Appendix A - FORMS

Appendix A1 -- Form A for SOQ Submittal

FORM A

WORK HISTORY FORM

List up to five projects completed by the Proposer's Lead Contractor or Sub-Contractors and up to five projects completed by the Proposer's Lead Designer or Sub-Consultants with a brief description of each project. Include work by firms or joint-venture members which best illustrates current qualifications relevant to this project. Projects listed should be completed or substantially completed. Specify if noted Cost of Project is Design Cost or Construction Cost. List not more than 10 projects. Note: Firms listed are subject to Section 14.1.2.1.

PROJECT NAME, LOCATION, AND DESCRIPTION	NAME OF FIRM AND NATURE OF FIRM'S RESPONSIBILITY	FIRM'S PROJECT MANAGER	PROJECT OWNER'S NAME AND ADRESS; OWNER'S PROJECT MANAGER'S NAME, PHONE NUMBER AND EMAIL	ACTUAL OR ESTIMATED COMPLETION DATE	COST OF PROJECT	COST OF WORK FOR WHICH FIRM WAS RESPONSIBLE

PROJECT NAME, LOCATION, AND DESCRIPTION	NAME OF FIRM AND NATURE OF FIRM'S RESPONSIBILITY	FIRM'S PROJECT MANAGER	PROJECT OWNER'S NAME AND ADRESS; OWNER'S PROJECT MANAGER'S NAME, PHONE NUMBER AND EMAIL	ACTUAL OR ESTIMATED COMPLETION DATE	COST OF PROJECT	COST OF WORK FOR WHICH FIRM WAS RESPONSIBLE

Appendix A2 -- Acknowledgement of Receipt of Proposal Addenda (Form "AOR")

FORM AOR

ACKNOWLEDGMENT OF RECEIPT OF

RFP, ADDENDA AND RESPONSES TO QUESTIONS

NAME OF DBT

We hereby acknowledge receipt of the Graves Road Interchange RFP dated _____ and subsequent responses to questions and Addenda issued by KYTC, as listed below.

Add additional lines in tables below, if needed.

Addendum number:	**Date issued by Agencies:**

Responses to questions number:	**Date issued by Agencies:**

SIGNED	
DATE	
NAME	
TITLE	

Appendix A3 -- Form PP – Price Proposal

Price and Completion Date Proposal

The procedure for calculation of price proposals on this project involves an "A & B" concept. Where:

A = the dollar amount of the All Inclusive Project Cost established below.

B = the number of calendar days the selected completion date is before or after the baseline completion date of November 1, 2022.

The "B" component shall have a daily dollar amount that will be used to calculate the total "B" cost component of the project. The value of each "B" day shall be $15,000.

Determination of All Inclusive Project Cost ("A" Value)

Item Description	Unit	Price
6-14 Project (Mt. Zion Road Interchange)	Lump Sum	
6-18 Project (Richwood Road Interchange)	Lump Sum	
6-20002 Project (I-75 Pavment Rehab)	Lump Sum	
Subtotal:		
Demobilization (3%):		
ALL INCLUSIVE PROJECT COST	Lump Sum	

"A" Value

Determination of Contractual Completion Date ("B" Days)

The DBT has determined the contractual completion date for the project shall be:

_____

This date corresponds to _____ ***"B" days*** according to the chart on page 4 or 5 of this form.

DESIGN BUILD TEAM SIGNATURE

By: _____

Name: _____

Title: _____

Date: _____

KYTC Vendor ID: _____

Federal ID Number: _____

Final Determination of Price Proposal

If the selected completion date is earlier than November 1, 2022; the following formula shall be used:

Price Proposal = A - (B x $15,000)

Line No.	Item Description	Unit	Item Total
1	(A) All Inclusive Project Cost	Lump Sum	
2	(B) Time Cost { B days x $15,000}	_____ Days	
3	Price Proposal (P_B) = Line 1 - (*minus*) Line 2	Lump Sum	*

If the selected completion date is later than November 1, 2022; the following formula shall be used:

Price Proposal = A + (B x $15,000)

Line No.	Item Description	Unit	Item Total
1	(A) All Inclusive Project Cost	Lump Sum	
2	(B) Time Cost { B days x $15,000}	_____ Days	
3	Price Proposal (P_B) = Line 1 + (*plus*) Line 2		*

* The single Price Proposal (P_B) diplayed above shall be used to calculate the DBT's overall score according to the Value Based Formula displayed in section 14.3 of the Instructions to Proposers. The "B" day value is for comparison purposes only. The successful proposer will be compensated the full "All Inclusive Project Cost" used to calculate the Price Proposal.

DESIGN BUILD TEAM SIGNATURE

By: _____

Name: _____

Title: _____

Date: _____

KYTC Vendor ID: _____

Federal ID Number: _____

Included Alternative Technical Concepts

The following Alternative Technical Concepts are included in this price and completion date proposal:

Name:	Approval Date:

The DBT has included herewith _____ pages, consisting of a schedule of values showing a complete breakdown of the All Inclusive Project cost shown on page 1 of Form PP.

Please check one of the following:

☐ The DBT has not violated any of the provisions included in section 5.15 of the Instructions to Proposers within the previous five (5) year period.

☐ The DBT has violated the provisions of one or more of the statutes included in section 5.15 of the Instructions to Proposers within the previous five (5) year period and has revealed such final determination(s) of violation(s). A list of such determination(s) is attached.

DESIGN BUILD TEAM SIGNATURE

By: _____

Name: _____

Title: _____

Date: _____

KYTC Vendor ID: _____

Federal ID Number: _____

Completion Date EARLIER than November 1, 2022

Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days
11/1/2022	0	8/31/2022	62	6/30/2022	124	4/30/2022	185	2/28/2022	246	12/31/2021	305
10/31/2022	1	8/30/2022	63	6/29/2022	125	4/29/2022	186	2/27/2022	247	12/30/2021	306
10/30/2022	2	8/29/2022	64	6/28/2022	126	4/28/2022	187	2/26/2022	248	12/29/2021	307
10/29/2022	3	8/28/2022	65	6/27/2022	127	4/27/2022	188	2/25/2022	249	12/28/2021	308
10/28/2022	4	8/27/2022	66	6/26/2022	128	4/26/2022	189	2/24/2022	250	12/27/2021	309
10/27/2022	5	8/26/2022	67	6/25/2022	129	4/25/2022	190	2/23/2022	251	12/26/2021	310
10/26/2022	6	8/25/2022	68	6/24/2022	130	4/24/2022	191	2/22/2022	252	12/25/2021	311
10/25/2022	7	8/24/2022	69	6/23/2022	131	4/23/2022	192	2/21/2022	253	12/24/2021	312
10/24/2022	8	8/23/2022	70	6/22/2022	132	4/22/2022	193	2/20/2022	254	12/23/2021	313
10/23/2022	9	8/22/2022	71	6/21/2022	133	4/21/2022	194	2/19/2022	255	12/22/2021	314
10/22/2022	10	8/21/2022	72	6/20/2022	134	4/20/2022	195	2/18/2022	256	12/21/2021	315
10/21/2022	11	8/20/2022	73	6/19/2022	135	4/19/2022	196	2/17/2022	257	12/20/2021	316
10/20/2022	12	8/19/2022	74	6/18/2022	136	4/18/2022	197	2/16/2022	258	12/19/2021	317
10/19/2022	13	8/18/2022	75	6/17/2022	137	4/17/2022	198	2/15/2022	259	12/18/2021	318
10/18/2022	14	8/17/2022	76	6/16/2022	138	4/16/2022	199	2/14/2022	260	12/17/2021	319
10/17/2022	15	8/16/2022	77	6/15/2022	139	4/15/2022	200	2/13/2022	261	12/16/2021	320
10/16/2022	16	8/15/2022	78	6/14/2022	140	4/14/2022	201	2/12/2022	262	12/15/2021	321
10/15/2022	17	8/14/2022	79	6/13/2022	141	4/13/2022	202	2/11/2022	263	12/14/2021	322
10/14/2022	18	8/13/2022	80	6/12/2022	142	4/12/2022	203	2/10/2022	264	12/13/2021	323
10/13/2022	19	8/12/2022	81	6/11/2022	143	4/11/2022	204	2/9/2022	265	12/12/2021	324
10/12/2022	20	8/11/2022	82	6/10/2022	144	4/10/2022	205	2/8/2022	266	12/11/2021	325
10/11/2022	21	8/10/2022	83	6/9/2022	145	4/9/2022	206	2/7/2022	267	12/10/2021	326
10/10/2022	22	8/9/2022	84	6/8/2022	146	4/8/2022	207	2/6/2022	268	12/9/2021	327
10/9/2022	23	8/8/2022	85	6/7/2022	147	4/7/2022	208	2/5/2022	269	12/8/2021	328
10/8/2022	24	8/7/2022	86	6/6/2022	148	4/6/2022	209	2/4/2022	270	12/7/2021	329
10/7/2022	25	8/6/2022	87	6/5/2022	149	4/5/2022	210	2/3/2022	271	12/6/2021	330
10/6/2022	26	8/5/2022	88	6/4/2022	150	4/4/2022	211	2/2/2022	272	12/5/2021	331
10/5/2022	27	8/4/2022	89	6/3/2022	151	4/3/2022	212	2/1/2022	273	12/4/2021	332
10/4/2022	28	8/3/2022	90	6/2/2022	152	4/2/2022	213	1/31/2022	274	12/3/2021	333
10/3/2022	29	8/2/2022	91	6/1/2022	153	4/1/2022	214	1/30/2022	275	12/2/2021	334
10/2/2022	30	8/1/2022	92	5/31/2022	154	3/31/2022	215	1/29/2022	276	12/1/2021	335
10/1/2022	31	7/31/2022	93	5/30/2022	155	3/30/2022	216	1/28/2022	277	11/30/2021	336
9/30/2022	32	7/30/2022	94	5/29/2022	156	3/29/2022	217	1/27/2022	278	11/29/2021	337
9/29/2022	33	7/29/2022	95	5/28/2022	157	3/28/2022	218	1/26/2022	279	11/28/2021	338
9/28/2022	34	7/28/2022	96	5/27/2022	158	3/27/2022	219	1/25/2022	280	11/27/2021	339
9/27/2022	35	7/27/2022	97	5/26/2022	159	3/26/2022	220	1/24/2022	281	11/26/2021	340
9/26/2022	36	7/26/2022	98	5/25/2022	160	3/25/2022	221	1/23/2022	282	11/25/2021	341
9/25/2022	37	7/25/2022	99	5/24/2022	161	3/24/2022	222	1/22/2022	283	11/24/2021	342
9/24/2022	38	7/24/2022	100	5/23/2022	162	3/23/2022	223	1/21/2022	284	11/23/2021	343
9/23/2022	39	7/23/2022	101	5/22/2022	163	3/22/2022	224	1/20/2022	285	11/22/2021	344
9/22/2022	40	7/22/2022	102	5/21/2022	164	3/21/2022	225	1/19/2022	286	11/21/2021	345
9/21/2022	41	7/21/2022	103	5/20/2022	165	3/20/2022	226	1/18/2022	287	11/20/2021	346
9/20/2022	42	7/20/2022	104	5/19/2022	166	3/19/2022	227	1/17/2022	288	11/19/2021	347
9/19/2022	43	7/19/2022	105	5/18/2022	167	3/18/2022	228	1/16/2022	289	11/18/2021	348
9/18/2022	44	7/18/2022	106	5/17/2022	168	3/17/2022	229	1/15/2022	290	11/17/2021	349
9/17/2022	45	7/17/2022	107	5/16/2022	169	3/16/2022	230	1/14/2022	291	11/16/2021	350
9/16/2022	46	7/16/2022	108	5/15/2022	170	3/15/2022	231	1/13/2022	292	11/15/2021	351
9/15/2022	47	7/15/2022	109	5/14/2022	171	3/14/2022	232	1/12/2022	293	11/14/2021	352
9/14/2022	48	7/14/2022	110	5/13/2022	172	3/13/2022	233	1/11/2022	294	11/13/2021	353
9/13/2022	49	7/13/2022	111	5/12/2022	173	3/12/2022	234	1/10/2022	295	11/12/2021	354
9/12/2022	50	7/12/2022	112	5/11/2022	174	3/11/2022	235	1/9/2022	296	11/11/2021	355
9/11/2022	51	7/11/2022	113	5/10/2022	175	3/10/2022	236	1/8/2022	297	11/10/2021	356
9/10/2022	52	7/10/2022	114	5/9/2022	176	3/9/2022	237	1/7/2022	298	11/9/2021	357
9/9/2022	53	7/9/2022	115	5/8/2022	177	3/8/2022	238	1/6/2022	299	11/8/2021	358
9/8/2022	54	7/8/2022	116	5/7/2022	178	3/7/2022	239	1/5/2022	300	11/7/2021	359
9/7/2022	55	7/7/2022	117	5/6/2022	179	3/6/2022	240	1/4/2022	301	11/6/2021	360
9/6/2022	56	7/6/2022	118	5/5/2022	180	3/5/2022	241	1/3/2022	302	11/5/2021	361
9/5/2022	57	7/5/2022	119	5/4/2022	181	3/4/2022	242	1/2/2022	303	11/4/2021	362
9/4/2022	58	7/4/2022	120	5/3/2022	182	3/3/2022	243	1/1/2022	304	11/3/2021	363
9/3/2022	59	7/3/2022	121	5/2/2022	183	3/2/2022	244			11/2/2021	364
9/2/2022	60	7/2/2022	122	5/1/2022	184	3/1/2022	245			11/1/2021	365
9/1/2022	61	7/1/2022	123								

Completion Date LATER than November 1, 2022

Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days	Date	# "B" Days
11/1/2022	0	1/1/2023	61	3/1/2023	120	5/1/2023	181	7/1/2023	242	9/1/2023	304
11/2/2022	1	1/2/2023	62	3/2/2023	121	5/2/2023	182	7/2/2023	243	9/2/2023	305
11/3/2022	2	1/3/2023	63	3/3/2023	122	5/3/2023	183	7/3/2023	244	9/3/2023	306
11/4/2022	3	1/4/2023	64	3/4/2023	123	5/4/2023	184	7/4/2023	245	9/4/2023	307
11/5/2022	4	1/5/2023	65	3/5/2023	124	5/5/2023	185	7/5/2023	246	9/5/2023	308
11/6/2022	5	1/6/2023	66	3/6/2023	125	5/6/2023	186	7/6/2023	247	9/6/2023	309
11/7/2022	6	1/7/2023	67	3/7/2023	126	5/7/2023	187	7/7/2023	248	9/7/2023	310
11/8/2022	7	1/8/2023	68	3/8/2023	127	5/8/2023	188	7/8/2023	249	9/8/2023	311
11/9/2022	8	1/9/2023	69	3/9/2023	128	5/9/2023	189	7/9/2023	250	9/9/2023	312
11/10/2022	9	1/10/2023	70	3/10/2023	129	5/10/2023	190	7/10/2023	251	9/10/2023	313
11/11/2022	10	1/11/2023	71	3/11/2023	130	5/11/2023	191	7/11/2023	252	9/11/2023	314
11/12/2022	11	1/12/2023	72	3/12/2023	131	5/12/2023	192	7/12/2023	253	9/12/2023	315
11/13/2022	12	1/13/2023	73	3/13/2023	132	5/13/2023	193	7/13/2023	254	9/13/2023	316
11/14/2022	13	1/14/2023	74	3/14/2023	133	5/14/2023	194	7/14/2023	255	9/14/2023	317
11/15/2022	14	1/15/2023	75	3/15/2023	134	5/15/2023	195	7/15/2023	256	9/15/2023	318
11/16/2022	15	1/16/2023	76	3/16/2023	135	5/16/2023	196	7/16/2023	257	9/16/2023	319
11/17/2022	16	1/17/2023	77	3/17/2023	136	5/17/2023	197	7/17/2023	258	9/17/2023	320
11/18/2022	17	1/18/2023	78	3/18/2023	137	5/18/2023	198	7/18/2023	259	9/18/2023	321
11/19/2022	18	1/19/2023	79	3/19/2023	138	5/19/2023	199	7/19/2023	260	9/19/2023	322
11/20/2022	19	1/20/2023	80	3/20/2023	139	5/20/2023	200	7/20/2023	261	9/20/2023	323
11/21/2022	20	1/21/2023	81	3/21/2023	140	5/21/2023	201	7/21/2023	262	9/21/2023	324
11/22/2022	21	1/22/2023	82	3/22/2023	141	5/22/2023	202	7/22/2023	263	9/22/2023	325
11/23/2022	22	1/23/2023	83	3/23/2023	142	5/23/2023	203	7/23/2023	264	9/23/2023	326
11/24/2022	23	1/24/2023	84	3/24/2023	143	5/24/2023	204	7/24/2023	265	9/24/2023	327
11/25/2022	24	1/25/2023	85	3/25/2023	144	5/25/2023	205	7/25/2023	266	9/25/2023	328
11/26/2022	25	1/26/2023	86	3/26/2023	145	5/26/2023	206	7/26/2023	267	9/26/2023	329
11/27/2022	26	1/27/2023	87	3/27/2023	146	5/27/2023	207	7/27/2023	268	9/27/2023	330
11/28/2022	27	1/28/2023	88	3/28/2023	147	5/28/2023	208	7/28/2023	269	9/28/2023	331
11/29/2022	28	1/29/2023	89	3/29/2023	148	5/29/2023	209	7/29/2023	270	9/29/2023	332
11/30/2022	29	1/30/2023	90	3/30/2023	149	5/30/2023	210	7/30/2023	271	9/30/2023	333
12/1/2022	30	1/31/2023	91	3/31/2023	150	5/31/2023	211	7/31/2023	272	10/1/2023	334
12/2/2022	31	2/1/2023	92	4/1/2023	151	6/1/2023	212	8/1/2023	273	10/2/2023	335
12/3/2022	32	2/2/2023	93	4/2/2023	152	6/2/2023	213	8/2/2023	274	10/3/2023	336
12/4/2022	33	2/3/2023	94	4/3/2023	153	6/3/2023	214	8/3/2023	275	10/4/2023	337
12/5/2022	34	2/4/2023	95	4/4/2023	154	6/4/2023	215	8/4/2023	276	10/5/2023	338
12/6/2022	35	2/5/2023	96	4/5/2023	155	6/5/2023	216	8/5/2023	277	10/6/2023	339
12/7/2022	36	2/6/2023	97	4/6/2023	156	6/6/2023	217	8/6/2023	278	10/7/2023	340
12/8/2022	37	2/7/2023	98	4/7/2023	157	6/7/2023	218	8/7/2023	279	10/8/2023	341
12/9/2022	38	2/8/2023	99	4/8/2023	158	6/8/2023	219	8/8/2023	280	10/9/2023	342
12/10/2022	39	2/9/2023	100	4/9/2023	159	6/9/2023	220	8/9/2023	281	10/10/2023	343
12/11/2022	40	2/10/2023	101	4/10/2023	160	6/10/2023	221	8/10/2023	282	10/11/2023	344
12/12/2022	41	2/11/2023	102	4/11/2023	161	6/11/2023	222	8/11/2023	283	10/12/2023	345
12/13/2022	42	2/12/2023	103	4/12/2023	162	6/12/2023	223	8/12/2023	284	10/13/2023	346
12/14/2022	43	2/13/2023	104	4/13/2023	163	6/13/2023	224	8/13/2023	285	10/14/2023	347
12/15/2022	44	2/14/2023	105	4/14/2023	164	6/14/2023	225	8/14/2023	286	10/15/2023	348
12/16/2022	45	2/15/2023	106	4/15/2023	165	6/15/2023	226	8/15/2023	287	10/16/2023	349
12/17/2022	46	2/16/2023	107	4/16/2023	166	6/16/2023	227	8/16/2023	288	10/17/2023	350
12/18/2022	47	2/17/2023	108	4/17/2023	167	6/17/2023	228	8/17/2023	289	10/18/2023	351
12/19/2022	48	2/18/2023	109	4/18/2023	168	6/18/2023	229	8/18/2023	290	10/19/2023	352
12/20/2022	49	2/19/2023	110	4/19/2023	169	6/19/2023	230	8/19/2023	291	10/20/2023	353
12/21/2022	50	2/20/2023	111	4/20/2023	170	6/20/2023	231	8/20/2023	292	10/21/2023	354
12/22/2022	51	2/21/2023	112	4/21/2023	171	6/21/2023	232	8/21/2023	293	10/22/2023	355
12/23/2022	52	2/22/2023	113	4/22/2023	172	6/22/2023	233	8/22/2023	294	10/23/2023	356
12/24/2022	53	2/23/2023	114	4/23/2023	173	6/23/2023	234	8/23/2023	295	10/24/2023	357
12/25/2022	54	2/24/2023	115	4/24/2023	174	6/24/2023	235	8/24/2023	296	10/25/2023	358
12/26/2022	55	2/25/2023	116	4/25/2023	175	6/25/2023	236	8/25/2023	297	10/26/2023	359
12/27/2022	56	2/26/2023	117	4/26/2023	176	6/26/2023	237	8/26/2023	298	10/27/2023	360
12/28/2022	57	2/27/2023	118	4/27/2023	177	6/27/2023	238	8/27/2023	299	10/28/2023	361
12/29/2022	58	2/28/2023	119	4/28/2023	178	6/28/2023	239	8/28/2023	300	10/29/2023	362
12/30/2022	59			4/29/2023	179	6/29/2023	240	8/29/2023	301	10/30/2023	363
12/31/2022	60			4/30/2023	180	6/30/2023	241	8/30/2023	302	10/31/2023	364
								8/31/2023	303	11/1/2023	365

Appendix B - ADMINISTRATIVE

Appendix B1 -- DBE Conditions

Appendix B -- DBE Conditions

DBE PARTICIPATION PLAN

Lowest responsive bidders must submit the *DBE Plan/ Subcontractor Request*, form TC 14-35 DBE, within 5 days of the letting. This is necessary before the Awards Committee will review and make a recommendation. **The project will not be considered for award prior to submission and approval of the apparent low bidder's DBE Plan/Subcontractor Request.**

The DBE Participation Plan shall include the following:

- Name and address of DBE Subcontractor(s) and/or supplier(s) intended to be used in the proposed project;
- Description of the work each is to perform including the work item, unit, quantity, unit price and total amount of the work to be performed by the individual DBE. The Contract Identification Number (CID), Category Number, and the Project Line Number can be found in the "material listing" on the Construction Procurement website under the specific letting;
- The dollar value of each proposed DBE subcontract and the percentage of total project contract value this represents. DBE participation may be counted as follows;
    - If DBE suppliers and manufactures assume actual and contractual responsibility, the dollar value of materials to be furnished will be counted toward the goal as follows:
        - The entire expenditure paid to a DBE manufacturer;
        - 60 percent of expenditures to DBE suppliers that are not manufacturers provided the supplier is a regular dealer in the product involved. A regular dealer must be engaged in, as its principal business and in its own name, the sale of products to the public, maintain an inventory and own and operate distribution equipment; and
        - The amount of fees or commissions charged by the DBE firms for a bona fide service, such as professional, technical, consultant, or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials, supplies, delivery of materials and supplies or for furnishing bonds, or insurance, providing such fees or commissions are determined to be reasonable and customary.
    - The dollar value of services provided by DBEs such as quality control testing, equipment repair and maintenance, engineering, staking, etc.;
    - The dollar value of joint ventures. DBE credit for joint ventures will be limited to the dollar amount of the work actually performed by the DBE in the joint venture;
- Written and signed documentation of the bidder's commitment to use a DBE contractor whose participation is being utilized to meet the DBE goal; and
- Written and signed confirmation from the DBE that it is participating in the contract as provided in the prime contractor's commitment.

UPON AWARD AND BEFORE A WORK ORDER WILL BE ISSUED

Contractors must submit the signed subcontract between the contractor and the DBE contractor, the DBE's certificate of insurance, and an affidavit for bidders, offerors, and contractors from the DBE to the Division of Construction Procurement. The affidavit can be found on the Construction Procurement website. If the DBE is a supplier of materials for the project, a signed purchase order and an affidavit for bidders, offerors, and contractors must be submitted to the Division of Construction Procurement.

Changes to DBE Participation Plans must be approved by the Cabinet. The Cabinet may consider extenuating circumstances including, but not limited to, changes in the nature or scope of the project, the inability or unwillingness of a DBE to perform the work in accordance with the bid, and/or other circumstances beyond the control of the prime contractor.

CONSIDERATION OF GOOD FAITH EFFORTS REQUESTS

If the DBE participation submitted in the bid by the apparent lowest responsive bidder does not meet or exceed the DBE contract goal, the apparent lowest responsive bidder must submit a Good Faith Effort Package to satisfy the Cabinet that sufficient good faith efforts were made to meet the contract goals prior to submission of the bid. Efforts to increase the goal after bid submission will not be considered in justifying the good faith effort, unless the contractor can show that the proposed DBE was solicited prior to the letting date. DBEs utilized in achieving the DBE goal must be certified and prequalified for the work items at the time the bid is submitted. One complete set and nine (9) copies of this information must be received in the office of the Division of Contract Procurement no later than 12:00 noon of the tenth calendar day after receipt of notification that they are the apparent low bidder.

Where the information submitted includes repetitious solicitation letters it will be acceptable to submit a sample representative letter along with a distribution list of the firms solicited. Documentation of DBE quotations shall be a part of the good faith effort submittal as necessary to demonstrate compliance with the factors listed below which the Cabinet considers in judging good faith efforts. This documentation may include written subcontractors' quotations telephone log notations of verbal quotations, or other types of quotation documentation.

The Good Faith Effort Package shall include, but may not be limited to information showing evidence of the following:

- Whether the bidder attended any pre-bid meetings that were scheduled by the Cabinet to inform DBEs of subcontracting opportunities;
- Whether the bidder provided solicitations through all reasonable and available means;
- Whether the bidder provided written notice to all DBEs listed in the DBE directory at the time of the letting who are prequalified in the areas of work that the bidder will be subcontracting;
- Whether the bidder followed up initial solicitations of interest by contacting DBEs to determine with certainly whether they were interested. If a reasonable amount of DBEs within the targeted districts do not provide an intent to quote or no DBEs are prequalified in the subcontracted areas, the bidder must notify the DBE Liaison in the Office of Minority Affairs to give notification of the bidder's inability to get DBE quotes;

- Whether the bidder selected portions of the work to be performed by DBEs in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise perform these work items with its own forces;
- Whether the bidder provided interested DBEs with adequate and timely information about the plans, specifications, and requirements of the contract;
- Whether the bidder negotiated in good faith with interested DBEs not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached;
- Whether quotations were received from interested DBE firms but were rejected as unacceptable without sound reasons why the quotations were considered unacceptable. The fact that the DBE firm's quotation for the work is not the lowest quotation received will not in itself be considered as a sound reason for rejecting the quotation as unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a DBE quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy DBE goals;
- Whether the bidder specifically negotiated with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be subcontracted includes potential DBE participation;
- Whether the bidder made any efforts and/or offered assistance to interested DBEs in obtaining the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal; and
- Any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include DBE participation.

FAILURE TO MEET GOOD FAITH REQUIREMENT

Where the apparent lowest responsive bidder fails to submit sufficient participation by DBE firms to meet the contract goal and upon a determination by the Good Faith Committee based upon the information submitted that the apparent lowest responsive bidder failed to make sufficient reasonable efforts to meet the contract goal, the bidder will be offered the opportunity to meet in person for administrative reconsideration. The bidder will be notified of the Committee's decision within 24 hours of its decision. The bidder will have 24 hours to request reconsideration of the Committee's decision. The reconsideration meeting will be held within two days of the receipt of a request by the bidder for reconsideration.

The request for reconsideration will be heard by the Office of the Secretary. The bidder will have the opportunity to present written documentation or argument concerning the issue of whether it met the goal or made an adequate good faith effort. The bidder will receive a written decision on the reconsideration explaining the basis for the finding that the bidder did or did not meet the goal or made adequate Good Faith efforts to do so.

The result of the reconsideration process is not administratively appealable to the Cabinet or to the United States Department of Transportation.

The Cabinet reserves the right to award the contract to the next lowest responsive bidder or to rebid the contract in the event that the contract is not awarded to the low bidder as the result of a failure to meet the good faith requirement.

SANCTIONS FOR FAILURE TO MEET DBE REQUIREMENTS OF THE PROJECT

Failure by the prime contractor to fulfill the DBE requirements of a project under contract or to demonstrate good faith efforts to meet the goal constitutes a breach of contract. When this occurs, the Cabinet will hold the prime contractor accountable, as would be the case with all other contract provisions. Therefore, the contractor's failure to carry out the DBE contract requirements shall constitute a breach of contract and as such the Cabinet reserves the right to exercise all administrative remedies at its disposal including, but not limited to the following:

- Disallow credit toward the DBE goal;
- Withholding progress payments;
- Withholding payment to the prime in an amount equal to the unmet portion of the contract goal; and/or
- Termination of the contract.

PROMPT PAYMENT

The prime contractor will be required to pay the DBE within seven (7) working days after he or she has received payment from the Kentucky Transportation Cabinet for work performed or materials furnished.

CONTRACTOR REPORTING

All contractors must keep detailed records and provide reports to the Cabinet on their progress in meeting the DBE requirement on any highway contract. These records may include, but shall not be limited to payroll, lease agreements, cancelled payroll checks, executed subcontracting agreements, etc. Prime contractors will be required to complete and submit a signed and notarized affidavit (TC 18-7) and copies of checks for any monies paid to each DBE subcontractor or supplier utilized to meet a DBE goal. These documents must be submitted within 10 days of being paid by the Cabinet.

Payment information that needs to be reported includes date the payment is sent to the DBE, check number, Contract ID, amount of payment and the check date. Before Final Payment is made on this contract, the Prime Contractor will certify that all payments were made to the DBE subcontractor and/or DBE suppliers.

The Prime Contractor should supply the payment information at the time the DBE is compensated for their work. Form to use is located at:
http://transportation.ky.gov/Construction/Pages/Subcontracts.aspx

The prime contractor should notify the KYTC Office of Civil Rights and Small Business Development seven (7) days prior to DBE contractors commencing work on the project. The contact is Melvin Bynes and the telephone number is (502) 564-3601.

Photocopied payments and completed, signed and notarized affidavit must be submitted by the Prime Contractor to:

Office of Civil Rights and Small Business Development
6th Floor West 200 Mero Street
Frankfort, KY 40622

DEFAULT OR DECERTIFICATION OF THE DBE

If the DBE subcontractor or supplier is decertified or defaults in the performance of its work, and the overall goal cannot be credited for the uncompleted work, the prime contractor may utilize a substitute DBE or elect to fulfill the DBE goal with another DBE on a different work item. If after exerting good faith effort in accordance with the Cabinet's Good Faith Effort policies and procedures, the prime contractor is unable to replace the DBE, then the unmet portion of the goal may be waived at the discretion of the Cabinet.

Appendix B2 -- EEO / Wage Rates / Insurance / FHWA 1273 / Ethics

KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

EMPLOYMENT REQUIREMENTS
RELATING TO
NONDISCRIMINATION OF EMPLOYEES
(APPLICABLE TO FEDERAL-AID SYSTEM CONTRACTS)

AN ACT OF THE KENTUCKY GENERAL ASSEMBLY TO PREVENT DISCRIMINATION IN EMPLOYMENT

KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (forty and above); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age forty (40) and over. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, except that such a notice or advertisement may indicate a preference, limitation, or specification based on religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, when religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age forty (40) and over, in admission to, or employment in any program established to provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administrating agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

Revised: January 25, 2017

Standard Title VI/Non-Discrimination Assurances

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, **Federal Highway Administration**, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the **Federal Highway Administration** to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the **Federal Highway Administration**, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the **Federal Highway Administration** may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the **Federal Highway Administration** may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Standard Title VI/Non-Discrimination Statutes and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.*), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 -- 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

GOALS FOR MINORITY PARTICIPATION IN EACH TRADE	GOALS FOR FEMALE PARTICIPATION IN EACH TRADE
6.0%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4, 3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within ten (10) working days of award of any construction subcontract in excess of $10,000.00 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed. The notification shall be mailed to:

Evelyn Teague, Regional Director
Office of Federal Contract Compliance Programs
61 Forsyth Street, SW, Suite 7B75
Atlanta, Georgia 30303-8609

4. As used in this Notice, and in the contract resulting from this solicitation, the **"covered area"** is Boone County.

Fringe benefit amounts are applicable for all hours worked except when otherwise noted.

No laborer, workman or mechanic shall be paid at a rate less than that of a Journeyman except those classified as bona fide apprentices.

Apprentices or trainees shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request from any interested person.

Before using apprentices on the job the contractor shall present to the Contracting Officer written evidence of registration of such employees in a program of a State apprenticeship and training agency approved and recognized by the U. S. Bureau of Apprenticeship and Training. In the absence of such a State agency, the contractor shall submit evidence of approval and registration by the U. S. Bureau of Apprenticeship and Training.

The contractor shall submit to the Contracting Officer, written evidence of the established apprenticeship-journeyman ratios and wage rates in the project area, which will be the basis for establishing such ratios and rates for the project under the applicable contract provisions.

TO: EMPLOYERS/EMPLOYEES

PREVAILING WAGE SCHEDULE:

The wages indicated on this wage schedule are the least permitted to be paid for the occupations indicated. When an employee works in more than one classification, the employer must record the number of hours worked in each classification at the prescribed hourly base rate.

OVERTIME:

Overtime is to be paid after an employee works eight (8) hours a day or forty (40) hours a week, whichever gives the employee the greater wages. At least time and one-half the base rate is required for all overtime. A laborer, workman or mechanic and an employer may enter into a written agreement or a collective bargaining agreement to work more than eight (8) hours a calendar day but not more than ten (10) hours a calendar day for the straight time hourly rate. Wage violations or questions should be directed to the designated Engineer or the undersigned.

Director
Division of Construction Procurement
Frankfort, Kentucky 40622
502-564-3500

General Decision Number: KY190039 02/01/2019 KY39

Superseded General Decision Number: KY20180101

State: Kentucky

Construction Type: Highway

Counties: Boone, Campbell, Kenton and Pendleton Counties in Kentucky.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	02/01/2019

BRKY0002-005 06/01/2017

	Rates	Fringes
BRICKLAYER	$ 27.81	13.01

BROH0001-005 06/01/2008

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.75	8.60

CARP0698-001 05/01/2014

BOONE, CAMPBELL, KENTON & PENDLETON COUNTIES:

	Rates	Fringes
Carpenter & Piledrivermen	$ 27.27	14.59
Diver	$ 40.58	9.69

ELEC0212-007 06/04/2018

	Rates	Fringes
ELECTRICIAN	$ 28.39	18.98

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* ELEC0212-013 11/26/2018

	Rates	Fringes
Sound & Communication Technician	$ 24.35	10.99

ENGI0018-013 05/01/2018

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1	$ 36.14	14.90
GROUP 2	$ 36.02	14.90
GROUP 3	$ 34.98	14.90
GROUP 4	$ 33.80	14.90
GROUP 5	$ 28.34	14.90
GROUP 6	$ 36.39	14.90
GROUP 7	$ 36.64	14.90

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Gradall; Helicopter Crew (Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24"

wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; & Wheel Excavator

GROUP 2 - Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Hydro Milling Machine; Horizontal Directional Drill (over 500,000 ft. lbs. thrust); Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); & Vermeer type Concrete Saw

GROUP 3 - A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer; Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller, Asphalt; Rotovator (lime soil stabilizer); Switch & Tie Tampers (without lifting & aligning device); Utility Operator (Small equipment); & Welding Machines

GROUP 4 - Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway) except Masonry); Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift (highway); Form Trencher; Hydro Hammer; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); & Vibratory Compactor with Integral Power

GROUP 5 - Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt); Generator; Masonry Fork Lift; Inboard-Outboard Motor Boat Launch; Masonry Fork Lift; Oil Heater (asphalt plant); Oiler; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; & VAC/ALLS

GROUP 6 - Master Mechanic & Boom from 150 to 180

GROUP 7 - Boom from 180 and over

IRON0044-008 06/01/2018

	Rates	Fringes

Ironworkers:

Fence Erector	$ 26.76	21.20
Structural	$ 28.17	21.20

IRON0044-018 06/01/2018

	Rates	Fringes
IRONWORKER, REINFORCING	$ 28.17	21.20

LABO0189-004 07/01/2018

PENDLETON COUNTY:

	Rates	Fringes
LABORER		
GROUP 1	$ 23.07	14.21
GROUP 2	$ 23.32	14.21
GROUP 3	$ 23.37	14.21
GROUP 4	$ 23.97	14.21

LABORERS CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal

Boring; Air Track Driller (All Types); Powderman & Blaster; Troxler & Concrete Tester if Laborer is Utilized

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LABO0265-009 05/01/2018

BOONE, CAMPBELL & KENTON COUNTIES:

	Rates	Fringes
LABORER		
GROUP 1	$ 30.62	10.95
GROUP 2	$ 30.79	10.95
GROUP 3	$ 31.12	10.95
GROUP 4	$ 31.57	10.95

LABORER CLASSIFICATIONS

GROUP 1 - Asphalt Laborer; Carpenter Tender; Concrete Curing Applicator; Dump Man (Batch Truck); Guardrail and Fence Installer; Joint Setter; Laborer (Construction); Landscape Laborer; Highway Lighting Worker; Signalization Worker; Mesh Handlers & Placer; Right-of-way Laborer; Riprap Laborer & Grouter; Scaffold Erector; Seal Coating; Surface Treatment or Road Mix Laborer; Sign Installer; Slurry Seal; Utility Man; Bridge Man; Handyman; Waterproofing Laborer; Flagperson; Hazardous Waste (level D); Diver Tender; Zone Person & Traffic Control

GROUP 2 - Skid Steer; Asphalt Raker; Concrete Puddler; Kettle Man (Pipeline); Machine Driven Tools (Gas, Electric, Air); Mason Tender; Brick Paver; Mortar Mixer; Power Buggy or Power Wheelbarrow; Sheeting & Shoring Man; Surface Grinder Man; Plastic Fusing Machine Operator; Pug Mill Operator; & Vacuum Devices (wet or dry); Rodding Machine Operator; Diver; Screwman or Paver; Screed Person; Water Blast, Hand Held Wand; Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (level C); Air Track and Wagon Drill; Bottom Person; Cofferdam (below 25 ft. deep); Concrete Saw Person; Cutting with Burning Torch; Form Setter; Hand Spiker (Railroad); Pipelayer; Tunnel Laborer (without air) & Caisson; Underground Person (working in Sewer and Waterline, Cleaning, Repairing & Reconditioning); Sandblaster Nozzle Person; & Hazardous Waste (level B)

GROUP 3 - Blaster; Mucker; Powder Person; Top Lander; Wrencher (Mechanical Joints & Utility Pipeline); Yarner; Hazardous Waste (level A); Concrete Specialist; Concrete Crew in Tunnels (With Air-pressurized - $1.00 premium); Curb Setter & Cutter; Grade Checker; Utility Pipeline Tapper; Waterline; and Caulker

GROUP 4 - Miner; & Gunite Nozzle Person

TUNNEL LABORER WITH AIR-PRESSURIZED ADD $1.00 TO BASE RATE

SIGNAL PERSON WILL RECEIVE THE RATE EQUAL TO THE RATE PAID THE LABORER CLASSIFICATION FOR WHICH HE OR SHE IS SIGNALING.

PAIN0012-016 05/01/2015

	Rates	Fringes
PAINTER		
Bridge	$ 24.39	9.06
Bridge Equipment Tender and Containment Builder	$ 20.73	9.06
Brush & Roller	$ 23.39	9.06
Sandblasting & Water Blasting	$ 24.14	9.06
Spray	$ 23.89	9.06

PLUM0392-008 06/01/2018

	Rates	Fringes
PLUMBER	$ 32.01	19.67

SUKY2010-161 02/05/1996

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 15.85	4.60
GROUP 2	$ 16.29	4.60

TRUCK DRIVER CLASSIFICATIONS

GROUP 1 - Driver

GROUP 2 - Euclid Wagon; End Dump; Lowboy; Heavy Duty Equipment; Tractor-Trailer Combination; & Drag

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage

payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

PART IV

INSURANCE

INSURANCE

The Contractor shall procure and maintain the following insurance in addition to the insurance required by law:

1) Commercial General Liability-Occurrence form – not less than $2,000,000 General aggregate, $2,000,000 Products & Completed Aggregate, $1,000,000 Personal & Advertising, $1,000,000 each occurrence.

2) Automobile Liability- $1,000,000 per accident

3) Employers Liability:

   a) $100,000 Each Accident Bodily Injury
   b) $500,000 Policy limit Bodily Injury by Disease
   c) $100,000 Each Employee Bodily Injury by Disease

4) The insurance required above must be evidenced by a Certificate of Insurance and this Certificate of Insurance must contain one of the following statements:
   a) "policy contains no deductible clauses."
   b) "policy contains _____ (amount) deductible property damage clause but company will pay claim and collect the deductible from the insured."

5) KENTUCKY WORKMEN'S COMPENSATION INSURANCE. The contractor shall furnish evidence of coverage of all his employees or give evidence of self-insurance by submitting a copy of a certificate issued by the Workmen's Compensation Board.

The cost of insurance is incidental to all contract items. All subcontractors must meet the same minimum insurance requirements.

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

EXECUTIVE BRANCH CODE OF ETHICS

In the 1992 regular legislative session, the General Assembly passed and Governor Brereton Jones signed Senate Bill 63 (codified as KRS 11A), the Executive Branch Code of Ethics, which states, in part:

KRS 11A.040 (7) provides:

No present or former public servant shall, within six (6) months following termination of his office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.

KRS 11A.040 (9) states:

A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:

a) The date of leaving office or termination of employment; or
b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not as a way to obtain private benefits.

If you have worked for the executive branch of state government within the past six months, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 3 Fountain Place, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: January 27, 2017

Appendix B3 -- Documents for Bid

PROVISIONS RELATIVE TO KRS 45A.485

During the performance of the contract, the contractor agrees to comply with applicable provisions of:

1. KRS 136 Corporation and Utility Tax
2. KRS 139 Sales and Use Taxes
3. KRS 141 Income Taxes
4. KRS 337 Wages and Hours
5. KRS 338 Occupational Safety and Health of Employees
6. KRS 341 Unemployment Compensation
7. KRS 342 Workers Compensation

Any final determinations of a violation by the contractor within the previous five (5) years pursuant to the applicable statutes above are revealed as follows:

Contract ID:

NON-COLLUSION CERTIFICATION

COMMONWEALTH OF KENTUCKY

COUNTY

PROJECT NO.

I, , ,
(Name of officer signing certification) (Title)
under penalty of perjury under the laws of the United States, do hereby certify that

(Name of Individual, Co-Partnership, or Corporation submitting bid)

its agent, officers or employees have not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding in connection with this proposal.

_____
(Signature) (Title)

NON-COLLUSION CERTIFICATION

COMMONWEALTH OF KENTUCKY

COUNTY

PROJECT NO.

I, , ,
(Name of officer signing certification) (Title)
under penalty of perjury under the laws of the United States, do hereby certify that

(Name of Individual, Co-Partnership, or Corporation submitting bid)

its agent, officers or employees have not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding in connection with this proposal.

_____
(Signature) (Title)

Contract ID:

CERTIFICATION OF ORGANIZATION(S)

COMMONWEALTH OF KENTUCKY

COUNTY

PROJECT NO.

I, , ,
(Name of Officer or Authorized Agent) (Title)

under penalty of perjury under the laws of the United States, do hereby certify that, except as noted below,

(Name of Individual, Co-Partnership, or Corporation submitting bid)

any person associated therewith in the capacity of (owner, partner, director, officer, principal investigator, project director, manager, auditor, or any position involving the Administration of Federal Funds): is not currently under suspension, debarment, voluntarily exclusion, or determination of ineligibility by any federal agency; has not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past 3 years; does not have a proposed debarment pending; and has not been indicted, convicted, or had a civil judgement rendered against (it) by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

Please list below any exceptions to the foregoing, to whom it applies, initiating agency and dates of action.

Exceptions:

_____
(Signature) (Title)

Contract ID:

CERTIFICATION OF PERFORMANCE

Certification with regard to the Performance of Previous Contracts or Subcontracts subject to the Equal Opportunity Clause and the filing of Required Reports.

The , hereby certifies that he , participated in previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, and that he , filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the Former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

(Name of Individual, Co-Partnership, or Corporation submitting bid)

(Name of Officer or Authorized Agent) (Title)

_____
(Signature)

Date:

NOTE: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b)(1)), and must be submitted by bidders and proposed subcontractors only in connection with the contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of $10,000 or under are exempt.)

Currently, Standard Form 100 (EE0-1) is the only report required by the Executive Orders of their implementing regulation.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed reports should note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

Contract ID:

CERTIFICATION FOR FEDERAL-AID CONTRACT

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agent.
2. If any funds other than the Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

This certification is a material representation of fact which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The prospective participation also agrees by submitting his or her bid proposal that he or she shall require the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such subrecipients shall certify and disclose accordingly.

(Name of Individual, Co-Partnership, or Corporation submitting bid)

(Name of Officer or Authorized Agent) (Title)

_____
(Signature)

Solicitation/Contract #: _____

REQUIRED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS

FOR BIDS AND CONTRACTS IN GENERAL:

I. Each bidder or offeror swears and affirms under penalty of perjury, that:

a. In accordance with KRS 45A.110 and KRS 45A.115, neither the bidder or offeror as defined in KRS 45A.070(6), nor the entity which he/she represents, has knowingly violated any provisions of the campaign finance laws of the Commonwealth of Kentucky; and the award of a contract to the bidder or offeror or the entity which he/she represents will not violate any provisions of the campaign finance laws of the Commonwealth.

b. The bidder or offeror swears and affirms under penalty of perjury that, to the extent required by Kentucky law, the entity bidding, and all subcontractors therein, are aware of the requirements and penalties outlined in KRS 45A.485; have properly disclosed all information required by this statute; and will continue to comply with such requirements for the duration of any contract awarded.

c. The bidder or offeror swears and affirms under penalty of perjury that, to the extent required by Kentucky law, the entity bidding, and its affiliates, are duly registered with the Kentucky Department of Revenue to collect and remit the sales and use tax imposed by KRS Chapter 139, and will remain registered for the duration of any contract awarded.

d. The bidder or offeror swears and affirms under penalty of perjury that the entity bidding is not delinquent on any state taxes or fees owed to the Commonwealth of Kentucky and will remain in good standing for the duration of any contract awarded.

FOR "NON-BID" CONTRACTS (I.E. SOLE-SOURCE; NOT-PRACTICAL OR FEASIBLE TO BID; OR EMERGENCY CONTRACTS, ETC):

II. Each contractor further swears and affirms under penalty of perjury, that:

a. In accordance with KRS 121.056, and if this is a non-bid contract, neither the contractor, nor any member of his/her immediate family having an interest of 10% or more in any business entity involved in the performance of any contract awarded, have contributed more than the amount specified in KRS 121.150 to the campaign of the gubernatorial slate elected in the election last preceding the date of contract award.

b. In accordance with KRS 121.330(1) and (2), and if this is a non-bid contract, neither the contractor, nor officers or employees of the contractor or any entity affiliated with the contractor, nor the spouses of officers or employees of the contractor or any entity affiliated with the contractor, have knowingly contributed more than $5,000 in aggregate to the campaign of a candidate elected in the election last preceding the date of contract award that has jurisdiction over this contract award.

Solicitation/Contract #: _____

REQUIRED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS

c. In accordance with KRS 121.330(3) and (4), and if this is a non-bid contract, to the best of his/her knowledge, neither the contractor, nor any member of his/her immediate family, his/her employer, or his/her employees, or any entity affiliated with any of these entities or individuals, have directly solicited contributions in excess of $30,000 in the aggregate for the campaign of a candidate elected in the election last preceding the date of contract award that has jurisdiction over this contract.

As a duly authorized representative for the bidder, offeror, or contractor, I have fully informed myself regarding the accuracy of all statements made in this affidavit, and acknowledge that the Commonwealth is reasonably relying upon these statements, in making a decision for contract award and any failure to accurately disclose such information may result in contract termination, repayment of funds and other available remedies under law.

_____ _____
Signature Printed Name

_____ _____
Title Date

Company Name _____

Address _____

_____

_____

Subscribed and sworn to before me by _____ _____
(Affiant) (Title)

of _____ this _____day of _____,20___.
(Company Name)

_____
Notary Public

[seal of notary] My commission expires: _____

Steven L. Beshear
Governor

Commonwealth of Kentucky
Finance and Administration Cabinet
OFFICE OF THE SECRETARY
Room 383, Capitol Annex
702 Capital Avenue
Frankfort, KY 40601-3462
(502) 564-4240
Fax (502) 564-6785

Lori H. Flanery
Secretary

SECRETARY'S ORDER 11-004

FINANCE AND ADMINISTRATION CABINET

Vendor Document Disclosure

WHEREAS, in order to promote accountability and transparency in governmental operations, the Finance and Administration Cabinet believes that a mechanism should be created which would provide for review and assistance to an Executive Branch agency if said agency cannot obtain access to documents that it deems necessary to conduct a review of the records of a private vendor that holds a contract to provide goods and/or services to the Commonwealth; and

WHEREAS, in order to promote accountability and transparency in governmental operations, the Finance and Administration Cabinet believes that a mechanism should be created which would provide for review and assistance to an Executive Branch agency if said agency cannot obtain access to documents that it deems necessary during the course of an audit, investigation or any other inquiry by an Executive Branch agency that involves the review of documents; and

WHEREAS, KRS 42.014 and KRS 12.270 authorizes the Secretary of the Finance and Administration Cabinet to establish the internal organization and assignment of functions which are not established by statute relating to the Finance and Administration Cabinet; further, KRS Chapter 45A.050 and 45A.230 authorizes the Secretary of the Finance and Administration Cabinet to procure, manage and control all supplies and services that are procured by the Commonwealth and to intervene in controversies among vendors and state agencies; and

NOW, THEREFORE, pursuant to the authority vested in me by KRS 42.014, KRS 12.270, KRS 45A.050, and 45A.230, I, Lori H. Flanery, Secretary of the Finance and Administration Cabinet, do hereby order and direct the following:

I. Upon the request of an Executive Branch agency, the Finance and Administration Cabinet ("FAC") shall formally review any dispute arising where the agency has requested documents from a private vendor that holds a state contract and the vendor has refused access to said documents under a claim that said documents are not directly pertinent or relevant to the agency's inquiry upon which the document request was predicated.

II. Upon the request of an Executive Branch agency, the FAC shall formally review any situation where the agency has requested documents that the agency deems necessary to

conduct audits, investigations or any other formal inquiry where a dispute has arisen as to what documents are necessary to conclude the inquiry.

III. Upon receipt of a request by a state agency pursuant to Sections I & II, the FAC shall consider the request from the Executive Branch agency and the position of the vendor or party opposing the disclosure of the documents, applying any and all relevant law to the facts and circumstances of the matter in controversy. After FAC's review is complete, FAC shall issue a Determination which sets out FAC's position as to what documents and/or records, if any, should be disclosed to the requesting agency. The Determination shall be issued within 30 days of receipt of the request from the agency. This time period may be extended for good cause.

IV. If the Determination concludes that documents are being wrongfully withheld by the private vendor or other party opposing the disclosure from the state agency, the private vendor shall immediately comply with the FAC's Determination. Should the private vendor or other party refuse to comply with FAC's Determination, then the FAC, in concert with the requesting agency, shall effectuate any and all options that it possesses to obtain the documents in question, including, but not limited to, jointly initiating an action in the appropriate court for relief.

V. Any provisions of any prior Order that conflicts with the provisions of this Order shall be deemed null and void.

Appendix C - DATA

Appendix C1 -- Design Executive Summaries

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-14.00
Route Number(s):	KY 536	**State Program #:**	8022203D
BMP/EMP:	13.08/14.174	**Federal Project #:**	IM 075-7 130
Type of Work:	Grade, Drain & Surface	**State Project #:**	FD52 008 0025 178-179

Highway Plan Project Description: Reconstruct the KY-536 (Mt. Zion Road) Interchange
This sheet is for KY 536 outside of the interchange limits.

EXISTING CONDITIONS

ADT (current): 25,000 | **Truck Class:** AAA | **Trucks:** 6.8 %

Existing Functional Classification: ☑ Urban ☐ Rural — Arterial

Terrain: Rolling

Route is on (check all that apply): ☐ NHS ☐ NN ☐ Ext Wt ☑ None

Posted Speed Limit: 45 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)

Existing Bike Accommodations: None **Ped:** ☐ Sidewalk ☐ Other:_____

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial

Design ADT (year): 57,000 (2030)
DHV: 5,200

Access Control: Partial
Min. Spacing: 130' CL - CL

CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)	
Design Speed	**45 mph**	Minimum: 30 mph Selected: 45 mph	**45 mph**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	12', 3	11', 4	11', 6	☐	☐
Shoulder Width (Minimum Usable)	8'@4-8% (varies)	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	818'	711'	800'	☐	☐
Max. Superelev. Rate (emax= 4%)	6%	4.00%	4.00%	☐	☐
Stopping Sight Distance (Minimum)	660'	360'	575'	☐	☐
Max. Grade (%)	3.86%	7.00%	3.86%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	14.5'	N/A	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8-12'	10'	☐
Sidewalk Width, slope	N/A	5', 6% max.	5', 5% max.	☐
Bike Lane Width, slope	N/A	5'	N/A	☐
Shared Use Path Width	N/A	8-10'	10' (Left Side Only)	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-14.00
Route Number(s):	KY 536	**State Program #:**	8022203D
BMP/EMP:	13.08/14.174	**Federal Project #:**	IM 075-7 130
Type of Work:	Grade, Drain & Surface	**State Project #:**	FD52 008 0025 178-179

Highway Plan Project Description: Reconstruct the KY-536 (Mt. Zion Road) Interchange
This sheet is for KY 536 at the interchange and DCD limits.

EXISTING CONDITIONS

ADT (current): 25,000	**Truck Class:** AAA		**Trucks:** 6.8 %
Existing Functional Classification: ☑ Urban ☐ Rural — Arterial	**Terrain:** Rolling	**Route is on (check all that apply):** ☐ NHS ☐ NN ☐ Ext Wt ☑ None	
Posted Speed Limit: 45 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)			
Existing Bike Accommodations: None	**Ped:** ☐ Sidewalk ☑ Other:_____		

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial	**Design ADT (year):** 57,000 (2030) DHV: 5,200	**Access Control:** Min. Spacing: N/A **Fully Controlled**	

CONTROLLING CRITERIA:	**EXISTING CONDITIONS (Estimated based upon existing geometrics.)**	**AASHTO Guidance (for design speed)**	**Recommendation**	**Design Exception (check if needed for Design Speed)**	
Design Speed	**45 mph**	Minimum: 20 mph * Selected: 25 mph	**25 mph**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	12', 3	11', 4	11', 6	☐	☐
Shoulder Width (Minimum Usable)	8' @ 4%	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	955'	167'	200'	☐	☐
Max. Superelev. Rate (emax= 4%.)	2.80%	4.00%	2.80%	☐	☐
Stopping Sight Distance (Minimum)		155'	197'	☐	☐
Max. Grade (%)	3.86%	9.00%	3.86%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	15.81'	14.5'	15.81'	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8-12'	Varies 2'-10' Berm	☐
Sidewalk Width, slope	N/A	5', 6% max.	N/A	☐
Bike Lane Width, slope	N/A	5'	N/A	☐
Shared Use Path Width	N/A	8-10'	10' (Left Side Only)	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-14.00	
Route Number(s):	KY 536	**State Program #:**	8022203D	
BMP/EMP:	13.08/14.174	**Federal Project #:**	IM 075-7 130	
Type of Work:	Grade, Drain & Surface	**State Project #:**	FD52 008 0025 178-179	

Highway Plan Project Description: Reconstruct the KY-536 (Mt. Zion Road) Interchange
This sheet is for US 25.

EXISTING CONDITIONS

ADT (current): 13,900 | **Truck Class:** AAA | **Trucks:** 8.6 %

Existing Functional Classification: ☐ Urban ☑ Rural — Arterial

Terrain: Rolling

Route is on (check all that apply): ☐ NHS ☐ NN ☐ Ext Wt ☑ None

Posted Speed Limit: 45 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)

Existing Bike Accommodations: None **Ped:** ☐ Sidewalk ☐ Other:_____

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial

Design ADT (year): 46,000 (2030)
DHV: 4,320

Access Control:
Min. Spacing:_____ **By Permit**

CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)	
Design Speed	45 mph	Minimum: 30 mph Selected: 45 mph	45 mph	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				Exception (≥ 50 mph)	Variance (< 50 mph)
Lane Width, No. of Lanes	12', 2	11', 2	12', 2	☐	☐
Shoulder Width (Minimum Usable)	4' @ 8%	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	N/A Tangent	800'	N/A Tangent	☐	☐
Max. Superelev. Rate (emax= R.C.)	2.00%	6.00%	R.C.	☐	☐
Stopping Sight Distance (Minimum)	367'	360'	367'	☐	☐
Max. Grade (%)	1.50%	7.00%	1.50%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	14.5'	N/A	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8-12'	LT. 2'-10'; RT. 2' BERM	☐
Sidewalk Width, slope	N/A	5', 6% max.	N/A	☐
Bike Lane Width, slope	N/A	5'	N/A	☐
Shared Use Path Width	N/A	8-10'	N/A	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-14.00	
Route Number(s):	KY 536	**State Program #:**	8022203D	
BMP/EMP:	13.08/14.174	**Federal Project #:**	IM 075-7 130	
Type of Work:	Grade, Drain & Surface	**State Project #:**	FD52 008 0025 178-179	

Highway Plan Project Description: Reconstruct the KY-536 (Mt. Zion Road) Interchange
This sheet is for US KY 3503 (Sam Neace Drive).

EXISTING CONDITIONS

ADT (current): 10,100	**Truck Class:** AA		**Trucks:** 8.0 %
Existing Functional Classification: ☑ Urban ☐ Rural — Collector	**Terrain:** Rolling	**Route is on (check all that apply):** ☐ NHS ☐ NN ☐ Ext Wt ☑ None	
Posted Speed Limit: 45 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)			
Existing Bike Accommodations: None	**Ped:** ☐ Sidewalk ☐ Other:_____		

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Collector	**Design ADT (year):** 13,100 (2030) DHV: 1,405	**Access Control:** Min. Spacing: Partial	

CONTROLLING CRITERIA:	**EXISTING CONDITIONS (Estimated based upon existing geometrics.)**	**AASHTO Guidance (for design speed)**	**Recommendation**	**Design Exception (check if needed for Design Speed)**	
Design Speed	**45 mph**	Minimum: 30 mph Selected: 45 mph	**45 mph**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	12', 3	11', 3	12', 3	☐	☐
Shoulder Width (Minimum Usable)	2' @ 2%; 6' @ 8%	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	N/A Tangent	800'	N/A Tangent	☐	☐
Max. Superelev. Rate (emax= R.C.)	6.00%	2.00%	2.00%	☐	☐
Stopping Sight Distance (Minimum)	2183'	360'	2183'	☐	☐
Max. Grade (%)	2.88%	6.00%	2.88%	☐	☐
Normal Cross Slope (%)	2.00%	6.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	14.5'	N/A	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8-12'	Varies 2'-10' BERM	☐
Sidewalk Width, slope	N/A	5', 6% max.	5', 2.88%	☐
Bike Lane Width, slope	N/A	5'	N/A	☐
Shared Use Path Width	N/A	8-10'	N/A	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-14.00	
Route Number(s):	KY 536	**State Program #:**	8022203D	
BMP/EMP:	13.08/14.174	**Federal Project #:**	IM 075-7 130	
Type of Work:	Grade, Drain & Surface	**State Project #:**	FD52 008 0025 178-179	

Highway Plan Project Description: Reconstruct the KY-536 (Mt. Zion Road) Interchange
This sheet is for local approach roads.

EXISTING CONDITIONS

ADT (current): VARIES	**Truck Class:** A	**Trucks:** VARIES%	
Existing Functional Classification: ☑ Urban ☐ Rural — Local	**Terrain:** Rolling	**Route is on (check all that apply):** ☐ NHS ☐ NN ☐ Ext Wt ☑ None	
Posted Speed Limit: 25 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)			
Existing Bike Accommodations: None	**Ped:** ☐ Sidewalk ☐ Other:_____		

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Local	**Design ADT (year):** VARIES **DHV:**	**Access Control:** **Min. Spacing:**_____ **By Permit**	

CONTROLLING CRITERIA:	**EXISTING CONDITIONS (Estimated based upon existing geometrics.)**	**AASHTO Guidance (for design speed)**	**Recommendation**	**Design Exception (check if needed for Design Speed)**	
Design Speed	**25 mph**	Minimum: 20 mph Selected: 15 mph	**15-25 mph**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	12', 2	10'-11', 2	12', 2	☐	☐
Shoulder Width (Minimum Usable)	2-4' @ 8%	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	100'	50' @ 15 mph; 107' @ 20mph	100'	☐	☐
Max. Superelev. Rate (emax= N. C.)	N.C.	N.C.	N.C.	☐	☐
Stopping Sight Distance (Minimum)	Varies	80' @ 15 mph: 115' @ 20 mph	91'	☐	☐
Max. Grade (%)	Varies	8.00%	7.73%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	14.5'	N/A	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	5-11'	N/A	☐
Sidewalk Width, slope	N/A	5', 6% max.	5', 7.73% max.	☐
Bike Lane Width, slope	N/A	5'	N/A	☐
Shared Use Path Width	N/A	8-10'	N/A	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

Design Criteria Notes:

The typical section on KY 536 varies. * Minimum Design Speed thru a DCD can be 20 mph based on 2018 Green Book pg. 10-55

Environmental Action: CE Level 3

Completion Date: _____ Oct.2014

☐ scheduled ☑ actual

Existing Pavement Depths: 1" Surface, 1.5" Binder, and 7.5" Bituminous base on 4" DGA

Include:

1. Typical sections, including bridges
2. Map showing project location
3. Project overview and existing conditions
4. Purpose and Need statement
5. Discussion of alternatives (including preferred and no build) with respective traffic control schemes, and environmental, utility and right-of-way impacts.
6. Discussion of Design Exceptions /Variances and mitigation strategies
7. Cost comparison table of alternatives vs. Highway Plan
8. Discussion if preferred alternate cost is >115% than highway plan
9. Discussion of clearzone
10. Consideration for bicycle and pedestrian facilities (see HDM Chapter 1500)
11. Water-related impacts summary

Submitted by Project Engineer: Brian E Aldridge ☐ KYTC ☑ Consultant **Date:** 11/30/2018

Recommended by Project Manager: Carol Callan-Romler **Date:** 2-8-19

Tier Level Approval ☐ Tier 1 ☐ Tier 2 ☑ Tier 3

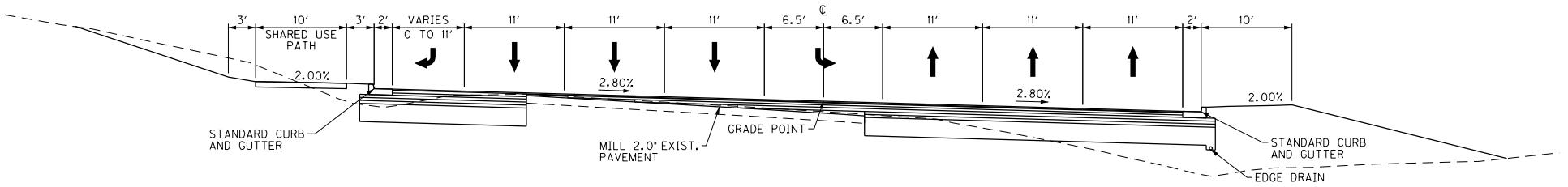
Location Engineer: Randall L. Imes **Date:** 2-21-19

Roadway Design Branch Manager: Brad Eldridge **Date:** 2-21-19

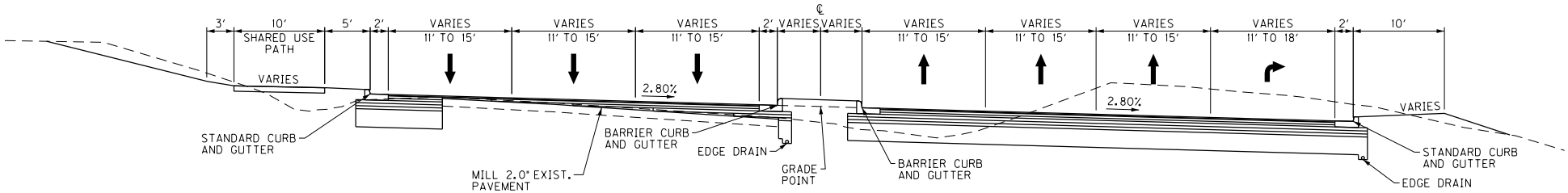
Geometric Approval Granted by: Jeff Adkins, Director, Div. of Hwy. Design **Date:** 2-21-19

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BOONE	6-14.00	R2

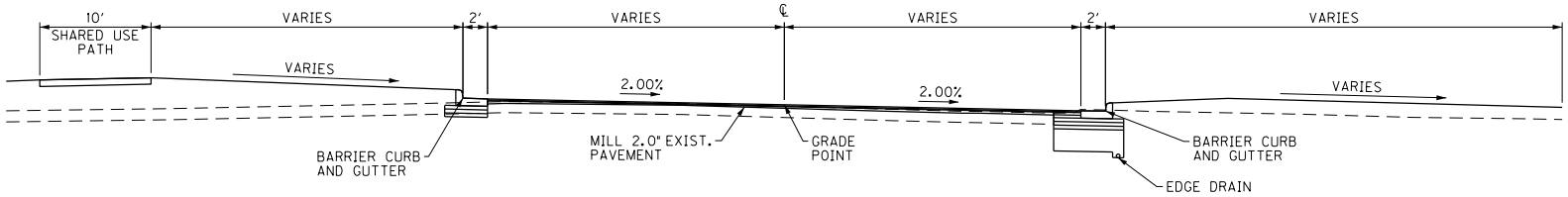
TYPICAL SECTIONS
KY 536



STA. 153 + 00 TO STA. 154 + 75



STA. 154 + 75 TO STA. 161 + 03



STA. 161 + 03 TO STA. 162 + 09

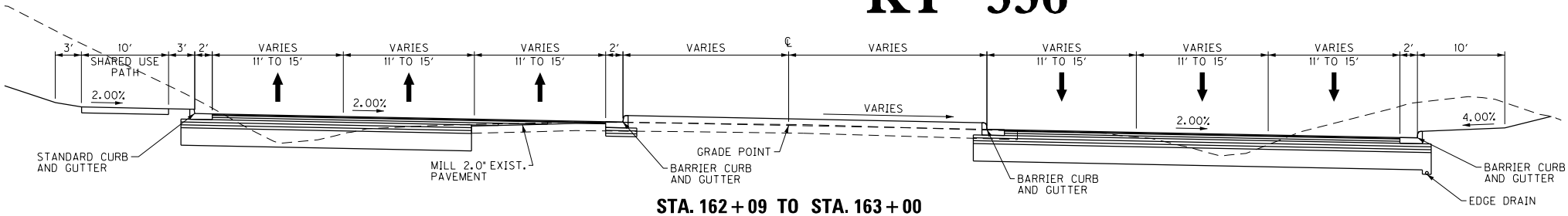
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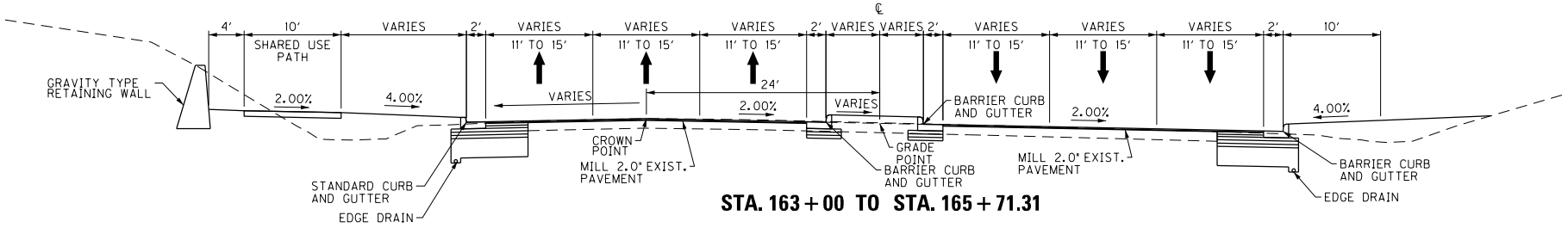
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BOONE	6-14.00	R2A

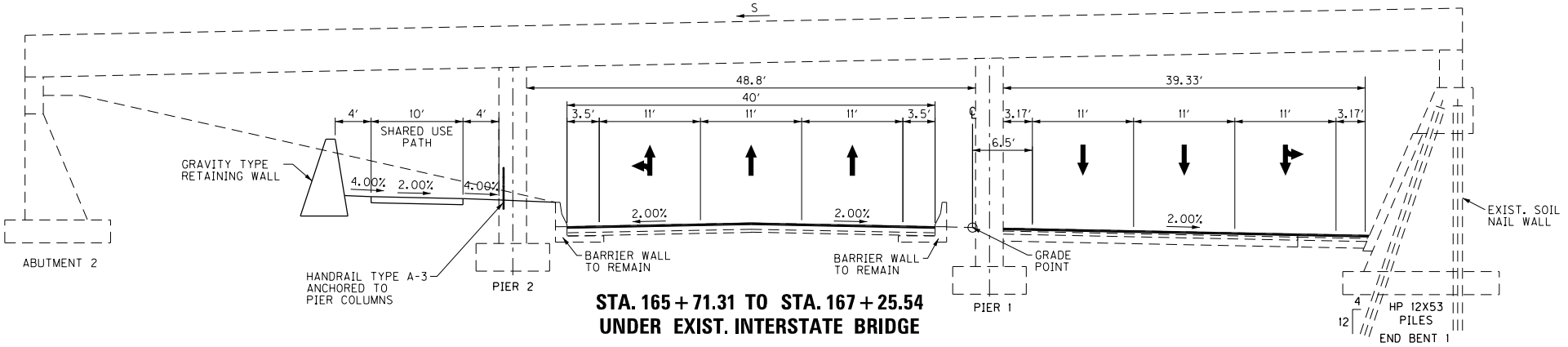
TYPICAL SECTIONS
KY 536



STA. 162 + 09 TO STA. 163 + 00



STA. 163 + 00 TO STA. 165 + 71.31



STA. 165 + 71.31 TO STA. 167 + 25.54
UNDER EXIST. INTERSTATE BRIDGE

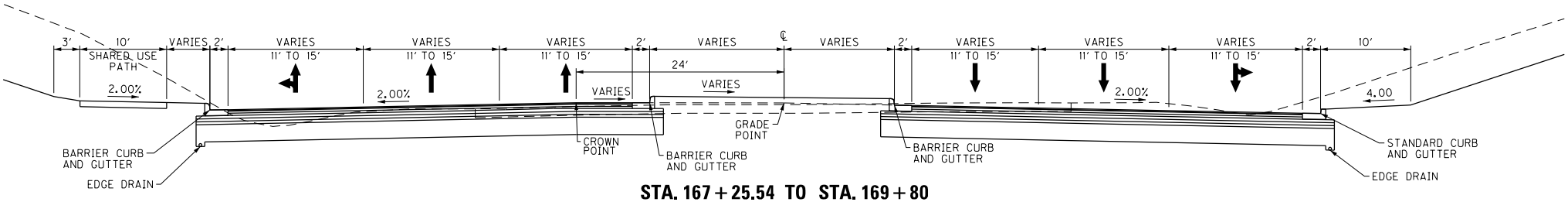
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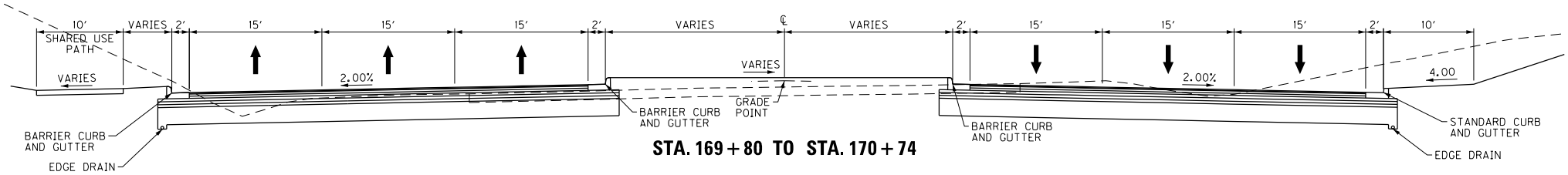
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BOONE	6-14.00	R2B

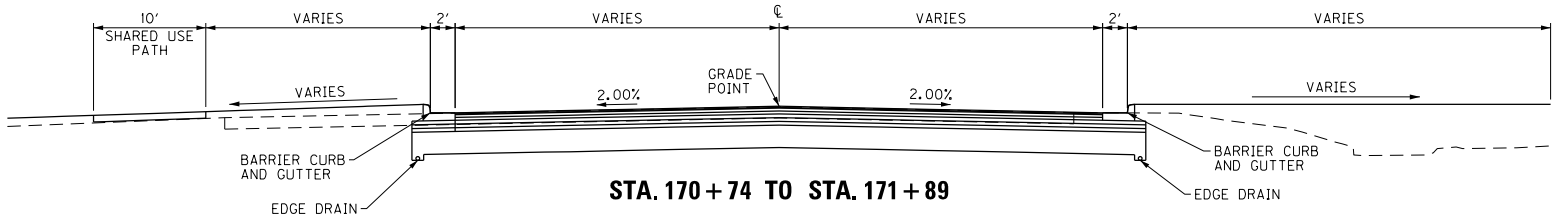
TYPICAL SECTIONS
KY 536



STA. 167 + 25.54 TO STA. 169 + 80



STA. 169 + 80 TO STA. 170 + 74



STA. 170 + 74 TO STA. 171 + 89

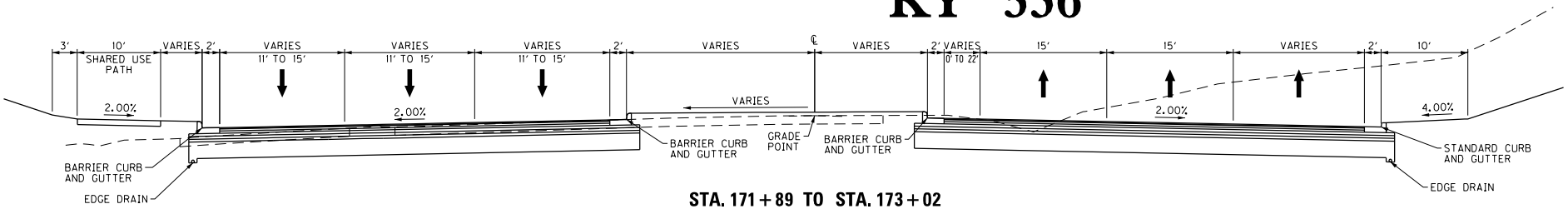
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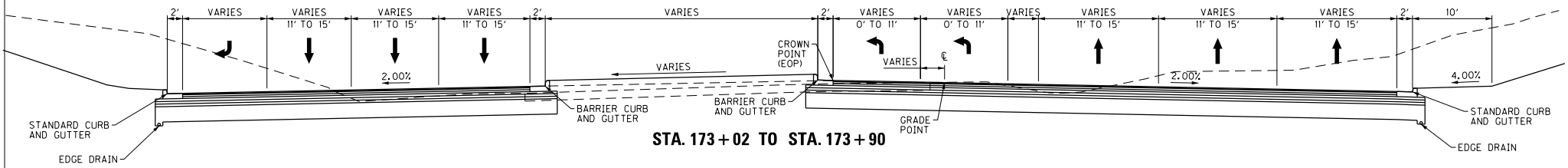
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2C

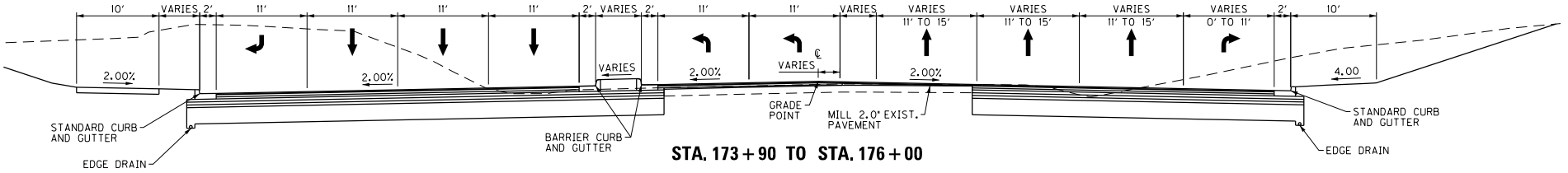
TYPICAL SECTIONS
KY 536



STA. 171+89 TO STA. 173+02



STA. 173+02 TO STA. 173+90



STA. 173+90 TO STA. 176+00

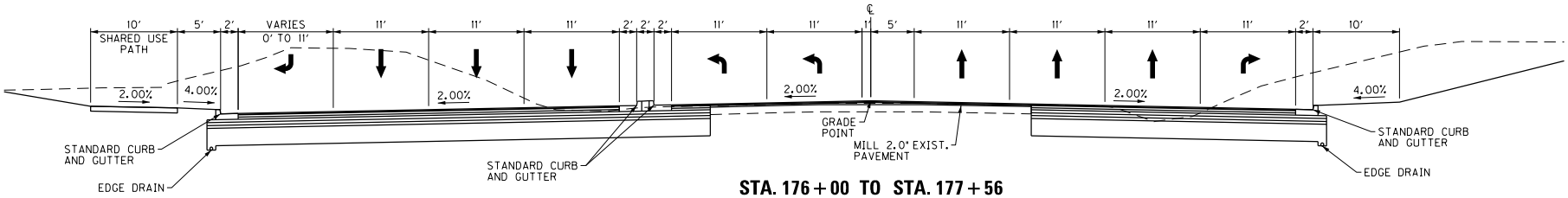
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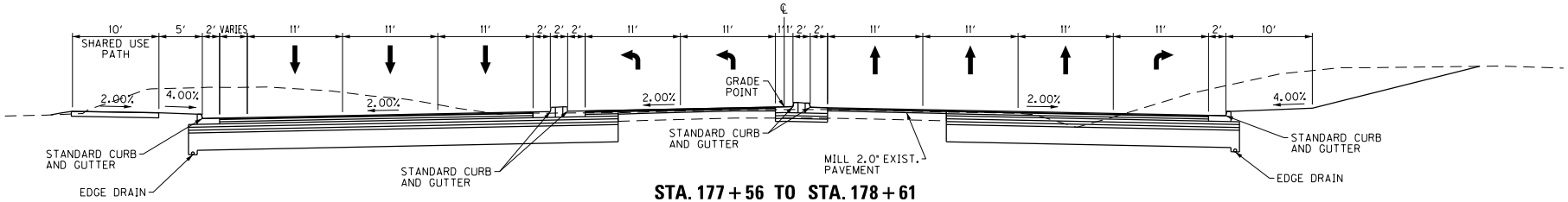
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2D

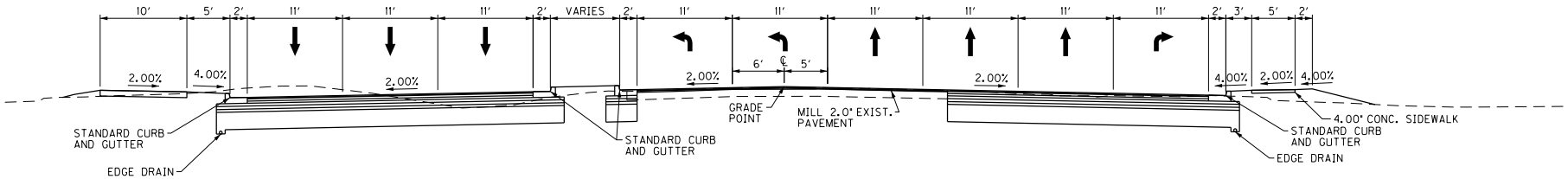
TYPICAL SECTIONS
KY 536



STA. 176+00 TO STA. 177+56



STA. 177+56 TO STA. 178+61



STA. 178+61 TO STA. 185+55

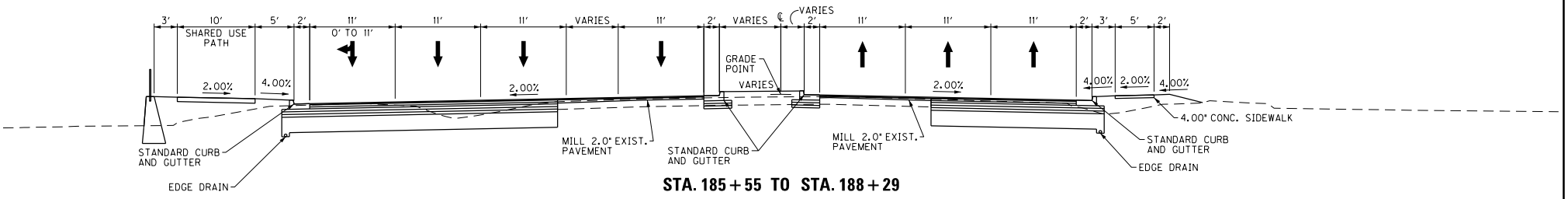
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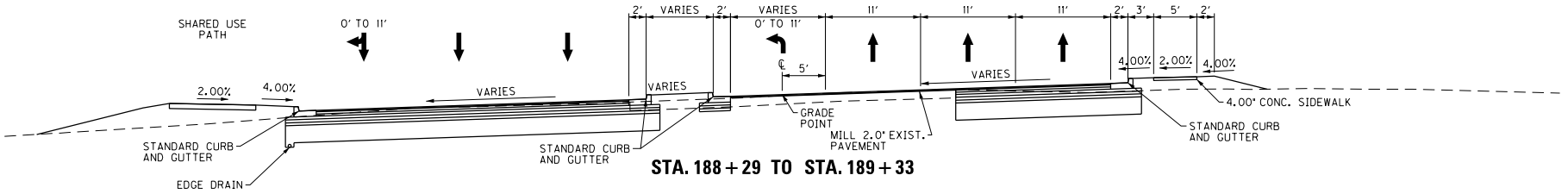
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2E

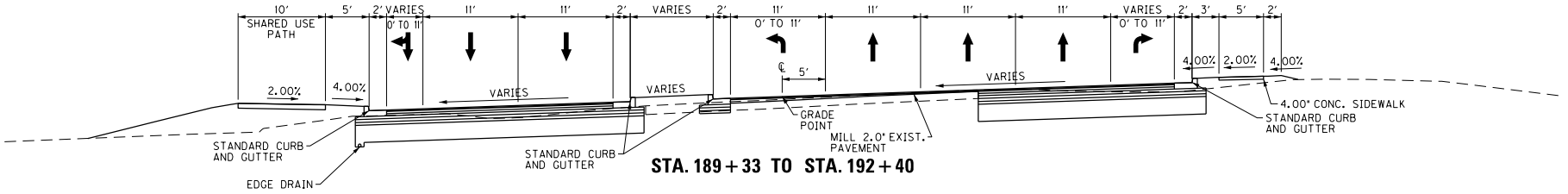
TYPICAL SECTIONS
KY 536



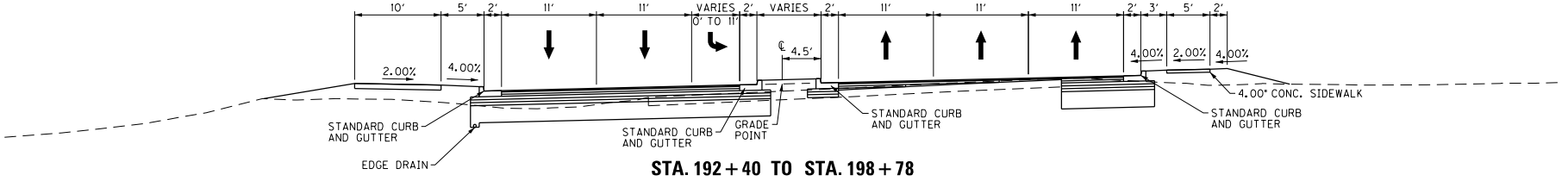
STA. 185+55 TO STA. 188+29



STA. 188+29 TO STA. 189+33



STA. 189+33 TO STA. 192+40



STA. 192+40 TO STA. 198+78

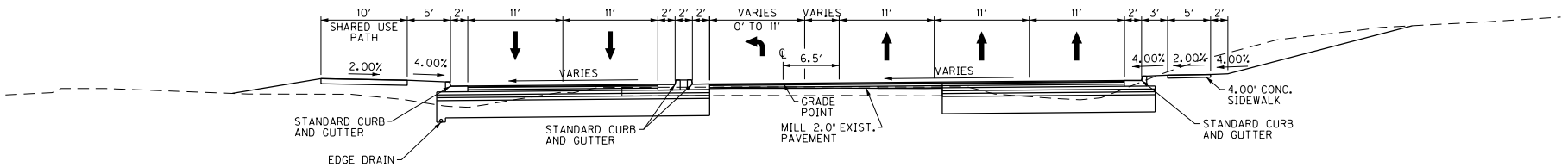
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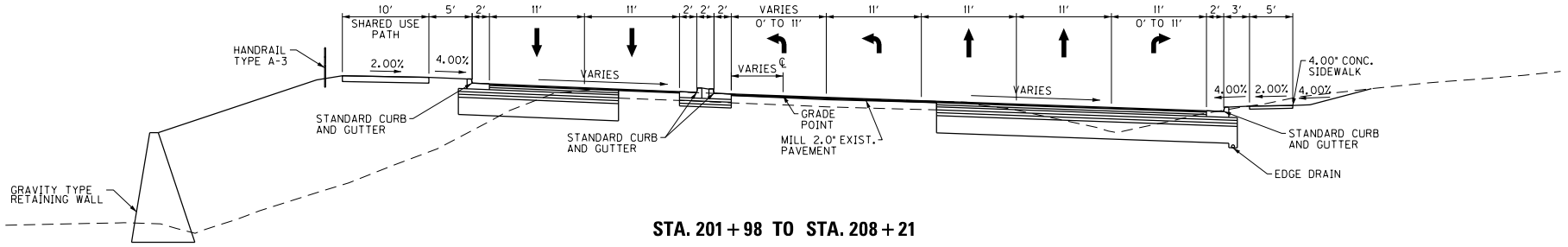
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2F

TYPICAL SECTIONS
KY 536



STA. 198 + 78 TO STA. 201 + 98



STA. 201 + 98 TO STA. 208 + 21

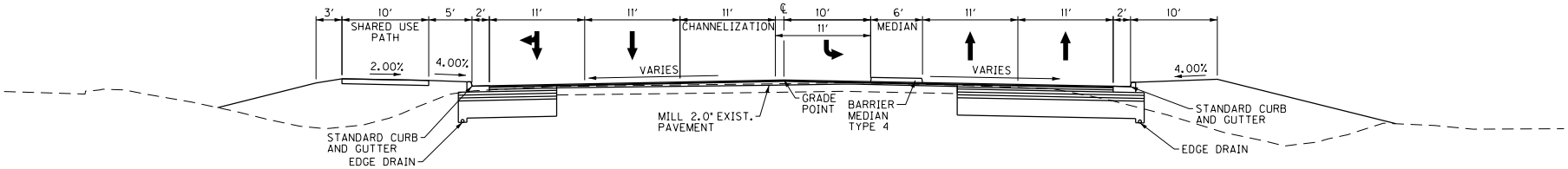
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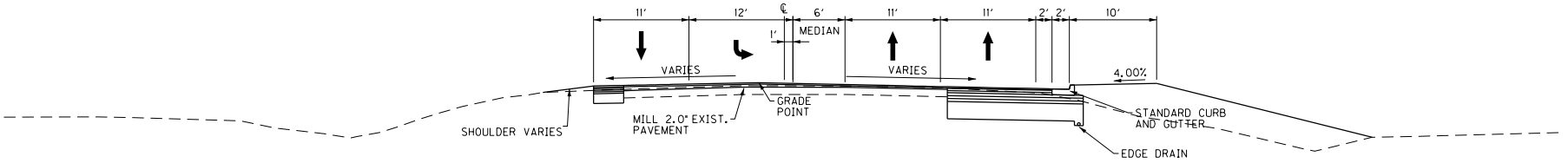
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2G

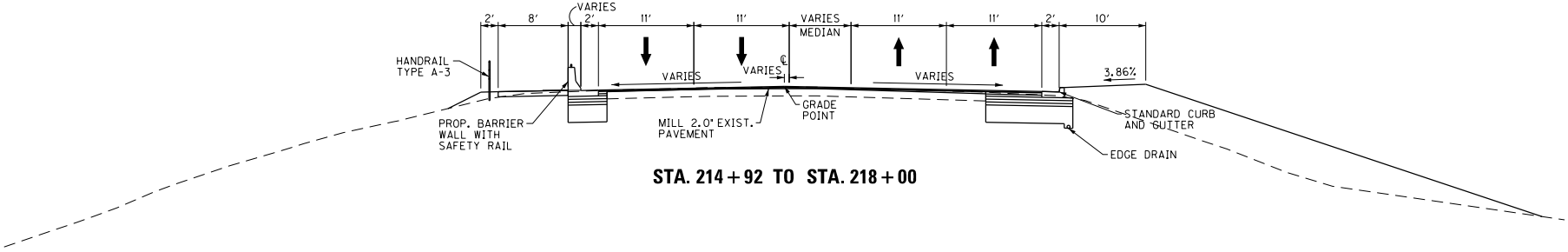
TYPICAL SECTIONS
KY 536



STA. 208 + 21 TO STA. 213 + 06



STA. 213 + 06 TO STA. 214 + 92



STA. 214 + 92 TO STA. 218 + 00

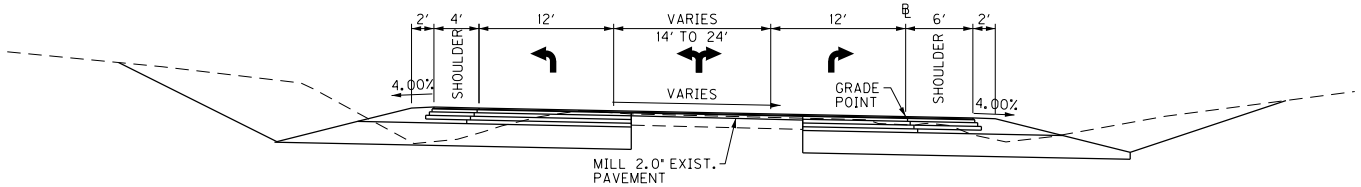
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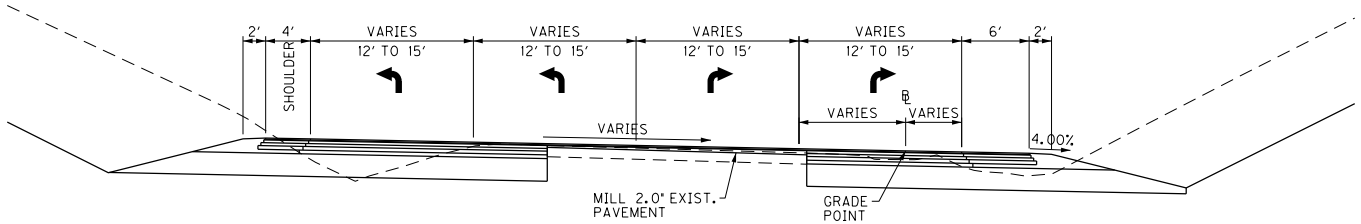
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2H

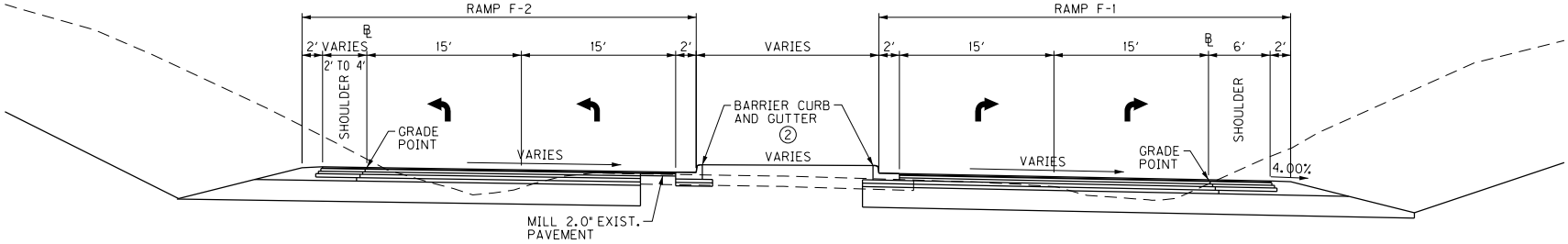
TYPICAL SECTIONS
RAMPS



RAMP F STA. 1614+00 TO STA. 1618+50



RAMP F STA. 1618+50 TO STA. 1620+60.95



RAMP F–2 STA. 21620+60.95 TO STA. 21622+62.01

RAMP F–1 STA. 11620+60.95 TO STA. 11623+19.14

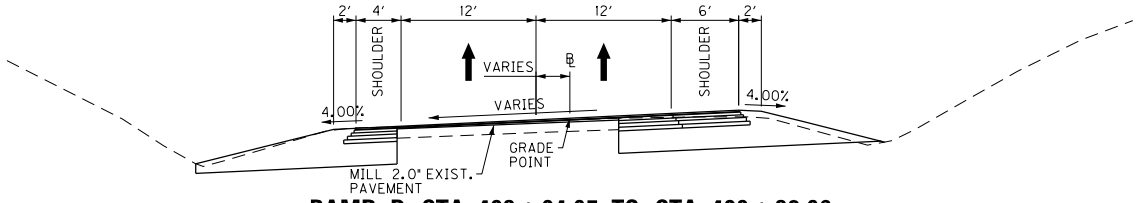
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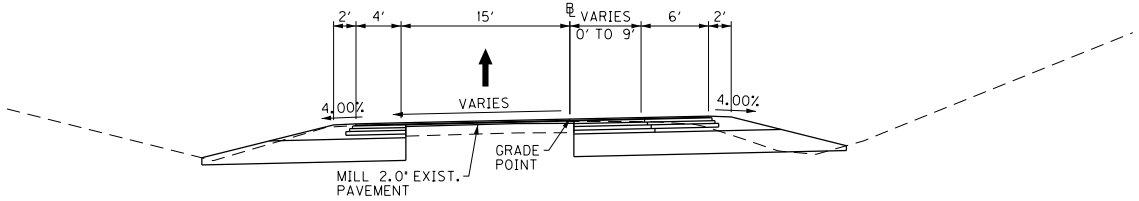
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R21

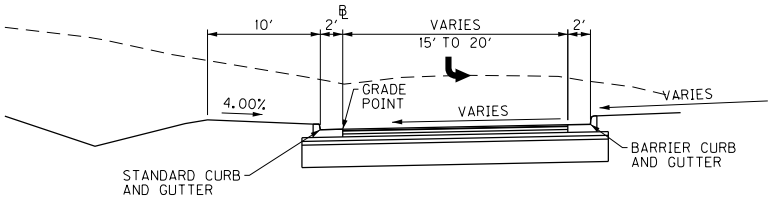
TYPICAL SECTIONS
RAMPS



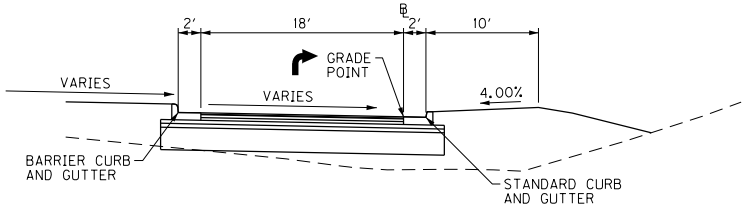
RAMP D STA. 403 + 04.97 TO STA. 408 + 32.96



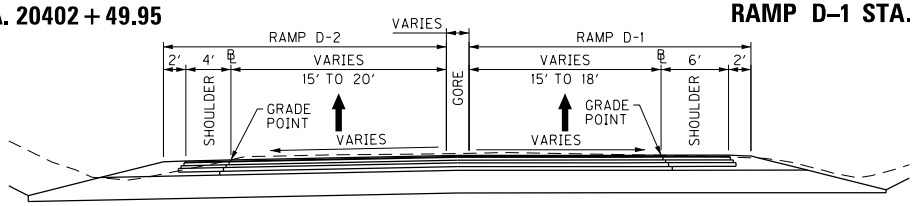
RAMP D STA. 408 + 32.96 TO STA. 412 + 00



RAMP D–2 STA. 20398 + 33.80 TO STA. 20402 + 49.95



RAMP D–1 STA. 10399 + 59.33 TO STA. 10402 + 45.58



RAMP D–1 STA. 10402 + 45.58 TO STA. 10403 + 04.97
RAMP D–2 STA. 20402 + 49.95 TO STA. 20403 + 04.97

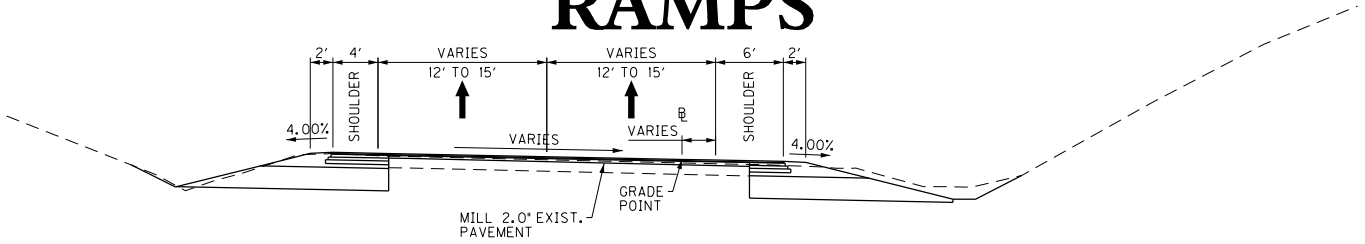
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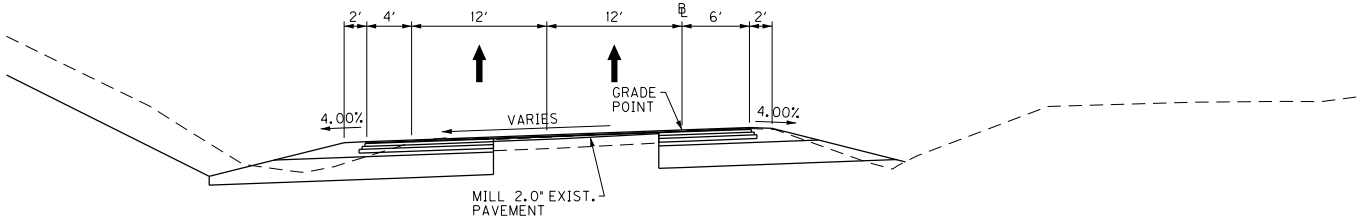
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2J

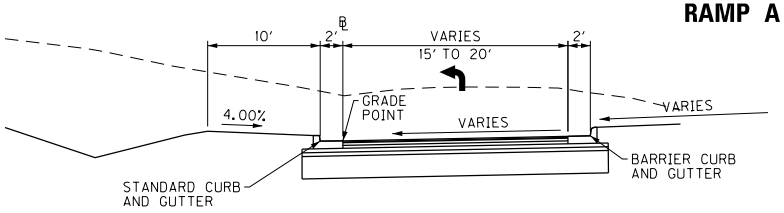
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RAMPS



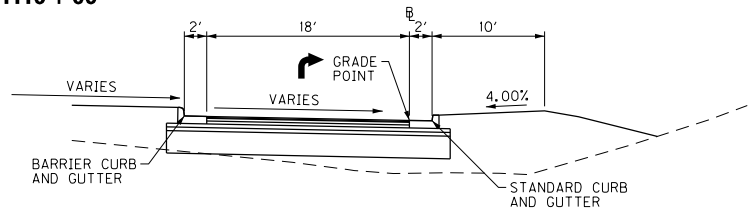
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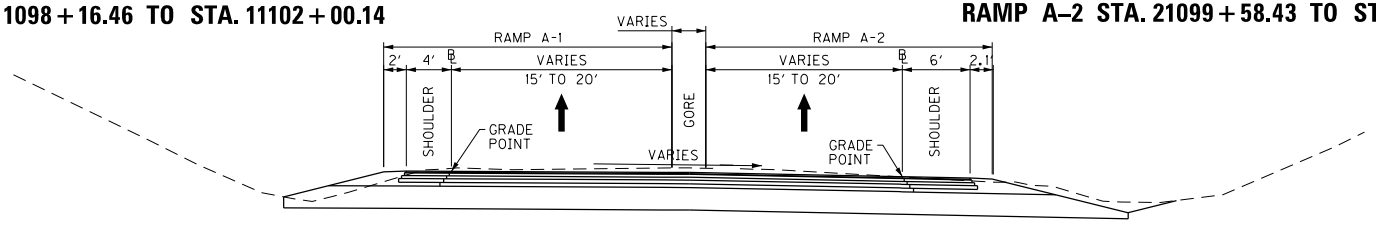
RAMP A STA. 1103 + 82.70 TO STA. 1110 + 00



RAMP A–1 STA. 11098 + 16.46 TO STA. 11102 + 00.14



RAMP A–2 STA. 21099 + 58.43 TO STA. 21101 + 95.24



RAMP A–1 STA. 11102 + 00.14 TO STA. 11102 + 41.68
RAMP A–2 STA. 21101 + 95.24 TO STA. 21102 + 41.68

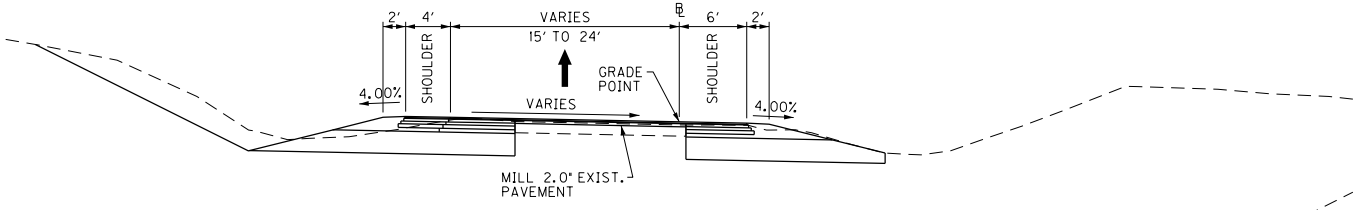
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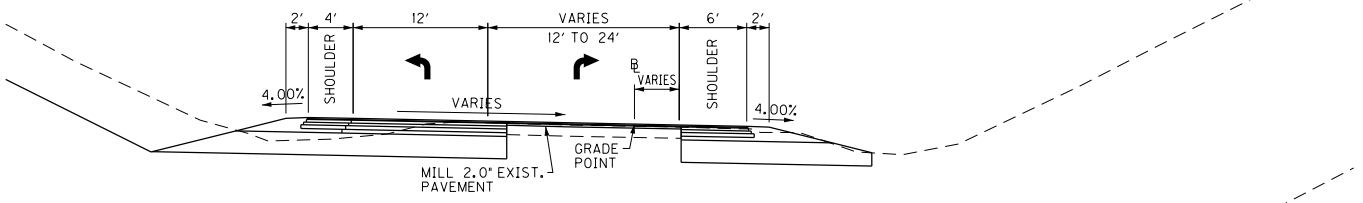
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BOONE	6-14.00	R2K

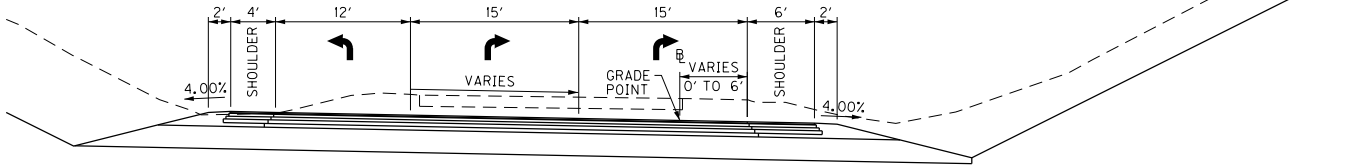
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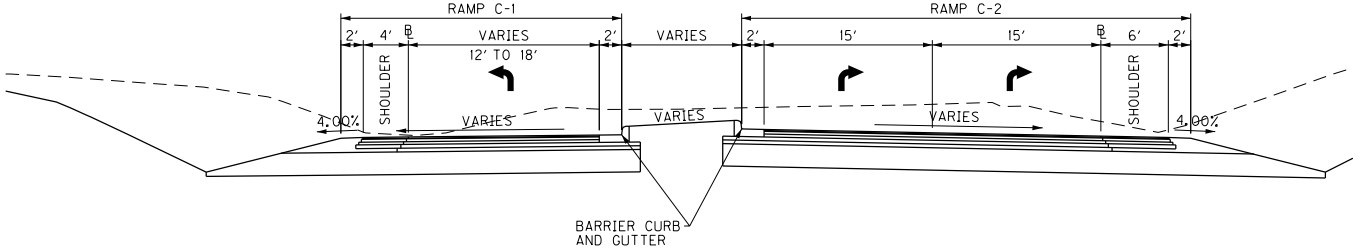
RAMP C STA. 312 + 38.61 TO STA. 315 + 08.61



RAMP C STA. 315 + 08.61 TO STA. 317 + 79.08



RAMP C STA. 317 + 79.08 TO 319 + 72.53



RAMP C–1 STA. 10319 + 72.53 TO STA. 10321 + 02.90

RAMP C–2 STA. 20319 + 72.53 TO STA. 20321 + 69.52

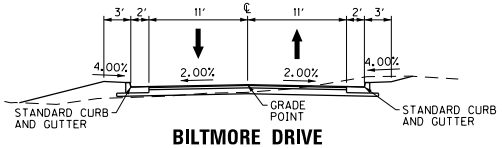
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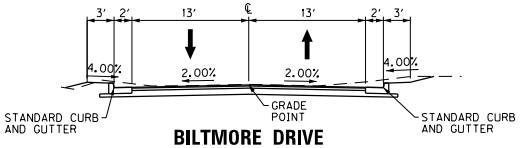
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BOONE	6-14.00	R2L

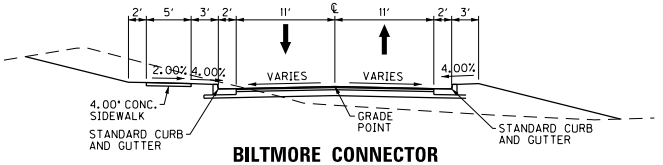
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APPROACH ROADS



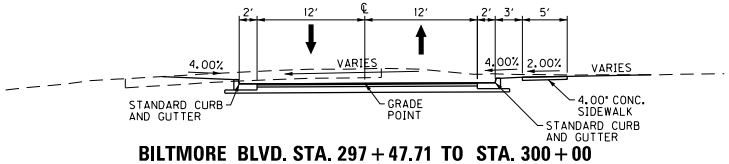
BILTMORE DRIVE
STA. 46 + 08.00 TO STA. 56 + 36.87



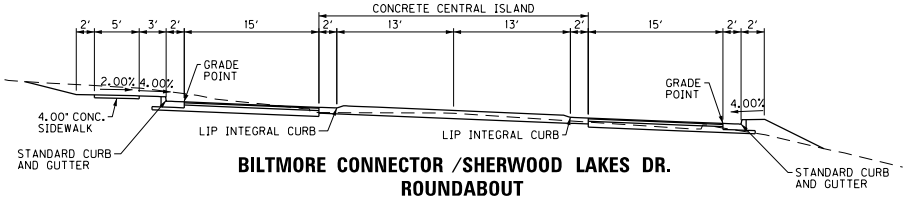
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STA. 56 + 36.87 TO STA. 61 + 68.21



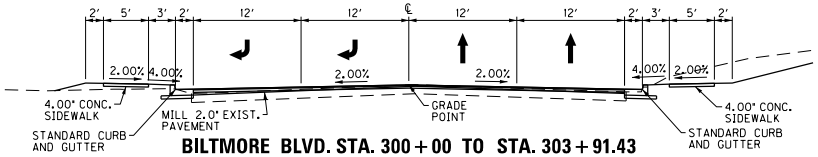
BILTMORE CONNECTOR



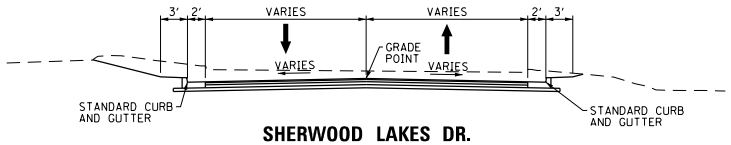
BILTMORE BLVD. STA. 297 + 47.71 TO STA. 300 + 00



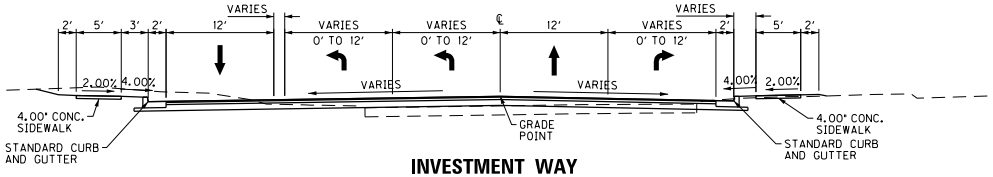
BILTMORE CONNECTOR /SHERWOOD LAKES DR.
ROUNDABOUT



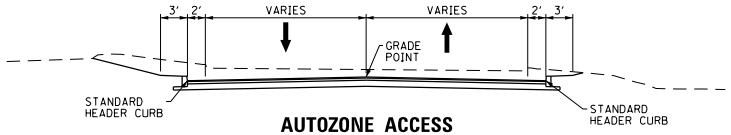
BILTMORE BLVD. STA. 300 + 00 TO STA. 303 + 91.43



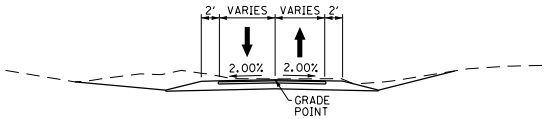
SHERWOOD LAKES DR.
TACO BELL ACCESS
FIFTH THIRD BANK ACCESS
DEMIA WAY
KROGER ACCESS



INVESTMENT WAY



AUTOZONE ACCESS
APPROACH LT. 206 + 09



APPROACH LT. STA. 202 + 21
APPROACH LT. 203 + 50

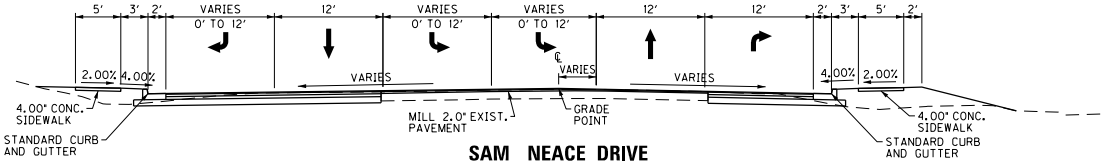
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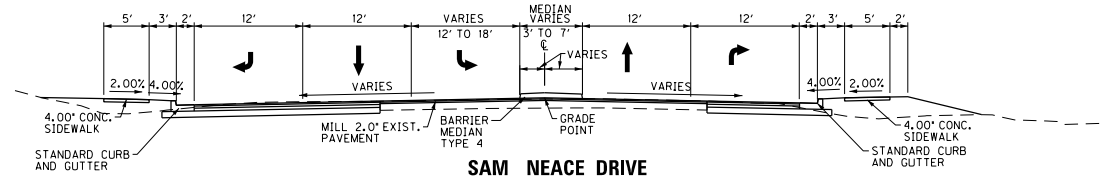
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2M

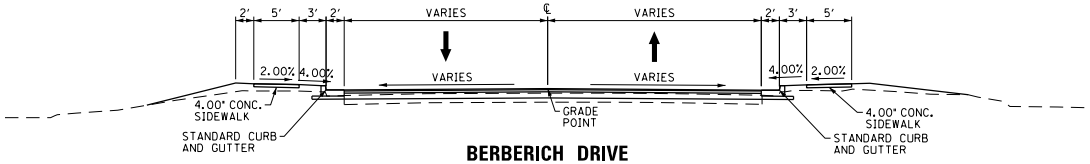
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APPROACH ROADS



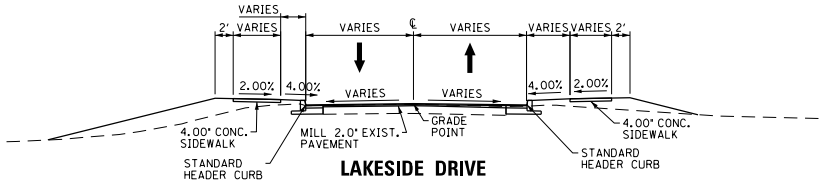
SAM NEACE DRIVE
STA. 10+00.00 TO STA. 12+40.83
STA. 14+33.08 TO STA. 15+81.36



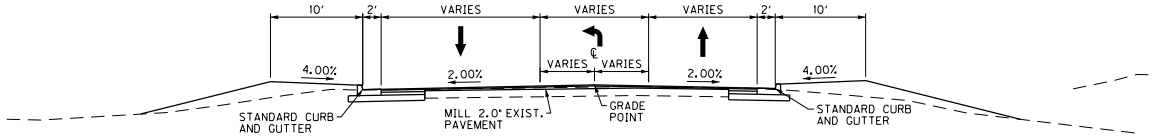
SAM NEACE DRIVE
STA. 12+40.83 TO STA. 14+33.08



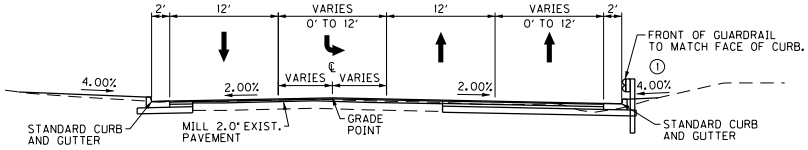
BERBERICH DRIVE



LAKESIDE DRIVE



U.S. 25 STA. 497+00 TO STA. 500+00

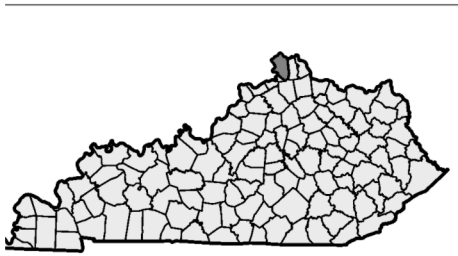


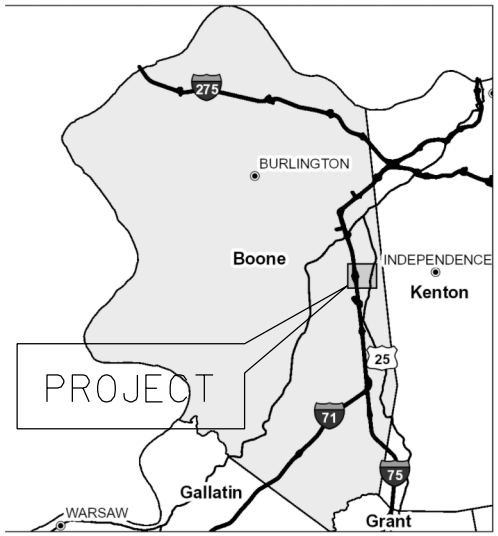
U.S. 25 STA. 500+00 TO STA. 509+60

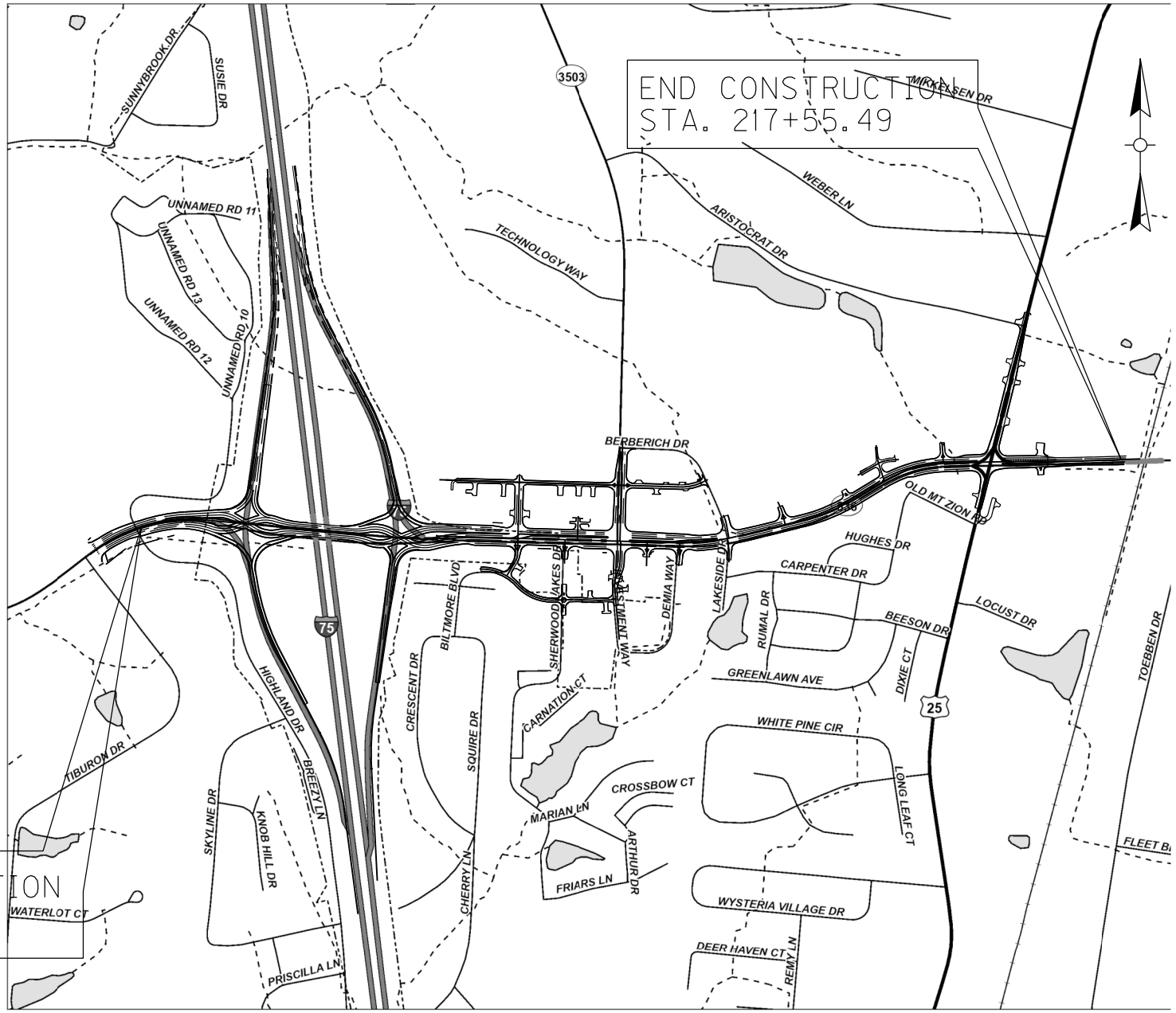
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Kentucky Transportation Cabinet	**Location Map**	COUNTY: **Boone** ITEM: **6–14.00**

KY 536 Interchange Reconstruction

Boone County

KYTC Item 6-14.00

Project Overview and Existing Conditions

The KY 536 corridor experienced rapid growth and development, resulting in increased traffic that has overloaded the existing transportation system. KY 536 has also been taxed by general growth along I-75, one of the nation's largest commercial routes. This growth has resulted in increased traffic congestion and accident rates that are above statewide averages, which will only be exacerbated by the forecasted continued growth.

The projected traffic growth rate on KY 536 is currently about 5%. This rate is based upon the growth rates shown in the OKI model when the projection was developed. The growth rate is also consistent with current and past projects in the area developed by KYTC and OKI.

The current configuration of the I-71/I-75/KY 536 interchange is a standard diamond. KY 536 from Tiburon Drive to US 25 is a 3-lane typical section consisting of one lane in each direction with a two-way left turn lane.

The project is an integral component of the overall corridor improvement initiative to enhance the east-west mobility of the region and consists of reconstructing the I-71/I-75 interchange with KY 536 as a double- crossover diamond (DCD) interchange and reconstructing KY 536. The western limit of the project is Tiburon Drive, where it meets a proposed 5-lane project currently in construction (Item 6-158). The eastern terminus is approximately 900 feet east of US 25 where it meets yet another 5-lane reconstruction project (Item 6-162). Approximately half of each interstate ramp will be reconstructed with this project. The remaining portions of the ramps will be reconstructed with the project presently under design to add auxiliary lanes on I-71/I-75 (Item 6-14.50).

Due to general funding constraints and the different funding sources for the various KY 536 projects, it is anticipated that the KY 536 DCD project will be built before the other improvements planned for this route described above. Therefore, the DCD project will need to show a temporary tie from a 5-lane typical section to the existing 3-lane section on the east end of the project.

KY 536 Interchange Reconstruction
Boone County

KYTC Item 6-14.00
Purpose and Need Statement

The purpose of the KY 536 (Mt. Zion Road) Interchange Reconstruction Project is to improve safety and traffic operations within and near the KY 536 interchange with I-71/I-75 in Boone County. In addition, the project will support the local and regional goal of economic development and growth in Northern Kentucky.

The KY 536 interchange was opened to traffic in 1992 and underwent improvement in 2007. The improvements, which were implemented as an interim project to address recurring congestion issues prior to the future reconstruction of the interchange, consisted of providing an additional lane beneath the I-75 overpass by constructing a soil-nail wall under the south abutment. This relatively low-cost improvement allowed for the eastbound lanes to be relocated to the south, providing a single left-turn and a through lane in each direction. While these interim improvements resulted in much-needed congestion relief, it was a short-term improvement. The current project will address the long-term needs of the corridor. This project includes not only reconstructing the interchange, but also consideration of access management concepts along adjacent sections of KY 536 to preserve roadway efficiency and safety for future roadway users.

This section of KY 536 through the I-71/I-75 interchange has historically had a high crash rate. **Figure 1** displays the crash data from 2015 to 2017 on KY 536. Crash types are summarized on **Figure 2**.

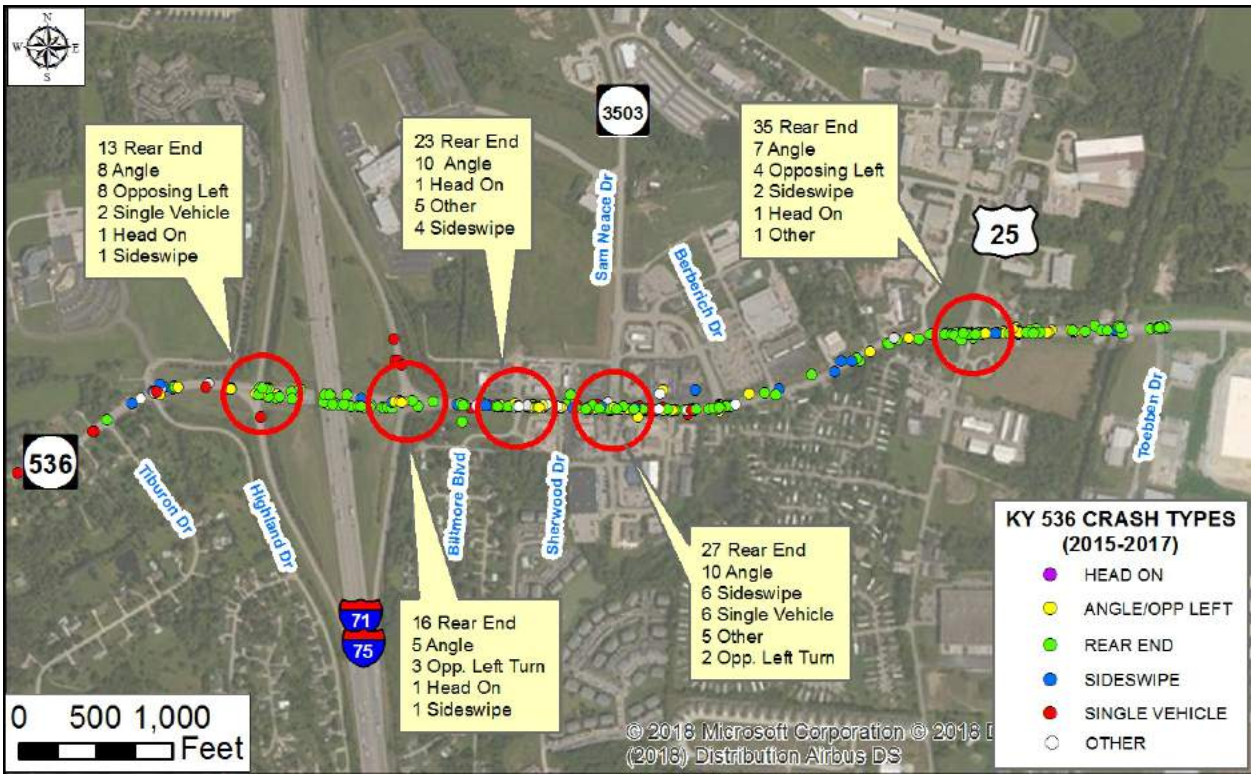


Figure 1: KY 536 Crashes (2015 to 2017)

Between 2015 and 2017 there were 350 crashes reported within the project area (from Tiburon Drive west of I-71/I-75 to east of the US 25 intersection). Crashes on KY 536 are predominantly rear end and angle crashes. Nearly 82 percent of the crashes reported were rear end crashes, angle collisions or opposing left turns. These are all crash types that can be related to congestion and poor access management.
Approximately 21 percent of the crashes along KY 536 resulted in one or more injuries. There were no reported fatalities over the three-year analysis period.

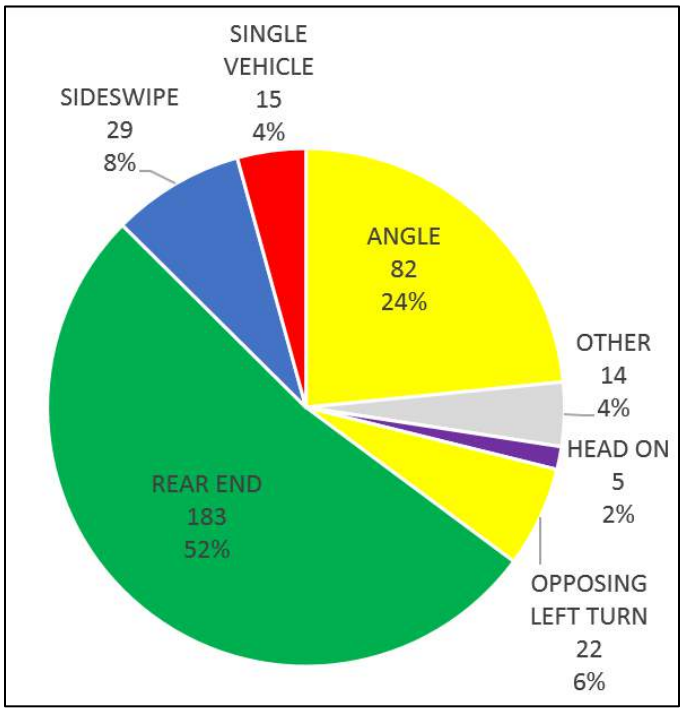


Figure 2: KY 536 Crash Types (2015 to 2017)

Critical Rate Factors (CRFs) have been determined as part of this analysis, and the results are shown in **Table 1**. A CRF greater than 1.0 suggests that conditions may exist that contribute to non-random occurrences and a higher than average crash rate. Within the project area, the 2010 IJS indicated KY 536 had CRF of 2.06 from 2009 to 2011. The revised analysis shows an overall CRF value of 2.89 with the highest segment being east of US 25 with a CRF of 4.7, suggesting that safety is a significant concern throughout the corridor. Controlling access with a raised median and constructing new service roads, as proposed, is intended to reduce the number of conflict points on KY 536 and subsequently improve safety.

Table 1: Crash Rates and Critical Crash Rate Factors for KY 536

Source/Period	Segment	Begin Milepoint	End Milepoint	Crashes	Actual Crash Rate*	Statewide Average Crash Rate*	Critical Crash Rate*	CRF
2010 IJS (2004-2006)	Exact segment loction not identified.				780	256	379.6	2.06
2015 - 2017	West of Tiburon Dr. to east of US 25	13.00	14.36	350	1056	277	365.3	2.89
	West of Tiburon Dr. to I-71/I-75 Underpass	13.00	13.37	65	1117	277	394.0	2.84
	I-71/I-75 Underpass to US 25	13.37	14.17	217	1028	277	362.9	2.83
	East of US 25**	14.17	14.36	68	8	0.83	1.7	4.70

Traffic volumes on KY 536 have increased precipitously since the interchange was constructed, and future traffic forecasts suggest that growth trend will continue. Existing traffic volumes range from 17,500 vehicles per day west of the interchange to 23,500 east of the interchange. By 2030, these volumes are expected to increase to 49,000 vehicles per day west of the interchange to 57,000 east. Reconstructing the interchange will be necessary to help accommodate this future demand for travel and to provide future mobility through the I-71/I-75 corridor.

Ultimately, the improvements that result from the KY 536 Interchange Reconstruction Project must be consistent with the transportation improvement plan (TIP) for the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) as well as other scheduled projects listed in the KYTC Six-Year Highway Plan.

DISCUSSION OF ALTERNATIVES

(Traffic control schemes, Environmental, Utility, & Right-of-way impacts)

KY 536 is a heavily traveled corridor serving numerous businesses and residential neighborhoods. Growth throughout Boone County has been steady over the years, and the project area has experienced a significant increase in both residential and commercial development – particularly since the interchange was constructed in the early 1990's. Meeting the needs of the businesses as well as those commuting along the route and accessing the I-71 / I-75 interchange was a primary goal in the preliminary planning phases and served as the underlying principle for the development of a list of needs in the area. Below are project goals that have been identified as a basis for design evaluation:

- Relieve traffic congestion and improve capacity
- Address safety concerns along KY 536 and the I-71 / I-75 interchange
- Address access needs along existing KY 536
- Minimize construction impacts to existing businesses and residences along the existing alignment

An Interchange Justification Study (IJS) was developed to evaluate the need for and scope of improvements to not only the KY 536 interchange with I-71 / I-75, but the KY 338 (Richwood Road) interchange as well. Approved in 2010, the IJS considered ten alternatives for the KY 536 interchange, as follows:

- No-Build Alternative
- Transportation System Management (TSM) / Transportation Demand Management (TDM) measures
- Alternative #1 – traditional widening by adding lanes to the existing KY 536 (Mt. Zion Road) and I-71/I-75 intersections until an acceptable LOS is obtained.
- Alternative #2 – modified the existing diamond interchange by adding an eastbound/northbound loop ramp.
- Alternative #3 –modified the existing diamond interchange by adding eastbound/northbound and southbound/eastbound loop ramps.
- Alternative #4 – modified the existing diamond interchange by adding eastbound/northbound and westbound/ southbound loop ramps.
- Alternative #5 – replaced the existing diamond interchange with a diverging diamond interchange (DDI).
- Alternative #6 – replaced the existing diamond interchange with a single point urban interchange (SPUI).
- Alternative #7 – replaced the existing diamond interchange with a double roundabout.
- Alternative #8 – replaced the existing eastbound/ northbound movement with an eastbound/northbound directional fly-over ramp interchange.

These conceptual alternatives were evaluated and compared against one another. A summary matrix, shown below, was prepared to compare the benefits, impacts, and costs.

Evaluation of Transportation Alternatives

+ Positive/Improves/Balanced Cost
• Further Study Required
- Negative/Declines/Costly

	KY 536 (Mt. Zion Road)								
	No-Build	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**	**Alternative 6**	**Alternative 7**	**Alternative 8**
	No Build Alternative	Additional Lanes to Existing Diamond	EB / NB Loop Ramp	EB / NB and SB / EB Loop Ramps	EB / NB and WB / SB Loop Ramps	Diverging Diamond Interchange (DDI)	Single Point Urban Interchange (SPUI)	Double Roundabout	Directional Fly-Over
Financial Measures									Alternative 8 is not geomterically feasible
Construction Costs	+	+	-	-	-	+	-	-	
Right of Way Costs	+	•	-	-	-	+	+	+	
Safety Benefits									
Improvements to High Accident Locations	-	+	+	+	+	+	+	+	
Provide for Acceptable Truck Acceleration	-	+	+	+	-	+	-	+	
Conflict Points	-	-	-	-	-	+	+	+	
Improves Incident Management	-	•	•	+	-	•	+	•	
Levels of Service / Mobility									
Improves Travel Time (Capacity Constraints)	-	+	+	+	+	+	+	+	
Freeway LOS and V/C	-	+	+	+	+	+	+	+	
Local LOS and V/C	-	+	+	+	+	+	+	+	
Suitable Local and Interstate Truck Access	-	+	+	+	+	+	+	-	
Design									
Efficient with Heavy Truck Volumes	-	+	-	-	-	+	-	-	
Meets Current Design Standards	+	+	+	+	+	•	+	•	
Provides for Pedestrians	-	•	•	•	•	•	•	•	
Socioeconomic - Environmental									
Relocations	+	+	-	-	-	+	+	+	
Access to/from Community Facilities	-	+	+	-	•	+	+	+	
Access to/from Businesses	-	+	+	+	+	+	+	+	
Natural Areas	+	+	+	+	+	+	+	+	
Noise/Air Quality	-	•	-	-	+	+	+	+	
Access to Public Transportation	+	•	•	•	•	•	•	•	
Equity (Environmental Justice)									
Equitable Distribution of Benefits	+	+	+	+	+	+	+	+	
Equitable Distribution of Impacts	+	+	+	+	+	+	+	+	
Implementation									
Schedule	+	+	-	-	-	+	-	•	
Maintain Traffic on KY 536	-	+	+	+	+	•	-	-	
Maintain Traffic on I-75	+	-	-	-	-	-	-	+	
Recommendation for Further Study	**Required**	**Further Study Recommended**	**No Further Study Recommended (1)**	**No Further Study Recommended (2)**	**No Further Study Recommended (1)**	**Further Study Recommended**	**No Further Study Recommended (3)**	**No Further Study Recommended (4)**	**No Further Study Recommended (5)**

LOS - Level of Service
V/C - Volume to Capacity

(1) Alternative eliminated from further study due to right-of way and truck traffic issue
(2) Alternative eliminated from further study due to alternative creating a weave.
(3) Alternative eliminated from further study due to construction feasibility and cost issues.
(4) Alternative eliminated from further study due to truck traffic issues.
(5) Alternative eliminated from further study due to geometric issues.

No-Build Alternative

Under this alternative, no improvement to existing KY 536 would occur. Without the proposed pavement widening and interchange modifications, the No Build alternative would not meet the project goals set forth in the planning phases of the project. With the increase in traffic projected by the design year, the No Build alternative would result in significantly higher levels of congestion along the KY 536 corridor and would further impact mainline operations along I-71/I-75.

Preferred Alternative

Through a comprehensive evaluation of the build alternatives, the IJS ultimately determined Alternative #5 was the optimal solution to address the current and future needs through the interchange.

The DDI, now officially referred to as a Double Crossover Diamond (DCD), is a simple solution to a complex problem. Interchanges are often traffic bottlenecks because they accommodate heavy volumes of turning traffic along already-congested arterial roadways. Traditional diamond interchanges can be problematic because they require closely-spaced, signalized intersections at entrance and exit ramps from the freeway. These traffic signals typically require three phases to accommodate the left turns from the arterial onto the freeway, the through movements on the arterial, and the turning movements from the freeway exit ramps. Providing adequate signal timings to serve each of these movements and coordinating the closely spaced signals is an ongoing battle, and other traffic signals along the arterial street make this task more difficult.

The DCD simplifies interchange operation by crossing traffic from the right side of the arterial roadway to the left side as it passes between the ramp terminals and through the interchange where it crosses back over to the right side. This simplifies the operation of each intersection's signal phasing so two signal phases can accommodate all movements. Each through movement on the arterial has its own signal phase, and the ramp movements in the opposite direction are served concurrently. This phasing is more efficient than the typical three phase operation and minimizes queuing on the exit ramps, as some storage for left-turning traffic is provided on the arterial instead of the ramp. Left turns onto the entrance ramps are now free-flow movements.

The DCD interchange is also a safer alternative to conventional interchange types for two reasons. First, the DCD reduces the number of conflict points where vehicle paths can cross. In particular, crossing paths, where the most severe crashes are more likely to occur, are reduced to two (compared to four for a conventional diamond interchange). Fewer conflict points means fewer crashes. Second, the speeds through the interchange are reduced due to the curvature of the roadway. For those crashes that do occur, their severity should be lessened because of the slower speeds.

Design year traffic forecasts developed for the project suggest traffic volumes will exceed 57,000 vehicles per day by 2030. This volume of traffic will require a minimum of four travel lanes. Median options were discussed and given the width required to accommodate a depressed median (minimum 40 feet), the project team dismissed that option and elected to use a raised median. With that assumption, the following three typical section options were considered:

- Four Lane "Urban" section with a raised median
- Five-Lane "Urban" section with a continuous center left-turn lane
- Four-Lane "Rural" section with a raised median

Both four-lane alternatives call for a raised median to be constructed. According to KYTC's proposed guidelines for Access Management, it recommends the use of a non-traversable median for roadways with a projected ADT greater than 24,000 vehicles per day. With KY 536 anticipated to carry over 57,000 VPD by 2030, construction of a non-traversable median is warranted.

The Project Team examined multiple access alternatives in an effort to maximize the distance between full access intersections while still providing safe and efficient access to both businesses and residents. Working with stakeholders, the Project Team has developed an access management plan that will accommodate all interests. A raised median is proposed along KY 536 from the interchange to US 25 with all existing access points other than the Biltmore Boulevard, Sam Neace Drive and Berberich Drive intersections converted to right-in/right-out only. A new traffic signal is proposed at Berberich Drive. The raised median requires the addition of frontage roads to accommodate access to existing and proposed developments. Sam Neace Drive is just less than 1,400 feet from the existing northbound I-71/I-75 ramp terminal and Biltmore Drive is about 750 feet from the ramp terminal. The Biltmore Boulevard intersection, currently signalized, was originally proposed to be converted to a right-in/right-out only. Based on stakeholder concerns related to parcel access, the intersection will remain signalized but the only left-turn access to remain will be from eastbound KY 536 to northbound Biltmore. This will allow the intersection to function with a two-phase signal operation, more compatible with the east crossover intersection at the DCD.

Preferred Alternative Maintenance of Traffic

The roadway and DCD interchange will be reconstructed in five phases.

Phase I – Traffic will remain in its normal flow patterns along the existing KY 536 lanes. Access to side roads, streets and entrances shall be maintained at all times. Lane widths will be 11'. Lesser widths may be permitted for short periods of time as approved by the Engineer. Channelization devices shall be placed so as to provide a minimum separation of 2 feet (3 feet desirable) between the construction zone and the driving lane. At the close of work day operations wedging shall be placed. Any storm sewer, culvert pipe or utility installations which require the roadway to be 'open-cut' to install the facility must be done during the work hours approved by the Engineer. All open cuts of the existing

roadways shall be backfilled with 'flowable fill' and be approved by the Engineer before reopening to traffic. Before commencing construction of any section of the roadway the contractor shall construct any temporary signing and waterblast or black-out any striping which is in conflict with the proposed traffic patterns during that stage of construction. He shall also cover any conflicting signing and/or relocate any signing which needs to remain active to an easily visible location.

Phase II - Traffic will be shifted from the existing travel lanes to the proposed roadway sections built during Phase I. Before commencing construction, temporary striping shall be installed on the built lanes prior to shifting traffic to those lanes. The existing striping will be removed and the travel lanes along the existing pavement between the different sections built during 'Phase I' will be restriped. Barricades will be placed to keep vehicles away from construction areas and away from the built Ramps D-1, D-2 and A-2, as applicable. Access to side roads, streets and entrances shall be maintained at all times. Lane widths will be 11' at a minimum. Lesser widths may be permitted for short periods of time as approved by the Engineer. Adhere to the practices previous phase for drainage construction and placement of traffic control devices.

Phase III - Phase III involves remaining construction operations in two different sections of the project.

Section 1 – proposed work <u>outside</u> the limits of the crossover intersections
This section extends from the beginning of the project to beginning of the western crossover and from the eastern crossover to the end of the project. Phase III work along this section shall consist on the completion of any remaining drainage items, raised medians, remaining portions of the proposed grading, construction of any remaining portions of milling and leveling and wedging for cross slope correction, the proposed scratch course layers of pavement to grade, and temporary striping. This work shall be performed using moveable lane closure operations with flaggers and shall be performed during periods of low traffic flow or at times approved by the Engineer. Temporary striping shall be placed as needed during these operations and at any time work ceases.

Section 2 – proposed work <u>inside</u> the limits of the crossover intersections
This section includes both crossover intersections at the end of ramps and the area between them. Prior to initiating Phase III work on this section 2, temporary striping shall be installed. Once the temporary striping is in place, shift traffic towards the outer lanes on both eastbound and westbound directions, away from the proposed center raised medians. At this point, traffic is still being maintained under the normal diamond interchange configuration, similarly to the existing configuration.

Complete all proposed median work including proposed median curb and gutter, median drainage curb boxes, and crossover and inside lane pavement cross slope correction. Shift the location of temporary left turn crossings from mainline and the ramps as needed to complete those items.

Maintain the existing or temporary signals in place and operational to control interchange traffic at the end of the ramps during Phase III work.

During Phase III, Ramp 'C' may be closed independently for a period of one extended weekend to remove the existing pavement and construct the remaining portions of this ramp up to the scratch course. Construct temporary pavement and striping at the split point of ramps 'C-1' and 'C-2', as needed for the ramps to function with existing traffic usage.

Phase IV – This work involves final construction items within the limits of the crossover intersections. During this phase, the contractor will be allocated one weekend beginning at 7:00 pm Friday and ending at 6:00 am Monday to close the section of KY 536 mainline roadway from between the two crossovers. During this period, the contractor shall complete any items that were left incomplete during previous phases of the project to facilitate traffic control operations.

Phase V - Final surfacing for the project along with permanent striping and painting of the curbs shall be completed during this stage. This work shall be performed using moveable lane closure operations with flaggers and shall be performed during periods of low traffic flow or at times approved by the Engineer. Temporary striping shall be placed as needed during these operations and at any time work ceases.

Preferred Alternative Environmental Impacts

The environmental document for this preferred alternative is a Categorical Exclusion 3 (CE 3) and the following sections pertaining to the Preferred Alternative Environmental impacts are excerpts from the CE 3 document.

Economic Impacts

Local Economy
No new access points will be constructed on KY 536 or I-71/I-75 as a result of this project, and no change in regional traffic patterns are expected to occur. Only one business relocation is expected (auto service center), and the project will not have any long-term adverse impacts on employment, income or business activity in the local or regional economy.

The project is expected to benefit/support existing development patterns already in place, underway or planned near the KY 536 & I-75/I-71 interchange by improving traffic flow through implementing access management, intersection improvements,
and widening along the KY 536 corridor through this area. From a regional perspective, the project is consistent with economic initiatives outlined in local land use plans. The *2010 Boone County Comprehensive Plan* identifies the area east of the interstate from the project area (Sam Neace Drive) north to Industrial Road, along US 25 and east into Kenton County, as future industrial development – a planned southern expansion of the existing Northern Kentucky Industrial Park, which is the largest industrial center

in the metropolitan area. Proposed transportation improvements at the KY 536 & I-71/I-75 interchange will support the continued development of this important economic hub. The *Comprehensive Plan* also identifies additional development (public and institutional uses) around Gateway Community and Technical College, located in the northeast quadrant of the KY 536 & I-71/I-75 interchange. Proposed access improvements by the project will support the development of this area. Additionally, proposed access points on Sam Neace Drive and the Biltmore Blvd. intersection with KY 536 were designed to accommodate development on parcels in that area of the project corridor. Overall, the capacity enhancements and access management improvements proposed as part of the project will accommodate future development, providing safe and efficient access to parcels where growth is anticipated to occur. During construction, access to local businesses may be temporarily hindered as a result of traffic delays due to construction activities. However, local businesses may also benefit from the sale of goods and services to those involved with the project's construction and there will likely be a short-term increase in construction-related employment and revenues during the construction period. Following project construction, traffic flow in the area and access to commercial development will be improved which will result in potential economic benefits to these facilities.

Prime Farmlands and Agricultural Districts

The study area is highly urbanized and there are no active or fallow farmlands within the study corridor. A Farmland Conversion Impact Rating Form (Form AD-1006) was submitted to the NRCS on August 29, 2013. The NRCS completed the form on September 10, 2013, and concluded that all areas within the project boundaries are prior converted farmlands and that the project currently does not contain prime, unique, statewide, or local important farmlands. There will be no cumulative or indirect impacts to agricultural land as a result of the project. The project is consistent with and supports the desired land use and proposed land use changes in the project vicinity

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Social Impacts

Neighborhoods/Community Cohesion

The project is not expected to adversely impact neighborhoods or community cohesion because the project will not bisect or isolate existing neighborhoods or eliminate access to local communities. The main impact will result from project right-of-way requirements, which involve the relocation of two residences and one business. A Conceptual Stage Relocation Study prepared for this project as part of the Socioeconomic Impact Analysis indicated that there is adequate replacement housing available in the general project area and several available commercial lots that could accommodate the displaced business within the Florence, Kentucky zip code area. The project will also require a small amount of strip right-of-way from Florence Baptist Church, St. Elizabeth Medical Center, and Sports of All Sorts. No impacts to structures at these three properties will occur. Impacts to a small prayer garden on the Florence Baptist Church property may occur due to construction of a new access road from KY 536 to the church and the adjacent Woodspring Apartment complex, which will be mitigated through KYTC's

right-of-way acquisition process. Access to residential areas and community facilities may be temporarily hindered as a result of traffic delays during construction. Following project construction, improved traffic flow through the project area and a new multi-use path and sidewalk facilities are expected to improve connectivity between existing neighborhoods and adjacent retail and commercial uses in the area and enhance safety.

Environmental Justice

An environmental justice analysis performed for the project area using the U.S. Environmental Protection Agency's EJView utility (USEPA, 2011) indicates that there are 2,161 persons residing in census block groups located within and immediately adjacent to the project study area based on the 2010 U.S. Census. Of these, an estimated 18% are of a minority population group, which is almost double the percentage for all of Boone County (9.5%) and higher than for all of Kentucky (12.2%). Less than 17.5% of the population of the project area lives below the poverty level, which is above the percentage living below poverty level for all of Boone County (7.5%) and slightly below that for all of Kentucky (18.1%). There will be no substantial changes in property access, access to community resources/services, traffic patterns, or social or economic activities as a result of the project. Based on review of available social, economic, and demographic information, the project is not anticipated to result in any disproportionately high and adverse impacts to minority or low-income populations which reside within the study area. Nor is the project anticipated to result in the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations. The project is not expected to result in any cumulative or indirect impacts to environmental justice populations. Improving traffic flow, safety, and pedestrian and bike access along KY 536 will improve mode choice and improve mobility for low income populations in the area. Additionally, the project team determined that the residents of these two properties affected were not low-income, nor were they identified as a protected minority population. The evaluation and finding of these two residential relocations is documented in the Socioeconomic Impact Analysis Addendum #1, KYTC Item #6-14. Based on this evaluation and finding, the project will not have a disproportionate or adverse effect on any minority or low-income population in accordance with Executive Order 12898 and Department of Transportation Order 5610.2(a).

Travel Patterns and Accessibility

Because the proposed transportation improvements will primarily occur on or immediately adjacent to the existing KY 536 alignment, there will be no long-term impacts to regional travel patterns. The new DCD interchange configuration will result in the need for the traveling public to learn and adjust to the new on/off ramp and through traffic travel patterns. Information and graphics depicting the traffic flow of the new configuration have been shown at public meetings. A Public Information Plan will be developed to inform the motoring public and area stakeholders of project information including a Temporary Traffic Control Plan. The KYTC District Public Information Officer will also coordinate and disseminate to stakeholders and the media appropriate project information regarding construction plans and changes to travel patterns. Other opportunities to educate and notify the traveling public will be provided during project implementation through KYTC's Central Office web site, KYTC's District 6 web site,

KYTC's social media sites (Facebook and Twitter), and through a KYTC press release prior to opening. In addition, signage directing traffic on and off the ramps and notifying the public of travel pattern changes at the interchange will be provided as part of the project. Finally, changes to travel patterns will be made available at the project's web site at http://75crossings.com/ky-536/

The project is expected to require minor re-configuration of several parking spaces at the Mt. Zion Park and Ride (serviced by TANK Route 22X), but overall there will be no net loss in available parking area at this facility and no long-term impact on transit users. The proposed transportation improvements include a proposed multi-use path, sidewalks along the north side of KY 536, and sidewalk extensions along road improvements to Biltmore Blvd. and Demia Way. The new multi-use path and sidewalk facilities associated with the project are expected to improve connectivity between existing retail, residential and commercial land uses in the study area, enhance safety for pedestrians and bicyclists in the area, and present a greater mode choice for the traveling public. During construction, access and travel times for local travelers, bus transit (TANK) users, and police, fire, and emergency services could be temporarily impacted (travel delays) as a result of lane closures and other construction activities. No major detours are expected to occur as a result of project construction. A Maintenance of Traffic (MOT) plan, which will be finalized during detailed design, will be developed to have minimal impact to local traffic and emergency services, and the District will coordinate with TANK prior to construction activities regarding bus routes through the area. Once construction is complete, accessibility, travel efficiency, and safety in and throughout the project area will be improved.

Local Land Use and Transportation Plan

Local Land Use Plans

The project is identified in the *2010 Boone County Comprehensive Plan* and compatible with the future land use recommendation in this plan for residential, industrial and commercial development. Neighboring Kenton County zoned approximately 3,535 acres of land along KY 536 about two miles east of the project study area from agricultural land use to a residential/light industrial mix (*South Banklick Small Area Study Report*, Northern Kentucky Area Planning Commission, 2006). The Boone County Planning Commission developed the *2000 Union Town Plan* to address significant residential growth anticipated for the City of Union, located just 2.5 miles west of the project area. Improvements to the KY 536 corridor are compatible with this plan by providing better traffic flow and reducing traffic congestion resulting from this residential growth.

Transportation Plans

The KY 536 & I-71/I-75 Interchange Reconstruction Project is listed on KYTC's Statewide Transportation Improvement Program for FY 2013 – 2016 as Items 6-14.00 and 6-14.02 on page 4 of 127. The project also is listed as Item 6-14.00 and 6-14.02 in OKI's Fiscal Years 2014-2017 Transportation Improvement Program (2013) on page BOO 8-4, and is listed on KYTC's FY 2014-2020 Six-Year Highway Plan as Item

6.14.00. The proposed project is also compatible with several other transportation projects planned for the Northern Kentucky area that are designed to provide system-wide improvements to the region, including two adjacent improvement projects along KY 536 and one adjacent project along I-71/I-75:

- KYTC Item No. 6-158, which involves widening KY 536 to five lanes west of the I-71/I-75 interchange. Construction to begin in 2017;
- KYTC Item No. 6-162, which will widen KY 536 to a four-lane divided roadway east of US 25. Construction date undetermined;
- KYTC Item No. 6-14.5, which will extend auxiliary lanes along both directions of the interstate from the KY 536 interchange to US 42, and also includes widening to the entrance and exit ramps for the KY 536 interchange. Construction to begin in 2018.

Additionally, KYTC Item No. 6-18.00 includes the reconstruction of the KY 338 interchange on I-71/I-75, located approximately 4.5 miles south of the KY 536 interchange.

Pedestrian and Bicycle Facilities
Sidewalks are limited in the project area, with the only sidewalk along existing KY 536 occurring on the south side of the roadway for one block between Sherwood Lakes Drive and Demia Way. There are no bicycle facilities or shared use paths in the project area. The proposed project includes the construction of a new shared new path along the north side of KY 536 from Tiburon Drive eastward to US 25, where there currently are no pedestrian and bike facilities. This proposed shared use facility is part of a planned regional multi-use trail network for Union, Walton, unincorporated Boone County, and Kenton County, and also links to planned pedestrian and bike projects included in the 2002 Florence Pedestrian and Bike Plan, located to the west of the project area.

Sidewalks are also proposed along the south side of KY 536 east of the interchange, from Biltmore Blvd. to the east project terminus. Sidewalk extensions also will be constructed alongside road improvements to Biltmore Blvd. and Demia Way, which will link to an existing sidewalk extending to the Mt. Zion Park and Ride in this vicinity (service by TANK bus transit). There are no adverse cumulative or indirect impacts to pedestrian and bicycle facilities expected as a result of this project. The new shared path and sidewalk facilities associated with the project are expected to improve mobility and present a greater mode choice for the traveling public. These facilities also will provide better connectivity between the residential areas and commercial areas in the study area.

Secondary and Cumulative Effects
The project area has experienced a significant amount of residential and commercial development as it is located in the rapidly developing Boone County and near the City of Florence. This project involves the improvement of existing transportation facilities (KY 536 & I-71/I-75 interchange and KY 536) and access management along KY 536. There will be no new access to undeveloped areas as a result of this project and no changes in regional traffic patterns are expected to occur. The project is expected to result in

improved traffic flow through this rapidly developing area; however, the project is not expected to induce land use changes that are not currently either planned or proposed. In addition, the proposed project is consistent with the *2010 Boone County Comprehensive Plan* and other local planning initiatives. Any secondary impacts that may occur as a result of additional development in the project area following project construction are already underway in the area or planned.

Historic Resources Impacts

There are no properties within the Area of Potential Effect (APE) for this project that are on or eligible for listing on the National Register of Historic Places (NHRP), therefore, the project will have No Effect on historic resources.

Archaeological Resources Impacts

A "Phase I Archaeological Survey of the Proposed Reconstruction Of KY 536 Interchange to a Double Crossover Diamond Type Interchange, I-71/75 Boone County, Kentucky (Item No. 6-14.00)" prepared by Corn Island, LLC (December 12, 2013) identified one previously recorded archaeological site (15BE660 [remnants of a historic church]) in the project's area of potential effect (APE). The Phase I study recommended no further archaeological investigation of the site due to previous disturbance and low research potential, and concluded that it was not eligible for listing in the NRHP. A letter of concurrence from the SHPO was received March 12, 2014.

The Phase I Archaeological Survey also noted two cemeteries that were once possibly located within the project APE, just east of the KY 536 interchange with I-71/I-75, on both the north and south sides of KY 536; the archival records suggested that one cemetery was moved, and no documentation regarding the second cemetery was found. Due to lack of documentation regarding these potential cemeteries, the Phase I study recommended that during construction, these areas be closely monitored for any presence of human interments, including but not limited to human remains, grave markers, and/or casket pieces such as wood or hardware. If human remains are discovered, all work must stop immediately and the County Coroner and SHPO must be notified

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The Phase I investigation did not identify any areas of Native American interest; therefore, Native American consultation is not required.

Section 4(f) Impacts

There are no Section 4(f) properties in the project area based on review of available mapping and site visit, and cultural/archaeological studies conducted for the project concluded that there would be no impact on any resources listed on or eligible for the NRHP. Therefore, there are no Section 4(f) impacts by the project.

Section 6(f) Impacts

There are no Section 6(f) Land and Water Conservation Fund (LWCF) properties in the project area based on review of the National Park Service database, therefore there will be no Section 6(f) impacts by the project.

Noise Impacts

A "Traffic Noise Impact Analysis for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" (Stantec, November 2013) in accordance with FHWA Title 23 Code of Federal Regulations Section 772.13 and the KYTC Noise Analysis and Abatement Policy (July 13, 2011) was prepared for the project and approved by KYTC on November 26, 2013. The noise study predicted sound levels under existing and Design Year (2030) No Build and Build conditions for 105 representative noise-sensitive receptors located within six analysis sites along the proposed project. Modeling results predicted noise impacts at five of the six analysis sites and noise barriers were recommended for further consideration at two locations based on feasibility, cost-effectiveness and ability to meet KTYC noise-reduction design goals:

- Located in the northwest quadrant of the interchange along the Woodspring Apartments Complex, the recommended 1,680-foot-long barrier provides a 5 dBA benefit to 84 of 107 impacted receptors (79%), and a minimum 7 dBA reduction for 40 of 92 benefitted receptors (43%); The barrier has a cost per benefitted receptor of approximately $9,405.

- Located in the southwest quadrant of the interchange in a residential area along Highland Drive, the recommended 2,424-foot-long barrier provides a 5 dBA benefit to all 26 impacted receptors (100%), and a minimum 7 dBA reduction for 21 of 50 benefitted receptors (42%); The barrier has a cost per benefitted receptor of approximately $23,460.

The final locations and dimensions of noise barriers will be determined during Phase II design. Public involvement regarding the noise abatement barriers recommended for further consideration will be conducted in accordance with KYTC noise policy. Identified benefitted receptors/property owners will be notified of a Noise Abatement Public Meeting to be held to provide opportunity for input regarding inclusion of these noise mitigation measures into the project. For the remaining sites with predicted noise impacts, structural noise abatement was determined not feasible at Analysis Sites along KY 536 west of the interchange and F along KY 536 east of the interchange due to the need to preserve existing access points to residential properties. For the Analysis Site along I-71/I-75 in southeast quadrant of the interchange, no barrier design could be achieved that met both cost-effectiveness and KYTC design goal requirements of reasonableness; therefore, a noise barrier was deemed not reasonable for construction.

Air Quality Impacts

Air Quality impacts of the project were evaluated in the technical memorandum titled "NEPA Documentation - Air Quality" (Stantec, February 2014) and approved by KTYC on February 19, 2014. Project determinations for the common transportation-related air pollutants ("criteria pollutants") are as follows:

Carbon Monoxide: None of the signalized intersections in the project area have a projected average Opening Year (2017) ADT volume which approaches 80,000 vehicles per day; therefore, the project will not produce a projected violation of the CO standards.

Lead, Nitrogen Dioxide, Particulate Matter PM10: All areas in Kentucky are in attainment for these pollutants.

Sulfur Dioxide: This pollutant is an industrial source concern (not a mobile source concern) and Boone County is in attainment.

8-Hour Ozone - Boone County is listed by USEPA as marginal nonattainment for ozone; however, the project is listed in the STIP/TIP.

Particulate Matter (PM2.5): Boone County is listed by USEPA as a maintenance area for PM 2.5. A PM2.5 Project Level Checklist was prepared for the project, classifying the proposed improvements as “non-exempt, not of air quality concern” with regard to PM2.5, and submitted for Interagency Consultation (IAC) in December 2013. OKI, the Kentucky Division of Air Quality (KDAQ), and the FHWA – Kentucky Division concurred with this classification on February 13, 2014, and concluded that no PM2.5 hot spot analysis is required for the project.

Mobile Source Air Toxics (MSATs): A qualitative MSAT Analysis was completed for this project (as part of the “NEPA Documentation – Air Quality tech memo; Stantec, February 14, 2014) and approved by KYTC on February 19, 2013. This analysis concluded that there would be no appreciable difference in estimated vehicle miles traveled (VMTs) under the Build and No Build alternatives and, therefore, no appreciable difference in overall MSAT emissions between the two alternatives. In addition, regardless of whether or not the proposed project is constructed, design year emissions will likely be lower than present levels as a result of EPA's national control programs for vehicle and fuel regulations which are projected to reduce MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Hazardous Materials

A "Phase I Site Assessment of Hazardous Materials/USTs for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" was prepared by Stantec (April 2013) and approved by KYTC on February 28, 2014. A total of 117 properties were evaluated, two of which were recommended for additional Phase II site assessment: 1) the Sunoco/75 Express Mart, located at 430 Mt. Zion Road (KY 536) and; 2) the United Dairy Farmers convenience store and Mobile gas station, located at 8577 Dixie Highway (US 25). The Sunoco/75 Express Mart site has three underground storage tanks (USTs), six fuel pumps, and a ground-mounted transformer on site. Preliminary construction limits indicate disturbance to the property along KY 536 extending from existing right-of-way, leading up to the existing pump islands and canopy in the proximity of the existing USTs. A Phase II ESA is recommended to be conducted at the location of the USTs, pump islands and petroleum conduits in proximity to the construction limits to investigate the potential for petroleum contamination of soils. The United Dairy Farmers was identified as a site with "petroleum leak/monitoring wells." The property is adjacent to the proposed alignment, and new strip right-of-way is expected to be required along US 25 north of the existing driveway entrance in an area currently existing as landscaped grounds. A Phase II ESA is recommended to investigate the site for potential soil contamination by petroleum products.

In addition, KYTC will sample and analyze all structures prior to demolition for asbestos-containing materials. The Phase II ESA and asbestos inspections are included as Environmental Commitments for the project.

No bridge structures will be removed by the project however a modification to the northern abutment of the existing I-71/I-75 bridge is needed for construction of a retaining wall within the existing slope wall to accommodate the proposed 10-foot wide shared use path. The existing slope wall is earth with aggregate cover and will be excavated to provide the horizontal clearance to accommodate the construction of the retaining wall. No other modifications to the existing I-71/I-75 structure are required.

Threatened and Endangered Species (T&E)

An "Ecological Resources Impact Assessment for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" was prepared by Stantec (May 2013) and approved by KYTC on July 9, 2013. No federal-listed species reported by resource agencies as possibly occurring in the project area were observed during field surveys conducted for this project. However, potential suitable habitat for endangered bats was noted in the area, consisting of five potential bat roost trees and 2.1 acres of wooded habitat (potential foraging area) within the preliminary project construction limits.

KYTC DEA's provided a No Effect Finding (dated June 30, 2014) for listed mussels (no habitat, no effect all species), Running Buffalo Clover (no habitat, no effect), and Indiana bat (no effect finding for winter habitat only).

Prior to construction, KYTC will enter into an Indiana Bat Conservation Memorandum of Agreement (IBCMOA) with the USFWS to account for loss of Indiana bat summer roosting habitat. Additionally, the Project Team commits to a biological assessment (BA) for the Northern long-eared bat prior to construction.

Construction Impacts

Water Quality/Stream impacts
Short-term stream impacts during construction relative to water quality and streams include: temporary increases in dissolved solids, nutrients, settleable solids, suspended solids and acidity; the destruction or displacement of aquatic fauna whose foraging, reproduction or locomotion is hindered by silt; temporary increase in turbidity which may reduce light penetration, pH, oxygen levels and/or buffering capacity of the streams; and/or increased water temperatures which may cause oxygen demands and damage or destroy aquatic biota. Overall, these short-term impacts are expected to be minor and minimized through adherence to Best Management Practices (BMPs) during construction and implementation of Section 212 (Erosion Control) and 213 (Water Pollution Control) of KYTC's "Standard Specifications for Road and Bridge Construction". Additionally, impacts to water quality will be minimized by adherence to requirements of the KYTC's MS4 permit and KPDES General Permits for Stormwater Discharges Associated with Construction Activities (KYR10).

Air Quality
Short-term construction-related air quality impacts from dust and equipment exhaust are expected to be minor and minimized through the use of Best Management Practices (BMPs) during construction and adhering to the KYTC's "Standard Specifications for Road and Bridge Construction.

Travel Delays and Maintenance of Traffic
There will be short-term disruptions/travel delays for local residences, businesses, bus transit (TANK) users, and emergency services during construction as a result of lane closures. No major detours are expected during project construction. A Maintenance of Traffic (MOT) plan will be developed to have minimal impact to local traffic and emergency services. The project is expected to be constructed under traffic with evening and weekend lane closures allowed. Access to local businesses may be hindered for a short time during project construction, though impacts will be mitigated through the implementation of the MOT plan, which will identify how access would be maintained to businesses throughout the project area during the construction period. Local businesses may also benefit from the sale of goods and services to those involved with the project's construction and there will likely be a short-term increase in construction-related employment and revenues during the construction period. Following project construction, traffic flow in the area and access to commercial development will be improved which will result in potential economic benefits to these facilities.

Noise

Specific sound levels during the construction period cannot be projected, as construction sound levels will vary based on the number and type of equipment being used, as well as the type of construction activities occurring at a given time. Reasonable efforts will be made to reduce construction noise impacts to the extent practicable. The project construction contractor will be required to provide such equipment as sound deadening devices, shields, and physical barriers, and take such noise abatement measures which may be necessary to restrict the transmission of noise in the immediate vicinity of noise-sensitive land uses. All construction equipment will be required to comply with OSHA (Occupational Safety and Health Administration) regulations.

Preferred Alternative Utility Impacts

The utilities present and impacted along the corridor are, Duke Energy (electrical and gas), Cincinnati Bell (telephone), Spectrum Cable (cable television), Boone County Water District (water), and Sanitation District No. 1 (sanitary sewer).

Duke Energy (Electrical)

All electrical power (69 kV lines) on the north side of KY 536, east of the interchange to approximately Station 218+00, will be relocated.

Duke Energy (Gas)

Construction of the Preferred Alternative will require the relocation of approximately 4,600 LF of 8-inch high pressure gas main, approximately 600 LF of 6-inch high pressure gas main, approximately 150 LF of 4-inch high pressure gas main, and approximately 150 LF of 2-inch high pressure gas main. The project team decided to relocate the gas line outside of the proposed roadway footprint to facilitate repairs.

Cincinnati Bell

There will be approximately 12,000 LF of aerial telephone line relocated. Accommodations were made in the design to avoid the existing Cincinnati Bell remote terminal near the Steak ‘n Shake property.

Spectrum Cable

There will be approximately 11,000 LF of aerial cable relocation for cable TV.

Boone County Water District

The project will require the relocation of approximately 12,500 LF of water main of which 1,500 LF is 8-inch, 8,500 LF is 12-inch and 2,500 LF is 16-inch. The project team decided to relocate the water mains outside of the proposed roadway footprint to facilitate repairs.

Sanitation District No. 1

There are no anticipated sanitary sewer relocations to occur. Manholes will be modified as required to accommodate the design of the proposed roadway.

Preferred Alternative Right-of-way Impacts

A total of 44 parcels containing permanent right-of-way, permanent easements, and/or temporary easements are included in the project. Approximately 3.60 acres of new right-of-way will be required from 30 parcels (seven residential, 21 commercial, two institutional), all east of the existing interchange. The right of way necessary for construction on the west side of the interchange will be obtained with KY 536 widening project, west of the interchange. Most are minor strip right-of-way takes, but also include two residential relocations and one business relocation (an auto service center). There is an additional taking of a service station canopy over their gasoline pumps. Additionally, the project involves 43 acres of existing right-of-way. Of 3.60 acres of new right-of-way required, 0.66 acres are residential, 2.16 acres are commercial, and 0.78 acres are institutional, which include small amounts of new right-of-way from St. Elizabeth Medical Center and Sports of All Sorts. Two residences and one business would be affected by the project and would need to be acquired. A Conceptual Stage Relocation Study completed for this project indicates that there is an inventory of available comparable housing and businesses in the area; therefore, there should be no issues finding replacement housing and a replacement commercial building for the anticipated displacements. All relocation procedures will be accomplished in accordance with Title VI of the Civil Rights Act of 1966 and the provisions of Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended. All property acquisition will be accomplished in accordance with the KYTC's procedures within the Right of Way Guidance Manual.

The total area of Temporary Easement required is 308,120 SQ FT.

The total area of Permanent Easements required is 3,501 SQ FT.

I-71/75 & KY 536 Interchange Reconstruction

Boone County
KYTC Item 6-14.00
Performance Based Flexible Solutions Analysis

Performance Based Flexible Solutions Analysis (PBFS) Goals

KYTC Design Memo 03-17 (February 2017) concerns the application of Performance Based Flexible Solutions (PBFS) throughout the project development process. The primary goal is to seek value-based solutions with the objective of lowering the costs for the project such that funding can be made available sooner and possibly allow other projects to be advanced with the savings. Some level of design exceptions may be appropriate in the attempt for project savings.

Applying PBFS to the Current Project

As previously discussed, the purpose of the KYTC Item 6-14.00 project is to increase safety and reduce traffic delays experienced at and within vicinity of the I-71/75 and KY 536 interchange. Even before the introduction of Design Memo 03-17, the application of PBFS principles and strategies were being targeted for implementation to achieve project goals while minimizing project resources.

Safety

Improving safety has been a project team focus from the beginning. **Figure 1** displays the crash data from 2015 to 2017 on KY 536.

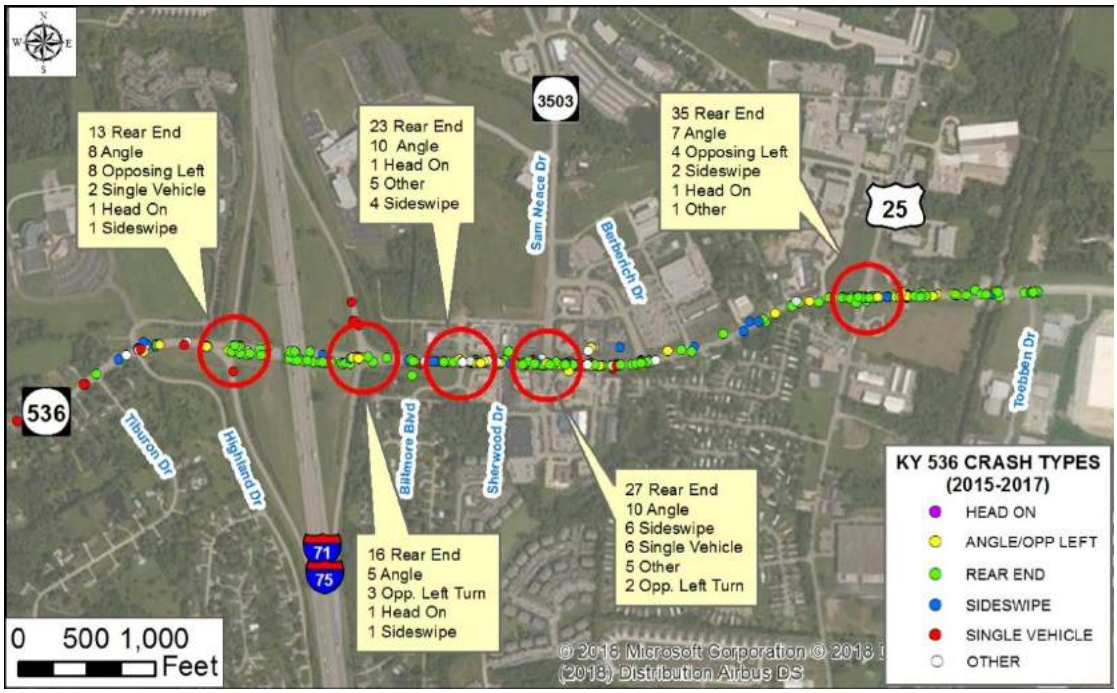


Figure 1: Crash Data from 2015 to 2017 on KY 536

Figure 2 shows a breakdown of the types of reported crashes along the project corridor. As shown, rear end and angle collisions tend to be the most common crash types that have occurred in the project area. These crash types are often related to congestion and access issues, both of which have been discussed as being significant issues within this portion of the KY 536 corridor.

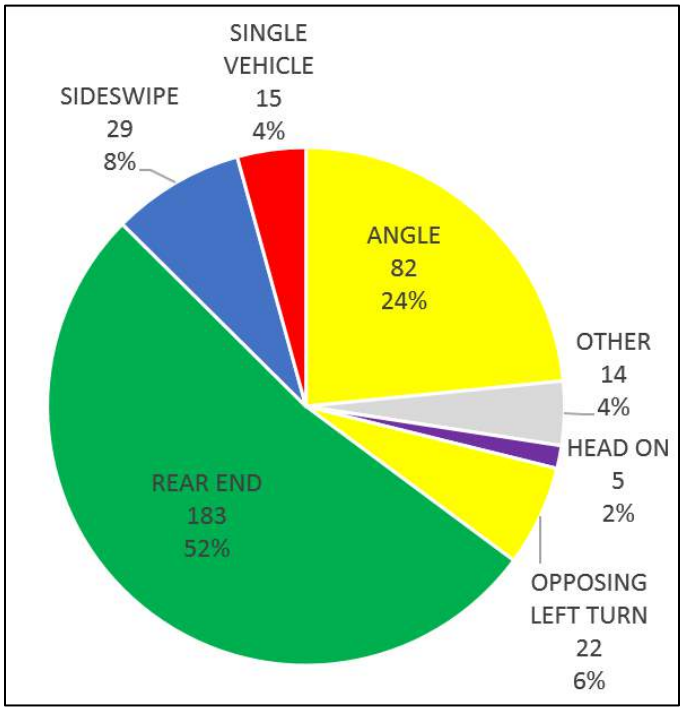


Figure 2: KY 536 Crash Types (2015 to 2017)

Critical Rate Factors (CRFs) have been determined as part of this analysis, and the results are shown in **Table 1**. A CRF greater than 1.0 suggests that conditions may exist that contribute to non-random occurrences and a higher than average crash rate. Within the project area, the 2010 IJS indicated KY 536 had CRF of 2.06 from 2009 to 2011. The revised analysis shows an overall CRF value of 2.89 with the highest segment being east of US 25 with a CRF of 4.7, suggesting that safety is a significant concern throughout the corridor. Controlling access with a raised median and constructing new service roads, as proposed, is intended to reduce the number of conflict points on KY 536 and subsequently improve safety.

Table 1: Crash Rates and Critical Crash Rate Factors for KY 536

Source/Period	Segment	Begin Milepoint	End Milepoint	Crashes	Actual Crash Rate*	Statewide Average Crash Rate*	Critical Crash Rate*	CRF
2010 IJS (2004-2006)	Exact segment loction not identified.				780	256	379.6	2.06
2015 - 2017	West of Tiburon Dr. to east of US 25	13.00	14.36	350	1056	277	365.3	2.89
	West of Tiburon Dr. to I-71/I-75 Underpass	13.00	13.37	65	1117	277	394.0	2.84
	I-71/I-75 Underpass to US 25	13.37	14.17	217	1028	277	362.9	2.83
	East of US 25**	14.17	14.36	68	8	0.83	1.7	4.70

The introduction of the Highway Safety Manual (HSM) some years ago initiated the development of the Crash Modification Factors Clearinghouse (CMFC). Based on research and empirical data from across the country, the clearinghouse includes a variety of crash countermeasures and the estimating crash modification factors (CMF) and crash reduction factors (CRF, in percent) associated with those countermeasures. There are three primary countermeasures included with the proposed 6-14 improvements, and the clearinghouse summary is shown in **Table 2**.

Table 2: Proposed Crash Countermeasures for KY 536

Countermeasure 1: Replace TWLTL with raised median

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type
0.77	23	★★★☆☆	Angle,Fixed object,Head on,Rear end,Run off road,Sideswipe,Single vehicle	All	Urban
0.65	36	★★★☆☆	Angle	All	Urban
0.81	19	★★★☆☆	Rear end	All	Urban

Countermeasure 2: Convert diamond interchange to Diverging Diamond Interchange (DDI) or Double Crossover Diamond (DCD)

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type
0.67	33	★★★★☆	All	All	Suburban
0.59	41	★★★★☆	All	K,A,B,C	Suburban
0.625	37.5	★★★★☆	All	All	Urban
0.374	62.6	★★★★☆	All	K,A,B,C	Urban

Countermeasure 3: Install curb and gutter

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Area Type
0.89	11	★★★☆☆	All	All	Suburban

(Source: http://www.cmfclearinghouse.org/)

The CMF value can be used to predict the expected number of crashes after the countermeasure is implemented. The CRF% is the percent crash reduction that is expected by applying the CMF. The quality rating is an indication of the confidence in the results of the study that produced the CMF. The star rating is based on a scale from 1 to 5, where a 5 indicates the highest or most reliable rating. The Crash Type refers to the types of crashes the countermeasure will impact. Crash Severity is based on the "KABCO" severity scale, outlined below:

- **K –** Fatal;
- **A –** Incapacitating injury;
- **B –** Non-incapacitating injury;
- **C –** Possible injury; and
- **O –** No injury.

The first countermeasure, replacing the existing two way left-turn lane (TWLTL) on KY 536 with a raised median, has a CRF% of 23 percent for angle and rear end crashes (and others, for all categories of crash severity), which are the predominant crash types in the project corridor. Converting the existing diamond interchange to a DCD has been shown to reduce overall crashes by about 1/3 in suburban areas and by 37.5 percent in urban areas. The third countermeasure, installing curb and gutter where shoulders exist today, has been found to reduce all crash types by about 11 percent. Although these CRF% values should not be counted cumulatively, with these improvements it is reasonable to expect an overall reduction in crashes of 35 percent or more for the corridor.

Traffic Analyses

Traffic volumes on KY 536 have increased precipitously since the interchange was constructed in the 1990's and future traffic forecasts suggest that growth trend will continue. Existing traffic volumes range from around 15,000 vehicles per day (vpd) west of the interchange to 25,000 vpd east of the interchange. By 2030, these volumes are expected to increase to 49,000 vpd west of the interchange and 57,000 vpd east of the interchange.

The KY 536 interchange reconstruction includes the reconfiguration of the existing interchange to a DCD. This will expand capacity by adding an additional through lane in each direction on KY 536 and reduce the signal time needed for left-turning vehicles utilizing the I-71/I-75 interchange. The interchange ramps will also be widened, further enhancing the interchange operation.

In an effort to further identify existing traffic issues and to evaluate improvement scenarios, a traffic simulation model was developed to replicate existing peak hour traffic conditions and estimate future travel conditions throughout the study area. Caliper Corporation developed and maintains the TransModeler traffic simulation software package. Models initially were developed to simulate typical weekday AM and PM peak hour traffic conditions for the base year. These were calibrated to the point where the models accurately reflected known traffic conditions. A simulation model was developed to replicate the geometry of the proposed alternative.

TransModeler is capable of replicating the Highway Capacity Manual's (HCM) methods to measure LOS. LOS is a qualitative measure describing operational conditions within a traffic stream, based on factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. For signalized intersections, LOS is based on control delay (in seconds per vehicle). The breakdown is shown in **Table 3**.

Table 3: Level of Service (LOS) Criteria for Signalized Intersections

Delay (sec/veh)	LOS
< 10	A
10 - 20	B
20 - 35	C
35 - 55	D
55 - 80	E
> 80	F

Source: *2010 Highway Capacity Manual*

Table 4 includes a summary of the 2030 No-Build and Build LOS values for the existing and proposed signalized intersections along KY 536. As shown, the proposed improvements will improve the performance of the KY 536/interchange ramp intersections from a LOS F for the 2030 No-Build to a LOS D or better for the 2030 Build Alternative.

Table 4: KY 536 2030 No-Build and Build LOS

KY 536 Intersection	2030 No-Build LOS		2030 Build LOS	
	AM	PM	AM	PM
Tiburon Drive	N/A	N/A	D	B
I-75 Southbound	F	F	B	B
I-75 Northbound	F	F	B	B
Biltmore Boulevard	F	F	A	A
Sam Neace Drive	F	F	C	C
Berberich Drive	N/A	N/A	A	A
US 25 (Dixie Highway)	F	F	E	E

Table 5 presents a summary of the estimated 95th percentile queue lengths for the KY 338 exit ramps for both the 2030 No-Build and Build alternatives. The 2030 No-Build queues exceed the existing ramp lengths for both the northbound and southbound off-ramps during the AM and PM peak hours. The Build alternative queue lengths would not extend beyond the proposed ramp lengths. Therefore, queues under the Build condition, are not anticipated to impact mainline traffic flow.

Table 5: 2030 No-Build and Build Exit Ramp Queues - I-71/I-75 at KY 536

KY 536 Exit Ramp	Available Storage (feet)	95th Percentile Queue Length (feet)			
		No Build AM	No Build PM	Build AM	Build PM
I-71/I-75 Northbound	1,900	Exceeds available storage	Exceeds available storage	260	220
I-71/I-75 Southbound	1,950	Exceeds available storage	Exceeds available storage	120	430

The following summarizes the PBFS solutions proposed with the project:

- The DCD is a PBFS solution that addresses the issues at the existing interchange at lower cost than other alternatives, such as a Single Point Urban Interchange (SPUI). A SPUI interchange would require replacement of the bridges carrying I-71/75 over KY 536, increasing the overall project cost.
- The project will include 11-foot wide lanes except through the DCD crossover intersections.
- Curb and gutter is proposed to reduce right-of-way and utility relocation impacts/costs. Drainage flumes that make use of the existing ditches are proposed, where feasible, to minimize cost and better utilize existing infrastructure.
- High mast lighting is proposed at the I-71/75 interchange, which will reduce future maintenance costs.

KY 536 Interchange Reconstruction

Boone County

KYTC Item 6-14.00

Design Exceptions and Mitigation Strategies

There are no design exceptions required for this project.

PREFERRED ALTERNATIVE COST VERSUS SIX YEAR PLAN

The estimated project costs for the Right-of-Way acquisition, Utility relocations, and Construction (R-U-C costs) are summarized in the table below. This includes cost estimates from the Highway Plan as well as estimates developed during the project development.

Phase Cost Estimates

Phase	Highway Plan	Current Estimated Cost	Percent Difference
Right-of-Way	$14,700,000*	$10,100,000	-45.5%
Utilities	$5,430,000**	$5,430,000	0%
Construction	$22,080,000**	$22,420,000	1.5%
TOTAL	$42,210,000	$37,950,000	-11.2%

* Source: *Kentucky's FY 2016- FY 2022 Highway Plan*

**Source: *Kentucky's FY 2018- FY 2024 Highway Plan*

The current overall cost estimate for the Preferred Alternative is approximately 11% percent lower than the estimate from the most recent version of the Highway Plan, wholly attributable to the difference in right-of-way.

KY 536 Interchange Reconstruction

Boone County

KYTC Item 6-14.00

Discussion of Clear Zone

Chapter 3 of the AASHTO *Roadside Design Guide* recommends a clear zone of 14-16' for a design speed of 25 mph and a design ADT over 6000 for foreslopes 6H:1V or flatter. However, Chapter 10, "Roadside Safety in Urban or Restricted Environments", states, "Generally, the principles and guidelines for roadside design presented in previous chapters of this guide discuss roadside safety considerations for rural highways, Interstates, and freeways where speeds are generally higher — approaching or exceeding 80 km/h [50 mph] — and vehicles operating under free flow conditions." Chapter 10 also says, "For arterials and other non-controlled access facilities in an urban environment, however, right-of-ways often are limited and, in many cases, establishing a clear zone using the guidance in Chapter 3 is not practical." Due to the presence of existing businesses along the corridor, this is the case for the KY 536 project.

In general, this project provides a 12.5' clear zone (2.5' curb & gutter + 10' berm) with positive protection provided for obstructions nearer to the travel lanes and at slopes steeper than 2H:1V. Positive protection in the form of an existing roadside barrier wall is in place under the existing interstate bridge in the eastbound direction. This will remain in place in the final roadway configuration. Similarly, a soil nail wall is presently in place in the westbound direction under the interstate bridge. This will also remain in place for the final configuration. Crash cushions will prevent vehicles from impacting bridge piers in the median. Sign posts, signal posts, and lighting will be located as far as practical from the travel way.

A retaining wall is proposed from Station 174+64.74 to Station 175+18.75 to keep excavation operations for the proposed roadway from impacting an existing Cincinnati Bell remote transfer station. This retaining wall is approximately 9.0' from the edge of the westbound travel lanes. Other barrier/retaining walls along the corridor for fill slopes are a minimum of 18' feet from the edge of the travel lanes. The lone cut wall is on the eastbound side of the roadway from approximate Station 201+45 to Station 203+20. The wall itself is the protective barrier and is approximately 15.5' from the edge of the travel lanes.

KY 536 Interchange Reconstruction

Boone County

KYTC Item 6-14.00

Consideration for Bike and Pedestrian Facilities

The northern Kentucky region has a strong commitment to providing and improving the facilities for bicycle and pedestrian travel. The 2001 *OKI Regional Bicycle Plan* serves as a guide for the improvement and expansion of the bicycle transportation system in the OKI Region and encourages bicycling as a mode of transportation. In that plan, KY 536 is identified as a component of the Primary Shared Road Network.

In 2002, the Boone County Planning Commission updated the Pedestrian/Bike Path Plan for the City of Florence and neighboring portions of Boone County. Boone County and the City of Florence, in conjunction with KYTC District 6, have provided bicycle and pedestrian facilities at many locations within Boone County. This roadway project is another opportunity to continue to provide connectivity for the multi-modal transportation system, including bicycle and pedestrian travel.

The roadway improvement project to the west of the interchange (6-158) provides a 10-ft. wide shared use path on each side of KY 536. The roadway improvement project to the east (6-162) provides a 10-ft. wide shared use path on the north side of KY 536. KY 536 west of Tiburon Drive is currently being constructed to a five-lane facility with construction to be completed in early summer of 2019. The three projects have been designed to complement each other. This includes the connectivity of the shared-use path.

The KY 536 Interchange Reconstruction project provides a 10-ft. wide ADA-compliant shared-use path on the north side of KY 536 that provides connectivity along the corridor between the two adjacent projects and a 5-ft. wide sidewalk on the south side of KY 536 from Biltmore Boulevard to US 25 to provide pedestrian access to businesses along the corridor. This project also provides 5-ft. wide sidewalks along both sides of the local roadways to the extent of their reconstruction limits.

A single shared use path through the interchange was selected due to the constrained width beneath the existing bridge structure on I-71/I-75 over KY 536. The entire structure would have to be reconstructed to get two 10-ft. paths under it. As it is, the northern abutment slope underneath the structure will be regraded and a gravity retaining wall will be placed to allow

the construction of the shared used path behind the existing piers. The pedestrian and bike traffic is protected by a signal when crossing the two segments of the southbound exit ramp. While the crossings of northbound entrance ramp are free-flow maneuvers, there is sufficient sight distance for vehicles, pedestrians and bicycles to see potential conflicts.

WATER-RELATED IMPACTS SUMMARY

This project is in Boone County at the interchange of KY 536 and I-71/I75. It involves reconstructing the interchange and KY 536 from Tiburon Drive to 900' east of US 25. Potential impacts of the proposed project on water resources were evaluated and presented the "Ecological Resources Impact Assessment for the KY 536 & I—71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6—14.00" prepared by Stantec (May 2013) and approved by KYTC on June 18, 2013. Potential impacts and anticipated permit requirements include:

Detention

The project will include a detention basin on the right side of KY 536 near the southbound entrance ramp. District 6 has an ongoing agreement with Boone County where detention is to be provided, if possible in any roadway project beyond any project needs, so that overall runoff in the County is reduced below existing figures. Current runoff flowing towards Gunpowder Creek, located to the west of the project, creates significant erosion along the creek and every effort is being implemented to try and reduce that erosion. This basin will reduce the future outflow to 80% of the existing outflow and provide an outlet to restrain the 1-hr to 2-hr storm events, pursuant to new guidelines distributed by Boone County for SD1 compliance and effective since October 1, 2015.

Stream Impacts

Seven surface streams were identified in the project study area, four of which are expected to be impacted by the proposed project (occur within the proposed construction limits), for a total impact length of 517 linear feet. These streams, which are unnamed tributaries to South Fork Gunpowder Creek include:

Unnamed Tributary: USGS intermittent; 441 feet of impact due to the relocation of a roadside ditch

- Unnamed Tributary: non—USGS ephemeral; 17 feet of impact due to fill placement

- Unnamed Tributary: non—USGS intermittent; 18 feet of impact due to culvert extension

- Unnamed Tributary: non—USGS ephemeral; 41 feet of impact due to the fill placement

Overall, no substantial long—term impacts to the water quality of streams are expected by the project because runoff from the improved facility is not expected to be substantially different from the existing roadways (i.e., same types of runoff constituents, including oil, grease, and rubber from vehicles, chemical compounds from fertilizers and herbicides, and sodium/calcium chlorides from de-icing compounds). There will be some direct destruction of aquatic habitat and biota where fill is placed and stream relocation is proposed, but these impacts are expected to be minor.

Wetland Impacts

Ten wetlands were identified in the project study area, three of which will be impacted by the project (partially or entirely within the proposed construction limits), for a total wetland impact of 0.12 acre. Identified wetlands are considered to be preliminary jurisdictional features, pending a USACE Jurisdictional Determination. Impacted wetlands include:

Emergent wetland in narrow elongated basin on south side of KY 536 at SW quadrant of interchange with I—71/ I—75; total size 0.12 acre, of which 0.09 acres will be impacted by fill/grading for roadway widening;

Emergent wetland in drainage swale on south side of KY 536 west of US 25; total size 0.01 acre, all of which

will be impacted by fill/grading for roadway widening.

Emergent wetland in drainage swale on south side of KY 536 east of US 25; total size 0.02 acre, all of which will be impacted by fill/grading for roadway widening. These wetlands are considered to be of limited value and provide only limited beneficial wetland functions for the local environment due to their small size. Because of their proximity to the proposed project, they are not able to be avoided by the proposed KY 536 widening/ intersection improvements.

Anticipated Permits

Section 404/401 – Dependent on USACE Jurisdictional Determination and based on available information to date, a USACE Section 404 Nationwide permit with mitigation and a KDOW Individual Water Quality Certification (WQC) is anticipated for impacts to Unnamed Tributary:(441 linear feet impacted), and for the remaining impacted streams, a USACE Letter of Notification (ACE LON)would likely apply; for impacts to wetlands, a USACE Section 404 Nationwide (NWI) permit with mitigation would likely apply.

Storm water – The project must meet the requirements of the KYTC's MS4 permit (KPDES No. KYS000003 with an effective date of October 1, 2012) and must also comply with KPDES General Permits for Storm Water Discharges Associated with Construction Activities (KYR10).

WATER RELATED IMPACTS SUMMARY

County	Boone	**Route No.**	KY 536	**Item No.**	6-14.00
Date	7/9/18	**Program #**	8022203D		
Federal Project No.	IM 025-7 130				
State Project No.	FD52 008 0075 178-179				
Location Engineer	Randy Turner				

Section 1: Impact Checklist

The only footprint presented at PL&G was the Preferred Alternative

FLOODPLAIN IMPACTS		
FEMA Study Type	**Yes**	**Community No.**
Detailed FEMA Study with delineated floodway*		
Detailed FEMA Study without delineated floodway*		
Approximate FEMA Study		
No FEMA Study	X	
* May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual.		

SIGNIFICANT RESOURCE IMPACTS				
Are open sinkholes impacted? If so, how many sinkholes are impacted?	Yes		No	X
Are wetlands impacted? If so, how many total acres are estimated? 0.12 acres	Yes	X	No	
Are any of the streams in the project area designated "Special Use Waters" (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?	Yes		No	X
Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the drainage manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual. Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment analysis for more information.				

STREAM CHANNEL IMPACTS				
Will stream relocations (channel changes) be needed? If so, how many total linear feet are estimated? _____LF	Yes		No	X
Will new culverts or culvert extensions be constructed? If so, how many total linear feet are estimated?_____LF	Yes		No	X
Will temporary stream crossings be needed?	Yes		No	X
Will excess material sites that require permitting be needed?	Yes		No	X
Will bridges be constructed?	Yes		No	X
On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the drainage manual.				

Section 2 : Impact Discussion

No Outstanding State Resource Waters, Exceptional Waters, or Special Use Waters are located within the project area.

DESIGN EXECUTIVE SUMMARY

I-75/I-71 & KY 338 (RICHWOOD ROAD) INTERCHANGE

BOONE COUNTY, KENTUCKY

IM 75-7 (129)

FD 52 008 0075 175-176

ITEM NO. 6-18.00

JANUARY 2019

HDR ENGINEERING, INC.

2517 SIR BARTON WAY

LEXINGTON, KENTUCKY 40509

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DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-18.00
Route Number(s):	KY 338	**State Program #:**	8433801D
BMP/EMP:	0/0.2	**Federal Project #:**	IM 75-7 (129)
Type of Work:	Reconstruction	**State Project #:**	FD 008 0075 175-176

Highway Plan Project Description: Reconstruction of the KY 338 (Richwood Road) and I-75/I-71 Interchange
KY 338 East of the DCD Interchange

EXISTING CONDITIONS

ADT (2011): 14,816 **Truck Class:** AAA **Trucks:** 33 %

Existing Functional Classification: ☑ Urban ☐ Rural — Arterial

Terrain: Rolling

Route is on (check all that apply): ☐ NHS ☐ NN ☑ Ext Wt ☐ None

Posted Speed Limit: 35 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)

Existing Bike Accommodations: None **Ped:** ☐ Sidewalk ☐ Other:_____

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial

Design ADT (2030): 21,600
DHV: 2,120

Access Control: Fully Controlled
Min. Spacing:_____

CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)	
Design Speed	**45 MPH**	Minimum: 30 MPH Selected: 35 MPH	**35 MPH**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	10'-11', 3 lanes	12', 2-4 lanes	12', 3-5 lanes	☐	☐
Shoulder Width (Minimum Usable)	12'	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	1637'	510'	600'	☐	☐
Max. Superelev. Rate (emax= NC %)	4.30%	NC	NC	☐	☑
Stopping Sight Distance (Minimum)	>500	250'	384'	☐	☐
Max. Grade (%)	5.90%	8.00%	5.10%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	16.00'	16.19'	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8' - 12'	13' *	☐
Sidewalk Width, slope	N/A	5', 2%	5', 2%	☐
Bike Lane Width, slope	N/A	N/A	N/A	☐
Shared Use Path Width	N/A	8' - 14'	8' - 10'	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-18.00
Route Number(s):	KY 338	**State Program #:**	8433801D
BMP/EMP:	0.2/0.4	**Federal Project #:**	IM 75-7 (129)
Type of Work:	Reconstruction	**State Project #:**	FD 008 0075 175-176

Highway Plan Project Description: Reconstruction of the KY 338 (Richwood Road) and I-75/I-71 Interchange KY 338 Through the DCD Interchange

EXISTING CONDITIONS

ADT (2011): 19,842 **Truck Class:** AAA **Trucks:** 14 %

Existing Functional Classification: ☑ Urban ☐ Rural — Arterial

Terrain: Rolling

Route is on (check all that apply): ☐ NHS ☐ NN ☐ Ext Wt ☑ None

Posted Speed Limit: 35 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)

Existing Bike Accommodations: None **Ped:** ☐ Sidewalk ☐ Other:_____

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial

Design ADT (2030): 31,300

DHV: 3,850

Access Control: Fully Controlled

Min. Spacing:_____

CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)
Design Speed	45 MPH	Minimum: 20 MPH **** Selected: 25 MPH	25 MPH	☐

Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.

				Exception (≥ 50 mph)	Variance (< 50 mph)
Lane Width, No. of Lanes	10'-11', 3 lanes	12', 4 lanes	15', 4 lanes	☐	☐
Shoulder Width (Minimum Usable)	12' (10' Paved)	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	1146'	198' (NC)	220'	☐	☐
Max. Superelev. Rate (emax= NC %)	4.30%	NC	NC	☐	☑
Stopping Sight Distance (Minimum)	>500'	155'	398'	☐	☐
Max. Grade (%)	5.90%	9.00%	5.36%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	17.19'	16'	17.19'	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	N/A	8' - 12'	13' *	☐
Sidewalk Width, slope	N/A	5', 2%	5', 2%	☐
Bike Lane Width, slope	N/A	N/A	N/A	☐
Shared Use Path Width	N/A	8' - 14'	10'	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-18.00
Route Number(s):	KY 338	**State Program #:**	8433801D
BMP/EMP:	0.4/0.8	**Federal Project #:**	IM 75-7 (129)
Type of Work:	Reconstruction	**State Project #:**	FD 008 0075 175-176

Highway Plan Project Description: Reconstruction of the KY 338 (Richwood Road) and I-75/I-71 Interchange
KY 338 West of the DCD Interchange

EXISTING CONDITIONS

ADT (current): 19,842 **Truck Class:** AAA **Trucks:** 13 %

Existing Functional Classification: ☑ Urban ☐ Rural — Arterial

Terrain: Rolling

Route is on (check all that apply): ☐ NHS ☐ NN ☐ Ext Wt ☑ None

Posted Speed Limit: 35 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)

Existing Bike Accommodations: None **Ped:** ☑ Sidewalk ☐ Other:

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial

Design ADT (2030): 31,300
DHV: 3,850

Access Control: By Permit
Min. Spacing:

CONTROLLING CRITERIA:	EXISTING CONDITIONS (Estimated based upon existing geometrics.)	AASHTO Guidance (for design speed)	Recommendation	Design Exception (check if needed for Design Speed)
Design Speed	45 MPH	Minimum: 30 MPH Selected: 35 MPH	35 MPH	☐

Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.

				Exception (≥ 50 mph)	Variance (< 50 mph)
Lane Width, No. of Lanes	10' -11', 2-3 lanes	12', 2-4 lanes	12', 3-5 lanes	☐	☐
Shoulder Width (Minimum Usable)	1'-2'	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	1146'	510'	930'	☐	☐
Max. Superelev. Rate (emax= NC %)	4.30%	NC	NC	☐	☑
Stopping Sight Distance (Minimum)	276'	250'	252'	☐	☐
Max. Grade (%)	3.60%	8.00%	3.70%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	N/A	N/A	☐	☐

OTHER CRITERIA:

				Design Variance
Border Area (urban)	10'	8' - 12'	13' *	☐
Sidewalk Width, slope	N/A	5', 2%	5', 2%	☐
Bike Lane Width, slope	N/A	N/A	N/A	☐
Shared Use Path Width	N/A	8' - 14'	8'	☐
Other:				☐

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-18.00
Route Number(s):	I-75/I-71	**State Program #:**	8433801D
BMP/EMP:	174.8/176.3	**Federal Project #:**	IM 75-7 (129)
Type of Work:	Reconstruction	**State Project #:**	FD 008 0075 175-176

Highway Plan Project Description: Reconstruction of the KY 338 (Richwood Road) and I-75/I-71 Interchange
Interstate I-75/I-71

EXISTING CONDITIONS

ADT (2011): 104,928	**Truck Class:** AAA		**Trucks:** 22 %
Existing Functional Classification: ☑ Urban ☐ Rural — Interstate	**Terrain:** Rolling	**Route is on (check all that apply):** ☑ NHS ☑ NN ☐ Ext Wt ☐ None	
Posted Speed Limit: 70 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)			
Existing Bike Accommodations: None	**Ped:** ☐ Sidewalk ☐ Other:_____		

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Interstate	**Design ADT (2030):** 146,644 **DHV: 13,800**	**Access Control:** Fully Controlled **Min. Spacing:**_____	

CONTROLLING CRITERIA:	**EXISTING CONDITIONS (Estimated based upon existing geometrics.)**	**AASHTO Guidance (for design speed)**	**Recommendation**	**Design Exception (check if needed for Design Speed)**	
Design Speed	**70 MPH**	Minimum: 50 MPH Selected: 70 MPH	**70 MPH**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	12', 8 lanes	12', 8 lanes	12', 8 lanes	☐	☐
Shoulder Width (Minimum Usable)	12', 10' paved	12', 10' paved	12', 10' paved	☐	☐
Horiz. Curve Radius (Minimum)	N/A (Tangent)	1810'	N/A (Tangent)	☐	☐
Max. Superelev. Rate (emax= 8.00%)	N/A (Tangent)	8.00%	N/A (Tangent)	☐	☐
Stopping Sight Distance (Minimum)	1045'	730'	1045'	☐	☐
Max. Grade (%)	2.75%	4.00%	2.75%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	N/A	N/A	☐	☐
OTHER CRITERIA:				**Design Variance**	
Border Area (urban)	N/A	N/A	N/A	☐	
Sidewalk Width, slope	N/A	N/A	N/A	☐	
Bike Lane Width, slope	N/A	N/A	N/A	☐	
Shared Use Path Width	N/A	N/A	N/A	☐	
Other:				☐	

DESIGN EXECUTIVE SUMMARY

County:	Boone	**Item #:**	6-18.00
Route Number(s):	US 25	**State Program #:**	8433801D
BMP/EMP:	4.0/5.3	**Federal Project #:**	IM 75-7 (129)
Type of Work:	Reconstruction	**State Project #:**	FD 008 0075 175-176

Highway Plan Project Description: Reconstruction of the KY 338 (Richwood Road) and I-75/I-71 Interchange US 25 (Dixie Highway)

EXISTING CONDITIONS

ADT (current): 11,964	**Truck Class:** AAA		**Trucks:** 19 %
Existing Functional Classification: ☑ Urban ☐ Rural — Arterial	**Terrain:** Rolling	**Route is on (check all that apply):** ☐ NHS ☐ NN ☐ Ext Wt ☑ None	
Posted Speed Limit: 55 mph **"or"** **Statutory Speed Limit:** ☐ 35 mph (urban) ☐ 55 mph (rural)			
Existing Bike Accommodations: None	**Ped:** ☐ Sidewalk ☐ Other:_____		

PROPOSED CONDITIONS

Design Functional Classification: ☑ Urban ☐ Rural — Arterial	**Design ADT (year):** 19,758 **DHV:** 1,820	**Access Control:** By Permit **Min. Spacing:**_____	

CONTROLLING CRITERIA:	**EXISTING CONDITIONS (Estimated based upon existing geometrics.)**	**AASHTO Guidance (for design speed)**	**Recommendation**	**Design Exception (check if needed for Design Speed)**	
Design Speed	**50 MPH**	Minimum: 30 MPH Selected: 45 MPH	**45 MPH**	☐	
Note: For any remaining controlling criteria that are less than AASHTO recommended guidance: If recommended design speed is ≥ 50 mph, exceptions are needed; If recommended design speed is < 50 mph, variances are needed.				**Exception (≥ 50 mph)**	**Variance (< 50 mph)**
Lane Width, No. of Lanes	10'-11', 2-3 lanes	12', 2-4 lanes	11'-12', 3-5 lanes	☐	☐
Shoulder Width (Minimum Usable)	2'-8'	Curb & Gutter	Curb & Gutter	☐	☐
Horiz. Curve Radius (Minimum)	1146'	711'	1100' **	☐	☐
Max. Superelev. Rate (emax= 4.00 %)	4.00%	4.00%	3.66%	☐	☐
Stopping Sight Distance (Minimum)	230'	360'	361'	☐	☐
Max. Grade (%)	4.90%	7.00%	4.73%	☐	☐
Normal Cross Slope (%)	2.00%	2.00%	2.00%	☐	☐
Vert. Clearance (ft.)	N/A	N/A	N/A	☐	☐
OTHER CRITERIA:				**Design Variance**	
Border Area (urban)	N/A	8' - 12'	6' - 13' ***	☐	
Sidewalk Width, slope	N/A	N/A	N/A	☐	
Bike Lane Width, slope	N/A	N/A	N/A	☐	
Shared Use Path Width	N/A	8' - 14'	8'	☐	
Other:				☐	

DESIGN EXECUTIVE SUMMARY

Design Criteria Notes:

*** The border area consists of an 8' shared use path with a 3' berm on the inside and 2' on the outside of the path.**
**** At the northern terminus, proposed US 25 ties to an existing 600' curve on US 25. *****
The border area on the west side from Sta. 28+35 to Sta. 47+50 consists of a 8' shared use path with a 3' berm on the inside and 2' on the outside of the path. The remaining border area has a 6' grass berm.
****** Minimum Design Speed thru DCD can be 20 mph based on 2018 Green Book pg. 10-55.**

Environmental Action: CE Level 3

Completion Date: May 2014
☐ scheduled ☑ actual

Existing Pavement Depths: N/A

Include:

1. Typical sections, including bridges
2. Map showing project location
3. Project overview and existing conditions
4. Purpose and Need statement
5. Discussion of alternatives (including preferred and no build) with respective traffic control schemes, and environmental, utility and right-of-way impacts.
6. Discussion of Design Exceptions /Variances and mitigation strategies
7. Cost comparison table of alternatives vs. Highway Plan
8. Discussion if preferred alternate cost is >115% than highway plan
9. Discussion of clearzone
10. Consideration for bicycle and pedestrian facilities (see HDM Chapter 1500)
11. Water-related impacts summary

Submitted by Project Engineer: Kelly N Meyer ☐ KYTC ☑ Consultant **Date:** 1/10/2019

Recommended by Project Manager: Carie Callaway-Rowlett **Date:** 2-11-19

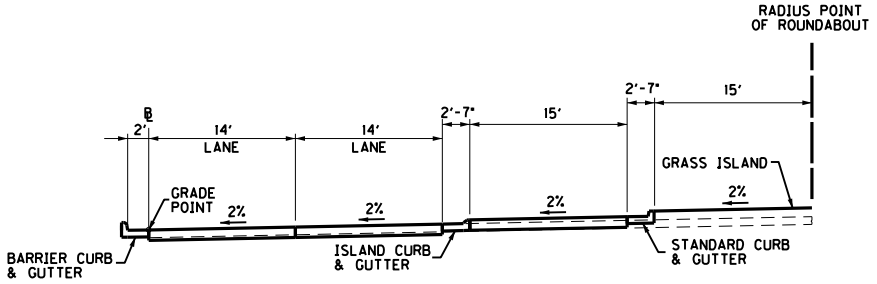
Tier Level Approval ☐ Tier 1 ☑ Tier 2 ☒ Tier 3

Location Engineer: Rachell L. Inman **Date:** 2-22-19

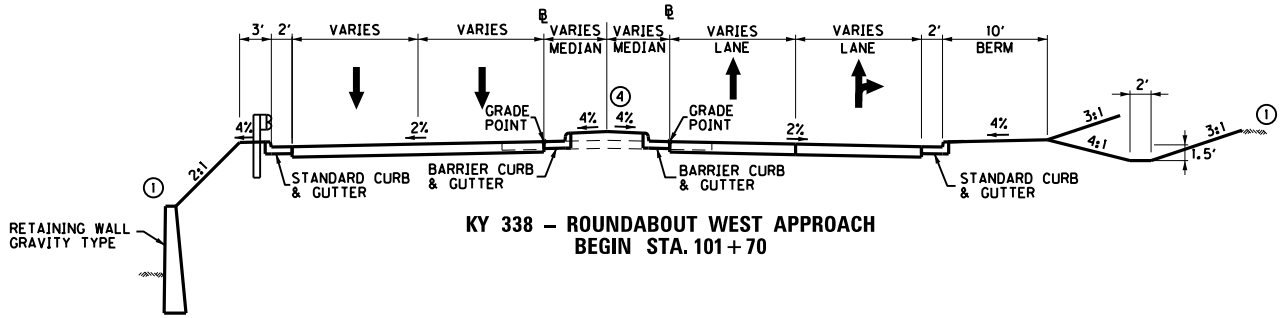
Roadway Design Branch Manager: Brad Eldridge **Date:** 2-22-19

Geometric Approval Granted by: Director, Div. of Hwy. Design **Date:** 2/26/19

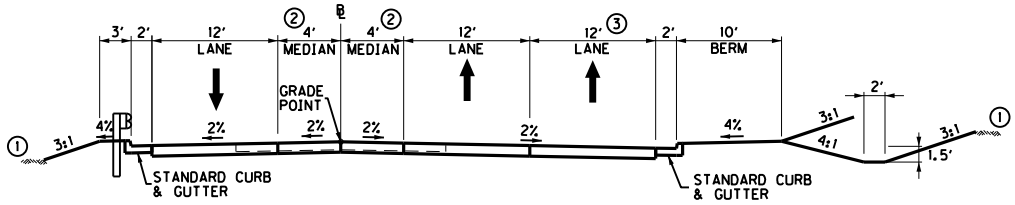
TYPICAL SECTIONS



KY 338 – ROUNDABOUT AT
TRIPLE CROWN & GRAND NATIONAL



KY 338 – ROUNDABOUT WEST APPROACH
BEGIN STA. 101+70



KY 338 – 3 LANE NORMAL SECTION
STA. 99+00 TO STA. 101+70

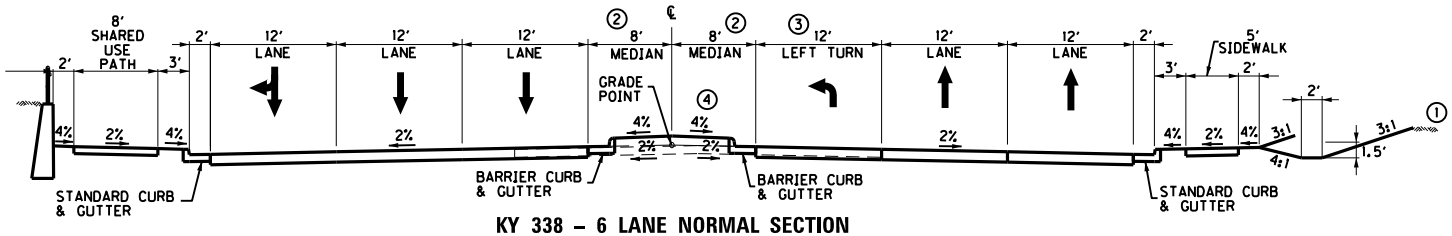
① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② 0'
STA. 99+00 TO 101+30
VARIES FROM 0' TO 4'
STA. 101+30 TO STA. 101+70

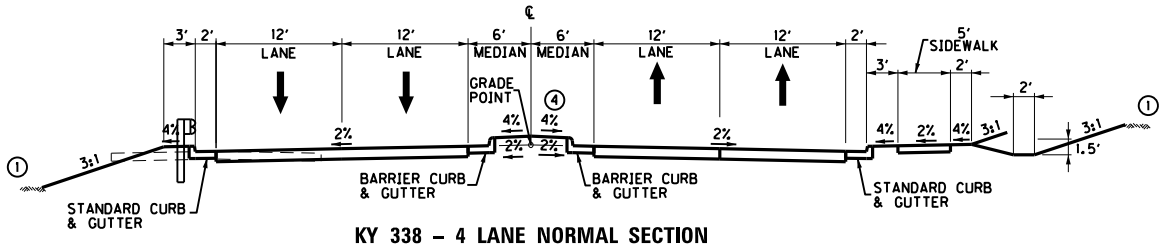
③ 0'
STA. 99+00 TO 100+45
VARIES FROM 0' TO 12'
STA. 100+45 TO STA. 101+70

④ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

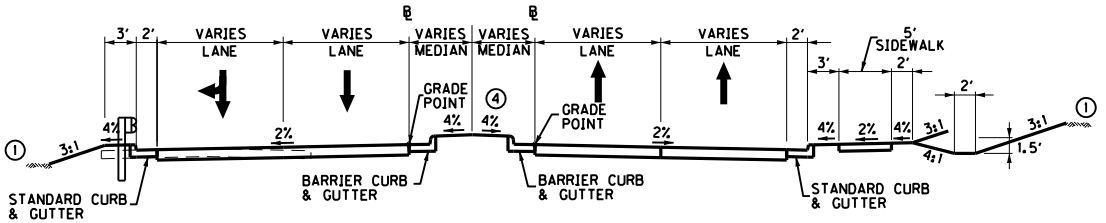
TYPICAL SECTIONS



KY 338 – 6 LANE NORMAL SECTION
STA. 113+00 TO STA. 114+50



KY 338 – 4 LANE NORMAL SECTION
STA. 111+15 TO STA. 113+00



KY 338 – ROUNDABOUT EAST APPROACH
END STA. 111+15

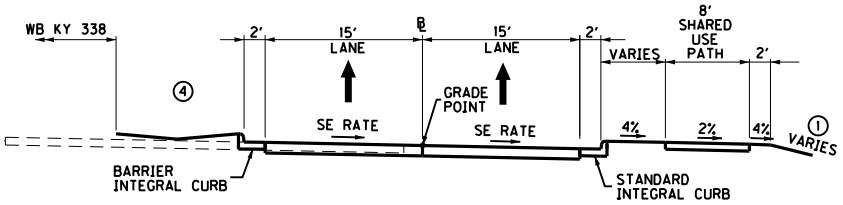
① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② VARIES FROM 6' TO 8'
STA. 113+00 TO STA. 113+50

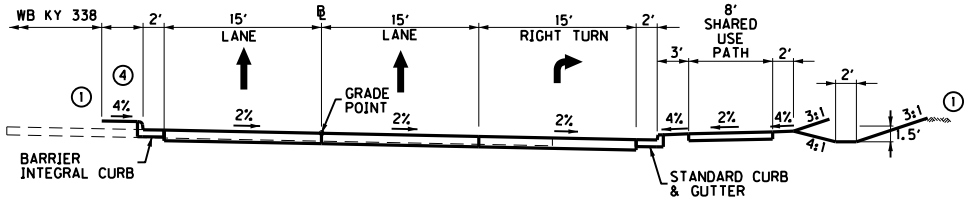
③ 0'
STA. 113+00 TO 114+00
VARIES FROM 0' TO 12'
STA. 114+00 TO STA. 114+50

④ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

TYPICAL SECTIONS

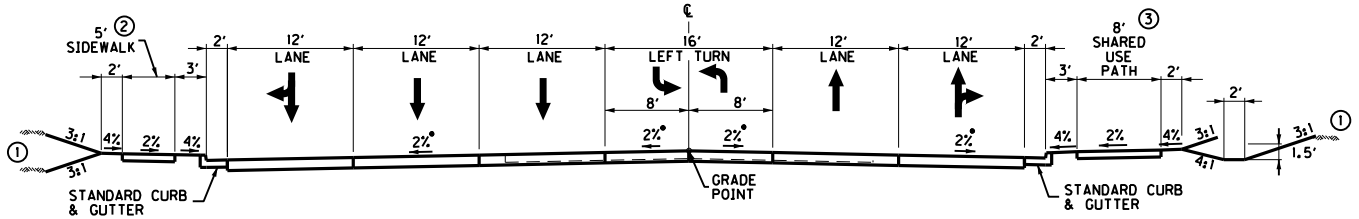


KY 338 EB – 2 LANE NORMAL SECTION
STA. 103+05 TO STA. 106+65



KY 338 EB – 3 LANE NORMAL SECTION
STA. 100+00 TO STA. 103+05

KY 338 STATION EQUATIONS
KY 338 STA. 124+07.17 BACK =
KY 338 EB STA. 100+00.00 AHEAD =
KY 338 WB STA. 200+00.00 AHEAD



•SLOPE VARIES THROUGH INTERSECTION
SEE CROSS SECTIONS AND GRADING
PLANS FOR DETAILS

KY 338 – 6 LANE NORMAL SECTION
STA. 114+50 TO STA. 124+07.17

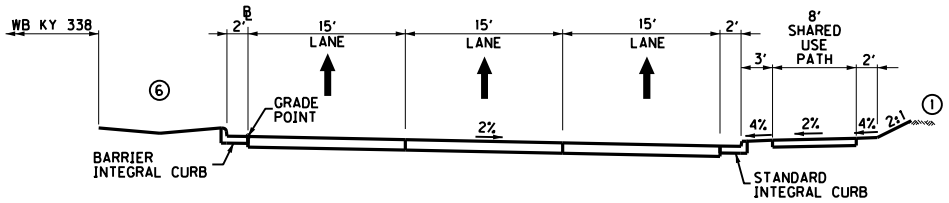
① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② 8'
STA. 114+50 TO 115+60

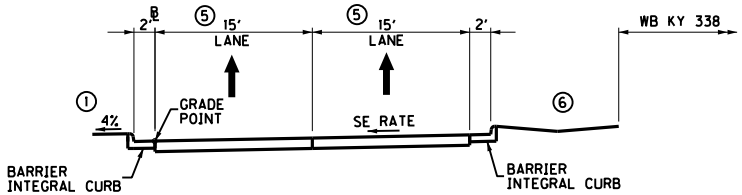
③ 5'
STA. 114+50 TO 115+00
VARIES FROM 5' TO 10'
STA. 115+00 TO STA. 115+30

④ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

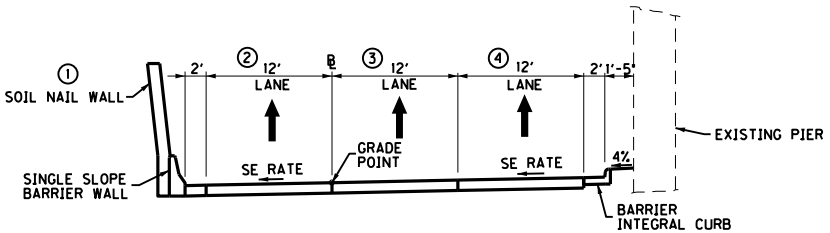
TYPICAL SECTIONS



KY 338 EB – 3 LANE NORMAL SECTION
STA. 113+50 TO STA. 116+06.82



KY 338 EB – 2 LANE SUPERELEVATION SECTION LEFT
STA. 110+50 TO STA. 113+50



KY 338 EB – 3 LANE SUPERELVATED SECTION LEFT
STA. 106+65 TO STA. 110+50

① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② VARIES FROM 15' TO 12'
STA. 107+30 TO STA. 107+95

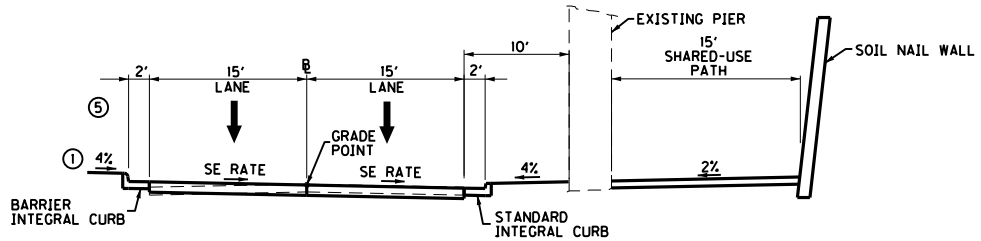
③ VARIES FROM 15' TO 12'
STA. 106+65 TO STA. 107+30

④ VARIES FROM 0' TO 12'
STA. 106+65 TO STA. 107+30

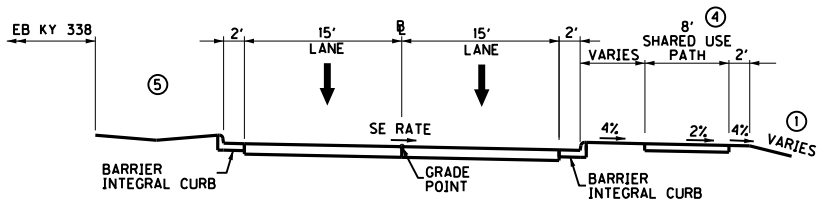
⑤ VARIES FROM 12' TO 15'
STA. 110+50 TO STA. 111+15

⑥ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

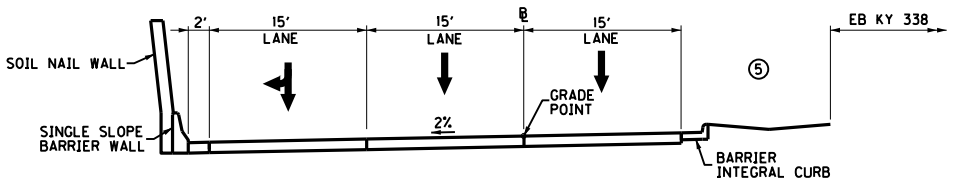
TYPICAL SECTIONS



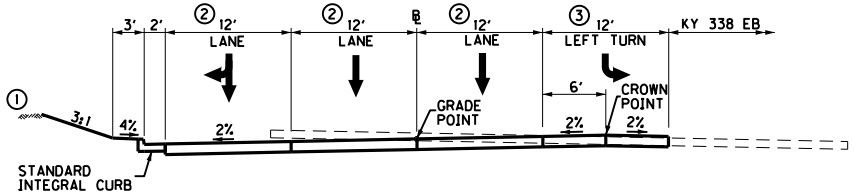
KY 338 WB – 2 LANE SUPERELEVATED SECTION RIGHT
STA. 207+06 TO STA. 210+46



KY 338 WB – 2 LANE SUPERELEVATED SECTION RIGHT
STA. 203+56 TO STA. 207+06



KY 338 WB – 3 LANE NORMAL SECTION
STA. 201+70 TO STA. 203+56



KY 338 WB – 4 LANE NORMAL SECTION
STA. 200+00 TO STA. 201+70

① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

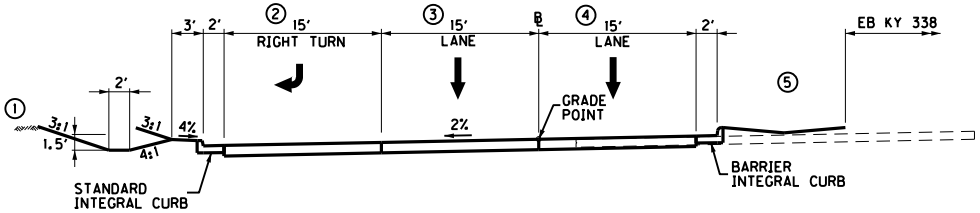
② VARIES FROM 12' TO 15' STA. 201+10 TO STA. 201+70

③ VARIES FROM 12' TO 0' STA. 200+10 TO STA. 201+70

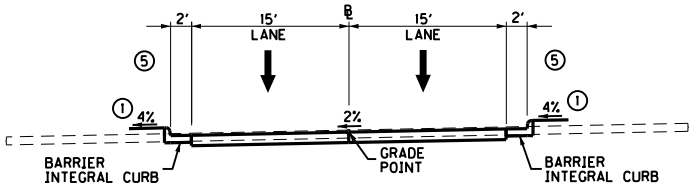
④ STA. 204+56.58 TO STA. 205+91.39

⑤ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

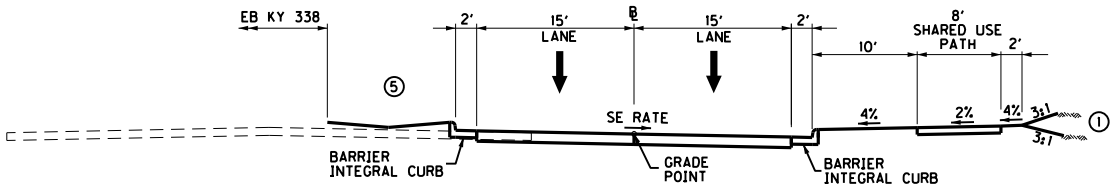
TYPICAL SECTIONS



KY 338 WB – 3 LANE NORMAL SECTION
STA. 214+00 TO STA. 216+22.16



KY 338 WB – 2 LANE NORMAL SECTION
STA. 212+40 TO STA. 214+00



KY 338 WB – 2 LANE SUPERELEVATED SECTION RIGHT
STA. 210+46 TO STA. 212+40

① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

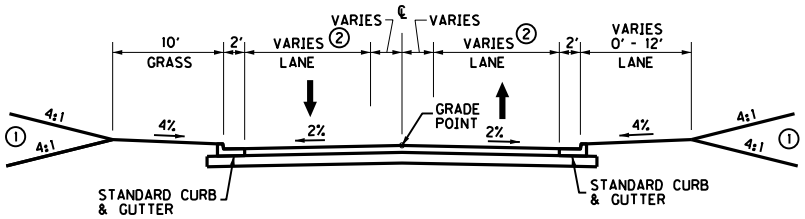
② VARIES FROM 15' TO 12'
STA. 215+19.48 TO STA. 216+19.45
12'
FROM STA. 216+19.45 TO STA. 216+22.16

③ VARIES FROM 15' TO 12'
STA. 215+14.54 TO STA. 216+10.09
12'
FROM STA. 216+10.09 TO STA. 216+22.16

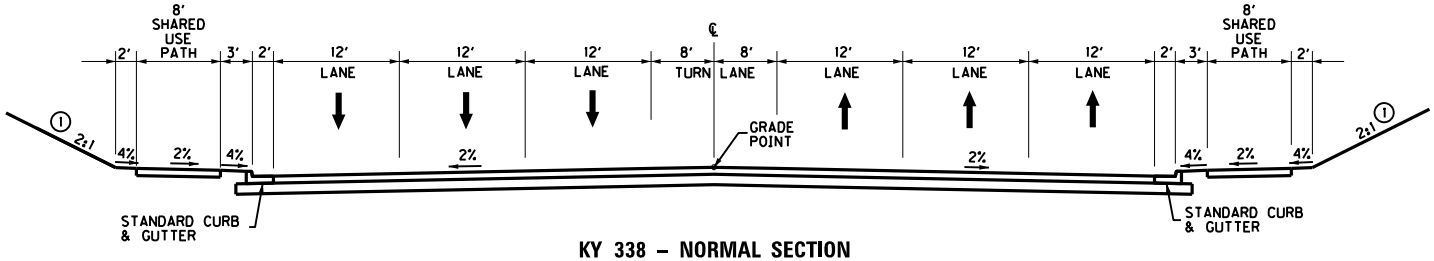
④ VARIES FROM 15' TO 12'
STA. 215+09.81 TO STA. 216+00.24
12'
FROM STA. 216+00.24 TO STA. 216+22.16

⑤ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

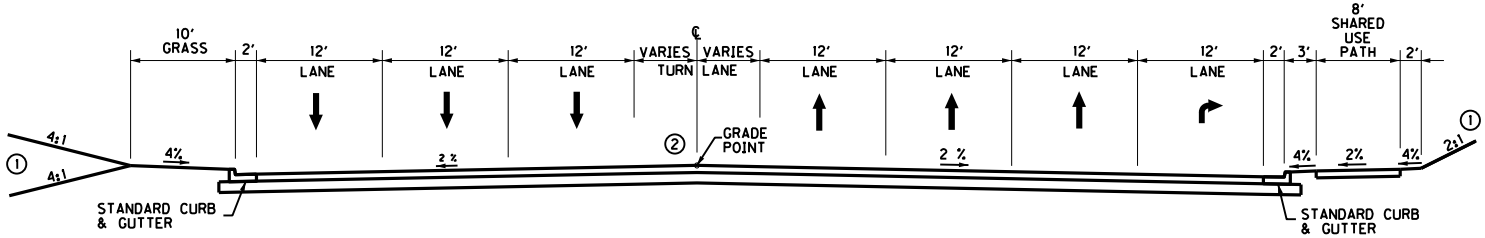
TYPICAL SECTIONS



KY 338 – NORMAL SECTION
STA. 384+00 TO STA. 392+47



KY 338 – NORMAL SECTION
STA. 374+00 TO STA. 384+40



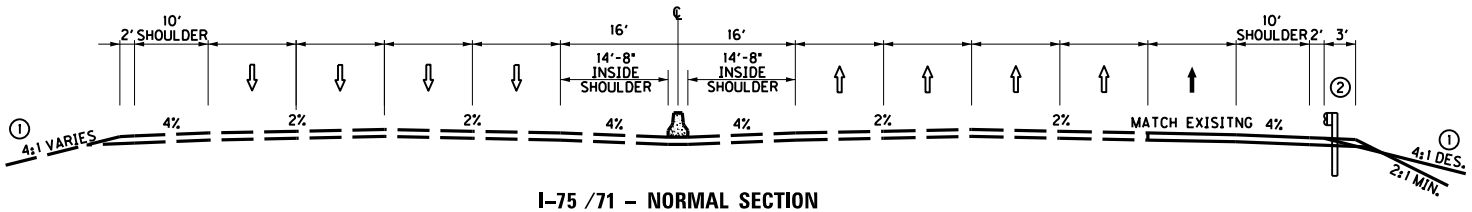
KY 338 – NORMAL SECTION
STA. 370+20 TO STA. 374+00

KY 338 STATION EQUATIONS
KY 338 EB STA. 116+06.82 BACK =
KY 338 WB STA. 216+22.16 BACK =
KY 338 STA. 370+20.00 AHEAD

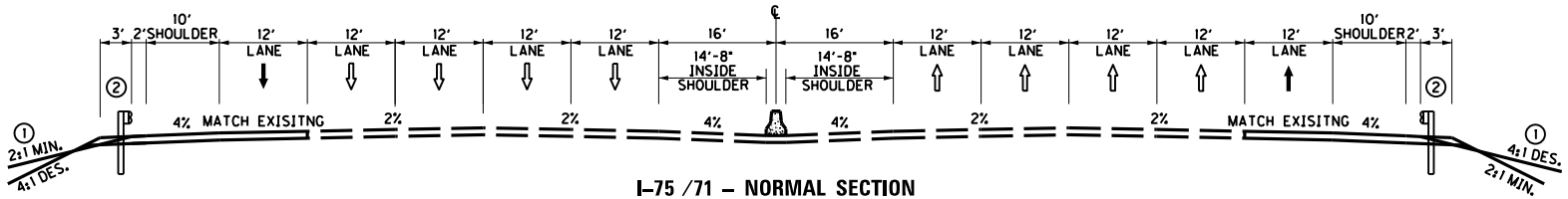
① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.

② SEE PLAN SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY AND MEDIAN DETAILS.

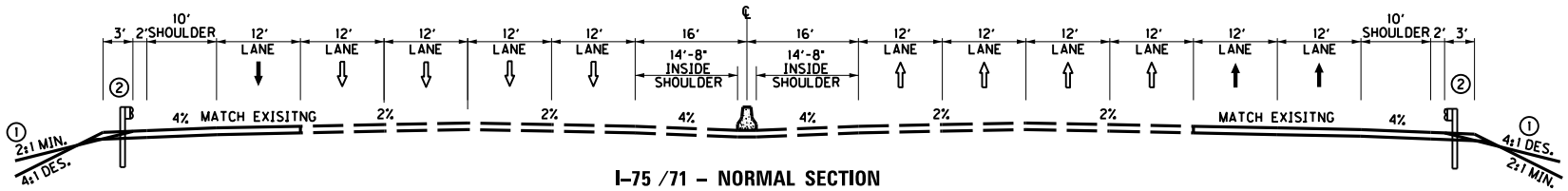
TYPICAL SECTIONS



I–75 /71 – NORMAL SECTION
STA. 492+86 TO STA. 506+18

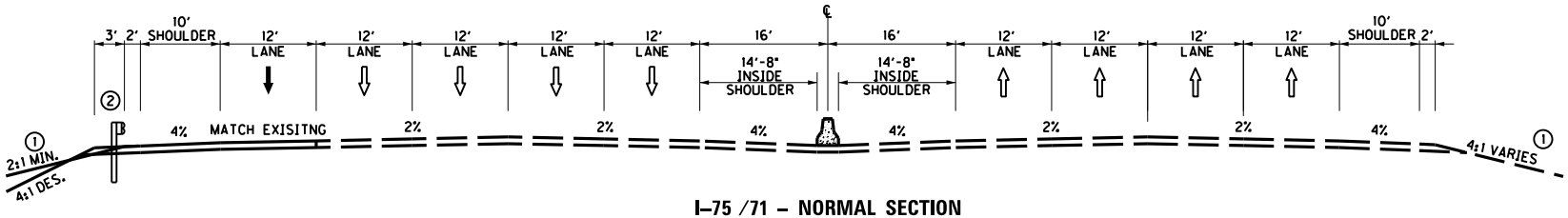


I–75 /71 – NORMAL SECTION
STA. 480+78 TO STA. 492+86



I–75 /71 – NORMAL SECTION
STA. 474+50 TO STA. 480+78

STA. 444+00 TO STA. 474+50 – NO WORK ON MAINLINE INTERSTATE

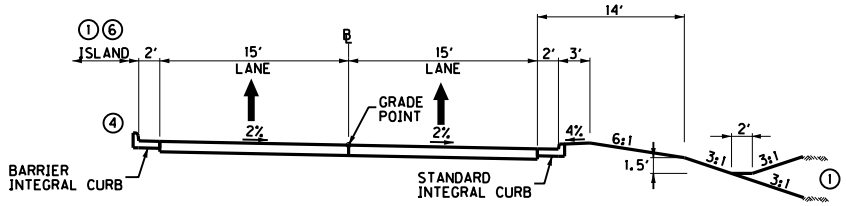


I–75 /71 – NORMAL SECTION
STA. 419+03.64 TO STA. 444+00

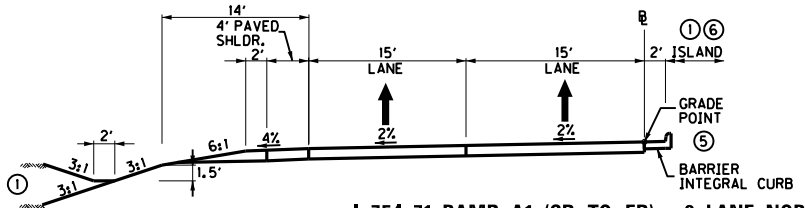
① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.

② SHOULDER SHALL BE WIDENED 3 FEET WHERE GUARDRAIL IS TO BE INSTALLED AND PAVED SHOULDER SHALL BE WIDENED 2 FEET TO FACE OF GUARDRAIL.

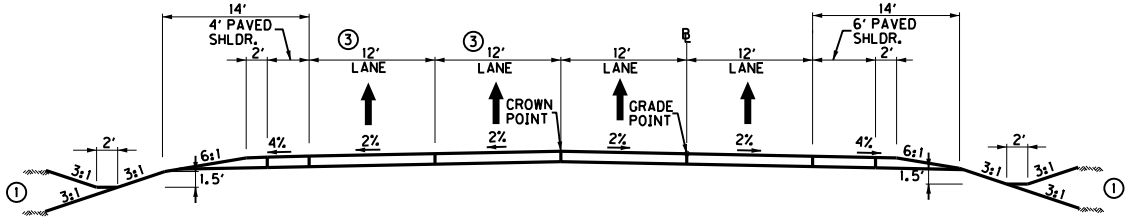
TYPICAL SECTIONS



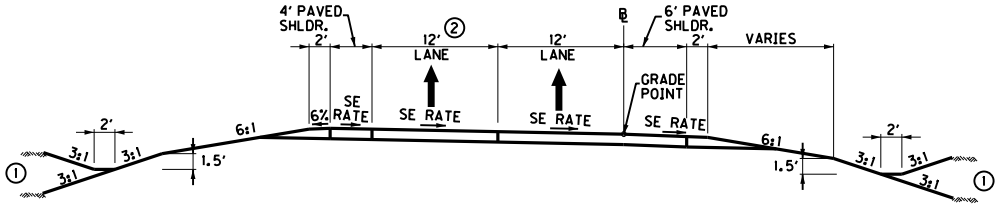
I–754–71 RAMP A (SB TO WB) – 2 LANE NORMAL SECTION
STA. 99+74.20 TO STA. 103+77.91



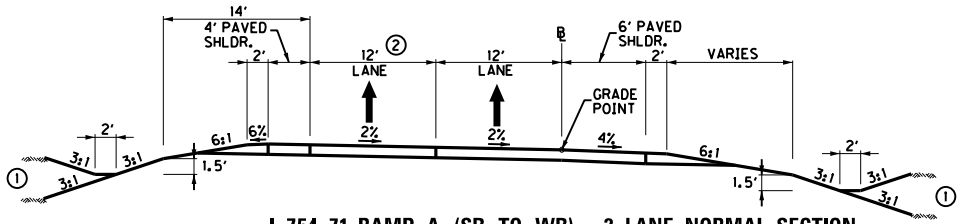
I–754–71 RAMP A1 (SB TO EB) – 2 LANE NORMAL SECTION
STA. 153+90.24 TO STA. 157+35.02



I–754–71 RAMP A (SB TO WB) – 4 LANE NORMAL SECTION
STA. 97+86 TO STA. 99+74.40



I–754–71 RAMP A (SB TO WB) – 2 LANE SUPERELEVATED RIGHT
STA. 89+81 TO STA. 97+86



I–754–71 RAMP A (SB TO WB) – 2 LANE NORMAL SECTION
STA. 87+60.69 TO STA. 89+81

① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② VARIES FROM 0' TO 12'
STA. 87+60.69 TO STA. 89+89.22

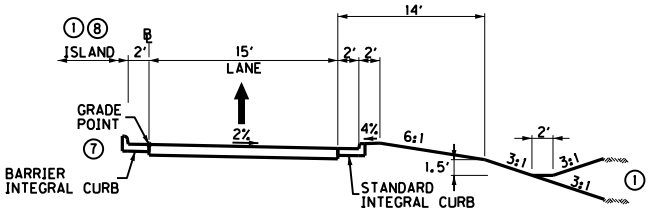
③ VARIES FROM 12' TO 15'
STA. 98+75 TO STA. 99+25
15'
STA. 99+25 TO STA. 99+74.20

④ CURB ENDS STA. 103+62.29

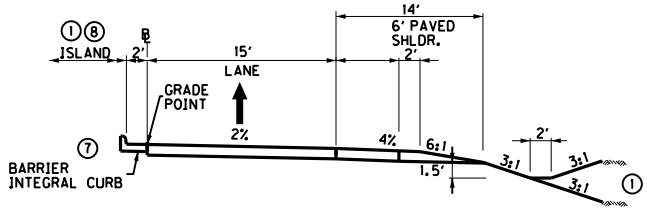
⑤ CURB ENDS STA. 157+20.30

⑥ MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

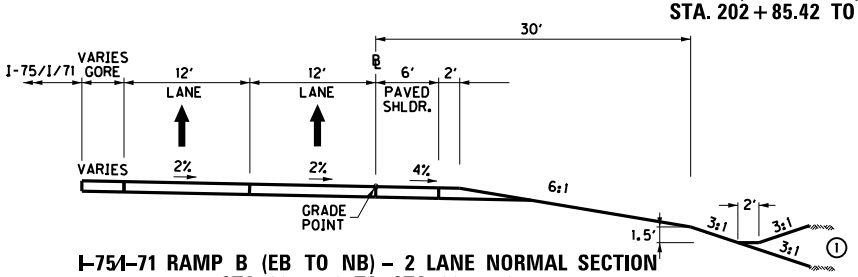
TYPICAL SECTIONS



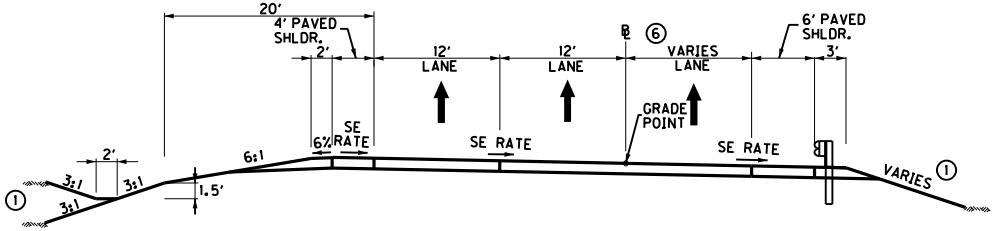
I–754–71 RAMP B1 (WB TO NB) – 1 LANE NORMAL SECTION
STA. 200 + 00 TO STA. 202 + 85.42



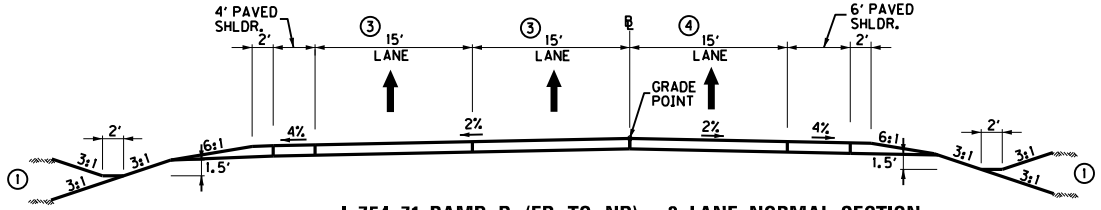
I–754–71 RAMP B1 (WB TO NB) – 1 LANE NORMAL SECTION
STA. 202 + 85.42 TO STA. 203 + 85.54



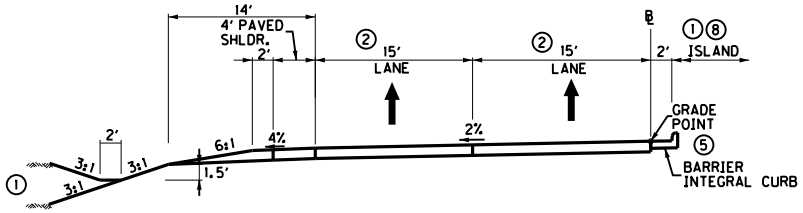
I–754–71 RAMP B (EB TO NB) – 2 LANE NORMAL SECTION
STA. 264 + 56 TO STA. 265 + 40



I–754–71 RAMP B (EB TO NB) – 2 LANE SUPERELEVATED SECTION RIGHT
STA. 255 + 02 TO STA. 264 + 56



I–754–71 RAMP B (EB TO NB) – 3 LANE NORMAL SECTION
STA. 253 + 91.81 TO STA. 255 + 02



I–754–71 RAMP B (EB TO NB) – 2 LANE NORMAL SECTION
STA. 250 + 60 TO STA. 253 + 91.81

(1) SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

(2) VARIES FROM 12' TO 15' ALONG RAMP

(3) VARIES FROM 15' TO 12'
STA. 254+00 TO STA. 255+25

(4) VARIES FROM 15' TO 0'
STA. 254+00 TO STA. 259+60

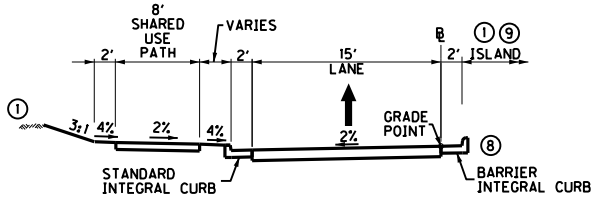
(5) CURB BEGINS STA. 250+83.93
CURB ENDS STA. 253+27.42

(6) VARIES FROM STA. 15' TO 0'
STA. 254+00 TO STA. 259+60
0'
STA. 259+60 TO STA. 260+95.29

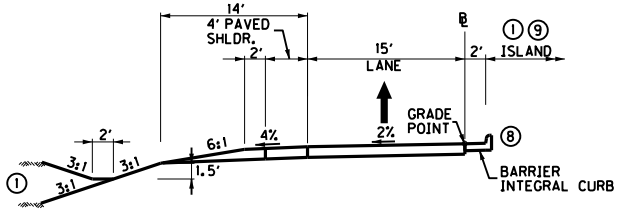
(7) CURB BEGINS STA. 200+46.86
CURB ENDS STA. 203+20.71

(8) MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

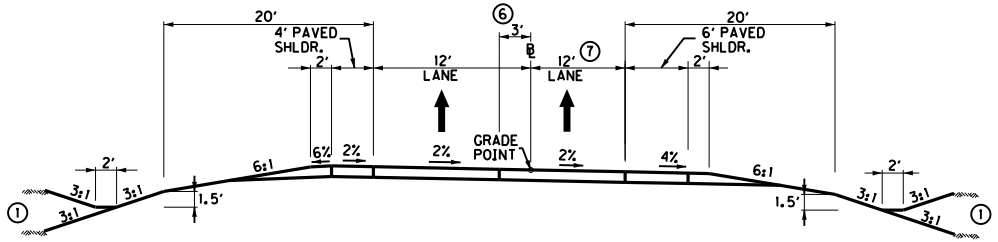
TYPICAL SECTIONS



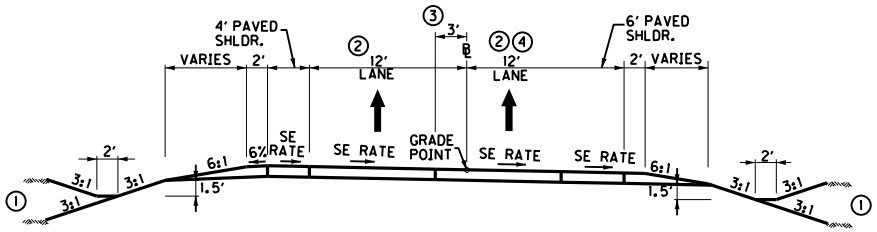
I–754–71 RAMP C1 (WB TO SB) – 1 LANE NORMAL SECTION
STA. 352+00 TO STA. 352+45



I–754–71 RAMP C1 (WB TO SB) – 1 LANE NORMAL SECTION
STA. 352+45 TO STA. 354+83

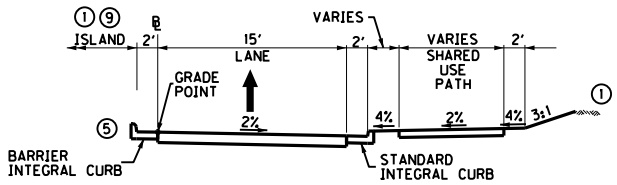


I–754–71 RAMP C (EB TO SB) – 2 LANE NORMAL SECTION
STA. 313+81 TO STA. 318+61

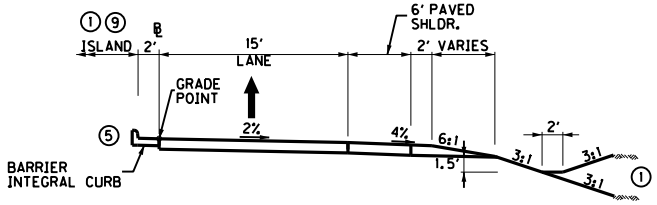


I–754–71 RAMP C (EB TO SB) – 2 LANE SUPERELEVATED SECTION RIGHT
STA. 305+90 TO STA. 313+81

1. SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.
2. VARIES FROM 15' TO 12'
   STA. 305+90 TO STA. 306+60
3. VARIES FROM 0' TO 3'
   STA. 305+90 TO STA. 306+60
   3'
   STA. 306+60 TO STA. 313+50
   VARIES FROM 3' TO 0'
   STA. 313+50 TO STA. 318+00
4. VARIES FROM 12' TO 0'
   STA. 313+50 TO STA. 318+00
5. CURB BEGINS STA. 302+85.14
   CURB ENDS STA. 305+22.85
6. VARIES FROM 3' TO 0'
   STA. 313+50 TO STA. 318+00
7. VARIES FROM STA. 12' TO 0'
   STA. 313+50 TO STA. 318+00
   0'
   STA. 318+00 TO STA. 318+61
8. CURB BEGINS STA. 352+00
   CURB ENDS STA. 354+26.30
9. MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.

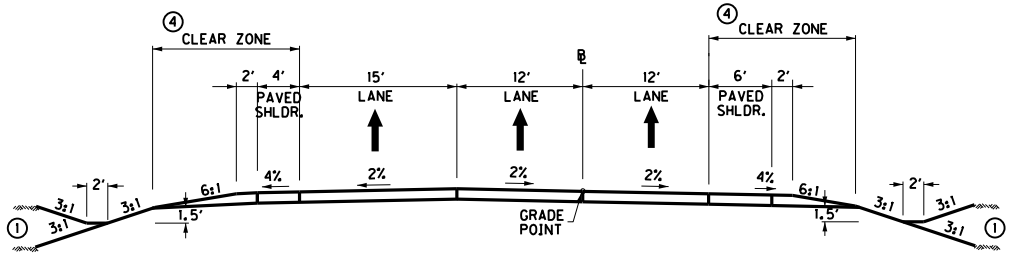


I–754–71 RAMP C (EB TO SB) – 1 LANE NORMAL SECTION
STA. 302+40 TO STA. 303+12

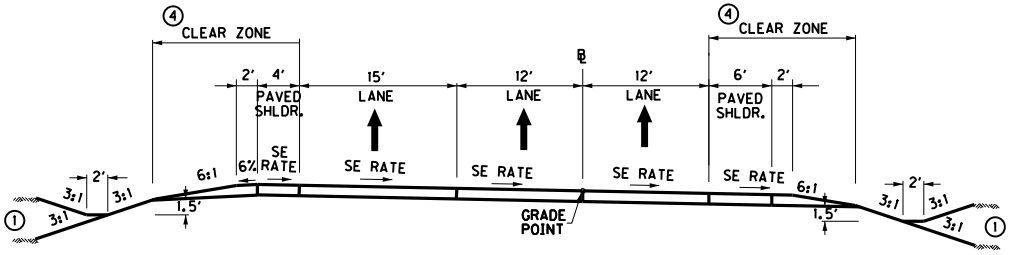


I–754–71 RAMP C (EB TO SB) – 1 LANE NORMAL SECTION
STA. 303+12 TO STA. 305+90

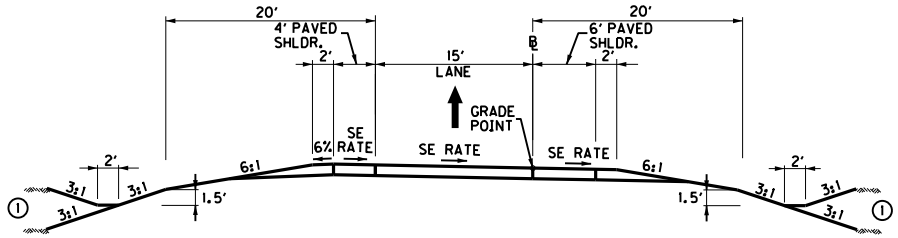
TYPICAL SECTIONS



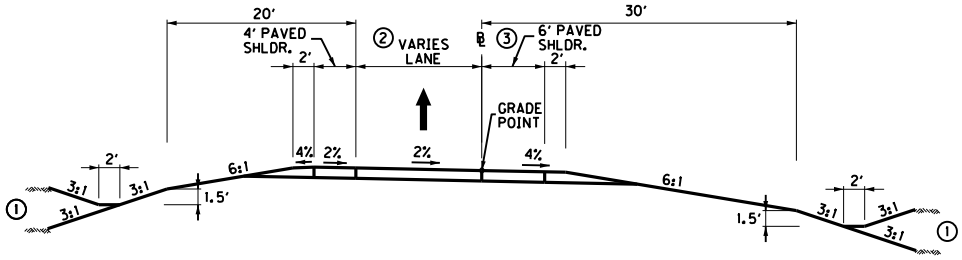
I–754–71 RAMP D (NB TO EB) – 3 LANE NORMAL SECTION
STA. 412+94 TO STA. 413+82.03



I–754–71 RAMP D (NB TO EB) – 3 LANE SUPERELEVATED SECTION RIGHT
STA. 409+80 TO STA. 412+94



I–754–71 RAMP D (NB TO EB) – 1 LANE SUPERELEVATED SECTION RIGHT
STA. 406+68 TO STA. 409+80



I–754–71 RAMP D (NB TO EB) – 1 LANE NORMAL SECTION
STA. 400+00 TO STA. 406+68

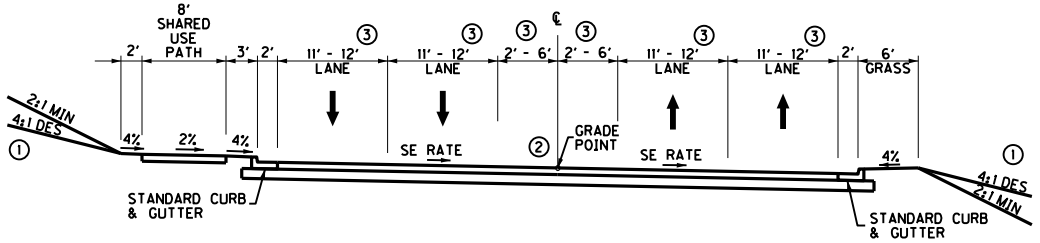
① SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.

② VARIES FROM 0' TO 17'
STA. 400+00 TO STA. 405+29.73
VARIES FROM 17' TO 15'
STA. 405+29.73 TO STA. 405+80.34
15'
STA. 405+80.34 TO STA. 406+68

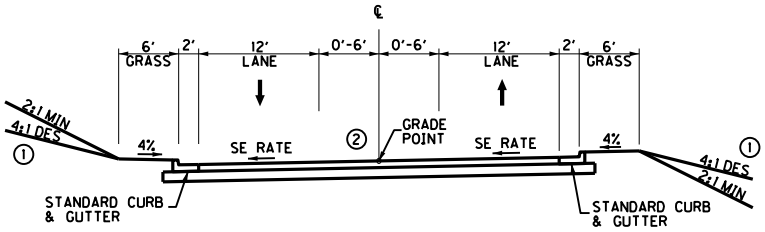
③ VARIES FROM 11'-7" TO 6'
STA. 400+00 TO STA. 400+81.45

④ CZ RT & LT VARIES FROM 20' TO 14'

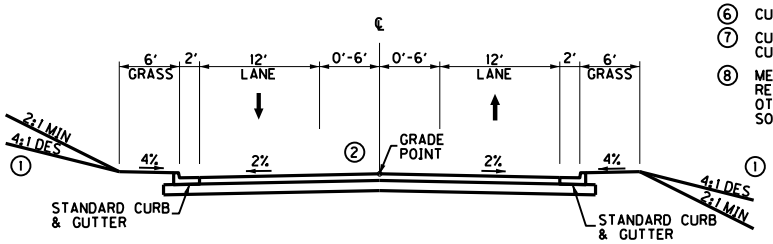
TYPICAL SECTIONS



US 25 – 5 LANE SUPERELEVATED
STA. 30+00 TO STA. 67+00

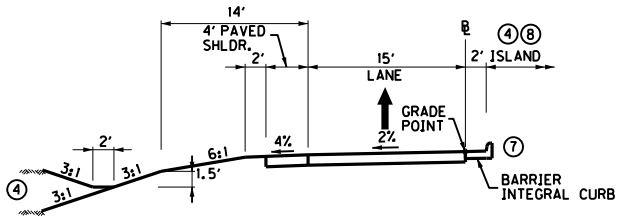


US 25 – 3 LANE SUPERELEVATED
STA. 5+83.94 TO STA. 30+00
STA. 67+00 TO STA. 77+00

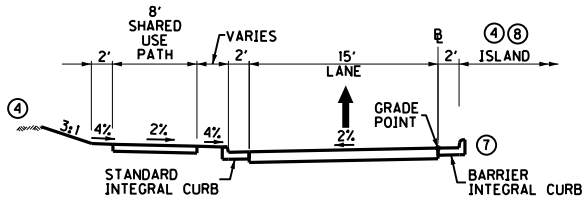


US 25 – 3 LANE NORMAL SECTION
STA. 5+83.94 TO STA. 30+00
STA. 67+00 TO STA. 77+00

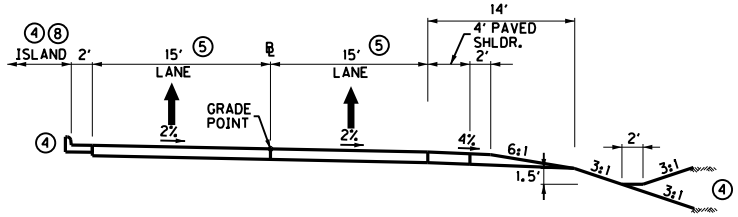
1. SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.
2. SEE PLAN SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY AND MEDIAN DETAILS.
3. SEE PLANS FOR DETAILS.
4. SEE CROSS SECTIONS FOR GRADING DETAILS. ALL SLOPES IN RESIDENTIAL/ COMMERCIAL AREAS SHALL BE SODDED.
5. 12'
   STA. 413-82.03 TO STA. 415+00
   VARIES FROM 12' TO 15'
   STA. 415+00 TO STA. 415+30
6. CURB ENDS STA. 417+05.07
7. CURB BEGINS STA. 423+51.74
   CURB ENDS STA. 425+55.03
8. MEDIAN AREAS LESS THAN 6' WIDE REQUIRE CLASS A CONCRETE. ALL OTHER MEDIAN AREAS SHALL BE SODDED.



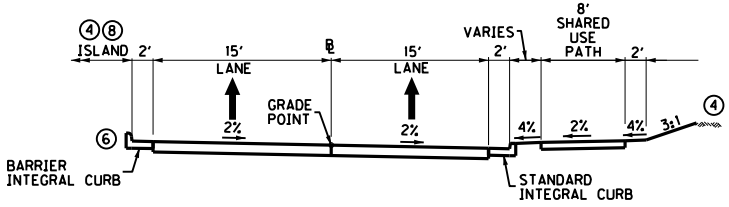
I–754–71 RAMP D1 (NB TO WB) – 1 LANE NORMAL SECTION
STA. 422+88.84 TO STA. 425+07.00



I–754–71 RAMP D1 (NB TO WB) – 1 LANE NORMAL SECTION
STA. 425+07 TO STA. 425+70.91

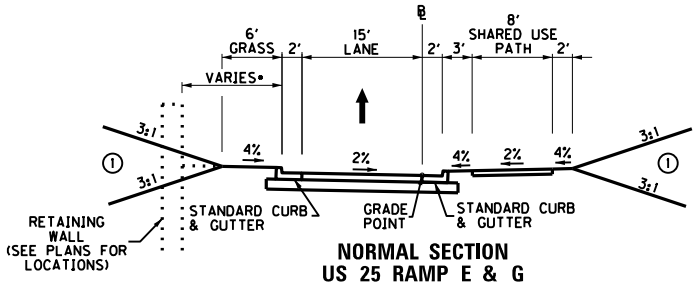


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STA. 413+82.03 TO STA. 416+86.38

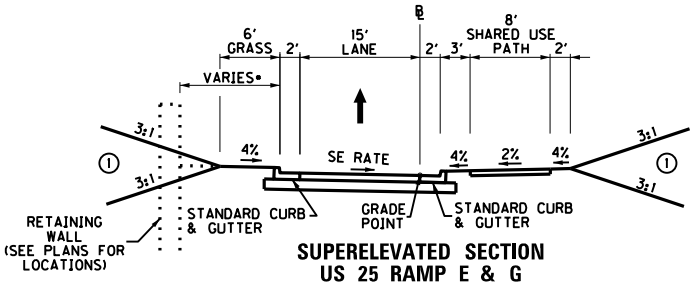


I–754–71 RAMP D (NB TO EB) – 2 LANE NORMAL SECTION
STA. 416+86.38 TO STA. 417+20

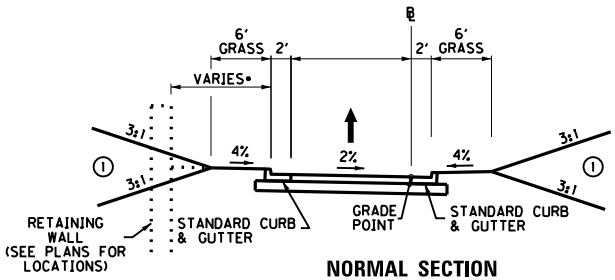
TYPICAL SECTIONS



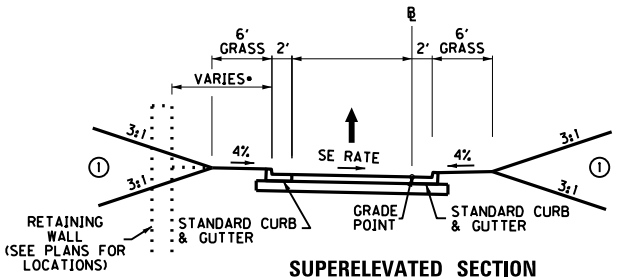
NORMAL SECTION
US 25 RAMP E & G



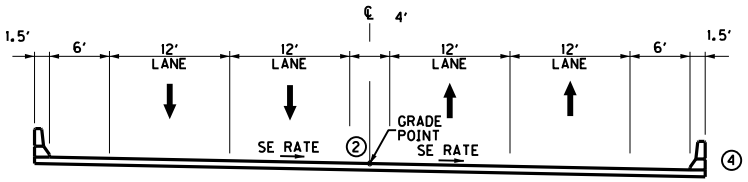
SUPERELEVATED SECTION
US 25 RAMP E & G



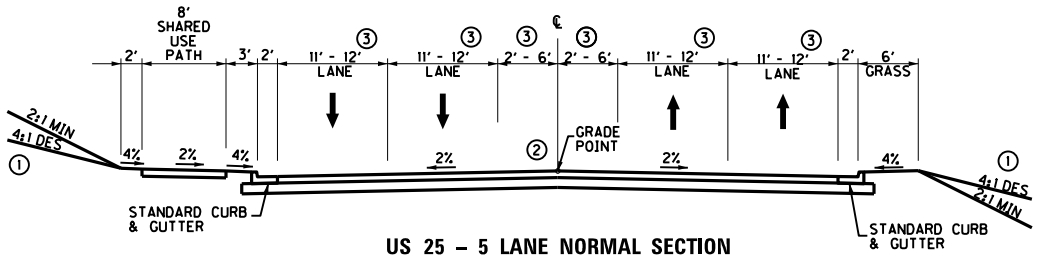
NORMAL SECTION
US 25 RAMP A & C



SUPERELEVATED SECTION
US 25 RAMP A & C

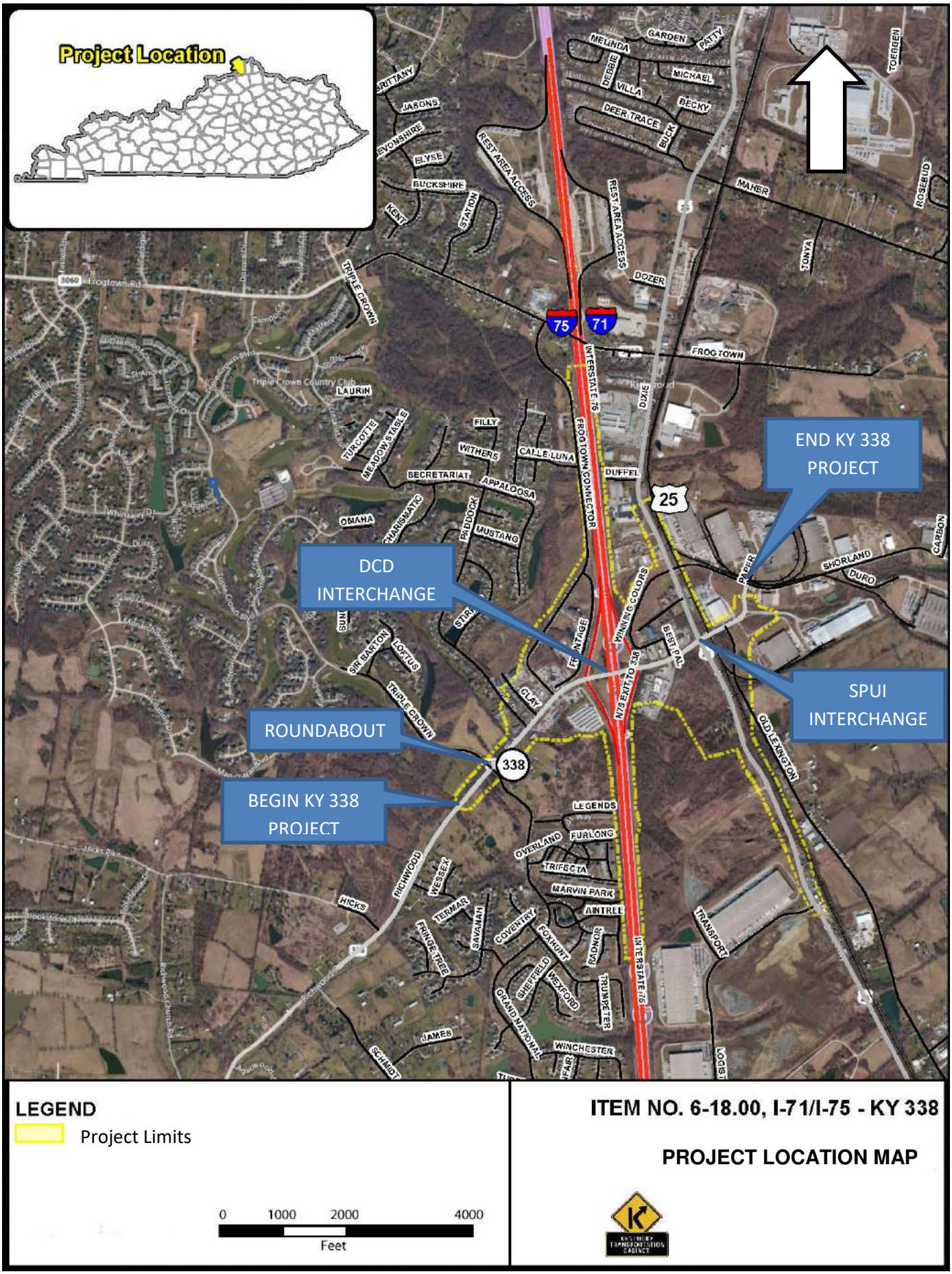


US 25 – BRIDGE SECTION
STA. 46+78 TO STA. 49+54



US 25 – 5 LANE NORMAL SECTION
STA. 30+00 TO STA. 67+00

① SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDER.
② SEE PLAN SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY AND MEDIAN DETAILS.
③ SEE PLANS FOR DETAILS.
④ SEE STRUCTURE PLANS FOR DETAILS.


Project Location
END KY 338 PROJECT
DCD INTERCHANGE
SPUI INTERCHANGE
ROUNDABOUT
BEGIN KY 338 PROJECT
LEGEND
Project Limits
0 1000 2000 4000
Feet
ITEM NO. 6-18.00, I-71/I-75 - KY 338
PROJECT LOCATION MAP

ITEM NO. 6-18.00
I-75/I-71 & RICHWOOD ROAD (KY 338) INTERCHANGE
BOONE COUNTY

PROJECT OVERVIEW

The project consists of the construction of a double crossover diamond interchange (DCD) at the I-75/I-71 & KY 338 interchange. KY 338 will be improved from Triple Crown Boulevard to Shorland Drive. The improvements to KY 338 also include a roundabout at the intersection of Triple Crown Boulevard and KY 338, a grade separation at US 25 using a single point urban interchange (SPUI), and a grade separation for the railroad crossing near US 25. The I-75/I-71 ramps at the interchange with KY 338 will be widened and lengthened to increase capacity and to facilitate passenger and truck traffic entering and exiting I-75/I-71. Improvements to US 25 include the reconstruction of the at grade intersection with a grade separated SPUI interchange. The SPUI eliminates two at-grade railroad crossings (KY 338 and Shorland).

The project is the result of an Interchange Justification Study (IJS) which was approved by the Federal Highway Administration (FHWA) in July 2010. The IJS recommended DCDs be constructed at both KY 338 (6-18) and at KY 536 (Item No. 6-14). Section 23 CFR 625 and FHWA Interstate Access Policy state that if improvements are not implemented within an eight year period that the document must be re-evaluated. The KYTC and respective project teams provided an Addendum to the IJS in 2018. The Addendum was approved on November 16, 2018, and the signed letter is found in Attachment B.

This DES makes numerous references to traffic data, forecasts, etc. that reflects the status of data at the time (2012/2013) to when this DES was initially documented. With having received 2018 FHWA approval of the IJS Addendum, the DES continues to reflect the DES at the time of Phase 1 completion.

In June 2018 KYTC was advised by the U.S. Department of Transportation that the project would be a recipient, with related projects 6-14.0 and 6-14.5, of receiving a $67,445,000 Infrastructure For Rebuilding America (INFRA) Grant. The funds substantively assist with construction funds for the project. As a part of receiving the funds comes with expedited delivery of the projects. The scope of 6-18 is large with corresponding larger amounts of funds needed for the respective design, right-of-way, and utilities phases. The project advanced slowly as a result. Meanwhile, KYTC had updated the Highway Design Manual. Therein, changes have occurred to which the plans reflect a more conservative design. Specifically, the former manual required that there be three feet from the face of guardrail to the shoulder break. So as to meet the project time schedule stipulated by INFRA, the three feet was left unchanged. Further, as the project is a “waste” project, it is beneficial to allocate the waste across the project.

PURPOSE AND NEED

Introduction

The purpose of this project is to improve safety and reduce congestion at the I-75/I-71 and KY 338 (Richwood Road) interchange and within the KY 338 corridor, and to develop and implement a comprehensive access management plan for KY 338 between Triple Crown Boulevard and US 25 (Dixie Highway).

Existing Facility

Located in Boone County, KY 338 (Richwood Road) is classified as an Urban Arterial throughout the project area. KY 338 (Richwood Road), from just west of Paddock Drive to its intersection with US 25 (Dixie Highway) consists of two 12 foot lanes with a 12 foot center turn lane. Beyond these limits to the east and west, KY 338 consists of a single lane in either direction. I-75/I-71 is an Urban Interstate with four lanes in each direction; which is one of the nation’s largest commercial routes. Its interchange with KY 338 (Richwood Road) is a traditional diamond-type interchange with single-lane entrance and exit ramps. Approximately one mile north of the interchange, KYTC operates and maintains rest area facilities on either side of the interstate. US 25 (Dixie Highway) is a urban minor arterial with one lane in each direction.

Environs

Boone County has had expansive growth for more than twenty years. Specifically within the footprint of the project there has been substantive residential and industrial/warehouse growth. The Triple Crown and Grand National communities, approximately one mile west of the I-75/I-71 interchange, have increased in both single-family and multi-family units. A church and motel have located in the commercial area immediately west of the interchange.

Immediately at the interchange are three tractor trailer truck stops. There are two Pilots, situated on either side of the interstate. In addition, a TA truck stop which includes full service repairs to tractors and personal services for the truck drivers.

In the industrial park to the east of US 25 (Dixie Highway) a new industrial facility was constructed and a major expansion occurred. Also situated in the industrial park is a fire department. Access to the industrial park is problematic. There are two points of egress: KY 338 (Richwood Road; signalized) and Shorland Drive (unsignalized); Shorland being approximately 1,170 feet north of KY 338. Both points of egress must utilize at-grade crossings with Norfolk Southern (NS) Railroad. NS parallels US 25 in this region. Further, the at-grade crossings to the respective US 25 intersections are very short: 120 feet and 85 feet respectively - - not much longer than the tractor trailers egressing the industrial park. The NS rail operates as Class A rail, meaning that it typically has over 30 trains/day which travel at 55-60 mph. Further, as NS dictates their operations, trains might stop at will (e.g. changing of train operational staff engineers). These stoppages can block both KY 338/Shorland intersections at the same time. The at-grade crossings are hazardous in and of themselves. Fully laden tractor trailers are slow moving and there is minimal queuing space leaving the industrial park to access US 25; increasing the chance of crashes. Thus, the situation is undesirable and is exponentially worse that train stoppages block egress for emergency responders.

To the north of KY 338 (Richwood Road), along US 25 (Dixie Highway) a tractor trailer dealership was constructed.

To the south of KY 338 (Richwood Road) along US 25 (Dixie Highway), a warehouse park, approximately 315 acres, has been constructed. Businesses within the park include Amazon, UPS, L'Oréal, and Radial (E-Bay). The real-time delivery nature of these operations has significantly increased tractor trailer traffic in the interchange area.

In summary, these major transportation arteries have experienced such growth in traffic that the lack of commensurate improvements to the transportation network have resulted in congestion and accident rates that are above statewide averages. Based upon land use projects, by 2030, the study area will lose nearly all of its agricultural land, while industrial uses will approximately double, resulting in greater volumes of traffic.

Project History

As early as 2000 the regional growth was such that the General Assembly programmed an improvement for US 25 (Dixie Highway, Item No. 6-351). This improvement was to widen US 25 (Dixie Highway) to five lanes for a corridor length of approximately 4.5 miles from KY 338 (Richwood Road) to KY 1829 (Industrial Road). Design for this project advanced to the extent of identifying the need of grade separated interchanges (single-point urban diamonds – SPUIs) for the intersections at KY 338 (Richwood Road) and KY 536 (Mt. Zion Road). The SPUIs were recommended due to traffic growth, forecasts and crashes. At-grade improvements at these respective intersections were not able to address the traffic forecasts and were eliminated as options. The inclusion of two SPUIs increased total project costs such that the project stalled from lack of funds. Ultimately, due to lack of funds, several years later the project was closed.

By the time that 6-351 was closed the IJS that resulted in 6-18 was underway. Therefore, when scope/funding were established for 6-18 the grade separation component at KY 338 / US 25 was kept; traffic and crashes had only worsened.

Note, the intersection of KY 338 / US 25 is approximately 800 feet from the northbound I-75/71 ramps. Intersections improvements at KY 338 / US 25 had to be include with the interchange improvements. At KY 536 (Mt. Zion Road), that intersection is approximately one mile from the interstate interchange and the Federal Highway Administration said it could not be part of that DCD project.

Logical Termini

The project has independent utility and would provide a fully functional road segment without any additional transportation improvements beyond the project limits. Logical termini for improvements to KY 338 extend approximately 0.15 mile west of Triple Crown Boulevard and on the east side to Shorland Drive. The project's logical termini along I-75/I-71 extend from approximately 0.8 mile south of KY 338 to approximately 0.9 miles north of KY 338. The project's logical termini along US 25 (Dixie Highway) extend from approximately 0.85 mile south of KY 338 to approximately 0.50 mile north of KY 338.

The Ohio, Kentucky, Indiana Regional Council of Governments (OKI), which functions as the Metropolitan Planning Organization (MPO) for Boone County has acknowledged the need for improved safety, reduced congestion, and better access to businesses and included this project in the 2016-2019 Transportation Improvement Program (TIP). This project is also included in the KYTC 2015-2018 Statewide Transportation Improvement Program (STIP). Also in the TIP and STIP are projects to improve the KY 536 interchange with I-75/I-71 and add an auxiliary lane to I-75/I-71 north of KY 536. Table 1 includes a list of all related projects in the corridor.

TABLE 1. CORRIDOR PROJECTS LISTED IN TIP/STIP

TIP ID	Facility	Location	Description
6-18.00	I-75/KY 338 Interchange	KY 338 (Richwood Road) Interchange	Reconstruct KY 338 (Richwood Road) Interchange
6-14.00	I-75/KY 536 Interchange	I-71/I-75 at KY 536 (Mt. Zion Road)	Reconstruct KY 536 (Mt. Zion Road) Interchange
6-14.50	I-75	From KY 536 to US 42	Add auxiliary lane on I-75/I-71

Project Purpose and Need Summary

The sections below describe specific problems or "needs" in the vicinity of the I-75/I-71 interchange with KY 338 (Richwood Road). These needs include improving safety, reducing congestion, and improving access to businesses. Selected alternatives shall balance the operational efficiency, safety, environmental impacts, constructability, and the availability of resources on state maintained facilities.

Need: Improve Safety

The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. The analysis compared observed crash rates against statewide critical crash rates for comparable facilities to obtain a Critical Rate Factor (CRF). A CRF that exceeds 1.0 indicates that the number of crashes exceeds the number that should occur on that roadway, and is considered to be a high crash location. Table 2 provides a summary of crash data for I-75 and KY 338 (Richwood Road) within the project limits.

TABLE 2. I-71/75 and KY 338 CRASH DATA

Roadway Segment	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate (100 MVM)	Critical Crash Rate Factor
I-75/I-71	91	75	106.7	0.70
KY 338	256	1703.2	566.3	3.01

Notes: Data is for 2004-2006 period
Source: *Interchange Justification Study for I-75/I-71 at KY 536 and KY 338*

On KY 338 (Richwood Road), the entire segment from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of 1.0, with the highest CRF being exhibited between the I-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. The CRF drops to below 1.0 west of the Frogtown Road Connector. The most frequent type of crash was rear-end crashes with 37 percent, followed by angle crashes at 26 percent. Overall, 82 percent of the crashes on KY 338 in the study area occurred during the day and 79 percent under dry conditions, indicating that neither weather nor darkness are a primary cause of crashes.

Crash data was reviewed for three intersections on US 25 (Dixie Highway): (1) Shorland Drive/Winning Colors Drive, (2) KY 338 (Richwood Road), and (3) Logistics Boulevard. Table 3 provides a summary of crash data for these three intersections. As shown, the US 25 (Dixie Highway) intersection with KY 338 (Richwood Road) exhibits a CRF of 3.7, indicating a location of concern. The intersection experienced a total of 66 crashes over the three-year study period. Angle, backing, rear-end, and sideswipe-same crashes each accounted for approximately 20 percent of all crash types. Overall, 61 percent of the crashes at this intersection occurred during the day and 88 percent under clear or cloudy conditions.

TABLE 3. US 25 CRASH DATA

US-25 Study Intersection	Total No. of Crashes (2008-2010)	Calculated 2011 ADT	Project Average Crash Rate (C/MV)	Statewide Average Crash Rate (C/MV)	Statewide Critical Crash Rate (C/MV)	Critical Rate Factor (CRF)
Shorland/Winning Colors Drive	8	13,034	0.6	0.48	0.95	0.6
KY 338 (Richwood Road)	66	18,489	3.3	0.48	0.88	3.7
Logistics Boulevard	7	8,730	0.7	0.48	1.06	0.7

Notes: C/MV = Crashes per million vehicles
Source – Statewide crash data: "Analysis of Traffic Crash Data in Kentucky (2004-2008)," University of Kentucky, September 2009
Source – Project crash data: "Memorandum: Crash Review for US-25 at KY 338," Parsons, July 5, 2012

Need: Reduce Congestion

The I-75/I-71 and KY338 (Richwood Road) interchange currently experiences intermittent periods of congestion. Existing (2006) and No Build (2030) conditions were evaluated as part of the 2007 IJS report and are summarized here. The primary measure of congestion used here is Level of Service (LOS), which the Highway Capacity Manual (2000) defines as a quality measure describing operational conditions within a traffic stream, generally in terms of such measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Levels of service range from A (best) to F (worst). LOS C is desirable; however, LOS D is often considered the minimum acceptable level of service for urban facilities like KY 338 (Richwood Road). Level of service D can also be considered acceptable when the cost to improve operation to LOS C is prohibitive. LOS D is considered acceptable for this project.

Existing Conditions

The IJS documented that under existing conditions (2006), during the AM peak period, traffic in the Richwood Road vicinity flows predominantly eastbound and northbound, with most intersections operating at LOS B or C. As volume builds, the southbound left turn movement from Triple Crown Boulevard, which was stop-controlled at that time, experienced substantial delay due to the lack of gaps in traffic, resulting in a LOS F for this approach to the intersection. Since the development of the IJS, Boone County made improvements to the intersection of KY 338 (Richwood Road) and Triple Crown Boulevard, converting it from a stop-controlled intersection to a signalized one. This modification improved traffic operations at this intersection.

During the evening peak hour, a high volume of traffic from southbound I-75/I-71 to Richwood Road results in a LOS D at the intersection of the ramp and roadway. Again, the high volume of eastbound traffic at the Triple Crown Boulevard/Grand National Boulevard intersection with Richwood Road resulted in congestion, resulting in a LOS E on the northern approach of the intersection. As with the AM peak, the signalization of this intersection improved this condition.

On I-75/I-71, the IJS found that existing traffic conditions to the north and south of the KY 338 (Richwood Road) interchange were LOS B and C in both the AM and PM peak periods.

No-Build Conditions

The IJS provided projections of traffic growth between 2006 and 2030 for both I-75/I-71 and KY 338 (Richwood Road). The interstate Average Daily Traffic (ADT) was projected to increase from 104,000 vehicles per day (vpd) in 2006, to 176,000 vpd in 2030, an increase of 69 percent. Traffic volumes on KY 338 (Richwood Road) were expected to grow even more – 175 percent – from 10,300 in 2006 to 28,400 in 2030.

Because its focus was on the interchange, the IJS documented No Build LOS for only the ramp intersections with KY 338 (Richwood Road). Both of those intersections are projected to operate at LOS F in 2030.

On I-75/I-71, the IJS projected that, as traffic grows on the interstate, conditions will degrade slightly to LOS C and D in the areas surrounding the KY 338 (Richwood Road) interchange. However, it found that during the PM peak hour, the southbound exit ramp area would operate at LOS F, due to a doubling of peak hour volumes and the inability of the signal at the ramp terminus to process the volumes. In the AM peak hour, the northbound entrance ramp would also experience a near doubling of volumes, but would experience LOS D conditions.

The existing and forecasted ADT were updated based on more recent traffic counts and updated forecasts. In 2011, existing ADT on KY 338 (Richwood Road) between the interchange ramps was 15,800 vpd, and expected to grow to 24,000 vpd in 2030. Just west of the interchange, volumes were higher: 19,800 vpd existing and 31,300 vpd in 2030. East of the interchange, volumes are slightly lower at 14,800 vpd and 21,600 vpd in 2011 and 2030, respectively.

The No Build Levels of Service were also evaluated at intersections within the project area using Synchro traffic analysis software and the 2030 No Build traffic forecasts. As shown in Table 4, the level of service at almost every signalized intersection would be E or F during the peak hours, with delays of up to five minutes per signal.

TABLE 4. SIGNALIZED INTERSECTION LEVEL OF SERVICE

	AM Peak			PM Peak		
Intersection	**LOS**	**V/C Ratio**	**Delay (sec)**	**LOS**	**V/C Ratio**	**Delay (sec)**
KY 338/Triple Crown Blvd	E	1.03	55.9	F	1.72	259.0
KY 338/Frogtown Road	F	1.28	114.1	F	1.34	118.6
KY 338/SB Off-Ramp	F	1.32	100.3	F	1.94	308.4
KY 338/NB Off-Ramp	F	1.55	194.5	E	1.10	55.5
KY 338/US 25	D	0.89	44.7	F	1.11	80.2

Notes: Source: Parsons Synchro analysis; unpublished

Need: Improve Access Management

The KY 338 (Richwood Road) corridor is dominated by retail and commercial uses, such as truck stops/gas stations and fast food restaurants that depend on short visits and are based on a high volume of visitors. As the corridor has developed over the last several decades, access to developing locations was provided as needed, with no comprehensive plan for drive locations or intersection controls. The result is a corridor with poor access management: numerous drive locations over a relatively short length that provide little accommodation in the form of turn lanes or signalization for entering and existing vehicles. This condition leads to an inefficient corridor for vehicles moving within or through the area and can contribute to both the congestion and safety issues noted above.

Project Purpose

The purpose of this project is to improve safety and reduce congestion at the I-75/I-71 and KY 338 (Richwood Road) interchange and within the KY 338 corridor, and to develop and implement a comprehensive access management plan for KY 338 between Triple Crown Boulevard and US 25 (Dixie Highway).

Other Goals and Objectives

In addition to the needs identified above, the alternatives will be evaluated on how well they meet the following secondary goals.

Improved Pedestrian Environment

Currently, there are no pedestrian facilities on KY 338 (Richwood Road) and limited facilities on adjacent roadways. The *2010 Boone County Comprehensive Plan* calls for increasing mobility by, among other strategies, improving pedestrian options and for pedestrian facilities to be built along streets wherever possible. This project will evaluate the feasibility of providing pedestrian facilities within the KY 338 (Richwood Road) and US 25 (Dixie Highway) corridors within the project limits.

Minimize Environmental Impact

In order to successfully bring this project through the environmental process efforts must be made to avoid or minimize any impacts to social, economic, natural or man-made environmental resources. Ensuring the support of the various state, local, and federal agencies charged with protecting these resources will confirm that the project has had minimal environmental impact.

DESCRIPTION OF ALTERNATIVES

No Build Alternative

This alternative considers no improvements to the I-75/I-71 mainline, the interchange at KY 338 (Richwood Road), or the ramp connections throughout the study area.

The majority of the study area currently operates below acceptable levels of service, with failing LOS in both the AM and PM peak hours, generally LOS D to LOS F. The No Build Alternative would not improve traffic flow or levels of service, because neither capacity nor demand along the interstate or at the interchange would be altered. Because congestion would not be alleviated, and geometric improvements would not be constructed, the No Build Alternative also would not improve safety or decrease the crash rate throughout the study area.

Build Alternatives

Conceptual Alternatives (See Exhibit C)

This project is comprised of four distinct parts:

1. I-75/I-71 DCD Interchange @ KY338
2. The widening and lengthening of the I-75/I-71 ramps
3. Capacity and access management improvements on KY338 and US25 on the east side of the interstate
4. Capacity and access management improvements on KY338 west side of the interstate

With construction of the DCD interchange with auxiliary lanes on I-75/I-71 recommended by the project team, conceptual alternatives were evaluated on the east and west side of I-75/I-71 to increase capacity and improve access management. The Conceptual Alternatives that were evaluated are as follows:

East Alternatives

The conceptual alternatives to the east focused on the provision of grade separation at the intersection of KY 338 (Richwood Road) and US 25 (Dixie Highway). Reference Project History section above. Keeping options open, the design team did consider alternatives that were at-grade as noted below.

Alternative E1:

SPUI Interchange of US25 @ KY338 offset approximately 200 feet south of the existing intersection (same as IJS). A frontage road is proposed parallel to US25 approximately 500 feet west in order to connect KY338 to US25 outside of the control of access limits for the SPUI ramps and to also facilitate MOT during construction. This frontage road may also be necessary if a signal at Best Pal does not meet an acceptable level of service and access is then limited to Right-In / Right-Out only. Relocates access to the TA truck stop to the back side of the property that would require reconfiguration of the facilities and circulation pattern. This alternative provides a grade separation of KY338 under US25 and the Norfolk Southern Railroad. The historic property is impacted by eliminating direct access to US25 by introduction of controlled access. ***This alternative was advanced for preliminary evaluation.***

Alternative E2:

This alternative is the same as Alternative E1 except the SPUI is shifted approximately 550 feet south of the existing US25 @ KY338 intersection in order to end the ramps and control of access before the historic property located on the west side of US25. This alternative will be more expensive than E1 because the location KY338 crosses under the RR is in the middle of a spur switch requiring a larger and more complicated bridge. This alternative also requires considerable relocation of Old Lexington Pike, which impacts access to industrial properties owned by Ridge Transportation. This alternative was dropped from consideration because it was the most expensive alternative and there is another avoidance alternative.

Alternative E3:

Construction of an at-grade intersection of US25 @ KY338, approximately 150 feet south of the existing, lowered to facilitate a grade separation with the Norfolk Southern railroad on the east side of US25. Similar frontage road construction to that of Alternative E1, with the exception of the southern leg being shorter. Signals proposed at US25 and Best Pal. The signal at Best Pal may not provide an adequate level of service and may be converted to right-in/right-out. ***This alternative was advanced for preliminary evaluation.***

Alternative E4:

This alternative was a hybrid intersection of KY338 @ US25. The intersection of KY338 and US25 was shifted to the south to a “T” intersection. Traffic going east under the railroad bridge turned left near Best Pal Drive. The Project team deemed this a very unorthodox configuration. This design could be confusing to motorists and difficult to sign. For these reasons this alternative was dropped from consideration.

Alternative E5:

Roundabouts at both Best Pal Drive and US25. Because of the large volume of trucks, especially on the east side of the interstate, this alternative was dropped from consideration.

West Alternatives

Alternative W1:

This alternative relocated Frogtown Road Connector to the location of the Clay Drive intersection with signal. Right-in, right-out only access was provided between signals on KY338 and a frontage road was constructed on the south side for access. This alternative was dropped from consideration because the new signalized intersection did not provide for the volume of traffic generated at Paddock Drive.

Alternative W2:

This alternative was essentially the same as W1 but relocated Frogtown Road Connector to the location of the Paddock Drive intersection with signal. Paddock Drive was relocated to intersect with relocated Frogtown. This alternative was dropped from consideration because the traffic simulation failed.

Alternative W3:

This alternative exhibited minimal improvements and is essentially what was shown in the IJS with a signal at Frogtown Road. The Frogtown Road Intersection with KY338 remains at the existing location with an extension south across KY338 for access to the businesses. This south access road continues on to connect with the existing entrance to the storage facility. Acquisition of the Bank on the south side of KY338 is required. This alternative was refined and later renamed and carried forward as Alternative W9.

Alternative W4:

This alternative was proposed as roundabouts at the existing locations of the Frogtown Road Connector and Paddock Drive. The project team decided that two roundabouts on KY338 at close proximity would not function well and to possibly investigate a single roundabout. For these reasons this alternative was dropped from consideration.

Alternative W5:

This alternative is essentially the same as W2 but replaces the signal on KY338 with a roundabout. It was eventually determined that any two lane roundabout on KY338 at Frogtown Road would fail. Traffic modeling showed that the traffic volumes and truck percentages were too high and that the roundabout would lock-up. With the intersection failing so close to the DCD, it would negatively affect DCD operations. For this reasons this alternative was dropped from consideration.

Alternative W6:

For this alternative relocated Frogtown tees into Paddock Drive. The Paddock Drive intersection with KY338 is reconstructed as a roundabout. It was eventually determined that any two lane roundabout on KY338 would fail. For this reason this alternative was dropped from consideration.

Alternative W7:

This alternative is exactly the same as Alternative W6 with the roundabout at KY338 replaced with a signal. ***This alternative was advanced for preliminary evaluation.***

Alternative W8:

For this alternative relocated Frogtown tees into Paddock Drive. The Paddock Drive intersection @ KY338 and the Frogtown @ Paddock Drive are reconstructed as roundabouts. It was eventually determined that any two lane roundabout on KY338 would fail. Also the single lane roundabout at the Paddock/Frogtown intersection failed. For these reasons this alternative was dropped from consideration.

Alternative W9:

This alternative is a refinement of Alternative W3. Partially controlled access, limited to right-in/right-out, is established from the DCD to the proposed two-lane roundabout at Triple Crown. Full access is provided at the signalized intersections of Frogtown and Paddock. Traffic modeling verified that the roundabout is operational in the forecast year. ***This alternative was advanced for preliminary evaluation.***

Alternative W10:

This alternative is essentially alternative W9 with a roundabout at the Paddock @ KY338 intersection in lieu of signal. It was eventually determined that any two lane roundabout on KY338 would fail. For this reasons this alternative was dropped from consideration.

Preliminary Alternatives

Along with construction of the DCD interchange with lengthened ramps along I-75/I-71 already recommended by the project team, the Conceptual Alternatives E1, E3, W7 and W9 were advanced through to preliminary design including VISSIM traffic simulations. The Preliminary Line and Grade inspection to select a preferred alternative was held on July 10, 2012. After review of the preliminary plans, traffic simulations, costs and impacts, the Project Team recommended Alternative E1 and Alternative W7. These alternatives were recommended in conjunction with the Double Crossover Diamond Interchange and the lengthened ramps along I-75/I-71.

On October 31, 2012 a project team meeting was held at the FHWA Frankfort offices. A general discussion ensued revolving around all aspects of the project and the preferred alternatives E1 and W7 selected at the July 10, 2012 meeting. Alternative W7 modified the intersection of KY338 @ Frogtown Connector to a Right-In/Right-Out configuration and created a new roadway that rerouted traffic wanting to head east on KY338 to a new intersection with Paddock Drive. This configuration merged commercial traffic with traffic from the residential neighborhoods accessed by Paddock Drive.

Following the Preliminary Line and Grade meeting, the project team received multiple comments from the public citing their displeasure with Alternative W7. Their comments concerning Alternative W7 were essentially as follows:

- It merged tractor trailers with cars approximately 1,600 feet sooner.
- It merged tractor trailers with all other commercial traffic accessing the proposed new roadway between Frogtown Connector and Paddock Drive.
- The proposed intersection with this new roadway and Paddock Drive would likely operate in a fashion that tractor trailers could clog the intersection making it difficult for the residents to exit.
- The neighborhood which uses Paddock as access has previously been very vocal when other developments were proposed in this area; it is anticipated that they will be so again because of the first three bullet items.
- Access, particularly to the Shell Station in the SW quadrant adjacent to the SB ramp, was significantly hampered; a lawsuit was already being suggested.
- It was also noted in comments that if Best Pal to the east could have a signal, why couldn't Frogtown Road Connector. It is approximately the same distance from the DCD signal at the crossover.

A discussion of these public meetings followed. The FHWA indicated that in light of the public opposition and design changes that occurred on the Item No. 6-14 DCD project, in addition to the project delay, the FHWA recommended re-considering Alternative W3 with modifications to overcome the issues why it had been initially eliminated. Alternative W3 was refined as Alternative W9 for the Preliminary Line and Grade inspection that addressed the capacity issues on KY338 by adding additional thru lanes.

On November 8, 2012 a project meeting was held at the KYTC District 6 office. The meeting was held to discuss public concerns with Alternative W7 and the input received from the FHWA at the October 31, 2012 meeting. In light of all the new information received since the Preliminary Line and Grade inspection held on July 10th, the attendees deemed it prudent to reconsider the preferred alternative on the west side of the DCD and recommend Alternative W9 as the preferred alternative. Alternative W9 is to be refined as much as feasible to reduce any backups on the SB exit ramp and the access on the south side of the Frogtown Connector Road intersection will be revised to be similar to what was shown on Alternative W3. It requires the acquisition of the Huntington Bank located on the south side of KY338 opposite of Frogtown Connector Road.

Maintenance of Traffic Plan

The Maintenance of Traffic (MOT) plan for the project consists of five construction phases having sequences within each phase. The sequencing identifies locations and construction activities to be completed within a phase prior to the following construction sequence or phase start. To minimize impacts to adjacent developments and maintain traffic during construction within the tight R/W constraints, KY 338, US 25 and the I-75/I-71 ramps will be

constructed part-width. Access to existing businesses, properties and drainage will be maintained at all times. Several side roads have traffic restrictions and time constraints associated with specific construction phases and sequences that will be noted in the MOT Plans.

The development of the MOT plan involved a Maintenance of Traffic Overview meeting on September 25, 2015. The Construction Sequencing Maintenance of Traffic strategy (CSMOT) evaluated during this meeting investigated the following major decision points:

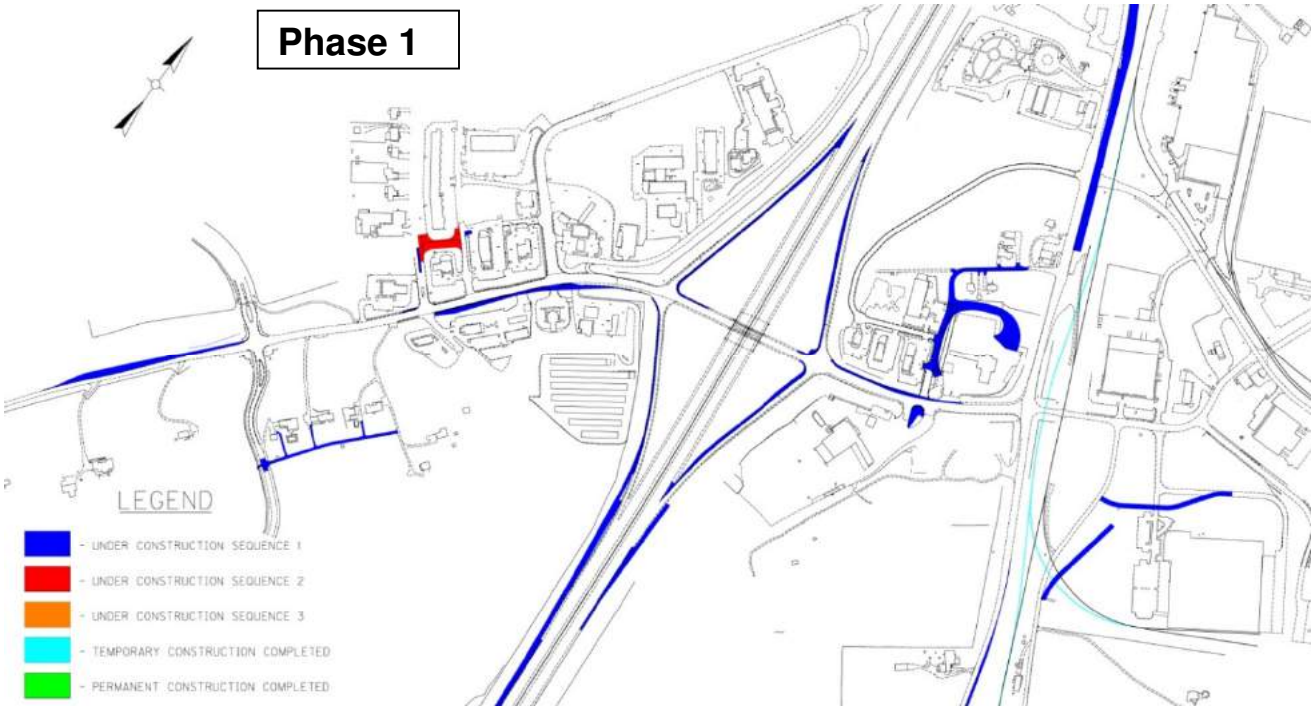
- **Level Of Service** – An evaluation of the level of service and ADT's at 6 major intersections prior to and during the 2021 scheduled construction was conducted. This summary compared the delay and level of service before and during construction. This information also included the roadway geometry before and during construction activities with recommended maintenance of traffic suggestions and lane configurations. The level of service was based on AM and PM peak hour volumes.
- **Detour Alternatives** – Detour options were evaluated and a detour log was complied. This information identified truck restricted areas and potential detour alternatives for each individual construction section with associated added travel distances for each detour option.
- **Maintenance of Traffic Matrix** – This information compared MOT options available for 21 individual construction sections with their associated individual construction durations and user costs. The matrix depicted the construction phase for each individual section and their sequence of construction within the entire project. The recommended MOT alternative for each individual construction section was also identified.
- **Construction Staging Summary and Plans** – The assumptions and summary of construction phasing and construction activities to be completed during several construction phases were demonstrated. The MOT plan evaluation consisted of a construction index plan sheet displaying all 21 construction segment locations and plan sheets depicting the construction segments and tasks associated with each phase. The construction activities were color coordinated to describe the segments under permanent construction as well as the completed permanent construction for each phase. The sequence and areas for temporary construction and completed temporary construction was displayed within each phase sequence to accurately define requirements for MOT during each phase. As a result of the meeting and project team comments, the phasing has been condensed to 5 phases rather than the 8 phases demonstrated and discussed during the CSMOT overview meeting.

To ensure the traffic during construction would not impact the operation of I-75/I-71, the traffic analysis utilized a Synchro model which considered all intersections as a network. The model optimized the signal timings to provide the best possible traffic operations during construction. The queuing for the off ramps was also reviewed. The analysis indicates any additional queuing will be contained on the ramp proper and would not impact interstate operations.

The MOT was developed through a comprehensive and detailed evaluation with input and review provided by KYTC District 6 Construction and Project Development Branches. This project requires the construction of several complex transportation facilities including the following:

- Roundabout at KY 338 / Triple Crown and Grand National
- Double Cross-Over Diamond (DCD) Interchange at KY 338 and I-75/I-71
- SPUI Interchange at KY 338 and US 25
- Temporary Norfolk Southern Railroad Detour

The following is a brief summary of the five construction phases comprising the overall MOT strategy.

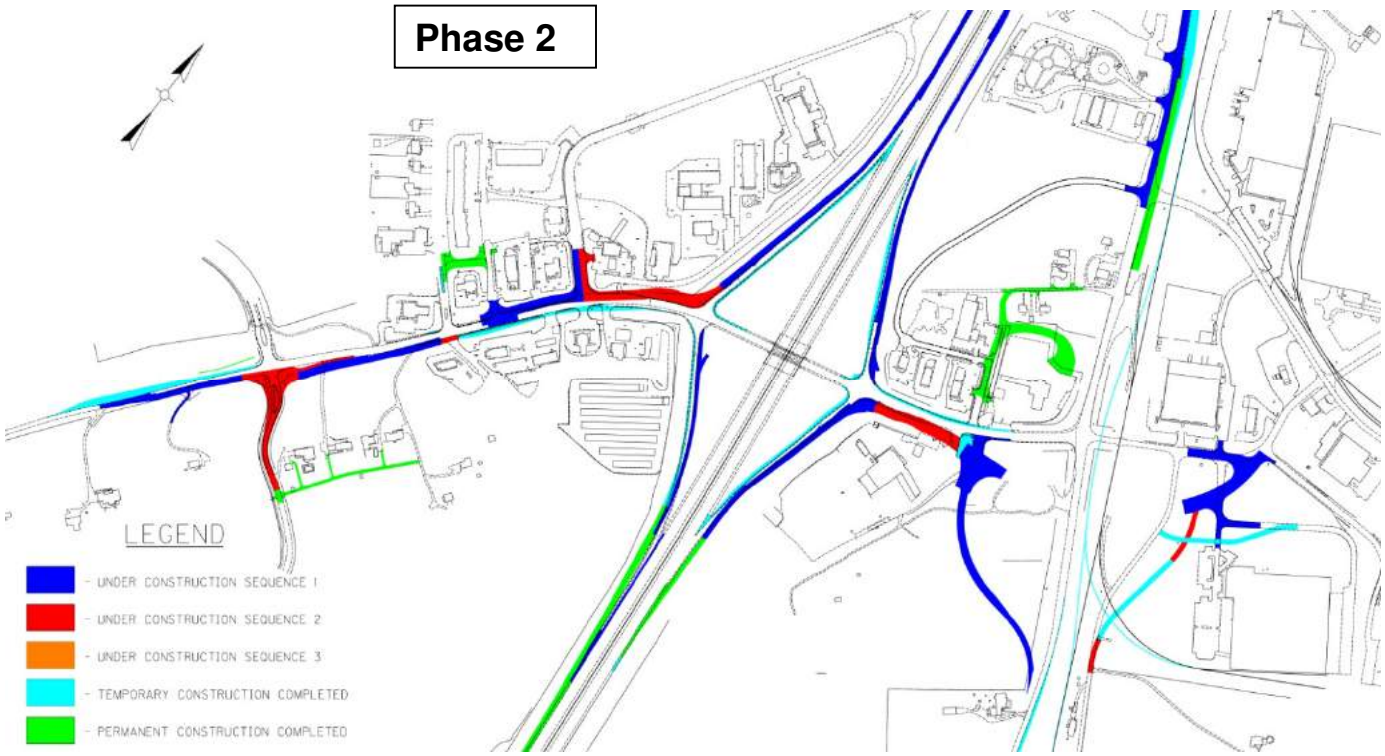


Phase 1 Sequence 1

- Construct the temporary KY 338 Diversion 1 on the western end of KY 338 as shown in the MOT plans, along with the proposed retaining wall from Sta. 103+88 to Sta. 106+60.
- Construct temporary widening along KY 338 from Sta. 114+75 to Sta. 115+59 Left, from Sta. 116+25 to Sta. 124+07 Right, and along EB KY 338 from Sta. 100+00 to Sta. 102+42.
- Strengthen, Widen, and/or Reconstruct the existing left shoulder along KY 338 through the DCD and from Ramp B to the Pilot Entrance.
- Construct Grand National Access Drive including all driveway connections.
- Remove existing median and construct temporary pavement along Paddock Drive.
- Construct proposed curb return for McDonald's rear entrance.
- Construct proposed Best Pal Drive from Sta. 24+30 to Sta. 33+33, including the proposed rear Pilot entrance and connection to Old Richwood Road. Remove existing median at the TA Truck stop entrance and construct temporary pavement.
- Construct a portion of temporary Old Lexington Pike Road Diversion 1 as shown in the MOT plans and construct temporary entrance for Ridge Transportation.
- Construct proposed ramp extensions along I-75/I-71 from Sta. 419+03 to Sta. 443+93 Left. Strengthen existing shoulder from Sta. 442+60 to Sta. 443+36 Right.
- Strengthen and widen the existing inside shoulder for Ramps A, B and D and the existing outside shoulder for Ramp C. Construct proposed Ramp C from Sta. 312+00 to Sta. 318+61 Right and Ramp D from Sta. 400+00 to Sta. 406+81 Right.
- Strengthen and widen the existing right shoulder along US 25 from Sta. 5+90 to Sta. 43+35. Construct proposed US 25 from Sta. 59+20 to Sta. 69+50 right. Construct the temporary US 25 Diversion 1 as shown in the MOT plans.

Phase 1 Sequence 2

- Construct proposed Clay Access Drive
- Construction for McDonald's Rear Entrance complete.

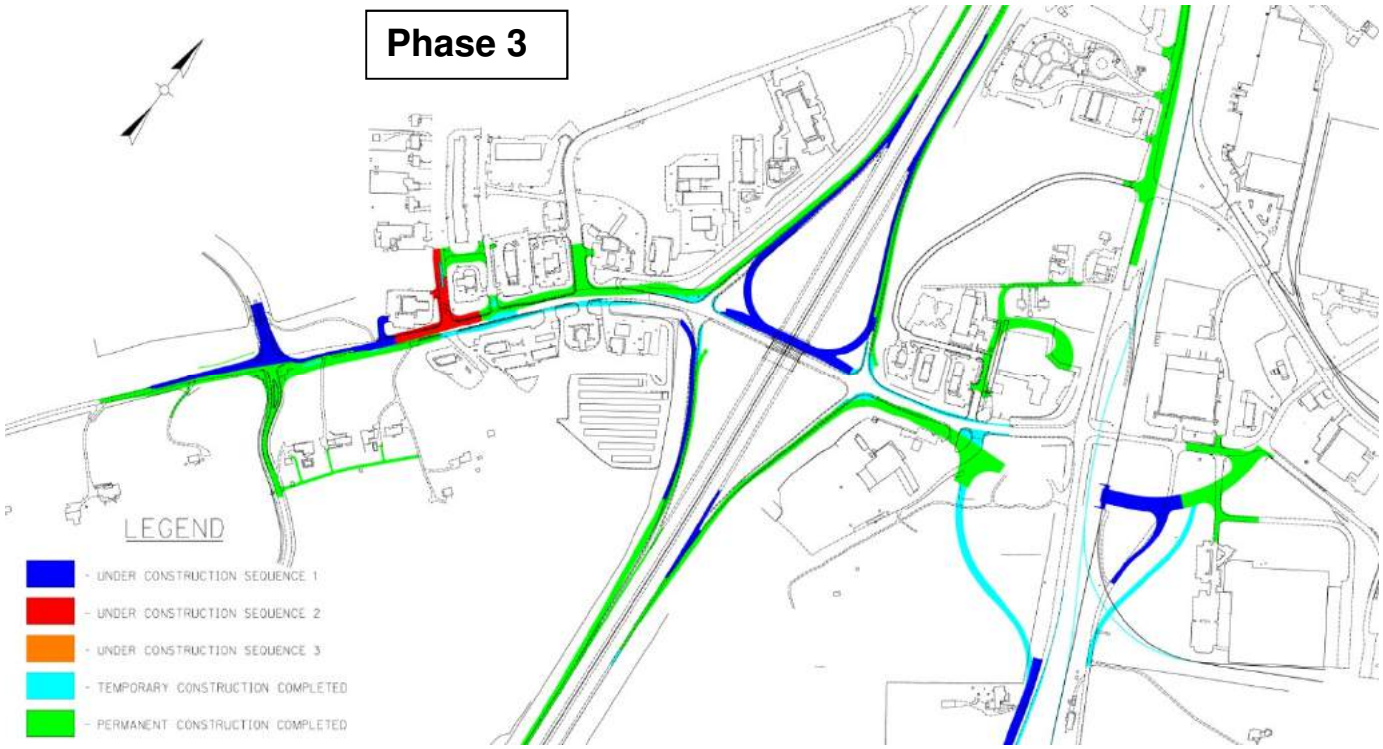


Phase 2 Sequence 1

- Construction of proposed KY 338 from Phase 1 and temporary KY 338 Diversion 1 is complete.
- Construct proposed KY 338 from Sta. 99+00 to Sta. 105+87 Right, from Sta. 108+50 to Sta. 115+40 Right, from Sta. 117+50 to Sta. 122+44 Left and temporary tie in with Clay Drive, from Sta. 372+40 to Sta. 372+63 Right and temporary tie in with Best Pal Drive, and from Sta. 383+30 to Sta. 387+95 and proposed Richwood Road and Ridge Transportation Entrances 1 and 2.
- Construction of Grand National Access Drive is complete.
- Construction of proposed Clay Access Drive is complete.
- Construct Proposed Clay Drive without center curbs.
- Construct Proposed Frogtown Connector Road from the right of the baseline.
- Construction of Best Pal Drive from Sta. 24+50 to Sta. 33+33 is complete.
- Construct southern portion of the Proposed Best Pal Drive intersection and tie in with the proposed TA truck stop entrance and US 25 Diversion 2.
- Construction of the proposed ramp extensions from Sta. 419+03 to Sta. 443+93 Left is complete.
- Construct Proposed Shoulder and Gore along I-75/I-71 from Sta. 441+13 to Sta. 449+36 Left, and the Proposed ramps from Sta. 474+86 to Sta. 492+86 Left and from Sta. 474+29 to Sta. 506+18 Right.
- Construction of proposed Ramps C and D from Phase 1 are complete.
- Construct proposed Ramp A from Sta. 87+60 to Sta. 102+19 Right. Construct Proposed Ramp B1 from Sta. 201+50 to Sta. 203+87 and Ramp B from Sta. 253+93 to Sta. 265+40. Construct Proposed Ramp C1 from Sta. 353+50 to Sta. 354+89 and Ramp C from Sta. 305+86 to Sta. 313+46 Left. Construct Proposed Ramp D from Sta. 406+81 to Sta. 417+20 Right.
- Construction of US 25 from Phase 1 and temporary US 25 Diversion 1 is complete.
- Construct the temporary US 25 Diversion 2 as shown in the plans and proposed US 25 from Sta. 62+15 to Sta. 77+00 Left.

Phase 2 Sequence 2

- Construction of proposed KY 338 from Sta. 117+50 to Sta. 122+44 left, from Sta. 372+40 to Sta. 372+63 right, and from Sta. 383+30 to 387+95 along with proposed Richwood Road and the Ridge Transportation entrances 1 and 2 are complete.
- Construct proposed KY 338 from Sta. 105+87 to Sta. 108+50 Right, this includes the southern half of the KY 338 roundabout, from Sta. 122+44 to Sta. 124+07 Left, from to KY 338 WB Sta. 200+00 to Sta. 203+42, from KY 338 EB Sta. 113+61 to Sta. 116+07 , and from Sta. 370+20 to Sta. 372+40 Right.
- Construct proposed Grand National Blvd. which includes the southern half of the roundabout.
- Construct proposed Frogtown Connector Road from the left of the baseline.
- Construction of the southern portion of Best Pal Drive intersection is complete.
- Complete construction of the temporary Old Lexington Pike Road Diversion 1 as shown on the MOT plans.
- Construct Proposed Ramp A from Sta. 102+19 to Sta. 104+37 Right.
- Construction of temporary US 25 Diversion 2 complete.

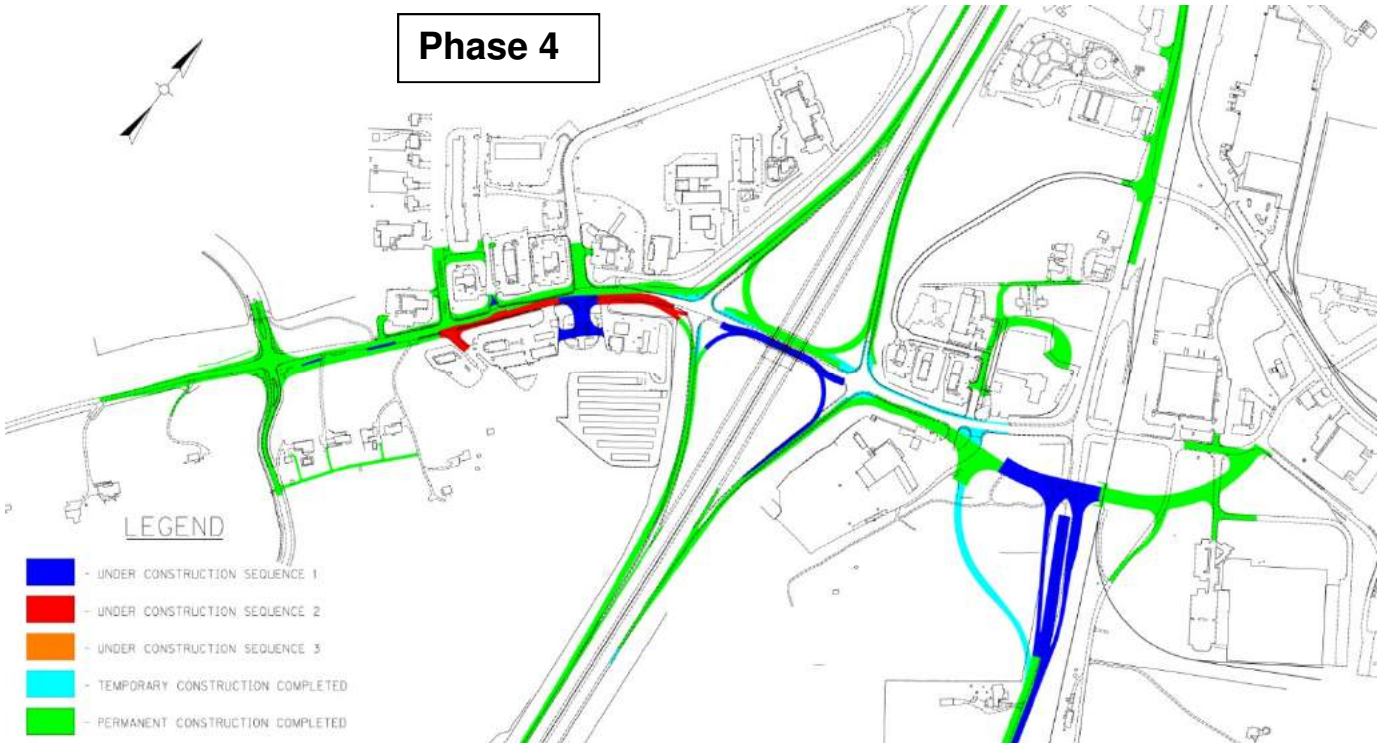


Phase 3 Sequence 1

- Construction of proposed KY 338 from Phase 2 is complete.
- Construct proposed KY 338 from Sta. 101+50 to Sta. 113+30 Left, this includes the remaining northern portion of the KY 338 roundabout, from EB KY 338 Sta. 105+25 to Sta. 111+00, and from Sta. 379+44 to Sta. 383+30, including the proposed railroad bridge.
- Construct Triple Crown Blvd. which includes the northern half of the roundabout.
- Construction of proposed Grand National Blvd. is complete.
- Construction of Frogtown Connector Road is complete.
- Construction of temporary Old Lexington Pike Road Diversion 1 is complete.
- Construct proposed Old Lexington Pike Road.
- Construction of I-75/I-71 from phase 2 is complete.
- Construct proposed ramp extension along I-75/I-71 from Sta. 474+29 to Sta. 477+29 Right.
- Construction of Ramps A, C, C1, B, B1, and D from Phase 2 are complete.
- Complete remaining portions of the proposed ramp, shoulder and gore for Ramp A, A1, B, and D. Construct proposed ramp C from Sta. 303+04 to Sta. 312+00 Right.
- Construction of US 25 from phase 2 is complete.
- Construct proposed US 25 from Sta. 5+90 to Sta. 40+00 left.

Phase 3 Sequence 2

- Construction of proposed KY 338 from Sta. 101+50 to Sta. 113+30 Left is complete.
- Construct proposed KY 338 from Sta. 113+30 to Sta. 117+50 Left.
- Construction of Proposed Triple Crown Blvd. is complete.
- Construct proposed Paddock Drive.

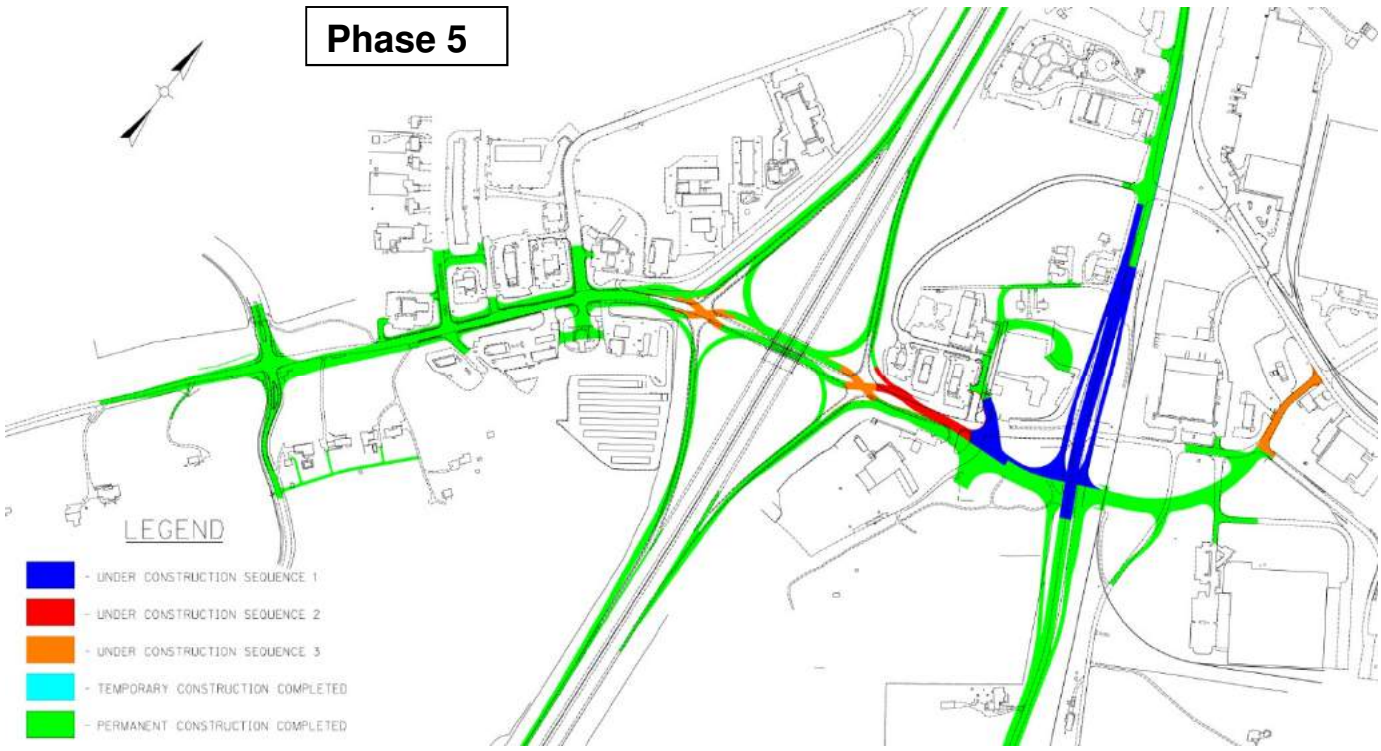


Phase 4 Sequence 1

- Construction of proposed KY 338 from Phase 3 is complete.
- Construct proposed KY 338 from Sta. 121+30 to Sta. 123+15 Right, including the new Gas Access, from WB KY 338 Sta. 205+50 to Sta. 212+00 and from Sta. 374+63 to Sta. 379+44.
- Complete Clay Drive center curbs.
- Construction of proposed Paddock Drive is complete.
- Construction of Old Lexington Pike Road is complete.
- Construction of I-75/I-71 is complete.
- Construction of Ramps from phase 3 is complete.
- Construct remaining portions of Ramp C, C1, D and D1.
- Construction of US 25 from Phase 3 is complete.
- Construct proposed US 25 from Sta. 5+90 to Sta. 40+00 Right, and from Sta. 40+00 to Sta. 46+91. Construct south half of SPUI, including ramps A, B, G, and H, the southern bridge abutments and both straddle bents.

Phase 4 Sequence 2

- Construction of proposed KY 338 from Sta. 121+30 to Sta. 123+15 Right, including the new Gas Access is complete.
- Construct proposed KY 338 from Sta. 115+40 to Sta. 121+30 Right, from Sta. 123+15 to Sta. 235+07 Right, and EB KY 338 Sta. 100+00 to Sta. 103+50.
- Construction of Clay Drive is complete.



Phase 5 Sequence 1

- Construction of proposed KY 338 from Phase 4 is complete.
- Construct proposed KY 338 from Sta. 72+64 to Sta. 74+63 Left.
- Construct remaining portions of Best Pal Drive.
- Construction of the Ramps from Phase 4 is complete.
- Construction of US 25 and SPUI from Phase 4 is complete.
- Construct north half of SPUI, including Ramps C, D, E F and the northern bridge abutments.

Phase 5 Sequence 2

- Construction of proposed KY 338 from Sta. 372+64 to Sta. 374+63 Left is complete.
- Construct proposed KY 338 from WB KY 338 Sta. 213+50 to Sta. 216+02 and from Sta. 370+00 to Sta. 372+64 Left.
- Construction of Best Pal Drive is complete.
- Construct remaining portions of Ramp B1.

Phase 5 Sequence 3

- Construction of proposed KY 338 from WB KY 338 Sta. 213+50 to Sta. 216+02 and from Sta. 370+00 to Sta. 372+64 Left are complete.
- Construct remaining proposed pavement at the I-75/I-71 and KY 338 DCD EB/WB crossovers and complete all remaining curb/gutter and median work along KY 338 at the ramp terminals.
- Construct proposed KY 338 widening and overlay from Sta. 387+95 to Sta. 392+45.
- Construction of Ramp B1 is complete.

DISCUSSION OF DESIGN EXCEPTIONS, VARIANCES, AND MITIGATION STRATAGIES

The project development team made the decision to not superelevate KY 338 for a design variance. The project corridor consists of commercial and industrial development with heavy semi-truck traffic. The corridor contains a low speed roundabout, a low speed double crossover diamond interchange, and a single point urban diamond interchange in close proximity of each other. Three other major intersections along the KY 338 corridor will be controlled with signals. Further, the FHWA publication "DIVERGING DIAMOND INTERCHANGE Informational Guide, August 2014" (Report No. FHWA-SA-14-067) indicates that the most common superelevation rates are +2% and -2%. Because of the above factors the variance to not superelevate KY 338 was requested.

A variance is requested for the design speed through the DCD. Typically the design speed through the reverse curves of the DCD is 10 mph less than the approach speed. The reduced speed will be mitigated with the use of reduced speed limit signage, lighting, and coordinated signal timing.

COST COMPARISON

Construction Cost Comparisons

Preliminary construction cost estimates were prepared for the I-75/I-71 ramps and for two alternatives on both the east and west side of I-75/I-71. These preliminary alternatives survived the initial project team review of the 5 eastern conceptual alternatives and the 10 western conceptual alternatives. The construction costs for the east and west alternatives were split at the I-75/I-71 centerline. Right of way and utility cost were not developed for the preliminary line and grade inspection. For the preliminary line and grade inspection a 20% contingency was applied and the resulting preliminary construction cost estimates were as follows:

Preliminary Line and Grade Construction Costs

Alternative	Description	Cost (2012 dollars)
E1	**SPUI KY 338 @ US 25, Signalize KY 338 @ Best Pal**	**$ 28,700,000**
E3	At-Grade KY 338 @ US 25, Rt-in/Rt-out KY 338 @ Best Pal	$ 19,300,000
I-75/I-71	**Ramps**	**$ 6,400,000**
W7	Signalize KY 338 @ Paddock, Rt-in/Rt-out KY 338 @ Frogtown	$ 16,100,000
W9	**Signalize KY 338 @ Paddock & KY 338 @ Paddock**	**$ 13,900,000**
TOTAL	Alternate E3, I-75 / I-71 Ramps, and W7 **Preferred Alternative E1, I-75/I-71 Ramps, and W9**	$ 41,800,000 **$ 49,000,000**

Note: Preferred Alternatives Shown in **Bold**

2016 Highway Plan	Funding	Phase	Year	Amount	Current Funding
6-18.00	IM	R	2019	$ 26,250,000	$ 40,897,660 (auth.)
6-18.00	IM	U	2020	$ 12,480,000	$ 2,215,000 (auth.)
6-18.00	IM	C	2021	$ 15,000,000	$ 62.2 million (Funding
6-18.10	IM	C	2021	$ 15,000,000	thru INFRA Grant, Federal,
6-18.11	IM	C	2022	$ 27,000,000	State, and Local)
Total Const.				$ 57,000,000	

Preferred Alternative Cost vs 6 Year Plan

The total estimated construction cost of the preferred alternate is well within the current construction cost shown in the Highway Plan.

CHOICE OF PREFERRED ALTERNATE

At the October 31, 2012 meeting, the FHWA indicated that in light of the public opposition and design changes that occurred on the Item No. 6-14 DCD project, in addition to the project delay, the FHWA recommended re-considering Alternative W3 with modifications to overcome the issues for which it had been initially eliminated. Alternative W9 was a refinement of Alternative W3. It addressed the capacity issues on KY338 by adding additional thru lanes and it eliminated the issues raised by the public.

On November 8, 2012, a meeting was held at the District 6 offices to discuss public concerns with Alternative W7 and the input received from the FHWA at the October 31, 2012 meeting. As a result of all the new information received since the Preliminary Line and Grade inspection held on July 10, 2012, the attendees deemed it prudent to reconsider the preferred alternative on the west side of the DCD and recommend Alternative W9 as the preferred alternative. Alternative W9 was further refined as much as feasible to reduce any backups on the SB exit ramp and the access on the south side of the Frogtown Connector Road intersection. The Frogtown Connector Road was revised to be similar to what was shown on Alternative W3. It requires the acquisition of the Huntington Bank located on the south side of KY338, opposite of Frogtown Connector Road.

Preferred Alternative

The preferred alternative is summarized as follows:

- Construction of a Double Crossover Diamond Interchange at I-75/I-71 at KY 338 Richwood Road (Labelled as Alternative #3 in the IJS).
- Construction of Acceleration/Deceleration lanes on I-75/I-71 to meet current AASHTO standards and necessary to meet capacity requirements. This includes all ramps and modifying the grade of the southbound entrance ramp.
- Alternative E1 on the east side of I-75/I-71.
- Alternative W9 (modified) on the west side of I-75/I-71.

DISCUSSION OF CLEARZONE

According to AASHTO “Roadside Design Guide” Chapter 10 “Roadside Safety in Urban or Restricted Environments” the minimum lateral offset is 1.5’ from the face of the curb and 3’ at intersections. The typical section for KY 338 provides for a 10’ berm where sidewalk will be constructed and a 13’ berm where the shared use path will be constructed. US 25 will have a minimum 6’ berm. A portion of US 25 will have a 13’ berm for a shared use path. Interstate I-75/I-71 will have a 30’ minimum clearzone.

CONSIDERATION OF BICYCLE AND PEDESTRIAN FACILITIES

This KYTC project, Item No. 6-18.00, will reconstruct the I-75 @ KY 338 (Richwood Road) Interchange and include widening/improvements to KY 338 from Triple Crown Boulevard to US 25 (Dixie Highway). Improvements include the reconstruction of the existing KY 338 traditional diamond interchange with I-75/I-71 to a Double Crossover Diamond Interchange (DCD), the reconstruction of the existing KY 338 @ US 25 signalized intersection to a Single Point Urban Interchange (SPUI), and the elimination of two at grade railroad crossings.

This discussion outlines the proposed improvements for non-motorized facilities for use by pedestrians and bicycles for various segments of the project. Table 1 on the following page summarizes existing non-motorized facilities and lists the recommended non-motorized facilities, including the reasoning for the recommendations. Recommendations are based on existing field conditions, guidance provided in the July 2012 KYTC *Pedestrian & Bicycle Travel Policy*, and the KYTC HD-1501 *Guidelines for Pedestrian & Bicycle Accommodations* chapter.

As existing pedestrian and bike provisions do not exist on the corridor, pedestrian and bicycle volume counts were not obtained for this project. However, very minimal pedestrian and bicycle activity were observed within the project area during the initial preliminary field review in the fall 2011. Even though there were only a handful of pedestrians and/or bicycles observed, there is potential for growth of these non-motorized modes of transportation. Because of the three truck stops and numerous restaurants it is known that pedestrians use the shoulders to access businesses. KY 338 on the west side of the project is suburban reflecting residential growth. Commercial / retail developments exist along KY 338 between Triple Crown Boulevard and I-75/I-71 which could serve as a destination for pedestrians and bicycles. Hotels exist on each side of the interstate. Truck stops exist along KY 338 immediately east of I-75/I-71, which would likely generate less non-motorized traffic than the area to the west. An industrial park with a large employment base exists east of US 25 within the project area that has potential to generate some non-motorized traffic.

For the last 15-20 years the KYTC District 6 has had a general unwritten policy of providing sidewalks along corridors that have existing urban elements such as those cited above. Further, it is very common for Boone County to request non-motorized facilities so to build a more connected community. In addition, the Transit Authority of Northern Kentucky (TANK) frequently requests sidewalks / shared-use paths in established or upcoming urban areas. During the Public Involvement phase, at the public meeting, sidewalks/shared-use paths were presented with a general response that the provision is expected as part of the overall corridor improvement.

For safety pedestrian crossings have been strategically situated so as to provide the greatest protection for pedestrians as they seek to utilize crossings. Specifically at the Triple Crown roundabout pedestrians are permitted to only cross on the west side of the roundabout so as to minimize the potential number of conflicts between motorized and non-motorized users. There will be fewer motorized vehicles on the west leg of the roundabout. Similarly, pedestrian crossings are restricted to the west side of the intersection at Frogtown. This is to provide greater separation from free-flow motorized operations and those on foot. Finally, extra care was given to protecting non-motorized users through the DCD. It is desirable to channelize the non-motorized traffic as much as possible through the interchange area. Motorists tend to focus on vehicular movements and proper staging for ramp entrances within the interchange, and stray pedestrians and/or bicycles can be a challenge. Channelizing the non-motorized traffic also minimizes the potential for pedestrians and/or bicycles entering the fully access controlled freeway facility. For the I-75/I-71 DCD interchange with KY 338, all non-motorized traffic will be channelized on a single shared-use path along the south side of KY 338.

Minimizing the potential for non-motorized encounters with railroads is also desired. Norfolk Southern Railroad parallels US 25 along the east side for the length of the project. KY 338 also crosses this railroad just east of US 25 via an at-grade crossing. This crossing will be reconstructed with KY 338 going underneath the railroad. The shared use path will continue thru the DCD and the SPUI interchange at US 25 to underneath the railroad. A shared use path is proposed for the west side of US 25 from Transport Drive to the intersection with KY 338. No non-motorized facility is proposed to parallel the east side of US 25 to minimize the presence of pedestrians and/or bicycles between US 25 and the railroad. The 5 foot sidewalks on both the north and south side of KY 338 will cross pedestrian traffic under US 25 and the railroad via the new grade separation.

The recommendations contained in this discussion provide adequate non-motorized facilities within the project area for current and future needs.

TABLE 1
Non-Motorized Recommendations

No.	Location	Facility Type	Existing Non-Motorized Facilities	Proposed Non-Motorized Facilities	Comments
A	KY 338 from Triple Crown Boulevard to Paddock Drive	Segment	• 10 ft. shared-use path 100 ft. north of KY 338 • 5 ft. sidewalk along north side 350 ft. west of Paddock Drive • 5 ft. sidewalk along south side beginning 150 ft. west of Paddock Drive	• 8 ft. shared-use path along north side • 5 ft. sidewalk along south side	Connect 8 ft. shared-use path into existing path on the north side. Since non-motorized facilities exist on both the north and south sides and since the area to the west is a suburban residential area with the future residential growth likely, provide a 5 ft. sidewalk on the south side.
B	KY 338 at Paddock Drive	Intersection	• Un-signalized intersection • No crosswalks	• Signalized Intersection. • Crosswalks on all legs • Pedestrian signal heads	Pedestrians can use crosswalks as part of normal signal operations. Pedestrian signal heads should be provided on signal poles.
C	KY 338 from Paddock Drive to Frogtown Connector Road	Segment	• 5 ft. sidewalks along north and south sides	• 5 ft. sidewalk along north side • 8 ft. shared-use path along south side	Provide non-motorized facilities on both sides since sidewalks currently exist on both sides and since area contains potential pedestrian destinations such as McDonald's and other restaurants.
D	KY 338 at Frogtown Connector Road	Intersection	• Signalized intersection • Crosswalks on west and south legs	• Signalized Intersection • Crosswalks on west and south legs • Pedestrian signal heads	Pedestrians can use crosswalks as part of normal signal operations. Pedestrian signal heads should be provided on signal poles.
E	KY 338 from Frogtown Connector Road to I-75 SB Ramp	Segment	• No sidewalks or paths	• 8 ft. shared-use path along south side	To avoid the potential for stray pedestrians within the DCD interchange, channelize all non-motorized traffic along the south side.
F	KY 338 at I-75 SB On-Ramps	Intersection	• No crosswalks	• 8 ft. shared-use path along south side thru ramp junction • Push-button activated pedestrian signal at ramp crossings	The DCD allows for free-flow traffic onto the freeway on-ramp. Since vehicles will be gaining speed as they negotiate the horizontal curve, provide pedestrian push-button signals at the ramp crossings.
G	KY 338 from I-75 SB On-Ramps to I-75 NB Off-Ramps	Segment	• No sidewalks or paths	• 8 ft. shared-use path along south side • Shared-use path to travel beneath existing I-75 bridge – existing slope wall to be reconstructed with partial vertical abutment to make space	To avoid the potential for stray pedestrians within the interchange, channelize all non-motorized traffic along the south side. Positive protection shall be provided.
H	KY 338 at I-75 NB Off-Ramps	Intersection	• No crosswalks	• 8 ft. shared-use path along south side • Push-button activated pedestrian signal at ramp crossings	The DCD interchange allows for free-flow traffic onto the freeway on-ramp. Since vehicles will be gaining speed as they negotiate the horizontal curve, provide pedestrian push-button signals at the ramp crossings.
I	KY 338 from I-75 NB Off-Ramp to Best Pal Drive	Segment	• No sidewalks or paths	• 8 ft. shared-use path along south side	To avoid the potential for stray pedestrians within the interchange, channelize all non-motorized traffic along the south side.
J	KY 338 at Best Pal Drive	Intersection	• Very wide non-signalized intersection • No crosswalks	• Signalized Intersection with no medians • Crosswalks on south, north and east legs • Pedestrian signal heads	Since west side of the intersection operates more within the influence of the DCD interchange, only provide crosswalks on the east and south legs of the intersection. Pedestrians can use crosswalks as part of the normal signal operations.

TABLE 1 (cont.)
Non-Motorized Recommendations

No.	Location	Facility Type	Existing Non-Motorized Facilities	Proposed Non-Motorized Facilities	Comments
K	KY 338 from Best Pal Drive to US 25	Segment	• No sidewalks or paths	• 8 ft. shared-use path along south side	Since the truck stop in the northwest corner of KY 338 @ US 25 intersection is not a typical pedestrian destination it could be served via the proposed shared use path along the south side of KY 338. Do not provide a sidewalk along the north side.
L	KY 338 at US 25	Intersection	• Signalized intersection • No crosswalks	• Crosswalks north and south legs • Pedestrian signal heads	Pedestrians can use crosswalks on north and south legs as part of normal signal operations. Because of the SPUI configuration, pedestrian signal heads for the ramp crossings should be connected to the primary signal.
M	US 25 from Approx. 900 ft. south of KY 338 (@ new frontage road) to Winning Colors Drive	Segment	• No sidewalks or paths	• 8 ft. shared-use path along west side	It is desirable to channelize all non-motorized traffic along the west side of US 25 so that stray pedestrians are less likely between US 25 and the railroad tracks to the east. Land use along US 25 does not promote pedestrian traffic, but this could become part of a regional trail system in the future.
N	Grand National Boulevard	Segment	• 5 ft. shared-use path along west side • No crosswalks	• 5 ft. sidewalk on west side • Crosswalk on south side of KY 338	Pedestrians accessing Grand National Boulevard can use crosswalk on south leg of roundabout to access new sidewalk along south side of KY 338. The proposed sidewalk connects to existing system to the south on Grand National Boulevard.
O	Triple Crown Boulevard	Segment	• 5 ft. shared-use path along west side	• 5 ft. sidewalk on west side to crosswalk at intersection with KY 338	Pedestrians can use the existing shared-use path and crosswalk on Triple Crown Blvd. located approximately 175 ft. north of the KY 338 intersection. The crosswalk connects to the existing shared-use path that runs behind the creek paralleling KY 338. The shared-use path then connects to the existing sidewalk at the 5/3 Bank entrance on KY 338.
P	Paddock Drive	Segment	• No sidewalks or paths	• 5 ft. sidewalks on both east and west sides • Crosswalk at intersection with KY 338 • Pedestrian signal heads	Pedestrians can use the new sidewalks to access businesses along Paddock Drive and connect to the sidewalk system along KY 338.
Q	Frogtown Road Connector	Segment	• 5 ft. sidewalk on west side	• 5 ft. sidewalk on west side • Pedestrian signal heads	Pedestrians can use the sidewalk to access businesses along Frogtown Road Connector and connect to the sidewalk system heading west along KY 338. The proposed sidewalk connects to the existing system to the north on Frogtown Road Connector.
R	KY 338 from US 25 to EOP in Industrial Park	Segment	• 4 ft. sidewalk	• 5 ft. sidewalks on both east and west sides	Since this is part of a large industrial park with high employment base, provide non-motorized facilities on both sides.
S	Old Lexington Pike	Segment	• No sidewalk or paths	• 5 ft. sidewalk on east side	A sidewalk is to be provided on the east side of Old Lexington Pike from new KY 338 to tie down. This will meet a sidewalk on the property to the south.

AVOIDANCE OF WATER RELATED IMPACTS

WATER RELATED IMPACTS SUMMARY

County	Boone	**Route No.**	KY 338/US 25	**Item No.**	6-18.00
Date	01-24-2013	**Program #**			
Federal Project No.	IM 75-7 (129)				
State Project No.	FD 52 008 0075 175-176				
Location Engineer	Jim Simpson				

Section 1: Impact Checklist
Complete this section for each alternative considered at the conclusion of Phase 1 design. All alternates have the same impacts.

FLOODPLAIN IMPACTS		
FEMA Study Type	**Yes**	**Community No.**
Detailed FEMA Study with delineated floodway*	X	21015C
Detailed FEMA Study without delineated floodway*		
Approximate FEMA Study		
No FEMA Study		
* May require initiation of the map revision process if impacts to water surface elevations cannot be avoided. Potential impacts to floodplains and/or floodways shall be assessed early in the project. Refer to Sections DR 203 and DR 204 of the Drainage Manual.		

SIGNIFICANT RESOURCE IMPACTS				
Are open sinkholes impacted? If so, how many sinkholes are impacted?	Yes		No	X
Are wetlands impacted? If so, how many total acres are estimated? _____ acres	Yes		No	X
Are any of the streams in the project area designated “Special Use Waters” (e.g. Wild Rivers, Exceptional Waters, Outstanding State Resource Water, etc.)?	Yes		No	x
Where possible, alignments should be developed that avoid significant resources. When it becomes impossible to avoid a significant resource, the project should be designed to minimize these impacts. Significant resource impacts are discussed in DR 202 of the Drainage Manual. Wetland impacts and their costs are also discussed in DR 500 of the Drainage Manual. Projects that impact special use waters may require an individual KPDES Erosion Control Permit. Contact the Division of Environment Analysis for more information.				

STREAM CHANNEL IMPACTS				
Will stream relocations (channel changes) be needed? If so, how many total linear feet are estimated? 168 LF	Yes	x	No	
Will new culverts or culvert extensions be constructed? If so, how many total linear feet are estimated? 75 LF	Yes	x	No	
Will temporary stream crossings be needed?	Yes		No	x
Will excess material sites that require permitting be needed?	Yes		No	x
Will bridges be constructed?	Yes	x	No	
On highway projects that involve stream crossings such as bridge and culverts, it is often not feasible to totally avoid stream channel impacts. In these cases, design the project to minimize the impacts. Stream relocations should be avoided if possible. If stream relocations are unavoidable design to project to minimize their impacts. Stream channel impacts are discussed in DR 506, 601-3, 608-2, and 802-3 of the Drainage Manual.				

Section 2: Impact Discussion

The selected alternative for this project (E1-W9) does impact one blue-line stream within the project area. This impact occurs at a blue-line stream crossing under Triple Crown Blvd. This culvert will either be replaced or at a minimum be extended on each side. The impact to this blue-line stream was minimized along KY 338 with the use of retaining walls. Other culvert extensions on this project are for cross drainage and do not outfall into any blue-line streams as delineated by USGS.

Meeting Minutes

Project:	Item 6-18, KY338	
Subject:	**Ramp Geometry Meeting**	
Date:	Thursday, February 01, 2018	
Location:	Phone Conference Call	
Attendees:	Kelly Meyer – HDR Carol Callan–Ramler – KYTC D6	Jim Guinn – HDR Kyle Chism - PTG

A phone conference call was held this date to discuss findings and responses to a 12/4/2017 email from Carol Callan-Ramler that identified potential geometry issues from the District's initial review of the Interchange Geometric Layout sheets for the project's DCD and SPUI interchanges. Reference is made to the attached **Exhibit "A"** that was included with the aforementioned email that identified the issues the District identified for revisit.

The following comments were noted:

1. It was noted as a general comment that guidance on the treatment of DCD and SPUI ramps connecting to the intersecting low speed street/road is limited and there is significant inconsistency on how this is addressed on projects. With that said, the design team has used the most current AASHTO, FHWA, and KYTC documents as guiding resources. Additionally the team investigated the completed US68/Harrodsburg Interchange in Fayette County and the I-71&I-75 / KY536 Interchange under design in Boone County.

    a. The link to the FHWA - Diverging Diamond Interchange – Information Guide (2014) is shown below.

    https://safety.fhwa.dot.gov/intersection/alter_design/pdf/fhwasa14067_ddi_infoguide.pdf

2. HDR is designing the SPUI. PTG is designing the DCD. In response to the District's comments, both design consultants revisited the existing design considerations and engaged their respective national interchange experts for review and comments.

    a. The two interchanges will both be lit, which minimizes headlight sight distance issues.

3. SPUI – Ramps A and F

    a. After significant discussion it was determined that the ramp profiles and cross slopes in question are acceptable, recognizing the existing conditions and constraints. However, the team did decide to introduce countermeasures to help the situation. It was determined that concrete pavement would be constructed on both ramps to minimize pavement raveling and utilizing high friction surface techniques to increase skid resistance.

401 West Main Street, Suite 500
Louisville, KY 40202-2936
T 502.909.3234 **hdrinc.com**

b. The typical sections and plans will identify the stop/start locations for the concrete pavement.

4. DCD - Ramps A/A1 and D/D1

   a. Similar to the SPUI ramps, the two DCD ramps in question were discussed in detail. Sight distance was checked for multiple conditions on both ramps. The associated exhibits are included in Attachment A. It was determined that reverse crown (2%) was acceptable through the curves, recognizing the connection to the low speed KY338. This guidance is provided in the FHWA Diverging Diamond Interchange Informational Guide. Concrete pavement will also be used on the ramps as a countermeasure.

   b. Sight distance drawings (10 sheets) for ramps A/A1 and D/D1 of the DCD were developed and are attached as **"Exhibit B"**. Results of this review included modifying the back slope between the mainline and ramp D1 to a 5:1 slope, so as to increase sight distance.

5. These notes will be included with the Design Executive Summary as an attachment to the ramp discussions.

EXHIBIT A

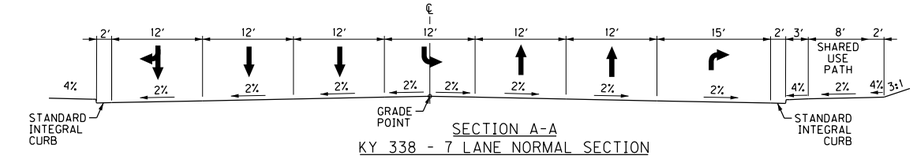
401 West Main Street, Suite 500
Louisville, KY 40202-2936

T 502.909.3234

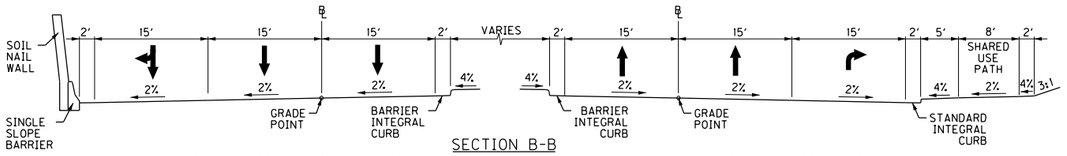
hdrinc.com

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	R224

REVISED PLAN DATE: NOVEMBER 28, 2018



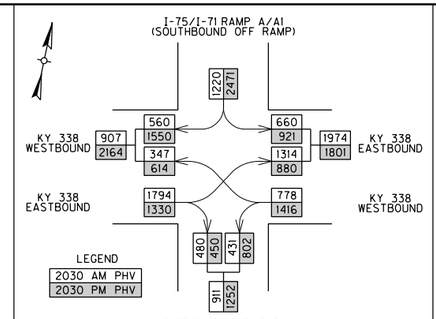
SECTION A-A
KY 338 - 7 LANE NORMAL SECTION



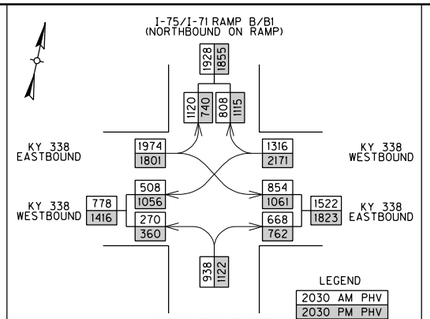
SECTION B-B

KY 338 WB - 3 LANE NORMAL SECTION

KY 338 EB - 3 LANE NORMAL SECTION



DESIGN HOUR VOLUMES (2030)



DESIGN HOUR VOLUMES (2030)

EB KY 338 (A)
PI 101+70.51
Δ = 34°53′21.14″ Rt.
T = 73.85′
L = 143.10′
R = 235.00′
E = 11.33′
e = NC

EB KY 338 (B)
PI 103+10.86
Δ = 36°36′00.01″ Lt.
T = 71.10′
L = 137.34′
R = 215.00′
E = 11.45′
e = NC

EB KY 338 (C)
PI 105+47.02
Δ = 29°07′10.15″ Rt.
T = 68.83′
L = 134.68′
R = 265.00′
E = 8.79′
e = NC

EB KY 338 (D)
PI 111+80.78
Δ = 22°56′26.25″ Rt.
T = 49.71′
L = 98.10′
R = 245.00′
E = 4.99′
e = NC

EB KY 338 (E)
PI 114+05.26
Δ = 36°22′17.39″ Lt.
T = 78.84′
L = 152.35′
R = 240.00′
E = 12.62′
e = NC

EB KY 338 (F)
PI 115+14.10
Δ = 13°25′51.15″ Rt.
T = 35.32′
L = 70.32′
R = 300.00′
E = 2.07′
e = NC

WB KY 338 (G)
PI 202+91.89
Δ = 43°17′21.13″ Rt.
T = 119.05′
L = 226.66′
R = 300.00′
E = 22.76′
e = NC

WB KY 338 (H)
PI 205+69.76
Δ = 31°02′47.00″ Lt.
T = 66.66′
L = 130.05′
R = 240.00′
E = 9.09′
e = NC

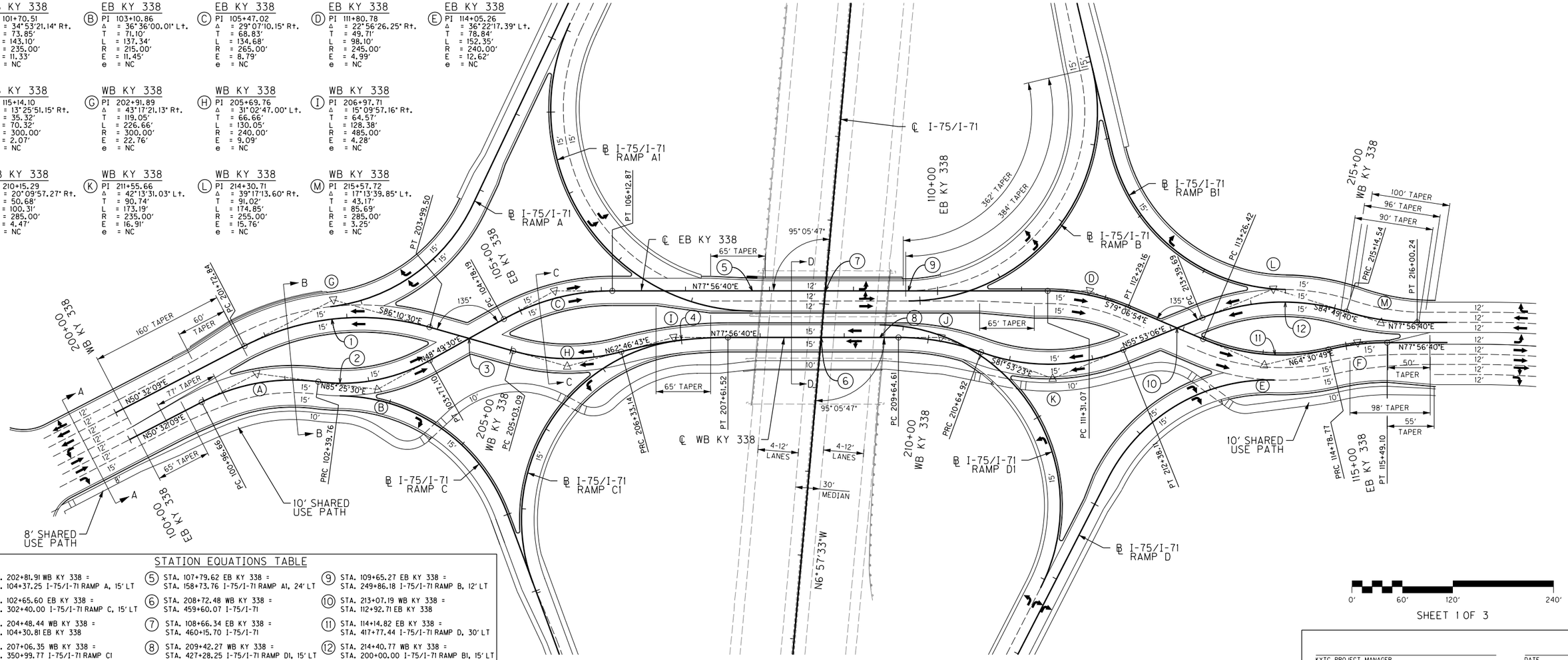
WB KY 338 (I)
PI 206+97.71
Δ = 15°09′57.16″ Rt.
T = 64.57′
L = 128.38′
R = 485.00′
E = 4.28′
e = NC

WB KY 338 (J)
PI 210+15.29
Δ = 20°09′57.27″ Rt.
T = 50.68′
L = 100.31′
R = 285.00′
E = 4.47′
e = NC

WB KY 338 (K)
PI 211+55.66
Δ = 42°13′31.03″ Lt.
T = 90.74′
L = 173.19′
R = 235.00′
E = 16.91′
e = NC

WB KY 338 (L)
PI 214+30.71
Δ = 39°17′13.60″ Rt.
T = 91.02′
L = 174.85′
R = 255.00′
E = 15.76′
e = NC

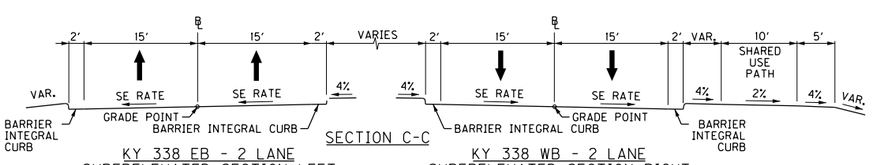
WB KY 338 (M)
PI 215+57.72
Δ = 17°13′39.85″ Lt.
T = 43.17′
L = 85.69′
R = 285.00′
E = 3.25′
e = NC



SHEET 1 OF 3

STATION EQUATIONS TABLE

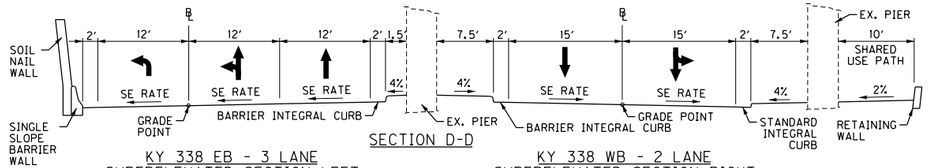
1. STA. 202+81.91 WB KY 338 = STA. 104+37.25 I-75/I-71 RAMP A, 15′ LT
2. STA. 102+65.60 EB KY 338 = STA. 302+40.00 I-75/I-71 RAMP C, 15′ LT
3. STA. 204+48.44 WB KY 338 = STA. 104+30.81 EB KY 338
4. STA. 207+06.35 WB KY 338 = STA. 350+99.77 I-75/I-71 RAMP C1
5. STA. 107+79.62 EB KY 338 = STA. 158+73.76 I-75/I-71 RAMP A1, 24′ LT
6. STA. 208+72.48 WB KY 338 = STA. 459+60.07 I-75/I-71
7. STA. 108+66.34 EB KY 338 = STA. 460+15.70 I-75/I-71
8. STA. 209+42.27 WB KY 338 = STA. 427+28.25 I-75/I-71 RAMP D1, 15′ LT
9. STA. 109+65.27 EB KY 338 = STA. 249+86.18 I-75/I-71 RAMP B, 12′ LT
10. STA. 213+07.19 WB KY 338 = STA. 112+92.71 EB KY 338
11. STA. 114+14.82 EB KY 338 = STA. 417+77.44 I-75/I-71 RAMP D, 30′ LT
12. STA. 214+40.77 WB KY 338 = STA. 200+00.00 I-75/I-71 RAMP B1, 15′ LT



KY 338 EB - 2 LANE SUPERELEVATED SECTION LEFT

SECTION C-C

KY 338 WB - 2 LANE SUPERELEVATED SECTION RIGHT



KY 338 EB - 3 LANE SUPERELEVATED SECTION LEFT

SECTION D-D

KY 338 WB - 2 LANE SUPERELEVATED SECTION RIGHT

SCALE: 1″=60′

KYTC PROJECT MANAGER	DATE
DIRECTOR OF DESIGN	DATE
DIRECTOR OF TRAFFIC OPERATIONS	DATE
FEDERAL HIGHWAY ADMINISTRATION	DATE

RICHWOOD ROAD (KY 338)
AND I-75/I-71
GEOMETRIC LAYOUT SHEET

FILE NAME: ...\Roadway\Sheets\R224000E.dgn
USER: p003822B
DATE PLOTTED: 11/30/2018
E-SHEET NAME:
Power InRoads v8.11.9.397

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	R225

REVISED PLAN DATE: NOVEMBER 28, 2018

I-75/I-71 RAMP C1
Ⓣ PI 353+73.87
Δ = 103°46'43.98" Lt.
T = 274.10'
L = 389.43'
R = 215.00'
E = 133.36'
e = NC

I-75/I-71 RAMP C
Ⓤ PI 303+88.07
Δ = 69°06'35.35" Rt.
T = 148.07'
L = 259.33'
R = 215.00'
E = 46.05'
e = NC

I-75/I-71 RAMP C
Ⓥ PI 310+26.40
Δ = 25°19'16.47" Rt.
T = 330.22'
L = 649.65'
R = 1470.00'
E = 36.63'
e = 4.6%
Runoff = 96'
Runout = 42'

END PARTIALLY CONTROLLED ACCESS
BEGIN FULLY CONTROLLED ACCESS
STA. 123+13.71, 74.19' RT

BEGIN EB KY 338
STA. 100+00.00 =
STA. 124+07.17
KY 338, 18' RT

℄ KY 338

END PARTIALLY CONTROLLED ACCESS
BEGIN FULLY CONTROLLED ACCESS
STA. 123+26.90, 49.00' LT

BEGIN WB KY 338
STA. 200+00.00 =
STA. 124+07.17
KY 338, 18' LT

I-75/I-71 RAMP A1
Ⓝ PI 157+69.97
Δ = 115°23'04.71" Lt.
T = 379.53'
L = 483.32'
R = 240.00'
E = 209.05'
e = NC

I-75/I-71 RAMP A
Ⓞ PI 93+24.32
Δ = 16°17'17.59" Rt.
T = 257.59'
L = 511.71'
R = 1800.00'
E = 18.34'
e = 5.6%
Runoff = 202'
Runout = 73'

I-75/I-71 RAMP A
Ⓟ PI 103+38.73
Δ = 58°02'15.81" Rt.
T = 119.27'
L = 217.78'
R = 215.00'
E = 30.87'
e = NC

I-75/I-71
Ⓩ PI 451+20.78
Δ = 01°59'24.65" Lt.
T = 393.38'
L = 786.68'
R = 22,647.99'
E = 3.42'
e = NC

RAMP C SUPERELEVATION DIAGRAM

LT-EP: STA. 302+40.00 SE = -2.00% | STA. 305+91.00 SE = -2.00% | STA. 307+29.00 SE = 4.60% | STA. 313+27.00 SE = 4.60% | STA. 313+81.00 SE = 2.00% | STA. 318+61.00 SE = 2.00%

RT-EP: STA. 302+40.00 SE = -2.00% | STA. 306+75.00 SE = -2.00% | STA. 307+29.00 SE = -4.60% | STA. 313+27.00 SE = -4.60% | STA. 313+81.00 SE = -2.00% | STA. 318+00.00 SE = -2.00%

RAMP C1 SUPERELEVATION DIAGRAM

STA. 352+00.00 SE = -2.00% | STA. 354+89.20 SE = -2.00%

RAMP A1 SUPERELEVATION DIAGRAM

STA. 153+90.44 SE = -2.00% | STA. 157+35.00 SE = -2.00%

RAMP A SUPERELEVATION DIAGRAM

LT-EP: STA. 87+60.69 SE = 2.00% | STA. 89+81.00 SE = 2.00% | STA. 91+11.00 SE = 5.60% | STA. 95+11.00 SE = 5.60% | STA. 96+40.00 SE = -2.00% | STA. 97+86.00 SE = -2.00% | STA. 103+77.91 SE = -2.00%

RT-EP: STA. 93+65.00 SE = -5.60% | STA. 95+11.00 SE = -5.60% | STA. 96+40.00 SE = -2.00% | STA. 103+77.91 SE = -2.00%

PC 302+40.00 | PT 104+62.89 | PRC 104+37.25 | PC 102+19.46 | PT 305+99.33 | PT 354+89.20 | POE 355+95.00 | PC 306+96.19 | PC 350+99.77 | PT 313+45.84 | PT 158+73.76 | PC 153+90.44 | PT 95+78.44 | PC 90+66.73 | PI 87+60.69 | PC 249+86.18 | PT 427+28.25 | PT 410+90.56 | PC 407+71.89 | PC 421+58.55 | PC 422+88.84 | PC 415+34.52 | PT 417+77.44 | PC 200+00.00 | PT 95+44.09 | PC 150+36.09 | PT 263+88.93 | PT 202+85.42 | PT 256+89.15 | PC 236+83.24 | PT 253+91.79

MATCH LINE I-75/I-71 STA 443+93.64 — SEE SHEET 3 OF 3

MATCH LINE I-75/I-71 STA 474+28.69 — SEE SHEET 3 OF 3

I-75/I-71 RAMP C | I-75/I-71 RAMP C1 | I-75/I-71 RAMP A1 | I-75/I-71 RAMP A | I-75/I-71 RAMP D | I-75/I-71 RAMP D1 | I-75/I-71 RAMP B | I-75/I-71 RAMP B1

℄ I-75/I-71 | ℄ EB KY 338 | ℄ WB KY 338 | ℄ KY 338

END WB KY 338
STA. 216+22.16=
STA. 370+20.00
KY 338, 18' LT

END EB KY 338
STA. 116+06.82=
STA. 370+20.00
KY 338, 6' RT

END FULLY CONTROLLED ACCESS
BEGIN PARTIALLY CONTROLLED ACCESS
STA. 371+58.66, 73.98' RT

END FULLY CONTROLLED ACCESS
BEGIN PARTIALLY CONTROLLED ACCESS
STA. 372+15.57, 124.28' LT

ACCEL./DECEL. LANE

2 LANE SUPERELEVATED RAMP SECTION

SECTION A-A
2 LANE NORMAL RAMP SECTION

SECTION B-B
2 LANE NORMAL RAMP SECTION

STATION EQUATIONS TABLE

⑬ STA. 153+90.44 I-75/I-71 RAMP A1 =
STA. 99+74.40 I-75/I-71 RAMP A, 12' LT

⑭ STA. 203+85.52 I-75/I-71 RAMP B1 =
STA. 253+91.79 I-75/I-71 RAMP B

⑮ STA. 354+89.20 I-75/I-71 RAMP C1 =
STA. 305+86.20 I-75/I-71 RAMP C

⑯ STA. 422+88.84 I-75/I-71 RAMP D1 =
STA. 413+82.03 I-75/I-71 RAMP D, 12' LT

I-75/I-71 RAMP D1
Ⓦ PI 426+40.38
Δ = 117°06'03.31" Lt.
T = 351.54'
L = 439.42'
R = 215.00'
E = 197.08'
e = NC

I-75/I-71 RAMP D
Ⓧ PI 409+32.31
Δ = 16°18'07.52" Rt.
T = 160.42'
L = 318.67'
R = 1120.00'
E = 11.43'
e = 7.2%
Runoff = 216'
Runout = 60'

I-75/I-71 RAMP D
Ⓨ PI 416+70.80
Δ = 64°44'08.75" Rt.
T = 136.27'
L = 242.92'
R = 215.00'
E = 39.55'
e = NC

I-75/I-71 RAMP B1
Ⓠ PI 201+68.16
Δ = 76°03'42.11" Rt.
T = 168.16'
L = 285.42'
R = 215.00'
E = 57.95'
e = NC

I-75/I-71 RAMP B
Ⓡ PI 252+70.50
Δ = 103°17'09.75" Lt.
T = 284.32'
L = 405.60'
R = 225.00'
E = 137.58'
e = NC

I-75/I-71 RAMP B
Ⓢ PI 260+42.25
Δ = 18°22'56.86" Rt.
T = 352.74'
L = 699.42'
R = 2180.00'
E = 28.35'
e = 4.8%
Runoff = 173'
Runout = 73'

0' 100' 200' 400'

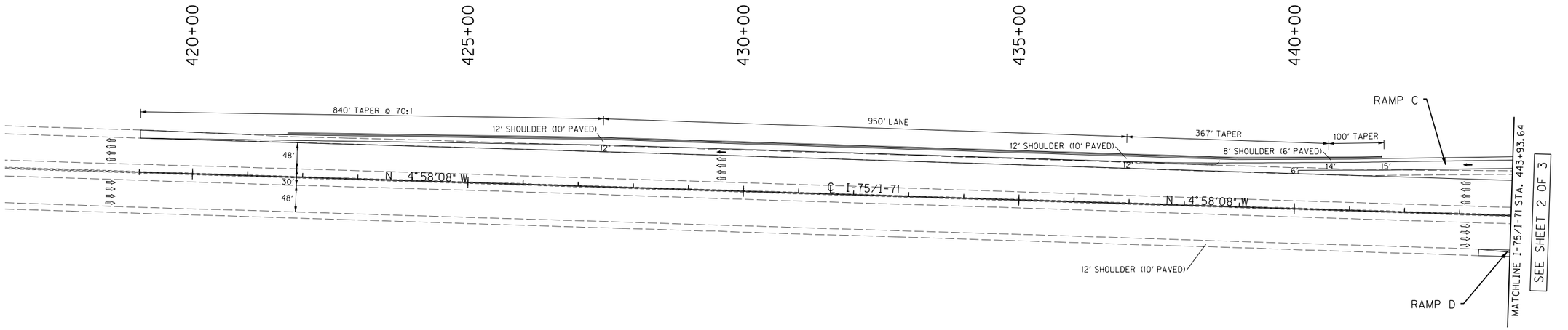
SHEET 2 OF 3

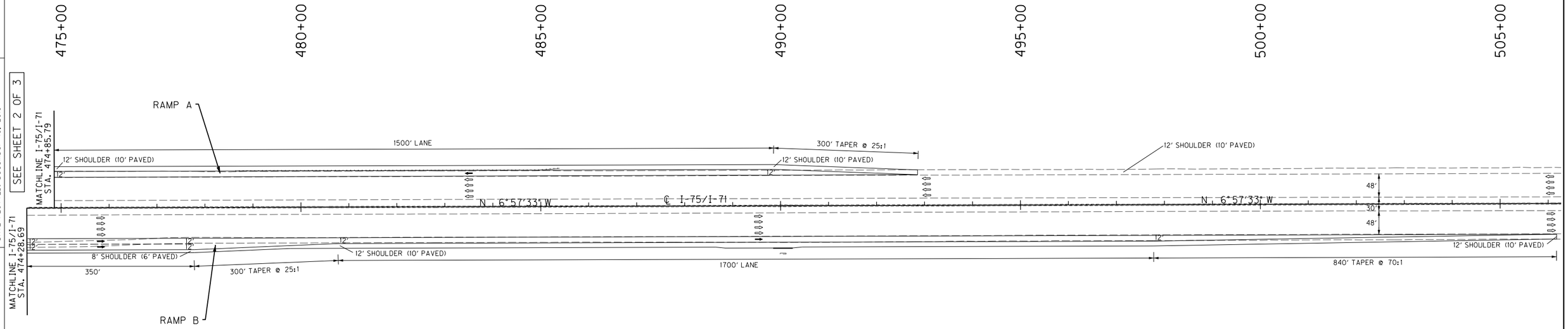
SCALE: 1"=100'

RICHWOOD ROAD (KY 338)
AND I-75/I-71
GEOMETRIC LAYOUT SHEET

USER: p003822B
DATE PLOTTED: 11/30/2018
E-SHEET NAME:
Power InRoads v8.11.9.397
FILE NAME: ...\Roadway\Sheets\R225000E.dgn

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	R226





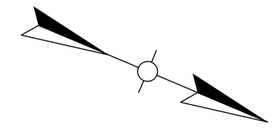
SHEET 3 OF 3

SCALE: 1"=100'

RICHWOOD ROAD (KY 338)
AND I-75/I-71
GEOMETRIC LAYOUT SHEET

MicroStation v8.11.9.832
E-SHEET NAME:
USER: rcaudill
DATE PLOTTED: December 10, 2018
FILE NAME: C:\PWWORKING\PITT\D1483157\R226000S.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	R228

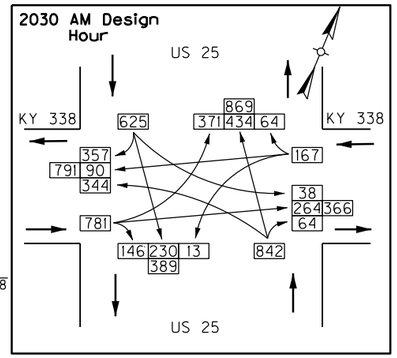


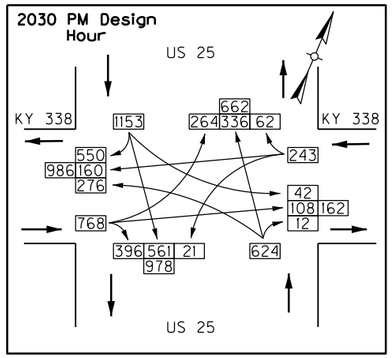
KY 338
PI 371+51.28
Δ = 09°10'27" Rt.
T = 80.23'
L = 160.12'
R = 1000.00'
E = 3.21'
e = NC

KY 338
PI 375+87.20
Δ = 22°09'27" Lt.
T = 117.48'
L = 232.03'
R = 600.00'
E = 11.39'
e = NC

RAMP G
PI 78+43.69
Δ = 13°44'07" Rt.
T = 150.55'
L = 299.65'
R = 1250.00'
E = 9.03'
e = 2.41%
Runoff = 45.00'
Runout = 37.34'

RAMP H (H)
PI 81+90.54
Δ = 94°52'07" Lt.
T = 190.54'
L = 289.76'
R = 175.00'
E = 83.71'
e = 2.72%
Runoff = 63.00'
Runout = 46.32'





RAMP G
PI 73+93.14
Δ = 00°57'18" Lt.
T = 16.67'
L = 33.33'
R = 2000.00'
E = 0.07'
e = NC

US 25
PI 49+87.36
Δ = 07°23'58" Rt.
T = 193.99'
L = 387.44'
R = 3000.00'
E = 6.27'
e = 2.39%
Runoff = 81.00'
Runout = 67.78'

US 25
PI 58+07.20
Δ = 01°25'57" Lt.
T = 62.51'
L = 125.02'
R = 5000.00'
E = 0.39'
e = NC

DESIGN VEHICLE WB-67

BEGIN ACCESS CONTROL
STA. 374+62.38, 68.81' RT.

℄ BEST PAL ROAD

BEGIN ACCESS CONTROL
STA. 374+33.66, 65.00' LT.

℄ RAMP E POE STA. 60+33.70=
47.00' LT. ℄ KY 338 STA. 375+31.78

℄ RAMP D POB STA. 40+00.00=
04.00' LT. ℄ KY 338 STA. 376+47.47

℄ RAMP G POB STA. 70+10.61=
44.00' RT. ℄ KY 338 STA. 376+18.18

℄ RAMP A POE STA. 19+63.26=
31.69' LT. ℄ KY 338 STA. 376+82.01

℄ RAMP F POB STA. 60+00.00=
25.61' LT. ℄ RAMP E STA. 58+12.66

℄ RAMP E POB STA. 50+00.00=
43.21' LT. ℄ US 25 STA. 58+00.01

℄ RAMP H POE STA. 82+89.76=
20.14' LT. ℄ RAMP G STA. 72+22.54

℄ RAMP B POB STA. 20+00.00=
14.86' RT. ℄ RAMP A STA. 17+02.10

℄ RAMP H POB STA. 80+00.00=
04.00' RT. ℄ KY 338 STA. 379+15.97

℄ RAMP B POE STA. 21+29.78=
32.00' RT. ℄ KY 338 STA. 379+65.91

℄ RAMP C POB STA. 30+02.65=
32.00' LT. ℄ KY 338 STA. 379+44.21

℄ RAMP D POB STA. 42+81.44=
21.45' LT. ℄ RAMP C STA. 31+91.07

℄ RAMP F POB STA. 62+76.49=
8.00' RT. ℄ KY 338 STA. 379+11.88

℄ RAMP C POE STA. 41+17.38=
40.00' RT. ℄ US 25 STA. 59+20.03

STA. 377+93.97 KY 338 =
STA. 48+19.12 US 25

END ACCESS CONTROL
STA. 381+66.78, 50.00 RT.

END ACCESS CONTROL
STA. 382+19.60, 50.00 LT.

℄ OLD LEXINGTON PIKE

℄ KY 338

℄ US 25

NORFOLK & SOUTHERN RAILWAY

8' SHARED USE PATH

RAMP A
PI 11+54.25
Δ = 11°48'51" Lt.
T = 103.46'
L = 206.20'
R = 1000.00'
E = 05.34'
e = 2.60%
Runoff = 48.00'
Runout = 36.92'

(A) **RAMP A**
PI 18+53.34
Δ = 87°03'02" Lt.
T = 183.31'
L = 293.23'
R = 193.00'
E = 73.18'
e = 2.64%
Runoff = 63.00'
Runout = 47.73'

(B) **RAMP B**
PI 20+84.23
Δ = 92°56'58" Rt.
T = 84.23'
L = 129.78'
R = 80.00'
E = 36.17'
e = 3.51%
Runoff = 81.00'
Runout = 46.15'

(C) **RAMP C**
PI 30+88.02
Δ = 90°14'51" Rt.
T = 58.37'
L = 133.88'
R = 85.00'
E = 35.47'
e = 3.44%
Runoff = 81.00'
Runout = 47.09'

RAMP C
PI 33+35.98
Δ = 02°32'26" Rt.
T = 42.13'
L = 84.25'
R = 1900.00'
E = 0.47'
e = NC

RAMP C
PI 36+46.53
Δ = 02°23'08" Lt.
T = 62.46'
L = 124.91'
R = 3000.00'
E = 0.65'
e = NC

KY 338
PI 385+26.60
Δ = 73°48'50" Lt.
T = 450.61'
L = 772.98'
R = 600.00'
E = 150.36'
e = NC

(D) **RAMP D**
PI 41+81.68
Δ = 92°08'42" Lt.
T = 181.68'
L = 281.44'
R = 175.00'
E = 77.25'
e = 2.72%
Runoff = 63.00'
Runout = 46.32'

RAMP E
PI 56+39.92
Δ = 05°53'55" Lt.
T = 61.83'
L = 123.54'
R = 1200.00'
E = 1.59'
e = 2.45%
Runoff = 69.00'
Runout = 56.33'

(E) **RAMP E**
PI 59+65.42
Δ = 90°31'27" Rt.
T = 171.47'
L = 239.74'
R = 130.00'
E = 85.18'
e = 2.98%
Runoff = 69.00'
Runout = 46.31'

(F) **RAMP F**
PI 61+76.61
Δ = 90°31'27" Lt.
T = 176.61'
L = 276.49'
R = 175.00'
E = 73.63'
e = 2.72%
Runoff = 63.00'
Runout = 46.32'

(G) **RAMP G**
PI 71+02.46
Δ = 74°51'40" Rt.
T = 91.85'
L = 156.79'
R = 120.00'
E = 31.12'
e = 3.06%
Runoff = 72.00'
Runout = 47.06'

0' 50' 100' 200'

SCALE: 1"=50'

SHEET 1 OF 2

PROJECT MANAGER	DATE
DIRECTOR OF DESIGN	DATE
DIRECTOR OF TRAFFIC OPERATIONS	DATE
FEDERAL HIGHWAY ADMINISTRATION	DATE

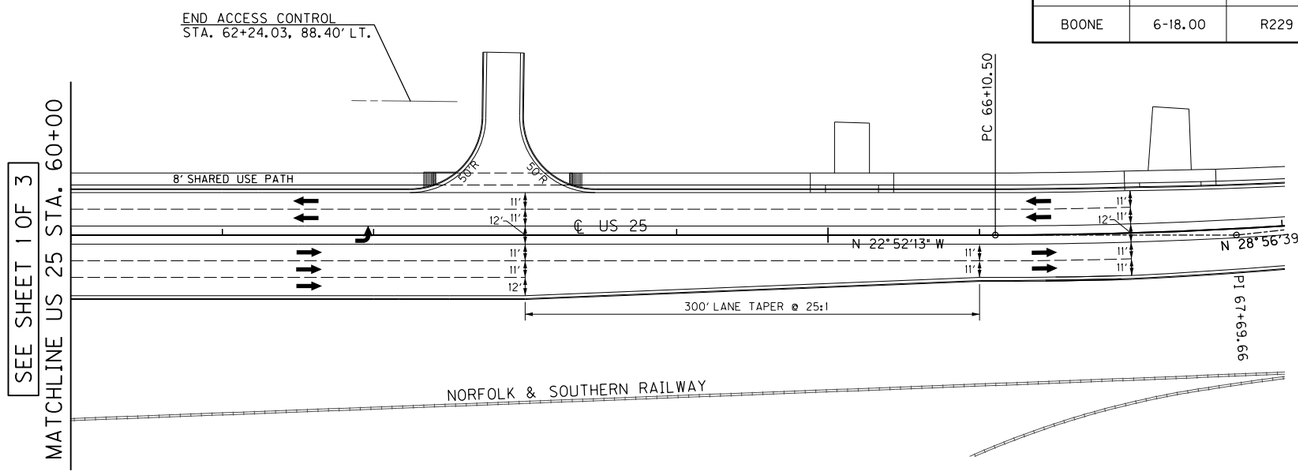
RICHWOOD ROAD (KY 338)
AND US 25
GEOMETRIC LAYOUT SHEET

MATCHLINE US 25 STA. 46+00
SEE SHEET 2 OF 3

MATCHLINE US 25 STA. 60+00
SEE SHEET 2 OF 3

C:\PWWORKING\PITT\D1483157\R228000S.DGN
USER: JGUNN
DATE PLOTTED: December 10, 2018
E-SHEET NAME:
MicroStation v8.11.9.832
FILE NAME: C:\PWWORKING\PITT\D1483157\R228000S.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	R229



US 25
PI 32+28.64
Δ = 20°15'12" Rt.
T = 196.47'
L = 388.84'
R = 1100.00'
E = 17.41'
e = 3.66%
Runoff = 165.00'
Runout = 90.16'

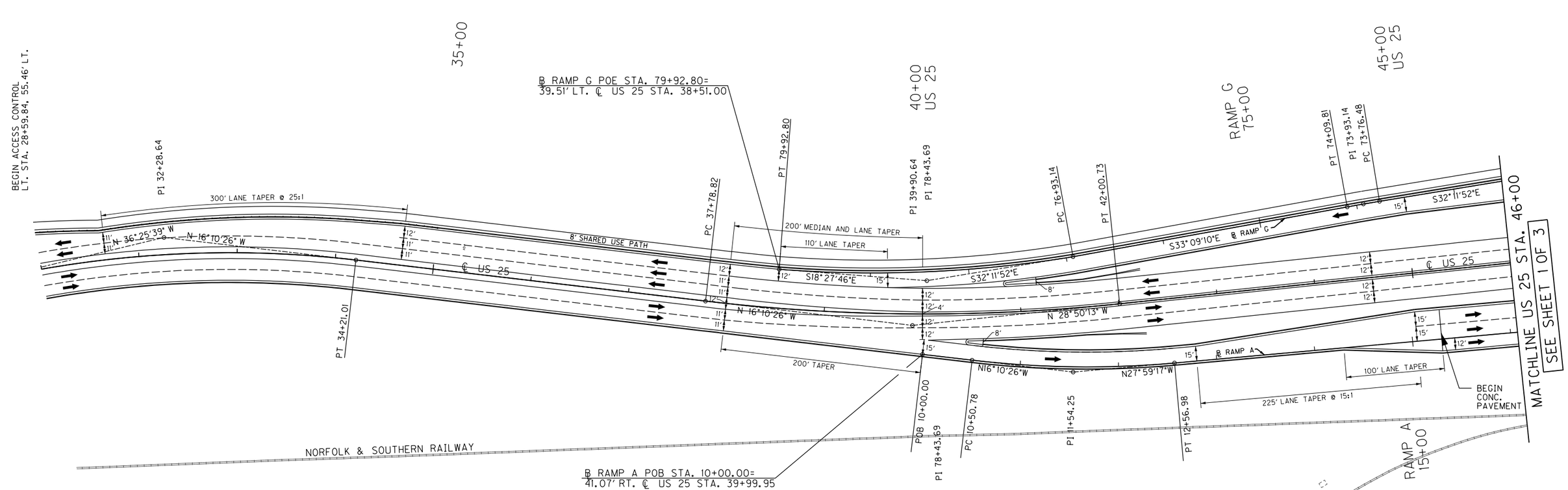
US 25
PI 39+90.64
Δ = 12°39'47" Lt.
T = 211.82'
L = 421.91'
R = 1909.00'
E = 11.72'
e = 2.93%
Runoff = 117.00'
Runout = 79.86'

US 25
PI 67+69.66
Δ = 06°04'26" Lt.
T = 159.16'
L = 318.03'
R = 3000.00'
E = 4.22'
e = 2.39%
Runoff = 93.00'
Runout = 77.82'

RAMP A
PI 11+54.25
Δ = 11°48'51" Lt.
T = 103.46'
L = 206.20'
R = 1000.00'
E = 05.34'
e = 2.60%
Runoff = 48.00'
Runout = 36.92'

RAMP G
PI 73+93.14
Δ = 00°57'18" Lt.
T = 16.67'
L = 33.33'
R = 2000.00'
E = 0.07'
e = NC

RAMP G
PI 78+43.69
Δ = 13°44'07" Rt.
T = 150.55'
L = 299.65'
R = 1250.00'
E = 9.03'
e = 2.41%
Runoff = 45.00'
Runout = 37.34'



SHEET 2 OF 2

0' 50' 100' 200' SCALE: 1"=50'

RICHWOOD ROAD (KY 338)
AND US 25
GEOMETRIC LAYOUT SHEET

MicroStation v8.11.9.832 | E-SHEET NAME: | USER: raudill DATE PLOTTED: May 18, 2018 | FILE NAME: C:\PWWORKING\PITT\D1483157\R229000S.DGN

EXHIBIT B

401 West Main Street, Suite 500
Louisville, KY 40202-2936
T 502.909.3234
hdrinc.com

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

97+00
98+00
99+00
154+00 RAMP A1
155+00 RAMP A1
156+00 RAMP A1
157+00 RAMP A1

EYE LOCATION
RAMP A
STA. 97+52

SIGHT LINE
DSD = 490'

SIGNAL HEAD

RAMP A TO RAMP A1 - DECISION SIGHT DISTANCE
AVOIDANCE MANEUVER B (STOP ON URBAN ROAD)
DS = 30MPH
DSD = 490' (AASHTO TABLE 3-3)

99+00 RAMP A
100+00 RAMP A
101+00 RAMP A
102+00 RAMP A

FRONTAGE RD

SCALE: 1"=20'

I-75/I-71 RAMP A AND A1
DECISION SIGHT DISTANCE
PLAN VIEW

FILE NAME: ...\2018-01-31_RAMPA-A1_ISD.dgn
USER: p0038228
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

DATUM

EYE HEIGHT = 3.5'

SIGHT LINE

SIGNAL HEAD MOUNTING HEIGHT = 14.5'

PROPOSED SURFACE

EXISITING GROUND

888 886 884 882 880 878 876 874 872 870 868 866 864 862 860 858 856 854 852

0+00 0+20 0+40 0+60 0+80 1+00 1+20 1+40 1+60 1+80 2+00 2+20 2+40 2+60 2+80 3+00 3+20 3+40 3+60 3+80 4+00 4+20 4+40 4+60 4+80

RAMP A TO RAMP A1 - DECISION SIGHT DISTANCE
AVOIDANCE MANEUVER B (STOP ON URBAN ROAD)
DS = 30MPH
DSD = 490' (AASHTO TABLE 3-3)

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

I-75/I-71 RAMP A AND A1
DECISION SIGHT DISTANCE
PROFILE VIEW

PREPARED BY ____ DATE ____
CHECKED BY ____ DATE ____
APPROVED BY ____ DATE ____

FILE NAME: ...\ISD\2018-01-31_RAMPA-A1_ISDPR
USER: p003822B
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

411+00

412+00

413+00 RAMP D

423+00 RAMP D1

424+00 RAMP D1

425+00 RAMP D1

5:1 BACKSLOPE LIMITS

SIGHT LINE
DSD = 490'

EYE LOCATION
RAMP D
STA. 411+06

SIGNAL HEAD

N15° 02'43"E

ASPHALT

PAVED SHOULDER

CONC.

PAVED SHOULDER

SIGN

414+00 RAMP D

415+00 RAMP D

416+00 RAMP D

417+00 RAMP D

POST

POST

POST

POST

W. PRIVATE DUMPSTER

(NC. BL. RET. WL. 2' X 6' BLOCK)

BRICK STRUCTURE BLDG.

CHAIN LINK

TMH

TEL JB

SIGN

RAMP D TO RAMP D1 - DECISION SIGHT DISTANCE
AVOIDANCE MANEUVER B (STOP ON URBAN ROAD)
DS = 30MPH
DSD = 490' (AASHTO TABLE 3-3)

0' 20' 40' 80'

SCALE: 1"=20'

I-75/I-71 RAMP D AND D1
DECISION SIGHT DISTANCE
PLAN VIEW

FILE NAME: ...\2018-01-31_RAMPD-D1_ISD.dgn

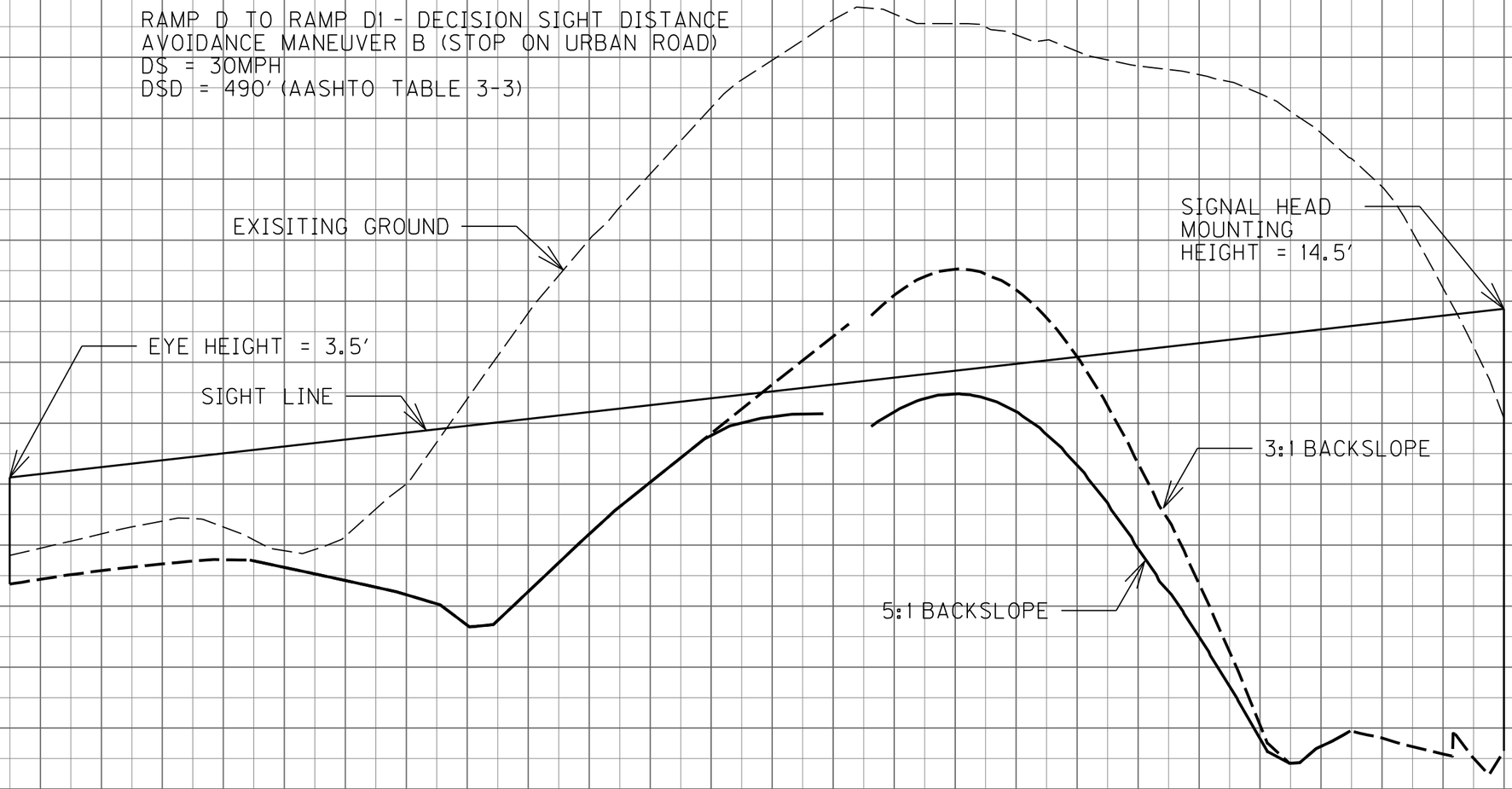
USER: p003822B
DATE PLOTTED: 2/5/2018

E-SHEET NAME:

MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

RAMP D TO RAMP D1 - DECISION SIGHT DISTANCE
AVOIDANCE MANEUVER B (STOP ON URBAN ROAD)
DS = 30MPH
DSD = 490' (AASHTO TABLE 3-3)



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

I-75/I-71 RAMP D AND D1
DECISION SIGHT DISTANCE
PROFILE VIEW

PREPARED BY ____ DATE ____
CHECKED BY ____ DATE ____
APPROVED BY ____ DATE ____

FILE NAME: ...\ISD\2018-01-31_RAMPD-D1.ISDPR
USER: p0038228
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

260+00
RAMP B

265+00
RAMP B

465+00

470+00

475+00

90+00
RAMP A

95+00
RAMP A

I-75/I-71 NB

I-75/I-71 SB

EYE LOCATION
RAMP A
STA. 93+05

SIGHT LINE
SSD = 525'

END OF MAX LEFT
TURN QUEUE
RAMP A STA. 98+30

END OF MAX RIGHT
TURN QUEUE
RAMP A STA. 93+27

SIGHT LINE
SSD = 740'

EYE LOCATION
RAMP A
STA. 85+87

RAMP A SIGHT DISTANCE TO
MAX QUEUE LENGTH
RIGHT TURN: DS=70 MPH TO STOP
SSD = 740' (AASHTO TABLE 10-4,10-5)
LEFT TURN: DS = 50 MPH TO STOP
SSD = 525' (AASHTO TABLE 10-4,10-5)

0' 40' 80' 160'

SCALE: 1"=40'

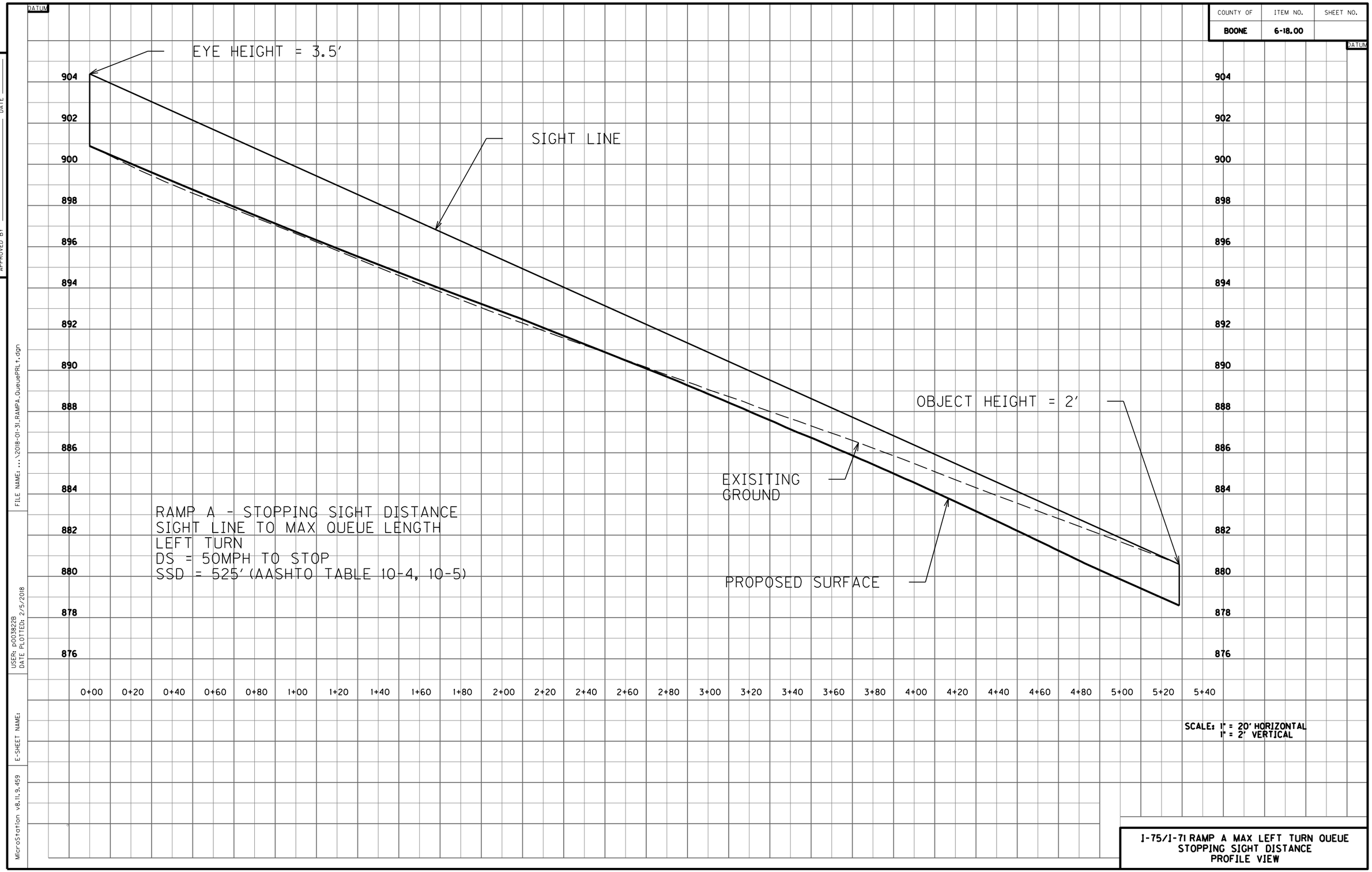
I-75/I-71 RAMP A MAX QUEUE LENGTH
STOPPING SIGHT DISTANCE
PLAN VIEW

FILE NAME: ...\ISD\2018-01-31_RAMPA_Queue.dgn
USER: p003822B
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

PREPARED BY ____ DATE ____
CHECKED BY ____ DATE ____
APPROVED BY ____ DATE ____

FILE NAME: ...\2018-01-31_RAMPA_QueuePRL1.dgn
USER: p003822B
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

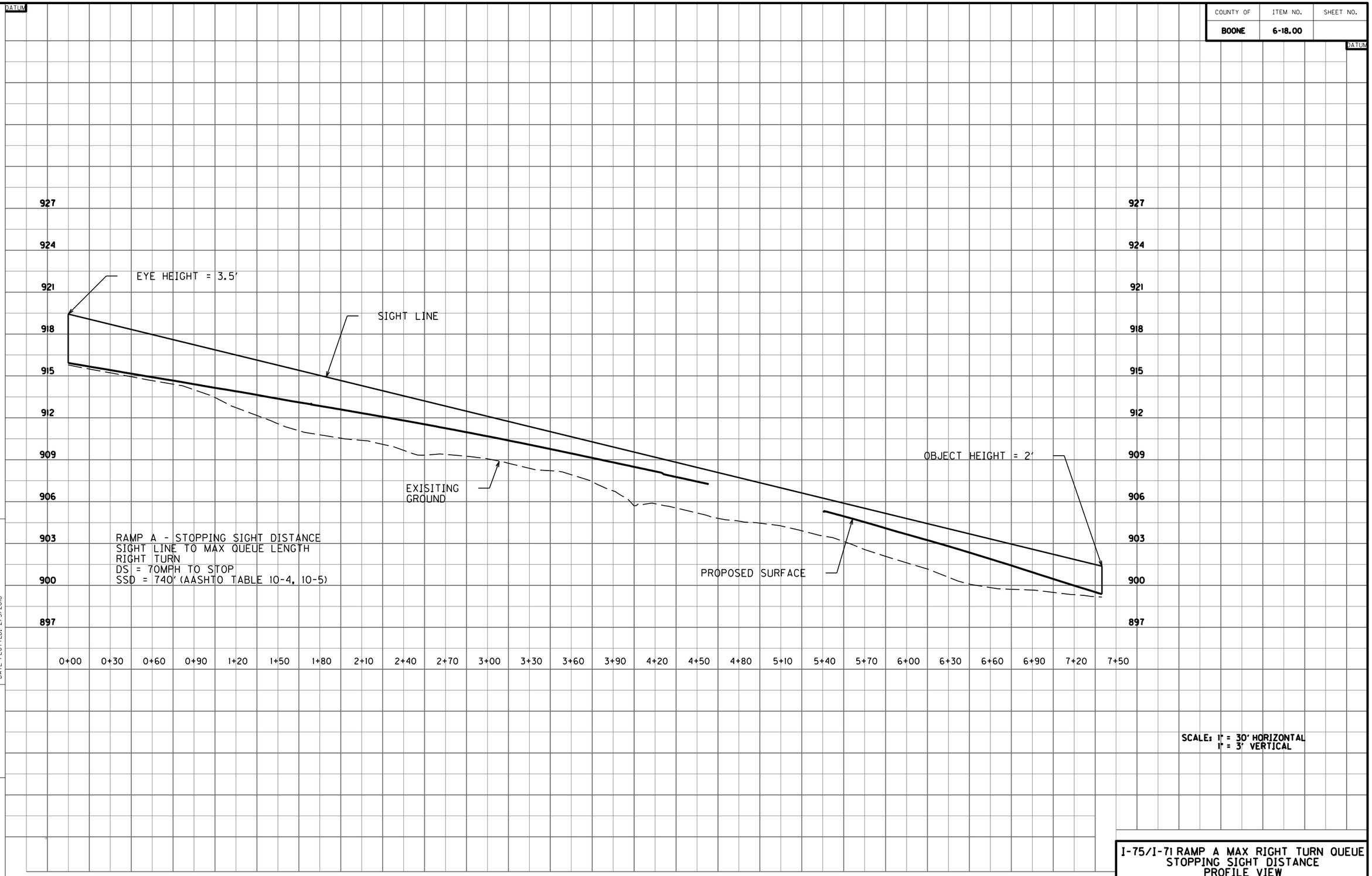


SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

I-75/I-71 RAMP A MAX LEFT TURN QUEUE
STOPPING SIGHT DISTANCE
PROFILE VIEW

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

PREPARED BY _____ DATE _____
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____



SCALE: 1" = 30' HORIZONTAL
1" = 3' VERTICAL

I-75/I-71 RAMP A MAX RIGHT TURN QUEUE
STOPPING SIGHT DISTANCE
PROFILE VIEW

FILE NAME: ...\2018-01-31_RAMPA_QueuePRR1.dgn
USER: p003822B
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

SIGHT LINE
SSD = 435'

END OF MAX LEFT
TURN QUEUE
RAMP D STA. 413+82

EYE LOCATION
RAMP D
STA. 409+47

EYE LOCATION
RAMP D
STA. 407+44

SIGHT LINE
SSD = 435'

END OF MAX RIGHT
TURN QUEUE
RAMP D STA. 411+79

RAMP D SIGHT DISTANCE TO
MAX QUEUE LENGTH
RIGHT TURN: DS=50 MPH TO STOP
SSD = 435' (AASHTO TABLE 10-5)
LEFT TURN: DS = 50 MPH TO STOP
SSD = 435' (AASHTO TABLE 10-5)

0' 30' 60' 120'

SCALE: 1"=30'

I-75/I-71 RAMP D MAX QUEUE LENGTH STOPPING SIGHT DISTANCE PLAN VIEW

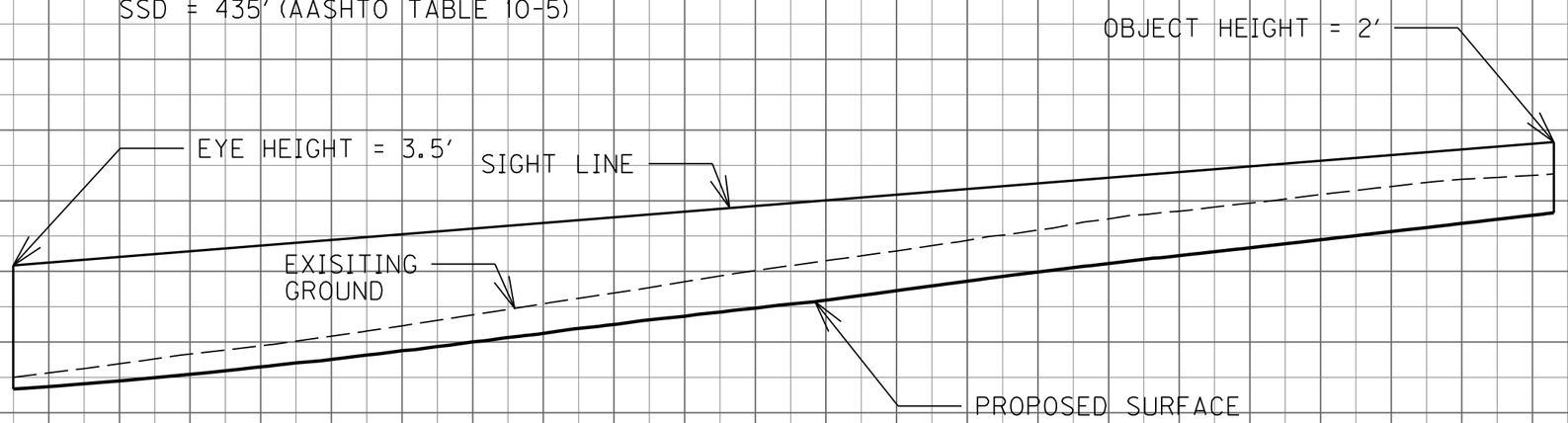
FILE NAME: ...\ISD\2018-01-31_RAMPD_Queue.dgn
USER: p003822B
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

DATUM

PREPARED BY ____ DATE ____
CHECKED BY ____ DATE ____
APPROVED BY ____ DATE ____

RAMP D - STOPPING SIGHT DISTANCE
SIGHT LINE TO MAX QUEUE LENGTH
LEFT TURN
DS = 50 MPH TO STOP
SSD = 435' (AASHTO TABLE 10-5)



896 894 892 890 888 886 884 882 880 878 876 874 872 870 868

0+00 0+20 0+40 0+60 0+80 1+00 1+20 1+40 1+60 1+80 2+00 2+20 2+40 2+60 2+80 3+00 3+20 3+40 3+60 3+80 4+00 4+20 4+40

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

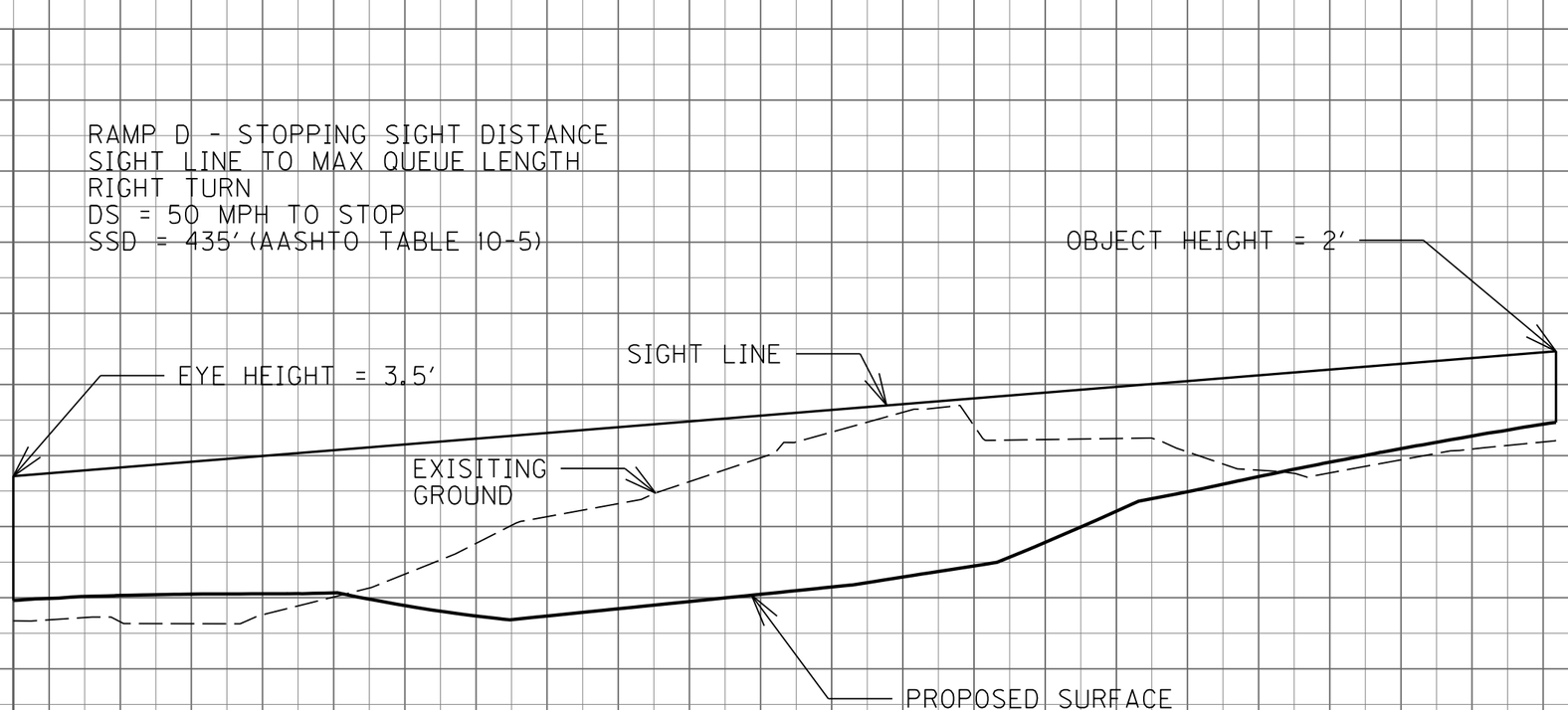
I-75/I-71 RAMP D MAX LEFT TURN QUEUE
STOPPING SIGHT DISTANCE
PROFILE VIEW

FILE NAME: ...\ISD\2018-01-31_RAMPD_QueuePRL.t
USER: p0038228
DATE PLOTTED: 2/5/2018
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

DATUM

RAMP D - STOPPING SIGHT DISTANCE
SIGHT LINE TO MAX QUEUE LENGTH
RIGHT TURN
DS = 50 MPH TO STOP
SSD = 435' (AASHTO TABLE 10-5)



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

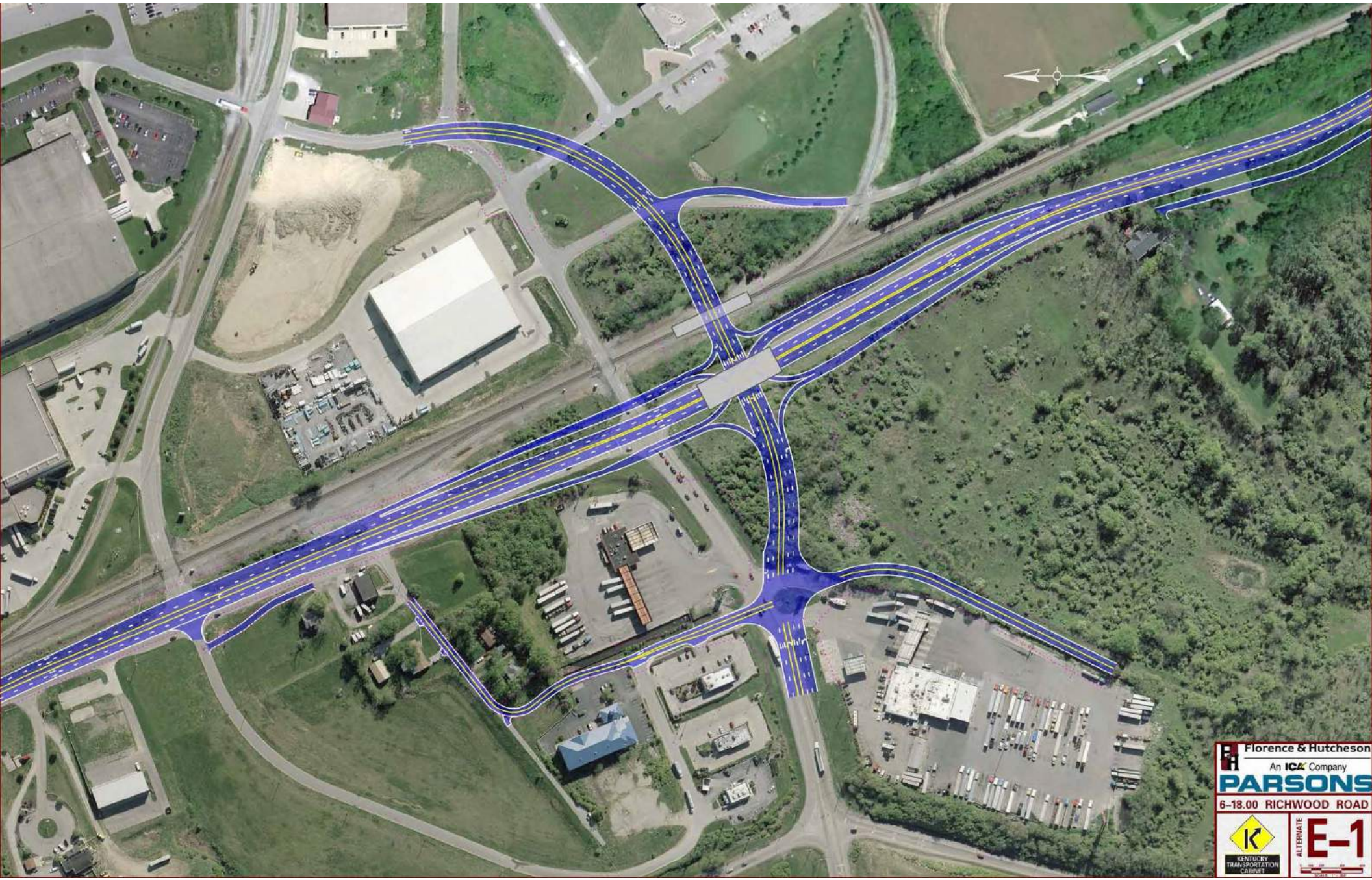
I-75/I-71 RAMP D MAX RIGHT TURN QUEUE
STOPPING SIGHT DISTANCE
PROFILE VIEW

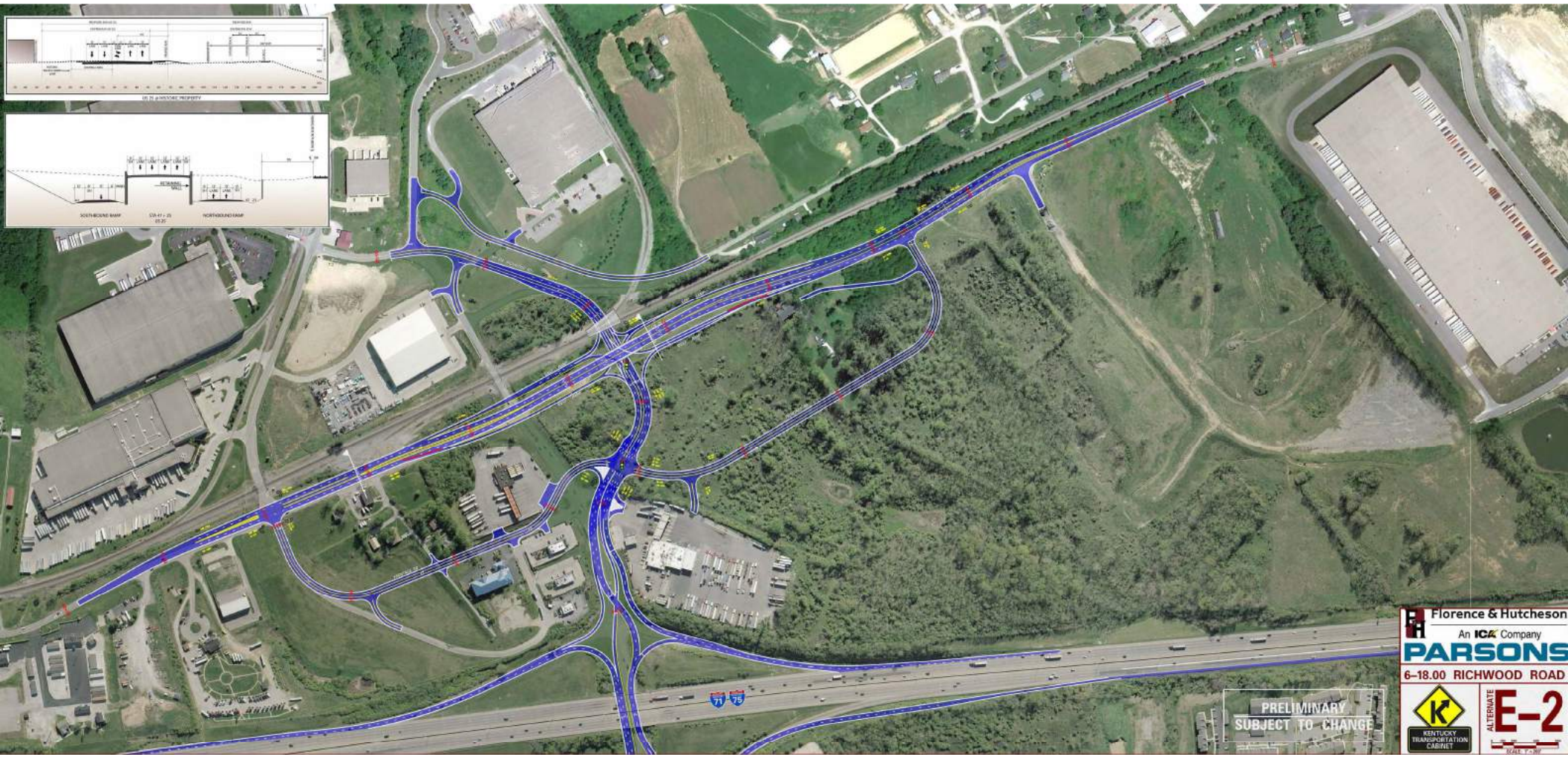
PREPARED BY ____ DATE ____
CHECKED BY ____ DATE ____
APPROVED BY ____ DATE ____

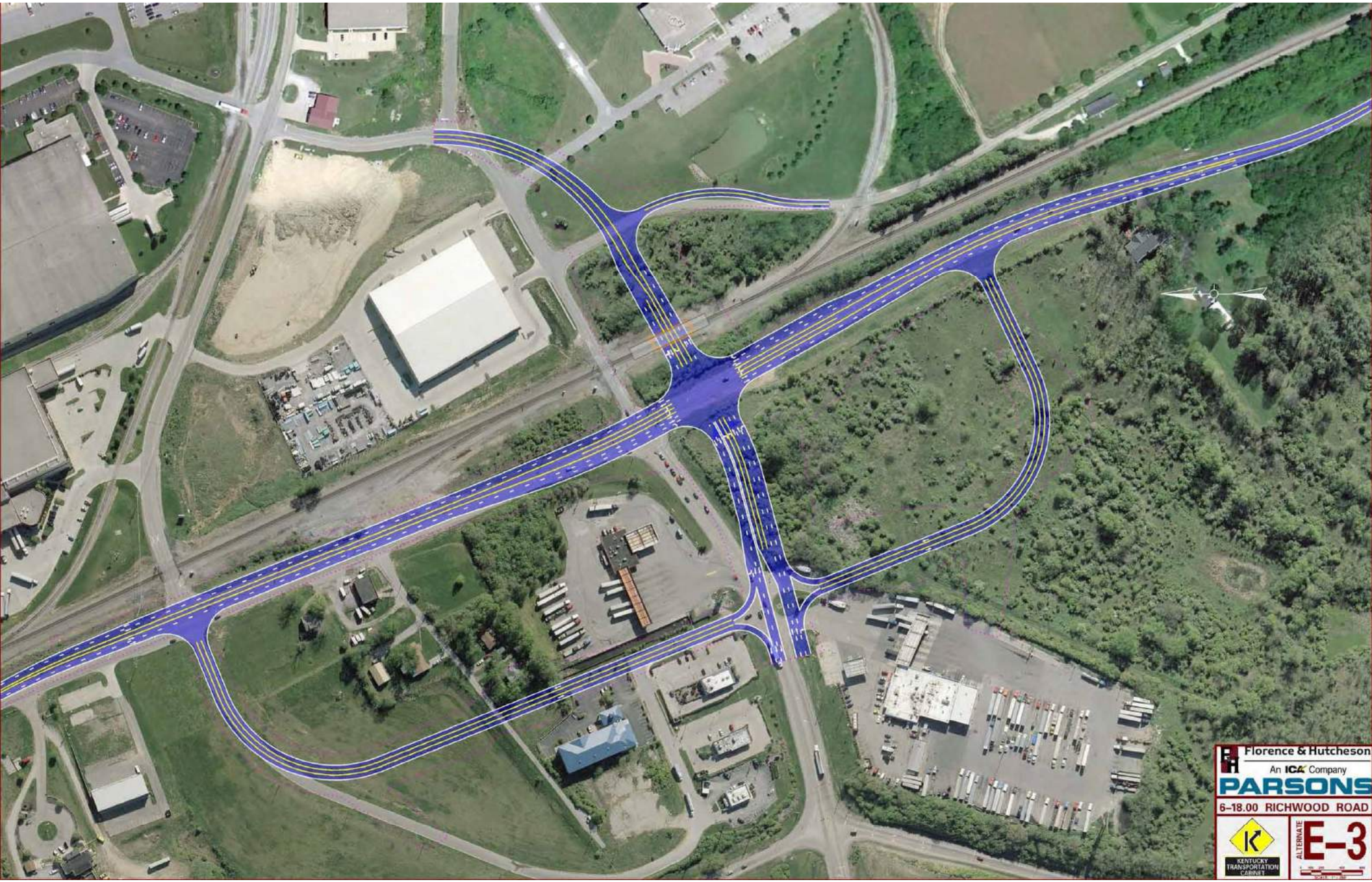
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USER: p003822B
DATE PLOTTED: 2/5/2018
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MicroStation v8.11.9.459

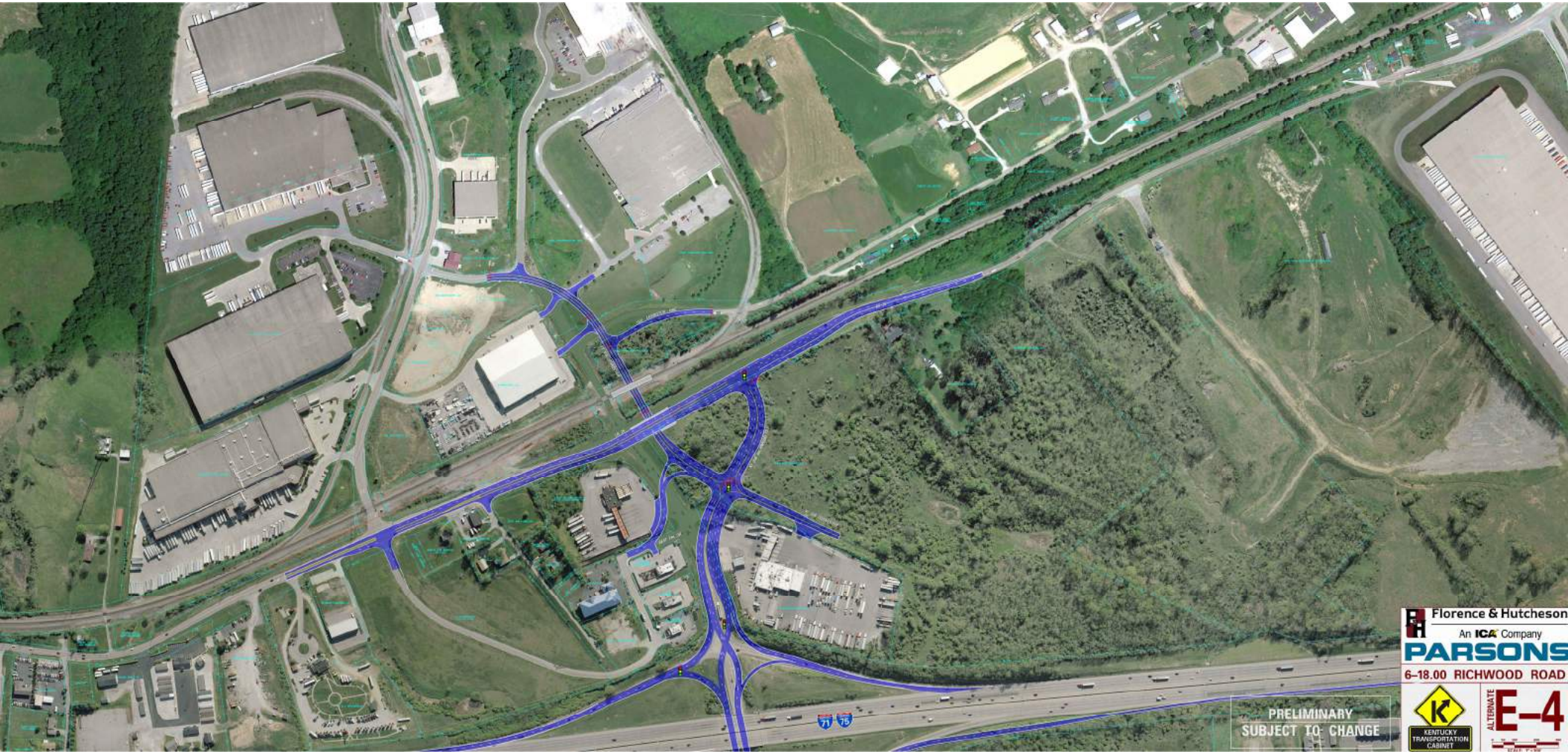
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401 West Main Street, Suite 500
Louisville, KY 40202-2936
T 502.909.3234
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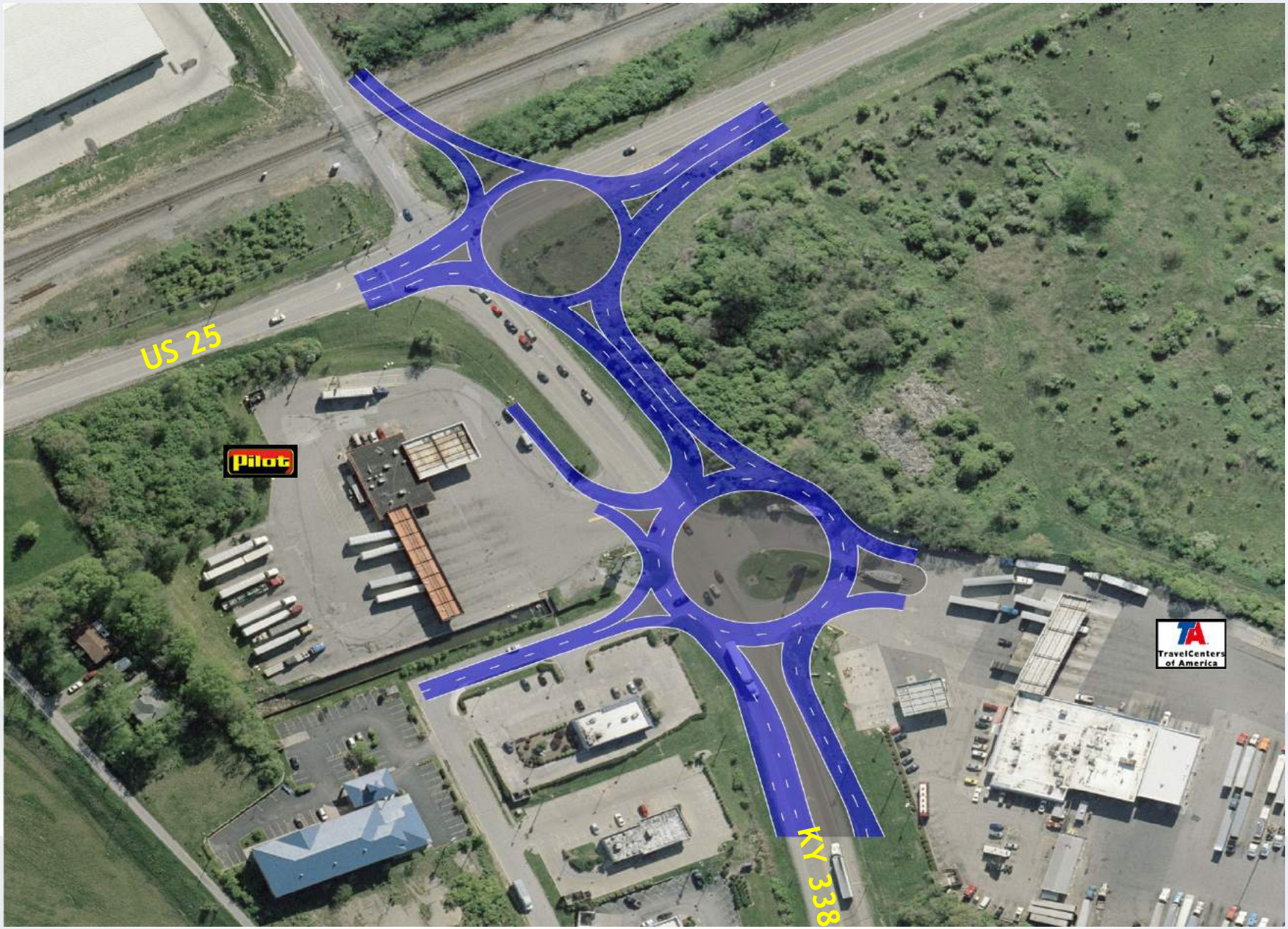

Florence & Hutcheson
An ICA Company
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
E-1


Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
PRELIMINARY
SUBJECT TO CHANGE
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
E–2

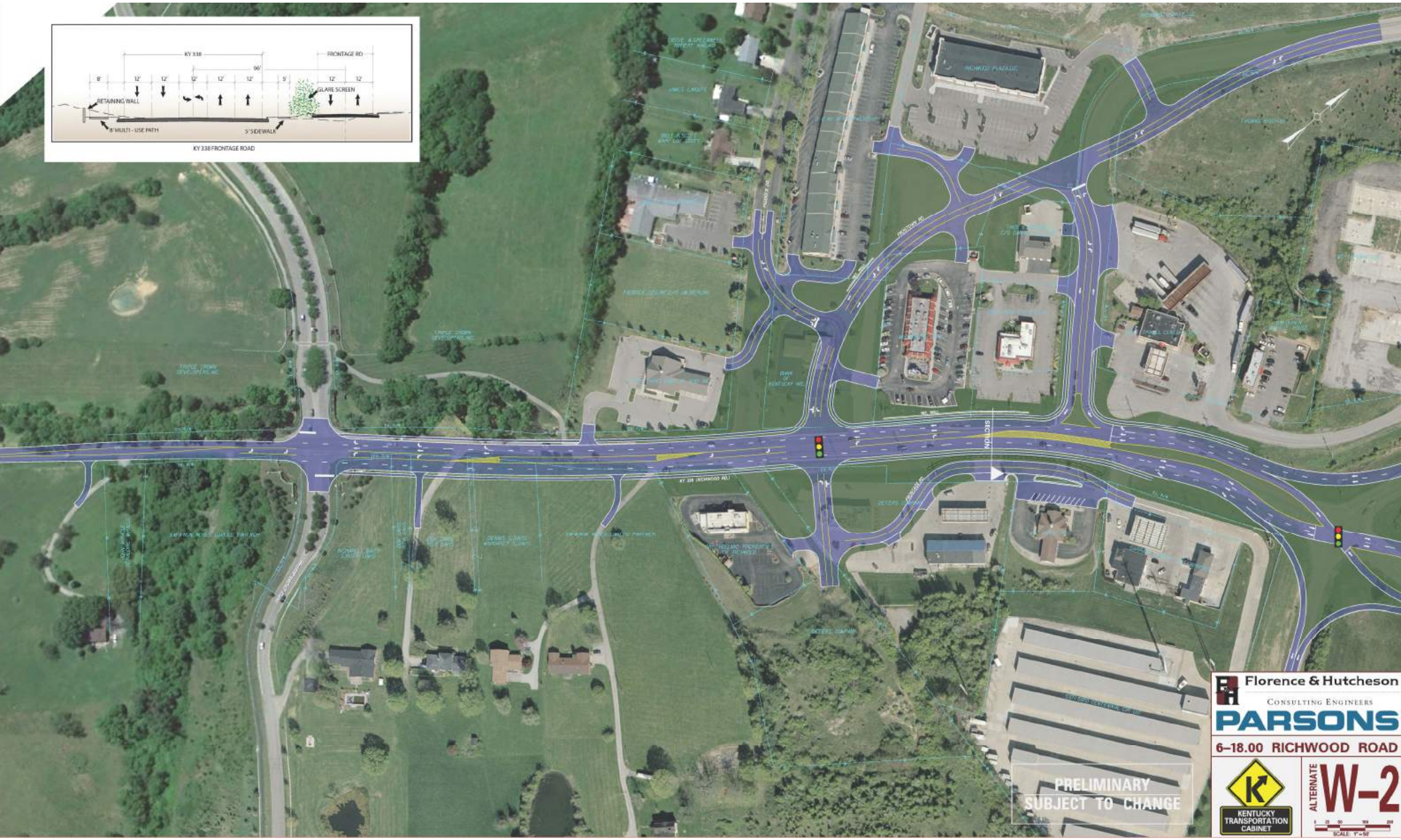

Florence & Hutcheson
An ICA Company
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
E-3


Florence & Hutcheson
An ICA Company
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
E-4
PRELIMINARY
SUBJECT TO CHANGE

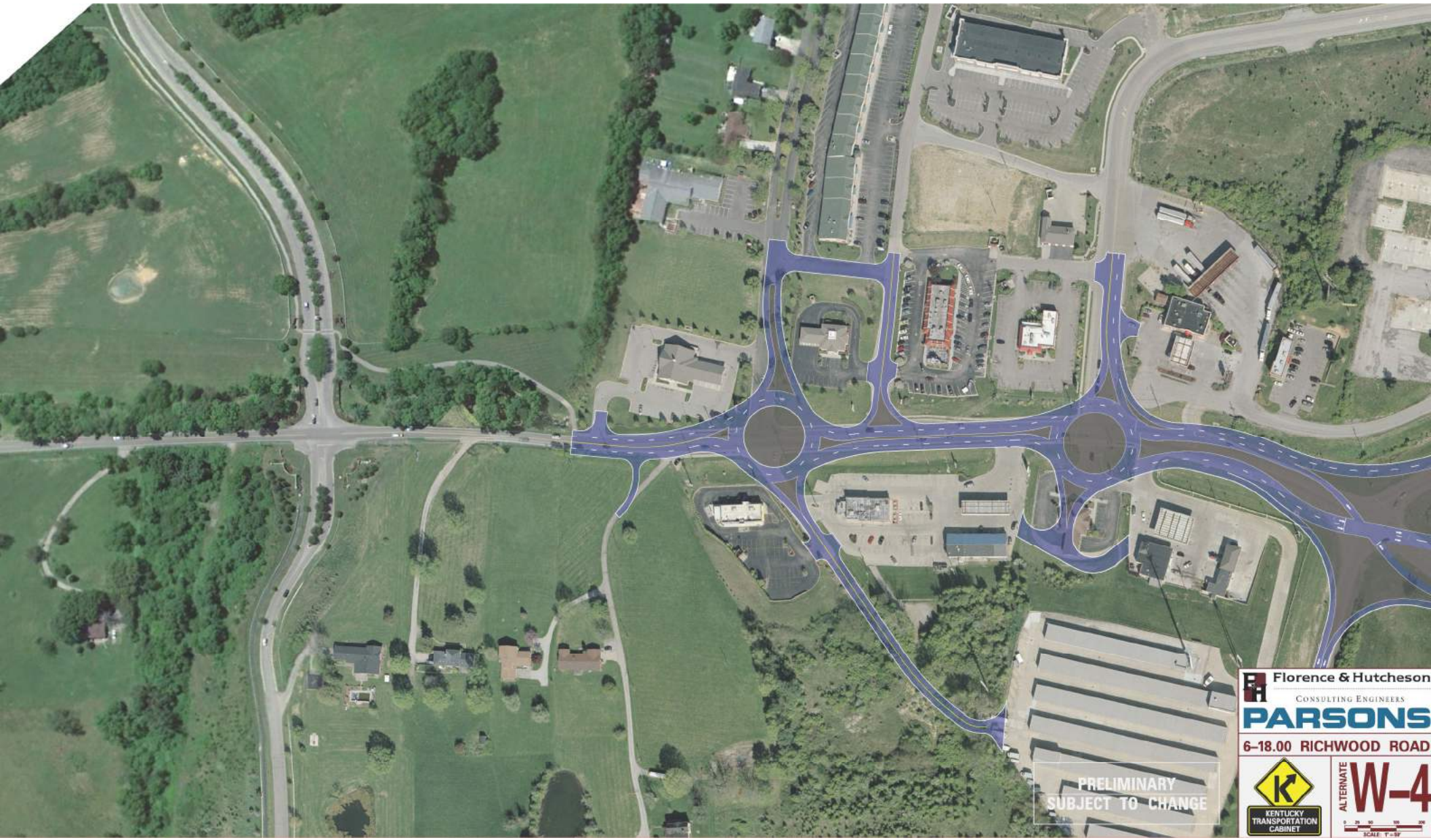
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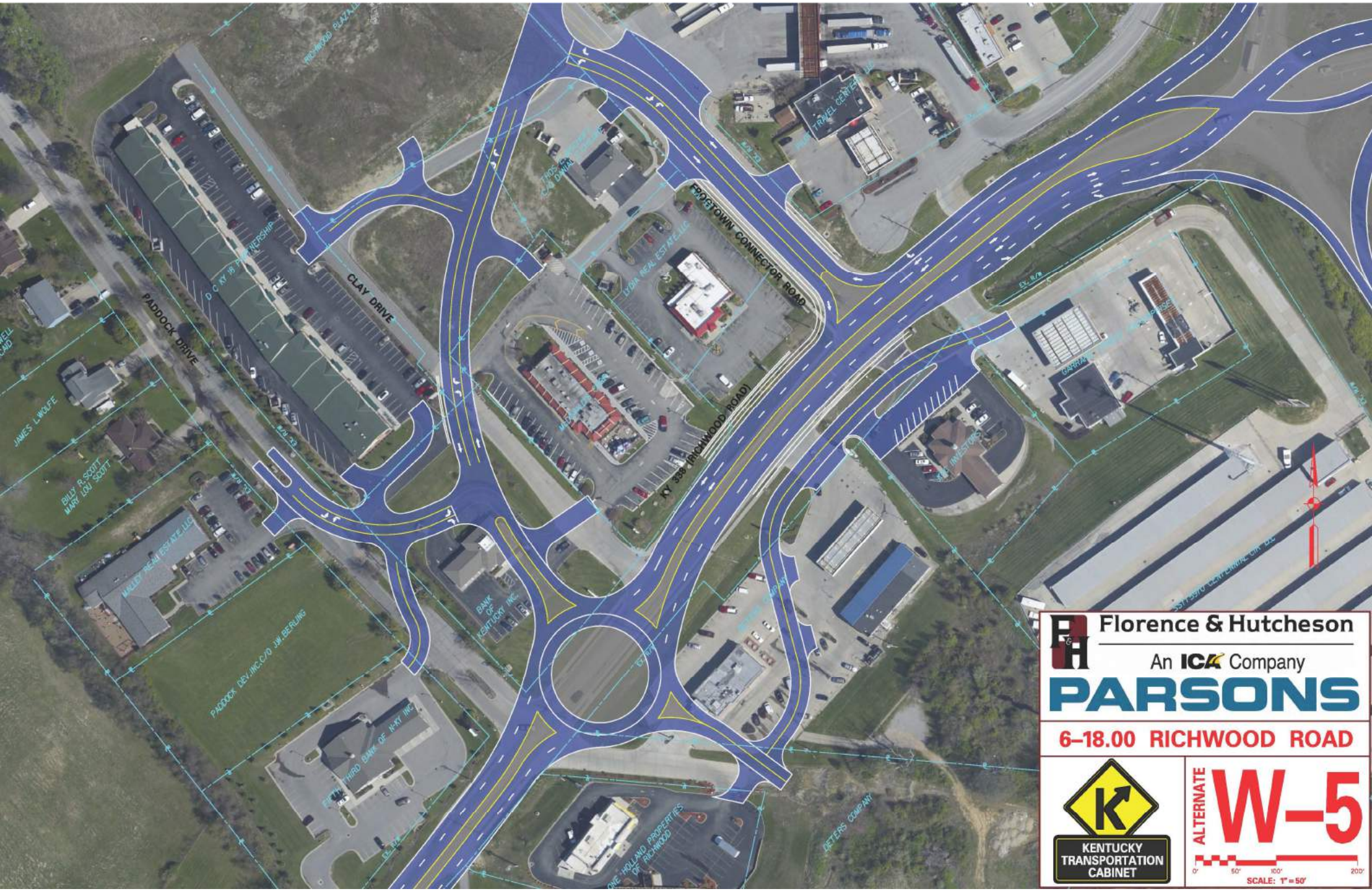



BANK PARKING AREA
2'
12'
4'
12'
2'
10'
RETAINING WALL
17' MAX
ACCESS ROAD
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40
PRELIMINARY
SUBJECT TO CHANGE
Florence & Hutcheson
CONSULTING ENGINEERS
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W-1


KY 338
FRONTAGE RD
66'
8'
12'
12'
12'
12'
12'
5'
12'
12'
RETAINING WALL
GLARE SCREEN
8' MULTI - USE PATH
5' SIDEWALK
KY 338 FRONTAGE ROAD
SECTION
PRELIMINARY
SUBJECT TO CHANGE
Florence & Hutcheson
CONSULTING ENGINEERS
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W-2
SCALE: 1"=50'

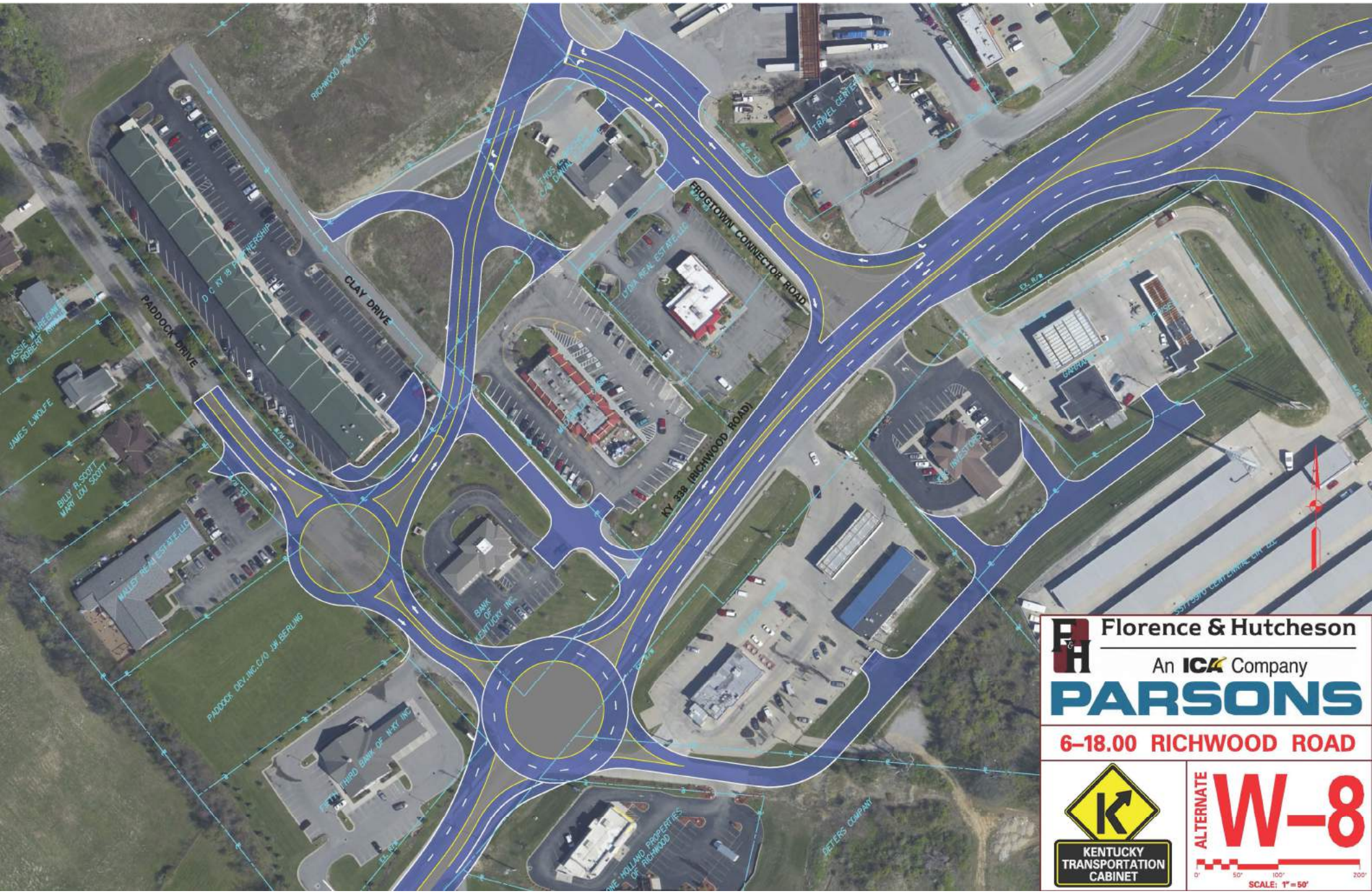

Florence & Hutcheson
Consulting Engineers
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W-3
PRELIMINARY
SUBJECT TO CHANGE


PRELIMINARY
SUBJECT TO CHANGE
Florence & Hutcheson
CONSULTING ENGINEERS
PARSONS
6-18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W-4


FRONTTOWN CONNECTOR ROAD
KY 338 (RICHWOOD ROAD)
CLAY DRIVE
PADDOCK DRIVE
TRAVEL CENTER
BANK OF KENTUCKY INC.
FIFTH THIRD BANK OF KY INC.
PADDOCK DEV.,INC.C/O J.W.BERLING
VALLEY REAL ESTATE LLC
LYDIA REAL ESTATE LLC
ONE HOLLAND PROPERTIES OF RICHWOOD
DETERS COMPANY
JAMES L.WOLFE
BILLY R.SCOTT
MARY LOU SCOTT
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–5
0'
50'
100'
200'
SCALE: 1" = 50'


CLAY DRIVE
PADDOCK DRIVE
FROGTOWN CONNECTOR ROAD
KY 338 (RICHWOOD ROAD)
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–6
SCALE: 1" = 50'


RICHWOOD PLAZA LLC
CLAY DRIVE
PADDOCK DRIVE
KY 338 (RICHWOOD ROAD)
RICHTOWN CONNECTOR ROAD
PADDOCK DEV. INC. C/O J.W. BERLING
BANK OF KENTUCKY INC.
THIRD BANK OF N KY INC
ONE HOLLAND PROPERTIES OF RICHWOOD
DETERS COMPANY
JAMES L WOLFE
BILLY R SCOTT
MARI LOU SCOTT
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–7
SCALE: 1" = 50'


RICHWOOD PLAZA LLC
TRAVEL CENTERS
FRANKTOWN CONNECTOR ROAD
CLAY DRIVE
PADDOCK DRIVE
KY 338 (RICHWOOD ROAD)
CASSIE MCGEEHAN
ROBERT KNIGHT
JAMES L WOLFE
BILLY R SCOTT
MARY LOU SCOTT
MALLEY REAL ESTATE LLC
PADDOCK DEV INC C/O J.W. EBERLING
BANK OF KENTUCKY INC
THIRD BANK OF N-KY INC
HOLLAND PROPERTIES OF RICHWOOD
PETERS COMPANY
GATRA
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–8
SCALE: 1" = 50'


CLAY DRIVE
PADDOCK DRIVE
FROGTOWN CONNECTOR ROAD
KY 338 (RICHWOOD ROAD)
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–9
SCALE: 1" = 50'


FROGTOWN CONNECTOR ROAD
KY 338 (RICHWOOD ROAD)
CLAY DRIVE
PADDOCK DRIVE
TRAVEL CENTER
DEAN REAL ESTATE LLC
BANK OF KENTUCKY INC.
HALEY REAL ESTATE LLC
PADDOCK DEV.INC.C/O J.W.BERLING
FIFTH THIRD BANK OF KNTY INC
ONE HOLLAND PROPERTIES OF RICHWOOD
DETERS COMPANY
JAMES L.WOLFE
BILLY R.SCOTT
MARY LOU SCOTT
Florence & Hutcheson
An ICA Company
PARSONS
6–18.00 RICHWOOD ROAD
KENTUCKY TRANSPORTATION CABINET
ALTERNATE
W–10
0'
50'
100'
200'
SCALE: 1" = 50'

ATTACHMENT A

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Louisville, KY 40202-2936

T 502.909.3234

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Item 06-18.00

Reconstruction of the I-71/I-75 Interchange and KY 338 (Richwood Road)

Boone County

Concept Report

PROJECT DESCRIPTION

The overall purpose of this project is to improve safety and reduce congestion at the I-71/I-75 and KY 338 interchange and within the KY 338 (Richwood Road) corridor, and to develop and implement a comprehensive access management plan for KY 338 between Triple Crown Boulevard and US 25 (Dixie Highway). As part of this project, the existing intersection of Triple Crown Boulevard/Grand National Boulevard with KY 338 is proposed to be rebuilt as a roundabout.

EXISTING CONDITIONS

KY 338 is classified as an Urban Minor Arterial throughout the limits of the project, as is US 25, while all other side roads, including Triple Crown Boulevard and Grand National Boulevard, are considered local roads. A project vicinity map is attached as Exhibit 1.

With a focus on the proposed roundabout location at KY 338 and Triple Crown Boulevard/Grand National Boulevard, the current east and westbound approach along KY 338 is a three-lane section with an approximate width of 36 feet. The existing southbound approach of Triple Crown Boulevard and northbound approach of Grand National Boulevard are also three-lane sections but with approximate widths of 40 to 45 feet. A drawing of the existing topography, adjacent structures and existing roadway alignments for the subject intersection is attached as Exhibit 2.

Currently, the intersection is signalized with all permissive movements. The eastbound and westbound left-turn movements along KY 338, the northbound left-turn from Grand National Boulevard and the southbound right-turn from Triple Crown Boulevard have storage provided.

Curb and gutter exist along Triple Crown Boulevard and Grand National Boulevard with an asphalt pavement sidewalk running along Grand National Boulevard and terminating in the subject intersection's southwest corner. With the exception of the intersection curve returns where curb and gutter is continued from the side streets, KY 338 has a narrow shoulder along the approaches. All storm water runoff is conveyed by either overland or ditch flow or via storm sewer system to a tributary of Mud Lick Creek running along the north side of KY 338 and crossing under Triple Crown Boulevard.

TRAFFIC VOLUME DATA & CRASH HISTORY

As noted in the January 18, 2012 report titled "*KYTC Item 6-18 Reconstruction of KY 338 Interchange with I-71/I-75 Project Traffic Data*" prepared by the Corradino Group, existing traffic counts for the subject intersection of KY 338 at Triple Crown Boulevard were obtained from the "*2006 Interchange Justification Study for I-71/I-75 at KY 536 and KY 338*." Using a straight-line growth factor and balancing procedures, the 2006 base volumes were forecast to a 2011 growth volume and 2030 build-out. Additionally, from the December 9, 2014 memorandum "*KY338/I-75/I-71 Road Improvements – Impact of Trips Generated by Anchor and IDI Developments,"* two significant developments are proposed to be constructed in the vicinity of the overall project area. Therefore, traffic generated by these

developments was estimated and added to the 2030 traffic projections. See Table 1 for existing and projected Average Daily Traffic (ADT) volumes for each leg of the subject intersection. Figure 1 shows projected peak hour turning movements, including the Anchor and IDI Development traffic, for the year 2030.

Location	ADT (2011)*	ADT (2030)*	DHV (2030)*
KY 338 (West of Intersection)	9,269	15,333	1,646
KY 338 (East of Intersection)	15,464	24,695	2,651
Triple Crown Blvd	4,257	6,390	686
Grand National Blvd	2,888	4,350	467

*Volumes from aforementioned Corradino Group Report

Table 1

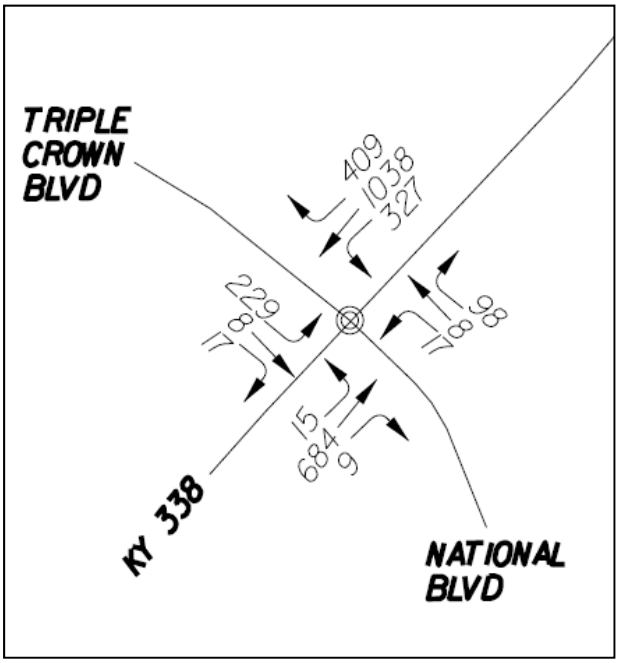


Figure 1

Crash data for KY 338 for the entire project area was obtained from the aforementioned Interchange Justification Study (IJS) in *"Appendix 1: Existing Conditions Report,"* a summary of which can be found in Table 2.

Accident Type	Sideswipe	Angle	Rear End	Head On	Fixed Object	Other
	11%	26%	37%	1%	8%	17%

Table 2

ALTERNATIVES CONSIDERED

On May 8, 2015 a meeting was held at the Kentucky Transportation Cabinet (KYTC) District 6 offices to review conceptual alternatives for the proposed roundabout at the intersection of KY 338 and Triple Crown Boulevard/Grand National Boulevard. The project team presented alternatives for a conventional traffic signal design as well as two roundabout alternatives. All alternates considered a WB-67 vehicle as the design vehicle due to the proximity of nearby existing and proposed industrial land uses.

Alternate 1 – Conventional Signalized Intersection

This alternate proposes keeping the subject intersection a signalized intersection however due to growth in the area higher volumes necessitated KY 338 to be widened to a four-lane and five-lane section to the west and east of the intersection, respectively. Phasing adjustments would need to be made and new signal equipment would need to be installed. Additionally, the Triple Crown Boulevard approach would become a four-lane section. Under a conventional signalized design, the approach along Grand National Boulevard exhibited a -9.73% grade. See Exhibit 3 for the plan view.

Alternate 2 – Roundabout Option 1

The design of this alternate establishes a roundabout with an inscribed diameter of 150 feet and the center point shifted slightly south to minimize stream and Running Buffalo Clover impacts. The roundabout has two 14-foot wide lanes eastbound and westbound along KY 338 and one lane northbound and southbound. This design does however, call for a reconstructed slope of -9.90% for Grand National Boulevard. See Exhibit 4 for the plan view.

Alternate 3 – Roundabout Option 2

The design for this roundabout option is similar to Option 1 except with no alignment shift to the south, which allows for a lesser -7.65% slope along Grand National Boulevard. See Exhibit 5 for the plan view.

PREFERRED ALTERNATE SELECTION

Discussions after the May 8th meeting between KYTC District 6 staff, Chief District Engineer Rob Hans and Boone County Fiscal Court representatives resulted in the recommendation to pursue Alternate 2 as the preferred alternate. Considerations for pursuing the Roundabout Option 1 alternate included lesser right-of-way impacts, less earthwork waste and shorter length of time to construct. The project team reached out to Adam Kirk, former KYTC Roundabout Review Committee member with the Kentucky Transportation Center. His opinion was that Alternate 3 would be more desirable with the lesser slope but that Alternate 2 would be permissible given that the slope along Grand National Boulevard is downward towards the roundabout, lessening the chances for sight distance issues. See Exhibit 6 for the roundabout geometric layout sheet. See Attachment 2 and for roundabout analysis and Attachment 3 for Vissim analysis comparing the proposed alternates.

EXHIBITS

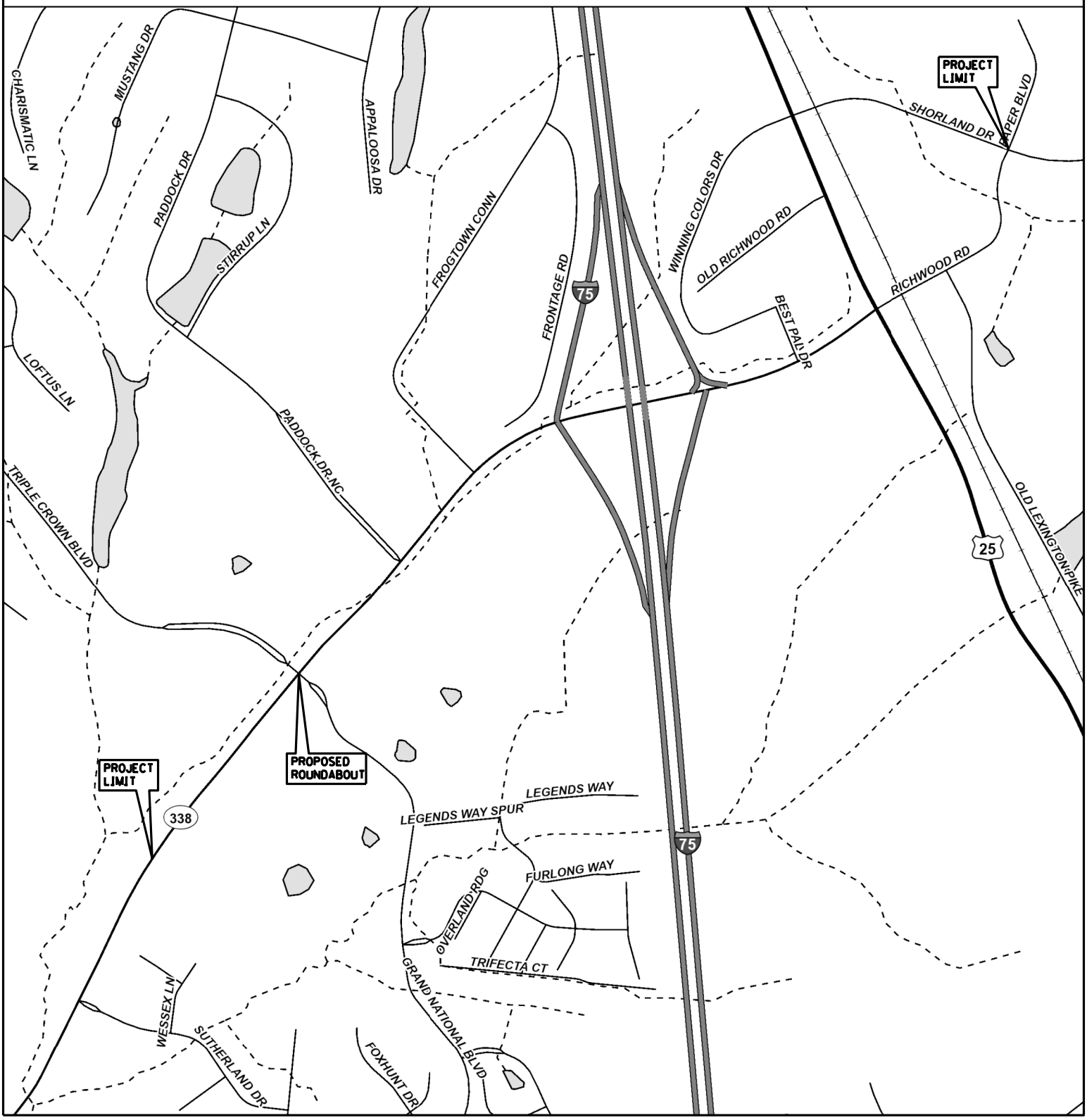
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1	Project Vicinity Map
2	Existing Topography
3	Alternate 1 - Conventional Intersection Option
4	Alternate 2 - Roundabout Option 1
5	Alternate 3 - Roundabout Option 2
6	Roundabout Geometric Layout Sheet

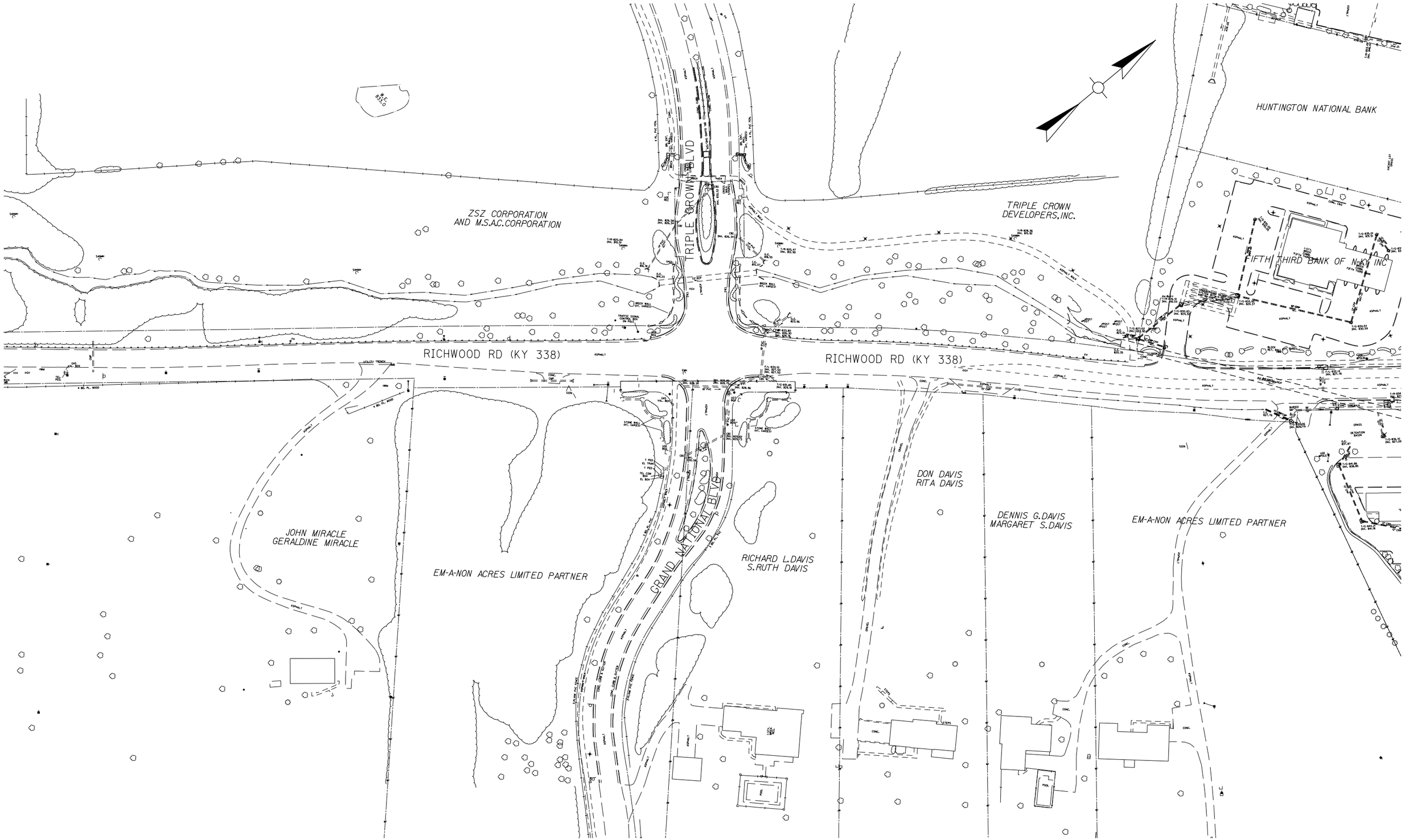
ATTACHMENTS

No.	Contents
1	Roundabout Analysis
2	VISSIM Analysis
3	Design Calculations and Exhibits

EXHIBIT 1

VICINITY MAP
BOONE COUNTY
ITEM NO. 6-18.00

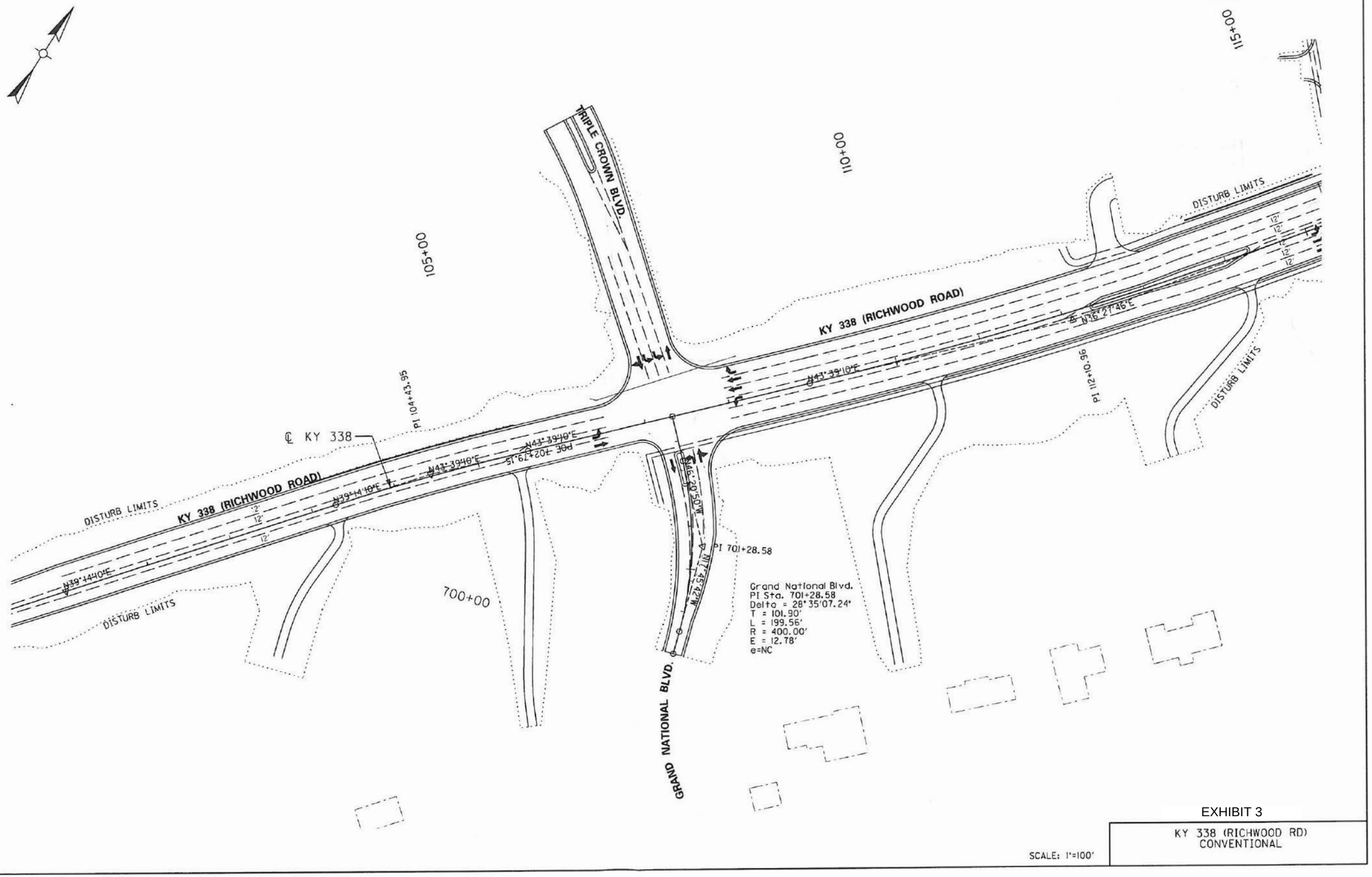




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EXHIBIT 2
EXISTING TOPOGRAPHY

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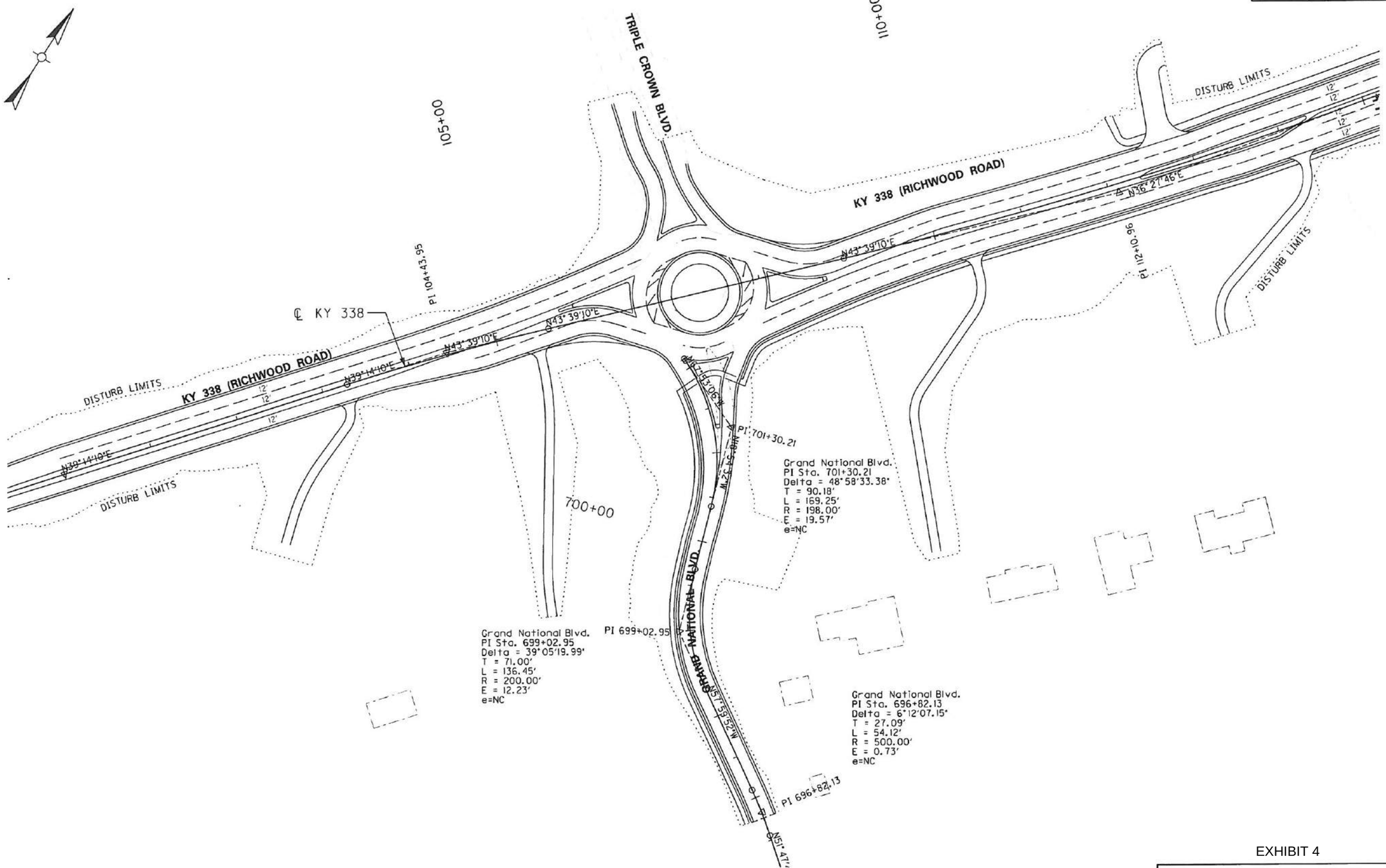
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EXHIBIT 3

KY 338 (RICHWOOD RD)
CONVENTIONAL

SCALE: 1"=100'

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BOONE	6-18.00	



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EXHIBIT 4

KY 338 (RICHWOOD RD)
ROUNDABOUT OPTION 1

SCALE: 1"=100'

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BOONE	6-18.00	

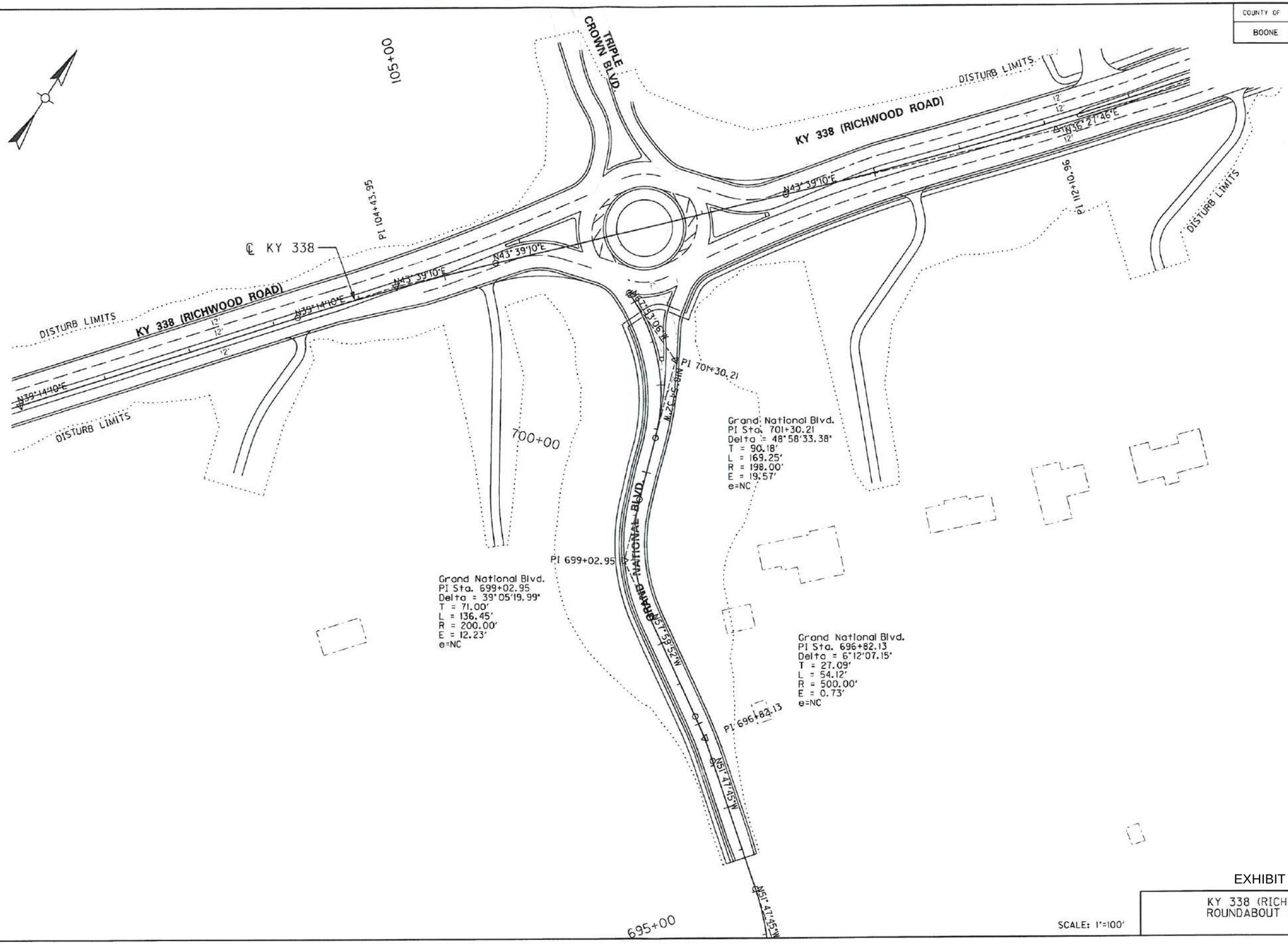


EXHIBIT 5

KY 338 (RICHWOOD RD)
ROUNDABOUT OPTION 2

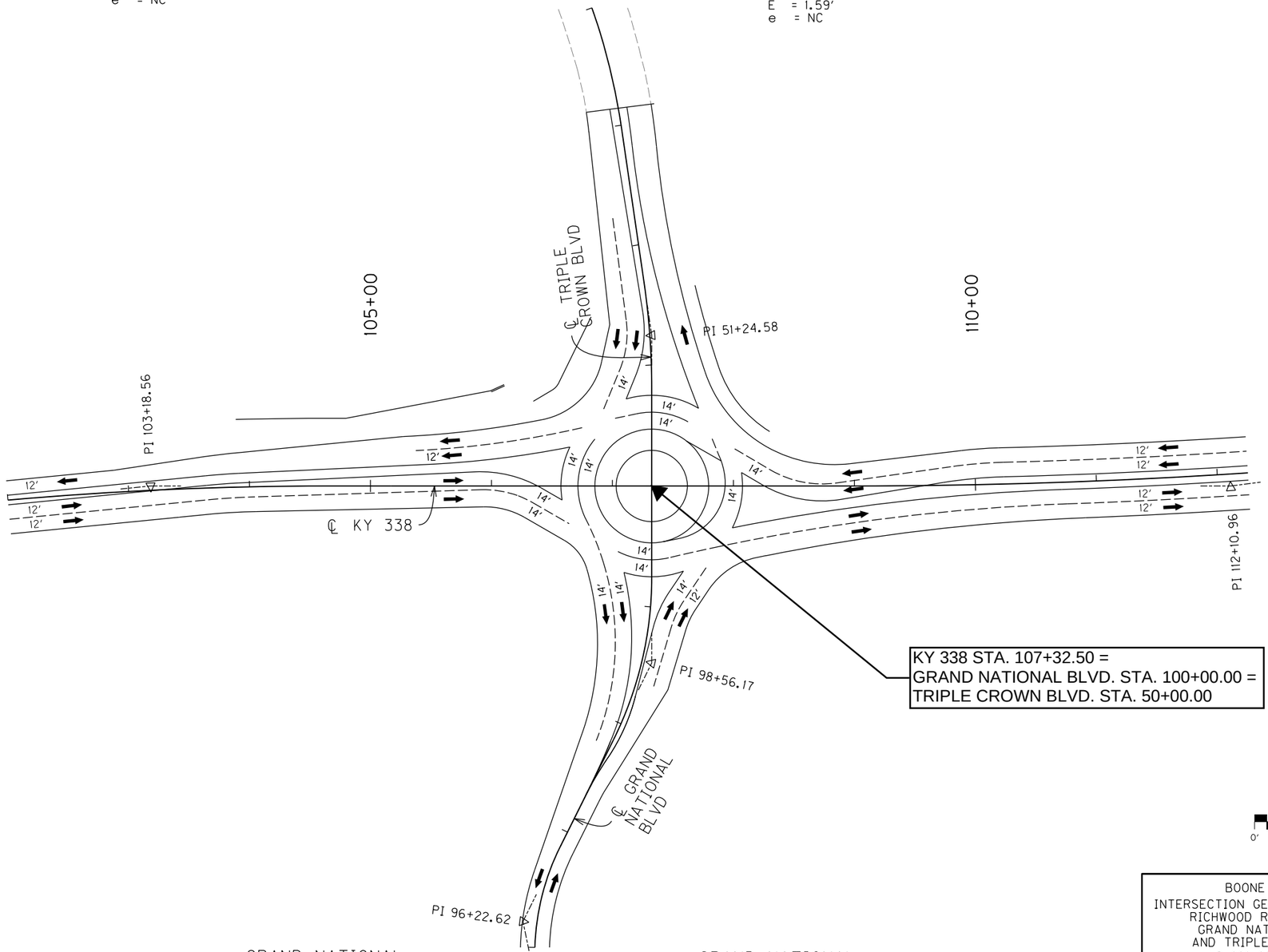
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BOONE	6-18.00	R222

DESIGN VEHICLE WB-67

KY 338
PI 103+18.56
D = 5°36'31.60" RT
C = 1°54'35.49"
T = 146.95'
L = 293.67'
R = 3000.00'
E = 3.60'
e = NC

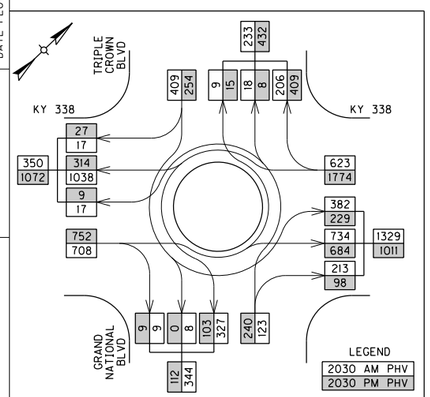
TRIPLE CROWN BOULEVARD
PI 51+24.58
D = 8°19'26.45" LT
T = 43.66'
L = 87.17'
C = 9°32'57.47"
R = 600.00'
E = 1.59'
e = NC



KY 338 STA. 107+32.50 =
GRAND NATIONAL BLVD. STA. 100+00.00 =
TRIPLE CROWN BLVD. STA. 50+00.00

EXHIBIT 6

0' 50' 100' 200'



DESIGN HOUR VOLUMES (2030)

GRAND NATIONAL BOULEVARD
PI 96+22.62
Delta = 38°08'56.66" RT
T = 69.16'
L = 133.17'
C = 28°38'52.40"
R = 200.00'
E = 11.62'
e = NC

GRAND NATIONAL BOULEVARD
PI 98+56.17
D = 26°29'53.85" LT
T = 70.64'
L = 138.74'
C = 19°05'54.94"
R = 300.00'
E = 8.20'
e = NC

KY 338
PI 112+10.96
D = 7°11'24.84" LT
T = 314.15'
L = 627.47'
C = 1°08'45.30"
R = 5000.00'
E = 9.86'
e = NC

SCALE: 1"=50'

BOONE COUNTY
INTERSECTION GEOMETRIC APPROVAL
RICHWOOD ROAD (KY 338),
GRAND NATIONAL BLVD,
AND TRIPLE CROWN BLVD

NUMBER: FD 008 0075 175-176
DATE: JANUARY, 2016
SCALE: 1"=50'

PLAN PREPARED AND SUBMITTED BY
PARSONS

T.E.B.M. FOR PRE-CONSTRUCTION — DATE

DIRECTOR OF DESIGN — DATE

DIRECTOR OF TRAFFIC OPERATIONS — DATE

FILE NAME: ...\Roadway\Sheets\R22200GE.dgn
USER: p003822B
DATE PLOTTED: 3/7/2018
E-SHEET NAME:
Power InRoads v8.11.9.832

ATTACHMENT 1

Single Lane NB & SB Roundabout Analysis

Roundabout Options 1 & 2

PARSONS

9300 Shelbyville Road • Suite 1301 • Louisville, KY 40222 • (502) 653-6621 • Fax: (502) 653-6636 • www.parsons.com

MEMORANDUM

Date: February 19, 2015

To: Carol Callan-Ramler, PE

From: Eric Tripi, PE, PTOE
CC: Dave Ayala, PE, PTOE
Bob Gustafson, PE

Subject: KY338/I-75/I-71 Road Improvements – Roundabout Analysis at KY338/Triple Crown

This memorandum summarizes the analyses performed to determine the feasibility of constructing a roundabout at the intersection of KY338 (Richwood Road) and Triple Crown Boulevard.

1 Roundabout Warrant Analysis at Triple Crown Boulevard

The Kentucky Transportation Cabinet (KYTC) has developed guidelines for the planning and design of roundabouts in Kentucky. The KYTC Roundabout Policy guidelines state that roundabouts may be considered only when either multi-way stop control or traffic signals are warranted at an intersection. In the case of Triple Crown Boulevard, the intersection is already signalized, therefore, a roundabout can be considered at this location.

2 Roundabout Traffic Operational Analysis at Triple Crown Boulevard

A traffic operational analysis of a potential roundabout at Triple Crown Boulevard was conducted using the future design year 2030 traffic volumes.

As noted in the December 9, 2014 memorandum titled "*KY338/I-75/I-71 Road Improvements – Impact of Trips Generated by Anchor and IDI Developments,*" two significant developments are proposed to be constructed in the vicinity of the KY338/I-75/I-71 road improvement project area. Anchor Properties is projecting 322,000 square feet (sf) of new retail, restaurant, and commercial use located in the southeast quadrant of the interchange. IDI is projecting 2,645,935 sf of new warehousing on their existing property along US-25, just south of the KY338/US-25 intersection. Traffic for these two developments was not considered in the 2030 traffic projections used to model the project area (including Triple Crown Boulevard) and to design the DCDI and SPUI at I-71/I-75 and US 25, respectively. Therefore, it was deemed necessary to estimate the traffic generated by each development, assign it to the area roadways, and then add to the 2030 traffic projections.

The December 9, 2014 memorandum describes the methodology used to update the 2030 traffic projections with the traffic volumes from the Anchor and IDI developments. It should be pointed out the memorandum evaluated the PM peak hour only since this was determined to be the critical time period based on a review of the trip generation characteristics of both developments. However, to perform the roundabout operation analysis for this study, it was necessary to update the AM 2030 design volumes as well.

The projected AM peak hour traffic volumes for the Anchor and IDI developments are presented in Table 1 and Table 2, respectively:

Table 1 - AM PEAK HOUR SITE-GENERATED TRAFFIC VOLUMES - ANCHOR

Trip Type	In	Out	Total
Total	870	760	1630
Pass-by	(-230)	(-220)	(-450)
New	640	540	1180

Ref.: Trip generation calculations for the Anchor property were provided by JEP Consulting Engineering in a memo dated October 21, 2014.

Table 2 - AM PEAK HOUR SITE-GENERATED TRAFFIC VOLUMES - IDI

Trip Type	In	Out	Total
New	185	67	252*

*The AM peak hour trips were projected utilizing the same methodology used to project the PM peak hour trips as described in the Dec. 2014 memo.

The AM peak hour volumes were assigned and distributed to the project roadways for the two developments using the same methodology presented in the aforementioned memorandum.

Roundabout Operational Analysis

The traffic modeling software VISSIM was used to analyze the proposed roundabout. Through the analysis, it was determined that the roundabout would need to be configured with one lane approaches on Triple Crown Boulevard and with two-lane approaches on KY338.

The VISSIM model was run for both the 2030 AM and PM peak hours. The KYTC Roundabout Policy guidelines require the following measures of effectiveness to be evaluated:

- V/C Ratio
- Delay Estimate by lane, approach, and intersection
- Queue length estimate for each approach

Tables 3 and 4 present the measure of effectiveness results:

Table 3 – 2030 PEAK HOUR DELAY AND MAXIMUM QUEUE LENGTHS

Approach	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
	Delay/LOS	Delay/LOS	Max. Queue (ft)	Max. Queue (ft)
Overall	**11.5/B**	**20.5/C**		
West	13.2/B	13.7/B	47	189
East	6.7/A	27.0/D	166	560
South	20.0/C	10.1/B	141	69
North	13.1/B	33.6/D	303	268

Note: The approach and intersection delay values were determined using HCS 2010 and queue values were obtained from VISSIM.

Table 4 – V/C RATIOS

Approach	AM Peak Hour		PM Peak Hour	
	Left/Thru	Right/Thru	Left/Thru	Right/Thru
Eastbound (2-Lane Approach)	0.55	0.54	0.55	0.54
Westbound (2-Lane Approach)	0.32	0.32	0.89	0.89
Northbound (1-Lane Approach)	0.56		0.25	
Southbound (1-Lane Approach)	0.56		0.72	

Note: V/C ratios were obtained for each lane using HCS 2010 software for the proposed geometry.

As can be seen from Tables 3 and 4, the roundabout will operate at acceptable delays and levels of service for each lane, approach, and overall during both the AM and PM peak hours. The queue lengths for each approach will be manageable. The longest queue is seen on the westbound approach (560'); however it will not impact the operation of the adjacent signal at Paddock Drive.

As can be seen in Table 4, all approaches will operate at acceptable v/c ratios during the AM peak hour. During the PM peak hour, the v/c ratios also are acceptable but the westbound approach will have a v/c ratio of 0.89. The KYTC Roundabout Policy states that all approach lanes to the intersection shall have a v/c that is less than or equal to 0.85 for the design year analysis. However, the NCHRP Report 672 (an updated version of NCHRP Report 572), states that, "*a volume-to-capacity ratio of 0.85 should not be considered an absolute threshold; in fact, acceptable operations may be achieved at higher ratios. Where an operational analysis finds the volume-to-capacity ratio above 0.85, it is encouraged to conduct additional sensitivity analysis to evaluate whether relatively small increments of additional volume have dramatic impacts on delay or queues.*"

Looking a little closer at this approach during the PM peak hour, the total approach volume during this period is about 1700 vehicles with approximately 25% of the projected traffic turning

right. A possible mitigation measure could be to provide a yielding westbound right-turn bypass lane. If this were implemented, the v/c ratio would lower to 0.65 for both approach lanes. However, since this movement operates well within acceptable v/c levels during the AM peak hour and borders the acceptable threshold during the PM peak hour, the addition of a bypass lane may not be needed.

The HCS capacity analysis worksheets are attached.

3 Conclusions

The intersection of KY 338 and Triple Crown Boulevard is signalized and therefore can be considered as a potential location for a roundabout.

The traffic modeling software VISSIM and HCS 2010 were used to analyze the proposed roundabout. Through the analysis, it was determined that the roundabout would need to be configured with one lane approaches on Triple Crown Boulevard and with two-lane approaches on KY338.

It was determined the roundabout with the projected 2030 peak hour traffic volumes would operate at acceptable levels of service, delay, and queues during the AM and PM peak hours.

HCS PEAK HOUR CAPACITY ANALYSES

Phone: Fax:
E-Mail:

ROUNDABOUT ANALYSIS

Analyst: Parsons
Agency/Co.:
Date Performed: 12/30/2014
Analysis Time Period: AM Peak Hour
Intersection: KY338 and Triple Crown Blvd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2030
Project ID:
East/West Street: KY 338
North/South Street: Triple Crown / National Blvd.

Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	9	734	9	103	314		9	18	213	382	0	27
U-Turn Vol	0			0			0			0		
% Thrus Left Lane		50			50							

	Eastbound			Westbound			Northbound			Southbound		
	Left		Right BP	Left		Right BP	Left		Right BP	Left		Right BP
Lane Assn.	LT	TR		LT	TR		LTR			LTR		
RT Bypass	None			None			None			None		
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
%HV	0	2	0	5	5	5	0	0	2	2	0	4
NumPeds	0			0			0			0		
U-Turn PHF	0.92			0.92			0.92			0.92		
U-Turn %HV	3			3			3			3		
Flow Rate	10	814	10	118	358	235	10	20	236	424	0	31
No. Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Cnfl. Lanes	2			2			2			2		

Duration, T 0.25 hrs.

Critical and Follow-Up Headway Adjustment

	Eastbound			Westbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Northbound			Southbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Eastbound			Westbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858
	Northbound			Southbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858

Flow Computations

	Eastbound	Westbound	Northbound	Southbound
Circ. Flow	542	40	1248	486
Exit. Flow	1473	399	264	127

Capacity and Level of Service

	Eastbound	Westbound	Northbound	Southbound

	Left	Right BP	Left	Right BP	Left	Right BP	Left	Right BP
Entry Flow	417	417	356	356		265		454
Entry Cap.	753	774	1097	1099		472		804
Volume (vph)	409	409	339	339		260		445
Cap. (vph)	739	759	1045	1047		464		788
v/c Ratio	0.55	0.54	0.32	0.32		0.56		0.56
Critical Lane			*			*		*
Lane Delay	13.5	12.8	6.7	6.7		20.0		13.1
Lane LOS	B	B	A	A		C		B
95 % Queue	3.4	3.3	1.4	1.4		3.4		3.6
Approach:								
Delay		13.17		6.70		20.03		13.13
LOS		B		A		C		B
Intersection Delay		11.98		Intersection LOS		B		

Phone: Fax:
E-Mail:

ROUNDABOUT ANALYSIS

Analyst: Parsons
Agency/Co.:
Date Performed: 12/30/2014
Analysis Time Period: PM Peak Hour
Intersection: KY338 and Triple Crown Blvd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2030
Project ID:
East/West Street: KY 338
North/South Street:

Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	15	684	9	327	1038	409	17	8	98	229	8	17
U-Turn Vol	0			0			0			0		
% Thrus Left Lane		50			50							

	Eastbound			Westbound			Northbound			Southbound		
	Left		Right BP	Left		Right BP	Left		Right BP	Left		Right BP
Lane Assn.	LT	TR		LT	TR		LTR			LTR		
RT Bypass	None			None			None			None		
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
%HV	0	2	0	1	1	1	0	0	2	2	0	0
NumPeds	0			0			0			0		
U-Turn PHF	0.92			0.92			0.92			0.92		
U-Turn %HV	3			3			3			3		
Flow Rate	16	758	10	359	1140	449	18	9	109	254	9	18
No. Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Cnfl. Lanes	2			2			2			2		

Duration, T 0.25 hrs.

Critical and Follow-Up Headway Adjustment

	Eastbound			Westbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Northbound			Southbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Eastbound			Westbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858
	Northbound			Southbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858

Flow Computations

	Eastbound	Westbound	Northbound	Southbound
Circ. Flow	622	43	1028	1517
Exit. Flow	1121	1176	474	377

Capacity and Level of Service

	Eastbound	Westbound	Northbound	Southbound

	Left	Right BP	Left	Right BP	Left	Right BP	Left	Right BP
Entry Flow	392	392	974	974		136		281
Entry Cap.	709	731	1094	1096		550		391
Volume (vph)	385	385	964	964		134		276
Cap. (vph)	696	717	1083	1085		541		384
v/c Ratio	0.55	0.54	0.89	0.89		0.25		0.72
Critical Lane			*	*		*		*
Lane Delay	14.1	13.4	27.2	26.9		10.1		33.6
Lane LOS	B	B	D	D		B		D
95 % Queue	3.4	3.2	13.0	12.9		1.0		5.5
Approach:								
Delay		13.74		27.05		10.07		33.58
LOS		B		D		B		D
Intersection Delay		23.60		Intersection LOS		C		

Phone: Fax:
E-Mail:

ROUNDABOUT ANALYSIS

Analyst: Parsons
Agency/Co.:
Date Performed: 12/30/2014
Analysis Time Period: PM Peak Hour
Intersection: KY338 and Triple Crown Blvd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2030
Project ID: With WBR Bypass
East/West Street: KY 338
North/South Street: Triple Crown / National Blvd.

Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	15	684	9	327	1038	409	17	8	98	229	8	17
U-Turn Vol	0			0			0			0		
% Thrus Left Lane		50			50							

	Eastbound			Westbound			Northbound			Southbound		
	Left		Right BP	Left		Right BP	Left		Right BP	Left		Right BP
Lane Assn.	LT	TR		LT	TR		LTR			LTR		
RT Bypass	None			Yielding			None			None		
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
%HV	0	2	0	1	1	1	0	0	2	2	0	0
NumPeds	0			0			0			0		
U-Turn PHF	0.92			0.92			0.92			0.92		
U-Turn %HV	3			3			3			3		
Flow Rate	16	758	10	359	1140	449	18	9	109	254	9	18
No. Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Cnfl. Lanes	2			2		1	2			2		

Duration, T 0.25 hrs.

Critical and Follow-Up Headway Adjustment

	Eastbound			Westbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Northbound			Southbound		
Crit. Hdwy	4.2929	4.1129	5.1929	4.2929	4.1129	5.1929
	Eastbound			Westbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858
	Northbound			Southbound		
Flup. Hdwy	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858

Flow Computations

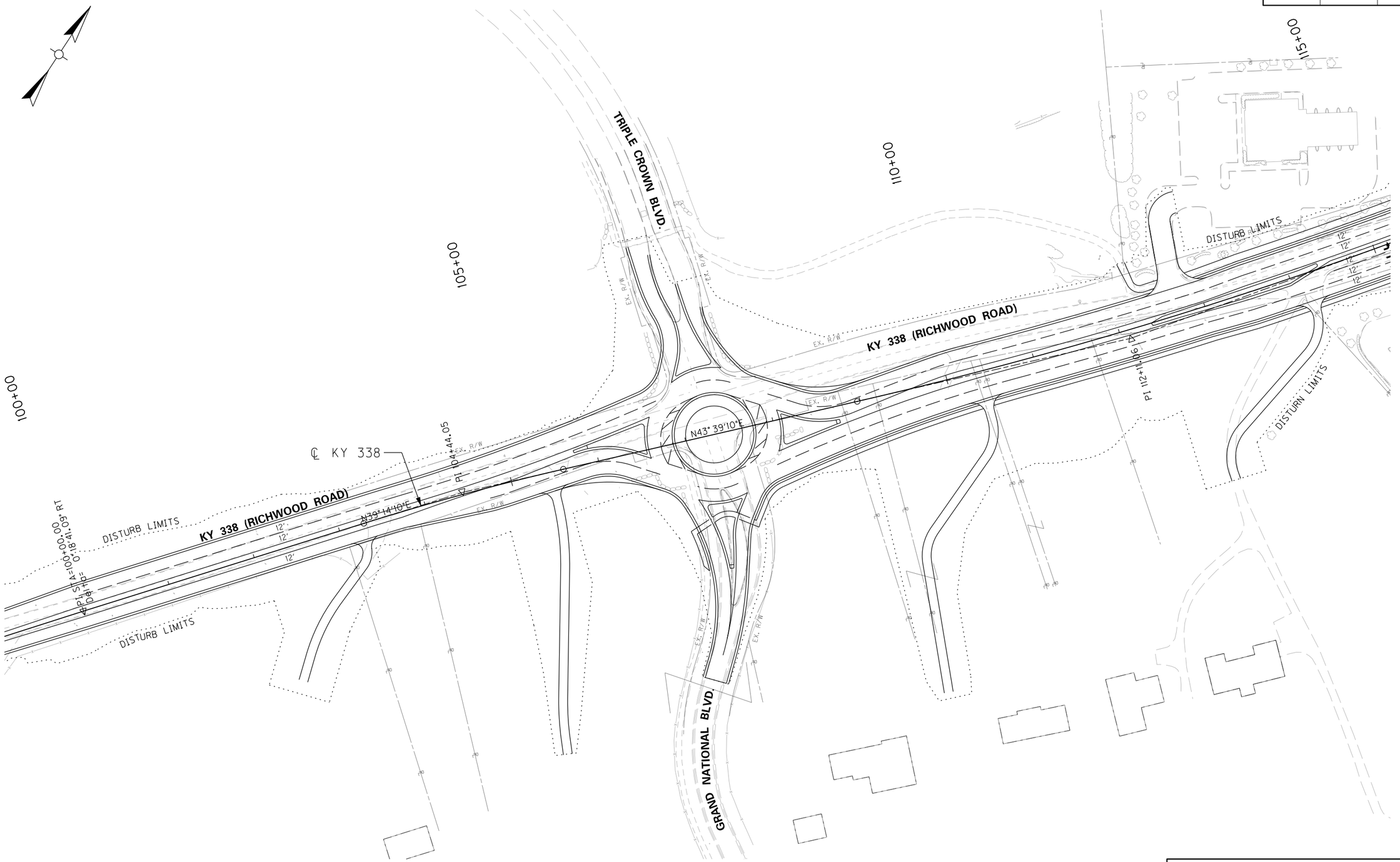
	Eastbound	Westbound	Northbound	Southbound
Circ. Flow	622	43	1028	1517
Exit. Flow	1121	1176	25	377

Capacity and Level of Service

	Eastbound	Westbound	Northbound	Southbound

	Left	Right	BP	Left	Right	BP	Left	Right	BP	Left	Right	BP
Entry Flow	392	392		749	749	449		136			281	
Entry Cap.	709	731		1094	1096	1102		550			391	
Volume (vph)	385	385		742	742	445		134			276	
Cap. (vph)	696	717		1083	1085	1091		541			384	
v/c Ratio	0.55	0.54		0.68	0.68	0.41		0.25			0.72	
Critical Lane				*				*			*	
Lane Delay	14.1	13.4		13.6	13.6	7.6		10.1			33.6	
Lane LOS	B	B		B	B	A		B			D	
95 % Queue	3.4	3.2		5.7	5.7	2.0		1.0			5.5	
Approach:												
Delay		13.74			12.22			10.07			33.58	
LOS		B			B			B			D	
Intersection Delay		14.40				Intersection LOS		B				

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	



KY 338 (RICHWOOD RD)
ROUNDABOUT OPTION

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: p003822b DATE PLOTTED: February 20, 2015 | FILE NAME: C:\PW_WORKING\MASTER\P003822B\DMS00357\ROUNDABOUT OPTION.DGN

ATTACHMENT 2

VISSIM ANALYSIS

Conventional Signal Control Intersection

Single Lane NB & SB Roundabout

Full 2 Lane Roundabout

Signal Control VISSIM Capacity Analysis

	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
Approach	**Delay/LOS**	**Delay/LOS**	**Max. Queue (ft)**	**Max. Queue (ft)**
Overall	**24.8 / C**	**21.6 / C**		
EBL	**18.7 / B**	**36.4 / C**		
EBT	**21.8 / C**	**35.6 / D**	**692**	**872**
EBR	**17.3 / B**	**30.9 / C**		
WBL	**37.4 / D**	**22.6 / C**		
WBT	**27.7 / C**	**14.7 / B**	**244**	**406**
WBR	**20.4 / C**	**9.7 / A**		
NBL	**39.4 / D**	**36.9 / D**		
NBT	**46.0 / D**	**40.1 / D**	**226**	**140**
NBR	**16.0 / B**	**9.2 / A**		
SBL	**35.8 / D**	**34.7 / C**		
SBT	**0.6 / A**	**0.4 / A**	**365**	**190**
SBR	**3.7 / A**	**3.4 / A**		

SIGNAL LOS	
Control Delay (s/veh)	LOS
0 - 10	A
>10 - 20	B
>20 - 35	C
>35 - 55	D
>55 - 80	E
>80	F

Signal Control V/C Ratio

	AM Peak Hour			PM Peak Hour		
Approach	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
Eastbound	0.02	0.96		0.05	0.77	
Westbound	0.67	0.20	0.30	0.89	0.51	0.45
Northbound	0.03	0.90		0.08	0.81	
Southbound	0.85	0.06		0.79	0.10	

Note: V/C ratios were obtained for each lane using HCS 2010 software

Multi-lane Roundabout VISSIM Capacity Analysis

1. Multi-lane Roundabout (with 2 approach lanes on EB&WB and 1 approach lane on NB&SB)

Approach	A.M. Peak Delay/LOS	P.M. Peak Delay/LOS	A.M. Peak Max. Queue (ft)	P.M. Peak Max. Queue (ft)
Overall	13.7 / B	26.6 / D		
EBL	13.2 / B	11.7 / B		
EBT	4.7 / A	11.0 / B	94	217
EBR	5.8 / A	15.1 / C		
WBL	24.6 / C	21.6 / C		
WBT	14.3 / B	20.5 / C	234	552
WBR	18.7 / C	22.3 / C		
NBL	15.5 / C	10.9 / B		
NBT	32.0 / D	11.1 / B	170	68
NBR	12.8 / B	8.4 / A		
SBL	23.6 / C	36.8 / E		
SBT	1.0 / A	1.0 / A	294	262
SBR	16.0 / C	1.0 / A		

ROUNDABOUT LOS	
Control Delay (s/veh)	LOS
0 - 10	A
>10 - 15	B
>15 - 25	C
>25 - 35	D
>35 - 50	E
>50	F

2. Multi-lane Roundabout (with 2 lanes on all approaches)

Approach	A.M. Peak Delay/LOS	P.M. Peak Delay/LOS	A.M. Peak Max. Queue (ft)	P.M. Peak Max. Queue (ft)
Overall	7.6 / A	15.8 / C		
EBL	5.2 / A	17.6 / C		
EBT	4.1 / A	13.2 / B	95	190
EBR	3.9 / A	14.4 / B		
WBL	18.2 / C	16.5 / C		
WBT	14.3 / B	16.4 / C	174	458
WBR	17.9 / C	17 / C		
NBL	3.1 / A	5.7 / A		
NBT	22.9 / C	2.6 / A	72	41
NBR	3.3 / A	7.5 / A		
SBL	11.1 / B	20.8 / C		
SBT	1.0 / A	1.0 / A	48	148
SBR	1.0 / A	1.0 / A		

Exhibit 2A – Roundabout V/C Ratio

Multi-lane Roundabout (with 2 approach lanes EB/WB and 1 lane on NB & SB)

	AM Peak Hour		PM Peak Hour	
Approach	**Left/Thru**	**Right/Thru**	**Left/Thru**	**Right/Thru**
Eastbound (2-Lane Approach)	0.55	0.54	0.55	0.54
Westbound (2-Lane Approach)	0.32	0.32	0.89	0.89
Northbound (1-Lane Approach)	0.56		0.25	
Southbound (1-Lane Approach)	0.56		0.72	

Note: V/C ratios were obtained for each lane using HCS 2010 software.

ATTACHMENT 3
Design Calculations and Exhibits

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	



SCALE: 1"=30'

WB-67 TURNING TEMPLATE
KY 338 @ TRIPLE CROWN BLVD
WB TO NB/EB TO SB

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: p003129C DATE PLOTTED: December 17, 2015 | FILE NAME: C:\PW_WORKING\KENTUCKY\P003129C\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	



SCALE: 1"=30'

WB-67 TURNING TEMPLATE
KY 338 @ TRIPLE CROWN BLVD
WB TO NB/EB TO SB

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: P0020878 DATE PLOTTED: December 17, 2015 | FILE NAME: C:\PW_WORKING\KENTUCKY\P003129C\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

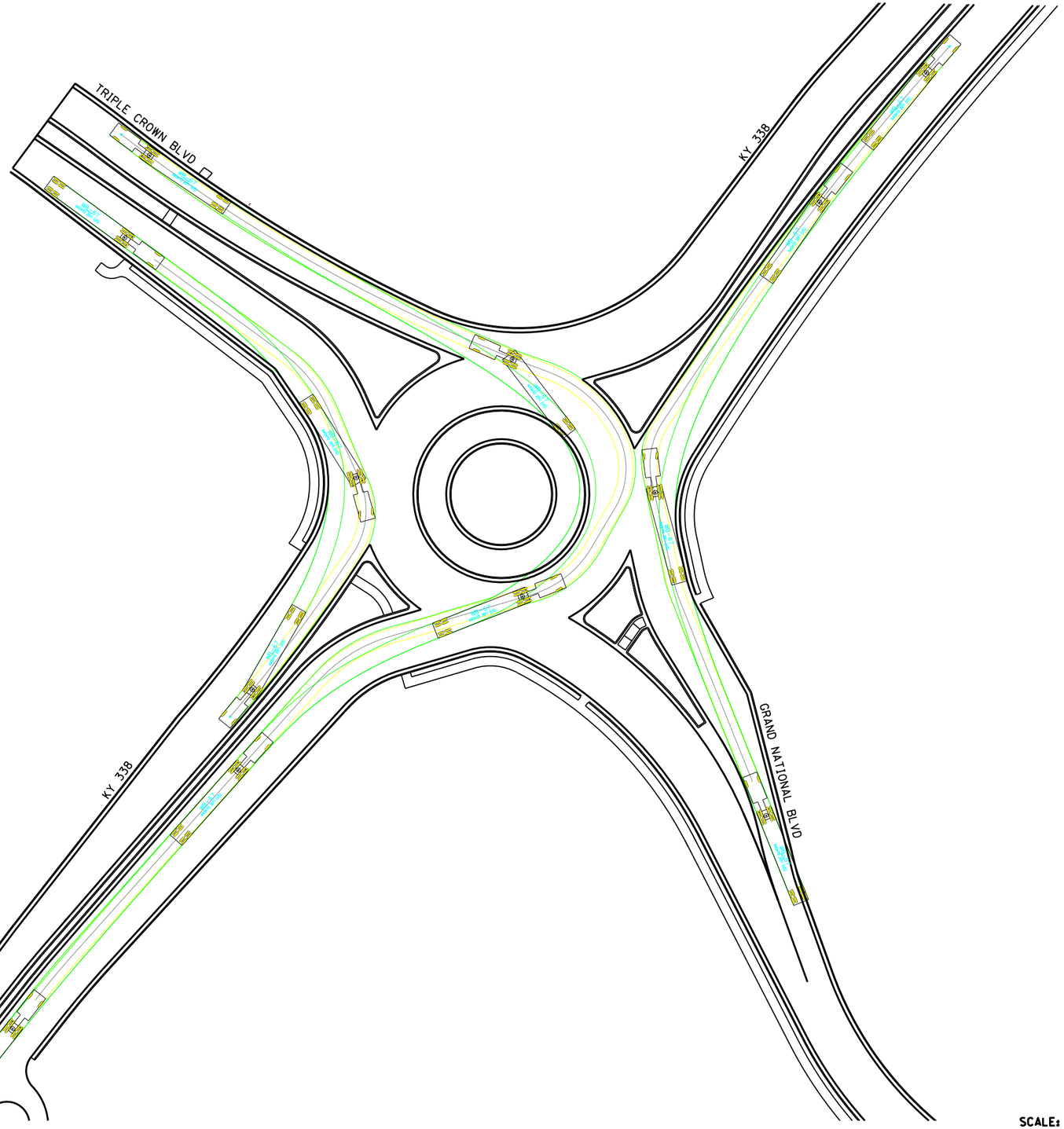


SCALE: 1"=30'

WB-67 TURNING TEMPLATE
KY 338 @ TRIPLE CROWN BLVD
SB TO EB

MicroStation v8.11.9.459
E-SHEET NAME:
USER: p003129C
DATE PLOTTED: December 17, 2015
FILE NAME: C:\PW_WORKING\KENTUCKY\P003129C\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	



SCALE: 1"=30'

WB-67 TURNING TEMPLATE
KY 338 @ TRIPLE CROWN BLVD
NB TO EB, SB TO WB & EB TO NB

MicroStation v8.11.9.459
E-SHEET NAME:
USER: p0020878
DATE PLOTTED: December 17, 2015
FILE NAME: C:\PW_WORKING\KENTUCKY\P0020878\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

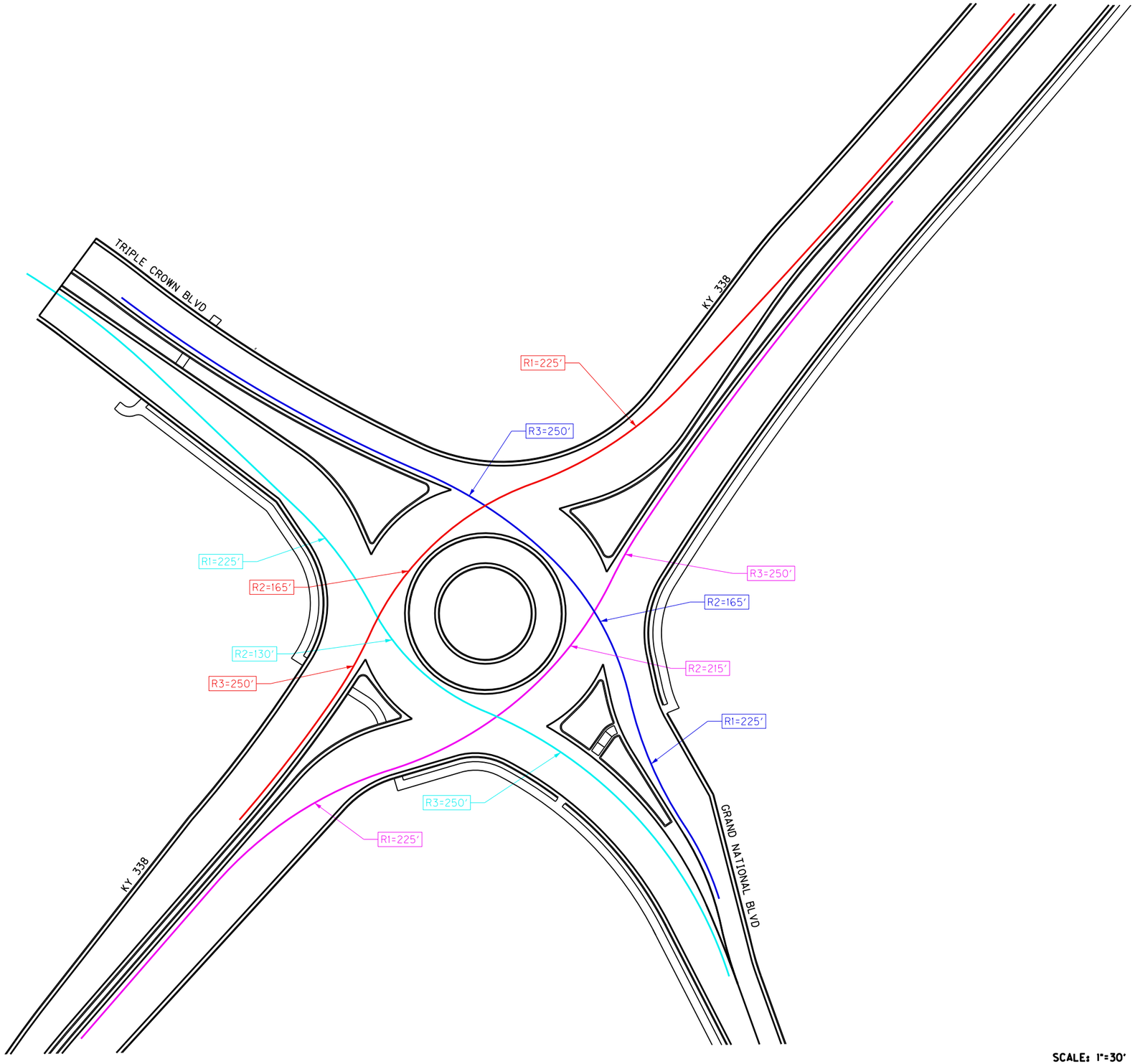


SCALE: 1"=30'

WB-67 TURNING TEMPLATE
KY 338 @ TRIPLE CROWN BLVD
WB TO SB

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: p002087B DATE PLOTTED: December 17, 2015 | FILE NAME: C:\PW_WORKING\KENTUCKY\P002087B\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

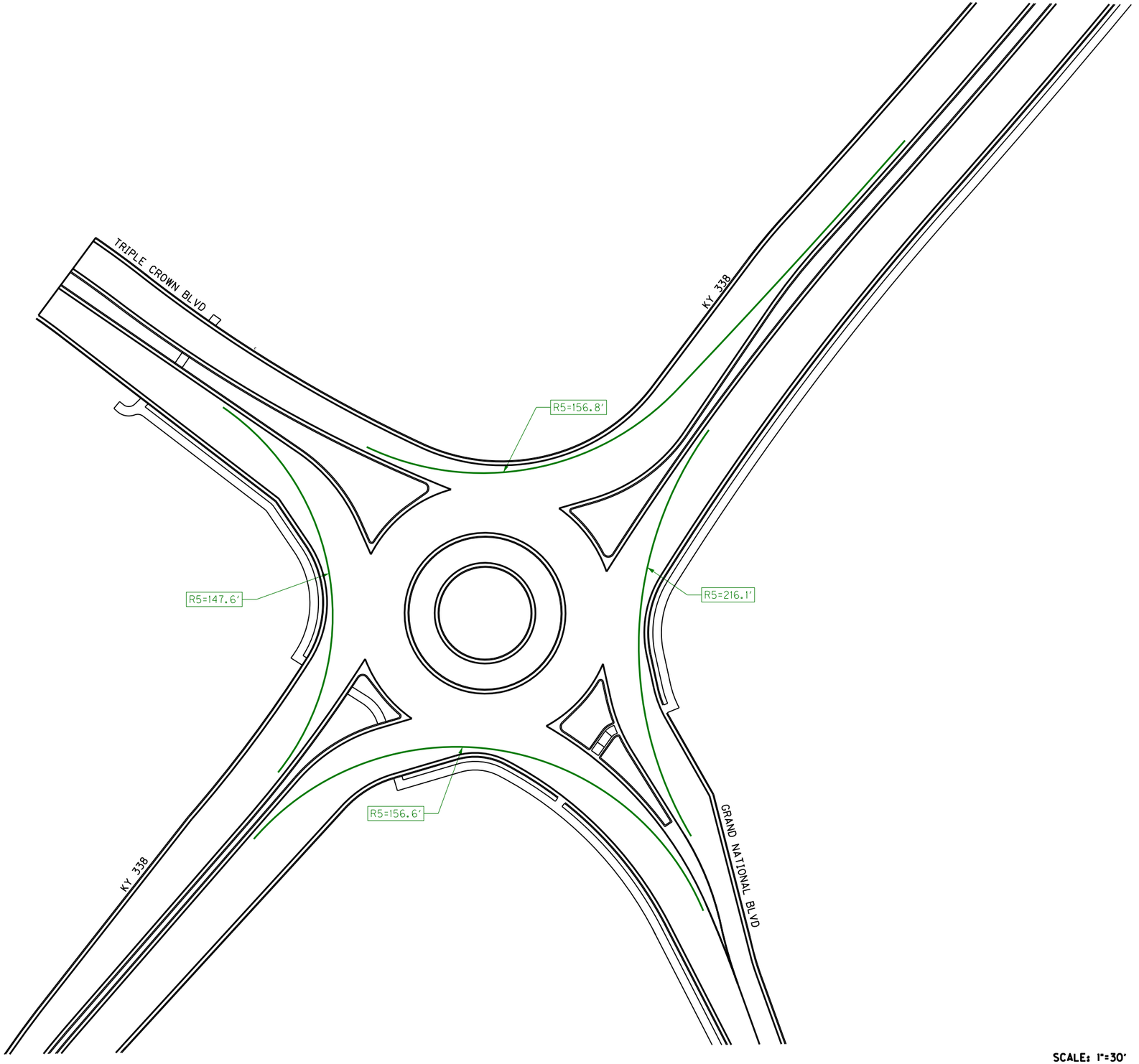


SCALE: 1"=30'

THROUGH FASTEST PATH EVALUATION
KY 338 @ TRIPLE CROWN BLVD

MicroStation v8.11.9.459
E-SHEET NAME:
USER: p0020878
DATE PLOTTED: December 17, 2015
FILE NAME: C:\PW_WORKING\KENTUCKY\P0020878\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	

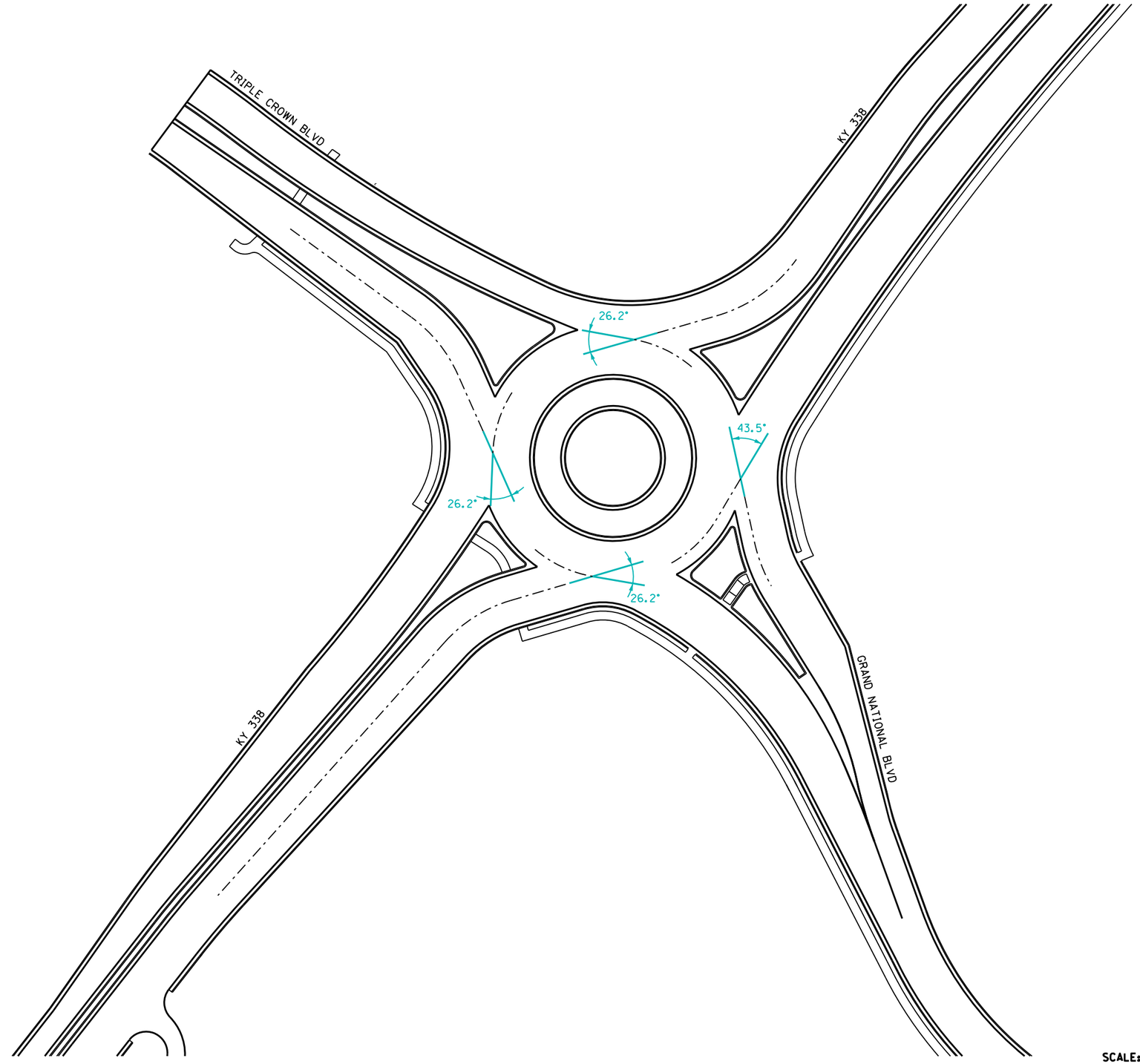


SCALE: 1"=30'

RT TURN SHORTEST PATH EVALUATION
KY 338 @ TRIPLE CROWN BLVD

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: p0020878 DATE PLOTTED: December 17, 2015 | FILE NAME: C:\PW_WORKING\KENTUCKY\P0020878\DMS00356\ROUNDABOUT FIGURES.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-18.00	



SCALE: 1"=30'

ENTRY ANGLE
KY 338 @ TRIPLE CROWN BLVD

MicroStation v8.11.9.459
E-SHEET NAME:
USER: p0020878
DATE PLOTTED: December 17, 2015
FILE NAME: C:\PW_WORKING\KENTUCKY\P003129C\OMS000356\ROUNDABOUT FIGURES.DGN

Intersection Sight Distance Computations

Intersection sight distance (ISD) and stopping sight distance (SSD) calculations were completed using KYTC Design Memo No. 03-10 and the NCHRP Report 672 "Roundabouts: An Informational Guide."

Entry/Exit curve and circulatory operating speeds are set at 16 mph and 14 mph respectively based on the inscribed roundabout circle diameter of 150 ft (Pg. 25, Table 6, KYTC Memo).

Intersection sight distance for the entry/exit curve and circulatory operating speeds are set at 195 ft and 170 ft respectively using Table 7 of the KYTC Memo and interpolating to match speeds of 16 mph and 14 mph (Pg 27, Table 7, KYTC Memo). ISD is measured along the path of the conflicting vehicles, not a straight line. ISD for the yielding vehicle is 50 ft from the yield line and is measured in a straight line (Pg 28, Figure 24, KYTC Memo).

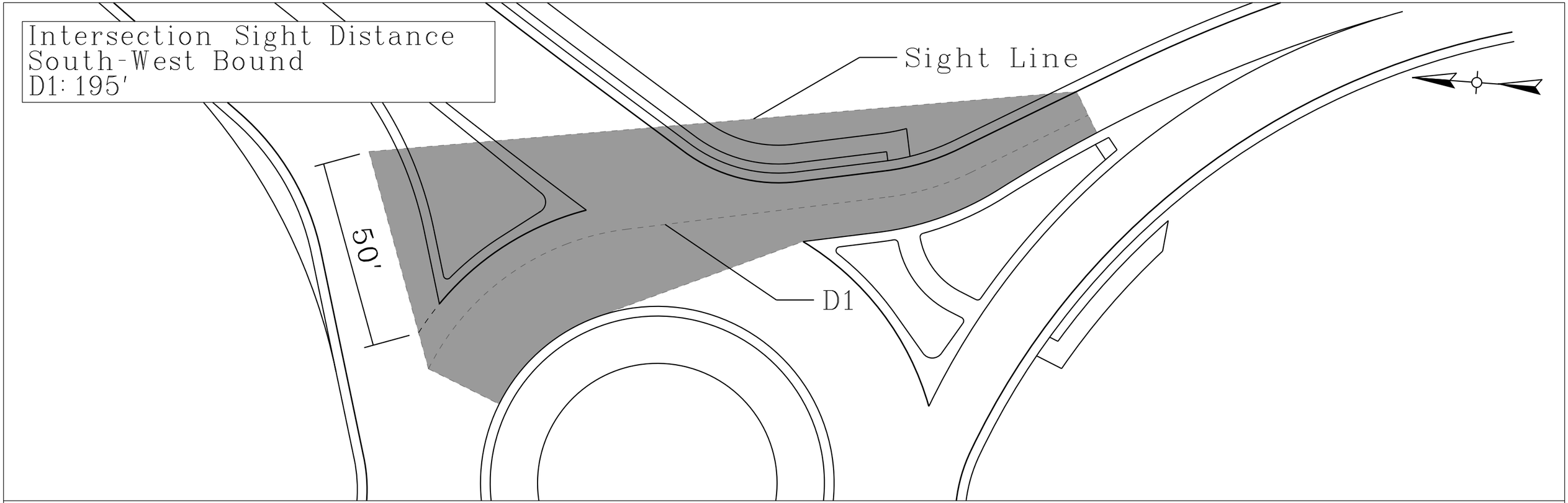
ISD eye height and object height is assumed to be 3.5 ft (Pg. 27, KYTC Memo).

Stopping Sight Distance Computations

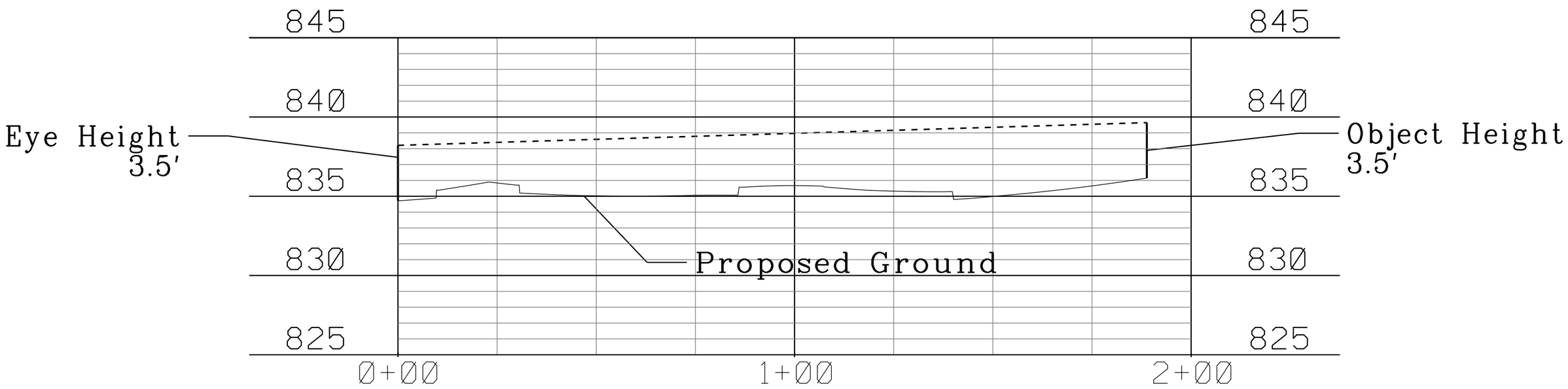
Stopping sight distance for the entry/exit curve and circulatory operating speeds are set at 90 ft and 75 ft respectively by interpolation to match speeds of 16mph and 14 mph (Pg. 24, Table 5, KYTC Memo). SSD when approaching the roundabout is measured from the yield line to the approaching vehicle in a straight line. For circulating traffic, SSD is measured along the vehicle path starting from the gore nose of the exit lane (Pg. 26, Figure 21, 22, KYTC Memo).

SSD eye height on the approach is 3.5 ft and object height is 0.5 ft. Object height to cross walks and on the circulatory roadway is 2.0 ft (Pg. 25, KYTC Memo).

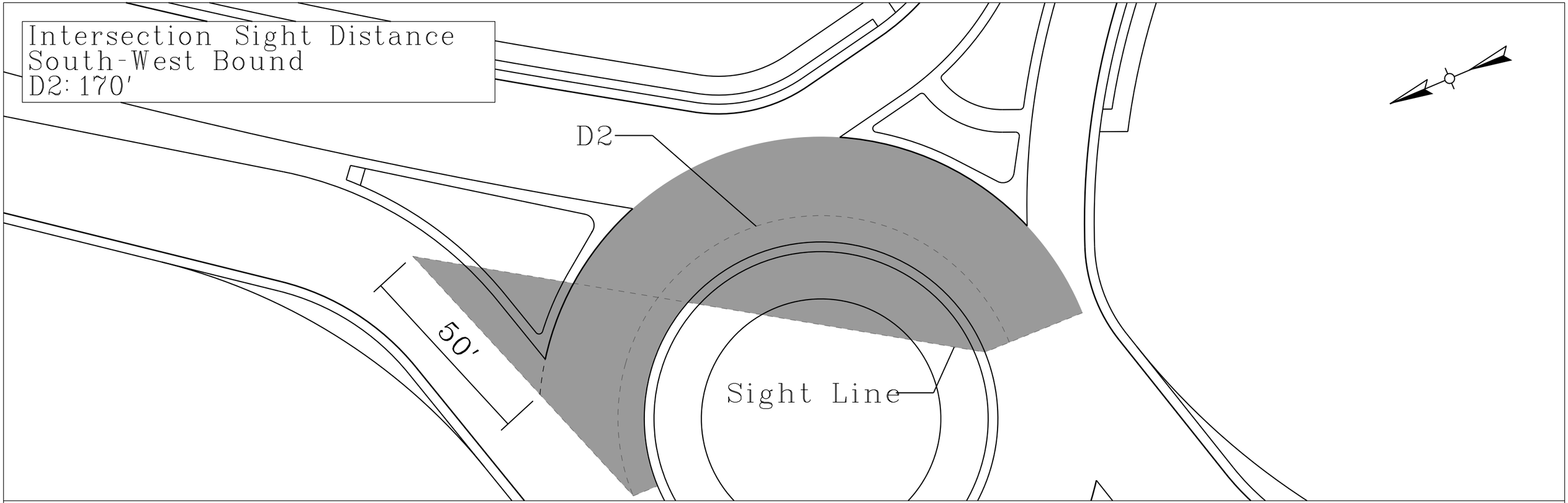
Intersection Sight Distance
South-West Bound
D1: 195'



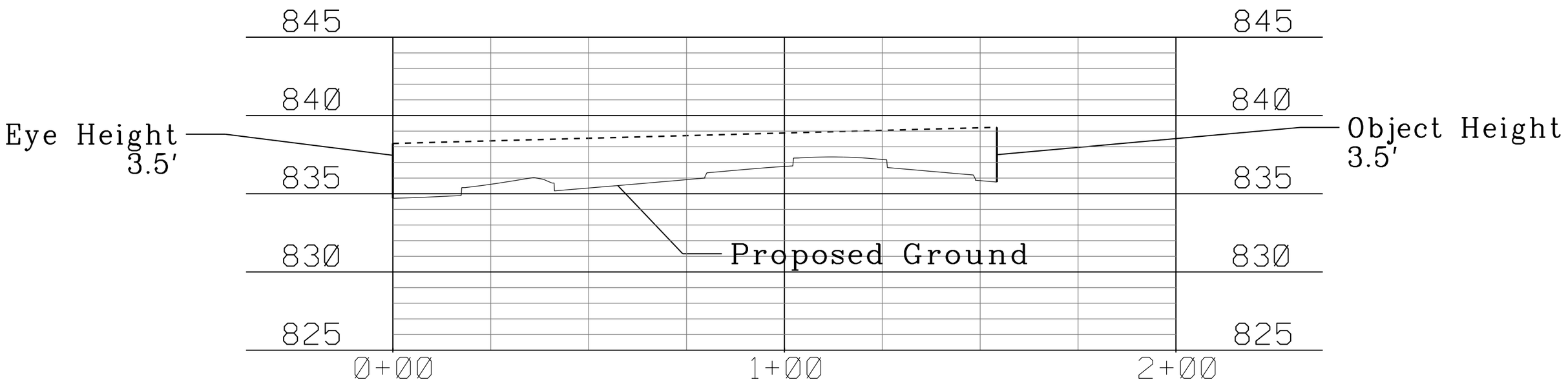
Sight Line Profile



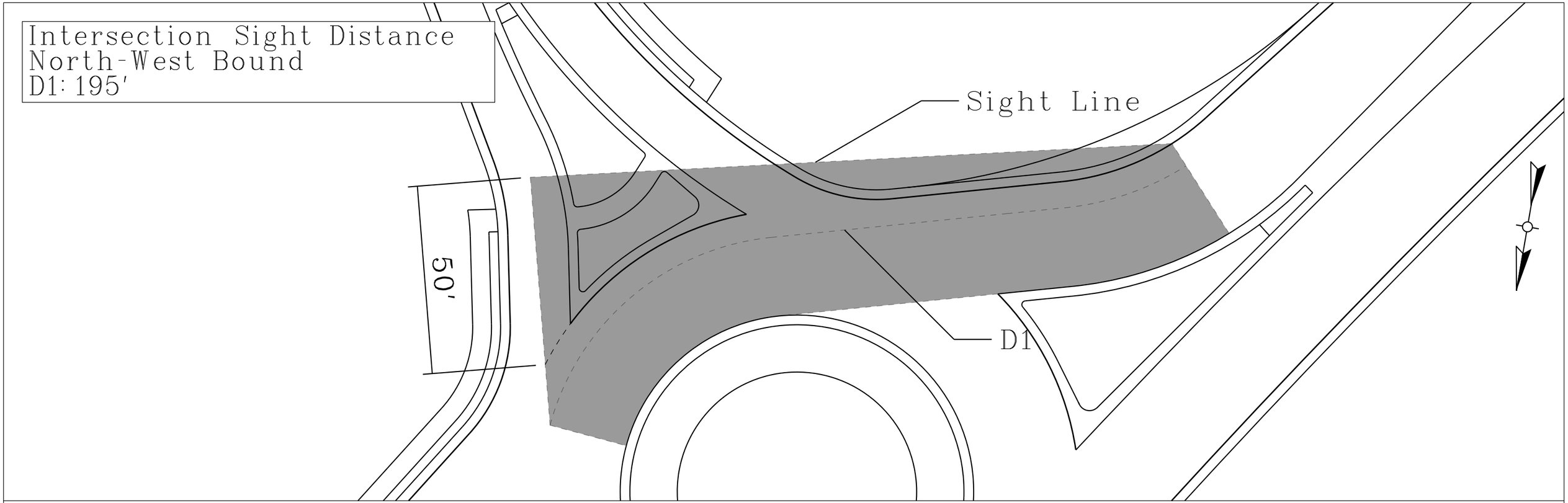
Intersection Sight Distance
South-West Bound
D2: 170'



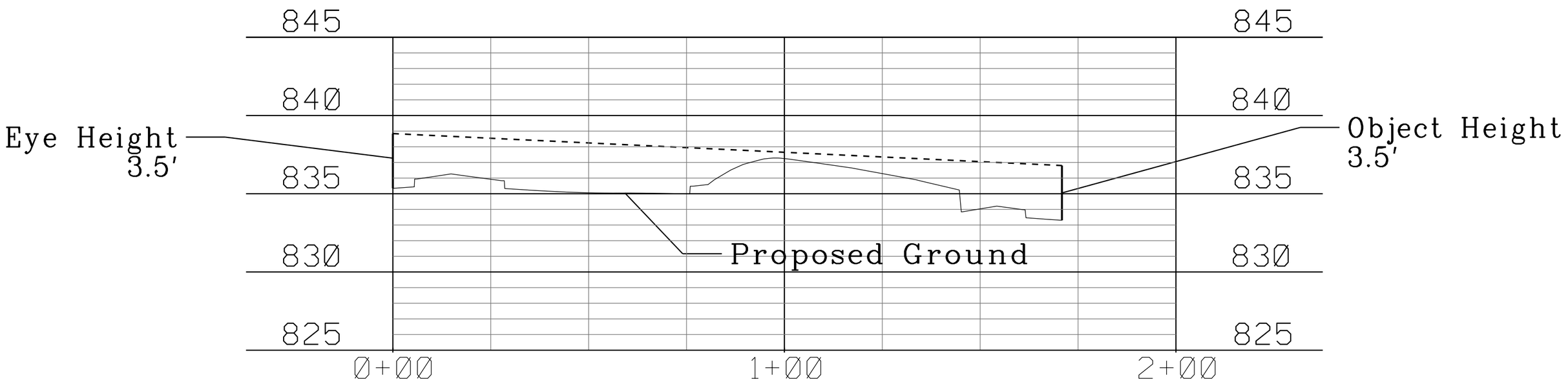
Sight Line Profile



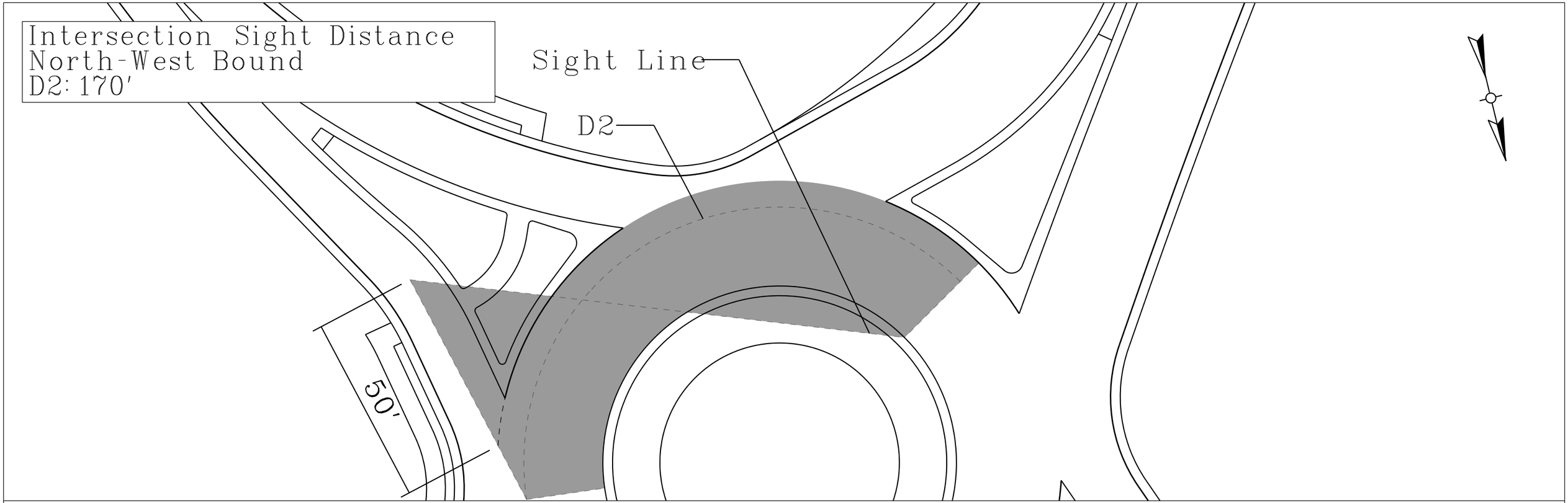
Intersection Sight Distance
North-West Bound
D1: 195'



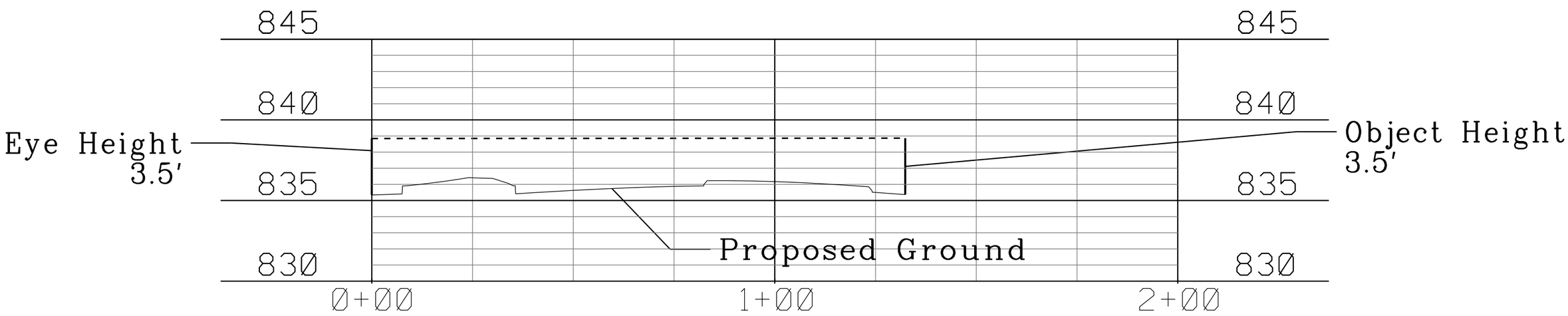
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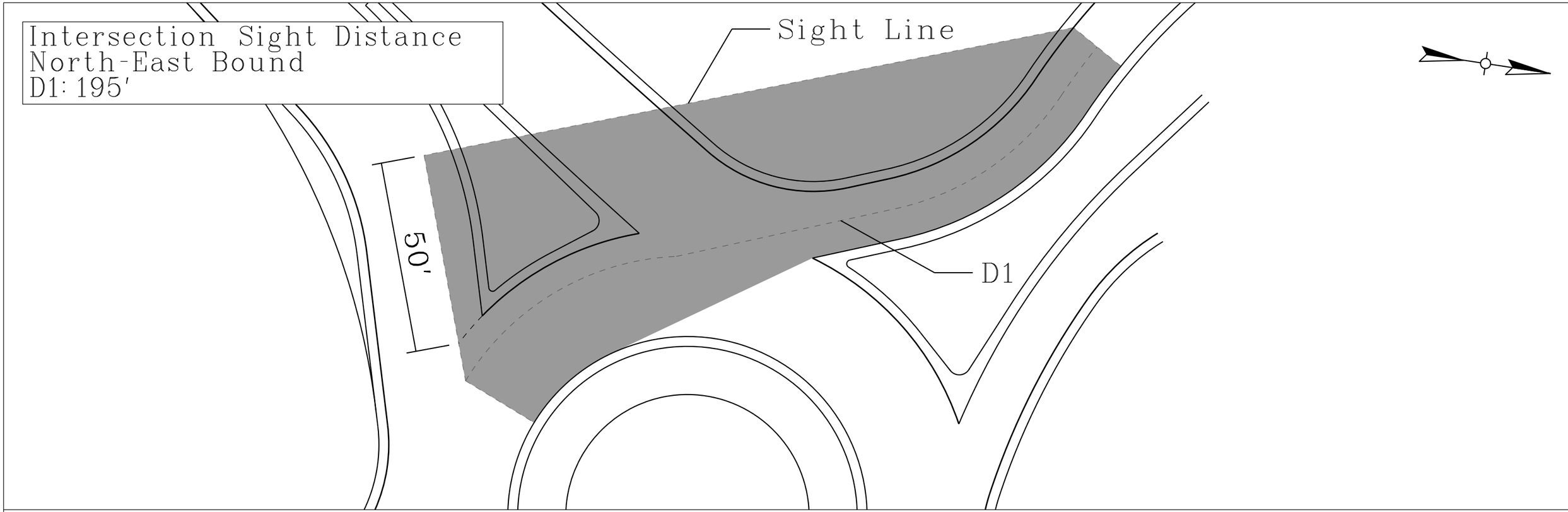
Intersection Sight Distance
North-West Bound
D2: 170'



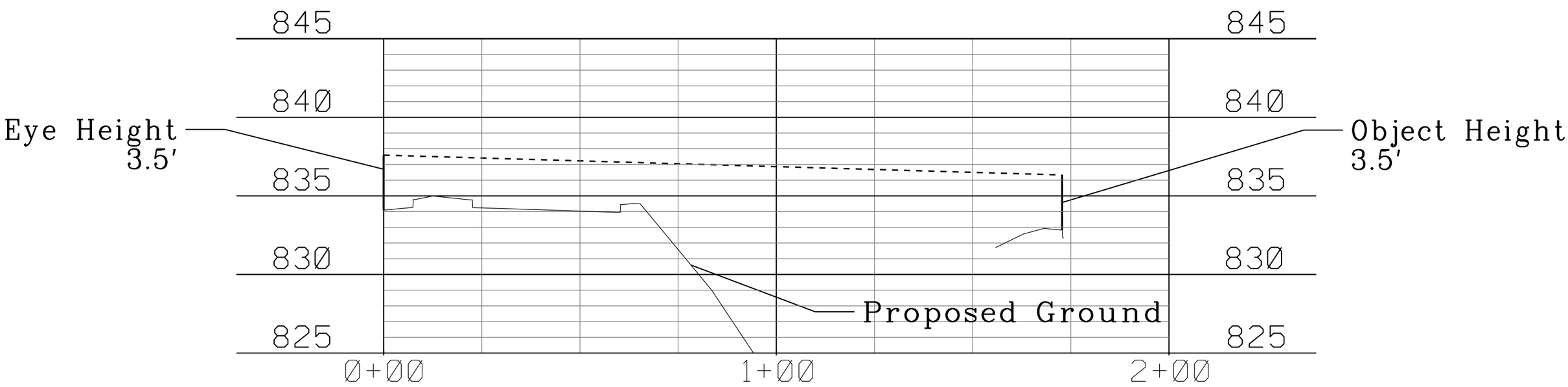
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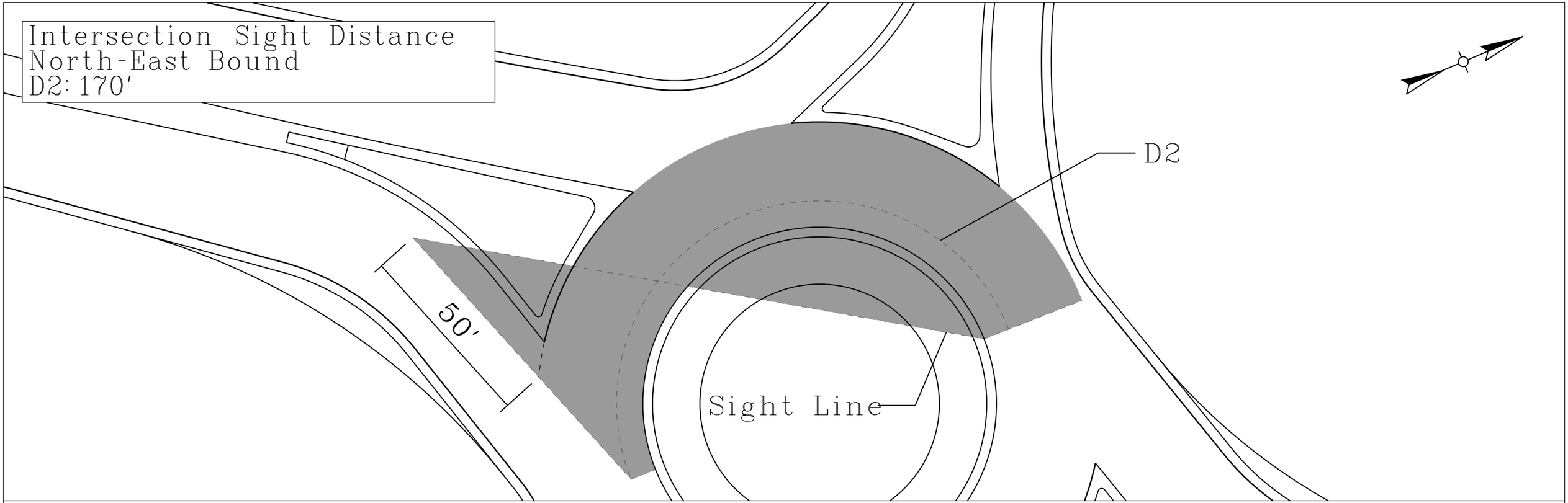
Intersection Sight Distance
North-East Bound
D1: 195'



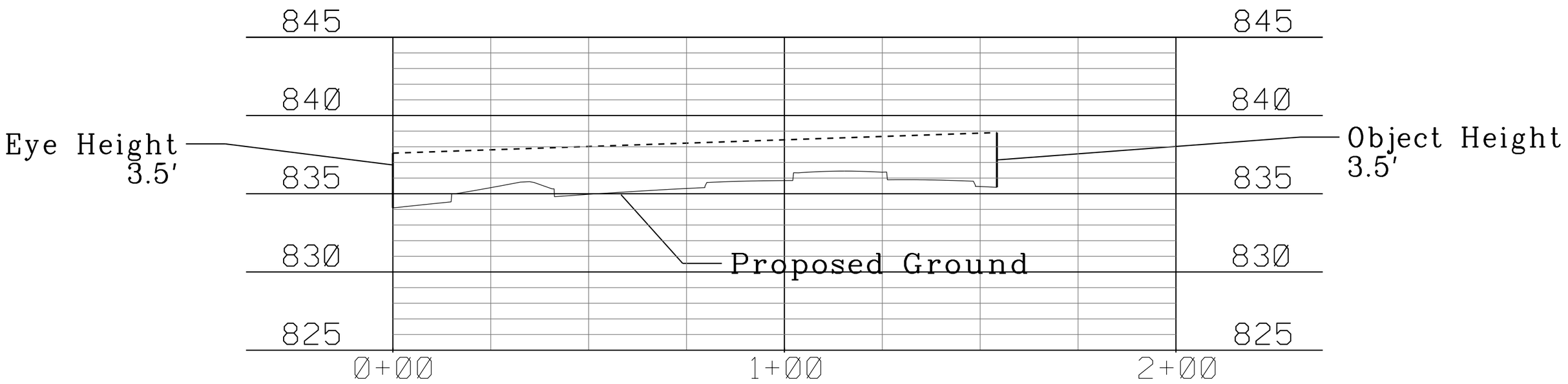
Sight Line Profile



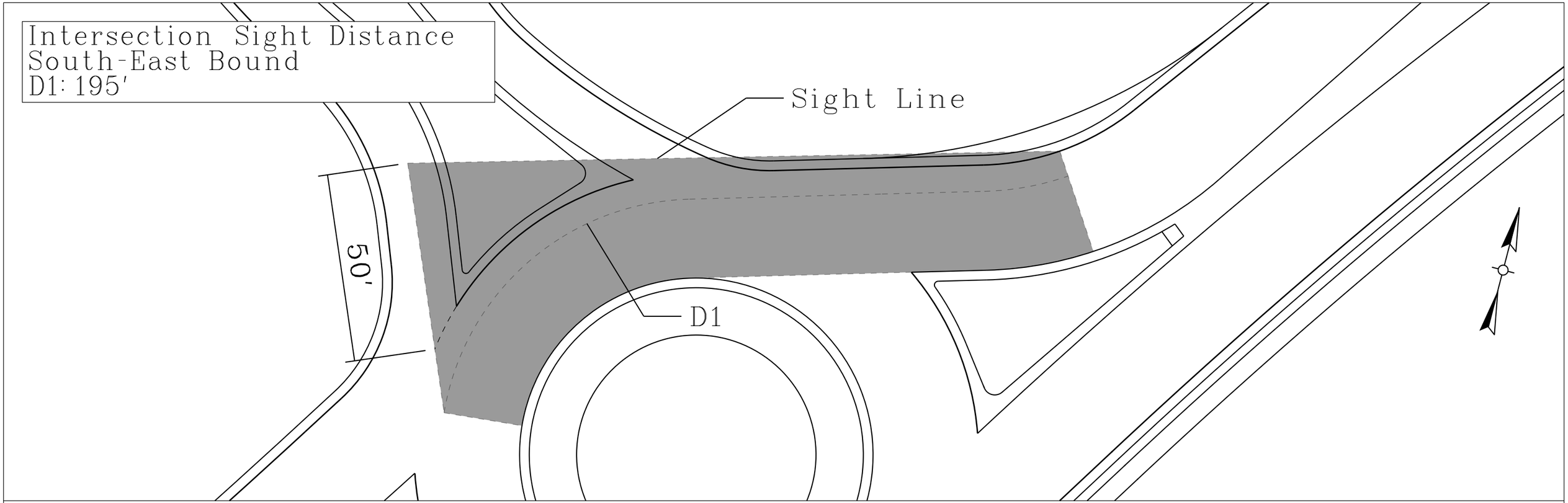
Intersection Sight Distance
North-East Bound
D2: 170'



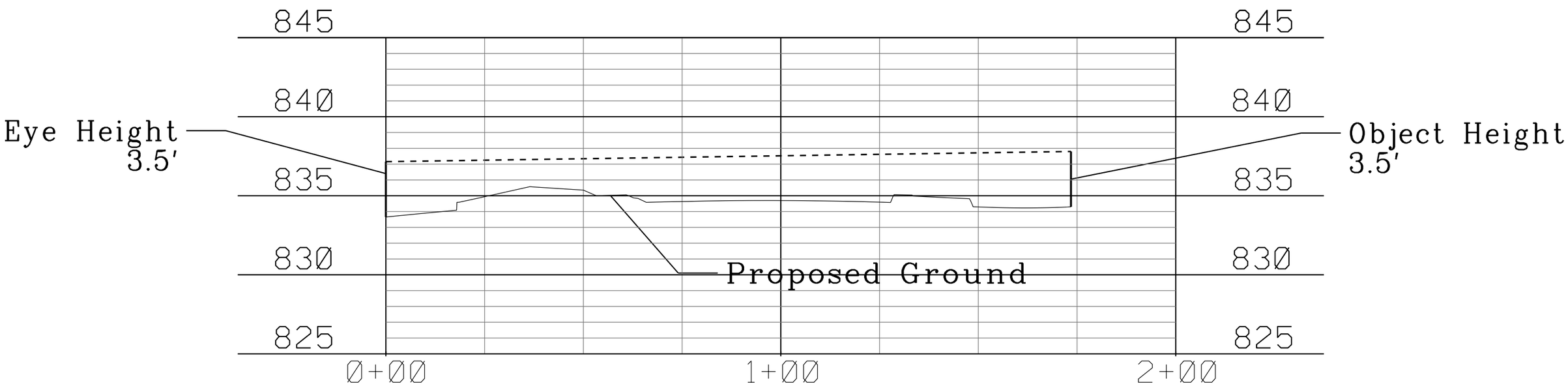
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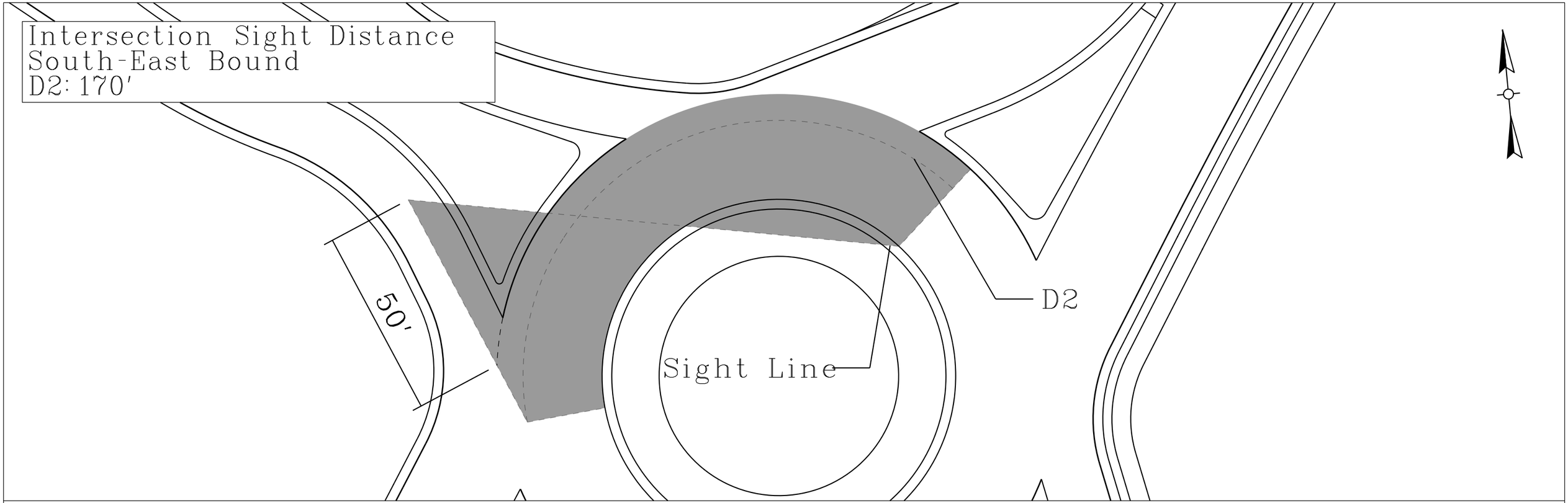
Intersection Sight Distance
South-East Bound
D1: 195'



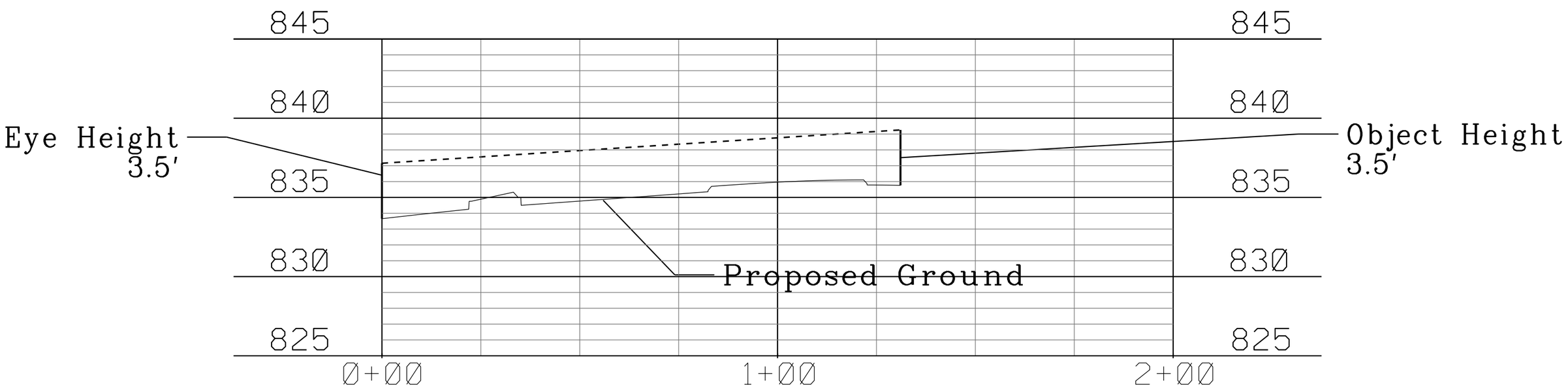
Sight Line Profile



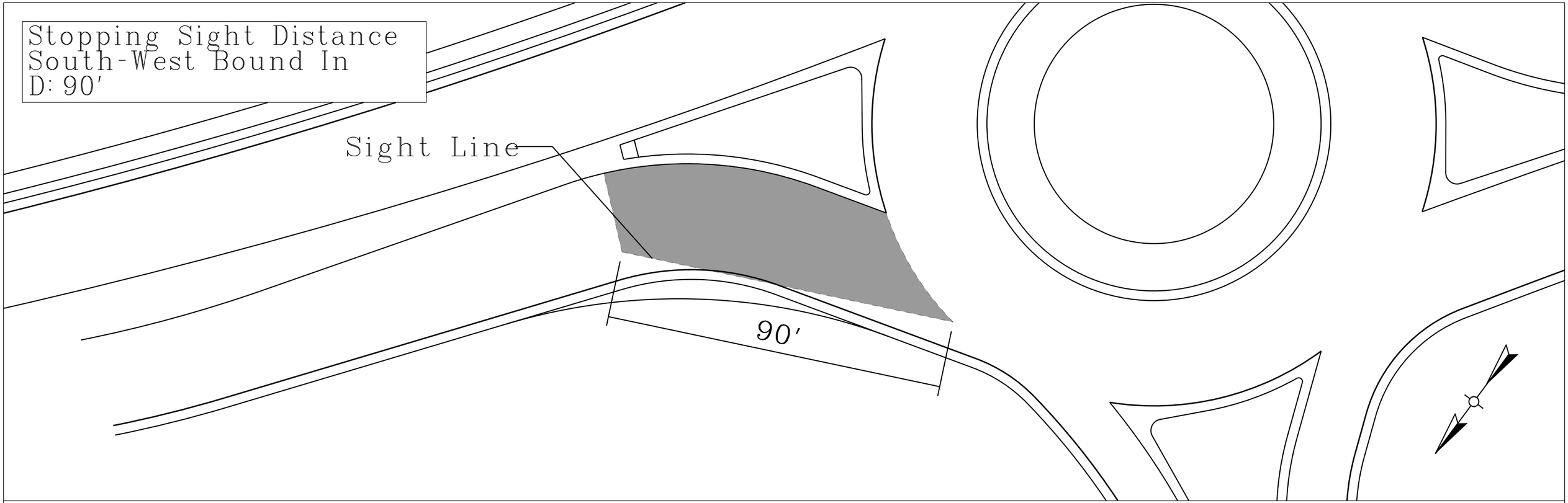
Intersection Sight Distance
South-East Bound
D2: 170'



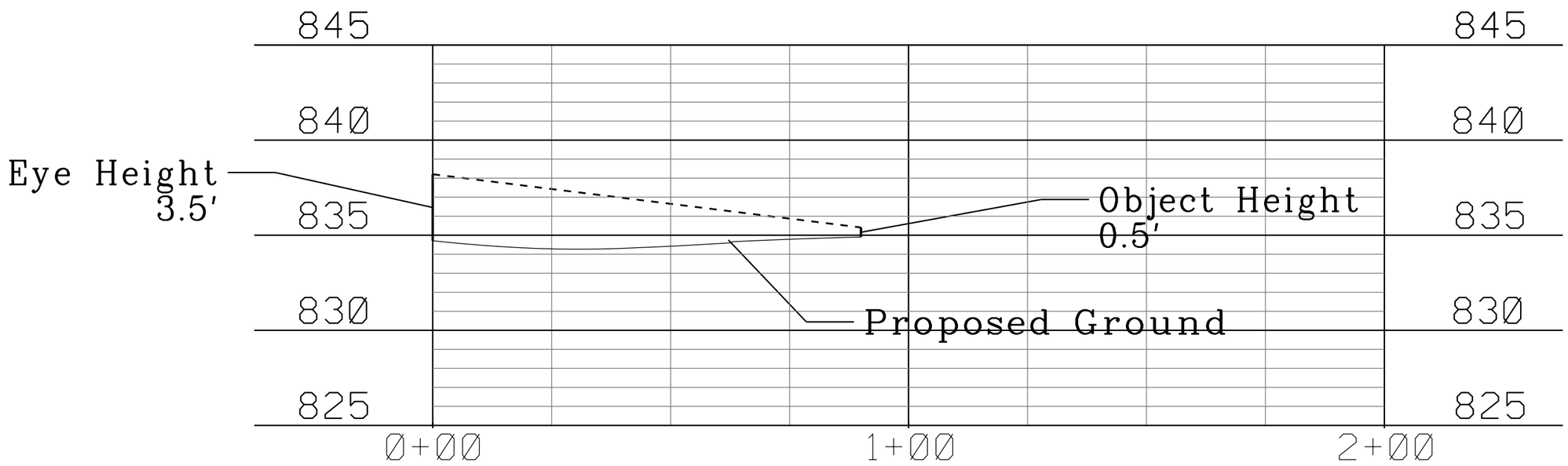
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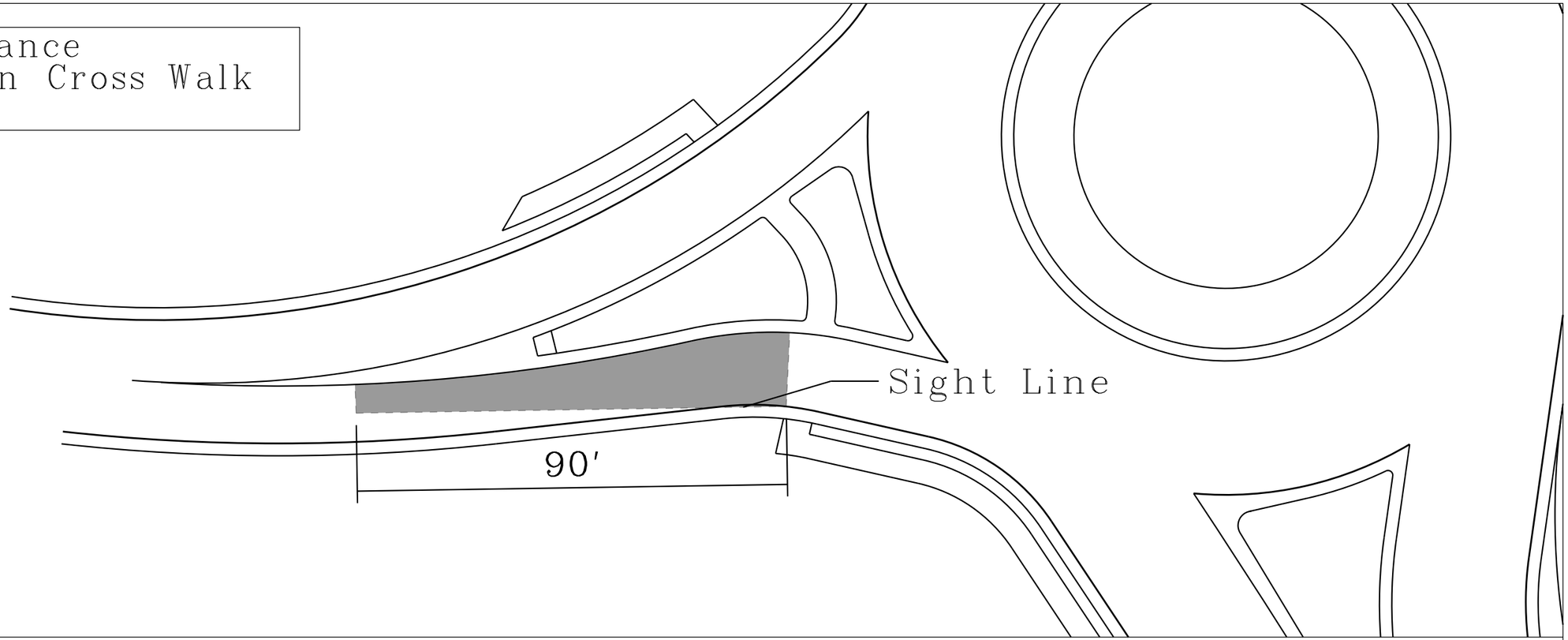
Stopping Sight Distance
South-West Bound In
D: 90′



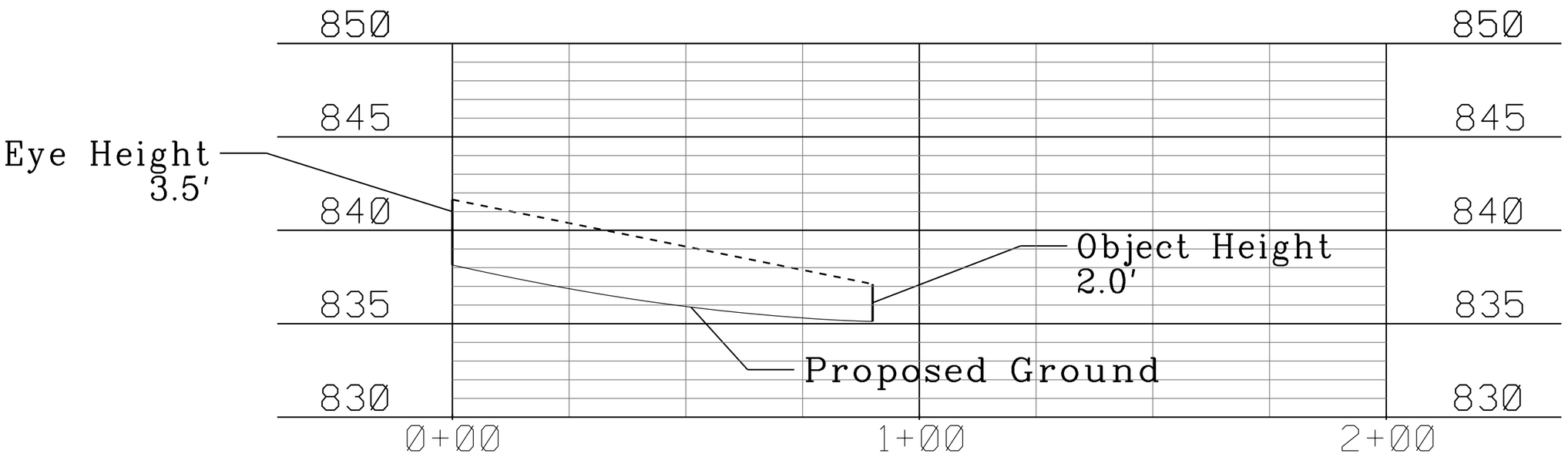
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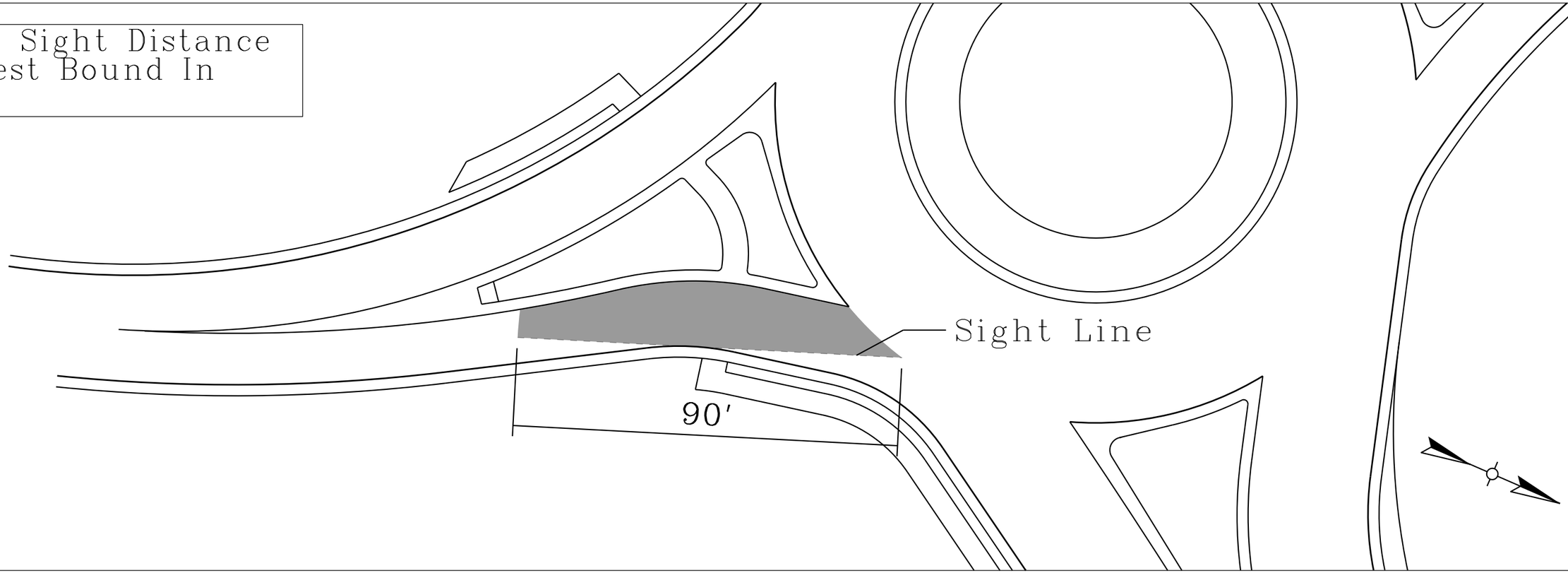
Stopping Sight Distance
North-West Bound In Cross Walk
D: 90'



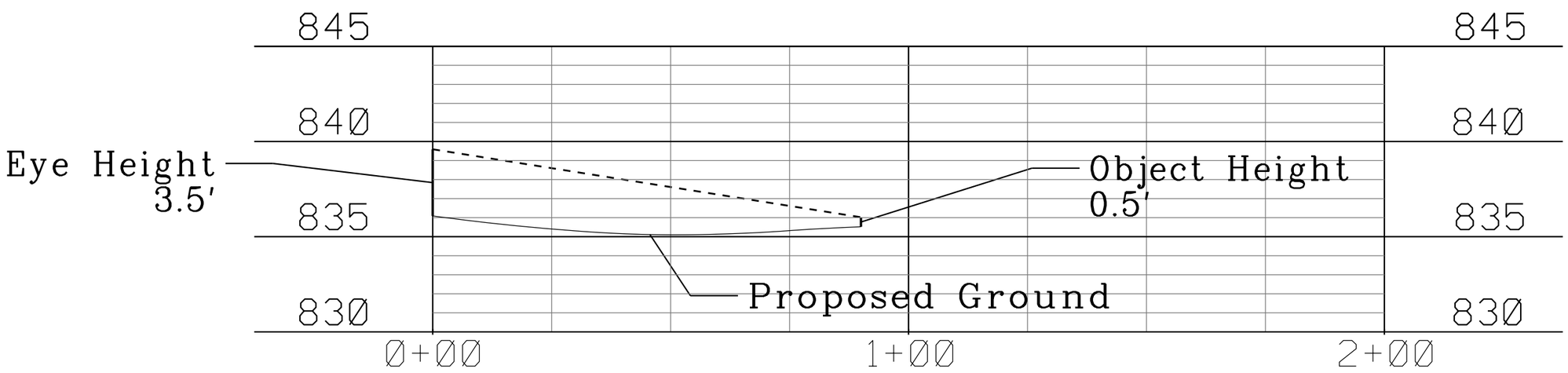
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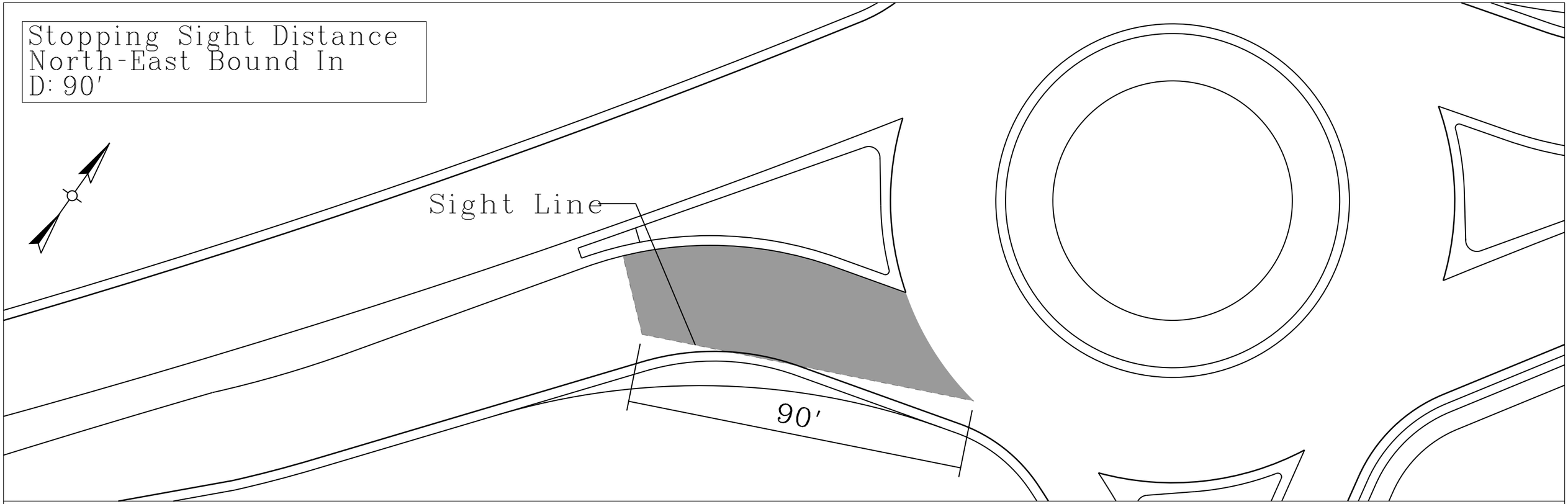
Stopping Sight Distance
North-West Bound In
D: 90′



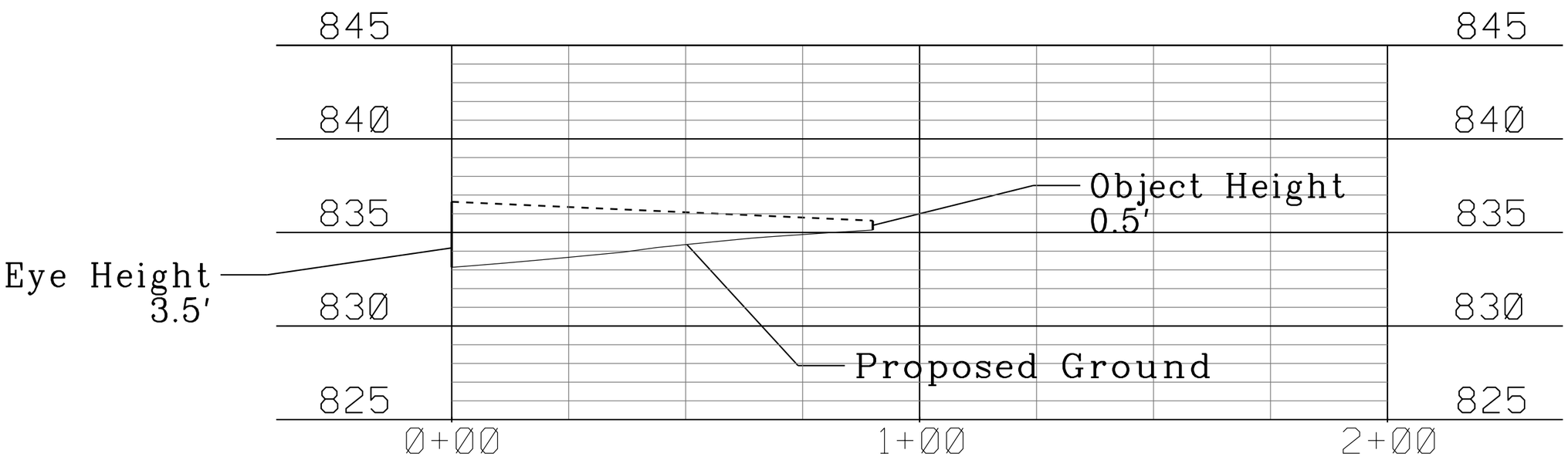
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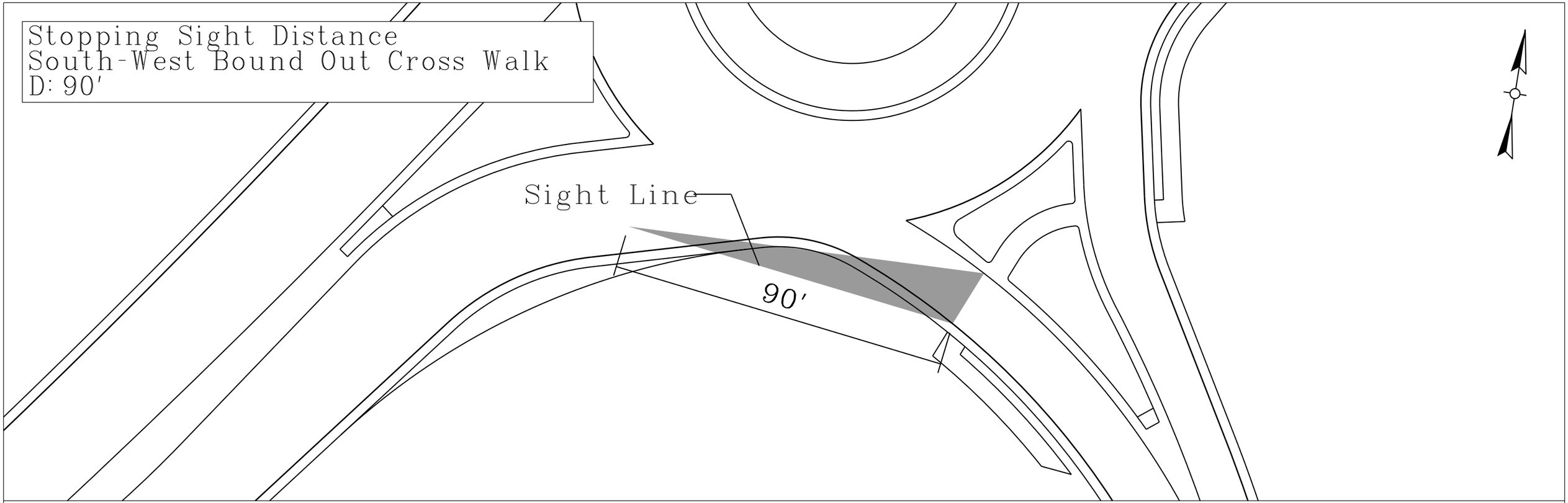
Stopping Sight Distance
North-East Bound In
D: 90′



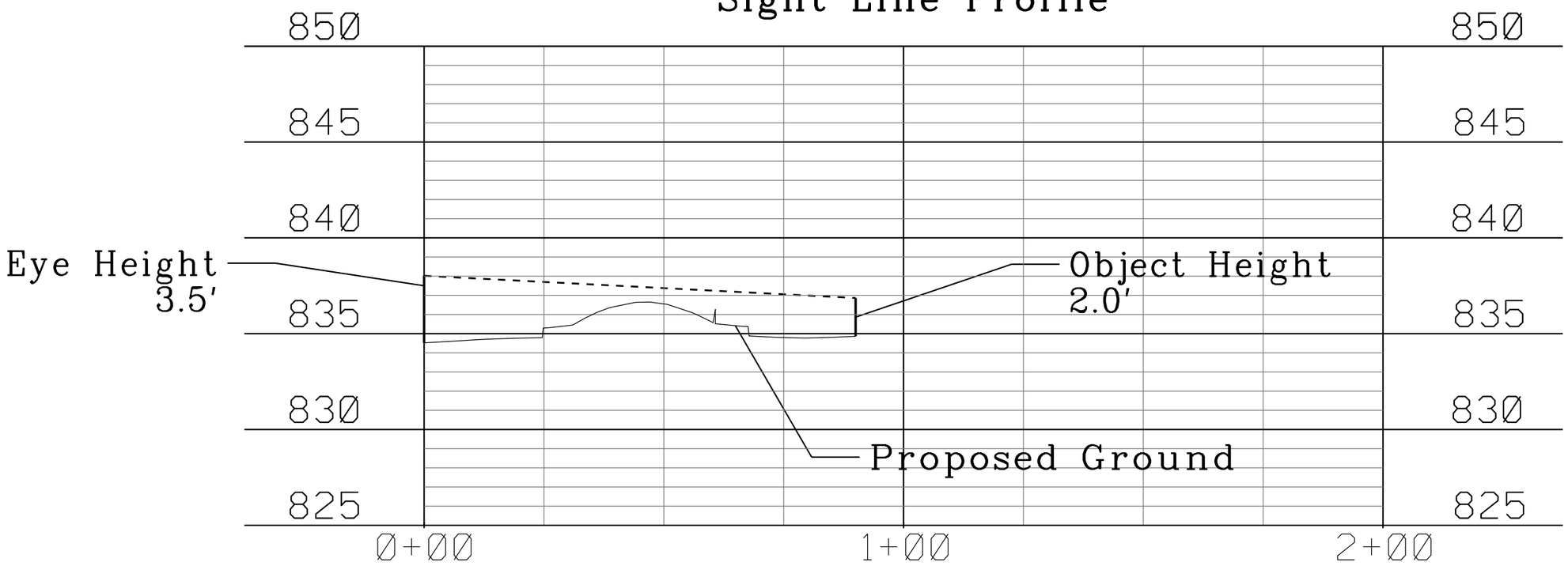
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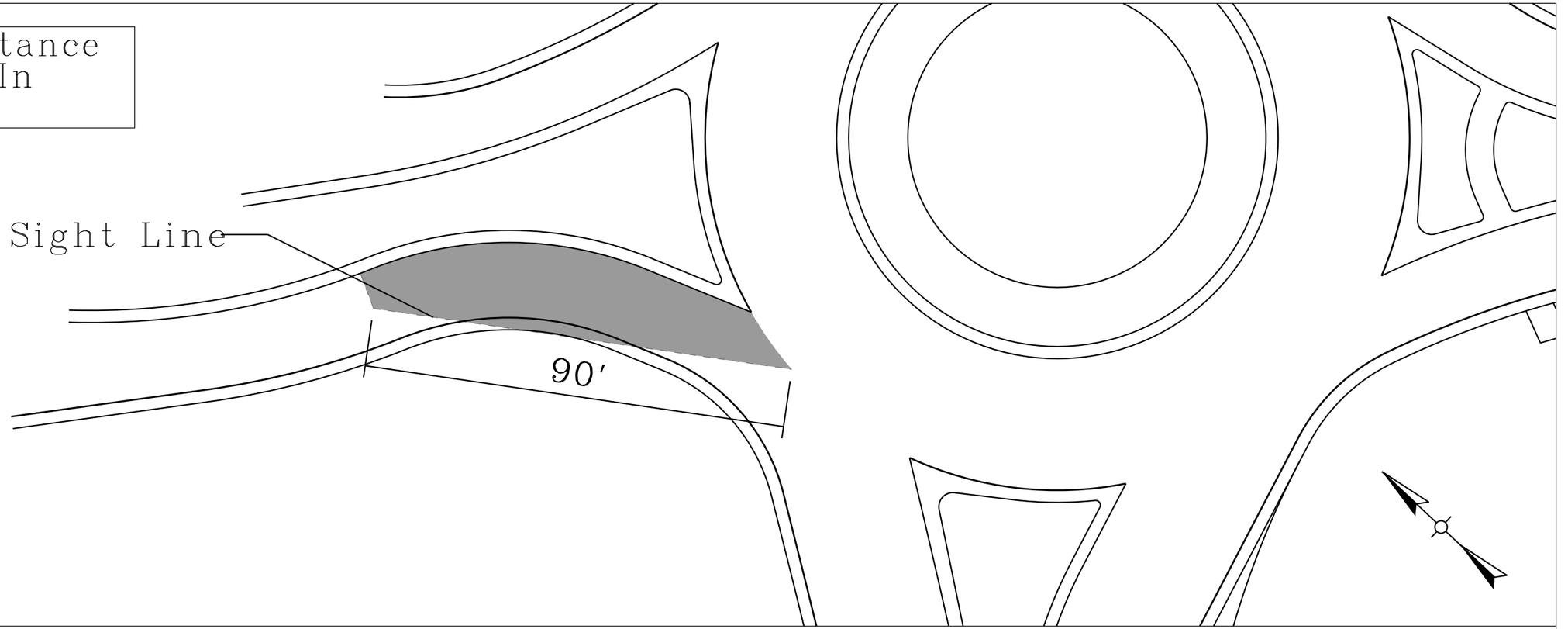
Stopping Sight Distance
South-West Bound Out Cross Walk
D: 90'



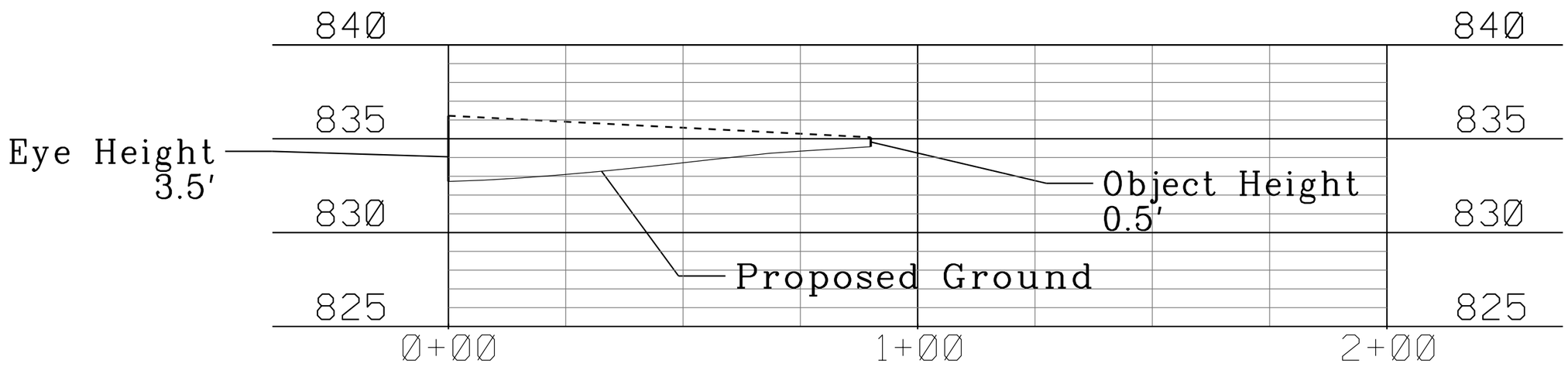
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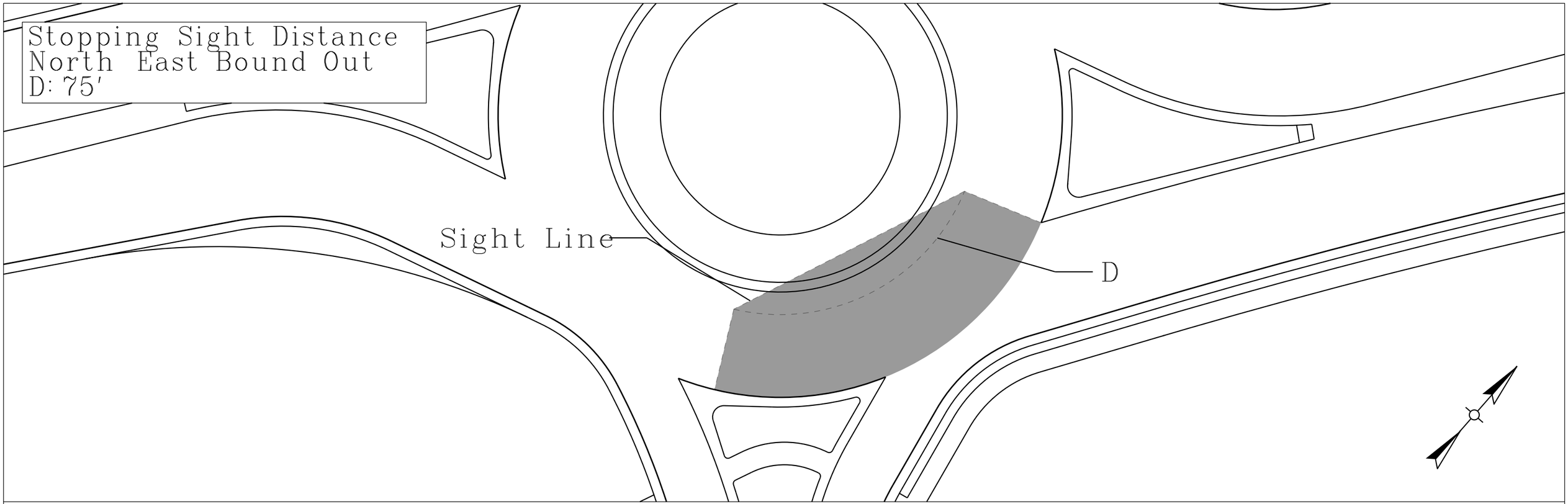
Stopping Sight Distance
South-East Bound In
D: 90′



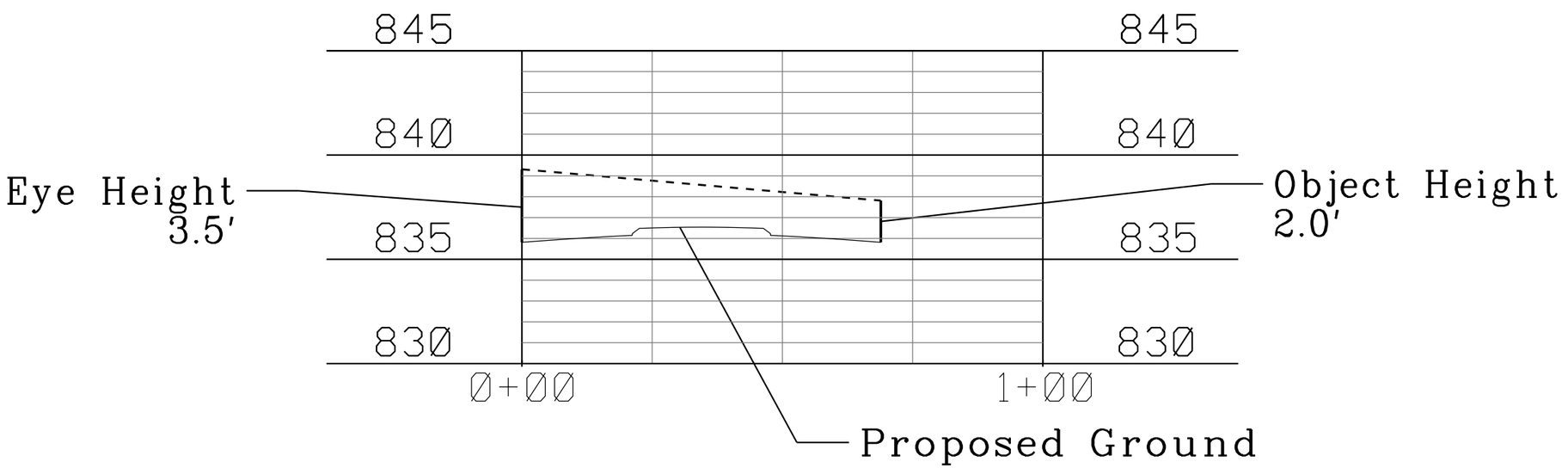
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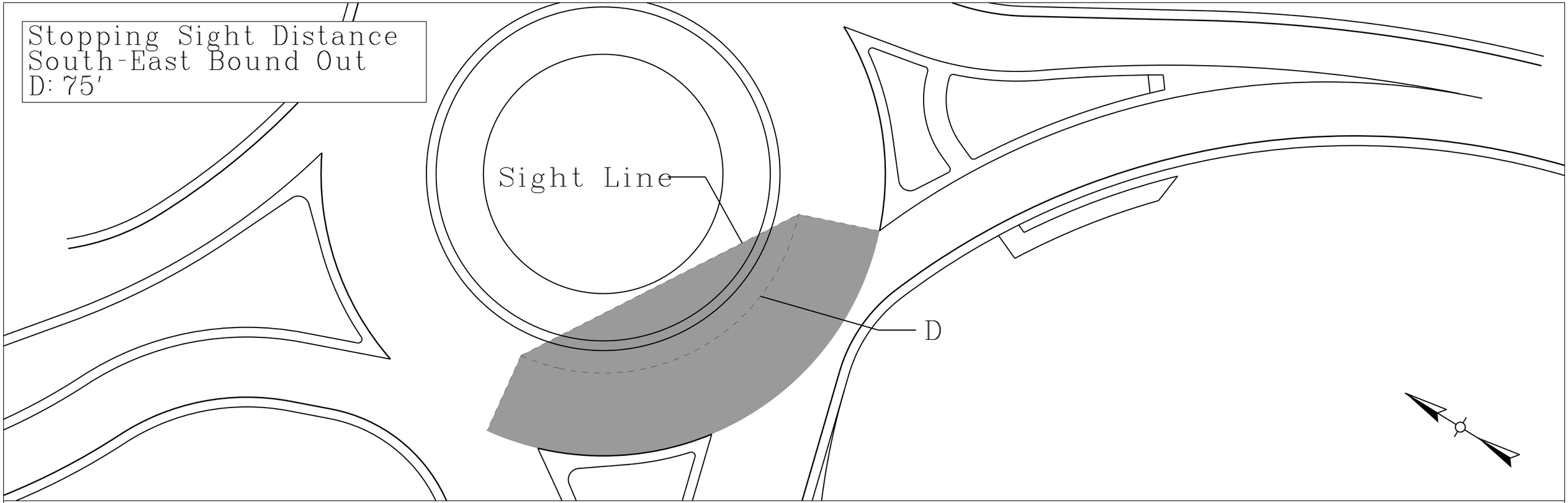
Stopping Sight Distance
North East Bound Out
D: 75'



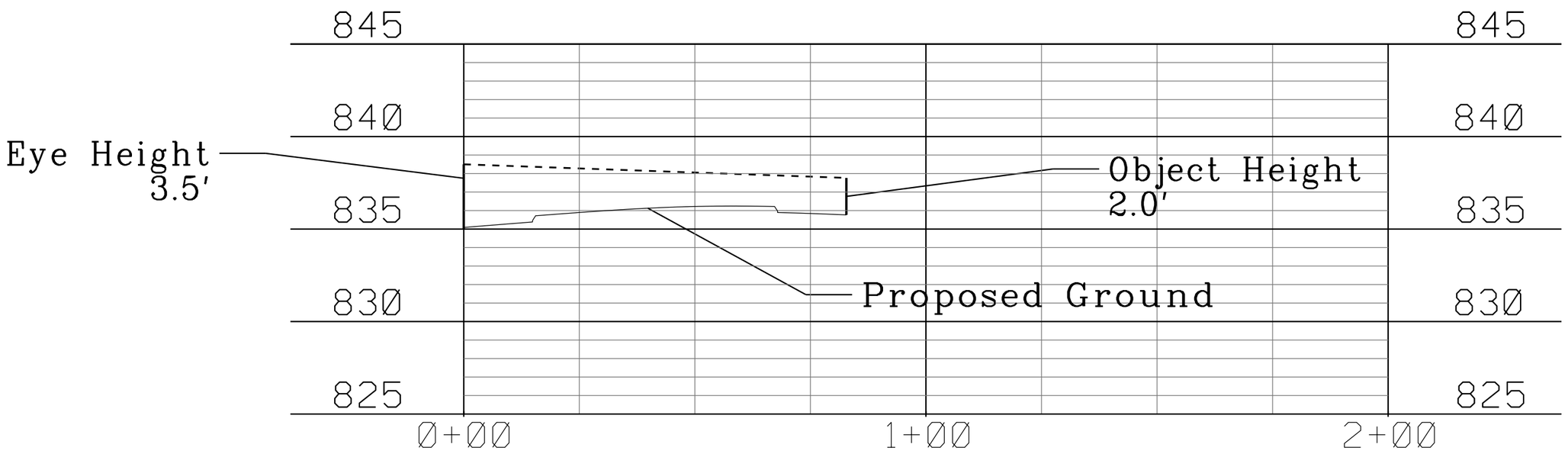
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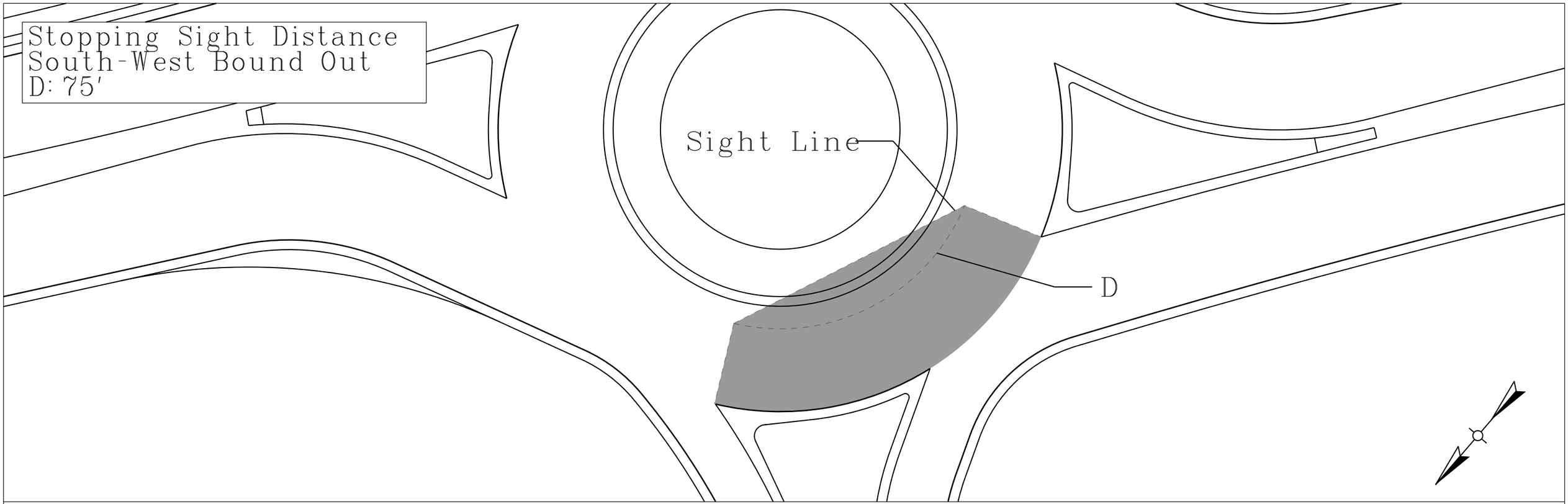
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South-East Bound Out
D: 75'



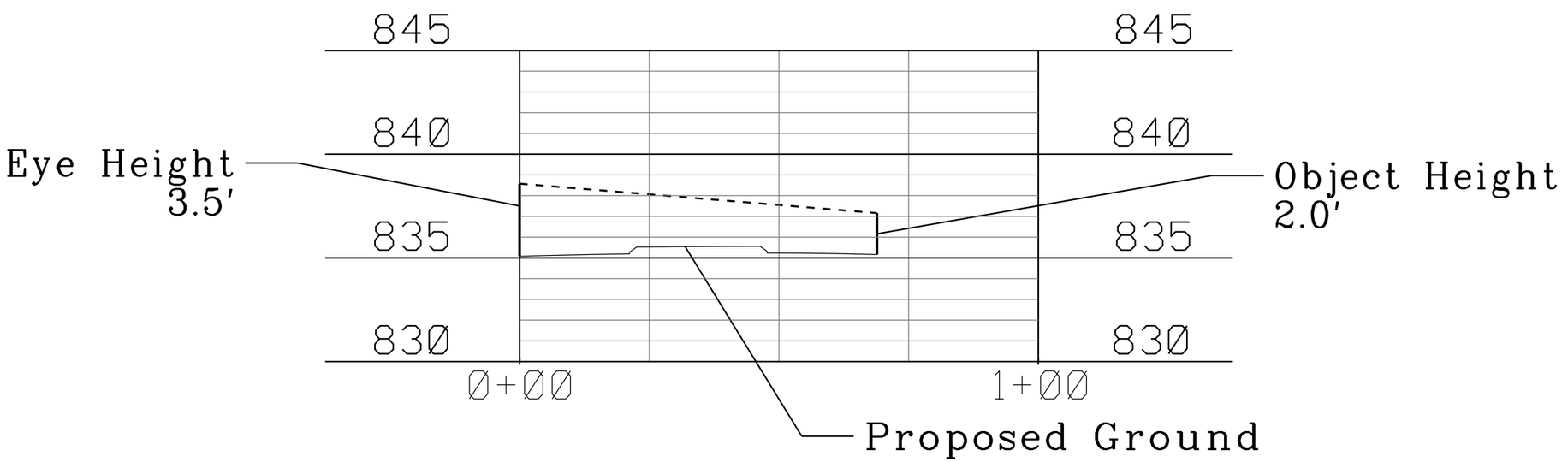
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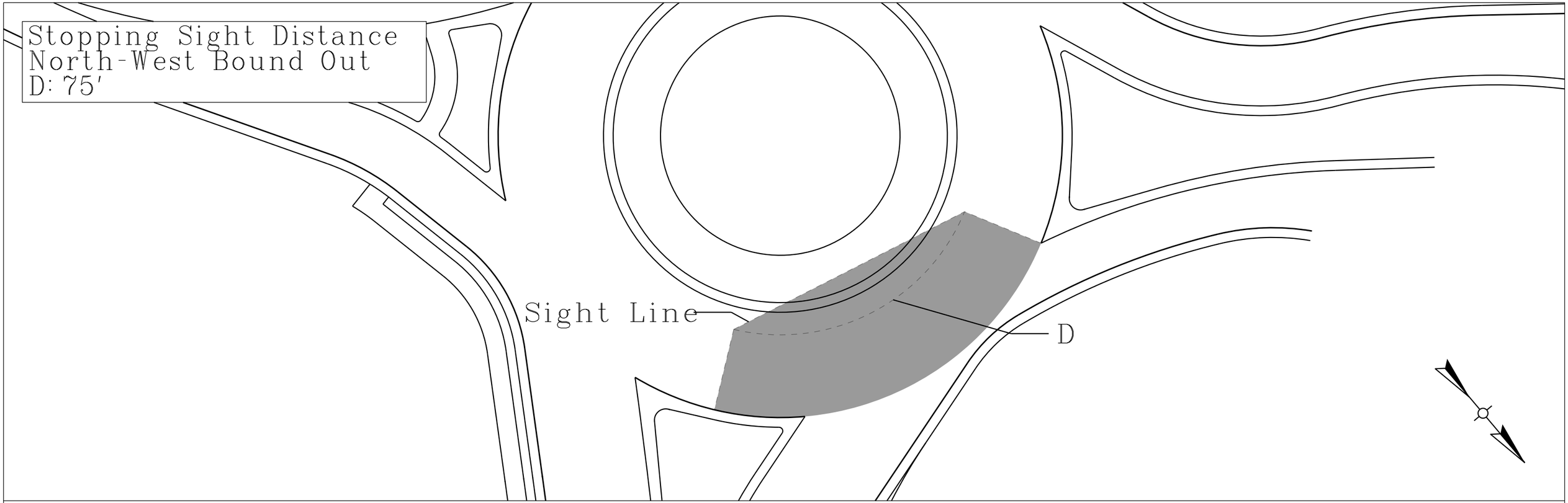
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South-West Bound Out
D: 75'



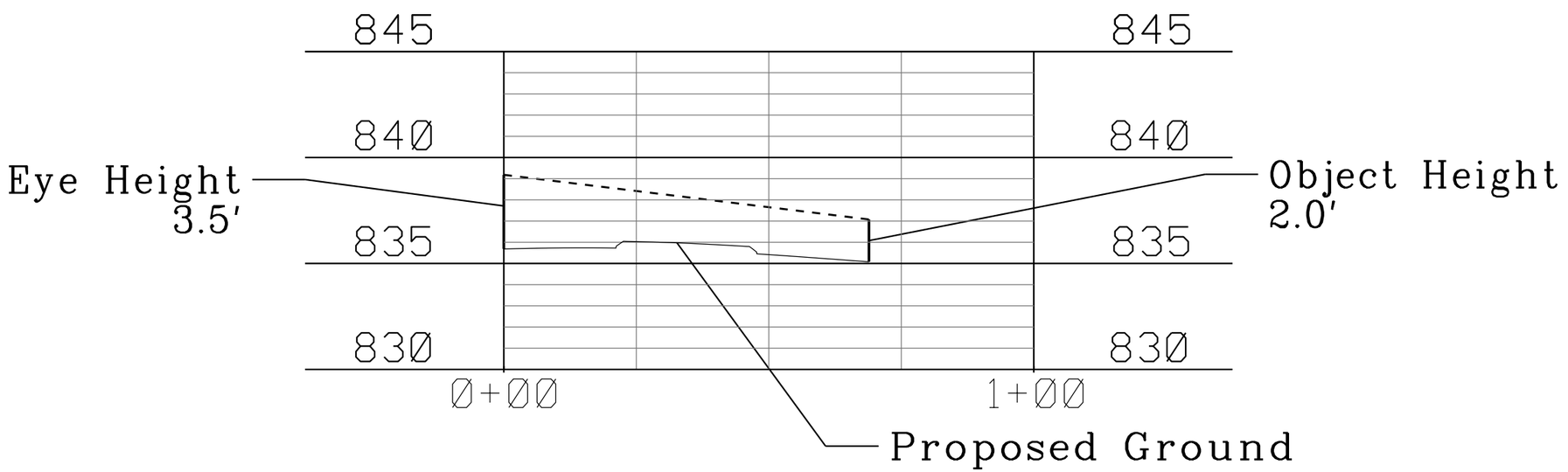
Sight Line Profile



Stopping Sight Distance
North-West Bound Out
D: 75'



Sight Line Profile



ATTACHMENT B

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Louisville, KY 40202-2936
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hdrinc.com

U.S. Department of Transportation
Federal Highway Administration

Kentucky Division

November 16, 2018

330 West Broadway
Frankfort, KY 40601
PH (502) 223-6720
FAX (502) 223 6735
http://www.fhwa.dot.gov/kydiv

In Reply Refer To:
HDA-KY

Mr. Greg Thomas
Secretary
Kentucky Transportation Cabinet
200 Mero Street
Frankfort, Kentucky 40622

SUBJECT: Federal-Aid Projects No. IM 0750130, 0750129 and 0755128;
NHPP-IM 0757144 and 0757045;
KYTC Item No. 06-0014.50, 06-0018.00 and 06-0014.01.

Dear Mr. Thomas:

The Federal Highway Administration (FHWA) has reviewed the Addendum to the previously approved Interchange Justification Study (IJS) for the modification of I-71/I-75 at KY536 and KY338, as well as addition of auxiliary lanes between the KY 536 and US 42 interchanges in Boone County. The FHWA has determined that the interstate access request conforms to 23 CFR 625 and the FHWA Interstate Access Policy.

The favorable determination was made based on an engineering and operations acceptability review of the recommended alternative, which includes the reconstruction of the existing diamond interchanges at KY536 and KY338 with double-crossover diamond interchange types, as well as other interstate and major roadway improvements. The FHWA will give final approval of the interstate access request upon the completion of the environmental process. Please note, this approval is subject to re-evaluation if significant changes in the final design or if construction is delayed (as specified in 23 CFR 771.129).

If you have questions or concerns, please let me know at your earliest convenience.

Sincerely,

Thomas L. Nelson, Jr., P.E.
Division Administrator

cc: John W. Moore, KYTC Division of Highway Design
Robert Yeager, KYTC District 6

Appendix C2 -- Traffic Data and Signal Requests

Technical Memorandum

To:	Carol Callan-Ramler KYTC District 6	From:	Brian Aldridge Stantec Consulting Services Inc.
File:	178560012	Date:	April 1, 2016

Reference: **KYTC 6-14.00: Reconstruction of the KY 536 (Mt. Zion Road) Interchange with I-71/I-75**
Traffic Signal Checklist Request
Traffic Signal Warrant Analysis - KY 536 at Tiburon Drive and Berberich Drive

This technical memorandum serves two purposes. First, **Attachment A** includes a copy of the latest traffic signal plans associated with the subject project. These plans, which include the proposed intersection layouts and phasing for two proposed traffic signals and the reconstruction of five existing signals along KY 536, can be provided to KYTC Central Office Traffic as part of our request for official traffic signal checklists.

Second, this memorandum summarizes the findings from a traffic signal warrant analysis performed for the KY 536 intersections with Tiburon Drive and Berberich Drive at the request of KYTC District 6. These intersections are shown in **Exhibit 1** along with the existing signals located on KY 536. **Attachment B** includes the supporting information and technical output supporting this analysis. A summary of the findings is included below.

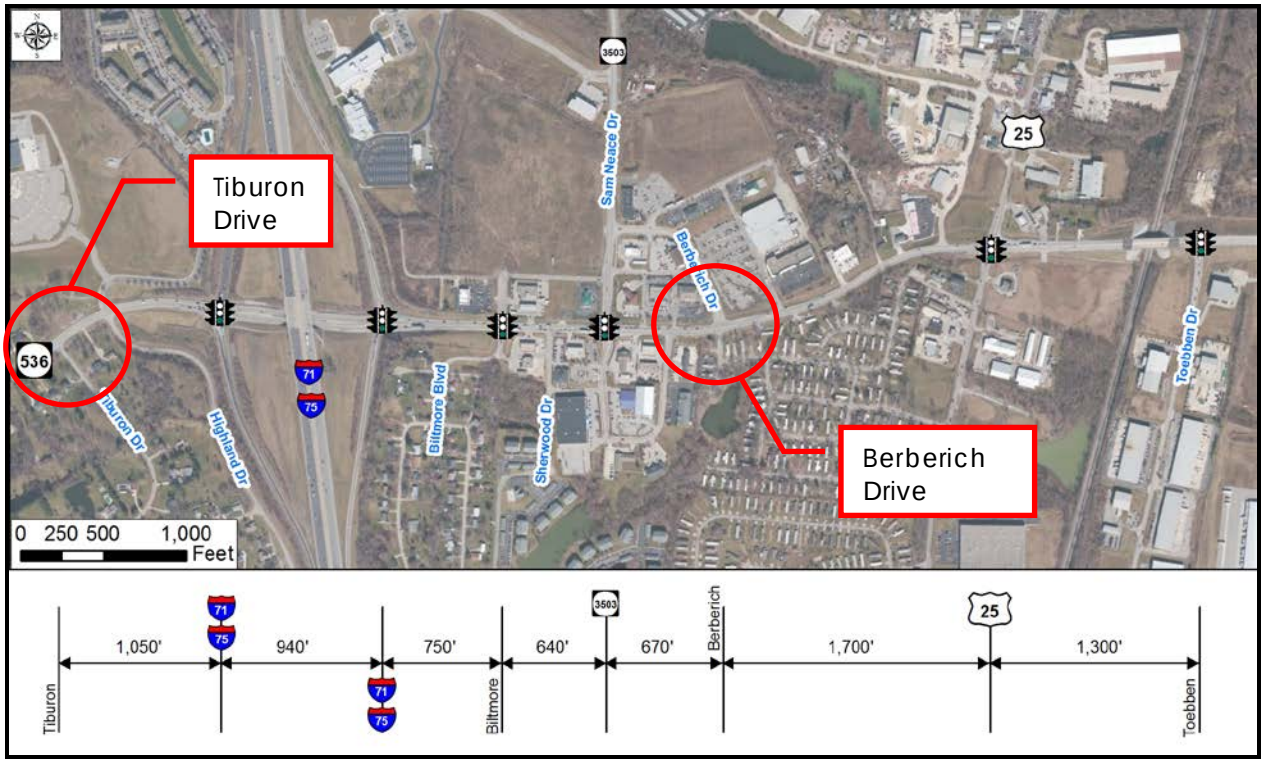


Exhibit 1: KY 536 (Mt. Zion Road) intersections with Tiburon Drive and Berberich Drive

With the reconstruction of the KY 536 to a Double Crossover Diamond (DCD) interchange, the Highland Drive intersection is to be relocated to the existing Tiburon Drive intersection. The proposed reconfiguration is shown in **Exhibit 2**. It is possible that this reconfiguration may be constructed with the 6-158.00 project, which includes widening KY 536 to five lanes west of the I-71/I-75 interchange. That project is currently in the right-of-way phase and some coordination with that project team will be necessary as both projects progress.



Exhibit 2: Proposed KY 536 at Tiburon Drive

Additional lanes will be added to KY 536 to beyond the Berberich Drive intersection. The proposed configuration is shown in **Exhibit 3**.

Traffic turning movement count data were collected at the intersections on Thursday, November 13, 2014. The counts were collected between the hours of 7:00 AM and 7:00 PM using MioVision video cameras. The resulting volumes were entered into the Highway Capacity Software (HCS) 2010 Warrants Module (version 6.60). Accounting for the relocation of Highland Drive, the appropriate turn volumes from Tiburon Drive and Highland Drive were summed to include both intersections. The turning movement counts and the results of the HCS analyses are included in the attachment. A summary of the warrant analysis is included in the following sections.



Exhibit 3: Proposed KY 536 at Berberich Drive

The *Manual on Uniform Traffic Control Devices* (MUTCD, 2009 Edition) states, "The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions." This analysis includes evaluating factors within the nine signal warrants outlined on **Exhibit 4**.

Warrant	Tiburon Dr.	Berberich Dr.
Warrant 1, Eight-Hour Vehicular Volume	X	X
Warrant 2, Four-Hour Vehicular Volume	X	X
Warrant 3, Peak Hour	X	X
Warrant 4, Pedestrian Volume		
Warrant 5, School Crossing		
Warrant 6, Coordinated Signal System	O	O
Warrant 7, Crash Experience	O	O
Warrant 8, Roadway Network		
Warrant 9, Intersection Near a Grade Crossing		
X = Warrant is met **O = Warrant is potentially met**		

Exhibit 4: Traffic Signal Warrants from the Manual on Uniform Traffic Control Devices

Satisfying one or more warrants does not require the installation of a traffic signal but rather provides justification for its installation. Application of each of these nine warrants, summarized on **Exhibit 4**, is discussed below.

Warrant 1, Eight-Hour Vehicular Volume

Warrant 1 takes into consideration 12 hours of traffic count data. The need for a traffic control signal shall be considered if one of the following conditions exists for each of any eight hours of an average day:

1. Condition A: The vehicles per hour given in both of the 100 percent columns of Condition A in **Exhibit 5** exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or
2. Condition B: The vehicles per hour given in both of the 100 percent columns of Condition B in **Exhibit 5** exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112
Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Exhibit 5: Warrant 1 Traffic Volume Thresholds

It is noted in the MUTCD that Warrant 1 should be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and Condition B is not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and Condition A is not needed. The red highlighted boxes on **Exhibit 5** apply to the subject intersections.

Conclusion: Condition A is not met at either intersection. As the speed limit on KY 536 is and will continue to be 45 MPH, condition B is met at both intersections with the reduced 70 percent volumes. Therefore, warrant 1 is met at both intersections.

Warrant 2, Four-Hour Vehicular Volume

The Four-Hour Vehicular Volume warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. The need for a traffic control signal shall be considered if the hourly traffic volumes, for each of any four hours of an average day, fall above the applicable curve in **Exhibit 6**. On the minor street, the higher volume shall not be required to be on the same approach during each of these four hours. If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, **Exhibit 7** may be used instead.

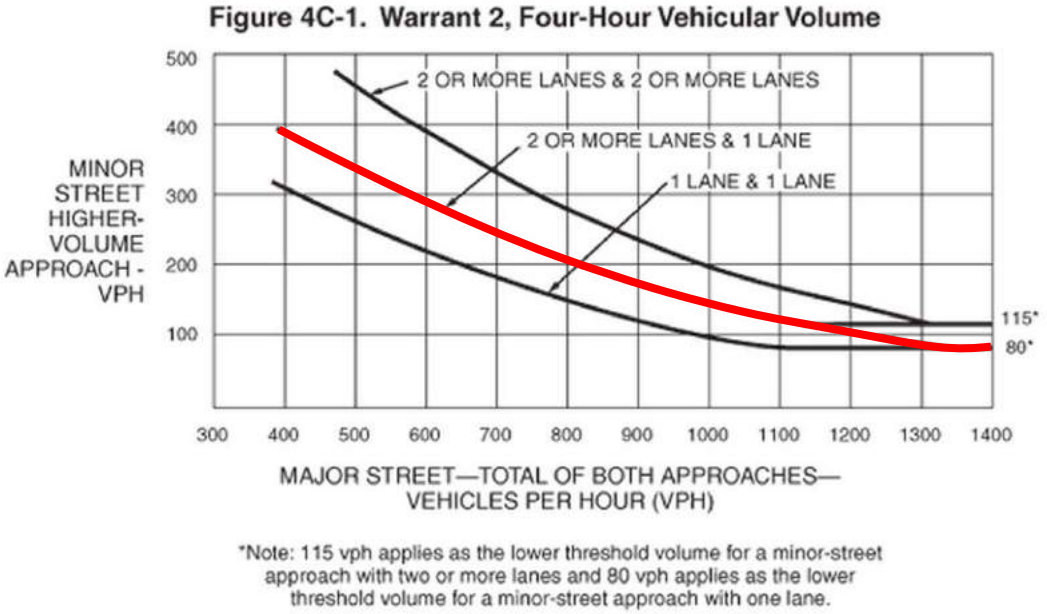


Exhibit 6: Warrant 2 Traffic Volume Thresholds

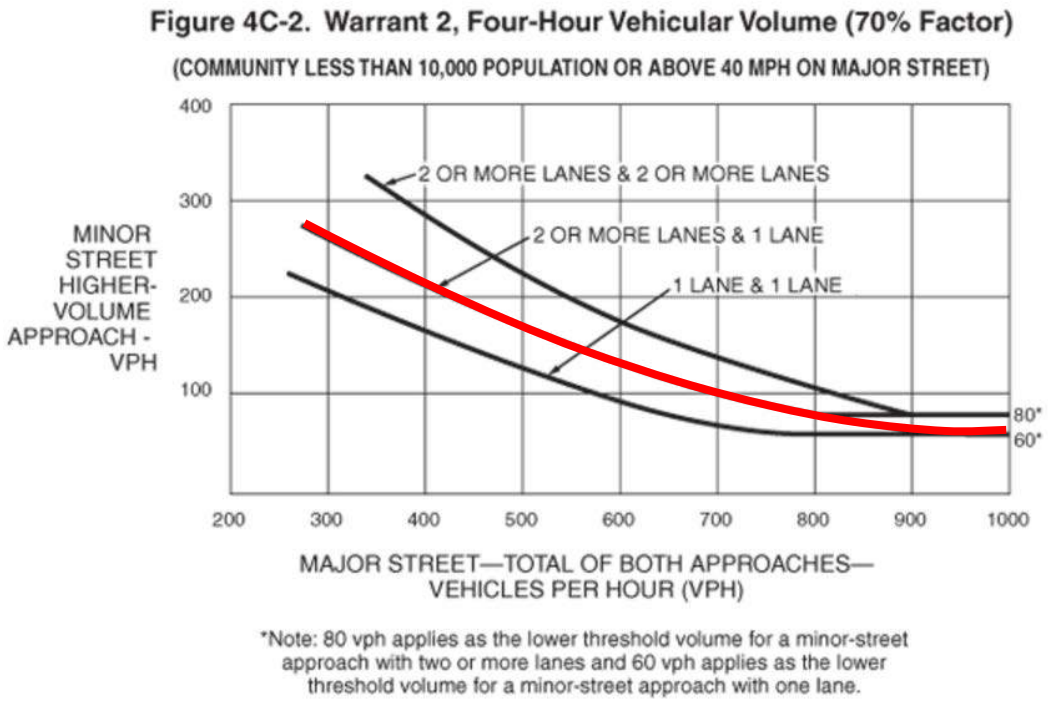


Exhibit 7: Warrant 2 Traffic Volume Thresholds (70% Factor)

In the case of the each intersection, the four highest hourly traffic volumes are summarized in **Exhibit 8.** Each of the four highest hourly volumes falls above the line but off the limits of the chart.

Tiburon Drive			Berberich Drive		
Period	**Major Approach (VPH)**	**Minor Approach (VPH)**	**Period**	**Major Approach (VPH)**	**Minor Approach (VPH)**
7-8 AM	1,563	151	3-4 PM	1,410	89
8-9 AM	1,213	117	4-5 PM	1,635	103
4-5 PM	1,548	74	5-6 PM	1,586	84
5-6 PM	2,019	65	6-7 PM	1,342	85

Exhibit 8: Four Highest Hourly Traffic Volumes applied for Warrant 2

Conclusion: The four peak hour volumes at Berberich Drive exceed the volumes on **Exhibit 6** at the 100 percent level. The volumes at Tiburon Drive exceed the reduced 70 percent values on **Exhibit 7**. Therefore, warrant 2 is met at both intersections.

Warrant 3, Peak Hour

Warrant 3, the Peak Hour signal warrant, is intended for use at a location where traffic on the minor street suffers undue delay when entering or crossing the major street for a minimum of one hour of an average day. The MUTCD notes that this signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

Warrant 3 suggests the need for a traffic control signal shall be considered if either of the following criteria is met:

A. If all three of the following conditions exist for the same one hour (any four consecutive 15-minute periods) of an average day:

   1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and

   2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and

   3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour of an average day falls above the applicable curve on **Exhibit 9** for the existing combination of approach lanes.

Traffic volumes representing the existing 7:00 – 8:00 A.M period for Tiburon Drive and the 4:00 – 5:00 P.M. period for Berberich Drive is shown on the exhibit.

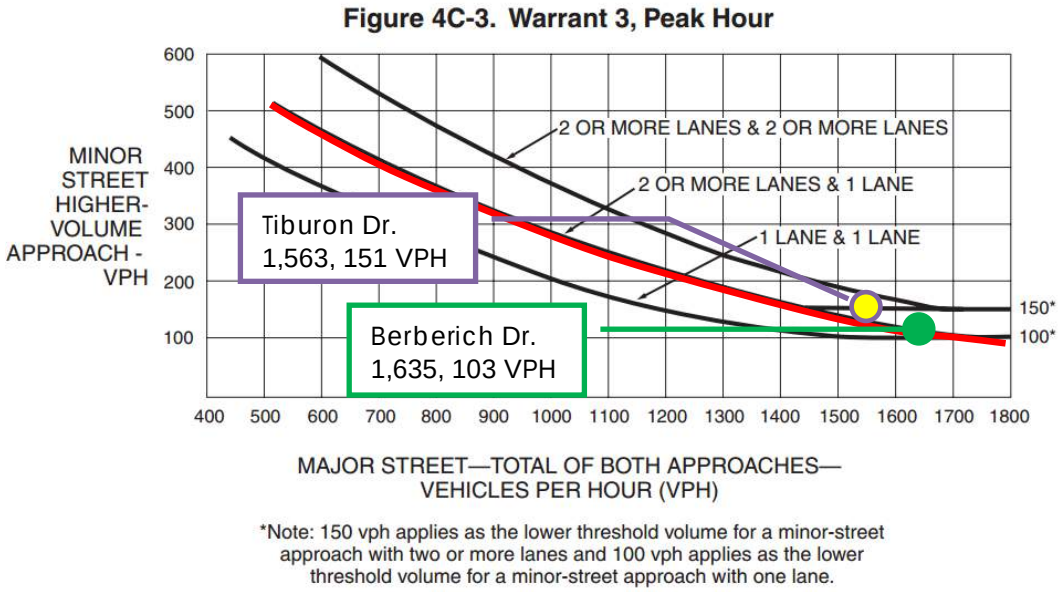


Exhibit 9: Warrant 3 Traffic Volume Thresholds

Conclusion: Warrant 3 is met for the peak hour at both Tiburon Drive and Berberich Drive.

Warrant 4, Pedestrian Volume

The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. The need for a traffic control signal at an intersection or midblock crossing shall be considered if either of the following criteria is met:

A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street all fall above the curve in **Exhibit 10**; or

B. For one hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street and the corresponding pedestrians per hour crossing the major street falls above the curve in **Exhibit 11**.

The intersections in question do not currently serve a significant volume of pedestrians.

Conclusion: Warrant 4 does not apply. However, the proposed project will construct a shared use path along the north side of the roadway through both intersections and sidewalks along the south side near Berberich Drive.

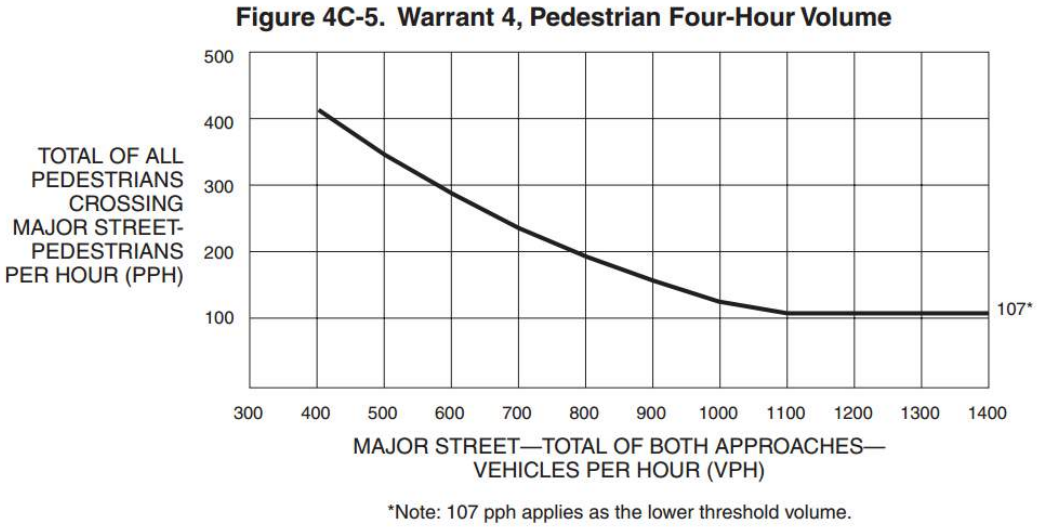


Exhibit 10: Warrant 4 Traffic Volume Thresholds for Condition A

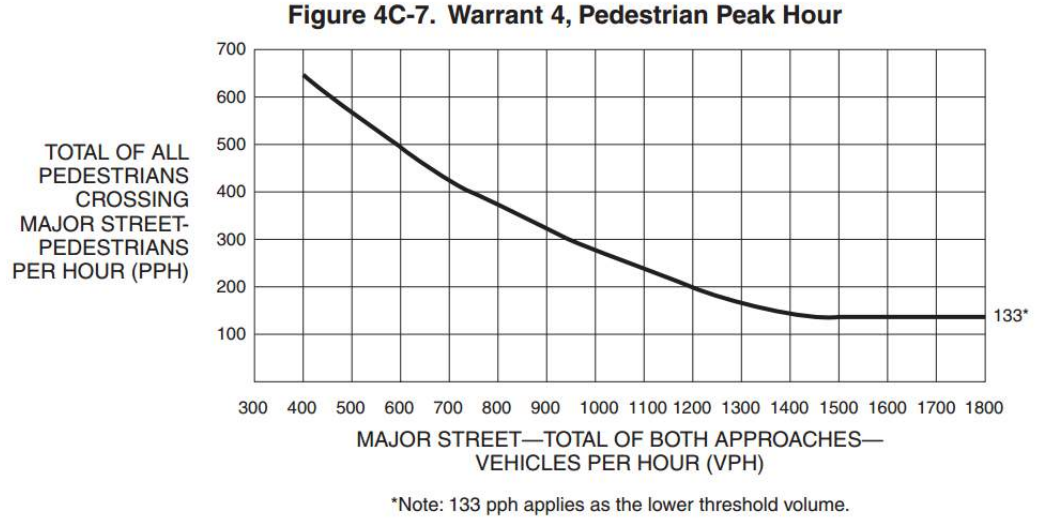


Exhibit 11: Warrant 4 Traffic Volume Thresholds for Condition B

Warrant 5, School Crossing

Warrant 5 is intended for intersections where a significant number of schoolchildren crossing the major street is the primary consideration for installing a traffic signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students. The need for a traffic control signal shall be considered where the frequency and adequacy of gaps in the vehicular traffic stream, relative to the number and size of groups of schoolchildren crossing the street during the period they would use the crossing, demonstrates the number of adequate gaps in the traffic

stream is less than the number of minutes in the same period there are a minimum of 20 schoolchildren during the highest crossing hour.

Neither intersection is near a school and do not currently provide pedestrian accommodations.

Conclusion: Warrant 5 does not apply.

Warrant 6, Coordinated Signal System

Warrant 6 deals with a desire to provide adequate platooning of vehicles. The progressive flow of traffic through a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning. The warrant states the need for a traffic control signal shall be considered if one of the following criteria is met:

C. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

D. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

Conclusion: KY 536 comprises a coordinated signal system, but each of the proposed traffic signals is at the end of the system. Warrant 6 is potentially met at both intersections.

Warrant 7, Crash Experience

Warrant 7 is intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal. It states the need for a traffic control signal shall be considered if each of the following criteria are met:

A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and

B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

C. For each of any eight hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in **Exhibit 5**, or the vph in both of the 80 percent columns of Condition B in **Exhibit 5** exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same eight hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the eight hours.

Exhibit 12 shows the reported crashes at both intersections between 2012 and 2014. Over that three-year period, there were 32 crashes at the Tiburon Drive/ Highland Drive intersection (over 10 per year) and 37 crashes at Berberich Drive (over 12 per year). Of these crashes, 12 were angle or opposing left turn crashes at Tiburon/Highland Drive and 14 were angle crashes at Berberich Drive. Angle and left-turn crashes are the most likely candidates to be corrected by the installation of a traffic signal.

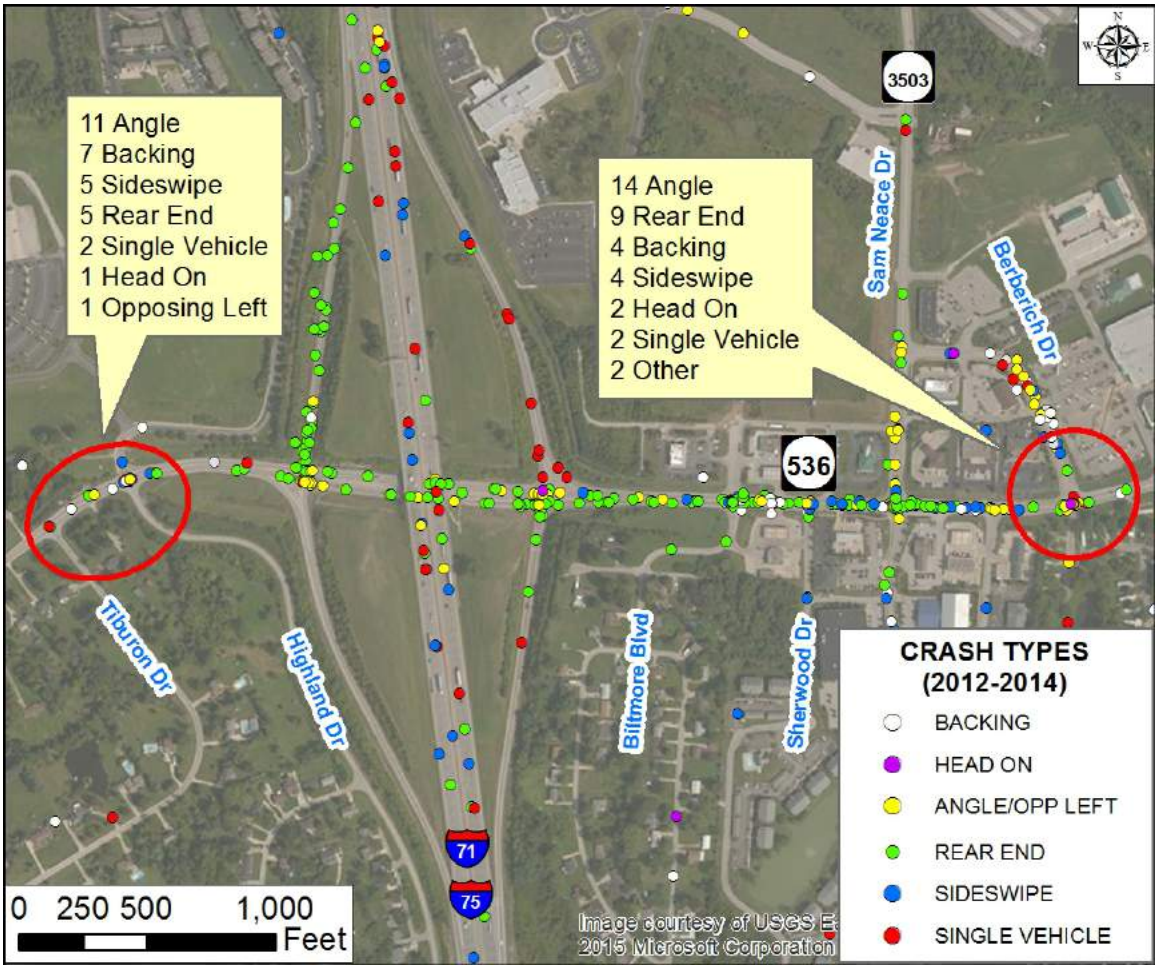


Exhibit 12: Crash History (2012 – 2014)

Conclusion: While the overall number of crashes at each intersection would exceed the thresholds outlined in Warrant 7, the number of potentially correctable crashes would likely not. Therefore, Warrant 7 is not fully met at either intersection.

Warrant 8, Roadway Network

Warrant 8 deals with installation of a traffic signal to encourage "concentration and organization" of traffic flow. The need for a traffic control signal shall be considered if the intersection in question serves two or more major routes that meet one or both of the following criteria:

A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes that meet one or more of Warrants 1, 2, and 3 during an average weekday; or

B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

A major route as used in this signal warrant shall have at least one of the following characteristics:

A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow.

B. It includes rural or suburban highways outside, entering, or traversing a city.

C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

KY 536 is functionally classified an Urban Minor Arterial but Tiburon and Berberich Drive are both classified as local streets.

Conclusion: Warrant 8 is not met at either intersection.

Warrant 9, Intersection Near a Grade Crossing

Warrant 9 is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a railroad grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal. Neither KY 536 intersection is near a grade crossing.

Conclusion: Warrant 9 does not apply.

Please let me know if you have any questions or concerns regarding this traffic signal warrant analysis.

STANTEC CONSULTING SERVICES IN C.

Brian Aldridge
Principal
Phone: (502) 212-5013
Fax: (502) 212-5055
Brian.Aldridge@stantec.com

Attachment: Attachment

c. Cc List

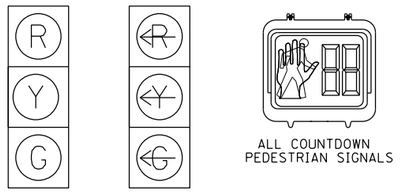
ATTACHMENT A

Preliminary Traffic Signal Plans

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS

12 INCH | 12 INCH | 16 INCH



HEAD #2A, 2B, 2C, 4A, 4B, 6A, 6B, 8A, & 8B

HEAD #1 & 5

ALL COUNTDOWN PEDESTRIAN SIGNALS

STEEL STRAIN POLES

POLE	HEIGHT	SPAN	ATT. HT.	CALC. SERV. MOMENT	SAG
A	32′	A-B	27.5′	196 KIP-FT	5%
		A-D	28′		
B	32′	B-A	27.5′	221 KIP-FT	5%
		B-C	27′		
C	32′	C-B	29′	222 KIP-FT	5%
		C-D	26′		
D	32′	D-A	30.5′	198 KIP-FT	5%
		D-C	27.5′		

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

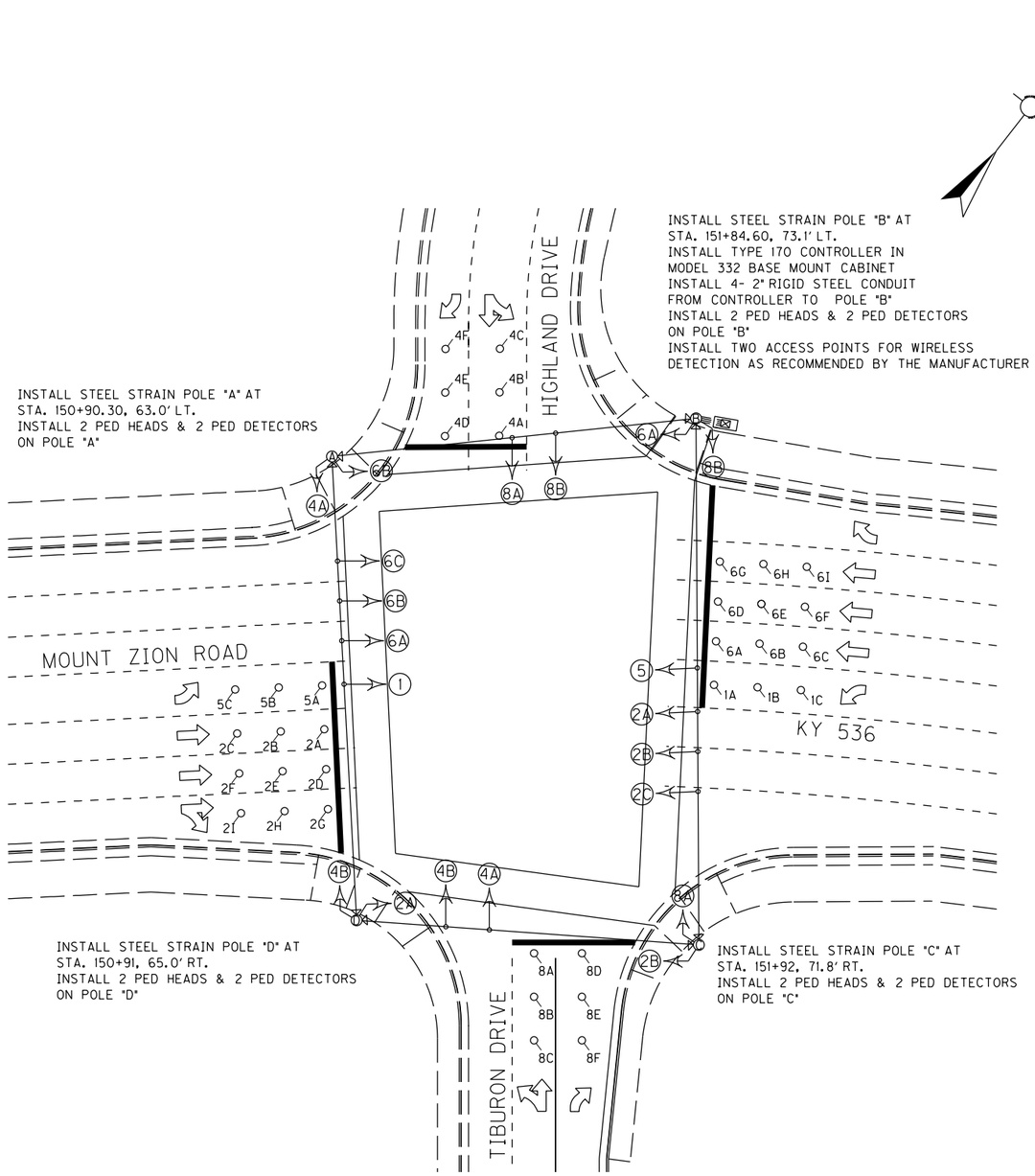
CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.

ALL MESSENGER IS 15,400 LB

THE CABINET SHALL SUPPLY CLAMP ASSEMBLIES FOR MESSENGER CABLE ATTACHMENTS BASED ON THE PRELIMINARY DESIGN OF THE POLES. IF THE CLAMP ASSEMBLIES' ATTACHMENT LOCATIONS ARE MORE THAN 2 FEET FROM THE TOP OF THE POLE, THE CONTRACTOR SHALL PROVIDE REPLACEMENT CLAMP ASSEMBLIES THAT WILL FACILITATE THE INSTALLATION. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL BE INCIDENTAL TO THE INSTALLATION OF THE STEEL STRAIN POLE. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL CONFORM TO THE SPECIFICATIONS STATED ON THE POLE BASE/SIGNAL HEAD DETAILS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE REPLACEMENT ASSEMBLIES TO THE DIVISION OF TRAFFIC OPERATIONS FOR APPROVAL.

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
1A-1C	1	I1	3′, 15′, 27′
2A-2I	2	I2-I3	3′, 15′, 27′
4A-4F	4	I6	3′, 15′, 27′
6A-6I	6	J2-J3	3′, 15′, 27′
8A-8F	8	J6	3′, 15′, 27′



WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 1	S.H. 1
1-#14/5C	CONTROLLER	S.H. 2C	S.H. 2A, 2B, 2C
1-#14/5C	CONTROLLER	S.H. 4B	S.H. 4A, 4B
1-#14/5C	CONTROLLER	S.H. 5	S.H. 5
1-#14/5C	CONTROLLER	S.H. 6A	S.H. 6A, 6B, 6C
1-#14/5C	CONTROLLER	S.H. 8A	S.H. 8A, 8B
1-#14/5C	CONTROLLER	POLE "A"	P.H 4A & 6B
1-#14/5C	CONTROLLER	POLE "A"	2 PED BUTTONS
1-#14/5C	CONTROLLER	POLE "B"	P.H. 6A & 8B
1-#14/5C	CONTROLLER	POLE "B"	2 PED BUTTONS
1-#14/5C	CONTROLLER	POLE "C"	P.H. 2B & 8A
1-#14/5C	CONTROLLER	POLE "C"	2 PED BUTTONS
1-#14/5C	CONTROLLER	POLE "D"	P.H. 2A & 4B
1-#14/5C	CONTROLLER	POLE "D"	2 PED BUTTONS

LEGEND

- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

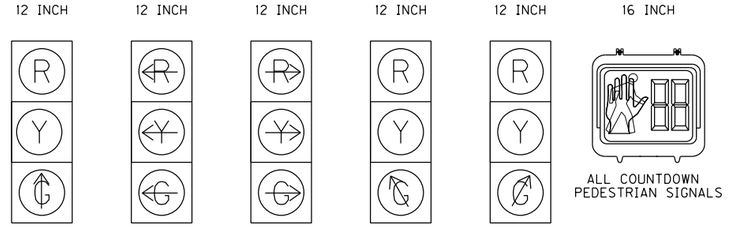
0′ 20′ 40′ 80′ SCALE: 1"= 20′

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND HIGHLAND DRIVE / TIBURON DRIVE

FILE NAME: W:\1785\ACTIVE\17856001Z\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-TIBURON.DGN
USER: koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS



ALL SIGNAL HEADS SHALL HAVE RETRO REFLECTIVE BACKPLATES

TRAFFIC SIGNAL POLES

POLE	POLE HEIGHT	MAST ARM LENGTH	MOUNTING HEIGHT	SIGNALS/SIGNS ON ARM	FROM	SIGNAL HEAD/ SIGN	TO
A	20′	36′	18′ •	3-SEC. W/BP	A	7A	19′
						7B	34′
				36"X36" SIGN		S1	15′
						S1	30′
B	20′	58′	18′ •	3-SEC. W/BP	B	1A	16.7′
						1B	26.7′
						1C	41.7′
						1D	51.7′
			14.5′••		ON POLE	7C	0′
				36"X36" SIGN	B	S2	11.75′
						S3	56′
				30"X36" SIGN		S4	20.25′
						S4	34.25′
						S4	48.25′
C	20′	54′	18′ •	3-SEC. W/BP	C	2A	13.7′
						2B	23.7′
						2C	38.7′
						2D	48.7′
			14.5′••		ON POLE	4C	0′
				36"X36" SIGN	C	S2	8.75′
						S5	53′
				30"X36" SIGN		S4	17.25′
						S4	31.25′
						S4	45.25′
D	20′	30′	18′ •	3-SEC. W/BP	D	4A	9′
						4B	24′
				36"X36" SIGN		S1	13′
						S1	28′

• CENTROID OF ARM
•• CENTER OF SIGN/SIGNAL HEAD
ATTACHMENT DISTANCES ARE MEASURED FROM THE FACE OF THE VERTICAL POLE

INSTALL MAST ARM POLE "B" AT
STA. 161+32.74, 49.44′ LT
INSTALL JUNCTION BOXES "A1" A2" & "A3"
INSTALL PEDESTALS "A" & "B"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "A2" TO JB "A1"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "A2" TO JB "A3"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "A3" TO JB "A4"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A2" TO POLE "B"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A1" TO PEDESTAL "A"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A2" TO PEDESTAL "B"

INSTALL PED HEAD AND PED
DETECTOR ON PEDESTAL "A"
INSTALL PED HEAD AND PED
DETECTOR ON PEDESTAL "B"

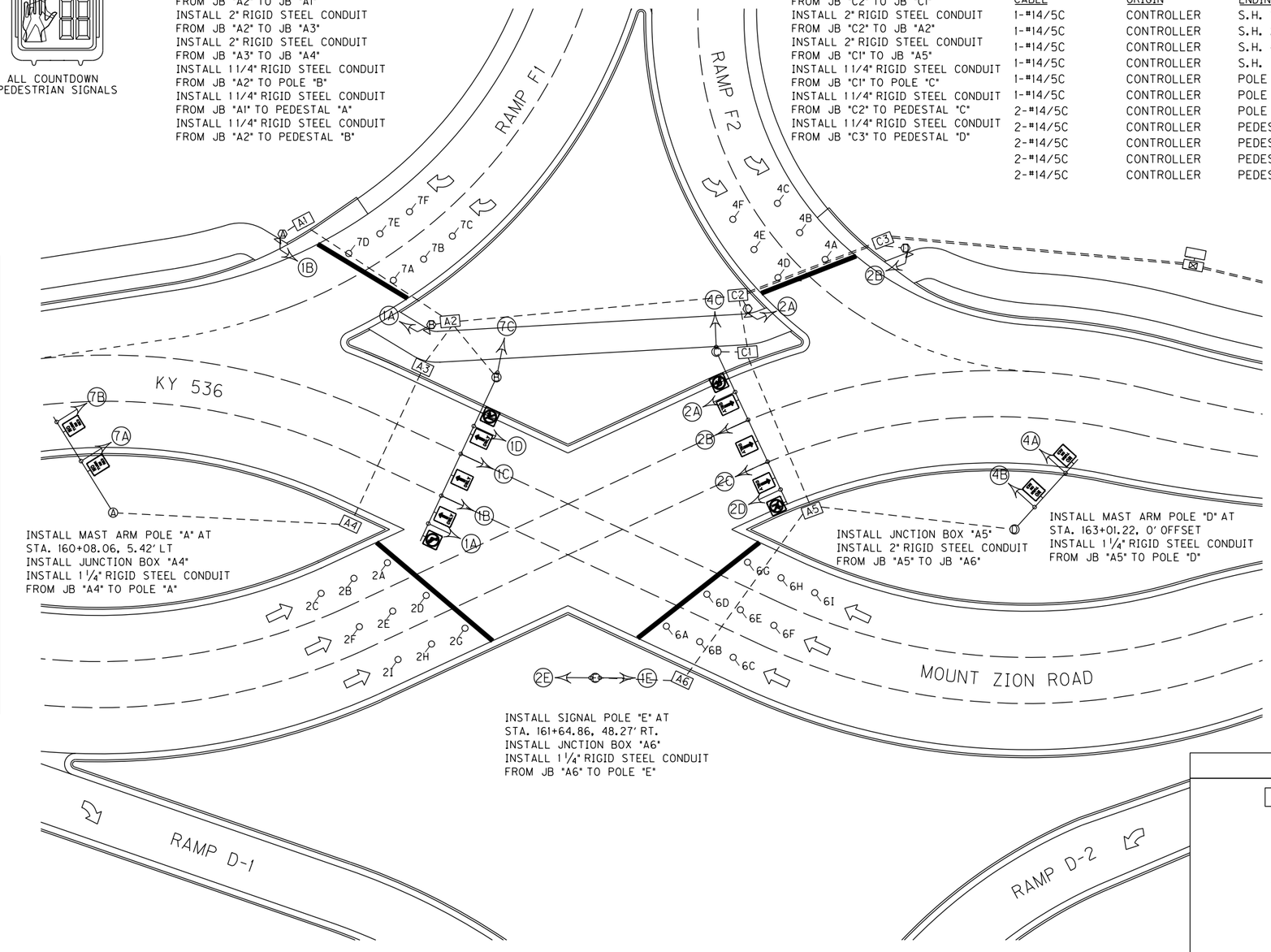
INSTALL PED HEAD AND PED
DETECTOR ON PEDESTAL "C"
INSTALL PED HEAD AND PED
DETECTOR ON PEDESTAL "D"

INSTALL MAST ARM POLE "C" AT
STA. 162+04.26, 57.77′ LT
INSTALL JUNCTION BOXES "C1" C2" & "C3"
INSTALL PEDESTALS "C" & "D"
INSTALL 2- 2" RIGID STEEL CONDUIT
FROM JB "C3" TO JB "C2"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "C2" TO JB "C1"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "C2" TO JB "A2"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "C1" TO JB "A5"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "C1" TO POLE "C"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "C2" TO PEDESTAL "C"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "C3" TO PEDESTAL "D"

WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 1A	S.H. 1A, 1B, 1C, & 1D
1-#14/5C	CONTROLLER	S.H. 2D	S.H. 2A, 2B, 2C, & 2D
1-#14/5C	CONTROLLER	S.H. 4A	S.H. 4A & 4B
1-#14/5C	CONTROLLER	S.H. 7B	S.H. 7A & 7B
1-#14/5C	CONTROLLER	POLE "B"	S.H. 7C
1-#14/5C	CONTROLLER	POLE "C"	S.H. 4C
2-#14/5C	CONTROLLER	POLE "E"	S.H. 1E & 2E
2-#14/5C	CONTROLLER	PEDESTAL "A"	P.H. 1B, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "B"	P.H. 1A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "C"	P.H. 2A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "D"	P.H. 2B, PED BUTTON

INSTALL TYPE 170 CONTROLLER IN
MODEL 332 BASE MOUNT CABINET
INSTALL 2- 2" RIGID STEEL CONDUIT
FROM CONTROLLER TO JB "C3"
INSTALL 2- 2" RIGID STEEL CONDUIT
FROM CONTROLLER TO JB "C4"



INSTALL MAST ARM POLE "A" AT
STA. 160+08.06, 5.42′ LT
INSTALL JUNCTION BOX "A4"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A4" TO POLE "A"

INSTALL JNCTION BOX "A5"
INSTALL 2" RIGID STEEL CONDUIT
FROM JB "A5" TO JB "A6"

INSTALL MAST ARM POLE "D" AT
STA. 163+01.22, 0′ OFFSET
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A5" TO POLE "D"

INSTALL SIGNAL POLE "E" AT
STA. 161+64.86, 48.27′ RT.
INSTALL JNCTION BOX "A6"
INSTALL 1 1/4" RIGID STEEL CONDUIT
FROM JB "A6" TO POLE "E"

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
2A-2I	2	I2-I3	3′, 15′, 27′
4A-4F	5	I6	3′, 15′, 27′
6A-6I	6	J2-J3	3′, 15′, 27′
7A-7F	7	J5	3′, 15′, 27′



R3-5A 30"x36" | R3-1 36"x36" | R3-2 36"x36" | R3-18 36"x36" | R10-11A 30"x36"

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.

0′ 20′ 40′ 80′ SCALE: 1"= 20′

LEGEND

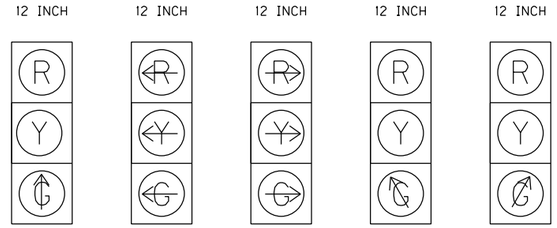
- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTAL POLE
- JUNCTION BOXES TYPES A & C (AS DESIGNATED) — B9
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND SOUTHBOUND RAMPS OF I-75/I-71

FILE NAME: W:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-DCD 1.DGN
USER: koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS

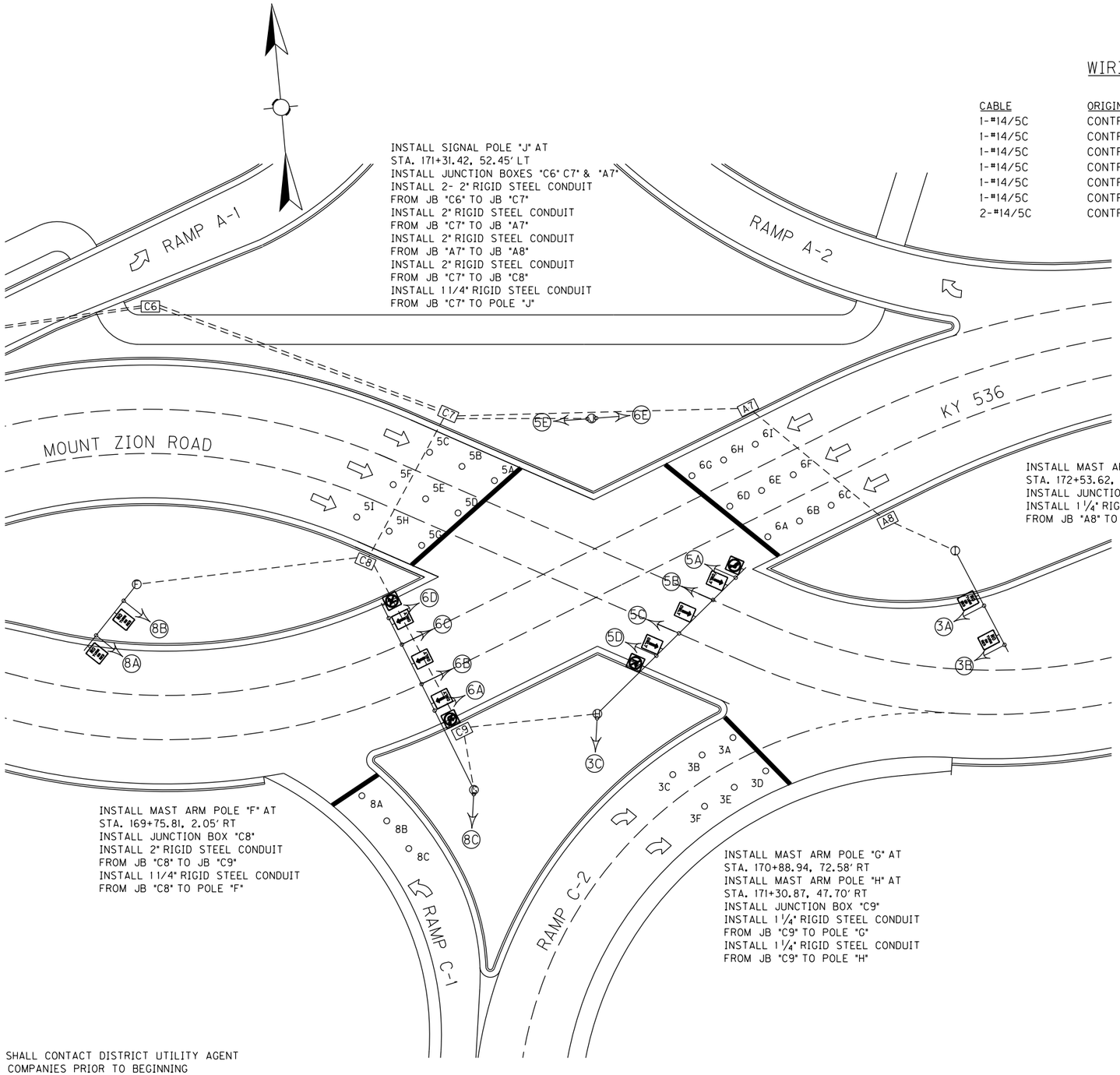


ALL SIGNAL HEADS SHALL HAVE RETRO REFLECTIVE BACKPLATES

TRAFFIC SIGNAL POLES

POLE	POLE HEIGHT	MAST ARM LENGTH	MOUNTING HEIGHT	SIGNALS/SIGNS ON ARM	FROM	SIGNAL HEAD/ SIGN	TO
F	20'	36'	18' •	3-SEC. W/BP	F	8A	6.4'
						8B	21.4'
				36"X36" SIGN		S1	11.4
						S1	26'
G	20'	58'	18' •	3-SEC. W/BP	G	6A	29.25'
						6B	39.25'
						6C	54.25'
						6D	64.25'
			14.5'••		ON POLE	8C	0'
				36"X36" SIGN	G	S2	24.25'
						S3	69'
				30"X36" SIGN		S4	32.75'
						S4	46.75'
						S4	60.75'
H	20'	54'	18' •	3-SEC. W/BP	H	5A	27.35'
						5B	38.12'
						5C	54.28'
						5D	65.05'
			14.5'••		ON POLE	3C	0'
				36"X36" SIGN	H	S2	21.9'
						S5	69'
				30"X36" SIGN		S4	30.5'
						S4	46.1'
						S4	61.25'
I	20'	30'	18' •	3-SEC. W/BP	I	3A	9'
						3B	24'
				36"X36" SIGN		S1	13'
						S1	28'

• CENTROID OF ARM
•• CENTER OF SIGN/SIGNAL HEAD
ATTACHMENT DISTANCES ARE MEASURED FROM THE FACE OF THE VERTICAL POLE



WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 3B	S.H. 3A, & 3B
1-#14/5C	CONTROLLER	S.H. 5A	S.H. 5A, 5B, 5C, & 5D
1-#14/5C	CONTROLLER	S.H. 6D	S.H. 6A, 6B, 6C & 6D
1-#14/5C	CONTROLLER	S.H. 8A	S.H. 8A & 8B
1-#14/5C	CONTROLLER	POLE "G"	S.H. 8C
1-#14/5C	CONTROLLER	POLE "H"	S.H. 3C
2-#14/5C	CONTROLLER	POLE "J"	S.H. 5E & 6E

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
3A-3F	3	I5	3', 15', 27'
5A-5I	5	JI	3', 15', 27'
6A-6I	6	J2-J3	3', 15', 27'
8A-8C	8	J6	3', 15', 27'

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.



0' 20' 40' 80' SCALE: 1"= 20'

LEGEND

- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTAL POLE
- JUNCTION BOXES TYPES A & C (AS DESIGNATED)
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND NORTHBOUND RAMPS OF I-75/I-71

MicroStation v8.11.7.443
E-SHEET NAME:
USER: kswald
DATE PLOTTED: April 6, 2016
FILE NAME: W:\1785\ACTIVE\1785600I2\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-DGD 2.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS

12 INCH — HEAD #6A, 6B, & 6C

12 INCH — HEAD #5A & 5B

12 INCH — HEAD #01 & 02

12 INCH — HEAD #H1, H2 & H3

16 INCH — ALL COUNTDOWN PEDESTRIAN SIGNALS

STEEL STRAIN POLES

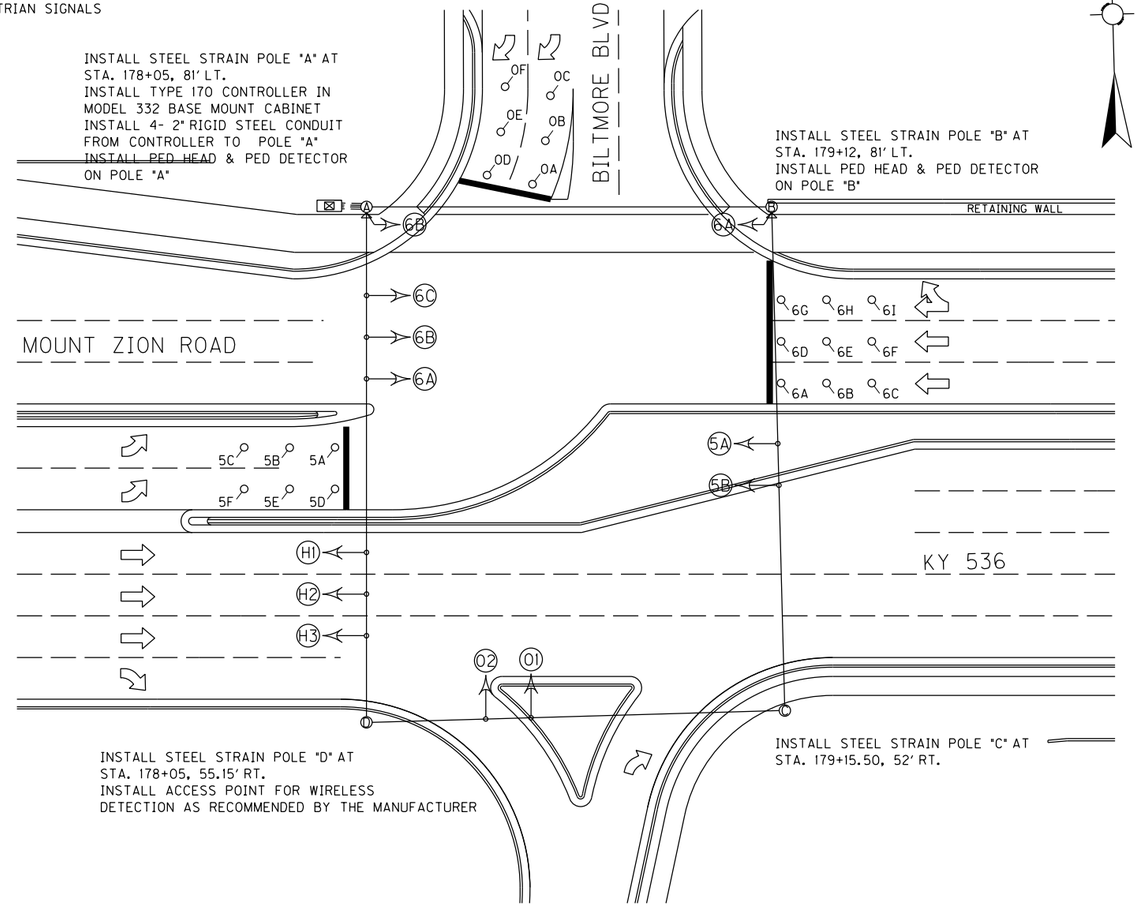
POLE	HEIGHT	SPAN	ATT. HT.	CALC. SERV. MOMENT	SAG
A	32′	A-B	28′	169 KIP-FT	5%
		A-D	28.5′		
B	32′	B-A	27.5′	147 KIP-FT	5%
		B-C	29.5′		
C	32′	C-B	30′	174 KIP-FT	5%
		C-D	26.5′		
D	32′	D-A	28.5′	196 KIP-FT	5%
		D-C	27.5′		

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.

ALL MESSENGER IS 15,400 LB

THE CABINET SHALL SUPPLY CLAMP ASSEMBLIES FOR MESSENGER CABLE ATTACHMENTS BASED ON THE PRELIMINARY DESIGN OF THE POLES. IF THE CLAMP ASSEMBLIES' ATTACHMENT LOCATIONS ARE MORE THAN 2 FEET FROM THE TOP OF THE POLE, THE CONTRACTOR SHALL PROVIDE REPLACEMENT CLAMP ASSEMBLIES THAT WILL FACILITATE THE INSTALLATION. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL BE INCIDENTAL TO THE INSTALLATION OF THE STEEL STRAIN POLE. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL CONFORM TO THE SPECIFICATIONS STATED ON THE POLE BASE/SIGNAL HEAD DETAILS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE REPLACEMENT ASSEMBLIES TO THE DIVISION OF TRAFFIC OPERATIONS FOR APPROVAL.



WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 01	S.H. 01, 02
1-#14/5C	CONTROLLER	S.H. H3	S.H. H1, H2, H3
1-#14/5C	CONTROLLER	S.H. 5B	S.H. 5A, 5B
1-#14/5C	CONTROLLER	S.H. 5	S.H. 5
1-#14/5C	CONTROLLER	S.H. 6A	S.H. 6A, 6B, 6C
2-#14/5C	CONTROLLER	POLE "A"	P.H. 6B, PED BUTTON
2-#14/5C	CONTROLLER	POLE "B"	P.H. 6A, PED BUTTON

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
0A-0I	OLAP E	J9	3′, 15′, 27′
5A-5F	5	J1	3′, 15′, 27′
6A-6I	6	J2-J3	3′, 15′, 27′

LEGEND

- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A — WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

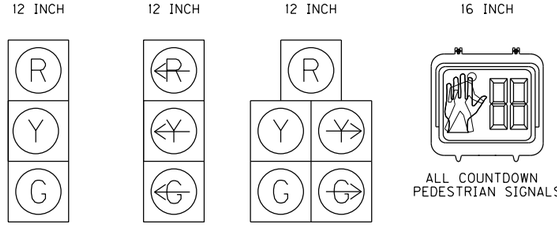
0′ 20′ 40′ 80′ SCALE: 1"= 20′

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND BILTMORE BOULEVARD

FILE NAME: W:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-BILTMORE.DGN
USER: koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS



STEEL STRAIN POLES

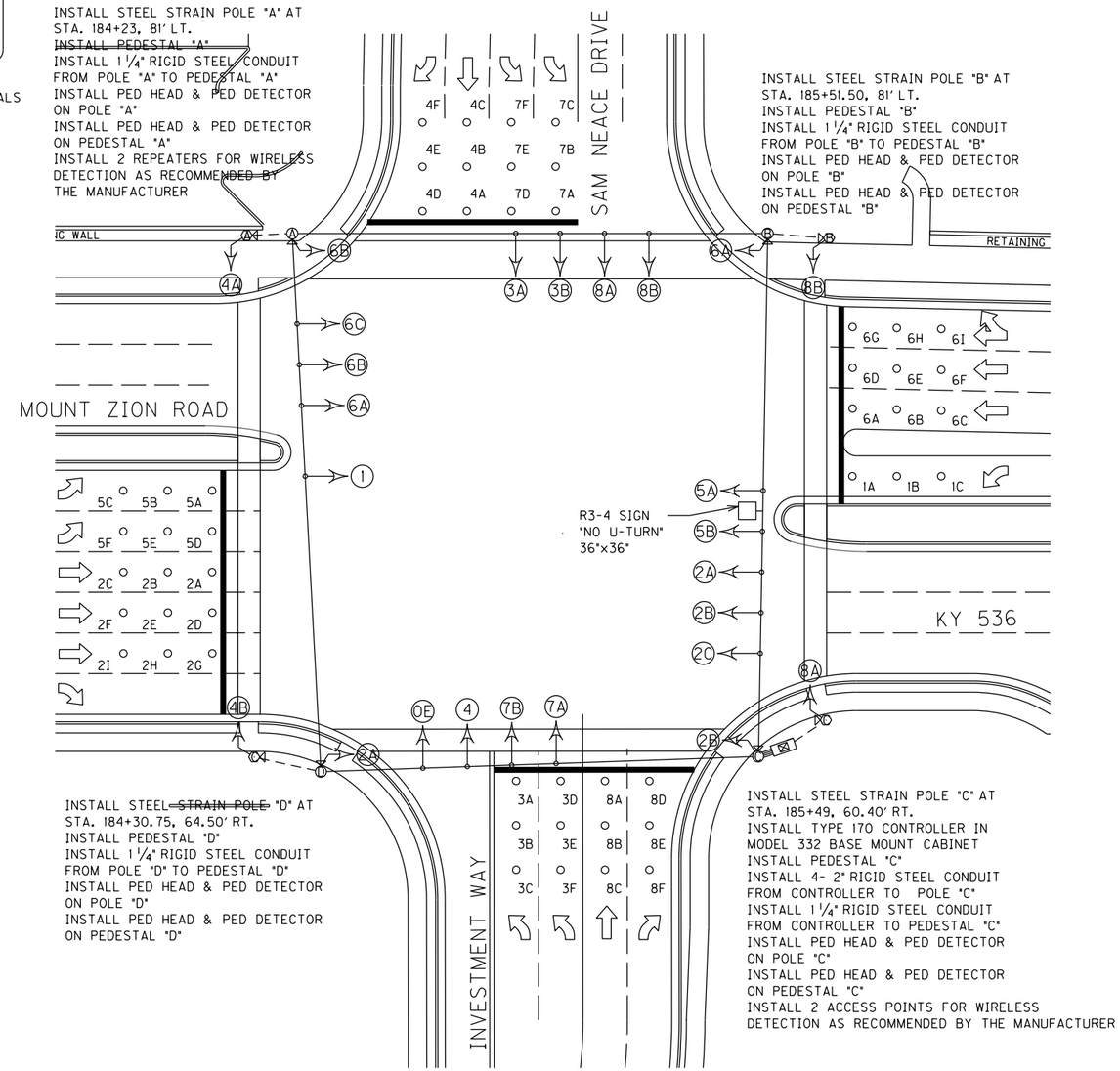
POLE	HEIGHT	SPAN	ATT. HT.	CALC. SERV. MOMENT	SAG
A	32′	A-B	28.5′	281 KIP-FT	5%
		A-D	30′		
B	32′	B-A	28.5′	306 KIP-FT	5%
		B-C	29.5′		
C	32′	C-B	29.5′	299 KIP-FT	5%
		C-D	28.5′		
D	32′	D-A	30′	271 KIP-FT	5%
		D-C	28′		

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.

SPAN B-C REQUIRES MESSENGER FOR DESIGN WIRE TENSION OF 17,100 LBS. ALL OTHER MESSENGER IS 15,400 LB

THE CABINET SHALL SUPPLY CLAMP ASSEMBLIES FOR MESSENGER CABLE ATTACHMENTS BASED ON THE PRELIMINARY DESIGN OF THE POLES. IF THE CLAMP ASSEMBLIES' ATTACHMENT LOCATIONS ARE MORE THAN 2 FEET FROM THE TOP OF THE POLE, THE CONTRACTOR SHALL PROVIDE REPLACEMENT CLAMP ASSEMBLIES THAT WILL FACILITATE THE INSTALLATION. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL BE INCIDENTAL TO THE INSTALLATION OF THE STEEL STRAIN POLE. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL CONFORM TO THE SPECIFICATIONS STATED ON THE POLE BASE/SIGNAL HEAD DETAILS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE REPLACEMENT ASSEMBLIES TO THE DIVISION OF TRAFFIC OPERATIONS FOR APPROVAL.



WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 1	S.H. 1
1-#14/5C	CONTROLLER	S.H. 2A	S.H. 2A, 2B, 2C
1-#14/5C	CONTROLLER	S.H. 3A	S.H. 3A, 3B
1-#14/7C	CONTROLLER	S.H. OE	S.H. 4, OE
1-#14/5C	CONTROLLER	S.H. 5A	S.H. 5A, 5B
1-#14/5C	CONTROLLER	S.H. 6C	S.H. 6A, 6B, 6C
1-#14/5C	CONTROLLER	S.H. 7B	S.H. 7A, 7B
1-#14/5C	CONTROLLER	S.H. 8A	S.H. 8A, 8B
2-#14/5C	CONTROLLER	POLE "A"	P.H. 6B, PED BUTTON
2-#14/5C	CONTROLLER	POLE "B"	P.H. 6A, PED BUTTON
2-#14/5C	CONTROLLER	POLE "C"	P.H. 2B, PED BUTTON
2-#14/5C	CONTROLLER	POLE "D"	P.H. 2A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "A"	P.H. 4A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "B"	P.H. 8B, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "C"	P.H. 8A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "D"	P.H. 4B, PED BUTTON

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
1A-1C	1	I1	3′, 15′, 27′
2A-2I	2	I2-I3	3′, 15′, 27′
3A-3F	4	I5	3′, 15′, 27′
4A-4F	4	I6	3′, 15′, 27′
5A-5F	5	J1	3′, 15′, 27′
6A-6I	6	J2-J3	3′, 15′, 27′
7A-7F	7	J5	3′, 15′, 27′
8A-8C	8	J6	3′, 15′, 27′

LEGEND

- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTAL POLE
- SPAN MOUNTED SIGN
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

SCALE: 1"= 20′

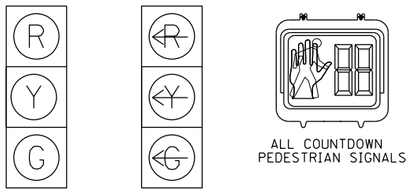
SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND SAM NEACE DRIVE / INVESTMENT WAY

FILE NAME: W:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-SAM NEACE.DGN
USER: Koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS

12 INCH | 12 INCH | 16 INCH



HEAD #2A, 2B, 2C, 4A, 4B, 6A, 6B, 8A, & 8B

HEAD #1 & 5

ALL COUNTDOWN PEDESTRIAN SIGNALS

STEEL STRAIN POLES

POLE	HEIGHT	SPAN	ATT. HT.	CALC. SERV. MOMENT	SAG
A	30′	A-B	27′	161 KIP-FT	5%
		A-D	28′		
B	32′	B-A	27′	184 KIP-FT	5%
		B-C	29′		
C	32′	C-B	27.5′	172 KIP-FT	5%
		C-D	28′		
D	30′	D-A	27′	180 KIP-FT	5%
		D-C	28′		

NOTE:
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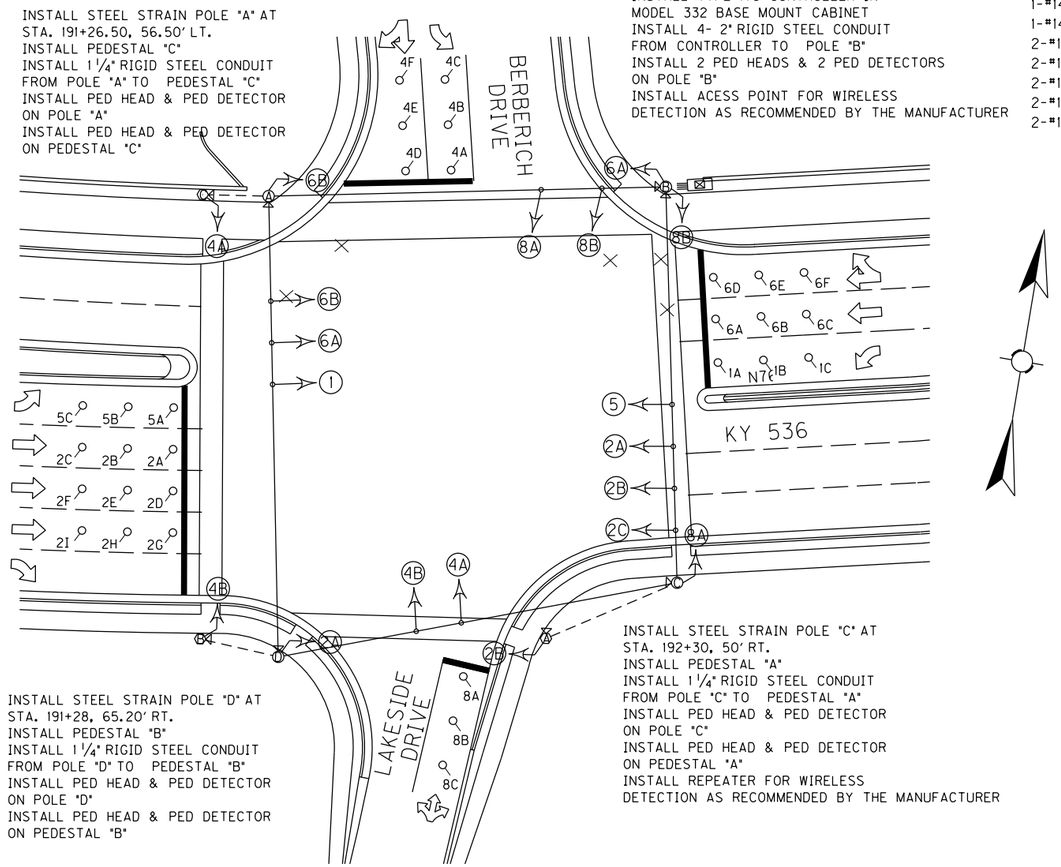
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ALL MESSENGER IS 15,400 LB

THE CABINET SHALL SUPPLY CLAMP ASSEMBLIES FOR MESSENGER CABLE ATTACHMENTS BASED ON THE PRELIMINARY DESIGN OF THE POLES. IF THE CLAMP ASSEMBLIES' ATTACHMENT LOCATIONS ARE MORE THAN 2 FEET FROM THE TOP OF THE POLE, THE CONTRACTOR SHALL PROVIDE REPLACEMENT CLAMP ASSEMBLIES THAT WILL FACILITATE THE INSTALLATION. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL BE INCIDENTAL TO THE INSTALLATION OF THE STEEL STRAIN POLE. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL CONFORM TO THE SPECIFICATIONS STATED ON THE POLE BASE/SIGNAL HEAD DETAILS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE REPLACEMENT ASSEMBLIES TO THE DIVISION OF TRAFFIC OPERATIONS FOR APPROVAL.

SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
1A-1C	1	I1	3′, 15′, 27′
2A-2I	2	I2-I3	3′, 15′, 27′
4A-4F	4	I6	3′, 15′, 27′
5A-5C	5	J1	3′, 15′, 27′
6A-6F	6	J2	3′, 15′, 27′
8A-8C	8	J6	3′, 15′, 27′



WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 1	S.H. 1
1-#14/5C	CONTROLLER	S.H. 2C	S.H. 2A, 2B, 2C
1-#14/5C	CONTROLLER	S.H. 4B	S.H. 4A, 4B
1-#14/5C	CONTROLLER	S.H. 5	S.H. 5
1-#14/5C	CONTROLLER	S.H. 6A	S.H. 6A, 6B
1-#14/5C	CONTROLLER	S.H. 8A	S.H. 8A, 8B
2-#14/5C	CONTROLLER	POLE "A"	P.H. 6B, PED BUTTON
1-#14/5C	CONTROLLER	POLE "B"	P.H. 6A, 8B
1-#14/5C	CONTROLLER	POLE "B"	2 PED BUTTONS
2-#14/5C	CONTROLLER	POLE "C"	P.H. 8A, PED BUTTON
2-#14/5C	CONTROLLER	POLE "D"	P.H. 2A, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "A"	P.H. 2B, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "B"	P.H. 4B, PED BUTTON
2-#14/5C	CONTROLLER	PEDESTAL "C"	P.H. 4A, PED BUTTON

LEGEND

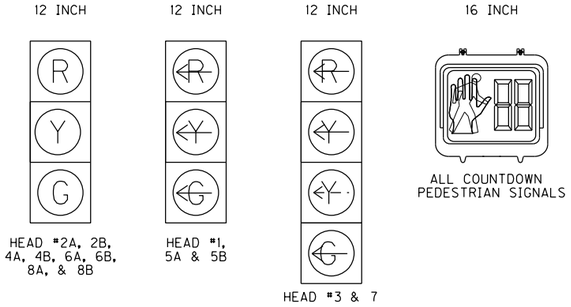
- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTAL POLE
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND BERBERICH DRIVE / LAKESIDE DRIVE

FILE NAME: W:\7855\ACTIVE\17856001\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-BERBERICH.DGN
USER: Koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	

SIGNAL HEADS



STEEL STRAIN POLES

POLE	HEIGHT	SPAN	ATT. HT.	CALC. SERV. MOMENT	SAG
A	32′	A-B	30′	211 KIP-FT	5%
		A-D	30.5′		
B	32′	B-A	30′	269 KIP-FT	5%
		B-C	29′		
C	32′	C-B	27.5′	196 KIP-FT	5%
		C-D	30′		
D	32′	D-A	29.5′	270 KIP-FT	5%
		D-C	30′		

NOTE:
THE CONTRACTOR SHALL CONTACT DISTRICT UTILITY AGENT AND ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. HAND DIG AREAS WHERE POLES OR CONDUIT CROSSES UTILITIES (TELEPHONE, GAS, WATER, SEWER, ETC.)

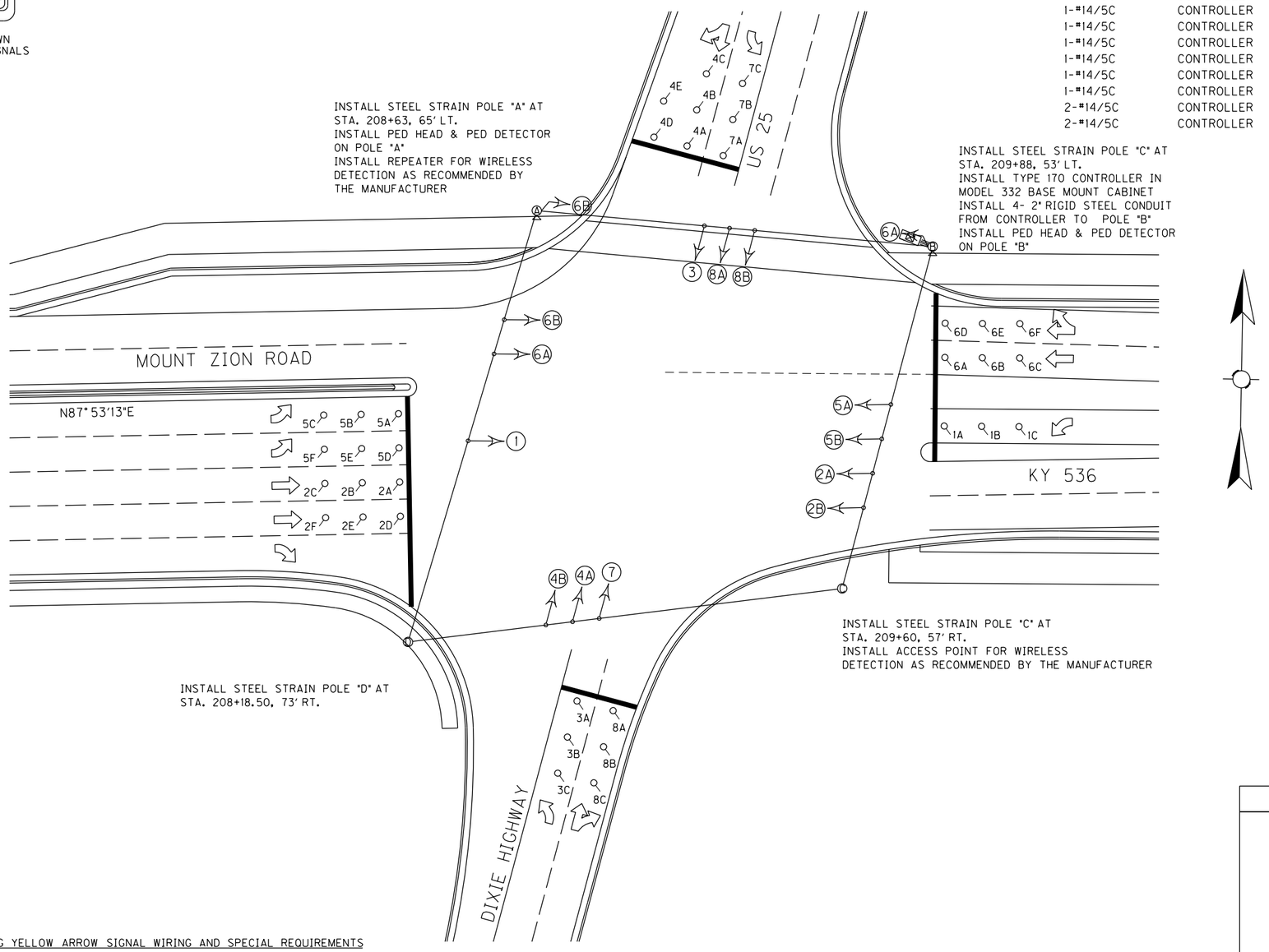
CONTRACTOR SHALL VERIFY FINAL POLE LOCATION WITH ENGINEER AND LOCAL UTILITY COMPANIES PRIOR TO ANY WORK BEING PERFORMED. FINAL LOCATIONS SHALL BE PROVIDED TO CENTRAL OFFICE DIVISION OF TRAFFIC OPERATIONS TO VERIFY POLE CALCULATIONS PRIOR TO ANY WORK BEING PERFORMED.

SPAN B-C REQUIRES MESSENGER FOR DESIGN WIRE TENSION OF 17,100 LBS. ALL OTHER MESSENGER IS 15,400 LB

THE CABINET SHALL SUPPLY CLAMP ASSEMBLIES FOR MESSENGER CABLE ATTACHMENTS BASED ON THE PRELIMINARY DESIGN OF THE POLES. IF THE CLAMP ASSEMBLIES' ATTACHMENT LOCATIONS ARE MORE THAN 2 FEET FROM THE TOP OF THE POLE, THE CONTRACTOR SHALL PROVIDE REPLACEMENT CLAMP ASSEMBLIES THAT WILL FACILITATE THE INSTALLATION. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL BE INCIDENTAL TO THE INSTALLATION OF THE STEEL STRAIN POLE. CONTRACTOR SUPPLIED CLAMP ASSEMBLIES SHALL CONFORM TO THE SPECIFICATIONS STATED ON THE POLE BASE/SIGNAL HEAD DETAILS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE REPLACEMENT ASSEMBLIES TO THE DIVISION OF TRAFFIC OPERATIONS FOR APPROVAL.

WIRING SCHEDULE

CABLE	ORIGIN	ENDING	CONNECTING
1-#14/5C	CONTROLLER	S.H. 1	S.H. 1
1-#14/5C	CONTROLLER	S.H. 2B	S.H. 2A, 2B
1-#14/5C	CONTROLLER	S.H. 3	S.H. 3
1-#14/5C	CONTROLLER	S.H. 4B	S.H. 4A, 4B
1-#14/5C	CONTROLLER	S.H. 5B	S.H. 5A, 5B
1-#14/5C	CONTROLLER	S.H. 6A	S.H. 6A, 6B
1-#14/5C	CONTROLLER	S.H. 7	S.H. 7
1-#14/5C	CONTROLLER	S.H. 8A	S.H. 8A, 8B
2-#14/5C	CONTROLLER	POLE "A"	P.H. 6B, PED BUTTON
2-#14/5C	CONTROLLER	POLE "B"	P.H. 6A, PED BUTTON



SENSOR SCHEDULE

LOOP	PHASE	SLOT	SPACING SEQUENCE FROM STOP BAR PER LANE
1A-1C	1	I1	3′, 15′, 27′
2A-2F	2	I2	3′, 15′, 27′
3A-3C	4	I5	3′, 15′, 27′
4A-4E	4	I6	3′, 15′, 27′
5A-5F	5	J1	3′, 15′, 27′
6A-6F	6	J2	3′, 15′, 27′
7A-7C	7	J5	3′, 15′, 27′
8A-8C	8	J6	3′, 15′, 27′

FLASHING YELLOW ARROW SIGNAL WIRING AND SPECIAL REQUIREMENTS

5-CONDUCTOR FOUR-SECTION FYA HEADS

CONNECTION	COLOR	OUTPUT FILE CONNECTION FOR FYA ON PHASE 3	OUTPUT FILE CONNECTION FOR FYA ON PHASE 7
RED ARROW	RED	PHASE 3 RED	PHASE 7 RED
STEADY YELLOW ARROW	ORANGE	PHASE 3 YELLOW	PHASE 7 YELLOW
FLASHING YELLOW ARROW	BLACK	PHASE 3 GREEN	PHASE 7 GREEN
GREEN ARROW	GREEN	PED YELLOW PHASE 4	PED YELLOW PHASE 8
NEUTRAL	WHITE	WHITE	WHITE

THE CONTRACTOR SHALL CONNECT THE CONNECTOR LABELED "2PY 4PY 6PY 8PY" TO CONNECTOR "CMU 13,16,R,U" BEHIND THE OUTPUT PANEL. IF IT IS A SOLID STATE CABINET (SIEMENS) ONLY HAVE 2 CONNECTORS WHICH SIMPLY NEED TO BE CONNECTED TOGETHER.

LEGEND

- BASE MOUNTED CONTROLLER
- STEEL STRAIN POLE
- PEDESTRIAN DETECTOR
- SIGNAL HEAD
- PEDESTRIAN HEAD
- 1A WIRELESS SENSOR
- RIGID STEEL CONDUIT (SIZE AS SPECIFIED)

SCALE: 1"= 20′

SIGNAL PLAN FOR MOUNT ZION ROAD (KY 536) AND DIXIE HIGHWAY (US 25)

FILE NAME: W:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\TRAFFIC SIGNAL PLANS\TRAFFIC PLAN-US25.DGN
USER: koswald
DATE PLOTTED: April 6, 2016
E-SHEET NAME:
MicroStation v8.11.7.443

ATTACHMENT B

Existing (2014) Traffic Counts

HCS 2010 Output Summaries

Cummins Consulting Services, PLLC

4661 Marlberry Place
Lexington, KY 40509
859.361.2589
"simplifying Data Collection"

File Name : KYTC_D6_-_Boone_-_KY536_at_Tiburon_Road_197959_11-13-2014
Site Code :
Start Date : 11/13/2014
Page No : 1

Groups Printed- Cars - Trucks

	KY536 - Mt Zion Road From East			Tiburon Road From South			KY536 - Mt Zion Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	3	61	64	0	33	33	283	1	284	381
07:15 AM	5	72	77	1	29	30	305	1	306	413
07:30 AM	4	84	88	2	25	27	289	1	290	405
07:45 AM	6	90	96	3	24	27	230	1	231	354
Total	18	307	325	6	111	117	1107	4	1111	1553
08:00 AM	7	89	96	5	24	29	208	2	210	335
08:15 AM	3	80	83	0	25	25	193	2	195	303
08:30 AM	6	55	61	2	15	17	188	4	192	270
08:45 AM	3	72	75	1	14	15	171	2	173	263
Total	19	296	315	8	78	86	760	10	770	1171
09:00 AM	4	91	95	0	11	11	144	1	145	251
09:15 AM	7	57	64	1	14	15	120	0	120	199
09:30 AM	4	56	60	4	11	15	127	2	129	204
09:45 AM	2	60	62	5	12	17	104	0	104	183
Total	17	264	281	10	48	58	495	3	498	837
10:00 AM	4	66	70	1	13	14	91	0	91	175
10:15 AM	5	66	71	4	7	11	94	2	96	178
10:30 AM	6	76	82	2	2	4	77	0	77	163
10:45 AM	6	62	68	2	15	17	85	1	86	171
Total	21	270	291	9	37	46	347	3	350	687
11:00 AM	6	64	70	0	8	8	91	2	93	171
11:15 AM	12	81	93	2	11	13	84	1	85	191
11:30 AM	8	65	73	0	14	14	74	1	75	162
11:45 AM	7	90	97	2	8	10	87	3	90	197
Total	33	300	333	4	41	45	336	7	343	721
12:00 PM	8	94	102	1	5	6	84	2	86	194
12:15 PM	8	89	97	0	4	4	74	0	74	175
12:30 PM	9	84	93	0	8	8	90	5	95	196
12:45 PM	5	85	90	2	6	8	89	3	92	190
Total	30	352	382	3	23	26	337	10	347	755
01:00 PM	4	82	86	2	6	8	89	1	90	184
01:15 PM	5	89	94	0	9	9	83	0	83	186

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4661 Marlberry Place
Lexington, KY 40509
859.361.2589
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File Name : KYTC_D6_-_Boone_-_KY536_at_Tiburon_Road_197959_11-13-2014
Site Code :
Start Date : 11/13/2014

Groups Printed- Cars - Trucks

	KY536 - Mt Zion Road From East			Tiburon Road From South			KY536 - Mt Zion Road From West			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
01:30 PM	8	107	115	1	5	6	86	2	88	209
01:45 PM	13	91	104	0	10	10	92	2	94	208
Total	30	369	399	3	30	33	350	5	355	787
02:00 PM	9	97	106	1	9	10	105	1	106	222
02:15 PM	14	114	128	1	13	14	91	4	95	237
02:30 PM	13	122	135	1	13	14	98	6	104	253
02:45 PM	9	152	161	4	14	18	95	5	100	279
Total	45	485	530	7	49	56	389	16	405	991
03:00 PM	6	61	67	0	7	7	93	2	95	169
03:15 PM	12	81	93	2	10	12	82	1	83	188
03:30 PM	8	65	73	0	15	15	73	1	74	162
03:45 PM	7	88	95	2	8	10	88	3	91	196
Total	33	295	328	4	40	44	336	7	343	715
04:00 PM	6	68	74	0	7	7	90	2	92	173
04:15 PM	12	80	92	2	10	12	85	1	86	190
04:30 PM	8	58	66	0	15	15	73	1	74	155
04:45 PM	7	81	88	2	7	9	88	3	91	188
Total	33	287	320	4	39	43	336	7	343	706
05:00 PM	8	97	105	1	6	7	84	2	86	198
05:15 PM	8	87	95	0	4	4	75	0	75	174
05:30 PM	9	84	93	0	9	9	90	5	95	197
05:45 PM	6	88	94	2	6	8	87	3	90	192
Total	31	356	387	3	25	28	336	10	346	761
06:00 PM	8	95	103	1	5	6	89	2	91	200
06:15 PM	8	87	95	0	4	4	75	0	75	174
06:30 PM	9	83	92	0	9	9	90	5	95	196
06:45 PM	6	87	93	2	6	8	87	3	90	191
Total	31	352	383	3	24	27	341	10	351	761
Grand Total	341	3933	4274	64	545	609	5470	92	5562	10445
Apprch %	8	92		10.5	89.5		98.3	1.7		
Total %	3.3	37.7	40.9	0.6	5.2	5.8	52.4	0.9	53.3	
Cars	329	3762	4091	58	534	592	5296	90	5386	10069
% Cars	96.5	95.7	95.7	90.6	98	97.2	96.8	97.8	96.8	96.4
Trucks	12	171	183	6	11	17	174	2	176	376
% Trucks	3.5	4.3	4.3	9.4	2	2.8	3.2	2.2	3.2	3.6

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4661 Marlberry Place
Lexington, KY 40509
859.361.2589
"simplifying Data Collection"

File Name : KYTC_D6_-_Boone_-_KY536_at_Highland_197961_11-13-2014
Site Code : Church Entrance
Start Date : 11/13/2014
Page No : 1

Groups Printed- Cars - Trucks

	Highland Dr - Chruch From North				KY536 - Mt Zion Road From East				Highland Dr From South				KY536 - Mt Zion Road From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	21	0	9	30	1	55	8	64	2	0	6	8	1	310	0	311	413
07:15 AM	21	1	7	29	1	73	5	79	0	0	6	6	1	328	0	329	443
07:30 AM	26	0	5	31	7	79	7	93	0	1	9	10	1	305	1	307	441
07:45 AM	15	0	3	18	6	92	6	104	1	0	9	10	1	252	1	254	386
Total	83	1	24	108	15	299	26	340	3	1	30	34	4	1195	2	1201	1683
08:00 AM	26	0	5	31	3	88	2	93	0	0	9	9	0	226	1	227	360
08:15 AM	17	0	4	21	4	78	4	86	3	0	9	12	1	223	3	227	346
08:30 AM	12	0	1	13	6	58	7	71	1	0	6	7	3	195	1	199	290
08:45 AM	12	0	4	16	4	78	14	96	0	0	3	3	6	179	0	185	300
Total	67	0	14	81	17	302	27	346	4	0	27	31	10	823	5	838	1296
09:00 AM	17	1	4	22	1	86	11	98	0	2	1	3	4	148	0	152	275
09:15 AM	6	2	3	11	2	57	6	65	1	0	4	5	2	129	2	133	214
09:30 AM	11	0	2	13	2	57	10	69	2	0	4	6	0	140	1	141	229
09:45 AM	9	0	3	12	3	61	6	70	0	0	3	3	7	108	0	115	200
Total	43	3	12	58	8	261	33	302	3	2	12	17	13	525	3	541	918
10:00 AM	6	0	3	9	0	62	8	70	2	0	5	7	0	105	0	105	191
10:15 AM	12	0	2	14	2	71	6	79	1	0	1	2	1	98	0	99	194
10:30 AM	13	0	1	14	1	79	7	87	1	0	5	6	2	75	0	77	184
10:45 AM	4	0	2	6	6	68	10	84	0	0	7	7	1	99	0	100	197
Total	35	0	8	43	9	280	31	320	4	0	18	22	4	377	0	381	766
11:00 AM	8	0	2	10	4	67	5	76	0	0	1	1	1	96	1	98	185
11:15 AM	7	0	2	9	5	88	11	104	0	0	4	4	1	89	1	91	208
11:30 AM	11	0	0	11	2	77	7	86	0	0	5	5	3	83	1	87	189
11:45 AM	12	0	2	14	2	98	19	119	1	1	2	4	8	86	0	94	231
Total	38	0	6	44	13	330	42	385	1	1	12	14	13	354	3	370	813
12:00 PM	21	0	8	29	6	91	9	106	0	0	1	1	1	88	1	90	226
12:15 PM	24	0	3	27	6	90	15	111	1	0	6	7	4	75	1	80	225
12:30 PM	9	0	1	10	2	97	12	111	3	0	1	4	0	100	0	100	225
12:45 PM	16	0	2	18	2	85	8	95	1	0	1	2	2	94	0	96	211
Total	70	0	14	84	16	363	44	423	5	0	9	14	7	357	2	366	887
01:00 PM	12	0	1	13	5	83	7	95	1	0	6	7	0	89	2	91	206
01:15 PM	12	0	0	12	3	96	9	108	1	0	3	4	0	93	0	93	217

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4661 Marlberry Place
Lexington, KY 40509
859.361.2589
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File Name : KYTC_D6_-_Boone_-_KY536_at_Highland_197961_11-13-2014
Site Code : Church Entrance
Start Date : 11/13/2014
Page No : 2

Groups Printed- Cars - Trucks

	Highland Dr - Chruch From North				KY536 - Mt Zion Road From East				Highland Dr From South				KY536 - Mt Zion Road From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:30 PM	9	0	5	14	5	109	7	121	2	0	1	3	1	91	0	92	230
01:45 PM	9	0	1	10	4	100	8	112	0	0	5	5	2	98	0	100	227
Total	42	0	7	49	17	388	31	436	4	0	15	19	3	371	2	376	880
02:00 PM	5	0	3	8	3	104	5	112	0	0	3	3	3	96	0	99	222
02:15 PM	7	0	2	9	1	123	12	136	2	0	4	6	0	102	2	104	255
02:30 PM	9	0	3	12	5	133	9	147	0	0	4	4	1	110	1	112	275
02:45 PM	10	0	2	12	5	160	8	173	0	0	3	3	3	105	2	110	298
Total	31	0	10	41	14	520	34	568	2	0	14	16	7	413	5	425	1050
03:00 PM	16	0	0	16	6	197	7	210	2	0	5	7	3	108	2	113	346
03:15 PM	11	0	2	13	6	198	11	215	0	0	4	4	2	102	2	106	338
03:30 PM	5	0	4	9	13	190	13	216	3	0	6	9	2	122	2	126	360
03:45 PM	9	0	3	12	3	224	21	248	2	0	2	4	4	121	1	126	390
Total	41	0	9	50	28	809	52	889	7	0	17	24	11	453	7	471	1434
04:00 PM	9	0	4	13	6	213	17	236	3	0	5	8	3	124	1	128	385
04:15 PM	8	0	1	9	12	242	15	269	3	0	6	9	5	117	0	122	409
04:30 PM	9	0	5	14	10	230	17	257	3	0	5	8	5	107	3	115	394
04:45 PM	6	0	3	9	5	247	15	267	1	0	5	6	3	110	1	114	396
Total	32	0	13	45	33	932	64	1029	10	0	21	31	16	458	5	479	1584
05:00 PM	12	0	3	15	12	296	27	335	2	0	7	9	5	130	0	135	494
05:15 PM	9	0	6	15	18	307	41	366	0	0	7	7	8	126	4	138	526
05:30 PM	9	1	5	15	11	307	54	372	0	0	6	6	31	155	0	186	579
05:45 PM	13	0	7	20	11	242	46	299	0	0	6	6	18	127	2	147	472
Total	43	1	21	65	52	1152	168	1372	2	0	26	28	62	538	6	606	2071
06:00 PM	8	0	4	12	10	226	29	265	0	0	7	7	4	132	1	137	421
06:15 PM	10	0	4	14	3	211	17	231	1	0	5	6	2	104	0	106	357
06:30 PM	15	0	2	17	4	202	15	221	1	0	4	5	2	117	2	121	364
06:45 PM	11	0	3	14	13	161	25	199	0	0	2	2	2	100	3	105	320
Total	44	0	13	57	30	800	86	916	2	0	18	20	10	453	6	469	1462
Grand Total	569	5	151	725	252	6436	638	7326	47	4	219	270	160	6317	46	6523	14844
Apprch %	78.5	0.7	20.8		3.4	87.9	8.7		17.4	1.5	81.1		2.5	96.8	0.7		
Total %	3.8	0	1	4.9	1.7	43.4	4.3	49.4	0.3	0	1.5	1.8	1.1	42.6	0.3	43.9	
Cars	556	4	143	703	245	6282	622	7149	40	4	212	256	157	6159	41	6357	14465
% Cars	97.7	80	94.7	97	97.2	97.6	97.5	97.6	85.1	100	96.8	94.8	98.1	97.5	89.1	97.5	97.4
Trucks	13	1	8	22	7	154	16	177	7	0	7	14	3	158	5	166	379
% Trucks	2.3	20	5.3	3	2.8	2.4	2.5	2.4	14.9	0	3.2	5.2	1.9	2.5	10.9	2.5	2.6

Cummins Consulting Services, PLLC

4661 Marlberry Place
Lexington, KY 40509
859.361.2589
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File Name : KYTC_D6_-_Boone_-_KY536_at_Berberich_Drive_197964_11-13-2014
Site Code : Krogers
Start Date : 11/13/2014

Groups Printed- Cars - Trucks

	Berberich Drive From North				KY536 - Mt Zion Road From East				Lakeside Drive From South				KY536 - Mt Zion Road From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	2	0	7	9	0	175	2	177	3	1	0	4	8	145	5	158	348
07:15 AM	1	0	7	8	0	184	5	189	6	1	2	9	2	167	8	177	383
07:30 AM	1	0	7	8	0	159	9	168	10	1	1	12	7	159	1	167	355
07:45 AM	0	0	4	4	0	158	7	165	3	0	2	5	3	172	5	180	354
Total	4	0	25	29	0	676	23	699	22	3	5	30	20	643	19	682	1440
08:00 AM	2	0	2	4	0	180	7	187	7	1	1	9	6	157	5	168	368
08:15 AM	3	0	4	7	0	174	6	180	2	0	1	3	7	171	5	183	373
08:30 AM	1	0	7	8	0	159	5	164	2	0	0	2	8	141	4	153	327
08:45 AM	1	0	3	4	0	156	6	162	4	0	1	5	0	127	3	130	301
Total	7	0	16	23	0	669	24	693	15	1	3	19	21	596	17	634	1369
09:00 AM	3	0	6	9	0	116	2	118	2	1	0	3	3	105	1	109	239
09:15 AM	0	0	6	6	0	111	3	114	2	0	1	3	5	91	0	96	219
09:30 AM	3	0	4	7	2	115	7	124	3	0	0	3	5	104	3	112	246
09:45 AM	2	0	5	7	2	101	6	109	1	1	1	3	10	110	2	122	241
Total	8	0	21	29	4	443	18	465	8	2	2	12	23	410	6	439	945
10:00 AM	5	0	9	14	0	128	1	129	2	0	0	2	5	104	0	109	254
10:15 AM	4	1	11	16	0	126	3	129	1	0	0	1	7	97	2	106	252
10:30 AM	1	0	5	6	1	131	4	136	2	0	0	2	7	83	0	90	234
10:45 AM	3	0	9	12	0	116	3	119	4	0	0	4	4	108	3	115	250
Total	13	1	34	48	1	501	11	513	9	0	0	9	23	392	5	420	990
11:00 AM	2	0	7	9	0	124	4	128	0	0	3	3	11	97	2	110	250
11:15 AM	4	0	12	16	0	127	3	130	4	0	0	4	11	105	5	121	271
11:30 AM	3	0	11	14	3	142	6	151	1	3	1	5	13	117	4	134	304
11:45 AM	10	0	8	18	0	155	8	163	2	0	0	2	13	127	3	143	326
Total	19	0	38	57	3	548	21	572	7	3	4	14	48	446	14	508	1151
12:00 PM	11	0	6	17	2	162	14	178	0	1	0	1	9	130	4	143	339
12:15 PM	10	0	9	19	1	120	11	132	1	0	2	3	10	142	5	157	311
12:30 PM	4	0	5	9	0	144	5	149	4	0	0	4	11	143	3	157	319
12:45 PM	9	2	6	17	2	142	4	148	4	0	0	4	6	169	2	177	346
Total	34	2	26	62	5	568	34	607	9	1	2	12	36	584	14	634	1315
01:00 PM	8	1	11	20	0	117	3	120	4	0	2	6	12	141	6	159	305
01:15 PM	3	0	14	17	1	119	4	124	2	1	3	6	15	146	2	163	310

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4661 Marlberry Place
Lexington, KY 40509
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File Name : KYTC_D6_-_Boone_-_KY536_at_Berberich_Drive_197964_11-13-2014
Site Code : Krogers
Start Date : 11/13/2014
Page No : 2

Groups Printed- Cars - Trucks

	Berberich Drive From North				KY536 - Mt Zion Road From East				Lakeside Drive From South				KY536 - Mt Zion Road From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:30 PM	7	0	10	17	1	129	9	139	3	0	0	3	8	153	5	166	325
01:45 PM	6	1	9	16	1	129	3	133	1	1	0	2	11	140	8	159	310
Total	24	2	44	70	3	494	19	516	10	2	5	17	46	580	21	647	1250
02:00 PM	6	0	10	16	1	170	2	173	4	2	1	7	13	130	2	145	341
02:15 PM	8	0	3	11	2	136	4	142	1	0	2	3	11	143	6	160	316
02:30 PM	5	0	11	16	1	174	5	180	4	0	0	4	13	166	3	182	382
02:45 PM	2	1	8	11	2	131	4	137	2	0	0	2	13	171	15	199	349
Total	21	1	32	54	6	611	15	632	11	2	3	16	50	610	26	686	1388
03:00 PM	10	0	10	20	0	153	8	161	3	2	1	6	13	162	10	185	372
03:15 PM	7	0	16	23	4	150	3	157	6	0	4	10	9	180	9	198	388
03:30 PM	6	1	13	20	2	178	9	189	5	0	0	5	9	162	10	181	395
03:45 PM	9	0	17	26	2	136	2	140	4	1	0	5	8	171	20	199	370
Total	32	1	56	89	8	617	22	647	18	3	5	26	39	675	49	763	1525
04:00 PM	4	0	16	20	1	223	6	230	5	0	1	6	17	156	10	183	439
04:15 PM	7	0	22	29	5	183	4	192	4	0	2	6	14	184	16	214	441
04:30 PM	7	1	20	28	3	181	9	193	9	1	4	14	14	165	23	202	437
04:45 PM	7	1	18	26	3	182	16	201	6	0	1	7	20	180	20	220	454
Total	25	2	76	103	12	769	35	816	24	1	8	33	65	685	69	819	1771
05:00 PM	6	0	27	33	4	210	5	219	4	0	3	7	12	168	17	197	456
05:15 PM	3	0	11	14	5	194	16	215	6	0	2	8	17	172	36	225	462
05:30 PM	8	0	13	21	6	151	7	164	4	1	1	6	7	173	28	208	399
05:45 PM	3	0	13	16	1	161	6	168	2	1	2	5	10	172	8	190	379
Total	20	0	64	84	16	716	34	766	16	2	8	26	46	685	89	820	1696
06:00 PM	2	2	12	16	4	183	9	196	6	1	1	8	10	173	7	190	410
06:15 PM	11	0	10	21	2	154	2	158	3	2	2	7	13	172	7	192	378
06:30 PM	7	1	20	28	1	140	2	143	3	2	2	7	12	155	10	177	355
06:45 PM	10	1	9	20	2	122	1	125	2	1	1	4	10	146	5	161	310
Total	30	4	51	85	9	599	14	622	14	6	6	26	45	646	29	720	1453
Grand Total	237	13	483	733	67	7211	270	7548	163	26	51	240	462	6952	358	7772	16293
Apprch %	32.3	1.8	65.9		0.9	95.5	3.6		67.9	10.8	21.2		5.9	89.4	4.6		
Total %	1.5	0.1	3	4.5	0.4	44.3	1.7	46.3	1	0.2	0.3	1.5	2.8	42.7	2.2	47.7	
Cars	234	13	475	722	67	6419	260	6746	161	23	47	231	451	6120	343	6914	14613
% Cars	98.7	100	98.3	98.5	100	89	96.3	89.4	98.8	88.5	92.2	96.2	97.6	88	95.8	89	89.7
Trucks	3	0	8	11	0	792	10	802	2	3	4	9	11	832	15	858	1680
% Trucks	1.3	0	1.7	1.5	0	11	3.7	10.6	1.2	11.5	7.8	3.8	2.4	12	4.2	11	10.3

KYTC 6-14.00 - Reconstruction of the KY 536 Interchange with I-71/I-75, Boone County

2014 Hourly Traffic Counts

KY 536 at Highland Drive/Tiburon Drive*	Eastbound (KY 536)			Westbound (KY 536)			Northbound (Tiburon)			Southbound (Highland)		
Period	Left	Thru	Rt	Left	Thru	Rt	Left	Thru	Rt	Left	Thru	Rt
7:00 AM	4	1195	6	33	299	26	9	1	141	83	1	24
8:00 AM	10	823	15	36	302	27	12	0	105	67	0	14
9:00 AM	13	525	6	25	261	33	13	2	60	43	3	12
10:00 AM	4	377	3	30	280	31	13	0	55	35	0	8
11:00 AM	13	354	10	46	330	42	5	1	53	38	0	6
12:00 PM	7	357	12	46	363	44	8	0	32	70	0	14
1:00 PM	3	371	7	47	388	31	7	0	45	42	0	7
2:00 PM	7	413	21	59	520	34	9	0	63	31	0	10
3:00 PM	11	453	14	61	809	52	11	0	57	41	0	9
4:00 PM	16	458	12	66	932	64	14	0	60	32	0	13
5:00 PM	62	538	16	83	1152	168	5	0	51	43	1	21
6:00 PM	10	453	16	61	800	86	5	0	42	44	0	13

*Note: Assumes Highland Drive south is connected to Tiburon Drive as proposed in KYTC Item No. 6-158.00.

KY 536 at Berberich Drive	Eastbound (KY 536)			Westbound (KY 536)			Northbound (Berberich)			Southbound (Berberich)		
Period	Left	Thru	Rt	Left	Thru	Rt	Left	Thru	Rt	Left	Thru	Rt
7:00 AM	20	643	19	0	676	23	22	3	5	4	0	25
8:00 AM	21	596	17	0	669	24	15	1	3	7	0	16
9:00 AM	23	410	6	4	443	18	8	2	2	8	0	21
10:00 AM	23	392	5	1	501	11	9	0	0	13	1	34
11:00 AM	48	446	14	3	548	21	7	3	4	19	0	38
12:00 PM	36	584	14	5	568	34	9	1	2	34	2	26
1:00 PM	46	580	21	3	494	19	10	2	5	24	2	44
2:00 PM	50	610	26	6	611	15	11	2	3	21	1	32
3:00 PM	39	675	49	8	617	22	18	3	5	32	1	56
4:00 PM	65	685	69	12	769	35	24	1	8	25	2	76
5:00 PM	46	685	89	16	716	34	16	2	8	20	0	64
6:00 PM	45	646	29	9	599	14	14	6	6	30	4	51

Warrants Summary

Information			
Analyst	BEA	Intersection	Berberich Dr
Agency/Co	Stantec	Jurisdiction	KYTC D6
Date Performed	11/10/2015	Units	U.S. Customary
Project ID	6-14 - KY 536 Interchange	Time Period Analyzed	2014 Peak
East/West Street	KY 536 (Mt. Zion Road)	North/South Street	Berberich Dr.
File Name	KY 536_Berberich.xhy	Major Street	East-West

Project Description *6-14 - KY 536 Interchange*

General				Roadway Network	
Major Street Speed (mph)	45	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	700	☑	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	3	1	1	2	0	0	1	0	0	1	0
Lane usage	L	T	R	L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	38	579	29	5	600	22	13	2	4	19	1	40
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☑
1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☑
6. Degree of Platooning (Predominant direction or both directions)	☑
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐
7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Warrants Summary

Information			
Analyst	BEA	Intersection	Tiburon Dr
Agency/Co	Stantec	Jurisdiction	KYTC D6
Date Performed	11/10/2015	Units	U.S. Customary
Project ID	6-14 - KY 536 Interchange	Time Period Analyzed	2014 Peak
East/West Street	KY 536 (Mt. Zion Road)	North/South Street	Tiburon/Highland Dr.
File Name	KY 536_Tiburon-Highland.xhy	Major Street	East-West

Project Description *6-14 - KY 536 Interchange*

General				Roadway Network	
Major Street Speed (mph)	45	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	700	☑	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	18

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	3	0	1	3	1	0	1	0	0	1	0
Lane usage	L	TR		L	T	R		LTR			LTR	
Vehicle Volume Averages (vph)	13	526	11	49	536	53	9	0	63	47	0	12
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☑
1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☑
6. Degree of Platooning (Predominant direction or both directions)	☑
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑
Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

TO: Bob Yeager, P.E.
Chief District Engineer
District 6 – Covington

ATTENTION: James Minckley, P.E.
TEBM – Engineering Support

Nick Reis, P.E.
District Traffic Engineer

FROM: Tim Tharpe, P.E.
TEBM – Traffic Engineering
Division of Traffic Operations

DATE: July 6, 2018

SUBJECT: Boone County
06-14.00
Traffic Signal Installations/Modifications

We have received approval from the State Highway Engineer's office to install traffic signals as part of the subject project. Below is a summary of the modifications at each location.

KY 536 @ Tiburon/Highland Drive

- This is a new signal.
- Protected-only phasing on KY 536.

KY 536 @ I-75 SB & KY 536 @ I-75 NB

- DCD interchange.
- Signal phasing is unconventional, see attached phasing diagram for phase number assignments.
- Rights on red will be prohibited.
- 4 signal heads will be utilized on KY 536, with a supplemental head mounted to the side on a separate pole.

KY 536 @ Biltmore Blvd

- It is our understanding that this signal was planned to be removed with the project and the intersection be converted to a right-in/right-out. However, due to political pressure, the signal will remain.
- This intersection will have restricted movements. Westbound lefts will not be allowed, and the southern side of Biltmore Blvd will be right-in/right-out.
- The EB through movement will have a continuous green indication.
- The EB left turns will be built to accommodate dual lefts, but will be striped to operate as a single left initially. This will operate as protected-only by time-of-day with the following times:
    - Monday-Friday 6:00am – 7:00pm
    - All other times will be protected/permitted

KY 536 @ Sam Neace Drive (KY 3503)/Investment Way

- Left turn phasing on KY 536 is changing from protected/permitted to protected-only. This will not operate with a time-of-day flashing yellow arrow due to sight distance concerns.
- Side streets will remain split-phased.

KY 536 @ Berberich Drive

- This is a new signal.
- Protected-only phasing on KY 536.

KY 536 @ US 25

- Dual lefts are being added on KY 536. The left turn phasing will change to protected-only on KY 536.

Attached you will find Traffic Signal Checklists to assist in the design of these signals. If you have any questions or comments, please feel free to contact us.

TDT:LKB
Attachments

C: Carol Callan-Ramler, Project Manager

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ Tiburon/Highland MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 6/11/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 5

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Tiburon/Highland SPEED 25 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

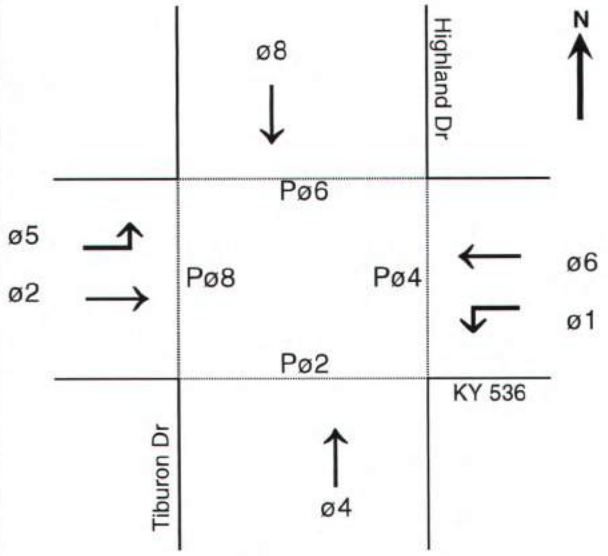
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X		X	X	X		X
PED PHASES	5		X		X		X		X
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ I-75 SB Ramp MILEPOINT 13.279

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 5/14/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME I-75 SB Ramp SPEED ____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

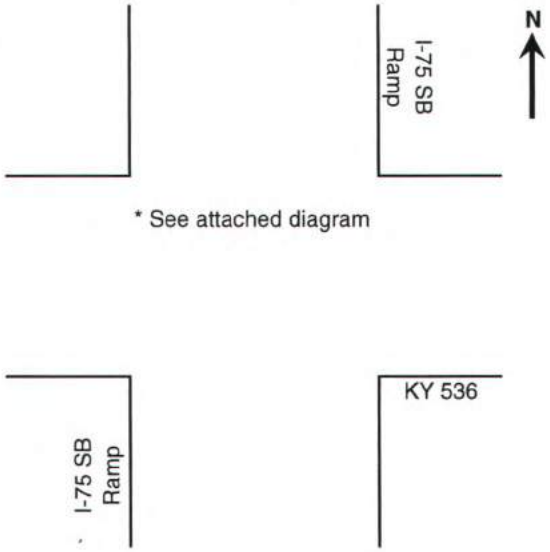
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	Loop	6' x 30'	0 feet
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

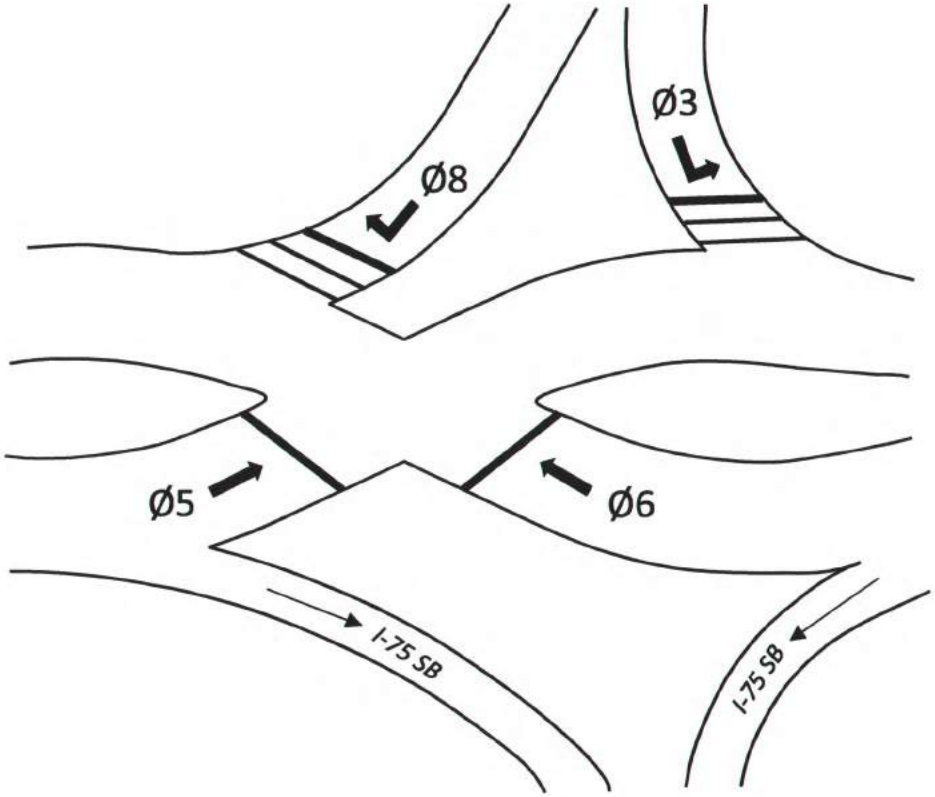
FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0								
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4								
PED PHASES	5								
LEAD PHASES	6								
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9								
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



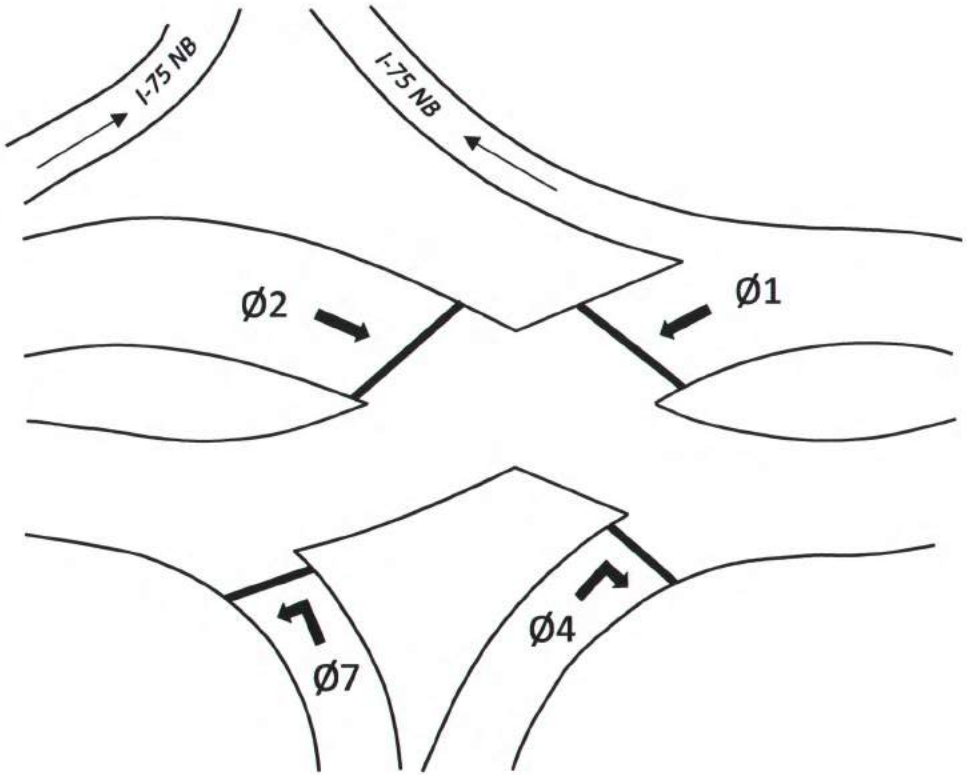
PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

KY 536 @ I-75 SB Ramp



KY 536 @ I-75 NB Ramp



Kentucky Transportation Cabinet
Division of Traffic Operations

Traffic Signal Checklist (Automated)

TC 72-4
03/2017

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ I-75 NB Ramp MILEPOINT 13.456

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 5/14/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[X] BACKPLATES
[X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK
[ ] COUNTDOWN
[ ] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME I-75 NB Ramp SPEED _____ MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[X] BACKPLATES
[X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK
[ ] COUNTDOWN
[ ] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

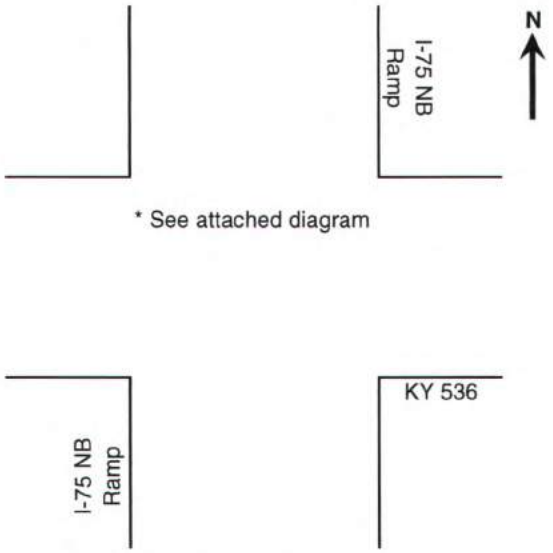
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	Loop	6' x 30'	0 feet
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

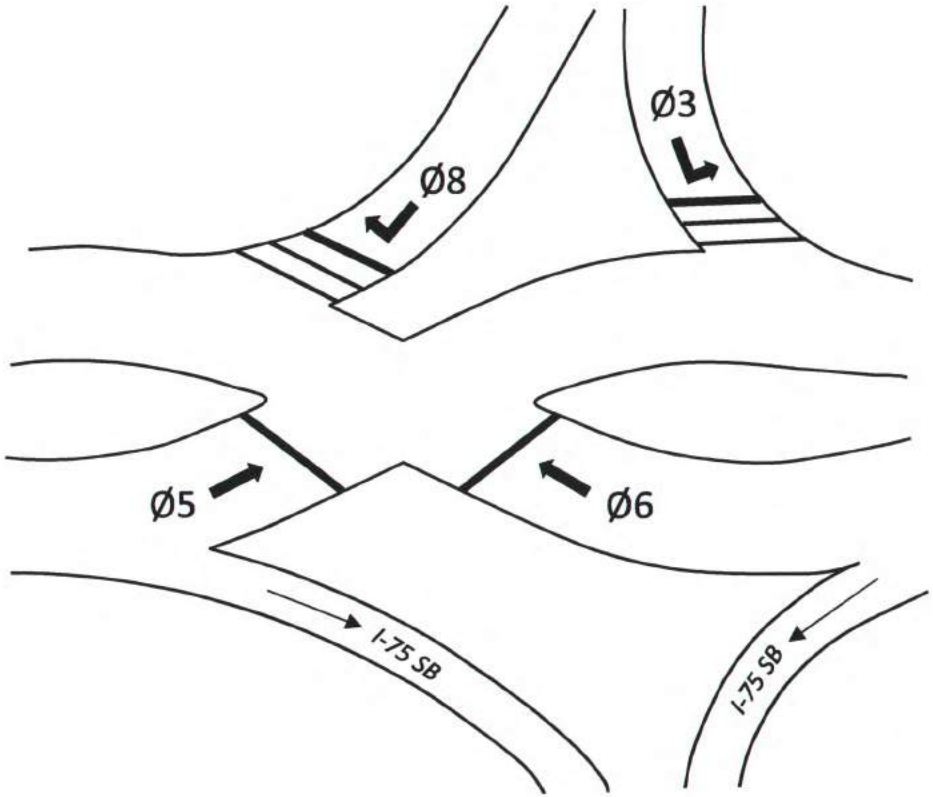
FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0								
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4								
PED PHASES	5								
LEAD PHASES	6								
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9								
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



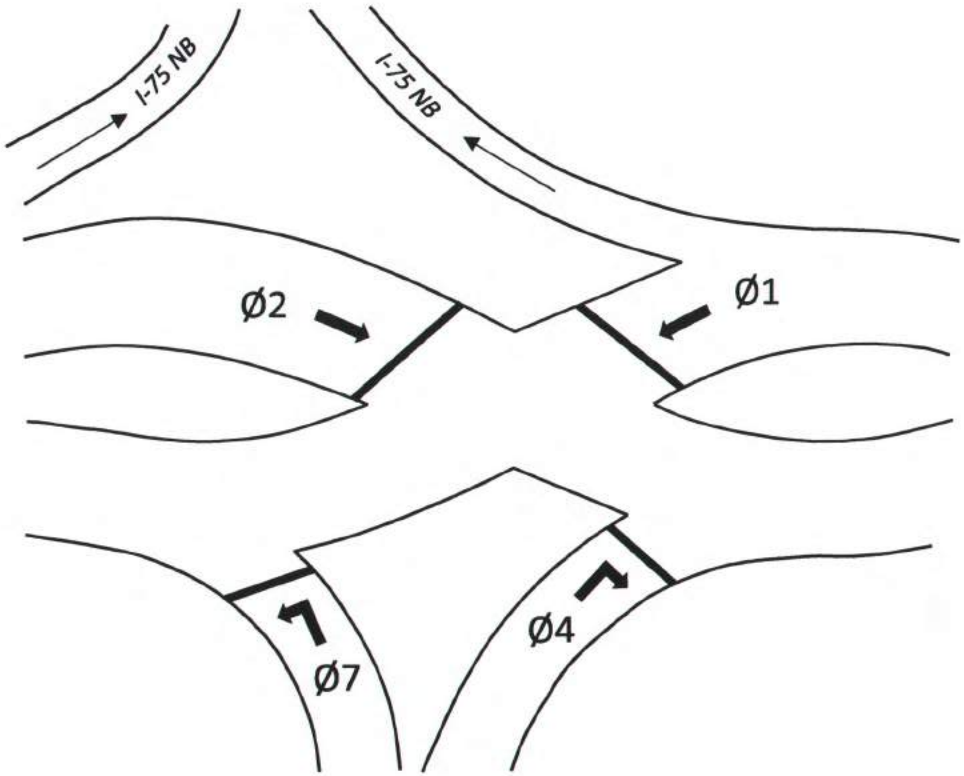
PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

KY 536 @ I-75 SB Ramp



KY 536 @ I-75 NB Ramp



Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ Biltmore Blvd MILEPOINT 13.597

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 5/14/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[X] N[ ]
- 4-SECTION (w/GREEN ARROW) 5
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER *Install a vertical green arrow over each of the eastbound through lanes. These heads will stay green at all times.

SIDE STREET, APPROACH NAME Biltmore Blvd SPEED ____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

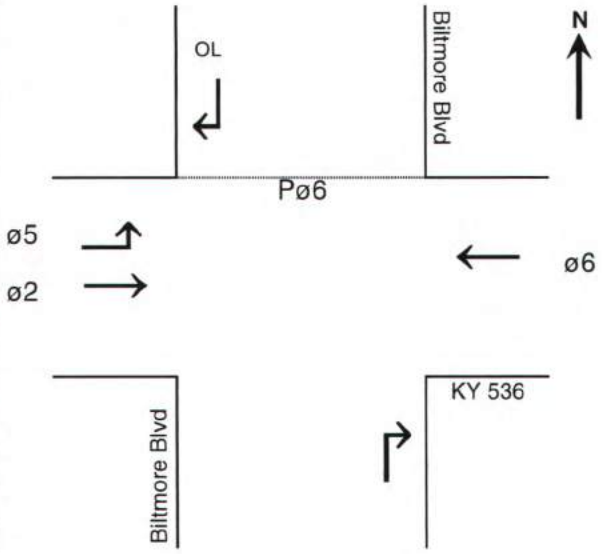
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	Loop	6' x 30'	0 feet
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
CRITICAL GRADE ____ %
NEAR LOOP ____ FEET FROM STOP BAR
VEHICLE INTERVAL ____ SECONDS
FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X			X	X		
PED PHASES	5						X		
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A					X			
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key)

(Timing Provided by the District Traffic Engineer)

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ Sam Neace Dr MILEPOINT 13.748

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 5/14/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 8

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER

SIDE STREET, APPROACH NAME Sam Neace Dr SPEED ____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

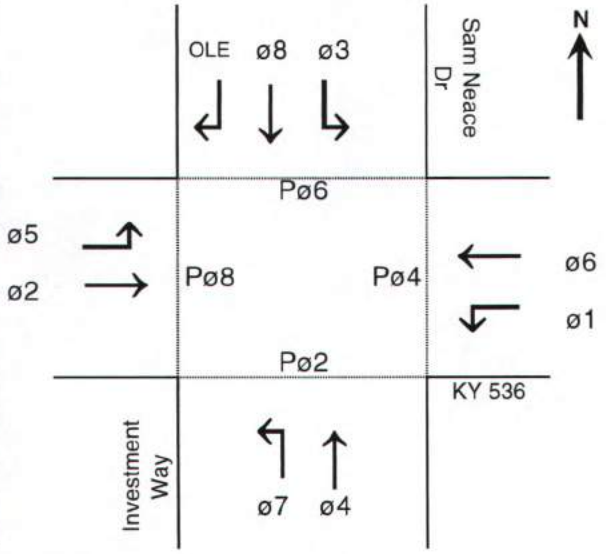
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X	X	X	X	X	X	X
PED PHASES	5		X		X		X		X
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E				X				X
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ Berberich Dr. MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 6/11/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 5

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Berberich Dr. SPEED ____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

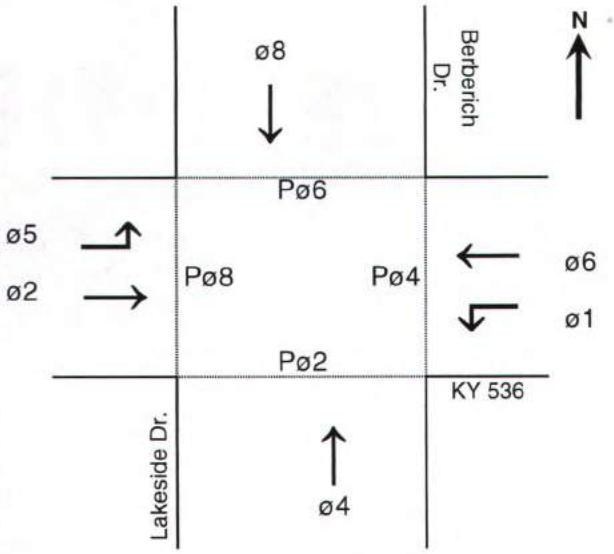
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X		X	X	X		X
PED PHASES	5		X		X		X		X
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE July 6, 2018 COUNTY Boone CITY Florence

INTERSECTION KY 536 @ US 25 MILEPOINT 14.174

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 5/14/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 8

PROT/PERM PHASES 3, 7

FLASHING YELLOW ARROW Y [X] N [ ]
- 4-SECTION (w/GREEN ARROW) 3, 7
- 3-SECTION (NO GREEN ARROW)

GES Y [ ] N [X]
- ON PHASES

ADVANCED WARNING FLASHER Y [ ] N [X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y [ ] N [X]
- ON PHASES

EMERGENCY PREEMPTION Y [ ] N [X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 536 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[X] BACKPLATES
[X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK
[X] COUNTDOWN
[X] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME US 25 SPEED 45 MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[X] BACKPLATES
[X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK
[ ] COUNTDOWN
[ ] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

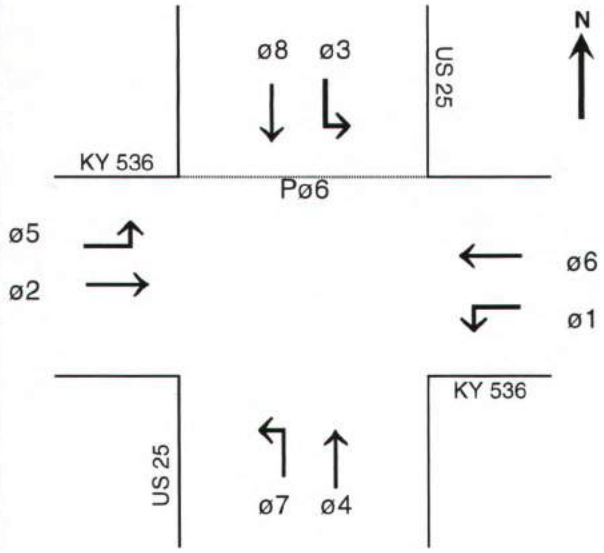
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X	X	X	X	X	X	X
PED PHASES	5						X		
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Matthew G. Bevin
Governor

Greg Thomas
Secretary

TO: Andy Barber, P.E.
State Highway Engineer

FROM: R. Jeffrey Wolfe, P.E.
Director
Division of Traffic Operations

DATE: May 17, 2018

SUBJECT: Boone County
06-14.00
KY 536 @ Tiburon/Highland Dr.
KY 536 @ Berberich Dr.
Traffic Signal Requests

We request your approval to construct traffic signals at the subject intersections as part of the upcoming construction project. This project will be constructing a Double Crossover Diamond interchange at I-75 and will be widening KY 536 to 6 lanes at these intersections. The project team and local officials are in support of traffic signals at these intersections.

If you agree, please notify us and we will advise the District Office. If you have any questions regarding this matter, please let us know.

APPROVE DATE 6.11.18 DISAPPROVE DATE

RJW:LKB

Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

TO: Andy Barber, P.E.
State Highway Engineer

FROM: R. Jeffrey Wolfe, P.E.
Director
Division of Traffic Operations

DATE: May 17, 2018

SUBJECT: Boone County
06-14.00
KY 536 @ Tiburon/Highland Dr.
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Traffic Signal Requests

We request your approval to construct traffic signals at the subject intersections as part of the upcoming construction project. This project will be constructing a Double Crossover Diamond interchange at I-75 and will be widening KY 536 to 6 lanes at these intersections. The project team and local officials are in support of traffic signals at these intersections.

If you agree, please notify us and we will advise the District Office. If you have any questions regarding this matter, please let us know.

APPROVE 6.11.18 DATE

DISAPPROVE DATE

RJW:LKB

Boone County

KYTC Item 6-18
Reconstruction of KY 338 Interchange with I-71/ I-75
Project Traffic Data

Prepared for:
Florence & Hutcheson, Inc.
Parsons

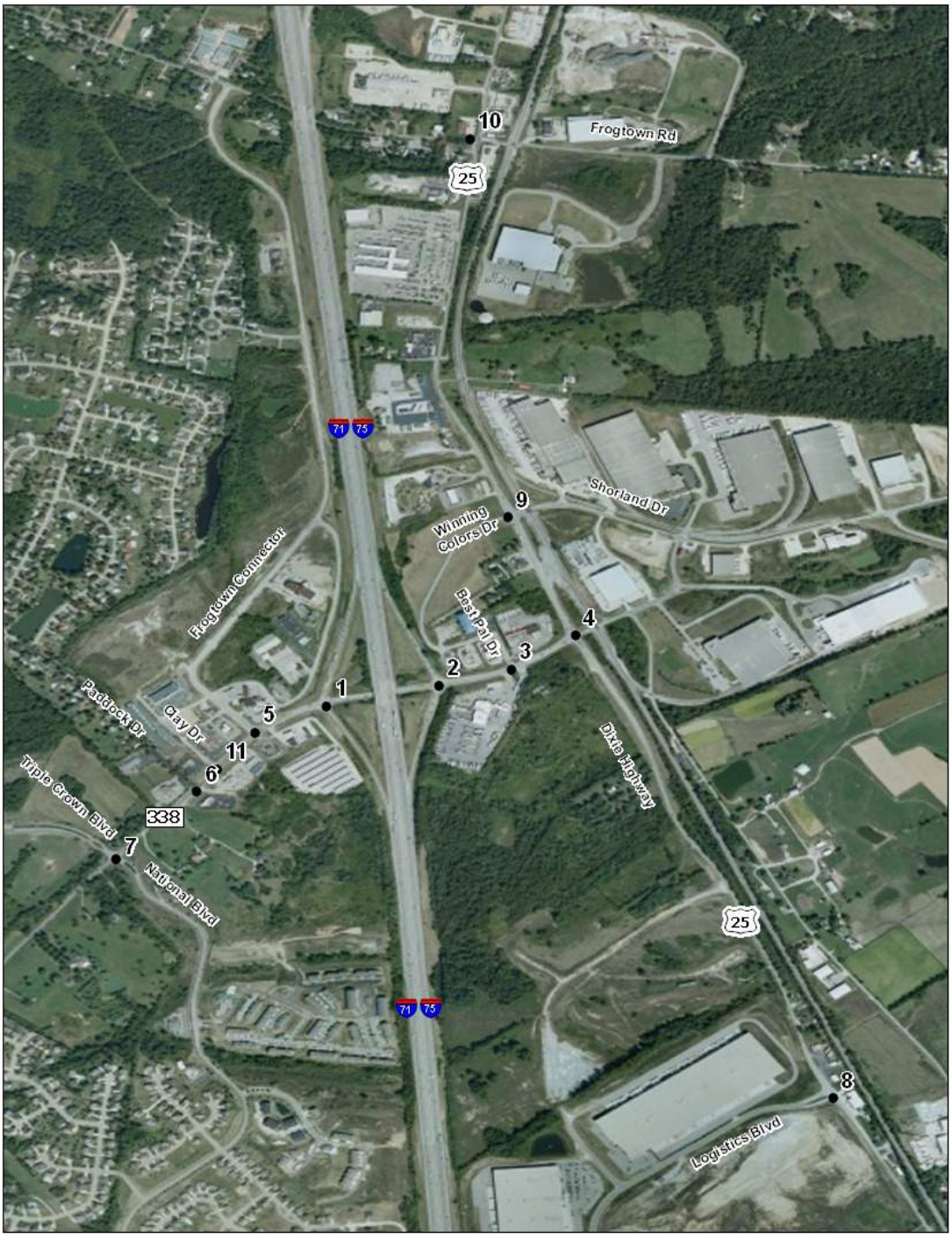
Prepared by:
The Corradino Group

January 18, 2012

Project Description

KYTC Item 6-18 will widen KY 338 (Richwood Road) from west of Triple Crown Boulevard to US 25 (Dixie Highway). Improvements include the reconstruction of the existing KY 338 traditional diamond interchange with I-71/I-75 to a diverging diamond interchange (DDI) and the reconstruction of the existing KY 338/US 25 signalized intersection to an interchange. This report assembles and balances traffic data from available sources and provides design-level 2011 and 2030 turning movement counts and ADT counts for the eleven intersections identified in Figure 1.

Figure 1 – Study Area



Methodology

Traffic data was primarily obtained from the following four sources:

1. *2006 Interchange Justification Study for I-71/I-75 at KY 536 and KY 338* **(IJS)**, prepared by HNTB Corporation;
2. *2008 Boone County US 25 Widening Traffic Forecasts Item No. 6-351.00* **(ENTRAN)**, prepared by ENTRAN ;
3. Turning Movement Counts, collected by Southern Traffic Services, Inc. in May 2008; and
4. Turning Movement Counts, collected by Florence & Hutcheson, Inc. in September 2011.
5. Current ADT counts from KYTC count stations **(KYTC Counts)**

Existing and Future Peak Periods

The data includes base year volumes, 2006 or 2008, and 2030 forecast year volumes. None of the studies provided traffic data for the entire study area, so turning movement counts from each of the study and raw count data sources were plotted on a single map encompassing the entire study area, so that the data could be easily compared to determine the priority to be placed on each data source. Table 1 summarizes the available data source(s) for each intersection.

Table 1 – Sources of Turning Movement Data

Intersections	Available Turning Movement Count Data					
	Existing			Future 2030		
	AM Peak	PM Peak	% Trucks	AM Peak	PM Peak	% Trucks
1-KY 338 at SB I-71/I-75 Ramp	2006 IJS 2008 ENTRAN	2006 IJS 2008 ENTRAN	2006 IJS 2008 ENTRAN	2030 IJS 2030 ENTRAN	2030 IJS 2030 ENTRAN	2030 IJS
2-KY 338 at NB I-71/I-75 Ramp	2006 IJS 2008 ENTRAN	2006 IJS 2008 ENTRAN	2006 IJS 2008 ENTRAN	2030 IJS 2030 ENTRAN	2030 IJS 2030 ENTRAN	2030 IJS
3-KY 338 at Best Pal Drive	2008 ENTRAN	2008 ENTRAN	2007 HNTB 2008 ENTRAN	2030 HNTB 2030 ENTRAN	2030 HNTB 2030 ENTRAN	X
4-KY 338 at US 25	2006 IJS 2006 KYTC 2008 ENTRAN	2006 IJS 2006 KYTC 2008 ENTRAN	2006 KYTC 2007 HNTB 2008 ENTRAN	2030 KYTC 2030 HNTB 2030 ENTRAN	2030 KYTC 2030 HNTB 2030 ENTRAN	2030 KYTC
5-KY 338 at Frogtown Connector	2006 IJS 2008 Southern	2006 IJS 2008 Southern	2006 IJS 2008 Southern	2030 HNTB	2030 HNTB	X
6-KY 338 at Paddock Drive	2008 Southern	2008 Southern	2008 Southern	X	X	X
7-KY 338 at Triple Crown Blvd.	2006 IJS	2006 IJS	X	2030 HNTB	2030 HNTB	X
8-US 25 at Logistics Boulevard	2011 F&H	2011 F&H	2011 F&H	X	X	X
9-US 25 at Winning Colors Dr./Shorland Dr.	2008 ENTRAN	2008 ENTRAN	2008 ENTRAN	X	X	X
10-US 25 at Frogtown Road	2008 ENTRAN	2008 ENTRAN	2008 ENTRAN	X	X	X
11-KY 338 at Clay Drive	X	X	X	X	X	X

The IJS provided 2006 turning movement volumes during the AM and PM peak for five intersections within the study area: KY 338 at the northbound and southbound I-71/I-75 ramps; KY 338 at US 25; KY 338 at Frogtown Connector Road; and KY 338 at Triple Crown Boulevard. The IJS only forecasted 2030 turning movement counts at the KY 338 intersections with the northbound and southbound I-71/I-75 ramps. Likewise, percentage trucks for the 2030 AM and PM peaks were only provided at the KY 338 intersections with the northbound and southbound I-71/I-75 ramps.

The ENTRAN study provided 2008 and 2030 traffic turning movement volumes during the AM and PM peak for five of the intersections within the study area: KY 338 at the northbound and southbound I-71/I-75 ramps; KY 338 at Best Pal Drive/Truck Stop; KY 338 at US 25; and US 25 at Frogtown Road. The study also included growth rates for KY 338 and US 25, as well as mainline truck average daily traffic (ADT) percentages. The ENTRAN study used turning movement counts prepared by Southern Traffic Services, Inc. in May 2008. These turning movement counts included locations not reported in the ENTRAN study; in particular, the intersections of KY 338 at Paddock Drive; KY 338 at Frogtown Connector Road; and US 25 at Winning Colors Drive/Shorland Drive. The Southern Traffic Services, Inc. turning movement data contained counts for vehicles, medium trucks, and heavy trucks and buses.

The data obtained from the 2006 IJS, the 2008 ENTRAN study, and the 2008 turning movement counts prepared by Southern Traffic Services, Inc. covered nine of the eleven intersections within the study area. For the intersection of US 25 at Logistics Blvd, Florence & Hutcheson performed peak period turning movement counts in September 2011. The intersection of KY 338 at Clay Drive is closely bounded by two intersections with existing data. Therefore, no additional counts were taken, and volumes for this intersection were estimated as part of the overall traffic balancing operation.

The *Boone County Traffic Forecast: Widen US 25 from KY 1829 to KY 338 study* was prepared by KYTC in 2006. The study includes AM and PM peak hour turning movement volumes for only one intersection within the study area, the intersection of KY 338 at US 25. This data was not consistent with the IJS and the ENTRAN study; therefore, it was not included as a source in the traffic balancing operation. There were additional traffic volumes produced by HNTB, presumably as part of the effort to prepare the IJS. Because the data did not come from an approved published source, it was not included in the subject traffic balancing operation; however, it was used as a reference to check the reasonableness of the balancing results.

The turning movement volumes from the IJS and the ENTRAN study were identical for 2030 AM and PM peak for intersections where both data sources existed. The base year volumes, 2006 and 2008, were not exact, but very similar given the two-year period between the counts. Because of this, the ENTRAN study data was used for five intersections where it was available (intersections 1, 2, 3, 4, and 10). The Southern Traffic Services data was used at the three intersections not covered by the ENTRAN study (intersections 5, 6, and 9). The IJS was the only available data source for intersection 7 so it was used. Likewise, the Florence & Hutcheson data was used for intersection 8, as it was the only source.

All data from raw data sources such as the Southern Traffic Services, Inc. counts and the Florence & Hutcheson, Inc. counts were adjusted using KYTC adjustment factors for day of the week and month of

the year. Straight-line growth factors from the ENTRAN study were used to grow the 2006 or 2008 counts, depending on the data source, to a 2011 base year and for some of the intersections where 2030 forecasts did not already exist, to 2030. The annual growth factors used for KY 338 were 2.4% (west of I-71/I-75); 2.2% (at I-71/I-75); and 2.1% (east of I-71/I-75). The annual growth factors used for US 25 were 2.9% (south of KY 338) and 3.3% (north of KY 338). For intersections where truck percentages were not available, either for 2006, 2008, or 2030, the ratio of the truck percentages for each movement contained in either the Southern Traffic Services, Inc or the Florence and Hutcheson counts, depending on the location, were applied to the total forecasted volumes to develop truck volumes.

The balancing procedure was initiated once the 2011 and 2030 AM and PM peak total and truck turning movement volumes were established for all eleven intersections within the study area. Since the KY 338 intersections at the northbound and southbound I-71/I-75 ramps are critical to the operation of the interchange, have multiple data sources that exhibited consistency, and are the subject of the Federal Highway Administration (FHWA) approved IJS, traffic volumes were held at these locations and the balancing proceeded in each direction from the interchange. Appendix A contains traffic data for the eleven intersections within the study area for 2011 and 2030. This data includes AM and PM peak period turning movement counts and truck percentages.

Existing and Future ADT

The ADT calculation methodology is a three part process: choose a peak hour from AM and PM peak balanced traffic, calculate a DHV to ADT ratio, and apply the DHV to ADT ratio.

First, the peak hour for each segment selected from the balanced traffic data described in the previous section. The peak hour is the max of the AM peak and PM peak balanced traffic data. The interstate mainline peak hour is an exception, because it was not part of the traffic balancing exercise. The peak hour for the interstate mainline is taken directly from the IJS study.

Second, DHV to ADT ratios are calculated for each major road segment. The sources of data used to calculate the DHV to ADT ratios per segment are presented in Table 2. The DHV used in the calculation is not the peak hour chosen in step one, it is taken directly from the source indicated in the table. The calculated DHV to ADT ratios range from 0.08 to 0.11. The ratios were calculated for the major roads (i.e. KY 338, I-71/I-75, US 25), but not for the minor roads (i.e. Paddock Drive, interstate ramps). The same DHV to ADT is used for existing and future ADT calculations per major road segment.

The third step is to apply the calculated DHV to ADT ratios to the peak hour traffic counts chosen in the first step. For major roads, the ratios are directly applied to the selected peak hour traffic counts. For minor roads, the ratios calculated for the intersecting major roads are applied. If the intersecting major roads' ratios differ, a weighted average of those ratios is applied to the minor road approach. The weighted average is based on the AM and PM peak hour turning movement count proportions.

For example, intersection with Best Pal Drive and the truck stop turning movements show a heavy northbound left and eastbound right. Therefore it can be assumed the traffic on these approaches shares more characteristics with KY 338 west of the intersection than east of the intersection. Appendix B contains the 2011 and 2030 ADT counts.

Table 2 – Sources of Data Used to Calculate DHV to ADT Ratios

Major Road Segments	DHV to ADT Ratio Data Sources		
	DHV	ADT	Calculated DHV/ADT Ratio
KY 338 West of I-71/I-75	2030 ENTRAN	2030 ENTRAN	0.11
KY 338 at I71/I-75	2030 ENTRAN	2030 ENTRAN	0.09
KY 338 from I-71/I-75 to Best Pal Dr	2030 ENTRAN	2030 ENTRAN	0.10
KY 338 from Best Pal Dr to US 25	2030 ENTRAN	2030 ENTRAN	0.08
Richwood Rd East of US 25	2030 ENTRAN	2030 ENTRAN	0.10
US 25 North of KY 338	2030 ENTRAN	2030 ENTRAN	0.09
US 25 South of KY 338	2030 ENTRAN	2030 ENTRAN	0.10
Frogtown Road	2008 ENTRAN	KYTC Counts	0.11
I-71/I-75 at KY 338	2006 IJS	2006 IJS	0.09

Interstate AM Peak and PM Peak

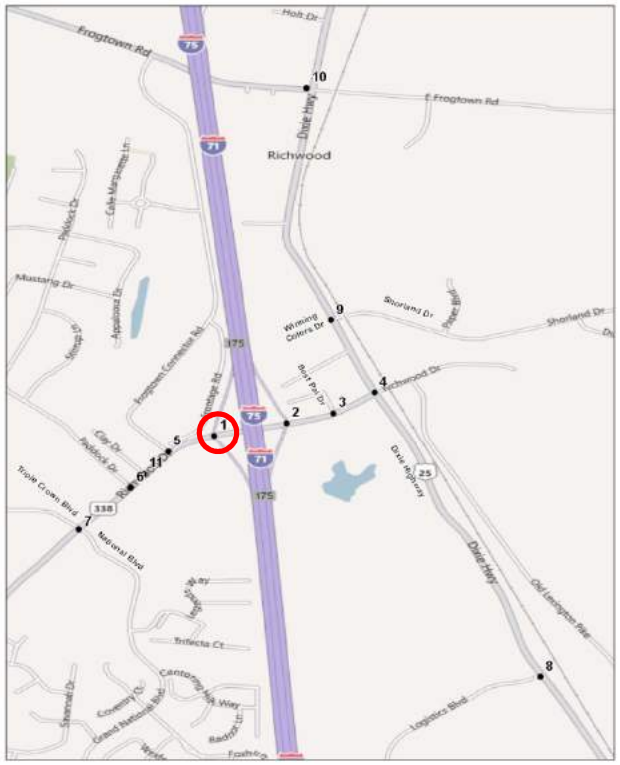
The 2030 AM peak and PM peak for the interstate mainline affect the study area, even though they were not including in the traffic balancing exercise. The directional AM and PM peak counts were published in the IJS and are presented in this report. Appendix C contains the 2030 AM and PM peak counts, including the mainline interstate counts.

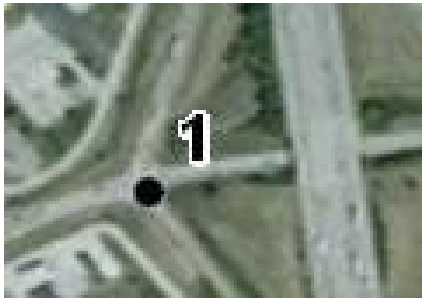
Appendix A

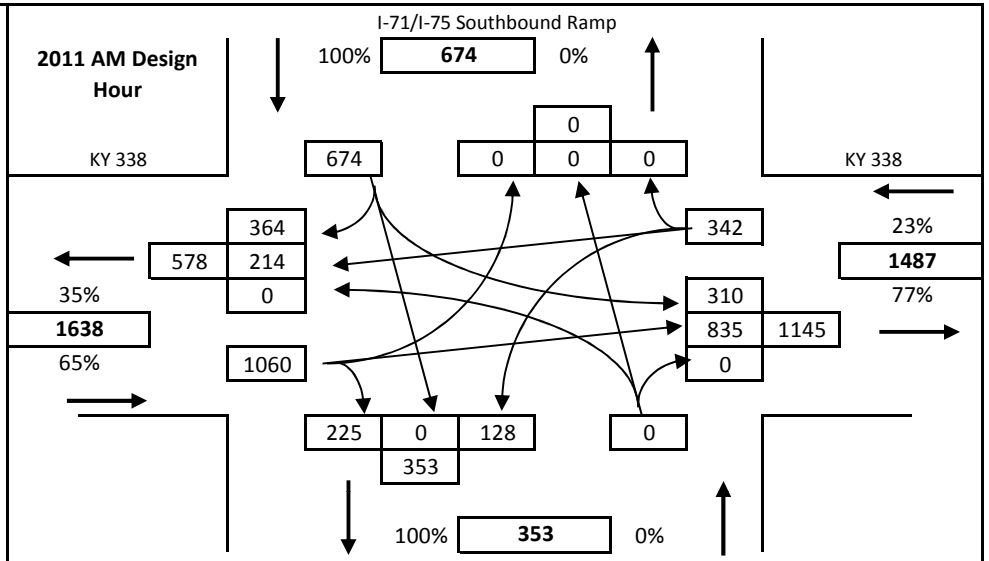
Intersection Turning Movement Counts

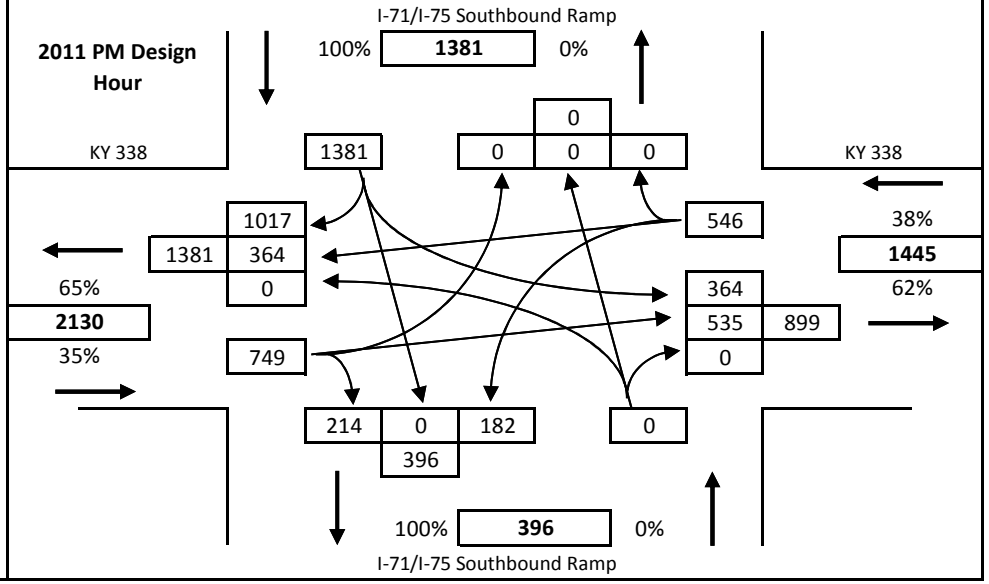
PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75 NOTE:
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 1 - KY 338 at I-71/I-75 Southbound Ramp

Location Map







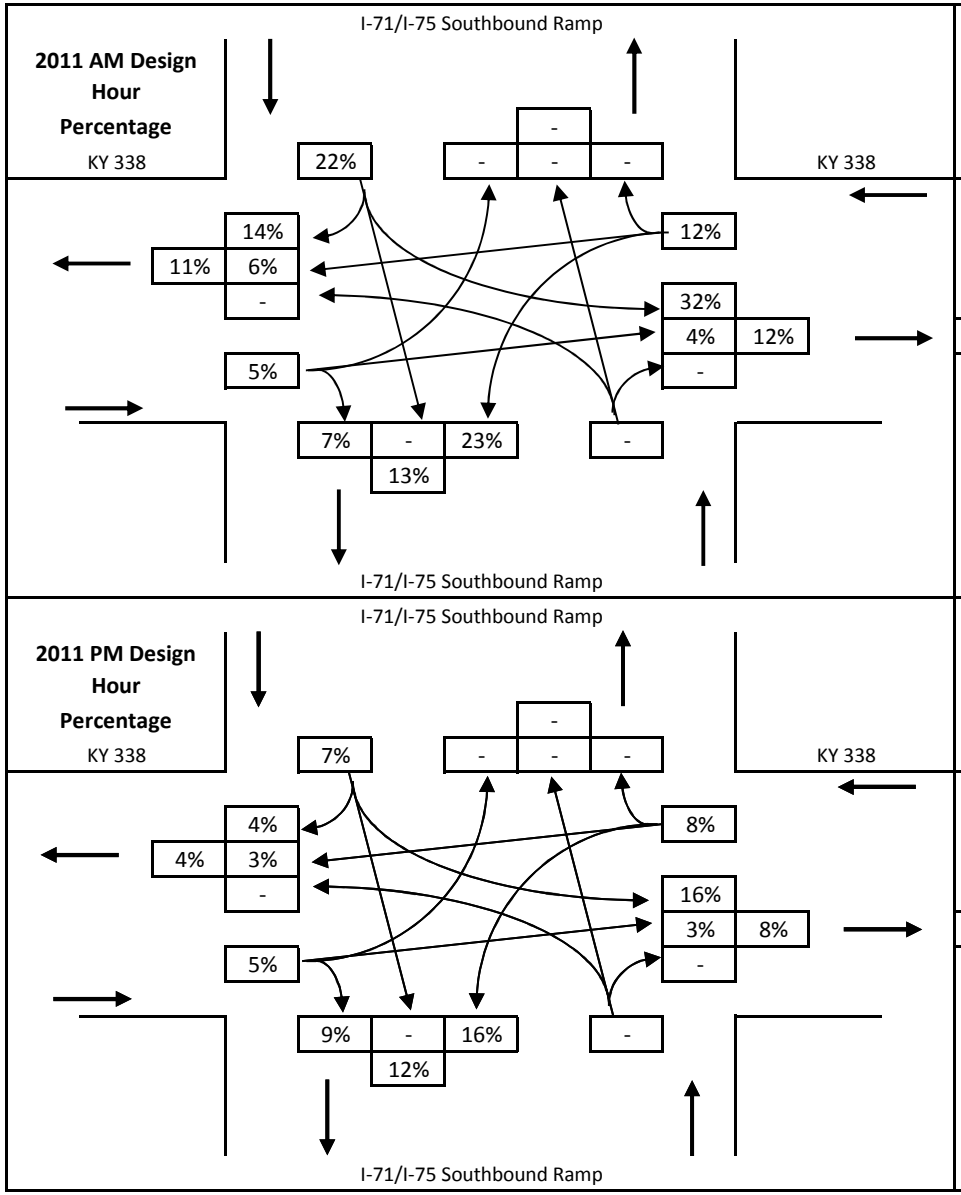


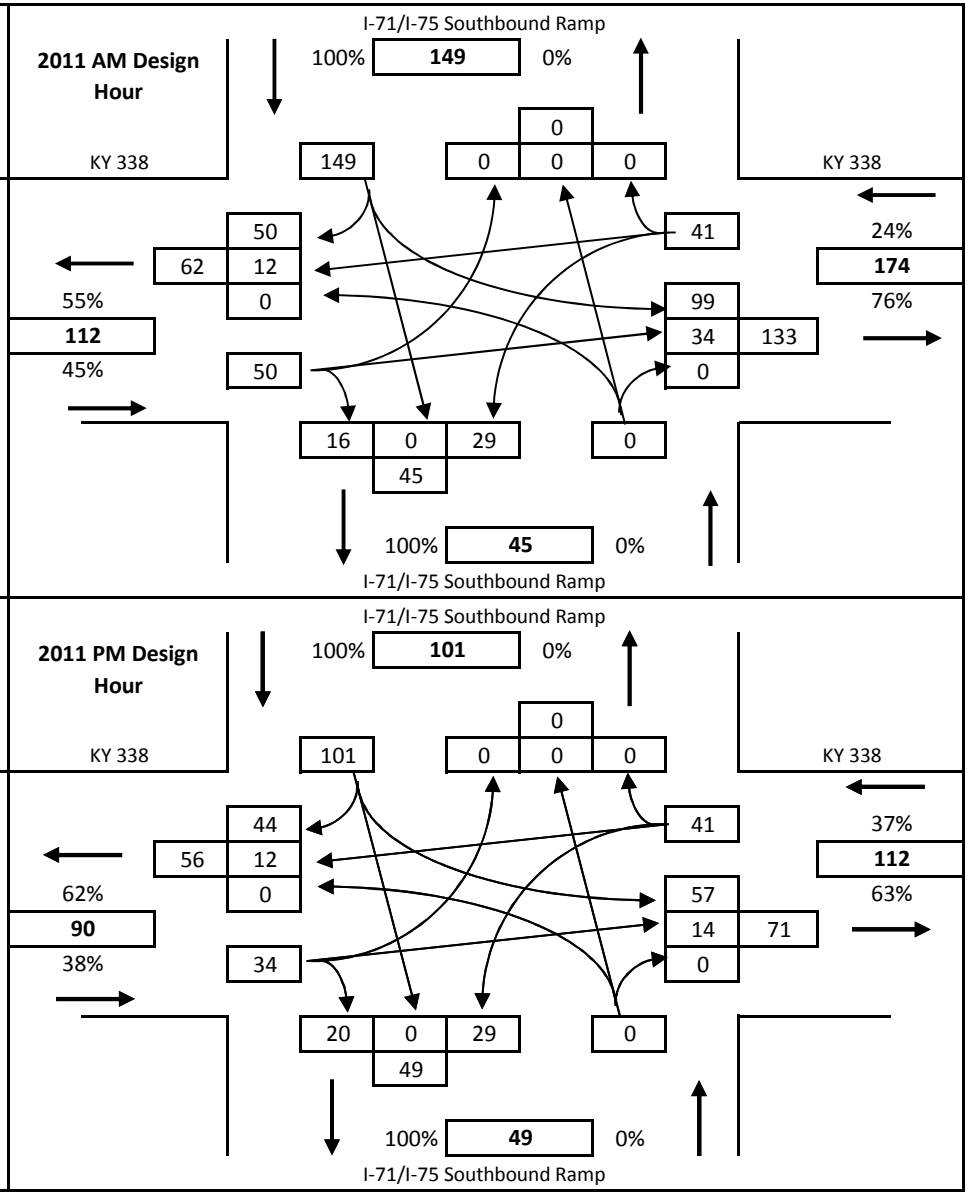
PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 1 - KY 338 at I-71/I-75 Southbound Ramp

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks





PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

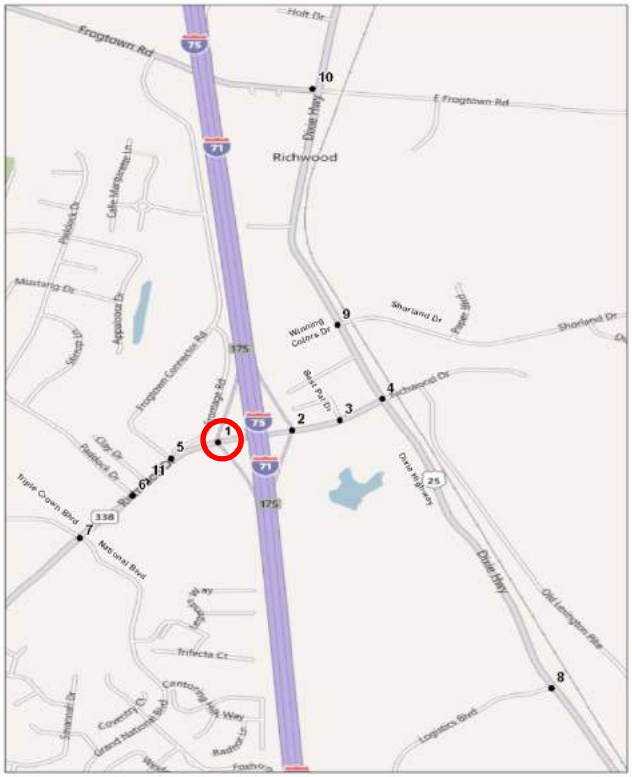
ANALYST: D.Pluckebaum/S.Hoch

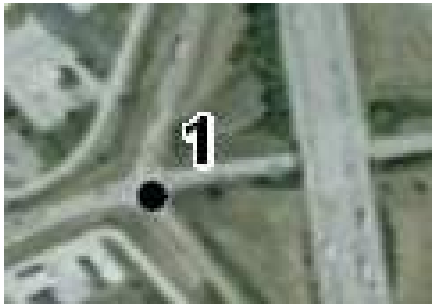
SCENARIO: 2030 Design Hour Volumes

INTERSECTION: 1 - KY 338 at I-71/I-75 Southbound Ramp

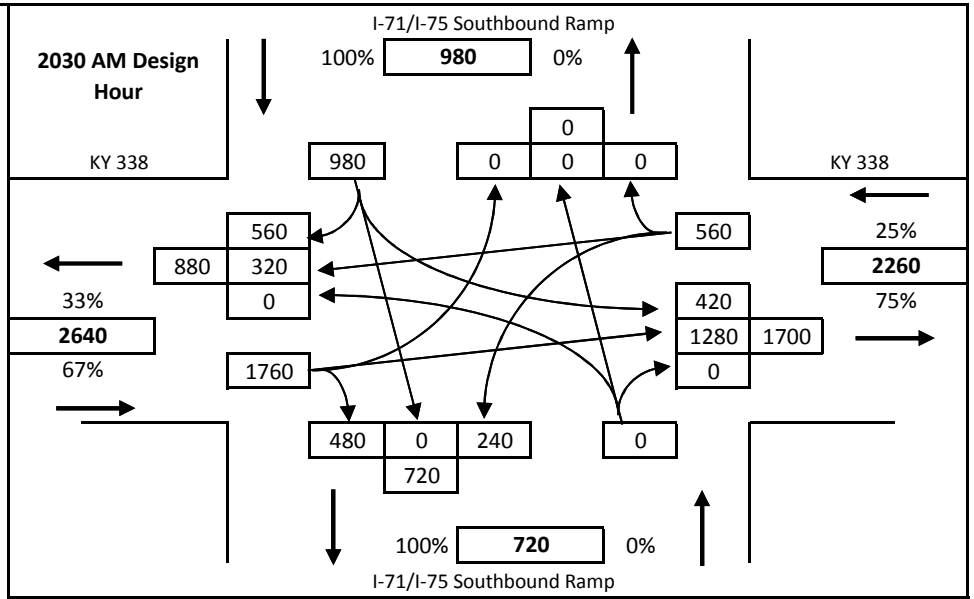
NOTE:

Location Map

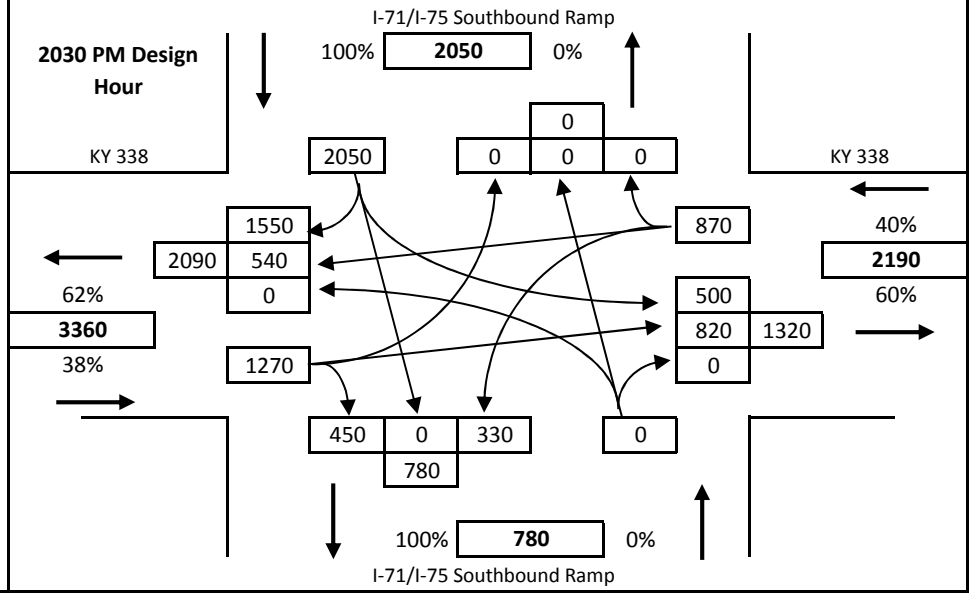




2030 AM Design Hour



2030 PM Design Hour



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

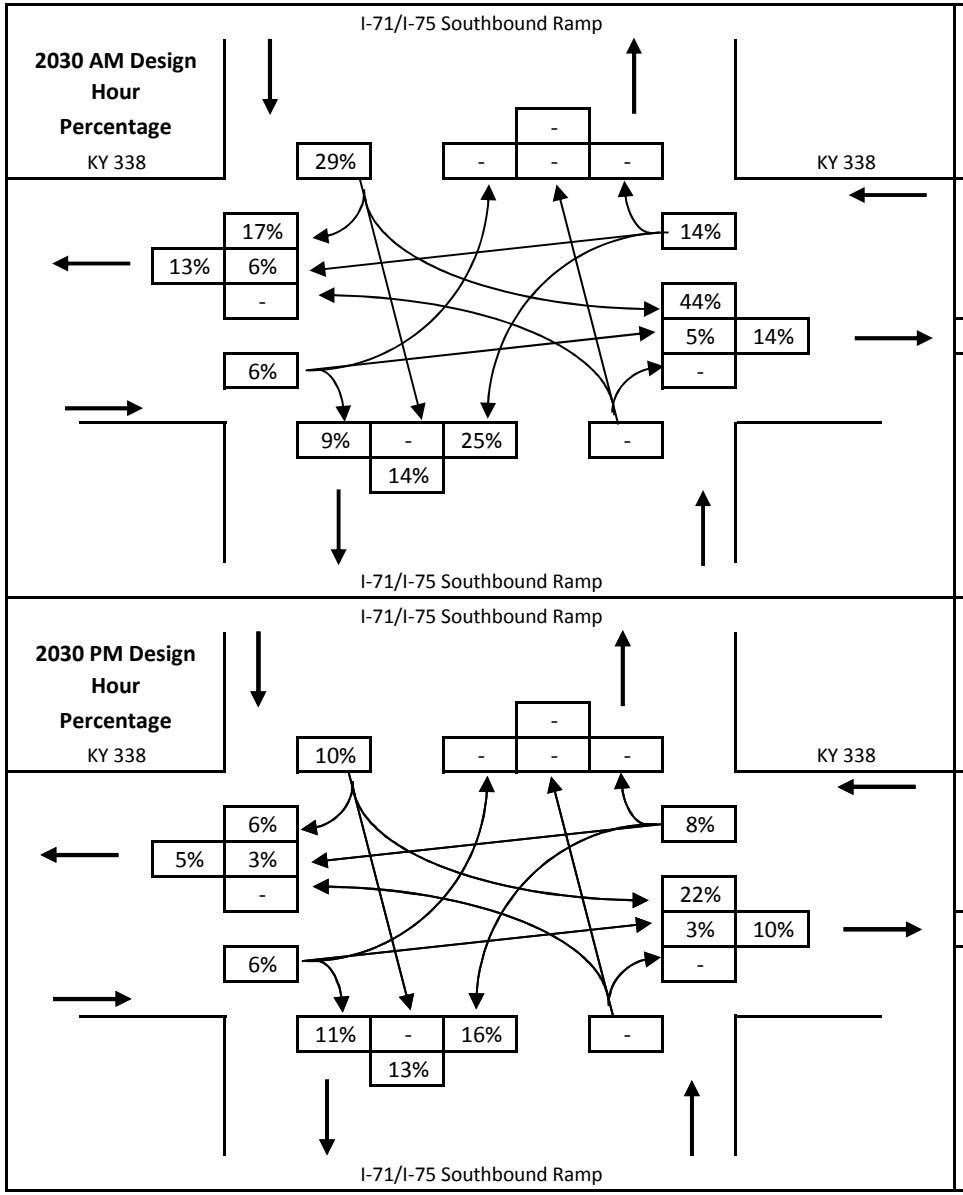
SCENARIO: 2030 Design Hour Volumes

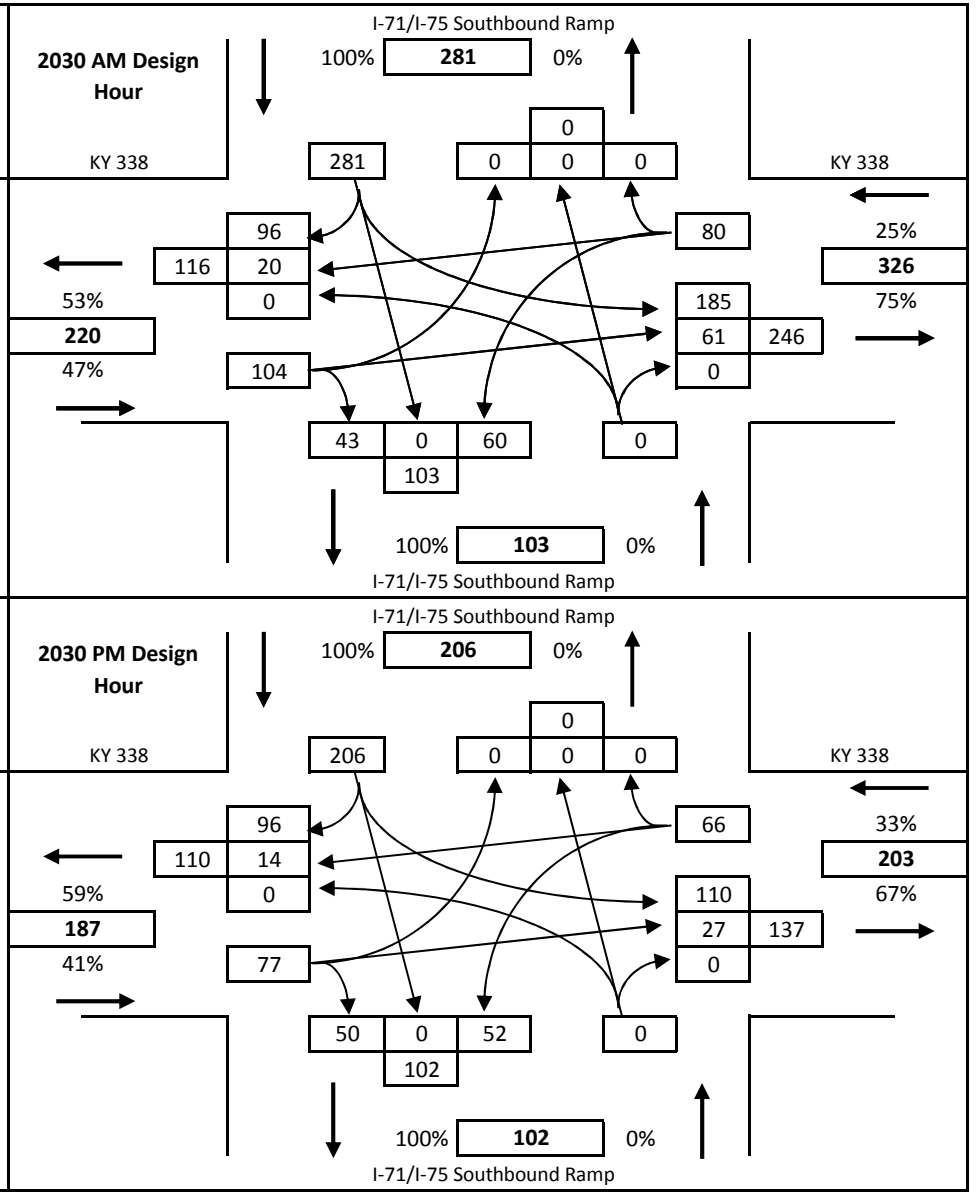
INTERSECTION: 1 - KY 338 at I-71/I-75 Southbound Ramp

NOTE:

TRUCK TURN MOVEMENTS

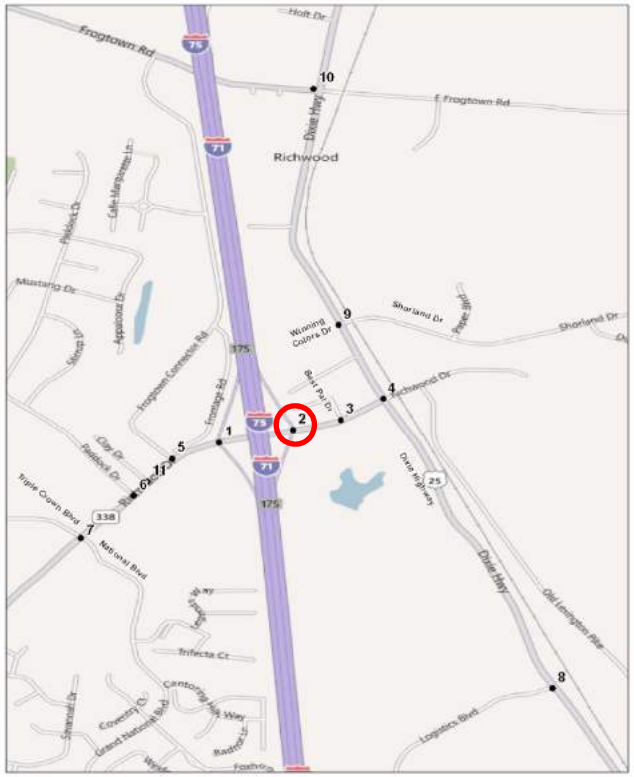
*Includes all single unit, single trailer, and multi-trailer trucks

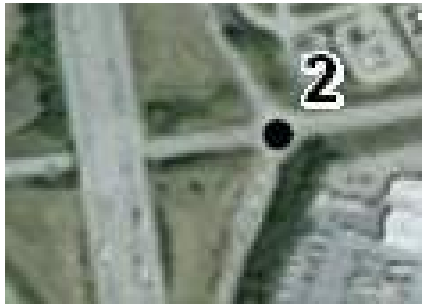


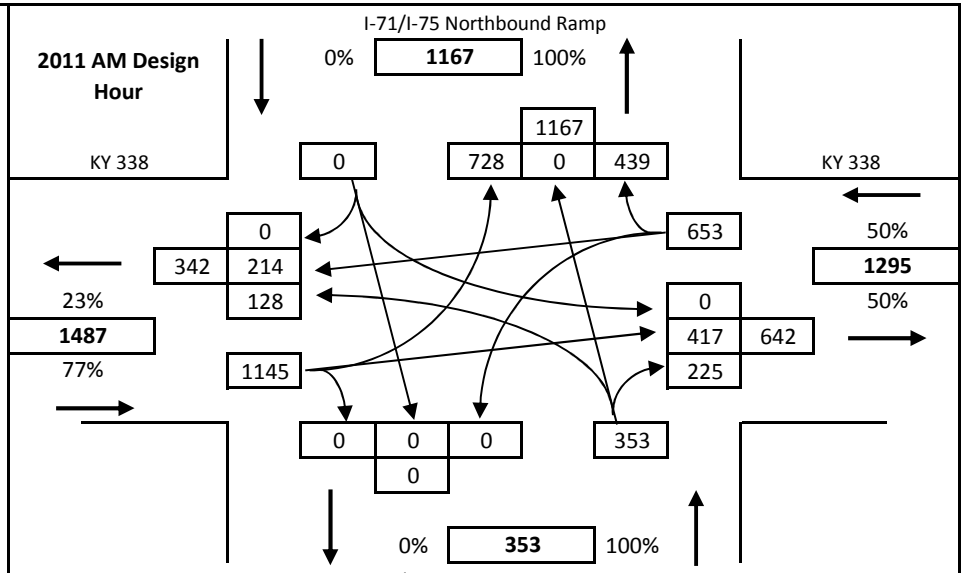


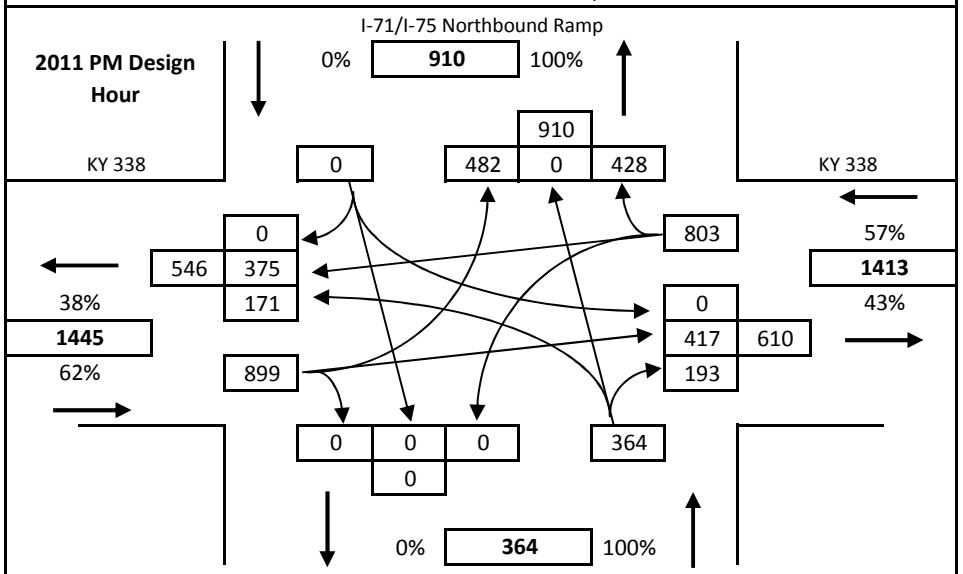
PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75 NOTE:
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 2 - KY 338 at I-71/I-75 Southbound Ramp

Location Map







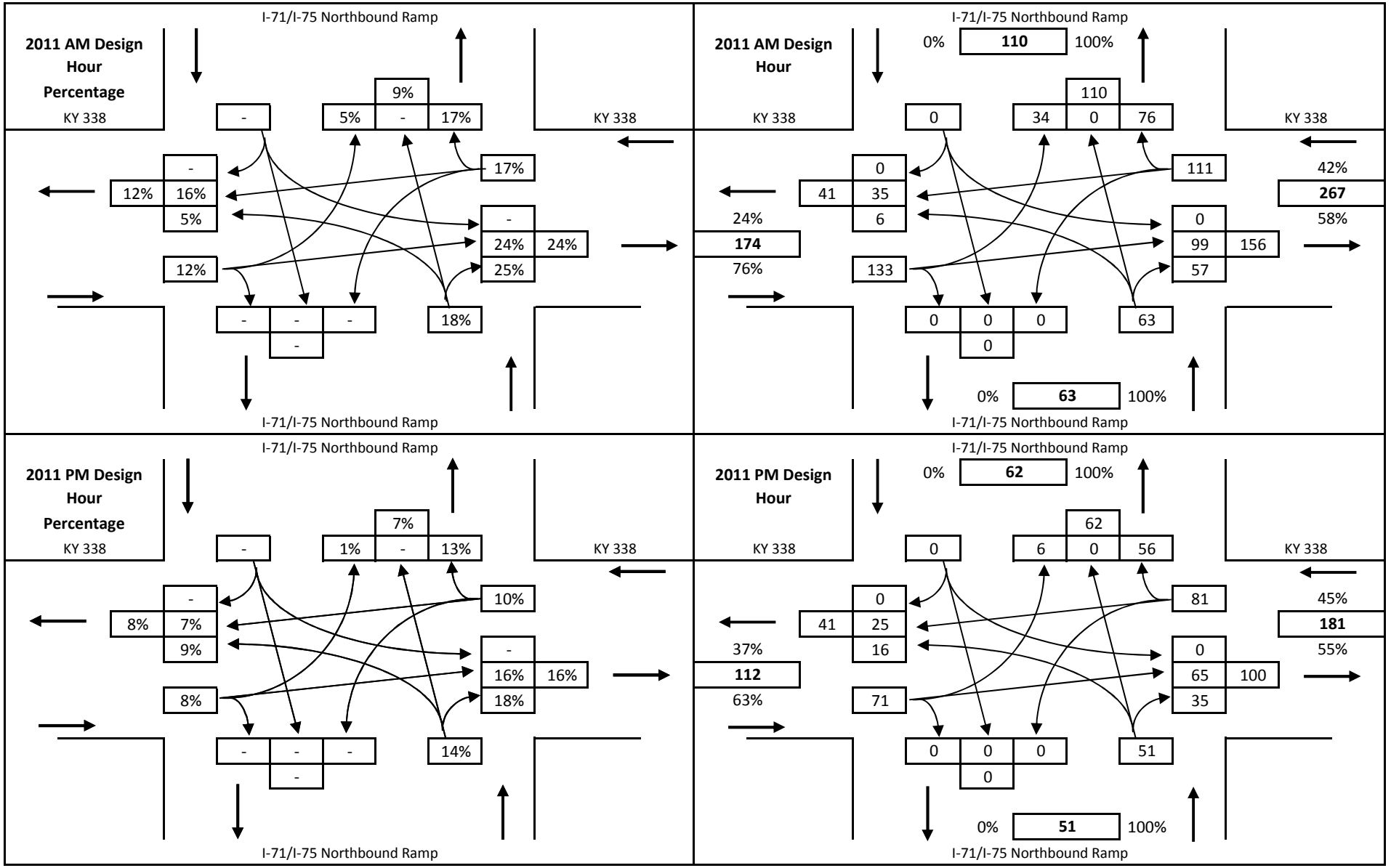


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 2 - KY 338 at I-71/I-75 Southbound Ramp

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

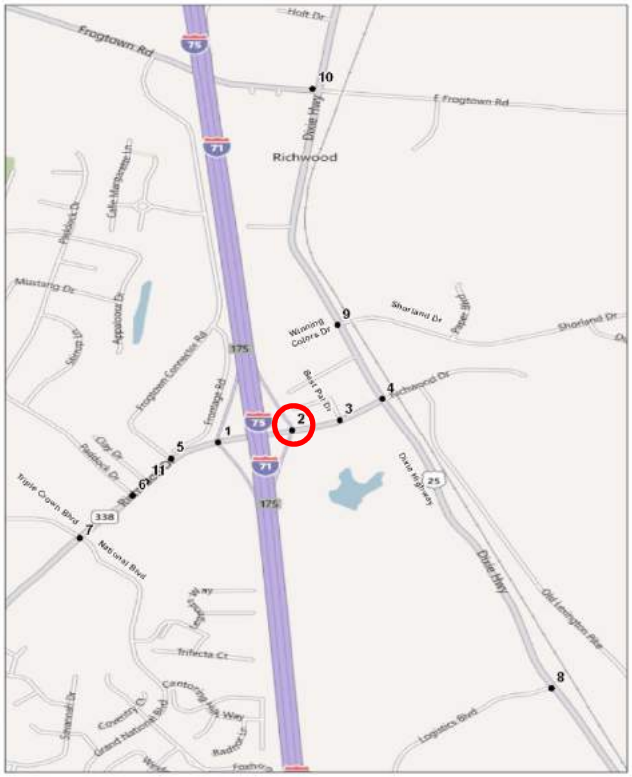
ANALYST: D.Pluckebaum/S.Hoch

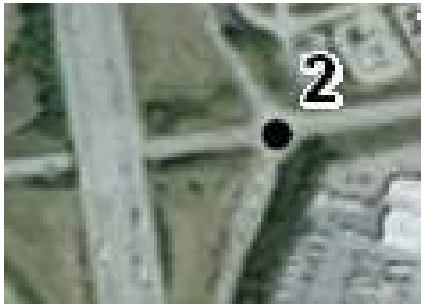
SCENARIO: 2030 Design Hour Volumes

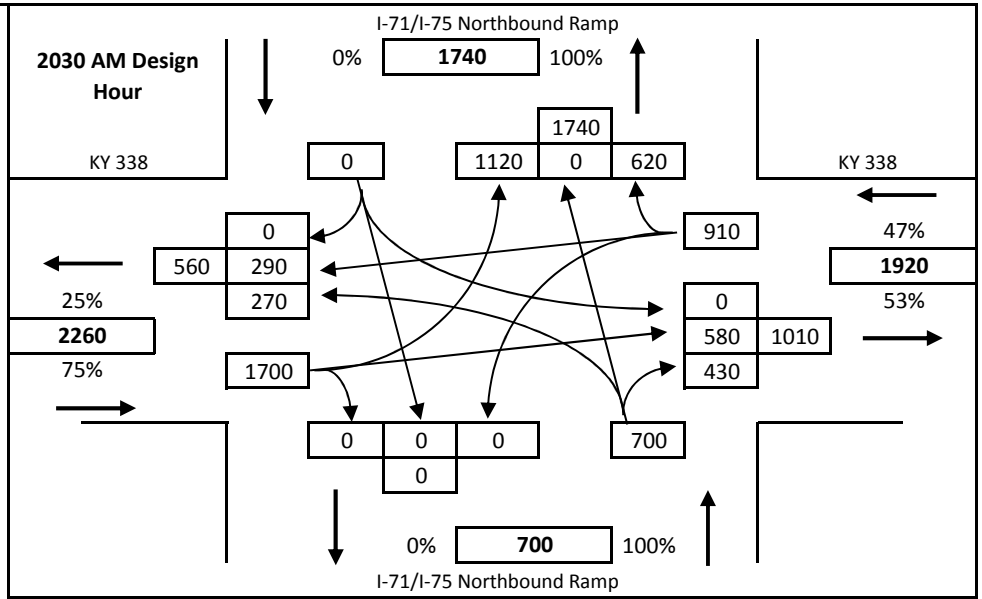
INTERSECTION: 2 - KY 338 at I-71/I-75 Northbound Ramp

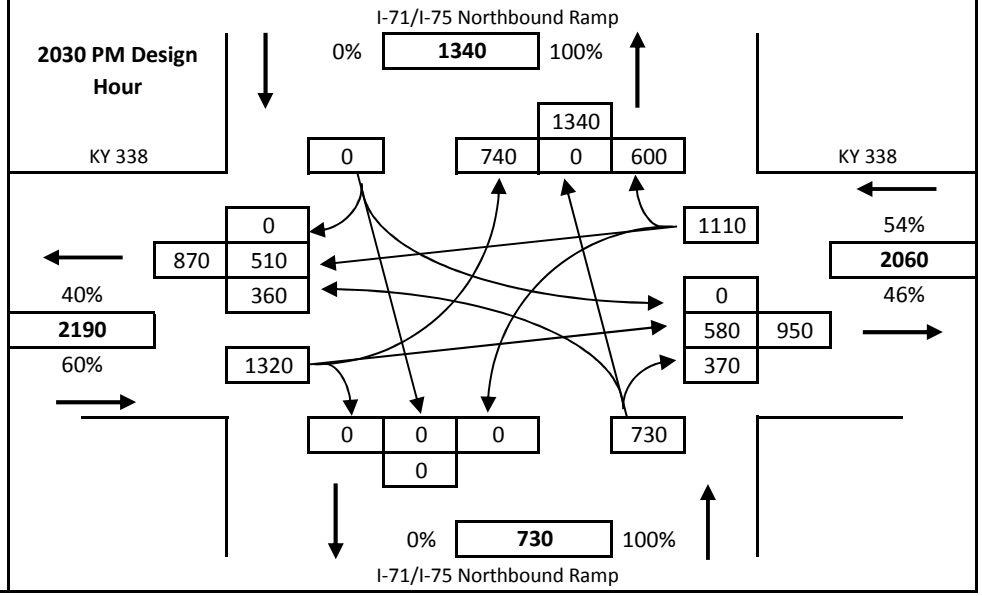
NOTE:

Location Map







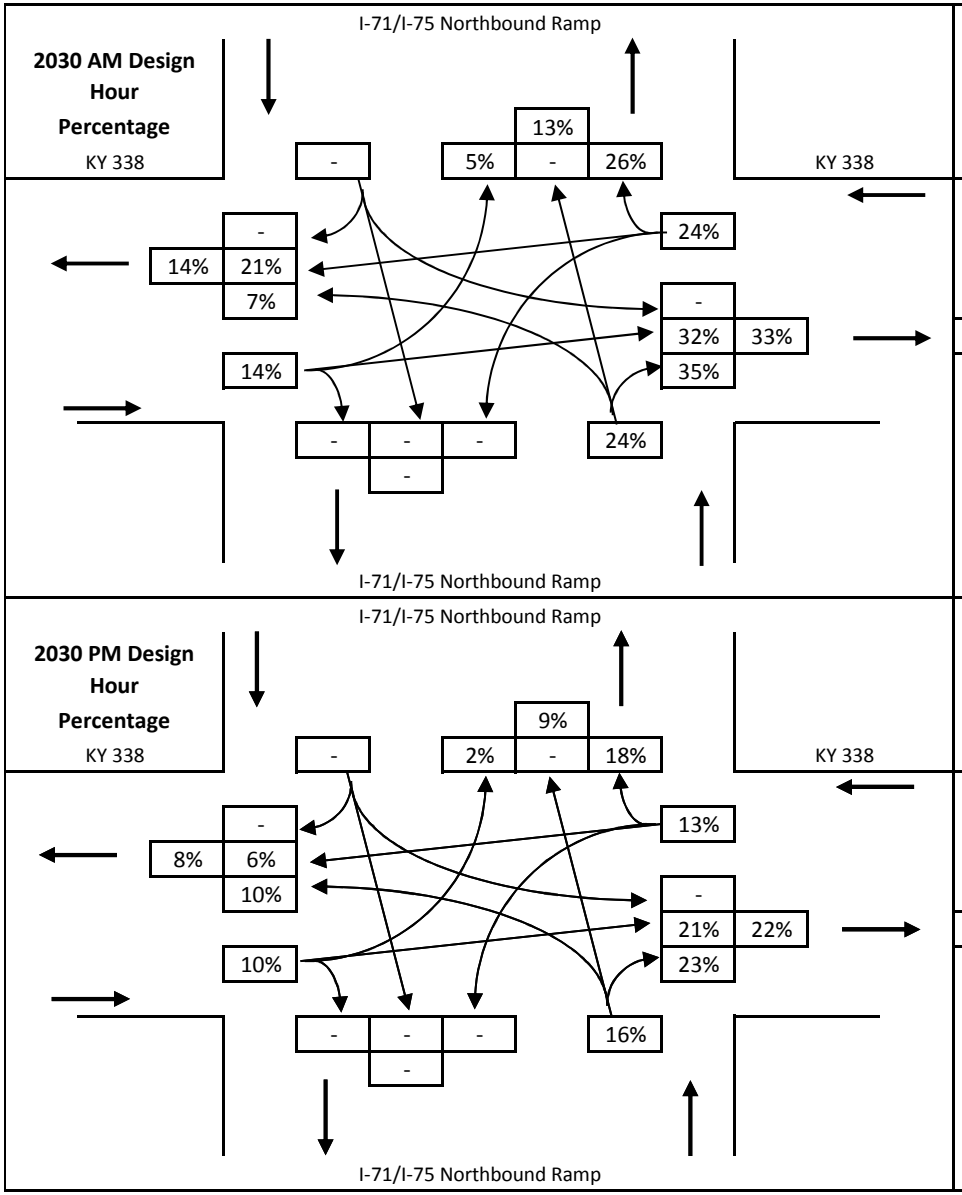


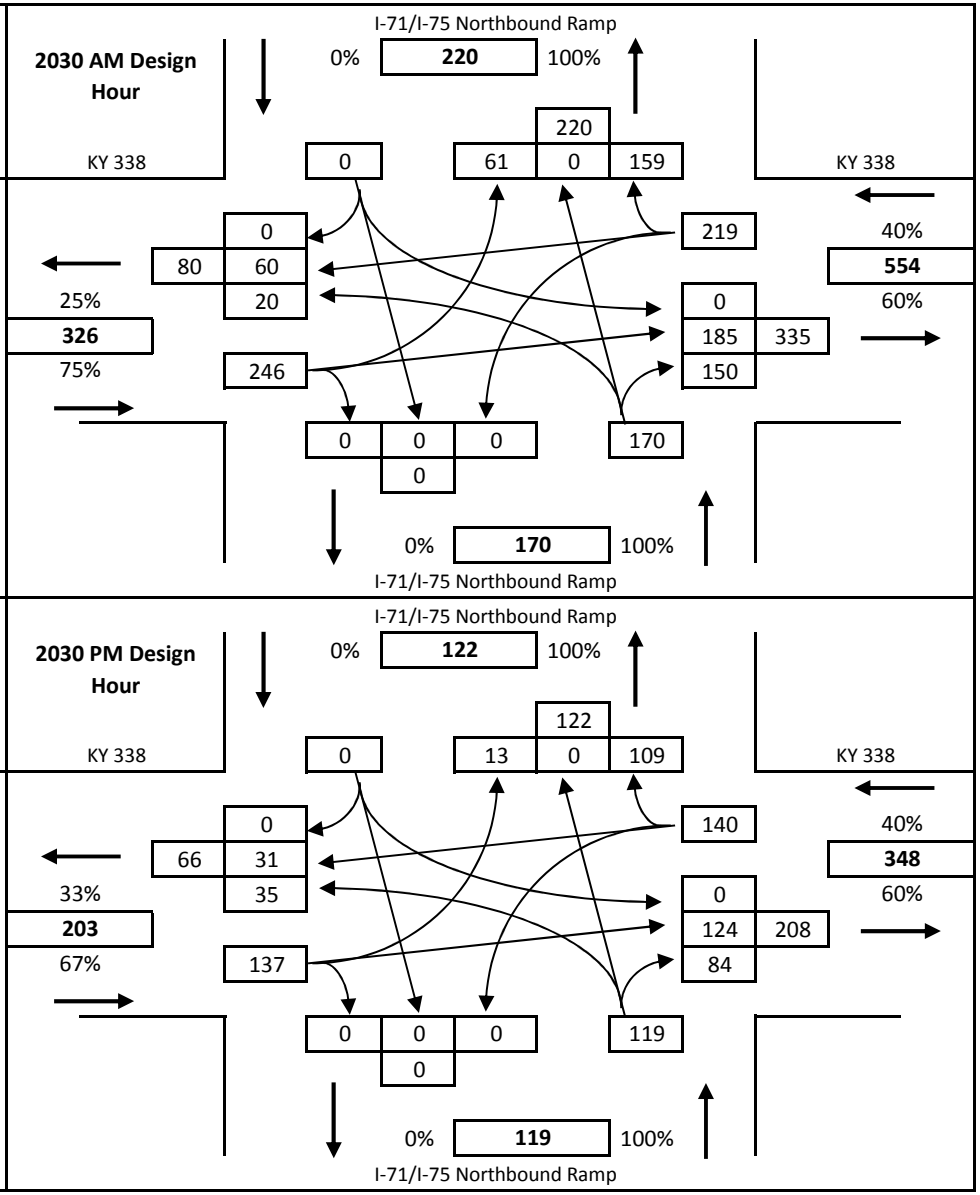
PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: 2030 Design Hour Volumes
INTERSECTION: 2 - KY 338 at I-71/I-75 Northbound Ramp

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks





PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

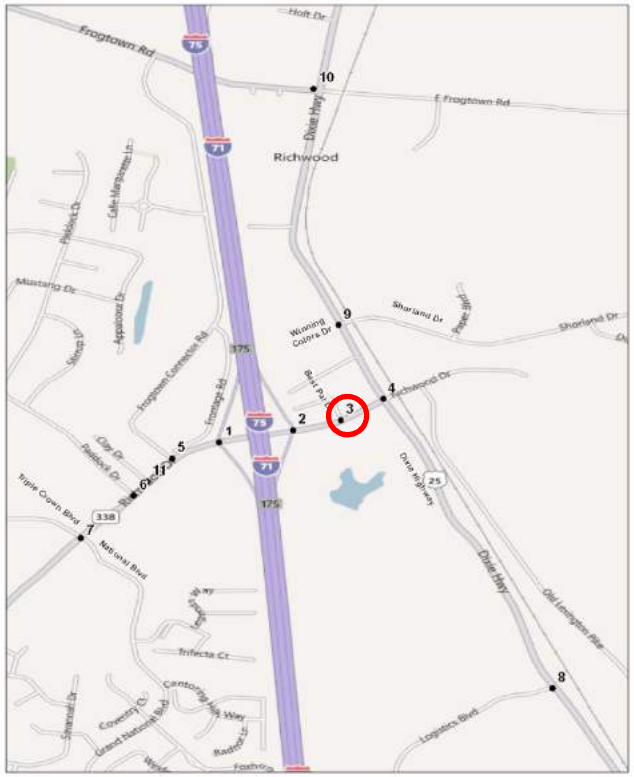
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

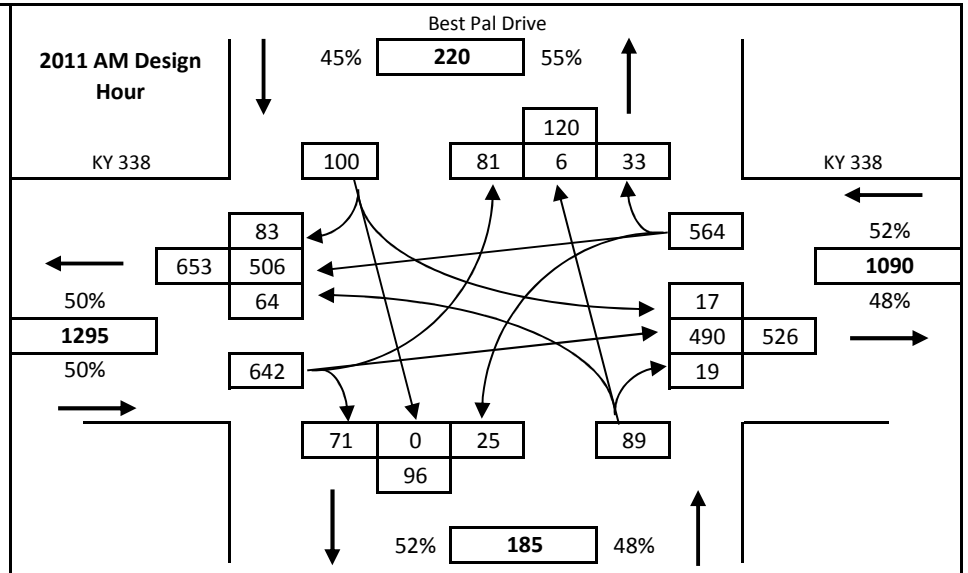
INTERSECTION: 3 - KY 338 at Best Pal Drive/Truck Stop

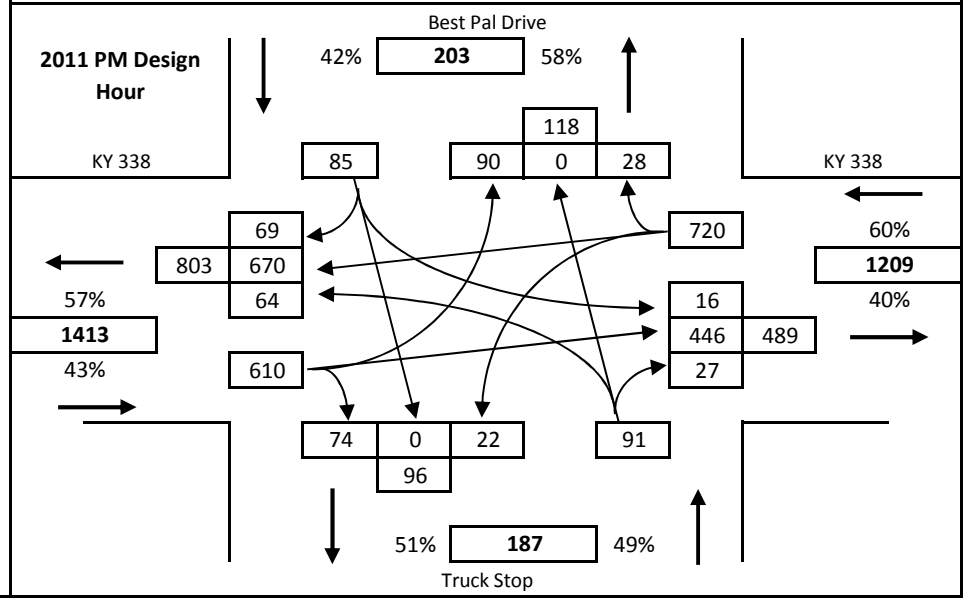
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

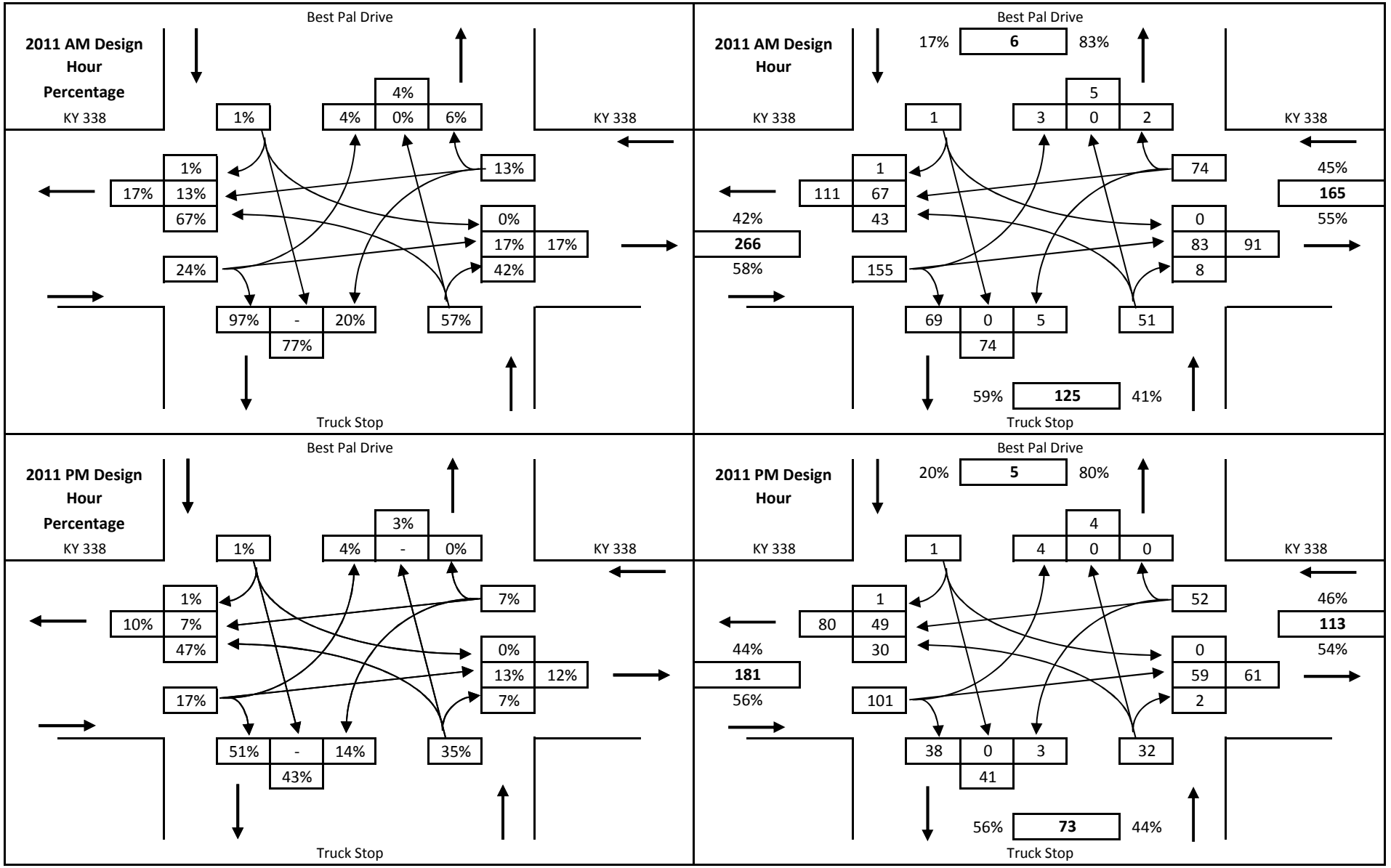
SCENARIO: Current Design Hour Volumes

INTERSECTION: 3 - KY 338 at Best Pal Drive/Truck Stop

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

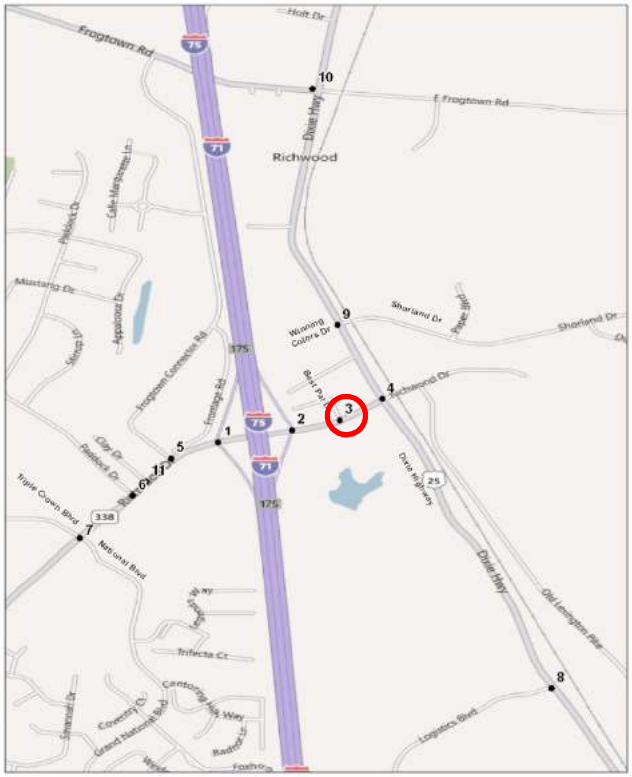
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

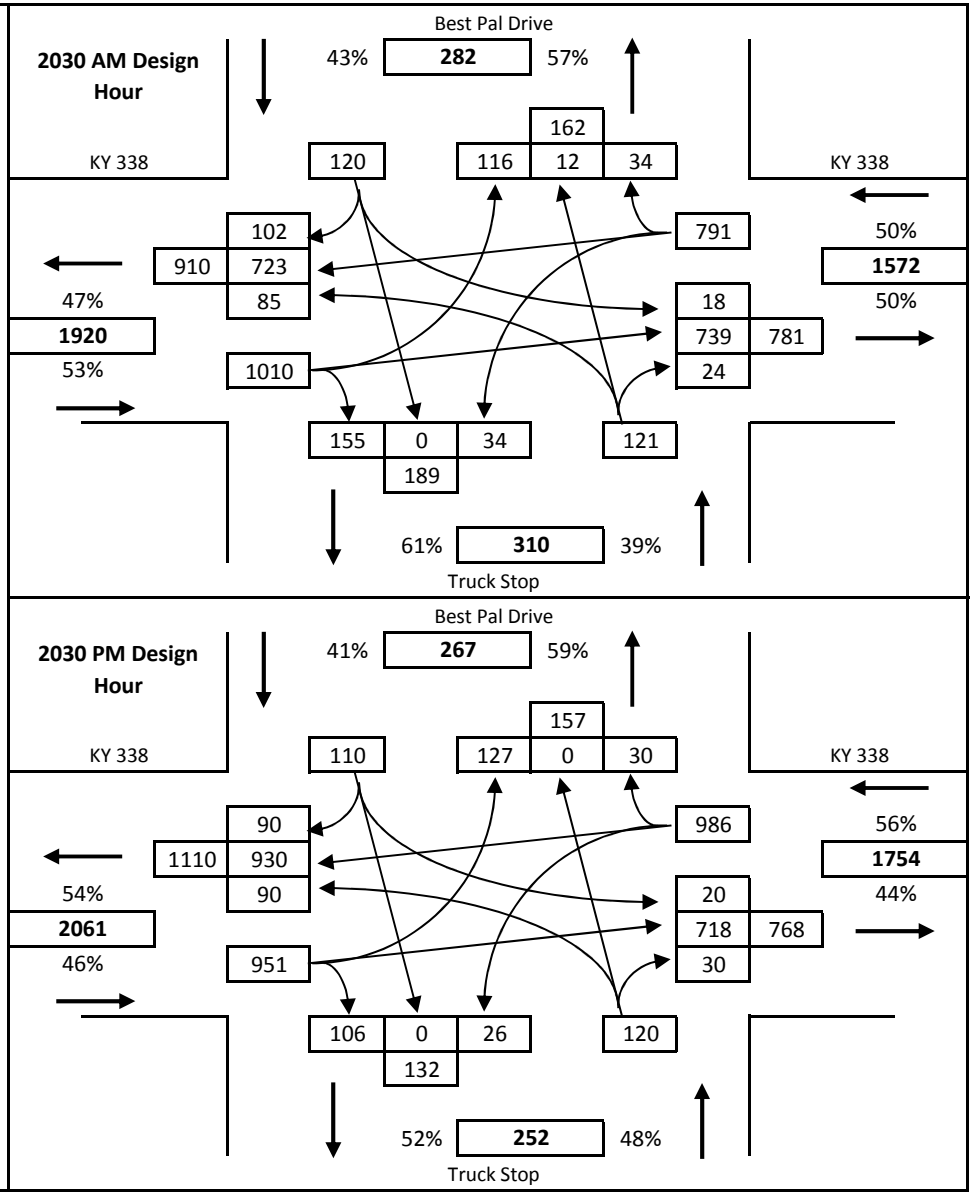
INTERSECTION: 3 - KY 338 at Best Pal Drive/Truck Stop

NOTE:

Location Map







PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

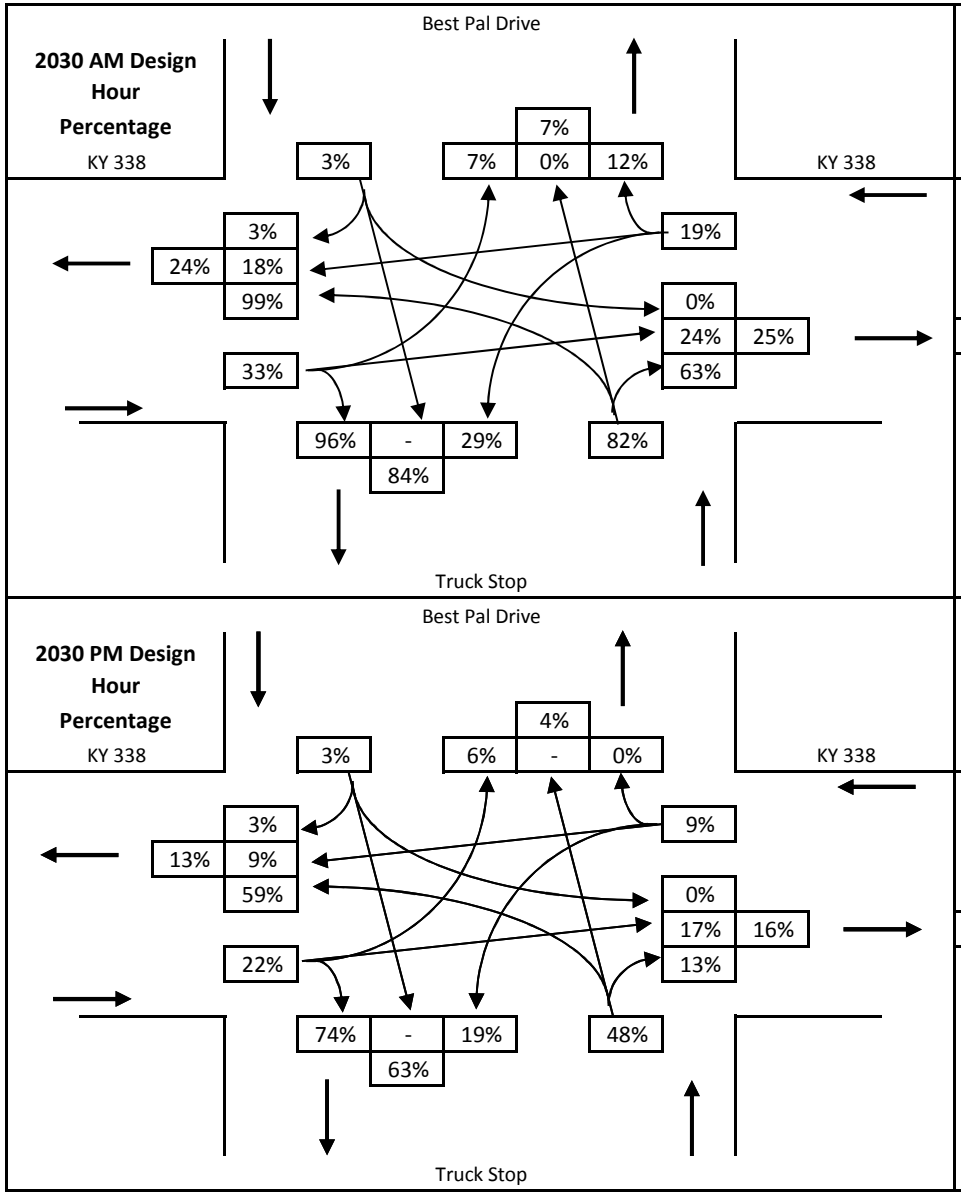
SCENARIO: 2030 Design Hour Volumes

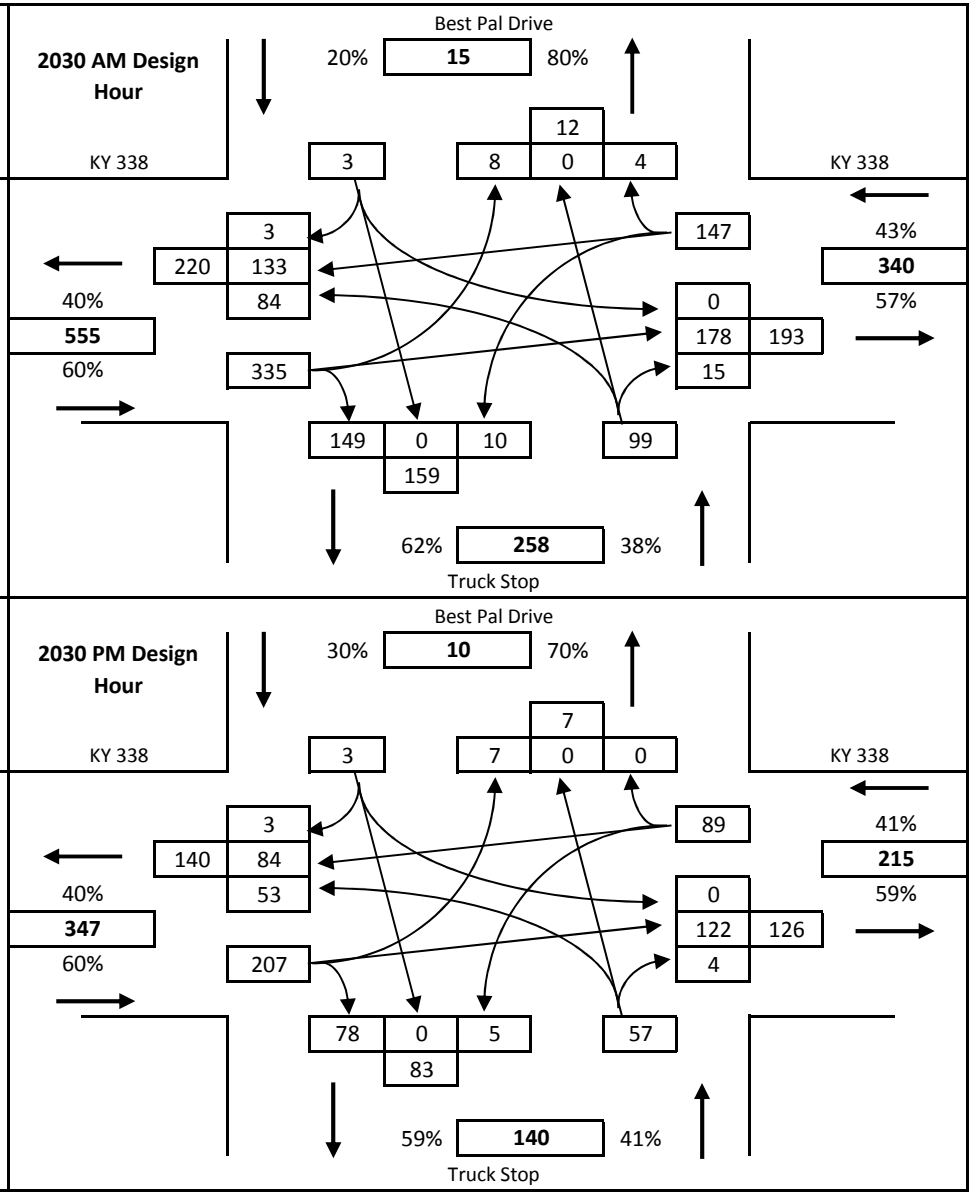
INTERSECTION: 3 - KY 338 at Best Pal Drive/Truck Stop

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks





PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

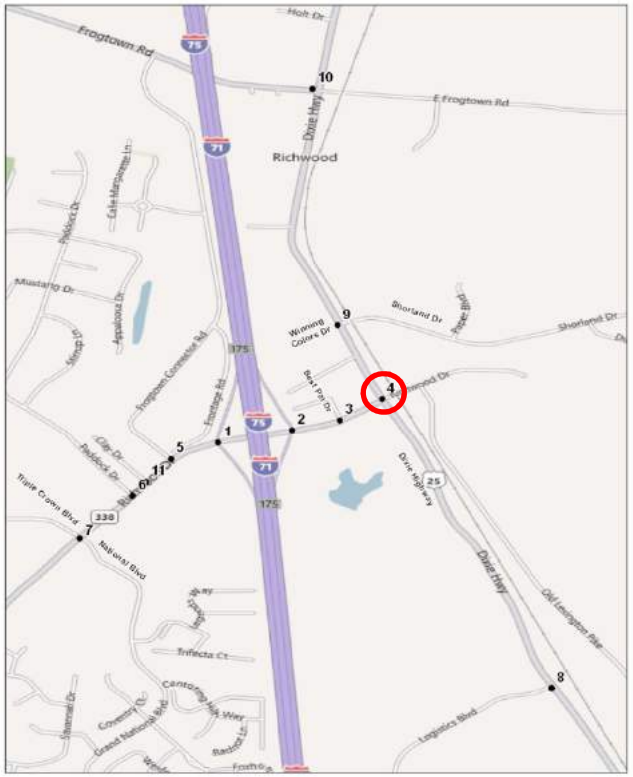
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

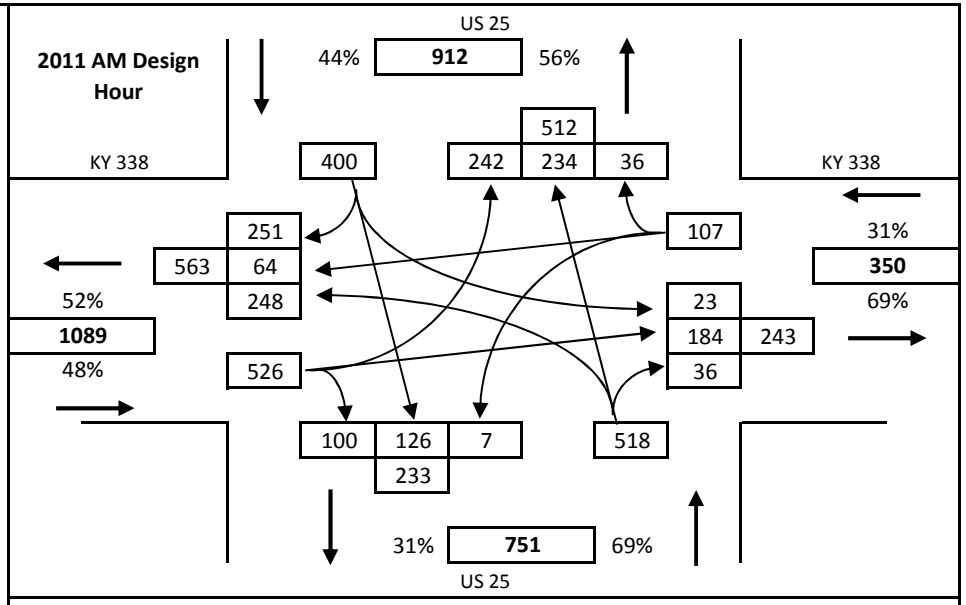
INTERSECTION: 4 - KY 338 at US 25

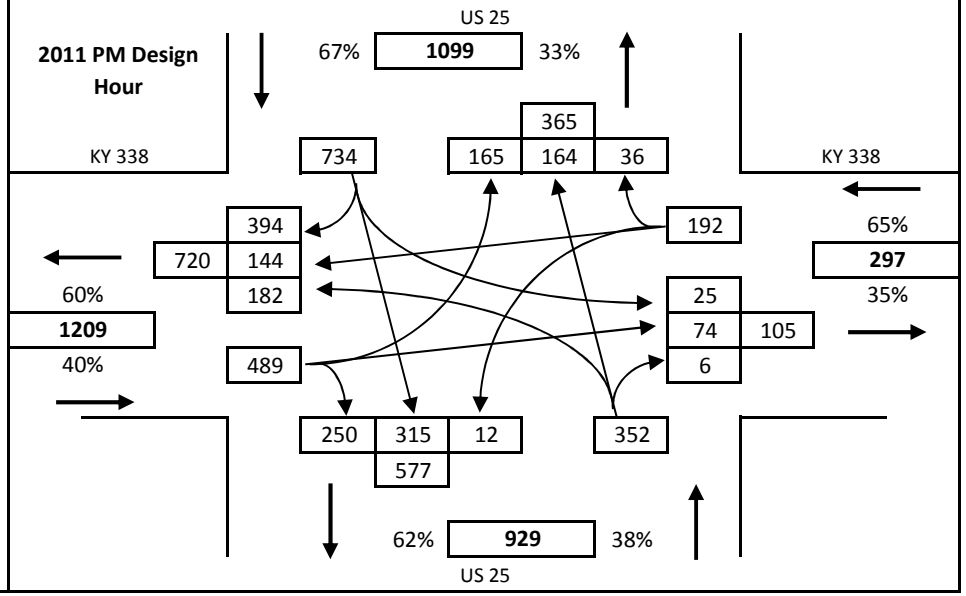
NOTE:

Location Map







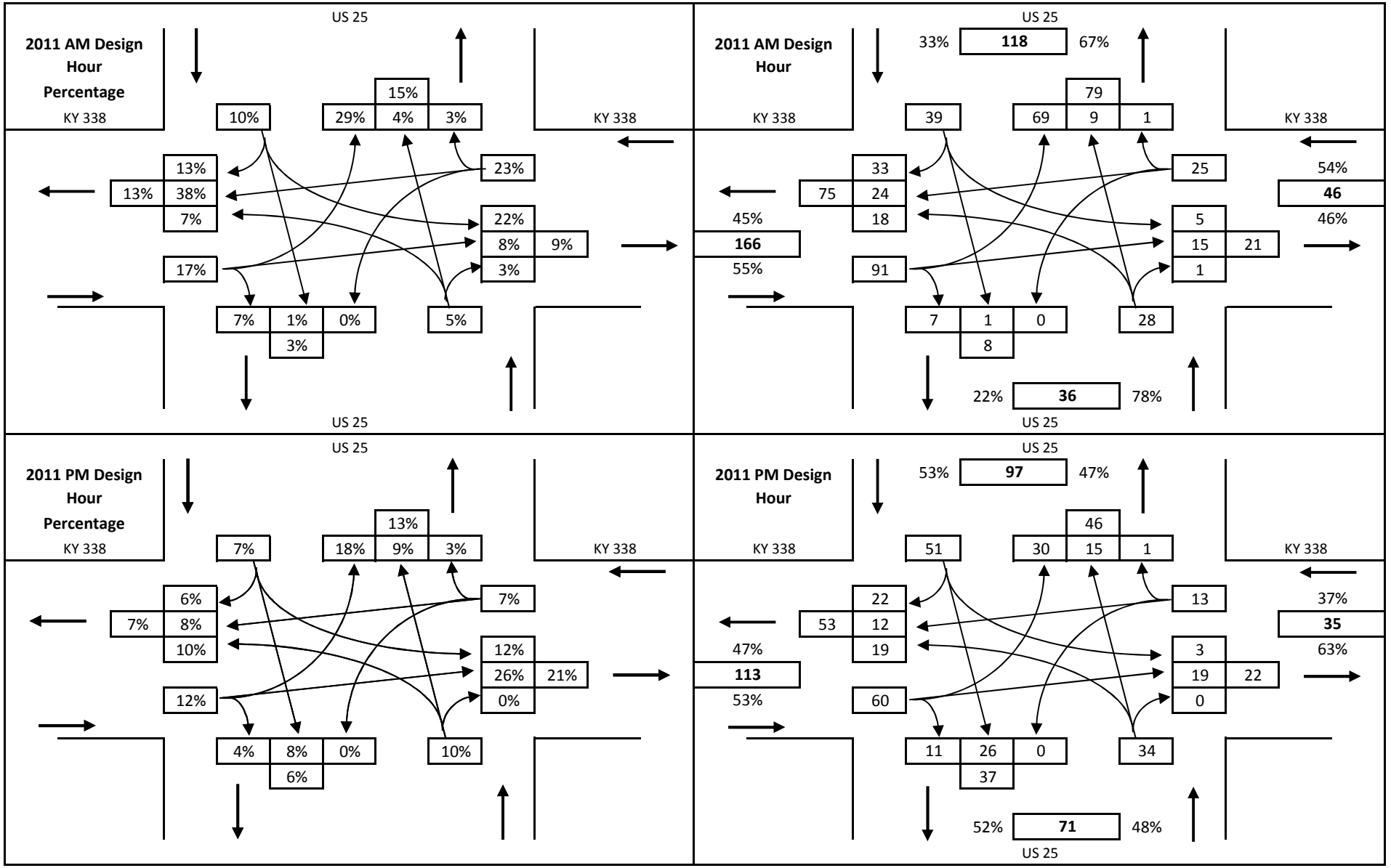


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 4 - KY 338 at US 25

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

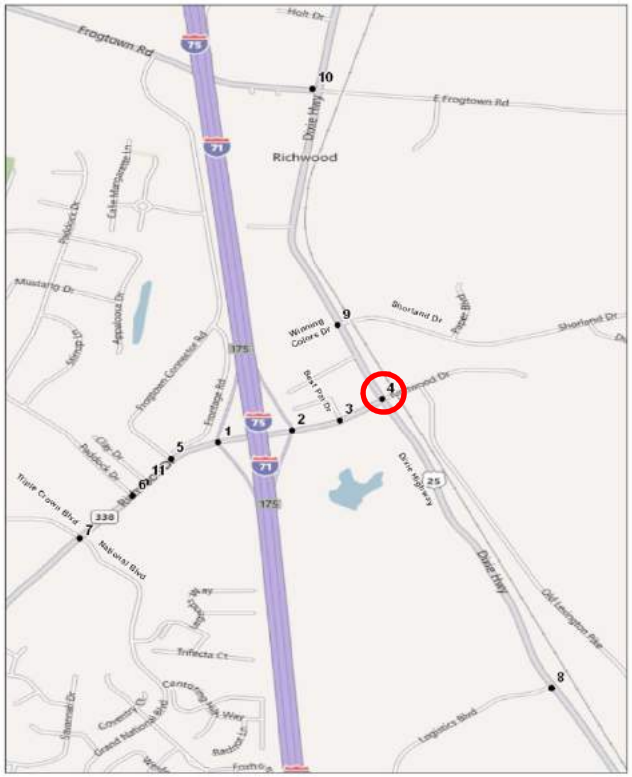
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

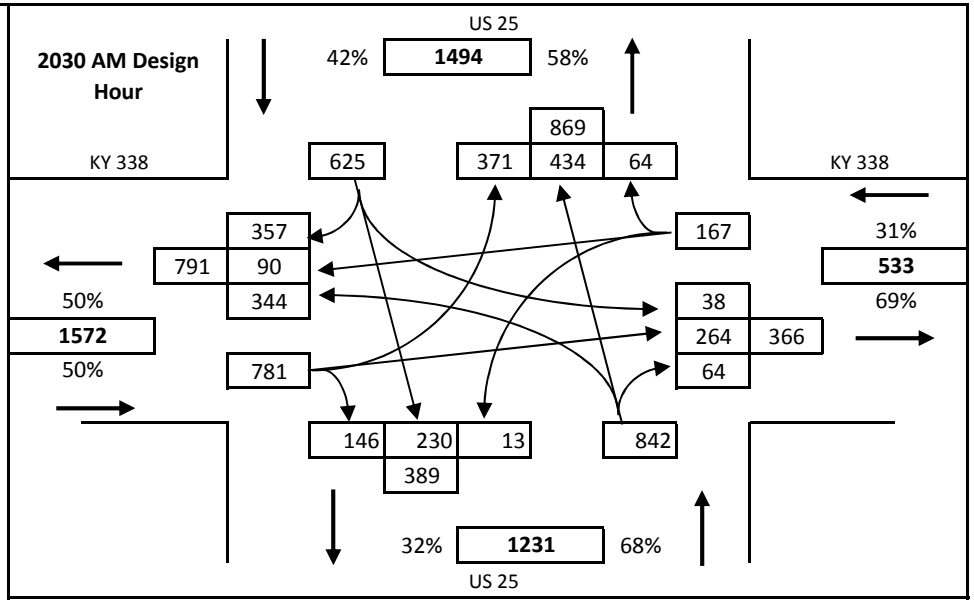
INTERSECTION: 4 - KY 338 at US 25

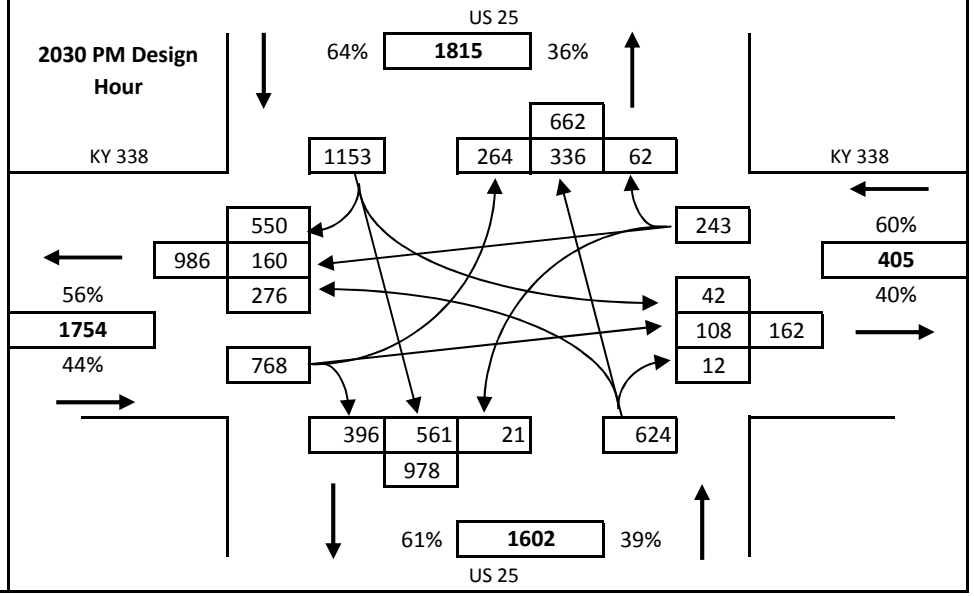
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

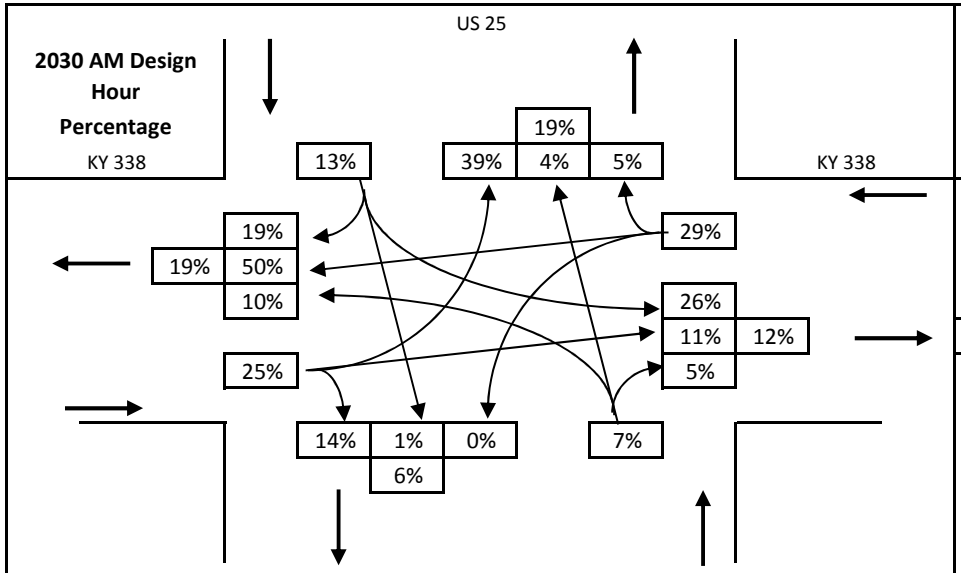
SCENARIO: 2030 Design Hour Volumes

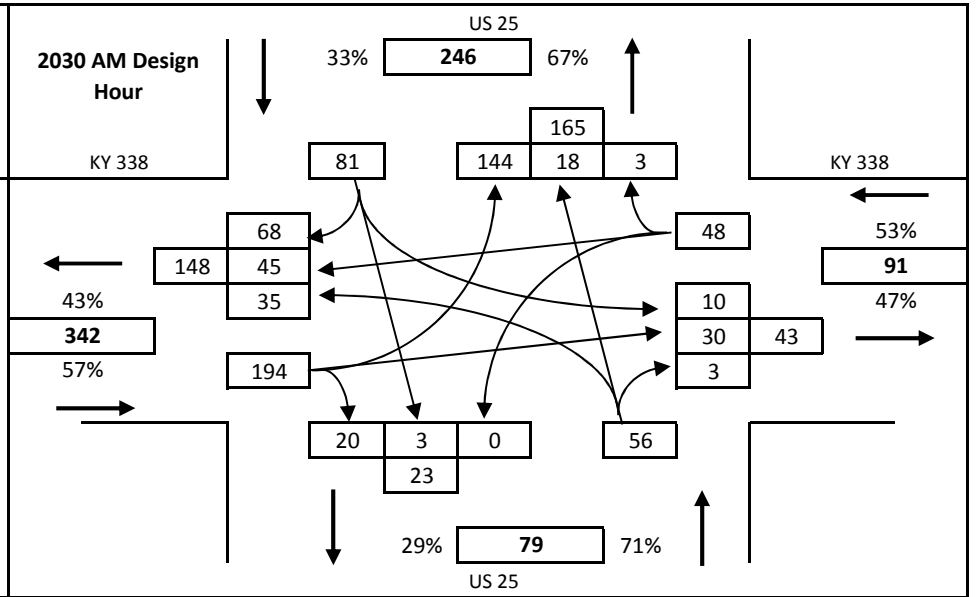
INTERSECTION: 4 - KY 338 at US 25

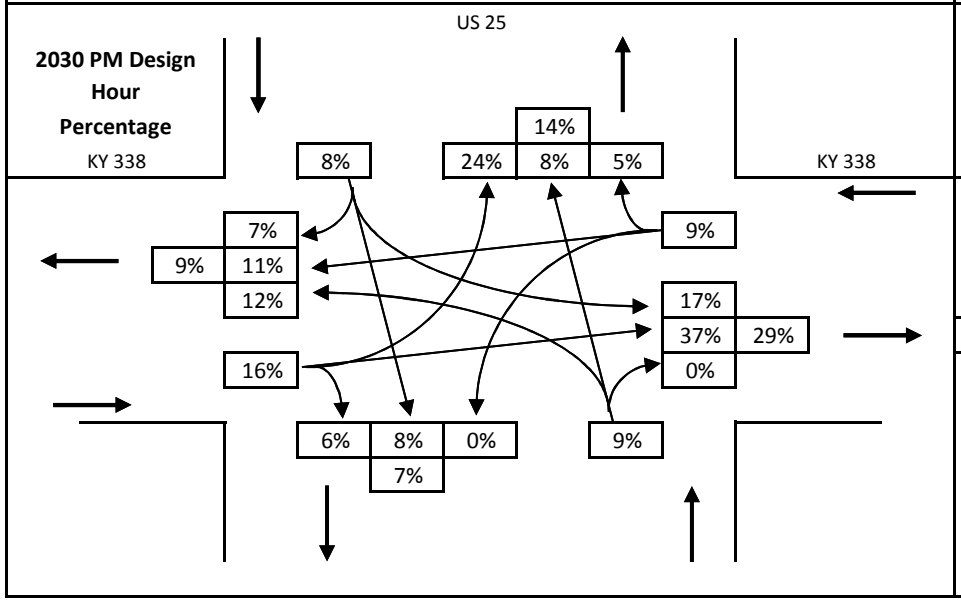
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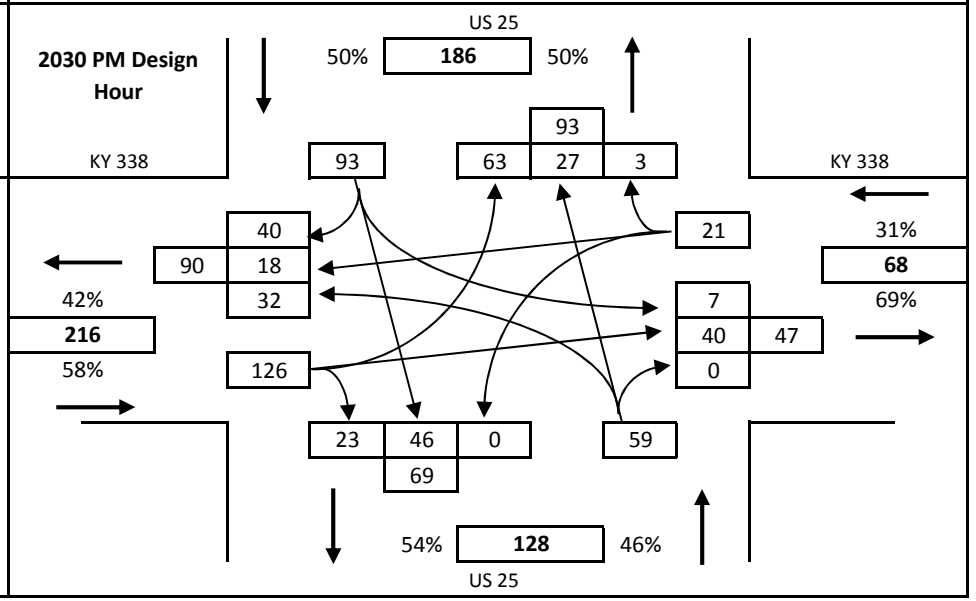
TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

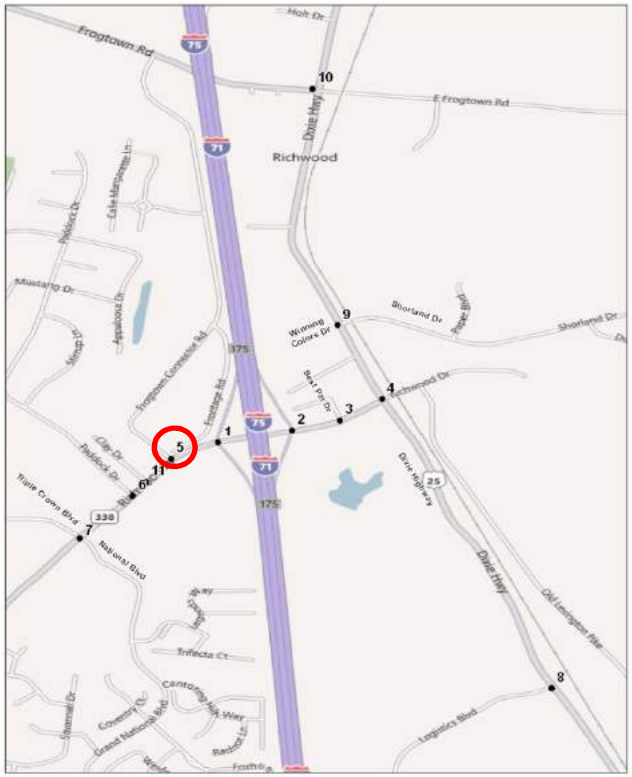
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

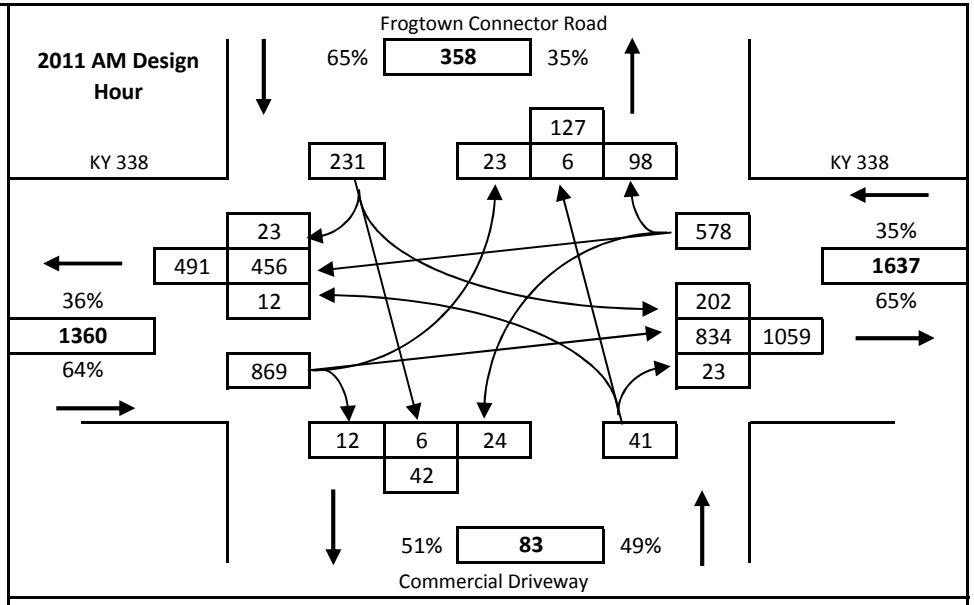
INTERSECTION: 5 - KY 338 at Frogtown Connector/Commercial Driveway

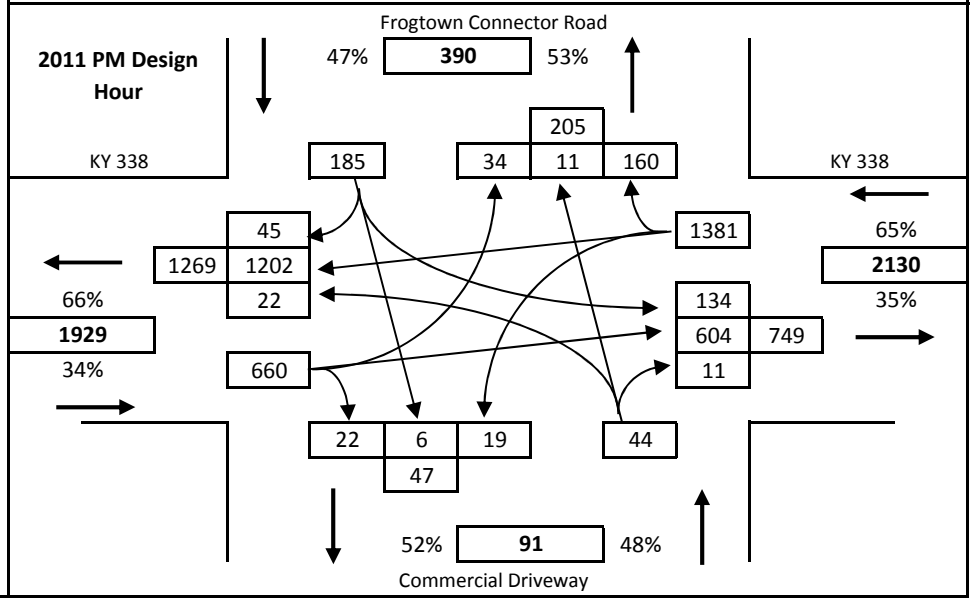
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

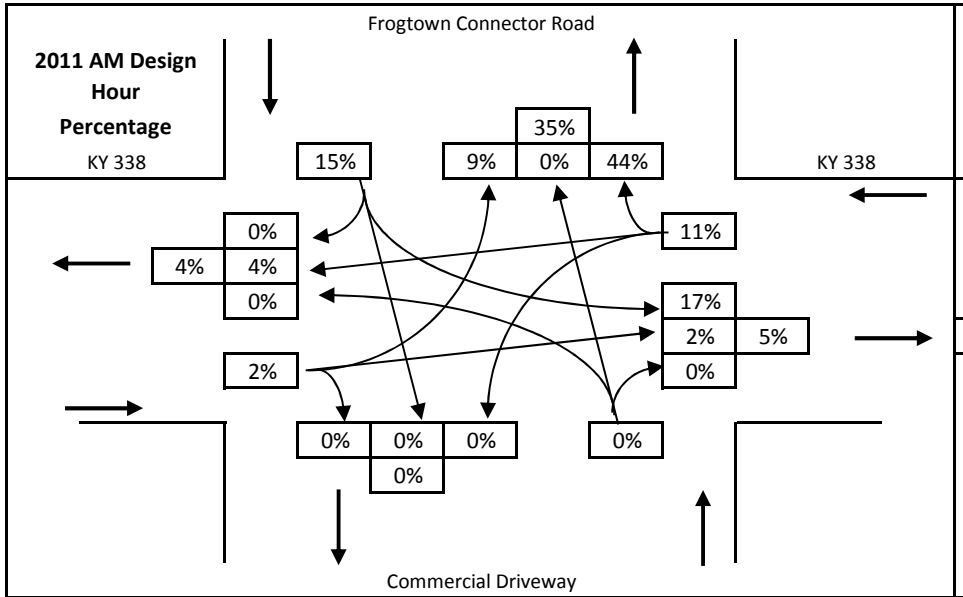
SCENARIO: Current Design Hour Volumes

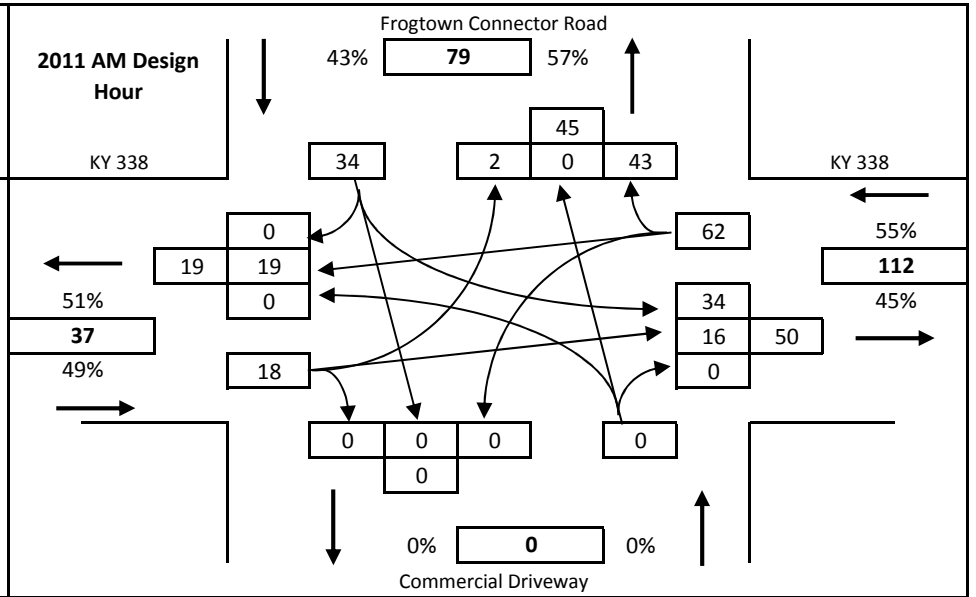
INTERSECTION: 5 - KY 338 at Frogtown Connector/Commercial Driveway

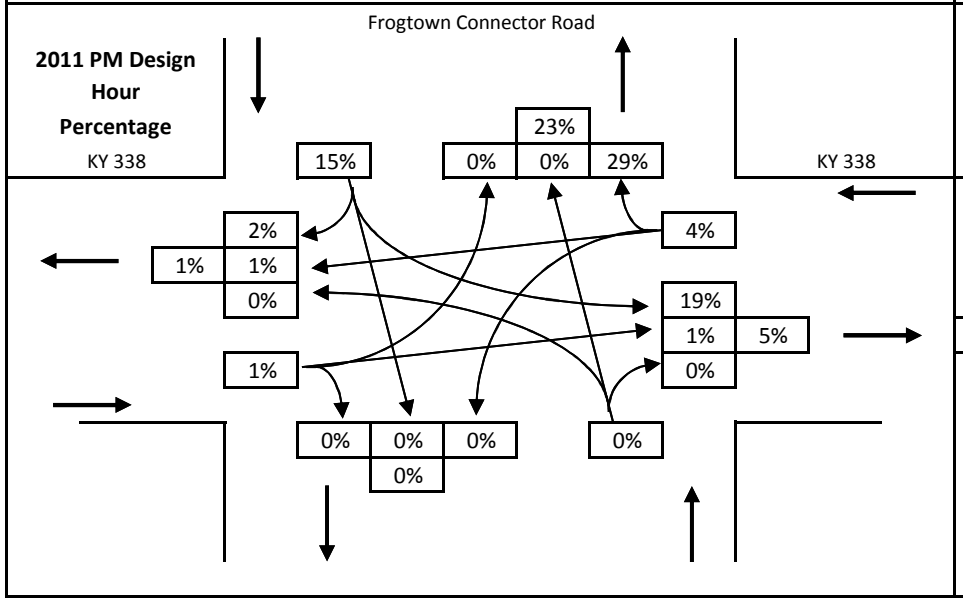
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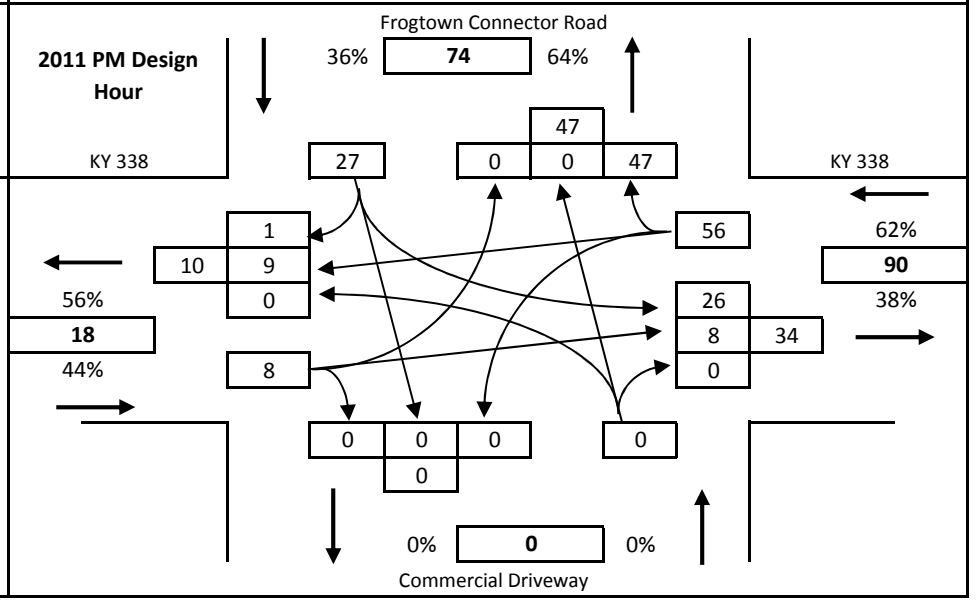
TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

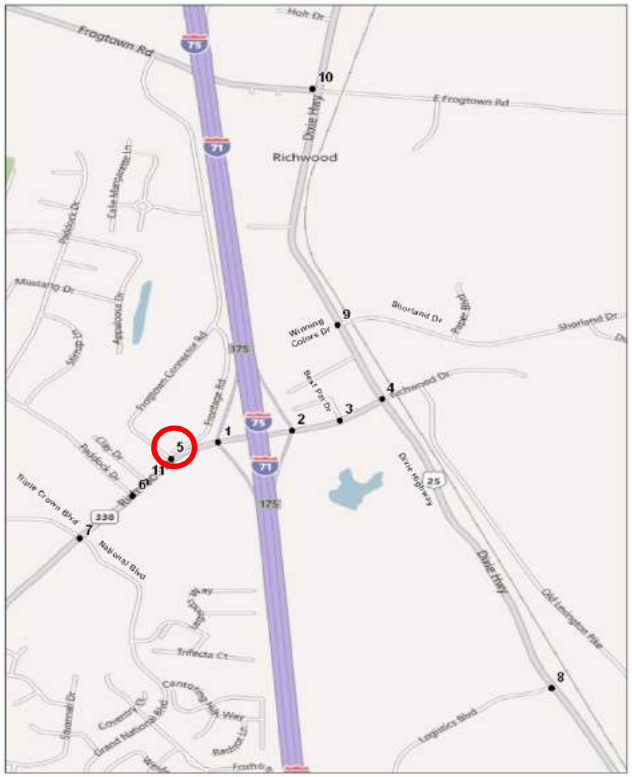
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

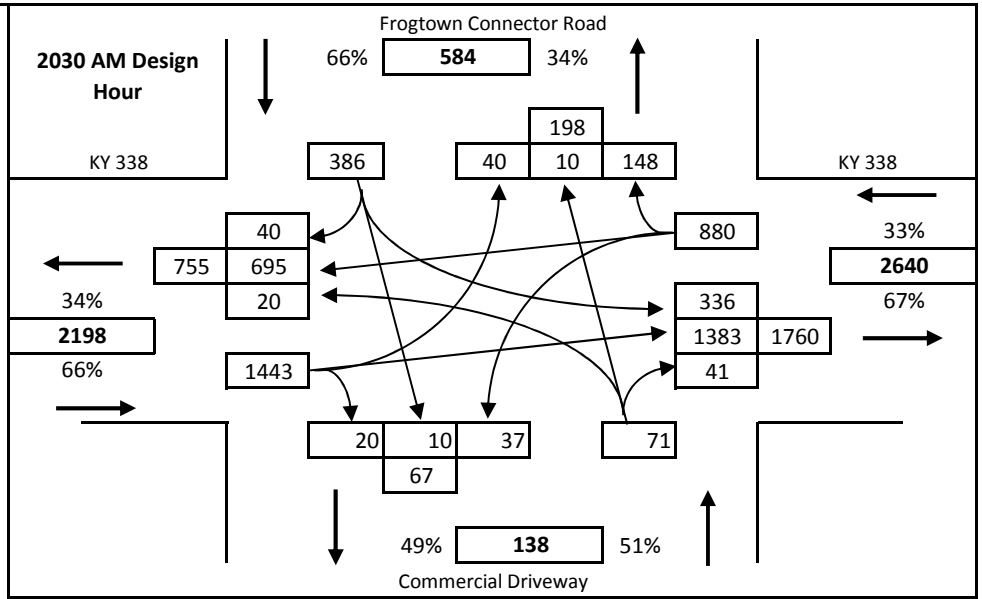
INTERSECTION: 5 - KY 338 at Frogtown Connector/Commercial Driveway

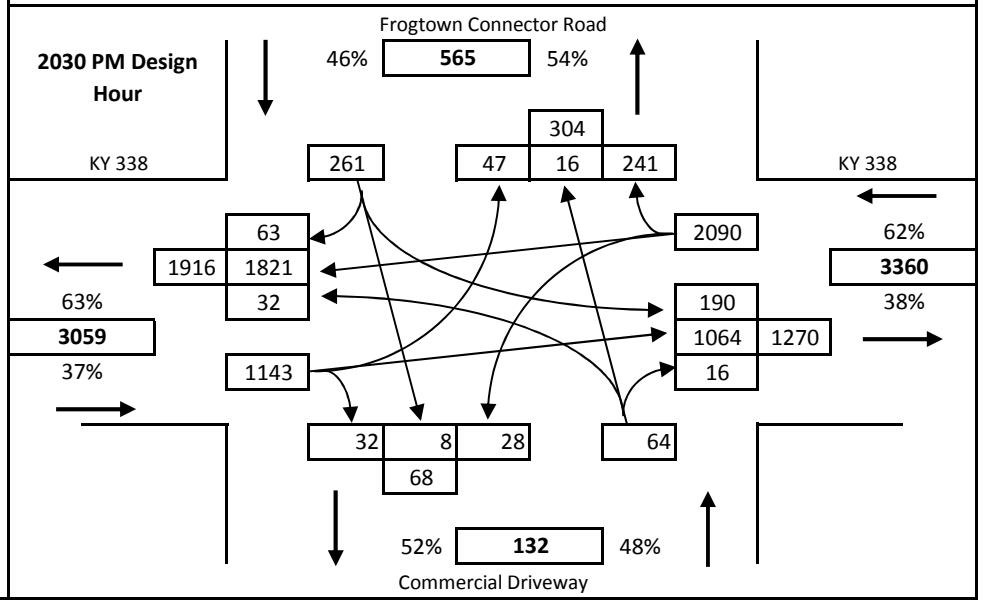
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

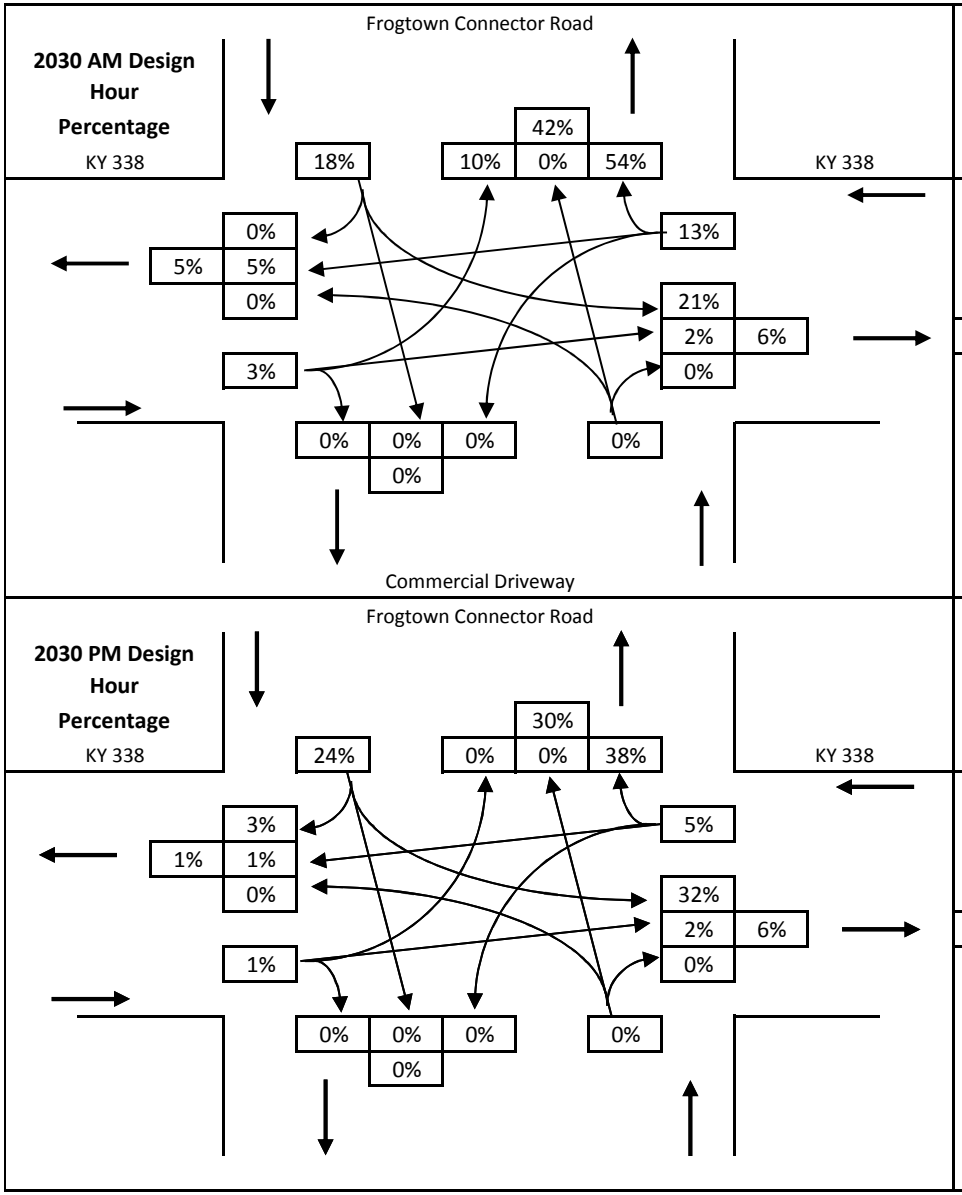
SCENARIO: 2030 Design Hour Volumes

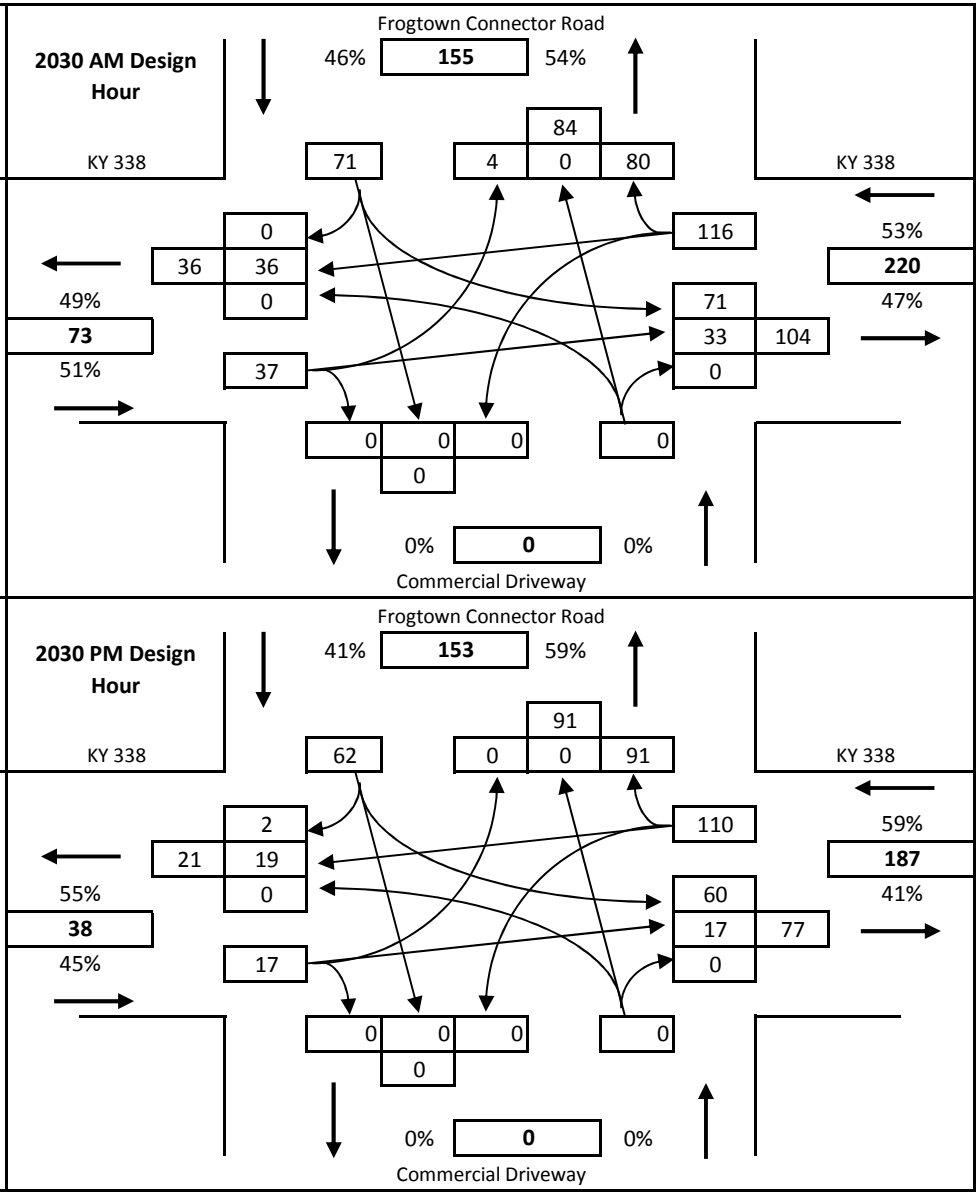
INTERSECTION: 5 - KY 338 at Frogtown Connector/Commercial Driveway

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks





PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

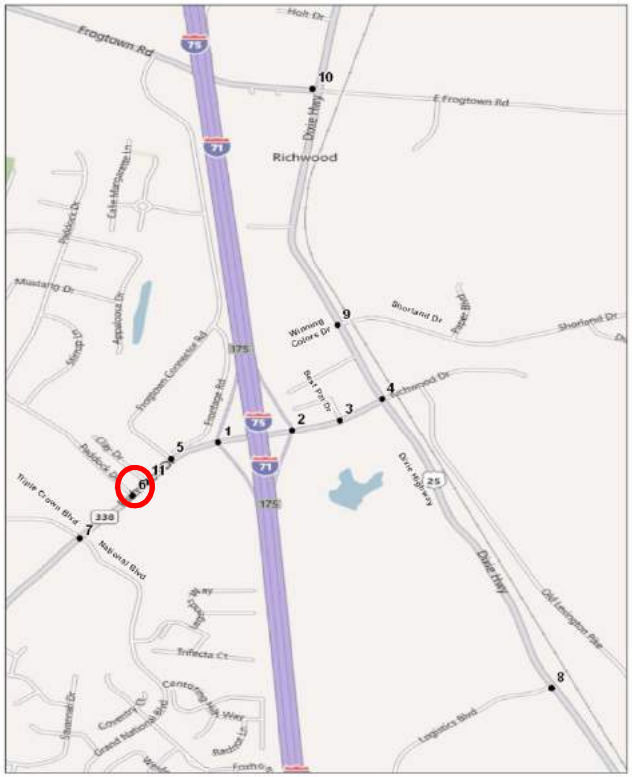
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

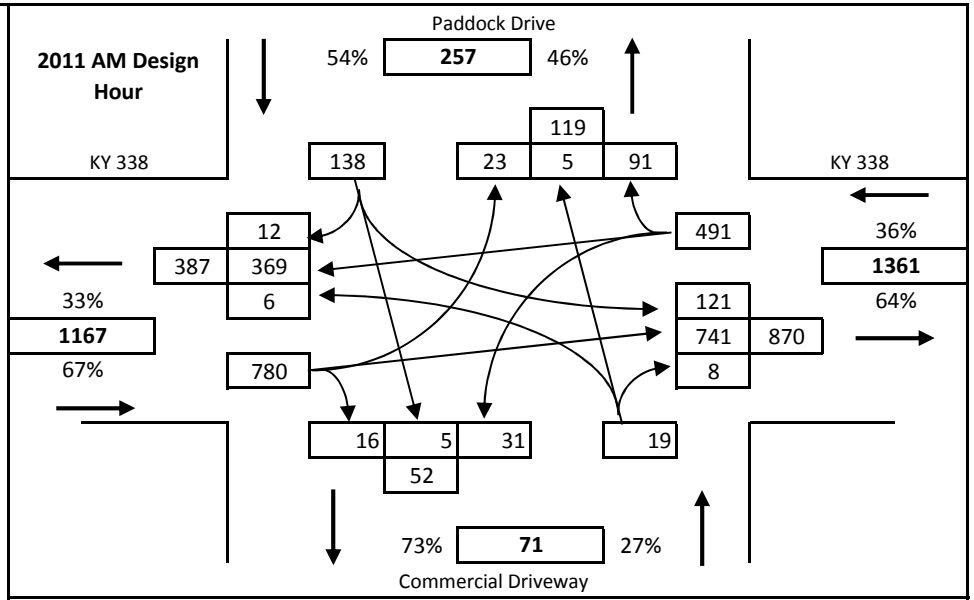
INTERSECTION: 6 - KY 338 at Paddock Drive/Commercial Driveway

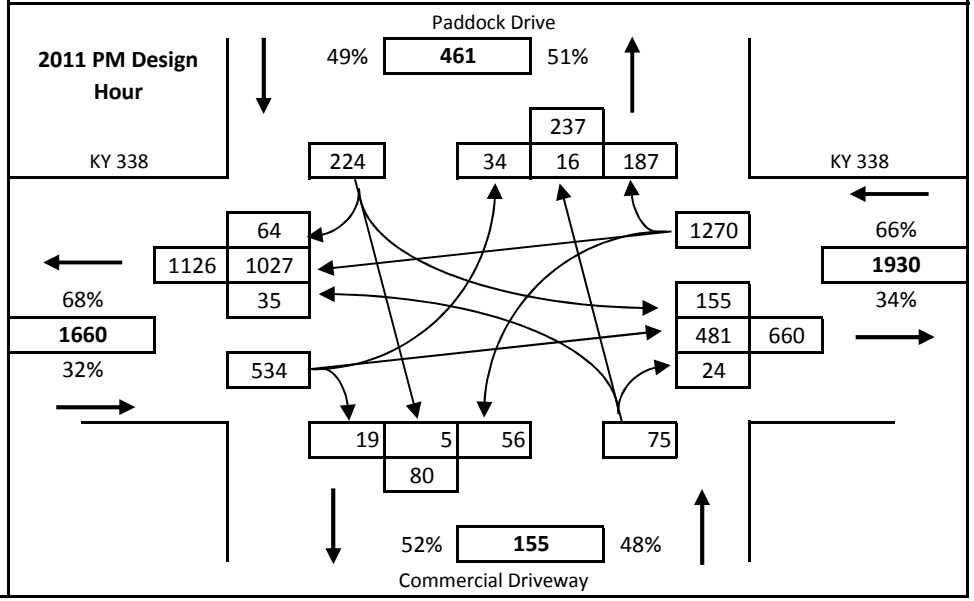
NOTE:

Location Map







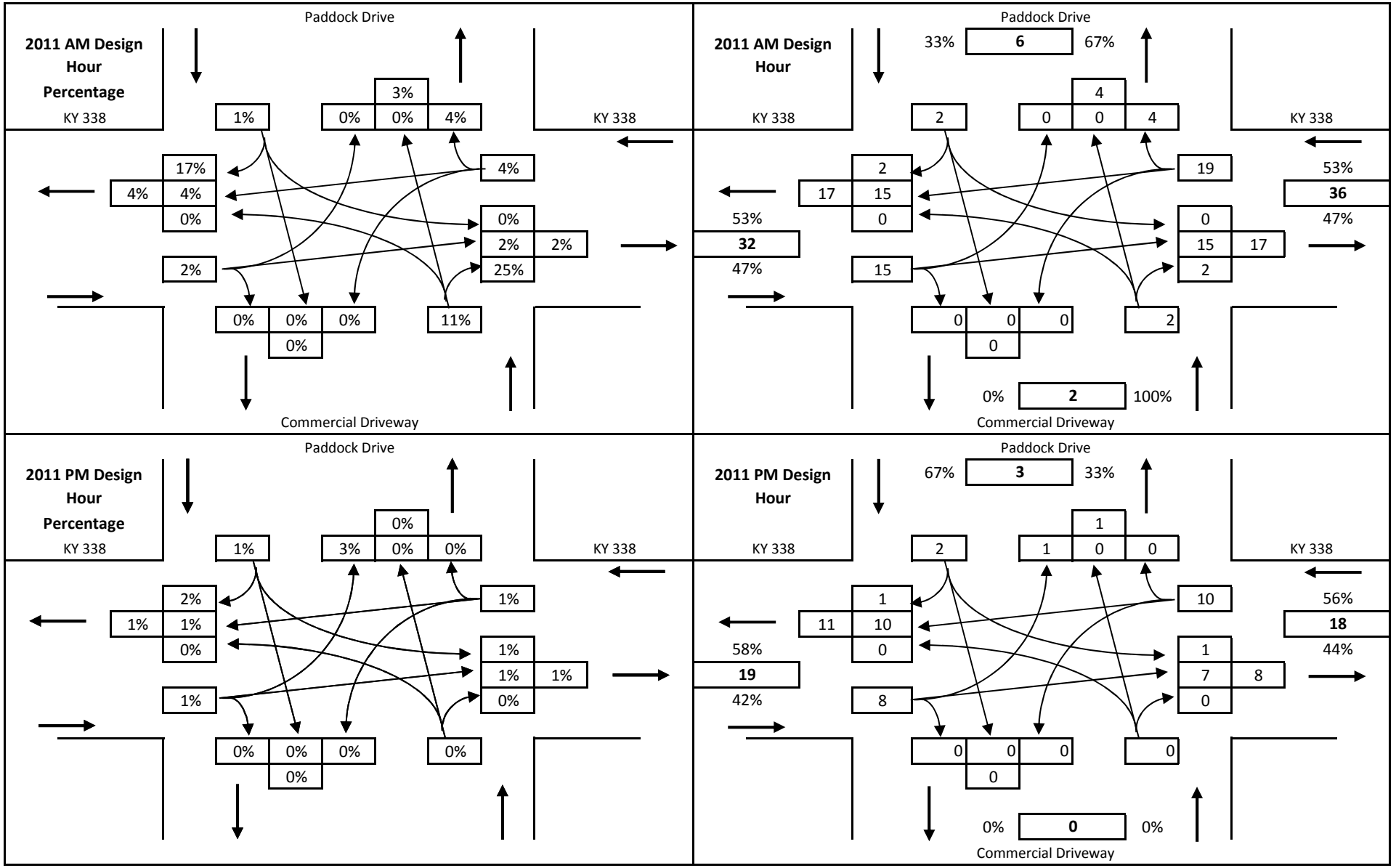


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 6 - KY 338 at Paddock Drive/Commercial Driveway

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

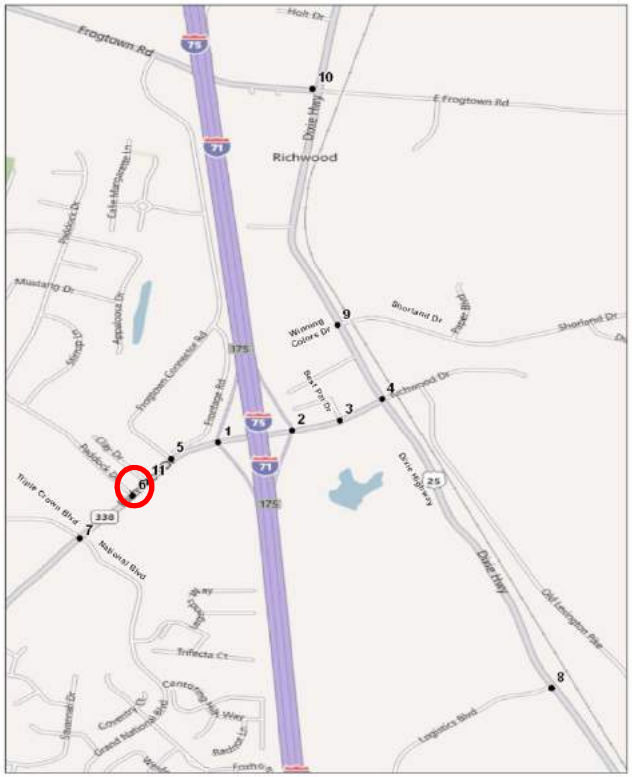
ANALYST: D.Pluckebaum/S.Hoch

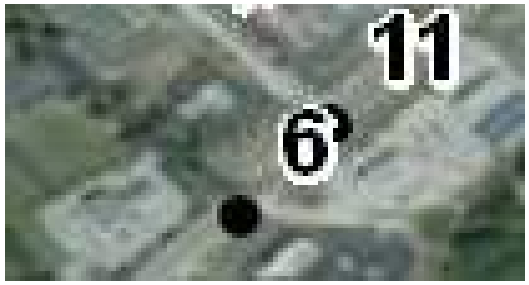
SCENARIO: 2030 Design Hour Volumes

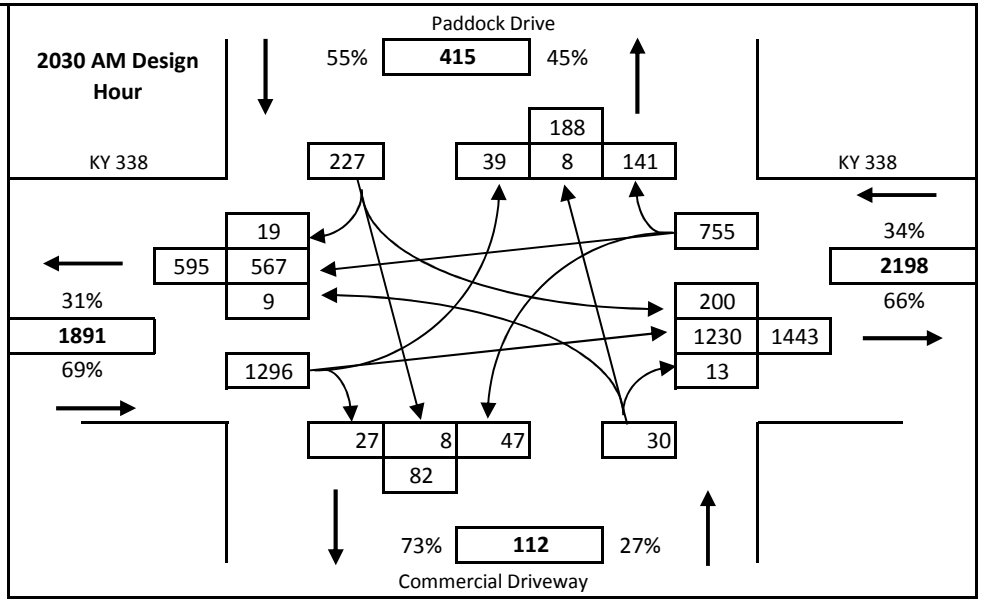
INTERSECTION: 6 - KY 338 at Paddock Drive/Commercial Driveway

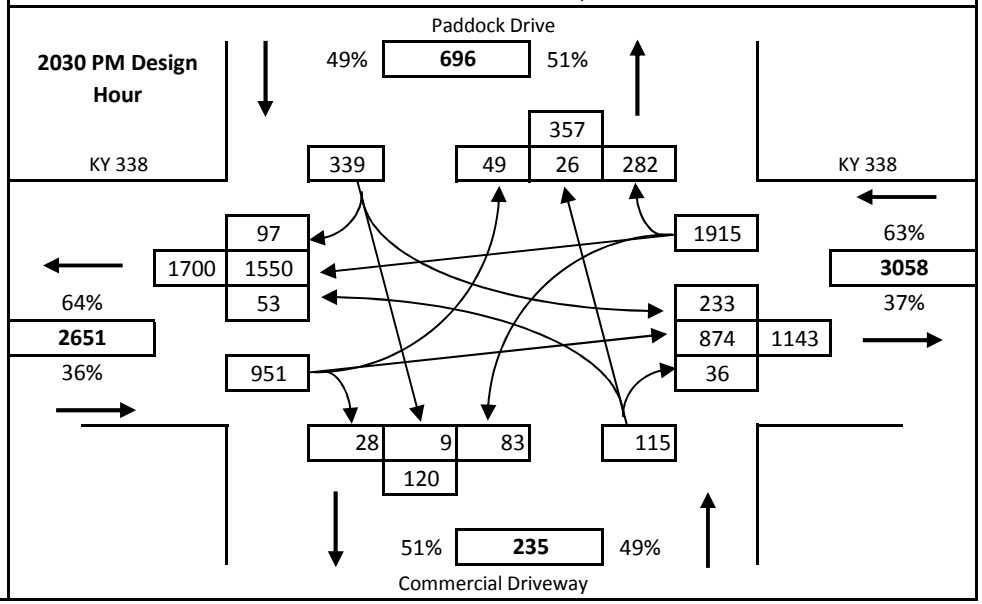
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

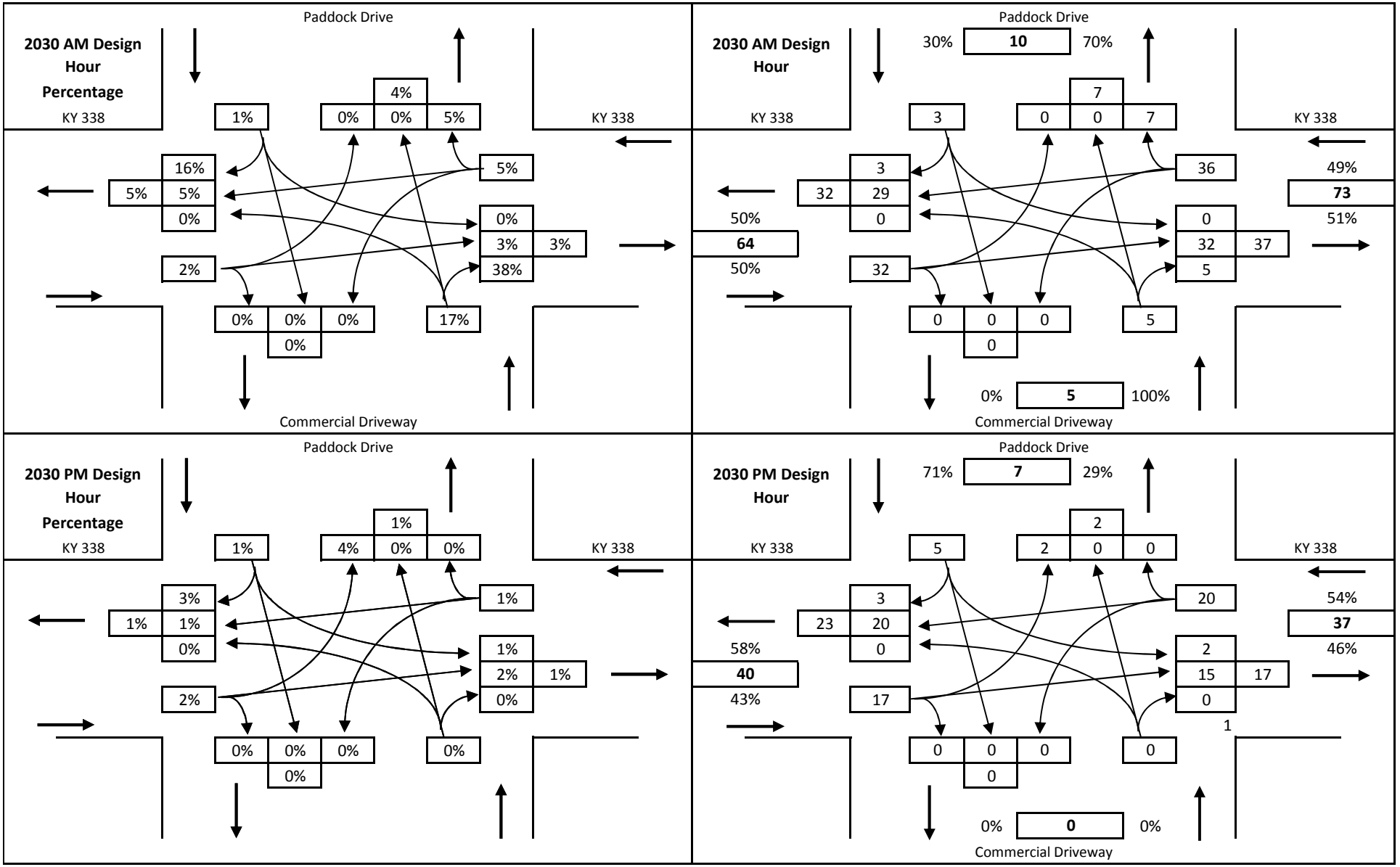
SCENARIO: 2030 Design Hour Volumes

INTERSECTION: 6 - KY 338 at Paddock Drive/Commercial Driveway

NOTE:

TRUCK TURN MOVEMENTS

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PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

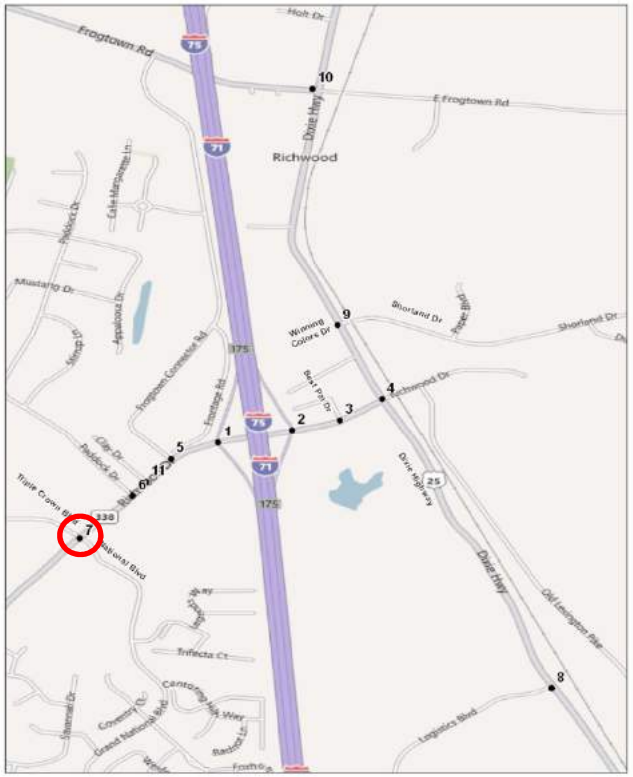
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

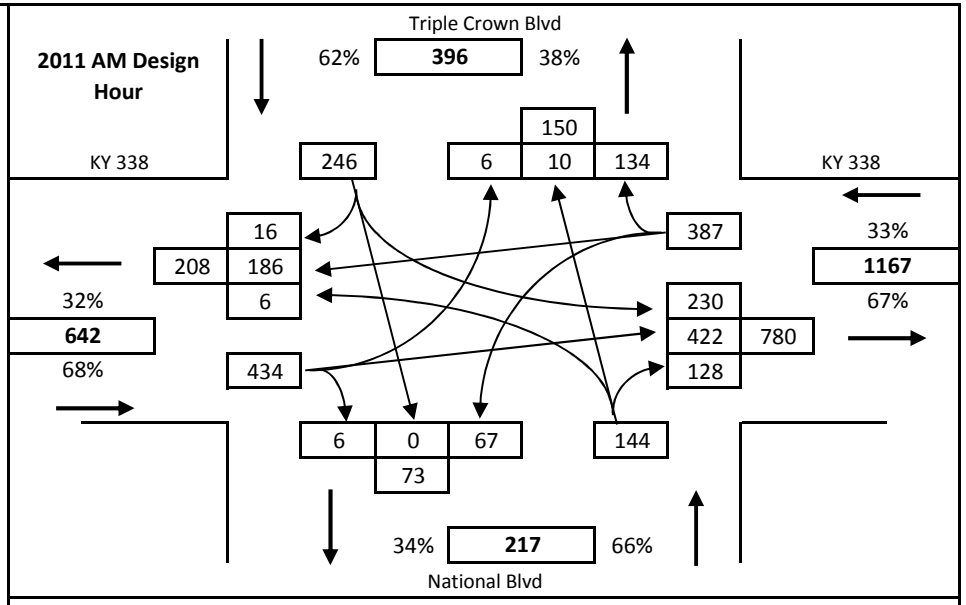
INTERSECTION: 7 - KY 338 at Triple Crown Blvd/National Blvd

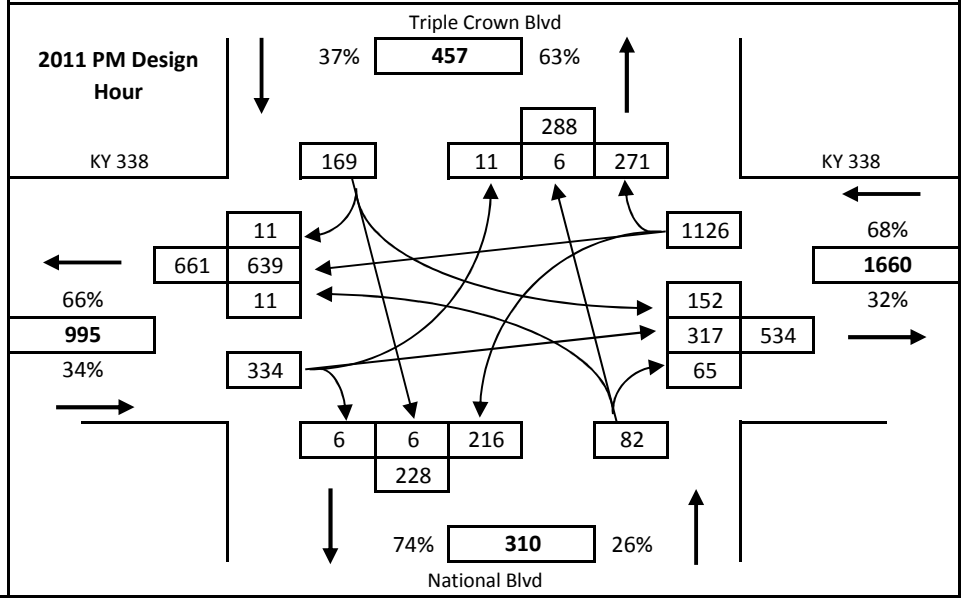
NOTE:

Location Map







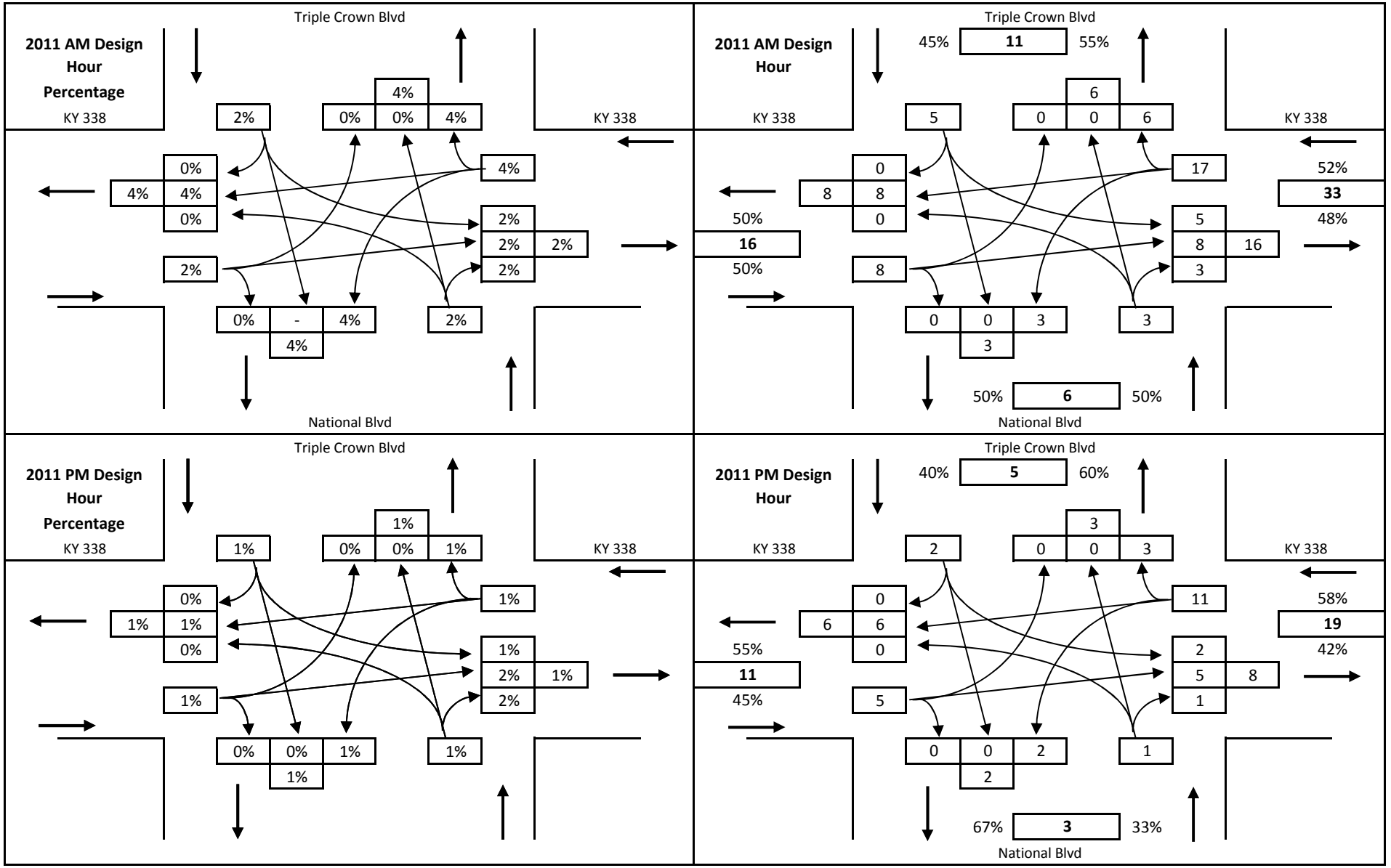


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 7 - KY 338 at Triple Crown Blvd/National Blvd

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

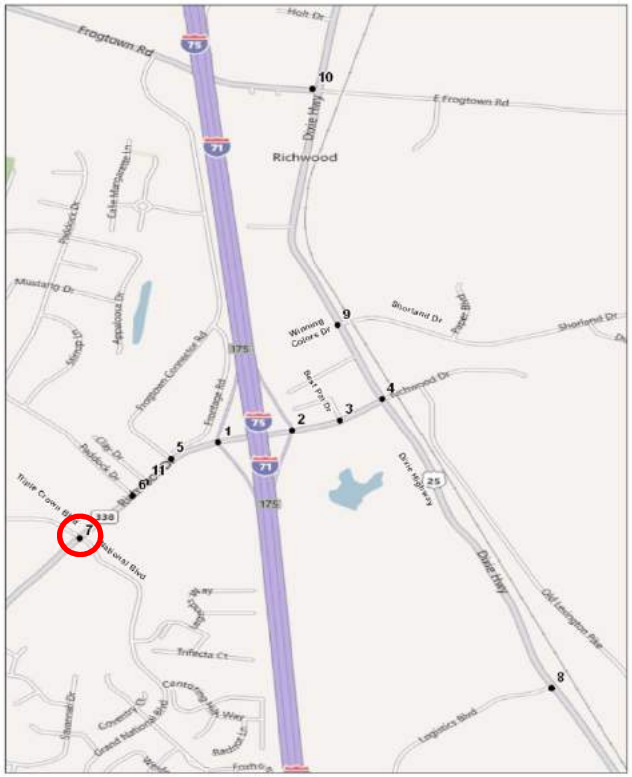
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

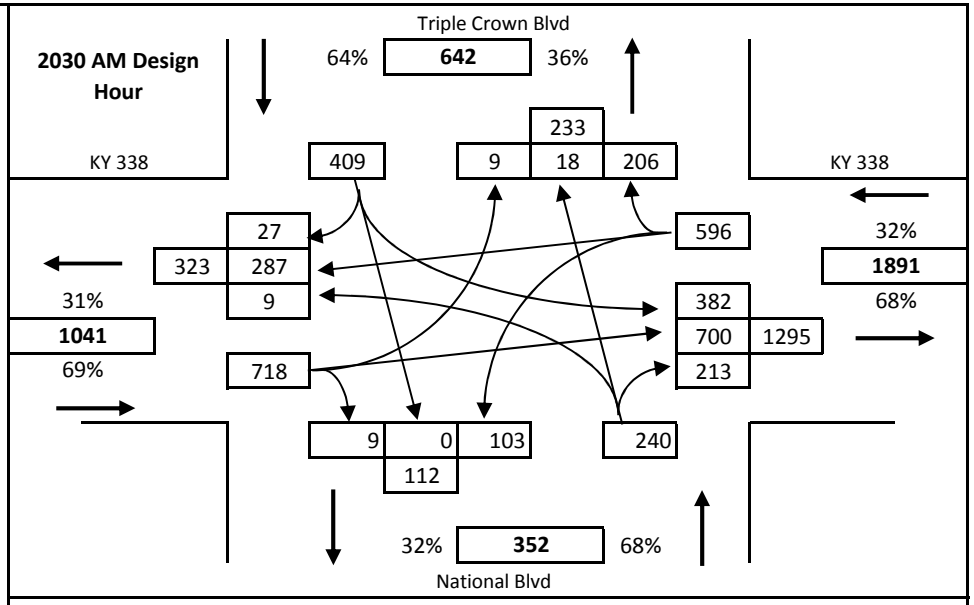
INTERSECTION: 7 - KY 338 at Triple Crown Blvd/National Blvd

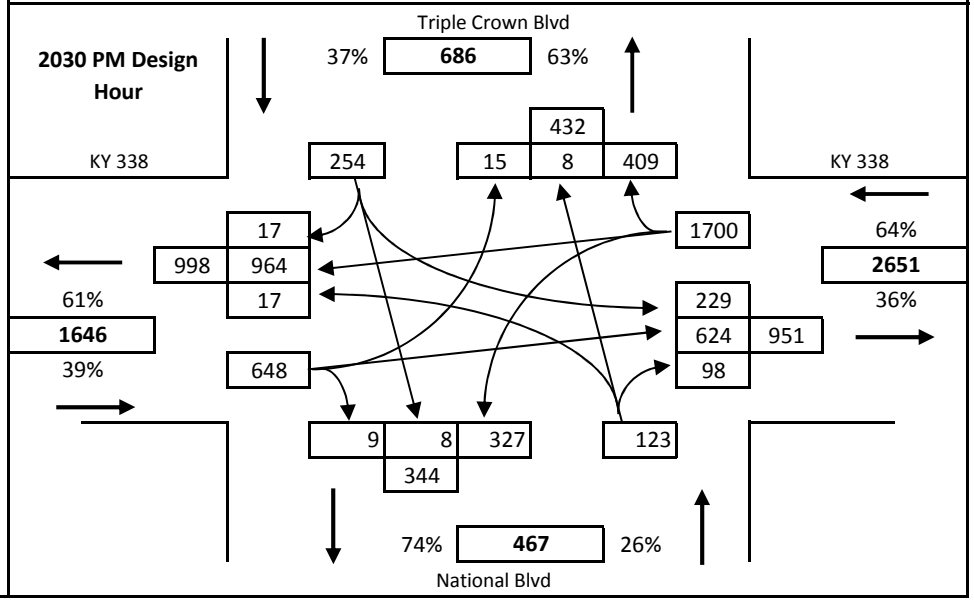
NOTE:

Location Map









PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

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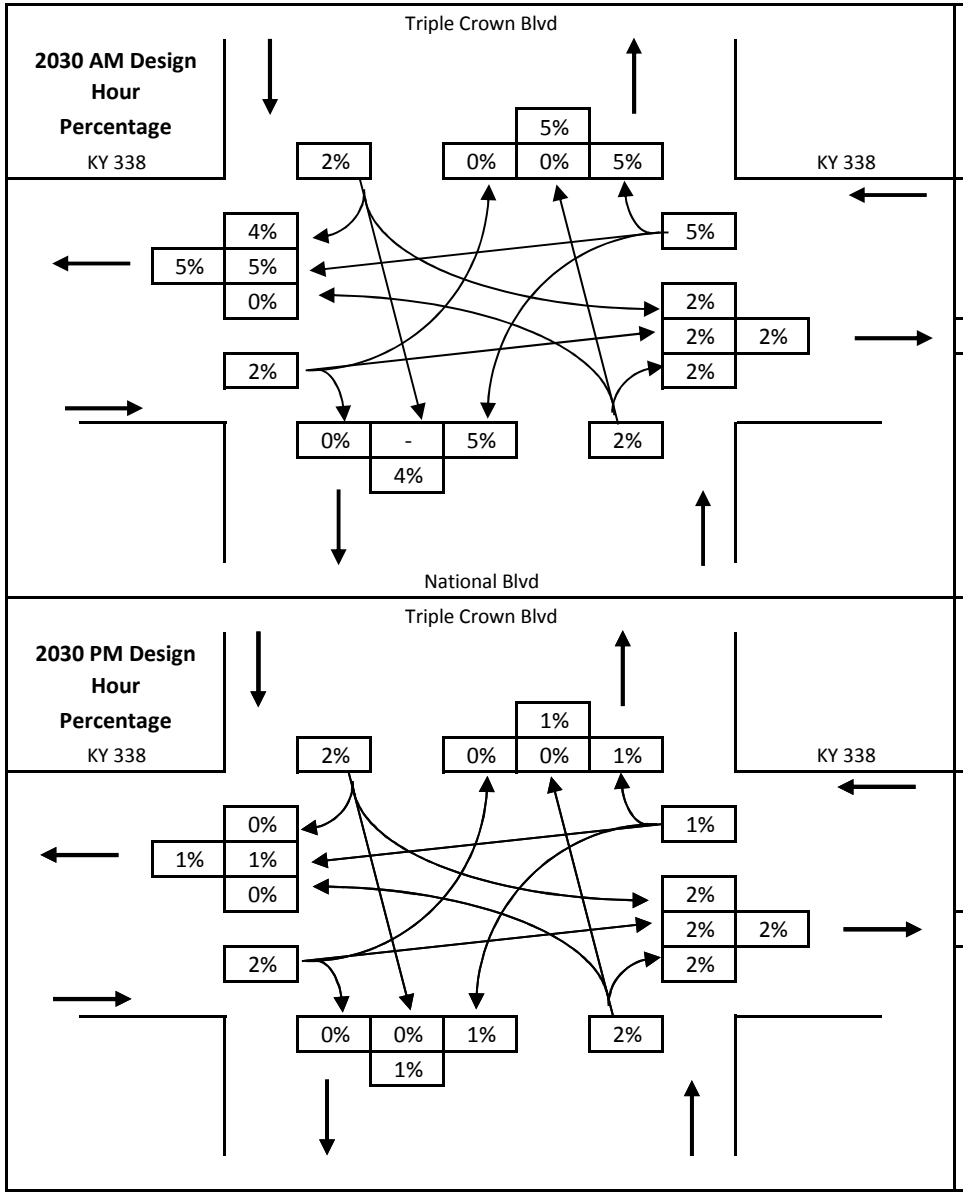
SCENARIO: 2030 Design Hour Volumes

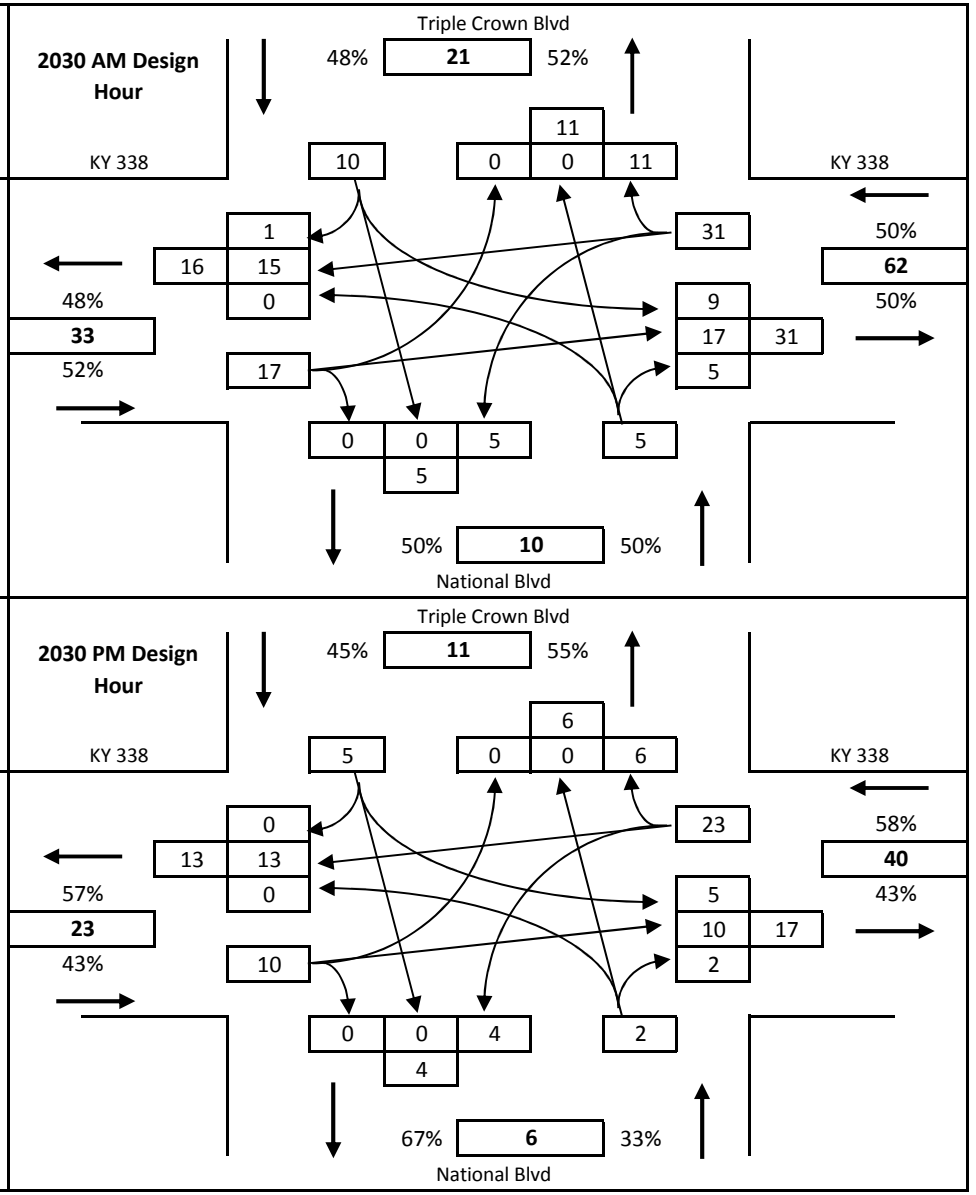
INTERSECTION: 7 - KY 338 at Triple Crown Blvd/National Blvd

NOTE:

TRUCK TURN MOVEMENTS

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PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

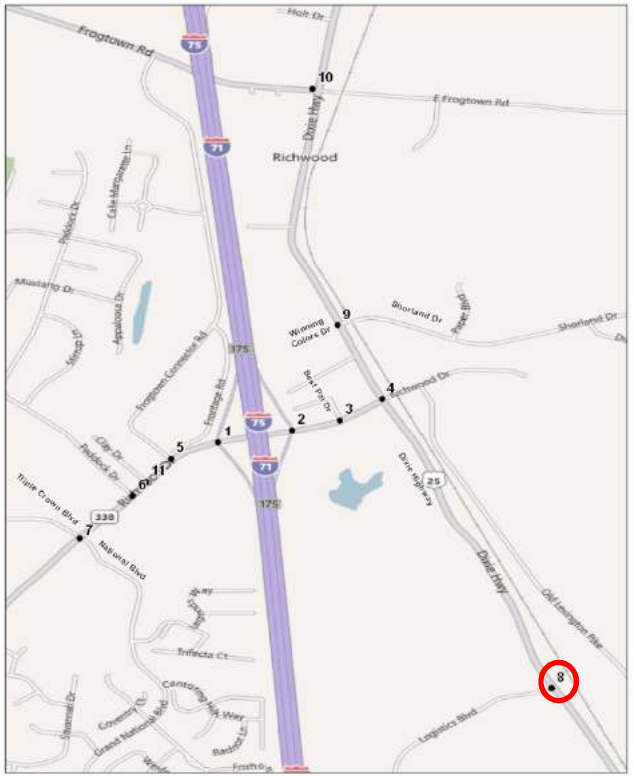
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: Current Design Hour Volumes

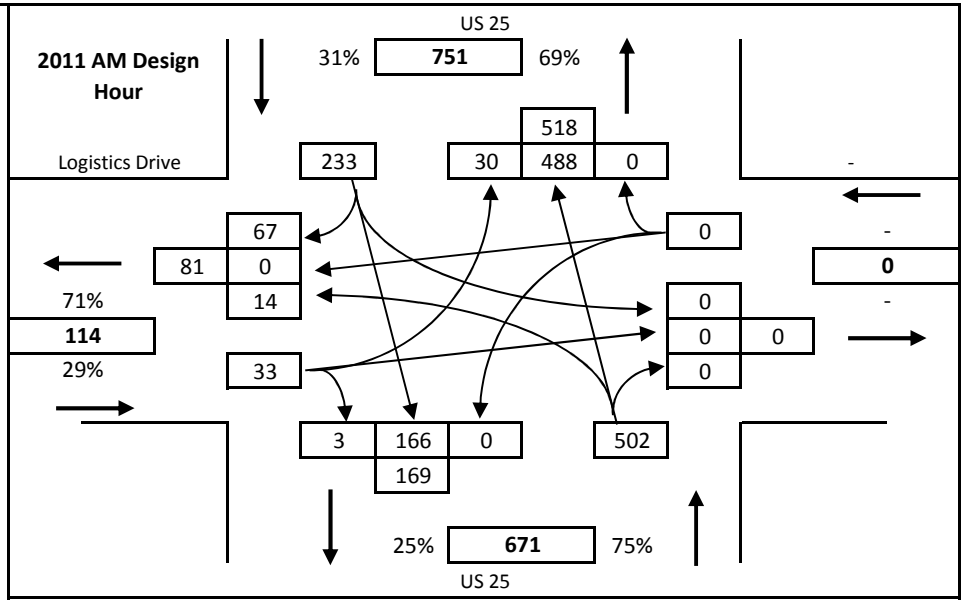
INTERSECTION: 8 - US 25 at Logistics Drive

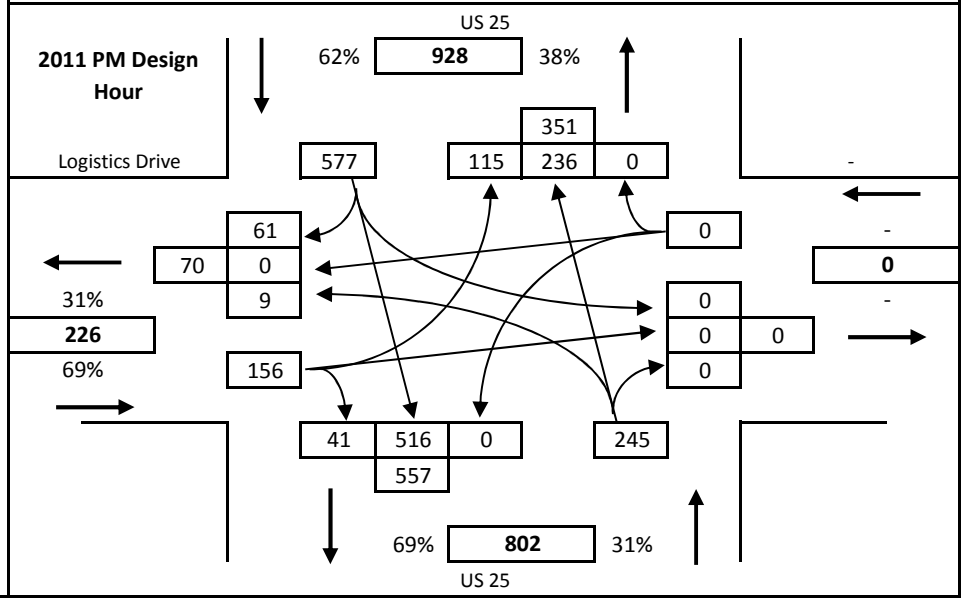
NOTE:

Location Map







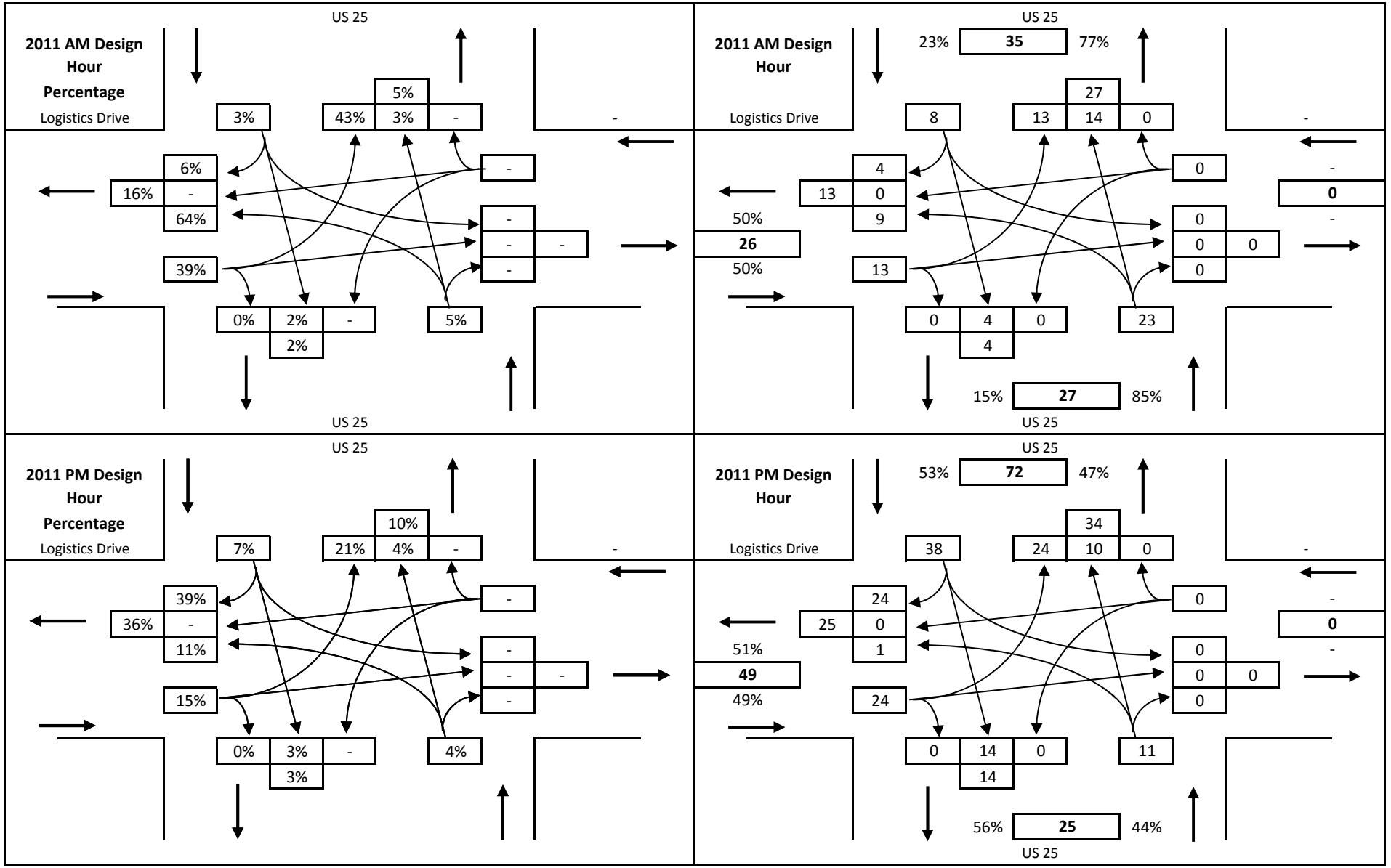


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 8 - US 25 at Logistics Drive

NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks



PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

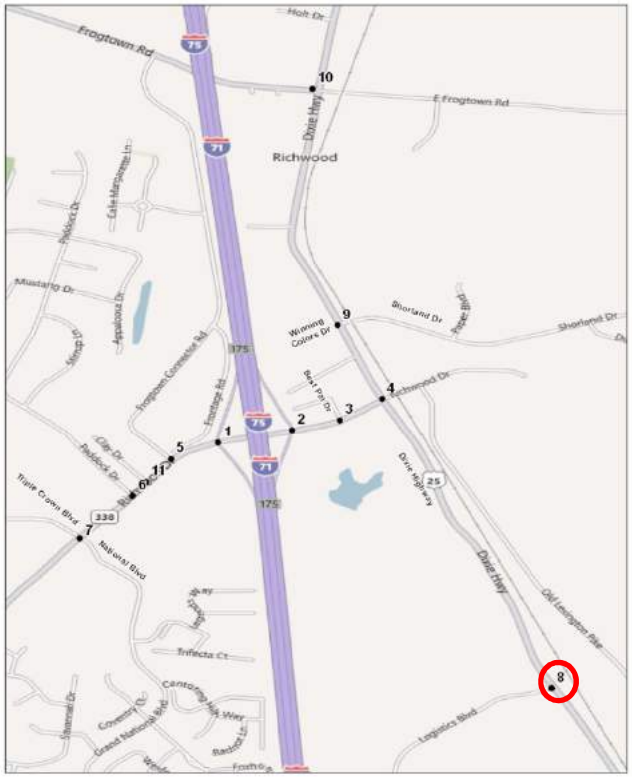
ANALYST: D.Pluckebaum/S.Hoch

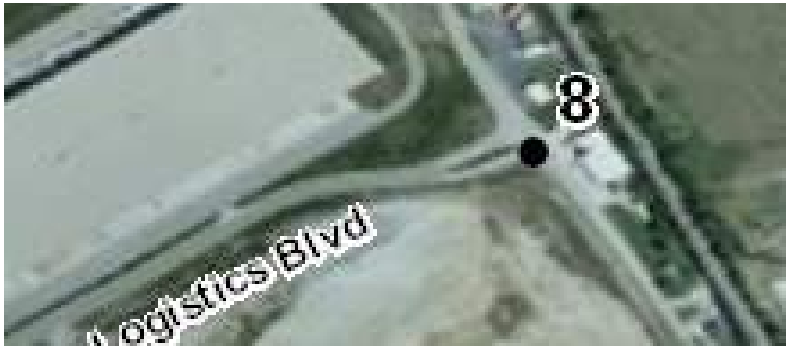
SCENARIO: 2030 Design Hour Volumes

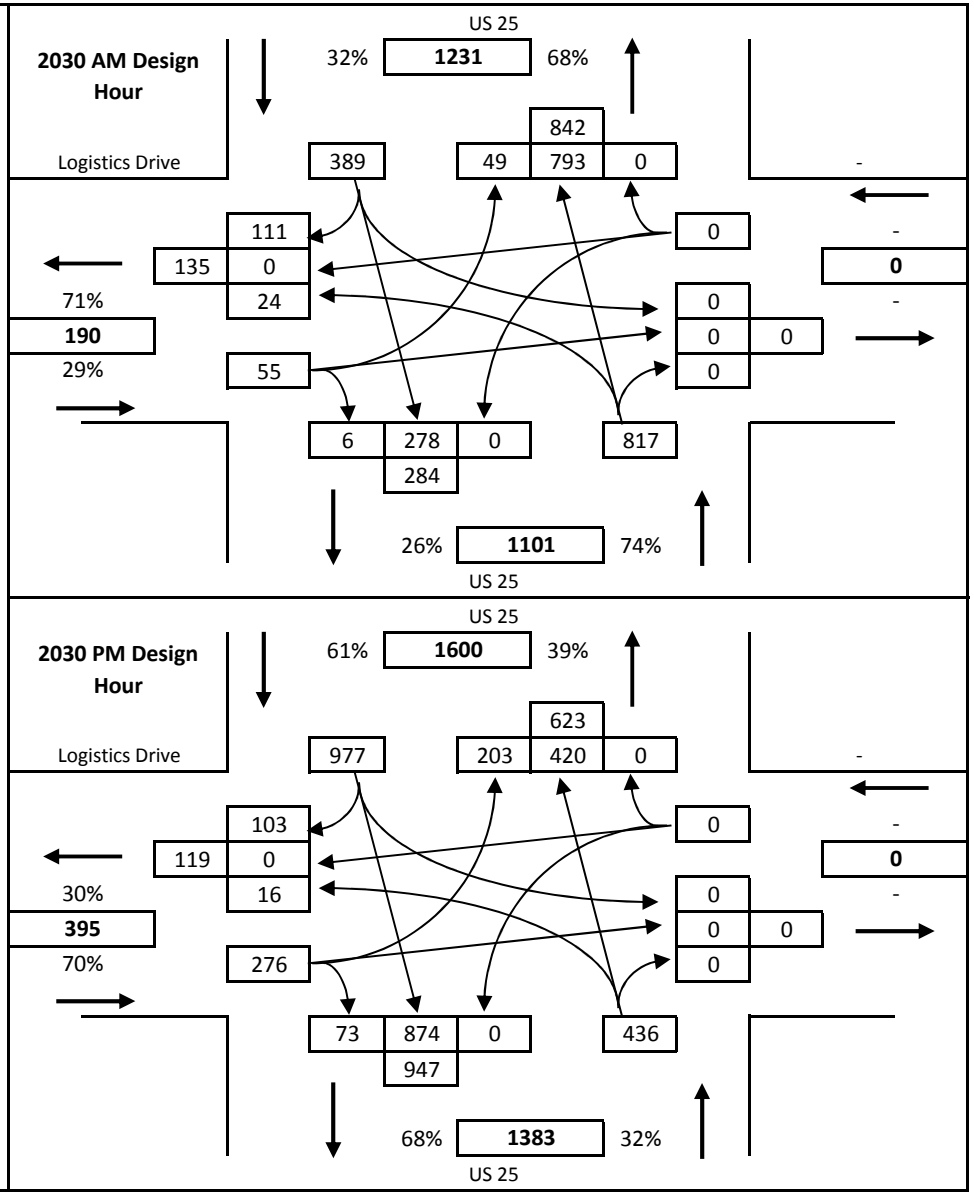
INTERSECTION: 8 - US 25 at Logistics Drive

NOTE:

Location Map





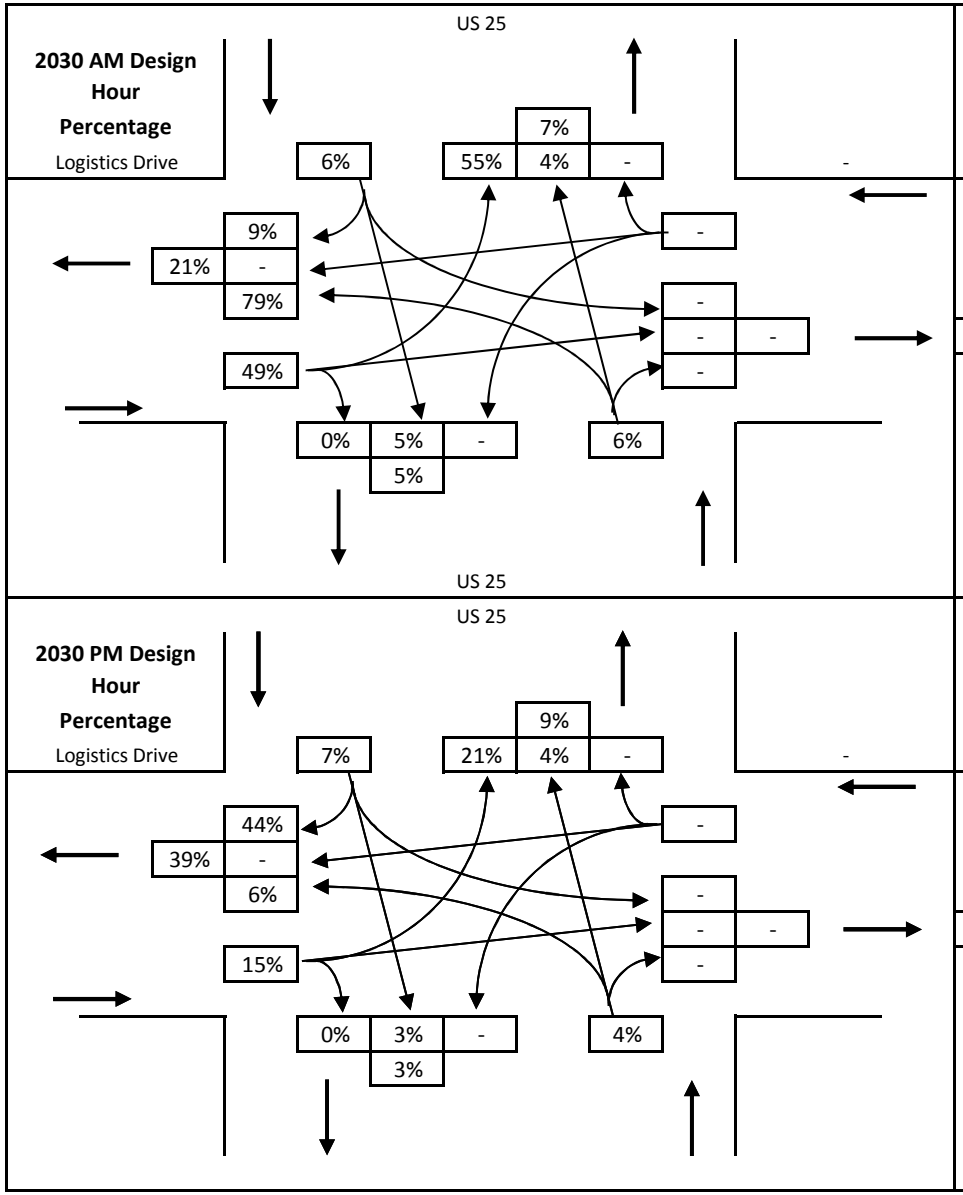


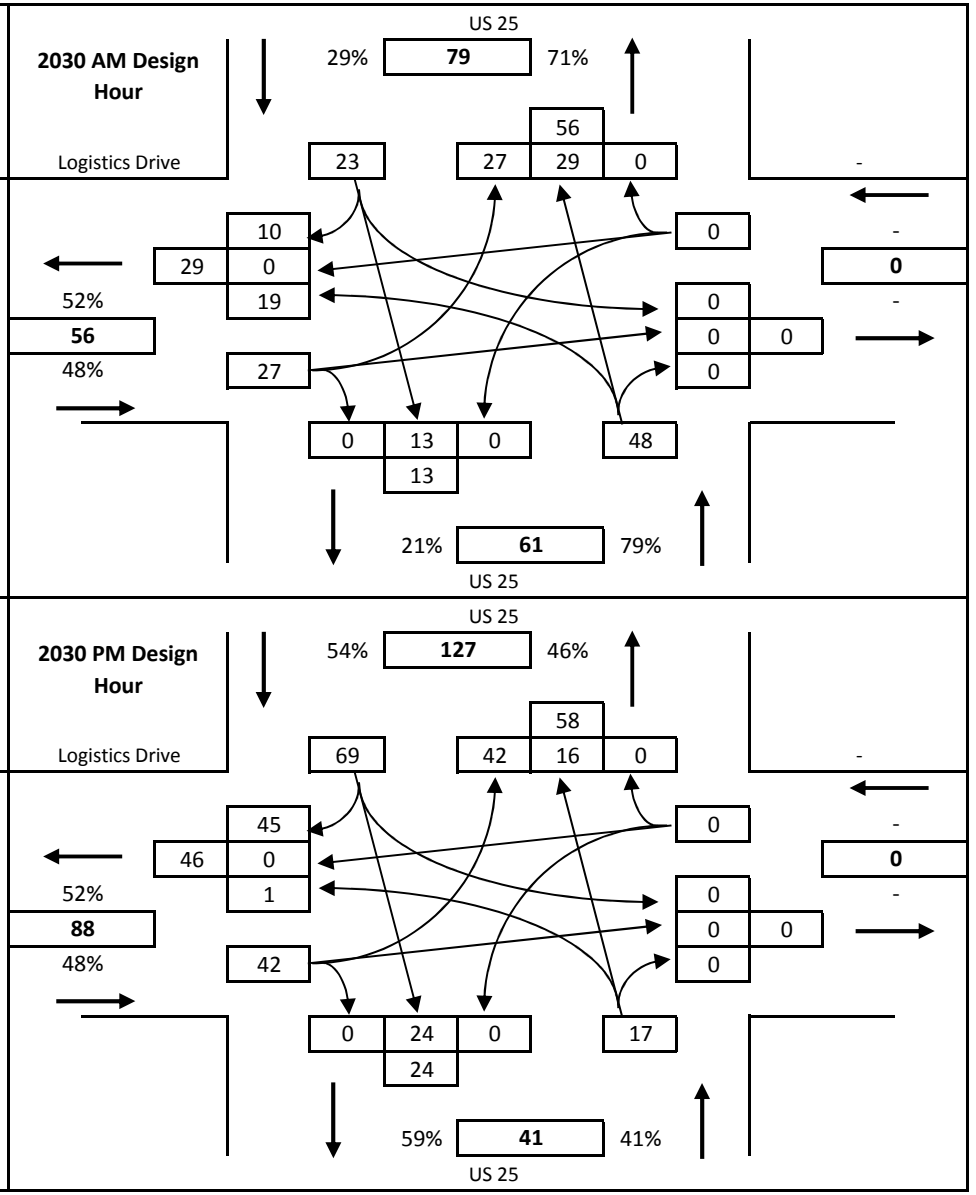
PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
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NOTE:

TRUCK TURN MOVEMENTS

*Includes all single unit, single trailer, and multi-trailer trucks

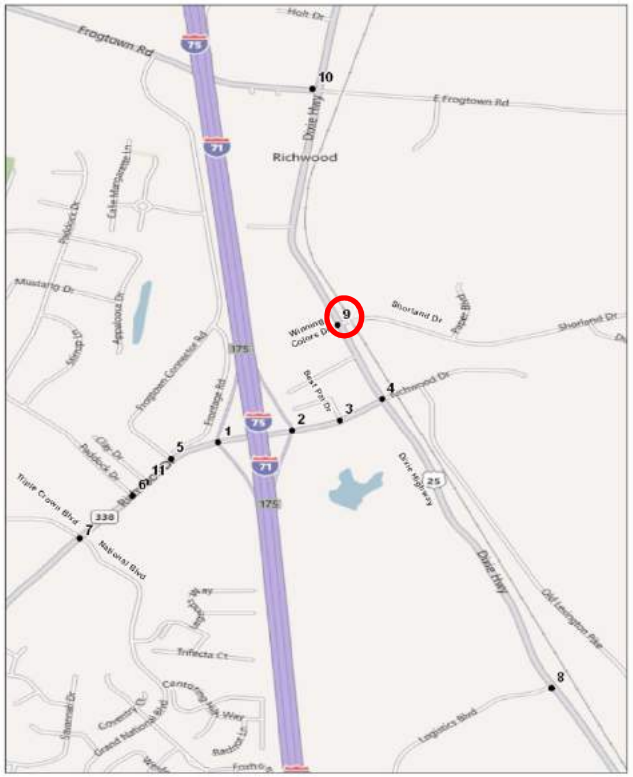


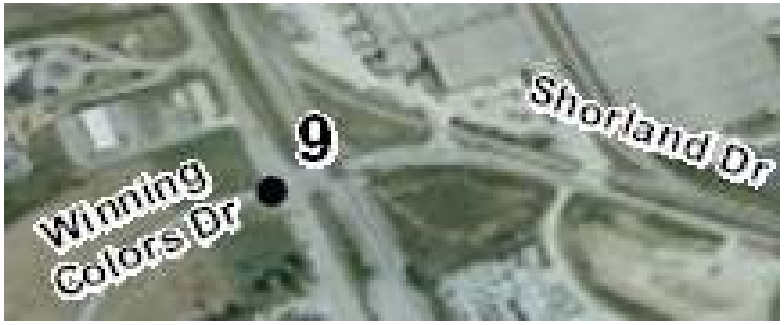


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
ITEM NUMBER: 6-18
ANALYST: D.Pluckebaum/S.Hoch
SCENARIO: Current Design Hour Volumes
INTERSECTION: 9 - US 25 at Shorland Dr/Winning Colors Way

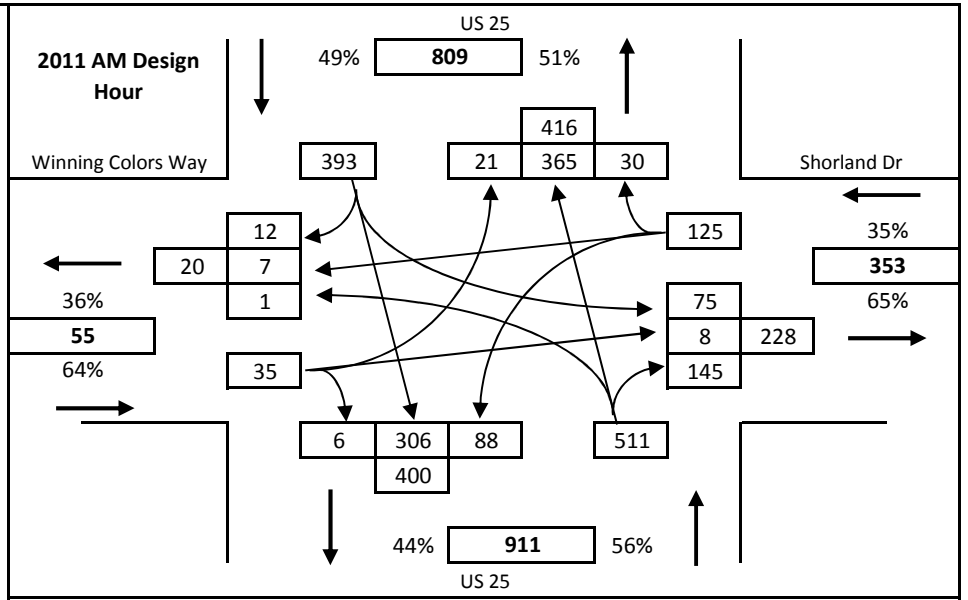
NOTE:

Location Map

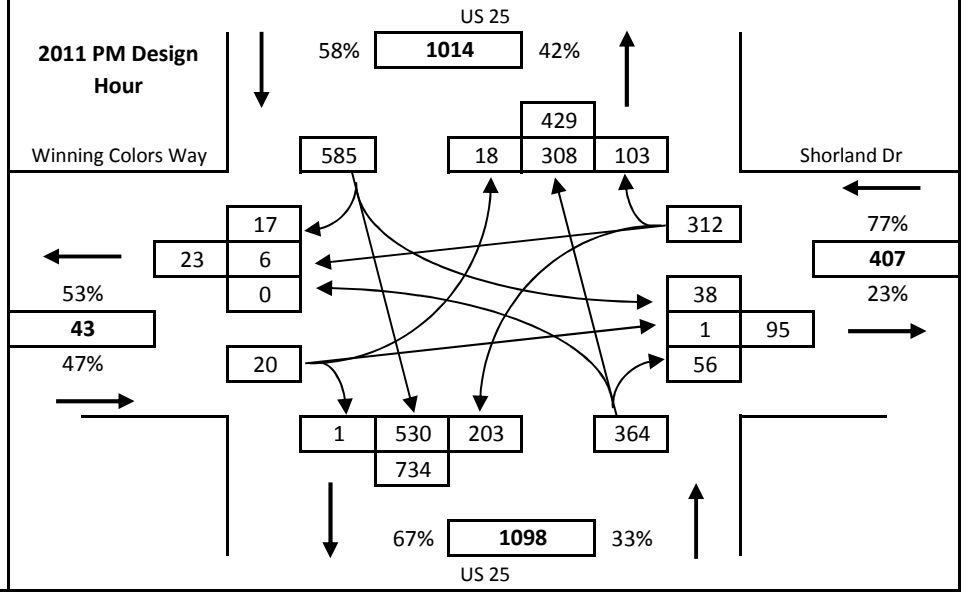




2011 AM Design Hour



2011 PM Design Hour

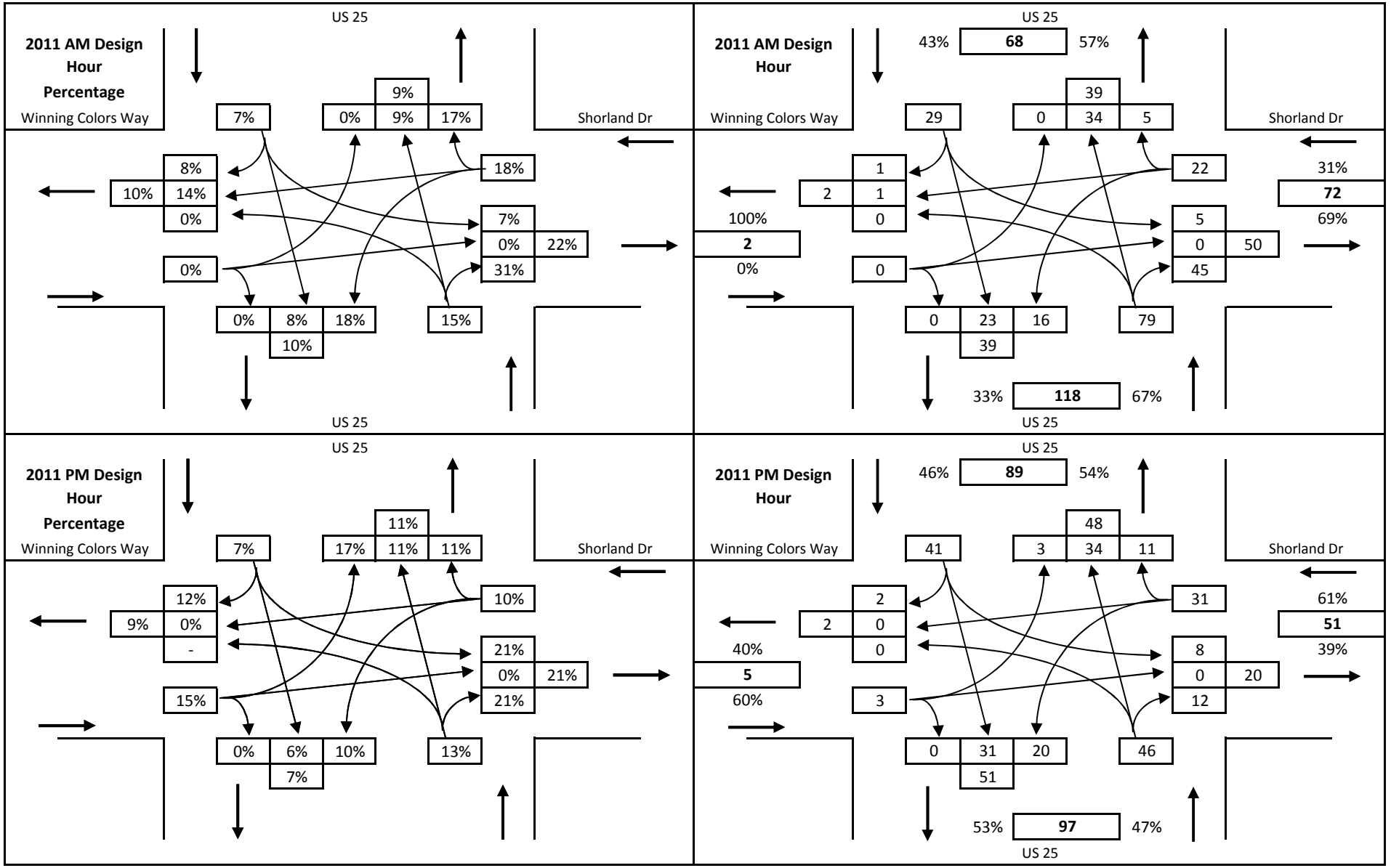


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PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

ITEM NUMBER: 6-18

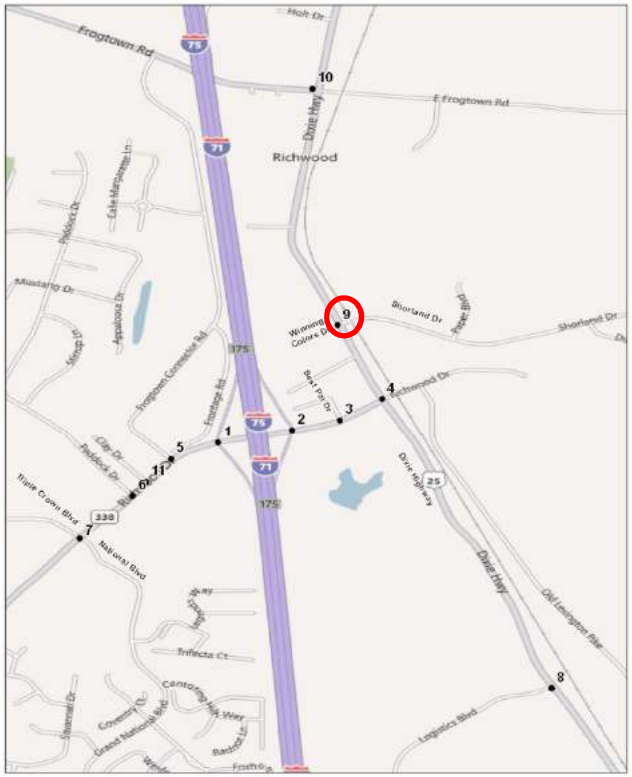
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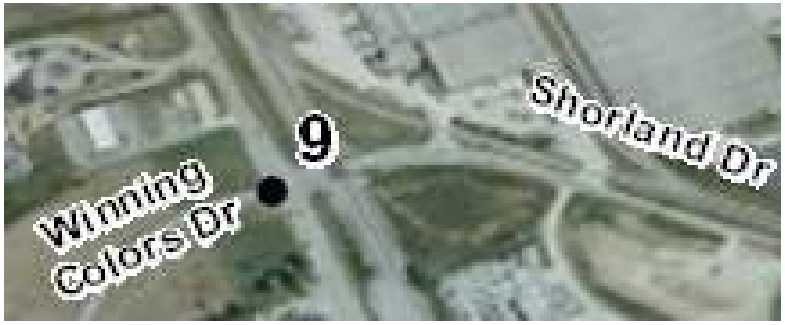
SCENARIO: 2030 Design Hour Volumes

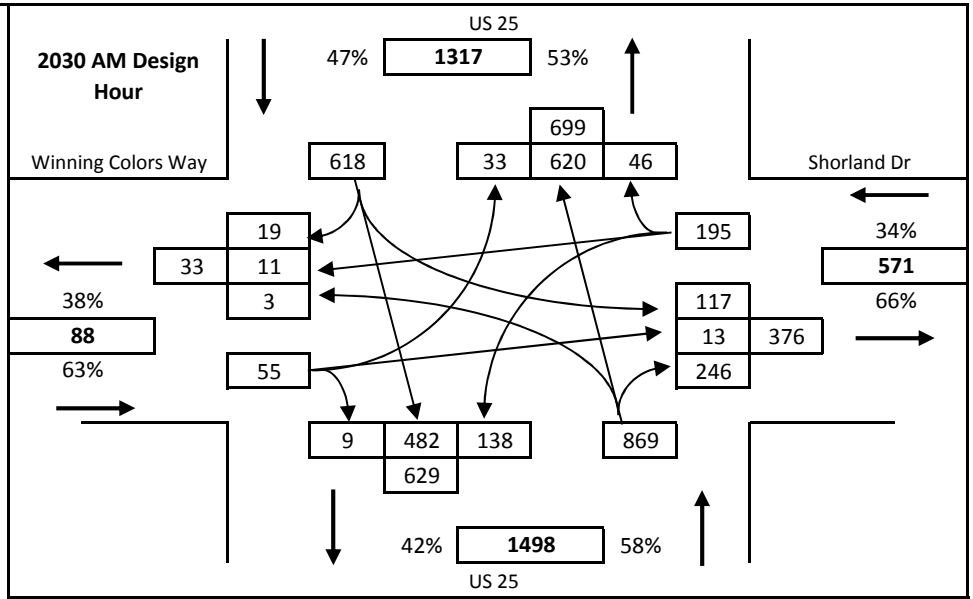
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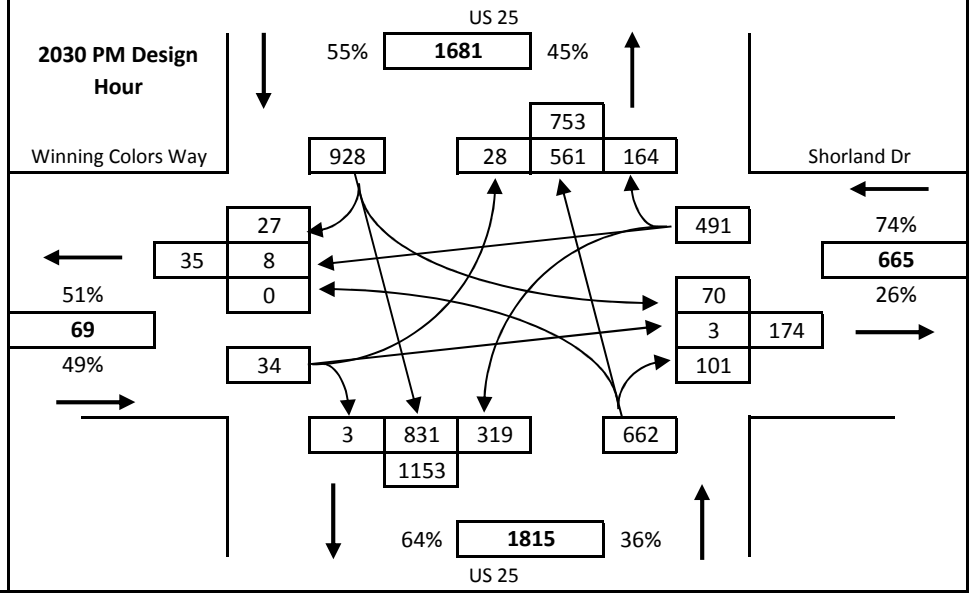
NOTE:

Location Map







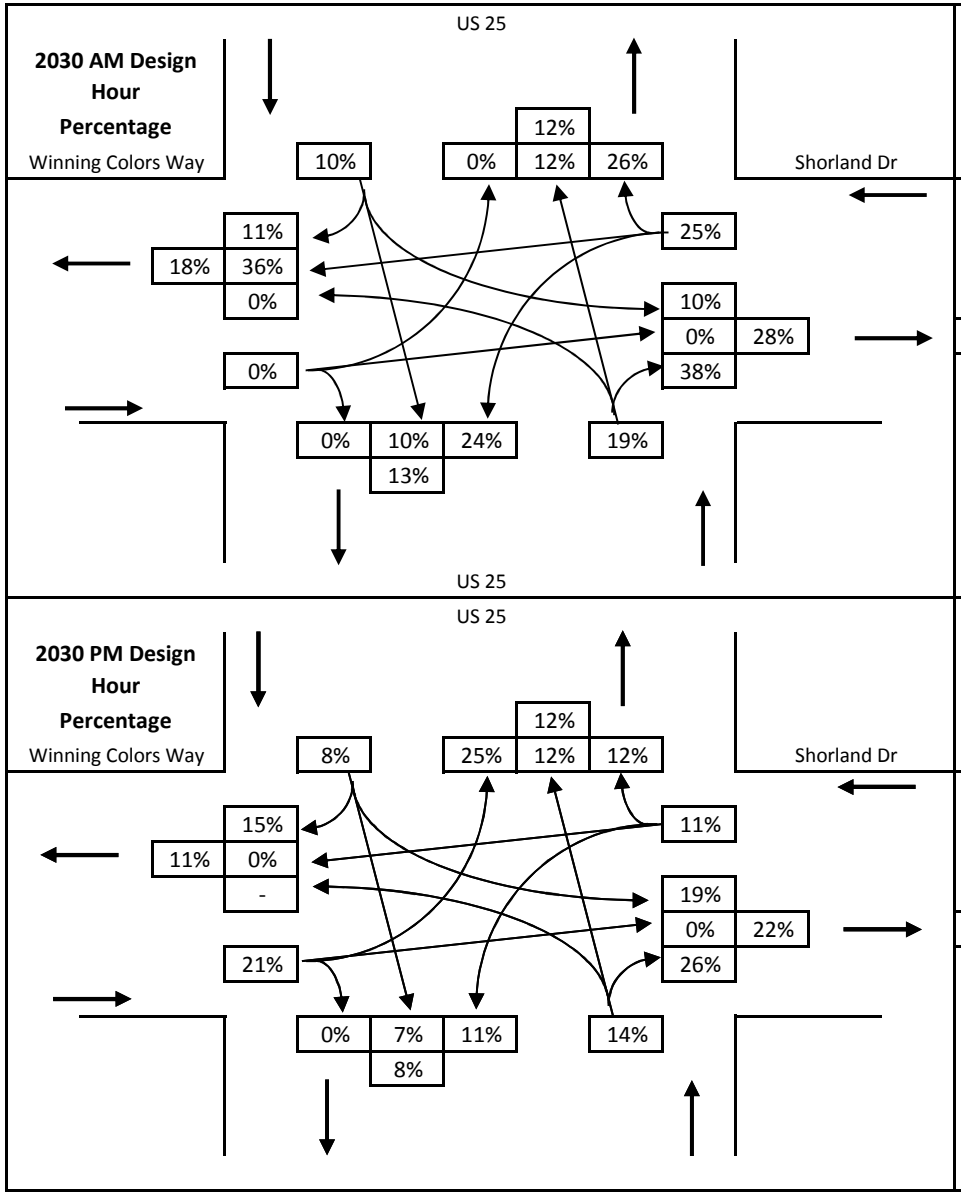


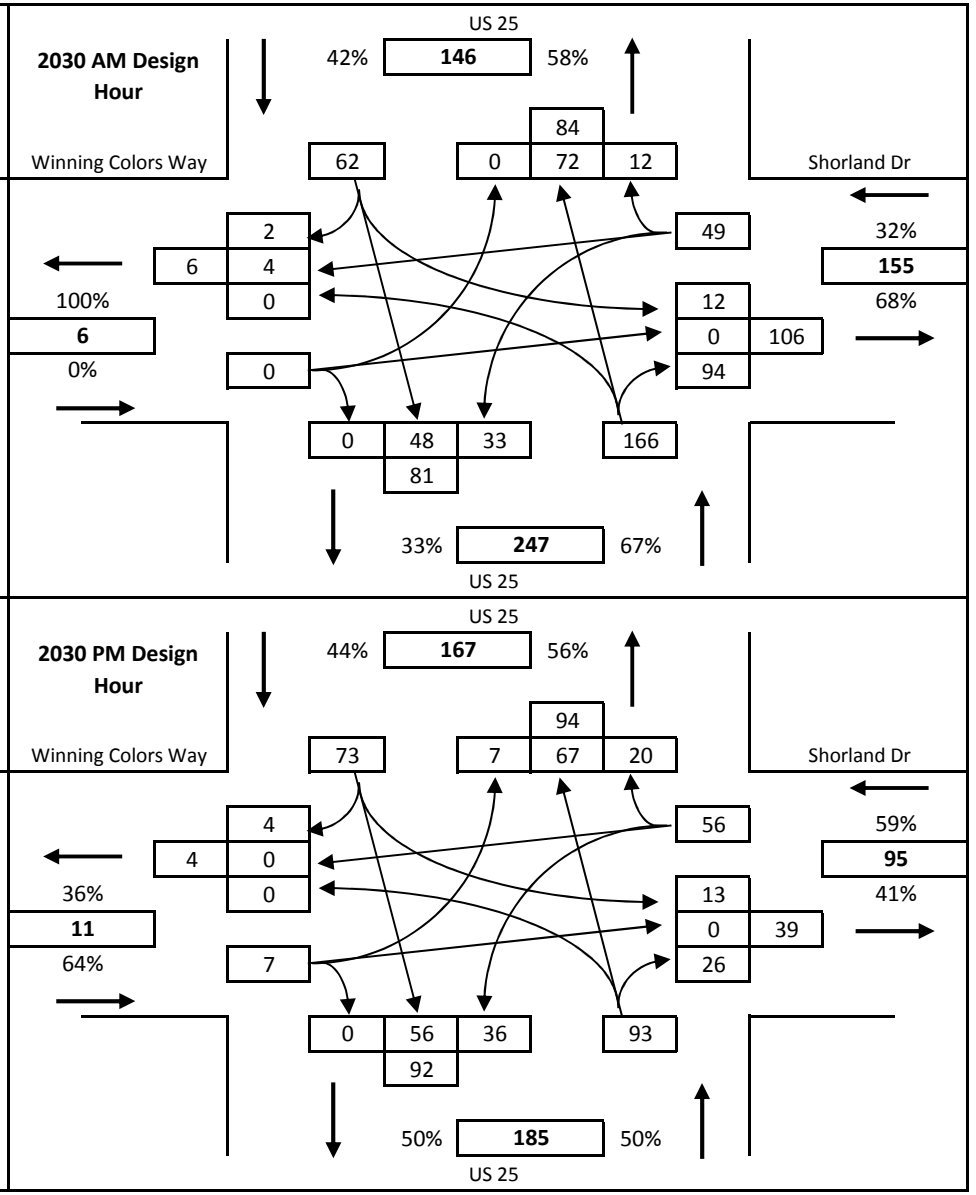
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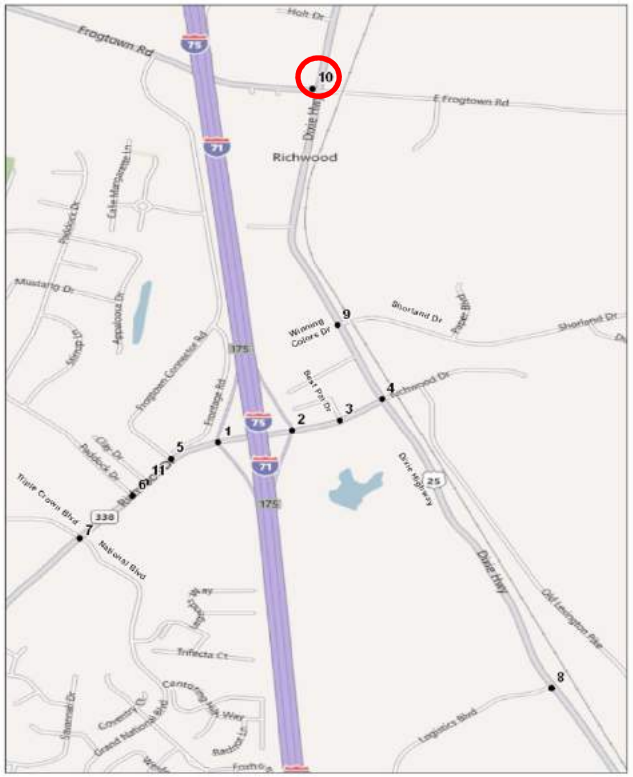




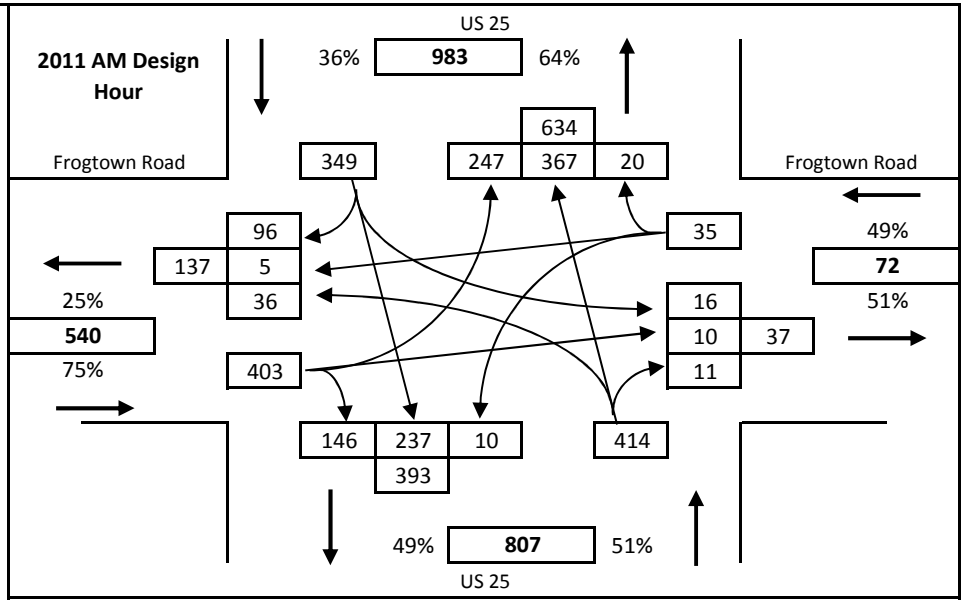
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INTERSECTION: 10 - US 25 at Frogtown Road

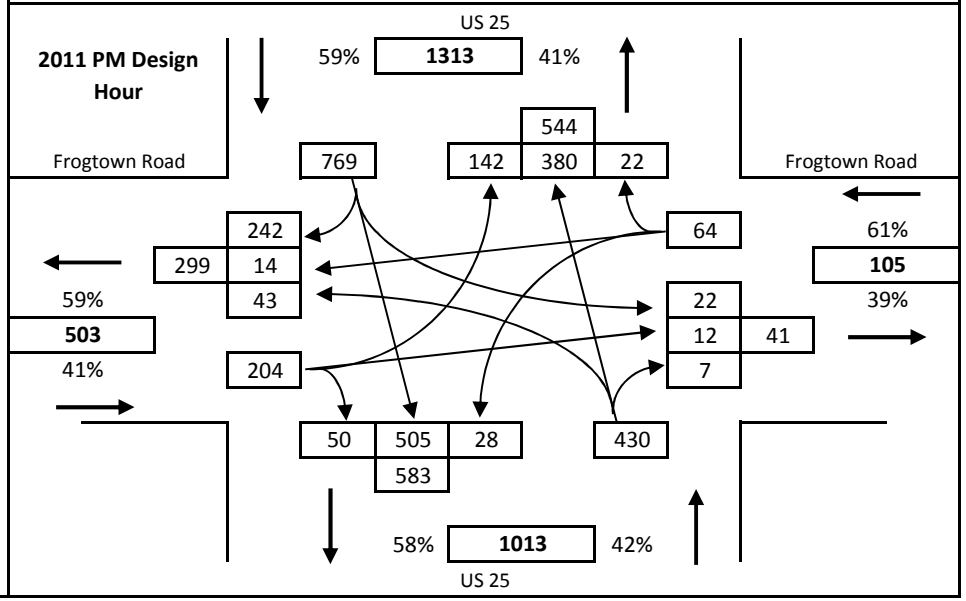
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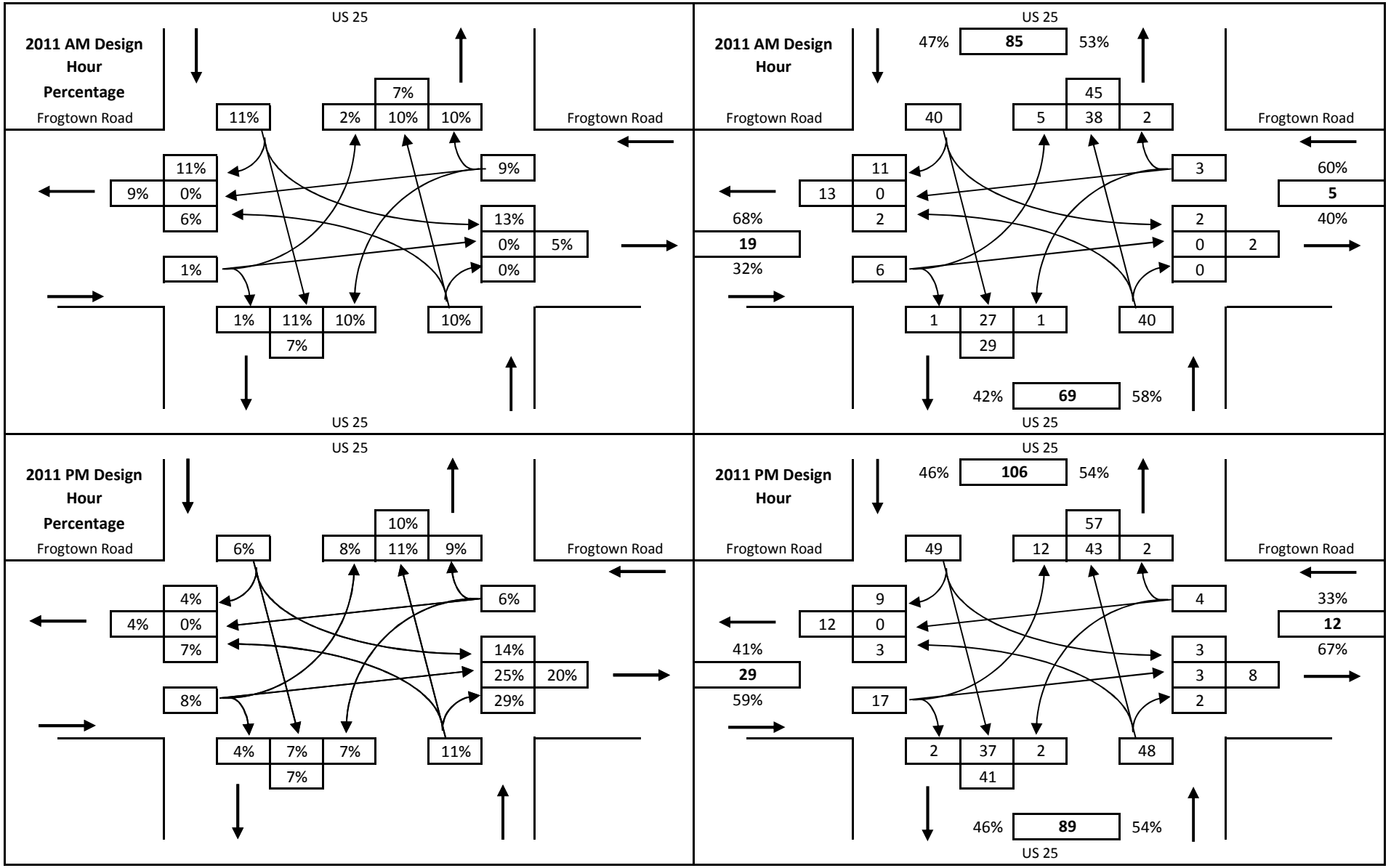


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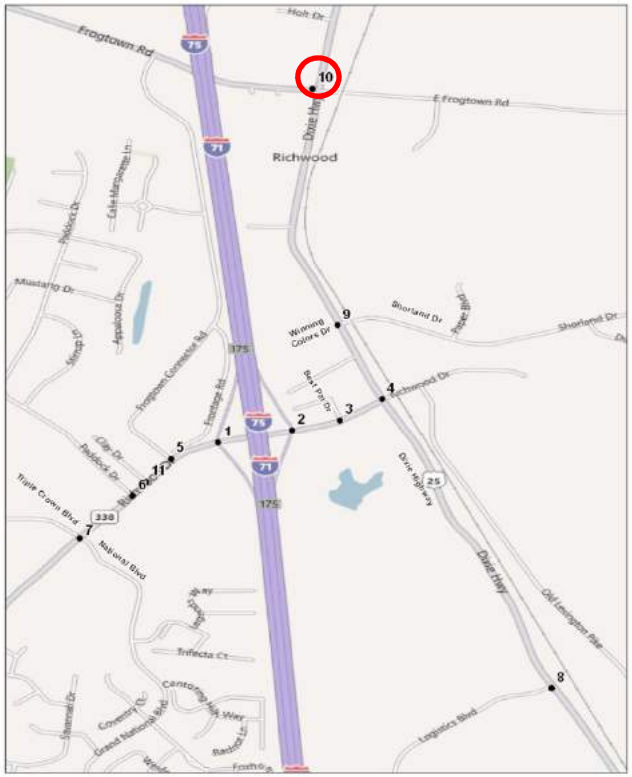
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

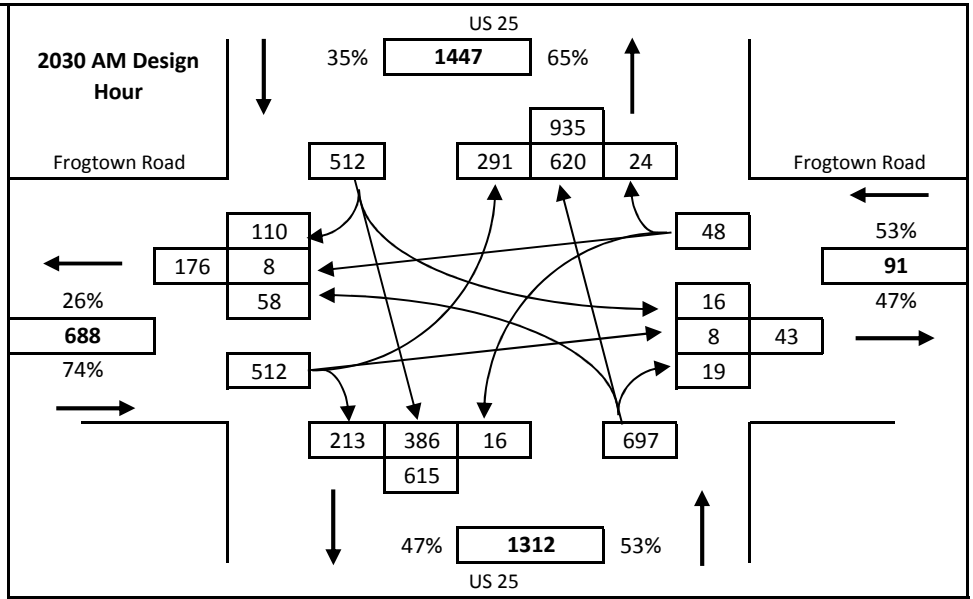
INTERSECTION: 10 - US 25 at Frogtown Road

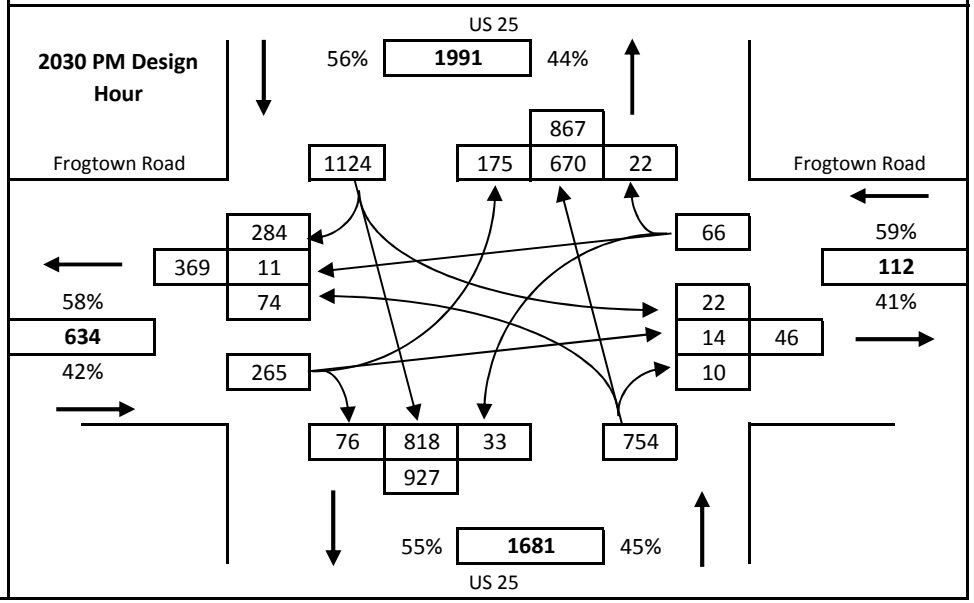
NOTE:

Location Map









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ITEM NUMBER: 6-18

ANALYST: D.Pluckebaum/S.Hoch

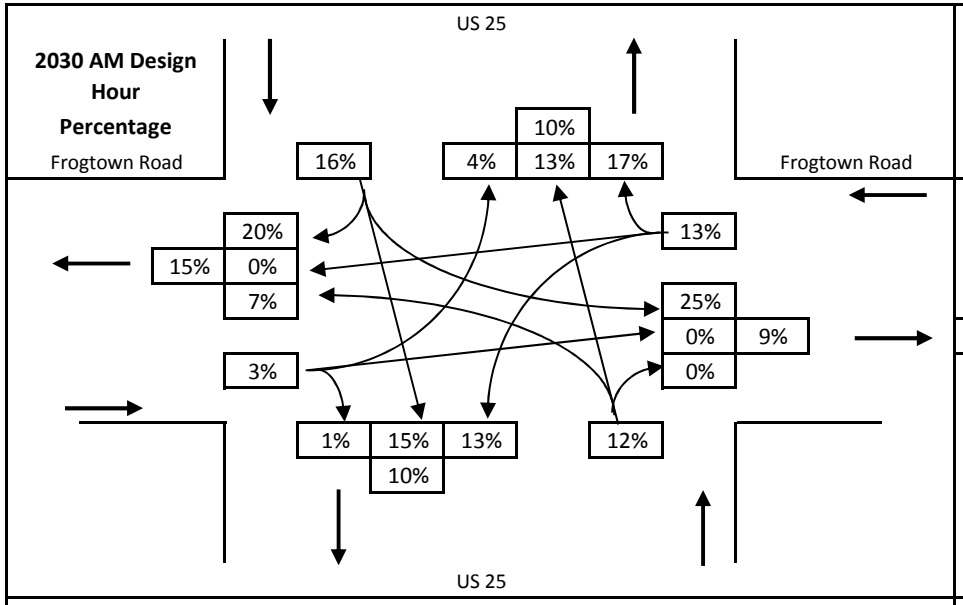
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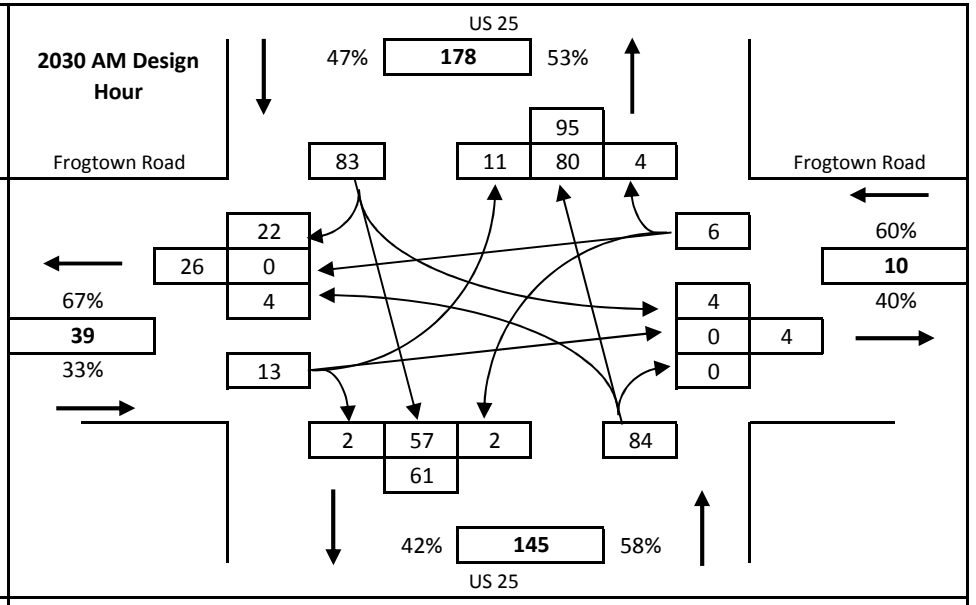
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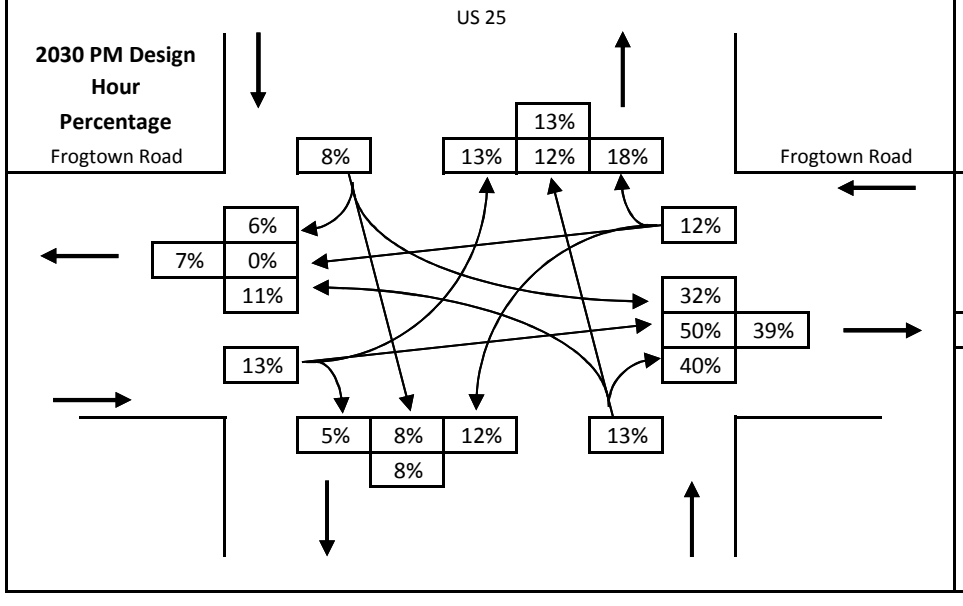
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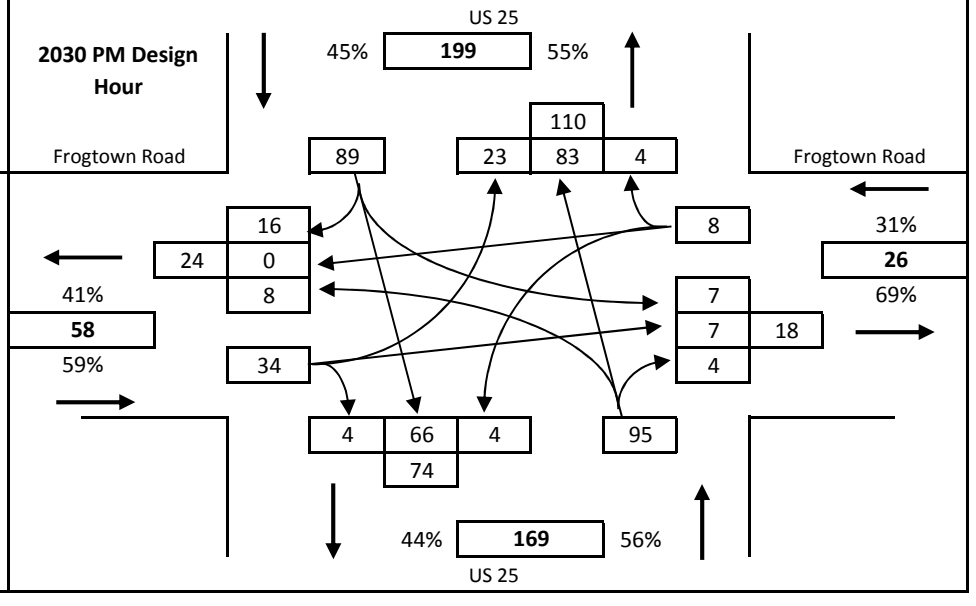
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PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75

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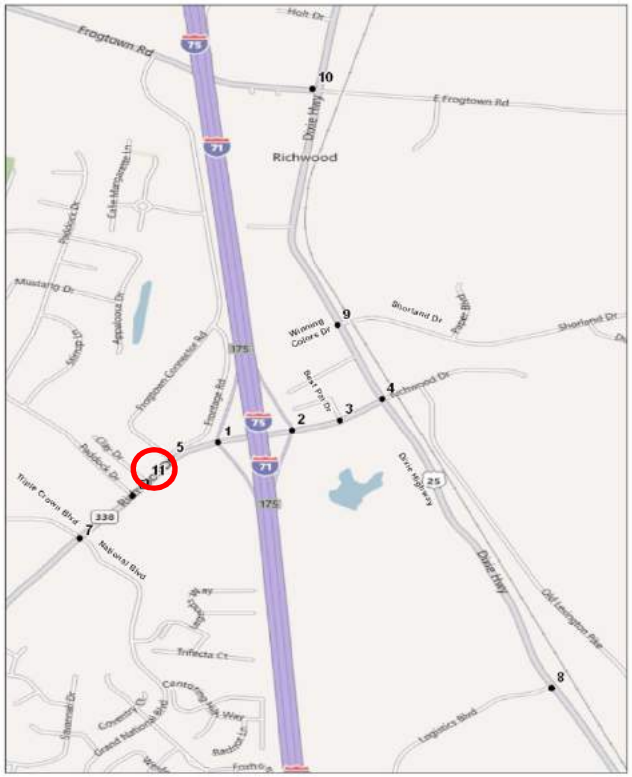
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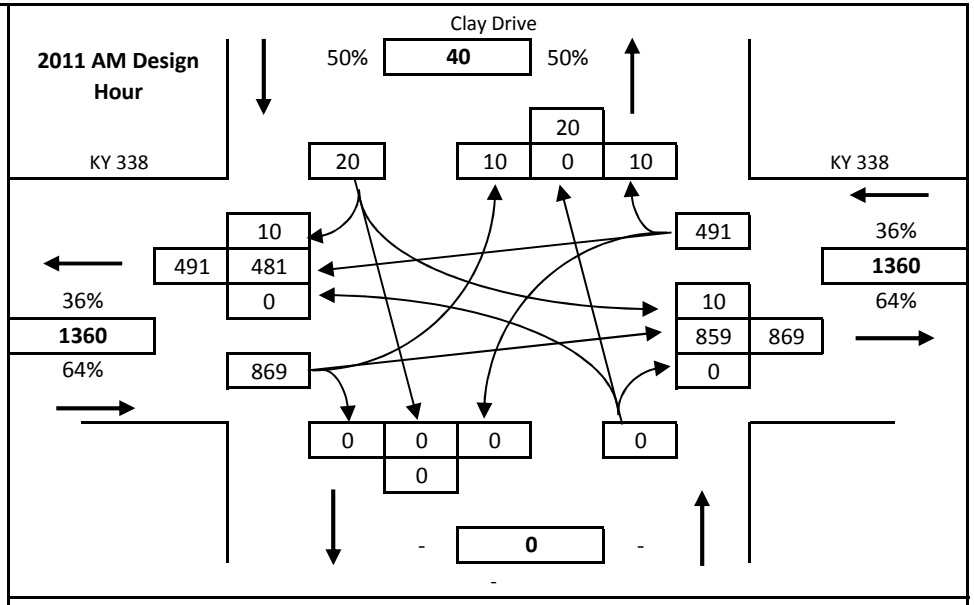
INTERSECTION: 11 - KY 338 at Clay Drive

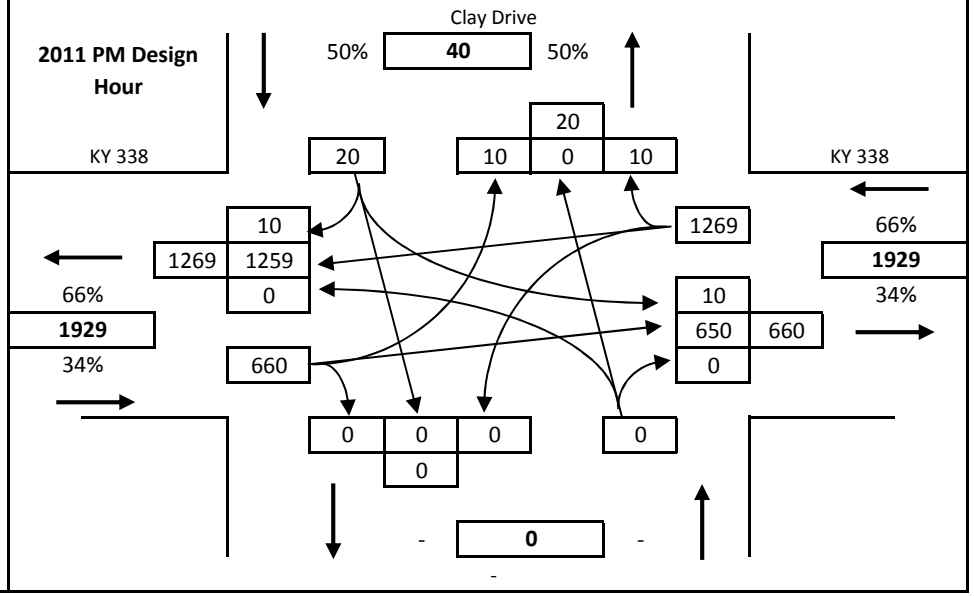
NOTE:

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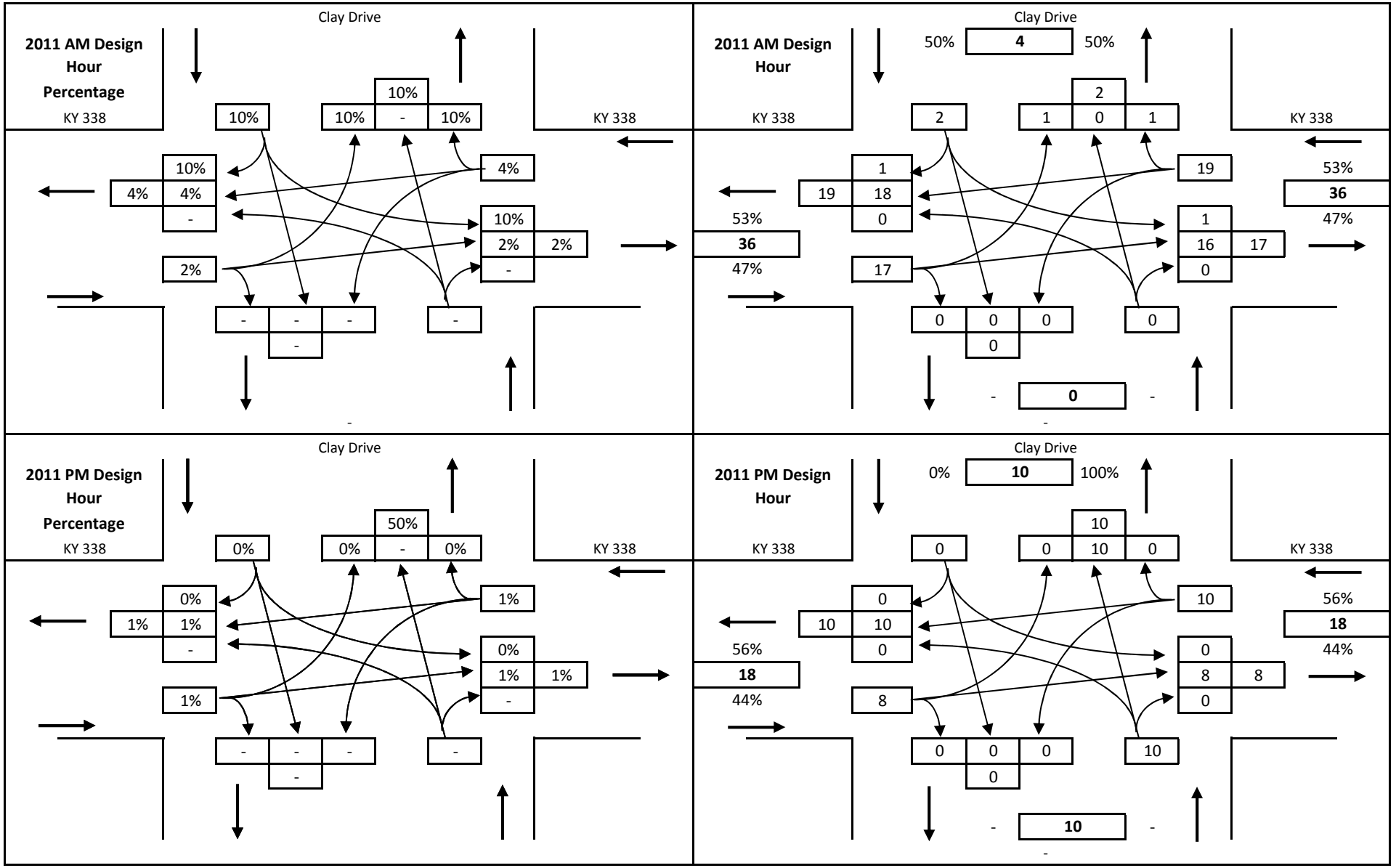


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ITEM NUMBER: 6-18

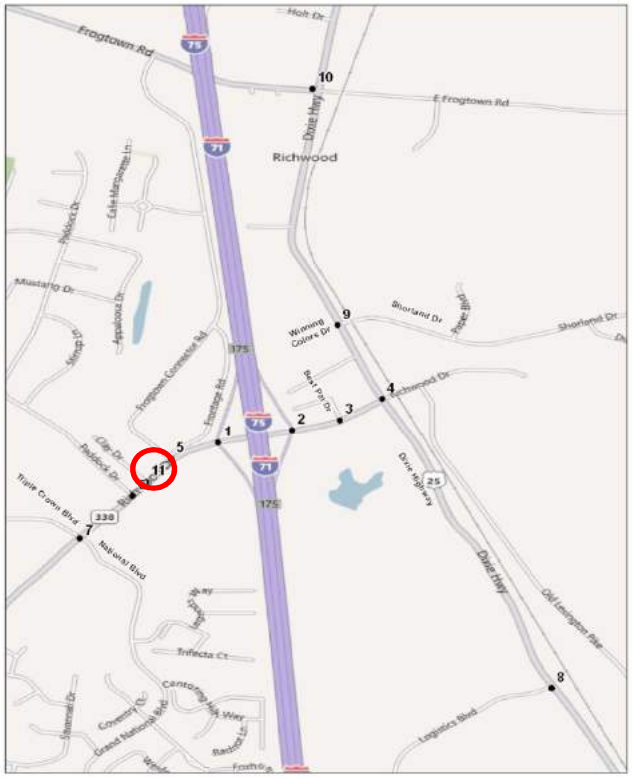
ANALYST: D.Pluckebaum/S.Hoch

SCENARIO: 2030 Design Hour Volumes

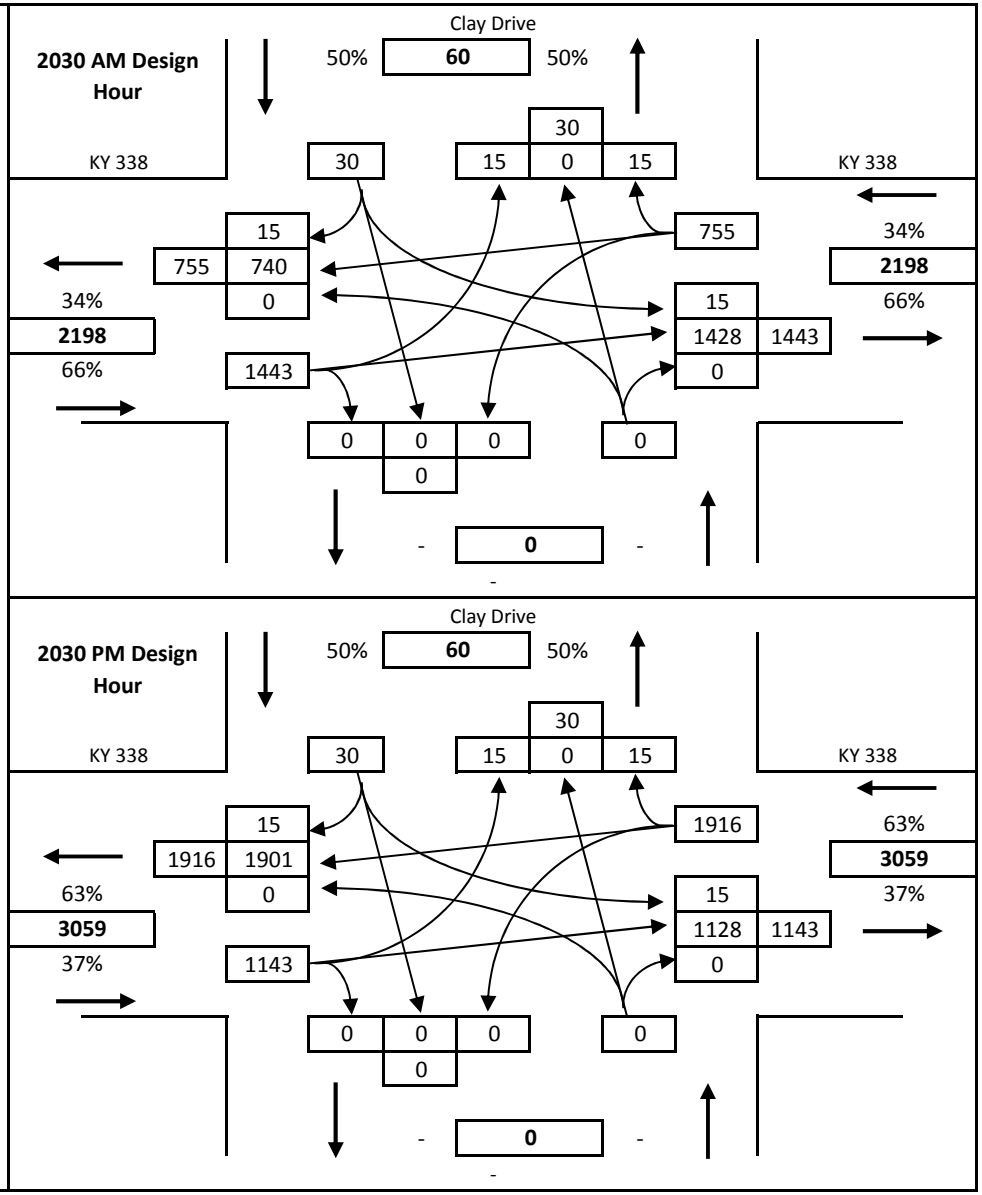
INTERSECTION: 11 - KY 338 at Clay Drive

NOTE:

Location Map





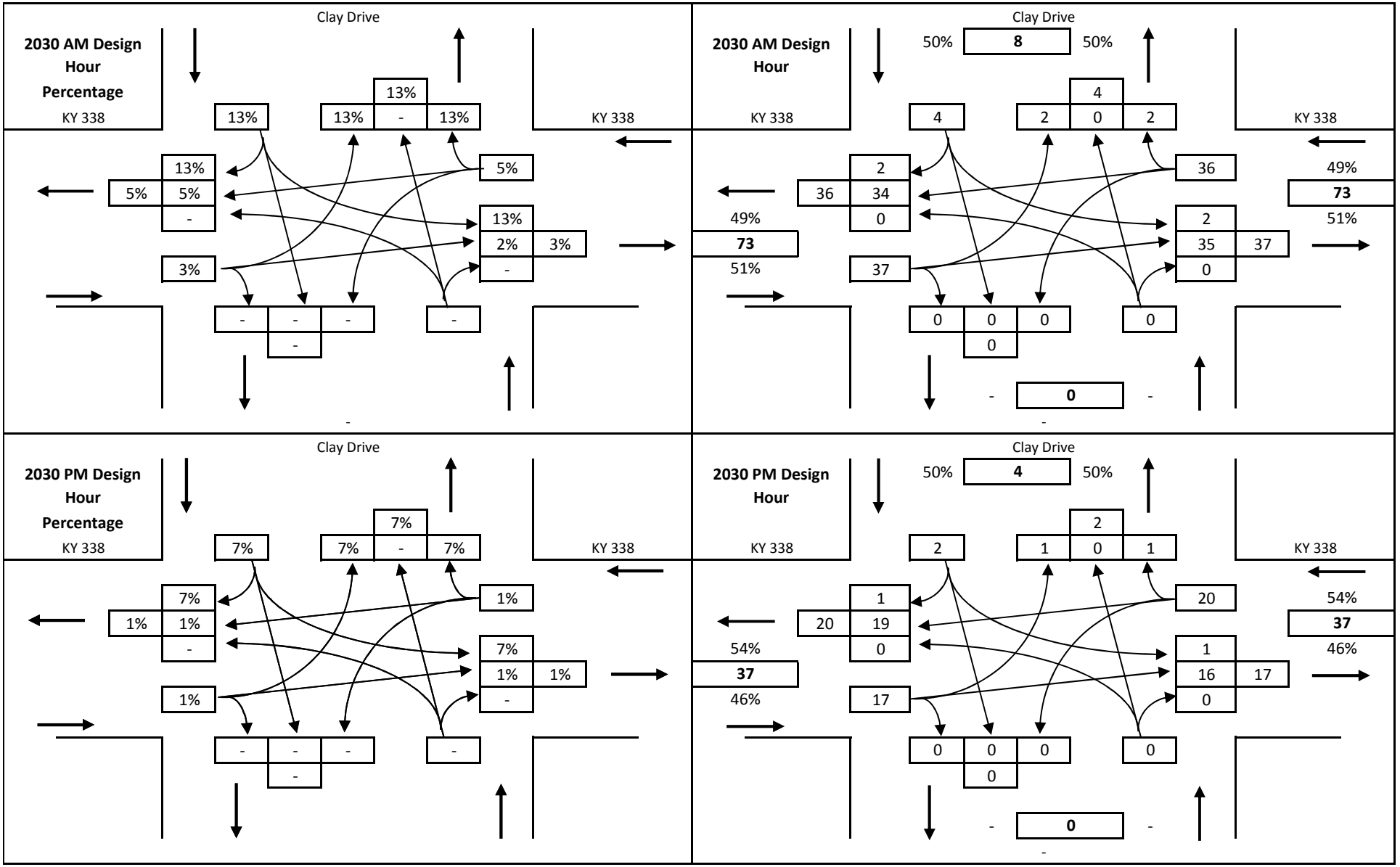


PROJECT: Reconstruction of KY 338 Interchange with I-71/I-75
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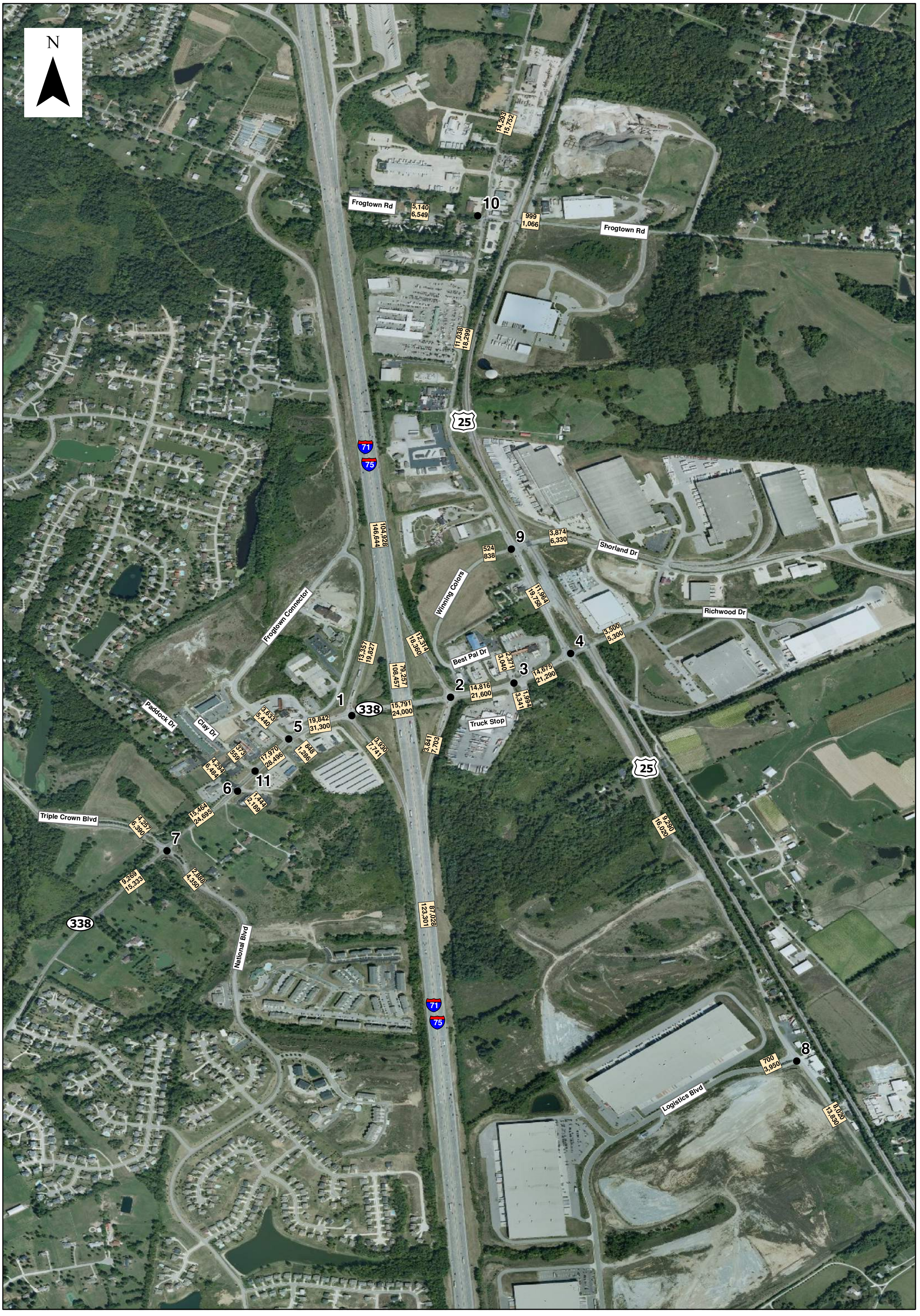
TRUCK TURN MOVEMENTS

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Appendix B

Average Daily Traffic (ADT) Exhibit



1,250 625 0 1,250 Feet

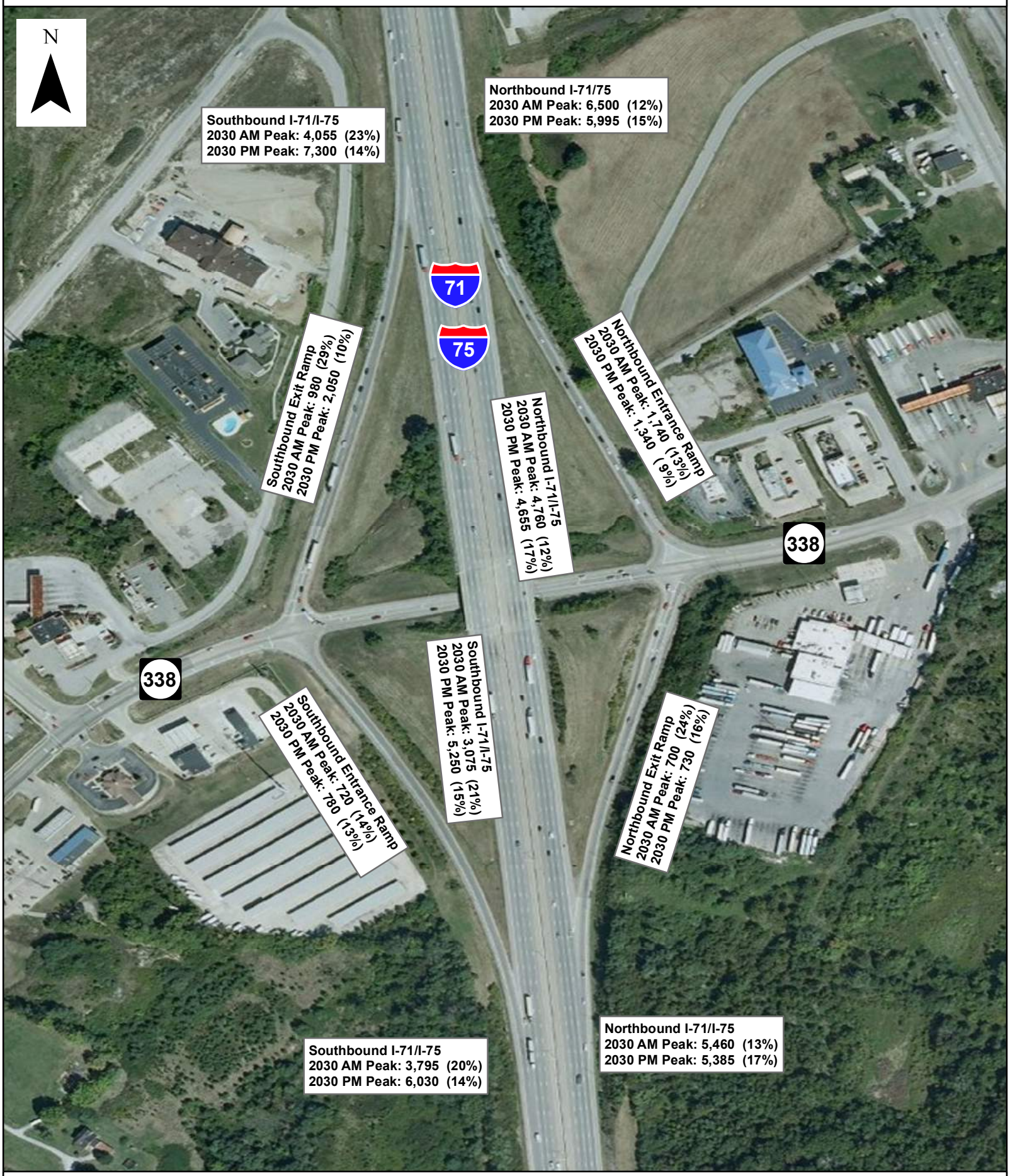
ADT Diagram
Reconstruction of KY 338
Interchange with I-71/I-75
Item Number 6-18

2011 ADT
2030 ADT

Appendix C

Mainline I-71/I75 and Ramp Traffic Data at KY 338

Mainline I-71/I-75 and Ramp Traffic Data at KY 338



400 200 0 400
Feet

Source: Interchange Justification Study for I-71/I-75 at KY 536 and KY 338.
* (XX%) Indicates Truck Percentage

PARSONS

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MEMORANDUM

Date: December 9, 2014

To: Carol Callan-Ramler, PE

From: Eric Tripi, PE, PTOE
CC: Dave Ayala, PE, PTOE
Bob Gustafson, PE

Subject: KY338/I-75/I-71 Road Improvements – Impact of Trips Generated by Anchor and IDI Developments

Two significant developments are proposed to be constructed in the vicinity of the KY338/I-75/I-71 road improvement project area. Anchor Properties is projecting 322,000 square feet (sf) of new retail, restaurant, and commercial use located in the southeast quadrant of the interchange. IDI is projecting 2,645,935 sf of new warehousing on their existing property along US-25, just south of the KY338/US-25 intersection. Attached are the site plans for each site.

Since traffic for these two developments was not considered in the 2030 traffic projections used to design the DCDI and SPUI, it was deemed necessary to estimate the traffic generated by each development, assign it to the area roadways, and then add to the 2030 traffic projections. The *PM peak hour* was determined to be the critical hour for analysis.

Thus the purpose of this traffic analysis is to determine if the proposed DCDI design of the KY338/I-75/I-71 interchange and adjacent proposed SPUI design of the KY338/US-25 intersection can adequately accommodate the additional traffic generated by these two developments.

Projected Traffic Volumes

Trip generation calculations for the Anchor property were provided by JEP Consulting Engineering in a memo dated October 21, 2014. The projected new trips and pass-by trips for the PM Peak hour were referenced from this memo and shown below in Table 1:

Table 1
PM PEAK HOUR SITE-GENERATED TRAFFIC VOLUMES - ANCHOR

Trip Type	In	Out	Total
Total	1030	980	2010
Pass-by	(-410)	(-390)	(-800)
New	620	590	1210

Trip generation calculations for the IDI site were initially provided by Bayer Becker in their trip generation study report dated February 25th, 2013. The trips projected for the future warehousing buildings appeared to be higher than what would realistically be expected to be generated (the numbers were based on peak Christmas season activities). Therefore, as a check, traffic volumes collected in December 2013 at Logistics Boulevard (all IDI traffic used this to access the site at the time of the counts) were reviewed. These volumes indicated a lower rate of trip generation than projected in the February 25th memo.

Based on discussions with IDI, it was deemed acceptable to assume that future warehousing uses would generate trips at the same rate as the existing warehouses. Therefore, the existing trip rate per square foot was used to calculate the projected trips for the future warehousing uses. This resulted in the following projected trips for the future warehousing uses shown in Table 2:

Table 2
PM PEAK HOUR SITE-GENERATED TRAFFIC VOLUMES - IDI

Trip Type	In	Out	Total
New	702	1160	1861**

**These projected trips include trips for the EBay warehouse (Building H on the IDI site plan dated 6/2/14). The building is now open but was not in December 2013 when the traffic counts were conducted.

Directional Distribution

The directional distribution was based on a review of the area roadways and population centers and trip distribution percentages contained in the JEP memo. Table 3 presents the directional distribution percentages used in the analysis:

Table 3
DIRECTION OF APPROACH

To/From	Anchor	IDI
North on US25	**20%**	**10%**
South on US25	**5%**	**20%**
North on I-75/I-71	**35%**	**35%**
South on I-75/I-71	**35%**	**30%**
West on KY338	**5%**	**5%**

The trips in Tables 1 and 2 were assigned to the area roadways based on the distribution shown in Table 3. The projected Anchor and IDI trips were assigned to the area roadways and added to the 2030 projected traffic volumes to create a revised Total 2030 PM Peak Hour traffic volume scenario. Figure 1 attached illustrates the revised Total 2030 PM Peak Hour traffic volumes.

Traffic Analysis

To determine the impact of the Anchor and IDI traffic volumes on the project intersections, capacity analyses were performed. The *Synchro/SimTraffic* (version 8) traffic software package was used for the analysis. The following intersections were included in the analysis:

- KY338/I-75/I-71 interchange
- KY338/US-25 SPUI
- KY338/Best Pal

The goal was to achieve at least LOS "D" for each of the study locations. The results of the PM peak hour capacity analyses were as follows:

- The KY338/I-75/I-71 interchange will operate acceptably (LOS "D" or with all movements at LOS "D" or better)
- The KY338/US-25 SPUI will operate at LOS "F"
- The KY338/Best Pal intersection will operate at LOS "F"

The main factors contributing to the low levels of service were the northbound left turn at Best Pal and the northbound left turn at the SPUI. Even with additional road improvements, the latter two intersections still operated at low levels of service due to the high volumes projected for these particular movements.

As a result, the projected traffic volumes and their assignment were revisited. First the SPUI was reviewed. It was determined that by reassigning vehicles from the northbound left turn movement on US25 to the northbound through movement, the intersection and northbound approach would operate at LOS "D" with all other approaches at LOS "C". This volume reassignment is reasonable for two reasons: first, the projected volumes for the Anchor and IDI sites are conservative, and second, it could be assumed that if the delay and queues at in the northbound left turn lane are too long, drivers may choose to go through the intersection instead and access I-75/I-71 at the next interchange to the north.

At the Best Pal intersection, it was assumed that some of the northbound left turn volume would choose not to wait at the Best Pal signal and exit the site via US25 during the PM peak hour. With this assumption, the operation of the intersection can be improved to overall LOS "D" (and all approaches at LOS "D") with the following mitigation:

- Add a second eastbound right-turn lane on KY 338
- Add a third westbound though lane on KY338
- Add a second northbound left turn lane on Best Pal

The new projected lane configuration at the Best Pal intersection is shown on Figure 1.

Conclusions

Trip generation calculations were completed for the Anchor and IDI developments located in the project vicinity. These trips were assigned to the area roadways and capacity analyses were completed for the critical intersections.

It was determined that by reasonably adjusting the original trip assignments and implementing some roadway mitigation, a LOS "D" or better could be achieved at the critical intersections during the critical PM peak hour.

Therefore, the following roadway improvements will be necessary to accommodate the traffic generated by the future Anchor and IDI developments:

- Add a second eastbound right-turn lane on KY 338 at Best Pal Drive.
- Add a third westbound though lane on KY338 from US 25 to the northbound ramp intersection.
- Add a second northbound left turn lane on Best Pal Drive at KY 338.

With these improvements, the project intersections will operate at acceptable levels of service.

ATTACHMENTS

INTERSTATE 75

DETENTION AREA

PROPOSED TRUCK ROUTE

RETAIL 'A'

RETAIL 'B'

TRUCK EXIT

BASELINE RAMP 'D'

BASELINE RAMP 'B'

EXISTING TRAVEL CENTER

WALL

TRUCK ENTRY

CARS

EXIST. TRAFFIC SIGNAL

LOT 7 | LOT 6 | LOT 5 | LOT 4 | LOT 3 | LOT 2 | LOT 1

PROP. TRAFFIC SIGNAL

U.S. 25 (DIXIE HWY)

RAILROAD

NOTE:
POSSIBLE WIDENING OF KY RT 338 & I-75 OVERPASS....CURRENTLY UNDER REVIEW BY K.D.O.H.

NO TRAFFIC SIGNAL ON OVERPASS...WHEN & IF S.P.U.I. IS CONSTRUCTED IN THE FUTURE.

0 100 200 300
SCALE: 1" = 200'

CONCEPT PLAN

ITEM	REVISIONS	DATE
1		
2		
3		
4		
5		
6		
7		

ANCHOR PROPERTIES
128 East Second Street
Covington, KY 41011-1742

PROPOSED
RETAIL CENTER
U.S. 25 & RICHWOOD ROAD
BOONE COUNTY KENTUCKY

DRAWING BY: RPS
DRAWING CHECKED:
DRAWING DATE: 2-27-07
PROJECT NUMBER:

SHEET NO. 2 OF 2



MACGREGOR ASSOCIATES ARCHITECTS
2839 Paces Ferry Road, NW
Suite 500
Atlanta, Georgia 30339
T (770) 432-9400 F (770) 432-9934
2014-017

IDI - Cincinnati (KY)
740 Centre View Boulevard
Floor 3
Crestview Hills, KY 41017
(859) 663-2880

PARK SOUTH at Richwood

RICHWOOD - BOONE COUNTY
KENTUCKY

MASTER PLAN
06/02/14
MP-1

PROPOSED LANE CONFIGURATION (PRE-ANCHOR & IDI)	MITIGATED LANE CONFIGURATION DUE TO ANCHOR & IDI TRIPS
KY 338 / BEST PAL	KY 338 / BEST PAL / NEW LANE

SPUI LOS		
PREF. ALT.	ANCHOR + IDI	MITIGATED
OVERALL & ALL MOVEMENTS "C"	OVERALL "E" NBL "F" ALL OTHER MOVEMENTS "C"	OVERALL "D" NBL "D" ALL OTHER MOVEMENTS "C"

WB LOS		
PREF. ALT.	ANCHOR + IDI	MITIGATED
B	F	C

SB LOS	
PREF. ALT.	ANCHOR + IDI
A	B

NB LOS		
PREF. ALT.	ANCHOR + IDI	MITIGATED
D	F	D

EB LOS		
PREF. ALT.	ANCHOR + IDI	MITIGATED
A	F	D

NB LOS	
PREF. ALT.	ANCHOR + IDI
B	D

I-71/75 · US-25 · FROGTOWN ROAD · KY 338 · BEST PAL/ WINNING COLORS · SB OFF-RAMP · NB ON-RAMP · EB KY 338 · WB KY 338 · FROGTOWN ACCESS · PADDOCK DR · SB ON-RAMP · NB OFF-RAMP · ANCHOR · IDI · LOGISTICS BLVD · TRIPLE CROWN BLVD · NATIONAL BLVD

REDISTRIBUTED TRAFFIC VOLUMES - 2030 PREFERRED
DESIGN ALTERNATIVE 2 (E1 & W9a) - PM PEAK HOUR (ALL VEHICLES)

LEGEND
- → TRAFFIC MOVEMENT
- XXX - TRAFFIC VOLUME
- SIGNAL
- ROUNDABOUT

FIGURE 1

MEMO TO: Tim Tharpe, Traffic Engineer Branch Manager
Ted Swansegar, Traffic Design Services Branch Manager

FROM: James Minckley, P.E. District 6 Traffic Engineer
Carol Callan-Ramler, P.E. Planning Supervisor| Project Manager

BY: Mathew Van der Meer, PE, PTOE Parsons Senior Engineer

DATE: July 10, 2018

SUBJECT: Boone County
KY 338 from US 25 to M.P. 0.8
Item No. 6-18.00
State Proj. No. FD52 008 0075 175-176
Federal Proj. No. IM 75-7 (129)
Signals Request

Purpose / Request

Please find attached the requested documents for use in evaluating proposed recommendations for new traffic signals and modifications to existing signals for the subject project.

Project Description

The purpose of this project is to improve safety and reduce congestion at the I-71/I-75 and KY 338 (Richwood Road) interchange and within the KY 338 corridor, and to develop and implement a comprehensive access management plan for KY 338 between Triple Crown Boulevard and US 25 (Dixie Highway).

Project Background

Within the last ten years, the area surrounding the KY 338 (Richwood Road) interchange has experienced rapid development. The resulting increase in employment and residential traffic has burdened the existing transportation system, including I-71/I-75, KY 338 (Richwood Road), and US 25 (Dixie Highway). These major transportation arteries have also been taxed by general growth along I-75, which is one of the nation's largest commercial routes. This growth in traffic without commensurate improvements to the transportation network has resulted in congestion and accident rates that are above statewide averages. Based upon land use projections, by 2030 the study area is expected to lose nearly all agricultural land, while residential and industrial uses are anticipated to approximately double, resulting in greater volumes of traffic. Additionally, truck percentages along KY 338 between the interstate and US 25 are likely to increase to between 17% and 23%.

In March 2010, KYTC published the *Interchange Justification Study for I-71/I-75 at KY 536 and KY 338 (IJS)* to evaluate potential improvements to both the KY 338 (Richwood Road) and KY 536 (Mt. Zion Road) interchange areas. That study proposed conversion of the existing diamond interchanges at each location to a double-crossover diamond interchange (DCD) configuration.

Numerous build alternatives were analyzed for four distinct parts of the project including the interchange of I-71/I-75 at KY 338 (Richwood Road), auxiliary lanes on I-71/I-75, capacity and access management on KY 338 (Richwood Road) and US 25 (Dixie Highway) on the east side of the interstate, and capacity and access management on KY 338 west of the interstate. The ultimate design alternatives selected included converting the existing diamond interchange of I-71/I-75 at KY 338 (Richwood Road) to a double-crossover diamond interchange (DCD), converting the at-grade intersection of US 25 (Dixie Highway) and KY 338 (Richwood Road) to a SPUI interchange, and various

capacity and access management methods throughout including adding lanes and signalizing the intersections of Paddock Drive and Best Pal Drive located along KY 338 (Richwood Road).

Project Design Status

The project was initiated in 2010. Joint Inspection took place in March of 2018 with an anticipated construction letting in 2019.

Signalized Intersections, Existing and Proposed

There are both existing and proposed traffic signals along this corridor. For convenience, the locations of said signals are numbered and may be found on the attached Project Map. The table below summarizes key information about the respective signals.

NO.	LOCATION		COMMENTS
	MAJOR STREET	MINOR STREET	
S1	KY 338 Sta. 107+22	Triple Crown Blvd/ Grand National Blvd Sta. 100+00	**Existing Signal – remove.** Intersection becomes a roundabout.
S2	KY 338 Sta. 115+90	Paddock Dr Sta. 200+00	**New.** Becomes an access point for developments along along Clay Drive, which becomes a right-in-right-out. New geometry calls for SB dual-left from Paddock. Anticipate 4 Ped x-ings: connection to subdivision and various commercial development.
S3	KY 338 Sta. 122+45	Frogtown Connector Rd. Sta. 600+00	**Existing signal – modify.** Keep ped x-ings in same locations. Will need to be coordinated with I-75 ramp signals. Additional lanes expected along KY 338 and Frogtown Connector Rd, including SB dual left. Bank will be eliminated and entrance will become the only access to Shell gas station and existing storage facility.
S4	KY 338 Sta. 128+35	I-71/I-75 Ramp A/ Ramp C	**Existing signal – modify.** Proposed interchange will be part of DCD (major geometric changes). Short ped x-ings for multi-use path at Ramp C.
S5	KY 338 Sta. 136+60	I-71/I-75 Ramp B/ Ramp D	**Existing signal – modify.** Proposed interchange will be part of DCD (major geometric changes). Ped x-ings for multi-use path on Ramp D (will require ped signals for interstate exit movements)
S6	KY 338 Sta. 143+00	Best Pal Dr. Sta. 50+00	**New**. Existing location has multiple unsignalized access points in close proximity. Will need to be coordinated with I-75 ramp signals. Best Pal will be realigned to combine multiple SB access points and will line up with a relocated TA Truck Stop entrance that will have a dual left movement. Current design calls for no WB left movement into the TA Truck Stop. KY 338 is an 8 lane section at this location so EB left-turn movement will have to cross multiple lanes. Current design shows ped x-ings expected for three legs.
S7	KY 338 Sta. 147+75	US 25 (Dixie Hwy)	**Existing signal – modify.** To eliminate the at-grade RR crossing, this intersection is planned as a SPUI with KY 338 traveling under US 25 and the RR (major geometric changes). Ped x-ings expected along KY 338 across SPUI ramps.

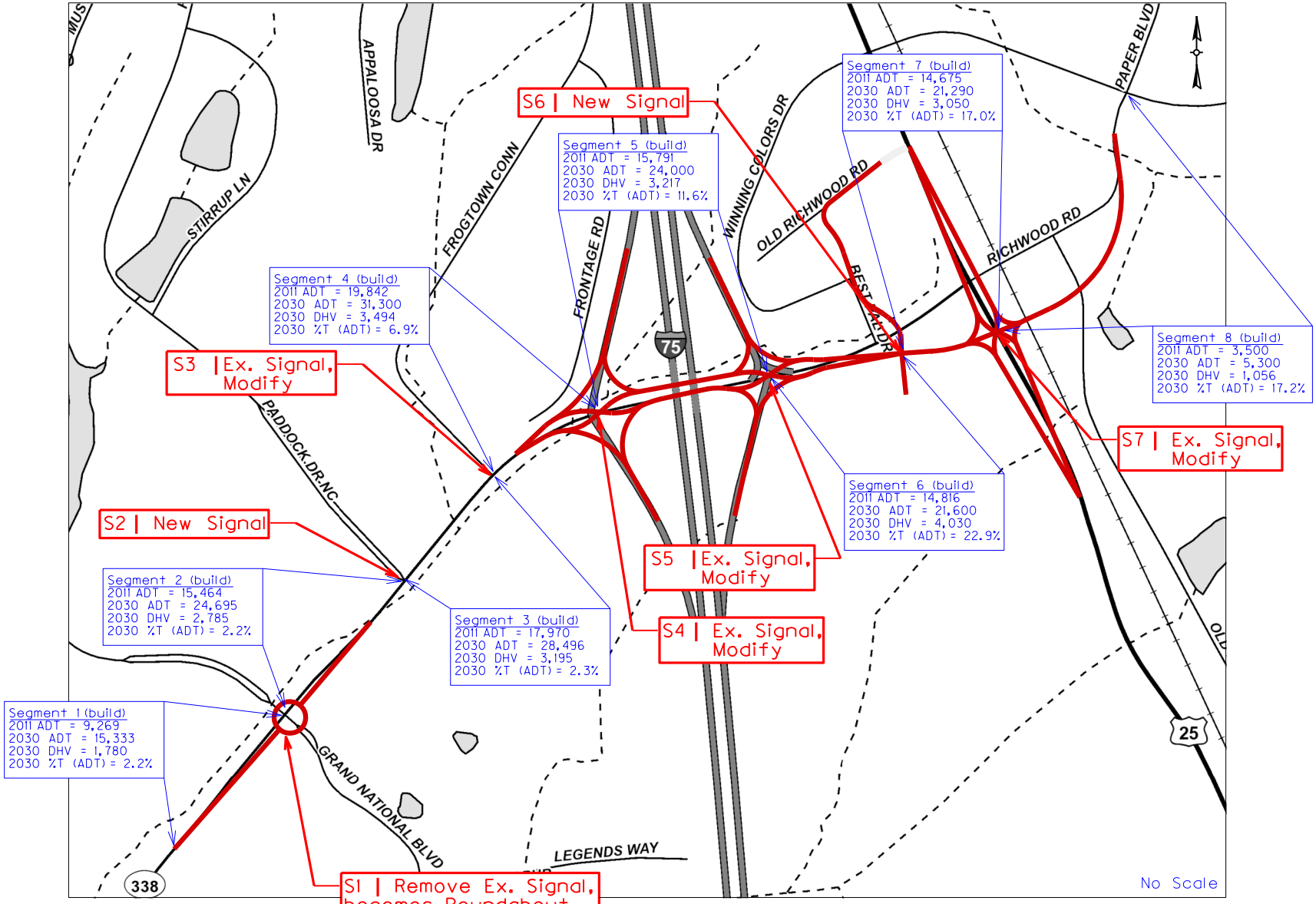
Project Funding

This project was originally included in the *Kentucky Six-Year Highway Plan* for Boone County and was slated to be funded by two sources: (1) the DCD portion by IM and (2) US 25 by STP money. Given the extension of the original project timeline, the project was combined with the interchange modification at Mount Zion Road to the north and received an INFRA Grant in 2018 to continue the two projects into final design and construction.

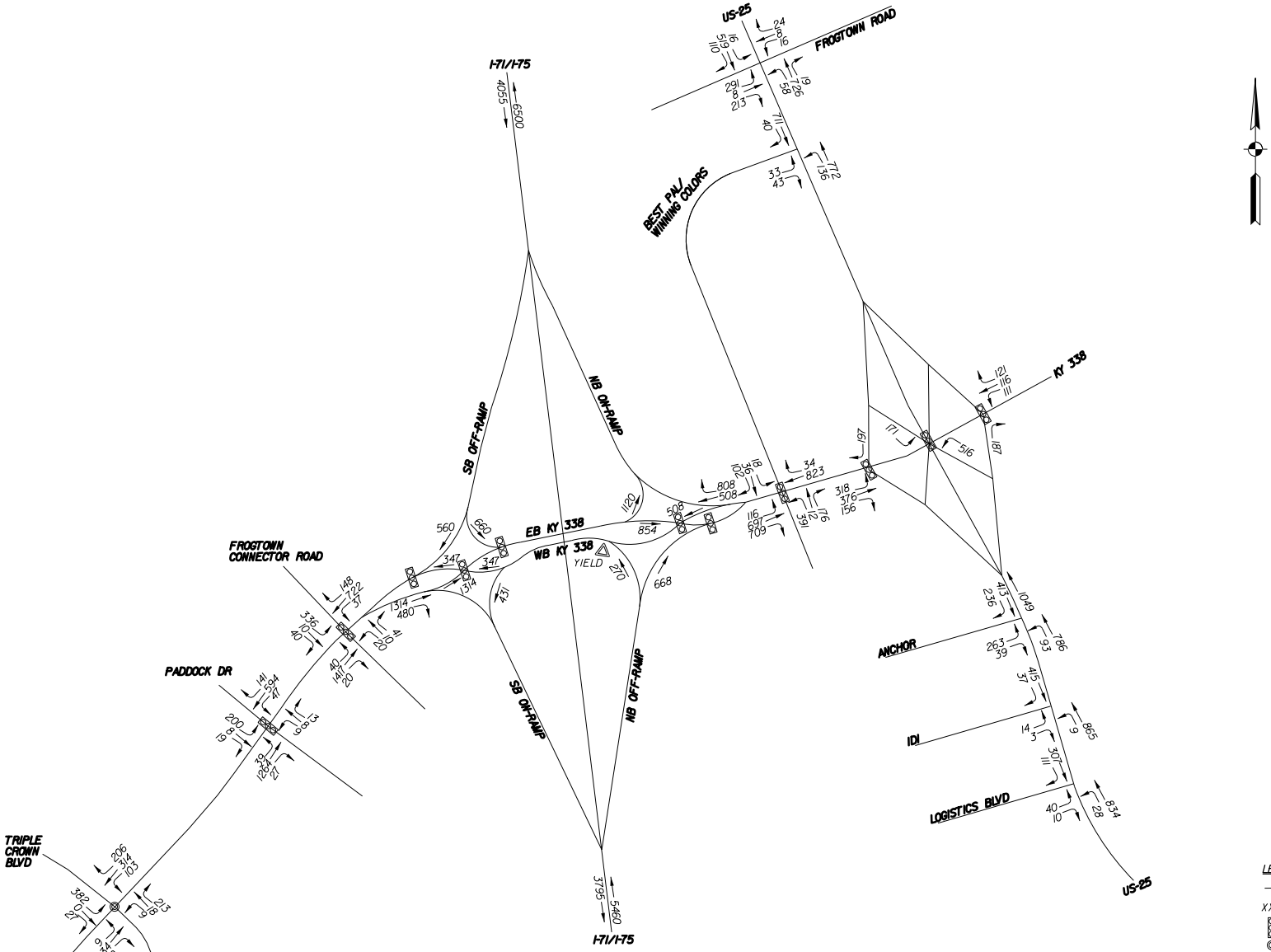
If you have any questions or need clarification, please do not hesitate to contact me.

Boone County
Reconstruct KY 338/I-71/I-75 Interchange
Item #6-18.00
Build

Project Map for Multiple Signal Locations - Signal Request



Intersection Designation: S# | Action



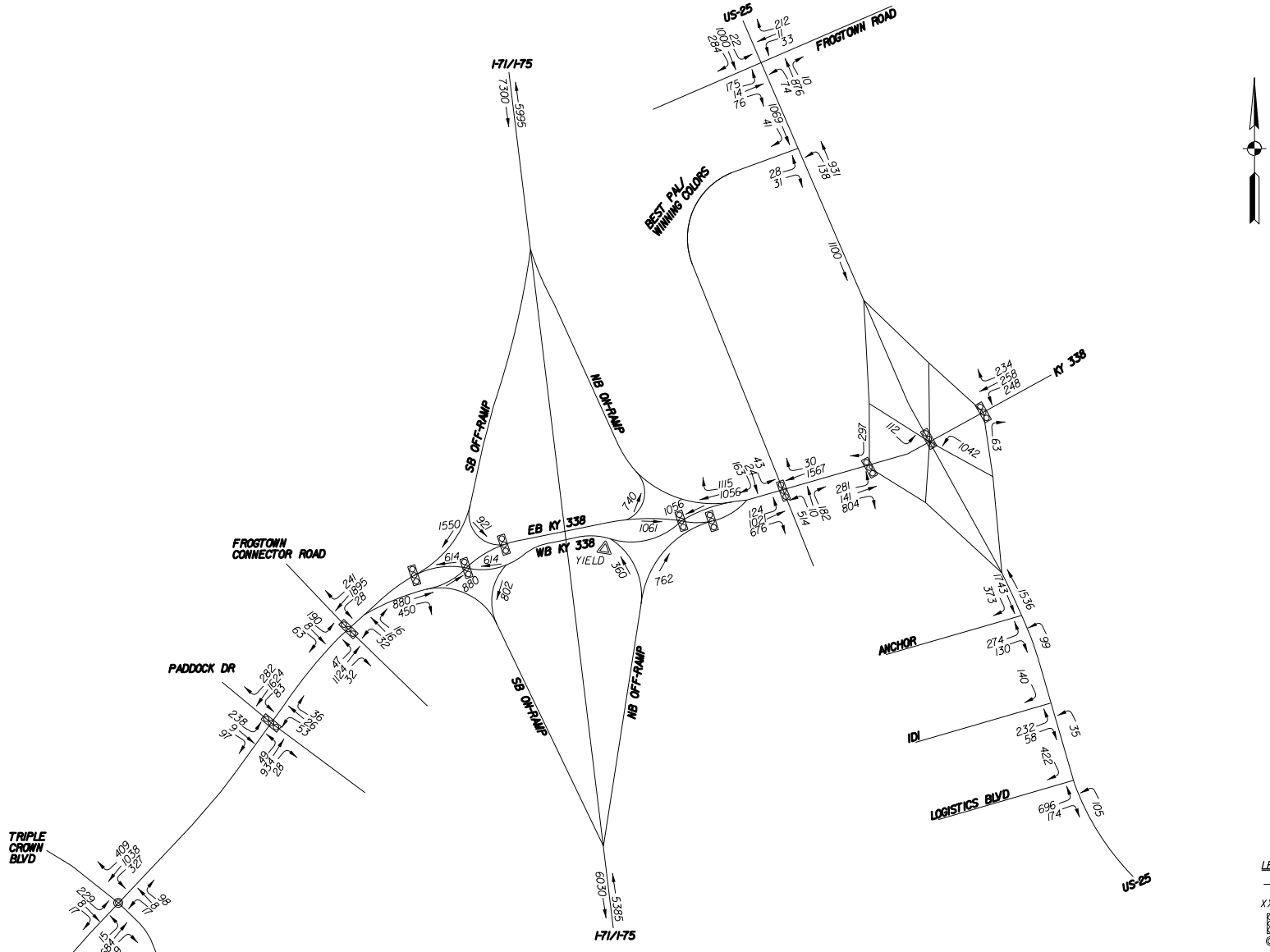
LEGEND

- TRAFFIC MOVEMENT
- XXXX - TRAFFIC VOLUME
- TRAFFIC SIGNAL
- ROUNDABOUT

Redistributed Traffic Volumes - 2030 Preferred Design Alternative 2 (E1 & W9a)
AM Peak Hour (All Vehicles) - WITH ANCHOR AND IDI TRAFFIC
Best Pal WB Left Trips Reassigned

SHEET 1 of 2

REVISED - 02/01/2016



LEGEND

→ TRAFFIC MOVEMENT

XXXX - TRAFFIC VOLUME

TRAFFIC SIGNAL

ROUNDABOUT

Redistributed Traffic Volumes - 2030 Preferred Design Alternative 2 (E1 & W9a)

PM Peak Hour (All Vehicles) - WITH ANCHOR AND IDI TRAFFIC

Best Pal WB Left Trips Reassigned

SHEET 2 of 2

REVISED - 02/01/2016

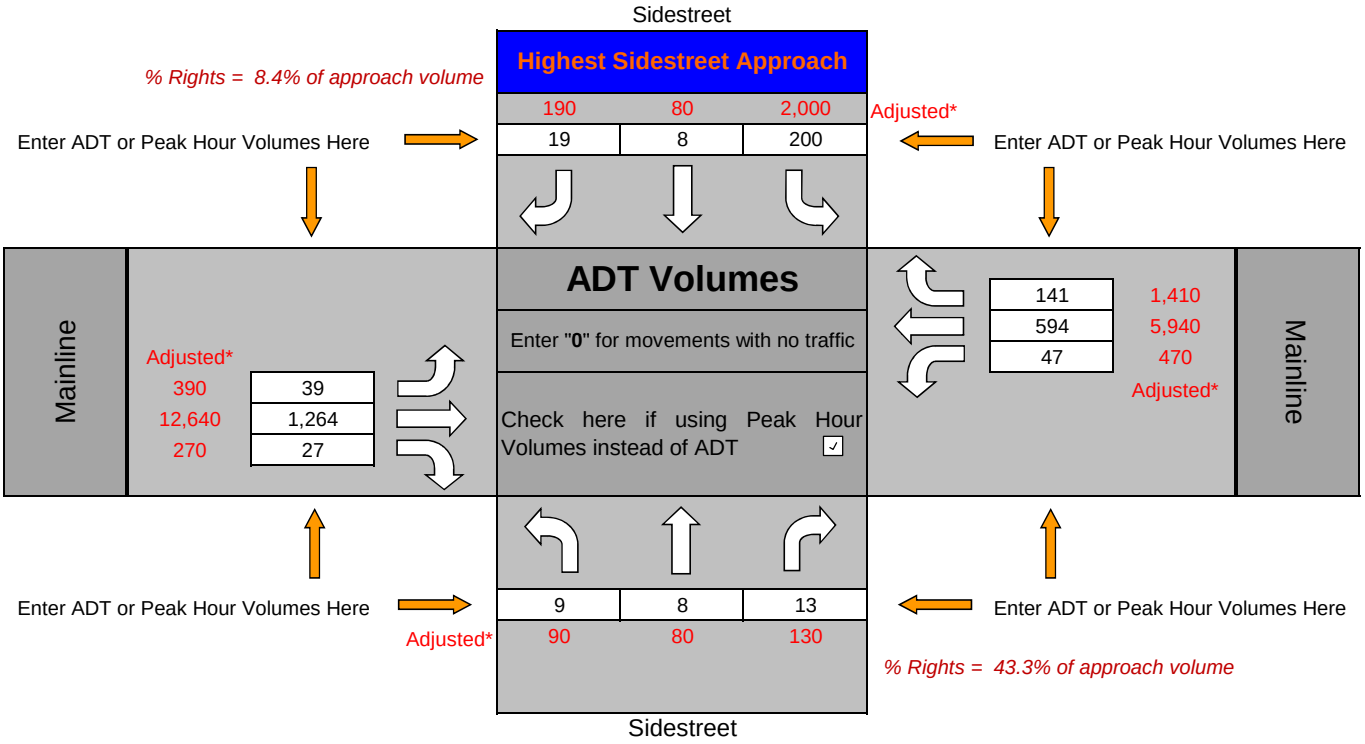
Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-106
10/2013

Signal Analysis Using Peak Hour/ADT Projections
(Highest Volume Approach)

County	Boone
Route	KY 338
Intersecting Route	Paddock Drive
Milepoint	0.600
Date	December 17, 2015
Reviewer	
Item Number/Permit Number	6-18.00_AM Peak

Enter Average Daily Traffic (ADT) volumes in the boxes below. Note that the diagram is for illustration and calculation purposes only and may not accurately represent actual conditions in the field.



*In the event that the peak hour volumes are entered instead of ADT, a general rule of thumb is that the peak hour volumes are typically 10% of the ADT. If you check this box, peak hour volumes you enter will be multiplied by 10 and the results will be posted in the "Adjusted" fields.

NOTE: Shaded Cells Cannot Be Edited!

The total mainline ADT for both directions as entered above is:	**21,120**
The highest ADT for the sidestreet as entered above is:	**2,270**
What is the number of lanes for moving traffic on the Major Street per approach? (Enter **1** for one lane, **2** for two or more lanes - do not count turn lanes)	**2**
What is the number of lanes for moving traffic on the Minor Street per approach? (Enter **1** for one lane, **2** for two or more lanes)	**2**
Is either the posted speed limit on the Major Street greater than 40 MPH **or** is the intersection located in an isolated community with a population less than 10,000?	**No** (Enter "Yes" or "No")

Warrant 1A (Minimum Vehicular Volume)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	10,600
Mainline ADT as entered above:	**21,120**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	3,550
Sidestreet ADT as entered above:	**2,270**

Warrant 1B (Interruption of Continuous Traffic)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	15,950
Mainline ADT as entered above:	**21,120**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	1,800
Sidestreet ADT as entered above:	**2,270**

Satisfaction of Warrants

	Major Street	*Minor Street*	***Warrant Satisfied?***
Warrant 1A	Yes	No	**No**
Warrant 1B	Yes	Yes	**Yes**

Satisfaction of warrants does not necessarily indicate signalization is necessary.

Left-Turn Cross Product Analysis

If signalized, the following table will help determine if left-turn phasing should be considered:

Cross Product	Number of Lanes	Type of Left-Turn Phase
Less than 50,000	1	Not Recommended
Less than 100,000	2	Not Recommended
Greater than 50,000	1	Protected-Permitted Phase
Greater than 100,000	2	Protected-Permitted Phase
Greater than 150,000	1	Protected-Only Phase
Greater than 300,000	2	Protected-Only Phase

Mainline Cross Product

Major Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	47
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	1,291
Cross Product (Lefts x (Opposing Throughs + Rights)):	**60,677**

Do Not Recommend Left-Turn Phasing

Sidestreet Cross Product

Minor Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	200
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	21
Cross Product (Lefts x (Opposing Throughs + Rights)):	**4,200**

Do Not Recommend Left-Turn Phasing

*Represents 10% of ADT value. Generally, the peak hour volume is approximately equal to 10% of the ADT. This number should give a rough estimate of the need for a left-turn phase.

Recommendation

Reviewer is resposible for completing recommendation box above.

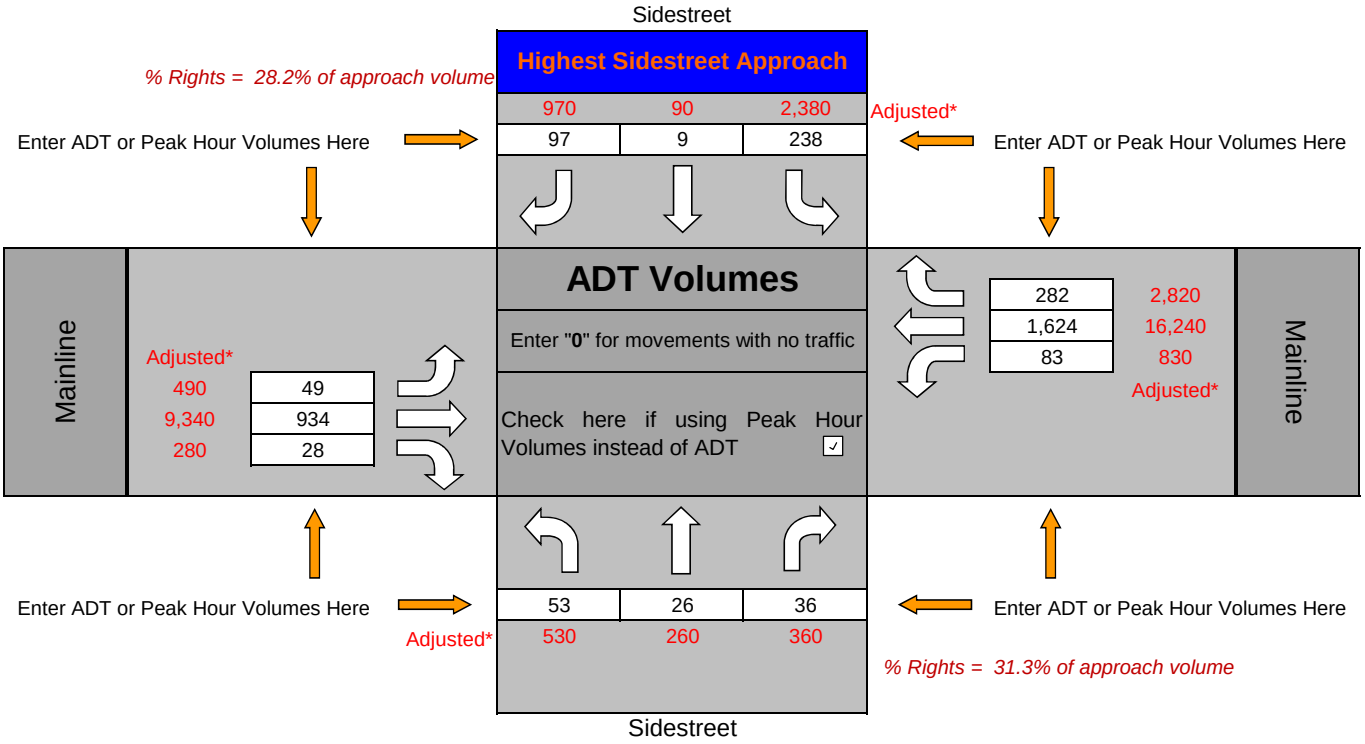
Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-106
10/2013

Signal Analysis Using Peak Hour/ADT Projections
(Highest Volume Approach)

County	Boone
Route	KY 338
Intersecting Route	Paddock Drive
Milepoint	0.600
Date	December 17, 2015
Reviewer	
Item Number/Permit Number	6-18.00_PM Peak

Enter Average Daily Traffic (ADT) volumes in the boxes below. Note that the diagram is for illustration and calculation purposes only and may not accurately represent actual conditions in the field.



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NOTE: Shaded Cells Cannot Be Edited!

The total mainline ADT for both directions as entered above is:	**30,000**
The highest ADT for the sidestreet as entered above is:	**3,440**
What is the number of lanes for moving traffic on the Major Street per approach? (Enter **1** for one lane, **2** for two or more lanes - do not count turn lanes)	**2**
What is the number of lanes for moving traffic on the Minor Street per approach? (Enter **1** for one lane, **2** for two or more lanes)	**2**
Is either the posted speed limit on the Major Street greater than 40 MPH **or** is the intersection located in an isolated community with a population less than 10,000?	**No** (Enter "Yes" or "No")

Warrant 1A (Minimum Vehicular Volume)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	10,600
Mainline ADT as entered above:	**30,000**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	3,550
Sidestreet ADT as entered above:	**3,440**

Warrant 1B (Interruption of Continuous Traffic)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	15,950
Mainline ADT as entered above:	**30,000**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	1,800
Sidestreet ADT as entered above:	**3,440**

Satisfaction of Warrants

	Major Street	*Minor Street*	***Warrant Satisfied?***
Warrant 1A	Yes	No	**No**
Warrant 1B	Yes	Yes	**Yes**

Satisfaction of warrants does not necessarily indicate signalization is necessary.

Left-Turn Cross Product Analysis

If signalized, the following table will help determine if left-turn phasing should be considered:

Cross Product	Number of Lanes	Type of Left-Turn Phase
Less than 50,000	1	Not Recommended
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Greater than 50,000	1	Protected-Permitted Phase
Greater than 100,000	2	Protected-Permitted Phase
Greater than 150,000	1	Protected-Only Phase
Greater than 300,000	2	Protected-Only Phase

Mainline Cross Product

Major Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	83
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	962
Cross Product (Lefts x (Opposing Throughs + Rights)):	**79,846**

Do Not Recommend Left-Turn Phasing

Sidestreet Cross Product

Minor Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	238
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	62
Cross Product (Lefts x (Opposing Throughs + Rights)):	**14,756**

Do Not Recommend Left-Turn Phasing

*Represents 10% of ADT value. Generally, the peak hour volume is approximately equal to 10% of the ADT. This number should give a rough estimate of the need for a left-turn phase.

Recommendation

Reviewer is resposible for completing recommendation box above.

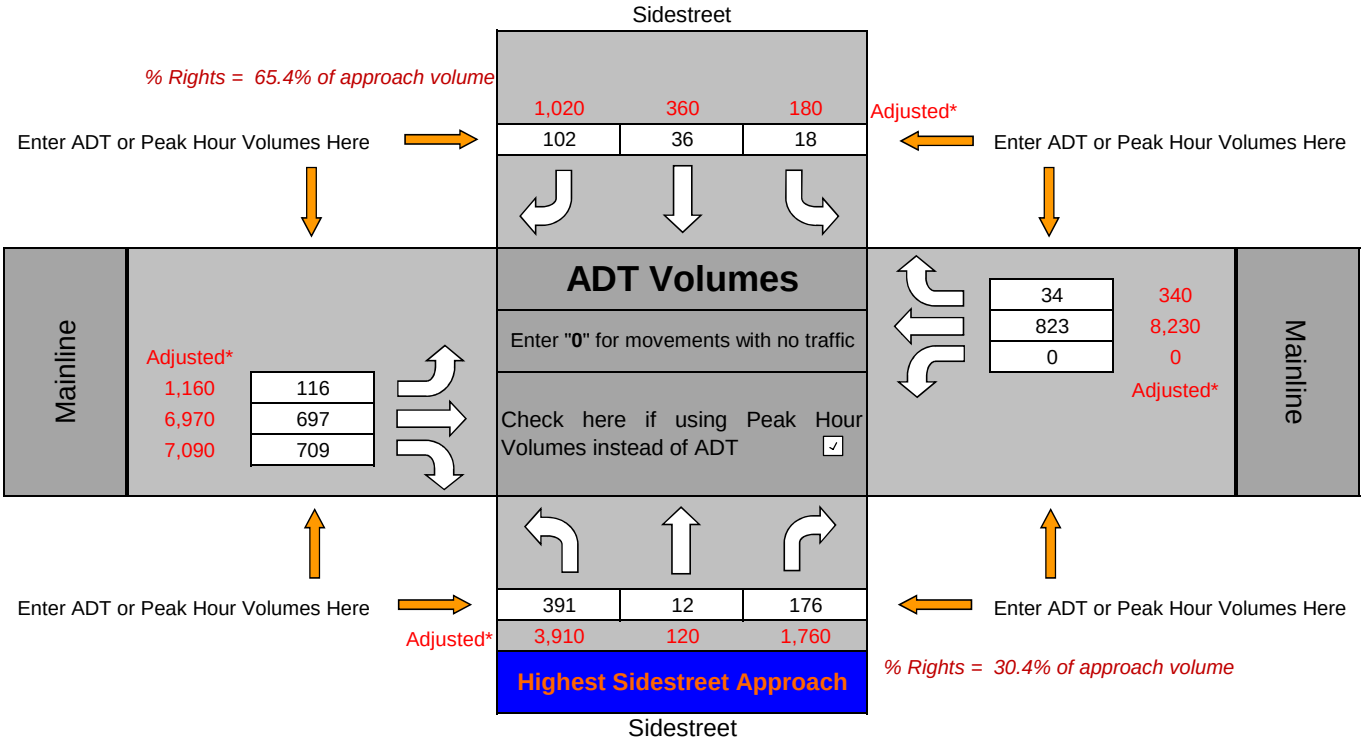
Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-106
10/2013

Signal Analysis Using Peak Hour/ADT Projections
(Highest Volume Approach)

County	Boone
Route	KY 338
Intersecting Route	Best Pal Drive
Milepoint	N/A
Date	December 17, 2015
Reviewer	
Item Number/Permit Number	6-18.00_AM Peak

Enter Average Daily Traffic (ADT) volumes in the boxes below. Note that the diagram is for illustration and calculation purposes only and may not accurately represent actual conditions in the field.



*In the event that the peak hour volumes are entered instead of ADT, a general rule of thumb is that the peak hour volumes are typically 10% of the ADT. If you check this box, peak hour volumes you enter will be multiplied by 10 and the results will be posted in the "Adjusted" fields.

NOTE: Shaded Cells Cannot Be Edited!

The total mainline ADT for both directions as entered above is:	**23,790**
The highest ADT for the sidestreet as entered above is:	**5,790**
What is the number of lanes for moving traffic on the Major Street per approach? (Enter **1** for one lane, **2** for two or more lanes - do not count turn lanes)	**2**
What is the number of lanes for moving traffic on the Minor Street per approach? (Enter **1** for one lane, **2** for two or more lanes)	**2**
Is either the posted speed limit on the Major Street greater than 40 MPH **or** is the intersection located in an isolated community with a population less than 10,000?	**No** (Enter "Yes" or "No")

Warrant 1A (Minimum Vehicular Volume)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	10,600
Mainline ADT as entered above:	**23,790**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	3,550
Sidestreet ADT as entered above:	**5,790**

Warrant 1B (Interruption of Continuous Traffic)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	15,950
Mainline ADT as entered above:	**23,790**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	1,800
Sidestreet ADT as entered above:	**5,790**

Satisfaction of Warrants

	Major Street	*Minor Street*	***Warrant Satisfied?***
Warrant 1A	Yes	Yes	**Yes**
Warrant 1B	Yes	Yes	**Yes**

Satisfaction of warrants does not necessarily indicate signalization is necessary.

Left-Turn Cross Product Analysis

If signalized, the following table will help determine if left-turn phasing should be considered:

Cross Product	Number of Lanes	Type of Left-Turn Phase
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Less than 100,000	2	Not Recommended
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Greater than 100,000	2	Protected-Permitted Phase
Greater than 150,000	1	Protected-Only Phase
Greater than 300,000	2	Protected-Only Phase

Mainline Cross Product

Major Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	116
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	857
Cross Product (Lefts x (Opposing Throughs + Rights)):	**99,412**

Do Not Recommend Left-Turn Phasing

Sidestreet Cross Product

Minor Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	391
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	138
Cross Product (Lefts x (Opposing Throughs + Rights)):	**53,958**

Do Not Recommend Left-Turn Phasing

*Represents 10% of ADT value. Generally, the peak hour volume is approximately equal to 10% of the ADT. This number should give a rough estimate of the need for a left-turn phase.

Recommendation

Reviewer is resposible for completing recommendation box above.

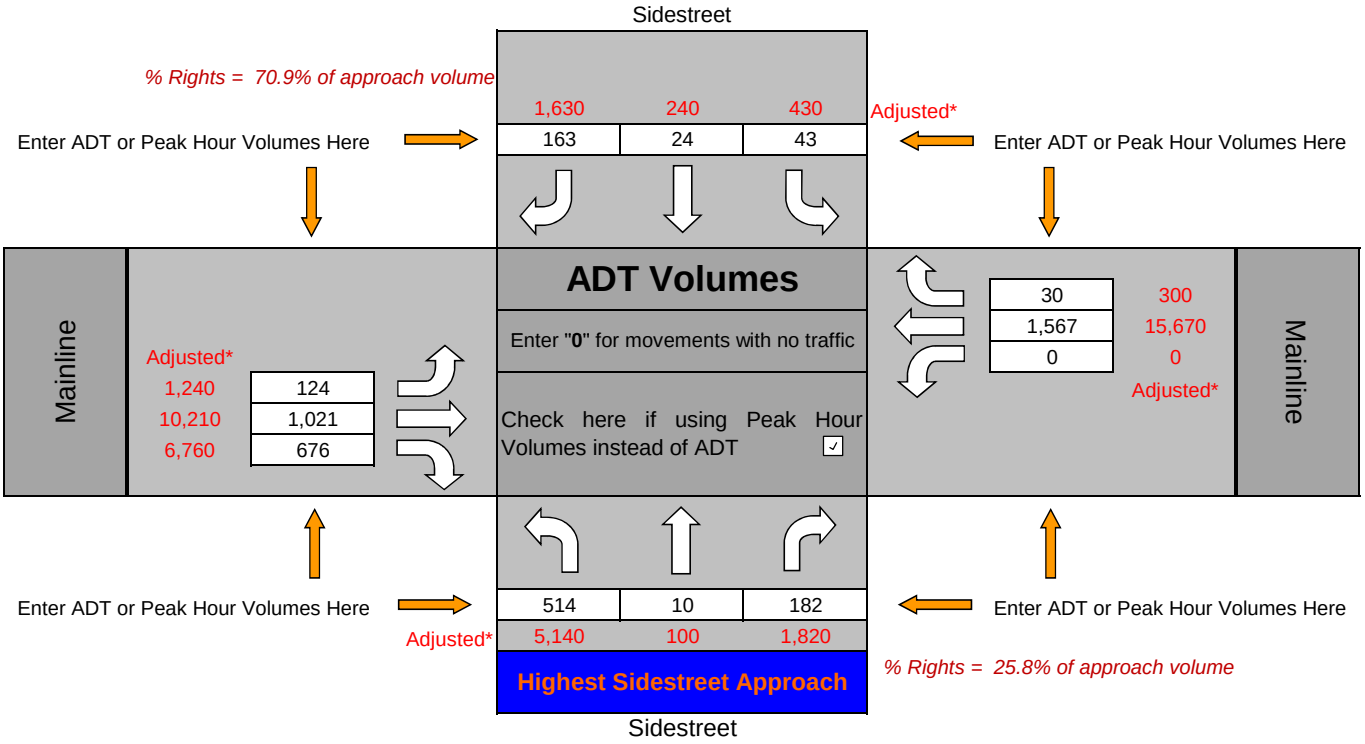
Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-106
10/2013

Signal Analysis Using Peak Hour/ADT Projections
(Highest Volume Approach)

County	Boone
Route	KY 338
Intersecting Route	Best Pal Drive
Milepoint	N/A
Date	December 17, 2015
Reviewer	
Item Number/Permit Number	6-18.00_PM Peak

Enter Average Daily Traffic (ADT) volumes in the boxes below. Note that the diagram is for illustration and calculation purposes only and may not accurately represent actual conditions in the field.



*In the event that the peak hour volumes are entered instead of ADT, a general rule of thumb is that the peak hour volumes are typically 10% of the ADT. If you check this box, peak hour volumes you enter will be multiplied by 10 and the results will be posted in the "Adjusted" fields.

NOTE: Shaded Cells Cannot Be Edited!

The total mainline ADT for both directions as entered above is:	**34,180**
The highest ADT for the sidestreet as entered above is:	**7,060**
What is the number of lanes for moving traffic on the Major Street per approach? (Enter **1** for one lane, **2** for two or more lanes - do not count turn lanes)	**2**
What is the number of lanes for moving traffic on the Minor Street per approach? (Enter **1** for one lane, **2** for two or more lanes)	**2**
Is either the posted speed limit on the Major Street greater than 40 MPH **or** is the intersection located in an isolated community with a population less than 10,000?	**No** (Enter "Yes" or "No")

Warrant 1A (Minimum Vehicular Volume)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	10,600
Mainline ADT as entered above:	**34,180**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	3,550
Sidestreet ADT as entered above:	**7,060**

Warrant 1B (Interruption of Continuous Traffic)

(Numbers are not reduced.)

Mainline Traffic

ADT volumes above which a signal may be warranted:	15,950
Mainline ADT as entered above:	**34,180**

Sidestreet Traffic (Highest Approach)

ADT volumes above which a signal may be warranted:	1,800
Sidestreet ADT as entered above:	**7,060**

Satisfaction of Warrants

	Major Street	*Minor Street*	***Warrant Satisfied?***
Warrant 1A	Yes	Yes	**Yes**
Warrant 1B	Yes	Yes	**Yes**

Satisfaction of warrants does not necessarily indicate signalization is necessary.

Left-Turn Cross Product Analysis

If signalized, the following table will help determine if left-turn phasing should be considered:

Cross Product	Number of Lanes	Type of Left-Turn Phase
Less than 50,000	1	Not Recommended
Less than 100,000	2	Not Recommended
Greater than 50,000	1	Protected-Permitted Phase
Greater than 100,000	2	Protected-Permitted Phase
Greater than 150,000	1	Protected-Only Phase
Greater than 300,000	2	Protected-Only Phase

Mainline Cross Product

Major Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	124
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	1,597
Cross Product (Lefts x (Opposing Throughs + Rights)):	**198,028**

Recommend Protected-Permitted Left-Turn Phase

Sidestreet Cross Product

Minor Street Left-Turn Volume (Highest Left-Turn Volume, **Peak Hour***):	514
Opposing Throughs and Rights (Opposing Throughs + Rights, **Peak Hour***):	187
Cross Product (Lefts x (Opposing Throughs + Rights)):	**96,118**

Do Not Recommend Left-Turn Phasing

*Represents 10% of ADT value. Generally, the peak hour volume is approximately equal to 10% of the ADT. This number should give a rough estimate of the need for a left-turn phase.

Recommendation

Reviewer is resposible for completing recommendation box above.

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ US 25 MILEPOINT

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 5

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME US 25 SPEED 55 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

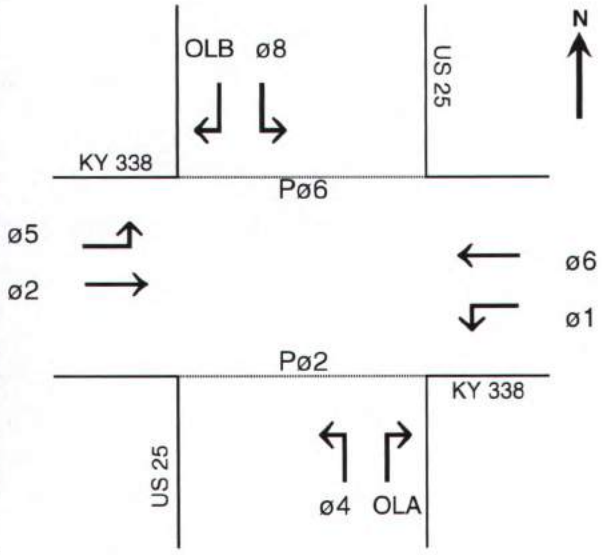
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X		X	X	X		X
PED PHASES	5		X				X		
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A	X							
OVERLAP B	B					X			
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION US 25 @ Chambers Lane MILEPOINT 2.582

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/19
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[X] N[ ]
- ON PHASES 4

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME US 25 SPEED 55 MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[ ] BACKPLATES
[ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK
[ ] COUNTDOWN
[ ] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Chambers Lane SPEED _____ MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED
[ ] BACKPLATES
[ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK
[ ] COUNTDOWN
[ ] PED BUTTONS
[ ] ACCESSIBLE
[ ] 12" BEACON
[ ] RED
[ ] YELLOW
[ ] OTHER

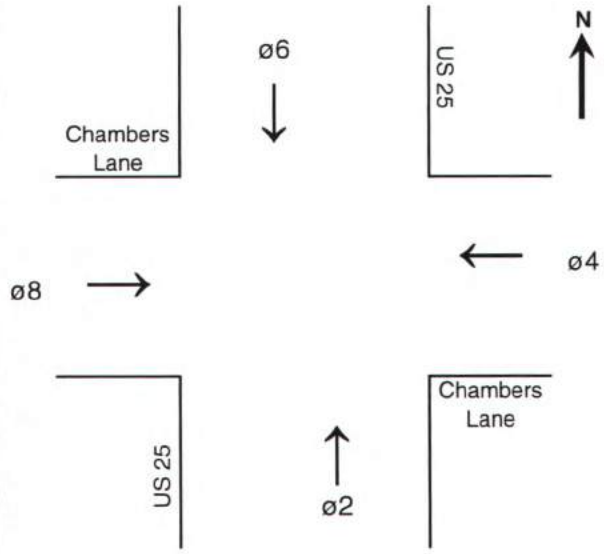
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X		X		X		X
PED PHASES	5								
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

Traffic Signal Checklist (Automated)

TC 72-4
03/2017

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION US 25 @ Shorland MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[X] N[ ]
- ON PHASES 4

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME US 25 SPEED 55 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Shorland SPEED _____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

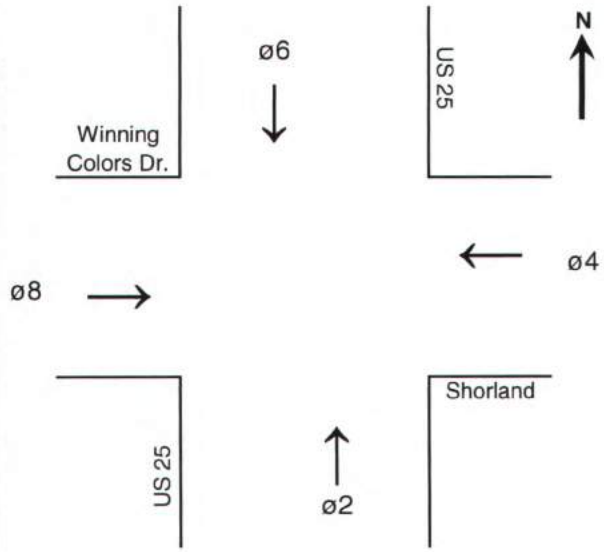
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X		X		X		X
PED PHASES	5								
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

TO: Jon Wilcoxson, P.E.
Assistant State Highway Engineer
For Project Delivery and Preservation

FROM: R. Jeffrey Wolfe, P.E.
Director
Division of Traffic Operations

DATE: September 10, 2018

SUBJECT: Boone County
06-18
KY 338 & I-75 Improvements
Traffic Signal Requests

As part of the subject widening project, we are requesting approval to install two new traffic signals along KY 338, and remove another. Details on each intersection are below.

For the two new signals, MUTCD volume warrants are met and the project team is in agreement that the signals are needed. These two locations are KY 338 @ Paddock Drive and KY 338 @ Best Pal Drive.

The signal to be removed is KY 338 @ Triple Crown Blvd. A roundabout will be constructed with the project, and as such, a traffic signal will no longer be needed.

In addition to these changes, a temporary signal is being requested on US 25 @ Shorland Drive. This signal is necessary as part of the detour plan while the interchange with KY 338 is being built. Previously, a temporary signal was approved on the south end of this detour.

If you agree, please notify us and we will advise the District Office. If you have any questions regarding this matter, please let us know.

9-13-18
APPROVE DATE

DISAPPROVE DATE

RJW:LKB

Kentucky UNBRIDLED SPIRIT
An Equal Opportunity Employer M/F/D

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ Best Pal Dr MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 7

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[ ]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Best Pal Dr SPEED 25 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

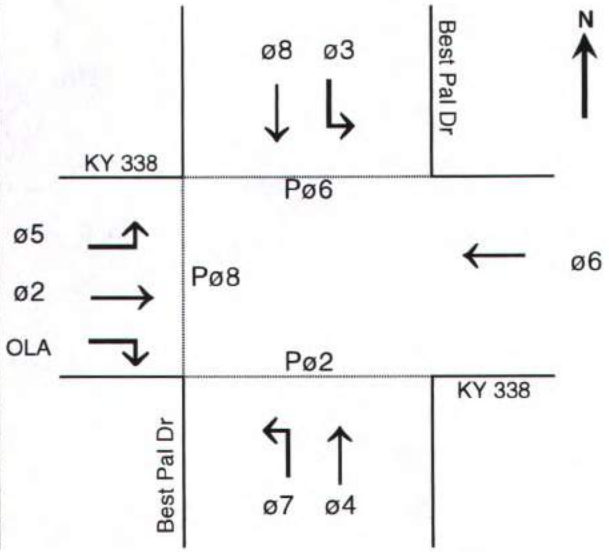
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X	X	X	X	X	X	X
PED PHASES	5		X				X		X
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A							X	
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

Traffic Signal Checklist (Automated)

TC 72-4
03/2017

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ Best Pal Dr (Temporary Setup) MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 3

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[ ]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Best Pal Dr (Temporary Setup) SPEED 25 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

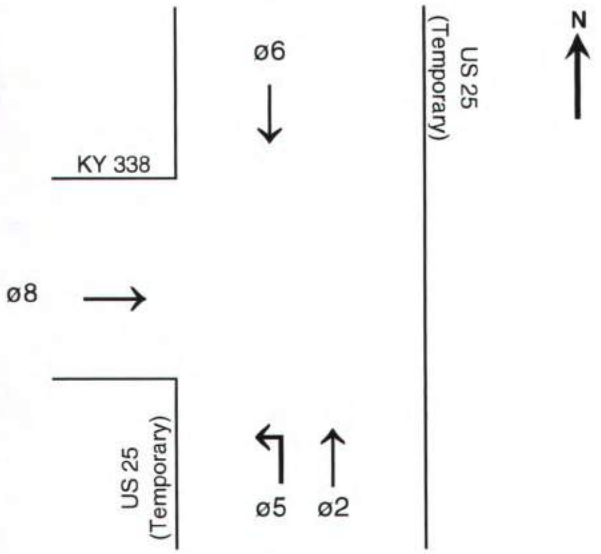
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
CRITICAL GRADE _____ %
NEAR LOOP _____ FEET FROM STOP BAR
VEHICLE INTERVAL _____ SECONDS
FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X						
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X			X	X		X
PED PHASES	5		X				X		
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key)

(Timing Provided by the District Traffic Engineer)

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

Traffic Signal Checklist (Automated)

TC 72-4
03/2017

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ Frogtown Connector MILEPOINT

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 8

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Frogtown Connector SPEED 25 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

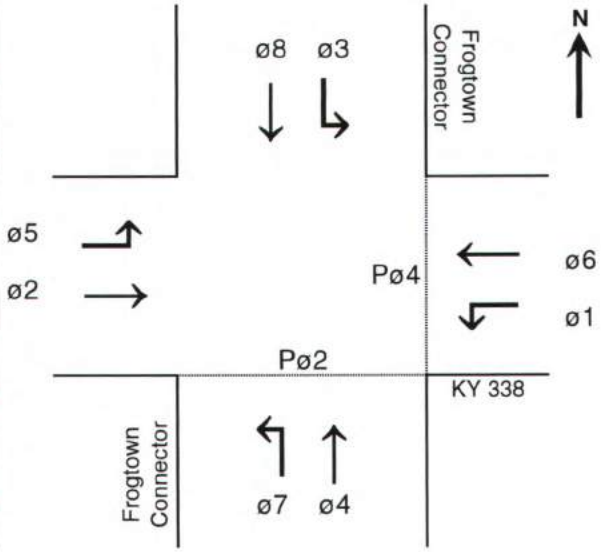
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	Loop	6' x 30'	0 feet
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
CRITICAL GRADE _____ %
NEAR LOOP _____ FEET FROM STOP BAR
VEHICLE INTERVAL _____ SECONDS
FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X	X	X	X	X	X	X
PED PHASES	5		X		X				
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE September 11, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ I-75 NB Ramp MILEPOINT 0.273

[ ] NEW INSTALLATION
[X] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-14

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [ ] SEMI-ACTUATED
- [X] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y [ ] N [X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y [ ] N [X]
- ON PHASES

ADVANCED WARNING FLASHER Y [ ] N [X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y [ ] N [X]
- ON PHASES

EMERGENCY PREEMPTION Y [ ] N [X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME I-75 NB Ramp SPEED _____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

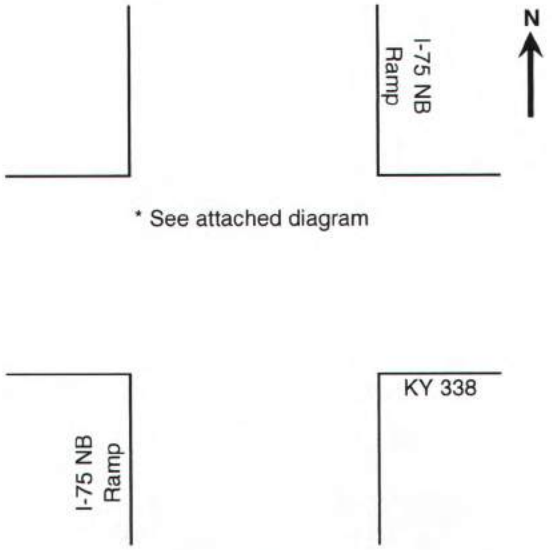
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	Loop	6' x 30'	0 feet
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

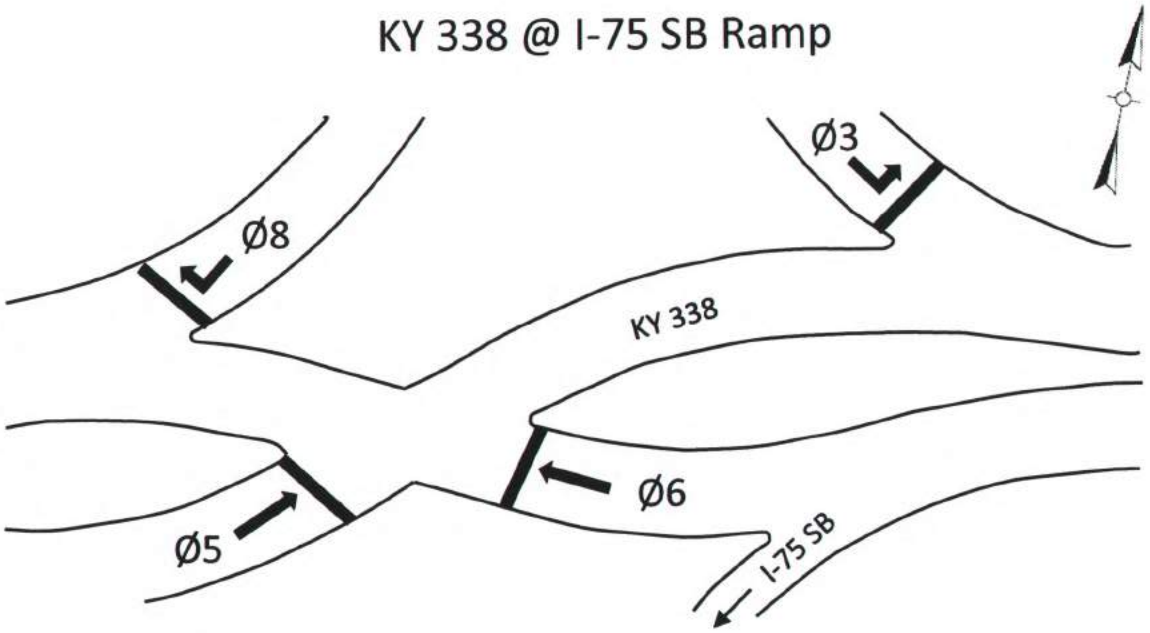
FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0								
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4								
PED PHASES	5								
LEAD PHASES	6								
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9								
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



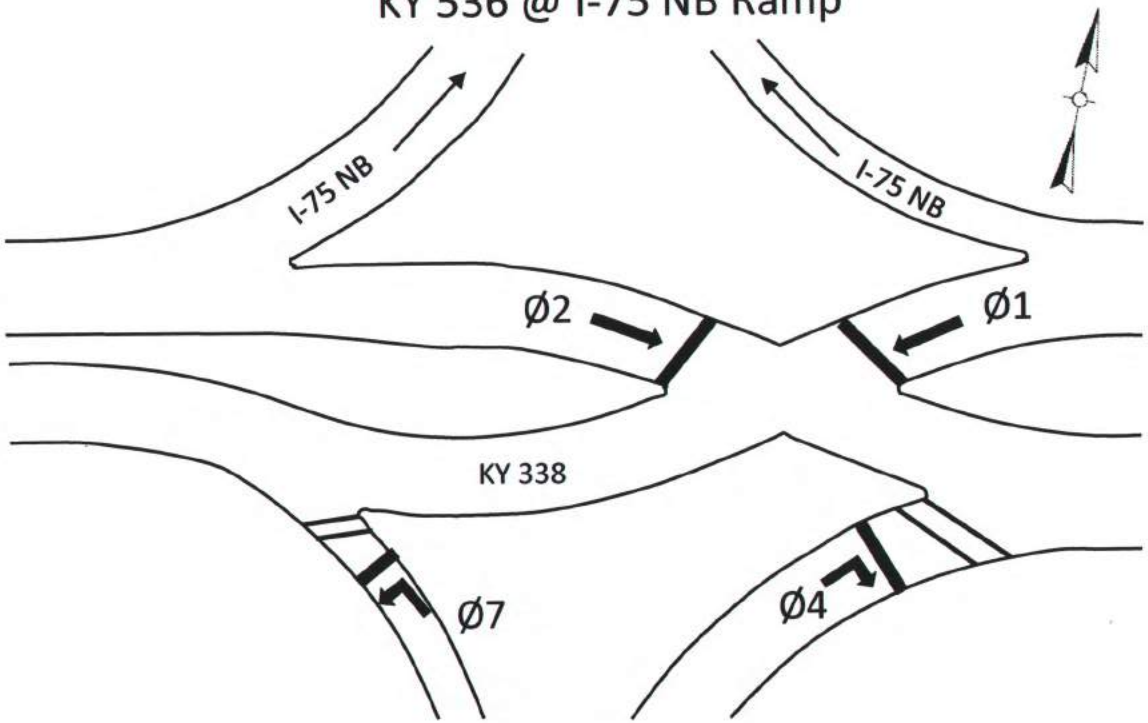
PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

KY 338 @ I-75 SB Ramp



KY 536 @ I-75 NB Ramp



COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Matthew G. Bevin
Governor

Greg Thomas
Secretary

TO: Jon Wilcoxson, P.E.
Assistant State Highway Engineer
For Project Delivery and Preservation

FROM: R. Jeffrey Wolfe, P.E.
Director
Division of Traffic Operations

DATE: September 10, 2018

SUBJECT: Boone County
06-18
KY 338 & I-75 Improvements
Traffic Signal Requests

As part of the subject widening project, we are requesting approval to install two new traffic signals along KY 338, and remove another. Details on each intersection are below.

For the two new signals, MUTCD volume warrants are met and the project team is in agreement that the signals are needed. These two locations are KY 338 @ Paddock Drive and KY 338 @ Best Pal Drive.

The signal to be removed is KY 338 @ Triple Crown Blvd. A roundabout will be constructed with the project, and as such, a traffic signal will no longer be needed.

In addition to these changes, a temporary signal is being requested on US 25 @ Shorland Drive. This signal is necessary as part of the detour plan while the interchange with KY 338 is being built. Previously, a temporary signal was approved on the south end of this detour.

If you agree, please notify us and we will advise the District Office. If you have any questions regarding this matter, please let us know.

9-13-18

APPROVE DATE DISAPPROVE DATE

RJW:LKB

Kentucky UNBRIDLED SPIRIT
An Equal Opportunity Employer M/F/D

Kentucky Transportation Cabinet
Division of Traffic Operations

Traffic Signal Checklist (Automated)

TC 72-4
03/2017

DATE September 14, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ Paddock Dr. MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- ____ SPEED WHEN FLASHING
- ____ OVERHEAD
- ____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

____ SIGN

[ ] LED-ENHANCED SIGN

____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 6

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[ ]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[ ] N[X]
- ON PHASES

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED 35 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

SIDE STREET, APPROACH NAME Paddock Dr. SPEED 25 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[X] WALK/DON'T WALK [X] COUNTDOWN [X] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER

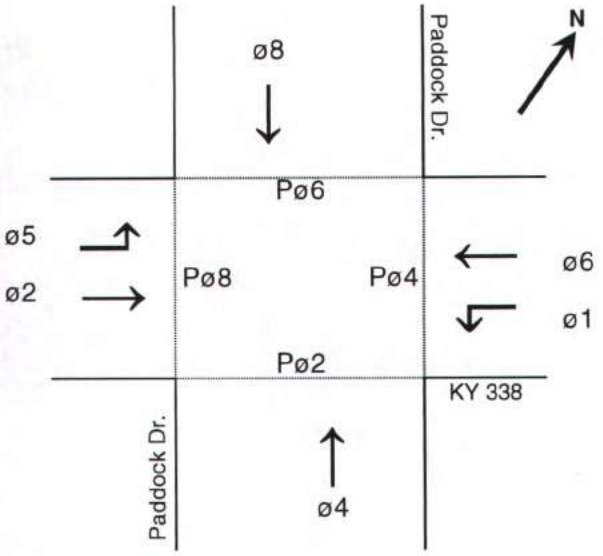
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN			
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE ____ %
- NEAR LOOP ____ FEET FROM STOP BAR
- VEHICLE INTERVAL ____ SECONDS
- FAR LOOP ____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1		X				X		
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4	X	X		X	X	X		X
PED PHASES	5		X		X		X		X
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E				X				X
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Matthew G. Bevin
Governor

Greg Thomas
Secretary

TO: Bob Yeager, P.E.
Chief District Engineer
District 6 – Covington

ATTENTION: James Minckley, P.E.
TEBM – Engineering Support

Nick Reis, P.E.
District Traffic Engineer

FROM: Tim Tharpe, P.E.
TEBM – Traffic Engineering
Division of Traffic Operations

DATE: November 7, 2018

SUBJECT: Boone County
06-18.00
Traffic Signal Installations/Modifications

We have received approval from the State Highway Engineer's office to install traffic signals as part of the subject project. Below is a summary of the modifications at each location.

KY 338 @ Triple Crown Blvd

- This signal will be removed due to a roundabout being constructed.
- Lighting at the roundabout is hereby approved, per our policy.

KY 338 @ Paddock Drive

- This will be a new signal.
- Protected-only left turn phasing on KY 338.

KY 338 @ Frogtown Connector

- Adding protected-only left turn phasing on KY 338.

KY 338 @ I-75 SB & KY 338 @ I-75 NB

- DCD interchange.
- See attached phasing diagram for phase number assignments.
- Rights on red will be prohibited.
- 4 signal heads will be utilized on KY 338, with a supplemental head mounted to the side on a separate pole.

KY 338 @ Best Pal Drive

- This will be a new signal.
- It is our understanding that this signal will be built in a temporary configuration as part of the MOT plans to reroute traffic to this area while the interchange with US 25 is being built. Because the signal will become permanent, just in a slightly different location, the approval for the permanent signal will suffice.
- In the temporary configuration, a left turn phase northbound is approved to allow traffic traveling on what will then be US 25 to turn left towards I-75.
- In the permanent configuration, protected-only phasing on EB KY 338 will be used. There will be no lefts allowed westbound.

KY 338 @ US 25

- Preemption equipment can be removed, as the crossing will be removed.

Temporary Signals

Both temporary signals on this project will require railroad preemption to be installed. After a meeting with the District and the Railroad, it was determined that 20 seconds of advance preemption will be obtained. This 20 seconds will be in advance of the gate arms beginning to descend.

US 25 @ Chambers Lane

- 2-phase signal with preemption.

US 25 @ Shorland Drive

- 2-phase signal with preemption.
- May consider looking at extra enhancements at this location to alert drivers of the railroad tracks. Dynamic envelope markings as well as oversized signage are options.

Attached you will find Traffic Signal Checklists to assist in the design of these signals. If you have any questions or comments, please feel free to contact us.

TDT:LKB
Attachments

C: Carol Callan-Ramler, Project Manager

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Matthew G. Bevin
Governor

Greg Thomas
Secretary

TO: Jon Wilcoxson, P.E.
Assistant State Highway Engineer
For Project Delivery and Preservation

FROM: R. Jeffrey Wolfe, P.E.
Director
Division of Traffic Operations

DATE: September 10, 2018

SUBJECT: Boone County
06-18
KY 338 & I-75 Improvements
Traffic Signal Requests

As part of the subject widening project, we are requesting approval to install two new traffic signals along KY 338, and remove another. Details on each intersection are below.

For the two new signals, MUTCD volume warrants are met and the project team is in agreement that the signals are needed. These two locations are KY 338 @ Paddock Drive and KY 338 @ Best Pal Drive.

The signal to be removed is KY 338 @ Triple Crown Blvd. A roundabout will be constructed with the project, and as such, a traffic signal will no longer be needed.

In addition to these changes, a temporary signal is being requested on US 25 @ Shorland Drive. This signal is necessary as part of the detour plan while the interchange with KY 338 is being built. Previously, a temporary signal was approved on the south end of this detour.

If you agree, please notify us and we will advise the District Office. If you have any questions regarding this matter, please let us know.

9-13-18

APPROVE DATE

DISAPPROVE DATE

RJW:LKB

Kentucky UNBRIDLED SPIRIT

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Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE September 11, 2018 COUNTY Boone CITY Walton

INTERSECTION KY 338 @ Triple Crown Blvd. MILEPOINT 0.756

[ ] NEW INSTALLATION
[ ] REVISION
[X] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/11/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [ ] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES _____

PROT/PERM PHASES _____

FLASHING YELLOW ARROW Y[ ] N[ ]
- 4-SECTION (w/GREEN ARROW) _____
- 3-SECTION (NO GREEN ARROW) _____

GES Y[ ] N[ ]
- ON PHASES _____

ADVANCED WARNING FLASHER Y[ ] N[ ]
- ON PHASES _____
- DISTANCE FROM STOP BAR _____
- ADVANCE WARNING TIME _____

RAILROAD PREEMPTION Y[ ] N[ ]
- ON PHASES _____

EMERGENCY PREEMPTION Y[ ] N[ ]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME KY 338 SPEED _____ MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER _____

SIDE STREET, APPROACH NAME Triple Crown Blvd. SPEED _____ MPH

[X] 12"R - 12"Y - 12"G
[ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[ ] OTHER _____

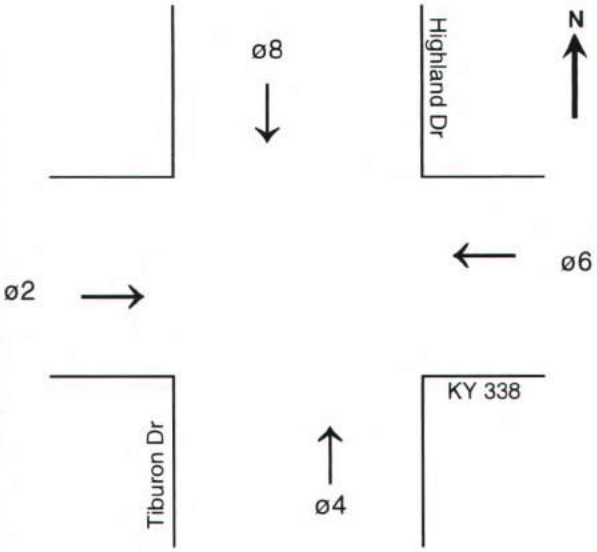
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH			
MAINLINE LEFT TURN			
SIDE STREET			

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0								
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X		X		X		X
PED PHASES	5								
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7								
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

TO: Bob Yeager, P.E.
Chief District Engineer
District 6 – Covington

ATTENTION: James Minckley, P.E.
TEBM – Engineering Support

Linzy Brefeld, P.E.
District Traffic Engineer

FROM: Tim Tharpe, P.E.
TEBM – Traffic Engineering
Division of Traffic Operations

DATE: December11, 2018

SUBJECT: Boone County
06-18.00
Updated Traffic Signal Checklists

Attached are updated traffic signal checklists for two temporary signals on the subject project. These two signals will require railroad preemption, and will need to have battery backup systems installed. Per our discussions with Norfolk Southern, we are not able to get the full amount of advance preemption time we requested. As a result, we will be installing additional countermeasures at each intersection to prevent drivers from stopping on the tracks. Additional details for each intersection are below.

US 25 @ Shorland Drive

- Norfolk Southern has agreed to 10 additional seconds beyond their existing 30 seconds of warning time.
- Dynamic envelope markings, as well as "do not block intersection" markings will be installed at the tracks.
- Oversized DO NOT STOP ON TRACKS signs will be installed.
- Track warning signs (W10-2) will be installed as necessary, along with storage distance plaques.
- Pre-signals were discussed, but due to design issues, it was decided that these would not be the best option here.

US 25 @ Chambers Lane

- Norfolk Southern has agreed to 20 additional seconds beyond their existing 30 seconds of warning time.
- Dynamic envelope markings will be installed at the tracks.
- Oversized DO NOT STOP ON TRACKS signs will be installed.
- Track warning signs (W10-2) will be installed as necessary, along with storage distance plaques.

If you have any questions or need more information, please feel free to contact us.

TDT:LKB
Attachments

C: Carol Callan-Ramler, Project Manager
Allen Rust

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE December 7, 2018 COUNTY Boone CITY Walton

INTERSECTION US 25 @ Shorland MILEPOINT

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/18
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 06-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[X] N[ ]
- ON PHASES 4

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME US 25 SPEED 55 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER Blankout signs (R3-1 & R3-2) to be installed on spans. Install battery backup equipment.

SIDE STREET, APPROACH NAME Shorland SPEED _____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [X] BACKPLATES [X] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER 4-section head with green arrow to be installed on track side approach to come on only during preemption.

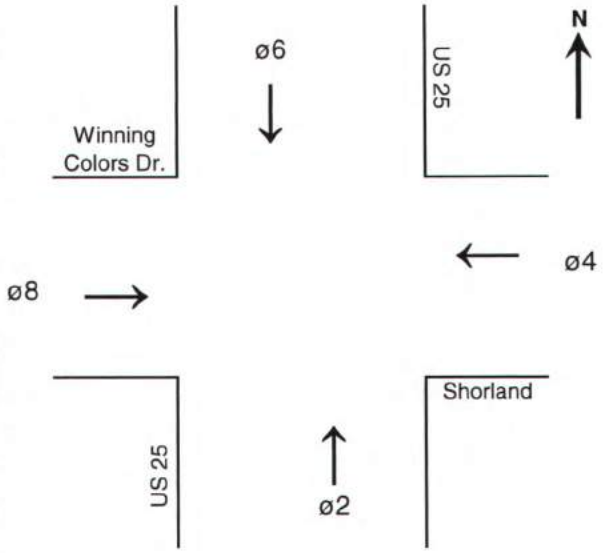
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X		X		X		X
PED PHASES	5								
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Kentucky Transportation Cabinet
Division of Traffic Operations

TC 72-4
03/2017

Traffic Signal Checklist (Automated)

DATE December 7, 2018 COUNTY Boone CITY Walton

INTERSECTION US 25 @ Chambers Lane MILEPOINT 2.582

[X] NEW INSTALLATION
[ ] REVISION
[ ] REMOVAL
[ ] UPDATE

APPROVAL DATE 9/13/19
TURN-ON DATE
TURN-ON TIME
ITEM NUMBER 6-18

TYPE OF DEVICE

[X] SIGNAL
- [ ] FIXED TIME
- [X] SEMI-ACTUATED
- [ ] FULLY ACTUATED
- [ ] PEDESTRIAN

[ ] SCHOOL FLASHER
- _____ SPEED WHEN FLASHING
- _____ OVERHEAD
- _____ SIDE MOUNTED

[ ] INTERSECTION BEACON

[ ] SIGN BEACON

_____ SIGN

[ ] LED-ENHANCED SIGN

_____ SIGN

OPERATIONAL DETAILS

NUMBER OF PHASES 2

PROT/PERM PHASES

FLASHING YELLOW ARROW Y[ ] N[X]
- 4-SECTION (w/GREEN ARROW)
- 3-SECTION (NO GREEN ARROW)

GES Y[ ] N[X]
- ON PHASES

ADVANCED WARNING FLASHER Y[ ] N[X]
- ON PHASES
- DISTANCE FROM STOP BAR
- ADVANCE WARNING TIME

RAILROAD PREEMPTION Y[X] N[ ]
- ON PHASES 4

EMERGENCY PREEMPTION Y[ ] N[X]

SIGNAL INDICATIONS

MAINLINE, APPROACH NAME US 25 SPEED 55 MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER Blankout signs (R3-1 & R3-2) to be installed on spans. Install battery backup equipment.

SIDE STREET, APPROACH NAME Chambers Lane SPEED _____ MPH

[X] 12"R - 12"Y - 12"G [ ] DOUBLE-RED [ ] BACKPLATES [ ] REFLECTIVE BACKPLATES
[ ] WALK/DON'T WALK [ ] COUNTDOWN [ ] PED BUTTONS [ ] ACCESSIBLE
[ ] 12" BEACON [ ] RED [ ] YELLOW
[X] OTHER 4-section head with green arrow to be installed on track side approach to come on only during preemption.

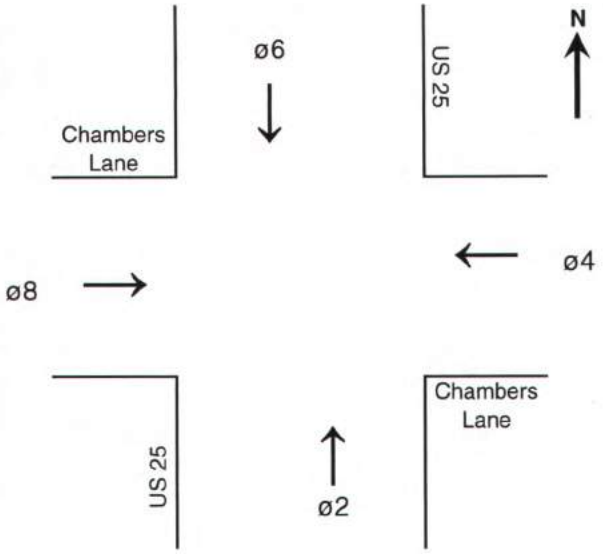
DETECTION

	TYPE (VIDEO/LOOP)	SIZE	DISTANCE FROM STOP BAR
MAINLINE THROUGH	N/A	N/A	N/A
MAINLINE LEFT TURN	N/A	N/A	N/A
SIDE STREET	Loop	6' x 30'	0 feet

GES LOOPS
- CRITICAL GRADE _____ %
- NEAR LOOP _____ FEET FROM STOP BAR
- VEHICLE INTERVAL _____ SECONDS
- FAR LOOP _____ FEET FROM STOP BAR

PHASE FUNCTIONS (0 + Key)

FUNCTION	KEY	PHASE NUMBER (use cad lights)							
		1	2	3	4	5	6	7	8
VEHICLE RECALL	0		X				X		
PED RECALL	1								
RED LOCK	2								
YELLOW LOCK	3								
PERMIT	4		X		X		X		X
PED PHASES	5								
LEAD PHASES	6	X		X		X		X	
DOUBLE ENTRY	7				X				X
SEQUENTIAL TIMING	8								
START UP GREEN	9		X				X		
OVERLAP A	A								
OVERLAP B	B								
OVERLAP C	C								
OVERLAP D	D								
EXCLUSIVE PHASE	E								
SIMULTANEOUS GAP	F								



PHASE TIMING (phase + key) **(Timing Provided by the District Traffic Engineer)**

FUNCTION	KEY	PHASE							
		1	2	3	4	5	6	7	8
MAX I									
MAX II									
WALK									
FLASHING DON'T WALK									
MAX INITIAL									
MINIMUM GREEN									
TIME BEFORE REDUCTION									
TIME TO REDUCE									
OBSERVE GAP (read only)									
PASSAGE									
MINIMUM GAP									
ADDED PER ACTUATION									
YELLOW									
RED CLEARANCE									
RED REVERT									
WALK II									
FLASH COLOR		R Y	R Y	R Y	R Y	R Y	R Y	R Y	R Y

Dixie Hwy
Shorland Dr
Shorland Dr
150 FEET BETWEEN HIGHWAY AND TRACKS BEHIND YOU
DO NOT STOP ON TRACKS
DO NOT STOP ON TRACKS
Shorland Dr
Shorland Dr
100 FEET BETWEEN TRACKS AND HIGHWAY

Chambers Rd
Dixie Hwy
25
25
Chambers Rd
150 FEET BETWEEN HIGHWAY AND TRACKS BEHIND YOU
DO NOT STOP ON TRACKS
DO NOT STOP ON TRACKS
Chambers Rd
100 FEET BETWEEN TRACKS AND HIGHWAY
Chambers

Appendix C3 -- CAP

(Pending)

Appendix C4 -- Drainage

V05-08

DRAINAGE DESIGN DOCUMENTATION

■ PRELIMINARY

☐ ADVANCE

☐ FINAL

STATE PROJECT NO.:

FEDERAL PROJECT NO.: FD

COUNTY: UNION

ITEM NO.: 6-14.00

EMARS NO.:

ROAD NAME: KY536

REVIEW STATUS

ROUTE NO.:

DISTRICT: 2

STATION TO STATION: STA. 153+00 TO STA. 218+00

CO DRAINAGE:

DESIGNED BY: STANTEC & PALMER

BRIDGES:

☐ BRIDGE

☐ BOX CULVERT

☐ ARCH CULVERT

☐ PIPE CULVERT

☐ OTHER

☐ INLET SPACING

■ STORM SEWER

☐ CHANNEL CHANGE

☐ DRY STRUCTURE

■ CHANNEL CHANGE



KENTUCKY TRANSPORTATION CABINET
DIVISION OF HIGHWAY DESIGN

KY 536
BOONE COUNTY
ITEM NO. 6-14.00

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SECTION 2. **MEETING REPORTS AND CORRESPONDENCE**

SECTION 3. **PROJECT LEVEL HYDROLOGY**

SECTION 4. **ABBREVIATED PLANS SET**

SECTION 5. **STORM SEWER SYSTEMS**

SECTION 6. **PAVEMENT INLET SPREAD CALCULATIONS**

SECTION 1

DRAINAGE SUMMARY

Kentucky Transportation Cabinet Division of Highway Design 5-06	**BRIDGE AND CULVERT SUMMARY**	**TC 61- 504** Page 1 of 1

County : BOONE	Route : KY 536	Item No. : 6-14.00
Road Name :		
UPN :	FPN :	Folder No. : 1 of 1
Type of Work : GRASE, DRAIN, AND SURFACING		Section :
Designer : STANTEC	Central Office Reviewer:	Doug Gesso
Termini : 153+00 to 218+00		
Bridges : 0	Box Culverts : 0	Pipe Culverts :
Arch Culverts : 0	Entrance Pipes : 1	Box Inlets : 119
Channel Changes : 0	Other :	

Station	Structure No.	Structure Description	Drawing No.	Remarks	Page No.
		Pipe Summary Sheets Attached			

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R27

SHEET NO.	STRUCTURE NO.	ROUTE	STATION	SIDE	SKEW	COVER HEIGHT (FEET)	DESIGN pH LEVEL	ENTRANCE PIPE 15 IN	STORM SEWER PIPE 15 IN	STORM SEWER PIPE 18 IN	STORM SEWER PIPE 24 IN	STORM SEWER PIPE 30 IN	REMOVE PIPE	PIPE CULVERT HEADWALL - 15 IN	PIPE CULVERT HEADWALL - 18 IN	PIPE CULVERT HEADWALL - 30 IN	SLOPED BOX OUTLET TYPE I 15 IN	SLOPED BOX OUTLET TYPE I 18 IN	CURB BOX INLET TYPE A	CURB BOX INLET TYPE B	DROP BOX INLET TYPE I	DROP BOX INLET TYPE II	DROP BOX INLET TYPE 13G	JUNCTION BOX 15 IN	JUNCTION BOX 18 IN	JUNCTION BOX 24 IN	MANHOLE TYPE A	MANHOLE TYPE C	ADJUST MANHOLE FRAME TO GRADE	CHANNEL LINING CLASS II	CHANNEL LINING CLASS III	REMOVE HEADWALL	TURF REINFORCEMENT MAT TYPE I	REMARKS
ITEM CODE								440	521	522	524	526	1310	1202	1204	1210	1432	1433	1456	1480	1490	1544	1559	1641	1642	1643	1756	1767	1791	2483	2484	2625	23274EN11F	
								LIN. FT.						EACH																TONS		EACH	SQ. YD.	
R5	1	KY 536 WEST	155+00.00	RT		3	M			50									1															CBI TYPE A 6-2; H = 4.38'
R5	2	KY 536 WEST	155+02.00	RT		4	M			26									1															CBI TYPE A 6-2; H = 4.38'
R5	3	KY 536 WEST	155+02.00	RT			M								1																			
R5	12	KY 536 WEST	157+00.00	LT		3	M			55									1															CBI TYPE A 6-2; H = 4.38'
R5	13	KY 536 WEST	157+00.00	RT		4	M			23									1															CBI TYPE A 6-2; H = 4.38'
R5	14	KY 536 WEST	157+00.00	RT			M								1																			
R7	11	KY 536 WEST	158+62.85	LT		4	M			161									1															CBI TYPE A 6-2; H = 4.38'
R7	21	KY 536 WEST	158+61.96	RT		4	M			34									1															CBI TYPE A 6-2; H = 4.38'
R7	22	KY 536 WEST	158+56.09	RT			M								1																			
R7	31	KY 536 WEST	160+02.86	RT		3	M			26									1															CBI TYPE A 6-2; H = 4.38'
R7	32	RAMP D-1	10399+87.00	RT		4	M			24									1															CBI TYPE A 6-2; H = 4.38'
R7	33	RAMP D-1	10399+87.00	RT			M								1																			
R7	441	KY 536 WEST	161+61.00	RT		6	M		82										1															CBI TYPE A 4-2; H = 4.11'
R7	451	KY 536 WEST	162+20.00	LT		7	M		72																									CBI TYPE A 4-2; H = 4.11'
R7	44	KY 536 WEST	162+39.00	RT		6	M					77							1															CBI TYPE A 50-2; H = 6.83'
R7	45	KY 536 WEST	162+95.01	RT			M				10		4																	1				
R9	442	KY 536 WEST	163+15.00	RT		8	M		74										1															CBI TYPE A 4-2; H = 4.11'
R9	46	KY 536 WEST	163+57.94	RT		6	M																				1							MATCH EXIST. PIPE
R9	461	KY 536 WEST	163+62.00	LT		6	M			18									1															CBI TYPE A 6-2; H = 4.38'
R9	462	KY 536 WEST	164+00.00	LT		4	M			56									1															CBI TYPE A 11-2; H = 4.38'
R9	463	KY 536 WEST	164+67.00	LT		4	M			64									1															CBI TYPE A 6-2; H = 4.38'
R9		KY 536 WEST	165+24.97	RT			M																							1				
R9	475	KY 536 WEST	167+35.17	LT		9	M		41															1										FIELD LOCATE EXIST. 12" PVC
R9	472	RAMP A-1	11098+36.70	LT		5	M													1														CBI TYPE B 11-2; H =4.70', MATCH EXIST. PIPE
R9	471	KY 536 WEST	167+64.50	LT		6	M												1															CBI TYPE A 6-2; H = 6.62', MATCH EXIST. PIPE
R9	47	KY 536 WEST	167+64.76	RT		6	M																							1				
R9	48	KY 536 WEST	167+84.82	RT		5	M				4		4						1															CBI TYPE A 27-2; H = 6.22'
R9	481	KY 536 WEST	167+92.73	RT		5	M		11												1													DBI TYPE I GRADE
R9	473	RAMP A-1	11099+45.00	LT		4	M			104									1															CBI TYPE A 6-2; H = 4.38'
R9	432	RAMP D-2	20400+98.00	LT		4	M				94								1															CBI TYPE A 21-6; H = 4.92'
R9	433	RAMP D-2	20399+38.00	LT		4	M			157																								CBI TYPE A 6-2; H = 4.92'
R9	434	RAMP D-2	20399+17.00	LT		8	M			47											1													DBI TYPE I SAG
R11	49	KY 536 WEST	169+07.00	RT		5	M				120								1															CBI TYPE A 21-2; H = 4.92'
R11	474	KY 536 WEST	169+20.00	LT		4	M		49										1															CBI TYPE A 4-2; H = 4.11'
R11	50	KY 536 WEST	169+80.00	RT		4	M				72								1															CBI TYPE A 21-2; H = 4.92'
R11	501	KY 536 WEST	169+80.00	RT		4	M		15												1													DBI TYPE I GRADE
R11	51	KY 536 WEST	171+00.00	RT		8	M				119																1							
R11	511	KY 536 WEST	171+40.00	RT		4	M		44										1															CBI TYPE A 4-2; H = 4.11'
R11	631	KY 536 WEST	171+41.00	LT		5	M		111										1															CBI TYPE A 4-2; H = 4.11'
R11	52	RAMP C-2	20320+80.00	RT		9	M				100										1													DBI TYPE I SAG
R11	63	RAMP A-2	21100+90.00	RT		4	M			90									1															CBI TYPE A 11-2; H = 4.38'
R11	53	KY 536 WEST	172+52.00	RT		4	M			79									1															CBI TYPE A 21-2; H = 4.38'
R11	64	RAMP A-2	21099+82.00	RT		4	M			102									1															CBI TYPE A 11-2; H = 4.38'
R11	54	KY 536 WEST	173+00.00	RT		4	M			58									1															CBI TYPE A 11-2; H = 4.38'
R11	55	KY 536 EAST	173+66.00	RT		4	M			55									1															CBI TYPE A 6-2; H = 4.38'
R11	65	KY 536 EAST	174+06.00	LT		4	M			122										1														CBI TYPE B 6-2; H = 4.38'
R11	651	KY 536 EAST	174+23.00	LT		4	M		65										1															CBI TYPE A 4-2; H = 4.11'
R11	56	KY 536 EAST	174+80.00	RT		4	M			114									1															CBI TYPE A 11-2; H = 4.38'
R13	66	KY 536 EAST	176+00.00	LT		4	M		191											1														CBI TYPE B 4-2; H = 4.11'
R13	57	KY 536 EAST	176+30.00	RT		4	M			147									1															CBI TYPE A 6-2; H = 4.38'
R13	58	KY 536 EAST	178+35.00	RT		4	M			202																	1							
R13	59	KY 536 EAST	179+31.00	RT		4	M			93									1															CBI TYPE A 6-2; H = 4.88'
R13	592	KY 536 EAST	179+52.00	LT		5	M		43										1															CBI TYPE A 4-2; H = 4.11'
R13	591	KY 536 EAST	179+52.00	LT		4	M			64									1															CBI TYPE A 6-2; H = 5.24'
R13	60	KY 536 EAST	180+50.00	RT		4	M			117									1															CBI TYPE A 6-2; H = 4.38'
R15	743	KY 536 EAST	184+00.00	RT		5	M			72									1															CBI TYPE A 6-2; H = 4.38'
R15	742	KY 536 EAST	184+00.00	LT		5	M			43									1															CBI TYPE A 6-2; H = 5.74'
R15	741	KY 536 EAST	184+00.00	LT		5	M			44									1															CBI TYPE A 6-2; H = 5.27'
R15	74	KY 536 EAST	184+47.00	LT		5	M			173																	1							

PIPE DRAINAGE SUMMARY
1 OF 3

MicroStation v8.11.7.443
E-SHEET NAME:
USER: amclain
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\1785600\2_ROADWAY\PLAN SHEETS\R2C_DRAINSUM.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R27

SHEET NO.	STRUCTURE NO.	ROUTE	STATION	SIDE	SKEW	COVER HEIGHT (FEET)	DESIGN pH LEVEL	ENTRANCE PIPE 15 IN	STORM SEWER PIPE 15 IN	STORM SEWER PIPE 18 IN	STORM SEWER PIPE 24 IN	STORM SEWER PIPE 30 IN	REMOVE PIPE	PIPE CULVERT HEADWALL - 15 IN	PIPE CULVERT HEADWALL - 18 IN	PIPE CULVERT HEADWALL - 30 IN	SLOPED BOX OUTLET TYPE I 15 IN	SLOPED BOX OUTLET TYPE I 18 IN	CURB BOX INLET TYPE A	CURB BOX INLET TYPE B	DROP BOX INLET TYPE I	DROP BOX INLET TYPE II	DROP BOX INLET TYPE 13G	JUNCTION BOX 15 IN	JUNCTION BOX 18 IN	JUNCTION BOX 24 IN	MANHOLE TYPE A	MANHOLE TYPE C	ADJUST MANHOLE FRAME TO GRADE	CHANNEL LINING CLASS II	CHANNEL LINING CLASS III	REMOVE HEADWALL	TURF REINFORCEMENT MAT TYPE I	REMARKS
ITEM CODE								440	521	522	524	526	1310	1202	1204	1210	1432	1433	1456	1480	1490	1544	1559	1641	1642	1643	1756	1767	1791	2483	2484	2625	23274ENIIF	
								LIN. FT.						EACH																TONS		EACH	SQ. YD.	
R15	73	KY 536 EAST	185+76.00	LT		5	M			126									1															CBI TYPE A 6-2; H = 4.44'
R15	731	KY 536 EAST	185+76.00	RT		4	M			104									1															CBI TYPE A 6-2; H = 4.38'
R15	732	FIFTH THIRD ENTR.	100+57.00	RT		4	M		68														1											INLET NO. 15
R15	145	INVESTMENT WAY	198+12.00	RT		4	M		55										1															CBI TYPE A 4-2; H = 4.11'
R15	146	INVESTMENT WAY	198+06.00	LT		4	M			122									1															CBI TYPE A 6-2; H = 4.43'
R18	72	KY 536 EAST	187+60.00	LT		4	M			181									1															CBI TYPE A 6-2; H = 4.38'
R18	71	KY 536 EAST	187+83.00	LT		4	M			61									1															CBI TYPE A 6-2; H = 4.38'
R18	70	KY 536 EAST	188+67.00	LT		4	M		82										1															CBI TYPE A 4-2; H = 4.11'
R18	721	KY 536 EAST	188+94.00	LT		4	M		129										1															CBI TYPE A 4-6; H = 4.11'
R18	825	KY 536 EAST	190+20.83	RT		5	M				32		4									1										1		
R18	824	KY 536 EAST	190+23.06	LT		4	M				9		4						1													1		CBI TYPE A 15-2; H = 5.59', MATCH EXIST. PIPE
R18	823	KY 536 EAST	190+24.09	LT		6	M				30								1															CBI TYPE A 16-2; H = 4.98'
R18	822	KY 536 EAST	190+58.00	LT		6	M																			1								INLET NO. 9, MATCH EXIST. PIPE
R18	821	KY 536 EAST	191+37.50	LT		10	M																						1					
R18	82	BERBERICH DRIVE	100+58.15	RT		10	M																						1					TIE TO EXIST. MANHOLE
R18	83	KY 536 EAST	192+38.50	LT		8	M				103												1											INLET NO. 13
R18	831	KY 536 EAST	192+51.00	RT		4	M		46														1											INLET NO. 2
R21	841	KY 536 EAST	194+12.00	RT		4	M		40														1											INLET NO. 2
R21	84	KY 536 EAST	194+12.00	LT		4	M				171								1															CBI TYPE A 21-2; H = 4.92'
R21	851	KY 536 EAST	196+10.00	RT		4	M		37										1															CBI TYPE A 4-2; H = 4.11'
R21	85	KY 536 EAST	196+10.00	LT		4	M				195								1															CBI TYPE A 16-2; H = 4.92'
R21	862	KY 536 EAST	198+00.00	RT		4	M			54											1													DBI TYPE I SAG
R21	861	KY 536 EAST	198+00.00	RT		4	M			38									1															CBI TYPE A 6-2; H = 4.38'
R21	86	KY 536 EAST	198+00.00	LT		4	M			183									1															CBI TYPE A 11-2; H = 4.38'
R24	881	KY 536 EAST	199+40.00	LT		6	M		79														1											INLET NO. 3
R24	87	KY 536 EAST	200+21.50	LT		6	M			212									1															CBI TYPE A 11-2; H = 6.45'
R24	88	KY 536 EAST	200+21.50	LT		6	M			28													1											INLET NO. 8
R24	89	KY 536 EAST	201+15.00	LT		6	M			88													1											INLET NO. 12
R24	90	KY 536 EAST	201+37.00	RT		6	M			59									1															CBI TYPE A 6-2; H = 6.13'
R24	91	KY 536 EAST	202+05.00	RT		5	M			65									1															CBI TYPE A 6-2; H = 5.34'
R24	891	KY 536 EAST	202+33.00	LT		6	M			119									1															CBI TYPE A 6-2; H = 4.38'
R24	92	KY 536 EAST	202+86.00	RT		4	M			74									1															CBI TYPE A 11-2; H = 4.38'
R24	93	KY 536 EAST	204+03.00	RT		4	M		107										1															CBI TYPE A 4-6; H = 4.11'
R24	892	KY 536 EAST	204+12.00	LT		4	M		180														1											INLET NO. 3
R27	124	KY 536 EAST	205+82.00	RT		15	M		116										1															CBI TYPE A 4-2; H = 4.11'
R27	125	KY 536 EAST	205+76.00	LT		19	M		110														1											INLET NO. 3
R27	101	KY 536 EAST	206+73.08	LT			M																						1					
R27	110	KY 536 EAST	206+79.79	RT		15	M			48					1																			
R27	102	KY 536 EAST	206+88.04	LT		21	M																1											INLET NO. 40, MATCH EXIST PIPE
R27	103	KY 536 EAST	207+02.97	RT		14	M					5	4						1															CBI TYPE A 27-2; H = 15.89'
R27	106	KY 536 EAST	209+64.00	RT		12	M			54																	1							
R27	116	KY 536 EAST	210+09.50	LT		7	M			10											1													DBI TYPE I SAG
R27	114	KY 536 EAST	210+09.50	LT		7	M																				1							MATCH EXIST. PIPE
R27	115	KY 536 EAST	210+80.00	LT		7	M			71									1															CBI TYPE A 11-6; H = 4.38'
R27	104	U.S. 25	499+14.19	LT		14	M					118											1											INLET NO. 55, MATCH EXIST. PIPE
R27	105	U.S. 25	499+34.81	RT		12	M																1											INLET NO. 52, MATCH EXIST. PIPE
R27	111	U.S. 25	499+15.58	RT		12	M			43					1																			
R27	112	U.S. 25	500+66.74	LT		16	M																1											INLET NO. 40, MATCH EXIST. PIPE
R27	113	U.S. 25	500+79.70	RT		11	M																1											INLET NO. 52, MATCH EXIST. PIPE
R27	120	U.S. 25	501+24.00	RT		11	M			43									1															CBI TYPE A 11-2; H = 5.52'
R30	108	KY 536 EAST	211+28.00	RT		6	M			161									1															CBI TYPE A 6-6; H = 4.38'
R30	109	KY 536 EAST	212+63.00	RT		4	M		132										1															CBI TYPE A 4-2; H = 4.11'
R30	117	KY 536 EAST	212+63.00	LT		5	M			180									1															CBI TYPE A 6-2; H = 5.44'
R30	118	KY 536 EAST	212+63.00	LT		5	M			30					1																			
R35		BILTMORE BLVD.	298+32.00	RT			M	38									2																	
R35	581	BILTMORE BLVD.	298+84.00	LT		4	M			61									1															CBI TYPE A 11-6; H = 4.11'
R41	130	BILTMORE CONNECTOR	20+83.61	LT		4	M		45																									CONNECT TO EXIST. HEADWALL

PIPE DRAINAGE SUMMARY
2 OF 3

MicroStation v8.11.7.443
E-SHEET NAME:
USER: amclain
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\1785600\2\ROADWAY\PLAN SHEETS\R2D_DRAINSUM.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R27

SHEET NO.	STRUCTURE NO.	ROUTE	STATION	SIDE	SKEW	COVER HEIGHT (FEET)	DESIGN pH LEVEL	ENTRANCE PIPE 15 IN	STORM SEWER PIPE 15 IN	STORM SEWER PIPE 18 IN	STORM SEWER PIPE 24 IN	STORM SEWER PIPE 30 IN	REMOVE PIPE	PIPE CULVERT HEADWALL - 15 IN	PIPE CULVERT HEADWALL - 18 IN	PIPE CULVERT HEADWALL - 30 IN	SLOPED BOX OUTLET TYPE I 15 IN	SLOPED BOX OUTLET TYPE I 18 IN	CURB BOX INLET TYPE A	CURB BOX INLET TYPE B	DROP BOX INLET TYPE I	DROP BOX INLET TYPE II	DROP BOX INLET TYPE 13G	JUNCTION BOX 15 IN	JUNCTION BOX 18 IN	JUNCTION BOX 24 IN	MANHOLE TYPE A	MANHOLE TYPE C	ADJUST MANHOLE FRAME TO GRADE	CHANNEL LINING CLASS II	CHANNEL LINING CLASS III	REMOVE HEADWALL	TURF REINFORCEMENT MAT TYPE I	REMARKS
ITEM CODE								440	521	522	524	526	1310	1202	1204	1210	1432	1433	1456	1480	1490	1544	1559	1641	1642	1643	1756	1767	1791	2483	2484	2625	23274EN11F	
								LIN. FT.						EACH																TONS		EACH	SQ. YD.	
R41	131	BILTMORE CONNECTOR	21+23.00	LT		4	M			28									1															CBI TYPE A 6-2; H = 4.96'
R41	132	BILTMORE CONNECTOR	21+23.00	RT		4	M			82									1															CBI TYPE A 11-2; H = 5.24'
R41	133	BILTMORE CONNECTOR	22+12.50	LT		4	M			42								1																
R41	134	BILTMORE CONNECTOR	22+13.00	RT		4	M			82									1															CBI TYPE A 11-2; H = 4.71'
R41	135	BILTMORE CONNECTOR	22+99.00	RT		4	M			40									1															CBI TYPE A 6-2; H = 4.38'
R41	136	BILTMORE CONNECTOR	22+99.00	RT			M								1																			
R43	137	BILTMORE CONNECTOR	24+67.00	LT		4	M		28										1															CBI TYPE A 4-2; H = 4.11'
R43	138	BILTMORE CONNECTOR	24+67.00	RT		4	M			100									1															CBI TYPE A 6-2; H = 4.38'
R43	139	BILTMORE CONNECTOR	25+66.60	RT		4	M																		1									INLET NO. 3, FIELD LOCATE EXIST. PIPE
R43	140	BILTMORE CONNECTOR	27+14.00	LT		4	M		28										1															CBI TYPE A 4-2; H = 4.11'
R43	141	BILTMORE CONNECTOR	27+14.00	RT		4	M		81										1															CBI TYPE A 4-2; H = 4.26'
R43	142	BILTMORE CONNECTOR	27+97.00	RT		4	M		8										1															CBI TYPE 21-2; H = 4.11'
R43	144	BILTMORE CONNECTOR	27+90.00	RT		4	M		14													1												
R37	151	BILTMORE BLVD.	302+54.00	LT		4	M		55										1															CBI TYPE A 4-2; H = 4.11'
R37	152	BILTMORE BLVD.	302+66.00	RT		4	M		36										1															CBI TYPE A 4-2; H = 4.11'
R37	153	BILTMORE DRIVE	49+35.00	LT		4	M		128										1															CBI TYPE A 4-2; H = 4.11'
R37	154	BILTMORE DRIVE	50+55.00	RT		4	M		27										1															CBI TYPE A 4-6; H = 4.11'
R37	155	BILTMORE DRIVE	50+65.50	LT		5	M		30										1															CBI TYPE A 4-2; H = 4.31'
R37	156	BILTMORE DRIVE	50+83.00	LT			M							1																				
R46	149	INVESTMENT WAY	196+18.40	RT			M																				1							FIELD LOCATE EXIST. PIPE
R46	148	INVESTMENT WAY	196+70.00	RT		7	M			48									1															CBI TYPE A 6-2; H = 4.38'
R46	147	INVESTMENT WAY	196+89.00	LT		4	M			34									1															CBI TYPE A 11-2; H = 4.38'
R43	143	BILTMORE CONNECTOR	28+05.28	RT		4	M																				1							FIELD LOCATE EXIST. PIPE
R61	62	RAMP A-1	21101+85.00	RT		4	M			29									1															CBI TYPE A 11-2; H = 4.38'
R61	61	RAMP A-1	21102+09.09	RT			M											1																
R49	75	SAM NEACE DRIVE	12+42.00	LT		4	M			188									1															CBI TYPE A 6-2; H = 4.38'
R49	781	SAM NEACE DRIVE	12+85.00	RT		4	M		134										1															CBI TYPE A 4-2; H = 4.11'
R51	782	SAM NEACE DRIVE	14+22.00	RT		4	M		104										1															CBI TYPE A 4-2; H = 4.11'
R51	76	SAM NEACE DRIVE	14+33.00	LT		4	M			114									1															CBI TYPE A 11-2; H = 4.38'
R51	783	SAM NEACE DRIVE	15+29.00	RT		4	M												1															CBI TYPE A 21-2; H = 4.11', Z=2'-5" CHAMBER ON ROADWAY SIDE, FIELD LOCATE EXIST. PIPE
R51	77	SAM NEACE DRIVE	15+47.91	LT		4	M			67									1															CBI TYPE A 11-2; H = 4.38'
R51	78	SAM NEACE DRIVE	16+14.62	LT			M											1																
R56	121	US 25	502+20.00	RT		5	M		93										1															CBI TYPE A 4-2; H = 4.11'
R56	122	US 25	502+24.00	LT		16	M		155										1															CBI TYPE A 4-2; H = 4.11'
R77	41	RAMP D-1	10401+14.00	RT			M									1																		
R77	42	RAMP D-1	10401+14.00	RT		5	M					26							1															CBI TYPE A 40-6; H = 5.91'
R77	43	RAMP D-1	10401+38.50	LT		5	M					68																	1					X=4'-0", Y=4'-0", Z=5'-3"
R77	431	RAMP D-2	200401+99.00	LT		5	M				115																							CBI TYPE A 21-6; H = 4.92'
R77	435	RAMP D-2	20402+02.30	LT		4	M			17											1													DBI TYPE I SAG
TOTALS								38	3006	5445	1174	294	20	1	8	1	2	3	93	3	7	2	14	1	1	1	8	1	6			3		

PIPE DRAINAGE SUMMARY
3 OF 3

FILE NAME: V:\1785\ACTIVE\17856001Z\ROADWAY\PLAN SHEETS\R2E_DRAINSUM.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

SECTION 2

MEETING REPORTS AND CORRESPONDENCE

MINUTES OF PRE-DESIGN CONFERENCE

Reconstruct KY 536 Interchange with I-71/75

BOONE COUNTY, KENTUCKY

Item No. 6-14.00

The Pre-Design Conference for the Interchange Reconstruction at KY 536 and I-71/75 in Boone County was held on October 14, 2010 at 10:00 am in the District Office No. 6. The following people were in attendance.

Carol Callan-Ramler	KYTC District 6
Michael Hill	KYTC Central Office
Nikki Molleson	KYTC District 6
Mike Lorenz	KYTC District 6
Spencer Stork	KYTC District 6
Eric Hackworth	KYTC District 6
Robert Yeager	KYTC District 6
Rick Davis	KYTC District 6
Scott Schurman	KYTC District 6
Michael Loyselle	FHWA
John Eckler	KYTC District 6
Larry Harmon	Hall-Harmon Engineers
Antonio Pousa	ENTRAN, PLC
Brian Aldridge	ENTRAN, PLC
Jason Bricker	ENTRAN, PLC
Deb Osborne	ENTRAN, PLC
Glenn Hardin	ENTRAN, PLC

Items discussed and agreed upon are included in the following paragraphs. (Note: Some items require additional discussion, as noted. These items will be resolved prior to final negotiations and will be documented in these minutes or in the negotiation minutes.)

KYTC's latest file versions of Pre-Design Conference Minutes and Description of Items, Production Hour Worksheet are the foundation for these minutes. They have been modified as required to address specific elements of work for this project.

PRE-DESIGN CONFERENCE MINUTES

The consultant is to provide engineering and related services for this project for the following items (check all that applies):

[ ] Pre-design scoping study

[X] Phase I Design

[X] Phase II Design

Phase II Design will be scoped and negotiated at a later date. This work will be added to this contract via contract modification.

Design Related Services

The following design related services shall be performed as checked below:

	N/A	Department	Consultant
Photogrammetry:	[ ]	[X]	[ ]
Surveying:(*)	[ ]	[X]	[X]
Environmental:	[ ]	[ ]	[X]
Geotechnical:	[ ]	[X]	[ ]
R/W & Utility Estimates: (**)	[ ]	[X]	[X]
Traffic Analysis(***)	[ ]	[X]	[X]
Pavement Design:	[ ]	[ ]	[X]
Structure Plans:	[ ]	[ ]	[X]
Signing Plans:	[ ]	[ ]	[X]
Signal Plans	[ ]	[ ]	[X]
Lighting Plans:	[ ]	[ ]	[X]
Landscaping Plans:(****)	[X]	[ ]	[ ]
Utility Design:(*****)	[ ]	[ ]	[X]

(*) The Department will provide the photogrammetry mapping and initial control information for the project and the Consultant will provide the rest of the needed survey.

(**) Department will provide Right of Way Estimates and the Consultant will proved Utility Estimates.

(***) Department will provide Interchange Justification Study (IJS) Information and the Consultant Access Management to Sam Neace.

(****) Will be determined in Phase II Design

(*****) Consultant will work with Utility Companies and provide a Preliminary Layout for Phase I plans.

Unless otherwise specified in the Pre-design Conference Minutes, the Department shall provide:

(1) All existing and projected traffic counts, including intersection turning movements.
Consultant will use the 2008 counts they have for Sam Neace and Berberich.

(2) The project's photogrammetry will be provided in DGN format, in English units. Additionally, the mass point and breakline files will be provided to aid the Consultant in creating a digital terrain model. Ortho-rectified aerial photographs will also be provided.

(3) Copies of any available record plans of existing roads and construction plans of any proposed road projects as details are finalized and become available. (Available at http://kytcgis.ky.gov/ProjectArchive/viewer.htm)

(4) Copies of any previous pertinent studies, reports or project documentation.
The following is partial list need information:
DGN files from GRW on the adjoining project on KY 536
EA Study from GRW project
Environmental on Item No. 6-111
DGN layout of the DCD from the IJS report

PROJECT LIMITS
Project limits on KY 536 are from Tiburon to Berberich

PURPOSE and NEED
The primary purpose of this project is to increase safety and reduce traffic delays experienced at and within the immediate vicinity of the I-71/75 – KY 536 interchange. Constructed in 1994, the KY 536 interchange has experienced tremendous growth. Comparing the 2006 average daily traffic (ADT) with 1994, I-71/75 has increased by a factor of 1.32 to over 104,000 vehicles per day (VPD) and KY 536 has increased by a factor of 3.41 to nearly 19,000 VPD.

The above purpose and need statement will be refined by the project team shortly after the project receives the Notice to Proceed. FHWA indicated that they did not need to attend the meeting when this will be addressed.

PROJECT DESCRIPTION
The project will provide preliminary engineering and environmental services to perform Phase I Preliminary Engineering & Environmental and the Phase II Final Roadway Design. Phase I design to include typical sections, line and grades, drainage, preliminary striping, signal, lighting layout, and cost estimates. Phase II design includes at a minimum, preparation of any design studies, drainage design, right of way plans, construction plans, structure design, traffic control plans, striping plans, signing plans, lighting plans, and cost estimates.

The Environmental document at this time is expected to be a CE Level III. Phase II units will be negotiated at an appropriate time so as to provide for transition from Phase I.

DESIGN CRITERIA
Mainline: The Geometric Design will be based on the following:

- Design Speed of 35 MPH
- DCD Speed of 25 MPH
- Urban Minor Arterial
- Rolling Terrain

Cross Roads: The Geometric Design will be based on the following:

- Posted Speed Limit
- Functional Classification
- Traffic Volumes

GENERAL COMMENTS from the Pre-Design Meeting

- The scope of work and production hours for Phase II Design of this project will be negotiated at a later date.
- A kick off meeting for the project will be held after Notice to Proceed is received. FHWA requested to be invited but does not necessarily need to attend.
- The Right of Way plans for the KY 536 Project west of the interchange (KYTC Item #6-58.00) will be available after the first of the year (2011)
- The FHWA noted that the IJS was not a NEPA document. But the information in this document can be utilized in our Environmental process. A Environmental Overview was completed for the IJS.
- The Department will provide all Existing Right of Way lines, Property Owners and property line information for this project.
- All signing involved with this project will follow the 2009 (or later) MUTCD manual.
- The island treatments in the interchange will be determined in Phase II design.
- A geometric approval sheet will be utilized in the DES for the Interchange portion (DCD) of this project.
- There will be four DES submittals for this project.
    - Ramps
    - KY 536 DCD
    - KY 536 Non-DCD
    - Local Roads
- This contract will include hours to provide SUE.
- An access management study will be completed along KY 536 from the I-71/I-75 to Berberich.
- KYTC will set up a website for this project and the Consultant will provide information to KYTC for the website as needed.
- The Consultant will verify that any changes in the design will maintain compliance with the Eight FHWA Policy Points that was approved in the IJS.
- The Consultant will coordinate this project with the adjoining projects. Item No. 6-14.5, 6-18.0 and 6-158.0
- The deliverables for Phase I includes the following
    - Preliminary Line and Grade Plans will be submitted in a manuscript format at a scale

of 1"=20'.
- Design Executive Summary (four)
- NEPA / Including public Involvement (CE-III document)
- Cost Estimates: R/W, Utilities, Construction. Right of Way estimates will be provided by the Department.
- Preliminary MOT phasing plans also manuscript format. There will a meeting to review the plans.
- Avoidance Alternatives to Water-Related Impacts
- Traffic Modeling: lane utilization / sight distance refinements
  - This will include bicycle and pedestrian accommodations; the schematics shall show each independently
  - A specific meeting will be held to review this information.
- Traffic Modeling: Roadway system approach to DCD
  - Determine lane adds/drops to tie into DCD
  - Set project termini
- Pedestrian and Bicycle Facility Locations
- Once traffic modeling is complete the Preliminary geometric layout sheet will be provided and will include the following information:
  - Lane utilization and alignment
  - Curve data
  - Location of bicycle and pedestrian accommodations
  - Traffic data
- 60% Striping Plans
- 60% Signing Plans (2009 or later MUTCD compliant. The signs on project 6-14.5 will be shown as dashed on this project)
- 60% Signal Plans (The signals will utilize Mast Arms)
- 40% Lighting Plans (High Mast Lighting will be used in the Interchange area with conventional lighting outside of the interchange along KY 536)
- Preliminary Structural evaluation for the median barrier and retaining walls at DCD
- Preliminary Relocation Plan for all utilities: above and below ground
- Preliminary stormwater design
- Obtain 3-5 year Crash data and provide an analysis for KY routes
- Preliminary waste areas locations

Explanations of work in most cases are identified within the Production-Hours Documentation, which is included with these Pre-Design Minutes.

Included with each following section are specific notes pertaining to that section that is not specific in the Production-Hours Documentation.

Traffic Studies

A variety of traffic studies will be performed to ensure interchange design elements will provide for efficient and safe operation in the future. In 2008, ENTRAN collected peak hour traffic turning movement counts and developed design year (2030) traffic forecasts for the US 25 traffic study, performed in support of KYTC Item No. 6-351.00. The development of these forecasts included coordination with the project team performing the IJS for KY 536 (KYTC Item No. 6-14.00) and

the subsequent design year forecasts used in both studies are similar.

From the 2008 US 25 traffic study, turning movement counts and forecasts are available for the following intersections:

- KY 536/Tiburon Drive
- KY 536/Highland Drive
- KY 536/I-75 Southbound ramps
- KY 536/I-75 Northbound ramps
- KY 536/Biltmore Boulevard
- KY 536/Sam Neace Drive
- KY 536/Berberich Drive

These traffic data will supplement traffic data from the IJS. It is assumed that no additional turning movement counts will be collected.

Crash Analysis
A comprehensive review of the last five (5) years of available crash data will be performed for state-maintained roadways within the study area. Raw crash data will be provided by KYTC or the Kentucky State Police. Critical crash rate factors (CRF's) will be developed and crash data will be summarized by applicable crash types. The Highway Safety Manual (HSM) will be reviewed for potential countermeasures to address locations (intersections or roadway segments) with high crash rates.

Update and Recalibrate Base Year Traffic Simulation Models
Existing (2008) base year traffic simulation models depicting the A.M. and P.M. peak hours of travel were previously developed by ENTRAN using the TransModeler® simulation software from Caliper Corporation. The current versions of these models were developed for typical weekday A.M. and P.M. peak periods and included the I-71/I-75 interchanges at both KY 338 and KY 536 as well as the US 25 corridor from south of the KY 338 to north of KY 536. A study area model network will be extracted to include I-71/I-75 north and south of KY 536 and KY 536 from west of Tiburon Drive to east of Berberich Drive.

Develop Traffic Simulation Models for Design Alternatives
Simulation models will be developed to evaluate potential design modifications. Future year (2030) model scenarios will be developed for the following scenarios:

- No Build (using the base year model network and future traffic volumes)
- IJS Layout
- Refined DCD Layout

Models will be developed for forecasted weekday A.M. and P.M. peak period traffic conditions. The development of the Refined DCD layout will be an iterative process that reflects modifications that result through the design process. This iterative process will examine the effect of design changes such as lane alignment/utilization, intersection control, bicycle/pedestrian needs, and lane drops/adds. The final version of this model will reflect the Study Team recommendations at or near the conclusion of Phase I.

Evaluate Design Alternatives
Measures of effectiveness (MOEs) that will be used to compare design options will include:

- System vehicle-miles traveled (VMT)
- System vehicle-hours traveled (VHT)
- Mean system speed
- System delay
- Travel time
- Intersection control delay
- Intersection queue lengths

It is assumed that no analyses utilizing the Highway Capacity Software (HCS) will be required.

Access Management
An access management study will be performed to explore potential improvements to KY 536 between I-71/I-75 and Berberich Drive. In particular, alternative treatments for the KY 536 intersection with Biltmore Drive will be investigated and evaluated. Options may include but are not necessarily limited to:

1) Maintain the traffic signal and full access operation of the intersection
2) Convert the intersection to right-in/right-out only operation and provide additional parcel access via connected backage roads
3) Close the intersection and provide parcel access only via connected backage roads

These and other options will be discussed with the Project Team early in the study. Traffic simulation models (2D only) depicting these options will be developed for the design year A.M. and P.M. peak periods. The simulation model output will be summarized.

Multimodal Level of Service (MMLOS)
Perform a "Complete Street" analysis using the method that was developed through National Cooperative Highway Research Program (NCHRP) Project 3-70, Multimodal Level of Service Analysis for Urban Streets. The methodology produces a traveler-based level of service for each mode and predicts the effects on level of service for a given mode based on changes in the other modes. The method will be performed for KY 536 to produce levels of service for automobile, bus, pedestrian and bicycle modes of travel. Scenarios to be analyzed will include the No Build and Refined DCD Layout as the IJS Layout did not explicitly provide bicycle and pedestrian accommodations.

Develop Recommendations and Prepare Technical Memorandum
The results of the alternatives analyses will be compiled and summarized. Based on the results, recommendations will be made as to which of the alternatives is best-suited to provide acceptable traffic operations in the opening year and for the future. A final report will be prepared that documents the study and summarizes the results. The report will be submitted in both hard copy and electronic (PDF) format.

Develop 3D Traffic Simulation Model
Near the conclusion of Phase I Design activities, a 3-D traffic simulation model will be developed depicting the recommended design for the KY 536 interchange. The 3-D models will include, to the greatest extent possible, the location of all proposed roadway features including signs (ground mounted and overhead), traffic signals, barriers, etc. Videos, including fly-around and drive-through views, and static graphics will be created from the 3-D simulation for use in presentations, inclusion on the project website, and in other project

Surveying

The consultant's responsibility for surveys shall include:

The Consultant will perform field surveys to supplement photogrammetry to be provided by KYTC. KYTC will provide property data.

Explanations of work in most cases will be identified within the Production-Hours Documentation.

Preliminary Design

The consultant shall be responsible for all studies and construction cost estimates necessary to make a determination of a recommended alignment. Said studies should generally include the following items:

The Phase I Design process will focus on modifying the conceptual DCD interchange alternative proposed in the IJS to maximize traffic operations and safety and to minimize right-of-way impacts and costs. Prior to the conclusion of Phase 1, Preliminary Line and Grade (PL&G) plans will be submitted in manuscript format. The following tasks will be undertaken during this phase of the project.

Study and Develop Typical Section and Design Criteria
Study, develop, and document typical sections for KY 536, I-71/I-75 ramps, and approach roads. Develop design criteria including design speed and other applicable design data.

Study and Develop Alternatives
Study, develop and document refinements to the IJS interchange layout, including preliminary horizontal and vertical geometry. Some specific concepts to be investigated include the following:

- Location of the crossover intersections
- Crossover intersection angles
- Exit/entrance ramp configurations
- Turn lane needs and lengths
- Roadside features, including curbs, barriers, and medians
- Approach roads / backage roads
- Bicycle/pedestrian accommodations

Generate the necessary graphics depicting the proposed alternative and estimated disturbed limits for use in Project Team Meetings, public/stakeholder meetings, and the environmental

documentation.

Structural Analysis
The feasibility of re-using the existing I-71/I-75 structure will be examined. In particular, horizontal clearance will be compared against roadway lane, shoulder, and clear zone requirements.

Traffic Signal Design
Develop preliminary traffic signal plans based on the Refined DCD layout. Signal plans will include a plan view of the existing/proposed intersections with proposed signal construction features. It is assumed mast arm mounted signals will be utilized at the KY 536 intersection with the I-71/I-75 ramp terminals. Necessary modifications for the KY 536 intersections with Sam Neace Drive and Biltmore Drive will be identified in the preliminary traffic signal plans. The proposed locations for all traffic signal appurtenances, including signal poles, controller cabinets, pedestrian signals, and supplemental signals, are to be reviewed for potential clear zone encroachment or visual impairment to drivers and to maximize pedestrian safety.

Lighting Design
Develop preliminary lighting plans based on the Refined DCD layout. High mast lighting will be utilized for the I-71/I-75 interchange and conventional lighting will be included on KY 536. Lighting will be included beneath the bridge. A preliminary lighting contour map will be developed. The VISUAL software will be utilized to determine number and location of fixtures. Lighting plans will include a plan view of the proposed lighting layout with proposed construction features. Pole locations will be reviewed for potential visual impairments to drivers.

Signage and Pavement Markings
Develop preliminary signage plans to comply with the latest version of the Manual on Uniform Traffic Control Devices (MUTCD). Existing signage located on I-71/I-75 will be reviewed for compliance with the MUTCD. The locations and heights of proposed overhead signs will be evaluated to ensure proper sight distance. Locations of ground mounted signs and guide signs and reference locations will be documented on the PL&G plans. Sign summary sheets will be prepared during subsequent project phases.

Develop preliminary pavement marking plans to comply with the latest version of the MUTCD.

Drainage Design
Preliminary drainage design will be performed. Location of drainage features will be shown on the PL&G plans.

Utility Design
Coordinate with local utility companies to locate existing underground facilities. Subsurface utility engineering (SUE) will be utilized to verify the location of existing utilities.

The location of existing and proposed utilities will be shown on the PL&G plans and 3D depictions will be included in the 3d modeling of the interchange. Cost estimates will be prepared for necessary relocation of existing utilities.

Pavement Design
Calculate Equivalent Single Axle Loads (ESALs) for use in designing pavement section and provide pavement design for review by the KYTC. Evaluate existing pavement condition to determine feasibility of re-using existing pavement. Provide cost comparison of complete reconstruction versus partial re-use of existing pavement (where applicable).

Bicycle and Pedestrian Accommodations
Develop a plan for bicycle and pedestrian improvements within the study area. No bicycle facilities currently exist. Improvements will consider future connections to other planned facilities. Locate and include proposed accommodations on the PL&G plans.

Calculate Preliminary Quantities and Cost Estimates.
Approximate quantities (i.e. earthwork volumes, pavement quantities, etc.) will be calculated and a construction cost estimate will be developed. The disturbed limits will be extracted and provided to KYTC for use in estimating right of way costs.

Maintenance of Traffic Plan
Develop preliminary maintenance of traffic (MOT) plans.

Explanations of work in most cases will be identified within the Production-Hours Documentation.

(1) Preliminary hydraulic studies, including stream sections, stream profile, and necessary channel changes. Consideration of avoidance and minimization of effects on blue-line streams must be included in accordance with Section 404 and 401 of the Clean Water Act. The consultant shall be responsible for obtaining all floodway studies and other pertinent drainage information to be utilized in his design.

Public Involvement

A public meeting will be held as discussed at the pre-design conference. The consultant will be responsible for providing all necessary exhibits and to attend the public meeting.

Public involvement activities during Phase I will focus on education and coordination.

Project Information
Provide project information (i.e. alternative schematics, simulation videos, project fact sheets, and other project information) will be provided that can be hosted on a project website.

Stakeholder Meetings
ENTRAN will provide project information to KYTC for use in meetings with project stakeholders. ENTRAN will attend a total of three (3) meetings with project stakeholders.

Project Team Meetings
Thirteen (13) project team meetings will be held throughout the Phase I design process.

Coordination Meetings
Three (3) coordination meetings will be held with other projects in the area including KYTC Item

Nos. 6-158.00, 6-14.50, and 6-18.00.

Public Meeting
A single public meeting will be held during Phase I. There will be two (2) preparation meetings prior to the public meeting.

- Pre-Planning Meeting
- Dry Run
- Public Meeting

Final Design (Negotiated at a Later Date)

This is a federally funded Phase I contract. Therefore, the consultant may not advance into the final design stages until such time that all public meeting requirements are met and a final environmental document has been approved.

General

(1) The consultant shall be represented at all inspections and meetings. Any plans or exhibits required shall be the responsibility of the consultant.

(2) Any subconsultants utilized must have approval of the Department prior to their performance of any work.

(3) The consultant is responsible for having obtained and being knowledgeable of all Department Manuals including, but not limited to, Design, Drainage, Standard Drawings and Bridges. All work shall be performed in accordance with those manuals or other memos issued subsequent to the publication of those manuals unless otherwise explicitly stated.

(4) The Consultant shall submit the Production-Hour Worksheet, listing only the involved units of work, including supporting documentation of units obtained to the Project Manager to be reviewed. Upon agreement of the Production-Hour units, the Consultant shall submit his fee proposal with detailed production-hours on the Department's standard Production-Hour Worksheet to the Director of Professional Services. The Department's Project Manager shall also submit the Department's detailed Production-Hours

(5) Change orders to this project will not be permitted except in such cases that:
- the project limits have been substantially revised from those initially indicated in the Pre-design Minutes.
- a change of scope has occurred.
- the Consultant is requested to revise the plans as a result of a direction change by the Department.

(6) The consultant is responsible, at all times, for correction of any errors or omissions that he may have made in the preparation of the plans. The consultant shall immediately notify the Project Manager of any item that he feels requires extra work. He shall not proceed with

that item of work until such time that the matter of extra work has been resolved.

(7) All original submissions, including pay estimates and consultant monthly reports, shall be sent to the Project Manager. The pay estimate and monthly report may be electronically submitted to the Project Manager. The consultant monthly report shall be submitted even if a pay estimate is not being submitted. All correspondences pertinent to this project shall have the County, Item No. and Project Description noted.

(8) Sets of plans shall be provided for inspections and meetings, as requested by the Project Manager.

(9) The Consultant will be responsible for preparation of all minutes of meetings, including this Pre-design Conference.

(10) Periodic progress meeting will be held with the District as discussed during the Pre-design Conference.

(11) All design work and development of plans, preliminary and final shall be prepared in MicroStation DGN format in accordance with current KTC CADD Standards

(12) The Department's Project Manager assigned to this project is Carol Callan-Ramler, P.E..

(13) The current schedule for this project, as described in the 2010 Six Year Plan is as follows:

Phase	**FY**
Final Design	2011
Right of Way	2013
Utilities	2013
Construction	2014

Milestones

PRELIMINARY DESIGN RELATED MEETINGS

- Kickoff meeting – Purpose and Need Development
- Lane Utilization and access management with approach roads
- Access Management follow-up meeting
- Bike and Pedestrian facility location(s) along with preliminary profile information
- Utility Coordination Meeting No. 1
- Traffic Signal and Stop bar Locations
- Lighting and Signs; re affirm lane utilization
- Proposed utility locations along with barrier wall locations
- Utility Coordination Meeting No. 2
- Profile / Pavement Crown / Islands and Preliminary Drainage
- Ramps and Approach Roads
- Conceptual MOT
- PL&G Inspection

COORDINATION MEETINGS

- Coordination Meeting with KYTC Item No. 6-158.00 (KY 536)
- Coordination Meeting with KYTC Item No. 6-14.50 (I-71/I-75 Auxiliary Lanes)
- Coordination Meeting with KYTC Item No. 6-18.00 (KY 338 Interchange Reconstruction)

PUBLIC/STAKEHOLDER MEETINGS

- Stakeholder Meetings (3 meetings)
- Preparation Meeting for the Public Meeting (including site visit to Church)
- Run through for Public Meeting
- Public Meeting

The consultant shall provide milestone dates for the following activities:

1) Phase I Design (Preliminary)
   a) Alternate Alignments ready for a Project Team Meeting -
   b) Hold Public Meeting -
   c) Hold PL&G Inspection -
   d) Submit DES / Geometric Sheet -
   e) Submit Electronic Plans -

2) Environmental Services
   a) Submittal of Environmental Base Studies -
   b) Approval of Environmental Base Studies -
   c) Submittal of Draft CE-III to KTC -
   d) Approval of CE-III by FHWA -

Other milestones may be added to this list as deemed necessary by the Department or Consultant.

Milestone dates are based on receiving Notice to Proceed by insert date and aerial photogrammetry and digitization by insert date.

Environmental

The Environmental Coordinator will review the project scope with the Director of the Division of Environmental Analysis to determine the level of environmental documentation that will be required (CE-III). The Consultant will prepare the Production-Hour estimate (for environmental work) based upon this determination and submit the estimate to the Director of the Division of Environmental Analysis for review and approval and submit to the District for review.

The consultant shall provide a general environmental footprint to the Project Development Team as soon as possible so alternative alignments can be developed.

The District Environmental Coordinator shall be notified upon the discovery of any environmental issue or condition which may influence alignment design or ultimate alignment recommendation.

The Division of Environmental Analysis and the District Environmental Coordinator shall be notified should it become necessary to change an environmental services milestone date.

A preliminary "Purpose and Need Statement" of the project is to be defined early in the initial design and environmental review stages of the project and developed more extensively during the public involvement process. If a Purpose and Need Statement has been developed during the planning phase of the project it will serve as the preliminary Purpose and Need Statement. The Purpose and Need statement shall be continuously evaluated during the development process and modified as needed based on information gained through the public involvement process. The development of the projects "Purpose and Need Statement" will be the responsibility of the project team.

The Consultant or their sub-consultant shall notify the District Environmental Coordinator prior to initiating any fieldwork for the environmental baseline studies.

ENVIRONMENTAL SCOPE

CATEGORICAL EXCLUSION LEVEL 3

ENTRAN will provide environmental services to prepare a Categorical Exclusion Level 3 (CE 3) for Item No. 6-14.00, KY 536 Interchange with I-71/75 in Boone County, Kentucky. This analysis will follow KYTC's Environmental Procedures Manual (April 1996) and applicable KYTC guidelines.

STUDY AREA

The current project involves the reconstruction of the KY 536 interchange with I-71/75 to a double crossover diamond (DCD) type interchange as recommended by the project Interchange Justification Study (IJS) for I-71/I-75 at KY 536 and KY 338: Item 6-14.01 (HNTB, March 2010). The current project study area encompasses a radius of approximately 0.4 mile centered upon the existing I-71/75 bridge over KY 536, as provided in the KYTC Procurement Bulletin 2011-02. A

preliminary preferred alternative has been developed which primarily follows existing KY 536 alignment, with a project length of 0.1 mile and anticipated project limits on KY 536 from Tiburon Drive (west) to Berberich Drive (east). There is the potential of multiple alternates on the east side of the DCD from Biltmore to Berberich. It is possible that backage roads might be required. This scope assumes the preliminary preferred alternative identified in the IJS will be further developed for the current project. A contract modification will be required if there are any future changes to the study area or scope during the environmental study process.

BACKGROUND

Environmental Documentation

Because the project involves interchange modification on the existing interstate system, a CE 3 is the appropriate level of documentation based on current the Categorical Exclusion Agreement between FHWA and the Kentucky Transportation Cabinet dated March 19, 2010. The project primarily follows existing alignment and is anticipated to involve mostly existing right-of-way. No substantial environmental impacts are anticipated and only minimal (if any) relocations.

Previous Studies and Alternatives Development

The 2010 Interchange Justification Study (IJS) documented FHWA approval for the reconstruction of the Interstate 71/Interstate 75 (I-71/I-75) interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). The analysis for the IJS included KY 536 and KY 338, the I-71/I-75 ramp intersections with KY 536 and KY 338, the ramps proper, the ramp junction points, the freeway segments within the interchanges, and the adjacent I-71/I-75 freeway segment from US 42 to KY 14.

For the proposed KY 536 Interchange with I-71/I-75, the 2010 IJS evaluated seven conceptual interchange configurations and the No Build, and recommended a preliminary preferred configuration (the double crossover diamond) for carrying forward into further evaluation. More detailed interchange configuration based on the IJS recommendation and final location of the proposed interchange improvements at KY 536, as well as access management options along KY 536, will be evaluated and documented as part of the NEPA process for this project. The CE document will summarize all of the previous conceptual alternatives development and analysis conducted as part of the IJS that led to the identification of the recommended configuration.

This project will also be coordinated with an adjacent project immediately to the west, Item 6-158.00 (KY 536 Reconstruction) which also involves the preparation of a CE3. Additionally, this project overlaps with Item 6-14.50 (I-71/I-75 Auxiliary Lanes) and coordination will be conducted to determine logical termini.

Environmental Base Studies

The CE 3 will include a summary of findings from each environmental base study conducted for this project (scoped separately from this CE narrative) including: noise, air quality, ecological resources, Phase I UST/hazmat, and Phase I cultural resources. The rationale for completing these base studies in support of the CE 3 document are summarized below:

- Traffic Noise Impact Assessment - base study is required to address and document potential noise impacts associated with moving traffic closer to sensitive noise receptors along the project corridor (residences, church, school)
- Air Quality - base study is required to address air quality concerns relative to Boone County exhibiting non-attainment for PM2.5 and ozone.
- Ecological Assessment – although ecological features are limited in this primarily disturbed corridor, the 2007 overview did not specifically address potential jurisdictional features or conduct a T&E species habitat assessment for the federal endangered Indiana bat and running buffalo clover listed for Boone County. An ecological base study is proposed to address these resources and other ecological features impacted by the project (although expected to be limited) for documentation and coordination purposes.
- Phase 1 UST/hazmat - the project is located in a commercial corridor and the 2007 environmental overview identified three potential UST properties. The Phase I ESA will document hazardous materials concerns and the potential need for Phase 2 study.
- Phase 1 cultural studies (history architecture and archaeology) are proposed on an as needed basis. The 2007 environmental overview did not identify any known cultural resources in the project vicinity, however, depending on final configuration of the preferred alternative, Phase I archaeology work, at minimum, may be required to clear any new right-of-way.

A socioeconomic base study is not proposed at this time. Socioeconomic data reported in the 2010 IJS will be updated (using available 2010 Census information) and included in the CE document (no separate socioeconomic deliverable). A conceptual relocation study (if relocations are required) is also included as part of the CE scope of work, and will be included as Appendix to the CE (no separate deliverable) as needed.

Section 106/4(f)/6(f) issues

Any Section 106/4(f)/6(f) resources will be identified through completion of the environmental base studies and avoidance measures (as necessary) will be evaluated and documented in the CE 3 report. At this time, there are no known parks, refuges, historic properties or other Section 106 resources anticipated to be affected by the project. A contract modification will be prepared if there are any future changes to the project study area or scope during the environmental study process, such as the need for formal Section 106 consultation and/or an individual or programmatic Section 4(f).

Biological Assessment:
Indiana bat, running buffalo clover and seven freshwater mussel species are listed for Boone County (June 2008). The 2007 environmental overview determined that no habitat was identified for any listed mussel species. A Biological Assessment (BA) for mussels will not be required due to the lack of suitable habitat present within the study area.

The 2007 environmental overview indicated that potential habitat for both the Indiana bat and running buffalo clover exists in the project study area. Habitat assessments for running buffalo clover and for IB (per the KYTC 2006 IB Habitat Assessment Guidelines) will be conducted as part of the ecological base study. This proposal assumes that no Biological Assessments will be conducted for either of these species at this time. If results of the habitat assessments indicate that BAs are needed, then this work will be scoped as a contract modification.

Public Involvement and Team Meetings: This CE proposal assumes that public involvement will be led by KYTC District 6 and that ENTRAN will assist in the development of PI materials supporting the KYTC project website and attendance at periodic stakeholder workshops and one public meeting.

TASK DESCRIPTIONS

Production hour and cost estimates for this study are based on the task descriptions presented below. Tasks are organized according to work items outlined in the KYTC Division of Environmental Analysis (DEA) Manhour Estimate (Production Hour) Worksheet for a CE 3.

TASK A. DRAFT CE

Four paper copies of a draft CE 3 for KYTC and FHWA review will be provided (two copies for District 6 and one copy each for DEA and FHWA). The draft CE will also be provided on a CD in pdf format. This proposal will include costs for four paper copies and one CD copy of the draft CE.

Item 1. Compile Checklist Info – This task consists of evaluating, extracting and formatting pertinent environmental resource descriptions and impact information from each of the environmental base studies, as well as preliminary design, traffic/level of service studies, alternatives development, public involvement summaries, agency coordination, and other project information for inclusion in the draft CE. This task also includes compiling environmental resource mapping from the base studies, and other pertinent GIS data for presentation in the draft CE.

Item 2. Public Officials Coordination/Meetings - This work includes preparing status reports/updates on the environmental study process and project development at key milestones for review and use by public officials.

Items 3 and 4. Draft CE Writing and Exhibits - A draft CE 3 checklist (KYTC form revised 3-08) for KYTC and FHWA review will be prepared following KYTC guidelines, including the following key components and work items:

- Project Background – including a description of the proposed action, existing conditions, environmental setting and project history

- Purpose and Need – a purpose for the project will be developed according to current FHWA purpose and need guidance/requirements, and include discussion of logical termini/independent utility, modal interrelationships, system linkage, potential for economic development enhancement, relation to the state and local transportation plans, and description of the transportation problems and needs related to safety/accidents, roadway deficiencies, and level of service/capacity/congestion issues. The 2010 IJS and current traffic data will be reviewed to obtain applicable P&N information for use in the CE.

- Alternatives Summary - including description of:

    - Alternatives considered and dismissed through the project development process

(including those developed as part of the 2010 IJS)
- The No Build Alternative
- Build Alternatives, including description of logical termini, typical section, geometric layout sheet, and design features
- Tabular summary of comparative environmental impacts, project costs and reasons for elimination/selection

- Comments and Coordination – including summaries and the disposition of resource agency coordination and comments, and public meetings

- Environmental Commitments – including a summary of proposed mitigation, environmental commitments for the project, and any unresolved issues

- Environmental Conditions and Impacts – including a discussion of current conditions, expected impacts, avoidance/minimization and mitigation considerations, and identification of any required permits, MOAs or MOUs associated with: right-of-way impacts, economic impacts, community impacts, fit with land use and transportation plans, cultural resources, Section 4(f)/106 and Section 6(f) properties, noise, air quality, hazardous materials, threatened and endangered species, water resources, and construction impacts. A conceptual relocation study (if relocations are required) is also included as part of this scope of work, and will be included as Appendix to the CE (no separate deliverable) as needed.

- Exhibit preparation – including a project location map, existing conditions exhibit, alternatives exhibits, environmental resources maps, a map of adjacent projects and their study areas, and other relevant exhibits/maps for inclusion in the Draft CE.

- Document preparation - including compiling tables, appendices, and completing the CE 3 checklist.

Item 5. Peer Review - This work consists of a QA/QC review of the Draft CE prior to submittal to KYTC.

TASK B. FINAL CE (Draft CE Review/Revisions)

Three paper copies of the final CE for FHWA signature will be provided (one copy each for District 6, DEA and FHWA). The final CE will also be provided on a CD in pdf format.

Item 6. Project Team Meeting – This includes a team meeting(s) to review project progress.

Item 7. CE Review Meeting/Draft CE Revisions – This work consists of preparing summary materials and attendance at a review meeting with FHWA, District 6, DEA and other appropriate agencies to review comments on the Draft CE that need to be developed for inclusion in the final CE. The final CE will be developed from these review comments.

Item 8. Public Meeting – This work consists of preparing summary materials (such as environmental summaries/handouts and/or maps) and attendance at one public meeting.

This task also includes a tabular summary of resource agency and public comments received throughout the environmental study process. Appropriate responses will also be prepared for inclusion in the CE.

TASK C. FINAL CE REVIEW

Item 9. Exhibit Preparation and Writing Final CE - A revised CE will be prepared, incorporating KYTC, FHWA and agency comments (from Item 7) and any project changes/updates since completion of the draft CE checklist.

Item 10. Peer Review - This work consists of a QA/QC review of the Final CE prior to submittal to KYTC.

Items 11 and 12. FHWA Review and Final CE – This work involves preparation of any final revisions based on FHWA review and production of the final CE document.

TRAFFIC NOISE IMPACT ANALYSIS

ENTRAN will provide environmental services in preparation of a Traffic Noise Impact Analysis for the improvement of the I-71/I-75 interchange at KY 536 (Mt. Zion Road) in Boone County, Kentucky (Item No. 6-14.00). This study will follow KYTC's Environmental Procedures Manual (April 1996), the KYTC Noise Abatement Policy (February 2000), and current KYTC Noise Study Guidance and Accountability (GAF) guidelines.

STUDY AREA

The current project involves the reconstruction of the KY 536 interchange with I-71/75 to a double crossover diamond type interchange as recommended by the project Interchange Justification Study (IJS): 6-14.01 (HNTB March 2010). The current project study area encompasses a radius of approximately 0.4 mile centered upon the existing I-71/75 bridge over KY 536, as provided in the KYTC Procurement Bulletin 2011-02. A preliminary preferred alternative has been developed which primarily follows existing KY 536 alignment, with a project length of 0.1 mile and anticipated project limits on KY 536 from Tiburon Dr (west) to Berberich Dr (east). There is the potential of multiple alternates on the east side of the DCD from Biltmore to Berberich. It is possible that backage roads might be required. This scope assumes the preliminary preferred alternative identified in the IJS will be further developed for this project. A contract modification will be required if there are any future changes to the study area or scope during the environmental study process.

BACKGROUND

An Environmental Overview prepared in 2007 for the project Interchange Justification Study (HNTB, March 2010) indicated the occurrence of several noise sensitive receptors in the project vicinity (residences and schools). Current land use along KY 536 consists primarily of residential development to the west of the I-71/I-75 interchange, and a mix of residential and commercial development to the east. Residential land use covers most of the area adjacent to the southwest and

southeast quadrants of the I-71/I-75 interchange at KY 536. The area adjacent to the northwest quadrant of the interchange is a mix of residential, institutional (Florence Baptist Church), and undeveloped land use; the area adjacent to the northeast interchange quadrant is a mix of commercial, institutional (Gateway Community and Technical College), and undeveloped land.

In total, there are five general areas of noise-sensitive land use which occur adjacent to the preliminary preferred alternative identified in the IJS that are anticipated to require noise impact analysis. These areas ("analysis sites") will be investigated for existing and design year (no build and build) sound-level impacts. These five potential analysis sites include: 1) an apartment complex and the Florence Baptist Church, both located adjacent to the ramp from southbound I-71/I-75 to KY 536; 2) residential development along the south side of KY 536 (west of the I-71/I-75 interchange) and along Tiburon Drive and Highland Drive (adjacent to the ramp from KY 536 to southbound I-71/I-75); 3) residential development along the south side of KY 536 (east of the I-71/I-75 interchange) and along Crescent Road, Squire Drive, Biltmore Street, and Biltmore Place (adjacent to the ramp from northbound I-71/I-75 to KY 536); 4) the Gateway Community and Technical College, located adjacent to the ramp from KY 536 to northbound I-71/I-75; and 5) residential development (mobile home park) along the south side of KY 536 near the east project terminus.

TASK DESCRIPTIONS

Production hour and cost estimates for this study will be based on the task descriptions presented below. Tasks are organized according to work items outlined in the KYTC Division of Environmental Analysis (DEA) Man-hour Estimate (Production Hour) Worksheet for Traffic Noise.

TASK A. – MEETINGS AND COORDINATION

Items 1-2: Preliminary Study of Project Area & Selection of Noise-Sensitive Receptors

- A preliminary review of aerial photos, proposed alternative alignments, and associated project mapping will be conducted to identify / confirm land uses in the project area which contain noise-sensitive receptors that may experience sound-level impacts under existing and future conditions. It is estimated that representative receptors from 5 areas of noise-sensitive land use ("analysis sites") will be selected for analysis.

Items 3-4: Traffic Count Information and Meetings with DEA

- Coordination with KYTC DEA will follow the preliminary identification of noise sensitive land uses to confirm analysis sites to be included in the study, and to obtain detailed existing and design year build / no build traffic volume (from the project IJS) data to be used in the sound-level analysis.

Items 5-7: Public Meeting Planning, Preparation, and Attendance

- The public will be advised through the NEPA public meeting process when traffic noise impacts are expected to occur. If barriers are determined to be warranted, an additional

public meeting (for individuals affected by noise barriers only) will be held with the affected property owners for each location were noise barriers are identified in the final environmental document as feasible, cost-effective, and "likely to be constructed".

Items 8-9: Miscellaneous Project Coordination Meetings / Project Team Meetings

- One project team meeting is assumed for this scope.

TASK B. – FIELD RESEARCH AND MODELING

Items 10-12: Property Owner Contact / Interview, Field Sound-Level Measurement, Field Traffic Counts

- Property owners in the project area will be notified of potential entrance upon property for the collection of existing sound-level measurements.

- Measurement of existing sound levels requires the placement and monitoring of a sound-level meter on select properties at each analysis site for brief (15-minute) intervals. Traffic counts will be conducted concurrently with each measurement. Preliminary review of the study area results in an estimated 5 potential analysis sites requiring an estimated 10-12 field sound-level measurements. Two persons may be required for completion of each measurement.

TASK C. – OFFICE RESEARCH

Items 13-15: Traffic Noise Model Setup, Execution, and Validation of Results

- Preparation for TNM analysis will include the use of electronic project mapping to aid in establishing vertical and horizontal point coordinates for TNM input. These point coordinates represent features such as roadway segments, noise-sensitive receptors, and a variety of other topographical site characteristics which must be considered in TNM model runs (such as building rows, ground surface contours, embankments, areas of dense vegetation, etc.). Required for this task are: 1) electronic topographical files with surface contours and/or spot-elevation data included; 2) detailed electronic design plans featuring edges of pavement for the Existing and No Build condition as well as the Preferred Alternative; 3) detailed profiles for the Preferred Alternative.

- TNM runs will be executed for: 1) the calibration of the TNM model to ensure modeling accuracy (using point coordinates representing the positioning of the sound level meter during the collection of field measurements and the manual traffic count data collected in the field); 2) the prediction of sound levels for representative receptors under existing conditions (using existing condition hourly traffic volumes and truck percentages); 3) prediction of sound levels under future No Build conditions (using design year No Build condition hourly traffic volumes and truck percentages); and 4) prediction of sound levels for representative receptors under future Build conditions for the Preferred Alternative for an estimated 5 analysis sites, using design year Build condition hourly traffic volumes and truck percentages).

- Further TNM analysis will be conducted as necessary to evaluate the location, height, and length of potential noise abatement barriers at analysis sites with TNM-predicted sound-level impacts. Such evaluations may be necessary for 4 of the 5 analysis sites identified for this project (barrier placement along KY 536 in the vicinity of the mobile home park at the east project terminus is not expected to be feasible due to access conflicts).

Items 16-17: Draft Report and Prepare Exhibits

- A Traffic Noise Impact Analysis report will be prepared following general KYTC Noise Baseline Guidance and Accountability Form guidelines.

- Key contents of the Draft report will include: 1) project description, including project purpose and need, project termini and length, description of alternatives, and discussion of existing and proposed roadway geometrics; 2) discussion of assessment methodology, including identification of noise sensitive land uses, FHWA Noise Abatement Criteria, field measurement of ambient sound levels, traffic volumes and speeds used, noise-sensitive receptor modeling and analysis results; 3) discussion of noise abatement measures considered; 4) discussion of construction noise; 5) noise abatement recommendations (if applicable) and conclusion; 6) appendices containing TNM output (results).

- Exhibits to be prepared for the Draft Traffic Noise Impact report will illustrate 1) project location; 2) proposed project alternatives and project termini; and 3) representative receptors analyzed and recommended noise abatement barrier locations (if applicable).

TASK D. – PREPARATION OF FINAL REPORT

Three paper copies each of a draft and final Noise report will be provided (two copies for District 6 and one copy for DEA). Each submittal of the report will also be provided on a CD in pdf format. This proposal includes costs for six paper copies and two CDs.

Items 18-22: Typing/Clerical, Administrative Review, GAF, Final Report, Response to Comments

The Draft Traffic Noise Impact Analysis will be revised in accordance with DEA comments, and will be subject to further administrative review. A Final Draft of the Traffic Noise Impact Analysis report will be produced and submitted. Each copy of the Final Draft will include a completed Guidance and Accountability Form.

AIR QUALITY ANALYSIS

ENTRAN will provide environmental services to prepare an Air Quality Analysis for the improvement of the I-71/I-75 interchange at KY 536 (Mt. Zion Road) in Boone County, Kentucky (Item No. 6-14.00). This analysis will follow the *Kentucky Guidelines for Addressing Transportation in NEPA Documents* (July 2008), the FHWA's and KYTC's *NEPA Documentation – Air Quality* document (revised June 2008) and current KYTC Air Quality Study Guidance and Accountability (GAF) guidelines.

STUDY AREA

The current project involves the reconstruction of the KY 536 interchange with I-71/75 to a double crossover diamond (DCD) type interchange as recommended by the project Interchange Justification Study (IJS): 6-14.01 (HNTB March 2010). The current project study area encompasses a radius of approximately 0.4 mile centered upon the existing I-71/75 bridge over KY 536, as provided in the KYTC Procurement Bulletin 2011-02. A preliminary preferred alternative has been developed which primarily follows existing KY 536 alignment, with a project length of 0.1 mile and anticipated project limits on KY 536 from Tiburon Dr (west) to Berberich Dr (east). There is the potential of multiple alternates on the east side of the DCD from Biltmore to Berberich. It is possible that backage roads might be required. This scope assumes the preliminary preferred alternative identified in the IJS will be further developed for this project. A contract modification will be required if there are any future changes to the study area or scope during the environmental study process.

BACKGROUND

Boone County is in non-attainment for ozone under the 8-hour ozone standard, and for fine particulate matter under the annual $PM_{2.5}$ standard. Therefore, ozone and $PM_{2.5}$ will be addressed in the air quality analysis. The project is a congestion mitigation project, and will add travel lanes to existing I-71/I-75 interchange ramps and to mainline KY 536 in the project study area. As reported in the project IJS, the highest current ADT for KY 536 in the project area is 18,800 vehicles per day (immediately east of the I-71/I-75 interchange). The highest 2030 ADT projections for KY 536 in the study area is approximately 52,000 vehicles. In addition, the existing A.M. peak-hour Level Of Service (LOS) for the KY 536 and southbound I-71/I-75 interchange ramps intersection is “D”, and the existing P.M. peak-hour Level Of Service is “E”; under 2030 No Build conditions, modeling predicts both KY 536 interchange ramps to have a LOS of “F”.

Based on these traffic considerations, the project will likely be one “Of Air Quality Concern” for $PM_{2.5}$., and one of “Low Potential MSAT Effects”. A microscale carbon monoxide (CO) analysis is not anticipated since the proposed project’s signalized intersections are not predicted to have “open to traffic year” ADTs of greater than 80,000 vehicles per day.

TASK DESCRIPTIONS

Production hour and cost estimates for this study will be based on the task descriptions presented below, in consideration of KYTC’s Summary of Anticipated Impacts (above). Tasks are organized according to work items outlined in the KYTC Division of Environmental Analysis (DEA) Man-hour Estimate (Production Hour) Worksheet for Air Quality and the *Kentucky Guidelines for Addressing Transportation in NEPA Documents* (July 2008).

<u>TASK A. – FIELD RESEARCH</u>

Items 1- 2: Confirm Roadway Geometrics, Vehicular Speed, and Signal Timing

- Based on the existing and predicted design year traffic volumes for KY 536 the I-71/I-75 interchange ramps, no microscale carbon monoxide (CO) analysis is anticipated for the project. Therefore, no field verification of roadway geometry, vehicle speed, or signal timing will be required.

TASK B. – OFFICE RESEARCH AND MODELING

Items 3-8: Computer Set-Up to Draft Report

- Current traffic data will be reviewed to confirm that the project is characterized as one of "Low Potential MSAT Effects." A Qualitative MSAT Analysis and Uncertainty Assessment will be performed. A detailed breakdown of Existing, No Build, and Build condition traffic data for the study area is required for this analysis.
- Current traffic data will be reviewed to confirm that the project is "Of air Quality Concern" and a Qualitative $PM_{2.5}$ Hot Spot analysis will be performed.
- A draft base study report will be prepared for the air quality analysis. The Qualitative MSAT analysis will be coordinated with KYTC-DEA and included in this document, along with the required documentation for the $PM_{2.5}$ Hot Spot analysis. All other required air quality information/statements (per the *Kentucky Guidelines for Addressing Transportation in NEPA Documents*) will be included the report.

TASK C. – PREPARATION OF FINAL REPORT

Items 11-15: Typing/Clerical, Administrative Review, GAF, Final Report, Response to Comments

- A final air quality base study report will be prepared that will address KYTC-DEA comments on the draft report, including final documentation for the Qualitative MSAT Analysis and Qualitative PM 2.5 Hot Spot analysis. The final report will involve text and exhibit revisions, administrative review and final editing.
- A Guidance and Accountability Form (GAF) will be prepared

ECOLOGICAL BASE STUDY

ENTRAN will provide environmental services to prepare an Ecological Base Study for Item No. 6-14.00, KY 536 Interchange with I-71/75 in Boone County, Kentucky. This analysis will follow KYTC's Environmental Procedures Manual (April 1996) and current KYTC Ecological Study Format Guidance and Accountability (GAF) guidelines.

STUDY AREA

The current project involves the reconstruction of the KY 536 interchange with I-71/75 to a double crossover diamond (DCD) type interchange as recommended by the project Interchange Justification Study (IJS): 6-14.01 (HNTB March 2010). The current project study area encompasses a radius of approximately 0.4 mile centered upon the existing I-71/75 bridge over KY 536, as provided in the KYTC Procurement Bulletin 2011-02. A preliminary preferred alternative has been developed which primarily follows existing KY 536 alignment, with a project length of 0.1 mile and anticipated project limits on KY 536 from Tiburon Dr (west) to Berberich Dr (east). There

is the potential of multiple alternates on the east side of the DCD from Biltmore to Berberich. It is possible that backage roads might be required. This scope assumes the preliminary preferred alternative identified in the IJS will be further developed for this project. A contract modification will be required if there are any future changes to the study area or scope during the environmental study process.

BACKGROUND

Although ecological features are limited in this primarily disturbed corridor, blueline streams and other potential jurisdictional features were not addressed in a 2007 Environmental Overview Report prepared for the project Interchange Justification Study. USGS topographic maps of the project study area indicate one intermittent blueline stream parallels the existing KY 536 roadway beginning west of the existing interchange. Three additional intermittent blueline streams pass through the periphery of the project study area (not likely to be impacted by the preliminary preferred alternative as currently configured). Review of project aerials indicates that non-USGS features may occur in proximity to the preliminary preferred alternative and field verification is needed to determine presence and jurisdictional status.

Seven NWI wetlands are mapped within the study area, three of which appear to be located in proximity to planned roadway improvement locations. Field verification is required to determine the existence of these features and their jurisdictional status.

Indiana bat (IB), running buffalo clover and seven freshwater mussel species are listed for Boone County (June 2008). The 2007 Environmental Overview determined that no habitat was identified for any listed mussel species. A Biological Assessment (BA) for mussels will not be required due to the lack of suitable habitat present within the study area.

The 2007 Environmental Overview indicated that potential habitat for both the Indiana bat and running buffalo clover exists in the project study area. Habitat assessments for running buffalo clover and for IB (per the KYTC 2006 IB Habitat Assessment Guidelines) will be conducted as part of the ecological base study. This proposal assumes that no Biological Assessments will be conducted. If results of the habitat assessments indicate that BAs are needed, then additional work will be scoped as a contract modification.

TASK DESCRIPTIONS

Production hour and cost estimates for this study will be based on the task descriptions presented below, in consideration of KYTC's Summary of Anticipated Impacts (above). Tasks are organized according to work items outlined in the KYTC Division of Environmental Analysis (DEA) Man-hour Estimate (Production Hour) Worksheet for Terrestrial/Aquatic base studies. Work to be performed under each task is based on study guidelines outlined in the current KYTC Ecological Study Format GAF dated June 2005, as applicable to this project.

<u>TASK A. LITERATURE REVIEW/ORIENTATION</u>

An Environmental Overview Report prepared in 2007 provides background information on

ecological resources in the project vicinity. Literature review will include gathering relevant information from this report, augmented/updated with the following:

Item 1 (Biological):

- All relevant biological secondary source information will be reviewed including publications by U.S. Fish and Wildlife Service (USFWS), Kentucky Department of Fish and Wildlife Resources (KDFWR), Kentucky State Nature Preserves Commission (KSNPC), Kentucky Division of Water (KDOW), U.S. Forest Service (USFS), Kentucky Geological Survey (KGS), Kentucky Speleological Society (KSS), and the Kentucky Division of Forestry and other studies. A narrative summary of historical fish and macroinvertebrate data (if available) will be prepared, based on this secondary source review.
- This task item also includes preparing narrative description of the methods used for collecting aquatic and terrestrial species information for inclusion in the ecological base study report.

Item 2 (Physical):

- All relevant physical secondary source information will be reviewed including local county soil surveys, National Wetland Inventory maps, aerial photographs, USGS topographic maps, local geologic maps, etc.
- The project description and environmental setting narrative will be written based on relevant secondary source information.
- This task item also includes preparing narrative description of the methods used for collecting physical information for inclusion in the ecological base study report.

TASK B. FIELD - *TERRESTRIAL*

Terrestrial field data collection will include floral and faunal surveys, identification of habitats, and identification of endangered species habitat. The items in this task include preparing field mapping and incorporating project mapping into a Trimble hand-held GPS unit. Terrestrial field sampling will be confined to one season, except for flora, which will be surveyed in the spring, summer and fall (multiple seasons). In addition, Indiana bat and running buffalo clover are listed from Boone County, and ENTRAN will conduct investigations to determine if suitable habitat is present following KYTC guidance. If suitable habitat will be impacted, ENTRAN will coordinate with KYTC DEA for effect determination and any need for additional study.

Item 3 (Terrestrial Botanical Sampling):

- The project area will be walked and visually investigated for plants.
- Terrestrial habitats will be delineated on project field mapping and floral surveys conducted in each habitat type.
- Habitat for state and federally threatened and endangered plant species (listed by agencies) will be evaluated.

Item 4 (Terrestrial Zoological Sampling):

- The project area will be walked and visually and aurally investigated for animals including overturning rocks, logs and other debris and observing evidence such as roadkills, scat, tracks or bedding.
- Habitat for state and federally threatened and endangered animal species will be evaluated.

TASK C. FIELD – *AQUATIC*

The project study area is located in the Ohio River, Gunpowder Creek watershed basin. Aquatic field data collection includes up to one USGS blueline stream and up to six non-USGS features within the project study area based on review of aerial photographs, USGS mapping and soil survey mapping. Of these 7 features, this proposal assumes that one will require full biological sampling and water chemistry analysis and all 7 features (up to) will require habitat assessment only. The items in this task also include preparation of field mapping and incorporation of project mapping into a Trimble hand-held GPS unit. All stream sampling will be confined to one season. Fresh water mussels are listed for Boone County but are not expected to be present within the study area due to lack of appropriate habitat.

Item 5 (Aquatic Zoological Sampling and Physical Stream Survey):

- Streams and tributaries within the project study area will be assessed according to aquatic sampling procedures outlined in the *KYTC Ecological Study Format Guidance and Accountability Form* (GAF – June 2005 revision) and using methods described in USEPA's 1999 *"Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers"* and KDOW's 2002 *"Methods for Assessing Biological Integrity of Surface Waters in Kentucky"*.
- This proposal assumes that one stream will be sampled for fish (electrofishing and seining) and macroinvertebrates (using kick seine, dip net, sieve or handpicking techniques for different substrates).
- Stream sampling will be completed within the KDOW required survey "window" (fish sampling between mid-March and October; headwater macroinvertebrates between February and May, non-headwater macroinvertebrates between May and September).
- Physical stream survey and habitat assessment information will be recorded on KDOW data sheets (Appendix A-1 or Appendix A-2 stream forms for high and low gradient streams, respectively) for up to 7 surface water features.
- Physical parameters including color, turbidity, air and water temperatures, conductivity and discharge will be collected for surface waters with sufficient water depth (could be up to 7 features).

Item 6 (Water Chemistry):

- Chemical parameters such as acidity/alkalinity, chloride, carbon dioxide, hardness, iron, ammonia nitrogen, dissolved oxygen, pH, sulfate and orthophosphate will be collected in the same streams where zoological sampling will be conducted (assume up to four streams).

TASK D. FIELD – *WETLANDS*

Wetland field data collection will include up to 3 wetlands (small features), based on review of aerial photographs, NWI mapping, USGS mapping and soil survey mapping. The items in this task include preparation of field mapping and incorporation of project mapping into a Trimble hand-held GPS unit.

Item 7 (Determination):

- On-site wetland determinations will be conducted following 2010 Interim Regional Supplement Wetland Delineation Manual: Eastern Mountains and Piedmont Region procedures.
- This proposal assumes wetland determinations will be performed for up to 3 wetlands (small features), based on review of aerial photographs, NWI mapping, USGS mapping and soil survey mapping, will be field determined using a point-in (wetland) and point-out (upland) data collection method.

Item 8 (Delineation):

- This proposal assumes that wetland delineations will be conducted for up to 3 wetlands (small features) using the sources listed in Item 7 (above) and a hand-held GPS unit.

TASK E. COORDINATION/MEETINGS

Item 9 (State Agencies):

- Agency information requests will be conducted with the Kentucky Department of Fish and Wildlife Resources, Kentucky State Nature Preserves Commission, Kentucky Division of Water, and Kentucky Division of Forestry (as noted in the GAF).
- This task item also includes preparation of a summary table of agency information responses for inclusion in the ecological base study report.
- Note: Other secondary source/literature review information on biological resources in the area will be obtained from various agencies (such as KSS and KGS) as listed in Task A, Item 1.

Item 10 (Federal Agencies):

- The most current U.S. Fish and Wildlife Service files will be reviewed for identification of federally listed species with potential for occurring within the impact area of the project. Any relevant federally listed species data will be included in the summary table of agency information.
- Correspondence with the U.S. Forest Service and U.S. National Park Service are not required for this project.

TASK F. LAB/DATA ANALYSIS

This task item includes analysis/narrative summary of data collected in the field and during office research and includes preparing data forms, tables, appendices, photograph inventory, etc., to be included in the ecological base study report.

Item 11 (Specimen/Collection Identification and Data Analysis):

- Any specimens not able to be identified in the field will be vouchered and brought to the laboratory for identification.
- All fish will be identified to species and a KIBI for one stream site will be calculated.
- All macroinvertebrate lab work will be contracted out to a professional lab (this work will be included as a direct cost in the fee proposal) who will provide lab results to ENTRAN for completion of assessment and required forms (EPT richness will be discussed and MBI calculation for up to four stream sites using KDOW 2002 methods).

- Electronic copies of KDOW physical stream data sheets will be prepared (assume up to 7 stream data sheets).
- Electronic copies of wetland determination forms will be prepared (assume up to 3 wetland determination forms).
- Summary tables for aquatic species, streams, terrestrial flora and fauna, wetlands, and threatened and endangered species will be prepared. This includes measuring and calculating stream drainage area, stream total length, and stream order.
- A photograph inventory of aquatic sampling sites, stream impact sites, terrestrial sampling sites, terrestrial habitats, wetlands, and threatened/endangered species habitat (if any) will be prepared.

Item 12 (Chemical Analysis):

- A summary table of chemical water quality data for up to one stream site will be prepared.
- A narrative comparison between collected water quality data and statewide water quality standards will be prepared.

TASK G. REPORT PREPARATION

Two paper copies of a draft ecological report will be prepared for review (one for District 6 and one for DEA), and eight final ecological report copies will be submitted (one for District 6, one for DEA and six for resource agencies). Each submittal of the report will also be provided on a CD in pdf format. This proposal includes costs for ten paper copies and two CDs.

Item 13 (Writing):

- An Ecological Resources Impact Assessment (ERIA) Report will be prepared for the project following general KYTC Ecological GAF guidelines.
- This task item also includes review of the design plans to determine and measure impacts for the Preferred Alternative and prepare a tabular summary of impacts.
- Key contents of the ERIA will include: 1) project description; 2) agency correspondence; 3) environmental setting; 4) ecological survey methods; 5) ecological sampling results; 6) project impacts and suggested mitigation measures; 7) short term use versus long term productivity; 8) irreversible and irretrievable commitment of resources; 9) alternative analysis and recommendations; 10) summary; 11) references; and 12) summary tables, exhibits and appendices.
- This task item also includes completion of the KYTC Ecological Study GAF.

Item 14 (Exhibits):

- Exhibits depicting the project limits, ecological features and project impacts will be prepared on USGS base and aerial base mapping. Specific exhibits include the following (site photographs will be included in an Appendix):

    - 1) Project Study Area map
    - 2) Soils Map
    - 3) Topographic map with ecological features, sample sites and habitat types delineated
    - 4) Aerial map with ecological features, sample sites and habitat types delineated
    - 5) Topographic map with ecological impacts

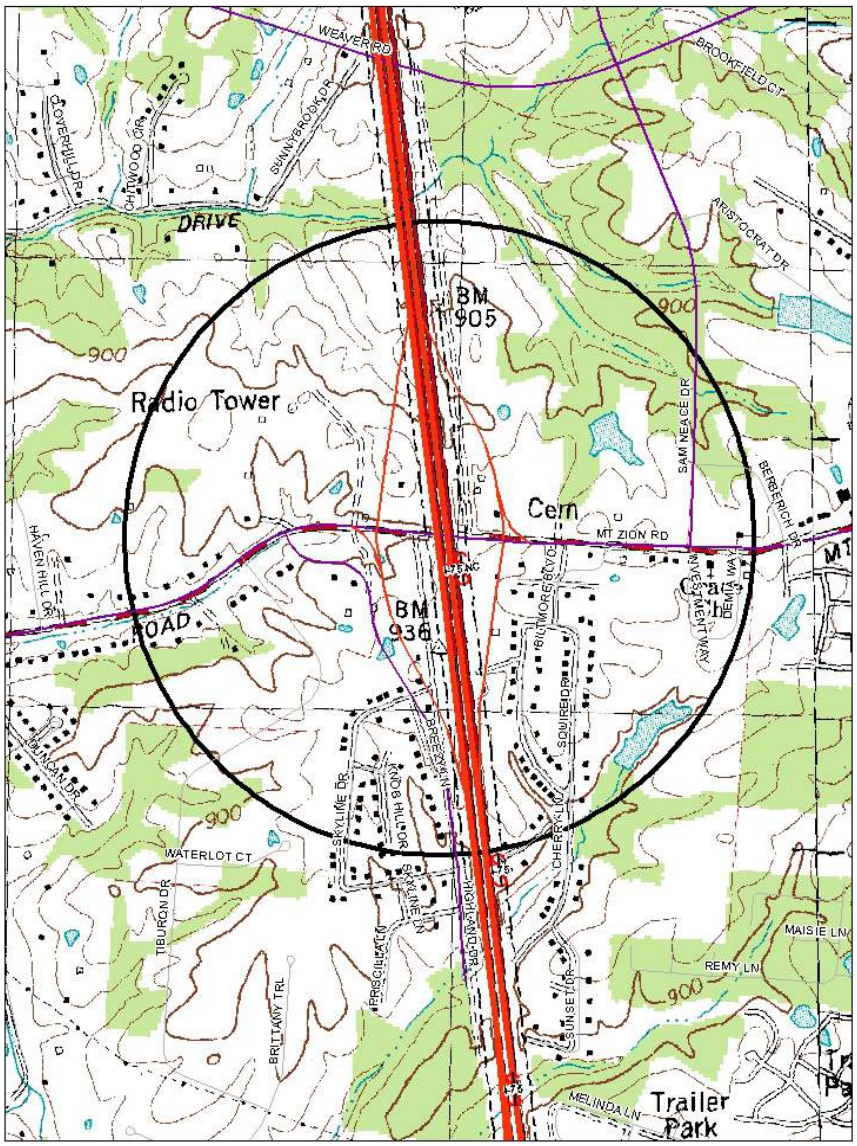
- 6) Aerial photograph with ecological impacts

EXCLUSIONS

This proposal *does not include*:

- Army Corps of Engineers 404 permit application and Kentucky Division of Water 401 Water Quality Certification application
- Biological Assessments for federal listed species

PROJECT STUDY AREA



PHASE I ENVIRONMENTAL SITE ASSESSMENT

ENTRAN will provide environmental services to prepare a Phase I Environmental Site Assessment for Item No. 6-14.00, KY 536 Interchange with I-71/75 in Boone County, Kentucky. This study will follow KYTC's Environmental Procedures Manual (April 1996), and current KYTC Hazardous Materials/UST Guidance and Accountability (GAF) guidelines.

STUDY AREA

The current project involves the reconstruction of the KY 536 interchange with I-71/75 to a double crossover diamond type interchange (DCD) as recommended by the project Interchange Justification Study (IJS): 6-14.01 (HNTB March 2010). The current project study area encompasses a radius of approximately 0.4 mile centered upon the existing I-71/75 bridge over KY 536, as provided in the KYTC Procurement Bulletin 2011-02. A preliminary preferred alternative has been developed which primarily follows existing KY 536 alignment, with a project length of 0.1 mile and anticipated project limits on KY 536 from Tiburon Drive (west) to Berberich Drive (east). There is the potential of multiple alternates on the east side of the DCD from Biltmore to Berberich. It is possible that backage roads might be required. This scope assumes the preliminary preferred alternative identified in the IJS will be further developed for this project. A contract modification will be required if there are any future changes to the study area or scope during the environmental study process.

BACKGROUND

At least three properties appear to have a current or former use that would indicate potential contamination. An Environmental Overview Report (HNTB July 2007) prepared for the Interchange Justification Study indicated that the three sites had registered UST's within the project study area.

TASK DESCRIPTIONS

Production hour and cost estimates for this study will be based on the task descriptions presented below. Tasks are organized according to Work Items outlined in the KYTC Division of Environmental Analysis (DEA) Manhour Estimate (Production Hour) Worksheet for Phase I Environmental Assessment. Work to be performed under each task is based on study guidelines outlined in the current KYTC Hazardous Materials/UST GAF dated June 2005, as applicable to this project.

TASK A. RESEARCH

Review of aerial photographs, and GIS information and mapping prepared for the Environmental Overview Report completed in 2007, identified three (3) underground storage tank sites present within the project study area. The Environmental Overview Report did not address USEPA and Kentucky Division of Waste Management listed facilities, gas or other wells listed by the Kentucky Office of Technology Division of Geographic Information, or industrial and/or manufacturing

facilities within or adjacent to the project Environmental Footprint. Information from the 2007 Environmental Overview Report will be reviewed, and augmented/updated with the following:

Items 1, 2 and 3. Division of Water, Division of Waste Management, and Database Search - This task consists of identifying sites in the vicinity of the project study area with potential hazardous materials concerns through: 1) a regulatory database search (Environmental Data Resources, Inc.), including records on file with the USEPA, the Kentucky Division of Waste Management and the Kentucky Division of Water; and 2) a review of available historical aerial photo, Sanborn and/ or other mapping to identify past land use(s), waste disposal sites and important geological or hydrogeological features in the area.

TASK B. FIELD WORK

Item 4. Inspection - A reconnaissance survey and photograph inventory of all properties in the project study area within or immediately adjacent to the preliminary preferred alternative will be conducted to assess current site uses and to identify and document evidence of chemical/hazardous materials use and concerns. This will include inventory and description of observed chemical/hazardous materials, waste disposal activities, occurrence of PCB electrical equipment, observation of staining or stressed vegetation, and occurrence of oil, gas and water supply wells within or adjacent to the project study area. Areas of focus will include those sites identified as a hazardous materials concern based on review of the regulatory database and/or other secondary sources from Task A.

Item 5. Interviews – Local fire and health department officials will be interviewed to determine past or current potential environmental concerns/facilities known from the project study area.

Item 6. Documentation – This task includes written documentation of interviews and preparation of site checklists, photos and field mapping of properties having hazardous materials concerns. This scope is based on an estimate of 3 sites with potential hazardous concerns (based on database information included in the Environmental Overview Report).

TASK C. ANALYSIS

Items 7 and 8. Data Compilation and Data Assessment – This work includes reviewing database and field research information and preparing a tabular summary of suspect sites, highlighting specific hazardous materials concerns for each site. This scope is based on an estimate of 3 sites with potential hazardous materials concerns.

TASK D. REPORT PREPARATION

Two paper copies each of a draft and final Phase I Environmental Site Assessment report will be provided (one copy each for District 6 and one copy each for DEA). Each submittal of the report will also be provided on a CD in pdf format. This proposal includes costs for four paper copies and two CDs.

Item 9. Writing/Recommendations - A Phase I Environmental Site Assessment Report will be prepared for the project following current KYTC GAF guidelines. This report will include a summary of the regulatory database search, interview and on-site inspection; identification and mapping of sites with hazardous materials concerns based on review of secondary sources and field reconnaissance; and conclusions and recommendations for Phase II site assessment. The database search report will be included as an appendix. A draft report will be submitted for District 6/DEA review, and a final report will be prepared, incorporating responses to comments, as needed. This task item also includes completion of the KYTC UST/Hazardous Materials GAF.

Item 10. Exhibits/Graphics – Appropriate mapping showing the location of sites with hazardous materials concerns will be prepared for inclusion in the Phase I ESA report.

TASK E. MEETINGS

This proposal assumes attending one (1) project team meeting for review of the Phase I ESA report.

CULTURAL - HISTORIC

COMPLIANCE

The purpose of the proposed services is to assist the Kentucky Transportation Cabinet (KYTC) and the Federal Highway Administration (FHWA) in their compliance with Section 106 of the National Historic Preservation Office (NHPA), as amended. The survey will be done in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation located at 48 F.R. 44716; the Kentucky Heritage Council's (KHC) Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports; and KYTC's Division of Environmental Analysis (DEA) Cultural and Historic Baseline Guidance.

PROJECT PARAMETERS

Our understanding of the project parameters is based on the project map and text in the Boone/I-71/75 6-14.00 announcement in the Professional Services Procurement Bulletin 2011-02. ENTRAN will provide KYTC with Phase I and II designs of the reconstruction of the interchange at I-71/75 and KY 536 (approach roads and ramps totaling approximately 4 miles). CIA will prepare a cultural-historic survey report for an Area of Potential Effect (APE) determined by ENTRANs design and agreed upon by KYTC, FHWA, and KHC.

A preliminary review of the project map, current aerial maps, and online street views indicates that there are no properties 50 years of age or older within the anticipated project APE.

SCOPE OF WORK

CIA will initiate a record search and conduct research at KHC in Frankfort to identify previous investigations and previously documented above-ground resources within a one-mile radius of the APE. CIA will also review Boone County Property Valuation Administration (PVA) records

to confirm construction dates of the subdivisions around the interchanges and visit the Boone County Public Library to conduct archival research for historic context development.

CIA will complete a windshield survey to determine if any resources within the APE are 50 years of age or older. If no resources are identified, CIA will draft a report of no find, following KHC's Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports, Section VII. Reporting Format When No Cultural Resources Are Located. This type of report will include an introduction, historic context, research and survey methodology, summary and recommendations explaining the lack of resources, and references cited.

PHASE I – ARCHAEOLOGICAL SURVEY

COMPLIANCE

The purpose of the proposed services is to assist the Kentucky Transportation Cabinet (KYTC) and the Federal Highway Administration (FHWA) in their compliance with Section 106 of the National Historic Preservation Office (NHPA), as amended. The survey will be done in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation located at 48 F.R. 44716 and the Kentucky Heritage Council's (KHC) Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports.

This investigation will satisfy State Historic Preservation Office (SHPO) and other agency requirements for archaeological investigations and identify those areas of concern, if any, for which additional compliance investigations and agency coordination may be required.

The investigation will be conducted by personnel who meet the Secretary of the Interior's standards for professional archaeologists. In addition, CIA's archaeological project managers are all Registered Professional Archaeologists (RPA) and abide by the RPA code of ethics.

STATEMENT OF WORK

CIA will assist ENTRAN in determining the presence of prehistoric and historical archaeological resources within the area of potential effects (APE) of the planned project. We estimate the project area could encompass an approximate 30 acres, inclusive of pavement, existing structures, and otherwise disturbed ground.

The Phase I archaeological survey will consist of a simple ground surface inspection of the entire APE and a systematic near-surface shovel probing program in all areas of poor surface visibility on ground that is less that 15 percent slope. The survey will result in the determination of the presence/absence of archaeological sites within the project APE. Where possible, the Phase I investigation will also provide preliminary recommendations regarding the significance of archaeological sites discovered, if any, and address the need for additional archaeological investigation at each site.

Specifically, the offered service will entail the following tasks:

- As required, a routine background records search at the Office of State Archaeology (OSA) in Lexington, Kentucky will be conducted to determine the level of existing documentation relevant to recorded archaeological sites and prior archaeological investigation(s), if any, at and nearby the site of the proposed project.
- A review of archival documentation pertaining to the presence and locations of potential historical archaeological resources within the APE will be made.
- A simple ground surface inspection will be made along transects spaced no more than 5 meters apart to identify above-ground evidence of past cultural activity.
- In areas of poor ground surface visibility, a near-surface examination through systematic shovel probing will occur to identify buried archaeological materials. The shovel test probes (STPs) will average 30 centimeters in diameter, and will be excavated where practical to sterile subsoil. The soil from each STP will be screened to recover artifacts. The soils and stratigraphy of each STP will be examined to determine the presence of prior disturbances and the potential for intact sub-plowzone cultural deposits.
- The STPs will be emplaced in accordance with a 20-meter interval, or 9 STPs per acre. It is estimated that a maximum 270 STPs may be required.
- When an STP is encountered that is positive for cultural materials, additional STPs will be excavated surrounding the positive in a radial pattern at an interval of 10 meters.
- Two consecutive negative STPs will suffice, in most cases, to delineate site boundaries.
- If a site is discovered through the pedestrian survey, shovel probing will occur judgmentally to ascertain the vertical extent of any archaeological sites discovered as well as the presence of undisturbed sub-plowzone deposits at each site.
- Ground that is obviously disturbed (aside from agriculture), sloped (greater than 15%), or very wet will not be shovel probed.
- Artifact analyses will be done if any artifacts are found.
- OSA site forms will be prepared, if any sites are found.
- A professional technical report of findings will be prepared.
- The curation of any artifacts recovered will occur at an approved facility within Kentucky.

DELIVERABLES

Eight copies of a technical report of findings will be submitted for review and distribution to appropriate regulatory agencies. If revisions are requested, CIA will address all comments and issue a revised report. Eight bound copies of the revised report will be submitted along with a .pdf digital version on CD. Upon acceptance of the report, completed site forms (if any) will be submitted and filed with the OSA. Artifacts recovered will be submitted for curation within 30 days of approval of the technical report or following negotiation of an approved Memorandum of Agreement regarding curation.

Meeting Summary

TO: Mrs. Carol Callan-Ramler, P.E.
Project Manager
District Office #6
421 Buttermilk Pike
Covington, Kentucky 41017

FROM: Brian Aldridge, P.E.
Project Engineer
Stantec Consulting Services Inc.

DATE: November 1, 2012

SUBJECT: I-71/75 & KY 536 Interchange Reconstruction
Boone County
KYTC Item No. 6-14.00
Preliminary Line and Grade Inspection

The Preliminary Line & Grade (PL&G) meeting for the above referenced project was held on Wednesday, October 17, 2012 at 9:00 a.m. in the Northern Kentucky Area Planning Commission main conference room. The following individuals were in attendance:

Mike Bezold	KYTC District 6
Tony Blau	KYTC District 6
Nikki Boden	KYTC District 6
Carol Callan-Ramler	KYTC District 6
Rick Davis	KYTC District 6
Bob Gustafson	Florence and Hutcheson
Nicholas Hendrix	KYTC District 6
Rob Hans	KYTC District 6
Stacee Hans	KYTC District 6
Jason Hyatt	KYTC – C.O. Traffic
Jeff Jasper	KYTC – C.O. Highway Design
Daniel Menetrey	KYTC District 6
James Minckley	KYTC District 6
Scott Pennington	KYTC District 6
Dan Prevost	Parsons
Jason Rankin	KYTC District 6
Scott Schurman	KYTC – DEA
Greg Sketch	Boone County
Tim Tharpe	KYTC – C.O. Traffic
Dan White	KYTC District 6
Thomas Whitt	KYTC District 6
Brian Aldridge	Stantec Consulting Services Inc.

Jason Bricker	Stantec Consulting Services Inc.
Glenn Hardin	Stantec Consulting Services Inc.
Antonio Pousa	Stantec Consulting Services Inc.

The purpose of the meeting was to discuss the PL&G plans for the preliminary design of the subject project. This includes reconfiguring the KY 536 interchange with I-71/I-75 as a Double Crossover Diamond (DCD) interchange. The following enumerated items were discussed:

1. Carol Callan-Ramler welcomed everyone and after introductions turned the presentation over to Brian Aldridge.

2. Brian provided a brief history of the project and the adjacent projects in the KY 536 corridor, including Item No. 6-162 in Kenton County and 6-158 west of the I-71/I-75 interchange. The 6-158 project includes widening KY 536 to five lanes and relocating the Highland Drive intersection to Tiburon Drive.

3. The Purpose and Need for the project was summarized as follows:

   The purpose of KY 536 (Mt. Zion Road) Interchange Reconstruction Project is to ***improve safety and traffic operations*** *within and near the KY 536 interchange with I-71/I-75 in Boone County. The project includes not only reconstructing the interchange, but also consideration of* ***access management*** *concepts along adjacent sections of KY 536 to preserve roadway efficiency and safety for future roadway users.*

4. The KY 536 corridor was noted in the IJS as having a high crash rate from 2004-2006 with a critical crash rate factor (CRF) of 2.06. A CRF greater than 1.0 indicates crashes are not occurring randomly and that conditions exist that contribute to a higher than average number of crashes. Stantec has updated the crash analysis and found the CRF value from 2009-2011 to also be a 2.06.

5. Existing traffic volumes are around 14,400 vehicles per day (VPD) west of the interchange and 25,000 VPD to the east. 2030 forecasts for the project are 49,000 VPD west of the interchange and 57,000 VPD to the east.

6. The Project Team has received concurrence from KYTC Central Office Traffic to use mast arms for the traffic signals at the DCD crossover intersections and span wire arrangements elsewhere. The Project Team is considering the implementation of an adaptive signal control system along KY 536.

7. KYTC Central Office Traffic has agreed to the use of high mast lighting at the interchange. Existing median lights along I-71/I-75 will be removed with the project; the limits of removal have yet to be determined but will consider the limits of existing circuits. KY 536 will be lit between Tiburon Drive and Biltmore Drive. New, conventional wall pack fixtures are acceptable beneath the I-71/I-75 structure.

8. Modifications to the DCD interchange configuration as proposed in the IJS were discussed. In general, the footprint of the interchange has been reduced while maintaining the same number of lanes beneath I-71/I-75. The right turn movements from the exit ramps were originally proposed as free-flow movements, but the proximity to the downstream intersections was considered too close for free-flow movements to work safely and efficiently. Both exiting right-turn movements have two lanes and are proposed to be controlled by the signal at the crossover intersection.

9. In the westbound direction, there are three lanes proposed beneath the I-71/I-75 bridge, with the third (left) lane dropping as a left-turn only onto the southbound interstate entrance ramp. After some discussion, it was decided that the Project Team should investigate the feasibility of carrying the third lane through the west crossover to a point west of the Tiburon intersection.

10. At the east crossover intersection, the IJS assumed two left-turn lanes entering northbound I-71/I-75. The outer lane developed just east of the I-71/I-75 bridge and the inner lane extended west through the upstream crossover. The forecasted demand for this movement warrants two lanes, but this free-flowing ramp will see pedestrian and bicycle traffic as is it has a shared use path crossing. Therefore, the project team felt it would be safer to provide a single left-turn lane, cutting the crossing distance in half.

11. The proposed typical section for KY 536 includes two westbound lanes from US 25 to Berberich Drive and three westbound lanes to I-71/I-75. There are three eastbound lanes from the interchange to US 25.

12. Proposed access management along KY 536 was discussed. Maps were shown demonstrating that Sam Neace Drive is just less than 1,400 feet from the existing northbound I-71/I-75 ramp terminal and Biltmore Drive is about 750 feet from the ramp terminal. The Biltmore Boulevard intersection, currently signalized, was originally proposed to be converted to a right-in/right-out only. Based on stakeholder concerns related to parcel access, the intersection will remain signalized but the only left-turn access to remain will be from eastbound KY 536 to northbound Biltmore. This will allow the intersection to function with a two-phase signal operation, more compatible with the east crossover intersection at the DCD. A raised median is proposed along KY 536 from the interchange to US 25 with all existing access points other than the Biltmore Boulevard, Sam Neace Drive and Berberich Drive intersections converted to right-in/right-out only. A new traffic signal is proposed at Berberich Drive.

13. Future travel demand through the US 25 intersection far exceeds the capacity of the existing configuration. Traffic simulation models developed for the project showed traffic backing up through the proposed DCD interchange (nearly 4,000 feet to the west) without improvements at US 25. A single point urban interchange (SPUI) has long been discussed as an alternative for this intersection, but Stantec had also previously proposed a short-term/interim improvement that includes an at-grade intersection with two through lanes and two left-turn lanes on each approach. In order

to facilitate traffic flow through the intersection, the interim intersection improvement has thus far been assumed. After some discussion, the Project Team will re-examine the needs at the intersection and determine the minimum level of improvements necessary to avoid traffic backing up to the interchange.

14. Access to parcels in the northwest quadrant of the US 25 intersection with KY 536 was discussed. Immediately east of Kroger, an Autozone has been constructed in the last couple of years and there are several parcels east that currently have full access driveways (or share a driveway) on KY 536. Three alternatives that included a series of backage or frontage roads were shown that utilized Berberich Drive or Aristocrat Drive (on US 25 north of KY 536) to serve all these parcels. Each of these alternatives was discussed in some detail and each presents challenges. Therefore, Stantec proposed to instead allow a left-turn in only just east of the Autozone that would connect to an existing driveway that could be reconfigured to service multiple parcels, including Autozone. It was agreed this is the preferred alternative.

15. KY 536 is proposed as an east-west bicycle corridor. The 6-162 project will include shared use paths on both sides of the improved roadway. The 6-14 project includes a shared use path along the north side and sidewalks along portions of the south.

16. The Value Engineering (VE) Study was conducted the last week of June. For discussion purposes, the recommendations from the VE Study were broken down into three categories, as follows:

    a. Completed recommendations
        i. CT-05: Ensure distance between stop bar and signal heads meets standards
        ii. M-01: Progression should be modeled to determine throughput
        iii. M-05: Establish a formal Public Involvement process
        iv. AM-02: Establish a formal Public Involvement process

    b. Access Management recommendations
        i. MA-03: Include backage road behind Shell to connect Biltmore to Investment Way; do not include the suggested backage road to connect Greenlawn Road to Demia Way
        ii. MA-05: Include raised median east of Berberich
        iii. MA-01: Restrict left turns <u>out</u> at Biltmore
        iv. MA-08: Acquire access rights from ramps to Biltmore to the east and Tiburon Drive to the west
        v. MA-13: MOUS for access management plan between KYTC, County, MPO and Planning & Zoning
        vi. M-04: Provide access management data illustrating performance to public

    c. Turn Lane recommendations
        i. MT-01: Evaluate option to provide dual lefts from EB KY 536 to

NB I-75

ii. MT-04: Include right-turn lanes on eastbound KY 536 at Biltmore, Sam Neace, and Lakeview Drive intersections
iii. CT-07: Include a right turn lane on eastbound KY 536 at the US 25 intersection
iv. CT-04: Re-evaluate length of turn lanes on KY 536

17. VE Recommendation MA-01 was discussed in some detail. As mentioned previously, the proposed configuration for the Biltmore Boulevard intersection includes left-turn access from eastbound KY 536 to northbound Biltmore only. Biltmore will have right-in/right-out only access on the south and left-in/right-in/right-out on the north. A two-phase signal operation will service all movements allowed. This alternative will be presented to the public in January.

18. VE Recommendation MT-01 was also discussed in detail. This proposed change to the DCD interchange would have created a split in the eastbound movements such that the three eastbound lanes would split into four lanes between the west crossover and the I-71/I-75 bridge; the split is required because there is insufficient horizontal clearance to accommodate more than three lanes (or two lanes plus a shared use path, as proposed in MT-01) between the median bridge piers and the northern row of piers. The four lanes would then include two left-turn lanes to northbound I-71/I-75 and two lanes to continue on eastbound KY 536. While this concept would provide dual left turn lanes for northbound access to the interstate, several disadvantages were discussed, as follows:

    a. The VE concept would be difficult to sign appropriately, given the distance available between the west crossover and the split.
    b. The concept limits through capacity on eastbound KY 536. As presented, there are no full lanes that travel completely through the interchange. The 6-158 project will construct a five-lane section to the west and a proposed eastbound right-turn bay at Tiburon will be restriped to a shared through and right lane, forming three eastbound lanes leading to the crossover. Essentially, eastbound KY 536 traffic would be served by half the middle lane and half the newly formed right lane.
    c. The pedestrian/bicycle crossing would be in the center of a bridge that is over 150 feet wide. The resulting "tunnel effect" would be discomforting to some.
    d. The traffic simulation models developed to evaluate this concept did not show significant traffic flow improvement. The capacity limitations upstream tend to be more of an issue than the need for a second left-turn lane.
    e. Finally, with this being only the second or third DCD that would be open to traffic in Kentucky, there is a need for some level of design consistency between them all. The VE concept would further complicate an already unique configuration.

Based on these concerns, it was decided to proceed with the previously proposed

concept and to not implement the VE recommendation.

19. The environmental documentation for the project was discussed. Brian said the 6-351 project included the field work necessary to cover the area around the US 25 intersection that was not included in 6-14. The Project Team is working to compile all the information.

20. Utility impacts were discussed. Beyond the ordinary underground utilities, Cincinnati Bell has fiber optic cabinet on the north side of KY 536 east of the interchange. If it has to be relocated, it is expected to take up to a year to move the lines. Carol Callan-Ramler has requested additional information from Cincinnati Bell regarding the cabinet and lines feeding into/out of it.

21. Geotechnical input will be requested at three areas:

    a. Through the DCD interchange, a gravity retaining wall is proposed along the north side to accommodate the shared use path outside the outer row of piers.
    b. In the vicinity of the Cincinnati Bell fiber optic cabinet, a gravity wall may be used to avoid relocating the cabinet.
    c. West of US 25, a retaining wall is proposed adjacent to the Schumaker Auto Body shop.

22. The Project Team has not advanced the drainage design because concepts were still being developed as recently as a few weeks prior to the PL&G meeting. Nearly all the drainage along the project is currently routed to the detention basin in the southwest quadrant of the interchange. With the relocation of Highland Drive, this detention basin can be enlarged as needed. Mike Bezold noted District 6 had developed grading plans that could also make the northeast quadrant of the interchange (inside the existing right-of-way) available for detention if needed.

23. The current cost estimate for the project is as follows:

    a. Right-of-Way: $4,300,000
    b. Utilities: $5,000,000
    c. Construction: $11,300,000
    d. TOTAL: $20,600,000

24. Carol Callan-Ramler provided comments from the KYTC Geotechnical Branch as well as District 6 comments on the signing and striping plans. These comments are attached.

The meeting ended at approximately 11:30 a.m. EDT.

Callan-Ramler, Carol (KYTC-D06)

From: Callan-Ramler, Carol (KYTC-D06)
Sent: Tuesday, October 16, 2012 4:17 PM
To: Greer, Daryl (KYTC-WSC)
Cc: Asher, Bart (KYTC-WSC); Scott, Erik (KYTC-WSC); Blevins, Mike (KYTC-WSC)
Subject: RE: KY 536 PL&G exhibits | 6-14

Daryl,

Sorry for the late and minimal response. I've been in back-2-back meetings today & I've got to leave right now.

I'll print your questions to take to the meeting tomorrow in case no one from your group is there.

Thanks!

Carol

From: Greer, Daryl (KYTC-WSC)
Sent: Tuesday, October 16, 2012 8:41 AM
To: Callan-Ramler, Carol (KYTC-D06)
Cc: Asher, Bart (KYTC-WSC); Scott, Erik (KYTC-WSC); Blevins, Mike (KYTC-WSC)
Subject: FW: KY 536 PL&G exhibits

Carol,

I've looked over the info, and I have some comments from the structure geotechnical perspective:

- I noticed some walls and some soil cuts that may eventually use walls to reduce right-of-way takings. Please remember that walls in cut situations still require ROW behind the wall for construction purposes as well as to protect any straps or tiebacks that may be needed. Walls in fill sections may require straps or special backfill that could then impact MOT during construction.

- Will the I-75/71 bridge over KY 536 be impacted? Will any changes be made to the bridge other than a wall to provide widening through the bridge opening?
- Looks like a wall will be used to protect Utility Cabinets Right of Station 174+80. That is very tight quarters for construction. A gravity wall is not appropriate and not constructible. It will require something more complicated. If it is a utility cabinet, I suspect there will be mucho underground stuff that would impact construction. It probably needs to be carefully thought through up front.

- I see several 2:1 cut slopes that appear to be over 20' high. In general 2:1 cut slopes up to 20 to 25' high in NKY can work given the right circumstances. However, seldom do we have the right circumstances. We won't know for sure until we drill, but consider up front that slope flattening or some type of wall might be needed in those areas.

- I see that the VE option requires another soil nail wall on Abutment 2. I see that the cost was $\$114/ft^2$, and that's pretty pricey compared to other wall types; however it works well for the situation shown. If we can find a way to utilize a different wall type, so would introduce competition and bring the price down.
- Any impacts to the bridge over the RR?

- I didn't see any other bridges or drainage structures on the plans. I suspect at this preliminary stage the drainage structures haven't been nailed down yet.

6-14 PL&G: District 6 Design Sign Comments, 10-15-12

1. WB 536: Consider adding "Speed Reduction Ahead"
2. WB 536: Move "Crossover Ahead" & "25 mph" east
3. EB at Sam Neace: Place "3503 LT arrow" on signal as well as ground
4. Both NB Exit Ramp and WB Crossover at E Cross over: sign located within median likely to be hit
5. NB Exit Ramp: "advanced" signals located in triangular island are missing. Was this on purpose or an omission?
6. Sam Neace: NB/SB painted splitter island...use raised medians instead
7. WB at East Crossover: move the signs: "Stay LT of Median" & "Don't Block Intersection" to east side of crossover. As shown, the signs will be quite a distance from the stop bar. Consider locating the signs near stop bar. OR consider "Stop Here on Red" + "Don't' Block Intersection" at stop bar and leave the other signs as shown.
8. Deleted comment.
9. Consider painted interstate icons on pavement.
10. Put "Biltmore" with 2 LT arrows on Truss #2
11. NB Exit Ramp: provide sign near bottom of ramp "RT lane must stay right"???
12. NB Entrance Ramp: both legs provide with Warning Sign showing Two Lanes coming side-by-side
13. If VE Alt is selected: location of the (2) black/white triple arrow signs will conflict with space for MUP users.
14. For both EB/WB mast arm signals: provide I-75 Icons
15. EB 536 at beginning of Biltmore LT turns: Black and white sign in median with street name OR have Biltmore name put on Truss # 2 (No. 10 above) & eliminate ground signs. Also, could put Sam Neace or KY 3503 Icon on Truss # 2.
16. Post (2) 25 mph within DCD??? Locate signs so that those coming from the LT Exit Ramps will be able to spot, too.
17. If VE Alt selected: consider directional guide signs hung on the existing bridge overpass.

Some of the comments are situational – they apply to more than the specified area cited. Also, current MUTCD takes precedence over these observations unless a particular aspect is challenging.

Stantec Consulting Services Inc.
10509 Timberwood Circle Suite 100, Louisville KY 40223
Tel: (502) 212-5000 ● Fax: (502) 212-5055

Meeting Minutes

SUBJECT: KYTC Item: 6-14.00
KY 536 Double Crossover Diamond Interchange Project
Constructibility Review Meeting
Stantec Project Number: 178560012

A constructibility meeting for the subject project was held on Tuesday, September 1, 2015, at 12:00 PM in the KYTC District 6 1st floor conference room. The following people attended:

Jim Simpson	KYTC Central Office Highway Design
Rob Hans	KYTC District6
Carol Callan-Ramler	KYTC District 6 Project Manager
Nikki Boden	KYTC District 6 Utilities
Tony Blau	KYTC District 6 Utilities
Robert Franxman	KYTC District 6
Daniel Menetrey	KYTC District 6 Planning
Matthew Arlinghaus	KYTC District 6 Engineering Support
James Minckley	KYTC District 6 Traffic
Laura Mitchell	KYTC District 6 – Burlington Section
Mike Bezold	KYTC District 6
Glenn Hardin	Stantec Consulting Services
Antonio Pousa	Stantec Consulting Services
Jason Bricker	Stantec Consulting Services
John Moss	Stantec Consulting Services

Carol provided a comprehensive background of the project and stated that there would be a Drainage Inspection on September 22 and that Joint Inspection was scheduled for October 6.

Nikki said that Duke Energy will acquire their easements, rather than having KYTC acquire them.

Stantec presented the Traffic Control Plan (TCP) and the TCP Notes shown in the materials uploaded to the project's ftp site prior to the meeting. Carol provided Stantec her handwritten markups to those plans and review comments to the TCP notes to be addressed in the final plans submittal. The Project Team made the following comments during Stantec's presentation of the TCP plans:

The current pavement design being considered for the project assumes that Lime Stabilization will be used. The project team recommended that a two-foot rock roadbed be used instead of Lime Stabilization due to constructibility issues and because the project will be built in an urban area. Geogrid is to be used with the roadbed if needed.

The Project Team agreed that asphalt pavement is to be used and a concrete pavement alternative will not be considered. The main reasons for this are the fast construction time needed for the DCD section of the project, which could not be accomplished with PCC pavement, and to salvage the existing pavement as much as possible by overlaying the existing road. Using asphalt pavement for widening and overlaying the existing road will not only be more economical, but will also make MOT much easier and will allow the project to be built faster. Only short sections of the existing pavement will need to be removed for the construction of the project.

The raised medians were discussed. Stantec is considering using grass for the outer ramp islands and concrete for the median islands, preferably using colored stamped concrete. The District advised that, if wanted, the

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stamped concrete should be specified with this project and not wait for a potential future project to implement it.

The District said that Boone County likes the opportunity to provide landscaping where possible on roadway projects and that the raised islands on the project may be a good place for this. Stantec advised that any future landscaping to be used should be very limited in height and be placed away from intersection sight triangles, due to the limited sight distance provided by the tight 25 mph geometry and, as importantly, so as not to distract drivers when they are negotiating a novel intersection that requires their full attention.

The District recommended building the proposed Biltmore Connector Road during Phase I instead of during Phase II as it is now shown in the TCP plans. Having this road already in place during Phase II will help to detour traffic temporarily along the connector for the while building the adjacent Biltmore Boulevard approach road.

The existing Kroger entrance could be closed to traffic during Phase I to build the proposed entrance. Traffic to and from Kroger can use the nearby access from Berberich Drive during Phase I instead. Add a note to the TCP plans to install the proposed signal at Berberich Drive and have it in operation as a temporary signal before closing the Kroger entrance to traffic.

The installation and implementation of the proposed signals were discussed. The District recommended using a chart detailing the construction sequence of all proposed signals on the project, explaining what the status of those signals would be during each construction phase. Stantec's plans require the contractor to maintain the existing signals and lighting on the project operational at all times while the proposed signals and lighting are installed, using temporary signal poles as needed to accomplish this. However, based on Stantec's experience gained when building the DCD project in Lexington, Stantec recommended the plans not specify exactly when and where to use the existing or temporary signals because it is very difficult to predict what the contractor will be doing in the field at any given time. The Project Team agreed that this will be the better approach to be used in the project. The District recommended setting up a lump sum item for "installation and maintenance of temporary signals" to cover signal operations during construction of the project.

It was stated that FHWA prefers to include/explore the inclusion of an adaptive signal system for this project.

Add notes to the TCP plans where needed detailing how to provide temporary access to specific businesses or residences while construction takes place. If no alternative entrance can be provided, Traffic Bound Base can be used to build temporary entrances to those.

Add notes to the TCP plans requiring night time construction for areas within existing intersections so as not to constrict turning maneuvers for large vehicles at those intersections during daytime construction hours.

Add temporary barrier wall on the plans where possible along areas where traffic is supposed to run close to roadway widening zones. Excavation for the widening pavement with rock roadbed will require drop offs in excess of 2 feet on those areas.

The specified duration time for closing Ramp 'C' to traffic during Phase III can be reduced given the short 300' length of ramp to be built during this closure. The closure will take place from 7:00 PM on Friday until 6:00 AM on the following Monday, instead of beginning the ramp closure on Thursday as it is now shown in the plans.

Place barricades on both sides of the built ramps along ramps F-2 and C-1 to make sure cars do not turn into these and drive in the wrong direction along these ramps and into the interstate during construction.

Place barricades and notes on the plans to block pedestrians from using any built sections of the shared-use path until the entire length of the shared-use path can be opened to pedestrian traffic during Phase IV, near the end of construction operations on the project.

The current TCP plans show final surface and final striping for the DCD section to be completed during a weekend when the entire interchange is closed to traffic. These plans also call for building remaining sections of curb and gutter for the ramp islands under traffic after the DCD is opened. Add a scratch pavement course to the pavement design to be used instead of the final surfacing as a temporary top layer with temporary DCD striping when the DCD is opened to traffic under its intended final configuration. Using the scratch course instead of final surface will expedite the construction of the DCD section during the weekend closure. Also, move the construction of all proposed barrier curb and gutter along the outer ramp islands to be built during the weekend closure of the interchange and not under traffic after the closure. The final surface and final striping for the entire project will, then, be built later on using lane closures during night hours or light traffic periods.

Add very specific notes to the TCP plans to require that the project is to be built to its final intended configuration, with the final number of lanes, final striping, final signage and final signals in operation, before it is opened to traffic under the proposed DCD configuration after the weekend closure during Phase IV.

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SECTION 3

PROJECT LEVEL HYDROLOGY

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

BEGIN CONSTRUCTION KY 536 STA 153+00 MATCH ITEM NO. 6-158 (CONSTRUCTION BY OTHERS)

MATCHLINE STA. 165+00

RAMP F-1 STA 16+23+19.14 KY 536 WEST STA 159+76.41 69.63' LT

RAMP F-2 STA 21+22+67.00 KY 536 WEST STA 163+97.38 66.28' RT

DA= 0.38 ac C= 0.85

DA= 0.31 ac C= 0.85

DA= 0.27 ac C= 0.85

DA= 0.23 ac C= 0.85

DA= 0.32 ac C= 0.85

DA= 0.37 ac C= 0.85

DA= 0.29 ac C= 0.85

DA= 0.12 ac C= 0.85

DA= 0.23 ac C= 0.85

DA= 0.20 ac C= 0.85

DA= 0.17 ac C= 0.85

DA= 0.18 ac C= 0.85

DA= 0.26 ac C= 0.85

DA= 4.23 ac, 0.46 paved C= 0.40

PROPOSED DRAINAGE BY OTHERS

Overhead Structure

F.B. CONC. DITCH

0' 20' 40' 80' SCALE: 1"=50'

KY 536
DRAINAGE AREA MAP 1 OF 7
STA. 153+00 TO STA. 165+00

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: kdeep DATE PLOTTED: September 16, 2015 | FILE NAME: V:\7855\ACTIVE\7856002\ROADWAY\DRAINAGE\DRAINAGE AREA MAP\DRAINAGE _AREA_MAP_SHEET_1.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

MATCHLINE STA. 165+00

MATCHLINE STA. 180+60

0' 20' 40' 80' SCALE: 1"=50'

KY 536
DRAINAGE AREA MAP 2 OF 7
STA. 165+00 TO STA. 180+60

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USER: apousa
DATE PLOTTED: September 16, 2015

E-SHEET NAME:

MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

MATCHLINE STA. 180+60

MATCHLINE STA. 196+00

KY 536 STA 182+32.00 =
TACO BELL ACCESS STA 101+50

KY 536 STA 186+66.92 =
FIFTH THIRD BANK ACCESS STA 100+00

KY 536 STA 191+79.16 =
BERBERICH DRIVE STA 101+50

KY 536 STA 195+40.78 =
KROGER ACCESS STA 101+50

KY 536 STA 191+66.01 =
LAKESIDE DRIVE STA 100+00

KY 536 STA 188+70.21 =
DEMIA WAY STA 100+00

KY 536 STA 184+96.09 =
SAM NEACE DR. STA 10+00

KY 536 STA 185+01.45 =
INVESTMENT WAY STA 200+00

KY 536 STA 181+55.15 =
SHERWOOD LAKES DR. STA 100+00

BEGIN CONSTRUCTION
TACO BELL ACCESS
STA 100+11.70

END CONSTRUCTION
SHERWOOD LAKES DR.
STA 101+21.00

END CONSTRUCTION
FIFTH THIRD BANK ACCESS
STA. 100+91.61

END CONSTRUCTION
DEMIA WAY
STA 101+35.89

BEGIN CONSTRUCTION
BERBERICH DRIVE
STA 100+11.00

BEGIN CONSTRUCTION
KROGER ACCESS
STA 100+33.00

END CONSTRUCTION
LAKESIDE DRIVE
STA 101+34.00

END CONSTRUCTION
SAM NEACE DR.
STA 101+51.38

DO NOT DISTURB
EXISTING POND

DA= 0.24 ac
C= 0.85

DA= 0.37 ac
C= 0.85

DA= 0.11 ac
C= 0.85

DA= 0.20 ac
C= 0.85

DA= 0.25 ac
C= 0.85

DA= 0.12 ac
C= 0.85

DA= 0.18 ac
C= 0.85

DA= 0.10 ac
C= 0.85

DA= 0.22 ac
C= 0.85

DA= 0.16 ac
C= 0.85

DA= 0.07 ac
C= 0.35

DA= 0.01 ac
C= 0.85

DA= 0.21 ac
C= 0.85

DA= 0.15 ac
C= 0.85

0' 20' 40' 80' SCALE: 1"=50'

KY 536
DRAINAGE AREA MAP 3 OF 7
STA. 180+60 TO STA. 196+00

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USER: apousa
DATE PLOTTED: September 16, 2015

E-SHEET NAME:

MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

MATCHLINE STA. 196+00

MATCHLINE STA. 504+00

MATCHLINE STA. 212+00

BEGIN CONSTRUCTION APPROACH LT STA 202+21 STA 100+11.92

APPR. LT STA 202+21, STA 101+15.74 AUTOZONE ACCESS STA 101+50.00

BEGIN CONSTRUCTION AUTOZONE ACCESS STA 100+23.01

APPR. LT STA 203+50, 100-00.00 =
APPR. LT STA 202+21, STA 101+18.72

END CONSTRUCTION APPR. LT STA 203+50 STA 101+13.22

BEGIN CONSTRUCTION APPROACH LT STA 206+09 STA 100+00.00

KY 536 STA 202+20.23 = APPR. LT STA 202+01, STA 102+00

KY 536 STA 206+06.56 = APPR. LT STA 206+09, STA 101+30

KY 536 STA 207+00.00 = 0.5' 25.316 SURF. 01

BEGIN CONSTRUCTION APPR. LT STA 207+00.00 STA 101+25.16

DA= 0.17 ac C= 0.85

DA= 0.18 ac C= 0.85

DA= 0.07 ac C= 0.85

DA= 0.09 ac C= 0.85

DA= 0.20 ac C= 0.85

DA= 0.34 ac C= 0.85

DA= 0.15 ac C= 0.85

DA= 0.12 ac C= 0.85

DA= 0.13 ac C= 0.85

DA= 0.23 ac C= 0.85

DA= 0.17 ac C= 0.85

DA= 0.20 ac C= 0.85

DA= 1.26 ac C= 0.35

DA= 0.43 ac C= 0.85

DA= 0.29 ac C= 0.85

DA= 1.82 ac C= 0.65

DA= 0.46 ac C= 0.85

DA= 0.16 ac C= 0.85

DA= 0.10ac C= 0.85

DA= 0.06ac C= 0.85

DA= 0.08ac C= 0.85

DA= 0.37 ac C= 0.85

DA= 0.38 ac C= 0.30

DA= 0.55 ac C= 0.85

DA= 0.26 ac C= 0.85

DA= 4.21 ac C= 0.30

DA= 0.40 ac C= 0.85

DA= 0.16 ac C= 0.85

DA= 0.14 ac C= 0.85

DA= 0.13 ac C= 0.85

DA= 0.18 ac C= 0.85

DA= 0.14 ac C= 0.85

DA= 0.14 ac C= 0.85

DA= 0.14

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

MATCHLINE STA. 212+00

MATCHLINE STA. 504+00

DA= 0.60 ac
C= 0.35

DA= 0.35 ac
C= 0.65

DA= 0.12 ac
C= 0.35

END CONSTRUCTION
US 42
STA 509+60.00

0' 20' 40' 80' SCALE: 1"=50'

KY 536
DRAINAGE AREA MAP 5 OF 7
STA. 212+00 TO STA. 217+50

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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX

BEGIN CONSTRUCTION
PROJECT
STA 312+38.61

END CONSTRUCTION
PROJECT
STA 412+00

SCALE: 1"=50'

KY 536
DRAINAGE AREA MAP 6 OF 7
STA. 153+00 TO STA. 165+00

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DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	RXX



KY 536
DRAINAGE AREA MAP 7 OF 7
STA. 153+00 TO STA. 165+00

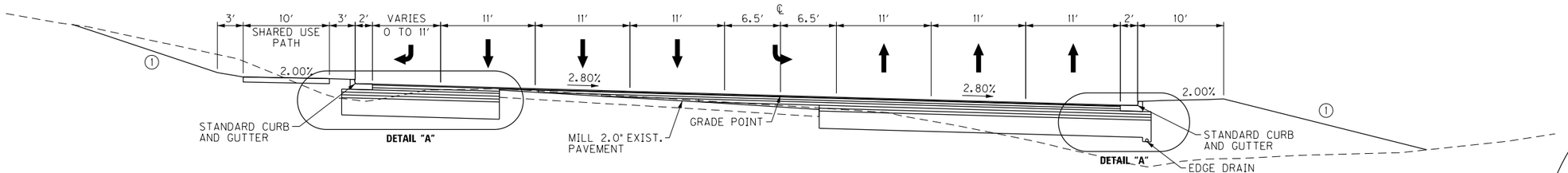
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DATE PLOTTED: September 16, 2015
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MicroStation v8.11.7.443

SECTION 4

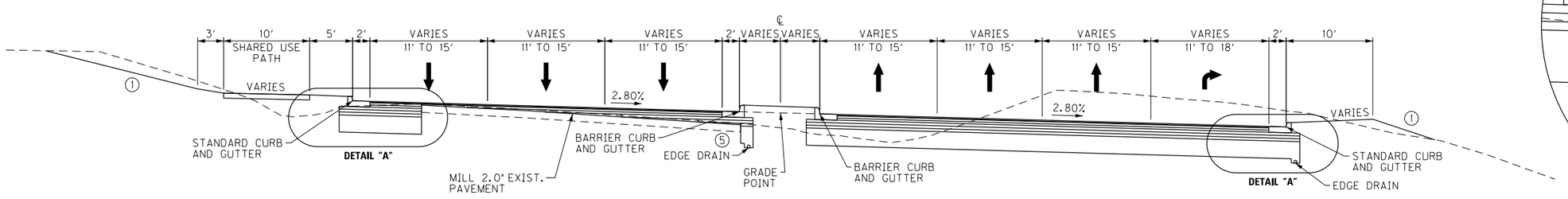
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COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2

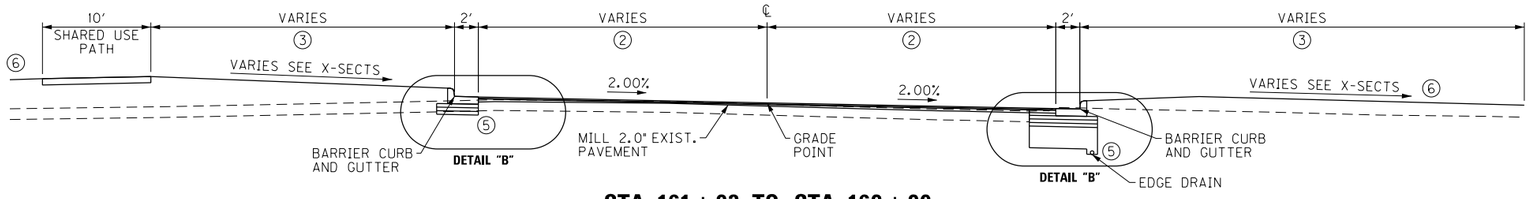
TYPICAL SECTIONS
KY 536



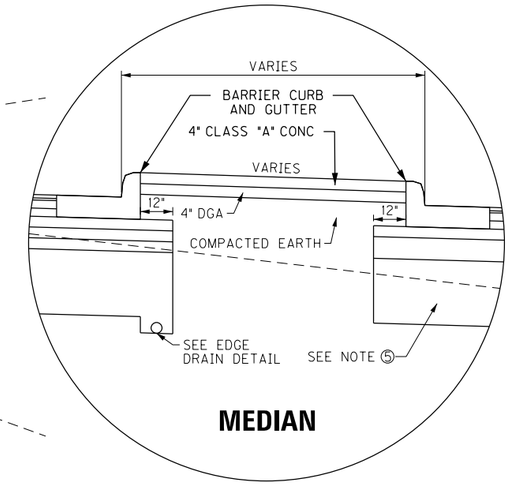
STA. 153 + 00 TO STA. 154 + 75



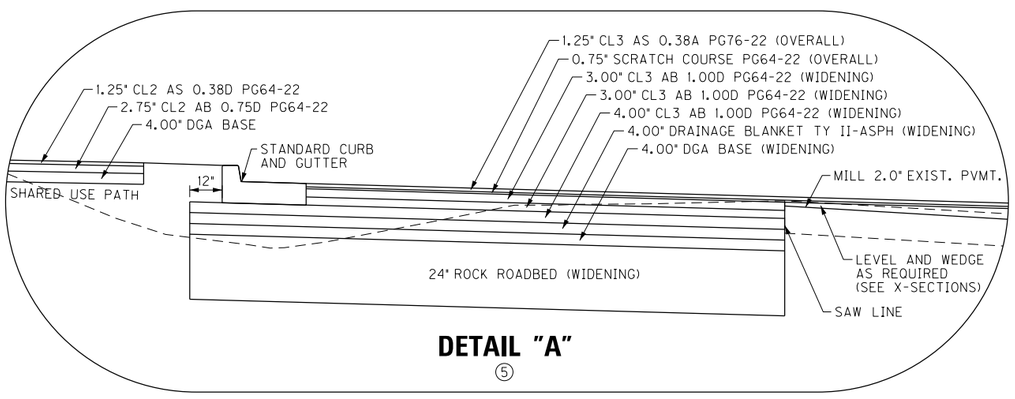
STA. 154 + 75 TO STA. 161 + 03



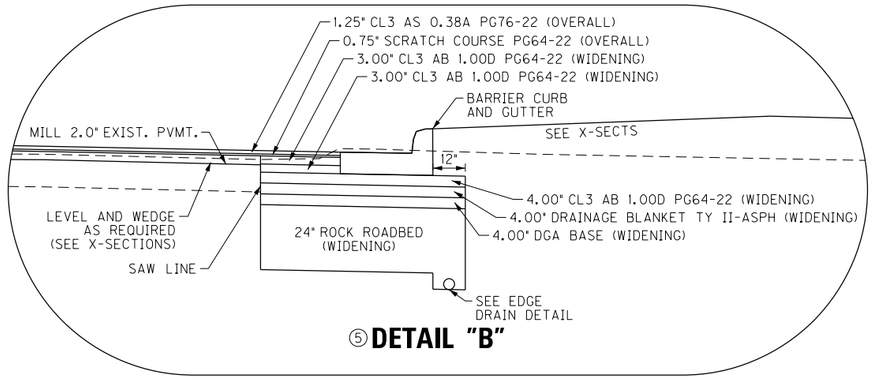
STA. 161 + 03 TO STA. 162 + 09



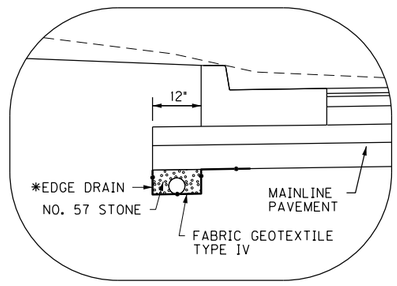
MEDIAN



DETAIL "A"
⑤



⑤ **DETAIL "B"**



EDGE DRAIN DETAIL

*THE FOLLOWING ITEMS ARE INCIDENTAL TO EDGE DRAIN PIPE INSTALLATION (SEE KYTC SPECS-SECT. 704): TRENCH EXCAVATION, MATERIALS FOR BEDDING AND BACKFILL, AND GEOTEXTILE FABRIC FOR WRAPPING PERFORATED PIPE OR FOR WRAPPING COARSE AGGREGATE BACKFILL.

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0′ SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

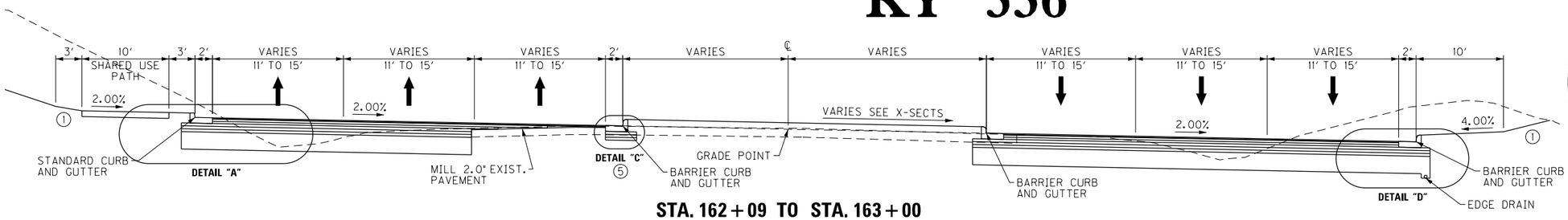
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TYPICAL SECTIONS

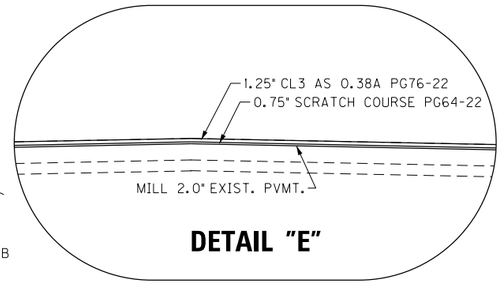
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USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2A

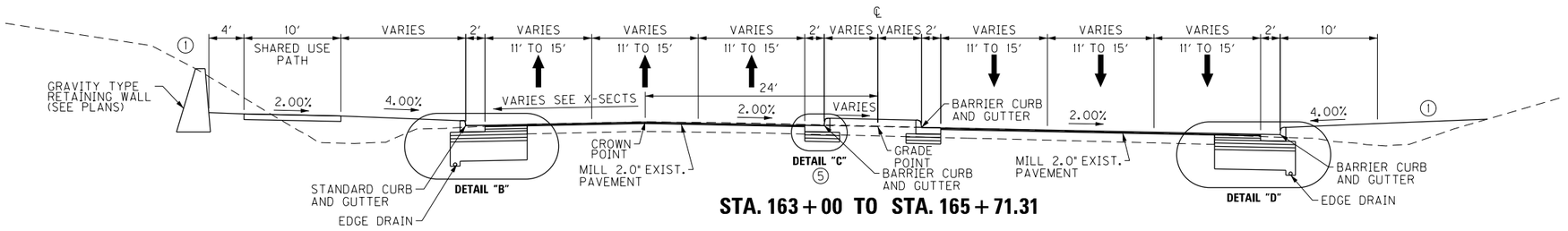
TYPICAL SECTIONS
KY 536



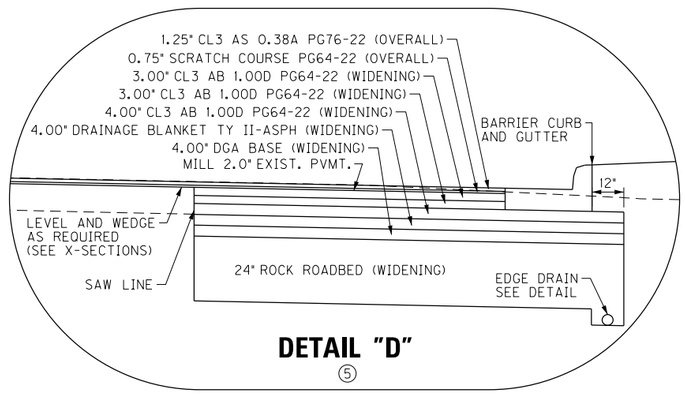
STA. 162+09 TO STA. 163+00



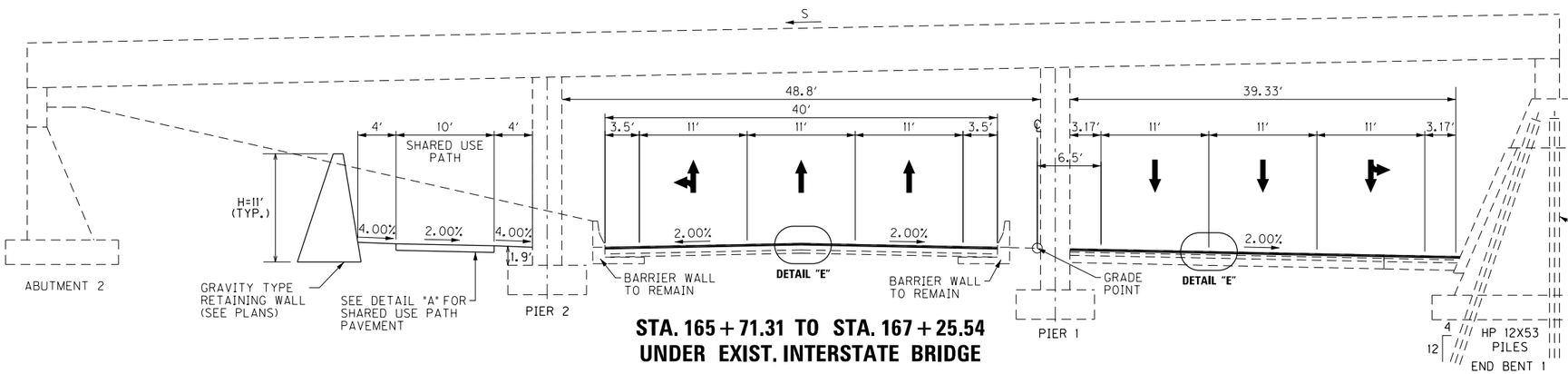
DETAIL "E"



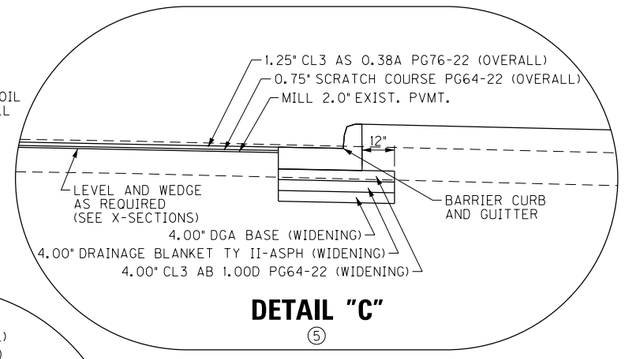
STA. 163+00 TO STA. 165+71.31



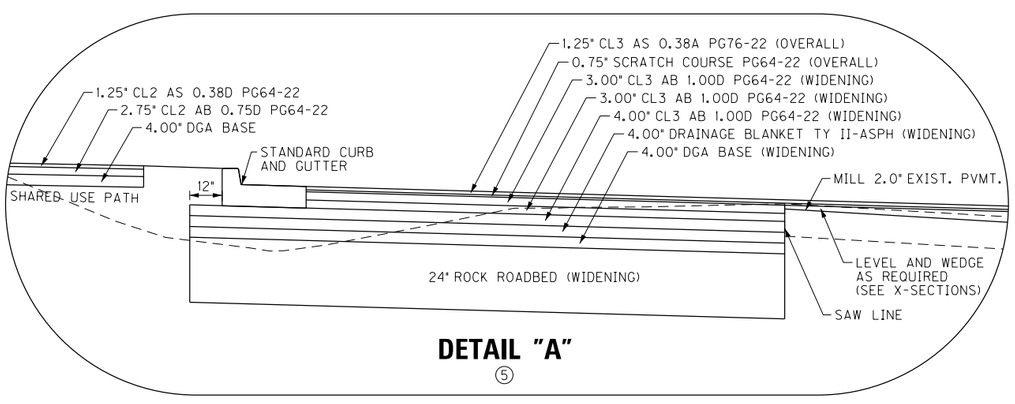
DETAIL "D"
⑤



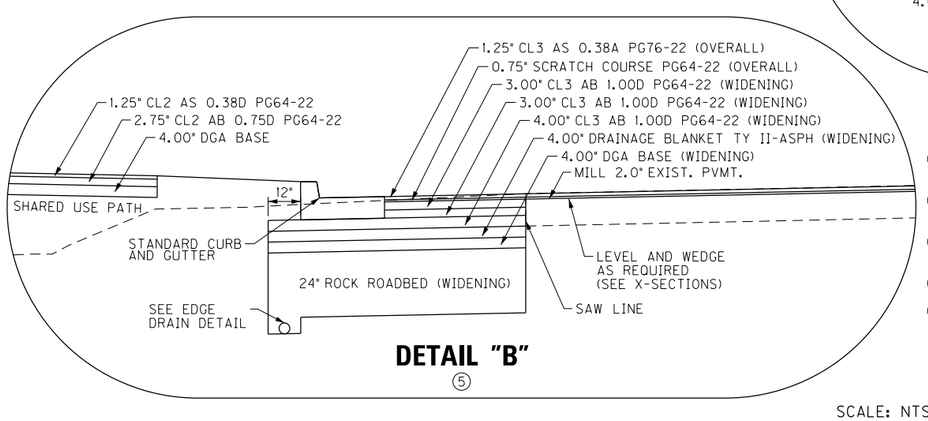
STA. 165+71.31 TO STA. 167+25.54
UNDER EXIST. INTERSTATE BRIDGE



DETAIL "C"
⑤



DETAIL "A"
⑤



DETAIL "B"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0' SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

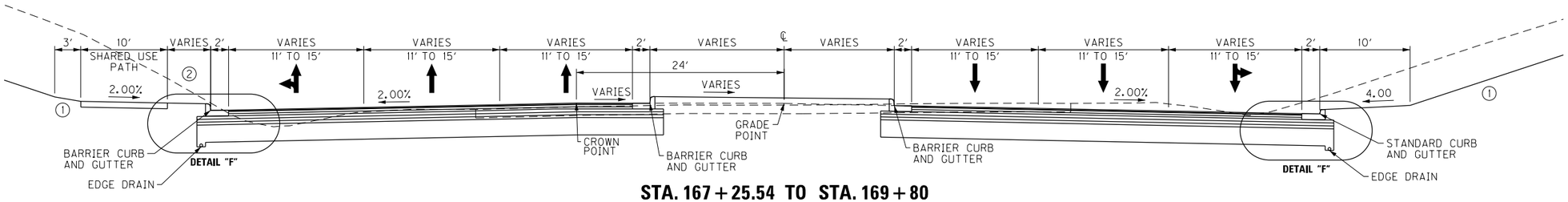
SCALE: NTS

TYPICAL SECTIONS

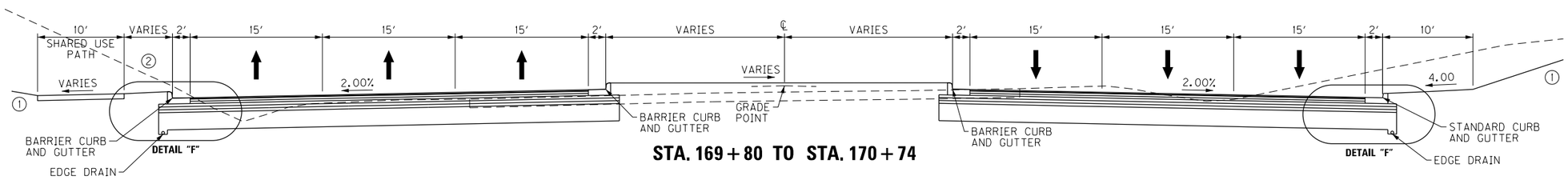
FILE NAME: V:\1785\ACTIVE\1785600I2\ROADWAY\PLAN SHEETS\TYPICALS.DGN
USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2B

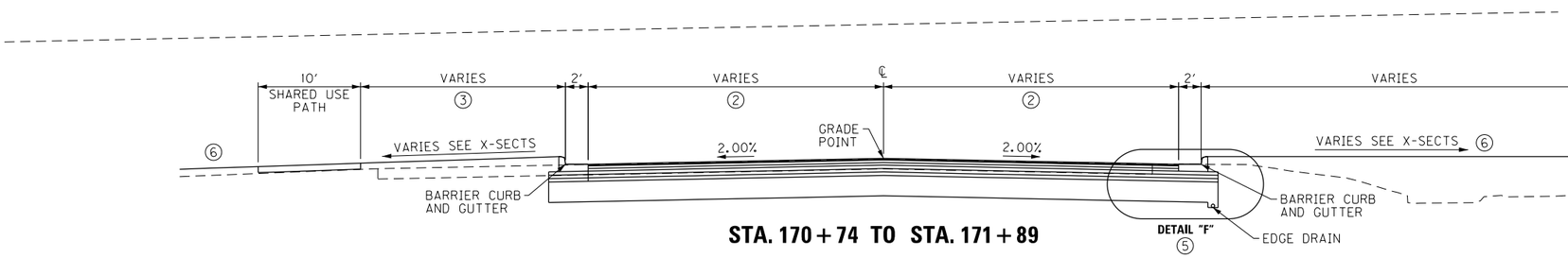
TYPICAL SECTIONS
KY 536



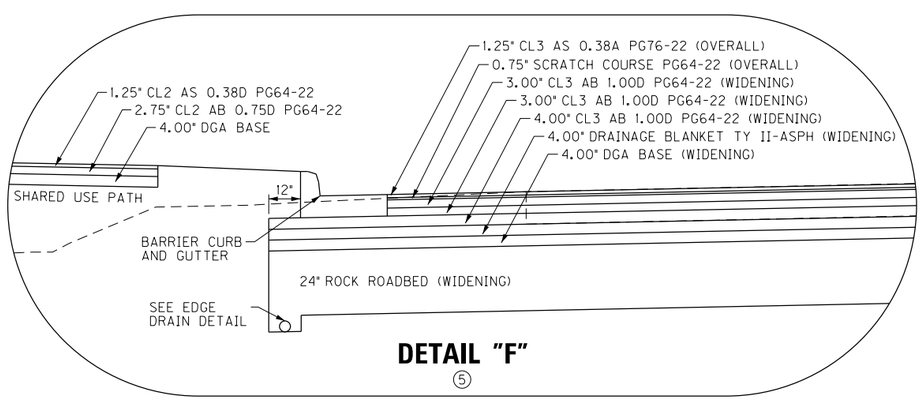
STA. 167 + 25.54 TO STA. 169 + 80



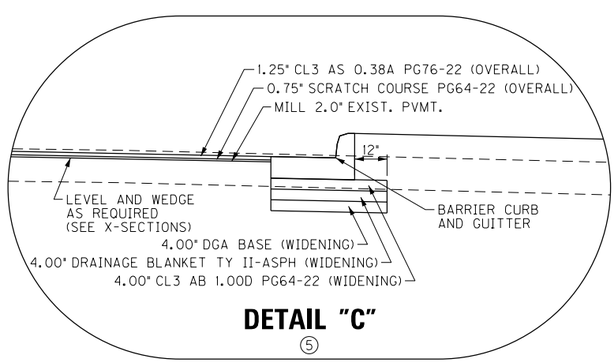
STA. 169 + 80 TO STA. 170 + 74



STA. 170 + 74 TO STA. 171 + 89



DETAIL "F"
⑤



DETAIL "C"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0′ SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

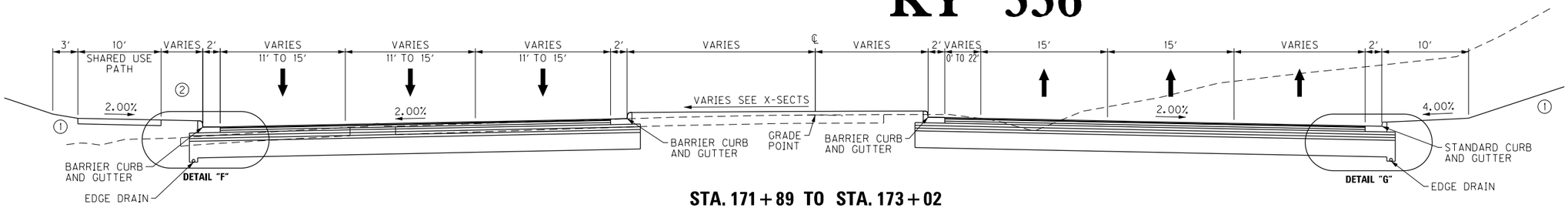
SCALE: NTS

TYPICAL SECTIONS

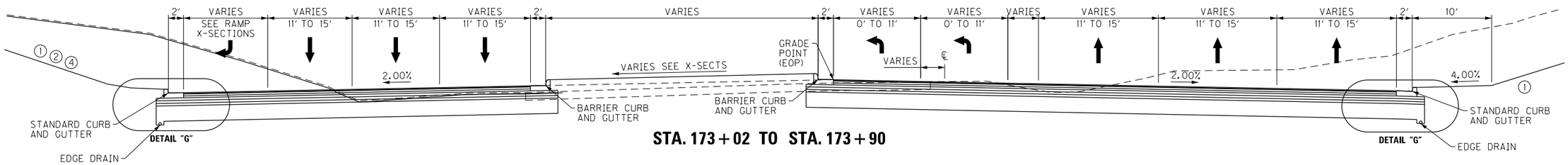
FILE NAME: V:\7856001\ROADWAY\PLAN SHEETS\TYPICALS.DGN
USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2C

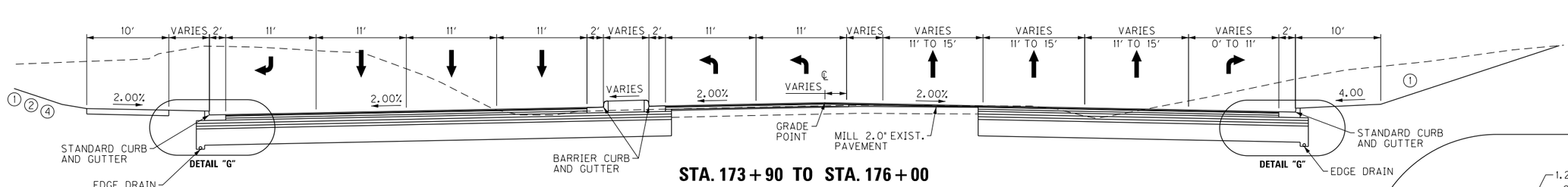
TYPICAL SECTIONS
KY 536



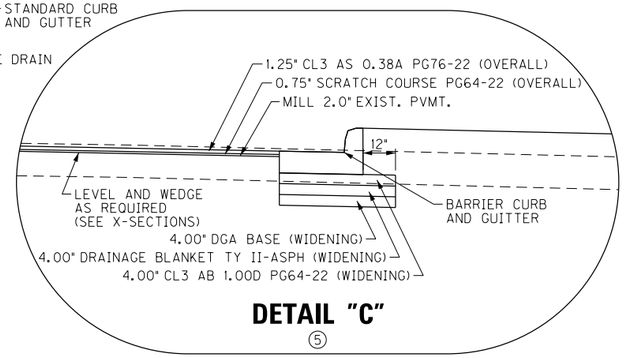
STA. 171+89 TO STA. 173+02



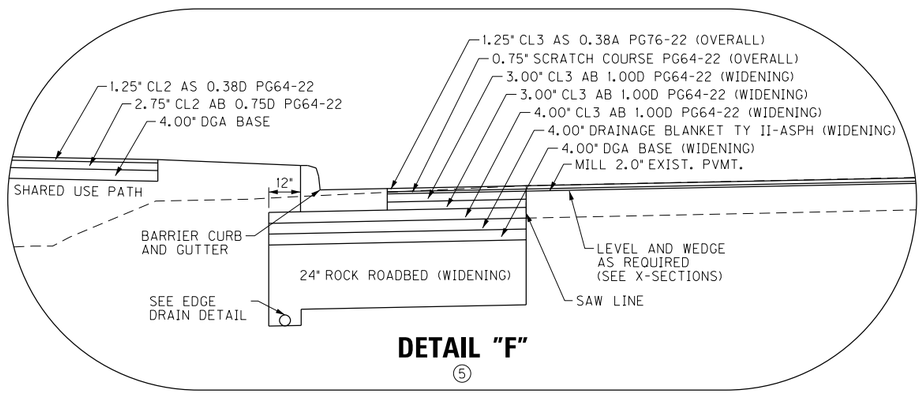
STA. 173+02 TO STA. 173+90



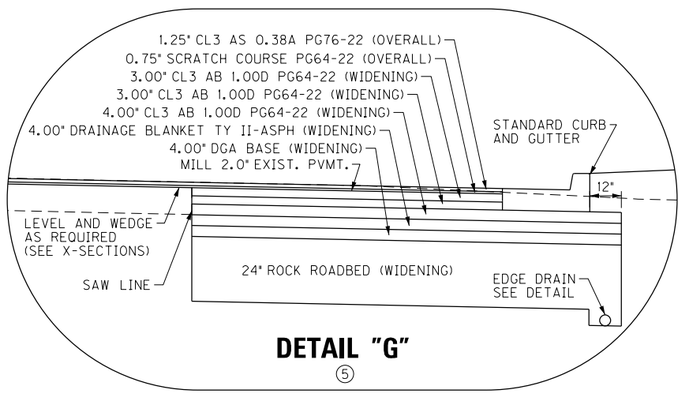
STA. 173+90 TO STA. 176+00



DETAIL "C"
⑤



DETAIL "F"
⑤



DETAIL "G"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0′ SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

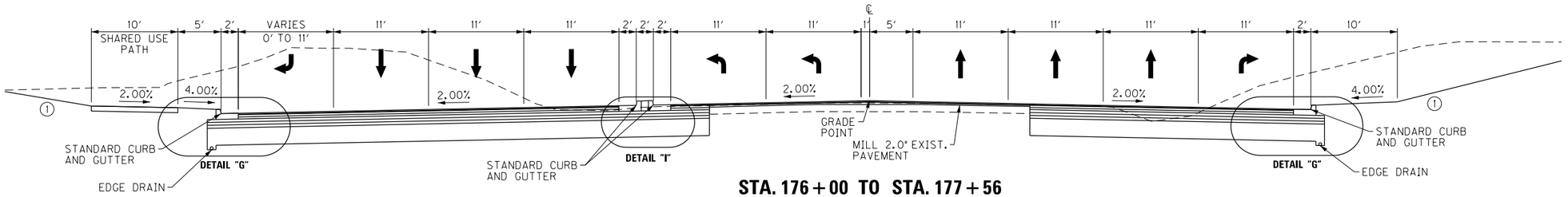
SCALE: NTS

TYPICAL SECTIONS

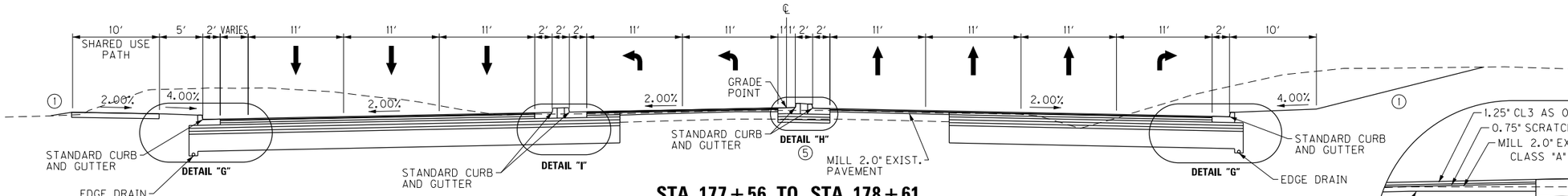
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USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2D

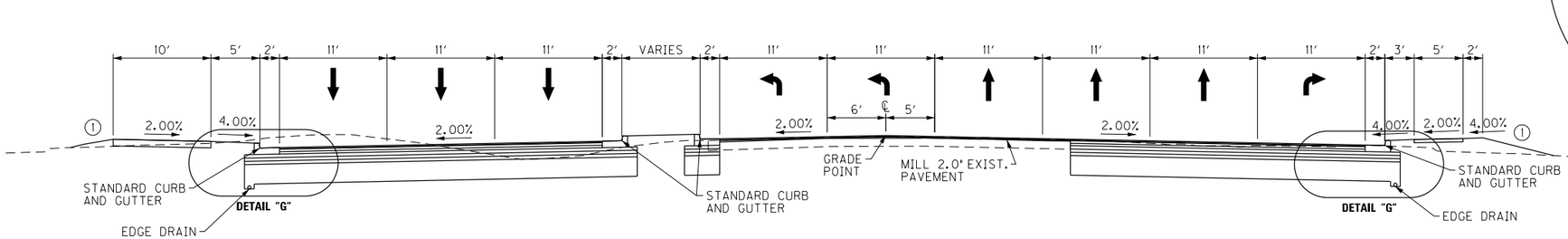
TYPICAL SECTIONS
KY 536



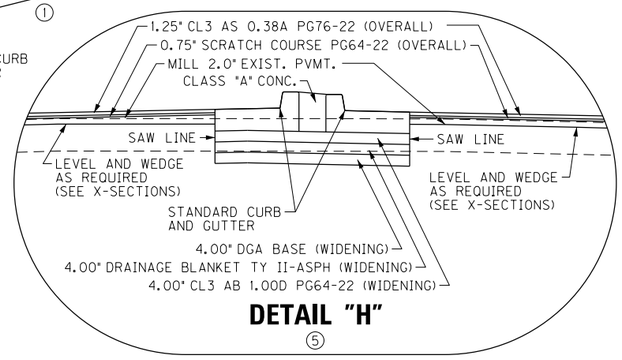
STA. 176+00 TO STA. 177+56



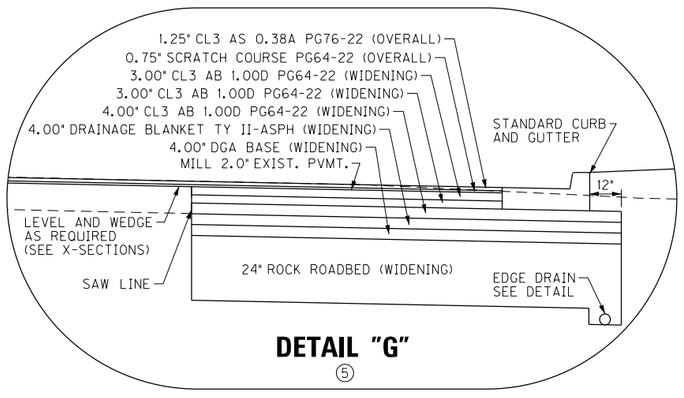
STA. 177+56 TO STA. 178+61



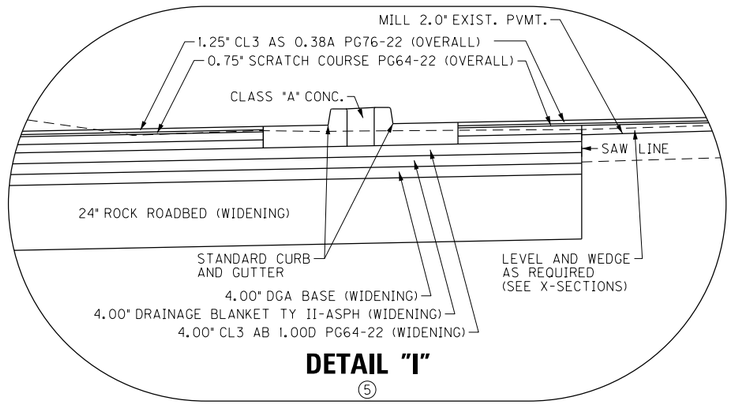
STA. 178+61 TO STA. 185+55



DETAIL "H"
⑤



DETAIL "G"
⑤



DETAIL "I"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0' SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

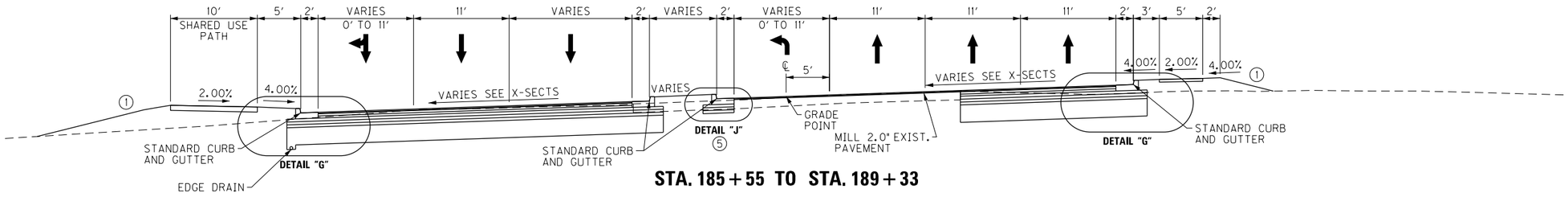
SCALE: NTS

TYPICAL SECTIONS

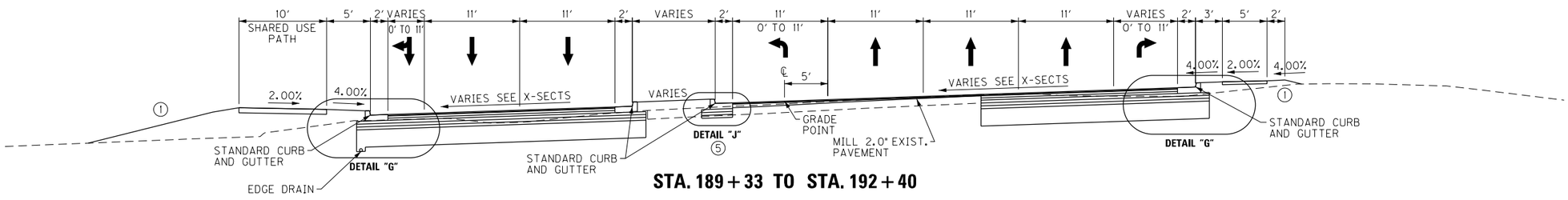
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USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2E

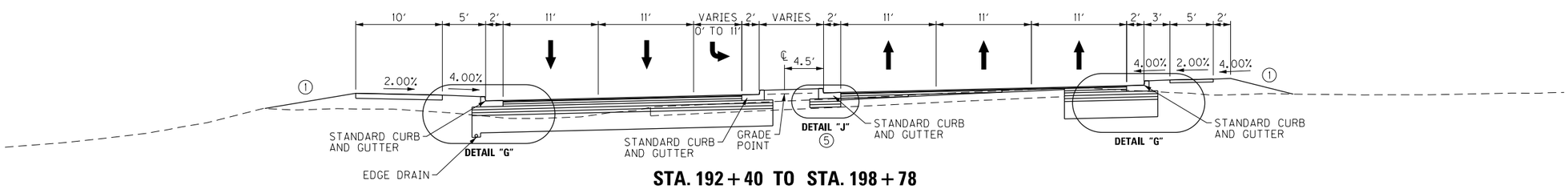
TYPICAL SECTIONS
KY 536



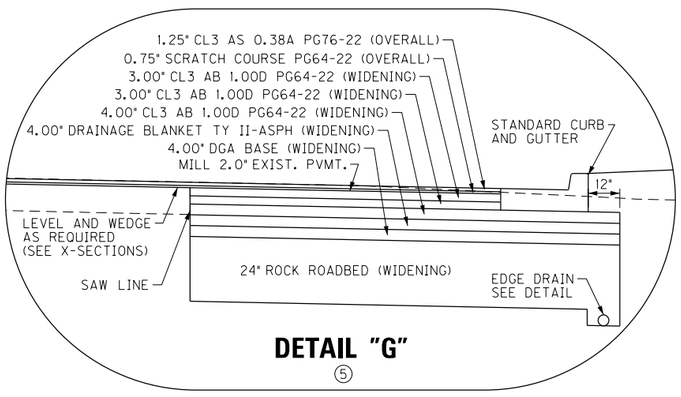
STA. 185 + 55 TO STA. 189 + 33



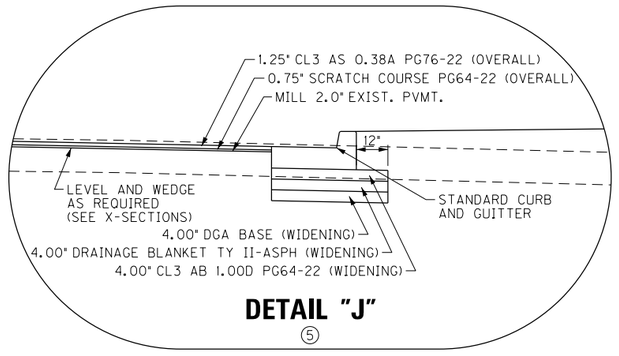
STA. 189 + 33 TO STA. 192 + 40



STA. 192 + 40 TO STA. 198 + 78



DETAIL "G"
5



DETAIL "J"
5

1. SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.
2. SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.
3. SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.
4. SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.
5. ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0' SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.
6. SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

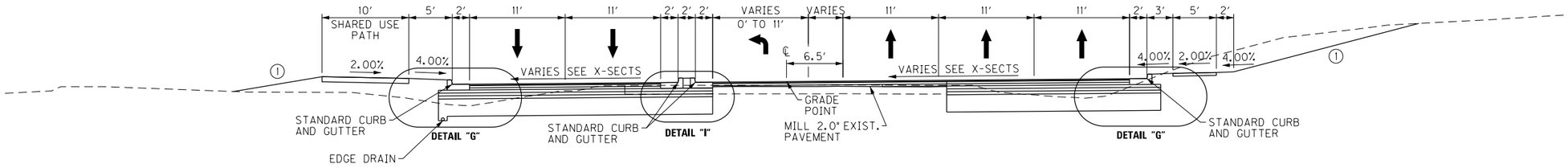
SCALE: NTS

TYPICAL SECTIONS

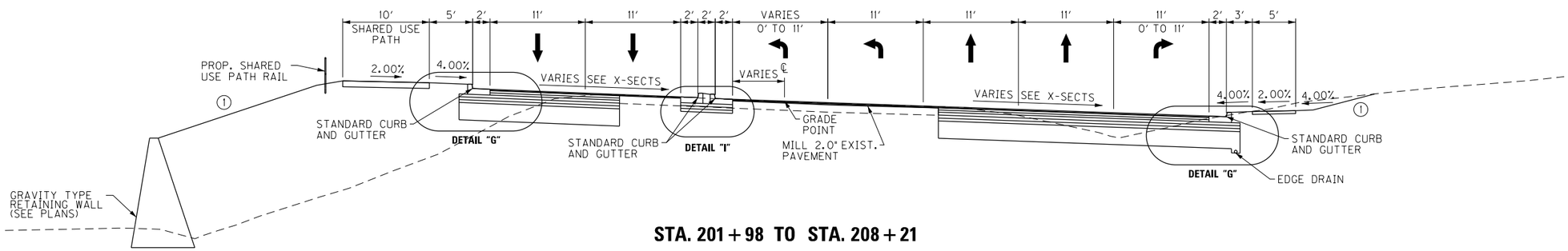
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USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2F

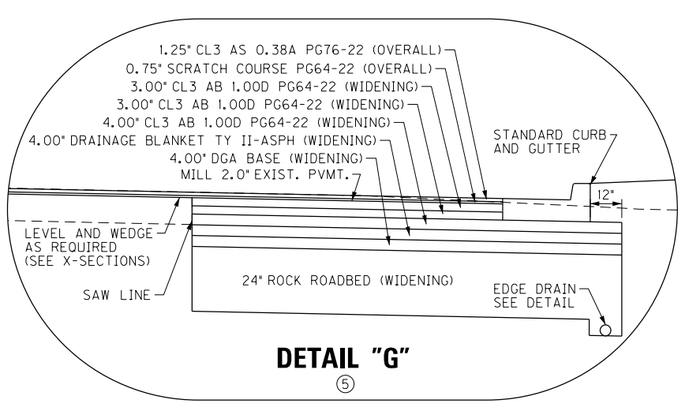
TYPICAL SECTIONS
KY 536



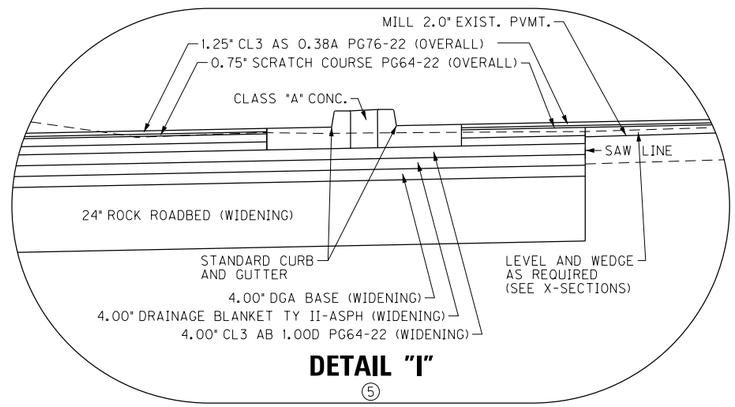
STA. 198 + 78 TO STA. 201 + 98



STA. 201 + 98 TO STA. 208 + 21



DETAIL "G"
⑤



DETAIL "I"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0' SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

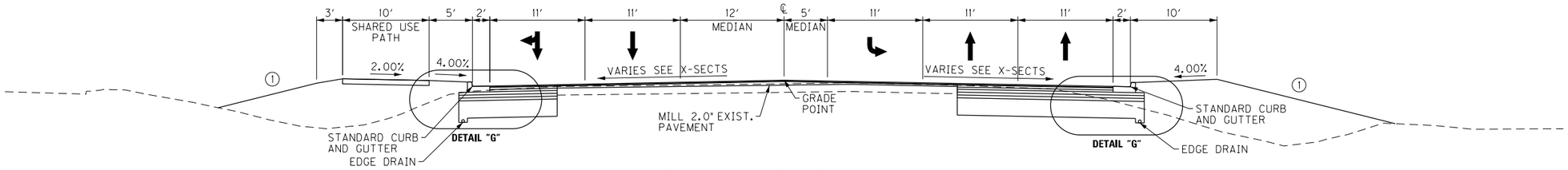
SCALE: NTS

TYPICAL SECTIONS

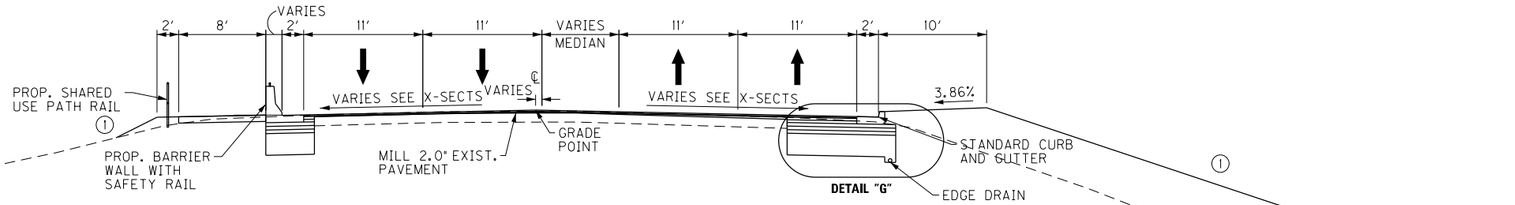
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USER: dhawkins
DATE PLOTTED: March 9, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2G

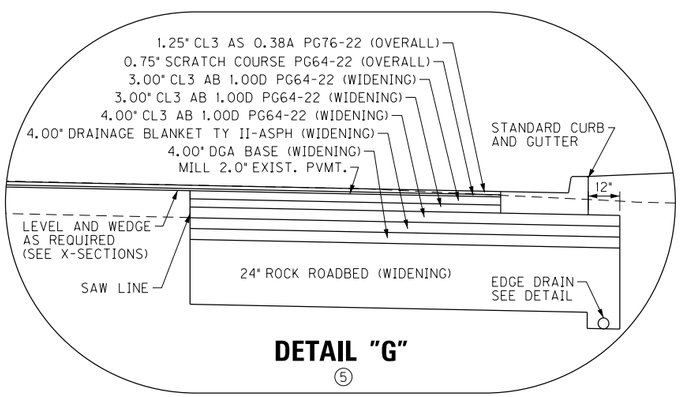
TYPICAL SECTIONS
KY 536



STA. 208 + 21 TO STA. 214 + 92



STA. 214 + 92 TO STA. 218 + 00



DETAIL "G"
⑤

① SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE SIDEWALK OR SHARED USE PATH BERM.

② SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ROADWAY, MEDIAN, AND SHARED USE PATH TRANSITIONS.

③ SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

④ SEE DETAIL SHEET XX FOR SHARED USE PATH DETAILS.

⑤ ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0′ SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

⑥ SEE PROPOSED RAMP TYPICAL SECTIONS AND CROSS SECTIONS FOR CONTINUATION OF PROPOSED SURFACE.

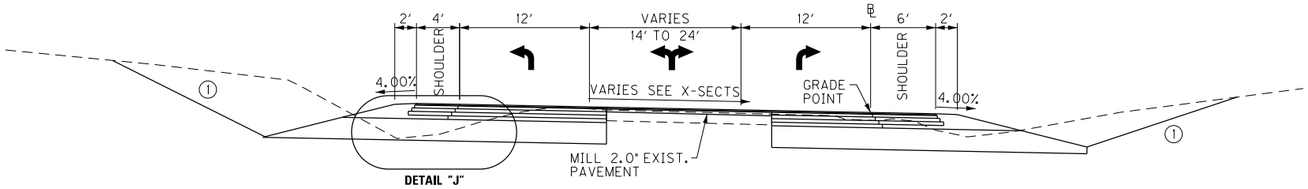
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TYPICAL SECTIONS

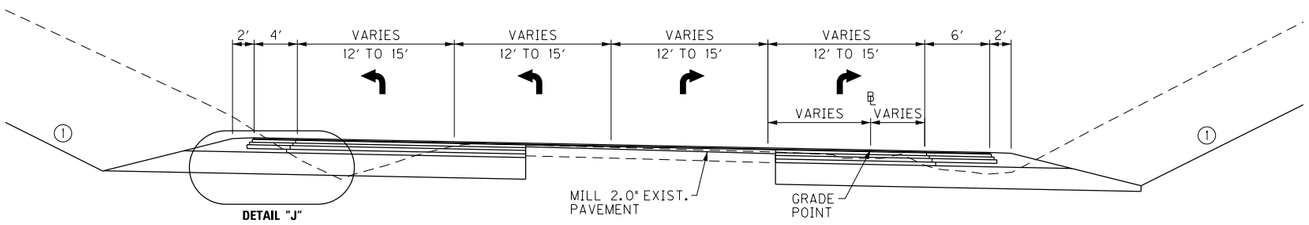
MicroStation v8.11.7.443 | E-SHEET NAME: | USER: dhawkins | DATE PLOTTED: March 9, 2015 | FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\TYPICALS.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R2H

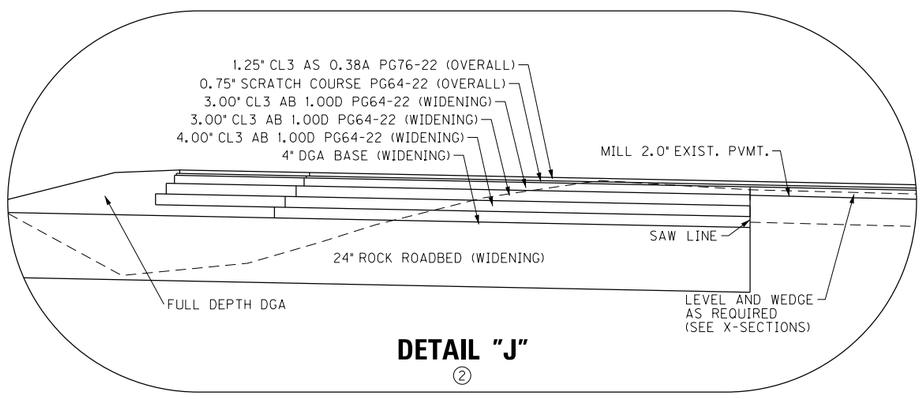
TYPICAL SECTIONS
RAMPS



RAMP F STA. 1614+00 TO STA. 1618+50



RAMP F STA. 1618+50 TO STA. 1620+60.95



DETAIL "J"
(2)

(1) SEE CROSS SECTIONS FOR CONSTRUCTION OUTSIDE THE LIMITS OF THE SHOULDERS.

(2) SEE DETAIL SHEETS AND CROSS SECTIONS FOR PROPOSED ISLAND, AND SHARED USE PATH DETAILS.

(3) ANY WIDENING OF EXISTING PAVEMENT OF LESS THAN 4.0' SHALL USE 10" PCC BASE INSTEAD OF ASPHALT BASE COURSES.

SCALE: NTS

TYPICAL SECTIONS

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dhawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856002\ROADWAY\PLAN SHEETS\TYPICALS.DGN

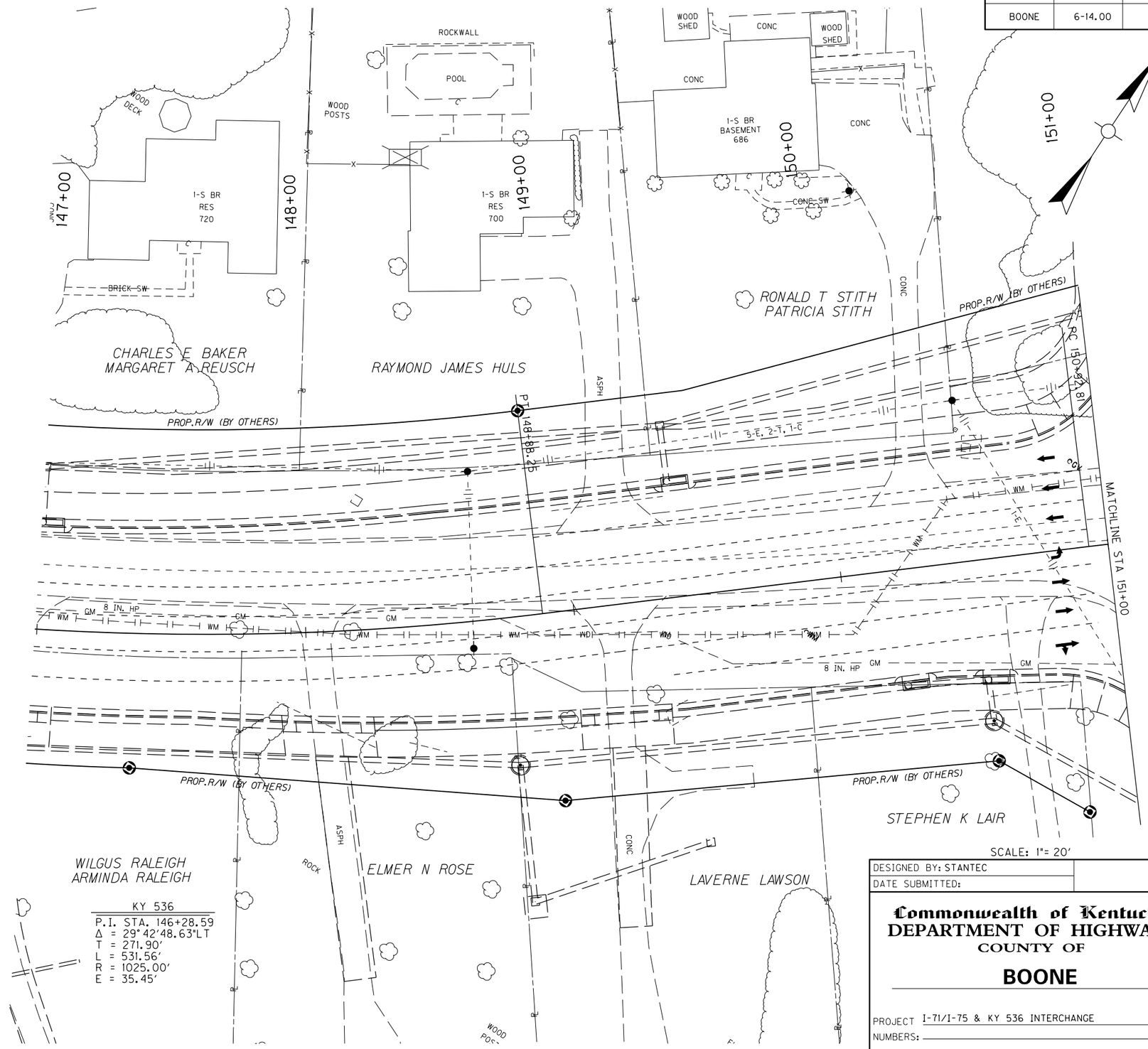
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R3

CONVENTIONAL SIGNS

SURVEY LINE
GRADE LINE
GROUND LINE
COUNTY LINE
CORPORATE LIMITS
EXIST. PROPERTY LINE
EXIST. RIGHT OF WAY & PROPERTY LINE
PROPOSED RIGHT OF WAY
RIGHT OF WAY MONUMENT
BENCH MARK
EXISTING R/W MARKER
RIGHT OF WAY MONUMENT EXISTING/PROPOSED
UTILITY TEST HOLE
EXISTING ROAD
RAILROAD
FENCE (CONTROLLED ACCESS)
FENCE (EXCEPT STONE AND HEDGE)
TREE LINE
TREES
PIPE CULVERT
CULVERT
BRIDGE
BUILDINGS
GUARDRAIL

	EXISTING	PROPOSED
LIGHTING POLE		
POWER POLE		
JOINT POWER & TELEPHONE POLE		
TELEPHONE & TELEGRAPH POLE		
ANCHOR, POWER OR TELEPHONE		
STUB POWER		
STUB TELEPHONE		
WATER MAIN	WM	6" WM
GAS MAIN	GM	6" GM
TELEPHONE DUCT	T	T
ELECTRIC DUCT	E	E
DIRECT BURIAL TV CABLE	TV	TV
SANITARY SEWER (WITH MANHOLE)	SAN	SAN
STORM SEWER (WITH MANHOLE)	STORM	STORM
DIRECT BURIAL ELECTRIC CABLE	E	E
DIRECT BURIAL TELEPHONE CABLE	T	T
OVERHEAD WIRE		
TRAFFIC LIGHTS		
ELECTRIC MANHOLE	EMH	EMH
TELEPHONE MANHOLE	TMH	TMH

STONE FENCE
HEDGE FENCE
SWAMP OR MARSH
SPRINGS
SINKHOLE
QUARRY SITE
BLUE LINE STREAM
INTERMITTENT STREAM OR DITCH
LAKES OR PONDS
REGULATED FLOODWAY
NORTH POINT



SCALE: 1"= 20'

DESIGNED BY: STANTEC	
DATE SUBMITTED:	

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS
COUNTY OF

BOONE

PROJECT NUMBERS: I-71/I-75 & KY 536 INTERCHANGE

KY 536
PLAN SHEET
STA 147+00 TO STA 151+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R3_PL_14700.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R4

DATUM

888 886 884 882 880 878 876 874 872 870 868 866 864 862 860 858 856 854

1.40%

MATCHLINE STA 151+00

EX. WATER LINE
ASSUMED ELEV.

EX. GAS LINE
ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

862.4	862.6	863.0	863.8	864.6	866.2	865.8	865.6	866.0	866.6	867.5	867.3	868.0	868.6	869.3	870.0	870.2	870.8	871.1	871.6	872.2	872.5	872.8	872.9	873.2	873.5
145+00	145+20	145+40	145+60	145+80	146+00	146+20	146+40	146+60	146+80	147+00	147+20	147+40	147+60	147+80	148+00	148+20	148+40	148+60	148+80	149+00	149+20	149+40	149+60	149+80	150+00

873.7	874.0	874.4	874.6	875.0
150+20	150+40	150+60	150+80	151+00

KY 536
PROFILE SHEET
STA 147+00 TO STA 151+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R4_PR_14700.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R5

BEGIN CONSTRUCTION
KY 536 STA 153+00
MATCH ITEM NO. 6-158
(CONSTRUCTION BY OTHERS)

FLORENCE BAPTIST CHURCH INC.

DONALD C.NEAL
BETTY NEAL

COMMONWEALTH OF KENTUCKY

PROP.R/W (BY OTHERS)

EXIST.& PROP.R/W

HIGHLAND DR

MATCHLINE STA. 151+00

MATCHLINE STA. 157+00

152+00 153+00 154+00 155+00 156+00

P.I. 155+26.00

O.E 880.09

Z 883.020

BOLLARD

WATER VAULT

24" CPP

24" CMP

6' CHAINLINK

SHARED USE PATH

STD. C&G

BARRIER C&G

KY - 536

REFLECTORS

RIP-RAP

GRAVEL

CONC

PROPOSED DRAINAGE BY OTHERS

8 IN. HP

5-E, 3-T, 1-C

BEGIN TAPER +25.20 -50.50'

BEGIN/END TAPER +04.99 -40.83'

BEGIN TAPER +76.02 0.51'

+76.22 3.50' 1' R

15:1 TAPER

END TAPER +81.11 -6.50'

BEGIN TAPER +08.35 39.50'

END TAPER +00.00 50.50'

8:1 TAPER

BEGIN TAPER +80.73 50.50'

01 02 03 12 13 14

11' 11' 11' 18'

DITCHES KY 536							
SIDE	STA.	TO	STA.	SIZE/TYPE	CHANNEL LINING		
					TYPE	DEPTH	QUANTITY
RT	153+50.00	-	157+00.00	2' FB SURF	TRM TY1	1.0'	281 SQYD
LT	153+50.00	-	157+00.00	2' FB SPCL	ECB	1.0'	380 SQYD

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	153+00.00	-	157+00.00	95
LT	153+00.00	-	157+00.00	161
RT	153+00.00	-	157+00.00	86

SHARED USE PATH KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	153+00.00	-	157+00.00	471

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
LT	153+00.00	-	157+00.00	417	-
MED	154+75.22	-	157+00.00	-	450
RT	153+00.00	-	157+00.00	385	-

KY 536
P.I. STA. 155+26.00
Δ = 45°49'13.81" RT
T = 433.19'
L = 819.71'
R = 1025.00'
E = 87.78'
e = 2.80%

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 151+00 TO STA 157+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R5_PL_15100.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R6

DATUM

BEGIN CONSTRUCTION
KY 536 STA 153+00
MATCH ITEM NO. 6-158
(CONSTRUCTION BY OTHERS)

VPI 153+61.61
Elev 879.16

VPI 154+26.98
Elev 880.34

VPI 156+61.98
Elev 883.60

1.39%

1.80%

1.39%

1.50%

1.40%

MATCHLINE STA 151+00

MATCHLINE STA 157+00

EX. WATER LINE
ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

| | | |

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R7

EXIST.& PROP.R/W

DITCHES KY 536							
SIDE	STA.	TO	STA.	SIZE/TYPE	CHANNEL LINING		
					TYPE	DEPTH	QUANTITY
RT	157+00.00	-	157+36.00	2' FB SURF	TRM TYI	1.0'	29 SQYD
RT	157+28.00	-	158+96.00	2' FB CONC	-	-	-
RT	158+96.00	-	10402+56•	2' FB SPCL	CLASS II	1.0'	210 TONS
LT	157+00.00	-	159+72.00	2' FB SPCL	ECB	1.0'	258 SQYD

KY 536
P.I. STA. 155+26.00
Δ = 45°49'13.81"RT
T = 433.19'
L = 819.71'
R = 1025.00'
E = 87.78'
e = 2.80%

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
LT	157+00.00	-	159+76.41	289	-
MED	160+82.05	-	162+34.51	-	170
MED	157+00.00	-	161+02.75	-	819
MED	162+09.23	-	163+00.00	-	190
RT	157+00.00	-	159+69.38	261	-
RT	159+92.33	-	163+00.00	-	328

•RAMP D ALIGNMENT
18" RCP
18" CPP
15" RCP
I.E. 895.47
O.E. 895.34
O.E. 896.00
O.E 895.29
O.E 883.22
ASPH
HIGHLAND
SIGN
CONC
157+00
158+00
159+00
160+00
161+00
162+00
163+00
RAMP F-1 STA 11623+19.14 = KY 536 WEST STA 159+76.41 69.63' LT
PT 11622+15.78
PT 159+12.52
4-E, 2-T, 1-C
WM
GV
GM
12"
SHARED USE PATH
STD. C&G
•SIGN
END TAPER +76.11 -46.86'
BEGIN TAPER +98.66 6.00'
4-E, 1-T, 1-C
@ CWV
RAMP F-1
BARRIER C&G
SOD
ASPH
RAMP F-2
PC 11621+05.66
PT 11621+83.03
PC 11622+04.93
+79.76 -167.57' 3.5' R
BEGIN TAPER +81.05 4.45'
END TAPER +34.54 2.00'
+31.07 -60.91' 3.5' R
+85.55 -60.78' 3.5' R
Z 891.810
S8°07'22"W
S86°24'17"W
END TAPER +68.74 2.00'
S84°42'09"E
MATCHLINE STA 157+00
MATCHLINE STA 163+00
BEGIN TAPER +88.12 6.56' HP
END TAPER +63.18 23.35'
NKC_034_ Z 887.680
O.E. 885.26
O.E 880.51
O.E 879.60
15" CMP
24" CMP
883.91
8 IN. HP
1-E
130°
+95.77 76.35' 3.5' R
END TAPER +69.38 89.98'
RAMP D-1
S65°38'45"E
PC 10400+74.80
2' FB SPCL. DT.
overflow structure
18" CMP
24" CMP RISER
2' FB CONC. DITCH
880
875
885
890
RAMP D-1 STA 10399+59.33 = KY 536 WEST STA 159+69.38
0' 20' 40' 80' SCALE: 1"= 20'

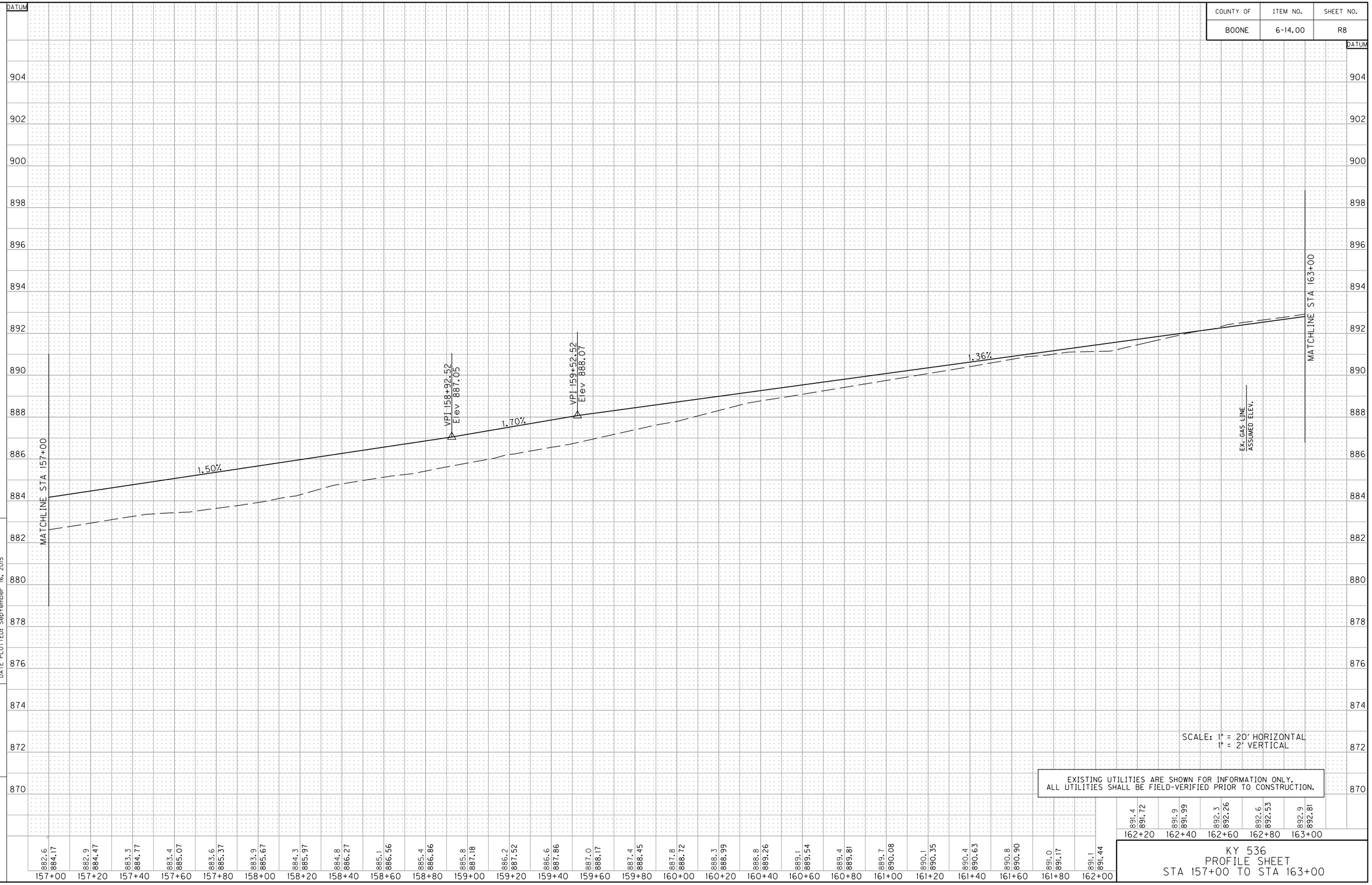
SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	157+00.00	-	160+90.95	91
LT	157+00.00	-	160+53.69	179
LT	162+40.90	-	163+00.00	15
LT	162+69.19	-	163+00.00	15
MED	161+01.00	-	162+20.60	77
MED	160+84.63	-	162+31.97	69
MED	161+11.76	-	163+00.00	99
RT	157+00.00	-	161+00.62	89

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	157+00.00	-	160+60.94	413	-	-	-
LT	160+49.47	-	160+65.02	-	6	1	24
LT	160+91.07	-	161+04.92	-	5	1	23
LT	160+94.98	-	162+24.72	137	-	-	-
LT	162+16.36	-	162+28.89	-	5	1	22
LT	162+58.88	-	162+73.26	-	6	1	24
LT	162+63.31	-	163+00.00	37	-	-	-

KY 536
PLAN SHEET
STA 157+00 TO STA 163+00

MicroStation v8.11.7.443 E-SHEET NAME: USER: cdawahare DATE PLOTTED: September 16, 2015 FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R7_PL_15700.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R8



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 157+00 TO STA 163+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R8_PR_15700.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R9

SHARED USE PATH KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	163+00.00	-	169+00.00	676

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	163+00.00	-	169+00.00	136
LT	163+00.00	-	169+00.00	135
LT	163+00.00	-	165+43.59	49
LT	167+43.93	-	169+00.00	37
MED	163+00.00	-	164+46.81	64
RT	163+23.41	-	165+74.29	59
RT	167+35.04	-	196+00.00	37

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
LT	163+00.00	-	165+43.59	246	-
MED	163+00.00	-	165+74.14	-	276
MED	167+24.12	-	169+00.00	-	176
MED	163+00.00	-	165+73.75	-	276
MED	167+24.37	-	169+00.00	-	176
RT	163+00.00	-	164+49.31	-	154
RT	167+35.00	-	169+00.00	167	-

RAMP F-2 STA 21622+62.01 = KY 536 WEST STA 163+07.58 66.28' LT

RAMP A-1 STA 11098+16.46 = KY 536 WEST STA 167+43.93 40.52' LT

RAMP D-2 STA 20398+33.80 = KY 536 WEST STA 165+74.29 39.50' RT

MATCHLINE STA 163+00

MATCHLINE STA 169+00

163+00 164+00 165+00 166+00 167+00 168+00 169+00

MOUNT ZION ROAD

S84° 42'09"E

S72° 21'52"W

RAMP D-2

RAMP A-1

RETAINING WALL

BRIDGE PIER

BARRIER WALL

SOIL NAIL WALL

SHARED USE PATH

CRASH CUSHION TY VI

BARRIER C&G

STD. C&G

RIP-RAP

SOD

ASPH

CONC FLUME

18"RCP

24" CMP

18" CMP

8 IN. HP

PI 20398+99.72

PC 20400+90.65

PT 20399+63.88

PI 11098+16.13

T/R 892.58 F/L 885.25

T/R 895.68 F/L 888.61

T/R 899.74 F/L 892.17

T/G 898.18 O.E. 893.00 I.E. 893.08

O.E 895.29

1 - T1 & T5 NBL

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 163+00 TO STA 169+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R9_PL_16300.DGN
USER: amclain
DATE PLOTTED: September 15, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R10

DATUM

EXISTING LOW BEAM
KY 536 STA 167+17.60
MINIMUM VERTICAL CLEARANCE = 15.81'

MATCHLINE STA 163+00

VPI 163+37.73
Elev 893.32

VPI 165+51.89
Elev 896.62

VPI 166+42.71
Elev 897.86

VPI 166+87.78
Elev 898.55

PVC 167+40.00
Elev 899.17

VPI 168+20.00
Elev 900.34

PVT 169+00.00
Elev 903.43

MATCHLINE STA 169+00

L 160 FT
SD 603 FT

1.36%
1.54%
1.37%
1.25%
1.46%

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

163+00	163+20	163+40	163+60	163+80	164+00	164+20	164+40	164+60	164+80	165+00	165+20	165+40	165+60	165+80	166+00	166+20	166+40	166+60	166+80	167+00	167+20	167+40	167+60	167+80	168+00
892.9	893.2	893.4	893.7	894.1	894.4	894.7	895.0	895.3	895.6	895.9	896.1	896.4	896.7	899.4	899.6	899.9	900.2	900.5	900.7	901.0	901.3	899.4	899.8	900.2	900.7
892.81	893.08	893.36	893.66	893.97	894.28	894.59	894.89	895.20	895.51	895.82	896.13	896.43	896.73	897.00	897.28	897.55	897.82	898.08	898.33	898.58	898.88	899.17	899.49	899.87	900.31

168+20	168+40	168+60	168+80	169+00
901.2	901.7	902.3	902.8	903.4
900.82	901.38	902.00	902.68	903.43

KY 536
PROFILE SHEET
STA 163+00 TO STA 169+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R10_PR_16300.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R11

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA	SIDEWALK 4 INCH CONC	RAMPS TYPE 1	DETECTABLE WARNINGS
				(SQYD)	(SQYD)	(EACH)	(SQFT)
LT	169+00.00	-	169+60.06	68	-	-	-
LT	169+49.75	-	169+62.30	-	5	1	20
LT	169+62.01	-	169+73.47	-	5	1	20
LT	169+63.82	-	172+31.85	287	-	-	-
LT	172+21.73	-	172+33.38	-	5	1	20
LT	172+31.26	-	172+42.32	-	5	1	20
LT	172+32.72	-	175+00.00	358	-	-	-

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA
				(SQYD)
LT	169+00.00	-	170+08.13	27
LT	169+00.00	-	169+53.01	28
LT	171+71.29	-	175+00.00	89
LT	172+41.14	-	175+00.00	128
MED	169+71.55	-	172+23.54	83
MED	169+12.15	-	172+56.16	157
MED	170+55.67	-	171+71.92	72
RT	169+00.00	-	170+14.72	26
RT	172+48.98	-	175+00.00	58

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD C&G	BARRIER C&G
				(LF)	(LF)
LT	169+09.75	-	172+58.78	-	370
LT	173+03.40	-	175+00.00	196	-
MED	169+00.00	-	170+78.18	-	368
MED	171+84.66	-	175+00.00	-	649
RT	169+00.00	-	170+14.72	117	-
RT	170+53.16	-	171+74.48	-	137
RT	172+49.46	-	175+00.00	257	-

SAINT ELIZABETH MEDICAL CENTER, INC

P 103

SHARED USE PATH

EXIST. & PROP. R/W

169+00

170+00

171+00

172+00

173+00

174+00

175+00

PC 11100+99.97

RAMP A-1

BEGIN TAPER +24.97 15.00'

END TAPER +99.97 20.00'

15:1 TAPER

N69°25'05"E

+13.00 65.75' 3.5' R

PC 169+89.32

END TAPER +04.96 -59.39'

CM END TAPER +30.35 -20.32'

S84°42'09"E

END TAPER +44.89 19.95'

END TAPER +22.10 60.42'

24" CMP

MATCHLINE STA 169+00

KY 536 WEST

P.I. STA. 171+72.04
Δ = 3°38'17.88"LT
T = 182.72'
L = 365.33'
R = 5753.14'
E = 2.90'
e = N/A

RAMP C-1 STA 10321+02.90 = KY 536 WEST STA 170+25.23 66.24' RT

PC 10319+88.66

N8°28'08"E

RAMP C-1

RWD SHLDR

ASPH

NB EXIT

RAMP C-2

PVD SHLDR

PI 10320+52.93

PI 171+72.04

PI 21101+16.28

CONC

SOD

BARRIER C&G

STD. C&G

RAMP A-2

RAMP A-2 STA 21099+58.43 = KY 536 WEST STA 173+03.40 96.34' LT

+55.23 -79.40' 3.5' R

+71.01 47.40' 3.5' R

T/G 898.18
I.E. 904.11
O.E. 903.95

I.E. 906.85

+56.55 62.01' 3.5' R

RAMP C-2 STA 20321+69.52 = KY 536 WEST STA 172+49.46 66.71' RT

PT 173+54.64

BEGIN TAPER +43.49 -26.15'

END TAPER +69.83 -29.00'

KY 536 WEST STA 173+54.64 = KY 536 EAST STA 173+54.64, 23.56' LT

S88°20'27"E

MATCHLINE STA 175+00

EXIST. ALLEN BLK. RET. WALL

RETAINING WALL

TMH #13269

HUT (WALK-IN)

ASPH

4-E, 1-T, 1-C

2-E, 1-T

DECK

A/G POOL

TRAMPOLINE

P 138

BILL C SHEHAN
FAYE SHEHAN

P 104

WAYNE SANDLIN
PHYLLIS SANDLIN

1-S BR

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 169+00 TO STA 175+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R11_PL_16900.DGN
USER: apousq
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R12

OVERHEAD UTILITY
ASSUMED ELEV.

KY 536 WEST STA 173+54.64 =
KY 536 EAST STA 173+54.64, 23.56' LT

VPI 173+54.64
Elev 921.13

VPI 173+54.64
Elev 920.98

3.86%

PVC 173+72.78
Elev 921.83

VPI 174+22.78
Elev 923.76

L 100 FT
SD 821 FT

EX. WATER LINE
ASSUMED ELEV.

PVT 174+72.78
Elev 924.99

2.46%

MATCHLINE STA 175+00

3.86%

MATCHLINE STA 169+00
PVT 169+00.00
Elev 903.43

EX. GAS LINE
ASSUMED ELEV.

903.4	904.0	904.6	905.3	906.0	906.6	907.3	908.1	908.8	909.5	910.3	911.2	912.1	912.8	913.7	914.4	915.1	915.8	916.6	917.4	918.1	918.9	919.7	919.9	920.7	921.4
903.43	904.20	904.97	905.74	906.51	907.29	908.06	908.83	909.60	910.38	911.15	911.92	912.69	913.46	914.24	915.01	915.78	916.55	917.33	918.10	918.87	919.64	920.41	921.34	922.11	922.83
169+00	169+20	169+40	169+60	169+80	170+00	170+20	170+40	170+60	170+80	171+00	171+20	171+40	171+60	171+80	172+00	172+20	172+40	172+60	172+80	173+00	173+20	173+40	173+60	173+80	174+00

922.2	922.9	923.5	924.1	924.8
923.50	924.11	924.67	925.17	925.66
174+20	174+40	174+60	174+80	175+00

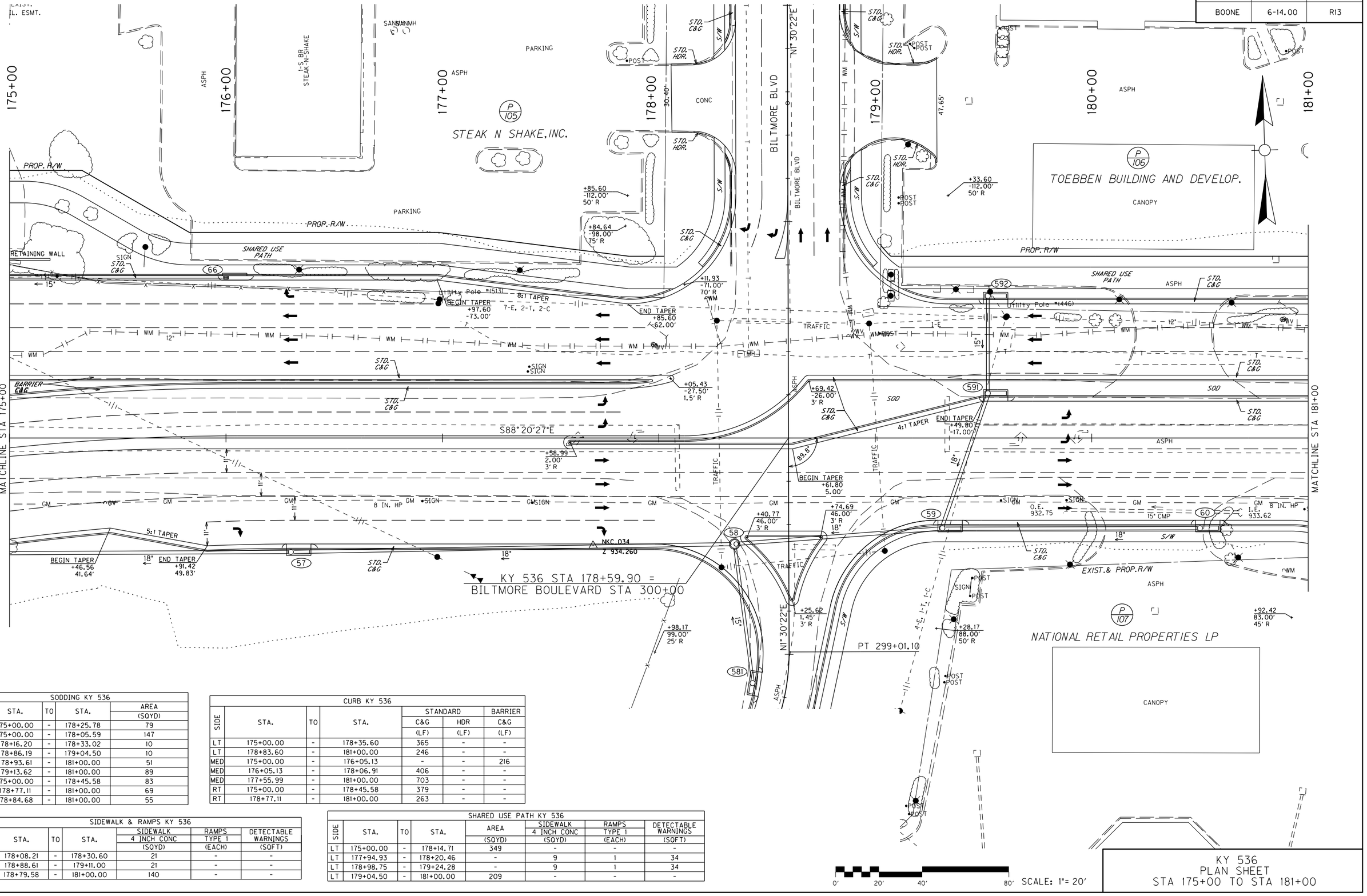
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 169+00 TO STA 175+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R12_PR_16900.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R13



SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	175+00.00	-	178+25.78	79
LT	175+00.00	-	178+05.59	147
LT	178+16.20	-	178+33.02	10
LT	178+86.19	-	179+04.50	10
LT	178+93.61	-	181+00.00	51
LT	179+13.62	-	181+00.00	89
RT	175+00.00	-	178+45.58	83
RT	178+77.11	-	181+00.00	69
RT	178+84.68	-	181+00.00	55

CURB KY 536						
SIDE	STA.	TO	STA.	STANDARD C&G (LF)	STANDARD HDR (LF)	BARRIER C&G (LF)
LT	175+00.00	-	178+35.60	365	-	-
LT	178+83.60	-	181+00.00	246	-	-
MED	175+00.00	-	176+05.13	-	-	216
MED	176+05.13	-	178+06.91	406	-	-
MED	177+55.99	-	181+00.00	703	-	-
RT	175+00.00	-	178+45.58	379	-	-
RT	178+77.11	-	181+00.00	263	-	-

SIDEWALK & RAMPS KY 536						
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	178+08.21	-	178+30.60	21	-	-
LT	178+88.61	-	179+11.00	21	-	-
RT	178+79.58	-	181+00.00	140	-	-

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	175+00.00	-	178+14.71	349	-	-	-
LT	177+94.93	-	178+20.46	-	9	1	34
LT	178+98.75	-	179+24.28	-	9	1	34
LT	179+04.50	-	181+00.00	209	-	-	-

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 175+00 TO STA 181+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R13_PL_17500.DGN
USER: dpousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R14

DATUM

OVERHEAD UTILITY
ASSUMED ELEV.

KY 536 STA 178+59.90 =
BILTMORE BLVD. STA 300+00

VPI 179+05.04
Elev 935.63

MATCHLINE STA 181+00

MATCHLINE STA 175+00

2.46%

PVC 177+05.04
Elev 930.71

L 400 FT
SD 716 FT

948 946 944 942 940 938 936 934 932 930 928 926 924 922 920 918 916 914

924.8	925.5	926.1	926.7	927.2	927.8	928.3	928.8	929.3	929.8	930.3	930.8	931.2	931.7	932.1	932.5	932.8	932.8	933.0	933.2	933.5	934.1	934.7	934.9	935.1	935.3
925.66	926.15	926.65	927.14	927.63	928.12	928.62	929.11	929.60	930.09	930.59	931.07	931.54	931.98	932.41	932.81	933.19	933.56	933.90	934.22	934.52	934.79	935.05	935.29	935.50	935.70
175+00	175+20	175+40	175+60	175+80	176+00	176+20	176+40	176+60	176+80	177+00	177+20	177+40	177+60	177+80	178+00	178+20	178+40	178+60	178+80	179+00	179+20	179+40	179+60	179+80	180+00

935.5	935.6	935.8	936.0	936.0
935.87	936.02	936.15	936.27	936.36
180+20	180+40	180+60	180+80	181+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 175+00 TO STA 181+00

FILE NAME: V:\17856001\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R14_PR_17500.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R15

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R15_PL_18100.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

P 106 TOEBBEN BUILDING AND DEVELOP.

P 139 TOEBBEN LTD.

BEGIN CONSTRUCTION TACO BELL ACCESS STA 100+11.70

I-S BLK TACO BELL

I-S BR PNC BANK

P 108 TOEBBEN LTD.

I-S BR THE BANK OF KENTUCKY

P 112 THE BANK OF KENTUCKY, INC.

KY 536 STA 182+32.00 = TACO BELL ACCESS STA 101+50

KY 536 STA 186+66.92 = FIFTH THIRD BANK ACCESS STA 100+00

SAM NEACE DR KY 3503

PROP. R/W

SHARED USE PATH

STD. C&G

STD. HDR.

SIDEWALK

SOD

ASPH

SIGN

FP

POST

SHERWOOD LAKES DR.

BRICK WALL

TEMP ESMT FOR BLDG. REMOVAL

END CONSTRUCTION SHERWOOD LAKES DR. STA 101+21.00

KY 536 STA 181+55.15 = SHERWOOD LAKES DR. STA 100+00

KY 536 STA 184+96.09 = SAM NEACE DR. STA 110+00

KY 536 STA 185+01.45 = INVESTMENT WAY STA 200+00

P 107 NATIONAL RETAIL PROPERTIES LP

P 110 FLEET DEVELOPMENT COMPANY, LLC

1-S ST

P 111 TRANSIT AUTHORITY OF NORTHERN KENTUCKY

P 113 FIFTH THIRD BANK, NORTHERN KENTUCKY, INC.

END CONSTRUCTION FIFTH THIRD BANK ACCESS STA. 100+91.61

P 114 B & G HOLDINGS, LLC

INVESTMENT WAY

DO NOT DISTURB EXIST. PIPE

PT 198+69.03

PT 198+49.33

PT 198+29.33

BEGIN TAPER

END TAPER

45:1 TAPER

4:1 TAPER

TRAFFIC

FIBER OPT RW MARKER

FIBER OPT Utility Pole (394)

Utility Pole (290)

Utility Pole (470)

MH

SANMH

CONC

CGV

OWM

WM

GM

SW

OHV

T

E

8 IN. HP

6 IN. HP

12" PVC

12" RCP

12" CPP

15" CMP

18" CMP (NO OUTLET)

MATCHLINE STA 181+00

MATCHLINE STA 187+00

SCALE: 1" = 20'

KY 536
PLAN SHEET
STA 181+00 TO STA 187+00

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R15A

ENTRANCES KY 536							
SIDE	STA.	WIDTH	SURFACE		PIPE		HDWL TYPE
		(LF)	TYPE	AREA (SQYD)	SIZE (IN)	LENGTH (FT)	EACH
LT	182+32.00	24	ASPH	304	-	-	-

SIDEWALK & RAMPS KY 536						
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	184+24.78	-	184+47.17	21	-	-
LT	185+29.17	-	185+50.84	21	-	-
RT	181+00.00	-	181+29.66	20	1	10
RT	181+43.59	-	181+66.72	12	2	24
RT	181+82.76	-	184+59.33	168	1	11
RT	185+30.51	-	186+40.81	72	1	18
RT	186+58.09	-	186+75.74	8	2	24
RT	186+94.16	-	187+00.00	3	1	14

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	181+00.00	-	182+10.17	117	-	-	-
LT	181+96.86	-	182+14.80	-	7	1	27
LT	182+49.20	-	182+67.14	-	7	1	27
LT	182+53.83	-	184+31.28	183	-	-	-
LT	184+11.50	-	184+37.03	-	9	1	34
LT	185+38.59	-	185+63.89	-	9	1	34
LT	185+44.35	-	187+00.00	165	-	-	-

CURB KY 536					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	181+00.00	-	182+18.00	144	-
LT	182+18.00	-	181+80.76	-	39
LT	181+80.94	-	181+95.96	-	86
LT	182+63.10	-	182+44.00	-	62
LT	182+44.00	-	184+52.17	254	-
LT	185+24.17	-	187+00.00	205	-
MED	181+00.00	-	184+31.82	668	-
MED	185+53.27	-	187+00.00	301	-
RT	181+00.00	-	181+37.91	102	-
RT	181+72.23	-	184+64.33	385	-
RT	185+25.51	-	186+41.57	150	-
RT	186+41.57	-	186+41.71	-	39
RT	186+86.75	-	186+93.38	-	45
RT	186+93.98	-	187+00.00	9	-

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	181+00.00	-	181+80.76	38
LT	181+00.00	-	182+04.92	50
LT	181+80.94	-	181+95.96	18
LT	182+63.10	-	184+42.17	63
LT	182+59.08	-	184+22.16	75
LT	184+32.77	-	184+49.59	10
LT	185+26.76	-	185+42.86	10
LT	185+34.17	-	187+00.00	42
LT	185+53.24	-	187+00.00	69
RT	181+00.00	-	181+26.39	9
RT	181+00.00	-	181+30.11	9
RT	181+43.03	-	181+67.27	7
RT	181+47.34	-	181+62.97	18
RT	181+86.18	-	184+61.74	82
RT	181+83.91	-	184+54.33	67
RT	185+28.10	-	186+32.66	35
RT	185+35.51	-	186+42.29	36
RT	186+57.54	-	186+76.30	5
RT	186+61.84	-	186+71.99	7
RT	186+86.75	-	187+00.00	11

KY 536
QUANTITY SHEET
STA 181+00 TO STA 187+00

MicroStation v8.11.7.443
E-SHEET NAME:
USER: cdawahare
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R15A_PL_1800.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R16

DATUM

952 950 948 946 944 942 940 938 936 934 932 930 928 926 924 922 920 918

MATCHLINE STA 181+00

L 400 FT
SD 716 FT

0.37%

PVT 181+05.04
Elev 936.37

PVC 181+53.49
Elev 936.55

KY 536 STA 181+55.15 =
SHERWOOD LAKES DR. STA 100+00

KY 536 STA 182+32.00 =
TACO BELL ACCESS STA 101+50

VPI 182+53.49
Elev 936.92

L 200 FT
SD 1180 FT

PVT 183+53.49
Elev 936.30

-0.63%

PVC 184+41.48
Elev 935.74

KY 536 STA 184+96.09 =
SAM NEACE DR. STA 110+00

KY 536 STA 185+01.45 =
INVESTMENT WAY STA 200+00

L 300 FT
SD 806 FT

LO 185+68.19
Elev 935.35

VPI 185+91.48
Elev 934.80

KY 536 STA 186+66.92 =
FIFTH THIRD BANK ACCESS STA 100+00

MATCHLINE STA 187+00

EX. WATER LINE
ASSUMED ELEV.

EX. TELEPHONE CABLE &
CONDUIT ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

EX. GAS LINE
ASSUMED ELEV.

	181+00	181+20	181+40	181+60	181+80	182+00	182+20	182+40	182+60	182+80	183+00	183+20	183+40	183+60	183+80	184+00	184+20	184+40	184+60	184+80	185+00	185+20	185+40	185+60	185+80	186+00
EXISTING	936.0	936.1	936.2	936.3	936.3	936.4	936.4	936.4	936.3	936.3	936.3	936.2	936.1	935.9	935.8	935.7	935.5	935.2	934.8	934.8	934.8	934.7	934.9	935.0	935.0	935.0
PROPOSED	936.36	936.43	936.50	936.58	936.63	936.67	936.69	936.69	936.67	936.62	936.56	936.48	936.38	936.26	936.13	936.00	935.88	935.75	935.64	935.54	935.46	935.40	935.37	935.35	935.35	935.37

	186+20	186+40	186+60	186+80	187+00
EXISTING	935.1	935.2	935.2	935.3	935.4
PROPOSED	935.41	935.47	935.55	935.66	935.78

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

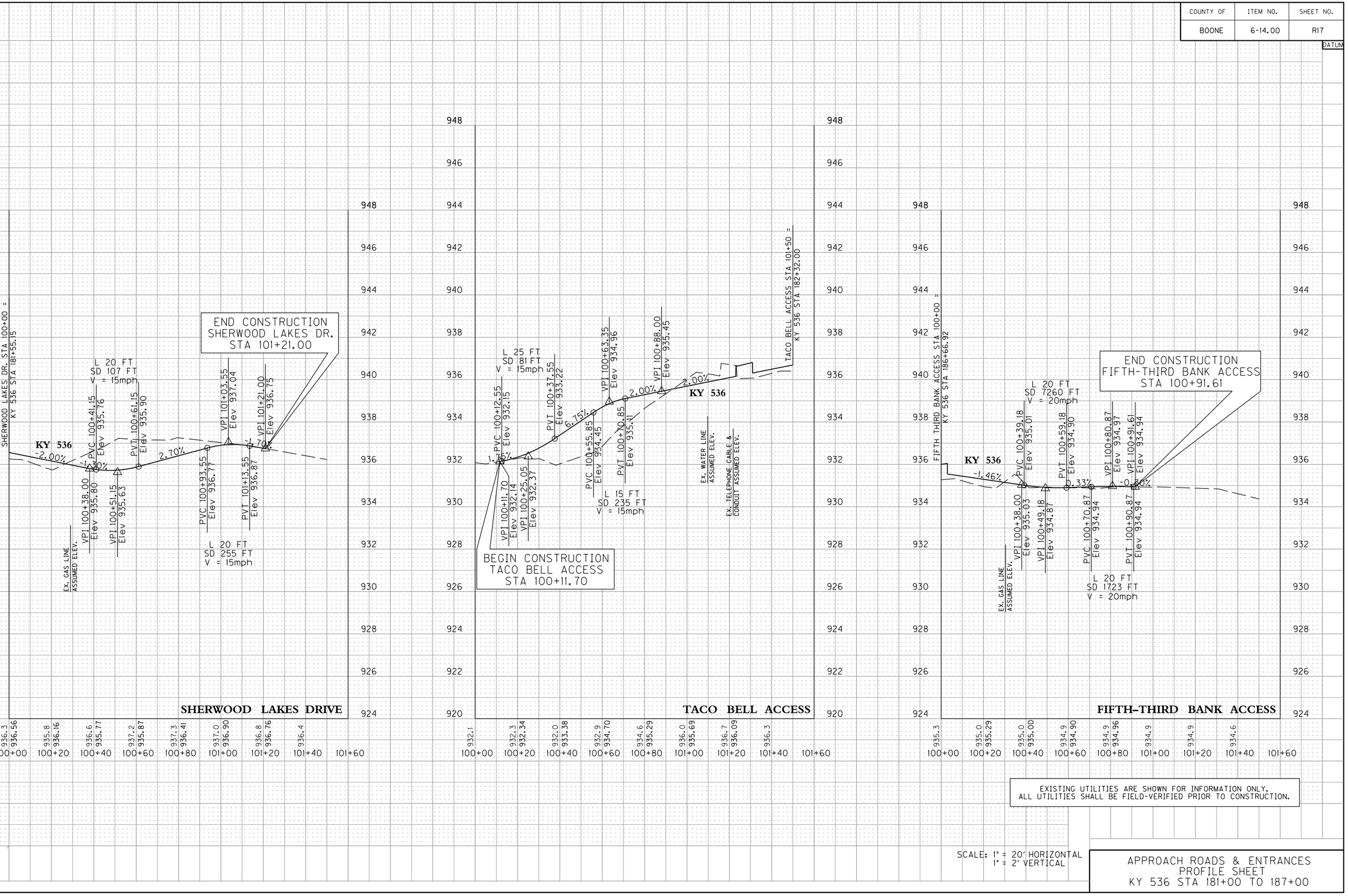
KY 536
PROFILE SHEET
STA 181+00 TO STA 187+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R16_PR_18100.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R17

DATUM

FILE NAME: V:\17856001\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R17_PR_APPROACHES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES PROFILE SHEET
KY 536 STA 181+00 TO 187+00

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R18

BERBERICH DRIVE
P.I. STA. 100+40.97
Δ = 10°15'15.26"RT
T = 17.94'
L = 35.79'
R = 200.00'
E = 0.80'
V = 25mph
e = SEE XS

KY 536
P.I. STA. 190+39.53
Δ = 15°29'00.09"LT
T = 190.32'
L = 378.33'
R = 1400'
E = 12.88'
e = 3.40%

BEGIN CONSTRUCTION
BERBERICH DRIVE
STA 100+11.00

KY 536 STA 191+79.16 =
BERBERICH DRIVE STA 101+50

KY 536 STA 188+70.27 =
DEMIA WAY STA 100+00

KY 536 STA 191+66.01 =
LAKESIDE DRIVE STA 100+00

DEMIA WAY
P.I. STA. 100+95.73
Δ = 6°30'58.90"RT
T = 11.39'
L = 22.75'
R = 200.00'
E = 0.32'
V = 25mph
e = SEE XS

LAKESIDE DRIVE
P.I. STA. 100+83.53
Δ = 14°58'08.30"RT
T = 26.28'
L = 52.25'
R = 200.00'
E = 1.72'
V = 25mph
e = SEE XS

END CONSTRUCTION
DEMIA WAY
STA 101+35.89

END CONSTRUCTION
LAKESIDE DRIVE
STA 101+34.00

TRIPLE CROWN MANAGEMENT CORP.

TOLL ROAD PROPERTIES, LLC

WD FLORENCE PORTFOLIO, L.P.

B & G HOLDINGS, LLC

HALL INVESTMENTS, LLC

GREENLAWN WHITE PINES, LLC

KY 536
PLAN SHEET
STA 187+00 TO STA 193+00

SCALE: 1"= 20'

FILE NAME: V:\17856\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R18_PL_18700.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R18A

SIDEWALK & RAMPS KY 536							
ALIGNMENT	SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
KY 536	LT	191+26.55	-	191+51.46	24	-	-
BERBERICH DR	RT	100+11.00	-	100+57.03	23	-	-
BERBERICH DR	LT	100+11.00	-	100+65.69	33	-	-
KY 536	LT	192+12.04	-	192+34.60	20	-	-
KY 536	RT	187+00.00	-	188+44.51	84	1	10
KY 536	RT	188+58.13	-	188+81.27	12	2	24
KY 536	RT	188+94.85	-	191+45.80	167	2	10
LAKESIDE DR	RT	101+01.19	-	101+34.00	14	-	-
LAKESIDE DR	LT	100+66.90	-	101+34.00	35	-	-
KY 536	RT	191+86.50	-	193+00.00	73	1	10

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	187+00.00	-	191+33.41	461	-	-	-
LT	191+12.25	-	191+39.47	-	9	1	34
LT	192+22.15	-	192+47.60	-	9	1	34
LT	192+28.11	-	193+00.00	72	-	-	-

STANDARD CURB & GUTTER KY 536					
ALIGNMENT	SIDE	STA.	TO	STA.	LENGTH (LF)
KY 536	LT	187+00.00	-	191+56.80	481
BERBERICH DR	RT	100+11.00	-	100+57.03	42
BERBERICH DR	LT	100+11.00	-	100+65.69	59
KY 536	LT	192+06.73	-	193+00.00	120
KY 536	MED	187+00.00	-	191+22.37	848
KY 536	MED	192+38.97	-	193+00.00	126
KY 536	RT	187+00.00	-	188+52.08	182
KY 536	RT	188+87.76	-	191+50.21	329
KY 536	RT	191+81.93	-	193+00.00	133

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	187+00.00	-	191+41.75	111
LT	187+00.00	-	191+23.47	206
LT	191+34.97	-	191+49.69	23
LT	192+05.68	-	192+26.58	25
LT	192+13.50	-	193+00.00	36
LT	192+37.24	-	193+00.00	28
RT	187+00.00	-	188+41.24	38
RT	187+00.00	-	188+49.85	50
RT	188+57.61	-	188+81.77	7
RT	188+61.70	-	188+77.78	22
RT	188+97.96	-	191+26.20	64
RT	188+83.15	-	191+39.58	89
RT	191+30.73	-	191+47.80	12
RT	191+84.30	-	192+01.16	7
RT	192+05.73	-	193+00.00	25
RT	191+67.68	-	193+00.00	43

KY 536
QUANTITY SHEET
STA 187+00 TO STA 193+00

MicroStation v8.11.7.443
E-SHEET NAME:
USER: cdawahare
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856002\ROADWAY\PLAN SHEETS\R18A_PL_18700.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R19

DATUM

952 950 948 946 944 942 940 938 936 934 932 930 928 926 924 922 920 918

MATCHLINE STA 187+00

L 300 FT
SD 806 FT

PVT 187+41.48
Elev 936.09

0.86%

KY 536 STA 188+70.27 =
DEMIA WAY STA 100+00

PVC 188+74.48
Elev 937.23

EX. WATER LINE
ASSUMED ELEV.

VPI 189+24.48
Elev 937.66

L 100 FT
SD 3000 FT

PVT 189+74.48
Elev 937.91

0.49%

KY 536 STA 191+66.01 =
LAKESIDE DRIVE STA 100+00

PVC 191+74.30
Elev 938.89

KY 536 STA 191+79.16 =
BERBERICH DRIVE STA 101+50

L 100 FT
SD 1341 FT

VPI 192+24.30
Elev 939.14

PVT 192+74.30
Elev 939.53

0.78%

MATCHLINE STA 193+00

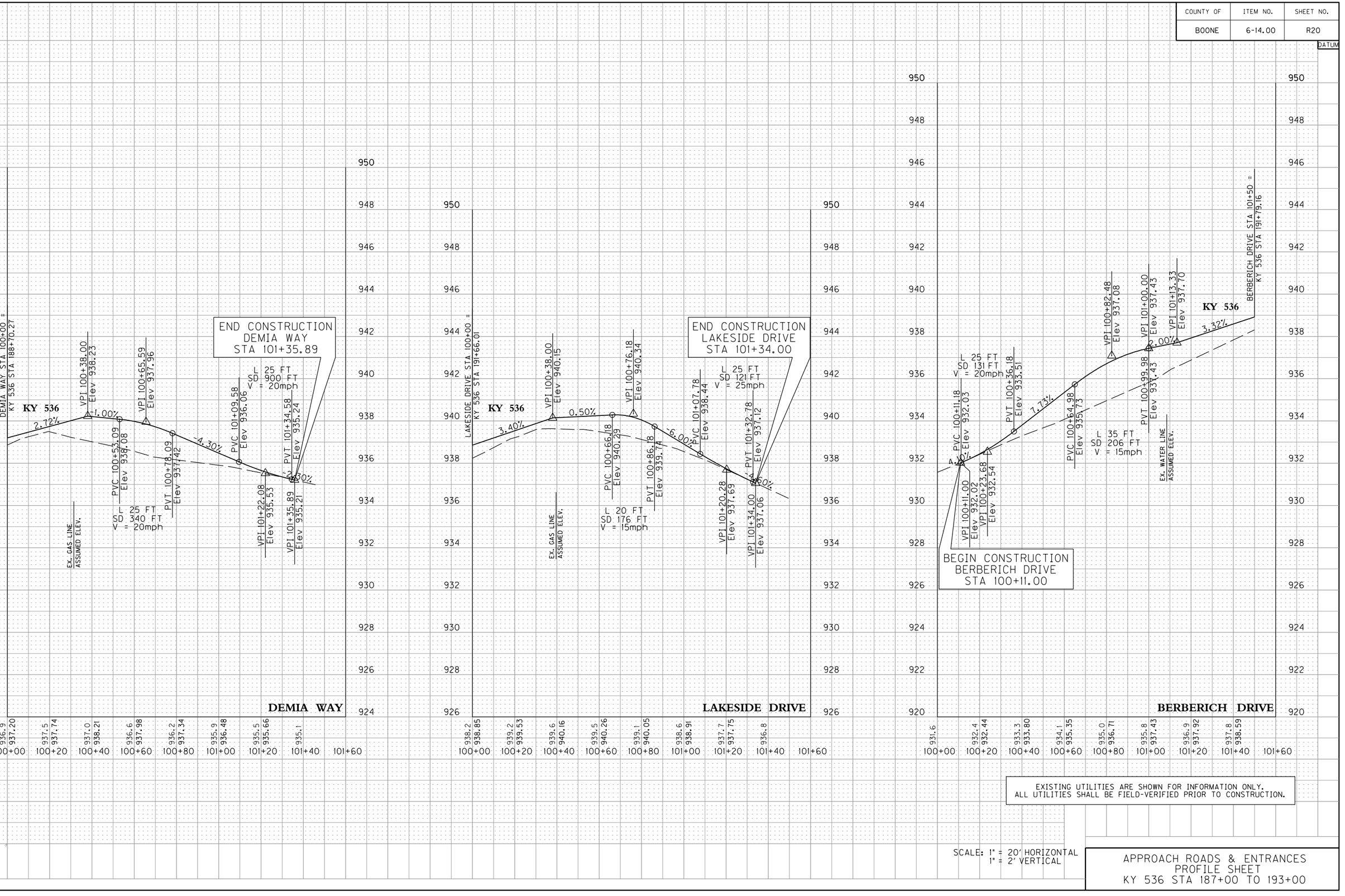
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

| | | |

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R20

DATUM



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES PROFILE SHEET
KY 536 STA 187+00 TO 193+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R20_PR_APPROACHES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R21

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	193+00.00	-	195+19.86	62
LT	193+00.00	-	194+95.22	93
LT	195+34.21	-	195+47.24	11
LT	195+28.34	-	195+53.12	4
LT	195+53.44	-	199+00.00	87
LT	195+86.24	-	199+00.00	147
RT	193+00.00	-	193+79.17	22
RT	193+00.00	-	199+00.00	166
RT	194+23.17	-	196+11.32	51

STANDARD CURB & GUTTER KY 536				
SIDE	STA.	TO	STA.	LENGTH (LF)
LT	193+00.00	-	195+22.40	286
LT	195+48.96	-	199+00.00	404
MED	193+00.00	-	199+00.00	599
MED	193+00.00	-	199+00.00	602
RT	193+00.00	-	199+00.00	609

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	193+00.00	-	195+03.36	219	-	-	-
LT	194+89.83	-	195+10.09	-	8	1	34
LT	195+28.22	-	195+38.35	-	5	1	34
LT	195+33.03	-	195+48.43	9	-	-	-
LT	195+43.11	-	195+53.23	-	5	1	20
LT	195+71.37	-	195+91.62	-	8	1	20
LT	195+78.09	-	199+00.00	340	-	-	-

SIDEWALK & RAMPS KY 536				
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)
RT	193+00.00	-	196+61.57	201

KROGER ACCESS
P.I. STA. 100+58.89
Δ = 10°57'08.84"Rt
T = 19.17'
L = 38.23'
R = 200.00'
E = 0.92'
V = 25mph
e = SEE XS

BEGIN CONSTRUCTION
KROGER ACCESS
STA 100+33.00

KY 536 STA 195+40.78 =
KROGER ACCESS STA 101+50

WD FLORENCE PORTFOLIO, L.P.

SUN LIFE ASSURANCE COMPANY OF CANADA

GREENLAWN WHITE PINES, LLC

GREENLAWN WHITE PINES, LLC

MATCHLINE STA 193+00

MATCHLINE STA 199+00

ENTRANCES KY 536								
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH	8" CEM CONC ENT AREA (SQYD)
RT	194+01.17	24	ASPH	126	-	-	-	49
RT	196+33.32	24	ASPH	166	-	-	-	49

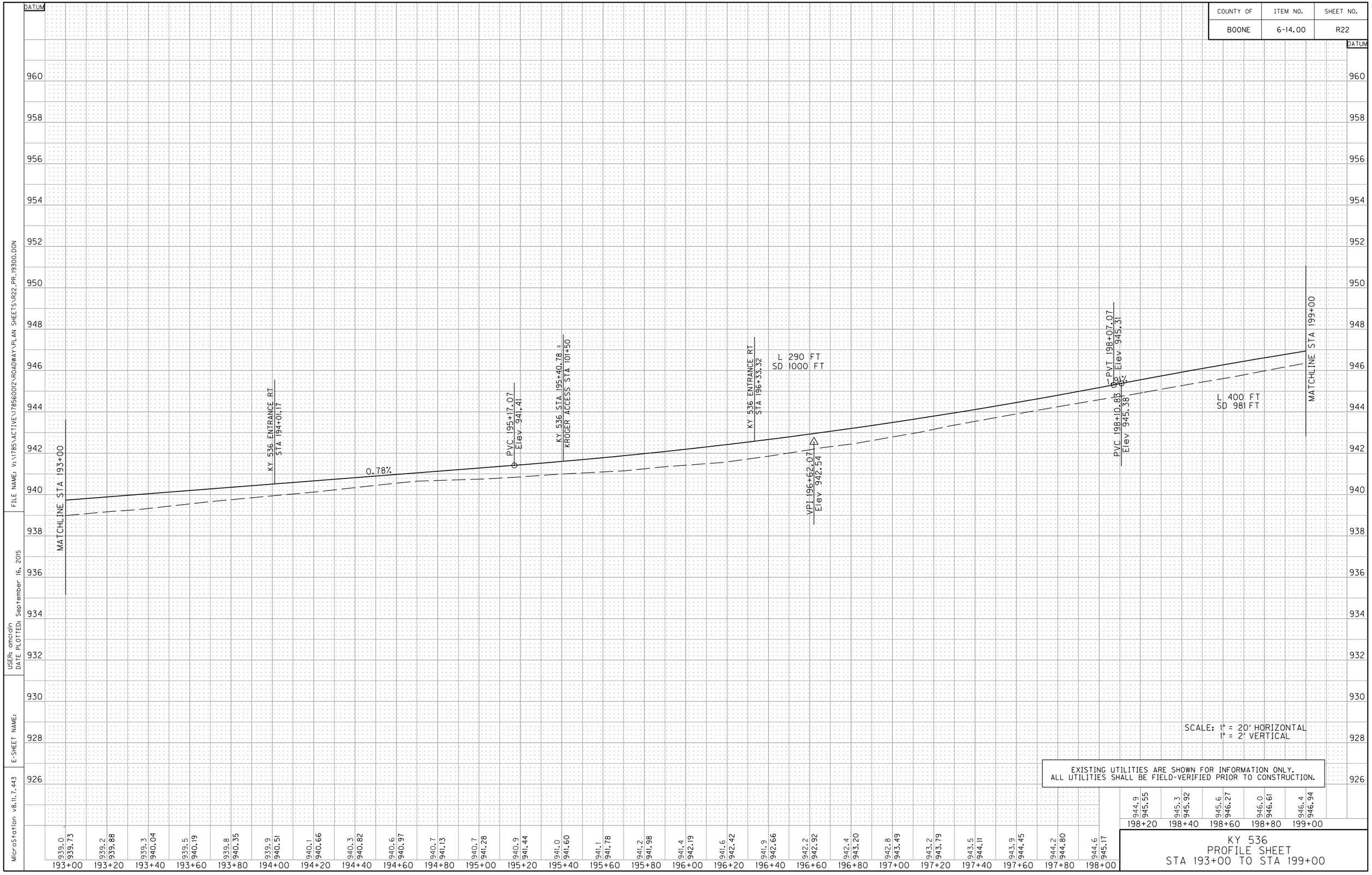
KY 536
P.I. STA. 198+34.14
Δ = 17°34'05.47"LT
T = 182.34'
L = 361.81'
R = 1180'
E = 14.00'
e = 3.60%

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 193+00 TO STA 199+00

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: amclain DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R21_PL_19300.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R22



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

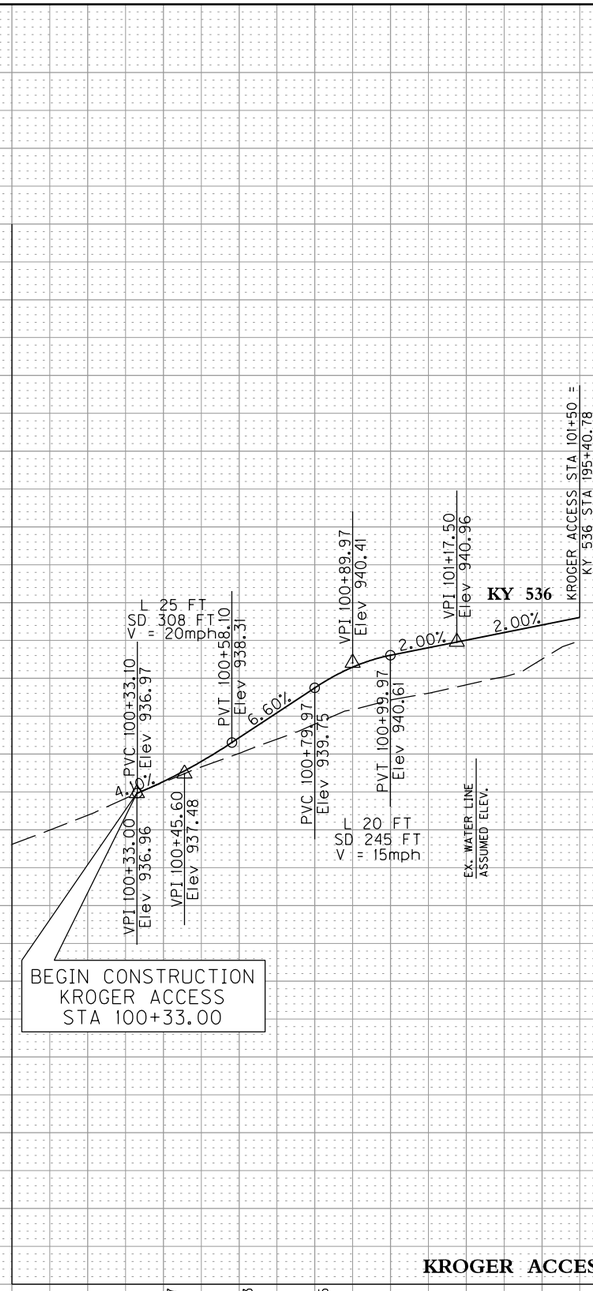
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

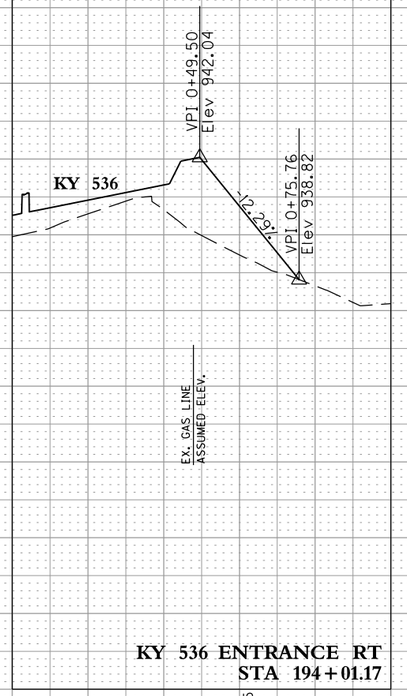
KY 536
PROFILE SHEET
STA 193+00 TO STA 199+00

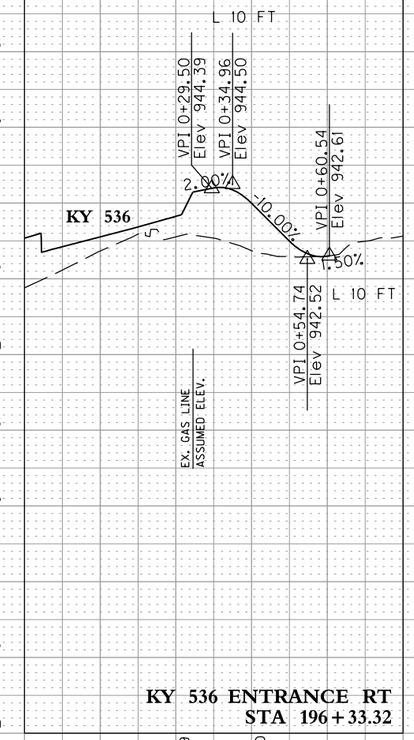
FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R22_PR_19300.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R23

DATUM







EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES
PROFILE SHEET
KY 536 STA 193+00 TO 199+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R23-PR_APPROACHES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R24

KY 536
P.I. STA. 198+34.14
Δ = 17°34'05.47"LT
T = 182.34'
L = 361.81'
R = 1180'
E = 14.00'
e = 3.60%

APPROACH LT 202+21
P.I. STA. 100+60.12
Δ = 15°01'54.48"RT
T = 14.64'
L = 29.12'
R = 111.00'
E = 0.96'
V = 20mph
e = SEE XS

APPROACH LT 203+50
P.I. STA. 100+83.51
Δ = 14°58'10.55"LT
T = 39.41'
L = 78.38'
R = 300.00'
E = 2.58'

KY 536
P.I. STA. 204+12.02
Δ = 29°16'45.80"RT
T = 208.98'
L = 408.82'
R = 800'
E = 26.84'
e = 4.00%

BEGIN CONSTRUCTION
AUTOZONE ACCESS
STA 100+23.01

APPR. LT STA 202+21, STA 101+15.74 =
AUTOZONE ACCESS STA 101+50.00

BEGIN CONSTRUCTION
APPROACH LT STA 202+21
STA 100+11.92

APPR. LT STA 203+50, 100+00.00 =
APPR. LT STA 202+21, STA 101+13.72

END CONSTRUCTION
APPR. LT STA 203+50
STA 101+13.22

KY 536 STA 202+21.23 =
APPR. LT STA 202+21, STA 102+30

MATCHLINE STA 199+00

MATCHLINE STA 205+00

P 120 SUN LIFE ASSURANCE COMPANY OF CANADA

P 121 AUTOZONE DEVELOPMENT CORPORATION

P 123 ROBERT REYNOLDS

P 125 CAROLYN DOOLIN

P 126 CAZ REAL ESTATE GROUP, LLC

P 118 GREENLAWN WHITE PINES, LLC

P 127 THOMAS E. KOHLHEPP
LINDA C. KOHLHEPP

KENTUCKY DEPARTMENT OF HIGHWAYS

GREENLAWN WHITE PINES, LLC

N60°16'23"E

N71°52'19"E

N86°54'13"E

S3°09'30"E

S18°07'41"E

N58°36'27"E

PC 202+03.04

PT 200+13.62

PT 204+12.02

1-S BLOCK AUTOZONE

2-S FR. RES.

2-S BR. COM.

1-S BLOCK METAL COM.

1 1/2-S-FR COMMERCIAL

MOBILE HOME

RETAINING WALL B020652RE

RETAINING WALL B020655RE

36BN380E

36BN446E B020650RE

36BN447 B020237RE

36BN448 B020655RE

36BN141E B020351RE

36BN114E

36BNI047E

405

503

SHARED USE PATH

EXIST.& PROP.R/W

PROP.R/W

PROP.RW

BEGIN TAPER +71.92 -35.69'

END TAPER +47.96 -33.99'

BEGIN TAPER +35.00 -14.50'

END TAPER +47.50 -12.00'

BEGIN TAPER +10.00 6.50'

END TAPER +10.00 -6.00'

BEGIN TAPER +66.00 38.98'

END TAPER +10.00 49.00'

END TAPER +25.39 -36.23'

END TAPER +38.00 -14.50'

END TAPER +38.00 -8.50'

4:1 TAPER

45:1 TAPER

8:1 TAPER

15" CMP

18" RCP

36" CPP

12" CPP

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 199+00 TO STA 205+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R24-PL_19900.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R24A

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA	SIDEWALK 4 INCH CONC	RAMPS TYPE 1	DETECTABLE WARNINGS
				(SQYD)	(SQYD)	(EACH)	(SQFT)
LT	199+00.00	-	199+45.49	44	-	-	-
LT	199+36.49	-	199+51.05	-	6	1	26
LT	199+66.70	-	199+77.68	-	7	-	-
LT	199+93.33	-	200+08.25	-	6	1	27
LT	199+98.97	-	202+15.09	230	-	-	-
LT	202+04.74	-	202+20.69	-	7	1	30
LT	202+49.18	-	202+62.15	-	6	1	26
LT	202+54.12	-	205+00.00	285	-	-	-

SODDING KY 536					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA
					(SQYD)
KY 536	LT	199+00.00	-	199+55.18	17
KY 536	LT	199+00.00	-	199+40.98	17
KY 536	LT	199+66.70	-	199+77.68	2•
KY 536	LT	199+88.93	-	202+25.31	62
KY 536	LT	200+03.80	-	202+09.41	97
AUTOZONE ACCESS	RT	100+22.49	-	101+30.93	28
APPR. LT 203+50	RT	100+10.87	-	101+13.92	29
KY 536	LT	202+47.56	-	205+00.00	63
KY 536	LT	202+58.09	-	205+00.00	123
KY 536	RT	199+00.00	-	205+00.00	131

•AREA INCLUDES TOTAL SODDING FOR ISLAND

ENTRANCES KY 536							
SIDE	STA.	WIDTH	SURFACE		PIPE		HDWL TYPE
		(LF)	TYPE	AREA (SQYD)	SIZE (IN)	LENGTH (FT)	EACH
LT	199+72.09	30	CONC	166	-	-	-

CURB KY 536						
ALIGNMENT	SIDE	STA.		STA.	STANDARD C&G	STANDARD HDR
					(LF)	(LF)
KY 536	LT	199+00.00	-	199+56.54	73	-
KY 536	LT	199+87.68	-	202+20.69	258	-
AUTOZONE ACCESS	RT	100+22.49	-	101+28.01	-	50
AUTOZONE ACCESS	LT	100+24.04	-	100+73.10	-	149
KY 536	LT	202+45.22	-	205+00.00	290	-
KY 536	MED	199+00.00	-	201+98.12	597	-
KY 536	MED	201+95.93	-	205+00.00	621	-
KY 536	RT	199+00.00	-	205+00.00	589	-

KY 536
QUANTITY SHEET
STA 199+00 TO STA 205+00

MicroStation v8.11.7.443
E-SHEET NAME:
USER: amclain
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\1785600\2\ROADWAY\PLAN SHEETS\R24A_PL_19900.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R25

DATUM

968
966
964
962
960
958
956
954
952
950
948
946
944
942
940
938
936
934

MATCHLINE STA 199+00

EX. GAS LINE
ASSUMED ELEV.

L 400 FT
SD 981 FT

VPI 200+10.83
Elev 949.19

KY 536 STA 202+21.23 =
APPR. LT STA 202+21, STA 102+30

PVT 202+10.83
Elev 950.24

EX. WATER LINE
ASSUMED ELEV.

EX. GAS LINE
ASSUMED ELEV.

0.53%

MATCHLINE STA 205+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

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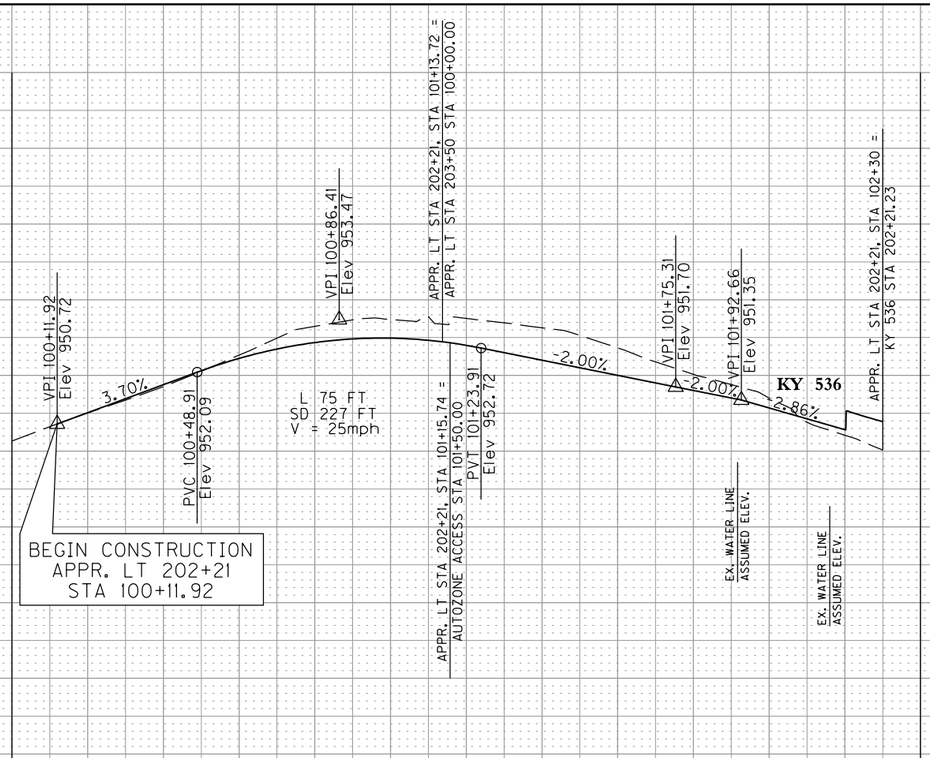
199+00	199+20	199+40	199+60	199+80	200+00	200+20	200+40	200+60	200+80	201+00	201+20	201+40	201+60	201+80	202+00	202+20	202+40	202+60	202+80	203+00	203+20	203+40	203+60	203+80	204+00
946.4	946.7	947.1	947.4	947.6	947.9	948.2	948.4	948.7	948.9	949.1	949.2	949.4	949.6	949.7	949.8	950.0	950.1	950.2	950.3	950.4	950.5	950.6	950.7	950.8	950.9
946.94	947.25	947.55	947.84	948.11	948.37	948.61	948.84	949.06	949.26	949.45	949.62	949.78	949.93	950.06	950.18	950.29	950.40	950.50	950.61	950.71	950.82	950.92	951.03	951.13	951.24

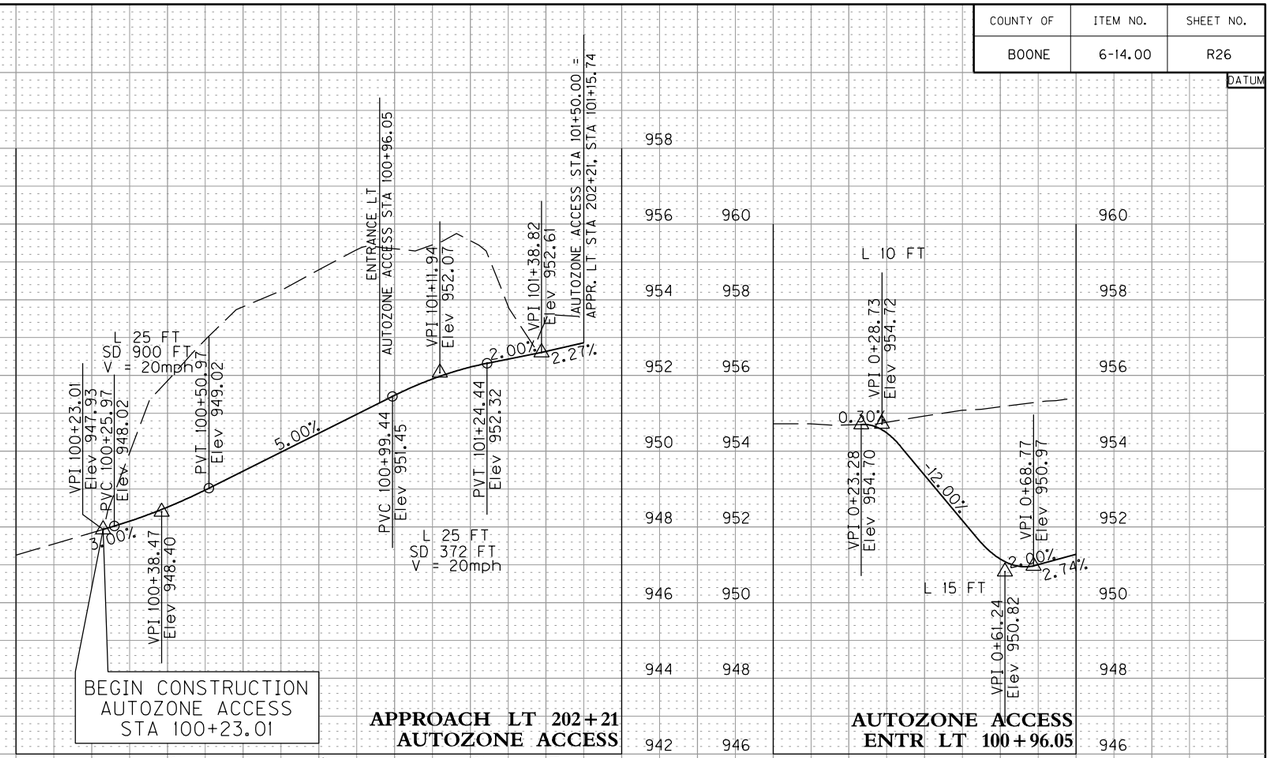
204+20	204+40	204+60	204+80	205+00
951.0	951.1	951.3	951.4	951.5
951.34	951.45	951.55	951.66	951.76

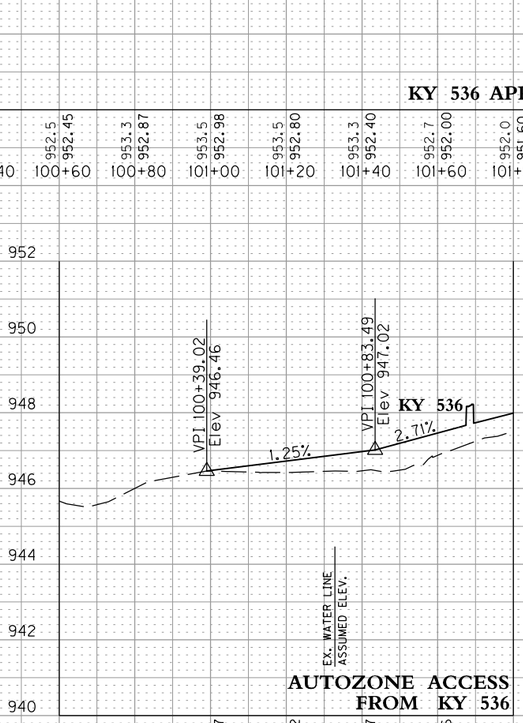
KY 536
PROFILE SHEET
STA 199+00 TO STA 205+00

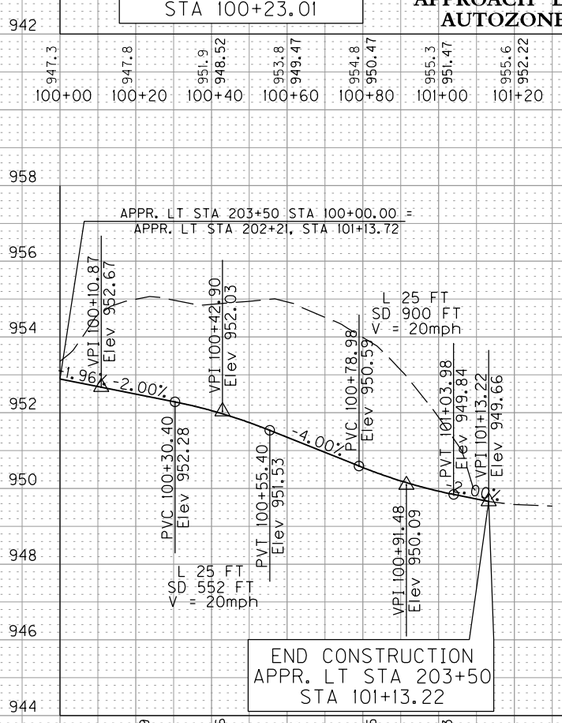
FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R25_PR_19900.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R26









EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
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SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES
PROFILE SHEET
KY 536 STA 199+00 TO 205+00

FILE NAME: V:\17856001\ROADWAY\PLAN SHEETS\R26_PR_APPROACHES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R27

APPROACH LT 206+09
P.I. STA. 100+64.44
Δ = 2°44'40.27"RT
T = 11.98'
L = 23.95'
R = 500.00'
E = 0.14'
V = 25mph
e = SEE XS

BEGIN CONSTRUCTION
APPROACH LT STA 206+09
STA 100+00.00

KY 536 EAST
P.I. STA. 204+12.02
Δ = 29°16'45.80"RT
T = 208.98'
L = 408.82'
R = 800'
E = 26.84'
e = 4.00%

KY 536 EAST
P.I. STA. 209+08.76
Δ = 1°30'53.40"RT

KY 536 STA 206+08.50 =
APPR. LT STA 206+09, STA 101+30

KY 536 STA 208+99.41
U.S. 25 STA 500+00.00

MATCHLINE STA 205+00

MATCHLINE STA 211+00

CAZ REAL ESTATE3 GROUP, LLC (P 126)

ARRM PROPERTIES, LLC (P 129)

UNITED DAIRY FARMERS, INC. (P 132)

120 MT. ZION RD, LLC (P 128)

FAY SHEHAN
WILLIAM SHEHAN (P 130)

WALTER HAYES, LLC (P 131)

DITCHES KY 536							
SIDE	STA.	TO	STA.	SIZE/TYPE	CHANNEL LINING		
					TYPE	DEPTH	QUANTITY
RT	205+20.00	-	206+76.00	V SPCL	ECB	1.0'	138 SQYD
RT	206+80.00	-	207+80.00	2' FB SPCL	ECB	1.0'	90 SQYD
RT	209+53.00	-	211+00.00	2' FB SURF	ECB	1.0'	136 SQYD

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD	
				C&G (LF)	HDR (LF)
LT	205+00.00	-	205+86.94	97	-
LT	205+86.94	-	205+93.75	-	81
LT	206+18.80	-	206+31.66	-	82
LT	206+31.66	-	208+91.66	282	-
LT	209+57.14	-	211+00.00	190	-
MED	205+00.00	-	208+23.02	652	-
LT	205+00.00	-	208+39.17	361	-
LT	208+85.13	-	211+00.00	250	-

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA	SIDEWALK 4 INCH CONC	RAMPS TYPE 1	DETECTABLE WARNINGS
				(SQYD)	(SQYD)	(EACH)	(SQFT)
LT	205+00.00	-	205+78.66	86	-	-	-
LT	205+67.02	-	205+84.54	-	7	1	32
LT	206+01.15	-	206+16.50	-	10	-	-
LT	206+34.25	-	206+53.16	-	8	1	32
LT	206+40.65	-	208+70.10	242	-	-	-
LT	208+55.62	-	208+77.13	-	8	1	36
LT	209+73.44	-	209+94.95	-	8	1	36
LT	208+80.47	-	211+00.00	125	-	-	-

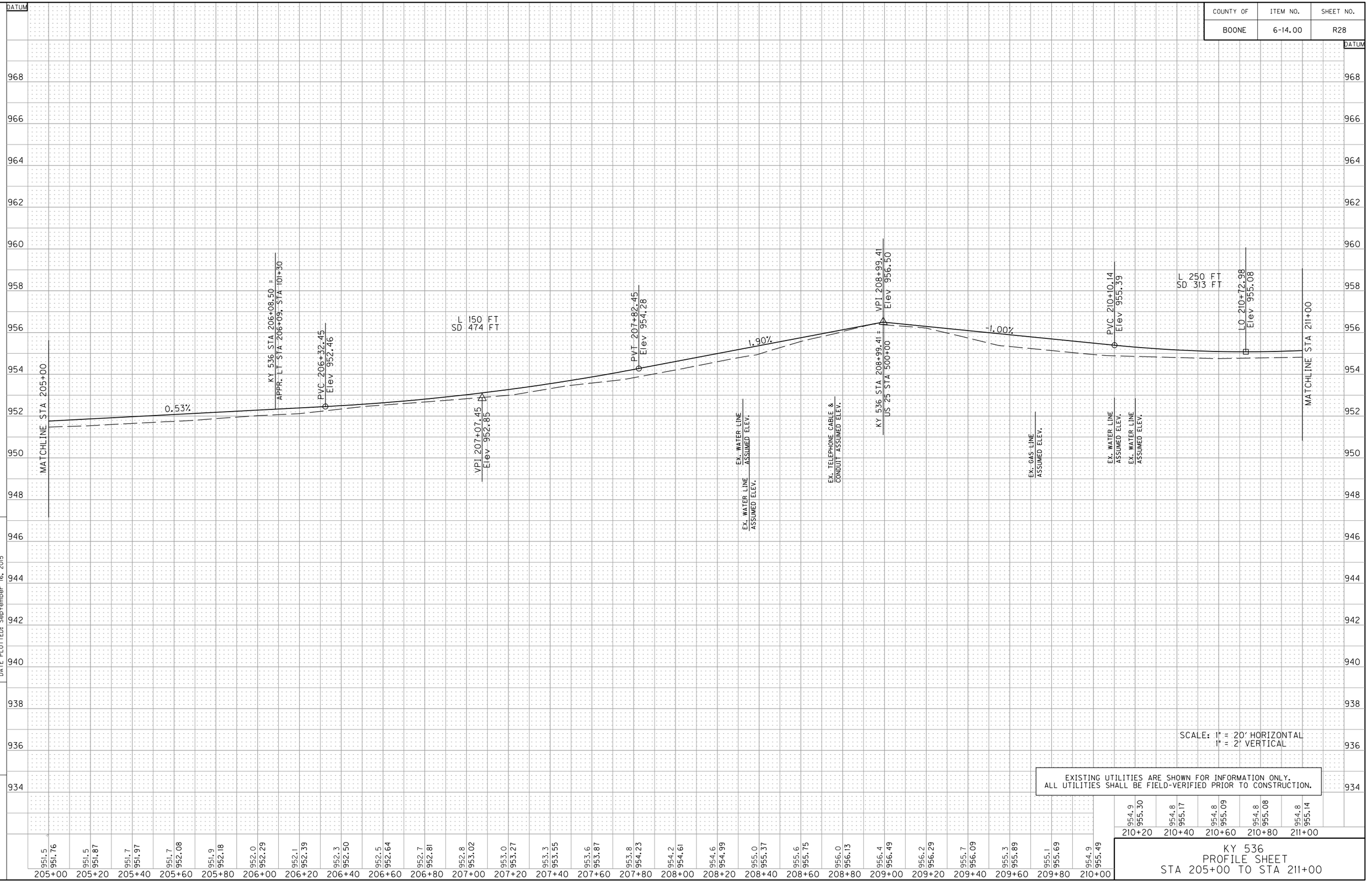
SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	205+00.00	-	205+93.23	38
LT	205+00.00	-	205+71.89	34
LT	206+19.39	-	208+89.24	78
LT	206+48.04	-	208+61.25	99
LT	209+57.14	-	211+00.00	40
LT	209+89.32	-	211+00.00	51
RT	205+00.00	-	208+34.46	87
RT	208+77.69	-	211+00.00	63

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 205+00 TO STA 211+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R27_PL_20500.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R28



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 205+00 TO STA 211+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R28_PR_20500.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R29

DATUM

966
964
962
960
958
956
954
952
950
948
946
944
942
940
938
936
934
932

VPI 100+66.50
Elev 952.71

VPI 100+96.01
Elev 953.30

KY 536

2.00%

-2.84%

APPR. LT STA 206+09, STA 101+30 =
KY 536 STA 206+08.50

PVT 100+79.00
Elev 952.96

PVC 100+54.00
Elev 950.75

L 25 FT
SD 91 FT
V = 10mph

PVT 100+25.90
Elev 946.33

L 25 FT
SD 81 FT
V = 15mph

15.70%

EX. GAS LINE
ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

10.73%

PVC 100+00.90
Elev 943.03

VPI 100+13.40
Elev 944.37

VPI 100+00.00
Elev 942.94

BEGIN CONSTRUCTION
APPR. LT 206+09
STA 100+00.00

KY 536 APPROACH LT 206+09

100+00	100+20	100+40	100+60	100+80	101+00	101+20	101+40
942.9 942.94	945.2 945.44	947.4 948.55	949.7 951.59	951.6 952.98	952.6 953.18	952.4	

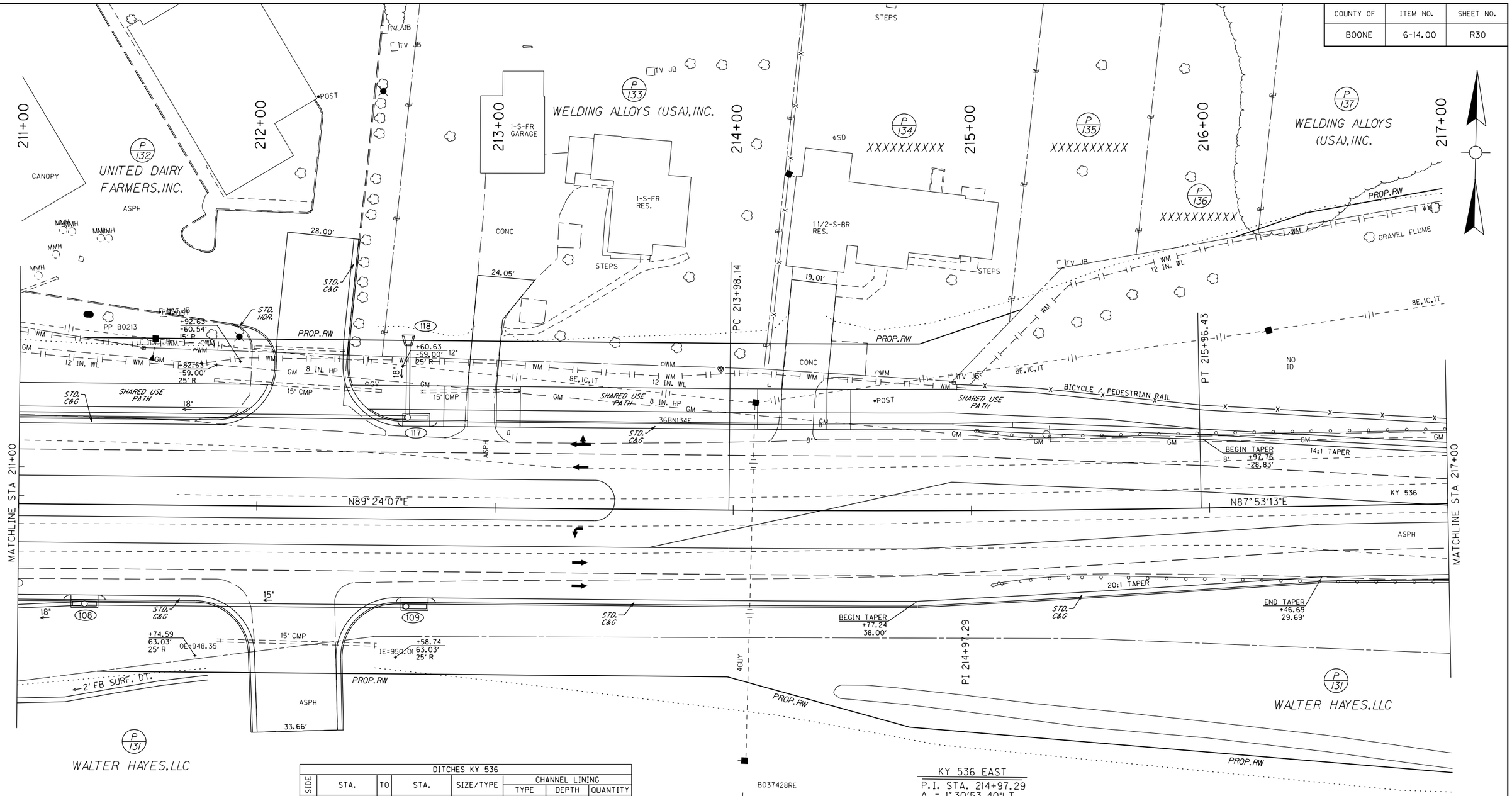
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES
PROFILE SHEET
KY 536 STA 205+00 TO 211+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R29_PR_APPROACHES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R30



DITCHES KY 536							
SIDE	STA.	TO	STA.	SIZE/TYPE	CHANNEL LINING		
					TYPE	DEPTH	QUANTITY
RT	211+00.00	-	211+80.00	2' FB SURF	ECB	1.0'	72 SQYD

KY 536 EAST
P.I. STA. 214+97.29
Δ = 1°30'53.40"LT
T = 99.15'
L = 198.29'
R = 7500'
E = 0.66'
e = NC

CURB KY 536					
SIDE	STA.	TO	STA.	STANDARD	
				C&G (LF)	HDR (LF)
LT	211+00.00	-	212+06.32	114	-
LT	212+06.32	-	211+88.76	-	38
LT	212+39.77	-	214+92.35	324	-
RT	211+00.00	-	212+01.01	146	-
RT	212+34.65	-	216+60.63	474	-

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	211+00.00	-	211+88.38	31
LT	211+00.00	-	211+95.99	45
LT	212+44.33	-	212+91.85	34
LT	212+47.27	-	212+78.15	13
LT	213+15.82	-	214+24.02	47
LT	213+10.19	-	214+09.91	49
LT	214+43.15	-	217+00.00	68
LT	214+49.22	-	215+97.99	50
RT	211+00.00	-	211+98.43	32
RT	212+37.23	-	217+00.00	113

SHARED USE PATH KY 536							
SIDE	STA.	TO	STA.	AREA (SQYD)	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE I (EACH)	DETECTABLE WARNINGS (SQFT)
LT	211+00.00	-	211+99.26	107	-	-	-
LT	211+92.01	-	212+04.20	-	6	1	25
LT	212+39.69	-	212+52.29	-	6	1	26
LT	212+44.71	-	217+00.00	467	-	-	-

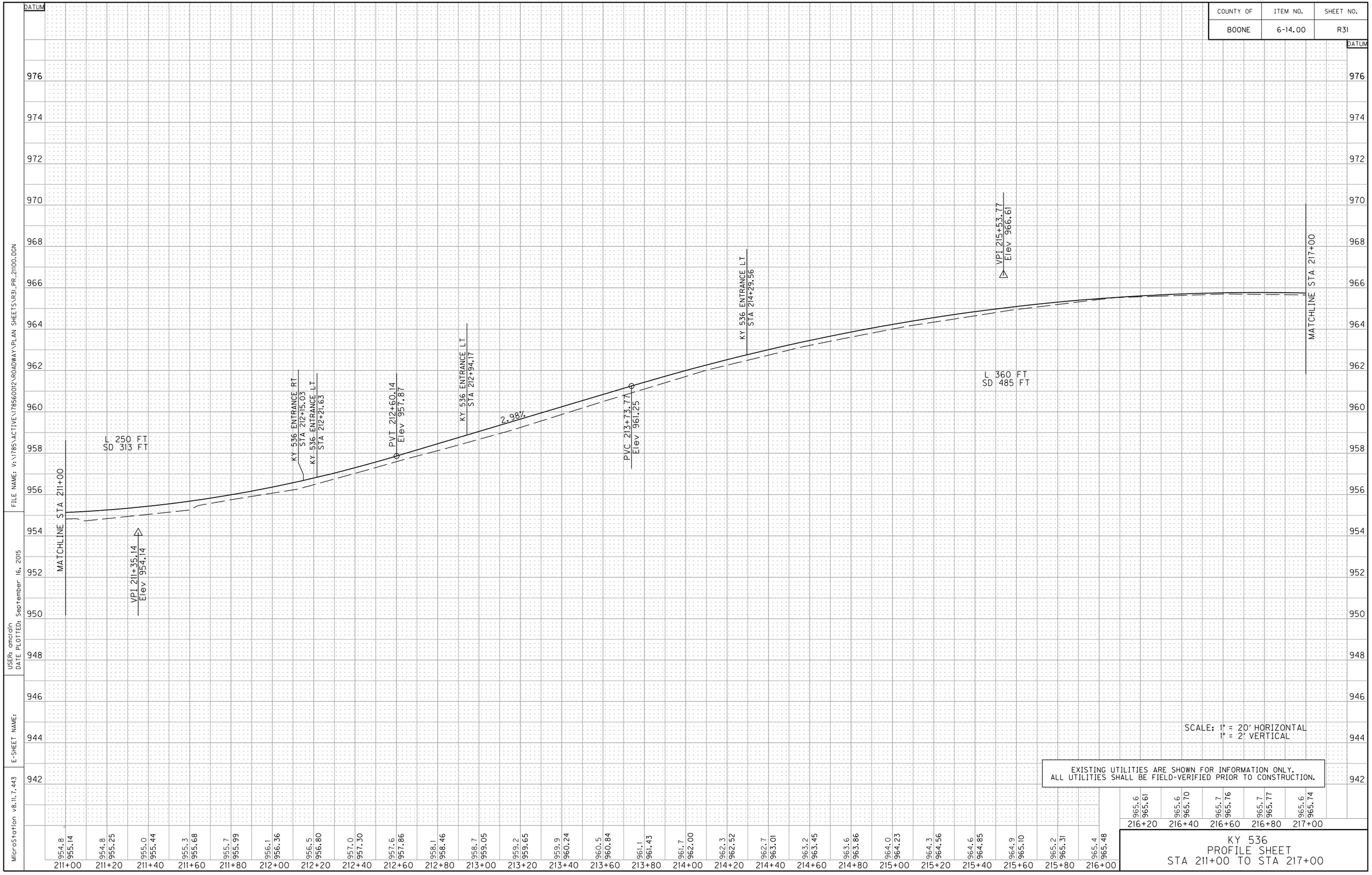
ENTRANCES KY 536								
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH	8" CEM CONC ENT AREA (SQYD)
LT	212+21.63	28	ASPH	279	-	-	-	-
LT	212+94.17	12	CONC	74	-	-	-	61
LT	214+29.56	19	CONC	95	-	-	-	74
RT	212+15.03	-	ASPH	-	-	-	-	-

0' 20' 40' 80' SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 211+00 TO STA 217+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R30_PL_21100.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R31



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

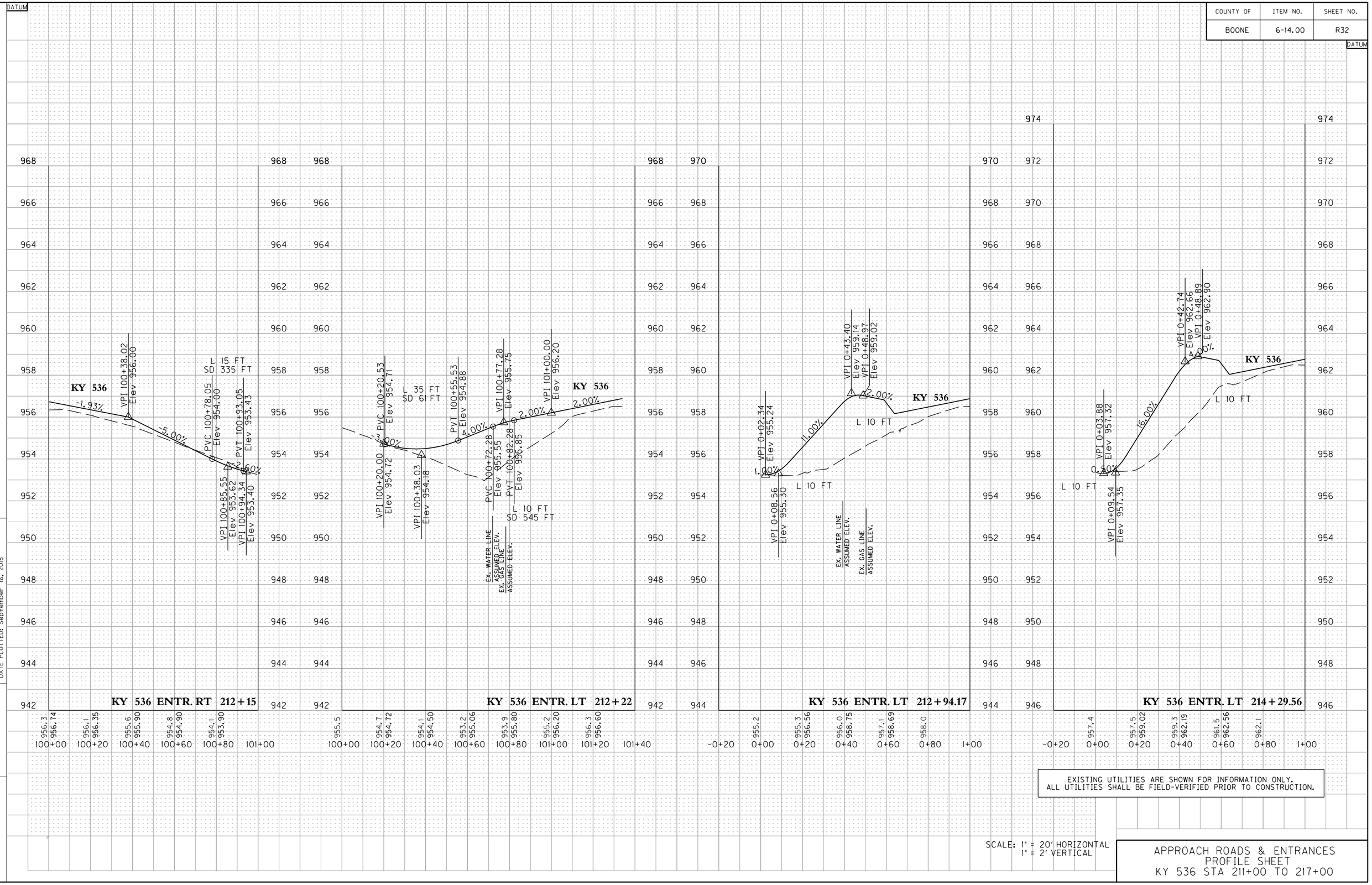
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 211+00 TO STA 217+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R31.PR.21100.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R32

DATUM



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROADS & ENTRANCES
PROFILE SHEET
KY 536 STA 211+00 TO 217+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R32_PR_ENTRANCES.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R33

P/137
WELDING ALLOYS (USA),INC.

217+00 218+00 219+00 220+00 221+00 222+00

PROP.RW

SHARED USE PATH KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	217+00.00	-	218+00.00	89

END CONSTRUCTION
KY 536 STA 218+00
MATCH ITEM NO. 6-162
(CONSTRUCTION BY OTHERS)

POE 222+06.18

MATCHLINE STA 217+00

8 IN. HP
SHARED USE PATH
14:1 TAPER
END TAPER
+47.09
-18.06

N87°53'13"E (BY OTHERS)

MT ZION RD

ASPH

CONC BRIDGE

NORFOLK SOUTHERN RR

SODDING KY 536				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	217+00.00	-	218+00.00	23
RT	217+00.00	-	218+00.00	23

P/131
WALTER HAYES,LLC

TOEBBEN DR

MI
959.836

36BN410E

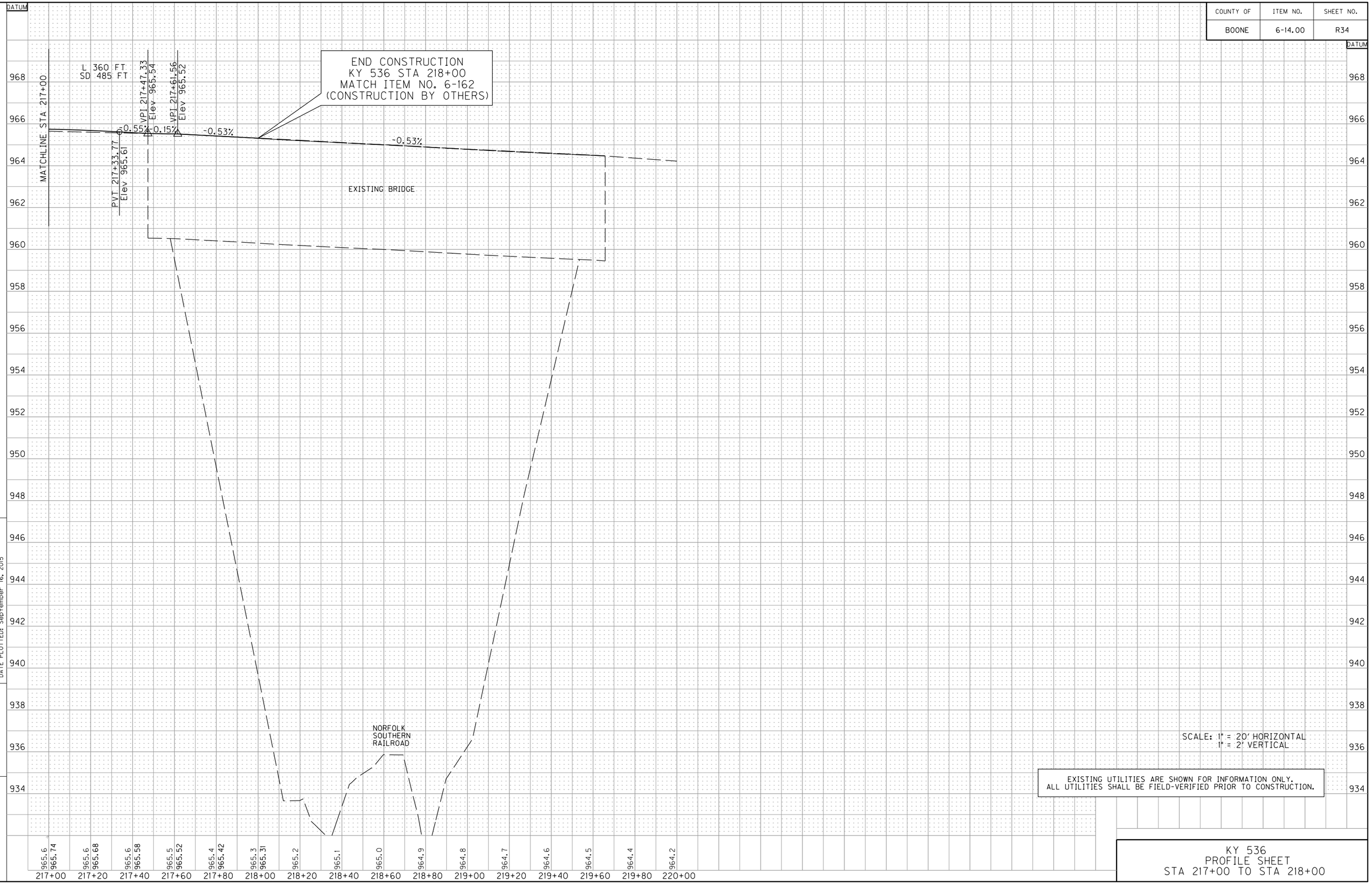
0' 20' 40' 80'

SCALE: 1"= 20'

KY 536
PLAN SHEET
STA 217+00 TO STA 218+00

FILE NAME: V:\7856001\ACTIVE\7856001\ROADWAY\PLAN SHEETS\R33_PL_21700.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R34



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

KY 536
PROFILE SHEET
STA 217+00 TO STA 218+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R34_PR_21700.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R35

SODDING BILTMORE BLVD					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
BILTMORE BLVD.	LT	297+86.11	-	299+01.24	24
BILTMORE BLVD.	RT	297+86.11	-	298+08.91	6
BILTMORE BLVD.	RT	297+86.11	-	298+19.37	15
BILTMORE BLVD.	RT	298+52.63	-	299+21.30	21
BILTMORE BLVD.	RT	298+44.49	-	299+19.82	27

CURB BILTMORE BLVD					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	297+85.99	-	299+01.24	109	-
RT	297+86.24	-	298+05.97	21	-
RT	298+05.97	-	298+19.95	-	50
RT	298+43.90	-	298+54.87	-	50
RT	298+54.87	-	299+22.35	75	-

SIDEWALK & RAMPS BILTMORE BLVD.					
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
RT	297+86.24	-	298+14.90	15	1	14
RT	298+47.94	-	299+20.25	46	1	13

ENTRANCES BILTMORE BLVD.							
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
RT	298+31.93	24	ASPH	152	-	-	-

BILTMORE CONNECTOR STA 21+77.90 =
BILTMORE BOULEVARD STA 297+47.71

KY 536 STA 178+59.90 =
BILTMORE BOULEVARD STA 300+00

JOHN CARL COBB &
CAROLYN LYNN COBB

SHERWOOD LAKES
DEVELOPMENT, LLC

NATIONAL RETAIL PROPERTIES LP

BILTMORE BOULEVARD
P.I. STA. 298+75.87
Δ = 29°35'12.33"LT
T = 26.41'
L = 51.64'
R = 100.00'
E = 3.43'
V = 20mph
e = SEE XS

PC 298+49.46
PI 298+75.87
PT 299+01.10

RC 22+64.37
RI 21+53.61
RI 24+01.49

21+00
22+00
23+00
24+00
298+00
301+00

MATCHLINE STA 301+00

0' 20' 40' 80'
SCALE: 1"= 20'

BILTMORE BOULEVARD
PLAN SHEET
STA 297+47.71 TO STA 301+00

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: apousa DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\1785001201\ROADWAY\PLAN SHEETS\R35_PL_BILTMORE_BLVD.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R36

DATUM

946
944
942
940
938
936
934
932
930
928
926
924
922
920
918
916
914

VPI 297+47.71
Elev 934.28
VPI 297+58.71
Elev 934.06
-2.00%
BEGIN CONSTRUCTION
BILTMORE BOULEVARD
STA 297+47.71
-2.00%
PVC 298+20.93
Elev 932.82
BILTMORE BOULEVARD
ENTRANCE RT STA 298+31.93
L 125 FT
SD 200 FT
PVT 299+45.93
Elev 932.82
2.00%
VPI 299+62.00
Elev 933.14
2.00%
VPI 300+00.00
Elev 933.90
-2.00%
PVC 300+67.92
Elev 932.54
L 25 FT
SD 441 FT
PVT 300+92.92
Elev 932.07
-1.75%
VPI 300+80.42
Elev 932.29
MATCHLINE STA 301+00
VPI 298+83.43
Elev 931.57
EX. GAS LINE
ASSUMED ELEV.
BILTMORE BLVD.
KY 536 STA 178+59.90
EX. TELEPHONE CABLE &
CONDUIT-ASSUMED ELEV.
EX. WATER LINE
ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

		932.0		934.6		934.9		934.2		933.8		933.6		933.5		933.3		933.1		933.2	
		934.03		933.63		933.23		932.83		932.49		932.28		932.19		932.23		932.40		933.10	
297+40	297+60		297+80		298+00		298+20		298+40		298+60		298+80		299+00		299+20		299+40		299+60

		933.3		933.0		932.7		932.4		932.0		931.7		931.8							
		933.50		933.90		933.50		933.10		932.70		932.30		931.94							
299+80	300+00		300+20		300+40		300+60		300+80		301+00										

BILTMORE BOULEVARD
PROFILE SHEET
STA 297+47.71 TO STA 301+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R36_PR_BILTMORE_BLVD.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R37

SODDING					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
BILTMORE DRIVE	LT	46+99.09	-	49+84.72	71
BILTMORE DRIVE	LT	50+25.80	-	51+61.38	38
BILTMORE DRIVE	RT	46+99.09	-	47+10.21	4
BILTMORE DRIVE	RT	47+34.89	-	48+76.60	43
BILTMORE DRIVE	RT	49+13.03	-	49+66.65	24
BILTMORE DRIVE	RT	49+71.48	-	49+74.65	3
BILTMORE BLVD.	LT	302+00.00	-	302+56.12	13
BILTMORE BLVD.	LT	302+00.00	-	302+70.98	15
BILTMORE BLVD.	RT	302+00.00	-	302+70.98	19
BILTMORE BLVD.	RT	302+00.00	-	302+70.98	16
BILTMORE DRIVE	RT	50+26.95	-	50+29.32	2
BILTMORE DRIVE	RT	50+34.45	-	51+61.38	32
BILTMORE BLVD.	LT	301+12.19	-	301+30.76	5
BILTMORE BLVD.	LT	301+12.19	-	301+41.47	10
BILTMORE BLVD.	LT	301+73.04	-	302+00.00	10
BILTMORE BLVD.	LT	301+83.71	-	302+00.00	4
BILTMORE BLVD.	RT	301+12.19	-	301+28.62	3
BILTMORE BLVD.	RT	301+12.19	-	301+27.04	13
BILTMORE BLVD.	RT	301+87.22	-	302+00.00	3
BILTMORE BLVD.	RT	301+75.57	-	302+00.00	13

SIDEWALK & RAMPS							
ALIGNMENT	SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE I (EACH)	DETECTABLE WARNINGS (SQFT)
BILTMORE BLVD.	LT	301+12.19	-	301+39.22	14	1	13
BILTMORE BLVD.	LT	301+75.24	-	302+56.05	44	1	13
BILTMORE DRIVE	RT	49+66.35	-	49+71.65	11	-	-
BILTMORE BLVD.	RT	301+11.80	-	301+33.62	11	1	14
BILTMORE BLVD.	RT	301+77.34	-	302+68.26	50	1	14
BILTMORE DRIVE	RT	50+29.49	-	50+34.23	10	-	-

ENTRANCES							
ALIGNMENT	SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
BILTMORE DRIVE	RT	47+22.21	25	CONC	48	-	-	-
BILTMORE DRIVE	RT	48+98.55	25	CONC	129	-	-	-
BILTMORE BLVD.	LT	301+57.26	31	CONC	120	-	-	-
BILTMORE BLVD.	RT	301+51.25	34	ASPH	206	-	-	-

CURB						
ALIGNMENT	SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
BILTMORE DRIVE	LT	46+99.09	-	49+87.22	322	-
BILTMORE DRIVE	LT	50+23.22	-	51+61.38	173	-
BILTMORE DRIVE	RT	46+99.09	-	47+03.94	6	-
BILTMORE DRIVE	RT	47+03.94	-	47+10.21	-	14
BILTMORE DRIVE	RT	47+34.33	-	47+41.31	-	15
BILTMORE DRIVE	RT	47+41.31	-	48+76.99	138	-
BILTMORE DRIVE	RT	48+76.99	-	48+76.90	-	46
BILTMORE DRIVE	RT	49+12.38	-	49+25.89	-	44
BILTMORE DRIVE	RT	49+25.89	-	49+76.65	73	-
BILTMORE DRIVE	LT	50+24.45	-	51+61.38	152	-
BILTMORE BLVD.	LT	301+12.19	-	301+35.13	25	-
BILTMORE BLVD.	LT	301+35.13	-	301+42.06	-	27
BILTMORE BLVD.	LT	301+72.45	-	301+79.33	-	27
BILTMORE BLVD.	LT	301+79.33	-	302+56.12	79	-
BILTMORE BLVD.	RT	301+11.80	-	301+28.62	16	-
BILTMORE BLVD.	RT	301+28.62	-	201+27.04	-	48
BILTMORE BLVD.	RT	301+75.08	-	301+82.34	-	44
BILTMORE BLVD.	RT	301+82.34	-	302+68.18	90	-

BILTMORE DRIVE
P.I. STA. 47+74.09
Δ = 10°45'30.84"LT
T = 47.08'
L = 93.89'
R = 500.00'
E = 2.21'
V = 25mph
e = SEE XS

BILTMORE DRIVE
P.I. STA. 48+94.03
Δ = 11°20'11.13"RT
T = 49.63'
L = 98.93'
R = 500.00'
E = 2.46'
V = 25mph
e = SEE XS

BEGIN CONSTRUCTION
BILTMORE DRIVE
STA 46+99.09

END CONSTRUCTION
BILTMORE BOULEVARD
STA 303+68.03

BILTMORE BOULEVARD
STA 303+06.36 =
BILTMORE DRIVE STA 50+00

END CONSTRUCTION
BILTMORE DRIVE
STA 51+61.38

MATCHLINE BILTMORE BOULEVARD STA 301+00

TOEBBEN, LTD.

STEAK N SHAKE, INC.

TOEBBEN BUILDING AND DEVELOP.

1-S STUCCO
SUNOCO

1-S BR
TEAK-N-SHAKE

10' EXIST. UTIL. ESMT.

2' FB CONC. DT.

BILTMORE BLVD

BILTMORE DRIVE

GRAVEL

CONC

ASPH

PARKING

CANOPY

SANMH

TMH #13270

8" PVC

SCALE: 1" = 20'

0' 20' 40' 80'

BILTMORE DRIVE
PLAN SHEET
STA 46+99.09 TO STA 51+61.38

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R37_PL_BILTMORE_DRIVEANDBLVD.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R38

DATUM

942 940 938 936 934 932 930 928 926 924 922 920 918 916

VPI 46+99.09
Elev 930.69

1.10%

PVC 47+09.31
Elev 930.58

VPI 47+21.81
Elev 930.44

BILTMORE DRIVE
ENTRANCE RT STA 47+22.46

L 25 FT
SD 3610 FT

PVT 47+34.31
Elev 930.26

BEGIN CONSTRUCTION
BILTMORE DRIVE
STA 46+99.09

-1.40%

PVC 48+43.31
Elev 928.74

L 50 FT
SD 275 FT

VPI 48+68.31
Elev 928.39

PVT 48+93.31
Elev 928.26

BILTMORE DRIVE
ENTRANCE RT STA 49+02.00

-0.50%

BILTMORE DR. STA 50+00.00 =
BILTMORE BLVD. STA 303+06.36

PVC 50+32.92
Elev 927.56

VPI 50+70.42
Elev 927.38

L 75 FT
SD 350 FT

PVT 51+07.92
Elev 928.16

2.10%

VPI 51+61.38
Elev 929.29

END CONSTRUCTION
BILTMORE DRIVE
STA 51+61.38

	931.7	931.4	931.2	930.9	930.7	930.4	930.1	929.8	929.6	929.4	929.3	929.2	928.6	928.4	928.3	928.0	927.8	927.3	927.0	927.4	927.4	927.7	928.0	928.3	928.5
					930.68	930.45	930.18	929.90	929.62	929.34	929.06	928.78	928.53	928.35	928.23	928.13	928.03	927.93	927.83	927.73	927.63	927.54	927.56	927.71	928.01
46+00	46+20	46+40	46+60	46+80	47+00	47+20	47+40	47+60	47+80	48+00	48+20	48+40	48+60	48+80	49+00	49+20	49+40	49+60	49+80	50+00	50+20	50+40	50+60	50+80	51+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

	928.7	929.0	929.3	929.7	930.1
	928.42	928.84	929.26		
51+20	51+40	51+60	51+80	52+00	

BILTMORE DRIVE
PROFILE SHEET
STA 46+99.09 TO STA 51+61.38

FILE NAME: V:\1785\ACTIVE\I7856001\ROADWAY\PLAN SHEETS\R38_PR_BILTMORE_DRIVE.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R39

DATUM

946
944
942
940
938
936
934
932
930
928
926
924
922
920
918
916
914

MATCHLINE STA 301+00

-1.75%

BILTMORE BOULEVARD
ENTRANCE RT STA 301+54.77

BILTMORE BOULEVARD
ENTRANCE LT STA 301+57.26

PVC 301+71.60
Elev 930.69

VPI 301+96.60
Elev 930.25

L 50 FT
SD 1824 FT

PVT 302+21.60
Elev 929.67

-2.35%

PVC 302+78.25
Elev 928.33

SD 25 FT
335 FT

PVT 303+03.25
Elev 927.79

BILTMORE BLVD. STA 303+06.36 =
BILTMORE DR. STA 50+00.00

VPI 302+90.75
Elev 928.04

-1.00%

VPI 303+16.80
Elev 927.52

-2.00%

PVC 303+31.39
Elev 927.23

VPI 303+48.89
Elev 926.88

L 35 FT
SD 601 FT

-3.85%

PVT 303+66.39
Elev 926.20

VPI 303+68.03
Elev 926.14

END CONSTRUCTION
BILTMORE BOULEVARD
STA 303+68.03

931.8 931.94 | 931.6 931.59 | 931.3 931.24 | 930.9 930.89 | 930.5 930.54 | 930.1 930.15 | 929.7 929.70 | 929.3 929.23 | 928.7 928.76 | 928.1 928.29 | 927.5 927.86 | 927.2 927.46 | 926.6 927.04 | 926.5 926.44 | 925.7

301+00 301+20 301+40 301+60 301+80 302+00 302+20 302+40 302+60 302+80 303+00 303+20 303+40 303+60 303+80 304+00

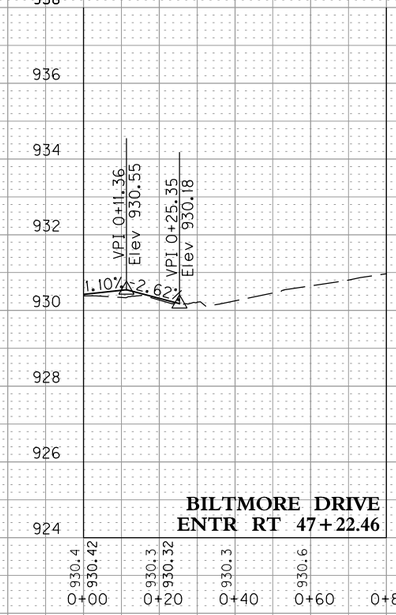
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

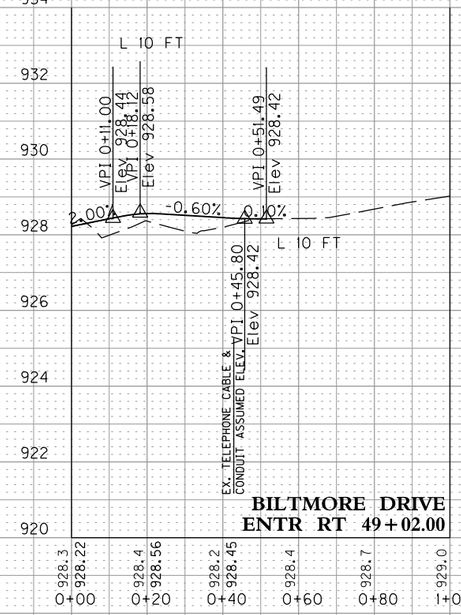
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

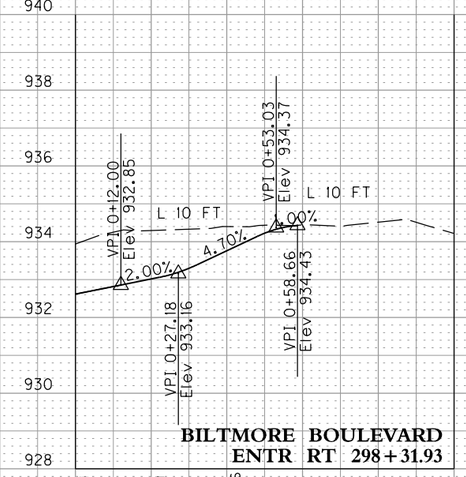
BILTMORE BOULEVARD
PROFILE SHEET
STA 301+00 TO STA 303+68.03

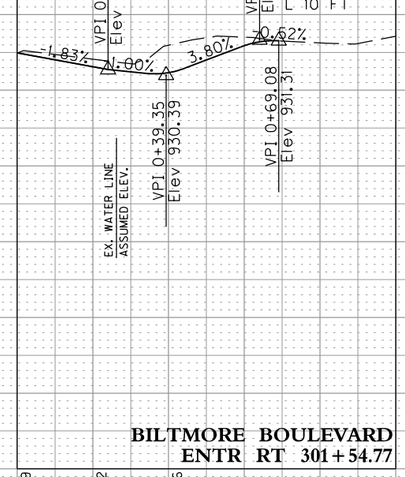
FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R39_PR_BILTMORE_BLVD.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

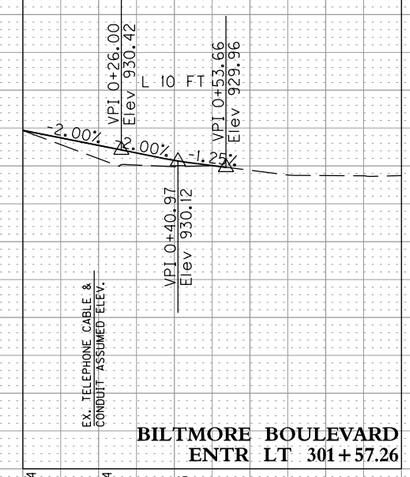
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R40











EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROAD ENTRANCES
PROFILE SHEET
BILTMORE DRIVE & BILTMORE BOULEVARD

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R40_PR_APPROACH_RD_ENTR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R41

CURB						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
BILTMORE CONN.	LT	20+08.98	-	21+67.38	180	-
BILTMORE BLVD.	LT	297+85.99	-	299+00.00	108	-
BILTMORE BLVD.	RT	297+86.24	-	298+14.90	32	-
BILTMORE BLVD.	RT	298+14.90	-	298+19.95	-	38
BILTMORE BLVD.	RT	298+43.90	-	298+47.94	-	38
BILTMORE BLVD.	RT	298+47.94	-	299+00.00	63	-
BILTMORE CONN.	LT	21+88.64	-	24+00.00	226	-
BILTMORE CONN.	RT	20+08.98	-	24+00.00	387	-

SIDEWALK & RAMPS					
ALIGNMENT	SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)
BILTMORE BLVD.	RT	297+86.24	-	298+14.90	15
BILTMORE BLVD.	RT	298+52.63	-	299+00.00	34
BILTMORE CONN.	LT	21+93.07	-	24+00.00	18

SODDING					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
BILTMORE CONN.	LT	20+08.32	-	21+65.09	40
BILTMORE BLVD.	LT	297+85.99	-	299+00.00	24
BILTMORE BLVD.	RT	297+86.24	-	298+08.91	6
BILTMORE BLVD.	RT	298+86.24	-	298+19.37	15
BILTMORE BLVD.	RT	298+52.63	-	299+00.00	15
BILTMORE BLVD.	RT	298+44.49	-	299+00.00	22
BILTMORE CONN.	LT	21+90.93	-	24+00.00	59
BILTMORE CONN.	LT	21+97.49	-	24+00.00	46
BILTMORE CONN.	RT	20+08.32	-	24+00.00	86

BEGIN CONSTRUCTION
BILTMORE CONNECTOR
STA 20+08.98

BILTMORE CONNECTOR STA 21+77.90 =
BILTMORE BOULEVARD STA 297+47.71

MATCHLINE STA 24+00

BILTMORE CONNECTOR
P.I. STA. 24+01.49
Δ = 49°07'42.44"LT
T = 137.12'
L = 257.24'
R = 300.00'
E = 29.85'
V = 25mph
e = SEE XS

BILTMORE CONNECTOR
P.I. STA. 21+53.61
Δ = 44°43'34.25"RT
T = 123.43'
L = 234.19'
R = 300.00'
E = 24.40'
V = 25mph
e = SEE XS

THOMAS WEBSTER &
KELLY GREEN

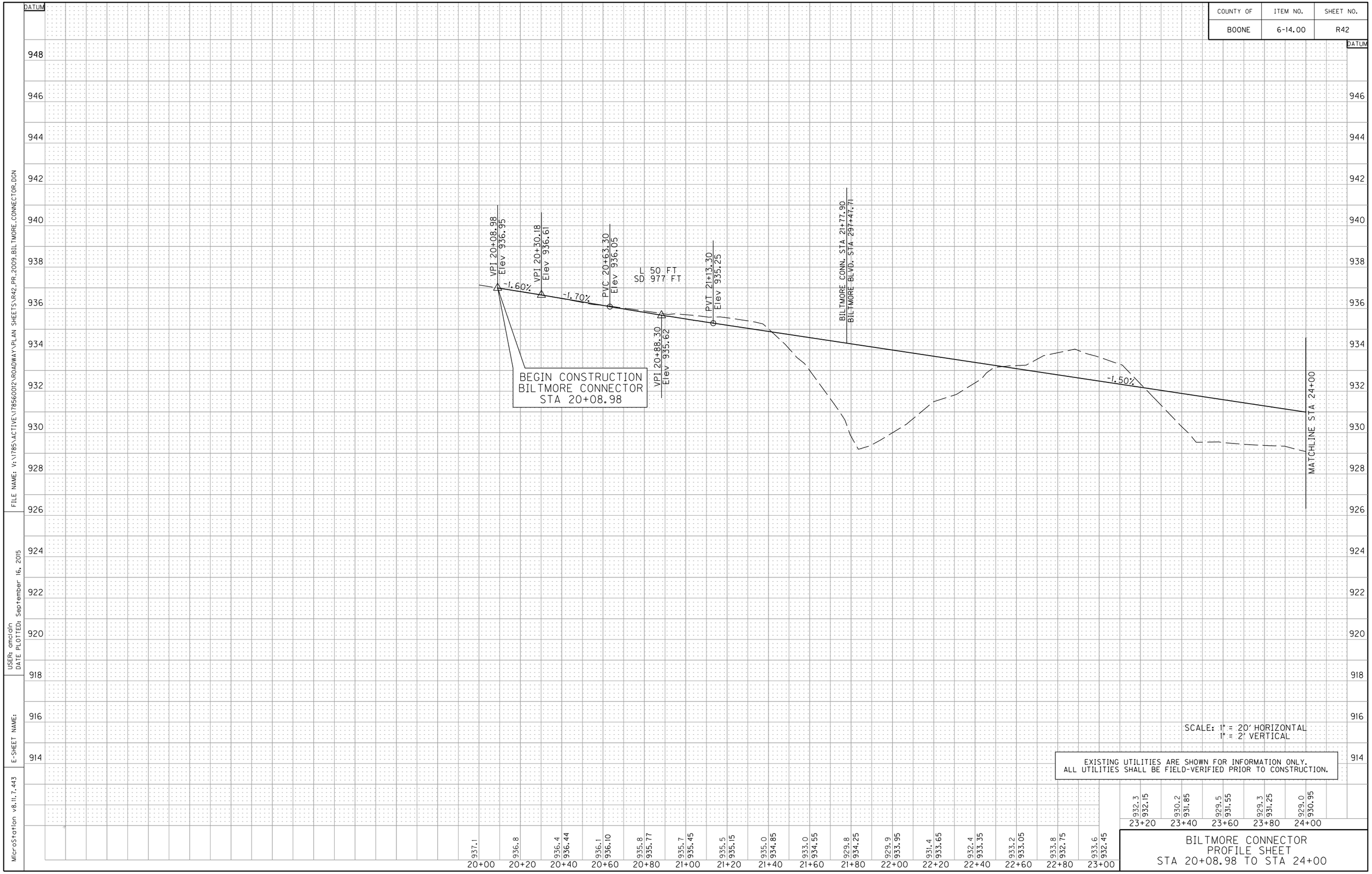
JOHN CARL COBB &
CAROLYN LYNN COBB

0' 20' 40' 80' SCALE: 1"= 20'

BILTMORE CONNECTOR
PLAN SHEET
STA 20+08.98 TO STA 24+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R41_PL_2009_BILTMORE_CONNECTOR.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R42



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

BILTMORE CONNECTOR
PROFILE SHEET
STA 20+08.98 TO STA 24+00

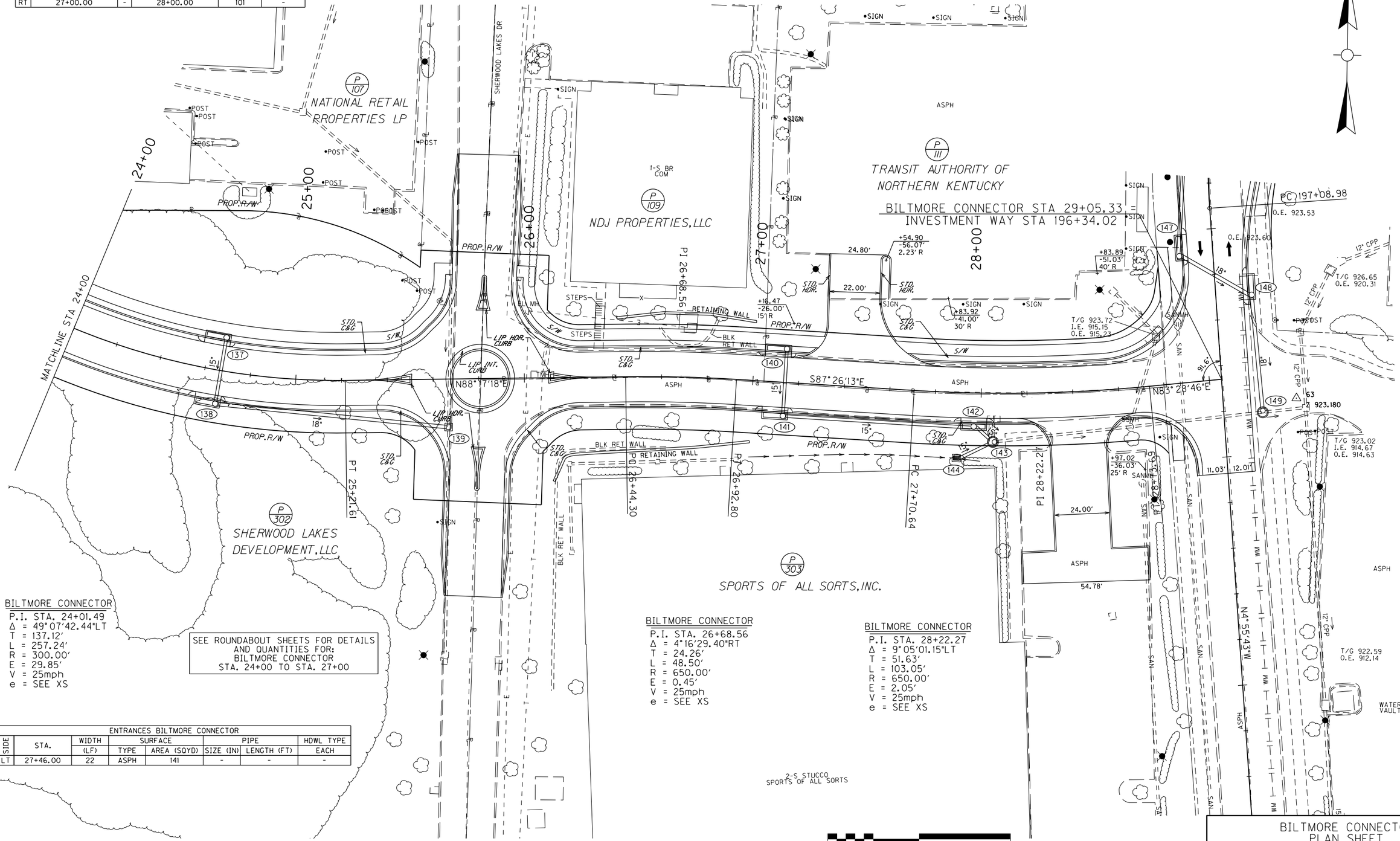
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USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R43

CURB BILTMORE CONNECTOR					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	27+00.00	-	27+30.61	35	-
LT	27+30.61	-	27+30.62	-	37
LT	27+52.66	-	27+60.77	-	61
LT	27+60.77	-	28+00.00	42	-
RT	27+00.00	-	28+00.00	101	-

SODDING BILTMORE CONNECTOR				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	27+00.00	-	27+26.85	7
LT	27+00.00	-	27+30.03	15
LT	27+53.25	-	28+00.00	25
LT	27+67.77	-	28+00.00	8
RT	27+00.00	-	28+00.00	23

SIDEWALK & RAMPS BILTMORE CONNECTOR						
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	27+00.00	-	27+30.61	17	1	12
LT	27+60.77	-	28+00.00	20	1	16



BILTMORE CONNECTOR
P.I. STA. 24+01.49
Δ = 49°07'42.44"LT
T = 137.12'
L = 257.24'
R = 300.00'
E = 29.85'
V = 25mph
e = SEE XS

SEE ROUNDABOUT SHEETS FOR DETAILS AND QUANTITIES FOR: BILTMORE CONNECTOR STA. 24+00 TO STA. 27+00

BILTMORE CONNECTOR
P.I. STA. 26+68.56
Δ = 4°16'29.40"RT
T = 24.26'
L = 48.50'
R = 650.00'
E = 0.45'
V = 25mph
e = SEE XS

BILTMORE CONNECTOR
P.I. STA. 28+22.27
Δ = 9°05'01.15"LT
T = 51.63'
L = 103.05'
R = 650.00'
E = 2.05'
V = 25mph
e = SEE XS

ENTRANCES BILTMORE CONNECTOR							
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
LT	27+46.00	22	ASPH	141	-	-	-

SCALE: 1"= 20'

BILTMORE CONNECTOR
PLAN SHEET
STA 24+00 TO STA 29+05.33

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R43_PL_2400_BILTMORE_CONNECTOR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R44

DATUM

SEE ROUNDABOUT PLANS FOR GEOMETRIC DETAIL

MATCHLINE STA 24+00

STA 24+00

STA 27+00

-3.48%

EX. GAS LINE
ASSUMED ELEV.
EX. TELEPHONE CABLE &
CONDUIT ASSUMED ELEV.

BILTMORE CONNECTOR
ENTRANCE LT STA 27+43.19
PVC 27+43.35
Elev 922.11

L 100 FT
SD 111 FT

VPI 27+93.35
Elev 920.37

BILTMORE CONNECTOR
ENTRANCE RT STA 28+41.57
PVT 28+43.55
Elev 921.87

-3.00%

PVC 28+56.87
Elev 922.28

L 25 FT
SD 1092 FT

PVT 28+81.87
Elev 922.90

+2.00%

VPI 28+69.37
Elev 922.65

VPI 28+82.00
Elev 922.90

VPI 28+94.30
Elev 923.15

VPI 29+05.33
Elev 923.37

END CONSTRUCTION
BILTMORE CONNECTOR
STA 29+05.33

EX. SAN. SEWER
ASSUMED ELEV.

EX. SAN. SEWER
ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

929.0	929.0	928.7	928.9	929.4	930.0	930.3	930.3	929.0	928.1	927.3	926.4	925.6	924.7	924.0	923.4	922.7	922.0	921.4	920.9	920.3	919.5	919.4	920.4	921.9	923.2
930.95	930.65	930.35	930.05	929.75	929.45	929.13	928.74	928.27	927.72	927.09	926.40	925.70	925.01	924.31	923.62	922.92	922.23	921.62	921.27	921.18	921.35	921.77	922.37	922.86	923.26
24+00	24+20	24+40	24+60	24+80	25+00	25+20	25+40	25+60	25+80	26+00	26+20	26+40	26+60	26+80	27+00	27+20	27+40	27+60	27+80	28+00	28+20	28+40	28+60	28+80	29+00

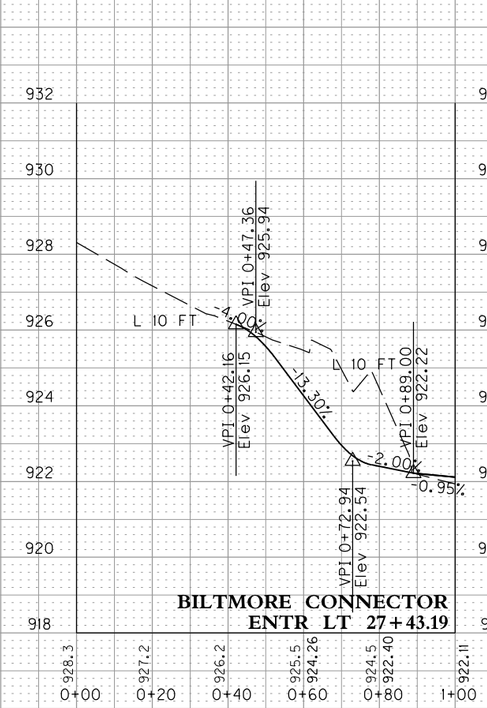
BILTMORE CONNECTOR
PROFILE SHEET
STA 24+00 TO STA 29+05.33

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R44_PR_2400_BILTMORE_CONNECTOR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

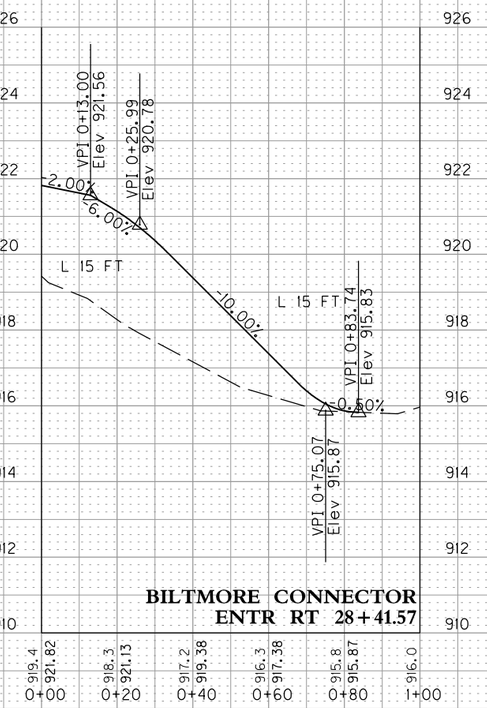
DATUM

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R45

DATUM



BILTMORE CONNECTOR
ENTR LT 27+43.19



BILTMORE CONNECTOR
ENTR RT 28+41.57

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SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROAD ENTRANCES
PROFILE SHEET
BILTMORE CONNECTOR

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R45_PR_APPROACH_RD_ENTR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

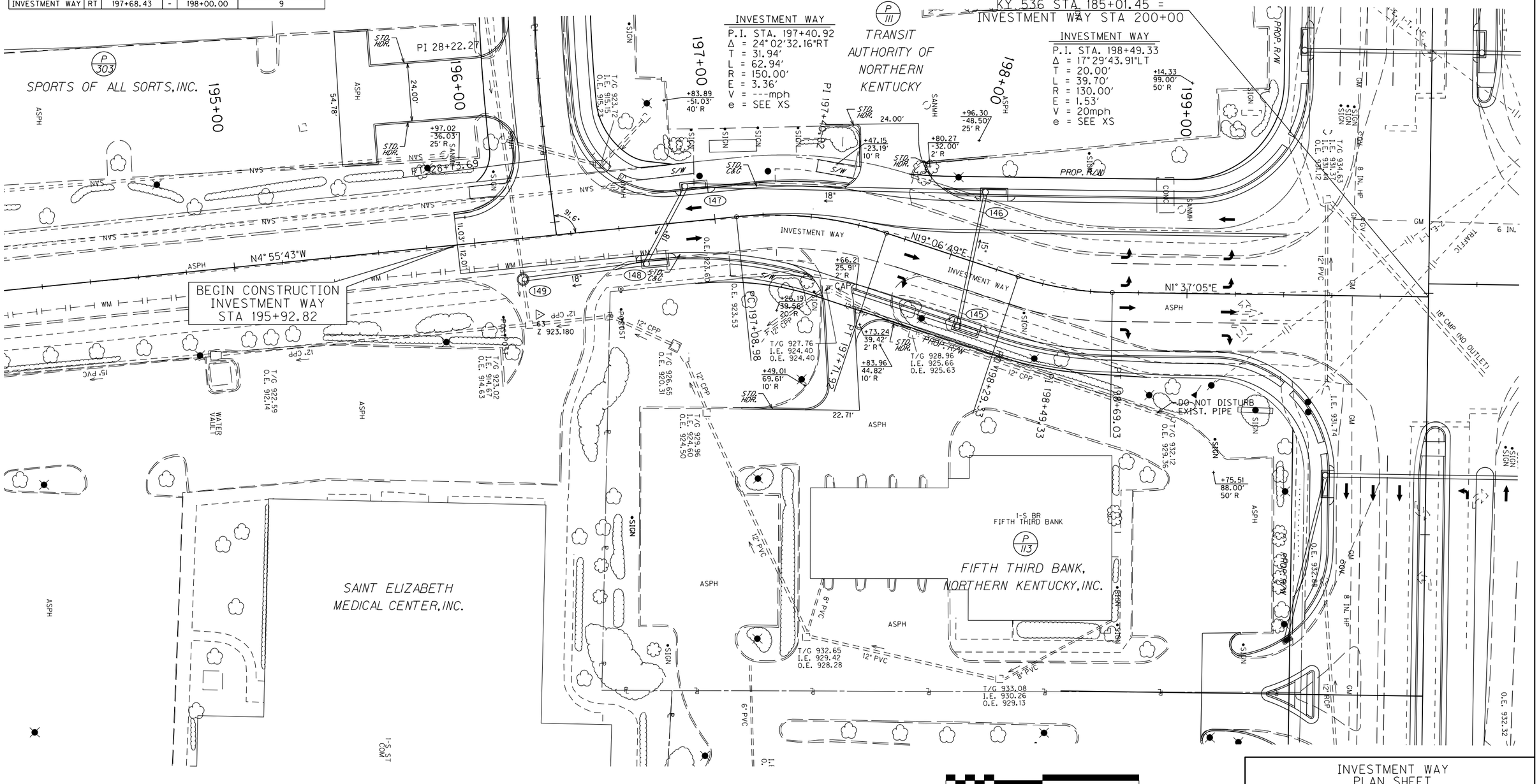
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R46

SODDING INVESTMENT WAY					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
INVESTMENT WAY	LT	195+92.82	-	196+19.44	9
BILTMORE CONN.	RT	28+52.94	-	28+68.57	22
BILTMORE CONN.	RT	28+00.00	-	28+30.19	24
BILTMORE CONN.	LT	28+00.00	-	28+54.17	15
BILTMORE CONN.	LT	28+00.00	-	28+54.17	12
INVESTMENT WAY	LT	196+46.47	-	196+61.74	9
INVESTMENT WAY	LT	196+53.89	-	196+93.57	13
INVESTMENT WAY	LT	196+64.52	-	196+93.19	15
INVESTMENT WAY	LT	197+40.37	-	197+55.28	10
INVESTMENT WAY	LT	197+40.29	-	197+54.38	5
INVESTMENT WAY	LT	197+79.29	-	198+00.00	10
INVESTMENT WAY	LT	197+88.94	-	198+00.00	3
INVESTMENT WAY	RT	196+65.82	-	197+43.86	13
INVESTMENT WAY	RT	197+04.13	-	197+65.65	26
INVESTMENT WAY	RT	197+64.59	-	198+00.00	6
INVESTMENT WAY	RT	197+68.43	-	198+00.00	9

CURB INVESTMENT WAY						
ALIGNMENT	SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
BILTMORE CONN.	RT	28+00.00	-	28+22.86	24	-
BILTMORE CONN.	RT	28+22.86	-	28+17.64	-	88
BILTMORE CONN.	RT	28+66.16	-	28+60.27	-	90
BILTMORE CONN.	RT	28+60.27	-	28+68.57	8	-
BILTMORE CONN.	LT	28+00.00	-	28+54.17	54	-
INVESTMENT WAY	LT	195+92.82	-	196+22.02	44	-
INVESTMENT WAY	LT	196+43.89	-	197+52.90	130	-
INVESTMENT WAY	LT	197+52.90	-	197+41.35	-	41
IMVESTMENT WAY	LT	197+78.31	-	197+93.87	-	44
IMVESTMENT WAY	LT	197+93.87	-	198+00.00	7	-
IMVESTMENT WAY	RT	196+65.82	-	197+41.34	73	-
IMVESTMENT WAY	RT	197+41.34	-	197+03.15	-	91
IMVESTMENT WAY	RT	197+63.79	-	197+93.67	-	41
IMVESTMENT WAY	RT	197+63.79	-	198+00.00	36	-

SIDEWALK & RAMPS INVESTMENT WAY							
ALIGNMENT	SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
INVESTMENT WAY	RT	196+48.89	-	196+93.60	36	1	16
INVESTMENT WAY	LT	197+40.37	-	197+55.78	10	1	10
INVESTMENT WAY	LT	197+81.57	-	198+00.00	9	1	14
INVESTMENT WAY	RT	197+04.21	-	197+50.41	21	1	14
INVESTMENT WAY	RT	197+64.76	-	198+00.00	19	1	11

ENTRANCES INVESTMENT WAY								
ALIGNMENT	SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
BILTMORE CONN.	RT	28+41.91	24	ASPH	251	-	-	-
INVESTMENT WAY	LT	197+73.25	26	ASPH	97	-	-	-
INVESTMENT WAY	RT	197+48.74	12	ASPH	80	-	-	-



INVESTMENT WAY
PLAN SHEET
STA 195+92.82 TO STA 200+00

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: apousa | DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R46_PL_INVESTMENT_WAY.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R47

DATUM

944
942
940
938
936
934
932
930
928
926
924
922
920
918
916
914
912
910

INVESTMENT WAY
ENTRANCE RT STA 197+31.07

INVESTMENT WAY
ENTRANCE LT STA 197+67.00

3.70%

PVC 198+90.38
Elev 932.84

VPI 199+15.38
Elev 933.76

L = 50 FT
SD = 660 FT

PVT 199+40.38
Elev 934.26

2.00%

VPI 200+00.00
Elev 935.46

END CONSTRUCTION
INVESTMENT WAY
STA 200+00.00

EX. GAS LINE
ASSUMED ELEV.

VPI 195+92.82
Elev 922.03

3.00%

PVC 195+96.97
Elev 922.16

L = 50 FT
SD = 335 FT

INVESTMENT WAY
BILTMORE CONNECTOR STA 29+05.33

PVT 196+46.97
Elev 923.83

VPI 196+21.97
Elev 922.91

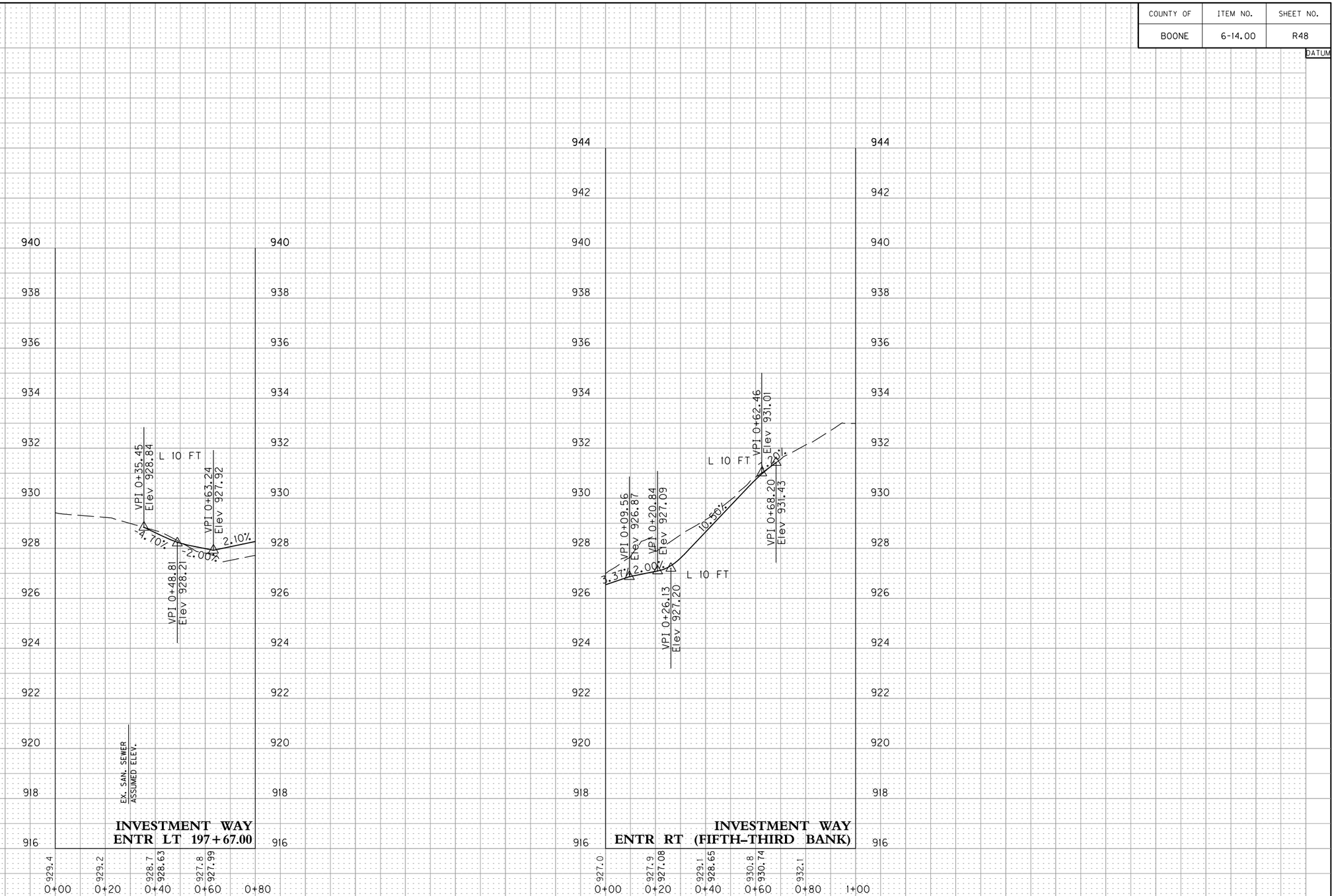
BEGIN CONSTRUCTION
INVESTMENT WAY
STA 195+92.82

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

| | | |

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R48



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

APPROACH ROAD ENTRANCES
PROFILE SHEET
INVESTMENT WAY

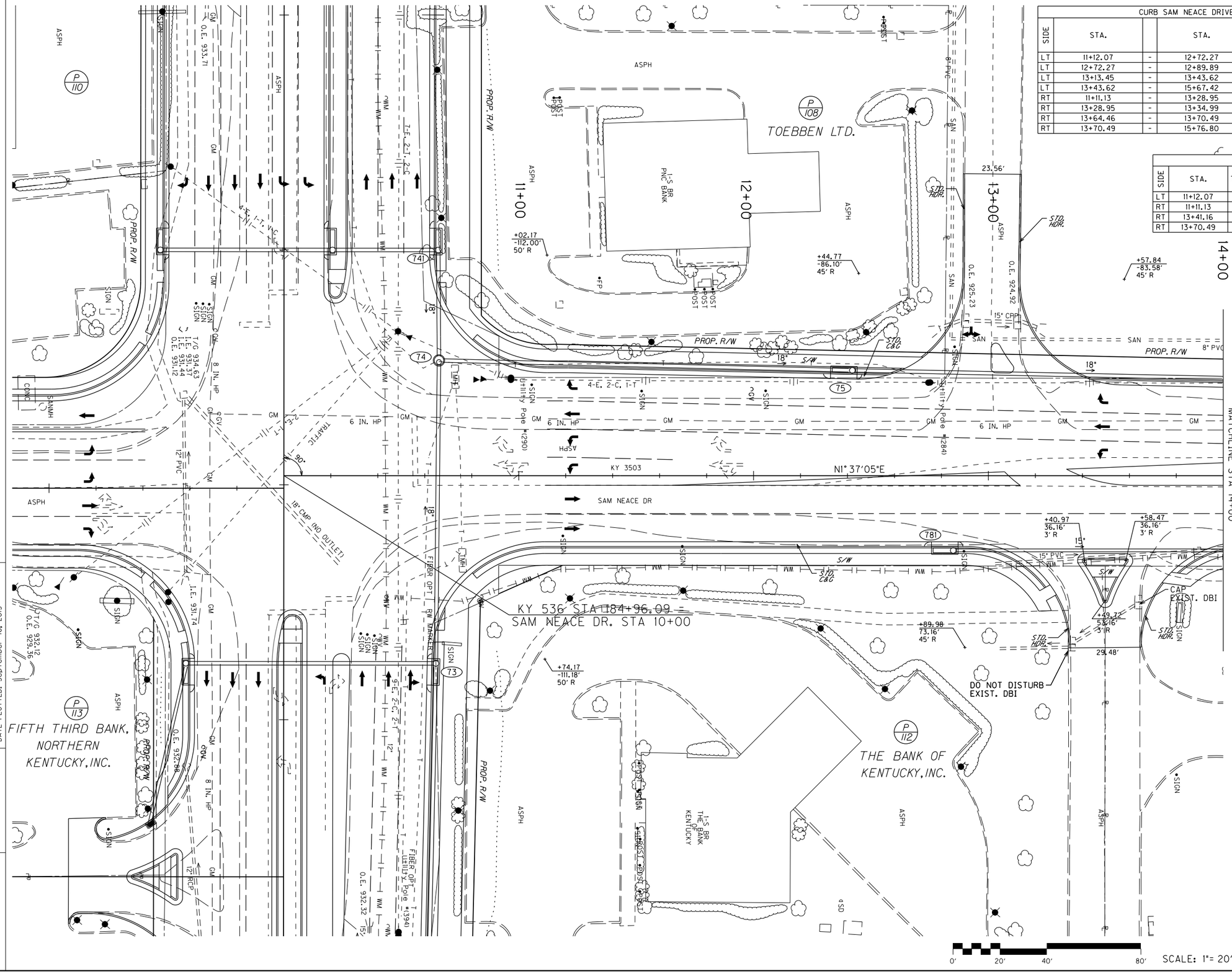
FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R48_PR_INVESTMENT_WAY_ENTR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R49

CURB SAM NEACE DRIVE					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	11+12.07	-	12+72.27	163	-
LT	12+72.27	-	12+89.89	-	84
LT	13+13.45	-	13+43.62	-	101
LT	13+43.62	-	15+67.42	226	-
RT	11+11.13	-	13+28.95	227	-
RT	13+28.95	-	13+34.99	-	24
RT	13+64.46	-	13+70.49	-	24
RT	13+70.49	-	15+76.80	253	-

SIDEWALK & RAMPS SAM NEACE DRIVE						
SIDE	STA.	TO	STA.	SIDEWALK 4 INCH CONC (SQYD)	RAMPS TYPE 1 (EACH)	DETECTABLE WARNINGS (SQFT)
LT	11+12.07	-	12+72.27	87	1	18
RT	11+11.13	-	13+28.95	125	1	10
RT	13+41.16	-	13+58.29	8	2	22
RT	13+70.49	-	15+76.80	133	1	10

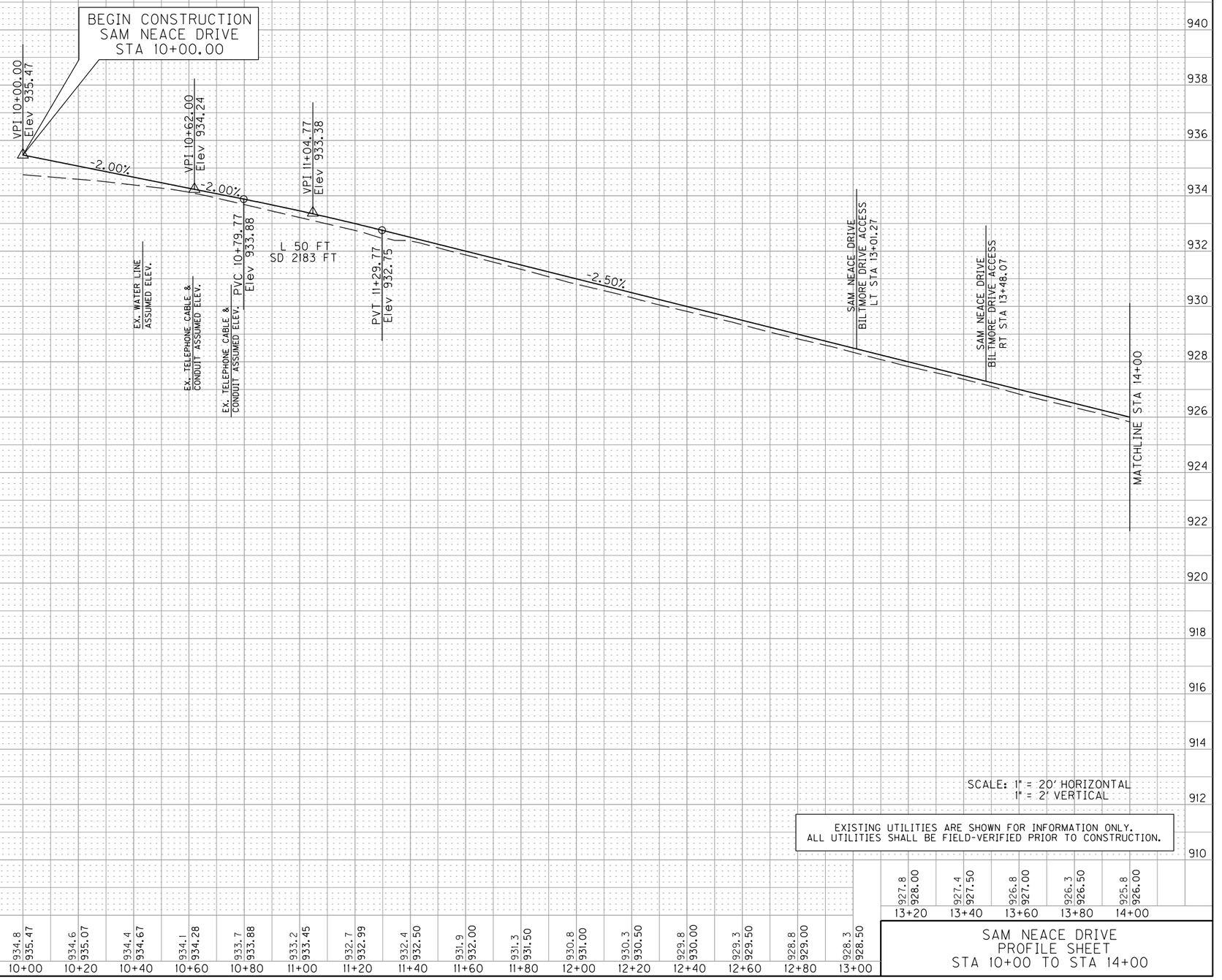
SODDING SAM NEACE DRIVE				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	11+12.07	-	12+89.31	59
LT	11+12.07	-	12+63.19	37
LT	13+13.45	-	15+81.36	76
RT	11+11.13	-	13+23.96	59
RT	11+11.13	-	13+34.40	55
RT	13+40.60	-	13+58.85	5
RT	13+44.91	-	13+54.54	6
RT	13+65.05	-	15+71.80	57
RT	13+75.49	-	15+76.80	64



SAM NEACE DRIVE
PLAN SHEET
STA 10+00 TO STA 14+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R49_PL_SAM_NEACE.DGN
USER: dpousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R50



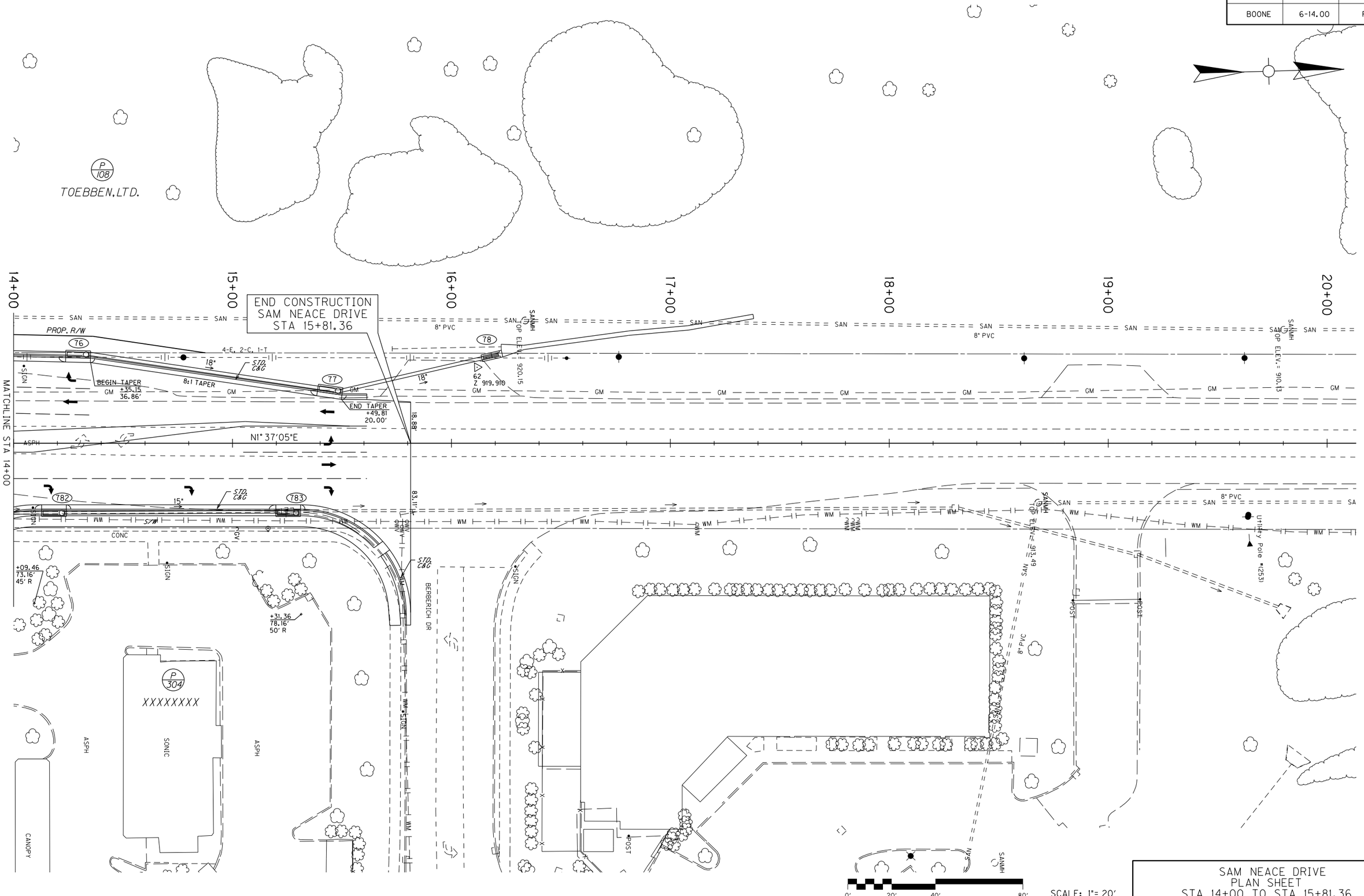
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
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SAM NEACE DRIVE
PROFILE SHEET
STA 10+00 TO STA 14+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R50_PR_SAM_NEACE.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R51



SAM NEACE DRIVE
PLAN SHEET
STA 14+00 TO STA 15+81.36

FILE NAME: V:\7856\ACTIVE\78560012\ROADWAY\PLAN SHEETS\R51_PL_SAM_NEACE.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R52

DATUM

940 938 936 934 932 930 928 926 924 922 920 918 916 914 912 910 908 906

MATCHLINE STA 14+00

-2.50%

PVC 15+11.37
Elev 923.21

VPI 15+36.37
Elev 922.59

L 50 FT
SD 2901 FT

PVT 15+61.37
Elev 921.87

2.88%

VPI 15+81.36
Elev 921.30

END CONSTRUCTION
SAM NEACE DRIVE
STA 15+81.36

925.8 926.00 | 925.3 925.50 | 924.9 925.00 | 924.4 924.50 | 923.9 924.00 | 923.4 923.50 | 922.9 923.00 | 922.4 922.47 | 921.9 921.91 | 921.3 921.34 | 920.8 | 920.3 | 919.8 | 919.3 | 918.8 | 918.2 | 917.7 | 917.2 | 916.7 | 916.2 | 915.7 | 915.2 | 914.7 | 914.1 | 913.6 | 913.1

14+00 14+20 14+40 14+60 14+80 15+00 15+20 15+40 15+60 15+80 16+00 16+20 16+40 16+60 16+80 17+00 17+20 17+40 17+60 17+80 18+00 18+20 18+40 18+60 18+80 19+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

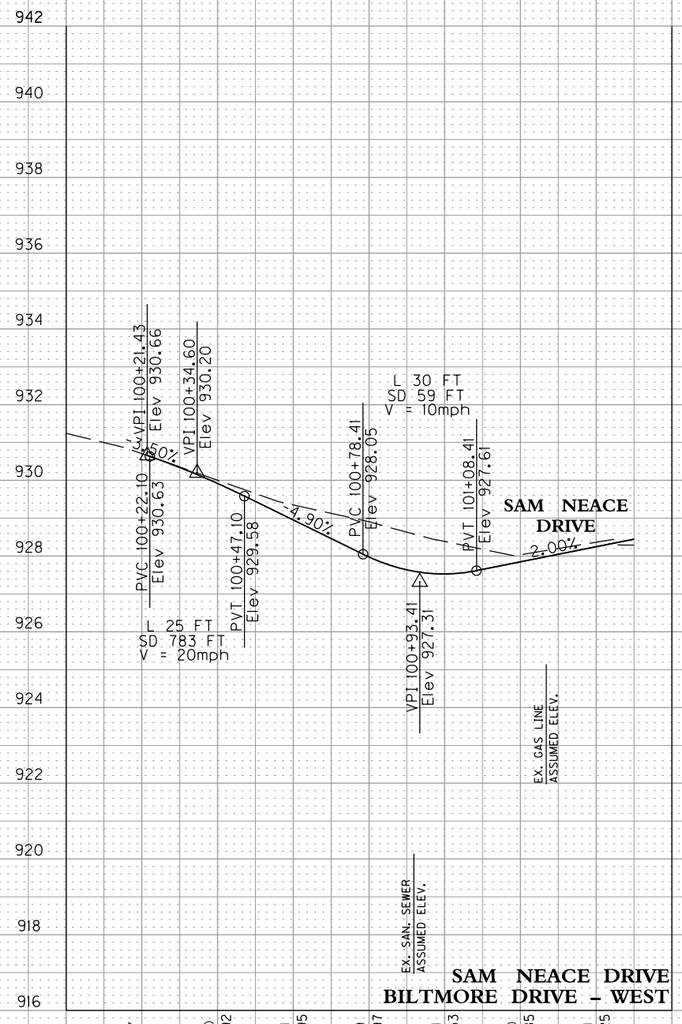
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

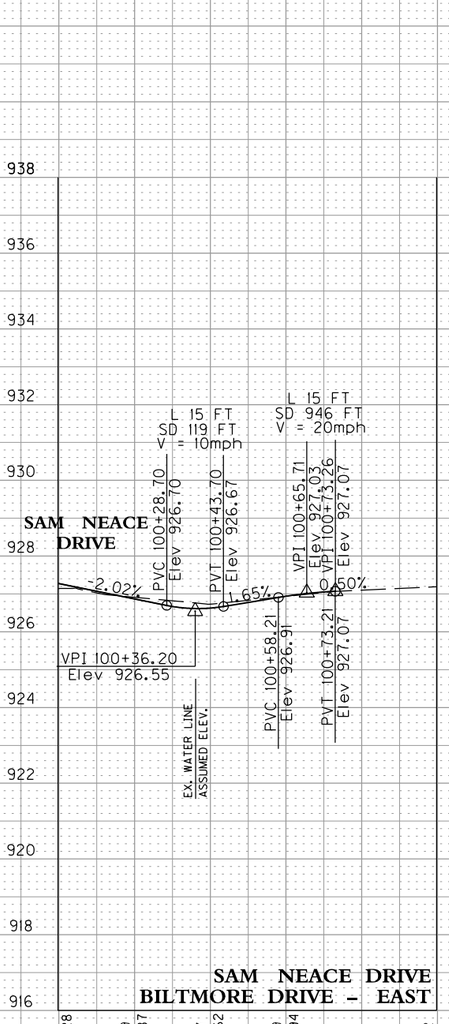
SAM NEACE DRIVE
PROFILE SHEET
STA 14+00 TO STA 15+81.36

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R52_PR_SAM_NEACE.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R53

DATUM





EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

BILTMORE DRIVE APPROACH ROADS
PROFILE SHEET
SAM NEACE DRIVE

FILE NAME: V:\1785\ACTIVE\I7856001\ROADWAY\PLAN SHEETS\R53_PR_SAM_NEACE_ENTR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R54

BRIGID SCHWARTZ

FAY SHEHAN
WILLIAM SHEHAN

ARRM PROPERTIES,LLC

WALTER HAYES,LLC

UNITED DAIRY FARMERS,INC.

496+00 497+00 498+00 499+00 501+00 502+00

BEGIN CONSTRUCTION
US 25
STA 497+00.00

KY 536 STA 208+99.41 =
U.S. 25 STA 500+00.00

P1 209+08.76

BEGIN TAPER
+76.29
30.03'

MATCHLINE STA 502+00

SCALE: 1"= 20'

US 25
PLAN SHEET
STA 497+00 TO STA 502+00

ENTRANCES U.S. 25							
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
LT	497+79.00	14	ASPH	90	-	-	-
RT	498+13.79	24	ASPH	125	-	-	-

STANDARD CURB & GUTTER U.S. 25				
SIDE	STA.	TO	STA.	LENGTH (LF)
LT	497+00.00	-	497+56.72	57
LT	497+98.88	-	498+50.00	52
RT	497+00.00	-	497+88.46	89
RT	498+40.48	-	498+50.00	10

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R54_PL_49700_US25.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R55

DATUM

BEGIN CONSTRUCTION
US 25
STA 497+00.00

VPI 497+00.00
Elev 957.38

0.30%

PVC 497+52.63
Elev 957.54

US 25
ENTRANCE LT STA 497+74.47

VPI 498+02.63
Elev 957.69

US 25
ENTRANCE RT STA 498+17.27

L 100 FT
SD 1249 FT

PVT 498+52.63
Elev 957.39

-0.60%

VPI 499+49.01
Elev 956.81

-0.61%

VPI 500+00.00
Elev 956.50

-0.59%

VPI 500+65.56
Elev 956.11

-0.50%

MATCHLINE STA 502+00

EX. TELEPHONE CABLE & CONDUIT ASSUMED ELEV.

EX. WATER LINE ASSUMED ELEV.

US 25 STA 500+00 = KY 536 STA 208+99.41

EX. TELEPHONE CABLE & CONDUIT ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

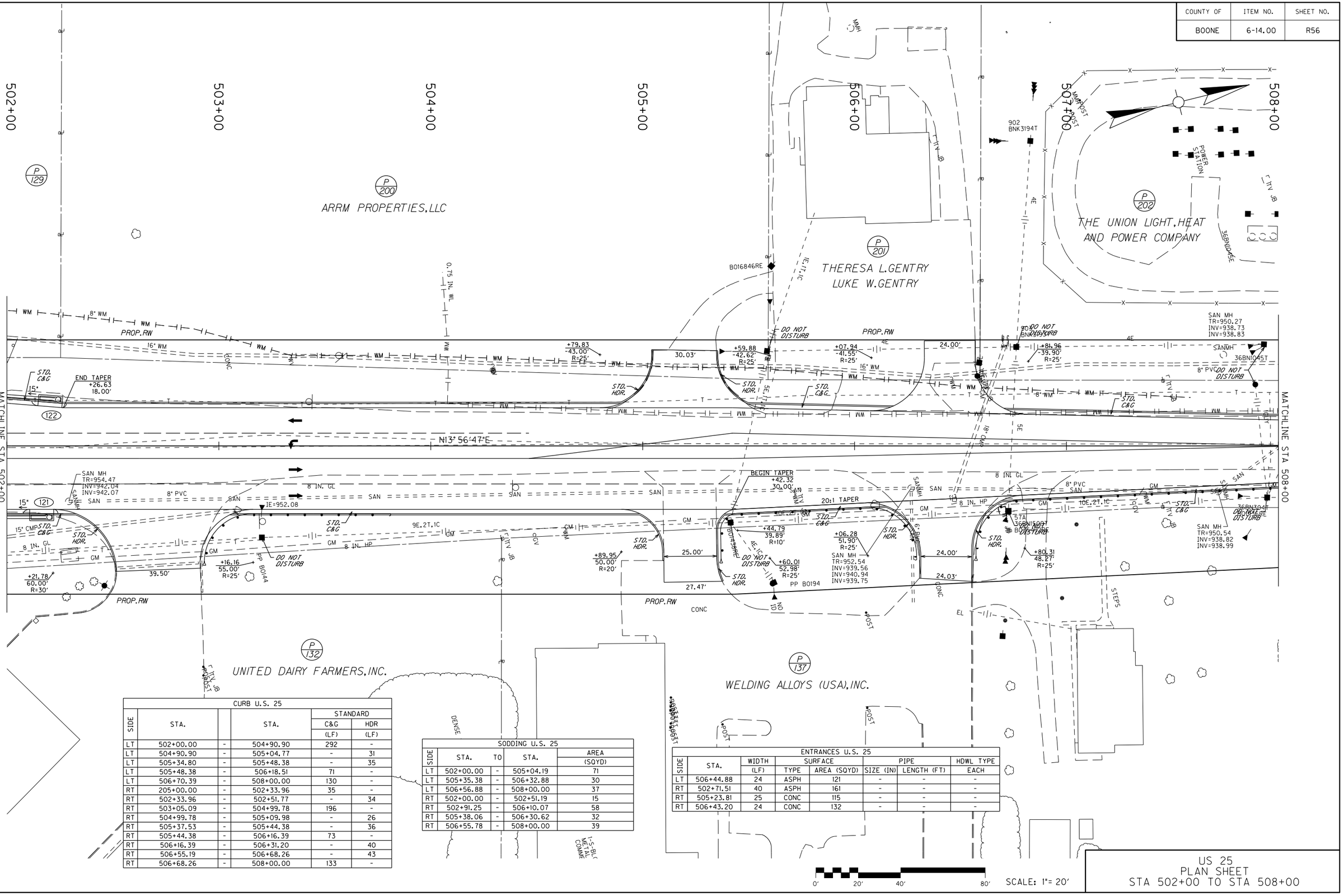
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

496+00	496+20	496+40	496+60	496+80	497+00	497+20	497+40	497+60	497+80	498+00	498+20	498+40	498+60	498+80	499+00	499+20	499+40	499+60	499+80	500+00	500+20	500+40	500+60	500+80	501+00	501+20	501+40	501+60	501+80	502+00
957.0	957.1	957.2	957.3	957.3	957.4 / 957.38	957.4 / 957.44	957.4 / 957.50	957.3 / 957.56	957.2 / 957.59	957.2 / 957.58	957.1 / 957.54	957.0 / 957.46	956.9 / 957.34	956.8 / 957.22	956.7 / 957.10	956.6 / 956.98	956.5 / 956.86	956.4 / 956.74	956.5 / 956.62	956.4 / 956.50	956.2 / 956.38	956.1 / 956.26	955.9 / 956.14	955.8 / 956.04	955.7 / 955.94	955.7 / 955.84	955.7 / 955.74	955.6 / 955.64	955.5 / 955.54	955.4 / 955.44

US 25
PROFILE SHEET
STA 497+00 TO STA 502+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R55_PR_49700.US25.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R56



CURB U.S. 25					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	502+00.00	-	504+90.90	292	-
LT	504+90.90	-	505+04.77	-	31
LT	505+34.80	-	505+48.38	-	35
LT	505+48.38	-	506+18.51	71	-
LT	506+70.39	-	508+00.00	130	-
RT	205+00.00	-	502+33.96	35	-
RT	502+33.96	-	502+51.77	-	34
RT	503+05.09	-	504+99.78	196	-
RT	504+99.78	-	505+09.98	-	26
RT	505+37.53	-	505+44.38	-	36
RT	505+44.38	-	506+16.39	73	-
RT	506+16.39	-	506+31.20	-	40
RT	506+55.19	-	506+68.26	-	43
RT	506+68.26	-	508+00.00	133	-

SODDING U.S. 25				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	502+00.00	-	505+04.19	71
LT	505+35.38	-	506+32.88	30
LT	506+56.88	-	508+00.00	37
RT	502+00.00	-	502+51.19	15
RT	502+91.25	-	506+10.07	58
RT	505+38.06	-	506+30.62	32
RT	506+55.78	-	508+00.00	39

ENTRANCES U.S. 25							
SIDE	STA.	WIDTH (LF)	SURFACE TYPE	SURFACE AREA (SQYD)	PIPE SIZE (IN)	PIPE LENGTH (FT)	HDWL TYPE EACH
LT	506+44.88	24	ASPH	121	-	-	-
RT	502+71.51	40	ASPH	161	-	-	-
RT	505+23.81	25	CONC	115	-	-	-
RT	506+43.20	24	CONC	132	-	-	-

0' 20' 40' 80'

SCALE: 1"= 20'

US 25
PLAN SHEET
STA 502+00 TO STA 508+00

FILE NAME: V:\1785\ACTIVE\17856001201\ROADWAY\PLAN SHEETS\R56-PL_50200.US25.DGN
USER: cdawahare
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R57

DATUM

MATCHLINE STA 502+00

-0.50%

US 25
ENTRANCE RT STA 502+69.28

PVC 503+56.69
Elev 954.65

VPI 503+96.69
Elev 954.45

LO 503+96.69
Elev954.55

L 80 FT
SD 367 FT

PVT 504+36.69
Elev 954.65

PVC 504+49.33
Elev 954.72

0.50%

US 25
ENTRANCE LT STA 505+21.16
VPI 505+24.33
Elev 955.09

L 150 FT
SD 615 FT

US 25
ENTRANCE RT STA 505+21.58

PVT 505+99.33
Elev 953.97

US 25
ENTRANCE RT STA 506+43.66

US 25
ENTRANCE LT STA 506+45.26

-1.50%

EX. TELEPHONE CABLE & CONDUIT ASSUMED ELEV.

MATCHLINE STA 508+00

| | | |

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R58

MATCHLINE STA. 508+00

508+00 509+00 510+00 511+00 512+00 513+00

N13°56'47"E

6-A RENTAL PROPERTIES

RONALD CONNLEY
JUDITH CONNLEY

XXXXXXXX

END CONSTRUCTION
US 25
STA 509+60.00

US 25

DIXIE HWY

ARISTOCRAT DR

36BN1023E
B020279RE

36BN1022E
B020278RE

36BN1292

36BN543
B014369RE

36BN540E

36BN3195E

36BN3182E

36BN3184E

36BN3174E

16" WM
BNK3176E

PP 36BN8

57
B03B202RE

55
36BN302T
B01434RE

B01435RE

SAN MH
TR=949.28
INV=938.28
INV=938.37

+29.85
-57.00'
R=45'

+46.34
-57.03'
R=45'

+53.29
18.52'
R=7.3'

END TAPER
BEGIN TAPER
+09.82
12.00'

END TAPER
+55.76
11.18'

20:1 TAPER

SGI
TG=946.22
INV=944.80

DO NOT DISTURB

EXIST. & PROP. RW

STD. C&G

STD. HDR.

8" PVC

8" WM

8 IN. HP

8 IN. GL

2 IN. GL

12.00'

11.18'

26.45'

10E,2T,2C

4E,1T

6E,1T

2GUY

3GUY

45 LT JF

POST

SIGN

SILTED

GRAVEL

CONC

ASPH

DENSE VEGETATION

P 202

P 204

P 137

CURB U.S. 25					
SIDE	STA.		STA.	STANDARD C&G (LF)	STANDARD HDR (LF)
LT	508+00.00	-	508+44.87	46	-
LT	508+44.87	-	508+74.90	-	57
LT	509+01.34	-	509+31.34	-	56
LT	509+31.34	-	509+60.00	29	-
RT	508+00.00	-	509+50.33	181	-

SODDING U.S. 25				
SIDE	STA.	TO	STA.	AREA (SQYD)
LT	508+00.00	-	508+74.31	22
LT	509+01.92	-	509+60.00	19
RT	508+00.00	-	059+50.33	39

0' 20' 40' 80' SCALE: 1"= 20'

US 25
PLAN SHEET
STA 508+00 TO STA 509+60

FILE NAME: V:\7856\ACTIVE\78560012\ROADWAY\PLAN SHEETS\R58_PL_50800_US25.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R59

DATUM

968
966
964
962
960
958
956
954
952
950
948
946
944
942
940
938
936
934

OVERHEAD UTILITY
ASSUMED ELEV.

MATCHLINE STA 508+00

-1.50%

PVC 508+39.11
Elev 950.37

L 50 FT
SD 1858 FT

VPI 508+64.11
Elev 950.00

PVT 508+89.11
Elev 949.65

-1.40%

VPI 509+60.00
Elev 948.65

END CONSTRUCTION
US 25
STA 509+60.00

EX. GAS LINE
ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

EX. SAN. SEWER
ASSUMED ELEV.

508+00	508+20	508+40	508+60	508+80	509+00	509+20	509+40	509+60	509+80	510+00	510+20	510+40	510+60	510+80	511+00	511+20	511+40	511+60	511+80	512+00	512+20	512+40	512+60	512+80	513+00
951.0	950.7	950.4	950.1	949.8	949.5	949.2	948.9	948.7	948.4	948.1	947.8	947.6	947.3	946.9	946.6	946.3	946.3	946.0	945.8	945.6	945.3	945.0	944.7	944.4	944.2
950.96	950.66	950.36	950.06	949.77	949.49	949.21	948.93	948.65																	

513+20	513+40	513+60	513+80	514+00
944.0	943.7	943.3	943.2	943.0

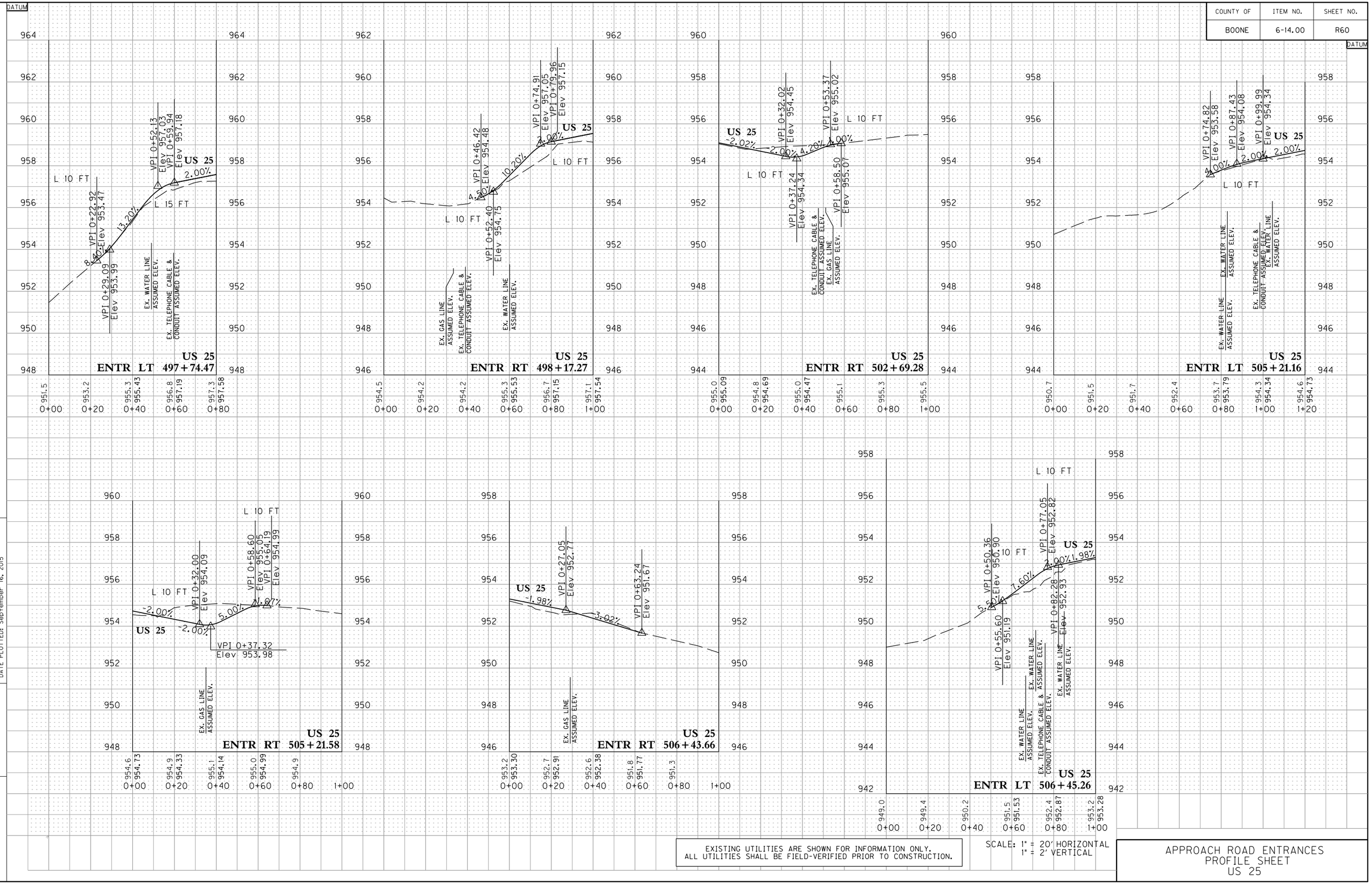
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

US 25
PROFILE SHEET
STA 508+00 TO STA 509+60

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R59_PR_50800.US25.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R60



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

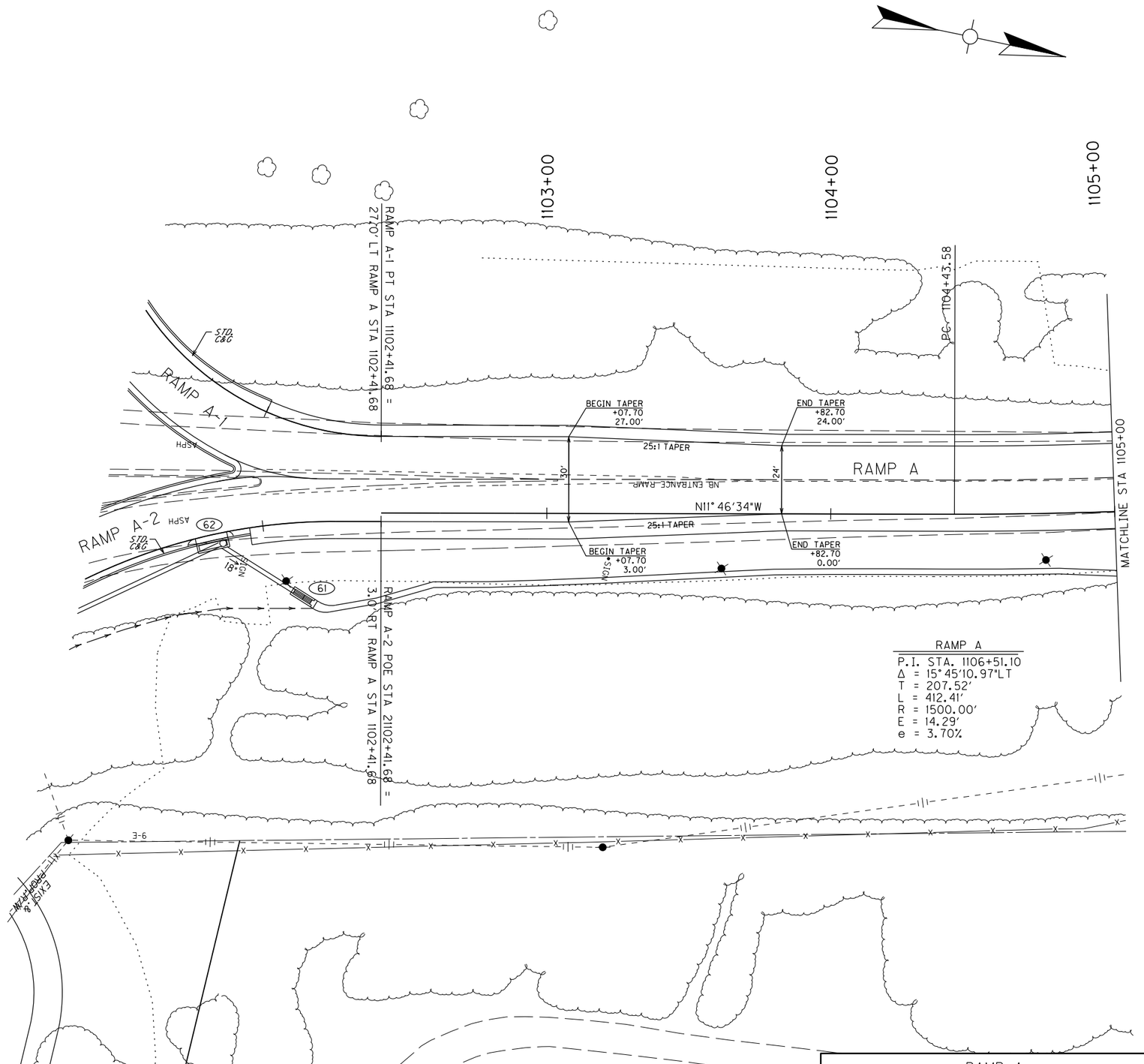
APPROACH ROAD ENTRANCES
PROFILE SHEET
US 25

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R60_PR_US25_ENTR.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R61

CURB RAMP A						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP A-1	LT	11101+00.00	-	11102+00.14	100	-
RAMP A-1	RT	11101+00.00	-	11102+00.14	-	122
RAMP A-2	LT	21101+00.00	-	21101+95.24	-	105
RAMP A-2	RT	21101+00.00	-	21101+95.24	96	-

SODDING RAMP A					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
RAMP A-1	LT	11101+00.00	-	11102+00.00	22
RAMP A-1	RT	11101+00.00	-	11101+98.13	27
RAMP A-2	LT	21101+00.00	-	21101+93.00	23
RAMP A-2	RT	21101+00.00	-	21102+00.00	21



RAMP A
PLAN SHEET
STA 1102+41.68 TO STA 1105+00

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: apousa | DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R61_PL_109972_RAMP_A.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R62

DATUM

EX. WATER LINE
ASSUMED ELEV.

BEGIN CONSTRUCTION
RAMP A STA 1102+41.68 =
RAMP A-1 STA 11102+41.68,
RAMP A-2 STA 21102+41.68

VPI 1102+41.68
Elev 903.36

PVC 1102+46.04
Elev 903.29

L 180 FT
SD 762 FT

VPI 1103+36.04
Elev 901.90

PVT 1104+26.04
Elev 901.36

MATCHLINE STA 1105+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

	912.8	912.0	911.2	911.0	910.4	909.6	908.8	908.1	907.0	905.9	905.0	904.4	903.6	903.2	902.8 903.08	902.5 902.80	902.2 902.53	901.9 902.29	901.7 902.07	901.6 901.87	901.4 901.69	901.3 901.53
1099+60	1099+80	1100+00	1100+20	1100+40	1100+60	1100+80	1101+00	1101+20	1101+40	1101+60	1101+80	1102+00	1102+20	1102+40	1102+60	1102+80	1103+00	1103+20	1103+40	1103+60	1103+80	1104+00

	901.2 901.40	901.0 901.27	900.9 901.15	900.8 901.03	900.7 900.91
1104+20	1104+40	1104+60	1104+80	1105+00	

RAMP A
PROFILE SHEET
STA 1102+41.68 TO STA 1105+00

FILENAME: V:\1356001\ROADWAY\PLAN SHEETS\R62_109972_RAMP_A.DGN
USER: amclain
DATE PLOTTED: 30 September 2015
E-SHEET NAME:
MicroStation v8.11.7.444

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R63

RAMP A
P.I. STA. 1106+51.10
Δ = 15°45'10.97"LT
T = 207.52'
L = 412.41'
R = 1500.00'
E = 14.29'
e = 3.70%

1105+00
1106+00
1107+00
1108+00
1109+00
1110+00

MATCHLINE STA. 1105+00

PT 1108+56.00

END CONSTRUCTION
RAMP A STA 1110+00
MATCH ADJACENT
(CONSTRUCTION BY OTHERS)

OE=888.97

N27° 31'45"W

24" CMP

ASPH

SIGN

IE=892.45

PI 1106+51.10

3-E

E-BOX

RIPRAP

ASPH

SIGN

0' 20' 40' 80'

SCALE: 1"= 20'

RAMP A
PLAN SHEET
STA 1105+00 TO STA 1111+00

FILE NAME: V:\1785\ACTIVE\17856002\ROADWAY\PLAN SHEETS\R63_PL_110500_RAMP_A.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R64

DATUM

MATCHLINE STA 1105+00

-0.60%

PVC 1107+65.00
Elev 899.32

VPI 1109+65.00
Elev 898.12

END CONSTRUCTION
RAMP A STA 1110+00
MATCH ADJACENT CONSTRUCTION
PROJECT (BY OTHERS)

L 400 FT
SD 947 FT

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

	1105+00	1105+20	1105+40	1105+60	1105+80	1106+00	1106+20	1106+40	1106+60	1106+80	1107+00	1107+20	1107+40	1107+60	1107+80	1108+00	1108+20	1108+40	1108+60	1108+80	1109+00	1109+20	1109+40	1109+60	1109+80	1110+00
EXISTING	900.7	900.5	900.4	900.3	900.1	900.0	899.9	899.8	899.7	899.6	899.5	899.3	899.2	899.1	898.9	898.8	898.6	898.4	898.2	898.0	897.7	897.5	897.3	897.0	896.8	896.5
PROPOSED	900.91	900.79	900.67	900.55	900.43	900.31	900.19	900.07	899.95	899.83	899.71	899.59	899.47	899.35	899.23	899.09	898.94	898.77	898.59	898.40	898.19	897.96	897.72	897.47	897.20	896.92

	1110+20	1110+40	1110+60	1110+80	1111+00
EXISTING	896.2	895.9	895.6	895.3	894.9

RAMP A
PROFILE SHEET
STA 1105+00 TO STA 1111+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R64_PR_110500_RAMP_A.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R65

CURB RAMP A						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP A-1	LT	11098+16.46	-	11099+79.05	163	-
RAMP A-1	LT	11099+79.05	-	11101+00.00	121	-
RAMP A-1	RT	11099+81.04	-	11101+00.00	-	121
RAMP A-2	LT	21099+98.71	-	21101+00.00	-	112
RAMP A-2	RT	21099+58.43	-	21101+00.00	142	-

RAMP A-1
P.I. STA. 11101+85.67
Δ = 81°11'39.38"LT
T = 85.70'
L = 141.71'
R = 100.00'
E = 31.70'
e = 2.00%

RAMP A-1
P.I. STA. 11098+91.13
Δ = 25°52'45.59"LT
T = 74.67'
L = 146.80'
R = 325.00'
E = 8.47'
e = 2.00%

RAMP A-2
P.I. STA. 21101+16.28
Δ = 76°33'52.91"RT
T = 157.85'
L = 267.26'
R = 200.00'
E = 54.79'
e = 4.00%

RAMP A-1 PT STA 11102+41.68 = 27.10' LT RAMP A STA 1102+41.68

RAMP A-2 POE STA 21102+41.68 = 3.0' RT RAMP A STA 1102+41.68

RAMP A-1 STA 11098+16.46 = KY 536 WEST STA 167+43.93 40.52' LT

RAMP A-2 STA 21099+58.43 = KY 536 WEST STA 173+03.40 96.34' LT

SAINT ELIZABETH MEDICAL CENTER, INC.

PROP. R/W

EXIST. & PROP. R/W

SCALE: 1"= 20'

RAMP A1 & RAMP A2 PLAN SHEET

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R65_PL_RAMP_A1_A2.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R66

DATUM

924 922 920 918 916 914 912 910 908 906 904 902 900 898 896 894 892 890 888

EX. WATER LINE
ASSUMED ELEV.

VPI 11098+16.46
Elev 899.38

1.61%

VPI 11098+40.00
Elev 899.76

1.85%

VPI 11098+60.00
Elev 900.13

2.05%

VPI 11098+80.00
Elev 900.54

2.25%

VPI 11099+00.00
Elev 900.99

2.45%

VPI 11099+20.00
Elev 901.48

2.50%

VPI 11099+40.00
Elev 901.98

1.90%

VPI 11099+60.00
Elev 902.36

1.95%

VPI 11099+80.00
Elev 902.75

2.10%

PVC 11100+83.93
Elev 904.93

L 120 FT
SD 290 FT

VPI 11101+43.93
Elev 906.19

L 27 FT
SD 156 FT

PVC 11102+04.48
Elev 904.62

PVT 11102+03.93
Elev 904.63

VPI 11102+17.98
Elev 904.27

PVT 11102+31.48
Elev 904.06

1.5%

VPI 11102+41.68
Elev 903.90

BEGIN CONSTRUCTION
RAMP A-1 STA 11098+16.46 =
KY 536 WEST STA 167+43.93

END CONSTRUCTION
RAMP A-1 STA 11102+41.68 =
RAMP A STA 1102+41.68

11098+00	11098+20	11098+40	11098+60	11098+80	11099+00	11099+20	11099+40	11099+60	11099+80	11100+00	11100+20	11100+40	11100+60	11100+80	11101+00	11101+20	11101+40	11101+60	11101+80	11102+00	11102+20	11102+40	11102+60
899.2	899.8	900.3	900.6	900.4	899.4	901.8	907.0	910.9	915.1	918.7	922.8	923.8	925.4	925.7	923.7	915.5	907.5	902.6	904.8	904.4	903.9		
899.44	899.76	900.13	900.54	900.99	901.48	901.98	902.36	902.75	903.17	903.59	904.01	904.43	904.85	905.22	905.44	905.49	905.40	905.14	904.73	904.26	903.93		

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

RAMP A-1
PROFILE SHEET

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R66_PR_RAMP_A1.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R67

OVERHEAD UTILITY
ASSUMED ELEV.

BEGIN CONSTRUCTION
RAMP A-2 STA 21099+58.43 =
KY 536 WEST STA 173+03.40

VPI 21099+58.43
Elev 917.10

-6.61%

PVC 21099+60.00
Elev 917.04

VPI 21100+00.00
Elev 915.49

L 80 FT
SD 403 FT

-6.83%

PVT 21100+40.00
Elev 912.76

PVC 21100+90.00
Elev 909.35

EX. WATER LINE
ASSUMED ELEV.

EX. WATER LINE
ASSUMED ELEV.

L 140 FT
SD 161 FT

VPI 21101+60.00
Elev 904.57

-1.55%

PVT 21102+30.00
Elev 903.48

VPI 21102+41.68
Elev 903.30

END CONSTRUCTION
RAMP A-2 STA 21102+41.68 =
RAMP A STA 1102+41.68

923.8	921.0	917.3	914.5	911.6	909.2	908.0	907.0	906.4	905.7	905.1	904.5	904.1	903.5	903.1
917.04	916.19	915.20	914.05	912.76	911.40	910.03	908.68	907.47	906.40	905.49	904.73	904.12	903.65	903.33

21099+40 21099+60 21099+80 21100+00 21100+20 21100+40 21100+60 21100+80 21101+00 21101+20 21101+40 21101+60 21101+80 21102+00 21102+20 21102+40 21102+60

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

RAMP A-2
PROFILE SHEET

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: amclain DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R67_PR_RAMP_A2.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R68

310+00
311+00
312+00
313+00
314+00
315+00
316+00

PT 310+76.61

BEGIN TAPER
+38.61
15.00'

30:1 TAPER

12'
12'

15'

N8°28'08"E

MATCHLINE STA 316+00

N015°15'

BEGIN CONSTRUCTION
RAMP C
STA 312+38.61

DECK

0' 20' 40' 80'

SCALE: 1"= 20'

RAMP C
PLAN SHEET
STA 310+00 TO STA 316+00

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R68_PL_31000_RAMP_C.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R69

DATUM

936
934
932
930
928
926
924
922
920
918
916
914
912
910
908
906
904
902

BEGIN CONSTRUCTION
RAMP C
STA 312+38.61

VPI 312+38.61
Elev 923.99

PVC 312+40.37
Elev 924.00

4.2%

VPI 313+85.37
Elev 924.60

L 290 FT
SD 648 FT

PVT 315+30.37
Elev 922.09

-1.73%

MATCHLINE STA 316+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

	310+00	310+20	310+40	310+60	310+80	311+00	311+20	311+40	311+60	311+80	312+00	312+20	312+40	312+60	312+80	313+00	313+20	313+40	313+60	313+80	314+00	314+20	314+40	314+60	314+80	315+00	315+20	315+40	315+60	315+80	316+00
EXISTING	922.0	922.2	922.5	922.8	923.1	923.3	923.4	923.5	923.6	923.7	923.8	923.9	924.0	924.0	924.0	924.0	923.9	923.9	923.7	923.6	923.5	923.2	923.0	922.8	922.6	922.3	922.0	921.7	921.4	921.1	920.7
PROPOSED	922.0	922.2	922.5	922.8	923.1	923.3	923.4	923.5	923.6	923.7	923.8	923.9	924.00	924.06	924.10	924.11	924.09	924.04	923.97	923.86	923.72	923.55	923.35	923.13	922.87	922.58	922.27	921.93	921.58	921.24	920.89

RAMP C
PROFILE SHEET
STA 310+00 TO STA 316+00

FILE NAME: V:\1785\ACTIVE\I78560012\ROADWAY\PLAN SHEETS\R69_PR_31000_RAMP_C.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R70

CURB RAMP C						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP C-1	RT	10320+10.78	-	10320+83.96	-	88
RAMP C-2	LT	20320+06.15	-	20321+05.22	-	126

RAMP C-1
P.I. STA. 10320+52.93
Δ = 65°27'23.75"LT
T = 64.27'
L = 114.24'
R = 100.00'
E = 18.87'
e = 2.00%

RAMP C-2
P.I. STA. 20320+98.17
Δ = 90°17'38.71"RT
T = 125.64'
L = 196.99'
R = 125.00'
E = 52.23'
e = 2.00%

RAMP C-1 STA 10321+02.90 =
KY 536 WEST STA 170+25.23
66.24' RT

RAMP C-1 POB STA 10319+72.53 =
36.0' LT RAMP C STA 319+72.53

RAMP C-2 PC STA 20319+72.53 =
6.0' RT RAMP C STA 319+72.53

RAMP C-2 STA 20321+69.52 =
KY 536 WEST STA 172+49.46
66.71' RT

316+00 317+00 318+00 319+00 10320+00 10321+00 20320+00 20321+00

MATCHLINE STA. 316+00

RAMP C RAMP C-1 RAMP C-2

BEGIN TAPER +88.61 0.00'
END TAPER +68.61 36.00'
END TAPER +68.61 6.00'
30:1 TAPER
N8°28'08"E

PC 10319+88.66
PI 10320+52.93
PT 20320+98.17

+56.55 62.01' 3.5' R
+93.33 132.73' 3.6' R
+71.01 47.40' 3.5' R

NB EXIT RAMP

STD C&G
BARRIER C&G
24" CMP
18" CMP
ASPH
CONC
GM
TRAFFIC
SIGN
POST
T/G 896.18
I.E. 901.11
I.E. 901.95
I.E. 906.85
8" INT. HP

501 50 51 511 52 53

BILL C SHEHAN
FAYE SHEHAN
P/138
WOOD SHED
TANK
HOOP
WM
PROP. R/W
A/G POOL
JOHN H BRESSER JR &
DIANE MARIE BRESSER

0' 20' 40' 80' SCALE: 1"= 20'

RAMP C, RAMP C-1 & RAMP C-2
PLAN SHEET
STA. 316+00 TO STA. 321+52.67

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R70_PL_31600_RAMP_C.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R71

DATUM

936
934
932
930
928
926
924
922
920
918
916
914
912
910
908
906
904
902

MATCHLINE STA 316+00

-1.73%

PVC 316+60.00
Elev 919.85

VPI 317+35.00
Elev 918.56

L 150 FT
SD 432 FT

PVT 318+10.00
Elev 914.99

-4.7%

PVC 318+20.53
Elev 914.49

L 152 FT
SD 218 FT

VPI 318+96.53
Elev 910.88

PVT 319+72.53
Elev 910.39

END CONSTRUCTION
RAMP C STA 319+72.53 =
RAMP C-1 STA 10319+72.53,
RAMP C-2 STA 20319+72.53

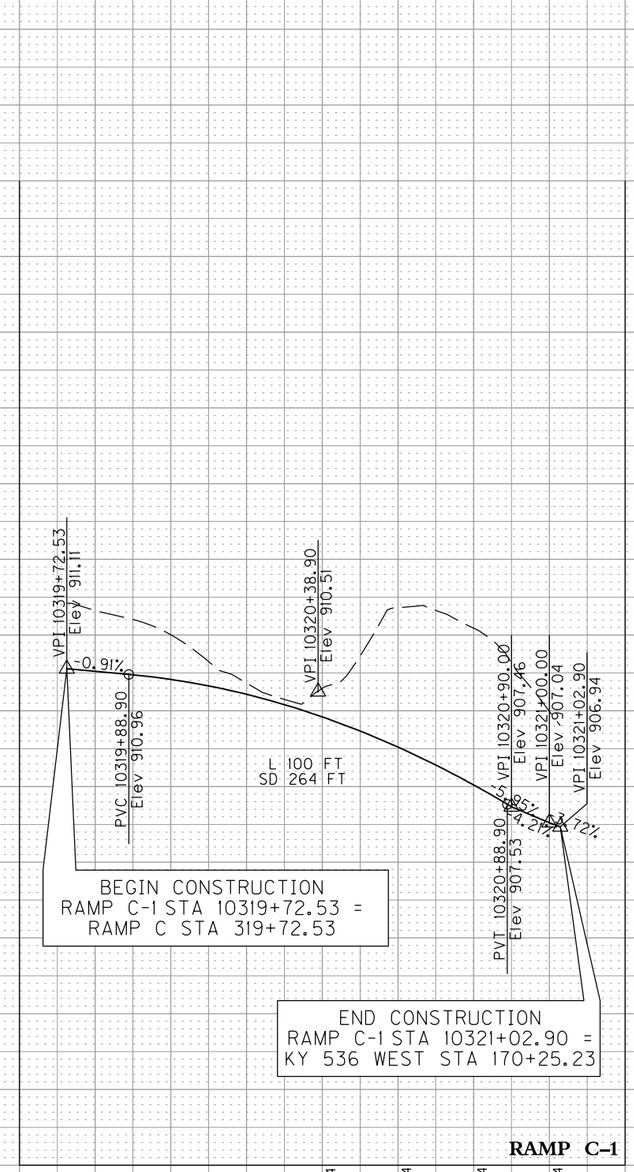
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

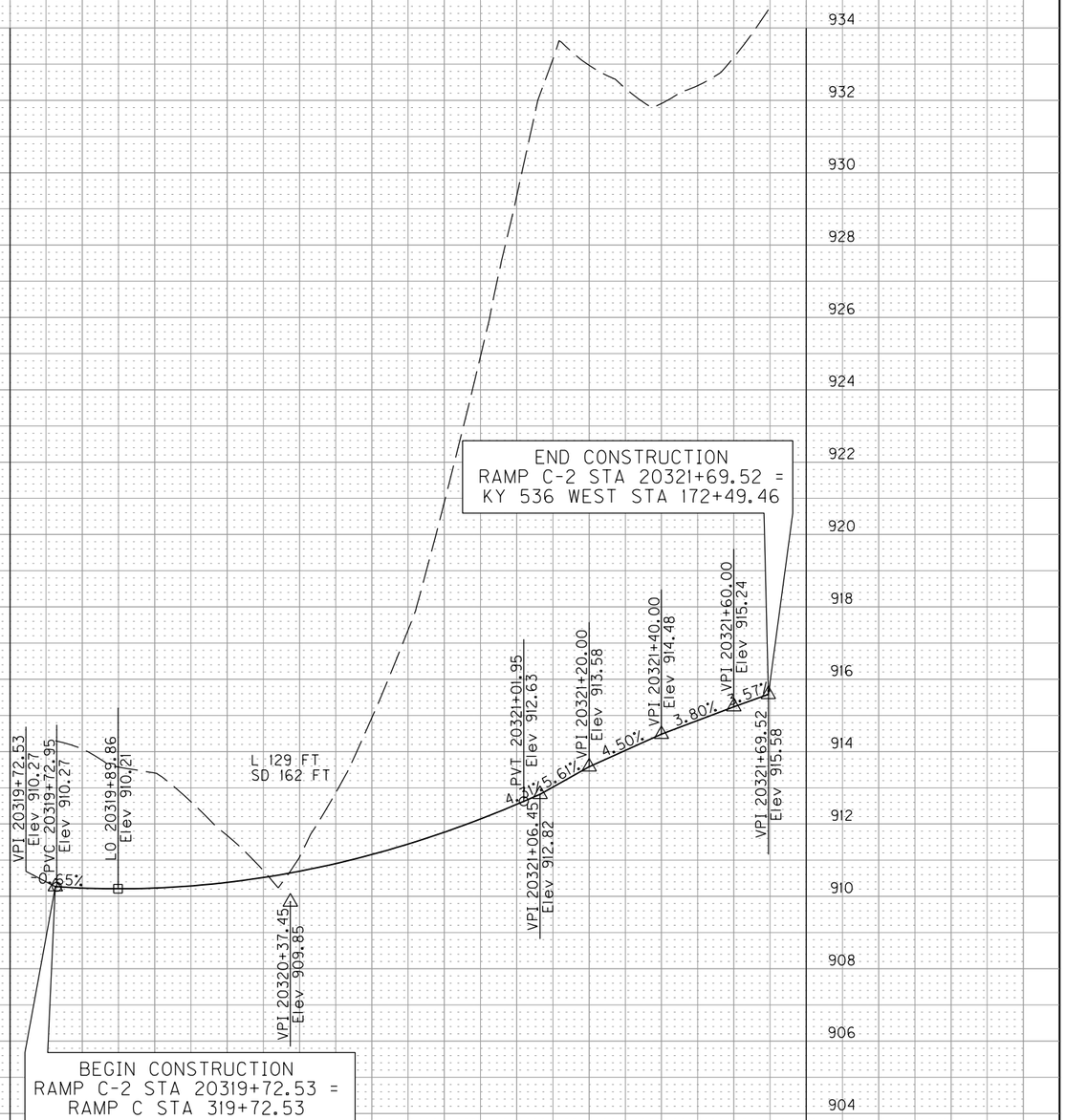
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

| | | |

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R72

DATUM





EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

RAMP C-1 & RAMP C-2
PROFILE SHEET

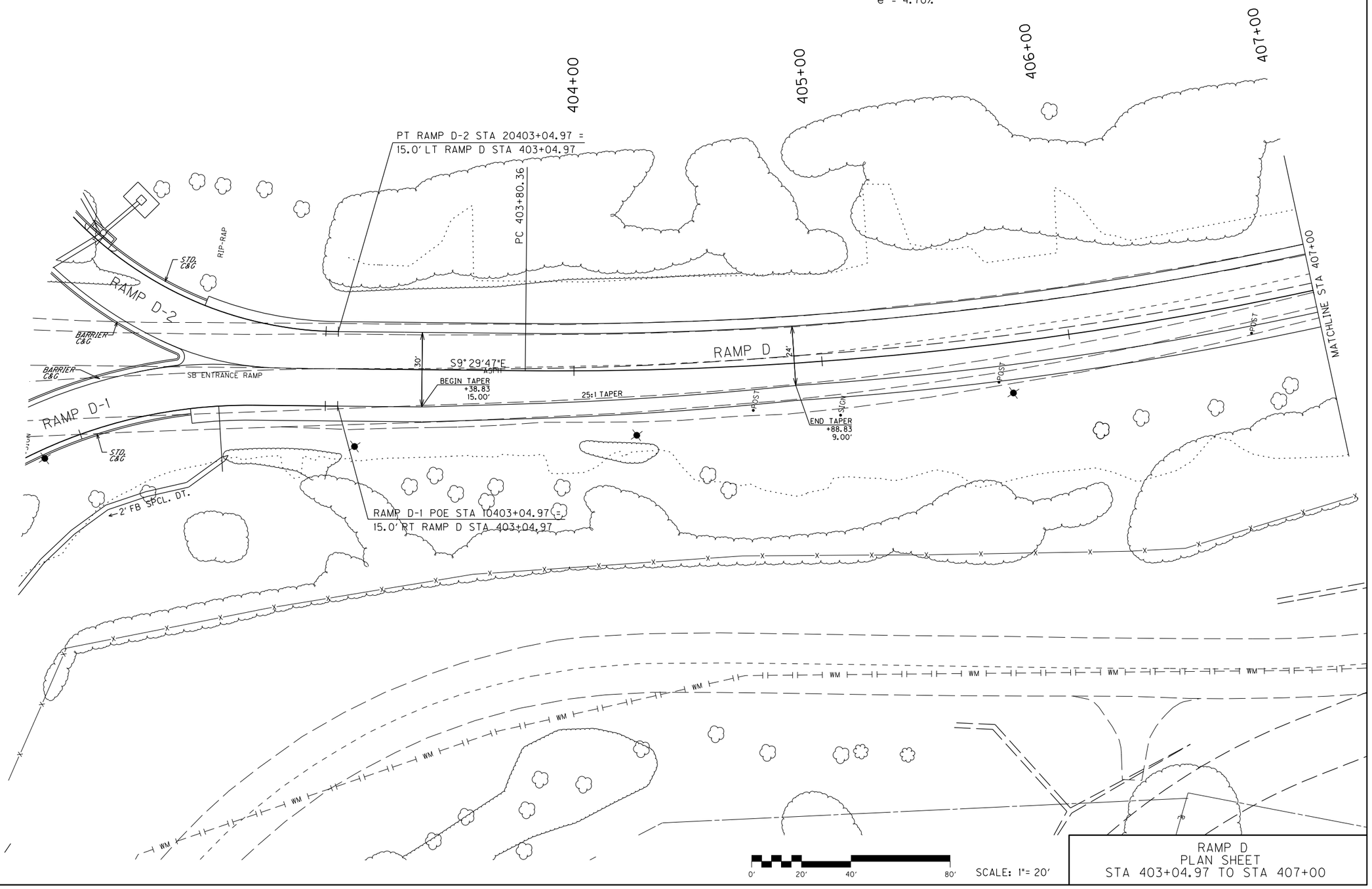
FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R72_PR_RAMPC1_RAMPC2.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R73

SODDING RAMP D					
ALIGNMENT	SIDE	STA.	TO	STA.	AREA (SQYD)
RAMP D-1	LT	10401+00.00	-	10402+43.32	35
RAMP D-1	RT	10401+00.00	-	10402+45.28	32
RAMP D-2	LT	20401+00.00	-	20402+49.95	33
RAMP D-2	RT	20401+00.00	-	20402+47.78	38

CURB RAMP D						
ALIGNMENT	SIDE	STA.		STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP D-1	LT	10401+00.00	-	10402+43.32	-	157
RAMP D-1	RT	10401+00.00	-	10402+45.58	143	-
RAMP D-2	LT	20401+00.00	-	20402+49.95	155	-
RAMP D-2	RT	20401+00.00	-	20402+47.78	-	176

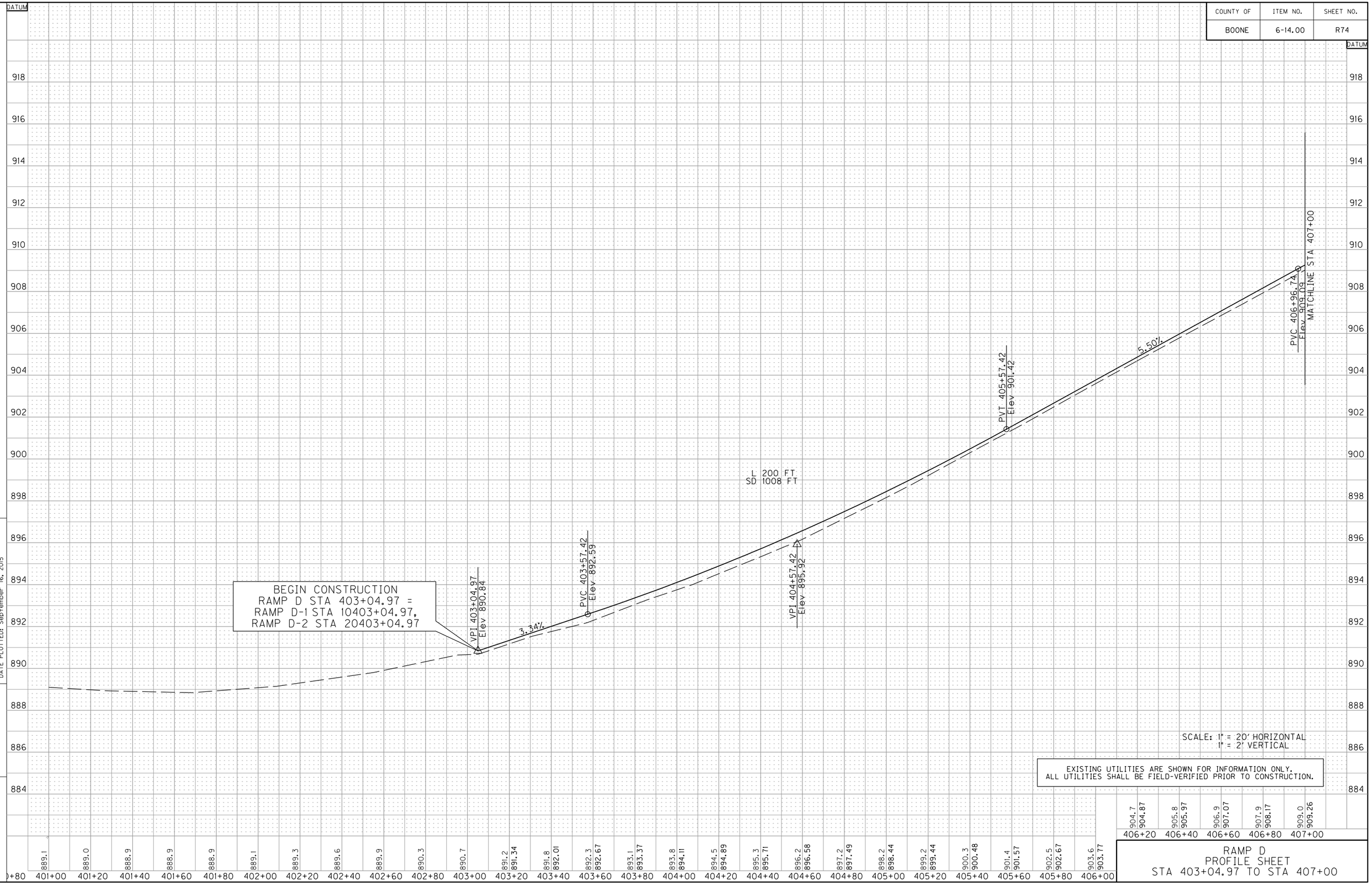
RAMP D
P.I. STA. 406+08.56
Δ = 18°06'13.47"LT
T = 228.20'
L = 452.59'
R = 1432.39'
E = 18.06'
e = 4.70%



RAMP D
PLAN SHEET
STA 403+04.97 TO STA 407+00

FILE NAME: V:\1785\ACTIVE\I7856001Z\ROADWAY\PLAN SHEETS\R73_PL_40000_RAMP_D.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R74



SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

RAMP D
PROFILE SHEET
STA 403+04.97 TO STA 407+00

FILE NAME: V:\1785\ACTIVE\I7856001\ROADWAY\PLAN SHEETS\R74_PR_40000_RAMP_D.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R75

RAMP D
P.I. STA. 406+08.56
Δ = 18°06'13.47"LT
T = 228.20'
L = 452.59'
R = 1432.39'
E = 18.06'
e = 4.70%

407+00
408+00
409+00
410+00
411+00
412+00

PT 408+32.96

MATCHLINE STA 407+00

RAMP

S27°36'00"E

25:1 TAPER

POST

BEGIN TAPER
+32.96
9.00'

END TAPER
+57.96
0.00'

END CONSTRUCTION
RAMP D
STA 412+00

PROP. NOISE WALL
(see Traffic Noise Impact Analysis)

WM

HIGHLAND DRIVE

SIGN

SIGN

0' 20' 40' 80'

SCALE: 1"= 20'

RAMP D
PLAN SHEET
STA 407+00 TO STA 412+00

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R75_PL_40700_RAMP_D.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R76

DATUM

928 926 924 922 920 918 916 914 912 910 908 906 904 902 900 898 896 894 892

MATCHLINE STA 407+00

L 500 FT
SD 437 FT

VPI 409+46.74
Elev 922.84

VPI 412+00.00
Elev 922.45

-0.45%

PVT 411+96.74
Elev 922.45

END CONSTRUCTION
RAMP D
STA 412+00

407+00	407+20	407+40	407+60	407+80	408+00	408+20	408+40	408+60	408+80	409+00	409+20	409+40	409+60	409+80	410+00	410+20	410+40	410+60	410+80	411+00	411+20	411+40	411+60	411+80	412+00
909.0	910.1	911.1	912.1	913.1	913.9	914.8	915.6	916.3	917.1	917.7	918.3	918.9	919.5	920.0	920.4	920.7	921.1	921.4	921.7	921.9	922.1	922.3	922.4	922.4	922.4
909.26	910.33	911.36	912.34	913.27	914.16	915.01	915.81	916.56	917.27	917.93	918.55	919.12	919.65	920.13	920.57	920.96	921.30	921.60	921.86	922.07	922.24	922.36	922.43	922.46	922.45

412+20	412+40	412+60	412+80	413+00
922.4	922.4	922.2	922.1	922.0

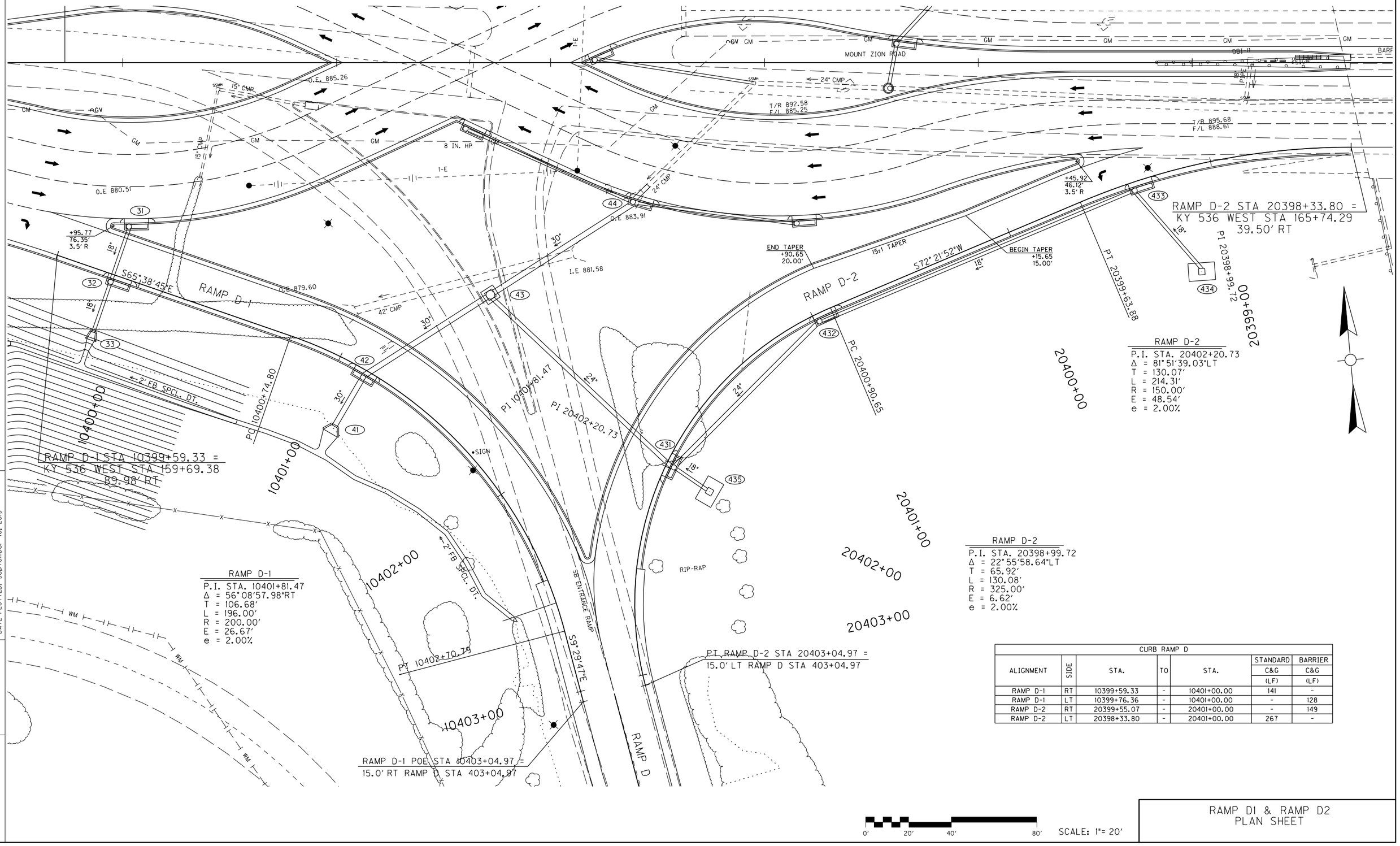
SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

RAMP D
PROFILE SHEET
STA 407+00 TO STA 412+00

FILE NAME: V:\1785\ACTIVE\78560012\ROADWAY\PLAN SHEETS\R76_PR_40700_RAMP_D.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R77



RAMP D-1

P.I. STA. 10401+81.47
Δ = 56°08'57.98"RT
T = 106.68'
L = 196.00'
R = 200.00'
E = 26.67'
e = 2.00%

RAMP D-2

P.I. STA. 20402+20.73
Δ = 81°51'39.03"LT
T = 130.07'
L = 214.31'
R = 150.00'
E = 48.54'
e = 2.00%

RAMP D-2

P.I. STA. 20398+99.72
Δ = 22°55'58.64"LT
T = 65.92'
L = 130.08'
R = 325.00'
E = 6.62'
e = 2.00%

CURB RAMP D						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP D-1	RT	10399+59.33	-	10401+00.00	141	-
RAMP D-1	LT	10399+76.36	-	10401+00.00	-	128
RAMP D-2	RT	20399+55.07	-	20401+00.00	-	149
RAMP D-2	LT	20398+33.80	-	20401+00.00	267	-

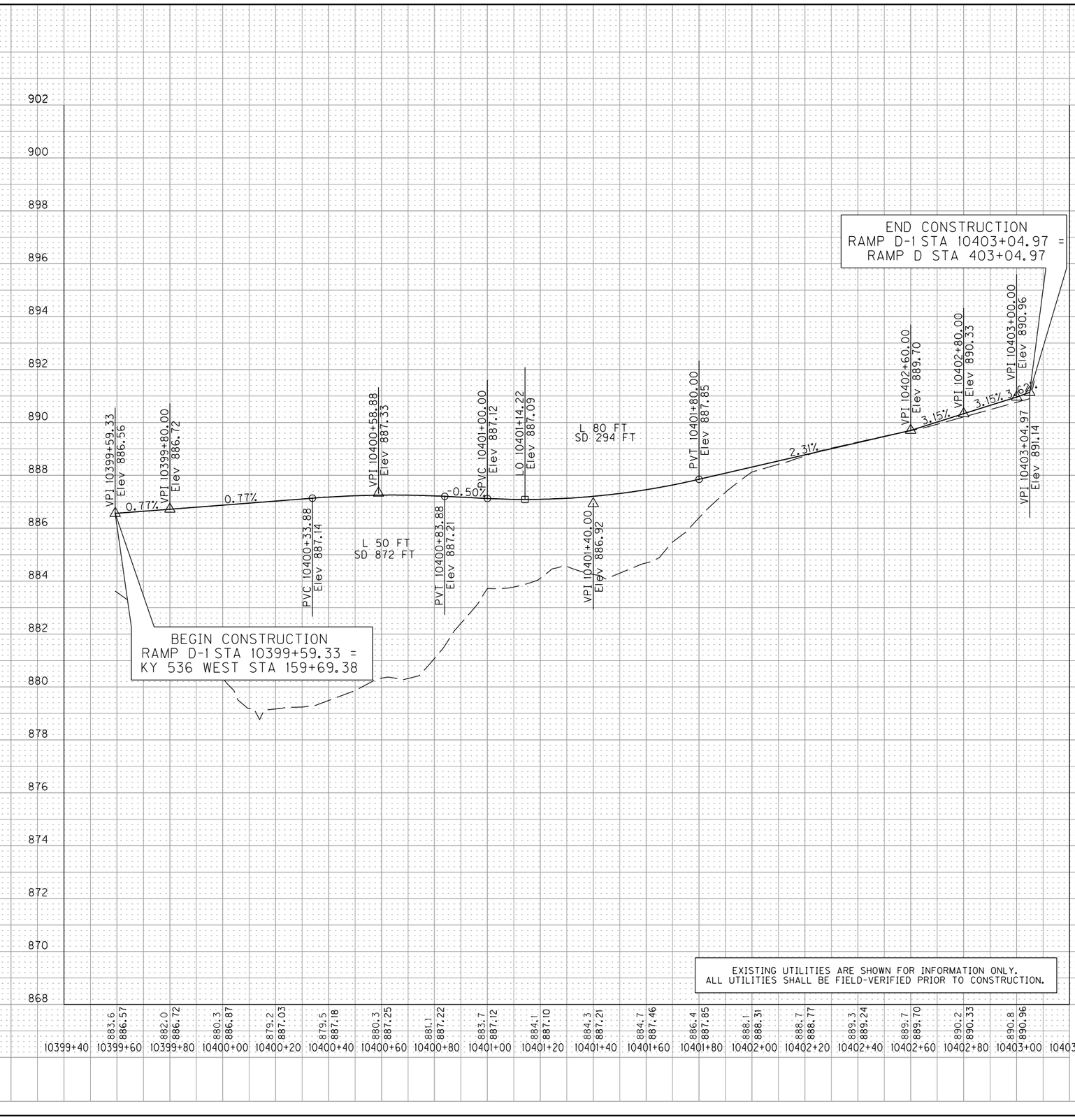
0' 20' 40' 80' SCALE: 1"= 20'

RAMP D1 & RAMP D2
PLAN SHEET

FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\R77_PL_RAMP_D1_D2.DGN
USER: apousa
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R78

DATUM



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

RAMP D-1
PROFILE SHEET

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R78_PR_RAMP_D1.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R79

DATUM

912
910
908
906
904
902
900
898
896
894
892
890
888
886
884
882
880
878
876

VPI 20398+33.80
Elev 896.13

VPI 20398+60.00
Elev 895.75

VPI 20398+80.00
Elev 895.39

VPI 20399+00.00
Elev 895.00

VPI 20399+20.00
Elev 894.58

VPI 20399+40.00
Elev 894.12

VPI 20399+60.00
Elev 893.63

-1.45%
-1.80%
-1.95%
-2.10%
-2.30%
-2.45%
-2.45%

BEGIN CONSTRUCTION
RAMP D-2 STA 20398+33.80 =
KY 536 WEST STA 165+74.29

PVC 20401+37.31
Elev 889.29

L 150 FT
SD 157 FT

LO 20402+00.82
Elev 888.51

VPI 20402+12.31
Elev 887.45

PVT 20402+87.31
Elev 889.95

+1.34%

VPI 20403+04.97
Elev 890.54

END CONSTRUCTION
RAMP D-2 STA 20403+04.97 =
RAMP D STA 403+04.97

20398+20 20398+40 20398+60 20398+80 20399+00 20399+20 20399+40 20399+60 20399+80 20400+00 20400+20 20400+40 20400+60 20400+80 20401+00 20401+20 20401+40 20401+60 20401+80 20402+00 20402+20 20402+40 20402+60 20402+80 20403+00 20403+20

895.7 896.04 | 895.5 895.75 | 895.2 895.39 | 894.5 895.00 | 893.9 894.58 | 893.8 894.12 | 896.1 893.63 | 898.5 893.14 | 900.6 892.65 | 902.9 892.16 | 900.7 891.67 | 901.1 891.18 | 904.0 890.69 | 905.1 890.20 | 904.3 889.71 | 902.2 889.22 | 903.7 888.83 | 900.2 888.59 | 893.7 888.51 | 888.9 888.58 | 887.3 888.80 | 889.2 889.18 | 889.8 889.72 | 890.3 890.37

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
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SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

RAMP D-2
PROFILE SHEET

MicroStation v8.11.7.443
E-SHEET NAME:
USER: amclain
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856002\ROADWAY\PLAN SHEETS\R79_PR_RAMP_D2.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R80

1611+00
1612+00
1613+00
1614+00
1615+00
1616+00
1617+00

ASPH
SIGN
TG=879.95
36" CMP
POST
BEGIN TAPER
+00.00
-38.00'
45:1 TAPER
SIGN
MATCHLINE STA 1617+00
S8° 07'22"W
BEGIN CONSTRUCTION
RAMP F STA 1614+00
MATCH ITEM NO. 6-14.05
(CONSTRUCTION BY OTHERS)
OE=871.43
E-BOX
CONC
SAW

0' 20' 40' 80'

SCALE: 1"= 20'

RAMP F
PLAN SHEET
STA 1614+00 TO STA 1617+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R80_PL_161400_RAMP_F.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R81

DATUM

904 902 900 898 896 894 892 890 888 886 884 882 880 878 876 874 872 870 868 866

BEGIN CONSTRUCTION
RAMP F STA 1614+00
MATCH ITEM NO. 6-14.05
(CONSTRUCTION BY OTHERS)

VPI 1614+00.00
Elev 885.64

VPI 1614+50.00
Elev 885.94

VPI 1616+00.00
Elev 886.64

0.60%

0.60%

0.47%

MATCHLINE STA 1617+00

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
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1611+00	1611+20	1611+40	1611+60	1611+80	1612+00	1612+20	1612+40	1612+60	1612+80	1613+00	1613+20	1613+40	1613+60	1613+80	1614+00	1614+20	1614+40	1614+60	1614+80	1615+00	1615+20	1615+40	1615+60	1615+80	1616+00
883.3	883.3	883.4	883.5	883.6	883.7	883.8	884.1	884.2	884.3	884.3	884.3	884.6	884.7	884.8	884.9 / 885.64	885.0 / 885.76	885.1 / 885.88	885.1 / 885.99	885.2 / 886.08	885.4 / 886.18	885.5 / 886.27	885.6 / 886.36	885.7 / 886.46	885.9 / 886.55	886.1 / 886.64

1616+20	1616+40	1616+60	1616+80	1617+00
886.2 / 886.75	886.3 / 886.85	886.4 / 886.96	886.5 / 887.06	886.6 / 887.17

RAMP F
PROFILE SHEET
STA 1614+00 TO STA 1617+00

FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R81_PR_161400_RAMP_F.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R82

CURB RAMP F						
ALIGNMENT	SIDE	STA.	TO	STA.	STANDARD C&G (LF)	BARRIER C&G (LF)
RAMP F-1	RT	11621+98.66	-	11621+98.66	121	-
RAMP F-1	LT	11620+99.38	-	11622+24.41	-	153
RAMP F-2	RT	21621+06.91	-	163+00.00	-	129
RAMP F-2	LT	21621+81.05	-	21622+54.12	74	-

RAMP F-2
P.I. STA. 21622+04.93
Δ = 89°34'40.28"LT
T = 99+27'
L = 156.34'
R = 100.00'
E = 40.90'
e = 2.00%

RAMP F-2 STA 21622+62.01 =
KY 536 WEST STA 163+07.58
66.28' LT

RAMP F-2 POB STA 21620+60.95 =
54.0' LT RAMP F STA 1620+60.95

RAMP F-1 PC STA 11620+60.95 =
6.0' RT RAMP F STA 1620+60.95

RAMP F-1
P.I. STA. 11621+83.03
Δ = 78°16'54.33"RT
T = 122.08'
L = 204.94'
R = 150.00'
E = 43.40'
e = 2.00%

RAMP F-1 STA 11623+19.14 =
KY 536 WEST STA 159+76.41
69.63' LT

1617+00 1618+00 1619+00 1620+00 21621+00 21622+00 11621+00 11622+00 11623+00

MATCHLINE STA 1617+00

RAMP F RAMP F-2 RAMP F-1

SB EXIT RAMP

PC 21621+05.66 PT 21622+04.93 PT 11621+83.03 PT 11622+65.89

BEGIN TAPER +50.00 48.00' END TAPER +30.00 54.00'

BEGIN TAPER +50.00 0.00' END TAPER +30.00 6.00'

BEGIN TAPER +81.05 4.45' END TAPER +34.54 2.00'

BEGIN TAPER +98.66 6.00' END TAPER +68.74 2.00'

30:1 TAPER 17:1 TAPER

S8°07'22"W S86°24'17"W

+79.76 -167.57' 3.5' R +31.07 -60.91' 3.5' R +85.55 -60.78' 3.5' R

59 Z 891.810 O.E. 885.26

4-E, 1-T, 1-C

ASPH CONC SIGN WM GM

0' 20' 40' 80'

SCALE: 1"= 20'

RAMP F, RAMP F-1 & RAMP F-2
PLAN SHEET
STA 1617+00 TO STA 1622+79.58

MicroStation v8.11.7.443 E-SHEET NAME: USER: apousa DATE PLOTTED: September 16, 2015 FILE NAME: V:\1785\ACTIVE\178560012\ROADWAY\PLAN SHEETS\R82_PL_161700_RAMP_F.DGN

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R83

DATUM

904 902 900 898 896 894 892 890 888 886 884 882 880 878 876 874 872 870 868 866

MATCHLINE STA 1617+00

0.52%

VPI 1619+00.00
Elev 888.21

0.60%

VPI 1620+60.95
Elev 889.18

END CONSTRUCTION
RAMP F STA 1620+60.95 =
RAMP F-1 STA 11620+60.95,
RAMP F-2 STA 21620+60.95

EX. WATER LINE
ASSUMED ELEV.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

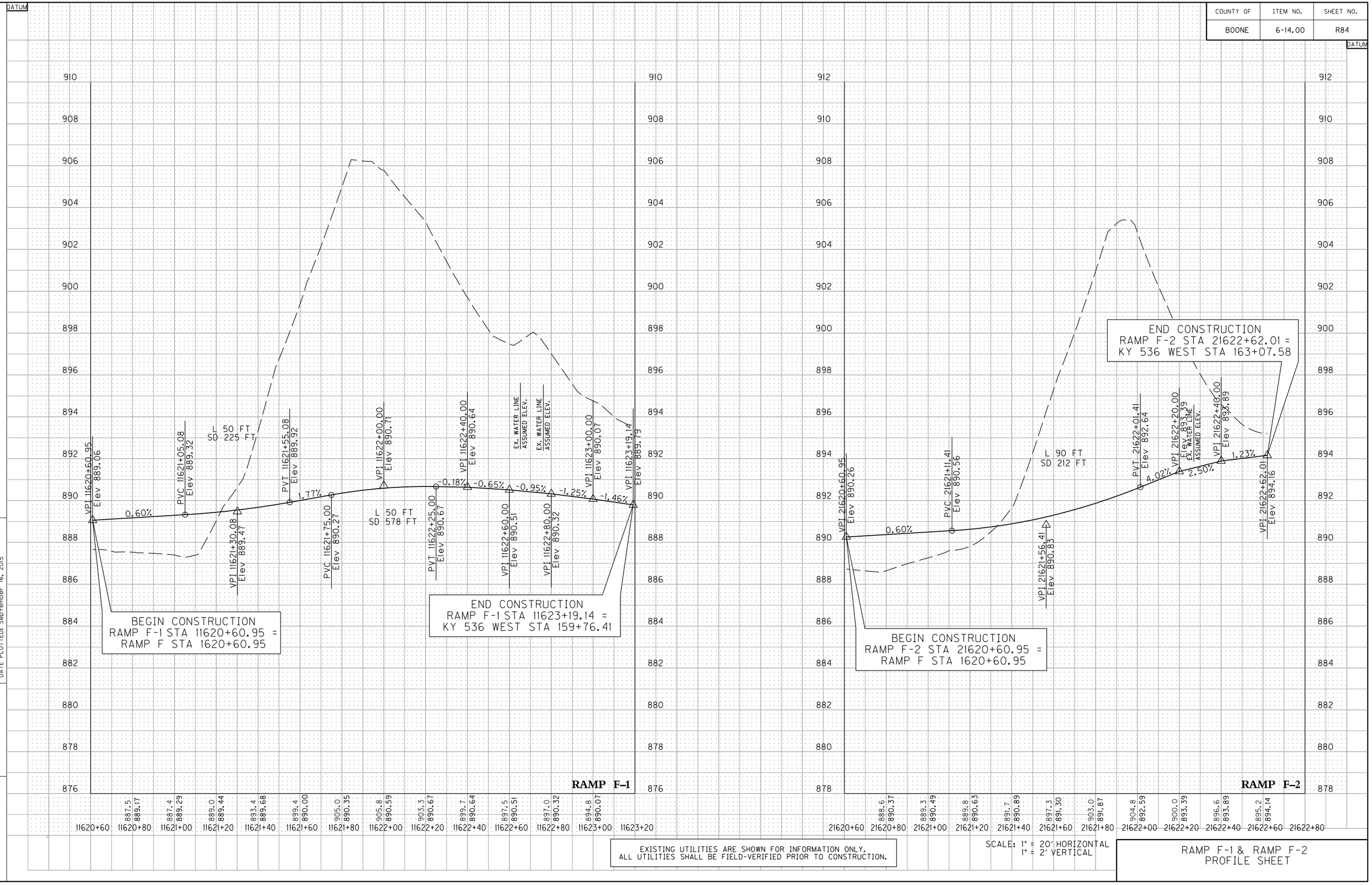
EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

	1617+00	1617+20	1617+40	1617+60	1617+80	1618+00	1618+20	1618+40	1618+60	1618+80	1619+00	1619+20	1619+40	1619+60	1619+80	1620+00	1620+20	1620+40	1620+60	1620+80	1621+00	1621+20	1621+40	1621+60	1621+80	1622+00
	886.6	886.5	886.7	886.8	887.1	887.1	887.2	887.2	887.5	887.6	887.7	887.9	888.0	888.0	888.0	888.0	888.1	888.4	888.6	888.7	888.9	889.0	889.0	889.4	889.6	890.0
	887.17	887.27	887.38	887.48	887.59	887.69	887.80	887.90	888.01	888.11	888.21	888.33	888.45	888.57	888.69	888.81	888.93	889.05	889.17							

RAMP F
PROFILE SHEET
STA 1617+00 TO STA 1622+79.58

FILE NAME: V:\1785\ACTIVE\I7856001\ROADWAY\PLAN SHEETS\R83_PR_161700_RAMP_F.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R84



EXISTING UTILITIES ARE SHOWN FOR INFORMATION ONLY.
ALL UTILITIES SHALL BE FIELD-VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 20' HORIZONTAL
1" = 2' VERTICAL

RAMP F-1 & RAMP F-2
PROFILE SHEET

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\R84_PR_RAMPF1_RAMPF2.DGN
USER: amclain
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

SECTION 5

STORM SEWER SYSTEMS

STORM SEWER SYSTEM

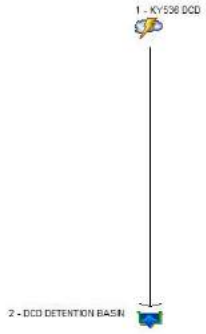
DETENTION BASIN

@ STATION

157+70 RIGHT KY 536

KY 536

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	KY536 DCD
2	Reservoir	DCD DETENTION BASIN

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.01

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	81.36	1	19	92,748	----	------	------	KY536 DCD
2	Reservoir	41.20	1	28	92,745	1	880.87	42,245	DCD DETENTION BASIN

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.01

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	95.34	1	19	108,689	----	------	------	KY536 DCD
2	Reservoir	46.28	1	29	108,686	1	881.69	51,512	DCD DETENTION BASIN

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.01

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Rational	115.24	1	19	131,372	----	------	------	KY536 DCD
2	Reservoir	53.18	1	29	131,369	1	882.77	65,172	DCD DETENTION BASIN

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	36.0251	7.2000	0.7992	--------
3	0.0000	0.0000	0.0000	--------
5	53.6229	9.4000	0.8201	--------
10	66.3099	10.7000	0.8280	--------
25	83.3000	12.0000	0.8379	--------
50	98.8211	12.9000	0.8526	--------
100	113.4154	13.7000	0.8592	--------

File name: KY536_DCD.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.88	3.71	3.02	2.57	2.25	2.00	1.81	1.66	1.53	1.42	1.33	1.25
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.02	4.71	3.90	3.35	2.95	2.64	2.39	2.19	2.02	1.88	1.76	1.66
10	6.78	5.39	4.51	3.89	3.44	3.08	2.80	2.57	2.38	2.21	2.07	1.95
25	7.76	6.25	5.26	4.57	4.04	3.64	3.31	3.04	2.81	2.62	2.46	2.31
50	8.45	6.85	5.79	5.03	4.46	4.01	3.65	3.35	3.10	2.89	2.71	2.55
100	9.16	7.47	6.34	5.52	4.90	4.42	4.02	3.70	3.43	3.20	2.99	2.82

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

STORM SEWER SYSTEM

@ STATION
155+00

KY 536

DCD STATION 155+02

10 YEAR FREQUENCY

```
+++ Commands Read From File 15502_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW DBI TYPE A NO 1,2
  STO 0.27 0.85 8
  PIP 50 881.16 879.75 876.78 875.37 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .29 ft, Critical depth =    .46 ft
  PNC 1 2 3 180 0
  STO 0.27 0.85 8
  PIP 26 879.75 876.00 875.37 874.02 -15
+++ Tc =   8.1 min
+++ CA =    .5
+++ Link #  2,  Flow depth =    .35 ft, Critical depth =    .66 ft
  PNC 2 3 0 180 2
  TWE 874.5
  END
 END OF INPUT DATA.
```

*** DBI TYPE A NO 1,2 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	50	15	876.78	.02820	4.4	3.0	6.4	1.36	12		
			875.37		4.4	3.0	9.6	11.75			
2	26	15	875.37	.05192	4.4	3.0	9.7	2.70	17		
			874.02		2.0	.6	13.0	15.95			

Length = 76. ft Total length = 76. ft

Hydraulic Gradeline Computations

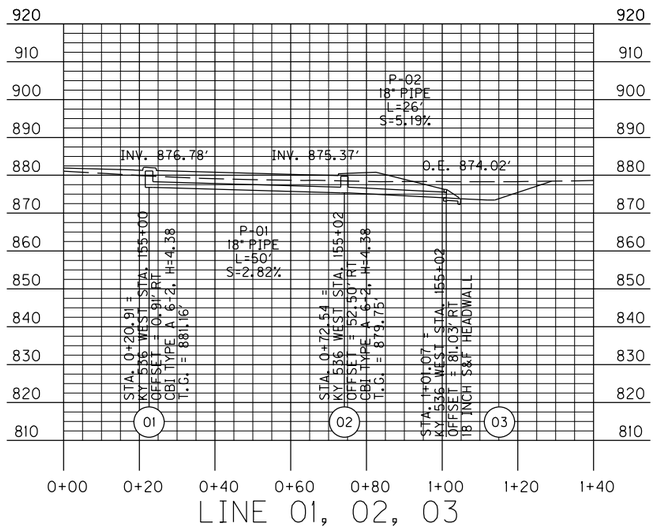
Link	Down-stream	Hydraulic Gradeline	Crown	Possible	Ground	Super-	Manhole Loss

#	Node #	Elevation	Elev.	Surcharge	Elev.	crit.?	Depth	Coef
1	2	875.83	876.62	N	879.75	Y	2.77	1.22
2	3	874.50	875.27	N	876.00	Y	.48	.00

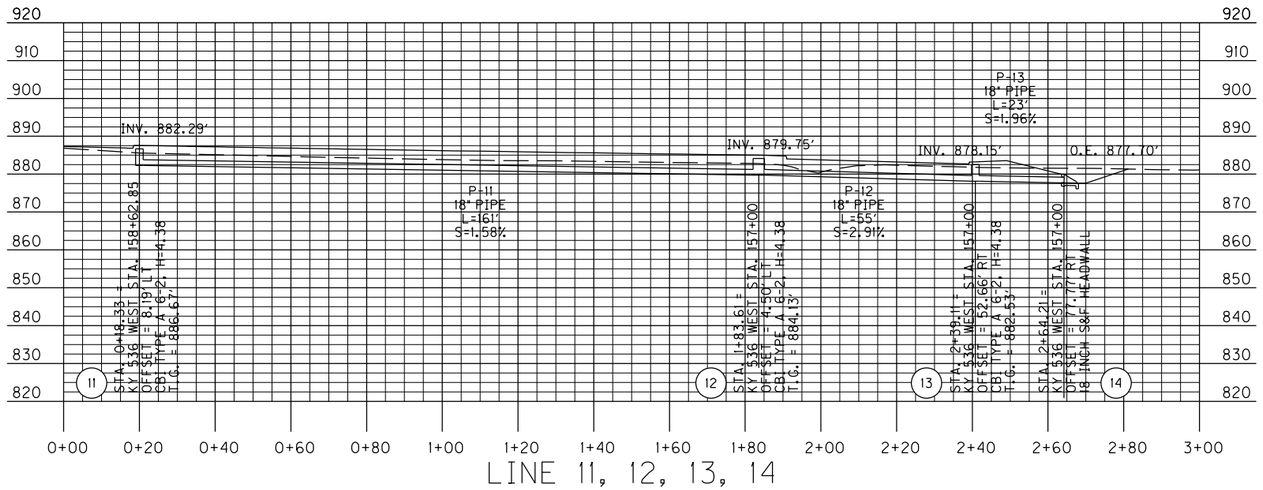
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	1	878.02	881.16	1.50

NORMAL END OF HYDRA

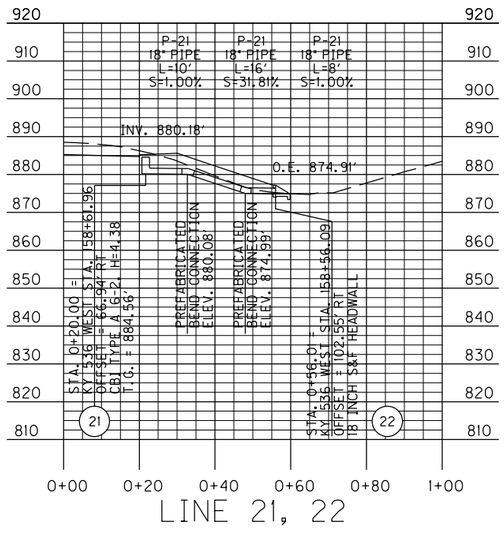
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



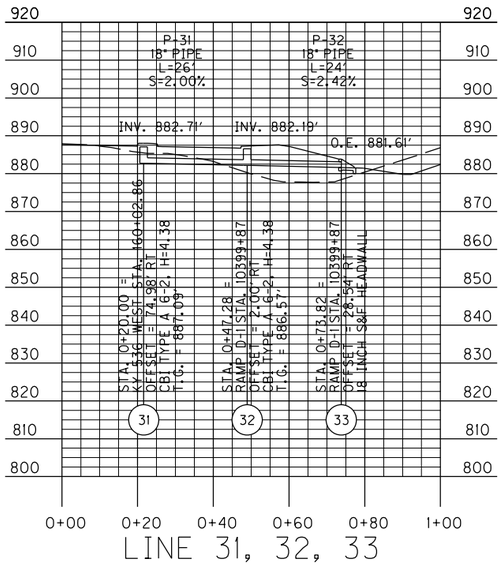
LINE 01, 02, 03



LINE 11, 12, 13, 14



LINE 21, 22



LINE 31, 32, 33

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

0' 20' 40' 80'

STORM SEWER PROFILES
SHEET 1 OF 16

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dnawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_01.DGN

STORM SEWER SYSTEM

@ STATION
157+00 to 158+62

KY 536

DCD STATION 157+00 KY536

10 YEAR FREQUENCY

```
+++ Commands Read From File 15700_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW DBI TYPE A NO 11,12,13
  STO 0.32 0.85 8
  PIP 161 886.67 884.13 882.29 879.75 -18
+++ Tc =   8.0 min
+++ CA =    .3
+++ Link #  1,  Flow depth =    .35 ft, Critical depth =    .48 ft
  PNC 11 12 3 90 0
  STO 0.23 0.85 8
  PIP 55 884.13 882.53 879.75 878.15 -18
+++ Tc =   8.5 min
+++ CA =    .5
+++ Link #  2,  Flow depth =    .39 ft, Critical depth =    .62 ft
  PNC 12 13 2 180 0
  STO 0.27 0.85 8
  PIP 23.0 882.53 880.00 878.15 877.70 -18
+++ Tc =   8.6 min
+++ CA =    .7
+++ Link #  3,  Flow depth =    .52 ft, Critical depth =    .77 ft
  PNC 13 14 0 180 2
  TWE 879.4
  END
 END OF INPUT DATA.
```

*** DBI TYPE A NO 11,12 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	161	18	882.29	.01578	4.4	2.8	5.3	1.61	11		
			879.75		4.4	2.8	8.1	14.29			
2	55	18	879.75	.02909	4.4	2.8	7.7	2.70	14		
			878.15		4.4	2.8	11.0	19.41			
3	23	18	878.15	.01956	4.4	2.8	7.5	4.01	25		
			877.70		2.3	.7	9.0	15.92			

Length = 239. ft Total length = 239. ft

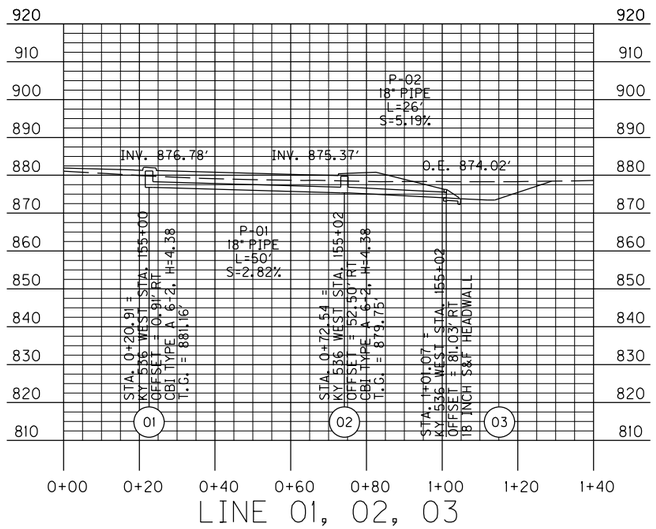
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	12	880.23	881.25	N	884.13	Y	1.47	1.44
2	13	878.77	879.65	N	882.53	Y	2.38	.56
3	14	879.40	879.20	Y	880.00	Y	1.70	.00

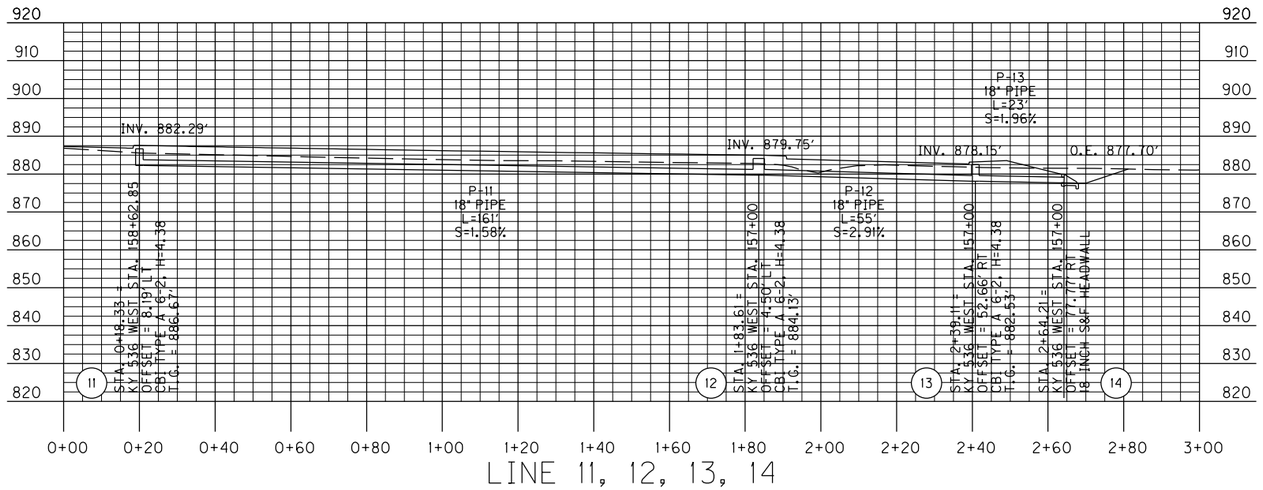
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	11	883.30	886.67	1.50

NORMAL END OF HYDRA

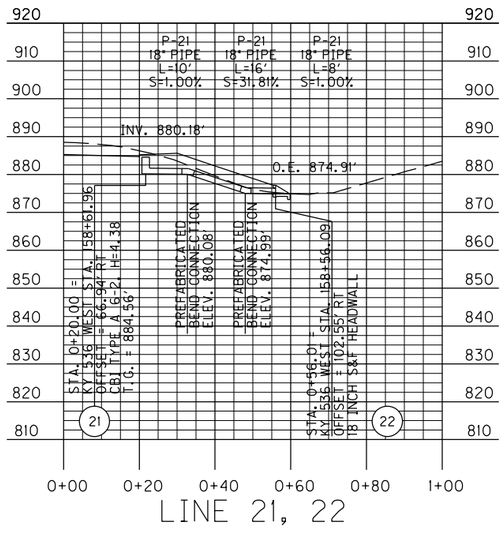
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



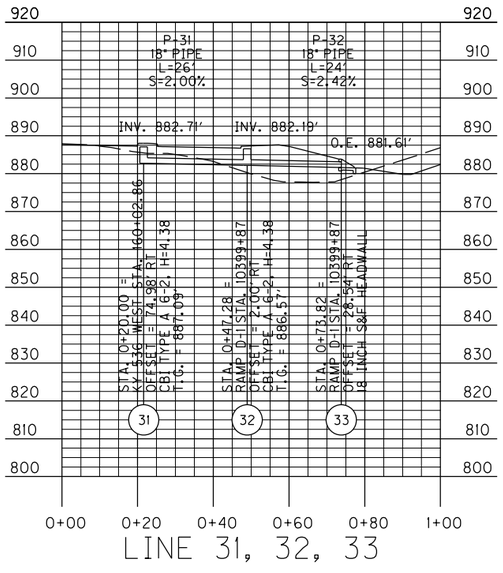
LINE 01, 02, 03



LINE 11, 12, 13, 14



LINE 21, 22



LINE 31, 32, 33

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

0' 20' 40' 80'

STORM SEWER PROFILES
SHEET 1 OF 16

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dnawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_01.DGN

STORM SEWER SYSTEM

@ STATION
158+61.96

KY 536

DCD STATION 158+61.96 KY536

10 YEAR FREQUENCY

```
+++ Commands Read From File 15862_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
```

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW DBI TYPE A NO 11,12,13
  STO 0.37 0.85 8
  PIP 34 884.56 886.00 880.18 874.91 -18
+++ Tc =   8.0 min
+++ CA =    .3
+++ Link #  1,  Flow depth =    .21 ft, Critical depth =    .51 ft
  PNC 21 22 0 90 2
  TWE 875.4
  END
 END OF INPUT DATA.
```

*** DBI TYPE A NO 11,12 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Velocity Up/Dn (ft)	Act/Full Flow (ft/s)	Act/Full Flow (cfs)	Load (%)	Remove Flow (cfs)	Diam Solutions (in)

```
-------------------------------------------------------------------------------
-
     1    34    18  880.18  .15500  4.4   2.8   12.5      1.86    4
                    874.91         11.1   9.5   25.4     44.80


-------------------------------------------------------------------------------
-
               Length =     34. ft  Total length =     34. ft
```

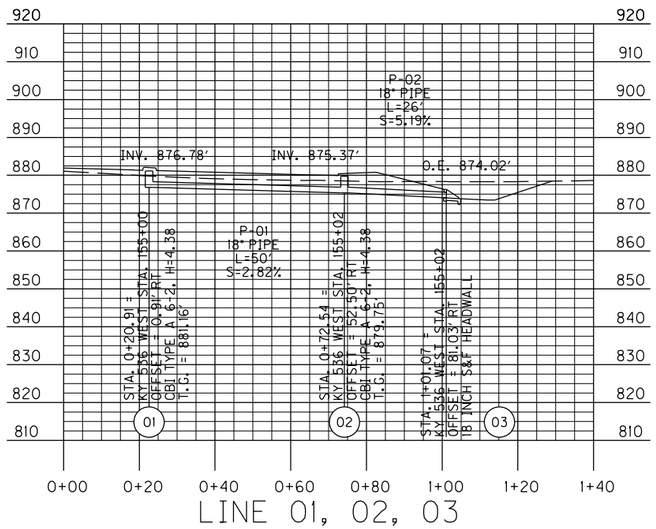
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	22	875.40	876.41	N	886.00	Y	.49	.00

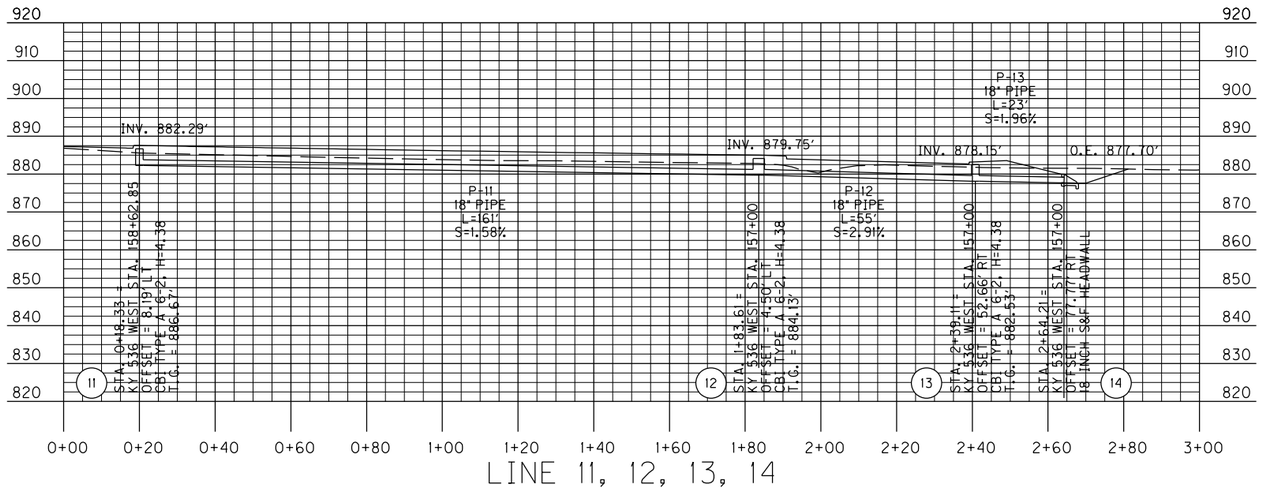
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	21	884.03	884.56	1.50

```
 NORMAL END OF HYDRA
```

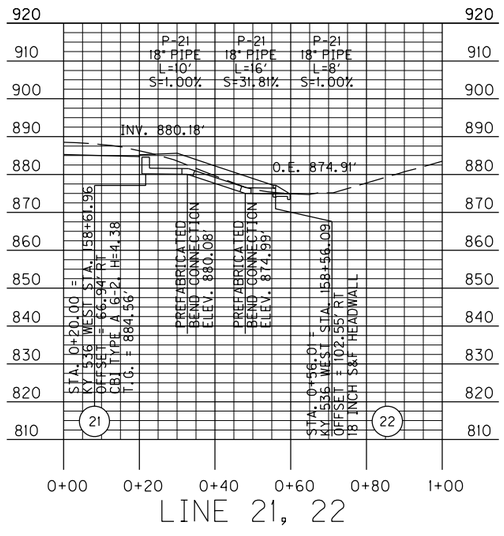
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



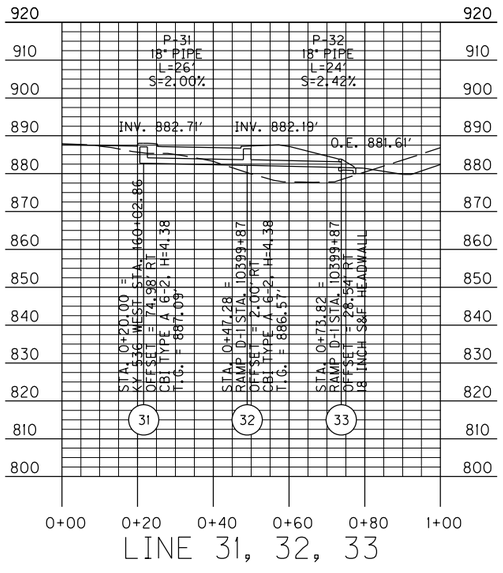
LINE 01, 02, 03



LINE 11, 12, 13, 14



LINE 21, 22



LINE 31, 32, 33

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

0' 20' 40' 80'

STORM SEWER PROFILES
SHEET 1 OF 16

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dnawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_01.DGN

STORM SEWER SYSTEM

@ STATION
10399+87 RAMP D-1

KY 536

DCD STATION 10399+87 RAMP D1 KY536

10 YEAR FREQUENCY

```
+++ Commands Read From File d1_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW DBI TYPE A NO 31,32,33
  STO 0.29 0.85 8
  PIP 26 887.09 886.57 882.71 882.19 -18
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .32 ft, Critical depth =    .45 ft
  PNC 31 32 3 180 0
  STO 0.12 0.85 8
  PIP 24 886.57 884.00 882.19 881.61 -18
+++ Tc =   8.1 min
+++ CA =    .3
+++ Link #  2,  Flow depth =    .36 ft, Critical depth =    .54 ft
  PNC 32 33 0 180 2
  TWE 882.00
  END
 END OF INPUT DATA.
```

*** DBI TYPE A NO 31,32 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	26	18	882.71	.02000	4.4	2.8	5.6	1.46	9		
			882.19		4.4	2.8	9.1	16.09			
2	24	18	882.19	.02417	4.4	2.8	6.7	2.06	12		
			881.61		2.4	.8	10.0	17.69			

Length = 50. ft Total length = 50. ft

Hydraulic Gradeline Computations

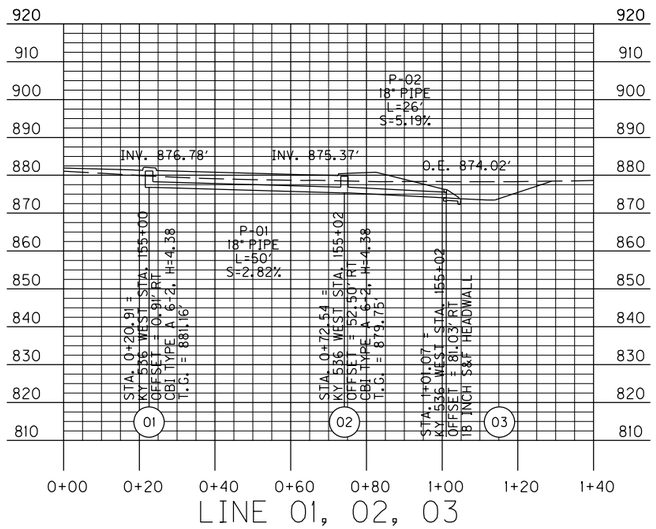
Down- Hydraulic

Link #	stream Node #	Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	32	882.64	883.69	N	886.57	Y	1.12	.40
2	33	882.00	883.11	N	884.00	Y	.39	.00

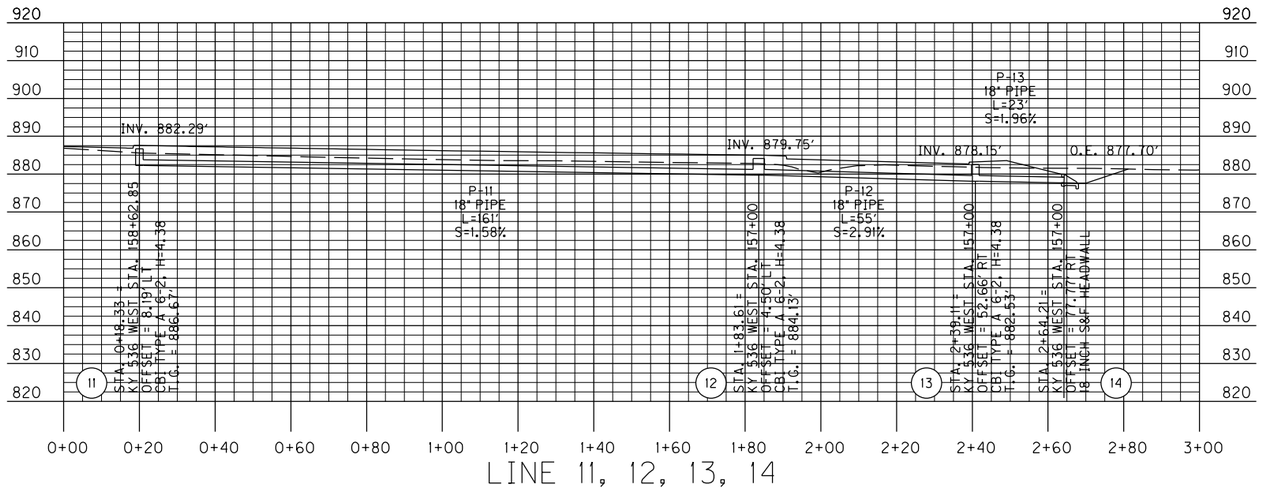
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	31	883.77	887.09	1.50

NORMAL END OF HYDRA

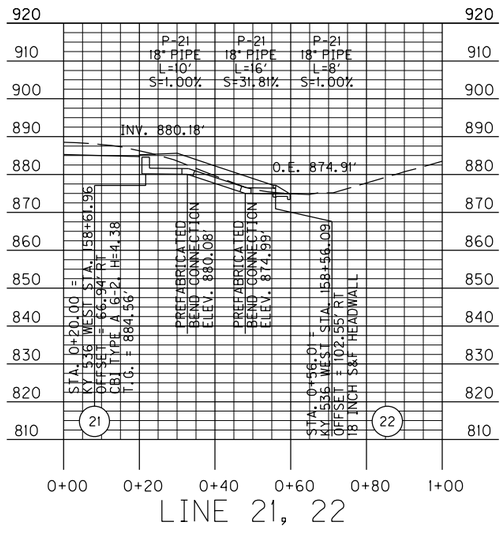
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



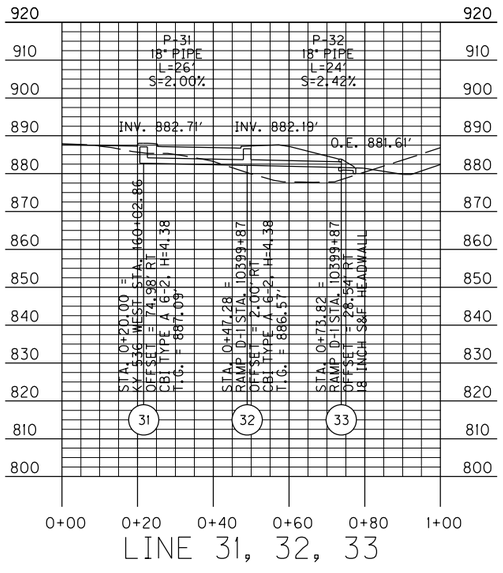
LINE 01, 02, 03



LINE 11, 12, 13, 14



LINE 21, 22



LINE 31, 32, 33

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

0' 20' 40' 80'

STORM SEWER PROFILES
SHEET 1 OF 16

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dnawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_01.DGN

STORM SEWER SYSTEM

@ STATION

10401+14 RAMP D-1 TO 180+50 KY 536

KY 536

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	RAMP C-2 20320+80 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
75	0.15	0.008	Locate Site:	No	BOONE CO.					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	4	630	0.010	2.6	0.40	0.93	0.078	0.45	0.58	3.85	Veg.Class C	

IDF Variables*			
RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

2.6 0.4

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	10.0	0.0	10.9	20.9	2.39	2.5	0.80	0.082	0.97	0.390	SCS
5	9.2	0.0	10.1	19.3	2.99	3.1	0.86	0.080	1.04	0.419	SCS
10	8.6	0.0	9.4	17.9	3.70	3.8	0.93	0.078	1.12	0.449	SCS
25	8.1	0.0	8.9	17.1	4.23	4.4	0.97	0.076	1.18	0.469	SCS
50	7.7	0.0	8.5	16.3	4.87	5.1	1.01	0.075	1.23	0.491	SCS
100	7.5	0.0	8.2	15.7	5.33	5.5	1.04	0.074	1.27	0.506	SCS
500						6.6					

	DESIGN STORM						
tc	2	5	10	25	50	100	IDF
5	5.35	6.34	7.11	7.99	8.72	9.34	FHWA
	5.47	6.43	7.16	8.06	8.74	9.35	NOAA
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	Diff
10	3.73	4.41	5.09	5.66	6.26	6.71	FHWA
	3.59	4.28	5.00	5.53	6.17	6.62	NOAA
	0.14	0.13	0.09	0.13	0.09	0.09	Diff
15	2.94	3.48	4.09	4.54	5.08	5.46	FHWA
	2.94	3.48	4.09	4.54	5.08	5.46	NOAA
	0.00	0.00	0.00	0.00	0.00	0.00	Diff
30	1.90	2.27	2.73	3.06	3.49	3.80	FHWA
	1.94	2.33	2.80	3.15	3.59	3.91	NOAA
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	Diff
60	1.20	1.45	1.78	2.03	2.37	2.62	FHWA
	1.19	1.43	1.76	2.00	2.33	2.57	NOAA
	0.01	0.02	0.02	0.03	0.04	0.05	Diff

Drop Box Inlet

DBI_52 STA. 20320+80 RT RAMP C-2

	Drop Box		Q10	Q25	Q100		
No.	**Inlet Types**		**3.8**	**4.4**	**5.5**		
1	Type 1						
2	Type 2		**Inlet No.**		**1**		
3	Type 3		**DBI Type**		Type 1		
4	Type 4						
5	Type 5		**Grate Elev.**		905.64		
6	Type 6						
7	Type 7						
8	Type 10		**Clogging**		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	**No. of Grates**			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	**Length (ft)**	**Longit. Bar Width (in)**	**No. of Bars**	**Trans. Bar Width (in)**	**No. of Bars**
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.036	0.048	0.075
Perimeter Control	0.373	0.411	0.477
Controling HW	906.01	906.05	906.12

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v16b Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	KY536 STA. 167+92.73 RT.
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
210	0.15	0.13	Locate Site:	No	BOONE CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	2	176	0.140	1.0	0.53	0.51	0.048	0.24	4.49	3.02	Class III	

IDF Variables*			
RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

1.0 0.53

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	7.6	0.0	0.9	8.4	4.10	2.2	0.46	0.048	3.40	0.217	Anderson
5	7.0	0.0	0.8	8.0	4.98	2.6	0.49	0.048	3.64	0.232	Anderson
10	6.5	0.0	0.8	8.0	5.71	3.0	0.51	0.048	3.81	0.243	Anderson
25	6.2	0.0	0.7	8.0	6.35	3.4	0.53	0.048	3.96	0.251	Anderson
50	5.9	0.0	0.7	8.0	7.00	3.7	0.55	0.048	4.09	0.259	Anderson
100	5.7	0.0	0.7	8.0	7.48	4.0	0.56	0.048	4.18	0.265	Anderson
500						4.8					

	DESIGN STORM						
tc	2	5	10	25	50	100	IDF
5	5.35	6.34	7.11	7.99	8.72	9.34	FHWA
	5.47	6.43	7.16	8.06	8.74	9.35	NOAA
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	Diff
10	3.73	4.41	5.09	5.66	6.26	6.71	FHWA
	3.59	4.28	5.00	5.53	6.17	6.62	NOAA
	0.14	0.13	0.09	0.13	0.09	0.09	Diff
15	2.94	3.48	4.09	4.54	5.08	5.46	FHWA
	2.94	3.48	4.09	4.54	5.08	5.46	NOAA
	0.00	0.00	0.00	0.00	0.00	0.00	Diff
30	1.90	2.27	2.73	3.06	3.49	3.80	FHWA
	1.94	2.33	2.80	3.15	3.59	3.91	NOAA
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	Diff
60	1.20	1.45	1.78	2.03	2.37	2.62	FHWA
	1.19	1.43	1.76	2.00	2.33	2.57	NOAA
	0.01	0.02	0.02	0.03	0.04	0.05	Diff

Drop Box Inlet

DBI_481 STA. 167+92.73 RT

No.	Drop Box Inlet Types		Q10 3.0	Q25 3.4	Q100 4.0		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		898.46		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.022	0.029	0.040
Perimeter Control	0.319	0.346	0.386
Controling HW	898.78	898.81	898.85

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	KY536 STA.169+80 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
75	0.15	0.011	Locate Site:	No	BOONE CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	4	722	0.010	1.7	0.50	0.85	0.080	0.41	0.53	2.96	Veg.Class C	

	1.7	0.5

IDF Variables*

RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	8.9	0.0	13.7	22.5	2.28	1.9	0.74	0.085	0.88	0.358	SCS
5	8.1	0.0	12.7	20.8	2.85	2.4	0.79	0.083	0.95	0.384	SCS
10	7.6	0.0	11.7	19.4	3.54	3.0	0.85	0.080	1.02	0.412	SCS
25	7.2	0.0	11.2	18.4	4.05	3.4	0.89	0.079	1.07	0.431	SCS
50	6.9	0.0	10.7	17.6	4.67	3.9	0.93	0.078	1.13	0.451	SCS
100	6.7	0.0	10.3	17.0	5.12	4.3	0.96	0.077	1.16	0.464	SCS
500						5.1					

	DESIGN STORM						
tc	**2**	**5**	**10**	**25**	**50**	**100**	**IDF**
5	5.35	6.34	7.11	7.99	8.72	9.34	**FHWA**
	5.47	6.43	7.16	8.06	8.74	9.35	**NOAA**
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	**Diff**
10	3.73	4.41	5.09	5.66	6.26	6.71	**FHWA**
	3.59	4.28	5.00	5.53	6.17	6.62	**NOAA**
	0.14	0.13	0.09	0.13	0.09	0.09	**Diff**
15	2.94	3.48	4.09	4.54	5.08	5.46	**FHWA**
	2.94	3.48	4.09	4.54	5.08	5.46	**NOAA**
	0.00	0.00	0.00	0.00	0.00	0.00	**Diff**
30	1.90	2.27	2.73	3.06	3.49	3.80	**FHWA**
	1.94	2.33	2.80	3.15	3.59	3.91	**NOAA**
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	**Diff**
60	1.20	1.45	1.78	2.03	2.37	2.62	**FHWA**
	1.19	1.43	1.76	2.00	2.33	2.57	**NOAA**
	0.01	0.02	0.02	0.03	0.04	0.05	**Diff**

Drop Box Inlet

DBI_501 STA. 169+80 RT KY536

No.	Drop Box Inlet Types		Q10 3.0	Q25 3.4	Q100 4.3		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		903.47		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.022	0.029	0.046
Perimeter Control	0.319	0.346	0.405
Controling HW	903.79	903.82	903.87

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	RAMP D-2 STA. 20399+17 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
75	0.15	0.011	Locate Site:	No	BOONE CO.					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
5	2.0	5	645	0.036	4.9	0.57	0.84	0.072	0.49	1.90	12.84	Class II	

	4.9	0.57

IDF Variables*

RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	8.9	0.0	5.2	14.0	3.06	8.5	0.73	0.078	2.08	0.435	Bathurst
5	8.1	0.0	4.7	12.9	3.81	10.6	0.79	0.075	2.27	0.466	Bathurst
10	7.6	0.0	4.4	12.0	4.62	12.8	0.84	0.072	2.45	0.495	Bathurst
25	7.2	0.0	4.2	11.4	5.28	14.7	0.89	0.070	2.58	0.516	Bathurst
50	6.9	0.0	4.0	10.8	6.01	16.7	0.93	0.069	2.71	0.537	Bathurst
100	6.7	0.0	3.8	10.5	6.55	18.2	0.96	0.068	2.80	0.552	Bathurst
500						21.8					

	DESIGN STORM						
tc	2	5	10	25	50	100	IDF
5	5.35	6.34	7.11	7.99	8.72	9.34	**FHWA**
	5.47	6.43	7.16	8.06	8.74	9.35	**NOAA**
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	**Diff**
10	3.73	4.41	5.09	5.66	6.26	6.71	**FHWA**
	3.59	4.28	5.00	5.53	6.17	6.62	**NOAA**
	0.14	0.13	0.09	0.13	0.09	0.09	**Diff**
15	2.94	3.48	4.09	4.54	5.08	5.46	**FHWA**
	2.94	3.48	4.09	4.54	5.08	5.46	**NOAA**
	0.00	0.00	0.00	0.00	0.00	0.00	**Diff**
30	1.90	2.27	2.73	3.06	3.49	3.80	**FHWA**
	1.94	2.33	2.80	3.15	3.59	3.91	**NOAA**
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	**Diff**
60	1.20	1.45	1.78	2.03	2.37	2.62	**FHWA**
	1.19	1.43	1.76	2.00	2.33	2.57	**NOAA**
	0.01	0.02	0.02	0.03	0.04	0.05	**Diff**

Drop Box Inlet

DBI_434 STA. 20399+17 RT RAMP D-2

No.	Drop Box Inlet Types		Q10 12.8	Q25 14.7	Q100 18.2		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		901.39		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	#N/A

	Q10	Q25	Q100
Area Control	0.407	0.536	0.822
Perimeter Control	0.838	0.919	1.060
Controling HW	902.23	902.31	902.45

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	RAMP D-2 20402+02 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
125	0.15	0.045	Locate Site:	No	BOONE CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	4	791	0.022	4.2	0.40	1.01	0.077	0.49	1.38	7.19	Class II	

4.2 0.4

IDF Variables*

RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	7.6	0.0	8.8	16.4	2.78	4.7	0.89	0.084	1.50	0.429	Bathurst
5	7.0	0.0	8.0	15.1	3.47	5.9	0.95	0.080	1.64	0.459	Bathurst
10	6.6	0.0	7.4	14.0	4.25	7.2	1.01	0.077	1.78	0.488	Bathurst
25	6.2	0.0	7.0	13.3	4.86	8.2	1.05	0.075	1.88	0.508	Bathurst
50	6.0	0.0	6.7	12.6	5.56	9.4	1.09	0.073	1.98	0.529	Bathurst
100	5.8	0.0	6.4	12.2	6.06	10.3	1.12	0.072	2.04	0.543	Bathurst
500						12.3					

	DESIGN STORM						
tc	**2**	**5**	**10**	**25**	**50**	**100**	**IDF**
5	5.35	6.34	7.11	7.99	8.72	9.34	**FHWA**
	5.47	6.43	7.16	8.06	8.74	9.35	**NOAA**
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	**Diff**
10	3.73	4.41	5.09	5.66	6.26	6.71	**FHWA**
	3.59	4.28	5.00	5.53	6.17	6.62	**NOAA**
	0.14	0.13	0.09	0.13	0.09	0.09	**Diff**
15	2.94	3.48	4.09	4.54	5.08	5.46	**FHWA**
	2.94	3.48	4.09	4.54	5.08	5.46	**NOAA**
	0.00	0.00	0.00	0.00	0.00	0.00	**Diff**
30	1.90	2.27	2.73	3.06	3.49	3.80	**FHWA**
	1.94	2.33	2.80	3.15	3.59	3.91	**NOAA**
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	**Diff**
60	1.20	1.45	1.78	2.03	2.37	2.62	**FHWA**
	1.19	1.43	1.76	2.00	2.33	2.57	**NOAA**
	0.01	0.02	0.02	0.03	0.04	0.05	**Diff**

Drop Box Inlet

DBI_435 STA. 20402+02 RT RAMP D-2

No.	Drop Box Inlet Types		Q10 7.2	Q25 8.2	Q100 10.3		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		886.87		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.129	0.167	0.263
Perimeter Control	0.571	0.623	0.725
Controling HW	887.44	887.49	887.59

DCD RAMP D-1 AT STA. 10401+14

10 YEAR FREQUENCY

```
+++ Commands Read From File 10401_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  NEW DBI TYPE A NO 435
  STO 4.23 0.46 15.7
  PIP 19 886.87 888.30 883.55 883.38 -18
+++ Tc =  15.7 min
+++ CA =   1.9
+++ Link #  1,  Flow depth =   1.02 ft, Critical depth =   1.13 ft
  PNC 435 431 3 170 0
  HOL 1
  NEW CBI NO 441
  STO 0.17 0.85 8
  PIP 82 890.17 890.63 886.06 883.80 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  2,  Flow depth =    .24 ft, Critical depth =    .36 ft
  PNC 441 44 3 71 0
  HOL 2
  NEW CBI NO 442
  STO 0.18 0.85 8
  PIP 78 891.70 891.70 887.59 883.10 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  3,  Flow depth =    .20 ft, Critical depth =    .37 ft
  PNC 442 44 3 124 0
  HOL 3
  NEW CBI NO 451
  STO 0.20 0.85 8
  PIP 74 891.37 890.63 887.26 883.80 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  4,  Flow depth =    .23 ft, Critical depth =    .40 ft
  PNC 451 45 3 51 0
```

```
  HOL 4
  NEW CBI NO 461,462,463
  STO 0.14 0.78 8
  PIP 64 895.24 894.47 890.86 890.09 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  5,  Flow depth =    .25 ft, Critical depth =    .31 ft
  PNC 463 462 3 180 0
  STO 0.07 0.85 8
  PIP 56 894.47 893.74 890.09 889.36 -18
+++ Tc =   8.3 min
+++ CA =    .2
+++ Link #  6,  Flow depth =    .29 ft, Critical depth =    .37 ft
  PNC 462 461 3 180 0
  STO 0.14 0.85 8
  PIP 18 893.74 894.15 889.36 886.13 -18
+++ Tc =   8.5 min
+++ CA =    .3
+++ Link #  7,  Flow depth =    .20 ft, Critical depth =    .49 ft
  PNC 461 46 3 90 0
  HOL 5
  NEW CBI NO 473,474
  STO 0.23 0.85 8
  PIP 49.0 903.23 901.86 899.12 897.48 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  8,  Flow depth =    .26 ft, Critical depth =    .42 ft
  PNC 474 473 3 180 0
  STO 0.52 0.85 8
  PIP 104 901.86 899.37 897.48 894.67 -18
+++ Tc =   8.1 min
+++ CA =    .6
+++ Link #  9,  Flow depth =    .46 ft, Critical depth =    .74 ft
  PNC 473 472 3 103 0
  HOL 6
  NEW CBI NO 481
  STO 1.0 .53 10.4
  PIP 11 898.46 898.97 893.96 892.75 -18
+++ Tc =  10.4 min
+++ CA =    .5
+++ Link # 10,  Flow depth =    .29 ft, Critical depth =    .64 ft
  PNC 481 48 3 180 0
  HOL 7
  NEW CBI NO 502,501
  STO 1.67 0.50 17.4
  PIP 15 903.47 904.91 900.14 899.99 -18
+++ Tc =  17.4 min
+++ CA =    .8
+++ Link # 11,  Flow depth =    .58 ft, Critical depth =    .72 ft
  PNC 502 501 3 142 0
  HOL 8
  NEW CBI NO 511
  STO 0.07 0.85 8
  PIP 44.0 911.93 911.09 907.82 905.26 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link # 12,  Flow depth =    .14 ft, Critical depth =    .23 ft
  PNC 511 51 3 155 0
  HOL 9
  NEW CBI NO 581
  STO 0.38 0.65 8
  PIP 56.0 931.74 932.42 927.63 927.32 -18
+++ Tc =   8.0 min
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+++ CA =    .2
+++ Link # 13,  Flow depth =    .43 ft, Critical depth =    .45 ft
  PNC 581 58 3 90 0
  HOL 10
  NEW CBI NO 434,433,432,431
  STO 4.87 0.57 14.1
  PIP 47.0 901.39 893.95 896.09 889.03 -18
+++ Tc =  14.1 min
+++ CA =   2.8
+++ Link # 14,  Flow depth =    .57 ft, Critical depth =   1.35 ft
  PNC 434 433 3 106 0
  STO 0.20 0.85 8
  PIP 157.0 893.95 890.04 889.03 885.12 -18
+++ Tc =  14.1 min
+++ CA =   2.9
+++ Link # 15,  Flow depth =    .99 ft, Critical depth =   1.37 ft
  PNC 433 432 3 157 0
  STO 0.18 0.85 8
  PIP 94.0 890.04 888.30 885.12 883.38 -24
+++ Tc =  14.4 min
+++ CA =   3.1
+++ Link # 16,  Flow depth =    .92 ft, Critical depth =   1.36 ft
  PNC 432 431 3 90 0
  REC 1
  STO 0.26 0.85 8
  PIP 96.0 888.30 889.48 883.38 882.43 -30
+++ Tc =  15.7 min
+++ CA =   5.3
+++ Link # 17,  Flow depth =   1.30 ft, Critical depth =   1.64 ft
  PNC 431 43 3 90 0
  HOL 11
  NEW CBI NO 592,591
  STO 0.31 .85 8
  PIP 43 933.75 934.65 929.64 929.41 -15
+++ Tc =   8.0 min
+++ CA =    .3
+++ Link # 18,  Flow depth =    .48 ft, Critical depth =    .50 ft
  PNC 592 591 5 90 0
  STO 0.12 0.85 8
  PIP 64.0 934.65 933.97 929.41 929.09 -18
+++ Tc =   8.2 min
+++ CA =    .4
+++ Link # 19,  Flow depth =    .54 ft, Critical depth =    .55 ft
  PNC 591 59 3 90 0
  HOL 12
  NEW CBI NO 475,472,471
  STO 0.45 0.55 8
  PIP 18.0 900.00 899.70 895.29 894.54 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link # 20,  Flow depth =    .28 ft, Critical depth =    .48 ft
  PNC 474 472 3 180 0
  REC 6
  STO 0.18 0.85 8
  PIP 38.0 899.70 899.70 894.54 892.96 -18
+++ Tc =   8.3 min
+++ CA =   1.0
+++ Link # 21,  Flow depth =    .52 ft, Critical depth =    .95 ft
  PNC 471 47 3 90 0
  HOL 13
  NEW CBI 41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60
  STO 0.20 0.85 8
  PIP 117.0 935.12 933.97 930.74,929.09 -18
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+++ Tc =   8.0 min
+++ CA =    .2
+++ Link # 22,  Flow depth =    .29 ft, Critical depth =    .37 ft
  PNC 60 59 30 180 0
  REC 12
  STO 0.15 0.85 8
  PIP 93.0 933.97 932.42 929.09 927.32 -18
+++ Tc =   8.5 min
+++ CA =    .7
+++ Link # 23,  Flow depth =    .51 ft, Critical depth =    .75 ft
  PNC 59 58 3 180 0
  REC 10
  STO 0.00 0.85 8
  PIP 202.0 932.42 927.67 927.32 923.29 -18
+++ Tc =   8.7 min
+++ CA =    .9
+++ Link # 24,  Flow depth =    .60 ft, Critical depth =    .88 ft
  PNC 58 57 3 180 0
  STO 0.40 0.65 8
  PIP 147.0 927.67 923.96 923.29 919.58 -18
+++ Tc =   9.1 min
+++ CA =   1.2
+++ Link # 25,  Flow depth =    .63 ft, Critical depth =    .99 ft
  PNC 57 56 3 174 0
  STO 0.31 0.65 8
  PIP 114 923.96 920.08 919.58 915.70 -18
+++ Tc =   9.4 min
+++ CA =   1.4
+++ Link # 26,  Flow depth =    .63 ft, Critical depth =   1.07 ft
  PNC 56 55 3 166 0
  STO 0.28 0.72 8
  PIP 55 920.08 917.86 915.70 913.48 -18
+++ Tc =   9.5 min
+++ CA =   1.6
+++ Link # 27,  Flow depth =    .64 ft, Critical depth =   1.14 ft
  PNC 55 54 3 180 0
  STO 0.17 0.68 8
  PIP 58.0 917.86 915.47 913.48 911.09 -18
+++ Tc =   9.6 min
+++ CA =   1.7
+++ Link # 28,  Flow depth =    .66 ft, Critical depth =   1.17 ft
  PNC 54 53 3 158 0
  STO 0.25 0.75 8
  PIP 79 915.47 905.64 911.09 902.37 -18
+++ Tc =   9.7 min
+++ CA =   1.9
+++ Link # 29,  Flow depth =    .54 ft, Critical depth =   1.23 ft
  PNC 53 52 3 124 0
  STO 2.6 0.45 16.9
  PIP 100 905.64 911.09 902.37 901.29 -24
+++ Tc =  16.9 min
+++ CA =   3.0
+++ Link # 30,  Flow depth =   1.02 ft, Critical depth =   1.30 ft
  PNC 52 51 3 142 0
  REC 9
  STO 0.00 0.85 8
  PIP 119 911.09 904.91 901.29 899.99 -24
+++ Tc =  17.1 min
+++ CA =   3.1
+++ Link # 31,  Flow depth =   1.04 ft, Critical depth =   1.31 ft
  PNC 51 50 3 155 0
  REC 8
  STO 0.11 0.85 8
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  PIP 72 904.91 902.38 899.99 897.46 -24
+++ Tc =  17.4 min
+++ CA =   4.0
+++ Link # 32,  Flow depth =    .86 ft, Critical depth =   1.49 ft
  PNC 50 49 3 180 0
  STO 0.14 0.85 8
  PIP 120 902.38 898.97 897.46 892.75 -24
+++ Tc =  17.5 min
+++ CA =   4.2
+++ Link # 33,  Flow depth =    .84 ft, Critical depth =   1.51 ft
  PNC 49 48 3 134 0
  REC 7
  STO 1.29 0.60 8
  PIP 34 898.97 899.24 892.75 892.17 -24
+++ Tc =  17.7 min
+++ CA =   5.5
+++ Link # 34,  Flow depth =   1.26 ft, Critical depth =   1.71 ft
  PNC 48 47 3 126 0
  REC 13
  STO 0.00 0.85 8
  PIP 406 899.24 894.15 892.17 886.18 -24
+++ Tc =  17.7 min
+++ CA =   6.5
+++ Link # 35,  Flow depth =   1.52 ft, Critical depth =   1.82 ft
  PNC 47 46 3 180 0
  REC 5
  STO 0.00 0.85 8
  PIP 64.00 894.15 893.30 886.18 885.25 -24
+++ Tc =  18.4 min
+++ CA =   6.8
+++ Link # 36,  Flow depth =   1.58 ft, Critical depth =   1.83 ft
  PNC 46 45 3 133 0
  REC 4
  STO 0.00 .85 8
  PIP 72.00 893.30 890.63 885.25 883.80 -24
+++ Tc =  18.5 min
+++ CA =   7.0
+++ Link # 37,  Flow depth =   1.40 ft, Critical depth =   1.84 ft
  PNC 45 44 3 180 0
  REC 2
  REC 3
  STO 0.17 0.85 8
  PIP 75.0 890.63 889.48 883.80 882.43 -30
+++ Tc =  18.6 min
+++ CA =   7.4
+++ Link # 38,  Flow depth =   1.28 ft, Critical depth =   1.89 ft
  PNC 44 43 3 180 0
  REC 11
  STO 0.00 .85 8
  PIP 61.00 889.48 887.11 882.43 881.21 -30
+++ Tc =  18.7 min
+++ CA =  12.7
+++ Link # 39,  Flow depth =   1.75 ft, Critical depth =   2.33 ft
  PNC 43 42 3 180 0
  STO 0.26 0.85 8
  PIP 23.00 887.11 884.82 882.43 880.72 -30
+++ Tc =  18.7 min
+++ CA =  12.9
+++ Link # 40,  Flow depth =   1.18 ft, Critical depth =   2.34 ft
  PNC 42 41 0 180 2
  TWE 882
  END
 END OF INPUT DATA.
```

*** DBI TYPE A NO 435 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	19	18	883.55	.00895	3.3	1.7	6.8	8.58	80		
			883.38		4.9	3.3	6.1	10.76			

Length = 19. ft Total length = 19. ft

*** CBI NO 441 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	82	15	886.06	.02756	4.1	2.8	5.5	.86	7		
			883.80		6.8	5.5	9.5	11.62			

Length = 82. ft Total length = 82. ft

*** CBI NO 442 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
3	78	15	887.59	.05756	4.1	2.8	7.3	.91	5		
			883.10		8.6	7.2	13.7	16.79			

Length = 78. ft Total length = 78. ft

*** CBI NO 451 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
4	74	15	887.26	.04676	4.1	2.8	7.0	1.01	7		
			883.80		6.8	5.5	12.3	15.13			

Length = 74. ft Total length = 74. ft

*** CBI NO 461,462,463 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
5	64	15	890.86	.01203	4.4	3.0	3.8	.65	8		
			890.09		4.4	3.0	6.3	7.68			
6	56	18	890.09	.01304	4.4	2.8	4.3	.99	8		
			889.36		4.4	2.8	7.4	12.99			
7	18	18	889.36	.17944	4.4	2.8	12.7	1.66	3		
			886.13		8.0	6.4	27.3	48.21			
	Length =	138. ft	Total length =	138. ft							

*** CBI NO 473,474 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
8	49	15	899.12	.03347	4.1	2.8	6.5	1.16	9		
			897.48		4.4	3.0	10.4	12.80			
9	104	18	897.48	.02702	4.4	2.8	8.3	3.75	20		
			894.67		4.7	3.1	10.6	18.71			
	Length =	153. ft	Total length =	153. ft							

*** CBI NO 481 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
10	11	18	893.96	.11000	4.5	2.9	12.5	2.80	7		
			892.75		6.2	4.6	21.4	37.74			
	Length =	11. ft	Total length =	11. ft							

*** CBI NO 502,501 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
11	15	18	900.14	.00999	3.3	1.7	5.7	3.55	31		
			899.99		4.9	3.3	6.4	11.38			
	Length =	15. ft	Total length =	15. ft							

Length = 15. ft Total length = 15. ft

*** CBI NO 511 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
12	44	15	907.82	.05818	4.1	2.8	5.5	.35	2		
			905.26		5.8	4.5	13.8	16.88			

Length = 44. ft Total length = 44. ft

*** CBI NO 581 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
13	56	18	927.63	.00554	4.1	2.5	3.6	1.46	17		
			927.32		5.1	3.5	4.8	8.47			

Length = 56. ft Total length = 56. ft

*** CBI NO 434,433,432, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
14	47	18	896.09	.15021	5.3	3.7	21.6	12.86	29		
			889.03		4.9	3.3	25.0	44.10			
15	157	18	889.03	.02490	4.9	3.3	11.2	13.63	76		
			885.12		4.9	3.3	10.2	17.96			

Length = 204. ft Total length = 204. ft

*** CBI NO 434,433,432, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
16	94	24	885.12	.01851	4.9	2.8	10.2	14.21	43		
			883.38		4.9	2.8	10.6	33.34			
17	96	30	883.38	.00990	4.9	2.2	9.1	23.19	52		
			882.43		7.0	4.3	9.0	44.20			

Length = 394. ft Total length = 413. ft

*** CBI NO 592,591 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
18	43	15	929.64	.00535	4.1	2.8	3.7	1.56	31		
			929.41		5.2	3.9	4.2	5.12			
19	64	18	929.41	.00500	5.2	3.6	3.8	2.15	27		
			929.09		4.9	3.3	4.6	8.05			

Length = 107. ft Total length = 107. ft

*** CBI NO 475,472,471 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
20	18	15	895.29	.04167	4.7	3.4	7.5	1.47	10		
			894.54		5.2	3.8	11.6	14.29			
21	38	18	894.54	.04158	5.2	3.5	11.0	6.05	26		
			892.96		6.7	5.1	13.1	23.20			

Length = 56. ft Total length = 209. ft

*** CBI 41,42,43,44,45, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
22	117	18	930.74	.01410	4.4	2.8	4.5	1.01	7		
			929.09		4.9	3.3	7.6	13.51			
23	93	18	929.09	.01903	4.9	3.3	7.3	3.84	24		
			927.32		5.1	3.5	8.9	15.70			
24	202	18	927.32	.01995	5.1	3.5	8.1	5.21	32		
			923.29		4.4	2.8	9.1	16.07			
25	147	18	923.29	.02524	4.4	2.8	9.4	6.56	36		
			919.58		4.4	2.8	10.2	18.08			
26	114	18	919.58	.03404	4.4	2.8	10.9	7.59	36		
			915.70		4.4	2.8	11.9	20.99			

27	55	18	915.70	.04036	4.4	2.8	12.0	8.63	38	
			913.48		4.4	2.8	12.9	22.86		
28	58	18	913.48	.04121	4.4	2.8	12.3	9.22	40	
			911.09		4.4	2.8	13.1	23.10		

Length = 786. ft Total length = 949. ft

*** CBI 41,42,43,44,45, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
29	79	18	911.09	.11038	4.4	2.8	18.1	10.21	27		
			902.37		3.3	1.6	21.4	37.81			
30	100	24	902.37	.01080	3.3	1.1	8.2	13.09	51		
			901.29		9.8	7.6	8.1	25.47			
31	119	24	901.29	.01092	9.8	7.6	8.2	13.29	52		
			899.99		4.9	2.8	8.2	25.62			
32	72	24	899.99	.03514	4.9	2.8	13.5	17.13	37		
			897.46		4.9	2.8	14.6	45.94			
33	120	24	897.46	.03925	4.9	2.8	14.2	17.61	36		
			892.75		6.2	4.1	15.5	48.55			
34	34	24	892.75	.01706	6.2	4.1	11.1	23.06	72		
			892.17		7.1	4.9	10.2	32.01			
35	406	24	892.17	.01475	7.1	4.9	10.7	27.42	92		
			886.18		8.0	5.8	9.5	29.77			
36	64	24	886.18	.01453	8.0	5.8	10.7	28.24	96		
			885.25		8.0	5.9	9.4	29.54			
37	72	24	885.25	.02014	8.0	5.9	12.4	28.88	83		
			883.80		6.8	4.7	11.1	34.78			
38	75	30	883.80	.01827	6.8	4.1	12.3	30.65	51		
			882.43		7.0	4.3	12.2	60.05			
39	61	30	882.43	.02000	7.0	4.3	14.3	52.35	83		
			881.21		5.9	3.2	12.8	62.84			
40	23	30	882.43	.07435	4.7	2.0	23.9	53.18	44		
			880.72		4.1	1.4	24.7	121.16			

Length = 2011. ft Total length = 3238. ft

Hydraulic Gradeline Computations

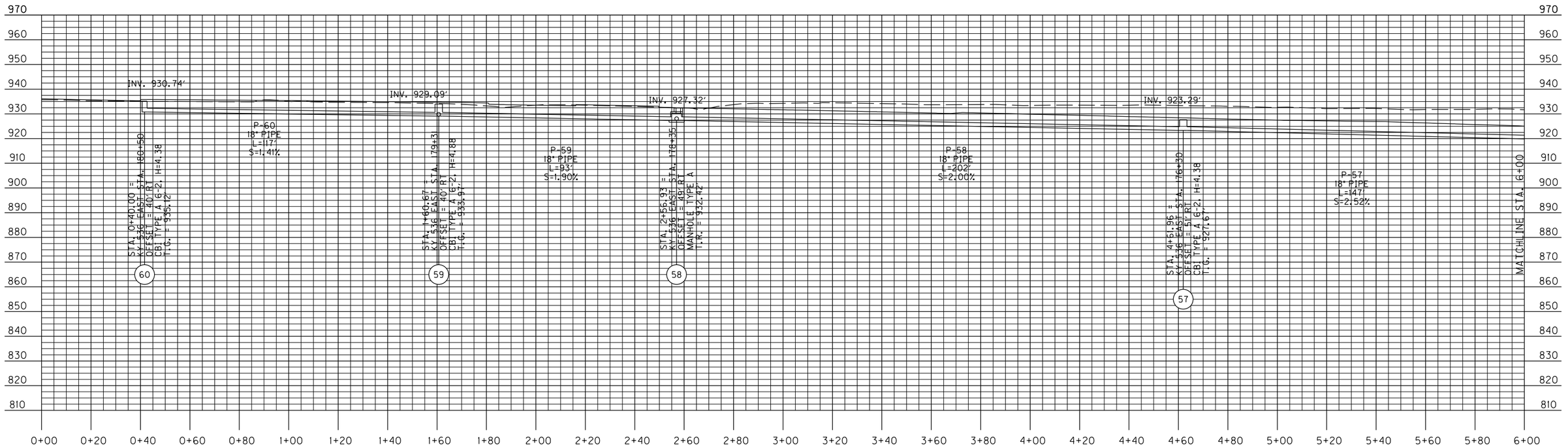
Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Loss Depth	Coef

1	431	884.51	884.88	N	888.30	Y	2.63	.69
2	44	884.16	885.05	N	890.63	Y	3.75	1.06
3	44	883.47	884.35	N	890.63	Y	3.75	1.05
4	45	884.20	885.05	N	893.30	Y	4.51	1.32
5	462	890.40	891.34	N	894.47	Y	.59	.38
6	461	889.73	890.86	N	893.74	Y	4.10	1.22
7	46	886.62	887.63	N	894.15	Y	3.51	1.17
8	473	897.74	898.73	N	901.86	Y	.00	.00
9	472	895.14	896.17	N	899.70	Y	.00	.00
10	48	893.39	894.25	N	898.97	Y	3.32	.96
11	501	900.58	901.49	N	904.91	Y	.00	.00
12	51	905.49	906.51	N	911.09	Y	2.13	.04
13	58	927.77	928.82	N	932.42	Y	1.68	1.11
14	433	890.38	890.53	N	893.95	Y	3.57	3.85
15	432	886.49	886.62	N	890.04	Y	2.77	.36
16	431	884.74	885.38	N	888.30	Y	2.63	1.80
17	43	884.07	884.93	N	889.48	Y	5.22	1.27
18	591	929.91	930.66	N	934.65	Y	.79	1.73
19	59	929.64	930.59	N	933.97	Y	1.39	1.22
20	472	894.82	895.79	N	899.70	Y	.00	.00
21	47	893.91	894.46	N	899.24	Y	3.58	1.38
22	59	929.46	930.59	N	933.97	Y	1.39	.84
23	58	928.07	928.82	N	932.42	Y	1.68	.32
24	57	924.17	924.79	N	927.67	Y	2.44	.54
25	56	920.57	921.08	N	923.96	Y	3.19	.53
26	55	916.77	917.20	N	920.08	Y	3.86	.60
27	54	914.62	914.98	N	917.86	Y	3.97	.47
28	53	912.26	912.59	N	915.47	Y	7.67	.67
29	52	903.60	903.87	N	905.64	Y	2.19	2.76
30	51	902.59	903.29	N	911.09	Y	2.13	.47
31	50	901.30	901.99	N	904.91	Y	4.42	.68
32	49	898.95	899.46	N	902.38	Y	4.84	.30
33	48	894.26	894.75	N	898.97	Y	3.32	.96
34	47	893.88	894.17	N	899.24	Y	3.58	1.01
35	46	888.00	888.18	N	894.15	Y	3.51	.11
36	45	887.08	887.25	N	893.30	Y	4.51	.88
37	44	885.64	885.80	N	890.63	Y	3.75	.11
38	43	884.32	884.93	N	889.48	Y	5.22	.51
39	42	883.54	883.71	N	887.11	Y	12.31	.43
40	41	882.00	883.22	N	884.82	Y	1.28	.00

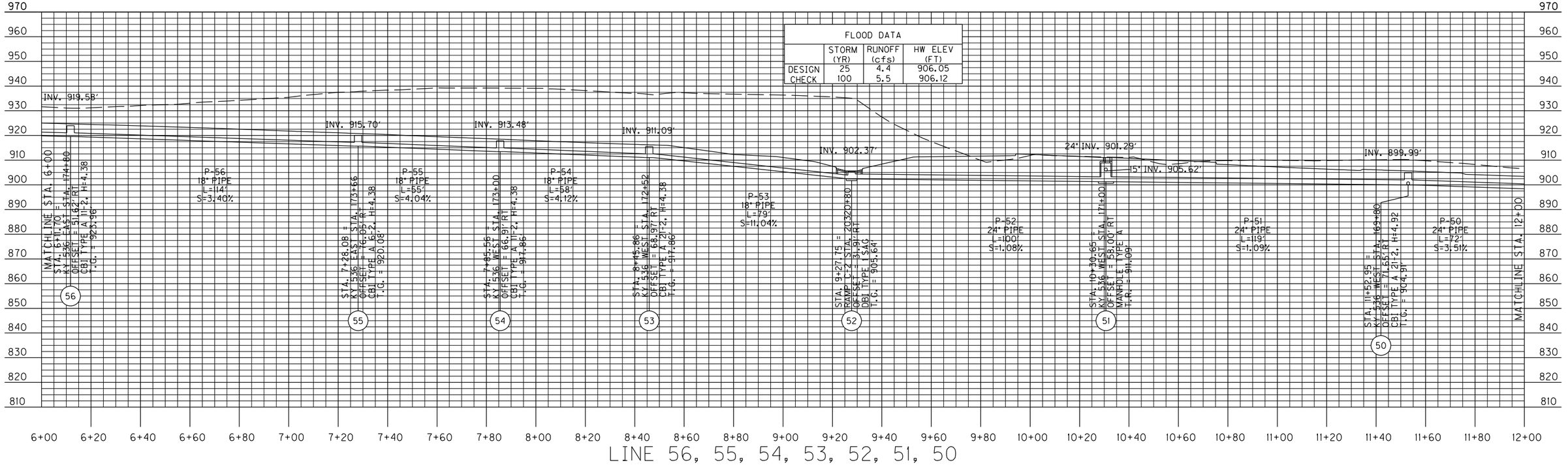
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	435	885.80	886.87	1.50
2	441	887.01	890.17	1.50
3	442	889.03	891.70	1.50
4	451	888.63	891.37	1.50
5	463	891.45	895.24	1.50
10	481	897.88	898.46	1.50
12	511	908.66	911.93	1.50
13	581	928.58	931.74	1.50
14	434	907.55	901.39	1.50
18	592	930.43	933.75	1.50
21	471	897.90	899.70	1.50
22	60	931.50	935.12	1.50

NORMAL END OF HYDRA

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



LINE 60, 59, 58, 57



LINE 56, 55, 54, 53, 52, 51, 50

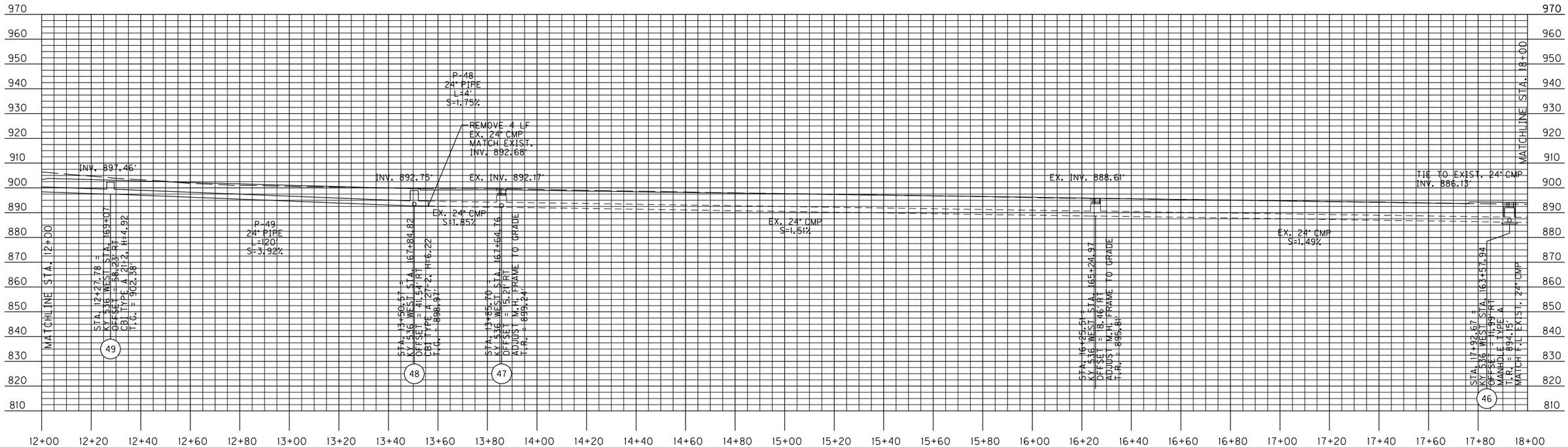
0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

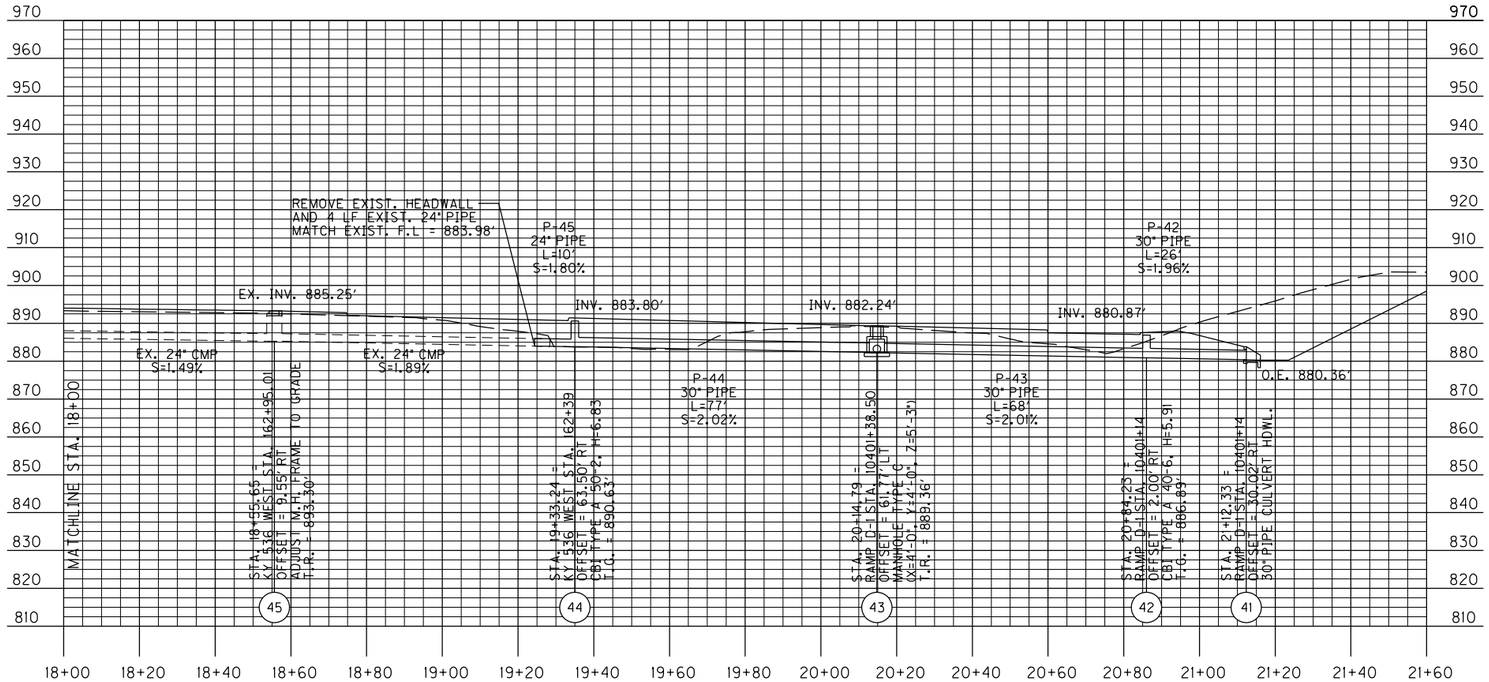
STORM SEWER PROFILES
SHEET 2 OF 16

FILE NAME: V:\7856\ACTIVE\7856002\ROADWAY\PLAN SHEETS\PIPE_PROFILES_02.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



LINE 49, 48, 47, 46



LINE 45, 44, 43, 42, 41

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 3 OF 16

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: dhawkins | DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\PIPE_PROFILES_03.DGN

STORM SEWER SYSTEM

@ STATION

21102+09.09 RAMP A-2 TO 176+00 KY536

KY 536

DCD RAMP A-2 AT STA. 21102+09.09

10 YEAR FREQUENCY

```
+++ Commands Read From File rampa_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  NEW DBI TYPE A NO 631
  STO 0.26 0.85 8
  PIP 111 911.96 909.10 907.85 904.72 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .29 ft, Critical depth =    .45 ft
  PNC 631 63 3 120 0
  HOL 1
  NEW CBI NO 651
  STO 0.21 0.85 8
  PIP 65 923.25 921.20 919.14 916.82 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  2,  Flow depth =    .25 ft, Critical depth =    .40 ft
  PNC 651 65 3 106 0
  HOL 2
  NEW CBI NO 62,63,64,65,66
  STO 0.36 0.80 8
  PIP 191 926.29 921.20 922.18 916.82 -18
+++ Tc =   8.0 min
+++ CA =    .3
+++ Link #  3,  Flow depth =    .32 ft, Critical depth =    .49 ft
  PNC 66 65 3 180 0
  REC 2
  STO 0.33 0.67 8
  PIP 122 921.20 915.89 916.82 911.57 -18
+++ Tc =   8.5 min
+++ CA =    .7
+++ Link #  4,  Flow depth =    .42 ft, Critical depth =    .76 ft
  PNC 65 64 3 180 0
  STO 0.23 0.70 8
  PIP 102 915.89 909.10 911.51 904.72 -18
+++ Tc =   8.7 min
```

```
+++ CA =    .8
+++ Link #  5,  Flow depth =    .42 ft, Critical depth =    .85 ft
  PNC 64 63 3 180 0
  REC 1
  STO 0.12 0.85 8
  PIP 93 909.10 904.35 904.72 899.97 -18
+++ Tc =   8.8 min
+++ CA =   1.2
+++ Link #  6,  Flow depth =    .52 ft, Critical depth =   1.00 ft
  PNC 63 62 3 180 0
  STO 0.17 .85 8
  PIP 28 904.35 904.0 899.97 899.68 -18
+++ Tc =   8.9 min
+++ CA =   1.3
+++ Link #  7,  Flow depth =    .89 ft, Critical depth =   1.06 ft
  PNC 62 61 0 180 2
  TWE 900.50
  END
```

*** DBI TYPE A NO 631 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	111	15	907.85	.02820	4.1	2.8	6.3	1.31	11		
			904.72		4.4	3.0	9.6	11.75			

Length = 111. ft Total length = 111. ft

*** CBI NO 651 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	65	15	919.14	.03569	4.1	2.8	6.4	1.06	8		
			916.82		4.4	3.0	10.8	13.22			

Length = 65. ft Total length = 65. ft

*** CBI NO 62,63,64,65, — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
3	191	18	922.18	.02806	4.1	2.5	6.7	1.71	9		
			916.82		4.4	2.8	10.8	19.06			
4	122	18	916.82	.04303	4.4	2.8	9.9	3.98	17		
			911.57		4.3	2.7	13.4	23.61			

Length = 313. ft Total length = 378. ft

*** CBI NO 62,63,64,65, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
5	102	18	911.51	.06657	4.4	2.8	12.3	4.86	17		
			904.72		4.4	2.8	16.6	29.36			
6	93	18	904.72	.05108	4.4	2.8	12.2	6.67	26		
			899.97		4.4	2.8	14.6	25.72			
7	28	18	899.97	.01036	4.4	2.8	6.9	7.44	64		
			899.68		4.3	2.7	6.6	11.58			

Length = 536. ft Total length = 712. ft

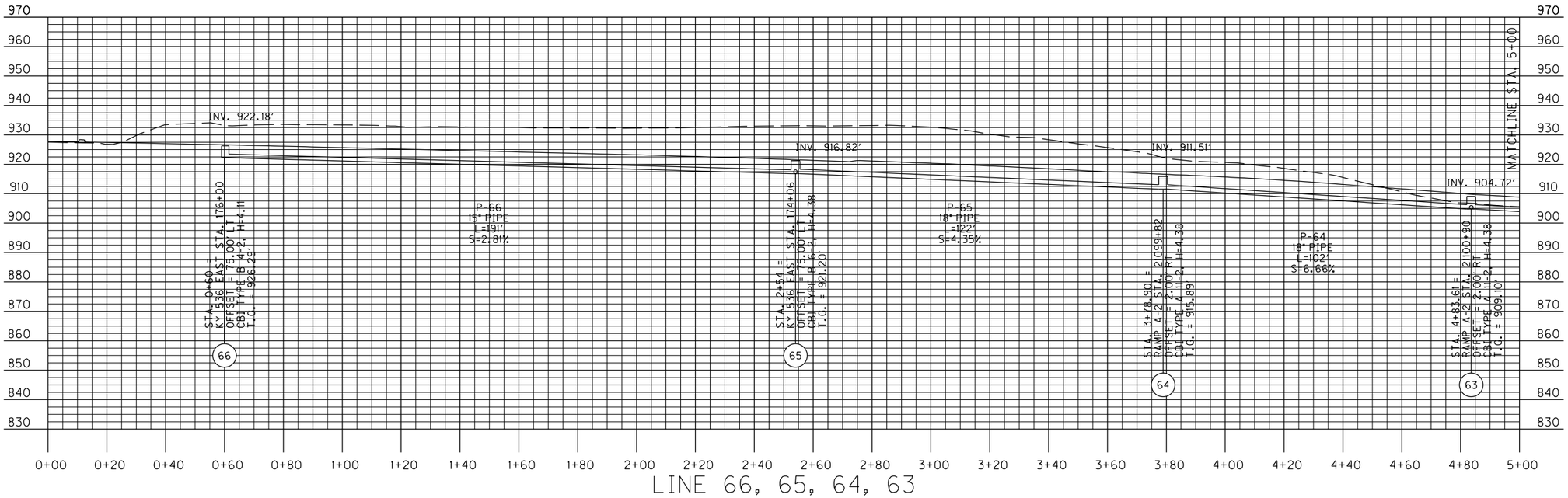
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	63	905.17	905.97	N	909.10	Y	3.16	1.09
2	65	917.22	918.07	N	921.20	Y	2.06	1.09
3	65	917.31	918.32	N	921.20	Y	2.06	.69
4	64	912.33	913.07	N	915.89	Y	3.81	.66
5	63	905.57	906.22	N	909.10	Y	3.16	.40
6	62	900.97	901.47	N	904.35	Y	1.75	.78
7	61	900.57	901.18	N	904.00	Y	.89	.00

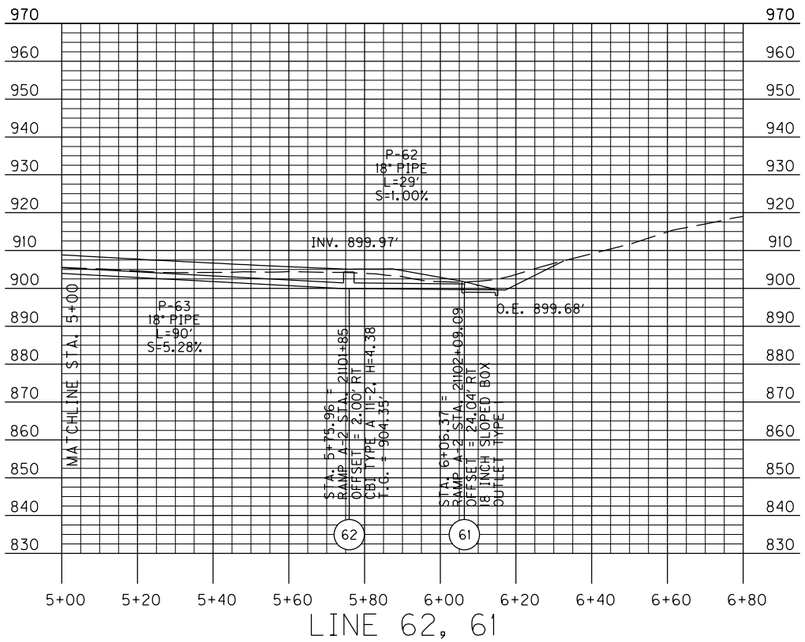
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	631	909.07	911.96	1.50
2	651	920.36	923.25	1.50
3	66	923.54	926.29	1.50

NORMAL END OF HYDRA

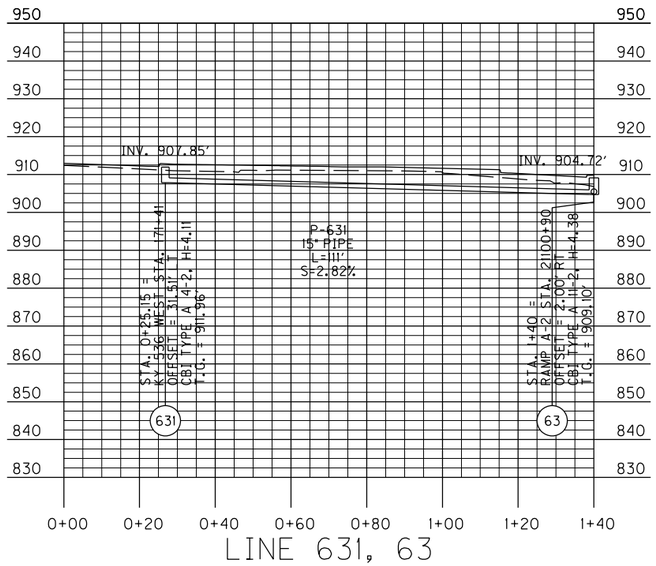
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



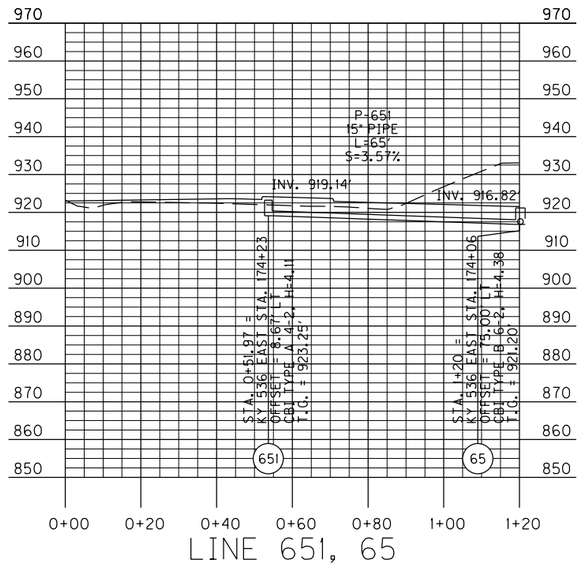
LINE 66, 65, 64, 63



LINE 62, 61



LINE 631, 63



LINE 651, 65

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 6 OF 16

MicroStation v8.11.7.443
E-SHEET NAME:
USER: dnawkins
DATE PLOTTED: September 16, 2015
FILE NAME: V:\1785\ACTIVE\1785600\2\ROADWAY\PLAN SHEETS\PIPE_PROFILES_06.DGN

STORM SEWER SYSTEM

@ STATION

184+00 TO 188+67 KY 536

KY 536

DCD STATION 15+54 SAM NEACE DR.

10 YEAR FREQUENCY

```
+++ Commands Read From File 1554_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW CBI NO 721
  STO 0.18 0.85 8
  PIP 129 935.39 934.90 931.28 930.52 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .35 ft, Critical depth =    .37 ft
  PNC 721 72 3 180 0
  HOL 1
  NEW CBI TYPE A NO 743,742,741
  STO 0.25 0.85 8
  PIP 72 934.82 935.46 930.44 929.72 -18
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  2,  Flow depth =    .35 ft, Critical depth =    .42 ft
  PNC 743 742 3 180 0
  STO 0.11 0.85 8
  PIP 43 935.46 934.56 929.72 929.29 -18
+++ Tc =   8.3 min
+++ CA =    .3
+++ Link #  3,  Flow depth =    .41 ft, Critical depth =    .50 ft
  PNC 742 741 3 90 0
  STO 0.24 0.85 8
  PIP 44.0 934.56 934.37 929.29 928.22 -18
+++ Tc =   8.4 min
+++ CA =    .5
+++ Link #  4,  Flow depth =    .42 ft, Critical depth =    .65 ft
  PNC 741 74 3 180 0
```

```
  HOL 2
  NEW CBI TYPE A NO 731,732
  STO 0.2 0.85 8
  PIP 68 934.54 934.38 930.43 930.00 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  5,  Flow depth =    .36 ft, Critical depth =    .40 ft
  PNC 732 731 3 90 0
  STO 0.10 0.85 8
  PIP 104.0 934.38 933.92 930.00 929.48 -18
+++ Tc =   8.3 min
+++ CA =    .3
+++ Link #  6,  Flow depth =    .45 ft, Critical depth =    .46 ft
  PNC 731 73 3 90 0
  HOL 3
  NEW CBI TYPE A NO 70,71,72,73,74,75,76,77
  STO 0.22 0.85 8
  PIP 82.0 936.79 936.28 932.68 931.90 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  7,  Flow depth =    .35 ft, Critical depth =    .41 ft
  PNC 70 71 3 90 0
  STO 0.10 0.85 8
  PIP 61.0 936.28 934.90 931.90 930.52 -18
+++ Tc =   8.3 min
+++ CA =    .3
+++ Link #  8,  Flow depth =    .32 ft, Critical depth =    .47 ft
  PNC 71 72 3 90 0
  REC 1
  STO 0.12 0.85 8
  PIP 181 934.90 933.92 930.52 929.48 -18
+++ Tc =   8.7 min
+++ CA =    .5
+++ Link #  9,  Flow depth =    .61 ft, Critical depth =    .66 ft
  PNC 72 73 3 180 0
  REC 3
  STO 0.38 0.85 8
  PIP 127 933.92 934.37 929.48 928.22 -18
+++ Tc =   9.3 min
+++ CA =   1.1
+++ Link # 10,  Flow depth =    .80 ft, Critical depth =    .96 ft
  PNC 73 74 3 90 0
  REC 2
  STO 0.00 0.85 8
  PIP 173.0 934.37 928.92 928.22 924.54 -18
+++ Tc =   9.7 min
+++ CA =   1.6
+++ Link # 11,  Flow depth =    .78 ft, Critical depth =   1.15 ft
  PNC 74 75 3 180 0
  STO 0.51 0.75 8
  PIP 188.0 928.92 924.23 924.54 919.85 -18
+++ Tc =  10.0 min
+++ CA =   2.0
+++ Link # 12,  Flow depth =    .84 ft, Critical depth =   1.26 ft
  PNC 75 76 3 180 0
  STO 0.34 0.65 8
  PIP 114.0 924.23 921.64 919.85 917.26 -18
+++ Tc =  10.3 min
+++ CA =   2.2
+++ Link # 13,  Flow depth =    .92 ft, Critical depth =   1.30 ft
  PNC 76 77 3 180 0
  STO 0.10 0.85 8
  PIP 67.0 921.64 918.00 917.26 916.19 -18
```

```
+++ Tc =  10.4 min
+++ CA =   2.3
+++ Link # 14,  Flow depth =   1.07 ft, Critical depth =   1.32 ft
  PNC 77 78 0 180 2
  TWE 917.70
  END
 END OF INPUT DATA.
```

*** CBI NO 721 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	129	15	931.28	.00589	4.1	2.8	3.2	.91	17		
			930.52		4.4	3.0	4.4	5.37			
	Length =	129. ft	Total length =	129. ft							

*** CBI TYPE A NO 743,7 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	72	18	930.44	.01000	4.4	2.8	4.2	1.26	11		
			929.72		5.7	4.1	6.4	11.38			
3	43	18	929.72	.01000	5.7	4.1	4.7	1.79	16		
			929.29		5.3	3.6	6.4	11.38			
4	44	18	929.29	.02432	5.3	3.6	7.4	2.96	17		
			928.22		6.1	4.5	10.0	17.75			
	Length =	159. ft	Total length =	159. ft							

*** CBI TYPE A NO 731,7 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
5	68	15	930.43	.00632	4.1	2.8	3.4	1.01	18		
			930.00		4.4	3.0	4.5	5.57			
6	104	18	930.00	.00500	4.4	2.8	3.5	1.49	18		
			929.48		4.4	2.8	4.6	8.05			
	Length =	172. ft	Total length =	172. ft							

*** CBI TYPE A NO 70,71 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
7	82	15	932.68	.00951	4.1	2.8	4.1	1.11	16		
			931.90		4.4	3.0	5.6	6.83			
8	61	18	931.90	.02262	4.4	2.8	6.1	1.59	9		
			930.52		4.4	2.8	9.7	17.12			
9	181	18	930.52	.00575	4.4	2.8	4.5	3.02	35		
			929.48		4.4	2.8	4.9	8.63			
10	127	18	929.48	.00992	4.4	2.8	6.5	6.12	54		
			928.22		6.1	4.5	6.4	11.33			
11	173	18	928.22	.02127	6.1	4.5	9.5	8.80	53		
			924.54		4.4	2.8	9.4	16.60			
12	188	18	924.54	.02495	4.4	2.8	10.6	10.71	60		
			919.85		4.4	2.8	10.2	17.97			
13	114	18	919.85	.02272	4.4	2.8	10.4	11.77	69		
			917.26		4.4	2.8	9.7	17.15			

Length = 926. ft Total length = 1386. ft

*** CBI TYPE A NO 70,71 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
14	67	18	917.26	.01597	4.4	2.8	9.1	12.14	84		
			916.19		1.8	.2	8.1	14.38			

Length = 993. ft Total length = 1453. ft

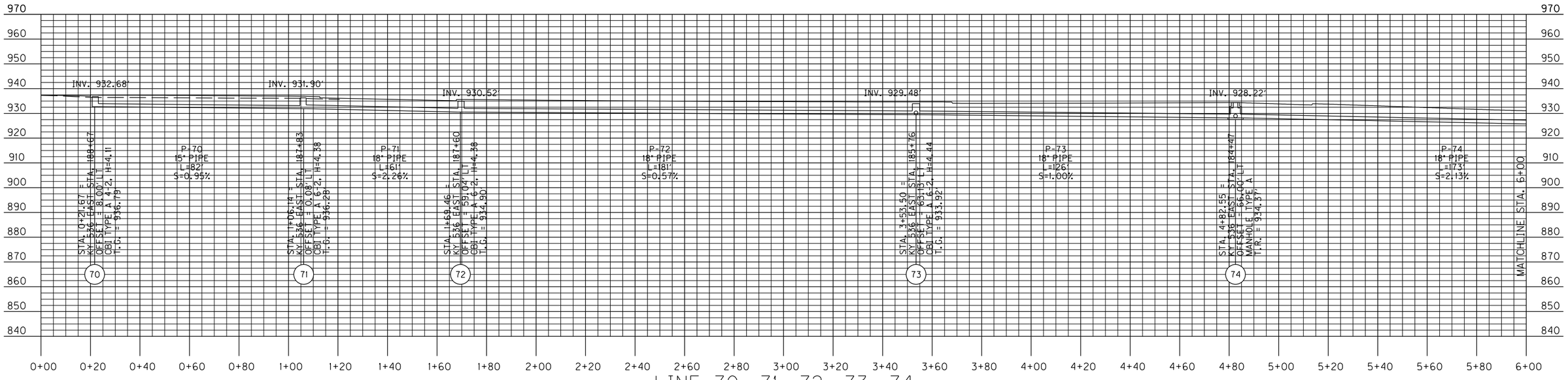
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	72	930.89	931.77	N	934.90	Y	.93	.74
2	742	930.14	931.22	N	935.46	Y	.76	.35
3	741	929.79	930.79	N	934.56	Y	1.42	1.41
4	74	928.87	929.72	N	934.37	Y	2.32	.77
5	731	930.40	931.25	N	934.38	Y	.64	1.70
6	73	929.94	930.98	N	933.92	Y	1.49	1.11
7	71	932.31	933.15	N	936.28	Y	.92	1.38
8	72	930.99	932.02	N	934.90	Y	.93	2.00
9	73	930.14	930.98	N	933.92	Y	1.49	.60
10	74	929.18	929.72	N	934.37	Y	2.32	1.41
11	75	925.69	926.04	N	928.92	Y	3.37	.64
12	76	921.11	921.35	N	924.23	Y	3.20	.44
13	77	918.56	918.76	N	921.64	Y	2.67	.30
14	78	917.70	917.69	Y	918.00	Y	1.51	.00

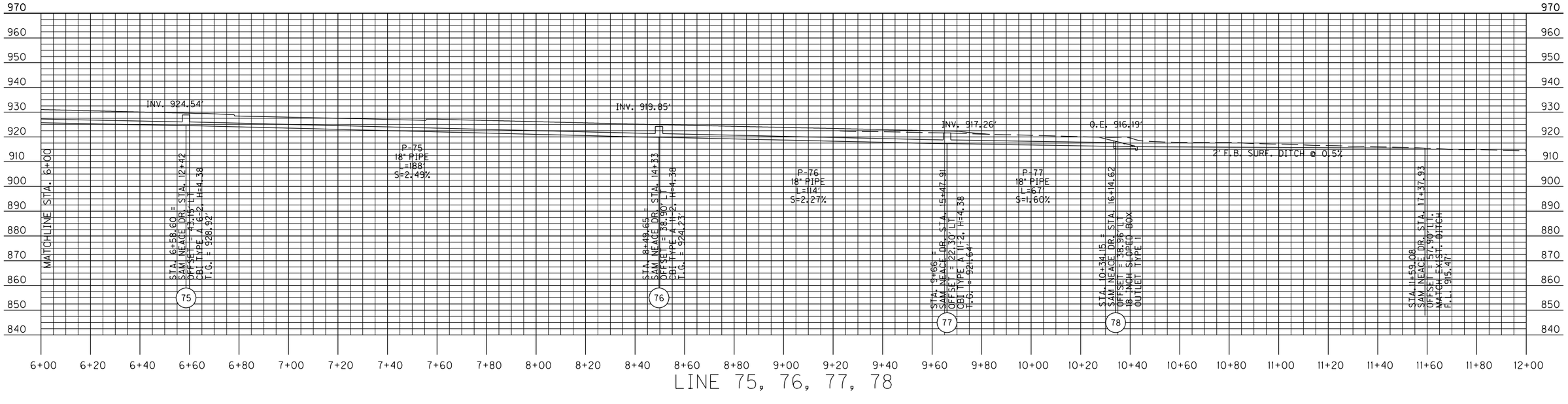
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	721	931.88	935.39	1.50
2	743	931.20	934.82	1.50
5	732	931.07	934.54	1.50
7	70	933.42	936.79	1.50

NORMAL END OF HYDRA

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



LINE 70, 71, 72, 73, 74



LINE 75, 76, 77, 78

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 7 OF 16

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_07.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

STORM SEWER SYSTEM

@ STATION

190+23.06 TO 204+12.00 KY 536

KY 536

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	KY536 STA.190+20.83 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
50	0.15	0.02	Locate Site:	No	BOONE CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	4	10	0.001	0.1	0.35	0.62	0.229	0.30	0.04	0.14	Veg.Class C	

IDF Variables*			
RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

0.1 0.35

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	5.2	0.0	2.0	8.0	4.22	0.1	0.57	0.236	0.08	0.278	SCS
5	4.8	0.0	1.9	8.0	4.98	0.1	0.60	0.231	0.09	0.293	SCS
10	4.5	0.0	1.8	8.0	5.71	0.1	0.62	0.229	0.09	0.299	SCS
25	4.3	0.0	1.8	8.0	6.35	0.2	0.63	0.227	0.09	0.307	SCS
50	4.1	0.0	1.7	8.0	7.00	0.2	0.66	0.224	0.10	0.318	SCS
100	4.0	0.0	1.7	8.0	7.48	0.2	0.67	0.221	0.10	0.327	SCS
500						0.2					

	DESIGN STORM						
tc	2	5	10	25	50	100	IDF
5	5.35	6.34	7.11	7.99	8.72	9.34	**FHWA**
	5.47	6.43	7.16	8.06	8.74	9.35	**NOAA**
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	**Diff**
10	3.73	4.41	5.09	5.66	6.26	6.71	**FHWA**
	3.59	4.28	5.00	5.53	6.17	6.62	**NOAA**
	0.14	0.13	0.09	0.13	0.09	0.09	**Diff**
15	2.94	3.48	4.09	4.54	5.08	5.46	**FHWA**
	2.94	3.48	4.09	4.54	5.08	5.46	**NOAA**
	0.00	0.00	0.00	0.00	0.00	0.00	**Diff**
30	1.90	2.27	2.73	3.06	3.49	3.80	**FHWA**
	1.94	2.33	2.80	3.15	3.59	3.91	**NOAA**
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	**Diff**
60	1.20	1.45	1.78	2.03	2.37	2.62	**FHWA**
	1.19	1.43	1.76	2.00	2.33	2.57	**NOAA**
	0.01	0.02	0.02	0.03	0.04	0.05	**Diff**

Drop Box Inlet

DBI_825 STA. 190+20.83 RT

No.	Drop Box Inlet Types		Q10 0.1	Q25 0.1	Q100 0.2		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		938.35		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.000	0.000	0.000
Perimeter Control	0.033	0.033	0.052
Controling HW	938.38	938.38	938.40

Kentucky Transportation Cabinet Division of Highway Design 04-13	RATIONAL FLOW ANALYSIS and DESIGN	TC 61-507C page 1 of 1

v16b Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	KY536 STA.198+00 RT
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
80	0.15	0.02	Locate Site:	No	BOONE CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	0.0	4	379	0.043	1.3	0.35	0.59	0.085	0.29	1.59	2.20	Class II	

IDF Variables*			
RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

1.3 0.35

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	7.4	0.0	4.7	12.1	3.34	1.5	0.52	0.092	1.34	0.255	Bathurst
5	6.8	0.0	4.3	11.1	4.14	1.8	0.56	0.088	1.46	0.271	Bathurst
10	6.4	0.0	4.0	10.4	4.99	2.2	0.59	0.085	1.57	0.287	Bathurst
25	6.0	0.0	3.8	9.9	5.70	2.5	0.62	0.083	1.66	0.299	Bathurst
50	5.8	0.0	3.6	9.4	6.45	2.8	0.64	0.081	1.74	0.310	Bathurst
100	5.6	0.0	3.5	9.1	7.02	3.1	0.66	0.080	1.80	0.318	Bathurst
500						3.7					

	DESIGN STORM						
tc	2	5	10	25	50	100	IDF
5	5.35	6.34	7.11	7.99	8.72	9.34	FHWA
	5.47	6.43	7.16	8.06	8.74	9.35	NOAA
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	Diff
10	3.73	4.41	5.09	5.66	6.26	6.71	FHWA
	3.59	4.28	5.00	5.53	6.17	6.62	NOAA
	0.14	0.13	0.09	0.13	0.09	0.09	Diff
15	2.94	3.48	4.09	4.54	5.08	5.46	FHWA
	2.94	3.48	4.09	4.54	5.08	5.46	NOAA
	0.00	0.00	0.00	0.00	0.00	0.00	Diff
30	1.90	2.27	2.73	3.06	3.49	3.80	FHWA
	1.94	2.33	2.80	3.15	3.59	3.91	NOAA
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	Diff
60	1.20	1.45	1.78	2.03	2.37	2.62	FHWA
	1.19	1.43	1.76	2.00	2.33	2.57	NOAA
	0.01	0.02	0.02	0.03	0.04	0.05	Diff

Drop Box Inlet

DBI_862 STA. 198+00 RT KY536

No.	Drop Box Inlet Types		Q10	Q25	Q100		
			2.2	2.5	3.1		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		945.59		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft
Net Perimeter	5.563	sq ft

	Q10	Q25	Q100
Area Control	0.012	0.016	0.024
Perimeter Control	0.259	0.282	0.326
Controling HW	945.85	945.87	945.92

DCD STA. 100+58 Right Berberich Dr.

10 YEAR FREQUENCY

```
+++ Commands Read From File 10058b10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	0.	.00	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW DBI TYPE A NO 831
  STO 0.15 0.85 8
  PIP 46 939.43 938.31 935.32 933.39 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  1,  Flow depth =    .20 ft, Critical depth =    .34 ft
  PNC 831 83 3 140 0
  HOL 1
  NEW CBI NO 841
  STO 0.21 0.85 8
  PIP 40 940.69 939.74 936.58 934.82 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  2,  Flow depth =    .24 ft, Critical depth =    .40 ft
  PNC 841 84 3 90 0
  HOL 2
  NEW CBI NO 851
  STO 0.2 0.85 8
  PIP 37 942.40 941.38 938.29 936.44 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  3,  Flow depth =    .23 ft, Critical depth =    .40 ft
  PNC 851 85 3 90 0
  HOL 3
  NEW CBI NO 862,861
  STO 1.26 0.35 8
  PIP 54 945.59 945.17 942.09 940.79 -18
+++ Tc =   8.0 min
+++ CA =    .4
+++ Link #  4,  Flow depth =    .41 ft, Critical depth =    .61 ft
  PNC 862 861 3 180 0
  STO 0.17 .85 8
  PIP 38 945.17 943.73 940.79 939.35 -18
+++ Tc =   8.1 min
+++ CA =    .6
+++ Link #  5,  Flow depth =    .41 ft, Critical depth =    .71 ft
  PNC 861 86 3 90 0
  HOL 4
  NEW CBI NO 881
  STO 0.13 0.85 8
  PIP 79 947.20 948.45 943.09 941.65 -15
```

```
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  6,  Flow depth =    .23 ft, Critical depth =    .32 ft
  PNC 881 88 3 90 0
  HOL 5
  NEW CBI NO 891,892
  STO 0.17 0.85 8
  PIP 180 951.70 950.55 947.59 946.17 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  7,  Flow depth =    .33 ft, Critical depth =    .36 ft
  PNC 892 891 3 180 0
  STO 0.18 0.85 8
  PIP 119 950.55 949.59 946.17 942.53 -18
+++ Tc =   8.8 min
+++ CA =    .3
+++ Link #  8,  Flow depth =    .30 ft, Critical depth =    .49 ft
  PNC 891 89 3 180 0
  HOL 6
  NEW CBI NO 821,822,823,824,825
  STO 0.07 0.35 8
  PIP 80.0 938.50 937.71 933.50 932.12 -24
+++ Tc =   8.0 min
+++ CA =    .0
+++ Link #  9,  Flow depth =    .10 ft, Critical depth =    .13 ft
  PNC 825 824 3 180 0
  STO 0.16 0.85 8
  PIP 32 937.71 936.56 932.12 931.57 -24
+++ Tc =   8.5 min
+++ CA =    .2
+++ Link # 10,  Flow depth =    .24 ft, Critical depth =    .33 ft
  PNC 824 823 3 90 0
  STO 0.1 .85 8
  PIP 33 936.55 935.00 931.57 929.24 -24
+++ Tc =   8.6 min
+++ CA =    .2
+++ Link # 11,  Flow depth =    .22 ft, Critical depth =    .41 ft
  PNC 823 822 3 180 0
  STO 0.00 .85 8
  PIP 76 935.00 937.71 929.24 926.10 -24
+++ Tc =   8.7 min
+++ CA =    .2
+++ Link # 12,  Flow depth =    .24 ft, Critical depth =    .41 ft
  PNC 822 821 3 90 0
  STO 0.00 0.85 8
  PIP 33 937.71 935.35 926.10 925.82 -24
+++ Tc =   8.9 min
+++ CA =    .2
+++ Link # 13,  Flow depth =    .34 ft, Critical depth =    .41 ft
  PNC 821 82 3 180 0
  HOL 7
  NEW CBI 481,82,83,84,85,86,87,88,90,91,92,93
  STO 0.37 0.85 8
  PIP 107.0 949.11 948.81 945.00 944.43 -15
+++ Tc =   8.0 min
+++ CA =    .3
+++ Link # 14,  Flow depth =    .53 ft, Critical depth =    .54 ft
  PNC 93 92 3 180 0
  STO 0.17 0.85 8
  PIP 74.0 948.81 949.10 944.43 943.76 -18
+++ Tc =   8.5 min
+++ CA =    .5
+++ Link # 15,  Flow depth =    .51 ft, Critical depth =    .62 ft
  PNC 92 91 3 180 0
  STO 0.14 0.85 8
  PIP 65.0 949.10 949.25 943.76 943.12 -18
+++ Tc =   8.7 min
+++ CA =    .6
+++ Link # 16,  Flow depth =    .57 ft, Critical depth =    .69 ft
  PNC 91 90 3 180 0
  STO 0.15 0.85 8
  PIP 59.0 949.25 949.59 943.12 942.53 -18
+++ Tc =   8.9 min
+++ CA =    .7
+++ Link # 17,  Flow depth =    .61 ft, Critical depth =    .77 ft
```

```
  PNC 90 89 3 90 0
  REC 6
  STO 0.07 0.85 8
  PIP 88.0 949.59 948.45 942.53 941.65 -18
+++ Tc =   9.1 min
+++ CA =   1.1
+++ Link # 18,  Flow depth =    .78 ft, Critical depth =    .94 ft
  PNC 89 88 3 90 0
  REC 5
  STO 0.15 0.85 8
  PIP 28 948.45 947.82 941.65 941.37 -18
+++ Tc =   9.4 min
+++ CA =   1.3
+++ Link # 19,  Flow depth =    .87 ft, Critical depth =   1.04 ft
  PNC 88 87 3 90 0
  STO 0.09 0.85 8
  PIP 212.0 947.82 943.73 941.37 939.35 -18
+++ Tc =   9.4 min
+++ CA =   1.4
+++ Link # 20,  Flow depth =    .92 ft, Critical depth =   1.07 ft
  PNC 87 86 3 180 0
  REC 4
  STO 0.18 0.85 8
  PIP 183 943.73 941.38 939.35 936.46 -18
+++ Tc =  10.0 min
+++ CA =   2.1
+++ Link # 21,  Flow depth =   1.02 ft, Critical depth =   1.28 ft
  PNC 86 85 3 180 0
  REC 3
  STO 0.23 0.85 8
  PIP 195 941.38 939.74 936.46 934.82 -24
+++ Tc =  10.3 min
+++ CA =   2.5
+++ Link # 22,  Flow depth =   1.12 ft, Critical depth =   1.31 ft
  PNC 85 84 3 180 0
  REC 2
  STO 0.11 0.85 8
  PIP 171 939.74 938.31 934.82 933.39 -24
+++ Tc =  10.7 min
+++ CA =   2.8
+++ Link # 23,  Flow depth =   1.18 ft, Critical depth =   1.37 ft
  PNC 84 83 3 150 0
  REC 1
  STO 0.21 0.85 8
  PIP 103 938.31 935.35 933.39 925.82 -24
+++ Tc =  11.1 min
+++ CA =   3.1
+++ Link # 24,  Flow depth =    .68 ft, Critical depth =   1.43 ft
  PNC 83 82 3 125 0
  STO 0.00 0.85 8
  PIP 240.0 935.35 925.00 925.82 921.00 -24
+++ Tc =  11.2 min
+++ CA =   3.1
+++ Link # 25,  Flow depth =    .96 ft, Critical depth =   1.43 ft
  PNC 82 81 3 180 2
  TWE 922
  END
 END OF INPUT DATA.


  ***  DBI TYPE A NO 831                          Analysis of Existing Pipes

                  Invert        Depth Cover Velocity --Flow--      -Solutions-
  Link Length Diam  Up/Dn  Slope Up/Dn Up/Dn Act/Full Act/Full Load Remove Diam
       (ft)  (in)  (ft)  (ft/ft) (ft)  (ft)  (ft/s)   (cfs)   (%)  (cfs)  (in)
 ------------------------------------------------------------------------------

    1    46    15  935.32  .04196  4.1   2.8    6.2       .76    5
                   933.39          4.9   3.6   11.7     14.33

 ------------------------------------------------------------------------------
             Length =     46. ft  Total length =     46. ft
```

*** CBI NO 841 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	40	15	936.58	.04400	4.1	2.8	7.0	1.06	7		
			934.82		4.9	3.6	12.0	14.68			

Length = 40. ft Total length = 40. ft

*** CBI NO 851 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
3	37	15	938.29	.05000	4.1	2.8	7.2	1.01	6		
			936.44		4.9	3.6	12.8	15.65			

Length = 37. ft Total length = 37. ft

*** CBI NO 862,861 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
4	54	18	942.09	.02407	3.5	1.9	7.2	2.61	15		
			940.79		4.4	2.8	10.0	17.66			
5	38	18	940.79	.03790	4.4	2.8	9.1	3.45	16		
			939.35		4.4	2.8	12.5	22.15			

Length = 92. ft Total length = 92. ft

*** CBI NO 881 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
6	79	15	943.09	.01823	4.1	2.8	4.4	.65	7		
			941.65		6.8	5.4	7.7	9.45			

Length = 79. ft Total length = 79. ft

*** CBI NO 891,892 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
7	180	15	947.59	.00789	4.1	2.8	3.5	.86	14		
			946.17		4.4	3.0	5.1	6.22			

Length = 180. ft Total length = 180. ft

*** CBI NO 891,892 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
8	119	18	946.17	.03059	4.4	2.8	6.9	1.69	8		
			942.53		7.1	5.4	11.3	19.90			

Length = 299. ft Total length = 299. ft

*** CBI NO 821,822,823, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
9	80	24	933.50	.01725	5.0	2.8	2.6	.15	0		
			932.12		5.6	3.4	10.2	32.19			
10	32	24	932.12	.01719	5.6	3.4	4.5	.93	3		
			931.57		5.0	2.8	10.2	32.13			
11	33	24	931.57	.07061	5.0	2.8	8.4	1.41	2		
			929.24		5.8	3.6	20.7	65.12			
12	76	24	929.24	.04132	5.8	3.6	7.0	1.41	3		
			926.10		11.6	9.4	15.9	49.81			
13	33	24	926.10	.00848	11.6	9.4	4.0	1.39	6		
			925.82		9.5	7.4	7.2	22.57			

Length = 254. ft Total length = 254. ft

*** CBI 481,82,83,84,85 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
14	107	15	945.00	.00533	4.1	2.8	3.8	1.86	36		
			944.43		4.4	3.0	4.2	5.11			
15	74	18	944.43	.00905	4.4	2.8	5.1	2.66	25		
			943.76		5.3	3.7	6.1	10.83			
16	65	18	943.76	.00985	5.3	3.7	5.5	3.31	29		
			943.12		6.1	4.5	6.4	11.29			
17	59	18	943.12	.01000	6.1	4.5	5.9	4.00	35		
			942.53		7.1	5.4	6.4	11.38			
18	88	18	942.53	.01000	7.1	5.4	6.5	5.95	52		
			941.65		6.8	5.2	6.4	11.38			
19	28	18	941.65	.01000	6.8	5.2	6.8	7.20	63		
			941.37		6.5	4.8	6.4	11.38			
20	212	18	941.37	.00953	6.5	4.8	6.8	7.59	68		
			939.35		4.4	2.8	6.3	11.11			
21	183	18	939.35	.01579	4.4	2.8	9.0	11.35	79		
			936.46		4.9	3.3	8.1	14.30			
22	195	24	936.46	.00841	4.9	2.8	7.4	13.15	58		
			934.82		4.9	2.8	7.2	22.48			

23	171	24	934.82	.00836	4.9	2.8	7.6	14.38	64
			933.39		4.9	2.8	7.1	22.41	
24	103	24	933.39	.07350	4.9	2.8	17.3	15.77	24
			925.82		9.5	7.4	21.1	66.44	
25	240	24	925.82	.02008	9.5	7.4	10.8	15.72	45
			921.00		4.0	1.8	11.1	34.73	

Length = 1525. ft Total length = 2118. ft

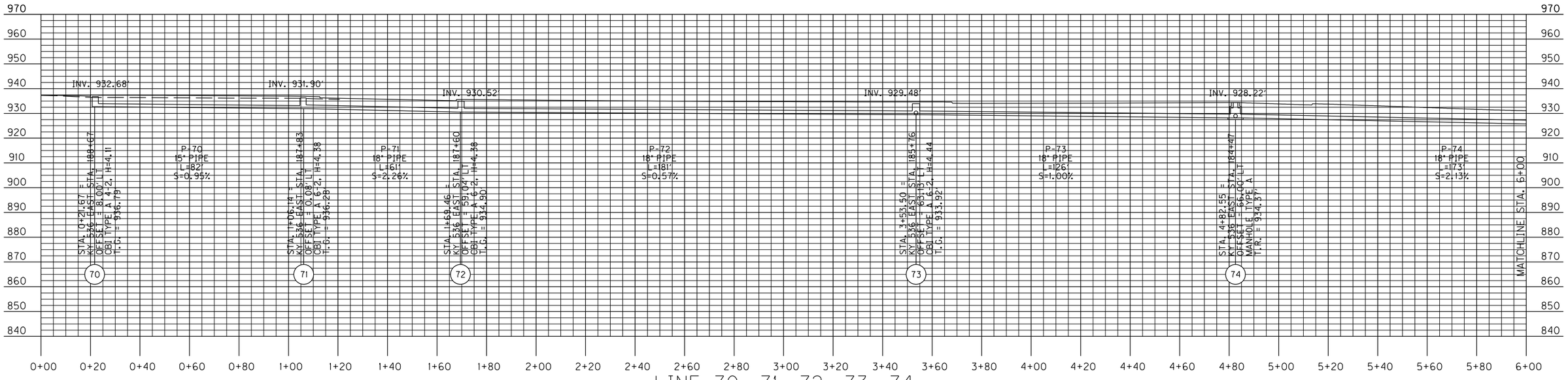
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	83	933.73	934.64	N	938.31	Y	6.03	1.13
2	84	935.22	936.07	N	939.74	Y	2.10	1.10
3	85	936.84	937.69	N	941.38	Y	2.01	1.11
4	861	941.40	942.29	N	945.17	Y	1.99	.50
5	86	940.06	940.85	N	943.73	Y	2.39	1.40
6	88	941.97	942.90	N	948.45	Y	1.76	1.27
7	891	946.53	947.42	N	950.55	Y	1.12	.72
8	89	943.02	944.03	N	949.59	Y	1.47	.76
9	824	932.25	934.12	N	937.71	Y	.56	.89
10	823	931.90	933.57	N	936.55	Y	.22	.00
11	822	929.65	931.24	N	935.00	Y	.24	.00
12	821	926.51	928.10	N	937.71	Y	.34	.00
13	82	926.23	927.82	N	935.35	Y	2.87	1.01
14	92	944.97	945.68	N	948.81	Y	.93	.40
15	91	944.38	945.26	N	949.10	Y	1.09	.28
16	90	943.81	944.62	N	949.25	Y	1.20	.27
17	89	943.30	944.03	N	949.59	Y	1.47	1.59
18	88	942.59	943.15	N	948.45	Y	1.76	1.98
19	87	942.41	942.87	N	947.82	Y	1.73	2.11
20	86	940.42	940.85	N	943.73	Y	2.39	.46
21	85	937.74	937.96	N	941.38	Y	2.01	.21
22	84	936.13	936.82	N	939.74	Y	2.10	.12
23	83	934.76	935.39	N	938.31	Y	6.03	.63
24	82	927.25	927.82	N	935.35	Y	2.87	1.82
25	81	922.00	923.00	N	925.00	Y	1.00	.00

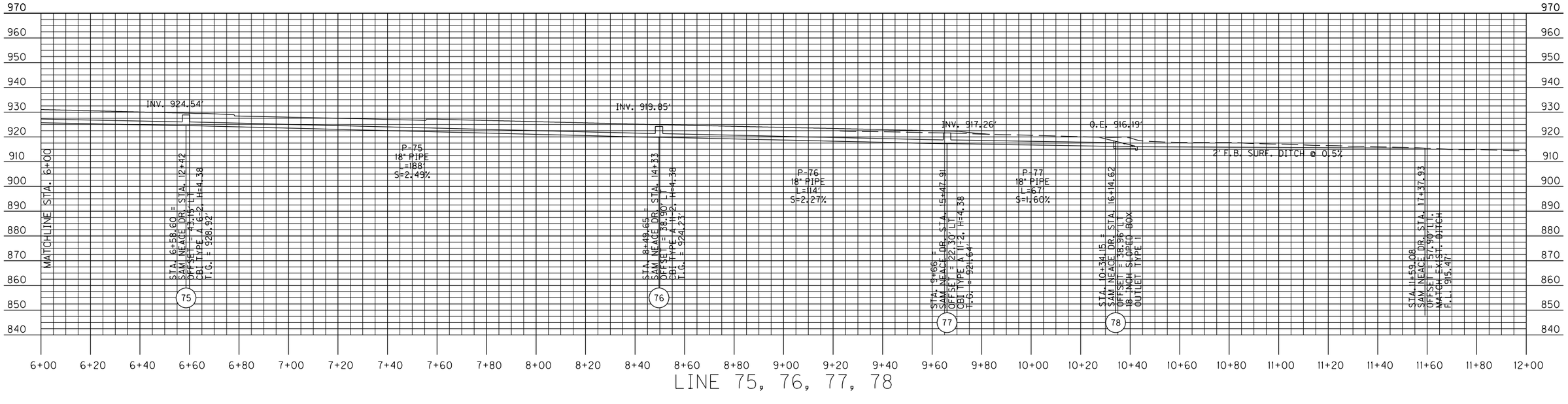
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	831	936.41	939.43	1.50
2	841	937.94	940.69	1.50
3	851	939.71	942.40	1.50
4	862	943.69	945.59	1.50
6	881	943.77	947.20	1.50
7	892	948.21	951.70	1.50
9	825	933.76	938.50	1.50
14	93	945.87	949.11	1.50

NORMAL END OF HYDRA

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



LINE 70, 71, 72, 73, 74



LINE 75, 76, 77, 78

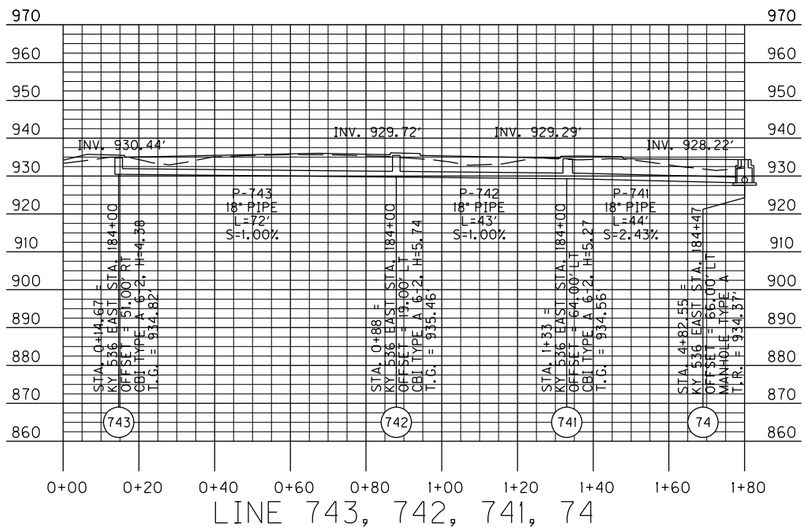
0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

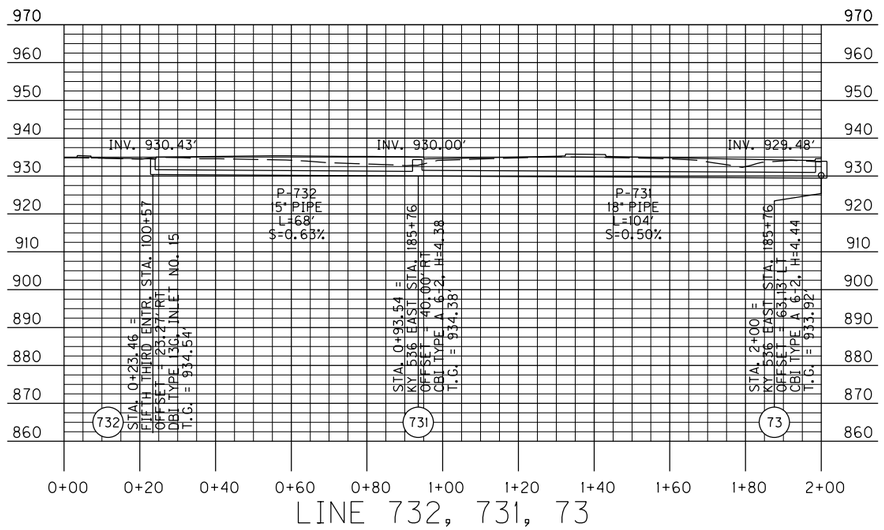
STORM SEWER PROFILES
SHEET 7 OF 16

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_07.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

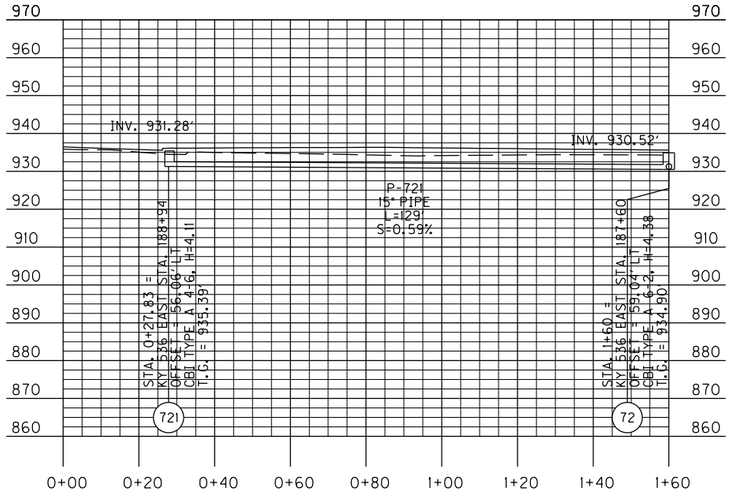
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



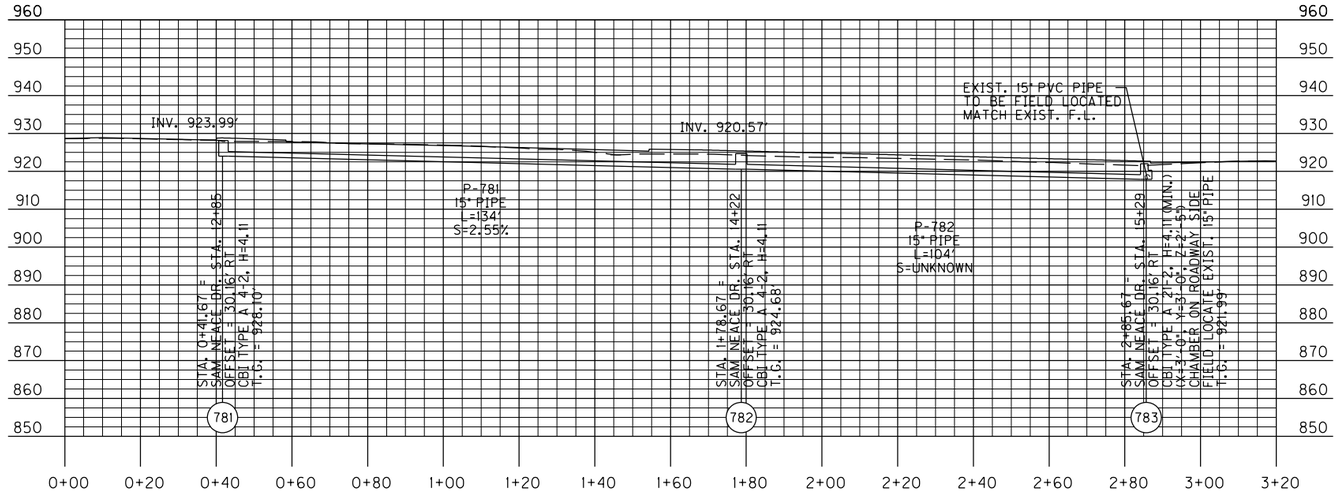
LINE 743, 742, 741, 74



LINE 732, 731, 73



LINE 721, 72



LINE 781, 782, 783

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 8 OF 16

MicroStation v8.11.7.443 E-SHEET NAME: USER: dhawkins DATE PLOTTED: September 16, 2015 FILE NAME: V:\1785\ACTIVE\1785600012\ROADWAY\PLAN SHEETS\PIPE_PROFILES_08.DGN

STORM SEWER SYSTEM

@ STATION

205+82 TO 212+63 KY 536

KY 536

Kentucky Transportation Cabinet Division of Highway Design 04-13	**RATIONAL FLOW ANALYSIS and DESIGN**	TC 61-507C page 1 of 1	v16b	Output Columns: 5 (0, 2, 5,14)

County:	BOONE	Road Name:	KY536
Federal Proj. No.:		Route No.:	
State Proj. No.:		Item No.:	6-14.00
Intensity Region:	NOAA	Station No.:	KY536 STA. 210+09.50 LT.
Comments:	Any comment		

Overland Sheet Flow			Geographic Site Location				Shallow Concentrated Flow				
Lo	no	So	latitude:	38.9560	longitude:	-84.627	k	Sc	Ls	Vs	tsc
75	0.15	0.02	Locate Site:	No	CAMPBELL CO					0	0.0

Channel Flow Segments							Q10 Storm Results						Comments
LSS	W	RSS	L	Sl	Ar	C	dn	n	R	Shear	Q	Liner	
4	2.0	3	123	0.020	0.4	0.35	0.28	0.081	0.20	0.34	0.74	Veg.Class C	

	0.4	0.35

IDF Variables*

RI	a	b	m
2	22.15	2.487	0.7058
5	23.84	2.03	0.6787
10	26.41	2.479	0.6519
25	25.47	1.605	0.6139
50	25.9	1.523	0.5808
100	25.22	1.061	0.5511

* I = a / (tc + b) ^ m

Watershed Results							Segment Summary				
RI	tov	tsc	tch	tc	I	Q	dn	n	V	R	n Class
2	7.1	0.0	2.7	9.7	3.79	0.5	0.23	0.085	0.77	0.176	SCS
5	6.5	0.0	2.4	8.9	4.70	0.6	0.26	0.083	0.84	0.191	SCS
10	6.1	0.0	2.3	8.4	5.58	0.7	0.28	0.081	0.90	0.204	SCS
25	5.8	0.0	2.2	8.0	6.35	0.8	0.29	0.079	0.95	0.214	SCS
50	5.5	0.0	2.1	8.0	7.00	0.9	0.31	0.078	0.99	0.222	SCS
100	5.3	0.0	2.0	8.0	7.48	1.0	0.31	0.077	1.01	0.227	SCS
500						1.2					

	DESIGN STORM						
tc	**2**	**5**	**10**	**25**	**50**	**100**	**IDF**
5	5.35	6.34	7.11	7.99	8.72	9.34	**FHWA**
	5.47	6.43	7.16	8.06	8.74	9.35	**NOAA**
	-0.12	-0.09	-0.05	-0.07	-0.02	-0.01	**Diff**
10	3.73	4.41	5.09	5.66	6.26	6.71	**FHWA**
	3.59	4.28	5.00	5.53	6.17	6.62	**NOAA**
	0.14	0.13	0.09	0.13	0.09	0.09	**Diff**
15	2.94	3.48	4.09	4.54	5.08	5.46	**FHWA**
	2.94	3.48	4.09	4.54	5.08	5.46	**NOAA**
	0.00	0.00	0.00	0.00	0.00	0.00	**Diff**
30	1.90	2.27	2.73	3.06	3.49	3.80	**FHWA**
	1.94	2.33	2.80	3.15	3.59	3.91	**NOAA**
	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	**Diff**
60	1.20	1.45	1.78	2.03	2.37	2.62	**FHWA**
	1.19	1.43	1.76	2.00	2.33	2.57	**NOAA**
	0.01	0.02	0.02	0.03	0.04	0.05	**Diff**

Drop Box Inlet

DBI_116 STA. 210+09.50 KY536

No.	Drop Box Inlet Types		Q10	Q25	Q100		
			0.7	0.8	1.0		
1	Type 1						
2	Type 2		Inlet No.		1		
3	Type 3		DBI Type		Type 1		
4	Type 4						
5	Type 5		Grate Elev.		951.11		
6	Type 6						
7	Type 7						
8	Type 10		Clogging		50%		
9	Type 11						
10	Type 11	(w/curb)					
11	Type 13S	(vane grate)					
12	Type 13S	(45° grate)					
13	Type 14						
14	Type 15						
			Length (ft)	No. of Grates			
15	Type 12	(w/curb)	0	0			
16	Type 12	(w/o curb)	0	0			
		Width (ft)	Length (ft)	Longit. Bar Width (in)	No. of Bars	Trans. Bar Width (in)	No. of Bars
17	Non-Standard	0	0	0	0	0	0

Calculated:

Net Area	3.737	sq ft	
Net Perimeter	5.563	sq ft	

	Q10	Q25	Q100
Area Control	0.001	0.002	0.002
Perimeter Control	0.121	0.132	0.153
Controling HW	951.23	951.24	951.26

DCD STA. 206+88

10 YEAR FREQUENCY

```
+++ Commands Read From File 2068810.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  NEW CBI TYPE A NO 122
  STO 0.14 0.85 8
  PIP 155.0 954.75 955.60 950.64 938.52 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  1,  Flow depth =    .16 ft, Critical depth =    .33 ft
  PNC 122 112 3 90 0
  HOL 1
  NEW CBI NO 121,120
  STO 0.08 0.85 8
  PIP 93 954.53 955.01 950.42 949.49 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  2,  Flow depth =    .21 ft, Critical depth =    .25 ft
  PNC 121 120 3 180 0
  STO 0.06 0.85 8
  PIP 43 955.01 955.42 949.49 942.70 -18
+++ Tc =   8.5 min
+++ CA =    .1
+++ Link #  3,  Flow depth =    .14 ft, Critical depth =    .31 ft
  PNC 120 113 3 90 0
  HOL 2
  NEW CBI NO 116
  STO 0.32 0.30 8
  PIP 10 953.00 953.85 947.11 945.16 -18
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  4,  Flow depth =    .12 ft, Critical depth =    .28 ft
  PNC 116 114 3 90 0
  HOL 3
  NEW INLET NO 110
  STO 1.82 0.85 8
  PIP 48 945.00 953.96 942.49 936.96 -18
+++ Tc =   8.0 min
+++ CA =   1.5
+++ Link #  5,  Flow depth =    .51 ft, Critical depth =   1.17 ft
  PNC 110 103 3 138 0
  HOL 4
  NEW INLET NO 111
  STO 4.21 0.30 8
  PIP 63 948.00 956.45 946.86 943.76 -18
```

```
+++ Tc =   8.0 min
+++ CA =   1.3
+++ Link #  6,  Flow depth =    .57 ft, Critical depth =   1.06 ft
  PNC 111 105 3 160 0
  HOL 5
  NEW CBI NO 124
  STO 0.48 .85 8
  PIP 116 950.93 952.85 946.82 936.96 -15
+++ Tc =   8.0 min
+++ CA =    .4
+++ Link #  7,  Flow depth =    .30 ft, Critical depth =    .62 ft
  PNC 124 103 3 90 0
  HOL 6
  NEW CBI NO 125
  STO 0.12 .85 8
  PIP 110 952.549 953.06 948.38 947.27 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  8,  Flow depth =    .25 ft, Critical depth =    .30 ft
  PNC 125 102 3 90 0
  HOL 7
  NEW CBI NO 112,113,114,115,117,118
  STO 0.60 0.35 8
  PIP 30 954.00 947.06 951.92 951.62 -18
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  9,  Flow depth =    .35 ft, Critical depth =    .42 ft
  PNC 118 117 3 90 0
  STO 0.42 .85 8
  PIP 180 957.06 954.19 951.62 949.81 -18
+++ Tc =   8.1 min
+++ CA =    .6
+++ Link # 10,  Flow depth =    .57 ft, Critical depth =    .70 ft
  PNC 117 115  0 180 0
  STO 0.38 0.85 8
  PIP 71 954.19 953.85 949.81 945.16 -18
+++ Tc =   8.7 min
+++ CA =    .9
+++ Link # 11,  Flow depth =    .43 ft, Critical depth =    .87 ft
  PNC 115 114 3 180 0
  REC 3
  STO 0.00 0.85 8
  PIP 44 953.85 955.42 945.16 942.70 -18
+++ Tc =   8.7 min
+++ CA =   1.0
+++ Link # 12,  Flow depth =    .48 ft, Critical depth =    .91 ft
  PNC 114 113 3 180 0
  FLO 10.23
  REC 2
  STO 0.07 0.85 8
  PIP 77 955.42 955.60 942.70 938.52 -18
+++ Tc =   8.8 min
+++ CA =   1.2
+++ Link # 13,  Flow depth =    .87 ft, Critical depth =   1.44 ft
  PNC 113 112 3 180 0
  REC 1
  STO 0.02 0.85 8
  PIP 220 955.60 947.81 938.52 926.85 -18
+++ Tc =   8.9 min
+++ CA =   1.3
+++ Link # 14,  Flow depth =    .92 ft, Critical depth =   1.45 ft
  PNC 112 100 3 180 0
  HOL 8
  NEW CBI NO 100,101,102,103,104,105,106,107,108,109
  STO 0.23 0.85 8
  PIP 132.0 956.98 954.66 952.87 950.28 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link # 15,  Flow depth =    .30 ft, Critical depth =    .42 ft
  PNC 109 108 3 180 0
  STO 0.26 .85 8
  PIP 161.0 954.66 956.65 950.28 948.68 -18
+++ Tc =   8.4 min
+++ CA =    .4
+++ Link # 16,  Flow depth =    .48 ft, Critical depth =    .59 ft
```

```
  PNC 108 106 3 180 0
  STO 0.00 .85 8
  PIP 54.00 956.65 956.45 948.68 943.73 -18
+++ Tc =   8.9 min
+++ CA =    .4
+++ Link # 17,  Flow depth =    .27 ft, Critical depth =    .58 ft
  PNC 106 105 3 160 0
  REC 5
  STO 0.10 0.85 8
  PIP 83.0 956.45 955.87 943.73 941.07 -24
+++ Tc =   9.0 min
+++ CA =   1.8
+++ Link # 18,  Flow depth =    .66 ft, Critical depth =   1.13 ft
  PNC 105 104 3 180 0
  STO 0.15 0.85 8
  PIP 118.0 955.87 952.85 941.07 936.96 -24
+++ Tc =   9.1 min
+++ CA =   1.9
+++ Link # 19,  Flow depth =    .66 ft, Critical depth =   1.17 ft
  PNC 104 103 3 180 0
  REC 4
  REC 6
  STO 0.001 0.85 8
  PIP 63.00 952.85 953.06 936.96 933.00 -30
+++ Tc =   9.3 min
+++ CA =   3.8
+++ Link # 20,  Flow depth =    .75 ft, Critical depth =   1.57 ft
  PNC 103 102 3 180 0
  REC 7
  STO 0.29 0.85 8
  PIP 60.0 953.06 949.60 933.00 929.33 -30
+++ Tc =   9.4 min
+++ CA =   4.2
+++ Link # 21,  Flow depth =    .80 ft, Critical depth =   1.64 ft
  PNC 102 101 3 180 0
  STO 0.00 0.85 8
  PIP 26.0 949.60 947.81 929.33 926.85 -30
+++ Tc =   9.4 min
+++ CA =   4.2
+++ Link # 22,  Flow depth =    .70 ft, Critical depth =   1.64 ft
  PNC 101 100 3 180 0
  REC 8
  STO 0.00 0.85 8
  PIP 343 947.81 927.43 926.85 916.47 -30
+++ Tc =   9.4 min
+++ CA =   5.5
+++ Link # 23,  Flow depth =   1.30 ft, Critical depth =   2.14 ft
  PNC 100 99 0 180 2
  TWE 918.00
  END
 END OF INPUT DATA.


  ***  CBI TYPE A NO 122                          Analysis of Existing Pipes

                   Invert        Depth Cover Velocity --Flow--      -Solutions-
  Link Length Diam  Up/Dn  Slope Up/Dn Up/Dn Act/Full Act/Full Load Remove Diam
        (ft)  (in)  (ft)  (ft/ft) (ft)  (ft)  (ft/s)   (cfs)   (%)  (cfs)  (in)
 ------------------------------------------------------------------------------

    1   155    15  950.64  .07819  4.1   2.8    7.5       .71    4
                   938.52         17.1  15.7   15.9     19.57

 ------------------------------------------------------------------------------
              Length =    155. ft  Total length =    155. ft


  ***  CBI NO 121,120                             Analysis of Existing Pipes

                   Invert        Depth Cover Velocity --Flow--      -Solutions-
  Link Length Diam  Up/Dn  Slope Up/Dn Up/Dn Act/Full Act/Full Load Remove Diam
        (ft)  (in)  (ft)  (ft/ft) (ft)  (ft)  (ft/s)   (cfs)   (%)  (cfs)  (in)
 ------------------------------------------------------------------------------
```

2	93	15	950.42	.01000	4.1	2.8	3.1	.40	6	
			949.49		5.5	4.2	5.7	7.00		
3	43	18	949.49	.15791	5.5	3.9	9.3	.69	2	
			942.70		12.7	11.1	25.6	45.22		

Length = 136. ft Total length = 136. ft

*** CBI NO 116 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
4	10	18	947.11	.19500	5.9	4.3	9.5	.57	1		
			945.16		8.7	7.1	28.4	50.25			

Length = 10. ft Total length = 10. ft

Length = 10. ft Total length = 10. ft

*** INLET NO 110 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
5	48	18	942.49	.11521	2.5	.9	17.9	9.17	24		
			936.96		17.0	15.4	21.9	38.63			

Length = 48. ft Total length = 48. ft

*** INLET NO 111 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
6	63	18	946.86	.04921	1.1	-.5	12.4	7.49	30		
			943.76		12.7	11.1	14.3	25.24			

Length = 63. ft Total length = 63. ft

*** CBI NO 124 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
7	116	15	946.82	.08500	4.1	2.8	11.1	2.42	12		
			936.96		15.9	14.5	16.6	20.40			

Length = 116. ft Total length = 116. ft

*** CBI NO 125 Analysis of Existing Pipes

Link	Length	Diam	Invert Up/Dn	Slope	Depth Cover Up/Dn	Up/Dn	Velocity Act/Full	--Flow-- Act/Full	Load	-Solutions- Remove	Diam

	(ft)	(in)	(ft)	(ft/ft)	(ft)	(ft)	(ft/s)	(cfs)	(%)	(cfs)	(in)
8	110	15	948.38	.01009	4.2	2.8	3.5	.60	9		
			947.27		5.8	4.4	5.7	7.03			

Length = 110. ft Total length = 110. ft

*** CBI NO 112,113,114, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
9	30	18	951.92	.01000	2.1	.5	4.2	1.24	11		
			951.62		-4.6	-6.2	6.4	11.38			
10	180	18	951.62	.01006	5.4	3.8	5.6	3.34	29		
			949.81		4.4	2.8	6.5	11.41			
11	71	18	949.81	.06549	4.4	2.8	12.4	5.11	18		
			945.16		8.7	7.1	16.5	29.12			
12	44	18	945.16	.05591	8.7	7.1	12.0	5.63	21		
			942.70		12.7	11.1	15.2	26.91			
13	77	18	942.70	.05429	12.7	11.1	15.9	16.86	64		
			938.52		17.1	15.5	15.0	26.51			
14	220	18	938.52	.05305	17.1	15.5	15.9	17.60	67		
			926.85		21.0	19.3	14.8	26.21			

Length = 622. ft Total length = 923. ft

*** CBI NO 100,101,102, Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
15	132	15	952.87	.01962	4.1	2.8	5.4	1.16	12		
			950.28		4.4	3.0	8.0	9.80			
16	161	18	950.28	.00994	4.4	2.8	5.1	2.42	21		
			948.68		8.0	6.3	6.4	11.34			
17	54	18	948.68	.09167	8.0	6.3	11.1	2.36	7		
			943.73		12.7	11.1	19.5	34.45			
18	83	24	943.73	.03205	12.7	10.6	11.3	9.94	23		
			941.07		14.8	12.6	14.0	43.87			
19	118	24	941.07	.03483	14.8	12.6	11.8	10.59	23		
			936.96		15.9	13.7	14.6	45.74			
20	63	30	936.96	.06286	15.9	13.2	17.5	21.35	19		
			933.00		20.1	17.4	22.7	111.41			
21	60	30	933.00	.06117	20.1	17.4	17.7	23.22	21		
			929.33		20.3	17.6	22.4	109.90			
22	26	30	929.33	.09539	20.3	17.6	20.8	23.15	17		
			926.85		21.0	18.3	28.0	137.24			
23	343	30	926.85	.03026	21.0	18.3	15.9	40.52	52		
			916.47		11.0	8.3	15.7	77.30			

Length = 1040. ft Total length = 2300. ft

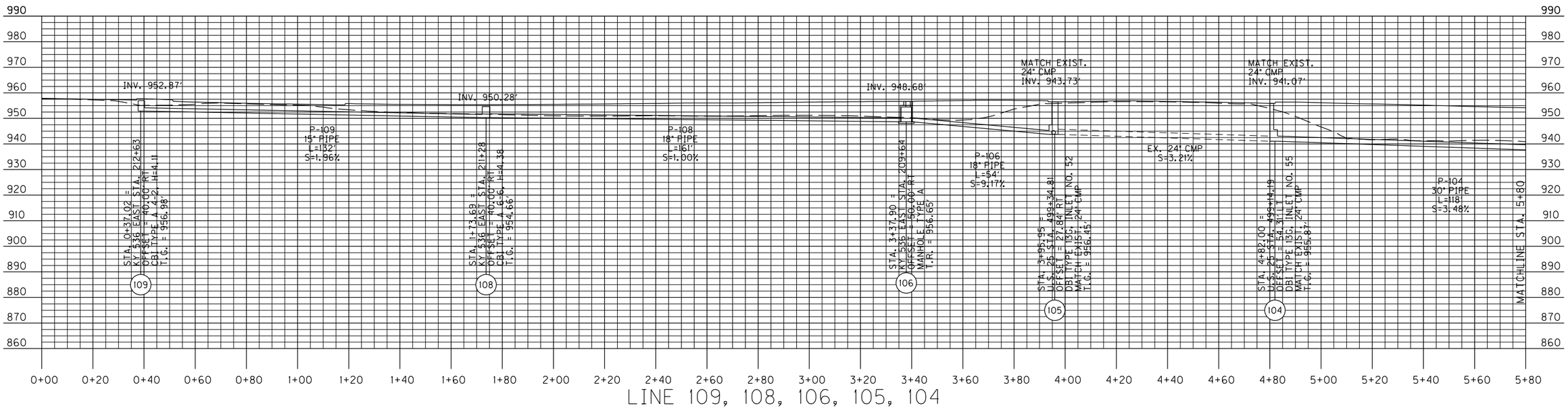
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	112	938.85	939.77	N	955.60	Y	5.55	1.19
2	120	949.74	950.74	N	955.01	Y	1.81	.93
3	113	943.01	944.20	N	955.42	Y	5.52	1.20
4	114	945.44	946.66	N	953.85	Y	3.03	1.19
5	103	938.13	938.46	N	952.85	Y	6.01	.90
6	105	944.82	945.26	N	956.45	Y	2.75	.41
7	103	937.58	938.21	N	952.85	Y	6.01	1.15
8	102	947.57	948.52	N	953.06	Y	8.95	.67
9	117	952.04	953.12	N	957.06	Y	1.08	1.26
10	115	950.51	951.31	N	954.19	Y	3.50	.83
11	114	946.03	946.66	N	953.85	Y	3.03	.22
12	113	943.61	944.20	N	955.42	Y	5.52	.87
13	112	939.96	940.02	N	955.60	Y	5.55	.23
14	100	928.30	928.35	N	947.81	Y	5.62	.66
15	108	950.70	951.53	N	954.66	Y	.92	.60
16	106	949.27	950.18	N	956.65	Y	2.38	.37
17	105	944.31	945.23	N	956.45	Y	2.75	.85
18	104	942.20	943.07	N	955.87	Y	3.34	.29
19	103	938.13	938.96	N	952.85	Y	6.01	.66
20	102	934.57	935.50	N	953.06	Y	8.95	.75
21	101	930.97	931.83	N	949.60	Y	8.22	.14
22	100	928.49	929.35	N	947.81	Y	5.62	.58
23	99	918.00	918.97	N	927.43	Y	1.53	.00

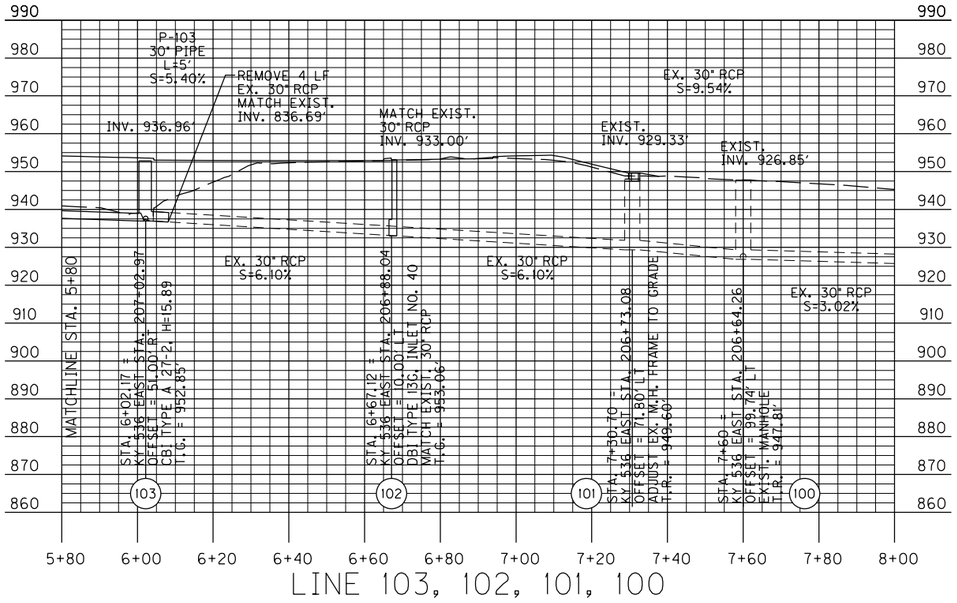
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	122	952.13	954.75	1.50
2	121	950.86	954.53	1.50
4	116	949.33	953.00	1.50
5	110	950.47	945.00	1.50
6	111	951.04	948.00	1.50
7	124	950.01	950.93	1.50
8	125	948.91	952.55	1.50
9	118	952.73	954.00	1.50
15	109	953.84	956.98	1.50

NORMAL END OF HYDRA

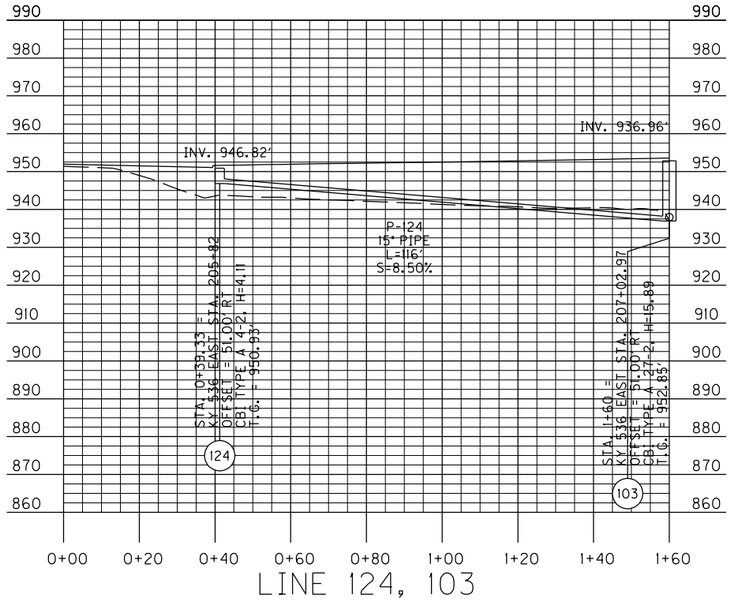
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



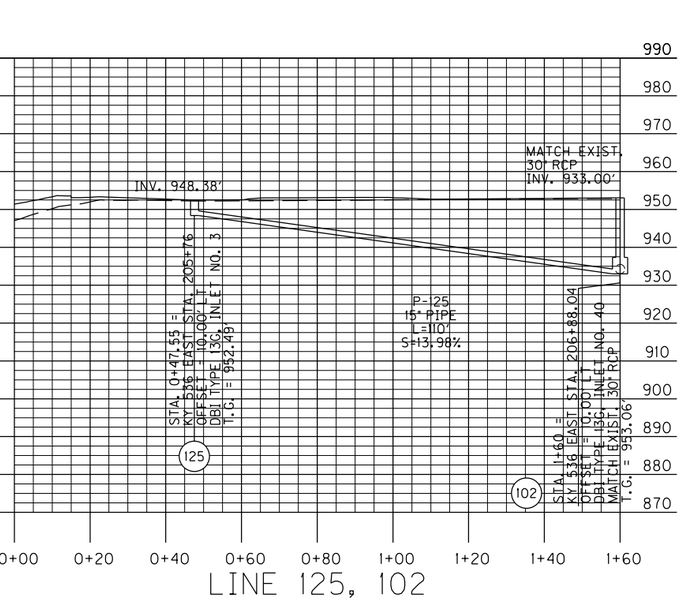
LINE 109, 108, 106, 105, 104



LINE 103, 102, 101, 100



LINE 124, 103



LINE 125, 102

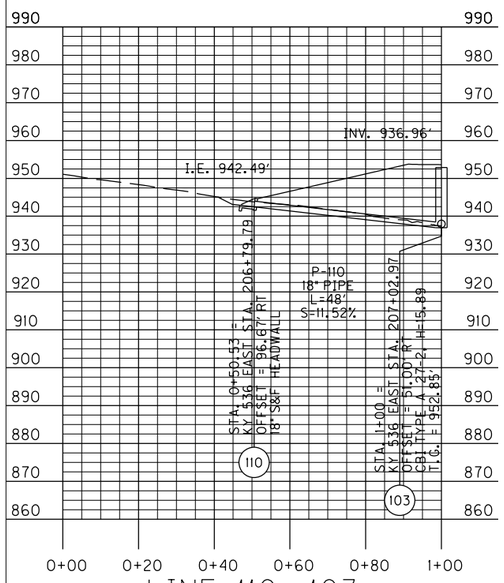
0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

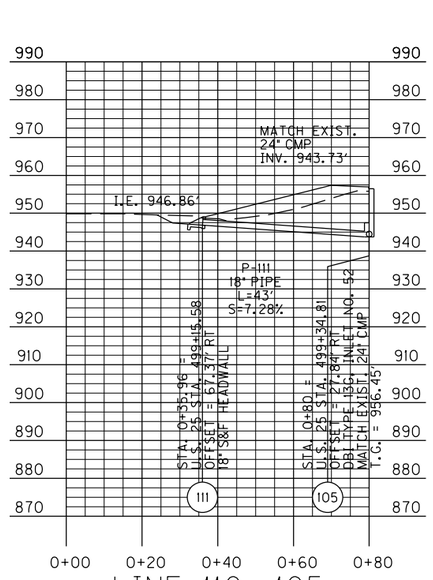
STORM SEWER PROFILES
SHEET 12 OF 16

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_12.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

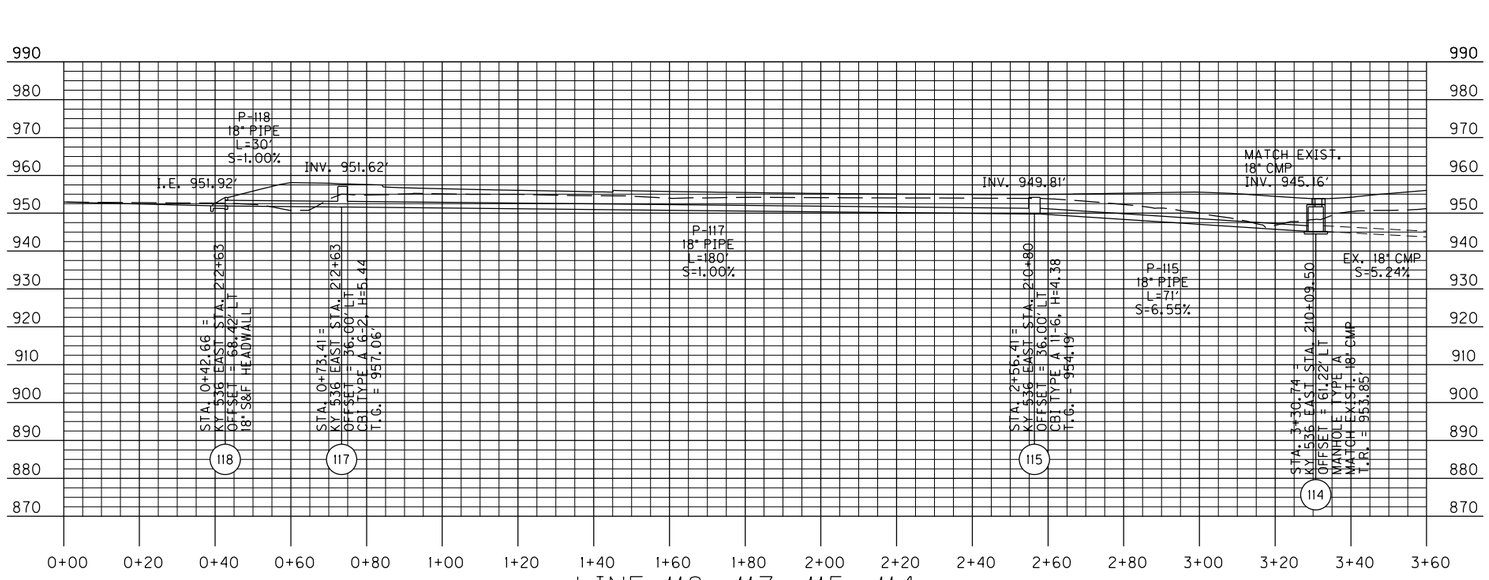
COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



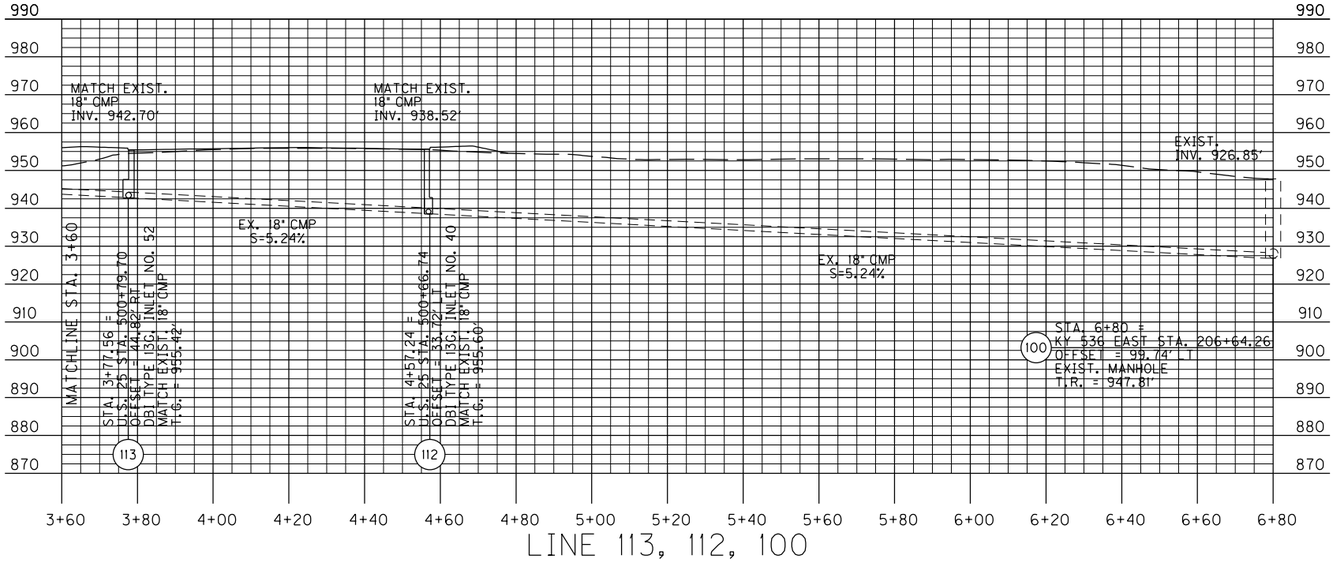
LINE 110, 103



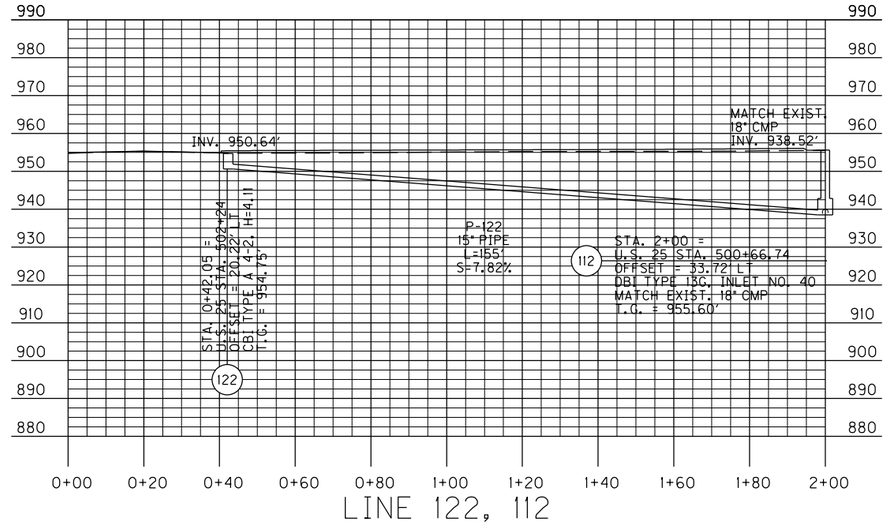
LINE 110, 105



LINE 118, 117, 115, 114



LINE 113, 112, 100



LINE 122, 112

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 13 OF 16

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_13.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

STORM SEWER SYSTEM

@ STATION

20+83.61 TO 22+99.00 BILTMORE DR.

KY 536

DCD STATION 22+99 BILTMORE BOULEVARD

10 YEAR FREQUENCY

```
+++ Commands Read From File 2300_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

Duration, t (min)

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW INLET NO 133
  STO 0.33 0.45 8
  PIP 42 934.00 928.61 930.98 928.61 -18
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  1,  Flow depth =    .20 ft, Critical depth =    .35 ft
  PNC 133 134 3 90 0
  HOL 1
  NEW CBI TYPE A NO 131,132,134,135
  STO 2.23 0.35 8
  PIP 45 932.00 934.67 930.16 929.71 -15
+++ Tc =   8.0 min
+++ CA =    .8
+++ Link #  2,  Flow depth =    .75 ft, Critical depth =    .87 ft
  PNC 130 131 0 105 0
  STO 0.04 0.85 8
  PIP 28 934.67 934.67 929.71 929.43 -18
+++ Tc =   8.1 min
+++ CA =    .8
+++ Link #  3,  Flow depth =    .69 ft, Critical depth =    .84 ft
  PNC 131 132 3 90 0
  STO 0.04 0.85 8
  PIP 82 934.67 933.32 929.43 928.61 -18
+++ Tc =   8.2 min
+++ CA =    .8
+++ Link #  4,  Flow depth =    .70 ft, Critical depth =    .86 ft
  PNC 132 134 3 180 0
  REC 1
```

```
  STO 0.03 0.85 8
  PIP 82 933.32 932.03 928.61 927.65 -18
+++ Tc =   8.4 min
+++ CA =   1.0
+++ Link #  5,  Flow depth =    .75 ft, Critical depth =    .94 ft
  PNC 134 135 3 90 0
  STO 0.04 0.85 8
  PIP 40 932.03 927.00 927.65 925.01 -18
+++ Tc =   8.6 min
+++ CA =   1.1
+++ Link #  6,  Flow depth =    .46 ft, Critical depth =    .95 ft
  PNC 135 136 0 180 2
  TWE 925.50
  END
 END OF INPUT DATA.
```

*** INLET NO 133 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
1	42	18	930.98	.05643	3.0	1.4	7.0	.88	3		
			928.61		.0	-1.6	15.3	27.03			
	Length =	42. ft	Total length =	42. ft							

*** CBI TYPE A NO 131,1 — Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Cover Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	45	15	930.16	.01000	1.8	.5	6.1	4.63	66		
			929.71		5.0	3.6	5.7	7.00			
3	28	18	929.71	.01000	5.0	3.3	6.2	4.80	42		
			929.43		5.2	3.6	6.4	11.38			
4	82	18	929.43	.01000	5.2	3.6	6.2	4.98	44		
			928.61		4.7	3.1	6.4	11.38			
5	82	18	928.61	.01171	4.7	3.1	6.9	5.94	48		
			927.65		4.4	2.8	7.0	12.31			
6	40	18	927.65	.06600	4.4	2.8	13.0	6.07	21		
			925.01		2.0	.4	16.5	29.23			
	Length =	277. ft	Total length =	319. ft							

Hydraulic Gradeline Computations

Link	Down-stream	Hydraulic Gradeline	Crown	Possible	Ground	Super-	Manhole Loss

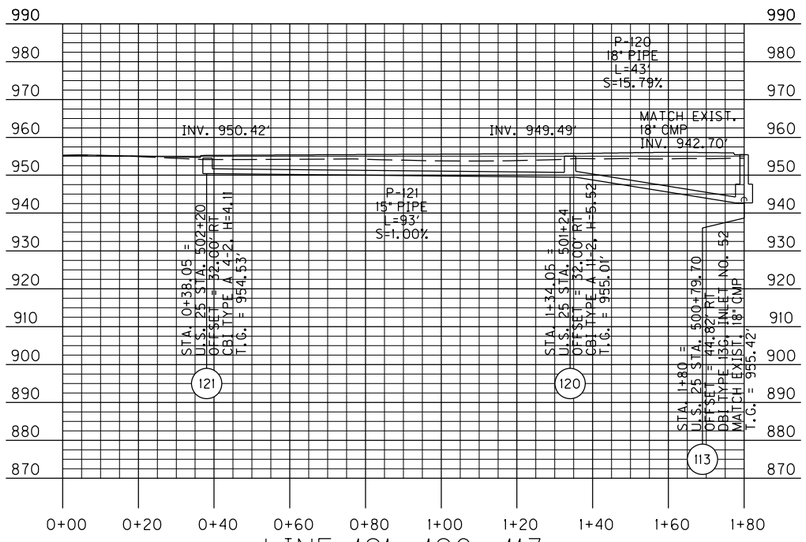
#	Node #	Elevation	Elev.	Surcharge	Elev.	crit.?	Depth	Coef
1	134	928.96	930.11	N	933.32	Y	1.52	1.20
2	131	930.58	930.96	N	934.67	Y	1.36	1.50
3	132	930.27	930.93	N	934.67	Y	1.36	2.03
4	134	929.47	930.11	N	933.32	Y	1.52	.21
5	135	928.59	929.15	N	932.03	Y	4.11	1.65
6	136	925.50	926.51	N	927.00	Y	.49	.00

Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	133	932.33	934.00	1.50
2	130	931.78	932.00	1.50

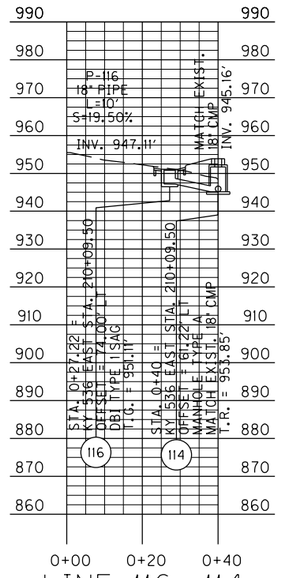
NORMAL END OF HYDRA

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?

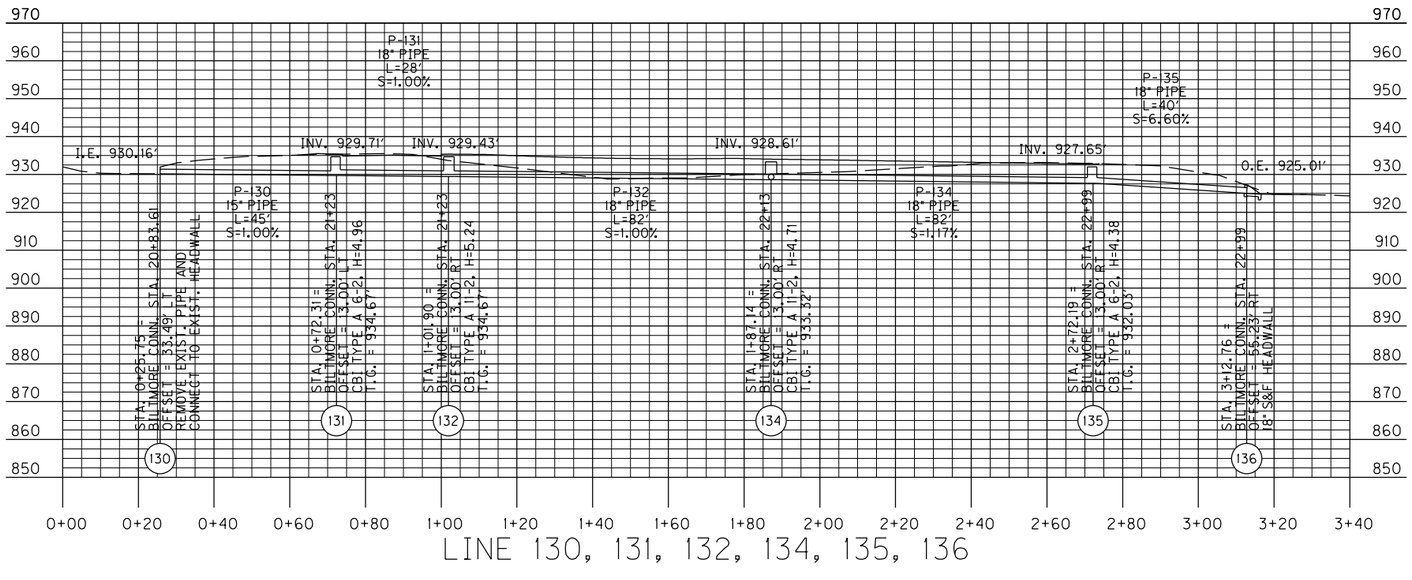
FLOOD DATA			
	STORM (YR)	RUNOFF (cfs)	HW ELEV (FT)
DESIGN	25	0.80	951.23
CHECK	100	1.0	951.26



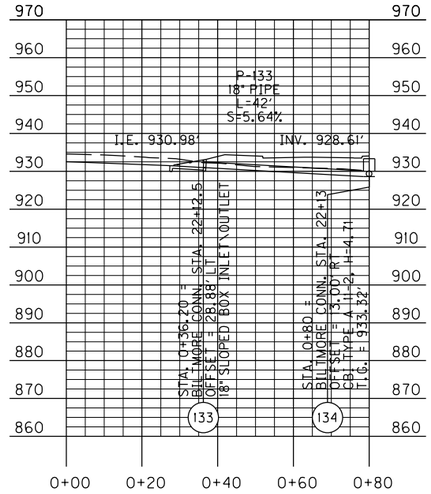
LINE 121, 120, 113



LINE 116, 114



LINE 130, 131, 132, 134, 135, 136



LINE 133,134

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 14 OF 16

FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_14.DGN
USER: dhawkins
DATE PLOTTED: September 16, 2015
E-SHEET NAME:
MicroStation v8.11.7.443

STORM SEWER SYSTEM

@ STATION

49+53.00 TO 50+55.50 KY BILTMORE DR.

KY 536

DCD STATION 50+64 BILTMORE DRIVE

10 YEAR FREQUENCY

```
+++ Commands Read From File 5064_10.hda
  JOB
  SWI 2
  PDA 0.012 15 3 3 2 0.005
  HGL 1
  REM RAI 10
  RAI 5 6.791 10 5.350 15.0 4.474 30.0 3.082 60.0 1.951 120 1.135 240.0 .607
```

PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	6.79	60.	1.95	0.	.00	0.	.00	0.	.00
10.	5.35	120.	1.13	0.	.00	0.	.00	0.	.00
15.	4.47	240.	.61	0.	.00	0.	.00	0.	.00
30.	3.08	0.	.00	0.	.00	0.	.00	0.	.00

```
  REM RAI 25
  REM RAI 25 5 7.757 10.0 6.205 15.0 5.227 30.0 3.635 60.0 2.314 120.0 1.348
  REM RAI 100
  REM RAI 5 9.160 10.0 7.438 15.0 6.306 30.0 4.417 60.0 2.819 120.0 1.639
  NEW CBI TYPE A NO 153
  STO 0.18 0.85 8
  PIP 128 927.62 927.18 923.51 922.87 -15
+++ Tc =   8.0 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .38 ft, Critical depth =    .37 ft
  PNC 153 155 3 127 0
  HOL 1
  NEW CBI TYPE A NO 151,152,154,155
  STO 0.16 0.85 8
  PIP 55 928.45 928.08 924.34 923.97 -15
+++ Tc =   8.0 min
+++ CA =    .1
+++ Link #  2,  Flow depth =    .33 ft, Critical depth =    .35 ft
  PNC 151 152 0 152 0
  STO 0.29 0.85 8
  PIP 36 928.08 927.57 923.97 923.46 -15
+++ Tc =   8.3 min
+++ CA =    .4
+++ Link #  3,  Flow depth =    .45 ft, Critical depth =    .60 ft
  PNC 152 154 3 148 0
  STO 0.15 0.85 8
  PIP 27 927.57 927.18 923.46 922.87 -15
+++ Tc =   8.4 min
+++ CA =    .5
+++ Link #  4,  Flow depth =    .46 ft, Critical depth =    .69 ft
  PNC 154 155 3 158 0
  REC 1
  STO 0.10 0.85 8
  PIP 30 927.18 925.00 922.87 922.57 -15
+++ Tc =   8.7 min
+++ CA =    .7
+++ Link #  5,  Flow depth =    .71 ft, Critical depth =    .84 ft
  PNC 155 156 0 180 2
  TWE 923.50
  END
 END OF INPUT DATA.
```

*** CBI TYPE A NO 153 Analysis of Existing Pipes

Invert Depth Cover Velocity --Flow-- -Solutions-

Link	Length (ft)	Diam (in)	Up/Dn (ft)	Slope (ft/ft)	Up/Dn (ft)	Up/Dn (ft)	Act/Full (ft/s)	Act/Full (cfs)	Load (%)	Remove (cfs)	Diam (in)
1	128	15	923.51	.00500	4.1	2.8	3.1	.91	18		
			922.87		4.3	3.0	4.0	4.95			

Length = 128. ft Total length = 128. ft

*** CBI TYPE A NO 151,1 Analysis of Existing Pipes

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Cover Up/Dn (ft)	Up/Dn (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Load (%)	-Solutions- Remove (cfs)	Diam (in)
2	55	15	924.34	.00673	4.1	2.8	3.3	.81	14		
			923.97		4.1	2.8	4.7	5.74			
3	36	15	923.97	.01417	4.1	2.8	5.8	2.24	27		
			923.46		4.1	2.8	6.8	8.33			
4	27	15	923.46	.02185	4.1	2.8	7.3	2.97	29		
			922.87		4.3	3.0	8.4	10.35			
5	30	15	922.87	.01000	4.3	3.0	6.0	4.28	61		
			922.57		2.4	1.1	5.7	7.00			

Length = 148. ft Total length = 276. ft

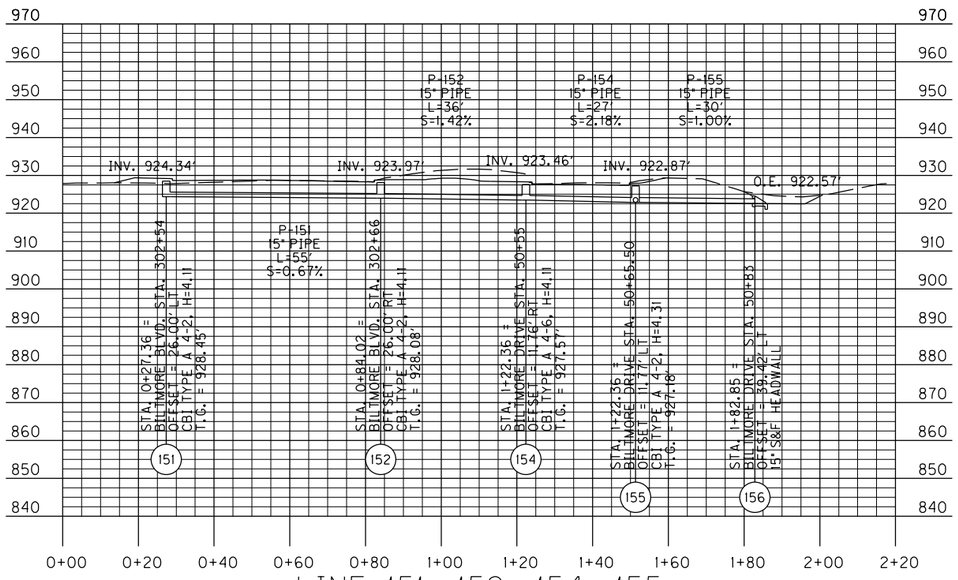
Hydraulic Gradeline Computations

Link #	Down-stream Node #	Hydraulic Gradeline Elevation	Crown Elev.	Possible Surcharge	Ground Elev.	Super-crit.?	Manhole Depth	Loss Coef
1	155	924.17	924.12	Y	927.18	N	1.30	.98
2	152	924.32	925.22	N	928.08	Y	1.01	.84
3	154	924.06	924.71	N	927.57	Y	1.47	.68
4	155	923.56	924.12	N	927.18	Y	1.30	.51
5	156	923.50	923.82	N	925.00	Y	.93	.00

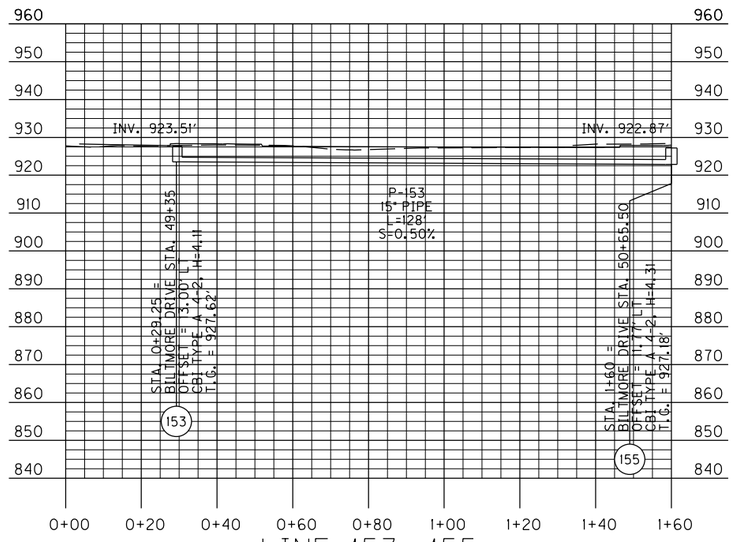
Link #	Terminal Node #	Hydraulic Gradeline Elevation	Ground Elevation	Loss Coef.
1	153	924.44	927.62	1.50
2	151	924.92	928.45	1.50

NORMAL END OF HYDRA

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.00	R?



LINE 151, 152, 154, 155



LINE 153, 155

0' 20' 40' 80'

SCALE: 1" = 20' HORIZONTAL
1" = 20' VERTICAL

STORM SEWER PROFILES
SHEET 16 OF 16

MicroStation v8.11.7.443 | E-SHEET NAME: | USER: dhawkins DATE PLOTTED: September 16, 2015 | FILE NAME: V:\1785\ACTIVE\17856001\ROADWAY\PLAN SHEETS\PIPE_PROFILES_16.DGN

SECTION 6

PAVEMENT INLET SPREAD CALCULATIONS

CURB BOX INLET SPACING CALCULATIONS- MERINO STREET v12a-13

County	BOONE				Item No.		6-14.00	Road No.	KY536	Road Name	KY536 DCD
	Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)	Paved Shld. Width	State Project No.			
								Federal Project No.			
	45	12	2	0.013	4	2	0	Emars No.			

Sag Location	Station	Inlet Type	L (ft)	C	Area (ac)	Slope (ft/ft)			LTI (ft)	Qt (cfs)	Spread (ft)		Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Flow (cfs)		Allow T (ft)	
						Sl	Sx	Sw			T	Ts						Qi	Qby		
SAG	10401+14RT	AS	10	0.85	0.26	0	0.02	0.187		0.884	4.64			0.43	0.966	0.187		0.884	0	8	Wd
	10399+87RT	AS	10	0.85	0.12	0.008	0.02	0.103	3.585	0.408	1.77	1.774	0.4044	0.20	1	0.187	1	0.408	0	8	
	158+62RT	AS	10	0.85	0.37	0.015	0.03	0.113	6.779	1.258	3.04	1.037	0.0168	0.26	0.987	0.194	1	1.258	0	8	
	157+00RT	AS	10	0.85	0.27	0.015	0.028	0.111	5.936	0.918	2.21	0.206	0.0002	0.23	1	0.195	1	0.918	0	8	
	155+00RT	AS	10	0.85	0.31	0.015	0.028	0.111	6.302	1.054	2.63	0.625	0.0039	0.24	0.996	0.194	1	1.054	0	8	
	153+50RT	AS	10	0.85	0.38	0.018	0.028	0.111	7.277	1.292	2.98	0.975	0.014	0.25	0.989	0.193	1	1.292	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	158+63CL	AS	10	0.85	0.32	0.015	0.023	0.106	5.835	1.088	3.861	1.861	0.042	0.255	0.962	0.183	1	1.088	0	8
	157+00CL	AS	10	0.85	0.23	0.015	0.028	0.111	4.901	0.782	2.355	0.355	7E-04	0.233	0.999	0.195	1	0.782	0	8
	155+00CL	AS	10	0.85	0.27	0.018	0.028	0.111	5.542	0.918	2.56	0.56	0.003	0.238	0.997	0.194	1	0.918	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	163+15RT	AS	10	0.85	0.18	0.0104	0.023	0.106	4.025	0.612	2.463	0.463	9E-04	0.223	0.999	0.189	1	0.612	0	8
	162+39RT	AS	10	0.85	0.17	0.012	0.022	0.105	4.112	0.578	2.069	0.069	5E-06	0.212	1	0.189	1	0.578	0	8
	161+61RT	AS	10	0.85	0.17	0.005	0.025	0.108	3.167	0.578	3.36	1.36	0.012	0.251	0.979	0.188	1	0.578	0	8
	160+02RT	AS	10	0.85	0.29	0.015	0.025	0.108	5.505	0.986	3.309	1.309	0.019	0.249	0.981	0.189	1	0.986	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	160+02RT	AS	10	0.85	0.29	0.015	0.025	0.108	5.505	0.986	3.309	1.309	0.019	0.249	0.981	0.189	1	0.986	0	8
	161+61RT	AS	10	0.85	0.17	0.005	0.025	0.108	3.167	0.578	3.36	1.36	0.012	0.251	0.979	0.188	1	0.578	0	8
	162+39RT	AS	10	0.85	0.17	0.012	0.022	0.105	4.112	0.578	2.069	0.069	5E-06	0.212	1	0.189	1	0.578	0	8
	163+15RT	AS	10	0.85	0.18	0.0104	0.023	0.106	4.025	0.612	2.463	0.463	9E-04	0.223	0.999	0.189	1	0.612	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTl (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	167+64LT	AS	10	0.85	0.07	0.024	0.02	0.103	3.51	0.238	1.285	1.285	0.241	0.192	1	0.187	1	0.238	0	8
	163+62LT	AS	10	0.85	0.14	0.02	0.014	0.097	4.534	0.476	1.79	1.79	0.481	0.192	1	0.181	1	0.476	0	8
	162+20LT	AS	10	0.85	0.2	0.018	0.013	0.096	5.135	0.68	2.775	0.775	0.002	0.201	0.998	0.179	1	0.68	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	71+41LT	AS	10	0.85	0.26	0.027	0.02	0.103	6.31	0.884	2.273	0.273	3E-04	0.212	1	0.187	1	0.884	0	8
	1099+45LT	AS	10	0.4	0.452	0.02	0.02	0.103	5.3	0.723	2.075	0.075	7E-06	0.208	1	0.187	1	0.723	0	8
	169+20LT	AS	10	0.85	0.23	0.024	0.026	0.109	5.676	0.782	1.925	1.925	0.778	0.217	1	0.193	1	0.782	0	8
	1098+36LT	AS	10	0.85	0.18	0.018	0.02	0.103	4.787	0.612	1.928	1.928	0.615	0.205	1	0.187	1	0.612	0	8
	164+67LT	AS	10	0.85	0.09	0.016	0.02	0.103	3.454	0.306	1.511	1.511	0.303	0.197	1	0.187	1	0.306	0	8
	164+00LT	AS	10	0.85	0.07	0.01	0.01	0.093	2.79	0.238	1.6	1.6	0.235	0.183	1	0.177	1	0.238	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	176+30RT	AS	10	0.65	0.31	0.024	0.02	0.103	5.858	0.806	2.139	0.139	4E-05	0.209	1	0.187	1	0.806	0	8
	174+80RT	AS	10	0.65	0.31	0.027	0.017	0.1	6.128	0.806	2.122	0.122	2E-05	0.203	1	0.184	1	0.806	0	8
	173+66RT	AS	10	0.72	0.28	0.033	0.017	0.1	6.51	0.806	1.937	1.937	0.803	0.2	1	0.184	1	0.806	0	8
	173+00RT	AS	10	0.68	0.17	0.04	0.013	0.096	5.533	0.462	1.561	1.561	0.464	0.187	1	0.18	1	0.462	0	8
	172+52RT	AS	10	0.85	0.25	0.037	0.025	0.108	6.714	0.85	1.842	1.842	0.845	0.213	1	0.192	1	0.85	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	184+00LT	AS	10	0.85	0.24	0.006	0.02	0.103	4.075	0.816	4.927	2.927	0.07	0.265	0.914	0.172	1	0.816	0	8
	12+42LT	AS	10	0.85	0.24	0.024	0.013	0.096	6.038	0.816	2.916	0.916	0.003	0.205	0.996	0.179	1	0.816	0	8
	14+33LT	AS	10	0.85	0.37	0.024	0.02	0.103	7.197	1.258	3.892	1.892	0.044	0.245	0.965	0.181	1	1.258	0	8
	15+47LT	AS	10	0.85	0.1	0.024	0.02	0.103	4.077	0.34	1.459	1.459	0.338	0.196	1	0.187	1	0.34	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTl (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)	
						(ft/ft)					(ft)							(cfs)			
	15+29RT	AS	10	0.85	0.1	0.024	0.02	0.103	4.077	0.34	1.459	1.459	0.338	0.196	1	0.187	1	0.34	0	8	
	14+22RT	AS	10	0.85	0.16	0.024	0.02	0.103	4.967	0.544	1.741	1.741	0.541	0.201	1	0.187	1	0.544	0	8	
	12+85RT	AS	10	0.85	0.31	0.024	0.02	0.103	6.6	1.054	3.198	1.198	0.013	0.231	0.988	0.185	1	1.054	0	8	
	185+76LT	AS	10	0.85	0.37	0.0034	0.02	0.103	4.643	1.258	7.906	5.906	0.343	0.325	0.728	0.141	1	1.258	0	8	
	187+60LT	AS	10	0.85	0.12	0.01	0.02	0.103	3.385	0.408	1.851	1.851	0.411	0.204	1	0.187	1	0.408	0	8	
sag	188+94LT	AS	10	0.85	0.18	0	0.033	0.2		0.612	2.2			0.406	1	0.2		0.612	0	8	Wd
	190+09LT	AS	10	0.85	0.1	0.006	0.033	0.116	2.583	0.34	1.754	1.754	0.336	0.225	1	0.2	1	0.34	0	8	

CURB BOX INLET CALCULATIONS											v05a-10
County	BOONE			**Item No.**	6-14.00	**Road No.**	KY536	**Road Name**			

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	200+21RT	AS	10	0.85	0.15	0.013	0.015	0.098	4.088	0.51	1.972	1.972	0.511	0.196	1	0.182	1	0.51	0	8
	199+40RT	AS	10	0.85	0.13	0.013	0.03	0.113	3.67	0.442	1.702	1.702	0.437	0.218	1	0.197	1	0.442	0	8
	198+00RT	AS	10	0.85	0.17	0.019	0.02	0.103	4.75	0.578	1.861	1.861	0.575	0.204	1	0.187	1	0.578	0	8
	196+10RT	AS	10	0.85	0.2	0.014	0.02	0.103	4.644	0.68	2.532	0.532	0.001	0.217	0.998	0.186	1	0.68	0	8
	194+12RT	AS	10	0.85	0.21	0.008	0.02	0.103	4.075	0.714	3.826	1.826	0.023	0.243	0.968	0.181	1	0.714	0	8
	192+31RT	AS	10	0.85	0.15	0.008	0.02	0.103	3.479	0.51	2.502	0.502	7E-04	0.217	0.999	0.186	1	0.51	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	200+21LT	AS	10	0.85	0.09	0.019	0.016	0.099	3.684	0.306	1.509	1.509	0.308	0.191	1	0.183	1	0.306	0	8
	198+00LT	AS	10	0.85	0.18	0.018	0.02	0.103	4.787	0.612	1.928	1.928	0.615	0.205	1	0.187	1	0.612	0	8
	196+10LT	AS	10	0.85	0.23	0.026	0.02	0.103	5.925	0.782	1.966	1.966	0.779	0.206	1	0.187	1	0.782	0	8
	194+12LT	AS	10	0.85	0.11	0.04	0.02	0.103	4.946	0.374	1.384	1.384	0.379	0.194	1	0.187	1	0.374	0	8
	192+38LT	AS	10	0.85	0.21	0.04	0.02	0.103	6.489	0.714	1.751	1.751	0.71	0.202	1	0.187	1	0.714	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTl (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)	
						(ft/ft)					(ft)							(cfs)			
	190+23LT	AS	10	0.85	0.16	0.005	0.034	0.117	2.976	0.544	2.565	0.565	0.002	0.254	0.996	0.2	1	0.544	0	8	
	187+83LT	AS	10	0.85	0.1	0.006	0.013	0.096	2.752	0.34	1.982	1.982	0.34	0.192	1	0.18	1	0.34	0	8	
sag	100+57LT	AS	10	0.85	0.2	0	0.01	0.177		0.68	7.789			0.411	0.913	0.177		0.68	0	8	Wd
	185+76RT	AS	10	0.85	0.1	0.004	0.02	0.103	2.382	0.34	2.271	0.271	1E-04	0.212	1	0.187	1	0.34	0	8	
	198+12RT	AS	10	0.85	0.17	0.038	0.02	0.103	5.848	0.578	1.641	1.641	0.582	0.199	1	0.187	1	0.578	0	8	
	196+70RT	AS	10	0.85	0.1	0.035	0.02	0.103	4.565	0.34	1.358	1.358	0.337	0.194	1	0.187	1	0.34	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTl (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)	
						(ft/ft)					(ft)							(cfs)			
	201+37RT	AS	10	0.85	0.14	0.002	0.01	0.093	2.574	0.476	7.98	5.98	0.086	0.246	0.821	0.147	1	0.476	0	8	
	202+05RT	AS	10	0.85	0.12	0.0029	0.02	0.103	2.366	0.408	3.624	1.624	0.01	0.239	0.975	0.183	1	0.408	0	8	
sag	202+85RT	AS	10	0.85	0.2	0	0.02	0.187		0.68	3.895			0.411	0.984	0.187		0.68	0	8	Wd
	205+82RT	AS	10	0.85	0.34	0.003	0.04	0.123	3.686	1.156	4.936	2.936	0.159	0.364	0.863	0.184	1	1.156	0	8	
	207+03RT	AS	10	0.85	0.001	0.02	0.001	0.084	0.595	0.003	0.308	0.308	0.003	0.167	1	0.168	1	0.003	0	8	
	499+14RT	AS	10	0.85	0.1	0.02	0.007	0.09	4.031	0.34	1.639	1.639	0.336	0.178	1	0.174	1	0.34	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	206+88LT	AS	10	0.85	0.29	0.01	0.015	0.098	5.295	0.986	5.685	3.685	0.103	0.252	0.895	0.164	1	0.986	0	8
	205+76LT	AS	10	0.85	0.12	0.0035	0.03	0.113	2.396	0.408	2.467	0.467	8E-04	0.241	0.998	0.196	1	0.408	0	8
	204+12LT	AS	10	0.85	0.17	0.005	0.04	0.123	2.997	0.578	2.455	0.455	0.001	0.265	0.998	0.206	1	0.578	0	8
	202+33LT	AS	10	0.85	0.18	0.007	0.02	0.103	3.645	0.612	3.478	1.478	0.012	0.236	0.98	0.183	1	0.612	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTI	Qt	T	Ts	Qs	di	Eo	Se	E	Qi	Qby	Allow T (ft)	
						(ft/ft)			(ft)	(cfs)	(ft)		(cfs)	(ft)		(ft/ft)		(cfs)			
	212+63LT	AS	10	0.85	0.42	0.03	0.02	0.103	8.127	1.428	3.951	1.951	0.053	0.246	0.963	0.18	1	1.428	0	8	
sag	210+80LT	AS	10	0.85	0.55	0	0.02	0.187		1.87	7.645			0.486	0.838	0.187		1.87	0	8	Wd
	500+79LT	AS	10	0.85	0.07	0.007	0.017	0.1	2.449	0.238	1.639	1.639	0.237	0.195	1	0.184	1	0.238	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTI (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)	
						(ft/ft)					(ft)							(cfs)			
	212+63RT	AS	10	0.85	0.35	0.03	0.02	0.103	7.43	1.19	3.236	1.236	0.016	0.231	0.987	0.184	1	1.19	0	8	
sag	211+28RT	AS	10	0.85	0.26	0	0.015	0.182		0.884	6.185			0.426	0.931	0.182		0.884	0	8	Wd

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	499+34RT	AS	10	0.85	0.1	0.008	0.015	0.098	2.98	0.34	1.849	1.849	0.338	0.194	1	0.182	1	0.34	0	8

CURB BOX INLET CALCULATIONS																			v05a-10
County	BOONE			**Item No.**		6-14.00		**Road No.**	KY536	**Road Name**									
	Speed Limit	**Lane Width**	**W (ft)**	**n**	**I (iph)**	**Gu.Dp. (in)**		**State Project No.**											
								Federal Project No.											
	45	12	2	0.016	4	2		**Emars No.**											

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	500+66LT	AS	10	0.85	0.01	0.006	0.02	0.103	1.023	0.034	0.803	0.803	0.034	0.183	1	0.187	1	0.034	0	8
	502+24LT	AS	10	0.85	0.14	0.004	0.02	0.103	2.779	0.476	3.598	1.598	0.011	0.239	0.976	0.183	1	0.476	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	501+24RT	AS	10	0.85	0.06	0.005	0.02	0.103	2.055	0.204	1.624	1.624	0.205	0.199	1	0.187	1	0.204	0	8
	502+20RT	AS	10	0.85	0.08	0.005	0.02	0.103	2.319	0.272	1.8	1.8	0.27	0.203	1	0.187	1	0.272	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	176+00LT	AS	10	0.85	0.36	0.025	0.02	0.103	7.175	1.224	3.707	1.707	0.034	0.241	0.972	0.182	1	1.224	0	8
	174+06LT	AS	10	0.67	0.33	0.03	0.02	0.103	6.513	0.884	2.069	0.069	7E-06	0.208	1	0.187	1	0.884	0	8
	21099+82	AS	10	0.7	0.23	0.043	0.02	0.103	6.351	0.644	1.659	1.659	0.637	0.2	1	0.187	1	0.644	0	8
	21100+90	AS	10	0.85	0.17	0.067	0.04	0.123	6.522	0.578	1.321	1.321	0.582	0.22	1	0.207	1	0.578	0	8
	211014+85	AS	10	0.85	0.13	0.04	0.028	0.111	5.174	0.442	1.405	1.405	0.447	0.206	1	0.195	1	0.442	0	8

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

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45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTI	Qt	T	Ts	Qs	di	Eo	Se	E	Qi	Qby	Allow T (ft)	
						(ft/ft)			(ft)	(cfs)	(ft)		(cfs)	(ft)		(ft/ft)		(cfs)			
	21+23LT_BC	AS	10	0.85	0.04	0.016	0.02	0.103	2.457	0.136	1.125	1.125	0.138	0.189	1	0.187	1	0.136	0	8	
sag	298+84RT	AS	10	0.85	0.27	0	0.02	0.187		0.918	4.757			0.428	0.962	0.187		0.918	0	8	Wd
	179+31RT	AS	10	0.85	0.12	0.01	0.02	0.103	3.385	0.408	1.851	1.851	0.411	0.204	1	0.187	1	0.408	0	8	
	180+50RT	AS	10	0.85	0.2	0.005	0.02	0.103	3.533	0.68	4.561	2.561	0.045	0.258	0.934	0.176	1	0.68	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

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45	12	2	0.016	4	2

State Project No.	
Federal Project No.	
Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTI (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)
						(ft/ft)					(ft)							(cfs)		
	21+23RT	AS	10	0.85	0.04	0.016	0.02	0.103	2.457	0.136	1.125	1.125	0.138	0.189	1	0.187	1	0.136	0	8
	22+13RT	AS	10	0.85	0.03	0.016	0.02	0.103	2.177	0.102	1.01	1.01	0.103	0.187	1	0.187	1	0.102	0	8
	22+99RT	AS	10	0.72	0.03	0.016	0.02	0.103	2.031	0.086	0.949	0.949	0.088	0.186	1	0.187	1	0.086	0	8
	24+67RT	AS	10	0.85	0.06	0.014	0.02	0.103	2.798	0.204	1.339	1.339	0.205	0.193	1	0.187	1	0.204	0	8

CURB BOX INLET CALCULATIONS

v05a-10

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Emars No.	

Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl	Sx	Sw	LTI (ft)	Qt (cfs)	T	Ts	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi	Qby	Allow T (ft)	
						(ft/ft)					(ft)							(cfs)			
sag	50+50RT_BD	AS	10	0.85	0.15	0	0.02	0.187		0.51	3.215			0.398	0.995	0.187		0.51	0	8	Wd
	302+66RT	AS	10	0.85	0.29	0.02	0.013	0.096	6.315	0.986	4.448	2.448	0.039	0.224	0.961	0.173	1	0.986	0	8	
	179+52LT	AS	10	0.85	0.37	0.008	0.02	0.103	5.56	1.258	6.089	4.089	0.197	0.288	0.843	0.161	1	1.258	0	8	
	179+52RT	AS	10	0.85	0.12	0.008	0.02	0.103	3.166	0.408	1.928	1.928	0.41	0.205	1	0.187	1	0.408	0	8	

CURB BOX INLET CALCULATIONS

v05a-10

County	BOONE	Item No.	6-14.00	Road No.	KY536	Road Name	

Speed Limit	Lane Width	W (ft)	n	I (iph)	Gu.Dp. (in)
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Sag Location	Station	CBI Type	L (ft)	C	Area (ac)	Sl (ft/ft)	Sx (ft/ft)	Sw (ft/ft)	LTI (ft)	Qt (cfs)	T (ft)	Ts (ft)	Qs (cfs)	di (ft)	Eo	Se (ft/ft)	E	Qi (cfs)	Qby (cfs)	Allow T (ft)
	163+15RT	AS	10	0.85	0.07	0.035	0.027	0.11	3.844	0.238	1.149	1.149	0.241	0.198	1	0.194	1	0.238	0	8
	169+38RT	AS	10	0.85	0.14	0.04	0.02	0.103	5.473	0.476	1.502	1.502	0.471	0.197	1	0.187	1	0.476	0	8
	169+07RT	AS	10	0.85	0.14	0.033	0.02	0.103	5.166	0.476	1.566	1.566	0.478	0.198	1	0.187	1	0.476	0	8
	167+84RT	AS	10	0.85	0.29	0.023	0.02	0.103	6.323	0.986	3.013	1.013	0.008	0.227	0.992	0.185	1	0.986	0	8
	20399+38RT	AS	10	0.85	0.2	0.022	0.02	0.103	5.314	0.68	1.926	1.926	0.679	0.205	1	0.187	1	0.68	0	8
	20400+98RT	AS	10	0.85	0.18	0.025	0.02	0.103	5.283	0.612	1.805	1.805	0.608	0.203	1	0.187	1	0.612	0	8
	20401+99RT	AS	10	0.85	0.26	0.01	0.02	0.103	4.812	0.884	4.232	2.232	0.044	0.251	0.951	0.178	1	0.884	0	8

Preliminary Drainage Folder Comments
Reconstruct KY 338 (Richwood Road) / I-75 Interchange
Item #6-18 – Boone County

General

Very thorough annotation of pipe & plan sheets in general, and overall documentation and folder organization. Highlighted storm sewer plan views of the seemingly endless inlets and pipes facilitated review. HGL tables on the storm sewer runs were clear and concise. Several exceptionally well-designed storm sewer outfalls, allowing pressure flow to reduce outfall velocity where capacity was not an issue. Overall well designs systems.

Existing flows at storm sewer outfalls were not included in most. Targeted outfalls were noted for need where necessary. Project wide peak flow detention analysis is anticipated for comparison of pre-post flows.

Storm sewers with headwall inlets need to document HW with either an HY8 run or the EGL from the Storm Sewer analysis in the hydraulic data table.

Source data was missing – include software input files in the final folder.

Spread and channels were not able to be reviewed. One exception: Commend the appropriate approach for sag inlets analysis.

Cursory review on most culverts and storm sewer hydraulics and pipe sheets.

Some storm sewer inlets appear to be "modified" from standard drawing heights. Some appear to still be able to fit, and others may not. It is recommended when the minimum Z+ top phase height is not met to note it as "modified". Ensure, if modified, it will still work or provided a detail modification drawing.

I-75/I-71

Culverts

Sta. 425+19.8 36" Pipe

OK *Update TC 61-100 for Q_{50}*

Sta. 435+53.5 8'x5' RCBC

OK *Update TC 61-100 for Q_{50}*

US 25

Sta. 32+06.4 4'x4' RCBC

OK *need to update the hydraulic data table to the corrected flows and HW data*

Triple Crown

Sta. 51+17 72" Pipe

The TC 61-100 is expired old form that doesn't have the existing flows and HWs.

Summary says a drainage easement is required due to exceeding the ROW limit. This is normally not required unless +1' from existing or negative impact to property results.

The pipe sheet appears to be missing from the plans and folder.

Need to carefully document preconstruction hydrology & HW of existing conditions. The proposed HW_{100} elevation (834.88) is near to Fifth Third Bank perimeter elevation. Due to a gradual rise in WSEL upstream, it is recommended to review existing verses proposed water surface profiles, or reduction of proposed flows.

Best Pal Rd

Sta. 29+90 18" Pipe

OK

Ridge Trans. Ent. 2

Sta. 19+51.6 18" Pipe

OK

Storm Sewer Outfalls

KY 338

Sta. 100+20 24" Storm Sewer Outfall

OK. *Note an 18" might be ok here*

Sta. 103+70 18" Storm Sewer Outfall

OK.

Due to only 1 cfs for a crossdrain a special top phase only CBI/ flume could be considered.

Sta. 108+70 24" Storm Sewer Outfall

OK.

Sta. 112+11 84” equiv. Storm Sewer Outfall

SCS (NRCS) hydrographic analyses report results and input data documentation is needed in Section 10, if that work is utilized or completed for detention. (Storage routing is recommended if SCS methods are used.) Need to document where the rational method was used verses regional in the storm sewer analyses. Based on section 10 SCS was not used and the Drainage Summary should be updated to show that.

Tailwater elevation of Triple Crown culvert needs to be included in the analysis. Top of the 84” equiv. outfall pipe is 826, and Triple Crown HW_{100} is 834.88. See recommendation on water surface profile analysis.

Hydrology discussion seems to imply the upstream SS components of this system are inadequate.

Inlets 53-2 and 53-4 at DCD are receiving bypass flow from split flow down interstate Ramp C. Refer to comments at that outfall.

See general comments on “modified” inlets for 9-7 & 119-2. –They appear to work however.)

Include the rest of the storm sewer system analyses. Much of the system not included.

Hydraulic data on the 72” headwall is needed on the pipe sheet.

Inlet 13-4 HW_{100} is listed below the top of grate.

Update pipe sheet Station 100+00 right for the correct inlet.

Sta. 112+14 30" Storm Sewer Outfall

Should document the tailwater assumption at this outfall, due to the Triple Crown HW impacts.

Flow in StormCAD analyses from inlet 119-10 to 119-8 is shown as zero, from 1.7 acres. (If Tc of 9 minutes was used by ignoring that area because it resulted in higher Qs, please note. Tc seems to be low there.)

See general comment on “modified” inlets regarding inlets 7-8, 7-5, 119-6, 119-5, & 9-1 (9-1, & 119-5 check height on profile sheet)

Lower portion of system 30” pipes only require a 10-yr design. Could reduce size if confirmed after including DA from 119-10, if required. May be able to do the same on Paddock. Also can consider eliminating one cross drain on Paddock.

Inlet labels appear to be off in the StormCAD analysis or the system has been modified since. (Inlets 7-8 & 7-4) Check Inlet 7-5 inlet area in StormCAD – it appears to show zero contributing area.

Sta. 114+27 15" Storm Sewer Outfall

The pipe sheet Sta. 114+60 appears to have a note regarding this 15” outfall pipe but otherwise the construction information appears to be missing from the plans.

KY 338 EB

Sta. 107+40 42" Storm Sewer Outfall

StormCAD storm sewer report appears to have slopes in percent instead of ft/ft here.

42” outfall operating at 50% capacity &Tc is low at 11 minutes.

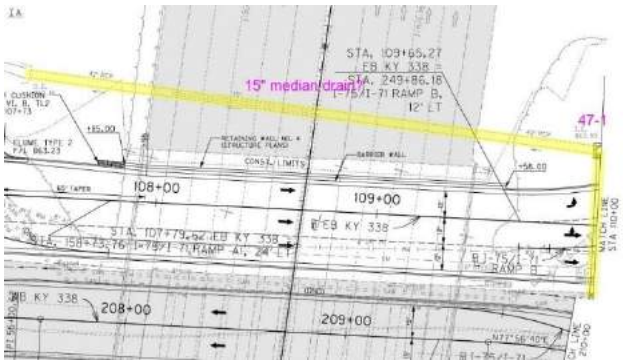
DBI Inlet 47-4 might need junctions or anchors or otherwise adjusted or connections detailed



Should include the existing system information used to contribute to this system flow. (30 cfs)

Inlet 17-2 to 17-1 shows 24 in equiv. & model has 30” equiv.

Is there a median drain inlet on US 25 to this system that should be included?



15" median drain

DBI type 3 – (17-5) – might be "modified". Looks like the grade can be raised slightly there to accommodate the standard incised inlet—HGL ok also.

Inlet (17-7) EB sta. 112+91 RT should be (17-8)

Inlet (17-9) type 11 – hydraulic data table blank – steep downgrade of median ditch – ditch bypass elevation 885.95….HW of the grate is above that. Needs adjustment there, or upgrade to type 6

Interstate B ramp inlets 47-4 and 47-2 could substitute Type 2 & Type 2 "modified" instead of the Type 7 safety grates (don't appear to be required).

KY 338

Sta. 370+41 18" existing Storm Sewer Outfall

OK.

Sta. 387+38.8 30" Storm Sewer Outfall

OK

RAMP C & Ramp E inlets will result is some minor bypass flow for Q_{100} and Q_{25} conditions but not significant to total flow.

Sta. 388+65 15" Storm Sewer Outfall

OK

Sta. 389+83 18"/48" Ex Storm Sewer Outfall

OK

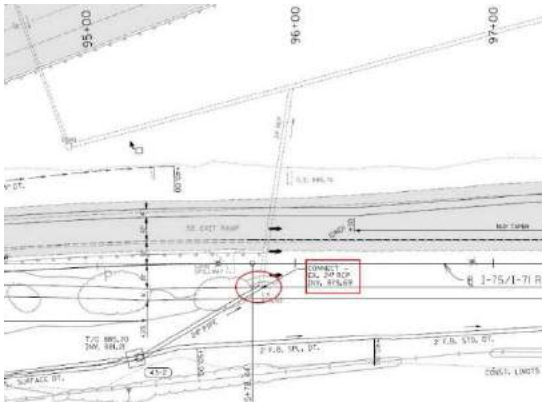
Invert elevations for 133-1, 133-2, 133-3 need to be updated in the StormCAD analysis but probably ok here. HGL of 48" existing not likely to impact.

I-75/I-71

Ramp A

Sta. 95+98 24" Storm Sewer Outfall

OK



Need a connection here?

Ramp B

Sta. 263+59 15" existing RCP Storm Sewer Outfall extension

OK need folder documentation though

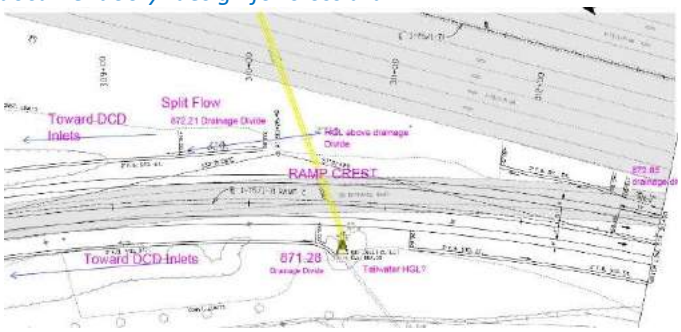
Ramp C

Sta. 310+70 24" RCP Storm Sewer Outfall extension

All the modeled flows (Q_{10} –Q_{100}) here exceed the ditch drainage divide between Ramp C and the Interstate. Split flow occurs and bypass back toward DCD unless ditch grade is raised there. Existing and proposed?

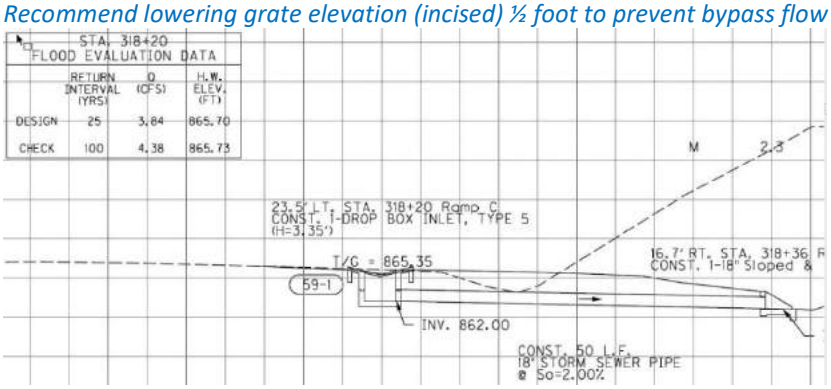
Confirm tailwater condition from pipe headwall immediately downstream. Appears will impact split flow at drainage divide on that side of the ramp also.

Need to document 50-yr design for cross drain.



Sta. 318+39 18" Storm Sewer Outfall

Gore Inlet HW_{25} = 865.70 HW_{100} – 865.73 Ditch drainage divide at gore 865.5. Inlet grate elevation 865.35. Recommend lowering grate elevation (incised) ½ foot to prevent bypass flow to ramp.



US 25

Sta. 10+10 28" Existing Storm Sewer Outfall

Inlet 71-2 to 71-3 – cross drain for only max 1 cfs. Looks like utilities are not an issue. Is this feasible to eliminate?

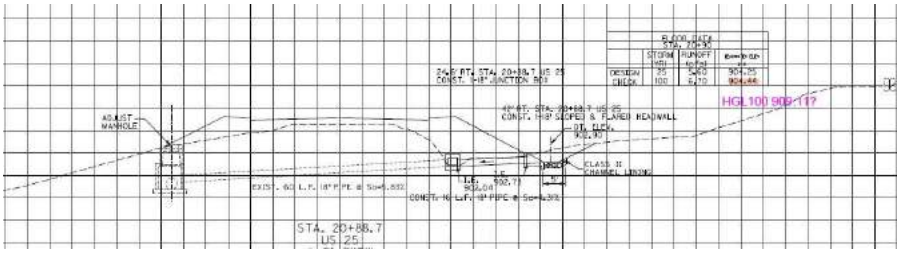
Check invert elevations on 71-1, 71-5, 71-3, and Out -1010 in the StormCAD analysis.

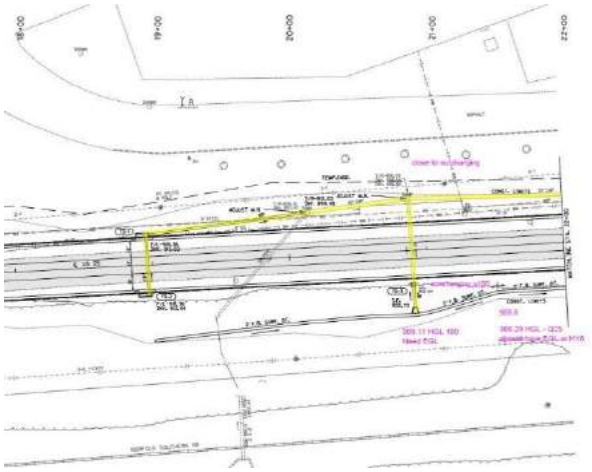
Sta. 25+78 30" Storm Sewer Outfall

Surcharging existing components. Need to document existing to proposed.

Headwalls need HY8 or EGL data to document HW.

Headwall HGL_{100} above drainage divide. Is it possible to raise ditch drainage divide grade? Or can the other existing 18" be used?



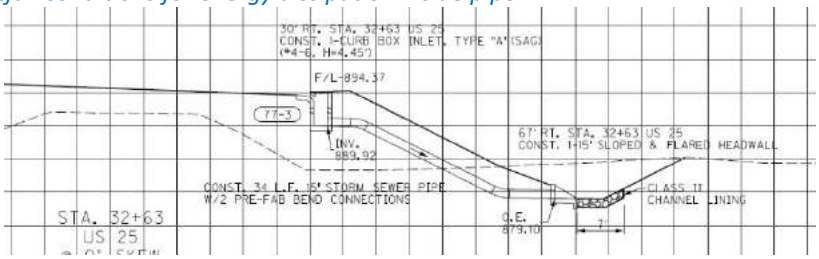


Sta. 29+00 18" Storm Sewer Outfall

OK

Sta. 32+63 15" Storm Sewer Outfall

OK Very nice work again on pressure flow outfall pipe for reduced velocity…and very nice modeling and set up of outfall conditions for energy dissipation inside pipe



Sta. 35+76 15" Storm Sewer Outfall

OK

Sta. 60+24 18" Storm Sewer Outfall

This is missing from the Bridge and Culvert summary

Outfall velocities for Q_{10} and Q_{25} are < 2fps…this is in the stone box (2.5 x 2.5) under the RR…due to size reduction below. Q_{100} there surcharges at the existing RR box. The low velocities in the stone box are due to the high HGL at its outfall. Is this system currently functioning? What happens to our system if blocked?

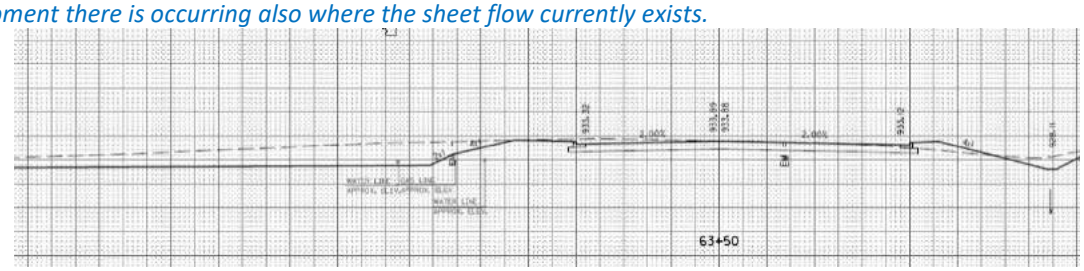
Additional flow from the crossdrain is only 4 cfs (Q_{100}) ….but there is additional flow from more pavement also. There is recent development at the outfall area. Conditions & maintenance should be checked.

Sta. 62+00 15" Storm Sewer Outfall

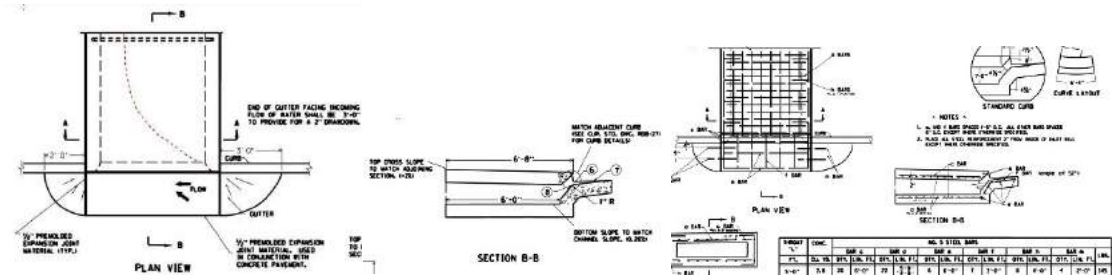
OK

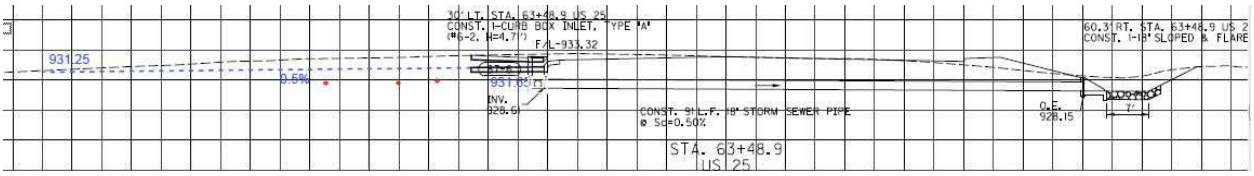
Sta. 63+48.9 18" Storm Sewer Outfall

OK – Prefer maintaining existing drainage but utility impacts appear to require sending drainage across US 25 here. (only 4 cfs Q_{100}) Could consider a special top phase/flume under shared use path. But development there is occurring also where the sheet flow currently exists.



Current cross section needs to be updated to current drainage plans.
An alternative could be a special modified flume.





Sta. 67+94 15" Storm Sewer Outfall
OK
Sta. 70+13.3 15" Storm Sewer Outfall
OK
Sta. 70+30 15" Storm Sewer Outfall
OK

US 25 Ramp E
Sta. 55+25 18" Storm Sewer Outfall
OK

US 25 Ramp G
Sta. 77+96 18" Storm Sewer Outfall
OK

Triple Crown
Sta. 51+12 15" Storm Sewer Outfall
OK *Due to very low cfs – could eliminate some inlets, but all done per standards.*

Old Lexington
Sta. 5+67 15" Storm Sewer Outfall
OK
Sta. 6+65 18" Storm Sewer Outfall
OK

Ridge Trans. Ent. 1
Sta. 10+48.5 15" Storm Sewer Outfall

OK

Sta. 10+93.1 36" Storm Sewer Outfall

OK

See general comment on headwall HW/EGL.

SPREAD

As noted, nicely done appropriate sag spread analyses that excludes the flankers.

Channel Calculations

2' FB left of stations 101+00 to 102+00 Has the channel flow elevation been determined here, against the side of the roadway? Might need rip rap along the flow line of the embankment if so instead of a ditch.

Outlet Protection

Station 111+75 Left Flume outfall protection down steep slope?

Ok

PLANS

48" existing pipe missing Sta. 389+60 profile sheet.

Appendix D - ENVIRONMENTAL

Appendix D1 -- Environmental Document (CE-3)

KENTUCKY TRANSPORTATION CABINET
CATEGORICAL EXCLUSION
ENVIRONMENTAL DETERMINATION CHECKLIST

1. PROJECT INFORMATION

SYP Project #: 6-14.00	Route: I-75	Work Type: Interchange Reconstruction	County: Boone
Project Description: Reconstruct the KY 536 & I-71/I-75 Interchange to a Double Crossover Diamond (DCD); widen KY 536 interchange ramps; improve 5,800 linear feet of KY 536 from just west of Tiburon Drive to US 25, including access management and multi-use path construction (see Exhibit 1 – Project Location and Exhibit 2 – Preliminary Plan).		**Purpose and Need: Improve safety and traffic operations within and near the I-71/I-75 interchange with KY 536 and meet projected travel demand of Boone and Kenton Counties. In addition, the project will support the local and regional goal of economic development and growth in Northern Kentucky (see Attachment A for further Purpose and Need discussion).**	
Roadway Conditions and Setting: Existing configuration at KY 536 is a diamond interchange with single lane merges/diverges. The project area is a suburban setting with commercial, residential, and institutional land uses.		Traffic Volume: Current KY 536: 15,000 to 25,000 ADT Design Year (2030) KY 536: 49,000 to 57,000 ADT	
Project Length: 1.09 Begin MP: 13.08 End MP: 14.17 Note: If project length is > 1 mile and on a new alignment, project may not be eligible for CE Level 1 and DEA and FHWA must be consulted.		Number of alternative(s) considered including "No Build": ☐ 1 ☒ 2 ☐ 3 ☐ 4 - *Discuss all alternatives in Section 3* See Section 3 Alternatives Summary	

2. ENVIRONMENTAL DETERMINATION

☑ Categorical Exclusion- Level 3 (Attach all project correspondence and documentation)

APPROVAL SIGNATURES

Stacie Hans — **District Environmental Coordinator** — 8/14/14 — **Date**

Carol Callan Ramler — **Project Manager** — 8-14-14 — **Date**

☐ *All appropriate project commitments/mitigation and identified required future work have been entered into the CAP*

David M. Waldon — **Division of Environmental Analysis** (required for Level 2) — 9/25/14 — **Date**

Bernadette Dupont — **Recommended by: FHWA** — 10/22/14 — **Date**

John D. Ballantyne — **Federal Highway Administration** (required for Level 3) — 10/22/2014 — **Date**

3. ALTERNATIVES SUMMARY

Describe all alternatives that were evaluated, their impacts and the reason(s) for elimination or selection.

REQUIRED ATTACHMENTS: ☒ Location Map ☒ Plan Map/Sheet(s) (See Exhibits 1 and 2)

History of Alternatives Development

Due to substantial population growth and land use changes occurring in Northern Kentucky and subsequent increases in demand on the I-71/I-75 corridor, the Kentucky Transportation Cabinet (KYTC) completed an Interchange Justification Study (IJS) for the Interchanges of I-71/I-75 with KY 536 and KY 338 (HNTB, 2010), approved by the Federal Highway Administration (FHWA). The IJS evaluated eight conceptual alternatives at the KY 536 interchange for addressing safety and traffic congestion issues in this area, including a traditional widening alternative and various modifications to the configuration of the existing KY 536/I-71/I-75 interchange and ramps, compared against the No Build Alternative; the evaluation matrix from the 2010 IJS is included in Attachment B. Six conceptual alternatives were eliminated from further study in the IJS based on factors such as right-of-way impacts, safety, truck traffic, and geometric issues. Two build alternatives were further evaluated in the IJS (see Attachment B), including: 1) Traditional Widening, which involved adding lanes to the existing KY 536 and I-71/I-75 ramps until acceptable LOS was obtained, and 2) Double Crossover Diamond (DCD) interchange, which involved replacing the existing diamond interchange at KY 536/I-71/I-75 with a non-traditional configuration that moves the through and left turn traffic to the left side of the roadway between the ramp intersections.

The DCD Alternative was recommended in the 2010 IJS as the preferred design alternative for the KY 536 interchange based on preliminary evaluation, as well as endorsement of a Stakeholder Advisory Council (SAC) and KYTC. The DCD Alternative was selected over traditional widening because it provided free-flow operations and fewer conflict points, thereby improving safety and efficiency. Furthermore, this alternative had fewer right-of-way impacts and utilized the existing twin I-71/I-75 bridge, thereby reducing project costs and allowing the project to be executed more quickly.

Development of the DCD (Preferred Design) Alternative

Based on recommendation presented in the 2010 IJS, the DCD Alternative at the KY 536 & I-71/I-75 interchange was carried forward into preliminary line and grade and environmental evaluation, as presented in this Categorical Exclusion (CE). Specific transportation issues/needs at the project location are detailed in the project Purpose and Need included in Attachment A, and include:

- *Congestion and Mobility* - much of KY 536, its intersections, and the existing interchange ramps in the project area currently operate below acceptable levels of service (LOS), exhibiting failing LOS in both the AM and PM peak hours (generally LOS D to LOS F), with conditions expected to deteriorate as predicted traffic volumes on KY 536 and I-71/I-75 increase by 2030;
- *Safety* - KY 536 through the I-71/I-75 interchange has a high crash rate, with 228 crashes reported between 2009 and 2011, 80 percent of which were rear end and angle crashes, indicating high congestion; and
- *Economic Development/Growth* - Boone County is one of the fastest growing counties in Kentucky for population and employment, and corridor improvements to address capacity issues and access management along KY 536 at the I-71/I-75 interchange are needed to support existing and future business and residential development in the area.

The goal of the preliminary line and grade phase of development has been to refine the DCD preferred design concept carried forward from the 2010 IJS. Design elements were developed to address safety, improve travel efficiency through this corridor and support existing and future development in the project area. Proposed improvements will address transportation needs at the KY 536 & I-71/I-75 interchange and mainline KY 536 in the project area, but will not degrade the operation of I-71/I-75 mainline operation based on findings of the 2010 IJS (density and level of service along I-71/I-75 remain the same or improve in the Build Condition).

The KY 536 & I-71/I-75 Interchange Reconstruction Project is listed on KYTC's *Statewide Transportation Improvement Program for FY 2013 – 2016* as Items 6-14.00 and 6-14.02 on page 4 of 127. The project also is listed as Item 6-14.00 and 6-14.02 in the Ohio-Kentucky-Indiana Regional Council of Governments' (OKI) *Fiscal Years 2014-2017 Transportation Improvement Program* (2013) on page BOO 8-4, and is listed on the KYTC *FY 2014-2020 Six-Year Highway Plan as Item 6.14.00*. STIP/TIP documentation is provided in Attachment A.

A Location Map and Preliminary Plan are included as Exhibits 1 and 2, and a rendering of the proposed DCD for the KY 536 & I-71/I-75 interchange is provided as Exhibit 3. Additional renderings of the proposed interchange, created as part of a video to inform the public about how the interchange operated, are provided in Attachment C. Key elements of the Preferred Alternative design are summarized below:

KY 536 Interchange Ramp Improvements:

- Widen the southbound entrance ramp to extend the existing acceleration lane for the eastbound KY 536 to southbound I-71/I-75 movement, tapering to one lane prior to its merge with southbound I-71/I-75.
- Widen the northbound exit ramp to three lanes to provide additional storage capacity in the form of a single left-turn lane and dual right-turn lanes at KY 536 (this ramp will remain as one lane at the point of its I-71/I-75 divergence).
- Widen the southbound exit ramp to four lanes, providing two lanes for movements onto eastbound KY 536 and two lanes for movements onto westbound KY 536. This ramp will be widened to two lanes as it departs from I-71/I-75.
- Widen the northbound entrance ramp from KY 536 to accommodate two lanes of traffic entering from KY 536, one lane each from eastbound KY 536 and westbound KY 536.

KY 536 Mainline Improvements:

- Widen KY 536 to the west of the proposed DCD interchange to connect to an adjacent roadway project planned for KY 536 west of the current project. That adjacent project (Item No. 6-158.00) will widen KY 536 to five lanes (four travel lanes with a continuous center left turn lane) west to Old Union Road.
- Between the above-mentioned five-lane section and the Sam Neace Drive intersection (KY 3503), KY 536 will be widened to six lanes with dual eastbound left-turn lanes provided at both the Biltmore Blvd. and Sam Neace Drive intersections.
- The Biltmore Blvd. intersection will be converted to a three-way intersection, providing left-turn access only from eastbound KY 536. The north and south approaches will be right-in/right-out only, but only the north approach will be signal controlled.
- East of Sam Neace Drive, two through lanes will be provided in each direction, with dual left-turn lanes onto northbound US 25. Two eastbound through lanes will be provided through the US 25 intersection and a right turn lane onto southbound US 25.
- The existing traffic signals at the southbound I-71/I-75 entrance/exit ramp, northbound I-71/I-75 entrance/exit ramp, Biltmore Blvd., Sam Neace Drive, and US 25 will remain. Additional traffic signals are proposed at Tiburon Drive and Berberich Drive.
- Total length of KY 536 mainline widening is 5,800 linear feet.

Access Management Improvements:

- Construction of a raised, non-traversable median along the project limits.
- Conversion of existing full-access commercial entrances on KY 536 to right-in/right-out.
- Improvements to Sam Neace Drive at its intersection with KY 536.
- Construction of a service road to provide access from Sam Neace Drive to Biltmore Blvd. (south of existing KY 536).
- The relocation/reconstruction of an existing service drive which accesses the Florence Baptist Church and adjacent apartments.

Shared Use Path and Pedestrian Facilities:

- Construction of a shared use path on the north side of KY 536 from Tiburon Drive to US 25 and along the proposed service road from Sam Neace Drive to Biltmore Blvd. (south of KY 536). This proposed facility is part of a planned regional multi-use trail network for Union, Walton, unincorporated Boone County, and Kenton County, and also links to planned pedestrian and bike projects included in the 2002 Florence Pedestrian and Bike Plan, located to the west of the project area.
- Sidewalks are proposed along the south side of KY 536 east of the interchange, from Biltmore Blvd. east to the east project terminus. Sidewalk extensions also will be constructed alongside road improvements to Biltmore Blvd. and Demia Way.

No Build Alternative

Under the No Build Alternative, there would be no changes to the existing diamond configuration of the KY 536 & I-71/I-75 interchange, or widening and access improvements along KY 536 (currently KY 536 is two-lane, except between interchange ramps, where there is one through lane and one left turn lane in each direction). Currently, the existing interchange and KY 536 both east and west of the interchange exceed traffic projections developed during their design. The current interchange, completed in 1994, exceeded future projections within five years of opening. Previous projections for KY 536 east of the I-71/I-75 interchange indicated a 2007 ADT of 5,520 (HNTB 2010), considerably below the current ADT, which ranges between 15,000 vehicles per day west of the interchange to 25,000 vehicles per day east of the interchange (Stantec, 2013). Insufficient capacity and numerous conflict points at the locations of interchange ramps and other signalized intersections along KY 536 (at Sam Neace Drive, Biltmore Blvd. and US 25) result in congestion and safety issues under the No Build. By 2030, traffic volumes are predicted to increase to 49,000 vehicles per day west of the interchange to 57,000 vehicles east of the interchange (HNTB, 2010). With these increases in travel demand, combined with growth and development in the area, congestion and safety at the interchange and along KY 536 through the project area will continue to worsen. Based on these considerations, the No Build Alternative does not meet the project purpose and need for providing adequate capacity and improving traffic flow through the area. The No Build Alternative is also not consistent with state and local transportation planning.

4. COMMENTS AND COORDINATION

Attach all letters, meeting minutes and copies of any newspaper advertisements.	YES	NO
1. Will the project have public, local government and resource agency outreach?	☒	☐

Identify type of outreach used:

Meeting(s) ☒ Date(s): January 17, 2013

Newspaper Adv. ☒ Newspaper Name Kentucky Enquirer, Boone County Recorder, and nky.com

Date(s): January 3, 2013; January 10, 2013; and January 14, 2013

Meeting(s) with local government and affected property owners ☒ Date(s): Stakeholder Meetings: 9/7/2011; 12/9/2011; 4/23/2012

Public Information Meeting

A Public Meeting was held on January 17, 2013 at the Florence Baptist Church in Florence, Kentucky for the purpose of providing information about the project, describing a DCD Interchange and how it operates, and to solicit public input. Representatives from KYTC and the consultant team were in attendance. The meeting was advertised on the project website (http//75crossings.com) and on KYTC District 6's Facebook page. A meeting notice was posted on nky.com on January 14, 2013 and legal notices were posted in the Kentucky Enquirer and the Boone County Recorder on January 3 and January 10, 2013, respectively. One hundred twenty-three persons attended the meeting and twelve written comments/responses were received, primarily in support of the project. The following issues were noted from the comments forms received: potential noise impacts (3); property impacts (2); and design concerns. Copies of the meeting notices, meeting handouts, comment sheets/questionnaires, and a Summary of the Public Meeting are included in Attachment D.

Project Website

A website was developed to provide project information and opportunity for the public to submit comments or questions via email (http//75crossings.com). Specific information on the website includes: description of the DCD interchange, including a video that explains how the interchange will operate from a motorist's point of view; a description of access management principles; an overview of the planning process; and information on the public meeting. Print screens of the website pages are provided in Attachment D.

Stakeholder Outreach

IJS Stakeholder Outreach - During the IJS phase of the project, the SAC was involved in the evaluation of the interchange alternatives and selection of the recommended preferred design alternative. Members of the SAC represented various levels of local government, FHWA, KYTC and local residents and businesses. Three SAC meetings were held in 2007 to provide stakeholders with an opportunity to share information and feedback about project issues, as well as express concerns and opinions regarding alternatives being considered. The SAC was structured to provide guidance on issues related to the study area and to the region as a whole. Summaries of the SAC meetings are provided in the IJS (HNTB, 2010).

Stakeholder Outreach During Preliminary Line & Grade/Environmental Studies - Three meetings were held with representatives from local businesses and government officials during the current project phase (September 7, 2011; December 9, 2011; and April 23, 2012). These meetings focused on discussion of how access management concepts would be included in project development. Meeting summaries are included in Attachment D.

Agency Outreach

Resource agency coordination for the project was conducted in conjunction with preparation and review of the environmental baseline studies, including coordination with the Kentucky State Nature Preserves Commission (KSNPC), U.S. Fish and Wildlife Service (USFWS), Kentucky Department of Fish and Wildlife Resources (KDFWR), Kentucky Division of Forestry (KDF), Kentucky Division of Water (KDOW), Kentucky Heritage Council (KHC), and Natural Resources Conservation Service (NRCS). Agency comments are summarized in CE Section 6 by resource.

	YES	NO
2. Was there public or agency controversy on the project? *If "Yes", explain in #*	☐	☒
3. Additional work needed to resolve all public, resource agency, and property owners concerns? *If "Yes" explain plans for resolution in #4 below.*	☒	☐

4. *Describe any unresolved issues:*
Additional public involvement is needed regarding two noise barriers recommended from the project noise analysis (see CE Section 6.I). The location and dimensions of the two barriers will be further developed during Phase II design, and public involvement regarding the noise abatement barriers recommended for further consideration will be conducted in accordance with KYTC noise policy. Identified benefitted receptors/property owners will be notified of a Noise Abatement Public Meeting to provide the opportunity for input regarding the proposed noise barriers.

5. ENVIRONMENTAL COMMITMENTS, MITIGATION, REQUIRED FUTURE ACTIONS AND OTHER COMMENTS

	YES	NO
1. Does the project have environmental commitments, mitigation measures, additional environmental investigations, studies or approvals still to be completed? *If "Yes", DEC should advise Project Manager for consideration of CAP entry in Oracle.*	☒	☐

2. Identify all issues:
Each of the environmental baseline studies completed for the project (Traffic Noise, Phase I UST/Hazmat, Socioeconomic, Ecological, Phase I Archaeology, Air Quality, and Cultural Historic) includes discussion of resource-specific minimization/mitigation measures and environmental commitments to be implemented as the project progresses through detailed design and construction based on resource impacts and agency input. Attachment E includes a tabular summary of the minimization/ mitigation measures that should be considered for further development during the detailed design and construction phases of the project, and environmental commitments that need to be implemented for the project – as compiled from the project baseline studies by resource.

3. Other unique environmental or engineering factors that require consideration through the remaining project development (excess excavation needs, utility considerations, drainage problems, geotechnical issues, topographic constraints, mines, acidic rock, drinking water wells, etc.)

The project occurs in an urbanized area, and utility coordination has been ongoing through project design and will continue until project completion. KYTC District 6 has handled preliminary coordination with utility owners to identify and resolve issues with facilities. A Cincinnati Bell fiber optic cabinet located in the northeast quadrant of the interchange will be avoided by the project. In addition, sanitary sewer relocations are being designed as part of this project. These plans will be coordinated with Sanitation District No. 1 (SD1).

Utilities in the area include the following:

- Boone County Water District: water lines ranging from 2" service lines to 16' mains, as well as fire hydrants;
- Cincinnati Bell: aerial communication lines and fiber optics;
- Duke Energy: gas - service distribution lines up to 8" gas main; electric- overhead lines and poles;
- Insight Communication/Time Warner Cable/Comcast: aerial transmission (cable TV) lines; and
- Sanitation District No. 1 (SD1): 8" sanitary sewer line and manholes.

6. ENVIRONMENTAL CONDITIONS AND CONSEQUENCES

A. Right-of-Way Impacts

	NA	Y	N
1. Does the project require the acquisition of right-of-way?		☒	☐
2. Business or residential relocations required.		☒	☐
No. of relocations: Residential 2 Business: 1 *			
Suitable properties available: Residential: ☒ Yes ☐ No ☐ Unknown *Describe "NO" in A.8*			
Business: ☒ Yes ☐ No ☐ Unknown *Describe "NO" in A.8*			
3. Full or partial property acquisition required.		☒	☐
Estimated acreage: Fee Simple 6.78 Permanent Easement: 0 *			
4. Will excess excavation sites be required?		☐	☒
☐ Designated ☐ Permitted/Available for Contractor ☐ Unknown (must note in Sec. 5)			
5. Property transfer from a State or Federal agency required. *List agency(ies) in A. 8 below*		☐	☒
6. Last resort housing required.		☐	☒
7. Cemetery affected by project		☐	☒

* *If total acreage >10 acres or total relocations are >5 –consult with DEA*
* *If total acreage is >25 acres or total relocations are >10 DEA consults with FHWA*

8. Describe Impacts/Comments:

Property impacts are shown on Exhibit 4 and detailed in the "Socioeconomic Impact Analysis, KY 536 & I-75/I-71 Reconstruction, Boone County, Kentucky; Item 6-14.00" prepared by Stantec (May 2013) and approved by KYTC on July 2, 2013.

Approximately 6.78 acres of new right-of-way will be required from an estimated 37 parcels, most of which are minor strip right-of-way takes, but also include two residential relocations and one business relocation (an auto service center). Additionally, the project involves 43 acres of existing right-of-way. Of the 6.78 acres of new right-of-way required, 1.92 acres are residential, 3.41 acres are commercial, and 1.45 acres are institutional, which include small amounts of new right-of-way from the following facilities: Florence Baptist Church, St. Elizabeth Medical Center, and Sports of All Sorts.

Two residences and one business would be affected by the project and would need to be acquired. A Conceptual Stage Relocation Study completed for this project and included in Socioeconomic Impact Analysis Report indicates that there is an inventory of available comparable housing and businesses in the area; therefore, there should be no issues finding replacement housing and a replacement commercial building for the anticipated displacements. All relocation procedures will be accomplished in accordance with Title VI of the Civil Rights Act of 1966 and the provisions of Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended. All property acquisition will be accomplished in accordance with the KYTC's procedures within the Right of Way Guidance Manual (see Attachment E, Environmental Commitments and Mitigation).

B. Economic Impacts

	NA	Y	N
1. The project will have economic impacts on the regional and/or local economy, such as effects on development, tax revenues and public expenditures, employment opportunities, accessibility, and retail sales.		☒	☐
2. The project will affect established businesses or business districts.		☒	☐

3. Describe Impacts/Benefits to the local economy and summarize methodology used in the analysis of Prime Farmlands and Agricultural Districts including avoidance, minimization and mitigation:

Economic impacts of the project are discussed in detail in the "Socioeconomic Impact Analysis, KY 536 & I-75/I-71 Reconstruction, Boone County, Kentucky; Item 6-14.00" prepared by Stantec (May 2013) and approved by KYTC on July 2, 2013.

Existing Conditions

The project area is located in a rapidly developing suburban setting on the south edge of the City of Florence, Kentucky. Land use in the area, identified on Exhibit 5, is comprised of single family residences (several subdivisions and a mobile home park), various retail and service establishments, health facilities, a church, a community college, and several isolated, undeveloped lots along KY 536, I-71/I-75 and intersecting side roads. Commercial development is concentrated along KY 536 in the area east of the I-71/I-75 interchange, and includes: the Mt Zion Crossing commercial development, located on the north side of KY 536 directly east of Sam Neace Drive; the Daniel's Business Park, located on the south side of KY 536 across from Mt. Zion Crossing; and various businesses at the KY 536/US 25 intersection.

Local Economy

No new access points will be constructed on KY 536 or I-71/I-75 as a result of this project, and no change in regional traffic patterns are expected to occur. Only one business relocation is expected (auto service center), and the project will not have any long-term adverse impacts on employment, income or business activity in the local or regional economy.

The project is expected to benefit/support existing development patterns already in place, underway or planned in the vicinity of the KY 536 & I-75/I-71 interchange by improving traffic flow through implementing access management, intersection improvements, and widening along the KY 536 corridor through this area. From a regional perspective, the project is consistent with economic initiatives outlined in local land use plans. The *2010 Boone County Comprehensive Plan* identifies the area east of the interstate from the project area (Sam Neace Drive) north to Industrial Road, along US 25 and east into Kenton County, as future industrial development – a planned southern expansion of the existing Northern Kentucky Industrial Park, which is the largest industrial center in the metropolitan area. Proposed transportation improvements at the KY 536 & I-71/I-75 interchange will support the continued development of this important economic hub. The *Comprehensive Plan* also identifies additional development (public and institutional uses) around Gateway Community and Technical College, located in the northeast quadrant of the KY 536 & I-71/I-75 interchange. Proposed access improvements by the project will support the development of this area. Additionally, proposed access points on Sam Neace Drive and the Biltmore Blvd. intersection with KY 536 were designed to accommodate development on parcels in that area of the project corridor. Overall, the capacity enhancements and access management improvements proposed as part of the project will accommodate future development, providing safe and efficient access to parcels where growth is anticipated to occur.

During construction, access to local businesses may be temporarily hindered as a result of traffic delays due to construction activities. However, local businesses may also benefit from the sale of goods and services to those involved with the project's construction and there will likely be a short-term increase in construction-related employment and revenues during the construction period. Following project construction, traffic flow in the area and access to commercial development will be improved which will result in potential economic benefits to these facilities.

Prime Farmlands and Agricultural Districts

Areas with mapped prime farmland soils occur in the study area as shown on Exhibit 6; however, the study area is highly urbanized. There are no active or fallow farmlands within the study corridor. A Farmland Conversion Impact Rating Form (Form AD-1006) was submitted to the NRCS on August 29, 2013. The NRCS completed the form on September 10, 2013 and concluded that all areas within the project boundaries are prior converted farmlands and that the project currently does not contain prime, unique, statewide, or local important farmlands. Form AD-1006 and coordination received from NRCS is provided in Attachment F. There will be no cumulative or indirect impacts to agricultural land as a result of the project. The project is consistent with and supports the desired land use and proposed land use changes in the project vicinity as detailed in local land use plans described in Section 6.D of this Checklist.

C. Social Impacts	NA	Y	N
1. The project will affect neighborhoods or community cohesion for the various social groups.	☐	☐	☒
2. The project will affect travel patterns and accessibility (e.g., vehicular, commuter, bicycle, or pedestrian).	☐	☒	☐
3. The project will affect school districts, churches, businesses, police and fire protection, etc. Include the direct impacts and the indirect impacts that may result from the displacement of households and businesses.	☐	☒	☐
4. The project will affect publicly owned park, recreation area, or wildlife or waterfowl refuge. *If "Yes", Section 4(f) must be completed.*	☐	☐	☒
5. Was Land and Water Conservation Fund Act funding used for any purpose at the publicly owned park, recreation area, or wildlife or waterfowl refuge? *If "Yes", Section 6(f) must be completed.*	☐	☐	☒
6. The project will impact the elderly, handicapped, nondrivers, transit-dependent, minority and ethnic groups, or the economically disadvantaged.	☐	☐	☒
7. The project will significantly or disproportionately impact minorities or disadvantaged persons (Environmental Justice, E.O. 12898).	☐	☐	☒

8. Describe Impacts/Benefits:

Social impacts of the project are discussed in detail in the "Socioeconomic Impact Analysis, KY 536 & I-75/I-71 Reconstruction, Boone County, Kentucky; Item 6-14.00" prepared by Stantec (May 2013) and approved by KYTC on July 2, 2013.

Existing Conditions

Land use in the area, identified on Exhibit 5, is comprised of residences development, various retail and service establishments, health facilities, a church, a community college, and several isolated, undeveloped lots along KY 536, I-71/I-75 and intersecting side roads. The project occurs in the Boone County School District, but there are no schools located in the project study area or immediate vicinity. Several community resources, including Florence Baptist Church, Gateway Community and Technical College, Sports of All Sorts, St. Elizabeth's Business Health Center/Sports Medicine Center, and Pediatric Associates, PSC, occur along KY 536 in the project area. Emergency services are provided by the Florence-EMS Fire Department, which is located approximately 2 miles northwest from the study area on Weaver Road.

Transit (bus) service is provided by the Transit Authority of Northern Kentucky (TANK), which has two routes that travel on I-71/I-75 and KY 536 through the project area, including: a) the Walton Express (Route 22X), which provides weekday morning and evening service between Cincinnati, Ohio and Walton, Kentucky and stops at the Mt. Zion Park and Ride located in the project corridor on the south side of KY 536 east of the interchange (see Exhibit 4); and b) the Gateway Shuttle, which provides service for Gateway Community and Technical College students, faculty and staff Monday through Thursday when school is in session, connecting three Northern Kentucky Gateway campuses.

Residential development in the project area mostly occurs to the west side of I-71/I-75 and in the southeast quadrant of the existing interchange, and include (see Exhibit 5):

- Triangle Subdivision: West of the interchange and south of KY 536, with access via Tiburon Drive from KY 536.
- Highland Acres: East and west sides of the interchange, south of KY 536, with access via Highland Drive from KY 536 west of the interchange and via Biltmore Blvd. from KY536 east side of the interchange.
- Southampton Estates: West of the interchange, with access via Tiburon Drive off of KY 536.
- Sherwood Lakes Subdivision: East of the interchange and south of KY 536, with access via Sherwood Lakes Drive from KY 536.
- White Pine Village: East of the interchange and south of KY 536, with access via White Pine Drive off of US 25.
- Greenlawn Mobile Home Park: East of the interchange and south of KY 536, with access via Greenlawn Avenue off of US 25 and via Berberich Drive off of KY 536.

Neighborhoods/Community Cohesion

The project is not expected to adversely impact neighborhoods or community cohesion because the project will not bisect or isolate existing neighborhoods or eliminate access to local communities. The main impact will result from project right-of-way requirements, which involve the relocation of two residences and one business. A Conceptual Stage Relocation Study prepared for

this project as part of the Socioeconomic Impact Analysis indicated that there is adequate replacement housing available in the general project area and several available commercial lots that could accommodate the displaced business within the Florence, Kentucky zip code area. The project will also require a small amount of strip right-of-way from Florence Baptist Church, St. Elizabeth Medical Center, and Sports of All Sorts. No impacts to structures at these three properties will occur. Impacts to a small prayer garden on the Florence Baptist Church property may occur due to construction of a new access road from KY 536 to the church and the adjacent Woodspring Apartment complex, which will be mitigated through KYTC's right-of-way acquisition process. Access to residential areas and community facilities may be temporarily hindered as a result of traffic delays during construction. Following project construction, improved traffic flow through the project area and a new multi-use path and sidewalk facilities are expected to improve connectivity between existing neighborhoods and adjacent retail and commercial uses in the area and enhance safety.

Environmental Justice

An environmental justice analysis performed for the project area using the U.S. Environmental Protection Agency's EJView utility (USEPA, 2011) indicates that there are 2,161 persons residing in census block groups located within and immediately adjacent to the project study area based on the 2010 U.S. Census. Of these, an estimated 18% are of a minority population group, which is almost double the percentage for all of Boone County (9.5%) and higher than for all of Kentucky (12.2%). Less than 17.5% of the population of the project area lives below the poverty level, which is above the percentage living below poverty level for all of Boone County (7.5%) and slightly below that for all of Kentucky (18.1%). Environmental justice documentation is provided in Attachment G.

There are only two residential property relocations anticipated by the project, and a Conceptual Stage Relocation Study indicates that adequate replacement housing is available in the general project area. There will be no substantial changes in property access, access to community resources/services, traffic patterns, or social or economic activities as a result of the project. Based on review of available social, economic, and demographic information, the project is not anticipated to result in any disproportionately high and adverse impacts to minority or low-income populations which reside within the study area. Nor is the project anticipated to result in the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations. The project is not expected to result in any cumulative or indirect impacts to environmental justice populations. Improving traffic flow, safety, and pedestrian and bike access along KY 536 will improve mode choice and improve mobility for low income populations in the area. Additionally, the project team determined that the residents of these two properties affected were not low-income, nor were they identified as a protected minority population. The evaluation and finding of these two residential relocations is documented in the Socioeconomic Impact Analysis Addendum #1, KYTC Item #6-14 (see Appendix G). Based on this evaluation and finding, the project will not have a disproportionate or adverse effect on any minority or low-income population in accordance with Executive Order 12898 and Department of Transportation Order 5610.2(a).

Travel Patterns and Accessibility

Because the proposed transportation improvements will primarily occur on or immediately adjacent to the existing KY 536 alignment, there will be no long-term impacts to regional travel patterns. The new DCD interchange configuration will result in the need for the traveling public to learn and adjust to the new on/off ramp and through traffic travel patterns. Information and graphics depicting the traffic flow of the new configuration have been shown at public meetings. A Public Information Plan will be developed to inform the motoring public and area stakeholders of project information including a Temporary Traffic Control Plan. The KYTC District Public Information Officer will also coordinate and disseminate to stakeholders and the media appropriate project information regarding construction plans and changes to travel patterns. Other opportunities to educate and notify the traveling public will be provided during project implementation through KYTC's Central Office web site, KYTC's District 6 web site, KYTC's social media sites (Facebook and Twitter), and through a KYTC press release prior to opening. In addition, signage directing traffic on and off the ramps and notifying the public of travel pattern changes at the interchange will be provided as part of the project. Finally, changes to travel patterns will made be made available at the project's web site at http://75crossings.com/ky-536/

The project is expected to require minor re-configuration of several parking spaces at the Mt. Zion Park and Ride (serviced by TANK Route 22X), but overall there will be no net loss in available parking area at this facility and no long-term impact on transit users.

The proposed transportation improvements include a proposed multi-use path, sidewalks along the north side of KY 536, and sidewalk extensions along road improvements to Biltmore Blvd. and Demia Way. The new multi-use path and sidewalk facilities associated with the project are expected to improve connectivity between existing retail, residential and commercial land uses in the study area, enhance safety for pedestrians and bicyclists in the area, and present a greater mode choice for the traveling public.

During construction, access and travel times for local travelers, bus transit (TANK) users, and police, fire, and emergency services could be temporarily impacted (travel delays) as a result of lane closures and other construction activities. No major detours are

expected to occur as a result of project construction. A Maintenance of Traffic (MOT) plan, which will be finalized during detailed design, will be developed to have minimal impact to local traffic and emergency services (see Attachment E, Environmental Commitments and Mitigation), and the District will coordinate with TANK prior to construction activities regarding bus routes through the area. Further detail regarding the MOT is provided in the Construction Impacts section of this form (see Section 6.N.). Once construction is complete, accessibility, travel efficiency, and safety in and throughout the project area will be improved.

D. Local Land Use and Transportation Plan	NA	Y	N
1. Project consistent with local land use plan. *(NA if no plan exists)*	☐	☒	☐
2. Project consistent with local transportation plan. *(NA if no plan exists)*	☐	☒	☐
3. Project would induce adverse or beneficial secondary and cumulative effects.		☐	☒
4. Are there any existing and/or planned bike or pedestrian walkways		☒	☐

5. Describe Impacts:

Local Land Use Plans

The project is identified in the *2010 Boone County Comprehensive Plan* and compatible with the future land use recommendation in this plan for residential, industrial and commercial development (see Attachment H). Neighboring Kenton County zoned approximately 3,535 acres of land along KY 536 about two miles east of the project study area from agricultural land use to a residential/light industrial mix (*South Banklick Small Area Study Report*, Northern Kentucky Area Planning Commission, 2006). The Boone County Planning Commission developed the *2000 Union Town Plan* to address significant residential growth anticipated for the City of Union, located just 2.5 miles west of the project area. Improvements to the KY 536 corridor are compatible with this plan by providing better traffic flow and reducing traffic congestion resulting from this residential growth.

Transportation Plans

The KY 536 & I-71/I-75 Interchange Reconstruction Project is listed on KYTC's Statewide Transportation Improvement Program for FY 2013 – 2016 as Items 6-14.00 and 6-14.02 on page 4 of 127. The project also is listed as Item 6-14.00 and 6-14.02 in OKI's Fiscal Years 2014-2017 Transportation Improvement Program (2013) on page BOO 8-4, and is listed on KYTC's FY 2014-2020 Six-Year Highway Plan as Item 6.14.00. STIP/TIP documentation is provided in Attachment A.

The proposed project is also compatible with several other transportation projects planned for the Northern Kentucky area that are designed to provide system-wide improvements to the region (see Attachment A), including two adjacent improvement projects along KY 536 and one adjacent project along I-71/I-75:

- KYTC Item No. 6-158, which involves widening KY 536 to five lanes west of the I-71/I-75 interchange. Construction to begin in 2017;
- KYTC Item No. 6-162, which will widen KY 536 to a four-lane divided roadway east of US 25. Construction date undetermined;
- KYTC Item No. 6-14.5, which will extend auxiliary lanes along both directions of the interstate from the KY 536 interchange to US 42, and also includes widening to the entrance and exit ramps for the KY 536 interchange. Construction to begin in 2018.

Additionally, KYTC Item No. 6-18.00 includes the reconstruction of the KY 338 interchange on I-71/I-75, located approximately 4.5 miles south of the KY 536 interchange.

Pedestrian and Bicycle Facilities

Sidewalks are limited in the project area, with the only sidewalk along existing KY 536 occurring on the south side of the roadway for one block between Sherwood Lakes Drive and Demia Way. There are no bicycle facilities or shared use paths in the project area. The proposed project includes the construction of a new shared new path along the north side of KY 536 from Tiburon Drive eastward to US 25, where there currently are no pedestrian and bike facilities (see Exhibit 2). This proposed shared use facility is part of a planned regional multi-use trail network for Union, Walton, unincorporated Boone County, and Kenton County, and also links to planned pedestrian and bike projects included in the 2002 Florence Pedestrian and Bike Plan, located to the west of the project area (see Attachment H).

Sidewalks are also proposed along the south side of KY 536 east of the interchange, from Biltmore Blvd. to the east project terminus. Sidewalk extensions also will be constructed alongside road improvements to Biltmore Blvd. and Demia Way, which will link to an existing sidewalk extending to the Mt. Zion Park and Ride in this vicinity (service by TANK bus transit). There are no adverse cumulative or indirect impacts to pedestrian and bicycle facilities expected as a result of this project. The new shared path and sidewalk facilities associated with the project are expected to improve mobility and present a greater mode choice for the traveling public. These facilities also will provide better connectivity between the residential areas and commercial areas in the study area.

Secondary and Cumulative Effects

The project area has experienced a significant amount of residential and commercial development as it is located in the rapidly developing Boone County and near the City of Florence. This project involves the improvement of existing transportation facilities (KY 536 & I-71/I-75 interchange and KY 536) and access management along KY 536. There will be no new access to undeveloped areas as a result of this project and no changes in regional traffic patterns are expected to occur. The project is expected to result in improved traffic flow through this rapidly developing area; however, the project is not expected to induce land use changes that are not currently either planned or proposed. In addition, the proposed project is consistent with the *2010 Boone County Comprehensive Plan* and other local planning initiatives. Any secondary impacts that may occur as a result of additional development in the project area following project construction are already underway in the area or planned.

E. Historic Resources

	NA	Y	N
1. Are NRHP listed eligible/potentially eligible sites/districts present within the project viewshed?		☐	☒
If "No", document means for assessing ages of structures within project viewshed or attach memorandum from DEA historian documenting no historic properties affected.			
If "Yes", indicate level of impact:			
☐- "No Effect" *(attach SHPO concurrence letter or DEA Historian memo)*			
☐- "No Adverse Effect" *(attach SHPO concurrence letter)*			
☐- "Adverse Effect" *(attach FHWA and SHPO concurrence letter)-Section 4(f) may need to be completed.**			
Memorandum of Agreement is required? SHPO signature date: _____	☒	☐	☐
** If Individual 4(f) required, project is not eligible for CE Level 1 or 2*			

2. Describe historic resource impacts:

There are no properties within the Area of Potential Effect (APE) for this project that are on or eligible for listing on the National Register of Historic Places (NHRP), therefore the project will have No Effect on historic resources.

The historic resources survey is documented in "A Cultural-Historic Survey of the Proposed Reconstruction of the I-71/75 and KY 536 Interchange in Boone County, Kentucky (Item No. 6-14.00)" prepared by Corn Island Archaeology, LLC dated December, 2013. A letter of concurrence from the Kentucky State Historic Preservation Officer (SHPO) dated March 12, 2014 is included in Attachment I.

F. Archaeological Resources	NA	Y	N
1. Does project involve the acquisition or easement of new right of way		☒	☐
2. Are new right-of-way areas undisturbed? *If "No" state basis for conclusion in box F.9.*		☒	☐
3. Are known archaeological resources affected by the project (per OSA database)		☐	☒
4. Is there potential for archaeological resources within the project? *If "Yes" to #2 or #3, consult with DEA District archaeologist for survey.*		☐	☒
5. Will project impact archaeological resources. *If "Yes", list site number(s) that can not be avoided:* _____		☐	☒
6. Are/were sites recommended for Phase II work? *(attach SHPO concurrence letter)* *If "Yes", list site number(s):* _____		☐	☒
7. Are NRHP eligible/potentially eligible sites affected by the project?		☐	☒
8. *If "Yes", indicate level of impact; If "No", attach SHPO concurrence letter:* ☐- "No Adverse Effect" *(attach SHPO concurrence letter)* ☐- "Adverse Effect" *(attach FHWA and SHPO concurrence letter)-Section 4(f) must be completed if preservation in-place is required.** Memorandum of Agreement required? SHPO signature date: _____ FHWA signature date: _____	☒	☐	☐
8. Is Native American Consultation (NAC) required? *If "No", explain why in F.9 below; If "Yes", document dates of consultation below and describe the outcome in F.9 below.*		☐	☒
Dates NAC conducted: Phase I _____; Phase II _____; MOA _____ FHWA Closure Date: Phase I _____; Phase II _____; MOA _____			
Tribal request for additional consultation: Phase I	☒	☐	☐
Tribal request for additional consultation: Phase II	☒	☐	☐
Tribal request for additional consultation: MOA	☒	☐	☐
Further Native American Consultation is required	☒	☐	☐

9. Describe archaeological resource impacts:

A "Phase I Archaeological Survey of the Proposed Reconstruction Of KY 536 Interchange to a Double Crossover Diamond Type Interchange, I-71/75 Boone County, Kentucky (Item No. 6-14.00)" prepared by Corn Island, LLC (December 12, 2013) identified one previously recorded archaeological site (15BE660 (remnants of a historic church)) in the project's area of potential effect (APE). The Phase I study recommended no further archaeological investigation of the site due to previous disturbance and low research potential, and concluded that it was not eligible for listing in the NRHP. A letter of concurrence from the SHPO was received March 12, 2014 and is included in Attachment I.

The Phase I Archaeological Survey also noted two cemeteries that were once possibly located within the project APE, just east of the KY 536 interchange with I-71/I-75, on both the north and south sides of KY 536; the archival records suggested that one cemetery was moved, and no documentation regarding the second cemetery was found. Due to lack of documentation regarding these potential cemeteries, the Phase I study recommended that during construction, these areas be closely monitored for any presence of human interments, including but not limited to human remains, grave markers, and/or casket pieces such as wood or hardware. If human remains are discovered, all work must stop immediately and the County Coroner and SHPO must be notified (see Attachment E, Environmental Commitments and Mitigation).

The Phase I investigation did not identify any areas of Native American interest; therefore Native American consultation is not required.

G. SECTION 4(f)	NA	Y	N
1. Are 4(f) properties affected by the project? *If "Yes", notify DEA EPM who will consult with FHWA to determine applicability of Section 4(f).*		☐	☒
2. Is the project adjacent to a 4(f) resource? *If "Yes", DEA EPM consults with the FHWA to determine applicability of "constructive use." f Questions 1 and 2 are both "No" , go to Section H.*		☐	☒
3. Prudent and feasible means to avoid 4(f) properties were fully considered but resource can not be avoided *Only determined in consultation with FHWA; indicate 4(f) type below.*	☒	☐	☐
☐ Deminimis Finding ☐ Programmatic Section 4(f) ☐ Full Section 4(f) Statement			
*If an Individual 4(f) Statement is required, the project **cannot** be completed as a CE Level 1 or 2. However, if the impacts can be satisfied by completing a Programmatic 4(f) Statement or a Deminimis Finding, the CE **can** be completed as a CE Level 1 or 2.*			
4. Describe process followed, consultation completed and attach documentation developed to resolve 4(f) issue:			
There are no Section 4(f) properties in the project area based on review of available mapping and site visit, and cultural/archaeological studies conducted for the project concluded that there would be no impact on any resources listed on or eligible for the NRHP. Therefore there are no Section 4(f) impacts by the project.			

H. SECTION 6(f)	NA	Y	N
1. Are 6(f) properties affected by the project? *If "Yes", consult with DEA and FHWA to determine applicability of Section 6(f).* *		☐	☒
2. Has discussion been initiated with the Governor's Office of Local Development and the agency having responsibility for the administration of the publicly owned park, recreation area, or wildlife or waterfowl refuge.	☐	☐	☒
3. Will a Memorandum of Agreement be required? Final Signature Date: _____	☐	☐	☒
** Project may only be processed as a CE Level 3 if Section 6(f) applies.*			
4. Describe parties involved, property involved, process followed and consultation completed to resolve 6(f) issue:			
There are no Section 6(f) Land and Water Conservation Fund (LWCF) properties in the project area based on review of the National Park Service database, therefore there will be no Section 6(f) impacts by the project. See Attachment J for a list of LWCF properties in Boone County.			

I. Noise Impact (23 CFR Part 772)	NA	Y	N
1. There are noise sensitive receivers/land uses adjacent to the proposed project (e.g. residences, businesses, schools, parks, etc.).		☒	☐
2. Indicate if any of the following are applicable, which would necessitate a noise analysis: ☐ New roadway on new alignment; ☒ Addition of one or more through travel lanes; ☐ Significant change in vehicle mix or traffic speed; ☐ Significant change in horizontal or vertical alignment; ☐ A change in roadway character that substantially reduces the shielding effect of landforms or noise barriers.		☒	☐
3. Noise analysis demonstrates that noise impacts exceed the KYTC Noise Abatement Criteria Policy. *If "Yes", a significant impact may be associated with this project. Consultation with DEA is required.*		☒	☐
4. There are feasible and reasonable measures that can reduce impacts. *If "Yes", discuss in I.5 below*		☒	☐

5. Describe noise impact and abatement measures (if applicable):

A "Traffic Noise Impact Analysis for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" (Stantec, November 2013) in accordance with FHWA Title 23 Code of Federal Regulations Section 772.13 and the KYTC Noise Analysis and Abatement Policy (July 13, 2011) was prepared for the project and approved by KYTC on November 26, 2013. The noise study predicted sound levels under existing and Design Year (2030) No Build and Build conditions for 105 representative noise-sensitive receptors located within six analysis sites along the proposed project (see Exhibit 7). Modeling results predicted noise impacts at five of the six analysis sites (Sites A, B, C, E and F), and noise barriers were recommended for further consideration at two locations based on feasibility, cost-effectiveness and ability to meet KTYC noise-reduction design goals:

- Analysis Site A (Barrier A): Located in the northwest quadrant of the interchange along the Woodspring Apartments Complex, the recommended 1,680 foot-long barrier provides a 5 dBA benefit to 84 of 107 impacted Site A receptors (79%), and a minimum 7 dBA reduction for 40 of 92 benefitted receptors (43%); Barrier A has a cost per benefitted receptor of approximately $9,405.

- Analysis Site B (Barrier B): Located in the southwest quadrant of the interchange in a residential area along Highland Drive, the recommended 2,424 foot-long barrier provides a 5 dBA benefit to all 26 impacted Site B receptors (100%), and a minimum 7 dBA reduction for 21 of 50 benefitted receptors (42%); Barrier B has a cost per benefitted receptor of approximately $23,460.

The final locations and dimensions of noise barriers will be determined during Phase II design. Public involvement regarding the noise abatement barriers recommended for further consideration (Barriers A and B) will be conducted in accordance with KYTC noise policy. Identified benefitted receptors/property owners will be notified of a Noise Abatement Public Meeting to be held to provide opportunity for input regarding inclusion of these noise mitigation measures into the project (see Attachment E, Environmental Commitments and Mitigation).

For the remaining sites with predicted noise impacts, structural noise abatement was determined not feasible at Analysis Sites E (along KY 536 west of the interchange) and F (along KY 536 east of the interchange) due to the need to preserve existing access points to residential properties. For Analysis Site C (along I-71/I-75 in southeast quadrant of the interchange), no barrier design could be achieved that met both cost-effectiveness and KYTC design goal requirements of reasonableness; therefore, a noise barrier for Site C was deemed not reasonable for construction.

J. Air Quality Impacts	NA	Y	N
1. The project is located in an air quality nonattainment or maintenance area		☒	☐
2. The project is listed in an approved STIP and/or TIP. *If not in STIP, notify DEA SME* STIP # FY 2013-2016 Page # 4 of 127 TIP Page # BOO 8-4		☒	☐
3. Is project controversial *or* does the project HAVE or ADD a signalized intersection with a projected "open to traffic" year ADT > 80,000 vehicles per day? (*If "Yes" analysis may be required. Clearance memo from DEA SME is required and must be attached. If "No", check box below)* ☒ This project does not exceed the Kentucky CO screening criteria for project-level analysis and is not expected to produce a violation of the CO standards (35 ppm over a one-hour period or 9 ppm over an eight-hour period)		☐	☒
4. Is the project type included in the Exempt Project list found at 40 CFR 93.126? *If "Yes", indicate project type as described in the list:* _____ *If "No", contact DEA SME for assistance and attach related correspondence.* ☐ Project is considered to be exempt or of no potential for meaningful MSAT effects.		☐	☒
5. The project is in an area requiring PM 2.5 consideration (Boone, Boyd, Bullitt, Campbell, Jefferson, Kenton or part of Lawrence) Date Inter-agency Consultation completed February 13, 2014; Project Status: ☐ Exempt ☒ Not Exempt, Not of Concern ☐ Of Concern *If PM 2.5 analysis is required, attach checklist, consultation emails, etc. to document findings.*		☒	☐

6. Impacts/Comments:

Air Quality impacts of the project were evaluated in the technical memorandum titled "NEPA Documentation - Air Quality" (Stantec, February 2014) and approved by KTYC on February 19, 2014. Project determinations for the common transportation-related air pollutants ("criteria pollutants") are as follows:

Carbon Monoxide: None of the signalized intersections in the project area have a projected average Opening Year (2017) ADT volume which approaches 80,000 vehicles per day; therefore the project will not produce a projected violation of the CO standards.

Lead, Nitrogen Dioxide, Particulate Matter PM_{10}: All areas in Kentucky are in attainment for these pollutants.

Sulfur Dioxide: This pollutant is an industrial source concern (not a mobile source concern) and Boone County is in attainment.

8-Hour Ozone - Boone County is listed by USEPA as marginal nonattainment for ozone; however, the project is listed in the STIP/TIP.

Particulate Matter (PM2.5): Boone County is listed by USEPA as a maintenance area for $PM_{2.5}$. A $PM_{2.5}$ Project Level Checklist was prepared for the project, classifying the proposed improvements as "non-exempt, not of air quality concern" with regard to $PM_{2.5}$, and submitted for Interagency Consultation (IAC) in December 2013. OKI, the Kentucky Division of Air Quality (KDAQ), and the FHWA – Kentucky Division concurred with this classification on February 13, 2014, and concluded that no $PM_{2.5}$ hot spot analysis is required for the project. Copies of the $PM_{2.5}$ checklist and IAC concurrence are included in Attachment K.

Mobile Source Air Toxics (MSATs): A qualitative MSAT Analysis was completed for this project (as part of the "NEPA Documentation – Air Quality tech memo; Stantec, February 14, 2014) and approved by KYTC on February 19, 2013. This analysis concluded that there would be no appreciable difference in estimated vehicle miles traveled (VMTs) under the Build and No Build alternatives and, therefore, no appreciable difference in overall MSAT emissions between the two alternatives. In addition, regardless of whether or not the proposed project is constructed, design year emissions will likely be lower than present levels as a result of EPA's national control programs for vehicle and fuel regulations which are projected to reduce MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

K. Hazardous Materials	NA	Y	N
1. Are known or potentially contaminated sites (service stations, landfills, automotive repair, junkyard, structures with asbestos, etc.) along the project corridor.		☒	☐
2. Is ROW required from, or extensive excavation required adjacent to a potentially contaminated site? *If "Yes" Phase II testing is required and should be completed prior to ROW authorization request. Deferral must be approved by FHWA.*		☒	☐
3. Phase II analysis indicated the existing and/or proposed ROW is contaminated. *Extent and estimated remediation cost to be provided by DEA SME to Div. of ROW and Project Team.*	☒	☐	☐
4. Will any bridges or standing structures be demolished for completion of the work? Status of inspection of bridges and structures for asbestos containing materials (ACM) ☐ Complete ☒ Required ☐ Not Required *(Identify bridges and structures, discuss results of assessment, if completed, reason not required or future work in K.6 and Sec. 5)*		☒	☐
5. If bridges are to be removed, refurbished or repainted, will there be lead-based paint wastes to address?	☒	☐	☐
* *If more than minor amounts of ACM, project may not be eligible for CE Level 1 and DEA must be consulted.*			

6. Discuss significance of any "Yes" marked in 1-5 and any deferred necessary activities (deferrals also discussed in Section 5 - Commitments):

A "Phase I Site Assessment of Hazardous Materials/USTs for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" was prepared by Stantec (April 2013) and approved by KYTC on February 28, 2014. A total of 117 properties were evaluated, two of which were recommended for additional Phase II site assessment: 1) the Sunoco/75 Express Mart, located at 430 Mt. Zion Road (KY 536) and; 2) the United Dairy Farmers convenience store and Mobile gas station, located at 8577 Dixie Highway (US 25). The Sunoco/75 Express Mart site has three underground storage tanks (USTs), six fuel pumps, and a ground-mounted transformer on site. Preliminary construction limits indicate disturbance to the property along KY 536 extending from existing right-of-way, leading up to the existing pump islands and canopy in the proximity of the existing USTs. A Phase II ESA is recommended to be conducted at the location of the USTs, pump islands and petroleum conduits in proximity to the construction limits to investigate the potential for petroleum contamination of soils. The United Dairy Farmers was identified as a site with "petroleum leak/monitoring wells." The property is adjacent to the proposed alignment, and new strip right-of-way is expected to be required along US 25 north of the existing driveway entrance in an area currently existing as landscaped grounds. A Phase II ESA is recommended to investigate the site for potential soil contamination by petroleum products.

In addition, KYTC will sample and analyze all structures prior to demolition for asbestos-containing materials. The Phase II ESA and asbestos inspections are included as Environmental Commitments for the project (see Attachment E).

No bridge structures will be removed by the project however a modification to the northern abutment of the existing I-71/I-75 bridge is needed for construction of a retaining wall within the existing slope wall in order to accommodate the proposed 10-foot wide shared use path. The existing slope wall is earth with aggregate cover and will be excavated to provide the horizontal clearance to accommodate the construction of the retaining wall. No other modifications to the existing I-71/I-75 structure are required.

L. Threatened and Endangered Species (T&E)	NA	Y	N
1. Sources considered to identify potential impacts to federally threatened and endangered species (attach copies): ☒ USFWS Species List ☒ KSNPC website ☒ KDFWR web site (see Attachment I - Agency Coordination) Species Identified: Indiana bat (Myotis sodalis); Running buffalo clover (Trifolium stoloniferum); Pink mucket (Lampsilis abrupta); Orangefoot pimpleback (Plethobasus cooperianus); Clubshell (Pleurobema clava); Rough pigtoe (Pleurobema plenum); Fanshell (Cyprogenia stegaria); Ring pink (Obovaria retusa); Sheepnose (Plethobasus cyphyus) The Northern long-eared bat (Myotis septentrionalis) was listed as Potential Endangered on October 2, 2013, after the completion of the Ecological Resources Impact Assessment for this project. Listing of this species is expected to occur in October, 2014.		☒	☐
2. Habitat Assessment indicates Federally listed T&E habitat present in vicinity No Effect determined for: listed mussels (no habitat, no effect all species), Running Buffalo Clover (no habitat, no effect), and Indiana bat (no habitat finding for winter habitat only) BA required for: Northern long-eared bat		☒	☐
3. Indiana bat *(Check all that apply)*: ☐ To be Determined ☐ No Effect; ☐ KYTC NLTAA Finding; ☒ IBCF; ☐ Tree Cutting Restrictions ☐ BA Complete; ☐ BA to be scheduled; ☐ To be Determined			
4. Project located upstream of or within Designated Critical Habitat *(Consultation with DEA required)*		☐	☒
5. Biological Assessment required: ☐ Completed (attach USFWS letter) ☒ To complete before Construction *(CAP entry recommended and include in Section 5)*	☐	☒	☐
6. Project may adversely affect federally listed T&E (formal consultation required)*	☐	☐	☒
** If the project is likely to affect a Federally listed T&E species it is not eligible for CE Level 1 or 2 and DEA and FHWA must be consulted.*			

7. Describe T&E species concerns/protective measures:

An "Ecological Resources Impact Assessment for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" was prepared by Stantec (May 2013) and approved by KYTC on July 9, 2013. No federal-listed species reported by resource agencies as possibly occurring in the project area were observed during field surveys conducted for this project. However, potential suitable habitat for endangered bats was noted in the area, consisting of five potential bat roost trees and 2.1 acres of wooded habitat (potential foraging area) within the preliminary project construction limits.

Agency correspondence is included in Attachment I. Attachment L includes KYTC DEA's No Effect Finding (dated June 30, 2014) for listed mussels (no habitat, no effect all species), Running Buffalo Clover (no habitat, no effect), and Indiana bat (no effect finding for winter habitat only).

Prior to construction, KYTC will enter into an Indiana Bat Conservation Memorandum of Agreement (IBCMOA) with the USFWS to account for loss of Indiana bat summer roosting habitat. Additionally, the Project Team commits to a biological assessment (BA) for the Northern long-eared bat prior to construction. These are included as Environmental Commitments in Attachment E of this CE.

M. Water Resource Impacts	NA	Y	N
1. Project impacts State Listed Special Use Waters or tributaries to a Special Use Water? *(indicate all types below and consult DEA Permit SME prior to issuance of the CE)* ☐ Cold Water Aquatic Habitat ☐ Outstanding National Resource Water ☐ Exceptional Waters ☐ Reference Reach Stream ☐ Outstanding State Resource Water ☐ State Wild River ☐ Federally Designated Wild River ☐ Federally Designated Scenic River ☐ Federal T&E Species		☐	☒
2. Project will involve surface disturbance greater than one acre *If "Yes", note need for KPDES KYR10 storm water permit in box M.11.* Surface area expected to be disturbed by the project is an estimated 50 acres.		☒	☐
3. Project is located partially or wholly within a designated MS4 community *If "Yes", identify any local ordinances, restrictions, local permits or other local requirements that require consideration before, during & after construction and specify in box M.13 below and, if appropriate, Section 5.* The project is located in the local MS4 areas of the City of Florence and Sanitation District No. 1 of Northern Kentucky; however, proposed project activities are covered under KYTC's MS 4 permit (KPDES No. KYS000003) and no additional local MS4 requirements are anticipated.		☒	☐
4. Project encroaches upon 100 year floodplain *If Yes, determinations regarding No Rise Certifications, FEMA Map Revisions, etc. to be made by KYTC Design, Drainage Section during final design.* There are no FEMA 100-year floodplains within the project corridor (see Exhibit 8).		☐	☒
5. Project could potentially impact surface or groundwater drinking water supplies (public or private) Based on information from the Kentucky Geologic Map Information Service online database of wells, there are four wells within the study area as shown on Exhibit 9. They are identified as monitoring wells at the Sunoco gas station within the study area and are not used for drinking water. There are no designated KDOW wellhead protection areas in the project area. The Boone County Water District purchases water from the Boone Florence Water Commission (BFWC)/ Greater Cincinnati Water Works (GCWW), which is treated surface water from the Ohio River. GCWW has a source water protection program in place, however, none of the public water supply intakes for the GCWW are located in the project area (they are located on the Ohio River), and the project does not occur within the designated GCWW protection area boundaries. The easternmost end of the project area, in the vicinity of the KY 536/US 25 intersection, is located at the edge of a Zone III portion of the Northern Kentucky Water District Source Water Assessment and Protection Program Area (SWAPP), which is the protection area furthest from the intake (see Exhibit 10). Because there are no residential drinking water wells or public water supply intakes within the project area, impacts to drinking water sources are not expected.		☐	☒
6. Project involves impacts to a stream below Ordinary High Water Mark (OHWM) *(If answer is "No" then the reply to questions 7 and 8 will also be "No")* Estimate total number of impacts below OHWM 517 feet Identify all applicable types of impact occurring below OHWM: ☐ Bridge/Pier Abutment ☒ Relocation/Channelization ☐ Temporary Diversion ☒ Culvert ☐ Low Water Crossing ☐ Excess Excavation Site ☐ Bank Stabilization ☒ Other (describe): Fill/grading		☒	☐

	NA	Y	N
7. Project involves impacts below the OHWM to streams defined as ephemeral? Estimate length and area of the single largest ephemeral impact: 41 feet and 0.003 acres *For largest single impact: <0.1 ac = ACE LON; between 0.1 and0.5 ac = ACE NW; > 0.5 acre = ACE IP*		☒	☐
8. Project involves impacts below OHWM to streams defined as intermittent or perennial? Estimate length and area of the single largest intermittent/perennial impact: 441 feet and 0.03 acres *Impact <300' = ACE LON; Impact between 300' & 500' =ACE NW + mitig.; Impact >500' = ACE IP + mitig* *Impact <0.1 ac=ACE LON; Impact between 0.1 ac & 0.5 ac=ACE NW+mitig; Impact >0.5 ac=ACE IP +mitig* *Impact >300'= Ind. WQC + mitig.; Cumulative impact in HUC 14>500' = Ind. WQC +mitig.*		☒	☐
9. Project will impact a lake or pond requiring its draining or filling (note characteristics below) ☐ A stream enters the lake or pond ☐ A stream exits the lake or pond *If stream is exiting lake or pond, 404 permit is required*		☐	☒
10. Project will result in loss of a Special Aquatic Site (SAS) *(indicate types below)* ☐ Riffle Pool Complex (#) _____ ☒ Wetland (estimated acreage) 0.117 acres Wetland consideration/delineation: ☐ Project affects areas delineated as wetlands on the National Wetlands Inventory Map ☐ Project affects soils designated as hydric, hydric inclusive or potentially hydric on the County Soil Survey ☒ Project affects areas identified by field inspection as having wetland characteristics ☒ Wetland boundaries delineated by *(name):* Michael de Villiers; Bill Leopold ☒ Project Team has evaluated all practicable alternatives and minimization measures to the proposed construction in wetlands? ☒ Project Team has complied with the Wetlands Finding Agreement? *If "No", the project can not be approved as a CE* *If > 5.0 acres wetland impact, project may not be eligible for Level 2 (consult with FHWA)*		☒	☐
11. Permit Requirements 401/404 Permits are likely to be required for this project *(indicate type below and in Section 5)* *If any permits are expected to be required, submit CE Request for Assistance to DEA SME* Stream/Lake/Pond Impacts: ☒ ACE LON; ☒ ACE NW; ☐ ACE IP; ☒ DOW IWQC Mitigation required by: ☒ ACE; ☐ DOW Wetland Impacts: ☐ ACE LON; ☒ ACE NW; ☐ ACE IP; ☐ DOW IWQC Mitigation required by: ☒ ACE; ☐ DOW		☒	☐
Will this project affect navigable Waters of the U.S. as defined by USACE and require a Section 10 permit? *If "Yes", then coordination with DEA is required*		☐	☒
Will this project affect a navigable water body requiring a Coast Guard, Section 9 permit? *If "Yes", then coordination with Div. of Structural Design is required.*		☐	☒
Will this project require a KPDES storm water permit (KYR10) for construction?		☒	☐
Will this project require any additional permits from a local MS4? *(discuss requirements in box M.13)* Although the project is located in local MS4 areas (City of Florence and Sanitation District No. 1 of Northern Kentucky), proposed project activities are covered under KYTC's MS 4 permit (KPDES No. KYS000003) and no additional local MS4 requirements are anticipated.		☐	☒

	NA	Y	N
Will construction in the floodplain require analysis and coordination by KYTC Design-Drainage Section to assure that potential flooding impacts are thoroughly addressed?		☐	☒
12. Project is within the watershed of a significant Water Resource (private or public drinking water supply, wellhead protection area, Special Use Waters, etc.) ☐ Project is candidate for application of KYTC Karst Policy		☐	☒

13. Describe Water Resource Investigations Conducted, Impacts Identified and Permits Required:

Potential impacts of the proposed project on water resources were evaluated and presented the "Ecological Resources Impact Assessment for the KY 536 & I-71/&5 Interchange Reconstruction, Boone County, Kentucky; Item 6-14.00" prepared by Stantec (May 2013) and approved by KYTC on June 18, 2013. Potential impacts and anticipated permit requirements include:

Stream Impacts

Seven surface streams were identified in the project study area, four of which are expected to be impacted by the proposed project (occur within the proposed construction limits), for a total impact length of 517 linear feet. These streams, which are unnamed tributaries to South Fork Gunpowder Creek, are identified on Exhibit 11, and include:

- Unnamed Tributary #1 (Sample Site S1): USGS intermittent; 441 feet of impact due to the relocation of a roadside ditch
- Unnamed Tributary #2 (Sample Site S2): non-USGS ephemeral; 17 feet of impact due to fill placement
- Unnamed Tributary #4 (Sample Site S4): non-USGS intermittent; 18 feet of impact due to culvert extension
- Unnamed Tributary #6 (Sample Site S6): non-USGS ephemeral; 41 feet of impact due to the fill placement

Communication with the design engineers indicate that impacts to Tributaries 1 and 2 may be avoided/minimized as detailed design is developed, and final stream impacts will be determined during the permit process.

Overall, no substantial long-term impacts to the water quality of streams are expected by the project because runoff from the improved facility is not expected to be substantially different from the existing roadways (i.e., same types of runoff constituents, including oil, grease, and rubber from vehicles, chemical compounds from fertilizers and herbicides, and sodium/calcium chlorides from de-icing compounds). There will be some direct destruction of aquatic habitat and biota where fill is placed and stream relocation is proposed, but these impacts are expected to be minor.

Wetland Impacts

Ten wetlands were identified in the project study area, three of which will be impacted by the project (partially or entirely within the proposed construction limits), for a total wetland impact of 0.12 acre. Identified wetlands are considered to be preliminary jurisdictional features, pending a USACE Jurisdictional Determination. Impacted wetlands are shown on Exhibit 11 and include:

- Wetland 1: emergent wetland in narrow elongated basin on south side of KY 536 at SW quadrant of interchange with I-71/I-75; total size 0.12 acre, of which 0.09 acres will be impacted by fill/grading for roadway widening;
- Wetland 9: emergent wetland in drainage swale on south side of KY 536 west of US 25; total size 0.01 acre, all of which will be impacted by fill/grading for roadway widening.
- Wetland 10: emergent wetland in drainage swale on south side of KY 536 east of US 25; total size 0.02 acre, all of which will be impacted by fill/grading for roadway widening.

Wetlands 1, 9, and 10 are considered to be of limited value and provide only limited beneficial wetland functions for the local environment due to their small size. Because of their close proximity to the proposed project, they are not able to be avoided by the proposed KY 536 widening/intersection improvements.

Anticipated Permits

Section 404/401 - Dependent on USACE Jurisdictional Determination and based on available information to date, a USACE Section 404 Nationwide permit with mitigation and a KDOW Individual Water Quality Certification (WQC) is anticipated for impacts to Unnamed Tributary #1 (441 linear feet impacted), and for the remaining impacted streams, a USACE Letter of Notification (ACE LON) would likely apply; for impacts to wetlands, a USACE Section 404 Nationwide (NWI) permit with mitigation would likely apply.

Stormwater – The project must meet the requirements of the KYTC's MS4 permit (KPDES No. KYS000003 with an effective date of October 1, 2012) and must also comply with KPDES General Permits for Stormwater Discharges Associated with Construction Activities (KYR10).

Obtaining the required permits for the project is included an Environmental Commitment in Attachment E of this CE document.

N. Construction Impacts

Discuss potential impacts of construction activities pertaining to water quality, stream diversion, air quality, detours and delays of traffic, businesses, noise, etc:

Water Quality/Stream impacts

Short-term stream impacts during construction relative to water quality and streams include: temporary increases in dissolved solids, nutrients, settleable solids, suspended solids and acidity; the destruction or displacement of aquatic fauna whose foraging, reproduction or locomotion is hindered by silt; temporary increase in turbidity which may reduce light penetration, pH, oxygen levels and/or buffering capacity of the streams; and/or increased water temperatures which may cause oxygen demands and damage or destroy aquatic biota. Overall, these short-term impacts are expected to be minor and minimized through adherence to Best Management Practices (BMPs) during construction and implementation of Section 212 (Erosion Control) and 213 (Water Pollution Control) of KYTC's "Standard Specifications for Road and Bridge Construction". Additionally, impacts to water quality will be minimized by adherence to requirements of the KYTC's MS4 permit and KPDES General Permits for Stormwater Discharges Associated with Construction Activities (KYR10) (see Attachment E, Environmental Commitments and Mitigation).

Air Quality

Short-term construction-related air quality impacts from dust and equipment exhaust are expected to be minor and minimized through the use of Best Management Practices (BMPs) during construction and adhering to the KYTC's "Standard Specifications for Road and Bridge Construction"(see Attachment E, Environmental Commitments and Mitigation).

Travel Delays and Maintenance of Traffic

There will be short-term disruptions/travel delays for local residences, businesses, bus transit (TANK) users, and emergency services during construction as a result of lane closures. No major detours are expected during project construction. A Maintenance of Traffic (MOT) plan will be developed to have minimal impact to local traffic and emergency services (see Attachment E, Environmental Commitments and Mitigation). The project is expected to be constructed under traffic with evening and weekend lane closures allowed.

Access to local businesses may be hindered for a short time during project construction, though impacts will be mitigated through the implementation of the MOT plan, which will identify how access would be maintained to businesses throughout the project area during the construction period. Local businesses may also benefit from the sale of goods and services to those involved with the project's construction and there will likely be a short-term increase in construction-related employment and revenues during the construction period. Following project construction, traffic flow in the area and access to commercial development will be improved which will result in potential economic benefits to these facilities.

Noise

Specific sound levels during the construction period cannot be projected, as construction sound levels will vary based on the number and type of equipment being used, as well as the type of construction activities occurring at a given time. Reasonable efforts will be made to reduce construction noise impacts to the extent practicable (see Attachment E, Environmental Commitments and Mitigation). The project construction contractor will be required to provide such equipment as sound deadening devices, shields, and physical barriers, and take such noise abatement measures which may be necessary to restrict the transmission of noise in the immediate vicinity of noise-sensitive land uses. All construction equipment will be required to comply with OSHA (Occupational Safety and Health Administration) regulations.

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF ENVIRONMENTAL ANALYSIS

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Rev. 5/2018
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PROJECT IMPACTS REEVALUATION SUMMARY

Reevaluation Phase: Utility		Letting Date: 15-APR-2019
Type Document: CE3		Approval Date: 22-OCT-2014
County: Boone	Route: I-75	Item No.: 6-14
Description/Limits: Reconstruct KY 536 at the I-75/Mt. Zion Rd. Interchange		

ENVIRONMENTAL IMPACT	YES	NO	STATUS -- REMARKS
PROJECT CHANGES *	☐	☒	☐ Perm Easements ☐ Temp Easements ☐ Connecting Roads ☐ Additional ROW ☐ Other Utility Areas ☐ Within ROW ☐ Beyond ROW
AIR QUALITY	☐	☒	
NOISE	☐	☒	
CULTURAL HISTORIC	☐	☒	
ARCHAEOLOGY	☐	☒	
TERRESTRIAL ECOLOGY	☒	☐	CMOA for northern long-eared & Indiana bats. No tree cutting July 1 through July 31
AQUATIC ECOLOGY	☒	☐	Stream impacts. USCOE Individual Permit required for construction.
SOCIOECONOMIC	☒	☐	1 business and 2 residential relocations required.
UST/HAZMAT	☐	☒	
OTHER ISSUES	☐	☒	

*Project changes that incorporate additional area in the project footprint or create affects not previously assessed.

CONDITIONS, MITIGATION, SPECIAL ISSUES:

USCOE Individual Permit will be obtained prior to construction. CMOA for tree take. No tree cutting June 1 through July 31.

The environmental document identified above has been reevaluated as required by 23 CFR 771.117. It has been determined that no substantial changes have occurred in the project, the project area, the regulatory requirements, or the environmental effects of the proposed action that would invalidate previous environmental approvals or significantly affect the quality of the human environment. Therefore, the original Administrative Action remains valid. It is recommended that this project be advanced to the next phase of project development.

APPROVAL/CONCURRENCE BY:

Stacee Hans — 8/7/18
District Environmental Coordinator (not required for Level 2 or Level 3 CEs) — Date

Director, Div. of Environmental Analysis (not required for CEMP or Level 1 CEs) — 8/29/18 — Date

Connie Cullen Hunter — 8-7-18
District Project Manager (not required for Level 2 or Level 3 CEs) — Date

Federal Highway Administration (not required for CEMP, Level 1 or Level 2 CEs) — 8/29/18 — Date

PC *(as applicable)* ☐ DEA ☐ District ☐ Program Management ☐ FHWA
Other *(specify)*

File

Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

January 14, 2019

Mr. Thomas L. Nelson Jr.
Federal Highway Administration
330 West Broadway Street
Frankfort, Kentucky 40602

SUBJECT: CE3 Reevaluation
Reconstruct KY 536 at the I-75 Mt. Zion Exit
Boone County, Kentucky
Item Number: # 6-14

Dear Mr. Nelson:

Enclosed is the reevaluation for the subject Categorical Exclusion 3 (CE3), originally approved October 22, 2014. This reevaluation is being submitted for approval in preparation of construction authorization for the above referenced project. We respectfully recommend that you approve this CE3 reevaluation and ask for your response by February 13, 2019.

If you have any questions or need further assistance, please contact Scott Schurman at (502) 564-7250.

Sincerely,

Daniel R. Peake, Director
Division of Environmental Analysis

DRP/srs
Enclosure

cc: C. Callan-Ramler (D6)
S. Hans (D6)
S. James (D6)
Central File w/a

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KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF ENVIRONMENTAL ANALYSIS

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PROJECT IMPACTS REEVALUATION SUMMARY

Reevaluation Phase: Construction		Letting Date: 26-APR-2019
Type Document: CE3		Approval Date: 22-OCT-2014
County: Boone	Route: I-75	Item No.: 6-14
Description/Limits: Reconstruct KY 536 at the I-75/Mt. Zion Road Interchange		

ENVIRONMENTAL IMPACT	***YES***	***NO***	***STATUS -- REMARKS***
PROJECT CHANGES *	☐	☒	☐ Perm Easements ☐ Temp Easements ☐ Connecting Roads ☐ Additional ROW ☐ Other Utility Areas: ☐ Within ROW ☐ Beyond ROW
AIR QUALITY	☐	☒	
NOISE	☐	☒	
CULTURAL HISTORIC	☐	☒	
ARCHAEOLOGY	☐	☒	
TERRESTRIAL ECOLOGY	☒	☐	CMOA for impacts to bat habitat. No tree clearing July 1 to July 31.
AQUATIC ECOLOGY	☐	☒	
SOCIOECONOMIC	☒	☐	One business and two residential relocations required
UST/HAZMAT	☐	☒	
OTHER ISSUES	☐	☒	

*Project changes that incorporate additional area in the project footprint or create affects not previously assessed.

CONDITIONS, MITIGATION, SPECIAL ISSUES:

CMOA for Indiana bat and northern long eared bat impacts. No tree clearing July 1 to July 31.

The environmental document identified above has been reevaluated as required by 23 CFR 771.117. It has been determined that no substantial changes have occurred in the project, the project area, the regulatory requirements, or the environmental effects of the proposed action that would invalidate previous environmental approvals or significantly affect the quality of the human environment. Therefore, the original Administrative Action remains valid. It is recommended that this project be advanced to the next phase of project development.

APPROVAL/CONCURRENCE BY:

District Environmental Coordinator (not required for Level 2 or Level 3 CEs)	Date	Director, Div. of Environmental Analysis (not required for CEMP or Level 1 CEs)	Date
District Project Manager (not required for Level 2 or Level 3 CEs)	Date	Federal Highway Administration (not required for CEMP, Level 1 or Level 2 CEs)	Date

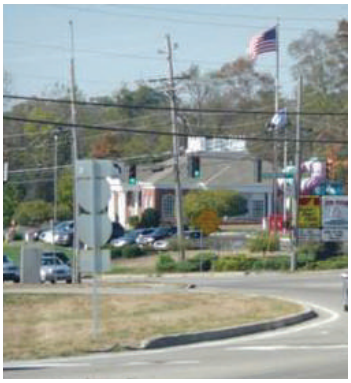
PC *(as applicable)*: ☒ DEA ☒ District ☐ Program Management ☐ FHWA

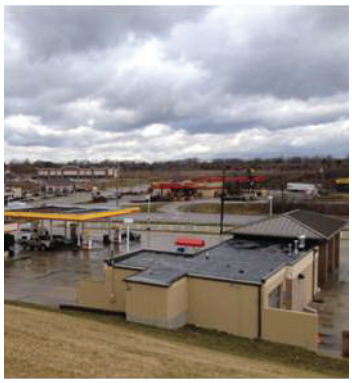
Other *(specify)*:

File: 6-14 Project File

I-71/I-75 – KY338

Categorical Exclusion







Project Item No. 6-18.00 | Boone County | March 2014

PREPARED BY

PARSONS

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PREPARED FOR:

KENTUCKY TRANSPORTATION CABINET

District 6
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I-71/I-75 – KY 338 (Richwood Road)

Interchange Improvement Project

Boone County, Kentucky

Item Number 6-18.00

CATEGORICAL EXCLUSION

ENVIRONMENTAL DETERMINATION CHECKLIST

March 2014

Prepared for:

Kentucky Transportation Cabinet
District 6

Prepared By:

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LIST OF ACRONYMS

BA	Biological Assessment
BMPs	Best Management Practices
CFR	Code of Federal Regulations
CO	Carbon monoxide
CRF	Critical Rate Factor
cy	cubic yards
dB	decibel
dBA	A-weighted decibels
DCD	Double Crossover Diamond Interchange
DEA	KYTC Division of Environmental Analysis
DOWM	Kentucky Division of Waste Management
ESA	Environmental Site Assessment
FHWA	Federal Highway Administration
IBCF	Indiana Bat Conservation Fund
IBCMOA	Indiana Bat Conservation Memorandum of Agreement
IJS	Interchange Justification Study
KDOW	Kentucky Division of Water
KSNPC	Kentucky State Nature Preserve Commission
KYTC	Kentucky Transportation Cabinet
Leq(h)	Hourly Equivalent Sound Level
LOS	Level of Service
LWCF	Land and Water Conservation Fund
MOT	Maintenance of Traffic
MSAT	Mobile Source Air Toxics
NAC	Noise Abatement Criteria
NKAPC	Northern Kentucky Area Planning Commission
NO_2	Nitrogen dioxide
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
OKI	Ohio, Kentucky, Indiana Regional Council of Governments
ONRW	Outstanding National Resource Waters
OWS	Oil-water separator
$PM_{2.5}$	Fine Particulate Matter
RBP	Rapid Bioassessment Protocol
RCRA	Resource Conservation and Recovery Act
REC	Recognizable Environmental Condition
SO_2	Sulfur dioxide
SPUI	Single Point Urban Interchange
SQG	Small Quantity Generator
STIP	Statewide Transportation Improvement Program
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
TNM	FHWA Traffic Noise Model Version 2.5
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture

USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
UST	Underground Storage Tank
VMT	Vehicle Miles Traveled

KENTUCKY TRANSPORTATION CABINET
CATEGORICAL EXCLUSION
ENVIRONMENTAL DETERMINATION CHECKLIST

1. PROJECT INFORMATION

SYP Project #: 6-18.00	Route: I-71/I-75 and KY 338 (Richwood Road)	Work Type: Interchange Improvement	County: Boone

Project Description:

The approximately 307-acre study area is located at the KY 338 (Richwood Road) interchange at 1-71/1-75 (Exit 175), near the community of Richwood within Boone County, Kentucky. The study area extends approximately 0.8 mile south and 1.2 miles north of the 1-71/1-75 and KY 338 (Richwood Road) interchange. To the west of the interchange, the study area extends along KY 338 (Richwood Road) from the interstate to approximately 1,000 feet west of Triple Crown Boulevard and north to Frogtown Connector Road (see Figure 1, next page and Appendix A). Construction in this area would consist of lane widening and tie-ins to existing roads used to access the commercial developments in the area. To the east of the interchange, the study area consists of the KY 338/US 25 intersection area, including 0.75 mile to the south and 0.25 mile north of the existing intersection. The US 25 intersection is approximately 0.2 miles east of the northbound ramps to/from I-71/I-75. The study area is located on the Union 7.5-minute USGS topographic quadrangle map.

Within the last ten years, the area surrounding the KY 338 (Richwood Road) interchange has experienced rapid development. The resulting increase in employment and residential traffic has burdened the existing transportation system, including I-71/I-75, KY 338 (Richwood Road), and US 25 (Dixie Highway). These major transportation arteries have also been taxed by general growth along I-75, which is one of the nation's largest commercial routes. This growth in traffic without commensurate improvements to the transportation network has resulted in congestion and accident rates that are above statewide averages. Based upon land use projections, by 2030, the study area will lose nearly all of its agricultural land, while residential and industrial uses will approximately double, resulting in greater volumes of traffic.

Purpose and Need**:**

Project Purpose

The purpose of this project is to improve safety and reduce congestion at the I-71/I-75 and KY 338 (Richwood Road) interchange and within the KY 338 (Richwood Road) corridor, and to develop and implement a comprehensive access management plan for KY 338 (Richwood Road) between Triple Crown Boulevard and US 25 (Dixie Highway).

Project Need

The project needs include improving safety, reducing congestion, and improving access to businesses.

The Kentucky Transportation Cabinet (KYTC) completed an Intersection Justification Study (IJS) in 2010 (Appendix B). The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. The analysis compared observed crash rates against statewide critical crash rates for comparable facilities to obtain a Critical Rate Factor (CRF). A CRF that exceeds 1.0 indicates that the number of crashes exceeds the number that would be expected to occur on that roadway and is considered to be a high crash location. KY 338 (Richwood Road) exhibitis higher crash rates than the statewide average for similar roadways.

KY 338 (Richwood Road) from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of 1.0 with the highest CRF being exhibited between the 1-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. Overall, the majority of crashes on KY 338 (Richwood Road) in the study area occurred during the day and under dry conditions, indicating that neither weather nor darkness are a primary cause of crashes.

Crash data was also reviewed for three intersections on US 25 (Dixie Highway): (1) Shorland Drive/Winning Colors Drive, (2) KY 338 (Richwood Road), and (3) Logistics Boulevard. KY 338 (Richwood Road) was the only intersection that exceeded a CRF of 1.0 with a total of 66 crashes and a CRF of 3.7. Overall, most of the crashes at this intersection occurred during the day and under clear or cloudy conditions.

Norfolk Southern Railroad owns an active track that parallels US 25 (Dixie Highway) immediately east of the roadway that typically carries 30 or more trains per day. Within the project area this rail line has two spurs that provide rail service to the industrial park to the west of US 25 (Dixie Highway). Also

within the project area the railroad opperates a maintinace yard bordered by US 25 (Dixie Highway) to the west, the rail line to the east, Shorland Drive to the north, and KY 338 (Richwood Road) to the south. At-grade crossings of the rail line are provided at both Richwood Road and Shorland Drive, approximately 1,200 feet apart. The proximity of these crossings to each other and to US 25 (Dixie Highway) creates safety concerns. First, trains periodically stop on the tracks blocking both crossings and limiting ingress/egress for buisness park users as well as emergency responders. The only other access point for the business park is via Chambers Road, approximately 2.5 miles to the south via Old Lexington Pike. Second, the close proximity of the crossings to US 25 (Dixie Highway), approximately 100-150 feet, creates opportunities for vehicles to be stopped on the tracks while attempting to enter or cross US 25 (Dixie Highway). Two train-vehicle crashes have occurred in the past four years at the Shorland Drive at-grade crossing.

The 1-71/I-75 – KY 338 (Richwood Road) interchange currently experiences intermittent periods of congestion. The IJS documented that in 2030 the I-71/I-75 ramp intersections with KY 338 (Richwood Road) would operate at an unacceptable Level of Service (LOS). Further analysis using more recent traffic counts indicate that almost every signalized intersection along KY 338 (Richwood Road) would operate at an unacceptable LOS in 2030 under No Build conditions. Table 1 in Attachment A.

The KY 338 (Richwood Road) corridor is dominated by retail and commerical uses that depend on short visits and are based on a high volume of visitors. As the corridor has developed over the last several decades, access to developing locations was provided as needed, with no comprehensive plan for drive locations or intersection controls. The result is a corridor with poor access management: numerous drive locations over a relatively short length that provides little accommodation in the form of turn lanes or signalization for entering and existing vehicles. This condition leads to an inefficient corridor for vehicles moving within or through the area and can contribute to both safety and congestion issues.

Other Goals and Objectives

In addition to the needs identified above, the alternatives will be evaluated on how well they meet the following secondary goals:

- Improved Pedestrian Environment: Currently, there are no pedestrian facilities on KY 338 (Richwood Road) and limited facilities on adjacent roadways.
- Minimize Environmental Impact

Project: KY 338 Interchange Improvement Project County: Boone Route: I-71/I-75 – KY 338

Roadway Conditions and Setting:	Traffic Volume: Current ADT Design Year ( ) ADT See Table 2 in Attachment A
KY 338 (Richwood Road) is classified as an urban minor arterial from Chambers Road (west of the project limits) to US 25 (Dixie Highway); east of US 25 (Dixie Highway), it is a local roadway. KY 338 (Richwood Road), from just west of Paddock Drive to its intersection with US 25 (Dixie Highway) consists of two 12 foot lanes with a 12 foot center turn lane. Beyond these limits to the east and west, KY 338 consists of a single lane in either direction. I-71/I-75 is an Urban Interstate with four lanes in each direction. Its interchange with KY 338 (Richwood Road) is a traditional diamond-type interchange with single-lane entrance and exit ramps. Approximately one mile north of the interchange, KYTC operates and maintains Rest Area facilities on either side of the interstate. Throughout the project limits, US 25 (Dixie Highway) is an urban minor arterial with one lane in each direction. Land uses surrounding the project area include industrial, commercial, and residential uses, within rolling terrain. The KY 338 (Richwood Road) corridor is dominated by retail uses including fast food restaurants, truck stops and other convenience retail businesses. Three truck stops (one to the west of I-71/I-75, two to the east), the business park located to the east of US 25 (Dixie Highway) and a major warehouse complex at Logistics Boulevard generate substantial truck volumes using the interchange and local arterials. The area also serves as the primary interstate access point for a large, and rapidly developing, residential area, located primarily west of the interchange. As noted in the Purpose and Need section above, an active Norfolk Southern rail line parallels US 25 (Dixie Highway) through the project area.	

Project Length:	Number of alternative(s) considered including "No Build":
The project has independent utility and would provide a fully functional road segment without any additional transportation improvements beyond the project limits. The logical termini are based on the minimum roadway limits required to improve the existing I-71/I-75 – KY 338 interchange, the US 25 (Dixie Highway) and KY 338 (Richwood Road) intersection, and address access management issues in the KY 338 (Richwood Road) corridor. The project's logical termini along I-71/I-75 extend from approximately 0.75 mile north of KY 338 (Richwood Road) to approximately 0.75 mile south of KY 338 (Richwood Road). The project's logical termini along US 25 (Dixie Highway) extend from approximately 0.75 mile south of KY 338 (Richwood Road) to approximately 0.25 mile north of Shorland Drive. Logical termini along KY 338 (Richwood Road) extend from 0.25 miles west of Triple Crown Boulevard to 0.25 miles east of US 25 (Dixie Highway). The begin MP and end MP were taken from the six year plan. Begin MP: 175.217 End MP: 175.622	☐ 1 ☐ 2 ☐ 3 ☐ 4 14 alternatives, including the No-Build, were considered. *See Section 3. Alternatives Summary*

2. ENVIRONMENTAL DETERMINATION

☒ Categorical Exclusion- Level 3 (Attach all project correspondence and documentation)

APPROVAL SIGNATURES

_____ _____
District Environmental Coordinator **Date**

_____ _____
Project Manager **Date**
☐ *All appropriate project commitments/mitigation and identified required future work have been entered into the CAP*

_____ _____
Division of Environmental Analysis **Date**
(required for Level 2)

_____ _____
Federal Highway Administration **Date**
(required for Level 3)

3. ALTERNATIVES SUMMARY

Describe all alternatives that were evaluated, their impacts and the reason(s) for elimination or selection.

REQUIRED ATTACHMENTS: ☒ Location Map ☒ Plan Map/Sheet(s)

NO BUILD ALTERNATIVE

The No Build condition provides no improvements to the I-71/I-75 mainline, the interchange at KY 338 (Richwood Road), US 25 (Dixie Highway), or along KY 338 (Richwood Road).

Portions of the study area currently operate below acceptable levels of service. In the future, as growth in the area continues, the majority of the study area will experience failing LOS in both the AM and PM peak hours, generally LOS D to LOS F (see Table 1). The No Build Alternative would not improve traffic flow or levels of service, because neither capacity nor demand at the interchange or along US 25 (Dixie Highway) or KY 338 (Richwood Road) would be altered. Because congestion would not be alleviated, and geometric improvements would not be constructed, the No Build Alternative also would not improve safety or decrease the crash rate throughout the study area and, therefore, does not meet the project's purpose and need. The No Build Alternative is carried forward as a baseline for comparison of the Build Alternatives.

BUILD ALTERNATIVES

The overall I-71/I-75 and KY 338 (Richwood Road) interchange project is composed of three subcomponents:

- I-71/I-75 Interchange
- Richwood Road East and US 25
- Richwood Road West

The initial screening of alternatives considered each subcomponent individually. Once the number of alternatives were reduced to the most viable options, the components were combined to ensure that the entire "system" of improvements operated efficiently together.

I-71/I-75 INTERCHANGE

The I-71/I-75 interchange alternatives were evaluated in the IJS (Appendix B). Each alternative is described in the following text.

Alternative #3: Preferred Alternative

Alternative #3, shown in Figure 2 in Appendix A, converts the I-71/I-75 and KY 338 (Richwood Road) existing diamond interchange to a Double Crossover Diamond Interchange (DCD). The DCD takes the traffic that is heading westbound (which is normally on the north side of a road) and crosses it over to the south side of the road. It does the opposite for the eastbound traffic, taking them from the south side of the road to the north side. Once through the interchange, the lanes crossover again and return to a traditional configuration. Both crossover locations would be controlled by traffic signals. By crossing over the travel lanes within the interchange, left turn movements to and from the interstate ramps can be completed without conflicting with through traffic.

This alternative would not alter the I-71/I-75 bridge over KY 338 (Richwood Road); nor would it modify the through lanes or the overall capacity of the interstate. Initial concepts for the interchange included consideration of providing auxiliary lanes between the KY 338 (Richwood Road) interchange and the rest areas to the north. During detailed analysis of the interchange and the merge/diverge areas on the ramps, it was determined that these auxiliary lanes were not required and that standard ramp tapering would be appropriate.

In order to provide the additional lanes required on KY 338 (Richwood Road), the spill slope on the north side of the road would be removed and replaced with a soil nail wall, providing sufficient space for three eastbound travel lanes (one through lane, one turn lane, and one shared lane). The existing KY 338 (Richwood Road) roadway would be converted to two westbound lanes. A similar soil nail wall would replace the spill slope on the south side of the road, providing space for an 8-foot wide multi-use path. See Figure 3 in Appendix A for a cross section of this area.

The interchange ramps would be modified to efficiently manage entrance and exit movements at the interstate and to accommodate turn lanes at KY 338 (Richwood Road). The northbound entrance ramp to I-71/I-75 would be widened to two lanes accommodating two left turn lanes from eastbound KY 338 (Richwood Road). A single right turn lane from

westbound KY 338 (Richwood Road) would merge into the ramp. The two lane ramp would continue for approximately 1,200 feet before dropping to a single lane for 1,700 feet and then becoming a 840-foot merge lane into I-71/I-75.

The southbound exit ramp would begin approximately 1,500 feet north of the existing exit ramp, widen to two lanes for approximately 1,000 feet, and then widen to four lanes (two right turn lanes and two left turn lanes) at the approach to the intersection. Both the right and left turn movements would be signal-controlled. Right turning traffic would be permitted to make a right-turn-on-red.

The southbound entrance ramp would be widened to two lanes, one each coming from eastbound and westbound KY 338 (Richwood Road). The two lane ramp would continue for 1,000 feet before dropping to a single lane for 2,000 feet and then becoming a 350-foot merge lane into I-71/I-75.

The northbound exit ramp would remain a single lane exit, widening to three lanes – two right turn lanes and one left turn lane – at the approach to the intersection. The right turn movement would be signal-controlled with right-turn-on-red permitted for both lanes. The left turn lane would be a free movement (uncontrolled), with a dedicated receiving lane on KY 338 (Richwood Road).

Alternative #3 was identified in the IJS as the recommended Preferred Alternative because the improvements meet the overall goals of the project by cost-effectively reducing congestion and improving safety through the interchange.

Interchange Alternatives Considered and Dismissed:

Alternative #1: Adding Lanes to Existing Diamond
Alternative 1 is a traditional diamond interchange with added lanes and turn lanes to improve congestion (see Figure 4). Operation of this type of interchange would require adding four more lanes (seven total) on KY 338 (Richwood Road) and the reconstruction of I-71/I-75 overpass bridges. This alternative was eliminated because it was not considered cost effective.

Alternative #2: Eastbound to Northbound Loop Ramp
Alternative #2 is a traditional diamond interchange with added lanes and the addition of an eastbound to northbound loop ramp (see Figure 5). Implementing this alternative would require reconstruction of the 1-71/I-75 overpass bridges and acquisition of multiple businesses in the southeast and northeast corners of the interchange. This alternative was eliminated because it was not considered cost effective and due to safety and operational concerns associated with vehicles merging into I-71/I-75 traffic.

Alternative #4: Single Point Urban Interchange
Alternative #4 is a Single Point Urban Interchange (SPUI) that would require the reconstruction of the I-71/I-75 overpass bridges and mainline I-71/I-75 (see Figure 6). Alternative #4 was eliminated because it was not considered cost effective.

Alternative #5: Roundabout
Alternative #5 is a Roundabout Interchange (see Figure 7). Alternative #5 was eliminated because KY 338 (Richwood Road) carries a high percentage of truck traffic, which may have problems maneuvering multi-lane roundabouts.

RICHWOOD ROAD EAST AND US 25
The project includes improvements to KY 338 (Richwood Road) east of its interchange with I-71/I-75 including access management measures, grade-separation or closure of at-grade railroad crossings, and modifications to the intersection with US 25 (Dixie Highway).

Alternative E1: Preferred Alternative
Under Alternative E1, shown in Figure 8 in Appendix A, the intersection of KY 338 (Richwood Road) and US 25 (Dixie Highway) would be reconstructed to a Single Point Urban Interchange (SPUI). KY 338 (Richwood Road) would be widened to two lanes in each direction from just east of US 25 (Dixie Highway) to I-71/I-75. KY 338 (Richwood Road) would be routed under US 25 (Dixie Highway) and the Norfolk Southern Railroad, which would remain at roughly their existing elevations. US 25 (Dixie Highway) would be reconstructed from approximately Logistics Boulevard to Duffel Lane, with two lanes in each direction. The Shorland Drive at-grade railroad crossing would be closed. A signal would be added at the Best Pal Drive intersection with KY 338 (Richwood Road) and Best Pal Drive would be extended to connect with Old Richwood Road; the Old Richwood Road intersection with US 25 (Dixie Highway) would be closed due to its proximity to the new interchange. Alternative E1 would minimize the take of property from the Richwood General Store, a

historic section 4(f) property and was considered as a minimization alternative.

Alternatives Considered and Dismissed:

Alternative E2
Alternative E2 would also grade-separate KY 338 (Richwood Road) and US 25 (Dixie Highway) by constructing a new SPUI (see Figure 9). Under Alternative E2, the SPUI would be shifted south to avoid impacts to the historic Richwood Store building located along US 25 (Dixie Highway) north of the proposed interchange. Frontage roads would be provided west of US 25 (Dixie Highway), connecting to KY 338 (Richwood Road). The frontage road intersections at US-25 (Dixie Highway), however, conflict with the interchange ramps which results in unsafe weaving conditions. The Norfolk Southern Railroad spur would require major reconfiguration including a complex bridge structure. This alternative was eliminated do to the unsafe weaving conditions and the costs associated with the railroad bridge.

Alternative E3
Alternative E3 would include an at-grade intersection at KY 338 (Richwood Road) and US 25 (Dixie Highway) (see Figure 10). A frontage road would be constructed west of US 25 (Dixie Highway) to connect to KY 338 (Richwood Road). KY 338 (Richwood Road) would include a raised median along the road, resulting in a right in/right out access at Best Pal Drive. Under Alternative E3, all the intersections within the project limits would operate at an acceptable level of service. Alternative E3 would avoid a property take "use" from Richwood General Store, a historic section 4(f) property and was considered as an avoidance alternative. However, eliminating full access at Best Pal Drive and KY 338 (Richwood Road) would require a longer, more circuitous route (1 mile) for vehicles accessing adjacent businesses. Alternative E3 was eliminated due to the impacts to businesses and drivers accessing Best Pal Drive and KY 338 (Richwood Road).

Alternative E4
Alternative E4 would realign KY 338 (Richwood Road) to create an at-grade, "T" intersection with US 25 (Dixie Highway) south of the existing intersection (see Figure 11). KY 338 (Richwood Road) to the east would "T" into the relocated KY 338 (Richwood Road). The close proximity of the Best Pal Drive intersection to the relocated KY 338 (Richwood Road) would result in operational issues and the layout could potentially be confusing for unfamiliar drivers. In addition, six traffic signals are required between the I-71/I-75 ramp terminal and US 25 (Dixie Highway), which includes an unconventional signal at the northbound I 71/I 75 entrance ramp. Alternative E-4 was eliminated because it did not provide continuity to KY 338 (Richwood Road) and could be confusing for unfamiliar drivers.

RICHWOOD ROAD WEST
To ensure that the KY 338 (Richwood Road) interchange with I-71/I-75 continues to meet operational requirements, access management measures are required within the commercial district west of the interchange. These alternatives begin at the ramp intersections and continue to approximately 1,000 feet west of Triple Crown Boulevard.

Alternative W9a: Preferred Alternative
KY 338 (Richwood Road) would be widened to two eastbound lanes and three westbound lanes from the I-71/I-75 interchange to Triple Crown Boulevard. Alternative W9a is shown in Figure 12 in Appendix A. West of Triple Crown Boulevard, KY 338 (Richwood Road) would transition back to its existing two lane configuration. The existing signal at Frogtown Connector Road would be maintained and a new signal would be added at Paddock Drive. A raised median would be added along KY 338 (Richwood Road) creating right in/right out access at the existing Clay Drive intersection. Access points along KY 338 (Richwood Road) would be consolidated, with all direct business drives onto KY 338 (Richwood Road) from the north side of the road being closed. Only the BP gas station on the south side would retain right-in/right-out only access. At Frogtown Connector, the bank on the south side of KY 338 (Richwood Road) would be displaced to provide access to adjacent businesses.

Under the W9 alternative, the southbound I-71/75 off-ramp to westbound KY 338 (Richwood Road) was proposed to have two right-turn lanes that would operate as free-flow right-turns. Further analysis indicated that traffic would queue on the off-ramp and spill back onto the interstate under 2030 traffic conditions during the PM peak hour. W9 was modified to W9a in order to mitigate the queuing on the southbound off-ramp and to improve traffic operations. The modifications include signalizing the southbound off-ramp right turning traffic with right-turn-on-red-allowed and to increase the outside (right-most) right-turn lane storage, from 650 feet to 850 feet to accommodate more storage for the SB I-71/75 off-ramp to westbound KY 338 (Richmond Road) traffic.

Under the W9a alternative, traffic would operate at an acceptable level of service during the construction year and year

2030. Alternative W9a was selected as the Preferred Alternative.

Alternatives Considered and Dismissed

Alternative W1:
Alternative W1 would relocate Frogtown Connector Road to Clay Drive and a new traffic signal would be installed (see Figure 13). A raised median would be added along KY 338 (Richwood Road) creating right in/right out only access at the existing Frogtown Connector intersection. A new access road would be constructed behind the businesses fronting on KY 338 (Richwood Road). Future traffic volumes would warrant a signal at Paddock Drive, but due to the proximity to the signal at Clay drive, one cannot be installed. Alternative W1 was eliminated due to the close proximity of the traffic signals required at both Clay Drive and Paddock Drive.

Alternative W2
Alternative W2 is similar to W1 in that Frogtown Connector Road would be relocated to Clay Drive and a traffic signal would be added at this location (see Figure 14). A raised median would be added along KY 338 (Richwood Road) creating right in/right out only access at the existing Frogtown Connector intersection. A new access road would be constructed along the frontside of the properties on the south side of KY 338 (Richwood Road). Alternative W2 differs from Alternative W1 in that Paddock Drive would become a "T" intersection. Alternative W2 was eliminated due to inadequate storage (200 feet) along Clay Drive between Paddock Drive and KY 338 (Richwood Road). The 200-foot storage distance would not be adequate to store the heavy southbound Clay Drive/realigned Frogtown Connector traffic turning left onto eastbound KY 338 (Richwood Road). Alternative W2 was subsequently modified to create Alternative W7 (see description below).

Alternative W3
Under Alternative W3, full access would be maintained at the existing Frogtown Connector intersection; however, right in/right out access would be provided at the BP gas station on Clay Drive (see Figure 15). Microsimulation traffic analysis showed that there would not be sufficient gaps in the traffic on KY 338 (Richwood Road) for the volume of vehicles turning left from Paddock Drive. Additionally, westbound KY 338 (Richwood Road) traffic waiting at the Frogtown Connector Road signal would back up onto the southbound I-71/I-75 off-ramp. Alternative W3 was eliminated due to queuing on the southbound exit ramp and on Paddock Drive. This alternative was subsequently modified to create Alternative W9 (see description below).

Alternative W4
Alternative W4 would include the construction of roundabout intersections along KY 338 (Richwood Road) at Paddock Drive and Frogtown Connector Road (see Figure 16). A raised median would be added along KY 338 (Richwood Road) creating right in/right out access at Clay Drive. Alternative W4 was eliminated due to the close proximity of the roundabout at Frogtown Connector Road to the interchange ramp intersections, which would result in operational problems within the reconfigured interchange.

Alternative W5
Under Alternative W5, Frogtown Connector Road would be relocated to Clay Drive with a roundabout intersection (see Figure 17). A raised median would be added along KY 338 (Richwood Road) creating right in/right out access at the existing Frogtown Connector Road intersection. As with Alternative W2, Paddock Drive would become a "T" intersection and a new access road would be constructed along the frontside of the properties on the south side of KY 338 (Richwood Road). Alternative W5 was eliminated due to inadequate storage along Clay Drive between Paddock Drive and KY 338 (Richwood Road). The 200 feet storage distance would not be adequate to store the heavy southbound Clay Drive/realigned Frogtown Connector traffic turning left onto eastbound KY 338 (Richwood Road).

Alternative W6
Under Alternative W6, Frogtown Connector would be realigned ("New Frogtown Connector") to terminate as a "T" intersection at Paddock Drive, where a new signal would be installed (see Figure 18). A raised median would be added along KY 338 (Richwood Road) creating right in/right out access at Frogtown Connector Road and Clay Drive. All direct business drives onto KY 338 (Richwood Road) in the area would be closed. South of KY 338 (Richwood Road), a new access road would be constructed behind the businesses fronting on KY 338 (Richwood Road) terminating at the access drive to the storage facility. The existing intersection at Paddock Drive would be converted to a roundabout. Future traffic volumes would require that KY 338 (Richwood Road) be widened to allow for three eastbound and westbound lanes through the roundabout at Paddock Drive. Alternative W6 was eliminated because of the amount of through lanes required

through the roundabout.

Alternative W7
Alternative W7 is similar to W6 in that Frogtown Connector would be realigned ("New Frogtown Connector") to terminate as a "T" intersection at Paddock Drive, where a new signal would be installed (see Figure 19). A raised median would be added along KY 338 (Richwood Road) creating right in/right out access at Frogtown Connector Road and Clay Drive. All direct business drives onto KY 338 (Richwood Road) in the area would be closed. South of KY 338 (Richwood Road), a new access road would be constructed behind the businesses fronting on KY 338 (Richwood Road) terminating at the access drive to the storage facility. The difference between the two alternatives is that Alternative W7 would create a signalized intersection at Paddock Drive and KY 338 (Richwood Road). Under this alternative, traffic would operate at a desirable level of service during the construction year and year 2030. Conversion of the existing Frogtown Connector Road to right in/right out only access would require tractor trailer vehicles to utilize the new relocated back road to Paddock Drive. In addition, closing direct business drives onto KY 338 (Richwood Road) would require multiple businesses to change access to their property to the back of their buildings. Alternative W7 was eliminated due to the impacts to surrounding businesses and the amount of truck traffic that would be diverted to Paddock Drive, a residential road.

Alternative W8
Under Alternative W8, as with W6 and W7 a raised median would be added along KY 338 (Richwood Road), creating right in/right out access at Frogtown Connector Road and Clay Drive (see Figure 20). In addition, all direct business drives onto KY 338 (Richwood Road) in the area would be closed. South of KY 338 (Richwood Road), a new access road would be constructed behind the businesses fronting on KY 338 (Richwood Road). Alternative W8 would create two new roundabouts. North of KY 338 (Richwood Road), Frogtown Connector would be realigned ("New Frogtown Connector") to terminate at Paddock Drive, where a roundabout would be installed. The existing intersection at Paddock Drive would also be converted to a roundabout. Future traffic volumes would require that KY 338 (Richwood Road) be widened to allow for three eastbound and three westbound lanes through the roundabout at Paddock Drive. Alternative W8 was eliminated because of the amount of through lanes required through the roundabout.

Alternative W9
Alternative W9 is similar to Alternative W9a (see the previous discussion for W9a) (see Figure 21). The difference between the two alternatives is that under the Alternative W9, the southbound I-71/75 off-ramp to westbound KY 338 (Richwood Road) would have two right-turn lanes that would operate as free-flow right-turns. Alternative W9 was modified to Alternative W9a because further analysis indicated that traffic would queue on the off-ramp and spill back onto the interstate under 2030 traffic conditions during the PM peak hour.

Alternative W10
Alternative W10 would maintain the existing signal at Frogtown Connector Road (see Figure 22). A roundabout would be constructed at Paddock Drive and a raised median would be added along KY 338 (Richwood Road) creating right in/right out access at Clay Drive. Traffic levels would require three eastbound lanes along KY 338 (Richwood Road). Due to heavy traffic on westbound KY 338 (Richwood Road) during the PM peak hours, traffic on southbound Paddock Drive could not find enough gaps to enter the roundabout causing significant queues and backups along Paddock Drive; therefore, Alternative W10 was eliminated.

PREFERRED ALTERNATIVE
As identified above, the Preferred Alternative for this project includes three components:

- Interchange Alternative #3
- Alternative E1
- Alternative W9a

Figure 23 (next page and Appendix A) depicts the combined components of the preferred alternative.

The Preferred Alternative would address each element of the project's purpose and need. Safety throughout the study area would be improved through a reduction in congestion and implementation of access management. Major improvements would be made at each of the locations identified in the purpose and need with the highest CRFs. At the I-71/I-75 interchange, the conversion of the existing interchange to a diverging diamond interchange would substantially improve safety by removing all left turn conflicts. The single point urban interchange (SPUI) proposed to replace the existing US 25 (Dixie Highway) intersection with KY 338 (Richwood Road) greatly reduces turning movement conflicts and improves

safety compared to an at-grade signalized intersection.

The Preferred Alternative would eliminate both at-grade railroad crossings in the project area. The crossing at Richwood Road would be eliminated through grade-separation, while the crossing at Shorland Drive would be closed.

As described in the Purpose and Need Section, while existing congestion is intermittent, severe congestion is limited to a handful of intersections. By 2030, congestion is anticipated to be severe throughout the project. The Preferred Alternative would greatly improve level of service along KY 338 (Richwood Road) and US 25 (Dixie Highway). As shown in Table 3, included in Attachment A, every intersection except US 25 (Dixie Highway) at Logistics Boulevard, located at the southern terminus of the project, would be improved to LOS C or better.

Finally, the Preferred Alternative would implement an access management program on KY 338 (Richwood Road) throughout the project limits, consolidating access points and controlling turning movement locations.

4. COMMENTS AND COORDINATION

Attach all letters, meeting minutes and copies of any newspaper advertisements.	YES	NO
1. Will the project have public, local government and resource agency outreach?	☒	☐
Identify type of outreach used:		
Meeting(s) ☒ Date(s): 11/29/12		
Newspaper Adv. ☒ Newspaper Name Kentucky Enquirer; Boone County Recorder		
Date(s): 11/15 & 11/22/2012; 11/22/2012		
Meeting(s) with local government and affected property owners ☒ Date(s): See Below		
2. Was there public or agency controversy on the project? *If "Yes", explain in #*	☒	☐
3. Additional work needed to resolve all public, resource agency, and property owners concerns? *If "Yes" explain plans for resolution in #4 below.*	☐	☒

4. Describe any unresolved issues:

Project representatives attended District 6/Boone County Quarterly Meetings in 2012 on January 17, April 17, July 17, and October 16. These meetings were attended by county officials and state legislators. Project alternatives were also presented at a meeting of the Richwood Business Association on October 17, 2012. Coordination was also conducted with Norfolk Southern Railroad and Federal Highway Administration (FHWA). Individual meetings were held with property owners at their request.

On July 20, 2012 a Preliminary Line and Grade Meeting was held at the Northern Kentucky Area Planning Commission (NKAPC) offices. The meeting was attended by FHWA, KYTC, and Boone County for the purpose of selecting a Preferred Alternative. After much discussion, Alternatives E1 and W7, in conjunction with the Double Crossover Diamond Interchange were recommended by those in attendance at the meeting (Appendix C).

Initially there was some controversy regarding the project when the Preferred Alternative included Alternative W7, which would limit access along KY 338 (Richwood Road). Under Alternative W7, a frontage road would be constructed along the backside of properties on the south side of KY 338 (Richwood Road), eliminating direct access for these businesses to KY 338 (Richwood Road). Based on the concerns raised, Alternative W7 was eliminated from consideration and W9a was identified as the Preferred Alternative. There are no remaining unresolved issues at this time.

Appendix C contains a summary of the public meeting, which includes a table summarizing all the public comments received. All agency comments received are also included in Appendix C.

Project: KY 338 Interchange Improvement Project County: Boone Route: I-71/I-75 – KY 338

5. ENVIRONMENTAL COMMITMENTS, MITIGATION, REQUIRED FUTURE ACTIONS AND OTHER COMMENTS

	YES	NO
1. Does the project have environmental commitments, mitigation measures, additional environmental investigations, studies or approvals still to be completed? *If "Yes", DEC should advise Project Manager for consideration of CAP entry in Oracle.*	☒	☐

2. Identify all issues:

The Preferred Alternatives would impact jurisdictional streams and wetlands and would require a Section 404 permit from the US Army Corps of Engineers and a Water Quality Certification from the Kentucky Division of Water.

An oil-water separator (OWS) was identified within an on-site concrete detention structure at the Pilot Travel Center, located east of I-71/I-75. The OWS may be impacted by entrance reconstruction and, if it is, a Phase II ESA is recommended. Two standing structures would be demolished, the Huntington National Bank on Richwood Road and one residence located on US 25 (Dixie Highway), south of KY 338 (Richwood Road). An asbestos survey would be required prior to demolition.

3. Other unique environmental or engineering factors that require consideration through the remaining project development (excess excavation needs, utility considerations, drainage problems, geotechnical issues, topographic constraints, mines, acidic rock, drinking water wells, etc.)

There are no unique environmental or engineering factors that require consideration through the remaining project development.

6. ENVIRONMENTAL CONDITIONS AND CONSEQUENCES

A. Right-of-Way Impacts

1. Does the project require the acquisition of right-of-way?	☒	☐
2. Business or residential relocations required.	☒	☐
No. of relocations: Residential 1 Business: 1		
Suitable properties available: Residential: ☒ Yes ☐ No ☐ Unknown *Describe "NO" in A.8*		
Business: ☒ Yes ☐ No ☐ Unknown *Describe "NO" in A.8*		
3. Full or partial property acquisition required.	☒	☐
Estimated acreage: Fee Simple 9.88 Permanent Easement: 0		
4. Will excess excavation sites be required?	☐	☒
☐ Designated ☒ Permitted/Available for Contractor ☐ Unknown (must note in Sec. 5)		
5. Property transfer from a State or Federal agency required. *List agency(ies) in A. 8 below*	☐	☒
6. Last resort housing required.	☐	☒
7. Cemetery affected by project	☐	☒

	NA	Y	N

8. Describe Impacts/Comments:

The Preferred Alternative would result in the acquisition of 9.88 acres of permanent right-of-way and 11.29 acres of temporary right-of-way.

This alternative was also evaluated to determine if displacements would occur. A residence or business was considered displaced if reasonable access could not be maintained as a result of the proposed project. One commercial property would be affected by right-of-way acquisition, Huntington National Bank, located at 287 KY 338 (Richwood Road).

One residence that is located on US 25 (Dixie Highway), south of KY 338 (Richwood Road), would be affected by the project and would need to be acquired. Suitable replacement housing is a available within the surrounding area. Available housing information was obtained from a website, www.zillow.com, which was searched for homes in Boone County with similar lot size (2 acres or more) and price ($350,000 to $650,000). The search resulted in 21 homes for sale matching those criteria. The search did not include homes for sale by owner.

Currently no facilities exist within the project area that would be a suitable replacement for the displaced commercial business. However, several currently undeveloped parcels exist within the study area that would be suitable for development of a replacement commercial facility. Huntington bank is currently in the process of acquiring a parcel on Paddock Road.

No regulated or protected land use types (Section 4(f), Section 6(f), Section 106 or Agricultural Districts) would be affected.

Only one public comment addressed right-of-way impacts. This comment requested more information on the connector road leading into the Richwood Industrial Park and if any businesses would be displaced or relocated. There would be no businesses displaced or relocated within Richwood Industrial Park. All comment letters are included in Appendix C.

B. Economic Impacts:

1. The project will have economic impacts on the regional and/or local economy, such as effects on development, tax revenues and public expenditures, employment opportunities, accessibility, and retail sales.	☒	☐
2. The project will affect established businesses or business districts.	☒	☐

3. Describe Impacts/Benefits:

Economic Impacts were considered based on an expanded study area rather than a set distance from the center lines of the proposed build alternatives. This larger study area was based on the dense retail district bordering KY 338 (Richwood Road) and the large commercial facilities along US 25 (Dixie Highway). A socioeconomic base study was conducted by Parsons and is included in Appendix D.

One commercial establishment, Huntington National Bank, a standalone bank branch would be displaced by the construction of a modified signalized intersection at Frogtown Road Connector. A commercial establishment was considered displaced if reasonable access could not be maintained from the proposed alternative. This displacement has the potential to temporarily cause the unemployment of approximately 15 employees. This employee number was estimated based on research of similar facilities conducted by Timothy H. Hannan & Gerald A. Hanweck (2008). Since there are several other Huntington National Bank branches within 10 miles of the relocated branch, it is likely that employees may be able to be temporarily transferred to other branches. Currently no facilities exist within the project area that would be a suitable replacement for the displaced commercial business. However, several currently undeveloped parcels exist within the study area that would be suitable for development of a replacement facility. Huntington bank is currently in the process of acquiring a parcel on Paddock Road.

Special attributes of the current bank site include convenient access for customers, high visibility from the existing road, and safe traffic flow patterns for the drive-through and ATM banking. These attributes can be reasonably replicated by relocating the business to one of several vacant sites within the study area. The vacant sites may be slightly less desirable from a convenience and visibility standpoint as these sites are slightly further removed from the existing road. The current location of this branch is ideally situated near a concentrated residential area, is on a major commuting route, and appropriately spaced between other branches. Due to these factors there is a strong likelihood that this branch would relocate within the immediate

vicinity of the current location.

The parcels on which the relocated business and the relocated residence are located would be removed from the tax rolls and become property of the state. The potential loss of tax revenue for the project area resulting from the project's potential displacement represents a very small percentage of the total tax base. The real estate tax impacts are minimal and likely to be offset by economic growth resulting from the operational improvements made in the area.

This proposed project would have a net benefit on the economic vitality of the project area and on established business districts. Inadequate public capital formation, i.e, the lack of new highway facilities and inadequate maintenance levels are a main cause of inefficiencies and lost revenues. On the west side of I-71/I-75 an improved access road system would enhance ingress and egress to the established businesses. East of I-71/I-75 improvements made to US 25 (Dixie Highway) and KY 338 (Richwood Road) would ease truck access to the retail gas stations and commercial distribution facilities along US 25. These improvements would also eliminate railroad/traffic conflicts within the project area providing safer and more reliable access to/from the business park.

No coordination letters were received regarding economic impacts. Two comment letters expressed a concern regarding the overall cost of the project and about borrowing money to build the project. The project has a documented need: addressing the existing and projected congestion and safety needs in the corridor. The proposed project would utilize a combination of state and federal funding sources and is in the State's fiscally constrained Six Year Plan. Another comment letter was received that expressed a concern that the proposed median on KY 338 (Richwood Road) would hinder access to all the commercial establishments on Clay Drive. Initially there may be a transition period while motorists adjust to the revised traffic pattern; however, it is believed that the proposed project would greatly improve the overall flow of traffic throughout the study area and access to local commercial establishments. All comment letters are included in Appendix C.

C. Social Impacts:

	NA	Y	N
1. The project will affect neighborhoods or community cohesion for the various social groups.	☐		☒
2. The project will affect travel patterns and accessibility (e.g., vehicular, commuter, bicycle, or pedestrian).	☐	☒	☐
3. The project will affect school districts, churches, businesses, police and fire protection, etc. Include the direct impacts and the indirect impacts that may result from the displacement of households and businesses.	☐	☒	☐
4. The project will affect publicly owned public park, recreation area, or wildlife or waterfowl refuge. *If "Yes", Section 4(f) must be completed.*	☐		☒
5. Was Land and Water Conservation Fund Act funding used for any purpose at the publicly owner public park, recreation area, or wildlife or waterfowl refuge? *If "Yes", Section 6(f) must be completed.*	☐		☒
6. The project will impact the elderly, handicapped, nondrivers, transit-dependent, minority and ethnic groups, or the economically disadvantaged.	☐		☒
7. The project will significantly or disproportionately impact minorities or disadvantaged persons (Environmental Justice, E.O. 12898).	☐		☒

8. Describe Impacts/Benefits:

A socioeconomic base study was conducted by Parsons and is included in Appendix D. Neighborhood and community cohesiveness are contingent upon many factors. Age, income, and marital status can be influencing factors of community cohesion. In addition, minority and ethnic communities represent differing levels of cohesion. Schools, parks, and other public amenities (grocery store, restaurants, etc.) also play a role in cohesion. Community cohesion can be viewed more simply as an established interdependency within a neighborhood where the community members have recognized interpersonal relationships with one another. In general, well established neighborhoods have a greater potential to contain elements that may promote community cohesion.

Neighborhoods within or immediately adjacent to the study area that have the potential to contain elements that may promote community cohesion were identified. Neighborhoods identified included Heritage Trails Subdivision, Triple Crown Subdivision, Steeplechase Apartment Homes, and Richwood Villas (See Figure 24 in Appendix A). Of these neighborhoods, Triple Crown Subdivision and Steeplechase Apartment homes contained elements of community cohesion such as community pools, tennis courts, and in the case of Triple Crown subdivision, a golf course. It should be noted that Heritage Trails

NA Y N

Subdivision is connected to Triple Crown Subdivision via Secretariat Run and may share some of these resources.

Residential development east of I-71/I-75 is disjointed and interspersed within large scale commercial development severely limiting the potential for the development of community cohesion. A single isolated residence would be displaced. No homes within established neighborhoods would be displaced and no loss of access would occur. There would be no displacement or loss of religious facilities, hospitals, schools, emergency facilities, libraries, day-care centers, cemeteries, shopping centers, or recreational facilities as a result of the proposed project.

The project will require one residential relocation. The project team determined that the residents of the property affected were not low-income, nor were they determined to be part of a protected minority population. Based on this finding, the project will not have a disproportional or adverse effect on any minority or low-income population in accordance with Executive Order 12898 and the Department of Transportation Order 5610.2 (a).

Travel patterns, one aspect of community cohesion, would be affected. The proposed project would greatly improve overall traffic flow throughout the study area. Under the Preferred Alternatives, US 25 (Dixie Highway) would become an access controlled facility and KY 338 (Richwood Road) would have a median being constructed with limited right in/right out access at some adjoining roads. Because of these changes, access to businesses and residential areas may be altered. These changes would improve mobility in the project area. Overall no loss of community cohesion is anticipated to result from this proposed project.

The goals of the project and all build alternatives are consistent with the goals and objectives for development in the project area discussed in the 2030 Boone County Comprehensive Plan. The entirety of the project area that is anticipated to see additional commercial development has already been zoned for commercial purposes and, therefore, this project and its associated indirect impacts are consistent with current land use plans. During coordination conducted for, and documented in, the IJS (2010) local officials have indicated that the completion of the KY 338 (Richwood Road) interchange project is consistent with plans to further develop the area into a regional distribution hub. High-density suburban residential, commercial, and industrial developments are occurring around the project area, prior to any changes being made to the existing transportation network.

A beneficial indirect impact anticipated to result from implementation of the proposed project is the continued progression of this area as an attractive development site for industrial and commercial businesses, especially for the area along US 25 on the south side of KY 338. Residential development is also expected to increase in the project vicinity due to safer driving conditions and reduction in roadway congestion. According to the Boone County Comprehensive Plan, the project area by 2030 would lose nearly all of its agricultural uses while residential and industrial uses would almost double. A cumulative impact that may result from the project is the continued conversion of open land to developed industrial, commercial, and residential areas. While many of these development trends are already occurring, this project would continue to facilitate this progression.

One fire station, Walton Fire Station #2, is located within the study area at 261 Shorland Drive (see Figure 24 in Appendix A). The proposed project would maintain connectivity for emergency services within and adjacent to the study area. The Preferred Alternative would eliminate access to US 25 (Dixie Highway) from Shorland Drive. However, the elimination of the at-grade rail crossing at Richwood Road would improve emergency service access and the reliability of response times. Other response times would also be reduced as the proposed project would provide for more efficient travel through the area.

There are currently no sidewalks throughout much of the project area. An eight-foot wide multi-use path would be added along the south side of KY 338 (Richwood Road) from Best Pal Drive to Triple Crown Boulevard and on the north side from Frogtown Road to Paddock Drive. The path would also extend along Best Pal Drive, Frogtown Road, Paddock Drive, and Frogtown Connector. The addition of this multi-use path would improve bicycle and pedestrian accessibility.

No protected community assets (publically owned parks, recreation areas, wildlife and waterfowl refuges, agricultural districts, historic properties) would be affected by the proposed project. One wetland would be affected, but due to the low quality of the wetland, it is not considered a community asset.

The proposed project is anticipated to improve safety for motorists traveling through the KY 338 (Richwood Road) interchange by improving capacity and overall level of service.

A few comments were received that mentioned concerns regarding social impacts. Some of the comments expressed concern regarding safety due to increased truck traffic and congestion. Others were concerned that mobility and access would be

changed or negatively impacted as a result of the proposed changes to access. Others were concerned that mobility would be negatively impacted due to additional truck traffic and increased congestion. Another comment was concerned about emergency vehicle access. All comment letters are included in Appendix C.

D. Local Land Use and Transportation Plan:

	NA	Y	N
1. Project consistent with local land use plan. *(NA if no plan exists)*	☐	☒	☐
2. Project consistent with local transportation plan. *(NA if no plan exists)*	☐	☒	☐
3. Project would induce adverse or beneficial secondary and cumulative effects.		☒	☐
4. Are there any existing and/or planned bike or pedestrian walkways		☒	☐

5. Describe Impacts:

The Ohio, Kentucky, Indiana Regional Council of Governments (OKI), the Metropolitan Planning Organization (MPO) for the Cincinnati region including Boone County, included the proposed project in its 2012-2015 Transportation Improvement Program (TIP). This project is also included in the KYTC 2010-2012 Statewide Transportation Improvement Program (STIP) and is also mentioned in the transportation section of the 2010 Boone County Comprehensive Plan.

During coordination conducted for, and documented in, the IJS (2010) local officials have indicated that the completion of the KY 338 (Richwood Road) Interchange Project is consistent with plans to further develop the area into a regional distribution hub. Residential, commercial, and industrial developments have been occurring and continue to occur throughout the project area. According to the Boone County Comprehensive Plan, by 2030 the project area would lose nearly all of its agricultural uses while residential and industrial uses would almost double. The improved highway facilities and access road system would make this area even more attractive as a development site for business and industry, which is consistent with the goals and objectives of the Boone County Comprehensive Plan.

There are currently no sidewalks throughout much of the project area. An eight-foot wide multi-use path would be added along the south side of KY 338 (Richwood Road) from Best Pal Drive to Triple Crown Boulevard and on the north side from Frogtown Road to Paddock Drive. The path would also extend along Best Pal Drive, Frogtown Road, Paddock Drive, and Frogtown Connector. The addition of this multi-use path would improve bicycle and pedestrian accessibility.

No coordination letters or comment letters relating to local land use impact issues have been received.

E. Historic Resources

1. Are NRHP listed eligible/potentially eligible sites/districts present within the project viewshed?		☒	☐
If "No", document means for assessing ages of structures within project viewshed or attach memorandum from DEA historian documenting no historic properties affected.			
If "Yes", indicate level of impact:			
☐- "No Effect" *(attach SHPO concurrence letter or DEA Historian memo)*			
☒- "No Adverse Effect" *(attach SHPO concurrence letter)*			
☐- "Adverse Effect" *(attach FHWA and SHPO concurrence letter)-Section 4(f) may need to be completed.*			
Memorandum of Agreement is required? SHPO signature date: _____	☐	☐	☒

2. Describe historic resource impacts:

One historic property, the Richwood General Store, was found to be eligible for the National Register of Historic Places (NRHP). The project would take a small strip of right-of-way from within this NRHP eligible property, which is located at the corner of US 25 (Dixie Highway) and Old Richwood Road (Appendix E). Because the minimal impacts associated with the proposed project would not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f), FHWA made a No Adverse Effect determination for this project. The KYTC Historic Architectural Investigation Form and SHPO concurrence letter is included in Appendix C.No comment letters relating to historic resource impact issues were received.

Project: KY 338 Interchange Improvement Project County: Boone Route: I-71/I-75 – KY 338

	NA	Y	N
F. Archaeological Resources:			
1. Does project involve the acquisition or easement of new right of way		☒	☐
2. Are new right-of-way areas undisturbed? *If "No" state basis for conclusion in box F.9.*		☒	☐
3. Are known archaeological resources affected by the project (per OSA database)		☐	☒
4. Is there potential for archaeological resources within the project? *If "Yes", to #2 or #3, consult with DEA District archaeologist for survey.*		☐	☒
5. Will project impact archaeological resources. *If "Yes", list site number(s) that can not be avoided:* _____		☐	☒
6. Are/were sites recommended for Phase II work? *(attach SHPO concurrence letter)* *If "Yes", list site number(s):* _____		☐	☒
7. Are NRHP eligible/potentially eligible sites affected by the project?		☐	☒
If "Yes", indicate level of impact; If "No", attach SHPO concurrence letter:			
☐- "No Adverse Effect" *(attach SHPO concurrence letter)*			
☐- "Adverse Effect" *(attach FHWA and SHPO concurrence letter)-Section 4(f) must be completed if preservation in-place is required.*			
Memorandum of Agreement required? SHPO signature date: _____ FHWA signature date: _____	☐	☐	☒
8. Is Native American Consultation (NAC) required? *If "No", explain why in F.9 below; If "Yes", document dates of consultation below and describe the outcome in F.9 below.*		☐	☒
Dates NAC conducted: Phase I _____; Phase II _____; MOA _____ FHWA Closure Date: Phase I _____; Phase II _____; MOA _____			
Tribal request for additional consultation: Phase I	☐	☐	☐
Tribal request for additional consultation: Phase II	☐	☐	☐
Tribal request for additional consultation: MOA	☐	☐	☐
Further Native American Consultation is required	☐	☐	☒

9. Describe archaeological resource impacts:

ASC Group, Inc. conducted a Phase I archaeological survey for the proposed project (Appendix F). No previously identified sites are located within the project area; however, the Kentucky Office of State Archaeology listed nine sites within the buffer area surrounding the project area. Although prehistoric and historic activity occurred within the project area and the region surrounding it, the Area of Potential Effect is mostly in areas that have been disturbed by modern development and it is considered unlikely that any intact archaeological deposits would be present. An archaeological survey was conducted that utilized a combination of visual inspection, shovel probes, and shovel test pits to examine the proejct area. No archaeological deposits were encountered during the survey. Based on the results of the Phase I archaeological survey, the proposed project would not affect any significant archaeological resources. No Native American Consultation was conducted for the CE because no prehistoric artifacts were found during the archaeological survey. No coordination letters or comment letters relating to archaeological resource impact issues have been received.

	NA	Y	N
G. Section 4(f)			
1. Are 4(f) properties affected by the project? *If "Yes" , notify DEA EPM who will consult with FHWA to determine applicability of Section 4(f).*		☐	☒
2. Is the project adjacent to a 4(f) resource*? If "Yes", DEA EPM consult with the FHWA to determine applicability of "constructive use." If Questions 1 and 2 are both "No" , go to Section H.*		☒	☐
3. Prudent and feasible means to avoid 4(f) properties were fully considered but resource can not be avoided *Only determined in consultation with FHWA; Indicate 4(f) type below*	☐	☒	☐
☒ De minimis Finding ☐ Programmatic Section 4(f) ☐ Full Section 4(f) Statement			

	NA	Y	N
4. Describe process followed, consultation completed and attach documentation developed to resolve 4(f) issue:			

Section 4(f) is triggered when a project would "use" land from a protected resource such as publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites. No such recreational or refuge properties currently exist within the project area. One historic property, the Richwood General Store, located at the northwest corner of the intersection of Old Richwood Road and US 25 (Dixie Highway), was found to be eligible for listing on the NRHP. Alternative E1, the Preferred Alternative, would minimize the take of property from the Richwood General Store, a historic section 4(f) property and was considered as a minimization alternative. The project would require a small strip of right-of-way from this site. The minimal impacts associated with the proposed action would not adversely affect the activities, features, and attributes of the 4(f) resource. In a letter dated December 10, 2012, FHWA and KHC agreed that the proposed action would have No Adverse Effect on the Richwood General Store and that the *de mimimis* rule be applied to the resource.

H. Section 6(f)

1. Are 6(f) properties affected by the project? *If "Yes", consult with DEA and FHWA to determine applicability of Section 6(f).*		☐	☒
2. Has discussion been initiated with the Governor's Office of Local Development and the agency having responsibility for the administration of the publicly owned park, recreation area, or wildlife or waterfowl refuge.	☒	☐	☐
3. Will a Memorandum of Agreement be required? Final Signature Date: _____	☒	☐	☐

4. Describe parties involved, property involved, process followed and consultation completed to resolve 6(f) issue:

The Land and Water Conservation Fund (LWCF) was enacted to establish a funding source to assist states and Federal agencies in meeting present and future outdoor recreation demands and needs. Section 6(f) of the LWCF Act requires that all properties "acquired or developed, either partially or wholly, with LWCF funds" must be maintained as such in perpetuity. Section 6(f)states that those properties acquired or developed with LWCF funds shall not be converted to a use other than public outdoor recreation without the approval of the Secretary of the Department of the Interior, acting through the National Park Service and at the request of the state delegate/State Liaison Officer.

A search of the National Park Service database identified 15 resources within Boone County purchased with or improved by LWCF grants; however, none of these resources would be affected by any of the alternatives considered for the project. This proposed project would not impact property acquired or improved via LWCF grants.

No coordination letters or comment letters relating to Section 6(f) resource impact issues have been received.

I. Noise Impact (23 CFR Part 772):

1. There are noise sensitive receivers/land uses adjacent to the proposed project (e.g. residences, businesses, schools, parks, etc.).		☒	☐
2. Indicate if any of the following are applicable, which would necessitate a noise analysis: ☐ New roadway on new alignment; ☒ Addition of one or more through travel lanes; ☐ Significant change in vehicle mix or traffic speed; ☒ Significant change in horizontal or vertical alignment; ☐ A change in roadway character that substantially reduces the shielding effect of landforms or noise barriers.		☒	☐
3. Noise analysis demonstrates that noise impacts exceed the KYTC Noise Abatement Criteria Policy. *If "Yes", a significant impact may be associated with this project. Consultation with DEA is required.*		☒	☐
4. There are feasible and reasonable measures that can reduce impacts. *If "Yes", discuss in I.5 below*		☒	☐

5. Describe noise impact and abatement measures (if applicable):

The unit of measurement used in sound measurement is the decibel (dB), and the unit of measurement used for traffic noise is the dB on the A-weighted scale (dBA). The A-weighted scale most closely represents the response of the human ear to sound. In general, a dBA change less than three is imperceptible by the human ear, while a five dBA change is readily perceptible. Further, a 10 dBA increase is perceived by the human ear to be twice as loud.The measurement most

commonly used to express dBA levels for traffic noise is the Hourly Equivalent Sound Level (Leq[h]). The Leq(h) describes a noise-sensitive receiver's cumulative exposure from all noise-producing events over a 1-hour period.

The KYTC Noise Analysis and Abatement Policy (KYTC, 2011) establishes KYTC policy for implementing Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772) in Kentucky. The Noise Analysis and Abatement Policy outlines the requirements for analyzing highway traffic noise. In accordance with FHWA noise regulations, the KY 338 Interchange Improvement Project was determined to be a Type 1 project and as such required a noise analysis. A Traffic Noise Impact Analysis was conducted for the KY 338 Interchange Improvement Project to evaluate noise impacts and abatement under the requirements of 23 CFR 772 "Procedures for Abatement of Highway Traffic Noise". The complete Traffic Noise Impact Analysis completed for this project is included in Appendix G. This complete report includes additional details on the proposed barrier including barrier heights.

The FHWA Traffic Noise Model (TNM) Version 2.5 was used to model existing and proposed noise levels. KYTC Division of Environmental Analysis (DEA) has reviewed the report and approved it on April 15, 2013, as noted in the letter included in Appendix G. For this study 90 representative receptors were used to represent 164 dwelling units. Existing noise levels range from 47.8 dB(A) to 74.4 dB(A) for the 90 receptors analyzed. Predicted noise levels for the "No Build Alternative" range from 48.9 dB(A) to 75.3 dB(A). Predicted noise levels for the Preferred Alternative (W9/E1) range from 49.1 dB(A) to 76.4 dB(A). Because numerous design year noise levels have been predicted to approach or exceed the FHWA Noise Abatement Criteria (NAC) for Category B and C land uses, the project has been found to have traffic noise impacts.

Based on the KYTC Noise Analysis and Abatement Policy, the feasibility and reasonableness of noise barriers were evaluated at all locations in the project area where noise impacts were identified under the future build alternative. Based on this evaluation, two feasible barriers were identified for this project (NB1 and NB2). Of these barriers only one, NB1, also met the cost reasonableness criteria. NB 1 is located on the west side of I 71/I-75, south of KY 338 (Richwood Road) and would provide abatement for the Legends at Steeplechase Apartments. The final decision on implementation of abatement measures would be made after completion of the project design and the public involvement process. No coordination letters or comment letters relating to project noise impact issues have been received.

J. Air Quality Impacts

	NA	Y	N
1. The project is located in an air quality nonattainment or maintenance area		☒	☐
2. The project is listed in an approved STIP and/or TIP. *If not in STIP, notify DEA SME* STIP # September 2010 Page # 103 TIP Page # 92		☒	☐
3. Is project controversial *or* does the project HAVE or ADD a signalized intersection with a projected "open to traffic" year ADT > 80,000 vehicles per day? (*If "Yes" analysis may be required. Clearance memo from DEA SME is required and must be attached. If "No", check box below)* ☒ This project does not exceed the Kentucky CO screening criteria for project-level analysis and is not expected to produce a violation of the CO standards (35 ppm over a one-hour period or 9 ppm over an eight-hour period)		☐	☒
4. Is the project type included in the Exempt Project list found at 40 CFR 93.126? *If "Yes",indicate project type as described in the list*: _____ *If "No", contact DEA SME for assistance and attach related correspondence.* ☒ Project is considered to be exempt or of no potential for meaningful MSAT effects.		☐	☒
5. The project is in an area requiring PM 2.5 consideration (Boone, Boyd, Bullitt, Campbell, Jefferson, Kenton or part of Lawrence) Date Inter-agency Consultation completed 11/26/13; Project Status: ☐ Exempt ☒ Not Exempt, Not of Concern ☐ Of Concern		☒	☐

Impacts/Comments:

Based on the Kentucky Carbon Monoxide (CO) Screening Criteria, this project does not meet the criteria requiring a CO

project level analysis and would not produce a projected violation of the CO standards (35 parts per million over a 1-one period or 9 parts per million over an 8-hour period). Lead (Pb) has not been a mobile source concern since Tetraethyl Lead was banned as a fuel additive. All areas in Kentucky are in attainment for Lead. All areas in the Kentucky are in attainment for Nitrogen Dioxide (NO2). Boone County is designated at nonattainment for 8-hr Ozone. Currently, there are no Transportation Control Measures (TCMs) included in the SIP. The proposed project is in the September 2010 STIP on page 103 and in the TIP on page 77. SO2 is primarily an industrial source concern and not a mobile source concern. Boone County is in attainment for Sulfur Dioxide (SO2).

The project is located in Boone County and in the Kentucky/Cincinnati Maintenance area for Fine Particulate Matter (PM2.5). The PM2.5 hotspot checklist was completed for this project (Appendix H). The project is not a project of air quality concern and a hot-spot analysis is not required. The project would improve LOS. Analysis for future conditions (2030) indicates that under a No Build scenario, all the intersections would fail. However, under the Build scenario all of the intersections would operate at LOS A, B, or C except for US 25 (Dixie Highway) and Logistics Boulevard (see Table 2). Overall, these improvements would result in fewer emissions than that No Build scenario.

All areas in Kentucky are in attainment for PM10. Therefore, the conformity procedures of 40 CFR 93 do not apply to this project.

For each alternative in this CE, the amount of Mobile Source Air Toxics (MSAT) emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is the same for the No Build Alternative, resulting in no increase in MSAT emissions. Because the VMT under each of the Alternatives are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions along the various alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the reductions projected by the US Environmental Protection Agency (USEPA) is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

No coordination letters or comment letters relating air quality impact issues have been received at this time.

K. Hazardous Materials:

		NA	Y	N
1.	Are known or potentially contaminated sites (service stations, landfills, automotive repair, junkyard, structures with asbestos, etc.) along the project corridor.		☒	☐
2.	Is ROW required from, or extensive excavation required adjacent to a potentially contaminated site? *If "Yes" Phase II testing is required and should be completed prior to ROW authorization request. Deferral must be approved by FHWA.*		☒	☐
3.	Phase II analysis indicated the existing and/or proposed ROW is contaminated. *Extent and estimated remediation cost to be provided by DEA SME to Div. of ROW and Project Team.*	☐	☐	☒
4.	Will any bridges or standing structures be demolished for completion of the work? Status of inspection of bridges and structures for asbestos containing materials (ACM) ☐ Complete ☒ Required ☐ Not Required *(Identify bridges and structures, discuss results of assessment, if completed, reason not required or future work in K.6 and Sec. 5)*		☒	☐
5.	If bridges are to be removed, refurbished or repainted, will there be lead-based paint wastes to address?	☐	☐	☒

6. Discuss significance of any "Yes" marked in 1-5 and any deferred necessary activities (deferrals also discussed in Section 5 - Commitments):

A Phase I Environmental Site Assessment (ESA) was conducted by Florence & Hutcheson for this proposed project (Appendix I). A total of 10 findings were documented from four separate field reconnaissance visits. All but one location was identified within a commercial land use and most locations are typically not very large in size. The majority of these "finds" are generally located in close proximity to the interchange, with many sites associated with gasoline/travel center facilities.

None of the 10 sites was identified as a Recognizable Environmental Condition (REC). While each location does have hazardous potential, it was determined that no finding exhibited the size and/or chemical composition sufficient for REC status. Preliminary design alternatives focus on construction efforts typically within the existing right-of-way, with only minor encroachment of adjacent commercial, industrial, and residential parcel tracts. An oil-water separator (OWS) was identified within an on-site concrete detention structure at the Pilot Travel Center. The OWS may be impacted by entrance reconstruction and, if it is, a Phase II ESA is recommended.

The proposed reconstruction of the KY 338 (Richwood Road) and I-71/I-75 interchange does not contain any known future recognizable environmental conditions (REC's) located witin the study area. It is recommended that potential construction near any existing facility containing underground storage tanks (UST's) be completed with prior communication from the Kentucky Transportation Cabinet, Kentucky Department of Waste Management – UST Branch.

A total of four separate EPA site occurrences were identified within the study area. One site, located on KY 338 (Richwood Road) is listed within EPA's Resource Conservation and Recovery Act (RCRA) and small quantity generators (SQG's) database. The other three sites are gasoline stations that had a previous underground storage tank (UST) leak(s) and/or an environmental release(s) of particular significance. According to the Kentucky Division of Waste Management (DOWM) proper cleanup was initiated and at this time no further action is required. Right-of-way would be required from these three sites, but the sites went through proper cleanup and no further action is required; therefore, a Phase II ESA is not needed.

Two standing structures would be demolished, the Huntington National Bank on Richwood Road and one residence located on US 25 (Dixie Highway), south of KY 338 (Richwood Road). An asbestos survey would be required prior to demolition. No coordination letters or comment letters relating to hazardous materials have been received.

L. Threatened and Endangered Species (T&E):

	NA	Y	N
1. Sources considered to identify potential impacts to federally threatened and endangered species (attach copies): ☒ USFWS Species List ☒ KSNPC website ☒ KDFWR web site Species Identified: Based on state and federal agency coordination conducted, nine federally threatened or endangered species were identified as potentially occuring within the study area. These species are as follows Indiana bat (Myotis sodalis), Fanshell (Cyprogenia stegaria), Pink Muckett (Lampisilis abripta), Rink Pink (Obovaria retusa), Orangefoot pimpleback (Plethobasus cooperianus), Sheepnose (Plethobasus cyphus), Clubshell (Pleurobema clava), Rough Pigtoe (Pleurobema plenum), Running Buffalo Clover (Trifolium stoloniferum)		☒	☐
2. Habitat Assessment indicates Federally listed T&E habitat present in vicinity No Effect determined for: Indiana bat (winter habitat), mussel species, and running buffalo clover BA required for:		☒	☐
3. Indiana bat *(Check all that apply)*: ☐ To be Determined ☐ No Effect; ☐ KYTC NLTAA Finding; ☒ IBCF; ☐ Tree Cutting Restrictions ☐ BA Complete; ☐ BA to be scheduled; ☐ To be Determined			
4. Project located upstream of or within Designated Critical Habitat *(Consultation with DEA required)*		☐	☒
5. Biological Assessment required: ☐ Completed (attach USFWS letter) ☐ To complete before Construction *(CAP entry recommended and include in Section 5)*	☐	☐	☒
6. Project may adversely affect federally listed T&E (formal consultation required)	☐	☐	☒

NA Y N

7. Describe T&E species concerns/protective measures:

Based on state and federal agency coordination conducted, nine federally threatened or endangered species were identified as potentially occurring within the study area. These species are as follows Indiana bat (Myotis sodalis), seven species of mussels Fanshell (Cyprogenia stegaria), Pink Muckett (Lampisilis abripta), Rink Pink (Obovaria retusa), Orangefoot pimpleback (Plethobasus cooperianus), Sheepnose (Plethobasus cyphus), Clubshell (Pleurobema clava), Rough Pigtoe (Pleurobema plenum), and one plant species: Running Buffalo Clover (Trifolium stoloniferum).

A field review was conducted by Redwing Ecological Services (Appendix J). No Indiana bats were observed during the field assessment; however, the upland woods habitat represents potential foraging areas and marginal roosting habitat for the Indiana bat within the study area. Additionally, 18 potential Indiana bat summer roost trees were identified outside the upland woods habitat and one primary roost tree was identified in the study area. The Preferred Alternative results in 12.61 acres of impacts and would impact six roost trees. The Preferred Alternative would not impact the primary roost tree located within the study area. The loss of this Indiana bat summer habitat will be mitigated through the Indiana Bat Programmatic Agreement currently held between KYTC and USFW. Mitigation payment into the Indiana Bat Conservation Fund (IBCF) will be specified in an Indiana Bat Conservation Memorandum of Agreement (IBCMOA) that will be executed prior to construction.

Seven federally-listed mussels are known to occur in Boone County. Typical habitat for these mussel species is small to large rivers. The streams within the study area do not provide suitable habitat; therefore, direct impacts to mussel species are not anticipated as a result of this project.

Potential indirect impacts to mussels from the proposed project could include alteration or removal of wooded riparian corridors, increased downstream sediment deposition due to construction activities, and runoff of fuel, pesticides, or other hazardous materials. These potential impacts would be minimized through the use of appropriate best management practices.

No individuals of running buffalo clover were observed during the field assessment; however, a survey during the flowering season was not completed as part of this assessment. One area of suitable habitat for running buffalo clover was identified in the study area totaling approximately 2.96 acres. This area is located along the streambanks of Intermittent Stream 1, which parallels KY 338 (Richwood Road) in the western portion of the study area. The Preferred Alternative would result in 1.54 acres of impact.

Mitigation measures for federal threatened/endangered species includes minimization of impacts to prime habitat areas, minimization of riparian tree clearing, use of proper equipment staging and fueling areas, and enhanced erosion control measures.

No comment letters were received relating to threatened and endangered species from the US Fish and Wildlife Service (USFWS). Coordination letters were received from the Kentucky Department of Fish and Wildlife Resources (KDFW), dated February 13, 2012, and the Kentucky State Nature Preserve Commission, dated January 30, 2012. The KDFW stated that the Kentucky Fish and Wildlife Information System indicates that no federally threatened/endangered species are known to occur within close proximity to the project site, but the state-listed Henslow's Sparrow (Ammodramus henslowii) is known to occur within the project boundary. All comment letters are included in Appendix C.

The Kentucky State Nature Preserve Commission (KSNPC) noted that two federally endangered species, running buffalo clover (Trifolium stoloniferum) and Indiana bat (Myotis sodalis) are known to occur within five miles of the project area. Running buffalo clover is a state threatened species and the Indiana bat is a state threatened species. The KSNPC recommended that a thorough search be conducted by a qualified biologist for both species if suitable habitat would be disturbed. They also mentioned the Henslow's sparrow, Savannah sparrow (Passerculus sandwichensis), Bewick's wren (Thyromanes bewickii), and barn owl (Tyto alba) which are all KSNPC special concern species. These bird species are not protected under the federal endangered species act and therefore, no field surveys were conducted for these species.

On February 4, 2014 KYTC issued a No Effect finding for Endangered species within the project area (see Appendix J). This precludes the need for completeion of a Biological Assessment.

Project: KY 338 Interchange Improvement Project County: Boone Route: I-71/I-75 – KY 338

M. Water Resource Impacts:	**NA**	**Y**	**N**
1. Project impacts State Listed Special Use Waters or tributaries to a Special Use Water? ☐ Cold Water Aquatic Habitat ☐ Outstanding National Resource Water ☐ Exceptional Waters ☐ Reference Reach Stream ☐ Outstanding State Resource Water ☐ State Wild River ☐ Federally Designated Wild River ☐ Federally Designated Scenic River ☐ Federal T&E Species	☐		☒
2. Project will involve surface disturbance greater than one acre *If "Yes", note need for KPDES KYR10 storm water permit in box M.12.*	☐	☒	☐
3. Project is located partially or wholly within a designated MS4 community *If "Yes", identify any local ordinances, restrictions, local permits or other local requirements that require consideration before, during and after construction and specify in box M.13 below and, if appropriate, Section 5.*	☐	☐	☒
4. Project encroaches upon 100 year floodplain *If Yes, determinations regarding No Rise Certifications, FEMA Map Revisions, etc. to be made by KYTC Design, Drainage Section during final design.*	☐	☐	☒
5. Project could potentially impact surface or groundwater drinking water supplies (public or private)	☐	☐	☒
6. Project involves impacts to a stream below Ordinary High Water Mark (OHWM) *(If answer is "No" then the reply to questions 7 and 8 will also be "No")* Estimate total number of impacts below OHWM 9 Identify all applicable types of impact occurring below OHWM: ☐ Bridge/Pier Abutment ☐ Relocation/Channelization ☐ Temporary Diversion ☒ Culvert ☐ Low Water Crossing ☐ Excess Excavation Site ☐ Bank Stabilization ☒ Other (describe): Fill	☐	☒	☐
7. Project involves impacts below the OHWM to streams defined as ephemeral? Estimate length and area of the single largest ephemeral impact: 190 feet and 0.007 acres *For largest single impact: <0.1 ac = ACE LON; between 0.1 and0.5 ac = ACE NW; > 0.5 acre = ACE IP*	☐	☒	☐
8. Project involves impacts below OHWM to streams defined as intermittent or perennial? Estimate length and area of the single largest intermittent/perennial impact: 1,025 feet and 0.165 acres *Impact <300' = ACE LON; Impact between 300' & 500' =ACE NW + mitig.; Impact >500' = ACE IP + mitig* *Impact <0.1 ac=ACE LON; Impact between 0.1 ac & 0.5 ac=ACE NW+mitig; Impact >0.5 ac=ACE IP +mitig* *Impact >300'= Ind. WQC + mitig.; Cumulative impact in HUC 14>500' = Ind. WQC +mitig.*	☐	☒	☐
9. Project will impact a lake or pond requiring its draining or filling (note characteristics below) ☐ A stream enters the lake or pond ☐ A stream exits the lake or pond *If stream is exiting lake or pond, 404 permit is required*	☐	☐	☒

	NA	Y	N
10. Permit Requirements			
401/404 Permits are likely to be required for this project *(indicate type below and in Section 5)*		☒	☐
Stream/Lake/Pond Impacts: ☐ ACE LON; ☒ ACE NW; ☐ ACE IP; ☒ DOW IWQC Mitigation required by: ☒ ACE; ☒ DOW			
Wetland Impacts: ☐ ACE LON; ☒ ACE NW; ☐ ACE IP; ☒ DOW IWQC Mitigation required by: ☒ ACE; ☒ DOW			
Will this project affect navigable Waters of the U.S. as defined by USACE and require a Section 10 permit? *If "Yes", then coordination with DEA is required*		☐	☒
Will this project affect a navigable water body requiring a Coast Guard, Section 9 permit? *If "Yes", then coordination with Div. of Structural Design is required*		☐	☒
Will this project require a KPDES storm water permit (KYR10) for construction?		☒	☐
Will this project require any additional permits from a local MS4? *(discuss requirements in box M.13)*		☐	☒
Will construction in the floodplain require analysis and coordination by KYTC Design-Drainage Section to assure that potential flooding impacts are thoroughly addressed?		☐	☒
11. Project is within the watershed of a significant Water Resource (private or public drinking water supply, wellhead protection area, Special Use Waters, etc.)		☐	☒
☐ Project is candidate for application of KYTC Karst Policy			

12. Describe Water Resource Investigations Conducted, Impacts Identified and Permits Required:

Streams within the study area were delineated based on the presence /absence of an ordinary high water mark (OHWM), defined bed and bank features, and flow regimes. Stream quality was assessed using the Rapid Bioassessment Protocol (RBP) developed by the USEPA and the Kentucky Division of Water (KDOW). The Preferred Alternative E1 would impact a total of 1,275 linear feet of poor quality intermittent stream and 425 feet of poor quality ephemeral stream. Known wetland locations were obtained using the USFWS National Wetlands Inventory (NWI) Wetlands Map (USFWS, 2012). In addition, US Department of Agriculture (USDA) soil survey maps were used to identify areas of hydric soil. A wetland delineation was conducted by Redwing Ecological Services wetland scientists that documented the presences/absence of hydric soils, wetland hydrology, and hydrophytic vegetation per the guildelines of the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0) (US Army Corps of Engineers [USACE], 2012). Soil, hydrology, and vegetation data were collected on Wetland Determination Data Forms.The Preferred Alternative would impact 0.21 acres of wetlands. .

Public water is supplied by the Northern Kentucky Water Services District, which utilizes treated surface water from the Ohio and Licking Rivers. Boone County is located within the Licking River region that includes the drainage area of the Licking River and other streams north and east of the basin along the Ohio River.

One comment letter received stated that the project should prioritize integration of sustainable storm water management into the final design. The other comment was concerned about stream runoff and potential flooding. Coordination letters regarding water resources were received from the KDFW and KDOW. All comment letters are included in Appendix C. The KDFW indicated in their coordination letter dated February 13, 2012 that the proposed project has potential to impact wetland habitats. They stated that if unavoidable wetland impacts occurred, they will recommend a 2:1 mitigation ratio, at a minimum, for any permanent loss or degradation of wetland habitats. They also indicated that erosion control measures should be developed and implemented prior to construction to minimize indirect impacts to aquatic resources.

The KDOW stated in their coordination letter dated February 14, 2012 that there are no Outstanding National Resource Waters (ONRW) or special classified surface waters are located in the area of interest. No groundwater tracer data or groundwater recharge area delineations were found to be surrounding this transportation corridor. The proposed project area is moderately sensitive to groundwater pollution and advised that proper Best Management Practices (BMPs) associated with required construction permit(s) are necessary to prevent pollutants from entering groundwater. The KDOW also mentioned that South Fork Gunpowder Creek is the nearest assessed stream and is not supporting primary

NA Y N

contact recreation (PCR) from river mile 4.1 to 6.8 due to fecal coliform. This stream is located outside of the project study area.

Permits required for the stream and wetland impacts include Section 404 nationwide permit and KDOW Water Quality Certification.

N. Construction Impacts

Discuss potential impacts of construction activities pertaining to water quality, stream diversion, air quality, detours and delays of traffic, businesses, noise, etc:

As noted in previous sections, there are several environmental impacts that could result during construction activities. These impacts could be controlled, minimized, or mitigated through careful construction practices and methods.

Construction activities could have a short-term impact on air quality conditions if uncontrolled. Dust (particulates) is the pollutant of primary concern during construction activities. Smoke associated with the burning of solid waste is another concern. Dust can be generated in association with excavation and earth moving, cement, asphalt and aggregate handling, heavy equipment operation over haul roads, and wind erosion of exposed areas and material storage piles. Local weather conditions and level of operation would play a significant role in the amount of dust generated.

An increase in project area noise levels would occur during roadway construction activities. Land uses that would be sensitive to vehicular noise would also be sensitive to construction noise. The actual level of noise impact during this period, however, would be a function of the number and type of equipment used, correct maintenance of the construction equipment, and type of construction activities.

Control of erosion from the construction site and the retention of siltation on the site are the two principal concerns of drainage related construction impacts. These impacts can be minimized through erosion and sediment control measures referred to as Best Management Practices (BMPs). Using prescribed measures, erosion and sedimentation can be significantly reduced at or near the construction sites(s). These erosion and sediment control measures would likely become permanent features in the roadway construction.

The locations of borrow and waste disposal sites are generally not known until the project is let for construction. In general practice, the contractor selects the sites on a case by case basis. Contractors must comply with all permitting requirements for borrow locations, and follow other applicable KYTC Standard Specifications. Based on current design estimates, Alternative E1 would result in a net waste of material totaling 31,000 cubic yards (cy) and 75,000 cy for Alternative W9a. Prior to the use of a location as a waste site, the potential sites would be assessed for impacts to resources such as archaeological resources, wetlands, streams, etc., and appropriate measures would be employed to avoid or minimize impacts, if any. If impacts were to occur, the contractor, with KYTC oversight, would obtain required permits. Due to the cost of mitigation that is often required when using sites that would result in impacts to resources, contractors often elect to identify and chose other sites in a different location that would avoid the impacts. Solid waste generation resulting from construction should be short-term and confined to the vicinity of the project area. In most cases the construction contractors use existing agricultural fields near the construction sites for borrow/waste sites as they are much easier to use and have low potential to impact protected environmental resources.

During construction, traffic would be maintained by altering traffic patterns to accommodate construction activities. Detailed Maintenance of Traffic (MOT) plans would be prepared during the final design of the project. As design progresses coordination with local officials would be undertaken to minimize the impact on public services such as emergency facilities and bus routes.

No coordination letters were received regarding construction impacts. One comment letter received expressed concern that there would be excessive traffic and backups during construction. Another comment asked about conditions during construction such as how access would be handled during construction and if signage would be used to indicate road closures.

Version 1.0
June 14, 2011
6-18.00

KYTC Historic Architectural Investigation Form

KYTC Item No: 6-18.00 County: Boone
Route: Richwood Rd & I75/I71 Project Description: Richwood Rd & I75/71 Improvement Project between US 25 and Paddock Avenue

Project Type listed in Attachment 1 (in Section 106 Programmatic Agreement)?

☐ Yes

☑ No (Continue)

Project Type listed in Attachment 2 (in Section 106 Handbook)?

☑ Yes (List project activity types) #9 Modernization of a Hwy

☐ No (This project is not considered a small scale project under the Section 106 Programmatic Agreement. This checklist cannot be used. Process with full baseline or joint memorandum)

☐ No (However, SHPO has agreed that this project may be documented using the Historic Architectural Investigation Form)

Project Area of Potential Effect is defined as:

☑ Within 150 feet of project centerline (Small Scale Project - within existing corridor)

☐ Within view shed of project (Discuss): _____

☐ Other (Discuss): _____

Are there Historical Resources within the project APE (per KHC database)?

☑ Yes

☐ No

☐ N/A (Explain):

Are there Historical Resources (50 years old or older) identified within the project APE based on field investigations?

☑ Yes

☐ No

Date of Field Investigation: December 2012

Investigator Name(s): Rebecca Horn Turner

Discuss Basis for finding (Historic Mapping, PVA, Building Permit, Date of Construction, Deed/Title, etc.):
CH Survey 6-351.00 Boone Co for US 25.

NRHP listed or potentially eligible sites/districts (> 50 years old) are:

☑ Present within the APE (Continue)

Sections below to be completed by KYTC Architectural Historian

---

Discuss eligibility determinations (criteria, integrity):
Site 9 in a Cultural Historic Survey of the Proposed Reconstruction and Widening of US 25 from KY 338 to KY 1829 in Boone Co. determined eligible by SHPO in a letter dated March 14, 2003. No other sites have been identified within the project area.

Determination of Effect (when eligible sites have been identified):

☐ No Historic Properties Affected

☑ No Adverse Effect (May result in Section 4(f) *De minimis* finding – Document appropriately)

☐ Adverse Effect

Discuss No Effect/No Adverse Effect Determination:

The 6-18.00 project will require a small taking from within the NR boundaries of Site 9. The taking will not diminish the intergrity of the structure. Therefore a recommended No Adverse/De Minimus is appropriate.

☐ No Historic Properties

☑ No Adverse Effect to Historic Properties

As Determined By:

Rebecca W. Turner — 12/10/12
KYTC HISTORIAN — **Date**

[signature] — 1-16-13
SHPO Representative — **Date**

[signature] — 1/14/13
~~**FHWA AREA ENGINEER**~~ — **Date**

Attachments: Recommended by: Bernadette Dupont 1/14/13

☑ Map Showing APE and identified Historic Resources

☑ Individual Site Maps

☑ Photographs

☑ Project Plans

☐ KHC Site Survey Forms

☐ Other (Describe): _____

☐ Copy EPM

☐ Copy DEC

☐ Copy DEA Architectural Historian

☐ Copy FHWA (w/De minimis Memo if appropriate)

☐ Copy SHPO

U.S. Department
of Transportation
Federal Highway Administration

Kentucky Division Office
Sepulveda, Division Administrator

Vest Broadway
kfort, KY 40601
502) 223-6720
(502) 223-6735

December 10, 2012

Lindy Casebier, Interim Executive Director
And State Historic Preservation Office
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601

Subject: *De Minimis* Determination
I75/71 and Richwood Road Improvement Project between US 25 and Paddock Ave.
Boone County, Kentucky
KYTC Item No. 6-18.00

Dear Mr. Dennen:

After review of the information provided to us by KYTC, it appears that the project will be taking a small portion from within the National Register of Historic Places eligible property at the corner of US 25 and Richwood Road to be used in the above-mentioned improvement project. Because the minimal impacts associated with the proposed roadway will not adversely affect the activities, features, and attributes that qualify the resource for protection under section 4(f), FHWA is making a No Adverse Effect Determination for this project. We are asking that you concur with our determination of No Adverse Effect and that the *de minimis* rule be applied.

If you have any questions, please contact me at your convenience.

Anthony Goodman
Environmental Specialist
Federal Highway Administration

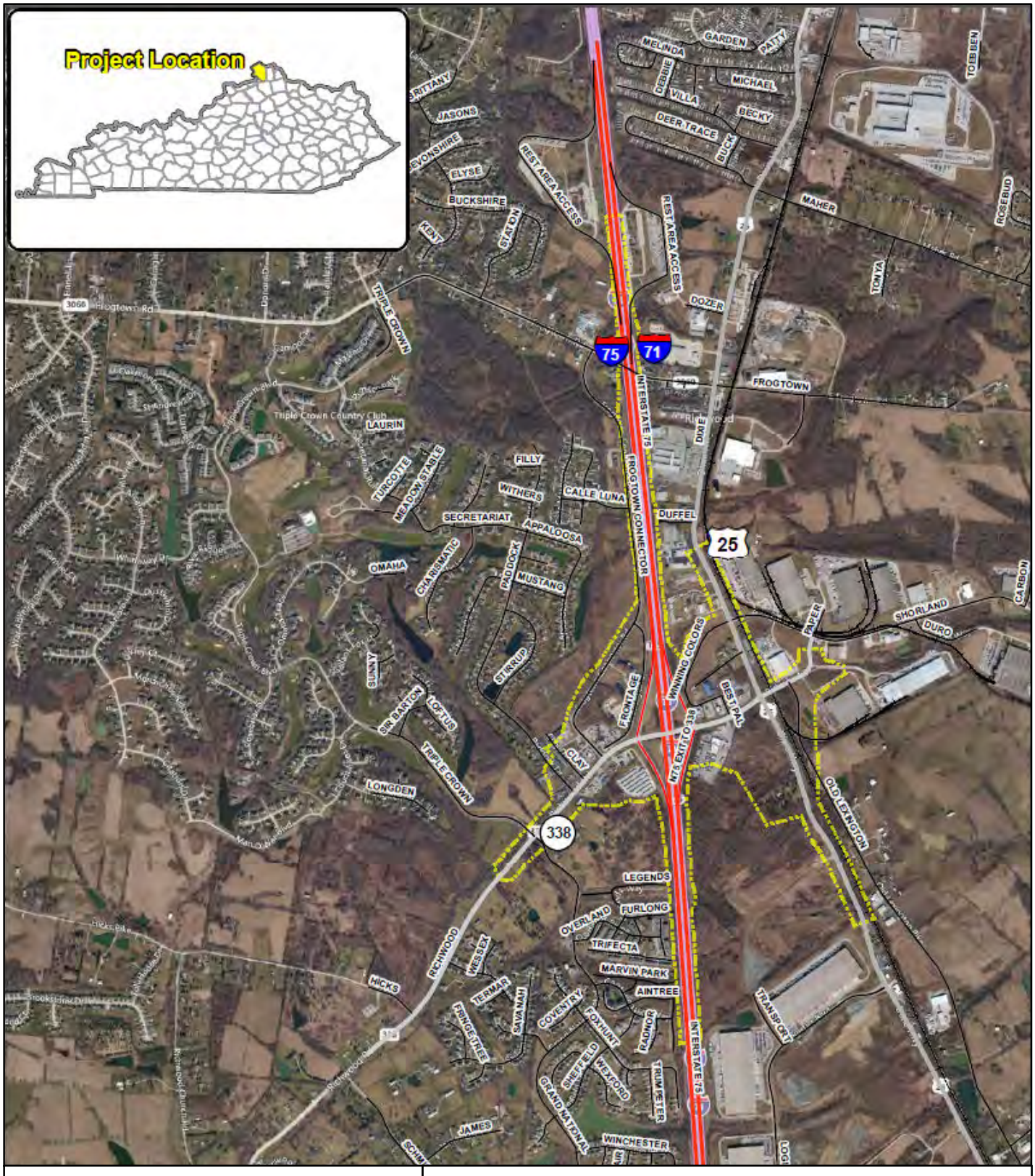
Lindy Casebier
Interim Executive Director
Kentucky Heritage Council
State Historic Preservation Office





APPENDIX A - FIGURES

1. Location Map
2. I-71/I-75 Alternative 3
3. I-71/I-75 Cross Section
4. I-71/I-75 Alternative 1
5. I-71/I-75 Alternative 2
6. I-71/I-75 Alternative 4
7. I-71/I-75 Alternative 5
8. Alternative E-1
9. Alternative E-2
10. Alternative E-3
11. Alternative E-4
12. Alternative W9a
13. Alternative W1
14. Alternative W2
15. Alternative W3
16. Alternative W4
17. Alternative W5
18. Alternative W6
19. Alternative W7
20. Alternative W8
21. Alternative W9
22. Alternative W10
23. Preferred Alternative
24. Community Resources



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2
Miles

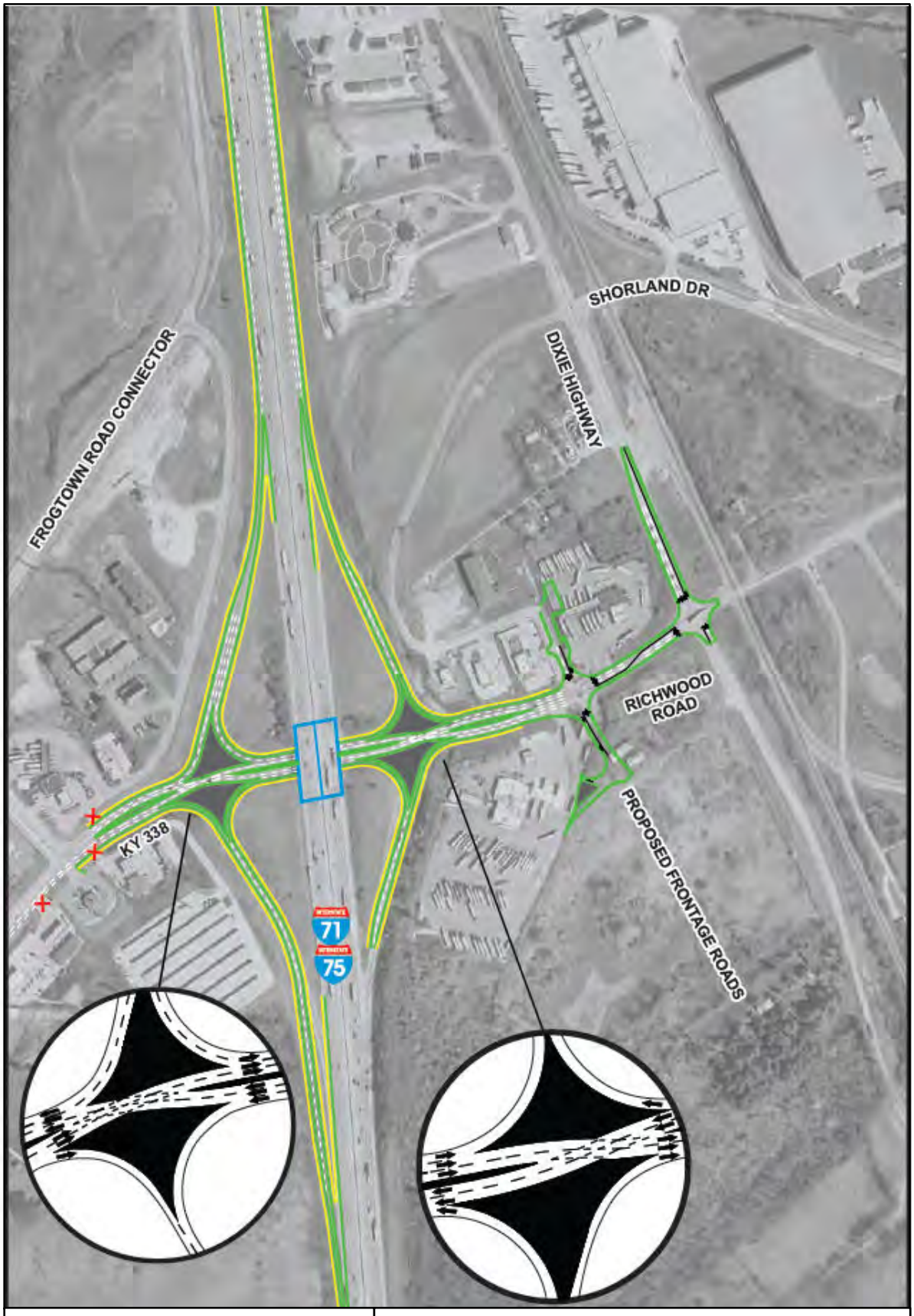
Legend

Study Area

FIGURE 1: PROJECT LOCATION

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2
Miles

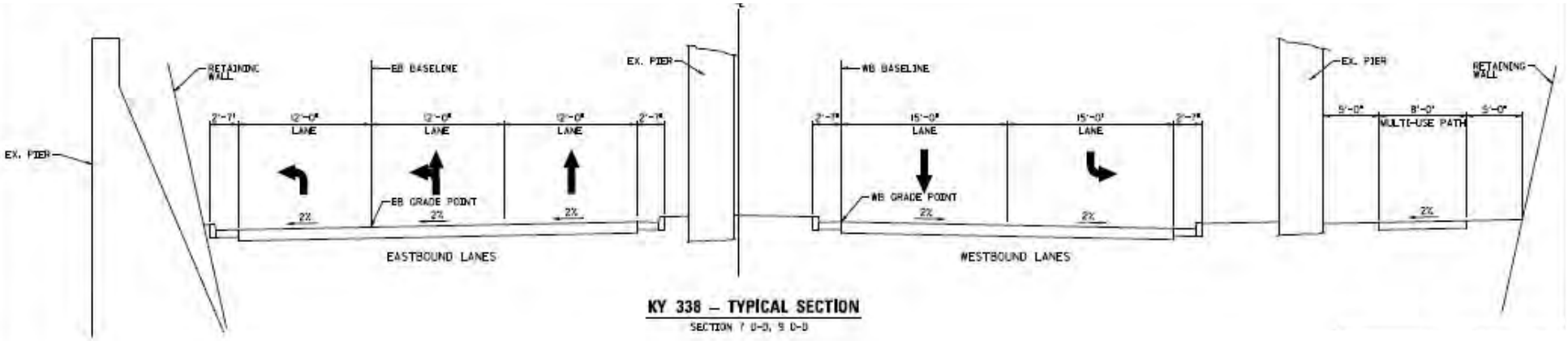
Legend

- X — Entrance to be closed
- Bridge
- Edge of Pavement
- Edge of Shoulder
- Lane Line
- Islands/Medians

FIGURE 2: I-71/75 ALTERNATIVE 3

I-71/I-75 - KY 338

PARSONS



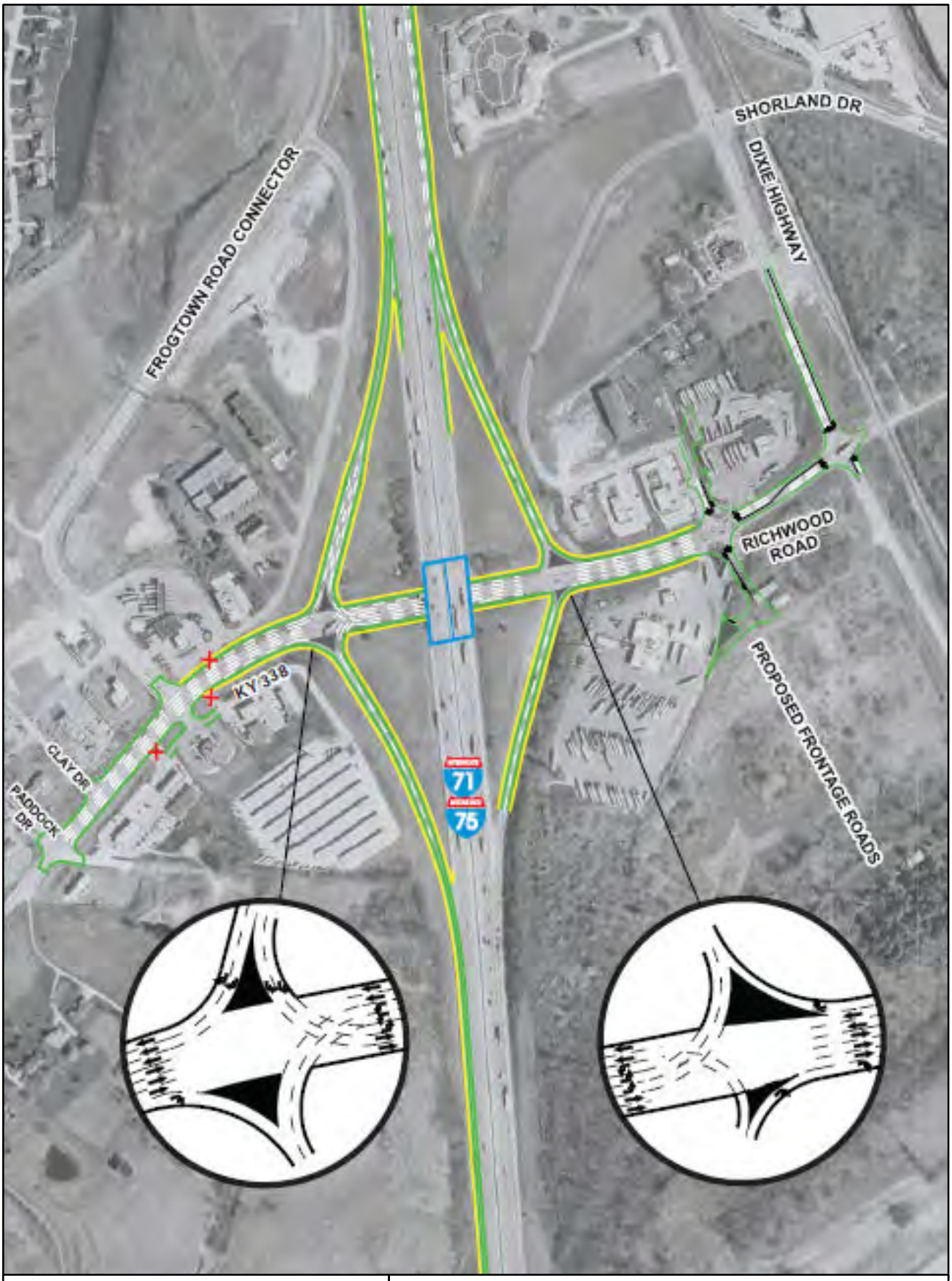
KY 338 – TYPICAL SECTION

SECTION 7 D-3, 9 D-3

FIGURE 3: I-71/75 CROSS SECTION, ALTERNATIVE 3

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2 Miles

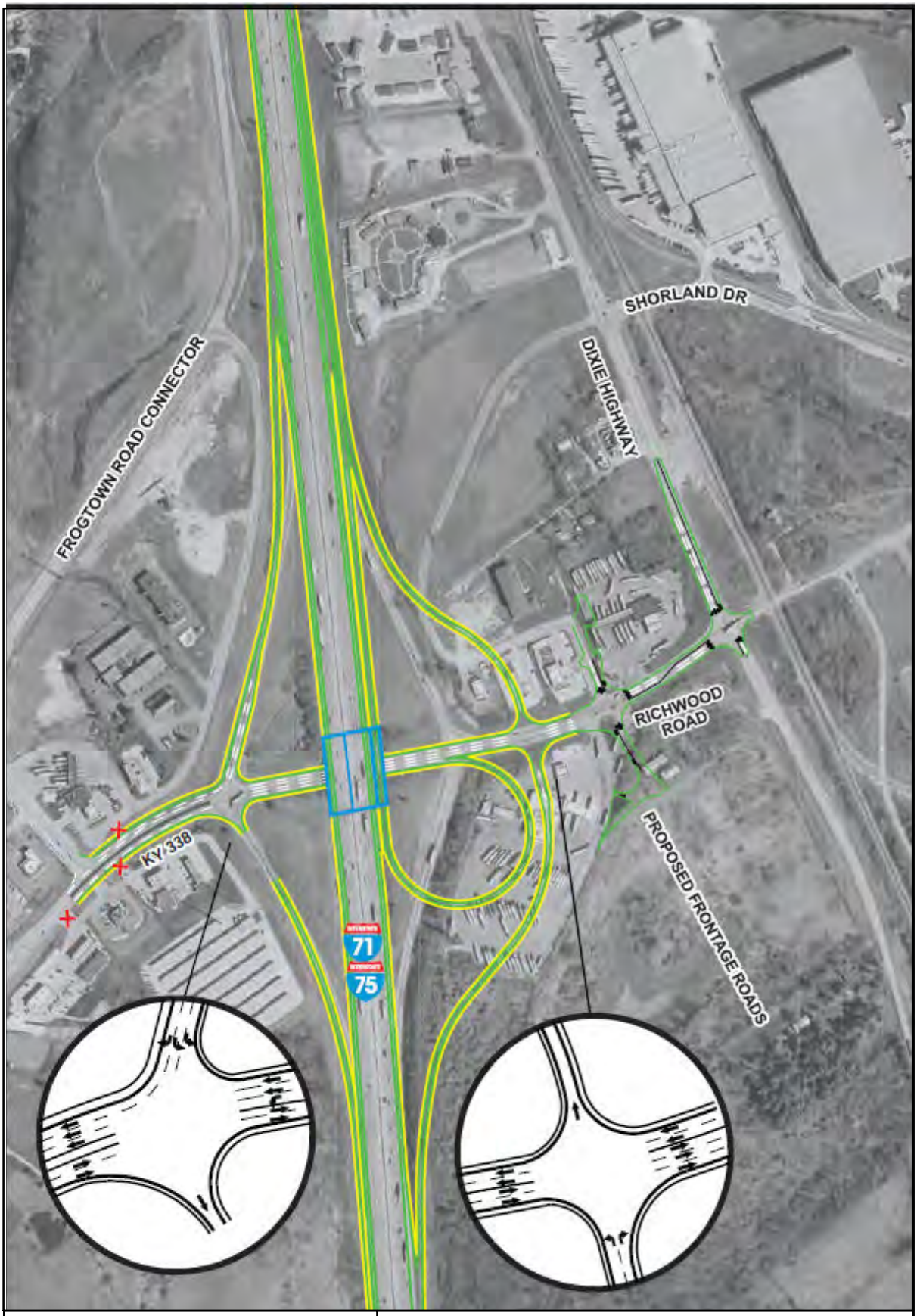
Legend

- X — Entrance to be closed
- Bridge
- Edge of Pavement
- Edge of Shoulder
- Lane Line
- Islands/Medians

FIGURE 4: I-71/75 ALTERNATIVE 1

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2 Miles

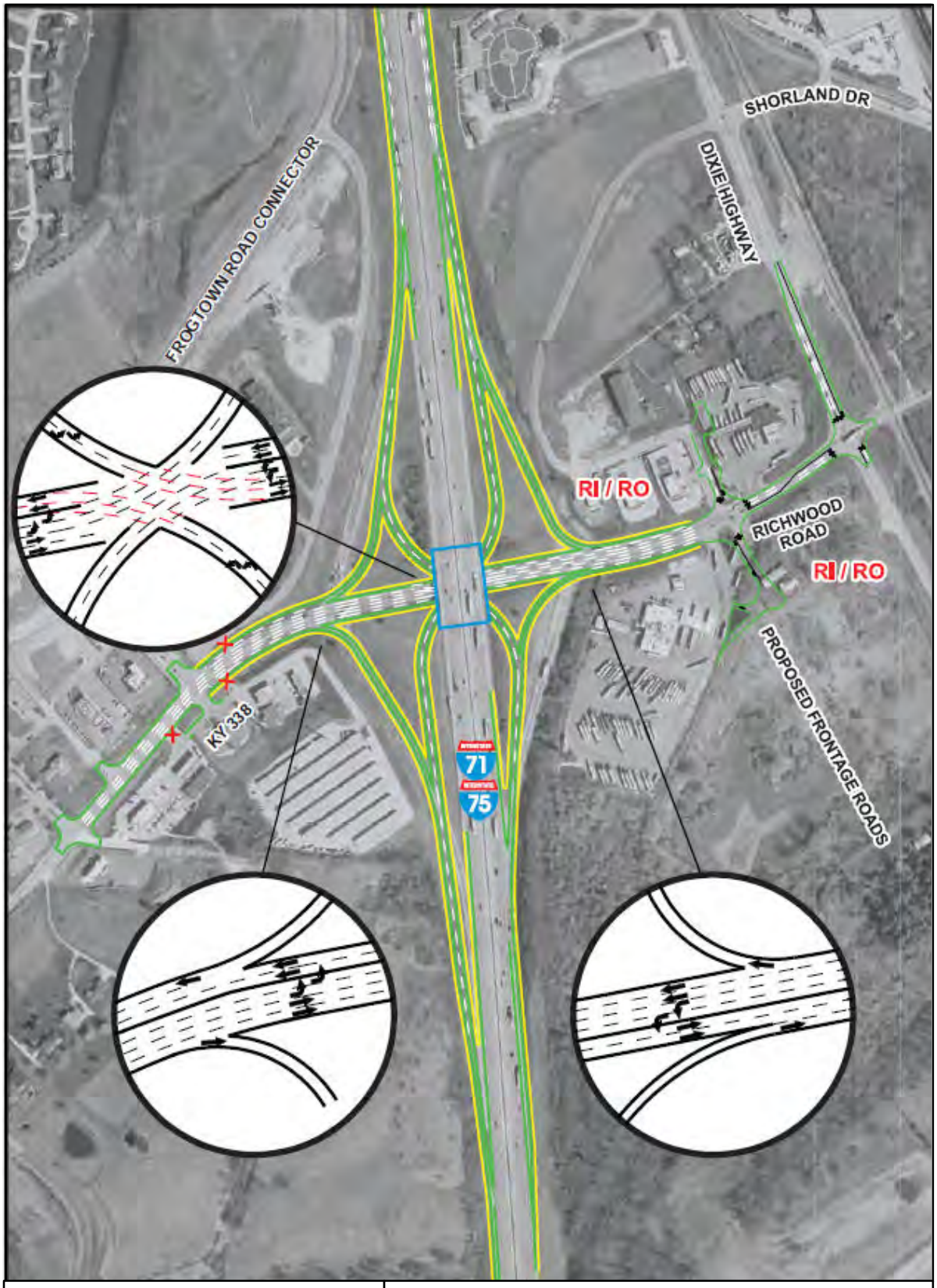
Legend

- X — Entrance to be closed
- Bridge
- Edge of Pavement
- Edge of Shoulder
- Lane Line
- Islands/Medians

FIGURE 5: I-71/75 ALTERNATIVE 2

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2 Miles

Legend

- X — Entrance to be closed
- Bridge
- Edge of Pavement
- Edge of Shoulder
- Lane Line
- Islands/Medians

FIGURE 6: I-71/75 ALTERNATIVE 4

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2 Miles

Legend

- X — Entrance to be closed
- Bridge
- Edge of Pavement
- Edge of Shoulder
- Lane Line
- Islands/Medians

FIGURE 7: I-71/75 ALTERNATIVE 5

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2 Miles

Legend

Edge of Pavement

Traffic Signal

FIGURE 8: ALTERNATIVE E-1
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

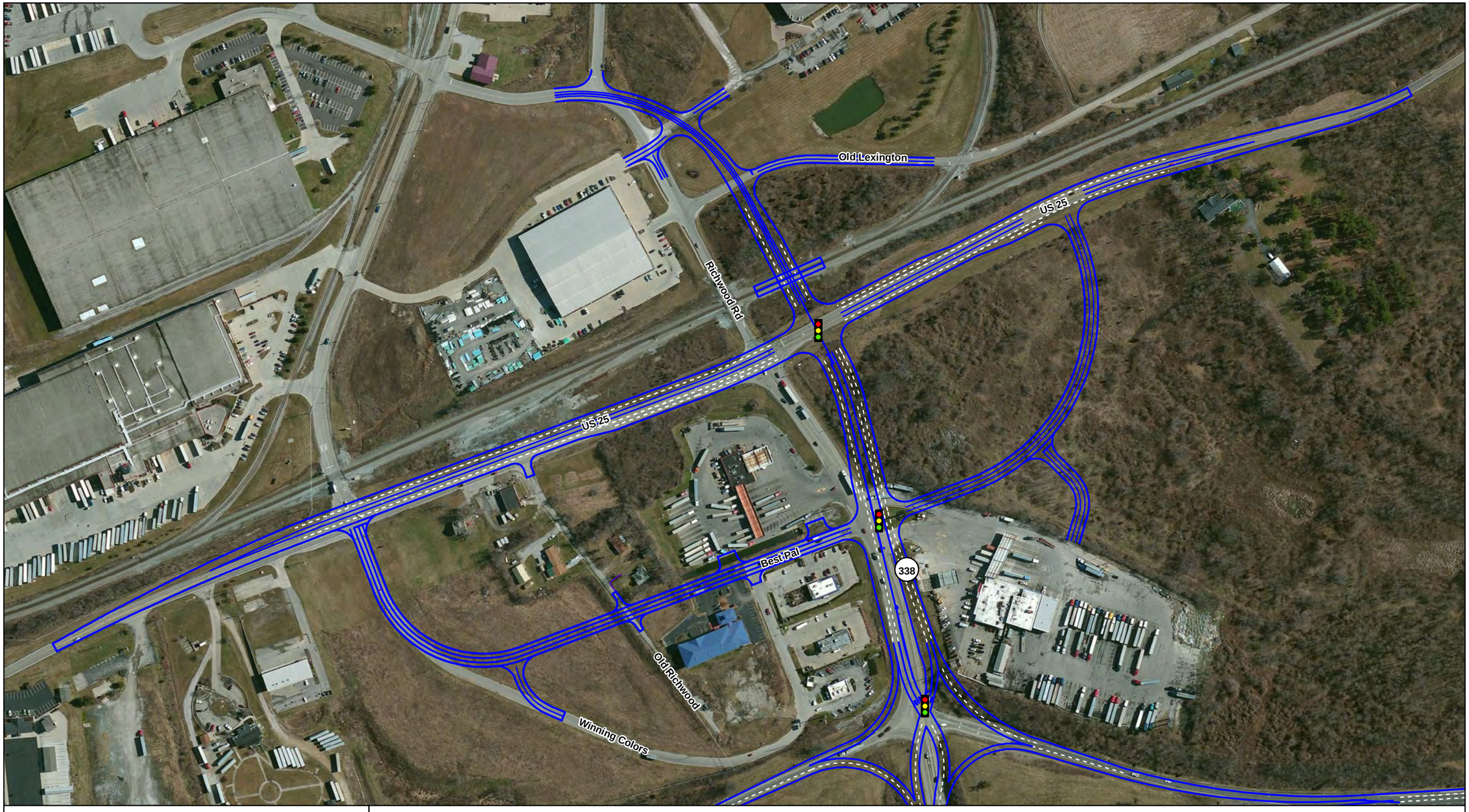
0 0.05 0.1 0.15 0.2
Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 9: ALTERNATIVE E-2
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

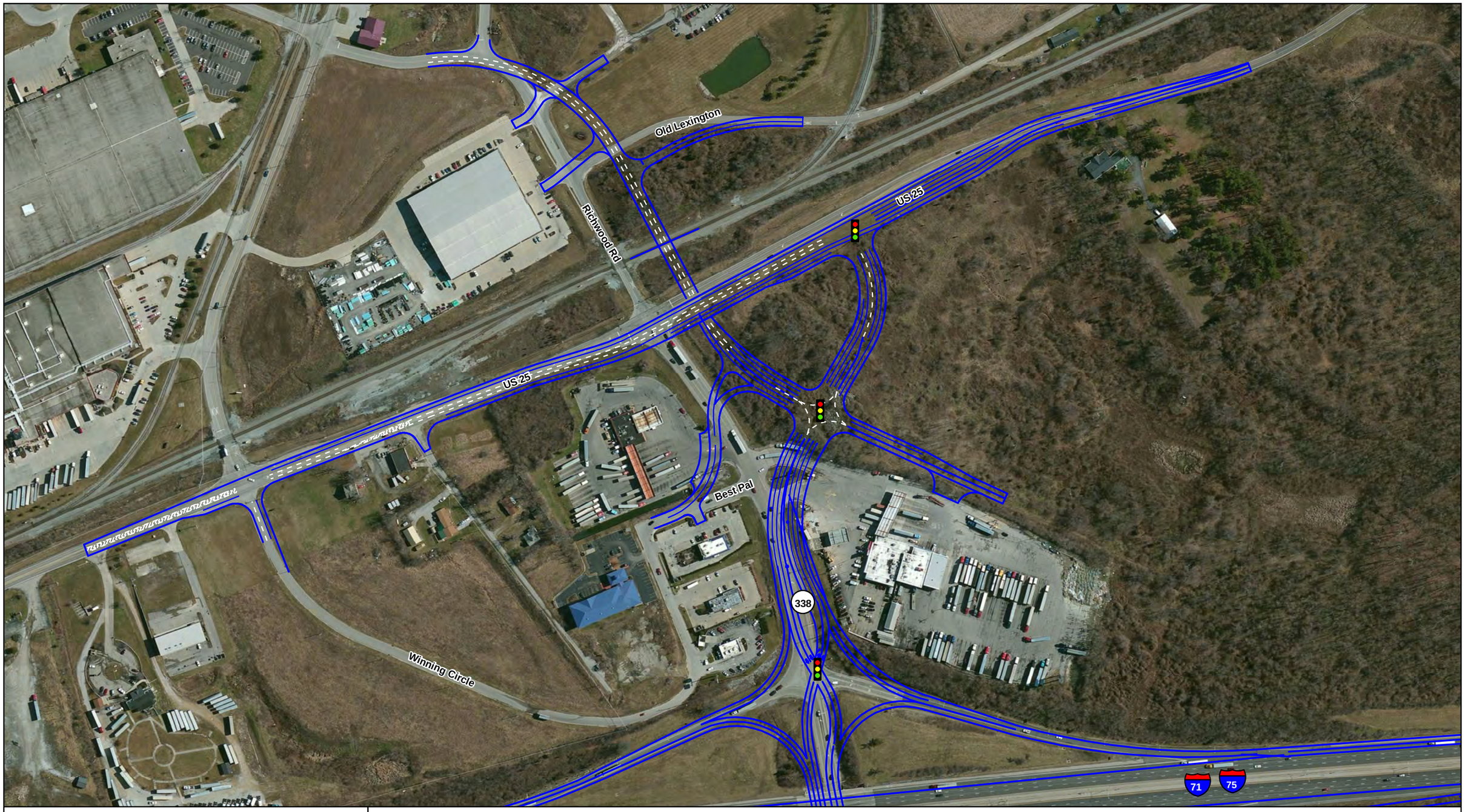
0 0.025 0.05 0.075 0.1 Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 10: ALTERNATIVE E-3
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.025 0.05 0.075 0.1 Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 11: ALTERNATIVE E-4

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.025 0.05 0.075 0.1
Miles

Legend

Edge of Pavement

Traffic Signal

FIGURE 12: ALTERNATIVE W-9A

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

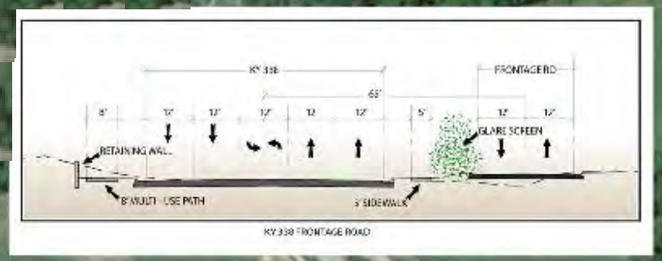
0 0.05 0.1 0.15 0.2 Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 13: ALTERNATIVE W-1
I-71/I-75 - KY 338

PARSONS



KY 338 FRONTAGE ROAD

Triple Crown Blvd

Richwood Rd

338

Clay Dr

Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

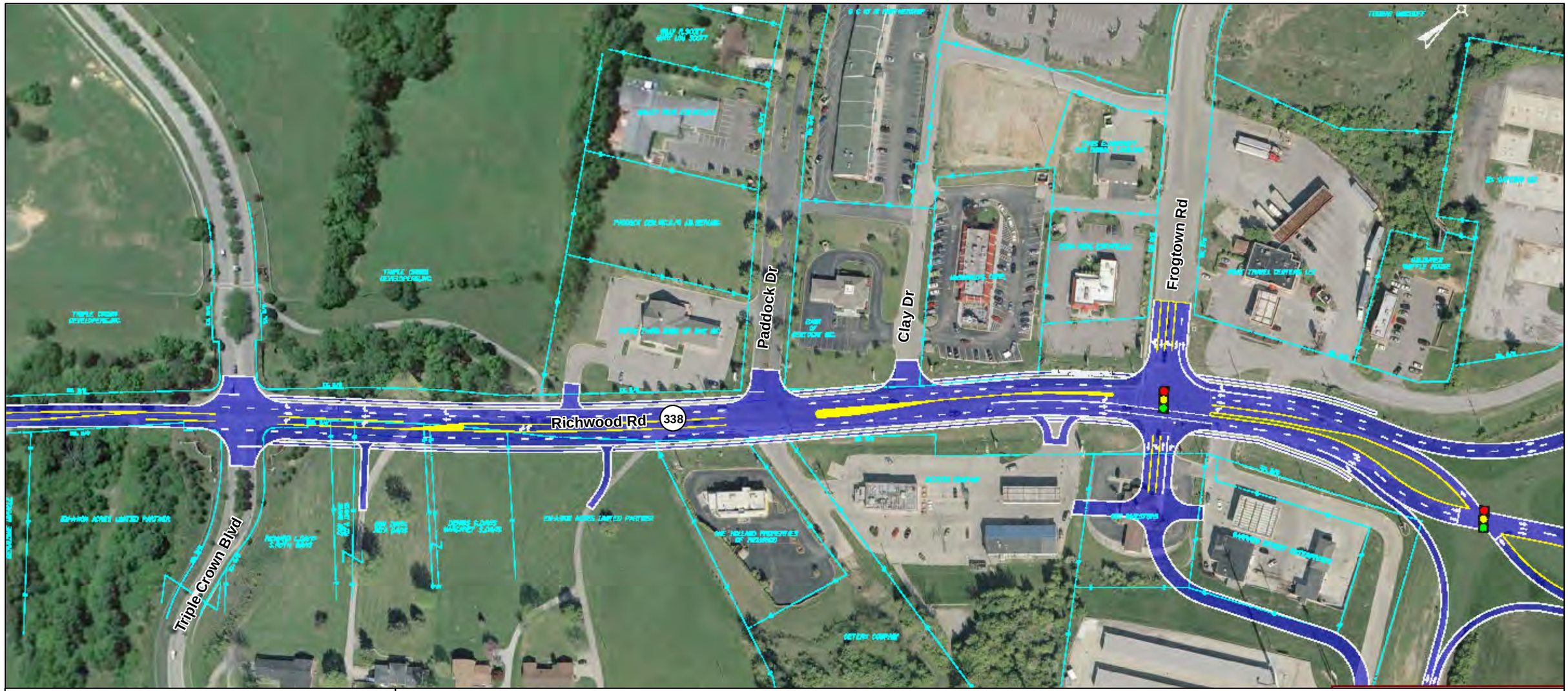
0 0.05 0.1 0.15 0.2 Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 14: ALTERNATIVE W-2
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2
Miles

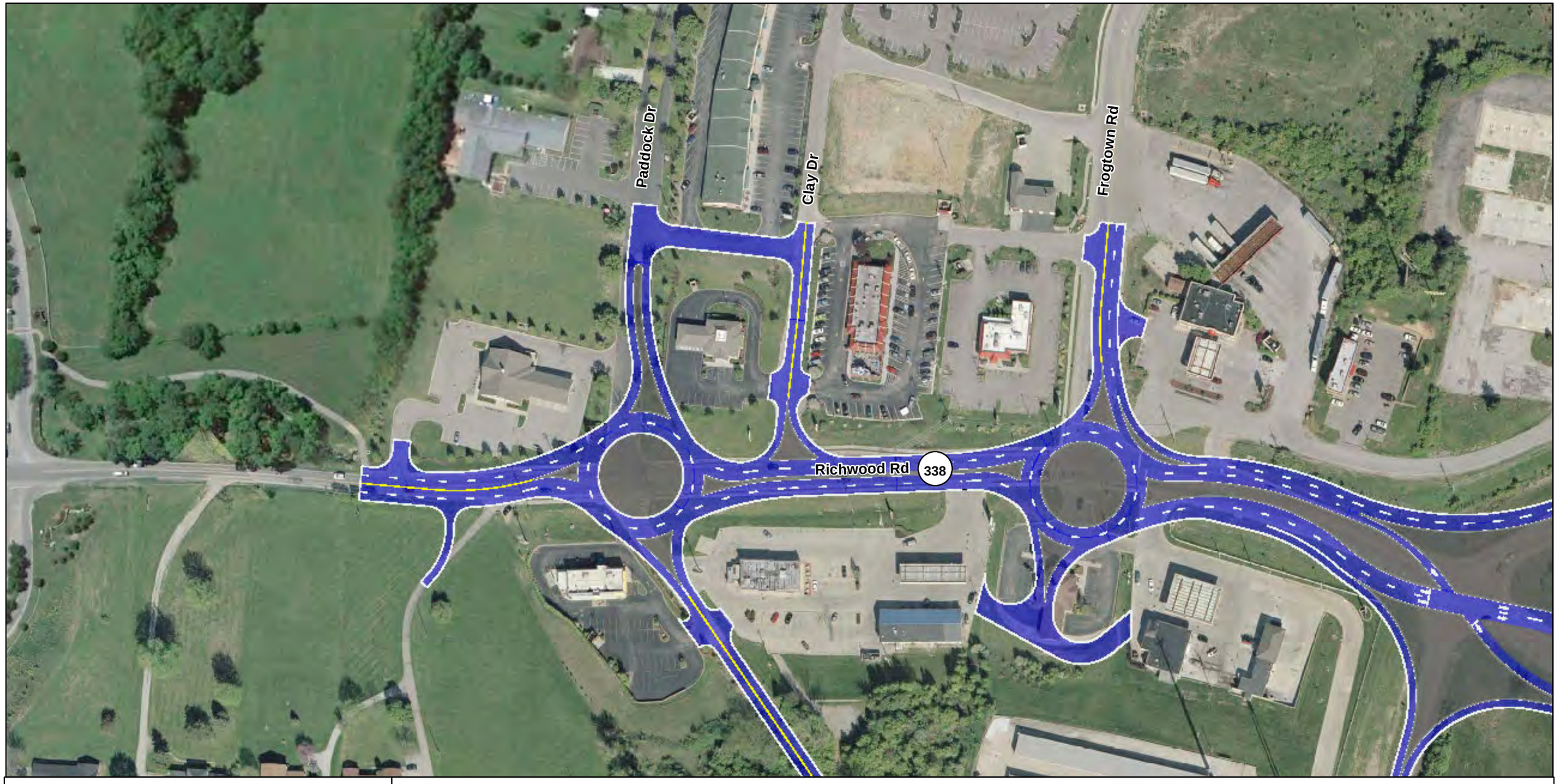
Legend

- Edge of Pavement
- Traffic Signal

FIGURE 15: ALTERNATIVE W-3

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

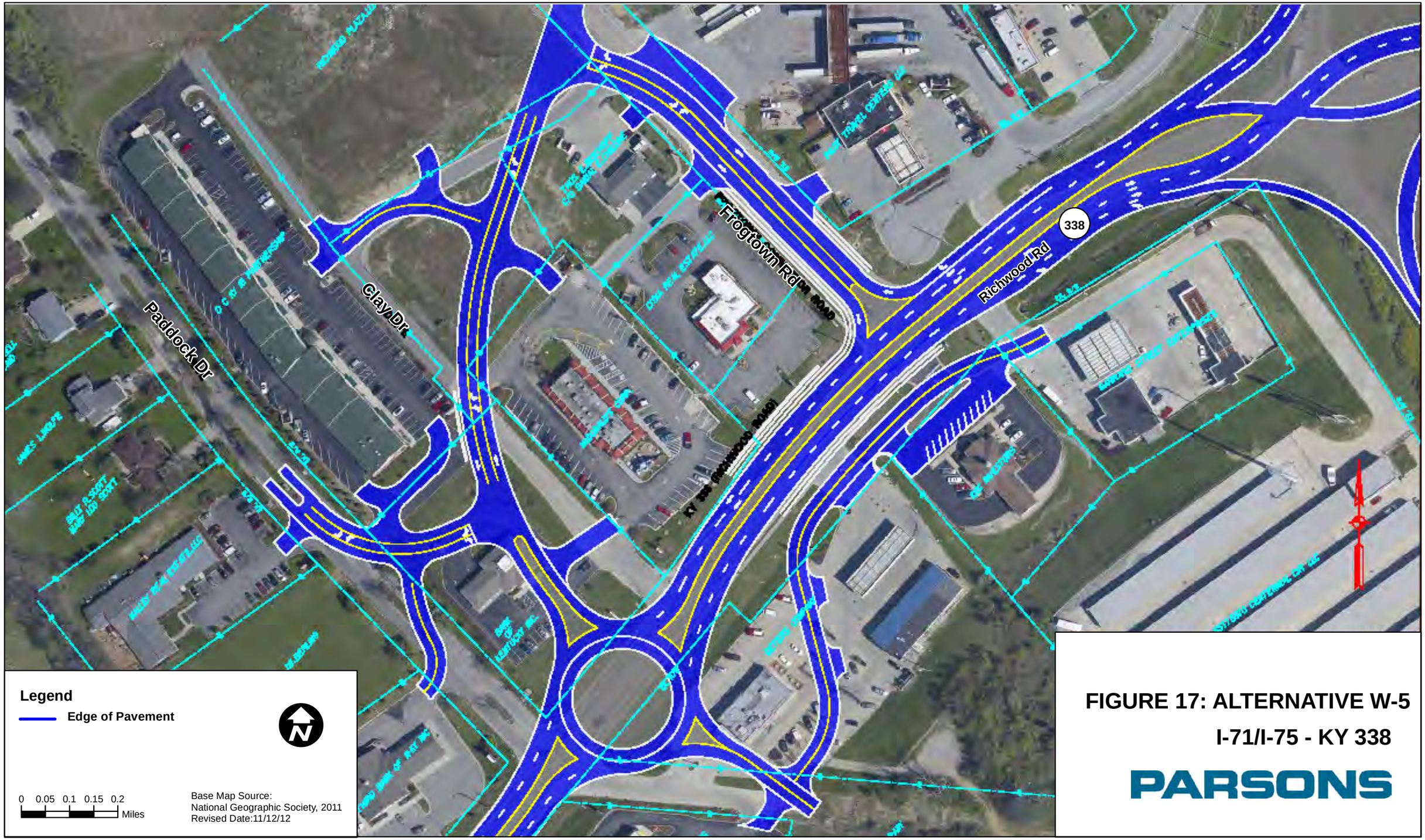
0 0.05 0.1 0.15 0.2
Miles

Legend

Edge of Pavement

FIGURE 16: ALTERNATIVE W-4
I-71/I-75 - KY 338

PARSONS



Legend

Edge of Pavement

0 0.05 0.1 0.15 0.2 Miles

Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

FIGURE 17: ALTERNATIVE W-5

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

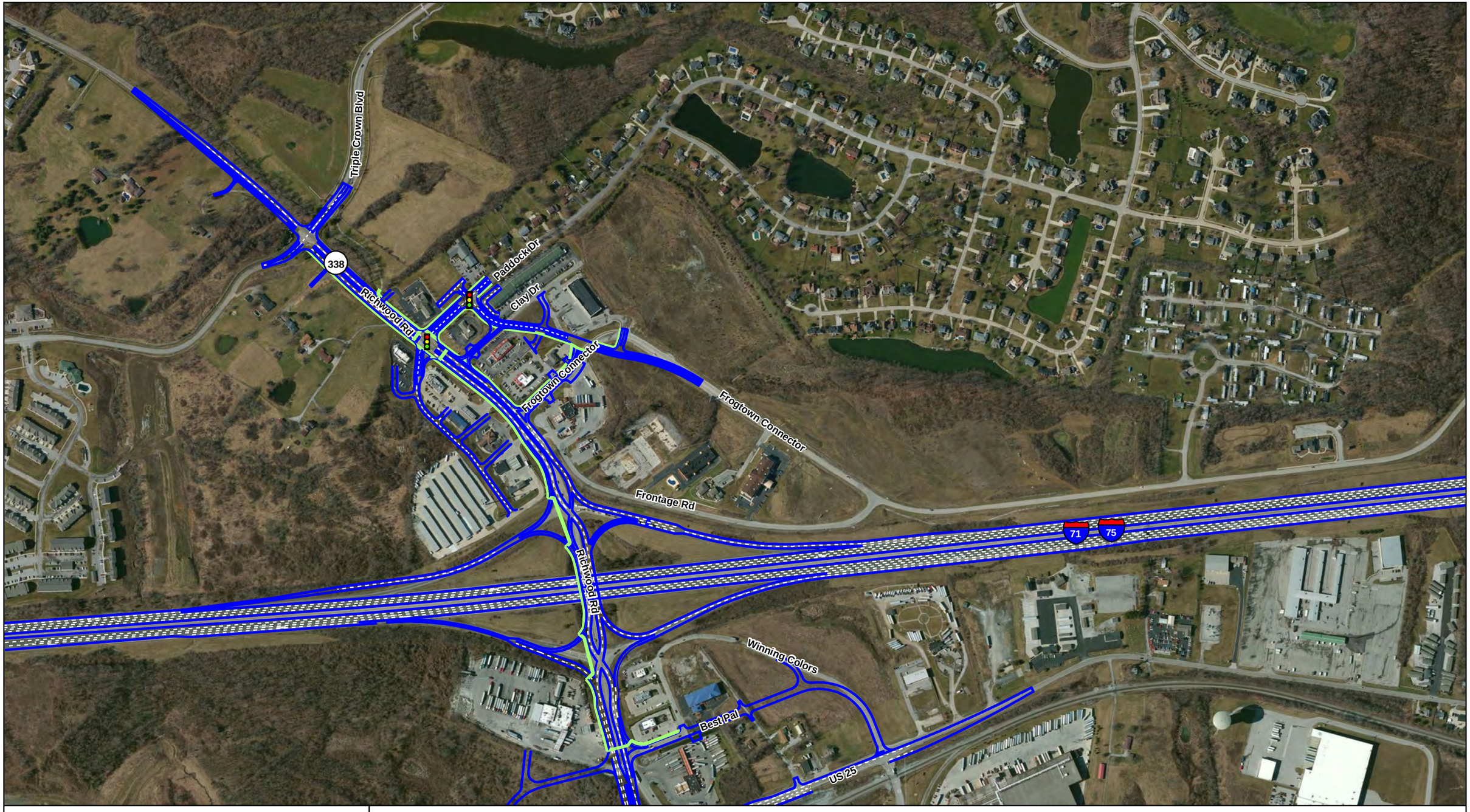
0 0.025 0.05 0.075 0.1
Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 18: ALTERNATIVE W-6
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

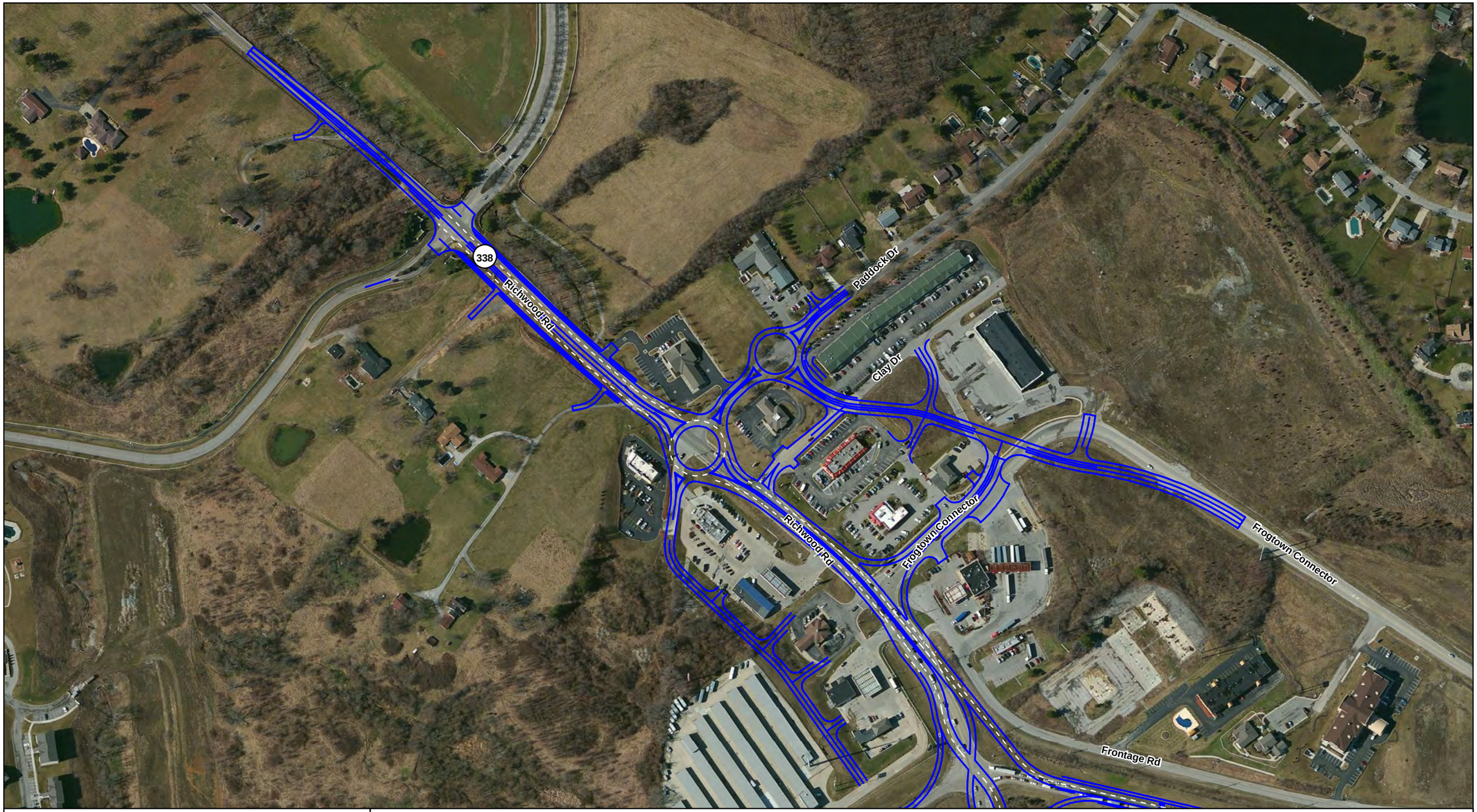
0 0.05 0.1 0.15 0.2 Miles

Legend

- Edge of Pavement
- Pedestrian Facilities
- Traffic Signal

FIGURE 19: ALTERNATIVE W-7
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.025 0.05 0.075 0.1
Miles

Legend

Edge of Pavement

Traffic Signal

FIGURE 20: ALTERNATIVE W-8
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.025 0.05 0.075 0.1
Miles

Legend

- Edge of Pavement
- Traffic Signal

FIGURE 21: ALTERNATIVE W-9

I-71/I-75 - KY 338

PARSONS

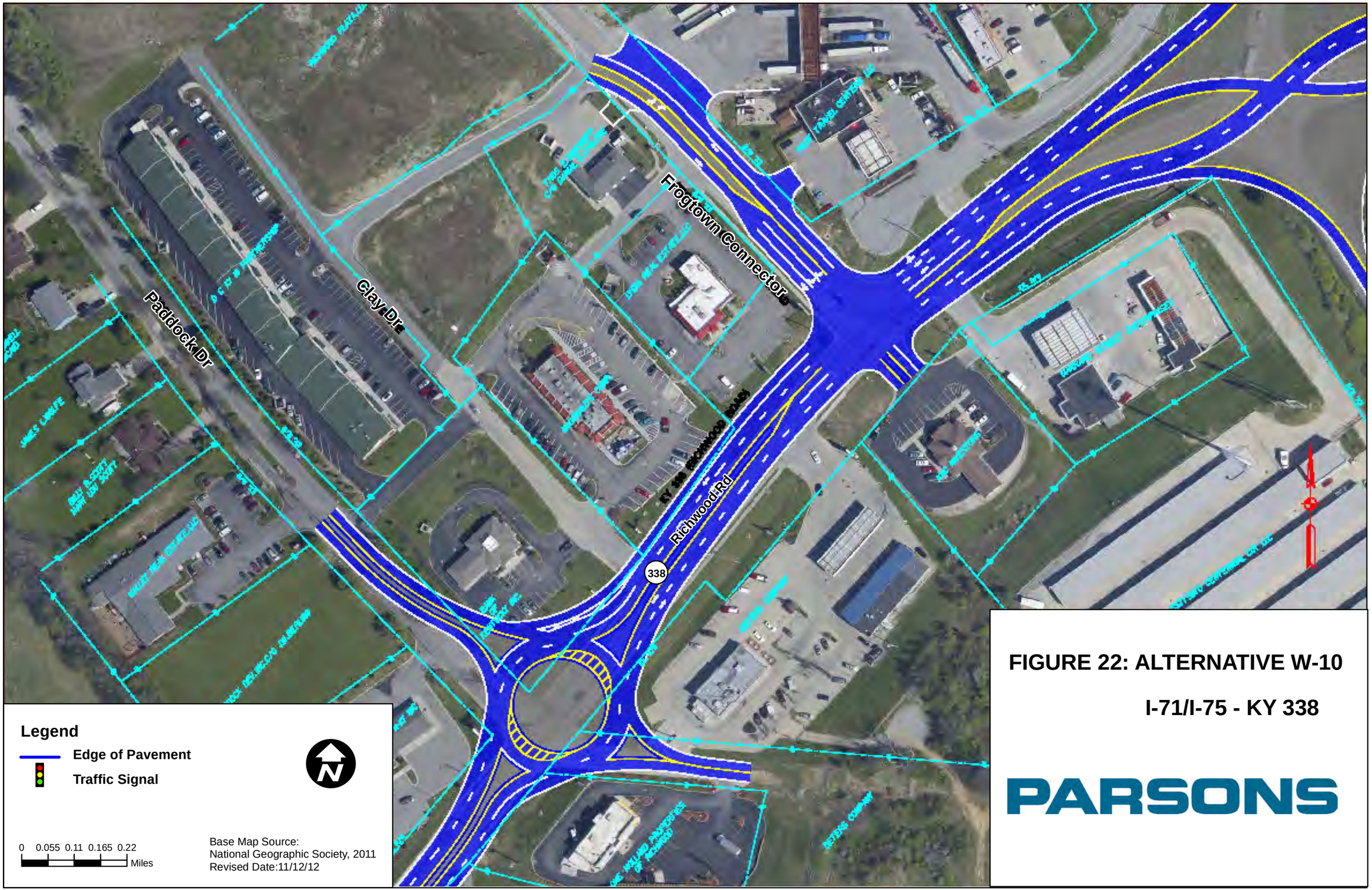
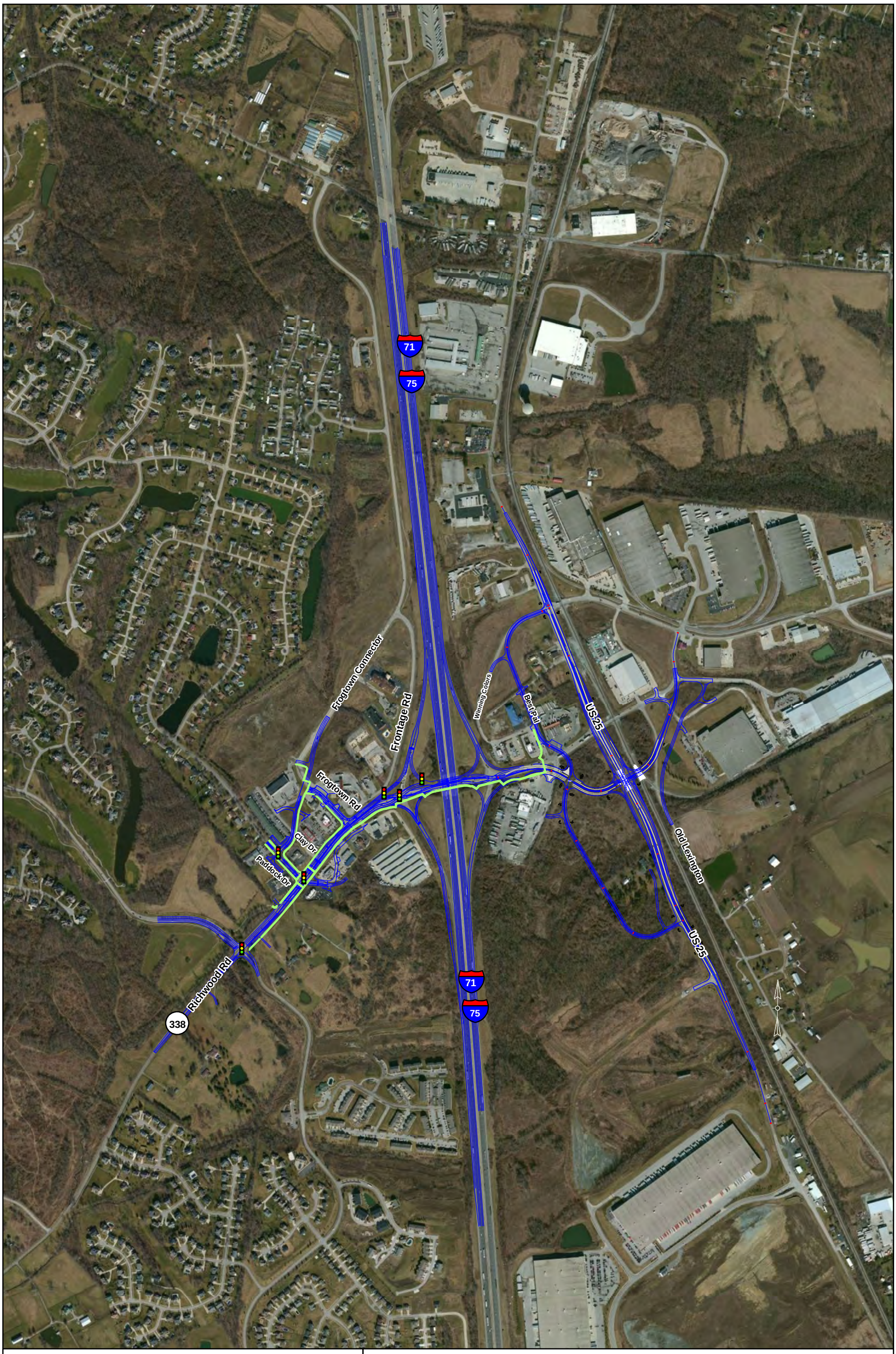


FIGURE 22: ALTERNATIVE W-10

I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

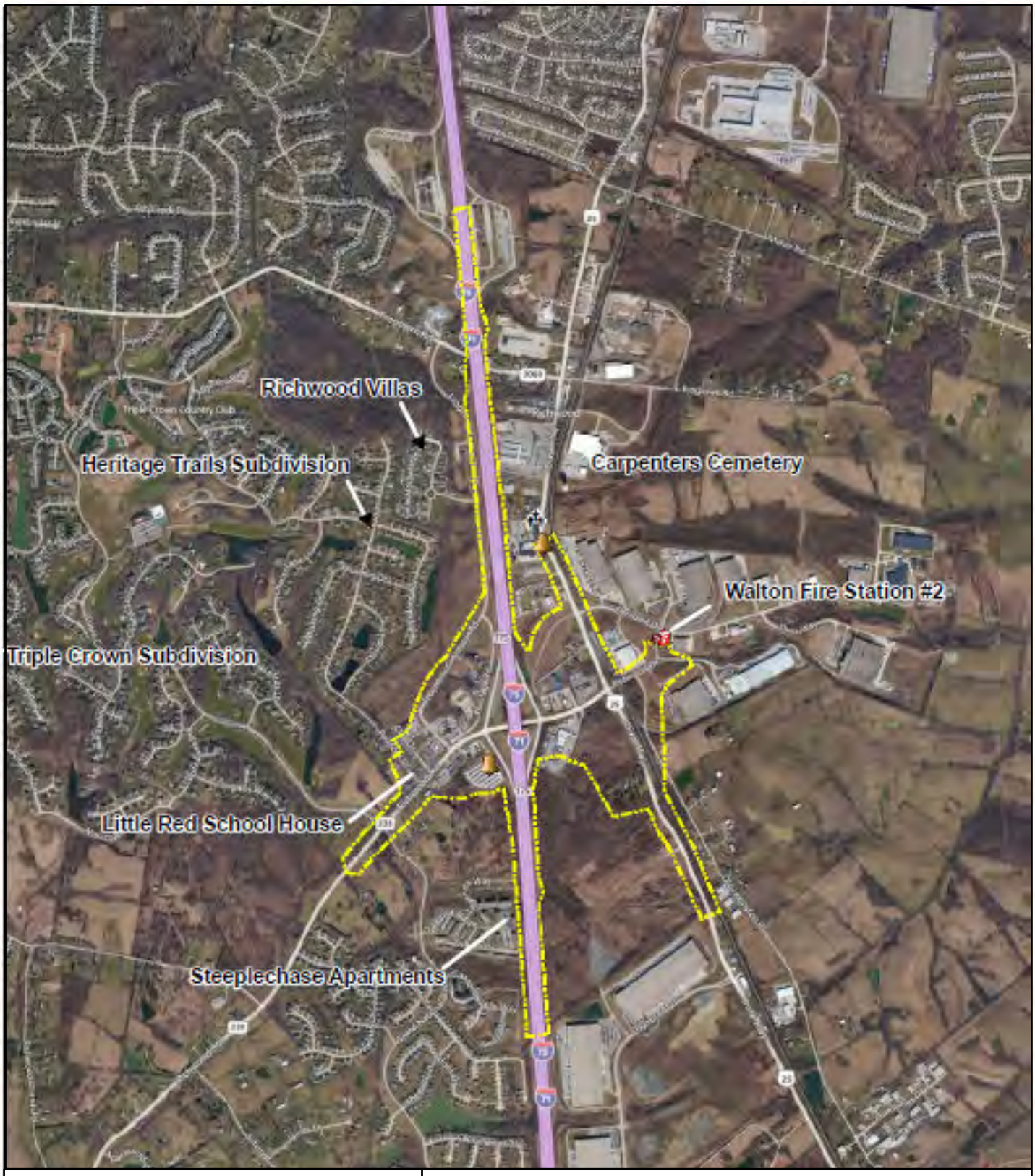
0 0.1 0.2 0.3 0.4 Miles

Legend

- Edge of Pavement
- Pedestrian Facilities
- Traffic Signal

FIGURE 23: PREFERRED ALTERNATIVE
I-71/I-75 - KY 338

PARSONS



Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 0.05 0.1 0.15 0.2
Miles

Legend

- Study Area
- Fire Station
- Emergency Facility
- Cemetery

FIGURE 24: COMMUNITY RESOURCES
I-71/I-75 - KY 338

PARSONS

APPENDIX B – INTERCHANGE JUSTIFICATION STUDY

EXECUTIVE SUMMARY

This Interchange Justification Study (IJS) documents a request to the Federal Highway Administration (FHWA) on behalf of the Kentucky Transportation Cabinet (KYTC) to approve reconstruction of the Interstate 71/Interstate 75 (I-71/I-75) interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). The analysis for the IJS includes KY 536 and KY 338, the I-71/I-75 ramp intersections with KY 536 and KY 338, the ramps proper, the ramp junction points, the freeway segments within the interchanges, and the adjacent I-71/I-75 freeway segments from US 42 to KY 14.

The purpose of this report is to demonstrate that the proposed projects will not result in adverse impacts to the safety and operation of the I-71/I-75 freeway system and to address the eight policy points required by the FHWA in an IJS. Traffic operations for the following conditions were analyzed and are documented in the following report:

- A No Build (2030) Condition that reflects the geometry, lane use, traffic control, and traffic volumes that would be present if the projects were not constructed.
- A Build (2030) Condition that reflects the proposed geometry, lane use, traffic control, and traffic volumes associated with the recommended preferred alternative.

As this report shows, the preferred alternative fulfills its purpose of:

- Improving safety
- Reducing congestion

The recommended preferred alternative includes converting each of the existing I-71/I-75 at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) diamond interchanges to Diverging Diamond Interchanges (DDI). A DDI is a diamond interchange which operates in a non-traditional manner by moving through and left turn vehicles between ramp intersections on the left side of the roadway. This eliminates the need for the left turn traffic signal phase. The basic geometric design footprint is very similar to the traditional diamond interchange. As such, the proposed DDI's are able to utilize the basic alignment of the existing northbound and southbound entrance and exit ramps.

The DDI design will accommodate left-turning movements at the signalized, grade-separated I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) by crossing traffic to the left side of the roadway at the signalized ramp terminal intersections. Two-phase traffic signals installed at each crossover will operate off of one controller. Once on the left side of the arterial roadway, vehicles can turn left onto limited-access entrance ramps without stopping and without conflicting with through traffic.

A short-term improvement has recently been implemented on KY 536 (Mt. Zion Road) at the I-71/I-75 interchange. This soil nail wall expands the number of lanes that can be constructed under the I-71/I-75 mainline bridges. This project provides space for up to six lanes (three eastbound and three westbound) between the I-71/I-75 entrance/exit ramps.

There is currently a soil nail wall proposed for KY 338 (Richwood Road) at the I-71/I-75 interchange. As planned, it would result in 4 lanes under the I-71/I-75 mainline bridges but allow for up to six lanes in the future. It is anticipated that the soil nail walls at each of these locations will allow the existing I-71/I-75 bridges to remain if the DDIs are constructed.

As part of the preferred alternatives, reconstruction of several ramps and the addition of auxiliary lanes on I-71/I-75 are recommended to increase capacity and improve geometrics to facilitate passenger and truck traffic entering and exiting the I-71/I-75 mainline. The Draft Geometric Layout Sheets contained in **Appendix 5** show the proposed DDI, auxiliary lane, and ramp geometries. Specific recommended modifications include:

- Southbound I-71/I-75 exit ramp to KY 536 (Mt. Zion Road) – An auxiliary lane (5th) will be added from the southbound US 42 entrance ramp. An additional (6th) lane will be added approximately 1,500 feet north of the ramp in addition to the auxiliary lane to develop a two lane exit ramp. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to continue south on I-71/I-75 or exit to KY 536 (Mt. Zion Road). This lane will be dropped within the KY 536 interchange, prior to the bridge over KY 536 (Mt. Zion Road). The total length of this auxiliary lane (5th lane) is approximately 8800 linear feet from where it picks up at US 42 to the end of the taper within the interchange.
- Southbound I-71/I-75 exit ramp to KY 338 (Richwood Road) – Develop a two lane southbound exit ramp just south of the bridge over Frogtown Road. The 5th lane (auxiliary lane) will be dropped within the KY 338 interchange, prior to the bridge over KY 338 (Richwood Road). The 6th lane will be added approximately 1,500 feet north of the ramp. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to continue south on I-71/I-75 or exit to KY 338 (Richwood Road). The auxiliary lane length is approximately 5150 feet from just south of Frogtown Road Bridge to where the auxiliary lane is dropped within the interchange.
- Southbound I-71/I-75 entrance ramp from KY 338 (Richwood Road) – The grade of this ramp will be flattened and the acceleration distance provided will be increased by approximately 2100 linear feet to provide sufficient acceleration length for tractor trailer traffic. Additional passing distance will be provided within the ramp proper, prior to it merging with I-71/I-75.
- Northbound I-71/I-75 entrance ramp from KY 536 (Mt. Zion Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside lane will continue as an auxiliary lane to US 42. The additional northbound auxiliary lane is dropped at the US 42 northbound single-lane exit ramp. The total length of this auxiliary lane from the entrance ramp lane drop to US 42 is approximately 5800 linear feet.
- Northbound I-71/I-75 entrance ramp from KY 338 (Richwood Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside (auxiliary) lane will continue to the rest area exit ramp. It is likely that the northbound I-71/I-75 bridge over Frogtown Road will have to be widened to accommodate the auxiliary lane. The auxiliary lane length is approximately 2400 feet from the end of the entrance ramp taper to the rest area exit ramp. Based on the grade of the ramp and the increased speed limit in the area, the large numbers of heavy trucks that use this entrance ramp require a longer acceleration lane to reach a reasonable merging speed.

The DDIs will improve traffic flow and safety at the I-71/I75 interchanges with KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) by reducing congestion and conflict points within the interchanges. The two ramp intersections within a DDI operate in concert with one another using two-phased signals with overlap. This means that once a vehicle starts moving through the interchange, it should clear both intersections without stopping, thereby reducing the amount

of stops and delay (congestion). The free flow left turns onto I-71/I-75 will further reduce delay and improve traffic operations on KY 536 and KY 338. By reducing the number of conflict points and reducing congestion, the rear end, sideswipe, and angle crashes typically associated a congested diamond interchange should be reduced.

Once interchange intersections are overcapacity they act as meters for the traffic entering the freeway, neither improving nor degrading main line operations. Construction of the DDIs, or otherwise upgrading the interchange intersections, increases the interchange capacity which allows more traffic to enter the interstate. This degrades the main line operations.

Therefore, in addition to converting the interchanges to DDIs and the associated ramp improvements, the IJS recommends the addition of auxiliary lanes on I-71/I-75 from KY 536 (Mt. Zion Road) to US 42, and the addition of an auxiliary lane northbound from KY 338 (Richwood Road) to the rest area to improve the mainline Level of Service (LOS).

Traffic analyses were performed on the recommended configurations using Highway Capacity Software (HCS), Synchro, and *Paramics*. The results of this modeling showed that the LOS on I-71/I-75 improved with the ramp modifications and the construction of the auxiliary lanes and in relation to the No Build condition. The proposed DDI interchanges at KY 536 (Mt Zion Road) and KY 338 (Richwood Road) will operate at acceptable levels for the design year. Therefore, this IJS is recommended for approval based upon the analyses and conclusions of this document.

The present-day estimated cost for the recommended preferred build alternatives at both KY536 (Mt. Zion Road) and KY 338 (Richwood Road) is approximately $49.7 million. The reconstruction of the I-71/I-75 at KY 536 (Mt. Zion Road) and I-71/I-75 at Richwood Road interchanges and the addition of northbound and southbound auxiliary lanes are four of seven components listed in KYTC's master plan for construction within the study area, contained in **Section 7, page 53.** Detailing an implementation program for the projects within the vicinity of the I-71/I-75 with KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) and prioritizing the investments is vitally important. Further, the combined program must balance the critical transportation safety needs with the available funding and logical improvements to maintain interstate commerce and access to the highly active residential and commercial communities which are adjacent to these projects.

SATISFYING THE EIGHT FHWA POLICY POINTS

As stated in the Code of Federal Regulations: *"It is in the national interest to preserve and enhance the Interstate System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility. Full control of access along the Interstate mainline and ramps, along with control of access on the crossroad at interchanges, is critical to providing such service. Therefore, FHWA's decision to approve new or revised access points to the Interstate System must be supported by substantiated information justifying and documenting that decision. The FHWA's decision to approve a request is dependent on the proposal satisfying and documenting the following"* eight policy points:

POLICY POINT #1

The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).

Policy Point #1 has been satisfied. KYTC has implemented projects within the corridor in an effort to ease congestion. A right turn lane from KY 338 (Richwood Road) to southbound I-71/I-75 was completed in September of 2007. Additionally, a soil nail wall was constructed on KY 536 (Mt. Zion Road) that allowed expansion of the roadway which provided additional capacity. However, traffic analyses show that additional lanes, or a reconfigured design, are still required on ramps and state routes to accommodate future traffic.

When KY 338 (Richwood Road) was constructed in 1956, the Average Daily Traffic (ADT) was 950 and the design year (1976) ADT was estimated to be 2,900. Current ADT is 10,300 and the future design year (2030) ADT is forecast to be 28,400, nearly 10 times the original design year traffic.

Similar growth has been observed at KY 536 (Mt. Zion Road). The 1991 plans for this state route projected a 2007 ADT of 5,520; however, the actual ADT is 18,800 which is already approximately 3.41 times higher than originally projected. Projections for 2030 are 52,000. Again, nearly 10 times the original design year projection.

With the rapid growth that Boone County has experienced and continues to experience, the Levels of Service (LOS) presented in **Exhibits 19 and 20** for mainline I71/I-75, KY 536 (Mt. Zion Road), and KY 338 (Richwood Road) show significant degradation in the design year with the No Build alternative.

Provisions of access control along surface streets, improving traffic control, additional ramp terminal and intersection improvements, adding turn bays or lengthening storage lanes cannot overcome such growth and will not improve the traffic flow to the LOS goal contained in Section 1.2.

POLICY POINT #2

The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).

Policy Point #2 has been satisfied. There are transportation system management (TSM) elements already in place in the vicinity of these two interchanges, including bus routes and two park and ride facilities along KY 536 (Mt. Zion Road). **Section 5.3** addresses TSM elements. Traffic modeling shows that the LOS degrades for both interchanges with these TSM elements already in place. Again, **Exhibits 19 and 20** illustrate this point.

POLICY POINT #3

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)).

Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).

Policy Point #3 has been satisfied. **Section 3.3** of this IJS discusses the crash data on both the state routes and mainline I-71/I-75 and **Section 6.2** discusses the safety of the proposed recommended alternatives. Crashes on the state routes are predominantly rear end and angle crashes. These types of crashes are generally associated with congested conditions. The vast majority of the crashes on mainline are fixed object, rear end, and sideswipe with vehicles moving in the same direction. Fixed object crashes are those where vehicles typically strike roadside objects, such as signs, light standards, etc. Rear end crashes typically occur during periods of heavy congestion while the sideswipe crashes are associated with merging. Reduction of ramp queue lengths and congestion relief brought about by the construction of the preferred alternatives would not have a significant adverse impact on the transportation system.

There is a need to create a signing plan for this corridor during the Preliminary Design phase of the project. Preliminary examination revealed no difficulty in providing sufficient signage for the corridor as the existing interchanges are adequately signed and their locations are not changing.

POLICY POINT #4

The proposed access connects to a public road only and will provide for all traffic movements. Less than ``full interchanges'' may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).

Policy Point #4 has been satisfied. The preferred alternatives being considered at each interchange are full interchanges that connect only to public roads and provide for all traffic movements. The preferred alternatives are shown in **Exhibits 16, 16A, 17, and 17A.** Preliminary concepts of the proposed access show that the alternatives can be designed to meet or exceed current design standards.

POLICY POINT #5

The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.

Policy Point #5 has been satisfied. Before proceeding with this IJS, planning studies conducted by the KYTC, the Ohio Kentucky Indiana Regional Council of Governments (OKI), Northern Kentucky Area Planning Commission (NKAPC), Kenton County and Boone County were reviewed. In particular, *The Boone County Transportation Study 2030* (2005) provided a comprehensive transportation plan update for Boone County. This plan update was in response to rapid growth and development in Boone County and the impact on the transportation system. The results have allowed the County to be proactive in dealing with continued future growth and development. This IJS considered the Boone County plan and is consistent with its goal to provide an adequate transportation system for future growth and development in Boone County. Phase 1 design monies have been allocated for both interchange projects in the KTYC Six-Year Plan.

POLICY POINT #6

In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).

Policy Point #6 is not applicable. The study corridor has five interchanges in addition to rest area exit and entrance ramps within a nine mile length of interstate. The proximity of these existing access points makes the addition of any future interchanges within the study area unlikely. No additional interchanges are presently proposed.

POLICY POINT #7

When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure

adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).

Policy Point #7 has been satisfied. Kenton County, the county immediately to the east of Boone County, recently rezoned approximately 3,535 acres (74% residential and 26% light industrial) in the vicinity of KY 536 (Mt. Zion Road). Updated Transportation Analysis Zones (TAZs) for both Boone and Kenton Counties reflecting this zoning change were used to develop the traffic model used in the analyses in this IJS. Additionally, three Stakeholder Advisory Council (SAC) meetings were held. The composition of this SAC is defined in Section 2.5 of this IJS. Members of the planning commissions of both the Boone County and Northern Kentucky were represented on this council.

POLICY POINT #8

The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).

Policy Point #8 has been satisfied. It is anticipated that the design of these interchange projects will follow the NEPA process and the preferred recommended alternatives of this IJS will be included as alternatives in the required documentation. **Appendix 2** of this IJS contains an Environmental Overview Report for the area.

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1.0 INTRODUCTION

1.1 PURPOSE OF STUDY

The purpose of this IJS is to provide information and documentation to assist KYTC and FHWA in assessing the impacts to safety and mobility related to improvements to the I-71/75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road).

The Mt. Zion Road interchange was designed in 1990 and opened for use in 1994. Since its opening, the area has experienced a dramatic change in land use patterns, resulting in substantially higher traffic volumes. At the time of the original design, local traffic patterns were mainly residential in nature and primarily located west of I-71/I-75. However, extensive commercial and educational development have emerged along US 25 (Dixie Highway), with access to I-71/I-75 via the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. This very active and prosperous area of growth has resulted in insufficient capacity at the interchanges along I-71/I-75 and the intersections along US 25 (Dixie Highway) at both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road).

When the KY 536 (Mt. Zion Road) interchange was completed in 1994, average daily traffic (ADT) projections for the interstate for the design year of 2007 were nearly 88,000. Actual numbers began exceeding these future projections within five years of its opening. Although actual ADT volumes for 2007 were not available, KYTC estimates for the year 2006 were 104,000, 18 percent higher than those originally projected for 2007. Furthermore, the 1991 plans for KY 536 (Mt. Zion Road), just east of the KY 536 (Mt. Zion Road) interchange projected a 2007 ADT of 5,520; however, the actual ADT is 18,800 which is approximately 3.41 times higher than originally projected.

While the KY 338 (Richwood Road) interchange has been established much longer, the emerging traffic problems are similar. The land uses surrounding this interchange have evolved from primarily agricultural to a full pattern of industrial, commercial, and residential uses.

It is an overarching goal to determine improvements which can achieve a LOS C for the overall project area. A LOS D may be deemed acceptable based upon implementation factors including right-of-way, environmental, cost and/or engineering constraints.

Both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) exhibit crash rates higher than the statewide average for similar roadways. A majority of those crashes are types that are consistent with those typically found in areas with high congestion, rear-end and angle. By reducing congestion, it is anticipated that these types of crashes will be reduced as well.

1.2 PURPOSE AND NEED FOR THE PROJECT

The following Purpose and Need Statement was developed with a goal to provide a LOS C for the traffic within the project area, but a LOS of D would be deemed acceptable if the measures required to attain a LOS C were too cost prohibitive.

The purpose of this project is to improve safety and reduce congestion within the vicinity of the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges in Boone County, Kentucky, while maintaining the mobility of the I-71/I-75 corridor. Selected alternatives shall balance the operational efficiency, safety, environmental impacts, constructability, and the availability of resources on state maintained facilities.

Improvements shall maintain or enhance the viability of Interstate I-71/I-75 as a major transportation corridor while appreciably improving the functionality and safety of the interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Alternative solutions shall maintain consistency with current KYTC standards. Probable construction sequencing shall maintain traffic flow on Interstate I-71/I-75 and provide appropriate access along the State routes.

Enhanced connections shall maintain consistency with the comprehensive plans for Boone and Kenton Counties and scheduled projects listed in the KYTC Six-Year Highway Plan. In addition, the preferred design alternative should be consistent with other modal connections established for the area.

Improvements shall be prioritized and evaluated in consideration of potential funding strategies balanced with the effectiveness of the selected operational efficiency and safety improvements to the transportation network.

1.3 Study Area

A regional northern Kentucky map is shown in **Exhibit 1, page 4**. The study area, as shown in **Exhibit 2, page 5,** is located in the eastern portion of Boone County, Kentucky, south of the City of Florence, east/southeast of the City of Union, and north of the City of Walton. The metropolitan City of Cincinnati, Ohio, is located approximately 15 miles northeast of the study area. The Greater Cincinnati/Northern Kentucky International Airport is located approximately six miles north of the study area.

The focal points for this IJS are the I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). As depicted on **Exhibit 2, page 5**, the study area limits that KYTC and FHWA agreed to prior to the issuance of the engineering bulletin extend approximately nine miles from the I-75/KY 14 interchange north to the I-71/I-75 and US 42 interchange. The Existing Conditions Report and Environmental Overview Report for this study area are contained in **Appendices 1 and 2,** respectively.

In December 2006, KYTC completed the *I-75 & KY 14 Interchange Study and Simulation Model* to address traffic operations and safety issues at the I-75/KY 14 interchange. This interchange is located to the south of the I-71/I-75 system-to-system interchange. During the initial traffic analyses, no significant traffic impacts were found south of the I-71/I-75 system-to-system interchange. Therefore, the traffic analyses contained within this IJS extend only from the I-71/I-75 systems interchange to the I-71/I-75 and US 42 interchange. This segment of I-71/I-75 is a four-lane freeway facility in each direction, with a posted speed limit of 70 miles per hour.

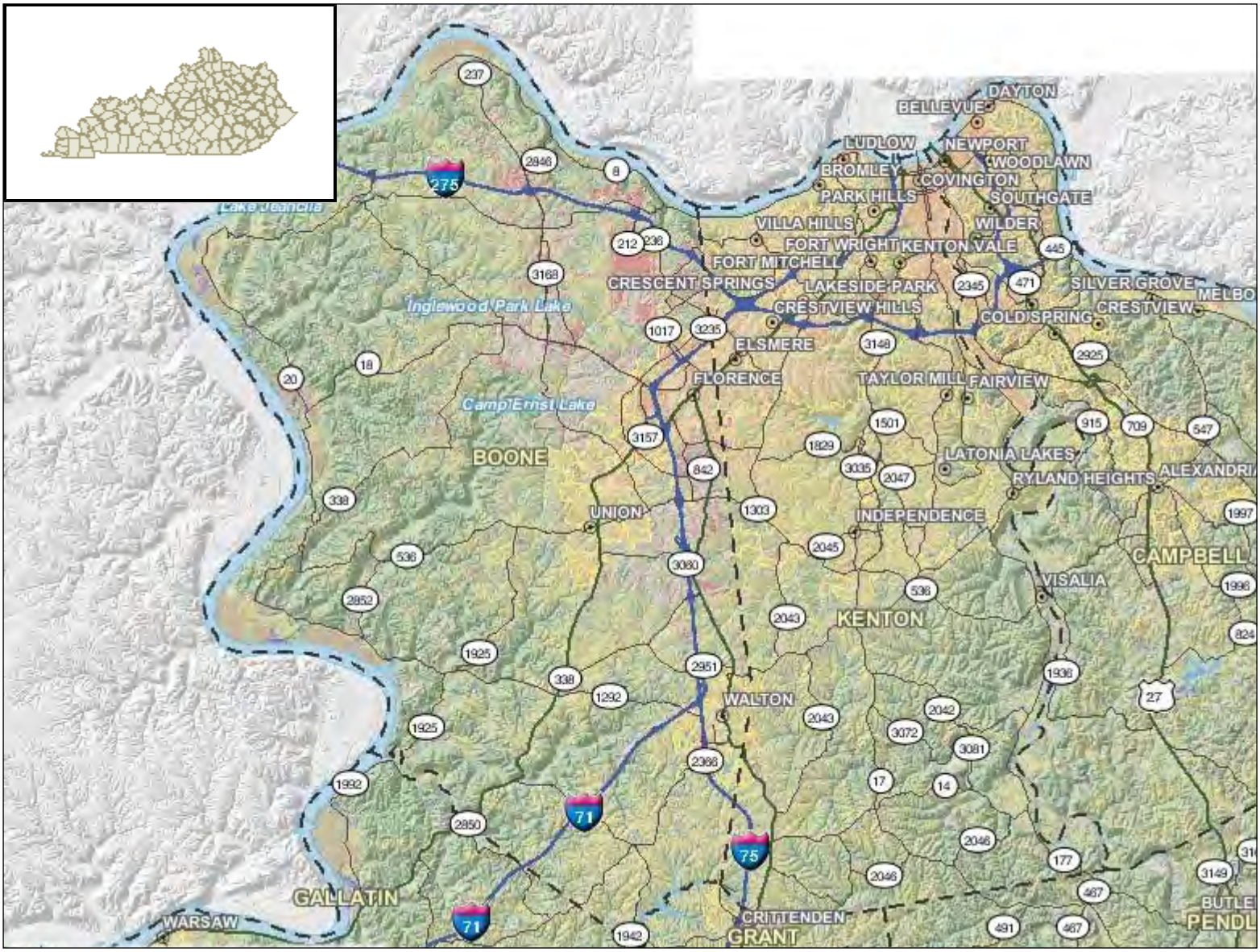
The study area encompasses the full entrance and exit ramps along I-71/I-75 at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Along KY 536 (Mt. Zion Road), the study

area spans west to east from Gunpowder Road to Sam Neace Drive. The study area along KY 338 (Richwood Road) extends west to east from Triple Crown Boulevard to US 25.

The logical termini were established with consideration of a full range of transportation solutions. The outermost limits in which a full range of solutions could be investigated or in which an action on only a portion of the system would be logical were evaluated. Thus, the study area limits are sufficient to allow for solutions that will be compatible with the local and regional transportation networks.

Within the study area limits described above, the safety issues and traffic operations in the area can be analyzed independently of any area outside these limits. Transportation solution concepts can be thoroughly explored, establishing independent utility that will neither force nor require any other additional roadway improvements/projects within or outside the study area in order for the roadway system to operate in a safe and efficient manner. Transportation solutions within the boundaries described above can be developed that will improve safety and improve traffic flow and LOS in the study area. The project is not divided into interdependent phases and stands alone as an independent project and therefore establishes independent utility.

Due to the adjacency of the two interchanges, FHWA and KYTC agreed to one IJS document prior to the project going to the engineering bulletin. This IJS is unique in that it provides analysis on two adjacent interchanges located three miles apart. This avoids duplication of effort of two separate studies for interchanges so closely spaced.



Interchange Justification Study

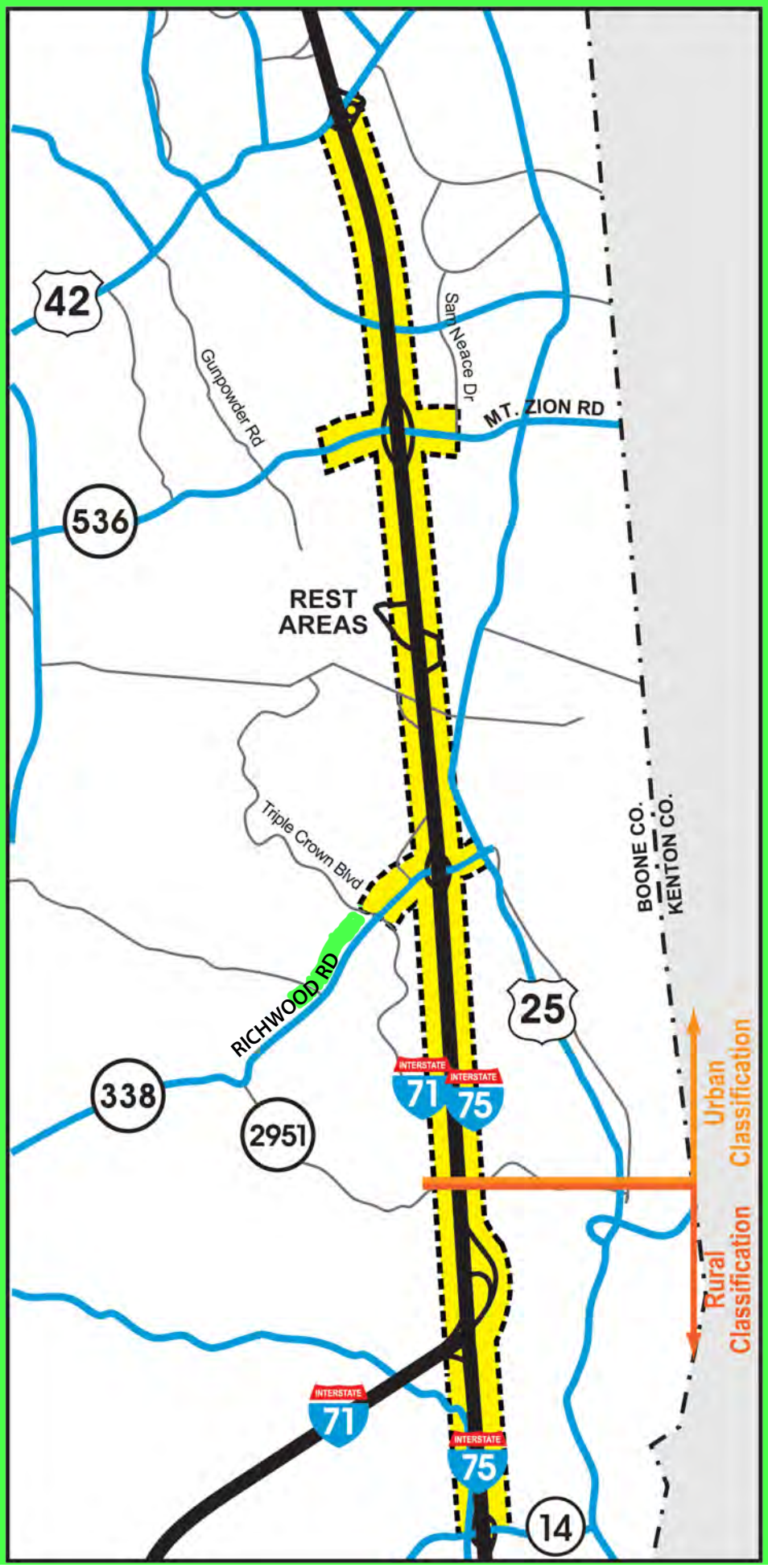
INTERSTATE 71 INTERSTATE 75 KY 338 KY 536

KENTUCKY TRANSPORTATION CABINET

N
W E
S

Exhibit 1:

Regional Map



Interchange Justification Study

71 75 338 536

KENTUCKY TRANSPORTATION CABINET

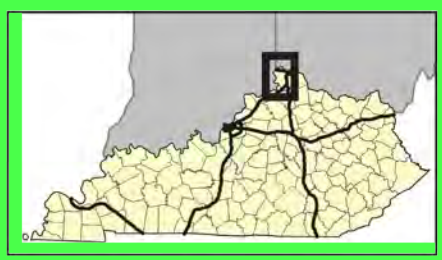
Exhibit 2:

Project Study Area

N W E S

Legend

- Interstate
- Access Ramp
- Arterial
- Collector
- Traffic Analysis Area
- Study Area



SCALE

0 0.5 1 2

Miles

2.0 BACKGROUND

The intention of this IJS is to complete required analyses and provide necessary background information to support a request to modify access to the I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) in eastern Boone County, Kentucky. This document is intended to provide a preliminary evaluation of the transportation, environmental, and other impacts that would arise from modifying access at these locations.

2.1 PROJECT HISTORY

Within the last ten years, the area surrounding the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges has experienced rapid development. The resulting increase in employment, education, and residential traffic has burdened the existing transportation system, including I-71/I-75, KY 536 (Mt. Zion Road), and KY 338 (Richwood Road). These major transportation arteries have also been taxed by general growth along I-75, which is one of the nation's largest commercial routes. This growth has resulted in increased traffic congestion and accident rates that are above statewide averages.

Once considered a principally agricultural area, this community has largely transitioned into a thriving mixed-use area of commercial, industrial, educational, and residential sections. Based upon land use projections, by 2030, the study area will lose nearly all of its agricultural land, while residential and industrial uses will approximately double. These changes, along with overall demand on the interstate system, will increase both safety concerns and traffic congestion. As a result, KYTC commissioned an IJS to identify transportation-related problems and needs, develop potential improvement options, and ultimately recommend a preferred alternative for improving traffic flow and safety within the corridor.

The Kentucky *Enacted FY 2007-2012 Six-Year Highway Plan* identifies the modification of the I-71/I-75 at KY 536 (Mt. Zion Road) interchange and the I-71/-75 at KY 338 (Richwood Road) interchange as two distinct projects (Items 06-14.00 and 06-18.00, respectively). Originally there were to be two IJS reports prepared; one for each interchange. However, KYTC District 6 sought and received concurrence from the FHWA-Kentucky Division to prepare one document that encompasses both interchanges to provide an overall cost savings to the two agencies by eliminating duplication of work and providing for consistent data throughout the corridor.

2.2 TRANSPORTATION CHARACTERISTICS

The Transit Authority of Northern Kentucky (TANK) provides transit services for Boone, Campbell, and Kenton Counties in Northern Kentucky, as well as downtown Cincinnati, Ohio. According to TANK's Transit Network Study (2006), the I-71/I-75 corridor has the greatest potential to create an exclusive transit way in Northern Kentucky, because of the high level of express services (nine routes) already operating in the corridor.

A Norfolk Southern rail line, running north and south, lies immediately east of the study area, along US 25 (Dixie Highway), and has several at-grade crossings. According to the 2003 Cincinnati Railroad Club, there are approximately 28 to 36 trains per day traveling in

this area. Crossing and/or bridging the railroad line presents complexities due to the topography. At this time, no expansion is intended by the railroad.

US 25 parallels I-71/I-75 directly to the east. The performance of each route heavily depends on the other. Accidents on I-71/I-75 directly and negatively affect traffic flow on US 25, which serves as a diversion route during incidents. Several improvement projects for US 25 from KY 338 north to KY 1829 (Industrial Road) are currently under design. These include proposed intersection improvements at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road), as described in later sections of this report. These projects are accounted for in the analyses prepared for this IJS.

Traffic volumes are growing rapidly in the study area. Currently, I-71/I-75 carries approximately 104,000 Average Daily Traffic (ADT); KY 536 carries 18,800 ADT; and KY 338 carries over 10,000 ADT. Exacerbating the traffic volume conditions is the heavy truck traffic. There are several truck stops in the area and two rest areas (one in each direction) between the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. Figures indicating the percent truck traffic in the study area are included in **Appendix 3**.

Additionally, several of the studies and reports within the corridor recommend projects that include bike lanes and pedestrian facilities. The City of Florence has a comprehensive bicycle and pedestrian plan that includes facilities along both the US 25 and KY 536 corridors. The Boone County Transportation Plan considers KY 536 a regional arterial for bikes. The Ohio Kentucky Indiana Regional Council of Governments (OKI), 2008 Regional Bike Plan also includes KY 338.

2.3 Review of Related Studies and Current Projects

Several documents, including county, state, and regional planning and transportation planning studies have been developed to address transportation improvements in the study area. Before proceeding with this IJS, planning studies conducted by the KYTC, OKI, the Northern Kentucky Area Planning Commission (NKAPC), Kenton County and Boone County were reviewed.

Three studies are of particular note:

- Boone County Transportation Plan - *The Boone County Transportation Study 2030* (2005) provided a comprehensive transportation plan update for Boone County. This plan update was in response to rapid growth and development in Boone County and their impact on the transportation system. The results have allowed the County to be proactive in dealing with continued future growth and development.
- KY 14 Interchange Study - *The Interchange Study for the KY 14 Interchange at I-75* (2006) recommended both short- and long-term improvements for the interchange. The short-term improvements included the addition of a northbound turn lane on KY 14 at the KY14/KY 1292/KY 2954 intersection and possibly adding a signal actuator on the I-75 SB ramp. The long-term recommendation realigns portions of KY 14, KY 1292, and the southbound ramps.
- The South Banklick Small Area Study - Covers portions of areas south of KY 536 (Mt. Zion Road), north of KY 16 (Walton Nicholson Road), east of Interstate 71/75

in Kenton County, and areas west of Wilson Road. Most of the study area is located in unincorporated Kenton County while portions of land north of Maher Road are located within the City of Independence. (NKAPC, 2006) As stated in the study, "*The intent of the study is to look closely at existing conditions in the area and, through a public process, identify appropriate areas for different development type – both residential and industrial – and to suggest development standards to help ensure compatibility of land use within the study area.*"

A short-term improvement has recently been implemented on KY 536 (Mt. Zion Road) at the I-71/I-75 interchange. A soil nail wall has been constructed, expanding the number of lanes that can be under the I-71/I-75 mainline bridges. This short-term improvement project allows for up to six lanes (three eastbound and three westbound) between the I-71/I-75 entrance/exit ramps. **Exhibit 3, page 9**, shows the existing opening width and proposed DDI lane configuration under the existing mainline bridges at KY 536 (Mt. Zion Road).

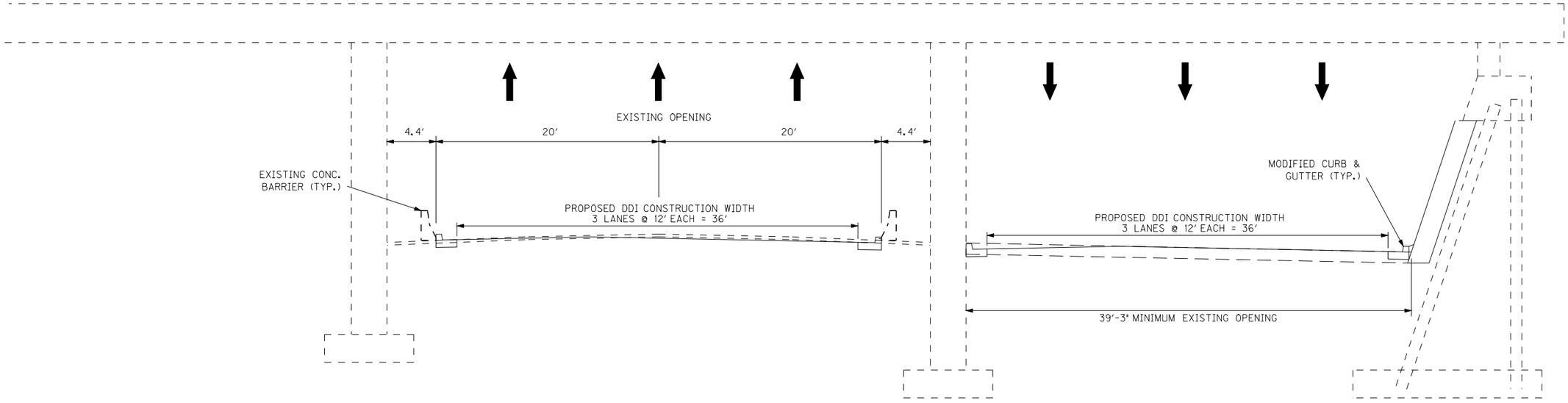
A similar short-term improvement is currently being proposed for KY 338 (Richwood Road) at the I-71/I-75 interchange. A soil nail wall will expand the number of lanes that can be under the I-71/I-75 mainline bridges. This project will allow for up to six lanes (three in each direction) between the I-71/I-75 entrance/exit ramps. **Exhibit 4, page 10,** illustrates the conceptual typical section for this improvement. This exhibit also shows the proposed lane widths for the proposed DDI construction.

Related transportation projects in the area are summarized in **Exhibit 5**, **page 11**. Construction for project 10 is ongoing. Projects 6, 7, and 11 were completed in 2007. **Exhibit 6, page 12,** indicates the locations of the related projects in the area. These studies and projects further corroborate the fact that this region of Boone County has undergone tremendous growth.

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.01	

TYPICAL SECTION
KY 536

LOOKING EAST



KY 536

Exhibit 3. KY 536 (Mt Zion Road) – Typical Section

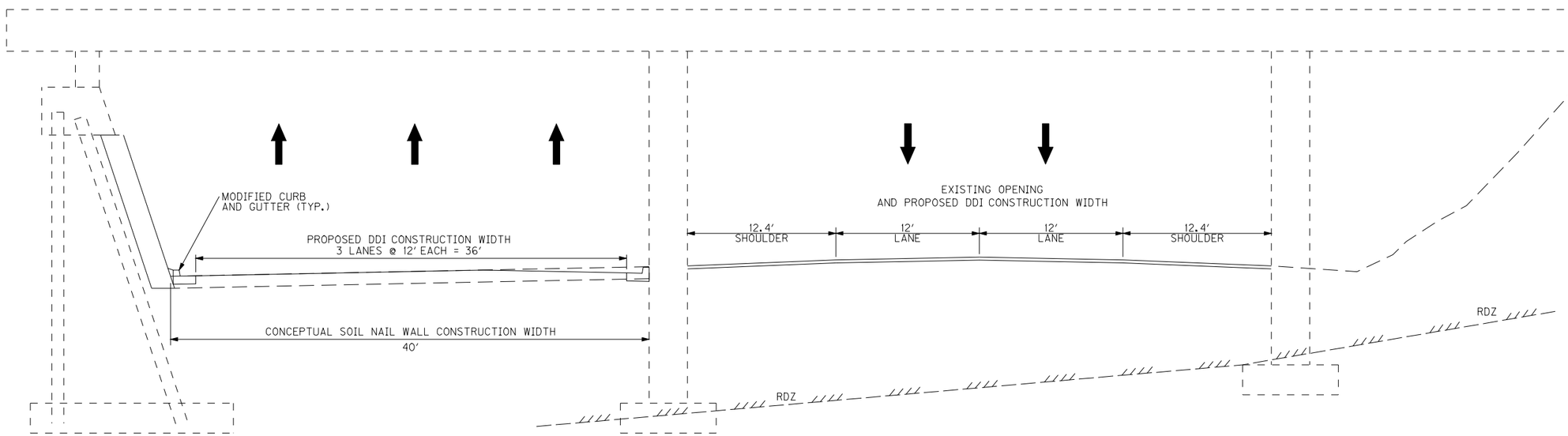
NOT TO SCALE

CONCEPTUAL TYPICAL SECTION

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.01	

CONCEPTUAL SOIL NAIL WALL TYPICAL SECTION KY 338

LOOKING EAST



KY 338

Exhibit 4. KY 338 (Richwood Road) Short Term Improvement – Typical Section

NOT TO SCALE

CONCEPTUAL TYPICAL SECTION

Exhibit 5. Related Project/Studies Improvements

Section (KYTC Item No.)	Project Title	Notes
		Series 6-8200 and 6-351
1 (6-8200.10)	US 25: Widen Intersection with KY 338	$4.37M construction funding FY 2012 in the KYTC recommended 6-Yr Plan
2 (6-8200.20)	US 25: 5 Lane from KY 338 to KY 536	$12.43M no construction funding in the KYTC recommended 6-Yr Plan
3 (6-8200.30)	US 25: Widen Intersection with KY 536	$6.4M construction funding FY 2012 in the KYTC recommended 6-Yr Plan
4 (6-8200.40)	US 25: 5 Lane from KY 536 to KY 1829	$6.79M no construction funding in the KYTC recommended 6-Yr Plan
5 (6-8200.50)	US 25 / KY 338: Frontage Roads	$1.88M construction funding FY 2011 in the KYTC recommended 6-Yr Plan
6	Shorland Drive Connector (By Boone County)	Shorland Drive connector in the Richwood Industrial Park was completed by Boone County in 2007. The Connector facilitates access to the park during periods of high railroad activity.
7 (6-111.01)	KY 536: Added Lane at I-71/I-75 Interchange	Construction completed December 2007. Left turn lanes onto I-71/I-75 are now side by side.
8 (6-158)	KY 536 Improvements from I-71/75 to Old Union Road	$25.54M construction funding FY 2012 in the KYTC recommended 6-Yr Plan
9 (6-162)	KY 536: 4 lane with median from Boone County Line to KY 17	$46.68M no construction funding in the KYTC recommended 6-Yr Plan
10 (6-106.10) (6-106.20)	KY 1829: US 25 to KY 1303-Widen to 3 lanes US 42 to US 25-Widen to 5 lanes	6-106.10 construction completed 2009 Cost = $12,528,575
11 (6-207)	KY 338: Added Turn Lane to I-71/75 Southbound	Construction completed September 2007 cost = $233,531
12	KY 338: Widen to Triple Crown Boulevard (By Boone County)	By Boone County

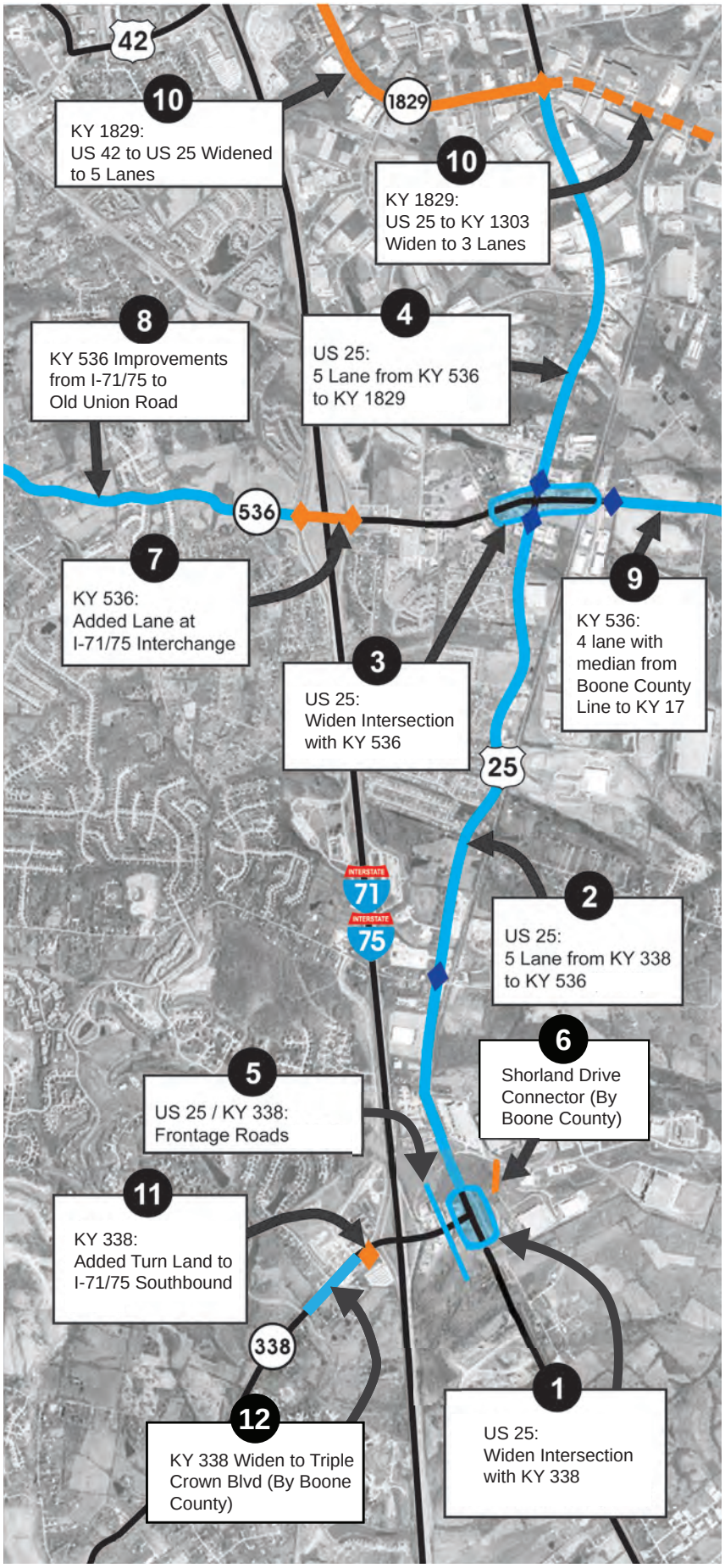


Exhibit 6:

Related Projects/Studies Surrounding the Study Area

N
W
E
S

Legend

- Construction Ongoing/Recently Completed
- Future Construction
- In Design

2.4 Environmental Overview

An environmental overview was conducted to determine the general characteristics of the study area and to identify potential impacts to threatened, endangered, or special concern species; national wetland inventory areas; 100-year floodplains, soil characteristics; environmental justice, cultural resources, noise and air quality, community resources, and sites with potential hazardous materials concerns within the study area. The environmental overview was based on secondary sources and limited field verifications conducted by HNTB and Kentucky Transportation Cabinet (KYTC) personnel.

The study area is predominantly industrial, commercial, and residential in nature. There are no floodplains, public water supplies, or libraries within the study area. In addition, no noise or air quality concerns have been identified to date. With the exception of Gateway Community and Technical College, few community resources such as schools, parks, fire stations and health care facilities occur within or immediately adjacent to the study area. National Wetland Inventory areas identify potential wetlands throughout the study area. These resources are described in HNTB's *Environmental Overview Report* (included as **Appendix 2**) and shown as part of the project base mapping. This information was used in part to develop and evaluate project alternatives and to avoid or minimize impacts to these resources.

Following approval of the IJS by the FHWA, the Kentucky Transportation Cabinet (KYTC) will undertake additional analyses in accordance with the National Environmental Policy Act (NEPA). NEPA was created in 1969 to ensure that agencies using federal money consider and minimize the impacts of projects to both the human-made and natural environments. The "human-made environment" includes residences, businesses, noise, and socio-economic and land use conditions of the area. The "natural environment" consists of features including streams, threatened and endangered species, and wildlife.

2.5 Public Involvement

The public involvement for the IJS included three stakeholder advisory council (SAC) meetings. This process provided stakeholders with an opportunity to share information and feedback about project issues, as well as express their concerns, opinions and other pertinent ideas regarding the IJS. The SAC structure was designed to provide guidance on issues that are related to the study area and to the region as a whole.

Members of the SAC represent:

- Boone County Administration, Office of Judge Executive
- Boone County Planning Commission
- Boone County Public Works
- City of Florence
- City of Union
- City of Walton
- Federal Highway Administration (FHWA)
- Kentucky Transportation Cabinet (KYTC)
- Local Citizens and Business Leaders
- Northern Kentucky Area Planning Commission
- Northern Kentucky Chamber of Commerce

- Northern Kentucky Tri-County Economic Development Corporation
- Norfolk Southern Corporation
- Ohio-Kentucky-Indiana Regional Council of Governments (OKI)
- Transit Authority of Northern Kentucky (TANK)

The first SAC meeting was held on April 30, 2007. Twenty-two (22) people were in attendance. The focus of the meeting was to convey the purpose and need of the IJS and to identify issues and concerns pertaining to the project. The regional characteristics and Purpose and Need for the project were presented to the SAC followed by a working session where SAC members were able to express their concerns on the topics of Safety, Traffic, Cost, Construction, and Environmental issues. Members of the SAC compared the existing conditions traffic model to their daily experiences. The SAC members expressed that they want the area improved sooner, rather than later. The SAC was concerned about continuing safety issues and the potential loss of development and jobs due to severe congestion. The members of the SAC encouraged FHWA and KYTC to progress the improvements as expeditiously as possible. The purpose and need statement was modified as a result of the issues and concerns addressed at this meeting.

The second SAC meeting was held on July 18, 2007. Twenty-eight (28) people were in attendance. The focus of the meeting was to present the evaluation criteria, summarize the conceptual alternatives, and receive input from the SAC to identify conceptual alternatives to be carried forward for further study. During a breakout session, the SAC members indicated whether an alternative definitely should go forward, warranted further evaluation, or definitely should not go forward. This was followed by group discussion to gain insight into how alternatives scored. It was concluded that in addition to the No Build alternative, two conceptual alternatives for both the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges would move forward. The two conceptual alternatives chosen at each interchange included adding lanes to the existing diamond (traditional widening) and converting to a Diverging Diamond Interchange (DDI).

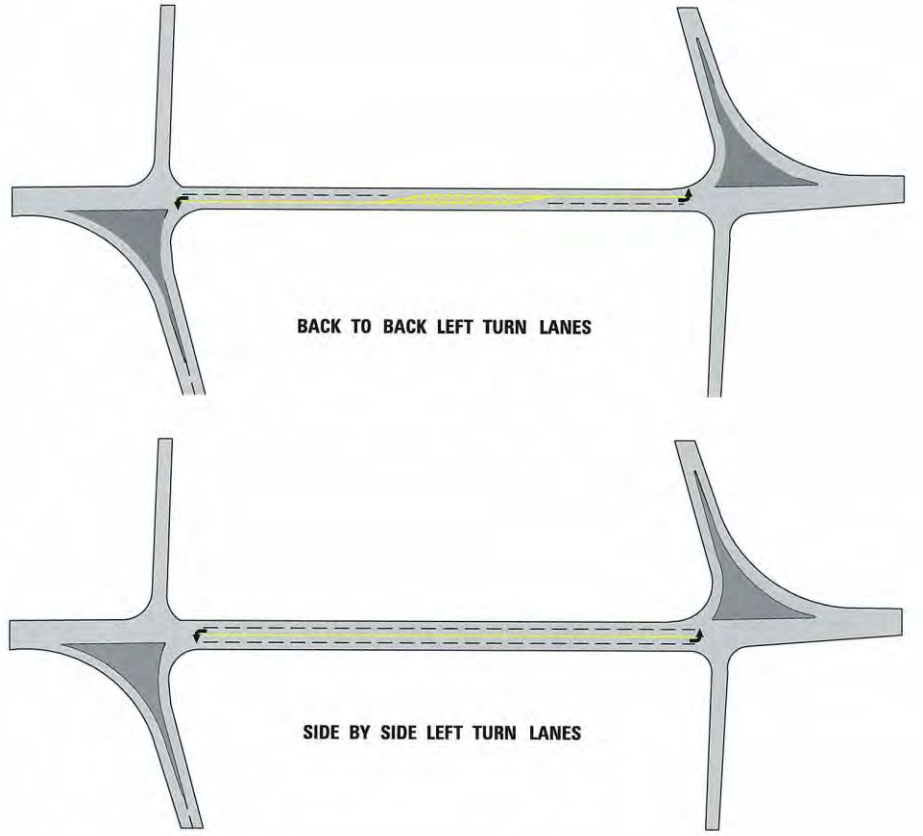
The third SAC meeting was held on September 26, 2007. Twenty-three (23) people were in attendance. The purpose of this meeting was to present the development of the single preferred design alternative for each interchange and identify additional issues and concerns. A comparison of the two preliminary engineering alternatives – adding lanes to the existing diamond and the DDI – was presented. The DDI, in most cases, was superior in terms of traffic and safety characteristics. The vast majority of the SAC voted to move the DDI forward as the preferred alternative at the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. The SAC endorsed the DDI because of the efficiency that the DDI offers and that by having smaller right-of-way impacts than other alternatives (keeping overall project costs lower) the project can be expedited sooner versus later. Due to topography concerns and its proximity to the intersection of KY 338 (Richwood Road) and US 25 (Dixie Highway), a secondary option of an expanded traditional diamond interchange was noted for the KY 338 (Richwood Road) interchange.

Summaries of the SAC meetings can be found in **Appendix 4**.

3.0 EXISTING CONDITIONS

HNTB completed an *Existing Conditions Report* (included as **Appendix 1**) as part of the IJS. The following sections summarize the existing geometrics, safety, and traffic characteristics in the study area. Since the completion of the *Existing Conditions Report*, a construction project has been completed on KY 536 (Mt. Zion Road) at the I-71/I-75 interchange. The back-to-back left turn lanes have been converted to side-by-side left turn lanes. **Exhibit 7** illustrates these two left turn lane configurations. The text in this section has been updated to reflect the most current existing conditions.

Exhibit 7. Left Turn Lane Configurations



3.1 ROAD GEOMETRY

Existing conditions for the I-71/I-75 mainline, KY 536 (Mt. Zion Road), and KY 338 (Richwood Road) were obtained from the as-built plans and the Kentucky Highway Information System (HIS) database and are listed below in **Exhibit 8, page 16**. Within the study area, the functional classification of I-71/I-75 is a Rural Interstate facility south of the KY 2951 overpass, which is located south of the two interchanges under study. North of KY 2951, the functional classification of the facility is an Urban Interstate.

The Mt. Zion Road and Richwood Road interchanges are diamond interchanges with single lane merges and diverges. The intersections of the northbound and southbound ramps are signalized at both intersections.

On Mt. Zion Road, between the entrance and exit ramp intersections, there are four lanes – one through lane and one left turn lane in each direction. There are four coordinated traffic signals along KY 536 (Mt. Zion Road) within the study corridor that are controlled by KYTC. They are: KY 536 at the I-71/I-75 southbound ramps, KY 536 at the I-71/I-75 northbound ramps, KY 536 at Biltmore Boulevard, and KY 536 at Sam Neace Drive.

On Richwood Road, between the entrance and exit ramp intersections, there are three lanes – one through lane in each direction and back-to-back left turn lanes. KYTC form TC 61-9, the Draft Design Executive Summaries and Draft Geometric Layout sheets are included as part of **Appendix 5**

There are three traffic signals between Paddock Drive and US 25 that are controlled and coordinated by KYTC. They are: KY 338 at the Frogtown Road Connector, KY 338 at the I-71/I-75 southbound ramps, and KY 338 at the I-71/I-75 northbound ramps. The traffic signal at the intersection of KY 338 and US 25 is not coordinated.

Exhibit 8. Existing Roadway Geometry

Description	I-71/I-75 Mainline	KY 536 (Mt. Zion Road)	KY 338 (Richwood Road)
Functional Classification	Urban Interstate	Urban Arterial	Urban Arterial
Number of Lanes	3-4 in each direction*	4	3
Posted Speed	70 mph	35-45 mph	45 mph
Lane Width	12’	11’-12’	11’-12’
Right (Outside) Shoulder Width	12’ (10’ paved)	4’	Varies 2’-8’
Left (Inside) Shoulder Width	14’-8”	4’	Varies 2’-8’
Maximum Grade	2.75%	4.00%	5.18%
Non-Passing Sight Distance	689’	537’	401’

* In area defined for traffic analysis

Based on a review of record plan information, the following geometric/roadway element deficiencies have been identified along I-71/I-75 and at both the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. The existing southbound entrance ramp configurations (steep climbing grades and little or no passing areas) provide inadequate acceleration distances for the large volume of truck traffic utilizing these ramps. Additionally, the existing turning radius at the KY 338 (Richwood Road) southbound exit ramp terminal is insufficient to allow trucks to make left turns onto the cross street without encroaching on the oncoming traffic. This leads to the truck traffic having to wait to make left turns onto the southbound entrance ramps or driving on the shoulder.

3.2 Traffic Data

A majority of the traffic counts for the study area were conducted in November of 2006. Two locations, KY 338 (Richwood Road) & Frogtown Connector along with KY 338 (Richwood Road) and the truck stop, were conducted in June of 2007. Existing peak hour traffic volumes for the study area were estimated from count data. The count data were collected through 24-hour tube counts and peak hour turning movement counts at key locations within the study area (see **Appendix 1** of the *Existing Conditions Report*).

Since the counts for different locations were not necessarily conducted on the same day, the volumes were then rebalanced with adjustments so that all the vehicles could be accounted for from one intersection to the next.

Signal timing data within the study area was also collected for the AM and PM peak period. Using this data, the intersections within the study area were evaluated with HCS and Synchro traffic modeling software. Details of the analyses are discussed in the *Existing Conditions Report*. **Appendix 2** of the *Existing Conditions Report* (**Appendix 1)** summarizes the AM and PM peak hour balanced volumes as well as the LOS obtained for each of the intersections.

KY 536 (Mt Zion Road) Vicinity

Morning congestion along KY 536 (Mt. Zion Road) increases as traffic approaches the interchange with I-71/I-75. The predominant traffic flow consists of eastbound to northbound traffic. Since these conditions require a protected signal phase for the left turn lane from KY 536 (Mt. Zion Road) to the northbound I-71/I-75 entrance ramp, there is increased delay for the westbound KY 536 (Mt. Zion Road) through movement, leading to an existing LOS D for the westbound KY 536 (Mt. Zion Road) through movement. The eastbound through movement at the KY 536 (Mt. Zion Road) and I-71/I-75 southbound ramp terminal intersection has an existing LOS C. The westbound left turning movement from KY 536 (Mt. Zion Road) to I-71/I-75 and the southbound left turning movement from I-71/I-75 to KY 536 operate at LOS E. The southbound I-71/I-75 ramp and KY 536 (Mt. Zion Road) intersection is LOS D. The four-way stop sign controlled intersection to the west (KY 536 and Gunpowder Road) is LOS D for the eastbound through/right lane. The two (2) intersections to the east of the I-71/I-75 interchange (KY 536 and Biltmore Street intersection and KY 536 and Sam Neace Road/Demia Way intersection) are LOS C.

In the evening, congestion along KY 536 (Mt. Zion Road) is also greatest to the west of the I-71/I-75 interchange. As in the morning, congestion increases as local traffic approaches and passes through the I-71/I-75 interchange. Traffic primarily comes from the north. These conditions result in a LOS E for the southbound I-71/I-75 to KY 536 (Mt. Zion Road) ramp. The westbound left turning movement onto I-71/75 south has a LOS F, while the southbound left turning movement has a LOS E. When queues begin backing up to the top of the single-lane exit ramp, vehicles will queue on the shoulder to make right turns onto westbound KY 536. Queues on the ramp can extend back toward mainline I-71/I-75. While the queues do not extend onto the mainline, the deceleration of exiting vehicles on the mainline due to the queuing negatively impacts the flow of mainline traffic.

The four-way stop controlled KY 536 and Gunpowder Road intersection, located just west of the I-71/I-75 interchange, has a LOS F. The westbound through movement has a LOS F. The northbound I-71/I-75 ramp is LOS B during the evening peak hour. At the Biltmore Street and KY 536 (Mt. Zion Road) intersection to the east, the westbound movement has a LOS C and the Sam Neace Road/Demia Way and KY 536 intersection has a LOS C for the westbound through movement.

KY 338 (Richwood Road) Vicinity

In the morning, traffic in the KY 338 (Richwood Road) vicinity flows predominately eastbound to northbound. Since these conditions require a protected signal phase for the

for the eastbound KY 338 (Richwood Road) traffic turning left onto the northbound I-71/I-75 entrance ramp, there is increased delay for the northbound left turning movement, leading to an existing LOS D for the northbound left turn movement from the I-71/I-75 exit ramp to westbound KY 338 (Richwood Road). The high volume of eastbound traffic from Triple Crown Boulevard to KY 338 results in a LOS F for the northern approach of the Triple Crown Boulevard/Grand National Boulevard intersection with KY 338 (Richwood Road). The southern approach has a LOS B. Because the north and south approaches are currently stop sign controlled, as the KY 338 (Richwood Road) traffic increases, there are less gaps for the southbound left turns and the LOS drops. The Dixie Highway intersection at KY 338 is LOS C due to a high volume of left turns from KY 338 (Richwood Road) to Dixie Highway. The southbound left turning movement for the ramp from I-71/I-75 to KY 338 (Richwood Road) is LOS F.

During the evening peak hour, a high volume of traffic from southbound I-71/I-75 to KY 338 (Richwood Road) results in a LOS D for the southbound ramp at the intersection. The high volume of eastbound traffic at the Triple Crown Boulevard/Grand National Boulevard intersection with KY 338 (Richwood Road) results in high congestion, and is a LOS F on the northern approach of the intersection. The southern approach is LOS B. The ramp from KY 338 (Richwood Road) to northbound I-71/I-75 is LOS D for the northbound ramp. The high volume of left turns in the evening from KY 338 (Richwood Road) to Dixie Highway results in congestion. The intersection is LOS C

3.2.1 Average Daily Traffic

In general, the Existing (2006) Average Daily Traffic (ADT) on KY 536 varies from approximately 9,600 immediately west of the I-71/75 interchange to approximately 18,800 ADT immediately east of the I-71/75 interchange.

Similarly, the ADT on Richwood Road is approximately 10,300 immediately west of the I-71/75 interchange to approximately 15,500 immediately east of the I-71/75 interchange. The ADT for I-71/75 varies from approximately 74,100 south of the Richwood Road interchange to approximately 104,000 immediately north of the Mt. Zion Road interchange.

3.2.2 Volume to Capacity Ratios

Exhibit 9, **page 19** summarizes the highest volume to capacity (v/c) ratio by movement for each of the signalized intersections for the existing condition. Currently, four movements have a v/c ratio over 0.90 and one movement has a v/c ratio over 1.0.

Exhibit 9. Highest Existing (2006) v/c ratios

Intersection	Existing v/c Ratio*	
	AM	PM
Mt. Zion Road & Sam Neace Drive	0.93 WBT	0.75 WBT
Mt. Zion Road & Biltmore Street	0.76 NBT	0.95 WBT
Mt. Zion Road & Northbound Ramp	0.74 NBR	0.78 WBT
Mt. Zion Road & Southbound Ramp	0.91 SBL	1.66 WBL
Richwood Drive & Dixie Highway	0.54 EBL	0.67 EBT
Richwood Drive & Northbound Ramp	0.65 WBR	0.83 NBL
Richwood Drive & Southbound Ramp	0.94 SBL	0.98 SBR
Richwood Drive & Frogtown Connector	0.81 SET	0.82 SWT

*NBT-northbound thru; WBT-westbound thru; NBR-northbound right; WBT-westbound thru; SBL-southbound left; WBL-westbound left; EBL-eastbound left; EBT-eastbound thru; WBR-westbound right; NBL-northbound left; SBR-southbound right; SET-southeast thru; SWT-southwest thru

3.3 CRASH DATA

Crash rates were calculated for the roadways within the study area for the three year period from 2004 to 2006. Crash data obtained from the Collision Report Analysis for Safer Highways (CRASH) database were used to calculate the crash rates for sections of I-71/I-75, KY 536 (Mt. Zion Road), and KY 338 (Richwood Road). The roadways were considered to have a high accident rate when the project's average crash rate was higher than the statewide critical crash rate. The critical crash rate is the maximum crash rate one might expect to occur on a roadway, given the average statewide accident rates, type of roadway, length of section and average annual daily traffic volume. The crash rates were compared to the critical crash rates for the similar roadways within the state, and the ratio of the two values was determined to obtain the Critical Rate Factor (CRF). A CRF that exceeded 1.0 was considered a high crash location. High crash locations are areas of roadways where the number of accidents is larger than the number of accidents that research and crash history say should occur on that roadway. Statewide average crash rates were found in the *Analysis of Traffic Crash Data in Kentucky (2001-2005)*, prepared by the Kentucky Transportation Center.

3.3.1 MAINLINE I-71/I-75

I-71/I-75 has two functional classification segments according to the KYTC Highway Information System (HIS) database. The highway segment from the Kenton County line to the KY 2951 overpass is classified as a rural interstate highway, while the segment north of KY 2951 is classified as an urban interstate, as shown in **Exhibit 2, Page 5**. **Exhibit 10**, **Page 20**, summarizes the crash rates for the interstate.

Exhibit 10. 2004-2006 Average Crash Rate for I-71/I-75

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate (100 MVM)	Critical Crash Rate Factor
I-71/I-75 Urban	91	75	106.7	0.70
I-71/I-75 Rural	52	84	75.5	**1.12**

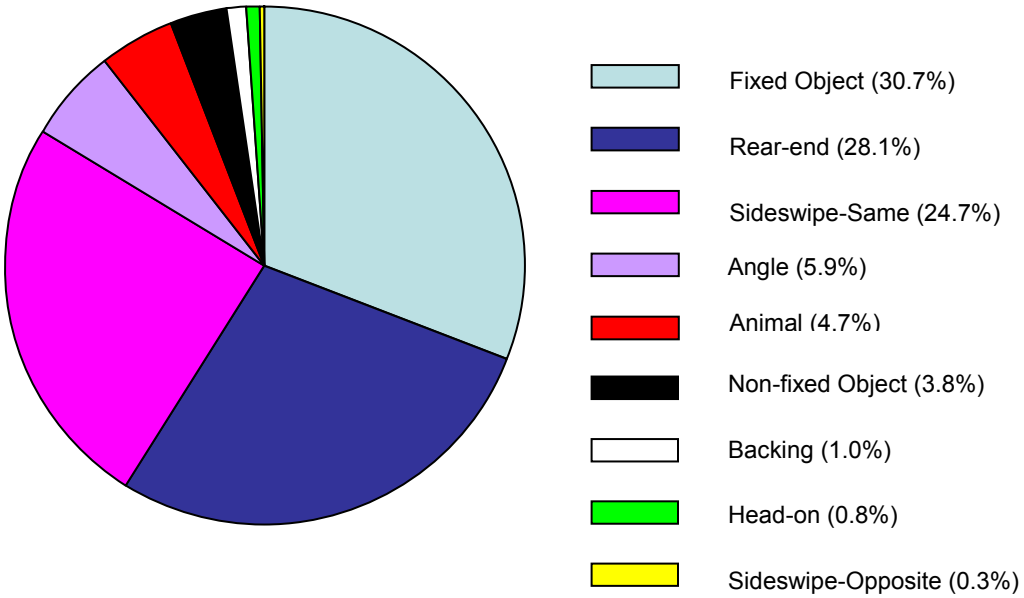
MVM – Crashes per 100 million vehicle miles

The majority of the I-71/I-75 mainline section of roadway within the study area is classified as urban and does not exceed the statewide average crash rate and has a CRF below one. The section of the roadway classified as rural, essentially from KY 14 to the I-71 overpass, has a critical rate factor that exceeds one and is, therefore, an area considered to have a high crash rate.

Exhibit 11, Page 20, depicts the types of crashes for I-71/I-75 within the study area (from KY 14 north to US 42). As one should expect, the fixed object, rear end, and sideswipe with vehicles moving in the same direction account for a great majority of the crashes. Fixed object crashes are those where vehicles typically strike roadside objects, such as signs, light standards, etc. Rear end crashes typically occur during periods of heavy congestion.

While the rural section of I-71/75 exhibits a high crash rate, the majority of the high crash locations within the study area occurs along KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) and is discussed in more detail in **Section 3.3.2**.

Exhibit 11. 2004-2006 Types of Crashes along I-71/I-75



3.3.2 STATE ROUTES KY 536 AND KY 338

Both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) are classified as three lane urban arterials. **Exhibit 12, Page 21,** summarizes the crash data for both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) within the study area. The overall CRF for both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) substantially exceed one. The sections of roadway on KY 536 (Mt. Zion Road) that exhibit the highest CRFs are from the I-71/I-75 underpass to Biltmore Boulevard and from Sam Neace Drive to US 25 (Dixie Highway). The highest CRF in this area is 2.86 between the I-71/I-75 underpass and the southbound ramps.

On KY 338 (Richwood Road), the entire segment from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of one, with the highest CRF being exhibited between the I-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. The CRF drops to below one west of the Frogtown Road Connector.

Rear end crashes were the most frequent type of crashes on KY 536. These accounted for 59 percent of the crashes with angle crashes (23 percent) being the next most prevalent type. Overall, 81 percent of the crashes on KY 536 in the study area occurred during the day and 76 percent under dry conditions.

For KY 338, the most frequent type of crash was rear end crash with 37 percent, followed by angle crashes at 26 percent. Overall, 82 percent of the crashes on KY 338 in the study area occurred during the day and 79 percent under dry conditions.

For both KY 536 and KY 338, property damage only crashes were the most frequently occurring, followed by injury crashes. There were no fatal crashes on either KY 536 or KY 338 within the study area from 2004 to 2006.

Exhibit 12. 2004-2006 Average Crash Rate for KY 536 &KY 338

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Critical Crash Rate (100 MVM)	Critical Crash Rate Factor
KY 536 (Mt. Zion Road)	256	780	379.6	**2.06**
KY 338 (Richwood Road)	256	1703.2	566.3	**3.01**

MVM – Crashes per 100 million vehicle miles

4.0 LAND USE AND REGIONAL GROWTH

Boone County is approximately 257 square miles (246 square miles of land and 11 square miles of water) in size and is part of the greater Cincinnati metropolitan area. It is bordered by Grant County to the south, Kenton County to the east, Hamilton County, Ohio to the north and Dearborn County, Indiana to the west. According to the US Census Bureau, from 2000 to 2008, the population increased by over 20,000 people, approximately a 34% increase. In 2007, the US Census Bureau ranked Boone County number 71 among the top 100 fastest growing counties in the US, giving it the distinction as the 4th most populous county in Kentucky, behind Jefferson, Fayette, and Kenton counties. The 2030 Boone County Comprehensive plan predicts population to increase by 121%, from 85,448 to 188,652 people, from 2000 to 2030.

4.1 LAND USE

Land use in the vicinity of the study area is a mix of commercial, industrial, urban/suburban/rural residential and agricultural development (approximately 2 acres). Socioeconomic data (population density, number of households and total employment) figures for the Transportation Analysis Zones (TAZs) in the study area for both Boone and Kenton counties are included in the *Environmental Overview Report* (**Appendix 2**). The progressively increasing population projected to 2030 implies that there is heavy industrial and commercial development anticipated in the study area. Similarly, employment is predicted to increase by 66% from 2000 to 2030. This trend is confirmed by the increasing household and employment numbers observed from year 2000 to year 2007 for Boone County.

4.2 HOUSEHOLD AND EMPLOYMENT GROWTH

It is anticipated that additional industrial/business development in Boone County will be largely located along US 25 (Dixie Highway), which lies immediately east of the study area and intersects with KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). In addition, the City of Union, due west of the study area has been experiencing residential and commercial growth at the Mt. Zion Road interchange area for the past ten (10) years.

Subsequent to the OKI model for the Boone County 2030 Transportation Plan, neighboring Kenton County recently rezoned approximately 3,535 acres (74% residential and 26% light industrial) in the vicinity of KY 536 based on the *South Banklick Small Area Study*. Likewise, Campbell County is amending its comprehensive plan to reflect KY 536 as its southern gateway from Kenton County. These developments will also impact the function of the KY 536 (Mt. Zion Road) interchange.

Further, along the southern portion of the study area, the City of Walton is attracting residential, commercial and industrial growth, putting additional pressure on US 25 in the KY 338 (Richwood Road) interchange area. The proximity, destinations, and amenities along US 25, KY 536, and KY 338 within the study area strongly influence local traffic patterns and have necessitated the reclassification of portions of the system from rural to urban roadways. This growth was most appreciable in 2006, when revised traffic counts warranted a design change for the US 25 project requiring a grade separated interchange along US 25 (Dixie Highway) at both KY 536 (Mt. Zion Road) and KY 338 (Richwood

Road). However, due to funding constraints at KYTC, these intersections will now be designed as at-grade intersections. The Northern Kentucky Area Planning Commission indicates several residential developments have been constructed or approved in the vicinity of the City of Independence, which is approximately 5 miles east of I-71/I-75. A regional map is provided as **Exhibit 1, Page 4**.

Exhibit 13, below, summarizes the compound annual growth rate in household and employment of the region west of the I-71/I-75 corridor. This information is based upon the 2000 and 2030 socioeconomic data from the regional OKI Demand Model, Version 6.3.

Exhibit 13. Compound Annual Household & Employment Growth Rate

	Compound Annual Growth Rate West of I-71/I-75	
	North of KY 536 (Mt. Zion Road)	South of KY 536 (Mt. Zion Road)
Household	2.93%	4.77%
Employment	1.05%	2.26%

4.3 TRAFFIC PROJECTIONS

The design year analyzed for this project is 2030. Three traffic forecasting sources were utilized in the development of the 2030 traffic projections. The OKI regional travel demand model was implemented to estimate traffic demand based on socio-economic growth in the region. The OKI model accounts for traffic generation, distribution, mode choice, and traffic assignment within a capacity constrained system. The OKI Origin-Destination model was used to develop the Paramics traffic for analysis summarized in Section 6.1. The Boone County Long Range Transportation Plan, which was utilized in the development of the traffic projections, was also utilized in the development of the traffic projections. Specific design documents which included site-specific future year traffic projections were also considered. Due to the extensive land development pressure anticipated for the study area, a minimum annual growth rate of 2% was warranted for those facilities providing access to the adjacent parcels.

Traffic demands along I-71/I-75 within the study area are projected to increase by 65% to 73% between 2001 (existing traffic) and 2030 (design year). This is slightly below 2% annual growth but was deemed appropriate due to the more regional nature of the Interstate system and the relatively lighter development pressures anticipated south of the study area in Grant and Gallatin counties. Since the design year traffic increased over the existing and opening day traffic, only analysis of the design year is included. If the facility provides acceptable levels of service for the design year, it will also provide acceptable levels of service in the opening day with lower traffic volumes.

The KY 536 (Mt. Zion Road) interchange will experience high growth in traffic demand over the next 20 years. Traffic demand near the southbound I-71/I-75 ramp terminal, is anticipated to grow by 5% annually to the west, 2% annually along the southbound off ramp and 3% on the southbound on ramp. The traffic growth is also substantial near the northbound I-71/I-75 ramp terminal, with a 3% annual growth to the east, and 2% annually along both the northbound off and on ramps.

The KY 338 (Richwood Road) interchange will experience growth in traffic demand by approximately 2% per year. Developments west of the KY 338 (Richwood Road) interchange, in concert with the improvements to Dixie Highway to the east, will spur a majority of the traffic growth within the KY 338 (Richwood Road) and I-71/I-75 interchange area.

The No Build condition for this study is defined as the existing geometrics and lane usage contained and any planned or programmed improvements within the area. The Build condition includes improvements to the I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) and along I-71/I-75 between the US 42 and KY 338 (Richwood Road) interchanges, as described in the following sections. Design year traffic analyses were performed for both the No Build and Build conditions. **Appendix 8** contains the AM and PM peak hour LOS, lane use and traffic volumes Build (DDI) scenario, while **Appendix 13** contains the same data for the No Build condition.

5.0 ALTERNATIVES CONSIDERED

Several conceptual alternatives were developed to address the purpose and need for improvements to the I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). The conceptual alternatives were developed using site specific topographical information, utilities, right of way, available traffic volumes, and coordination with projects presently in design. Based on analysis of the conceptual alternatives, several were identified for further study as preliminary engineering alternatives. The preliminary engineering alternatives were further refined, and preferred design alternatives were chosen.

5.1 EVALUATION CRITERIA

The alternatives were compiled and supporting material was developed that allowed each alternative to be screened against a set of evaluation criteria. The evaluation criteria included:

- Financial Measures
  - Construction Costs
  - Right of Way Costs
- Safety Benefits
  - Improvements to High Accident Locations or Cause as Defined in Section 3.3.2
  - Acceleration Lengths
  - Conflict Points
  - Improvements to Incident Management
- Levels of Service/Mobility
  - Improves Travel Time (Capacity Constraints)
  - Freeway and Local LOS & V/C
  - Suitable Local & Interstate Truck Access
- Design
  - Efficient with Heavy Truck Volumes
  - Meet Current Design Standards
  - Provides for Pedestrians in Commercial Areas
- Socioeconomic/Environmental
  - Relocation Impacts
  - Access to/from Community & Emergency Facilities
  - Natural Area Impacts
  - Noise/Air Quality Impacts
  - Access to Public Transportation
- Equity (Environmental Justice)
  - Equitable Distribution of Benefits and Impacts
- Implementation
  - Project Schedule
  - Maintenance of Traffic on I-71/I-75, KY 536, KY 338, and US 25

5.2 No Build Alternative

The No Build condition considers no improvements to the I-71/I-75 mainline, the interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road), or the ramp connections throughout the study area.

The majority of the study area currently operates below acceptable levels of service, with failing LOS in both the AM and PM peak hours, generally LOS D to LOS F. The No Build Alternative would not improve traffic flow or levels of service, because neither capacity nor demand along the interstate or at the interchanges would be altered. Because congestion would not be alleviated, and geometric improvements would not be constructed, the No Build Alternative also would not improve safety or decrease the crash rate throughout the study area. In addition, comments received during early stakeholder involvement indicated that the No Build Alternative was not an acceptable solution. However, the No Build Alternative was carried forward for further study as a baseline for comparison of the Build Alternatives.

5.3 Conceptual Alternatives

Public transit improvements, Transportation Demand Measures (TDM), or Transportation System Management (TSM) were assessed to determine if they could satisfy the project purpose and need. Although the I-71/I-75 corridor has the greatest potential to create an exclusive transit way in Northern Kentucky, nothing has been implemented that would cause substantial changes to existing transit services within the study area nor is anything planned. In addition, it is not likely that public transit programs, TDM or TSM would have any measurable effect on levels of service within the study area. Congestion may be minimally alleviated due to transit, TDM or TSM enhancements. However, the minor effects on congestion would not affect substantial improvements to safety or reductions in the crash rate throughout the study area. Therefore, only improvement alternatives were found to meet the purpose and need.

Eight (8) conceptual alternatives were developed for the KY 536 (Mt. Zion Road) interchange, and five (5) conceptual alternatives were developed for the KY 338 (Richwood Road) interchange. In developing the alternatives, the primary goal was to meet the project purpose and need while avoiding environmentally sensitive areas to the greatest extent possible.

The conceptual alternatives for each of the interchanges are briefly described below. Each of the KY 536 (Mt. Zion Road) alternatives could be combined with any of the KY 338 (Richwood Road) alternatives and vice versa. Figures of the alternatives with the lane configurations as there were presented to the SAC are included in **Appendix 6**.

KY 536 (Mt. Zion Road)

- Alternative #1 – This alternative recommended traditional widening by adding lanes to the existing KY 536 (Mt. Zion Road) and I-71/I-75 intersections until an acceptable LOS is obtained.

- Alternative #2 – This alternative recommended modifying the existing diamond interchange by adding an eastbound/northbound loop ramp.

- Alternative #3 – This alternative recommended modifying the existing diamond interchange by adding eastbound/northbound and southbound/eastbound loop ramps.

- Alternative #4 – This alternative recommended modifying the existing diamond interchange by adding eastbound/northbound and westbound/southbound loop ramps.

- Alternative #5 – This alternative recommended replacing the existing diamond interchange with a diverging diamond interchange (DDI).

- Alternative #6 – This alternative recommended replacing the existing diamond interchange with a single point urban interchange (SPUI).

- Alternative #7 – This alternative recommended replacing the existing diamond interchange with a double roundabout.

- Alternative #8 – This alternative recommended replacing the existing eastbound/ northbound movement with an eastbound/northbound directional fly-over ramp interchange.

KY 338 (Richwood Road)

- Alternative #1 – This alternative recommended traditional widening by adding lanes to the existing KY 338 (Richwood Road) and I-71/I-75 intersections until an acceptable LOS is obtained.

- Alternative #2 – This alternative recommended modifying the existing diamond interchange by adding an eastbound/northbound loop ramp.

- Alternative #3 – This alternative recommended replacing the existing diamond interchange with a diverging diamond interchange (DDI).

- Alternative #4 – This alternative recommended replacing the existing diamond interchange with a single point urban interchange (SPUI).

- Alternative #5 – This alternative recommended replacing the existing diamond interchange with a double roundabout.

Each of the conceptual alternatives was evaluated, and the benefits and impacts were quantified to the greatest extent possible. A summary matrix was prepared for each interchange to compare the benefits, impacts, and costs associated with each. The matrices for each interchange are included in **Appendix 7**.

Upon review of each alternative with respect to the evaluation criteria, several conceptual alternatives were eliminated from further consideration - by consensus of the SAC and KYTC - based on factors such as geometric concerns, property impacts and cost concerns. The remaining two Build alternatives (additional lanes to existing diamond and

diverging diamond interchange) and the No Build alternative for each interchange were carried forward for additional study as preliminary engineering alternatives.

5.4 PRELIMINARY DESIGN ALTERNATIVES

The evaluation of the preliminary engineering alternatives included more detailed studies of geometrics and traffic operations. The preliminary engineering alternatives for each of the interchanges are briefly described below. Figures of the alternatives with the lane configurations as they were presented to the SAC are included in **Appendix 6**. Both the Traditional Widening and DDI configurations recommend auxiliary lanes in both directions, north of KY 536.

Both alternatives also recommend auxiliary lanes north of KY 338. An auxiliary lane on northbound I-71/I-75 is recommended from KY 338 to the rest area. Also, an auxiliary lane is recommended on southbound I-71/I-75 from just south of the Frogtown Road overpass bridge to just north of the I-71/I-75 overpass bridge of KY 338. Costs shown below include the costs of all auxiliary lanes.

Preliminary horizontal and vertical alignments and traffic operations for each of the preliminary design alternatives were developed. Additionally, planning level costs for each preliminary engineering alternative were estimated based on 2008 KYTC Average Unit Bid Prices, and alternatives were reviewed for constructability. The preliminary engineering cost estimates include earthwork and roadway structure costs, and bridge costs. Planning level estimates of costs to acquire necessary right of way and relocate utilities and are based upon the data available at the time of the third SAC meeting (9/26/07). Each preliminary engineering alternative was reviewed according to the evaluation criteria, and one preferred design alternative for each interchange was selected for further study and refinement.

KY 536 (Mt. Zion Road)

KY 536 (Mt. Zion Road) will be improved from approximately 1100 feet west of existing Highland Drive to just east of the intersection with Sam Neace Drive for both the traditional widening and the DDI alternatives.

- Traditional Widening – This alternative assumes adding lanes to the existing KY 536 (Mt. Zion Road) and I-71/I-75 ramps until an acceptable LOS is obtained. This alternative would require an additional 2 lanes through the interchange for a total of 7 lanes on KY 536 and the reconstruction of the I-71/I-75 overpass bridges. Preliminary estimated cost = $37.4 million.

- Diverging Diamond Interchange – This alternative assumes replacing the existing diamond interchange with a diverging diamond interchange (DDI). There would be a total of 6 lanes required on KY 536 under the I-71/I-75 overpass bridges. An additional lane is developed immediately east of the bridge to provide a second lane for the northbound entrance ramp. It is likely that the I-71/I-75 bridges would not have to be reconstructed.
  Preliminary estimated cost = $30.8 million.

KY 338 (Richwood Road)

KY 338 (Richwood Road) will be improved from Paddock Drive to US 25 for both the traditional widening and the DDI alternatives.

- Traditional Widening – This alternative assumes adding lanes to the existing KY 338 (Richwood Road) and I-71/I-75 ramps until an acceptable LOS is obtained. This alternative would require an increase of 3 lanes for a total of 7 lanes on KY 338 and the reconstruction of the I-71/I-75 overpass bridges.
  Preliminary estimated cost = $24.5 million.

- Diverging Diamond Interchange – This alternative assumes replacing the existing diamond interchange with a diverging diamond interchange (DDI). There would be a total of 5 lanes required on KY 338 under the I-71/I75 overpass structures. It is likely that these I-71/I-75 overpass structures would not need to be reconstructed since a soil-nail wall proposed at this location should provide a sufficient opening for the required number of lanes.
  Preliminary estimated cost, including the soil-nail wall = $18.8 million.

  The cost difference between the traditional widening and the DDIs primarily reflects the cost of overpass reconstruction required for the traditional widening.

5.5 PREFERRED ALTERNATIVES

Based on analysis of the preliminary engineering alternatives and the endorsement by the SAC and KYTC, the diverging diamond interchange (DDI) was the recommended preferred design alternative for both the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. A DDI is a diamond interchange which operates in a non-traditional manner by moving through and left turn vehicles between ramp intersections on the left side of the roadway. This eliminates the need for the left turn phase of the traffic signals. However, the basic geometric design is very similar to the traditional diamond interchange. As such, the DDI for these specific locations utilize the basic alignment of the northbound and southbound entrance and exit ramps.

The SAC members did not express concern with such an innovative, non-traditional concept as the DDI. The DDI was chosen because, compared to the traditional widening improvement, the DDI showed more efficient operations, fewer conflict points, and smaller right-of-way impacts. Projects costs are thereby lower, thus funding and project execution can be more quickly implemented.

Appendix 8 and Appendix 9 illustrate the DDI and traditional widening AM and PM peak hour LOS, lane use and traffic volumes, respectively. The LOS color code used on the diagrams in the appendices is discussed in forthcoming **Section 6.1**. Therein, it is explained that the data presented in **Exhibit 20** takes precedence over the results provided by Synchro.

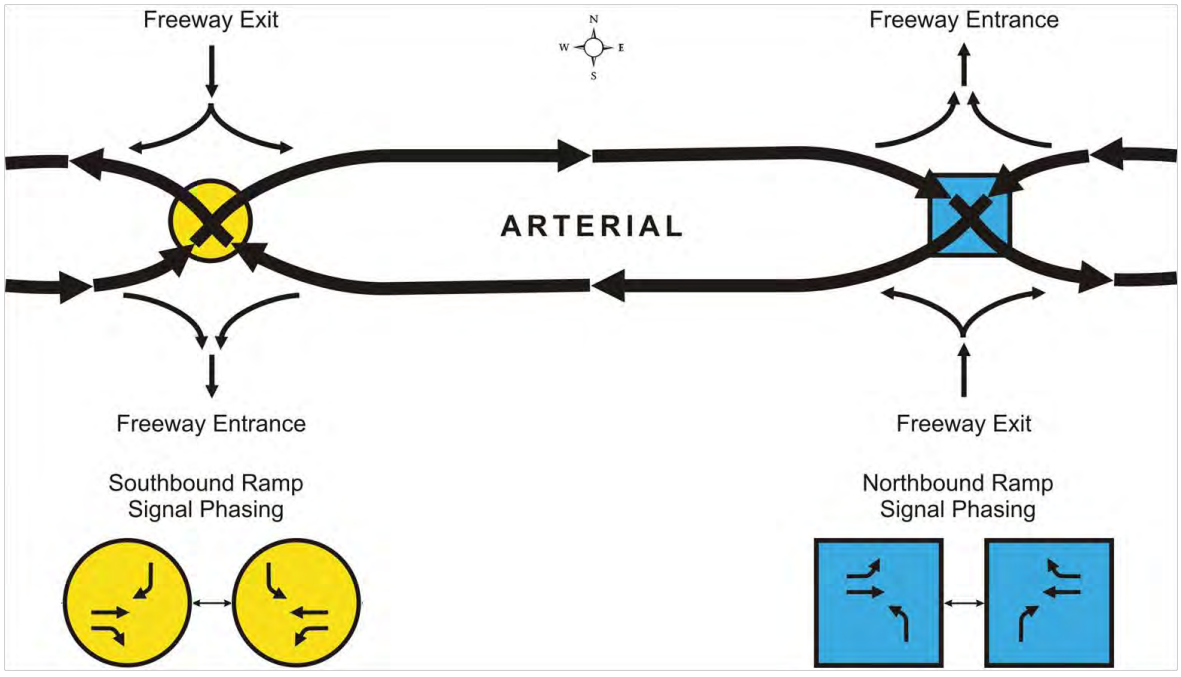
The DDI alternative meets the project purpose and need by providing acceptable levels of service along I-71/I-75 and at the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road)

intersections. It also theoretically improves safety in a number of ways. A DDI considerably reduces congestion, eliminates the left turn/through movement conflict points, and the curvature reduces vehicle speed within the interchange.

Conceptually by design premise, a DDI facilitates more efficient traffic movement. Theoretically it may not be necessary to widen the associated cross road. However, forecasted traffic volumes for this project necessitate widening both KY 536 and KY 338. The soil nail wall recently constructed on KY 536 (Mt. Zion Road) and the soil nail wall being proposed for KY 338 (Richwood Road) will likely allow the existing I-71/I-75 bridges to remain if the DDIs are constructed.

The DDI design will accommodate left-turning movements at the signalized, grade-separated I-71/I-75 interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) by crossing traffic to the left side of the roadway between the signal nodes of the interchange. Two-phase traffic signals will be installed at each crossover but will operate off of one controller. Once on the left side of the arterial roadway, vehicles can turn left onto limited-access entrance ramps without stopping and without conflicting with through traffic. **Exhibit 14, below,** illustrates a simplified version of the signal phase and traffic movements at a diverging diamond interchange. **Exhibits 16**, **16A**, **17, and 17A** on **pages 34** through **37**, show the preferred alternatives at the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges.

Exhibit 14. Simplified Signal Phasing and Traffic Movements at a DDI



The Build Condition, or Preferred Alternative, that the SAC has endorsed and for which KYTC is requesting FHWA approval, is recommended to include the following:

- I-71/I-75 Interchange at KY 536 (Mt. Zion Road) (see **Exhibit 3, Exhibit 16, Exhibit 16A, and Appendix 8**)
    - Convert the existing diamond interchange to a DDI with a design speed of 30 mph. Curb and gutter is to be used around the traffic islands and under the existing overpass structure. Outside of the footprint of the traveled way can be either shoulder or curb and gutter. This can be determined by the design team in Phase 1 design.
    - Widen KY 536 (Mt. Zion Road) to 5 lanes at the west side to connect into the planned 5 lane section from I-71/I-75 to Old Union Road.
    - Provide 6 to 7 lanes between the western crossover and the 5 lane section described above.
    - Provide 3 eastbound lanes and 2 westbound lanes at the western crossover.
    - Provide 6 lanes through the interchange with widening for turn lanes, as required. There will be 3 twelve-foot lanes in each direction under the existing overpass structures. There is sufficient space to provide modified curb and gutter, if necessary.
    - Provide 3 eastbound lanes and 3 westbound lanes at the eastern crossover.
    - Provide 6 through lanes, with 2 additional turning lanes, east of the interchange to Sam Neace Drive,
    - Provide 5 lanes east of Sam Neace then reduce the number of lanes, when appropriate, to tie into the existing roadway section. This widening along KY 536 (Mt. Zion Road) is approximately 3,300 linear feet of construction from Tiburon Drive to Sam Neace Drive.
    - Provide additional passing length on the SB entrance ramp proper and lengthen the acceleration lane along I-71/I-75.
    - Improve the NB exit ramp by lengthening the deceleration lane on I-71/I-75 and provide additional storage capacity within the NB exit ramp by widening it to two lanes within the ramp proper.

Traffic analysis indicates the need for two-lane ramps and auxiliary lanes at the KY 536 (Mt. Zion Road) southbound exit and northbound entrance ramps. **Exhibit 18, Page 38,** shows the locations and limits of the recommended auxiliary lanes.

    - Widen the following ramps to carry two lanes instead of one:
        - Southbound I-71/I-75 exit ramp to KY 536 (Mt. Zion Road) – An auxiliary lane (5th) will be added from the southbound US 42 entrance ramp. This lane will be dropped within the KY 536 interchange, prior to the bridge over KY 536 (Mt. Zion Road). An additional (6th) lane will be added approximately 1,500 feet north of the ramp in addition to the auxiliary lane. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to

continue south on I-71/I-75 or exit to KY 536 (Mt. Zion Road). The total length of this auxiliary lane is approximately 8800 linear feet from where it picks up at US 42 to the end of the taper within the interchange.

- Northbound I-71/I-75 entrance ramp from KY 536 (Mt. Zion Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside lane will continue as an auxiliary lane to US 42. The total length of this auxiliary lane from the entrance ramp lane drop to US 42 is approximately 5800 linear feet.

It is likely that Weaver Road Bridge over I-71/I-75 will have to be lengthened to accommodate the auxiliary lanes.

It should also be noted that given the anticipated traffic growth of 1.9% per year on mainline I-71/I-75, the level of service on southbound I-71/I-75 from US 42 to KY 538 (Mt. Zion Road) is projected to drop to LOS E, an unacceptable level, shortly after the design year (2030) even with the auxiliary lanes.

- I-71/I-75 Interchange at KY 338 (Richwood Road) (see **Exhibit 4**, **Exhibit 17, Exhibit 17A, and Appendix 8**)
  - Convert the existing diamond interchange to a DDI with a design speed of 30 mph. Curb and gutter is to be used around the traffic islands and under the existing overpass structure in the eastbound direction. Outside of the footprint of the traveled way can be either shoulder or curb and gutter. This can be determined by the design team in Phase 1 design.
  - On KY 338 (Richwood Road), from Frogtown Road Connector to western crossover, provide 3 eastbound lanes (2 through and 1 southbound exit lane) and 3 westbound lanes (2 from the southbound exit ramp and 1 from through traffic) plus 1 left turn lane at Frogtown Road Connector.
  - Provide 2 eastbound lanes and 1 westbound lane at the western crossover.
  - Provide 4 lanes through the interchange, adding a turn lane from KY 338 (Richwood Road) onto the northbound entrance ramp. This results in 5 lanes under the I-71/I-75 bridge structures. The 3 eastbound lanes will be twelve feet with a modified curb and gutter on each side. There is adequate width for 2 twelve-foot lanes with twelve foot shoulders in the westbound direction.
  - Provide 1 eastbound lane and 2 westbound lanes at the eastern crossover.
  - Provide 6 lanes between the eastern crossover and Best Pal Drive.
  - Tie into proposed KY 338/ US 25 intersection improvements east of Best Pal Drive. This construction constitutes approximately 3200 linear feet of construction along KY 338 (Richwood Road) from Paddock Drive to US 25.
  - Lengthen the southbound entrance ramp to provide additional passing length on the uphill grade and lengthen the acceleration lane at I-71/I-75.
  - Improve the northbound exit ramp by widening the ramp proper to three lanes to provide additional storage capacity on the ramp.

Traffic analysis also indicates the need for two-lane ramps and auxiliary lanes at the KY 338 (Richwood Road) southbound exit and northbound entrance ramps. **Exhibit 18** shows the locations and limits of the recommended auxiliary lanes.

- Widen the following ramp to carry two lanes instead of one lane:
  - Southbound I-71/I-75 exit ramp to KY 338 (Richwood Road) – Develop a two lane southbound exit ramp just south of the bridge over Frogtown Road. The 5th lane (auxiliary lane) will be dropped within the KY 338 interchange, prior to the bridge over KY 338 (Richwood Road). The 6th lane will be added approximately 1,500 feet north of the ramp. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to continue south on I-71/I-75 or exit to KY 338 (Richwood Road). The auxiliary lane length is approximately 5150 feet from just south of Frogtown Road Bridge to where the auxiliary lane is dropped within the interchange.
  - Northbound I-71/I-75 entrance ramp from KY 338 (Richwood Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside (auxiliary) lane will continue to the rest area exit ramp. It is likely that the northbound I-71/I-75 bridge over Frogtown Road will have to be widened to accommodate the auxiliary lane. The auxiliary lane length is approximately 2400 feet from the end of the entrance ramp taper to the rest area exit ramp. Based on the grade of the ramp and the increased speed limit in the area, the large number of heavy trucks that use this entrance ramp require a longer acceleration lane to reach a reasonable merging speed.

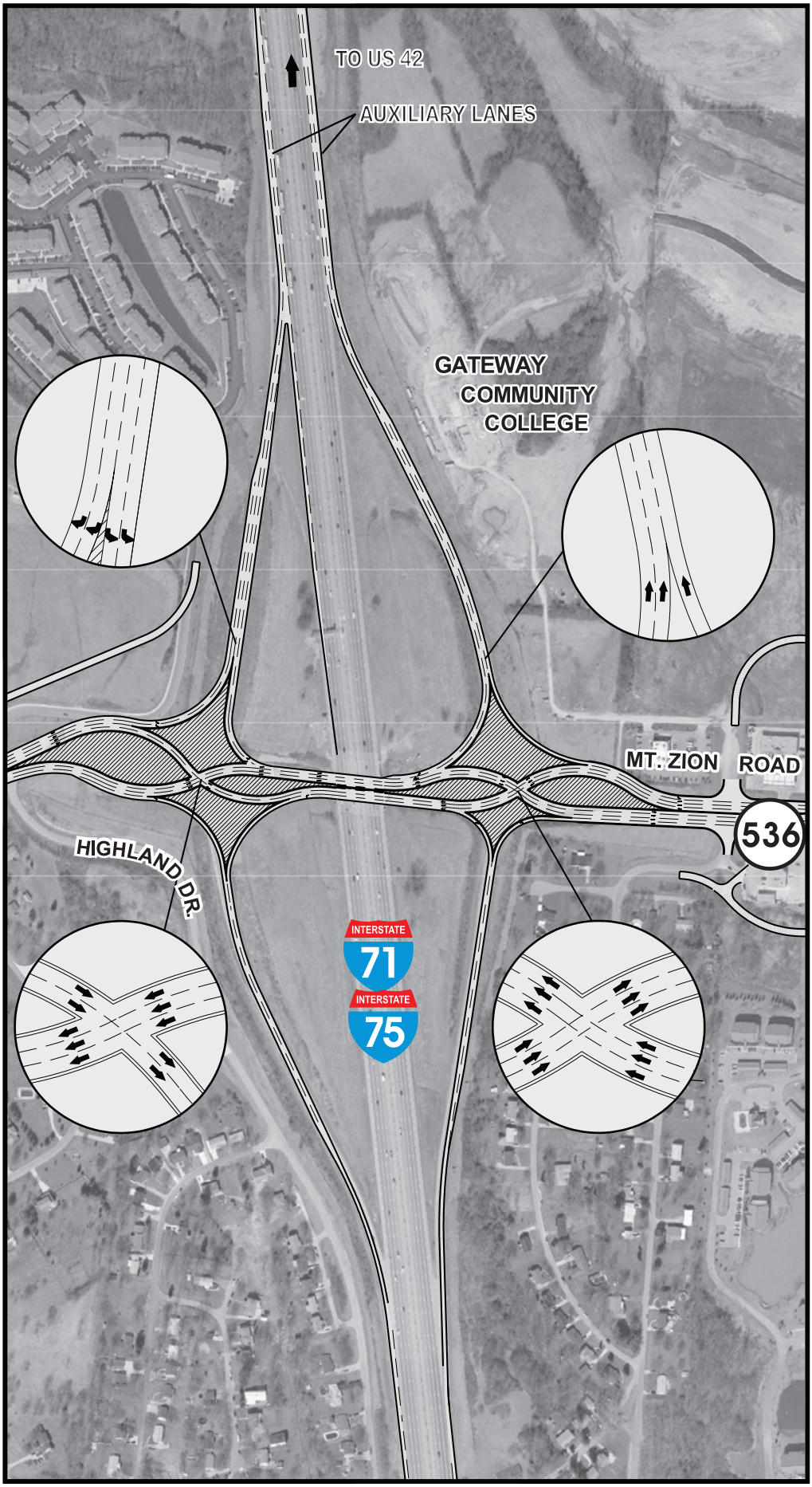
Exhibit 15, below, summarizes the number of ramp lanes for the No Build and Build conditions.

Exhibit 15. No Build and Build Number of Lanes for I-71/I-75 Ramps at Gore

Interchange	Southbound			Northbound		
	Ramp	No Build	Build	Ramp	No Build	Build
KY 536 (Mt. Zion Road)	Exit	1	2	Entrance	1	2
KY 536 (Mt. Zion Road)	Entrance	1	1*	Exit	1	1
Rest Area	Exit	1	1	Entrance	1	1
Rest Area	Entrance	1	1	Exit	1	1*
KY 338 (Richwood Road)	Exit	1	2	Entrance	1	2*
KY 338 (Richwood Road)	Entrance	1	1*	Exit	1	1*

*Ramp recommended to be lengthened

Exhibit 20 shows the LOS for mainline I-71/I75 and the US 42 interchange with I-71/I-75 for the No Build and Build conditions and are discussed in further in Section 6.



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

Exhibit 16:

Preferred Alternative Configuration - Mt. Zion Road

N W E S

Legend

- X — Entrance to be closed
- Edge of pavement
- Lane line
- Islands/medians

SCALE

0 250 500 750

FEET

Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

Exhibit 16A:

Enlarged View - Preferred Alternative Configuration - Mt Zion Road



N
W E
S

Legend

- X — Entrance to be closed
- Edge of pavement
- Lane line
- Islands/medians

NOT TO SCALE

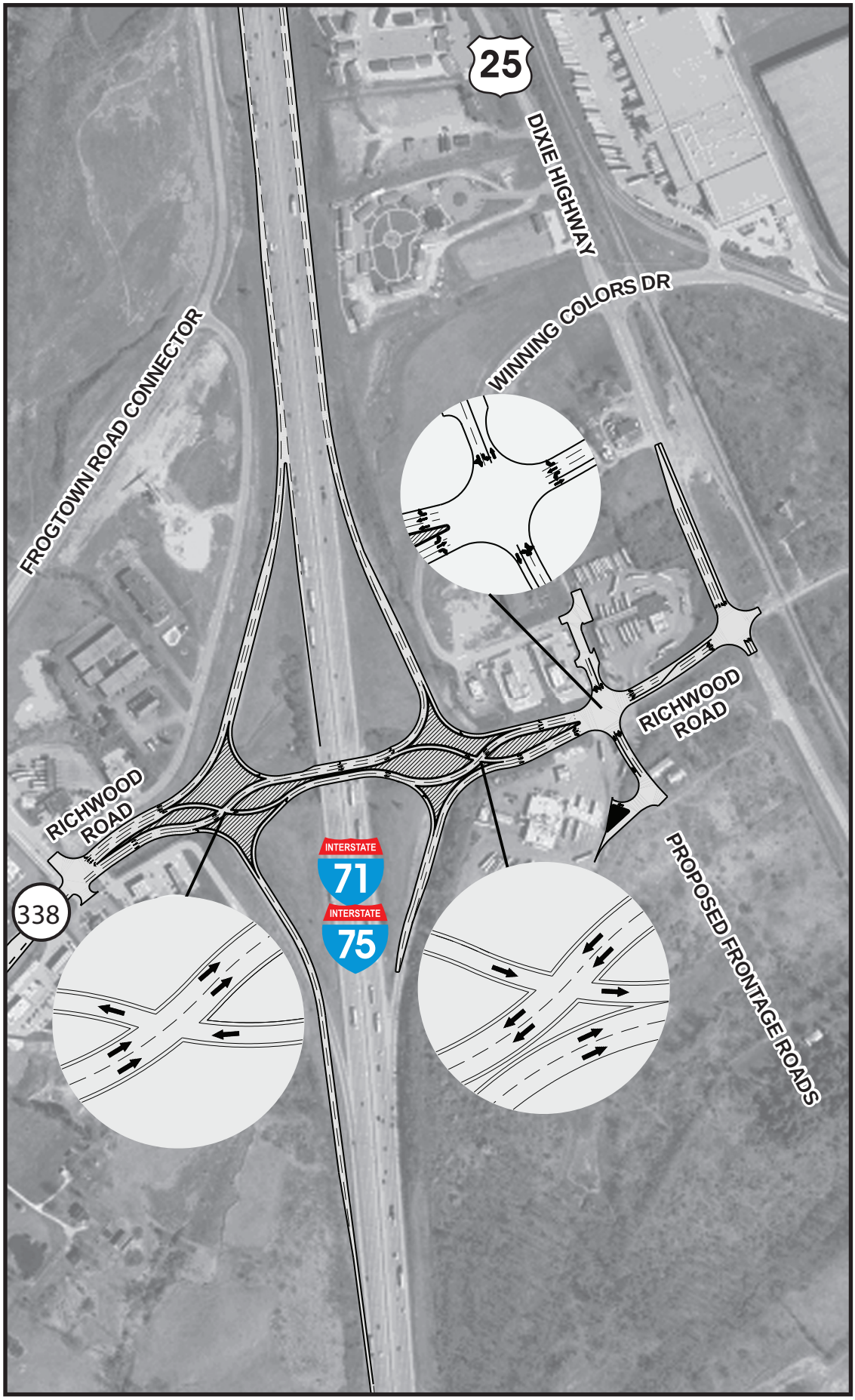


Exhibit 17:

Preferred Alternative Configuration - Richwood Road

N
W E
S

Legend

- X — Entrance to be closed
- Edge of pavement
- Lane line
- Islands/medians

SCALE

0 250 500 750

FEET

Exhibit 17A:

Enlarged View - Preferred Alternative Configuration - Richwood Road

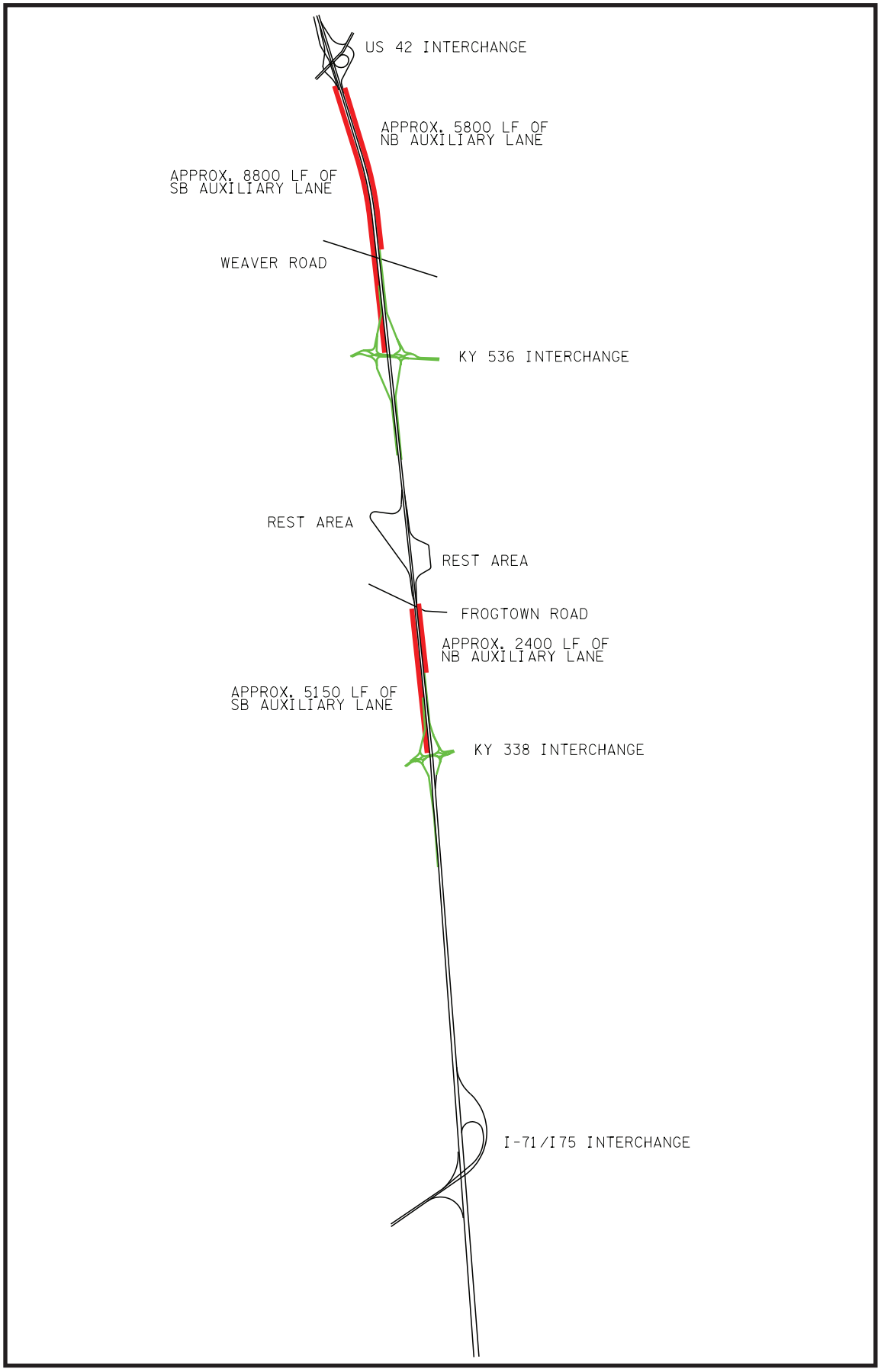


N
W E
S

Legend

- X — Entrance to be closed
- Edge of pavement
- Lane line
- Islands/medians

NOT TO SCALE



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

Exhibit 18:

Auxiliary Lanes Location Map

N
W E
S

Legend

- Recommended Auxiliary Lanes
- Recommended Interchange Reconstruction
- Existing Roadway

6.0 TRAFFIC ANALYSIS OF ALTERNATIVES

6.1 TRAFFIC OPERATIONS

Traffic operational, safety, and geometric characteristics of the design year (2030) No Build and Build conditions are summarized in the following sections. For the Build condition, only the recommended preferred alternatives, the diverging diamond interchanges, are evaluated. "Level of Service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience" (Highway Capacity Manual, 2000). Levels of service range from A (best) to F (worst). LOS C is desirable; however, LOS D is often considered the minimum acceptable level of service for urban facilities like KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Level of service D can also be considered acceptable when the cost to improve operation to LOS C is prohibitive. LOS D is considered acceptable for this project.

FHWA has found that at higher traffic volumes, delays were reduced by 15 to 60 percent and throughput was increased between 10 to 30 percent for DDI versus a conventional diamond interchange. These results were published in the FHWA Techbrief FHWA-HRT-09-054. It should be noted that the DDI alternatives for this project have additional capacity with respect to LOS and are expected to be functional five years beyond the design year.

A series of capacity and signal timing analyses were performed to determine the design year (2030) traffic operational characteristics. Synchro 7 was utilized to optimize the traffic signal timing and analyze levels of service at the signalized intersections. The Synchro results are included in **Appendix 10**. To analyze levels of service along the mainline, the computerized version of the Highway Capacity Manual 2000, *Highway Capacity Software* (HCS), was utilized. The HCS results are included in **Appendix 11**.

6.1.1 ARTERIAL SYNCHRO ANALYSIS

Intersection levels of service in the study area are summarized in **Exhibit 19, below**. The level of service listed indicates the overall intersection level of service based on the Synchro analysis. For signalized intersections, delay is used to estimate LOS. While the overall LOS for an intersection may rate as B (for example), individual legs of the intersection may actually be performing at level C or D. As shown, all intersections will fail in 2030 if no improvements are made. The build condition shows operations at an acceptable level of service of D or better. Detailed Synchro reports including operations by movement and approach is included in **Appendix 10**.

Exhibit 19. Intersection LOS: Design Year (2030) No Build and Build

Intersection	No Build LOS		Build LOS	
	AM	PM	AM	PM
KY 536 (Mt. Zion Road)& I-71/I-75 S	***F***	***F***	C	C
KY 536 (Mt. Zion Road)& I-71/I-75 N	***F***	***F***	B	D
KY 338 (Richwood Road) & I-71/I-75 S	***F***	***F***	B	B
KY 338 (Richwood Road) & I-71/I-75 N	***F***	***F***	B	B

Synchro analysis also provides a volume-to-capacity (v/c) ratio for each intersection movement. Movements with v/c over 1.0 are considered over capacity. All movements at KY 338 (Richwood Road) during AM and PM peak hours operate with v/c ratios below 1.0. With the proposed improvements, both intersections operate at a LOS B during the AM and PM peak periods. The screen shots at the end of this section are from Synchro and illustrate the LOS of the AM and PM peak traffic in the 2030 design year for both the No Build and Build conditions.

A soil nail wall has recently been constructed at the I-71/I-75 interchange with KY 536 (Mt. Zion Road). **Exhibit 3** on **page 9** presents a typical section of the roadway with the soil-nail wall. To avoid replacing the I-71/I-75 bridges over KY 536 (Mt. Zion Road), the build condition was limited to six lanes between the I-71/I-75 entrance/exit ramps, which is the capacity available after the nail wall was constructed.

Restricting KY 536 (Mt. Zion Road) to six lanes between the interchange ramps results in lower, but still acceptable, levels of service at the intersections along Mt. Zion Road. Heavy through movements along KY 536 (Mt. Zion Road) result in v/c ratios slightly over 1.0 at the I-71/I-75 southbound ramp intersections during the AM peak hour and both ramp intersections during the PM peak hour. Based upon LOS, there may be the perception that the DDI is overbuilt, but it has less impact than traditional widening, and allows for capacity beyond 2030.

During the PM peak hour each phase of this two-phase signal is carrying more than 2,000 vehicles through the I-71/I-75 northbound ramp intersection and over 1,600 vehicles through the I-71/I-75 southbound ramp intersections. Despite these large volumes, the DDI is able to process almost all the traffic. The overall intersection level of service for both ramp intersections during the PM peak hour, based on delay, is an acceptable LOS D or better. The intersection at the northbound ramp terminal is the most congested and exhibits a v/c ratio of 1.04 for both the eastbound and westbound through movements. Given that these v/c ratios are much over 1.0, and given that these volumes are not expected until 2030 during one hour of the day, it was determined that replacing the I-71/I-75 mainline bridges in order to widen Mt. Zion further, was not recommended. The project team's consensus was that the slight improvement in operation did not justify the cost of replacing the bridges. Figures indicating the Build 2030 AM and PM peak hour LOS, lane use and traffic volumes are included in **Appendix 8**. Figures indicating the No Build 2030 AM and PM peak hour LOS, lane use and traffic volumes are included in **Appendix 13**.



Illustration 1 - KY 536 (Mt. Zion Road) 2030 AM Peak Traffic – No Build



Illustration 2 - KY 536 (Mt. Zion Road) 2030 AM Peak Traffic – Build



Illustration 3 - KY 536 (Mt. Zion Road) 2030 PM Peak Traffic – No Build

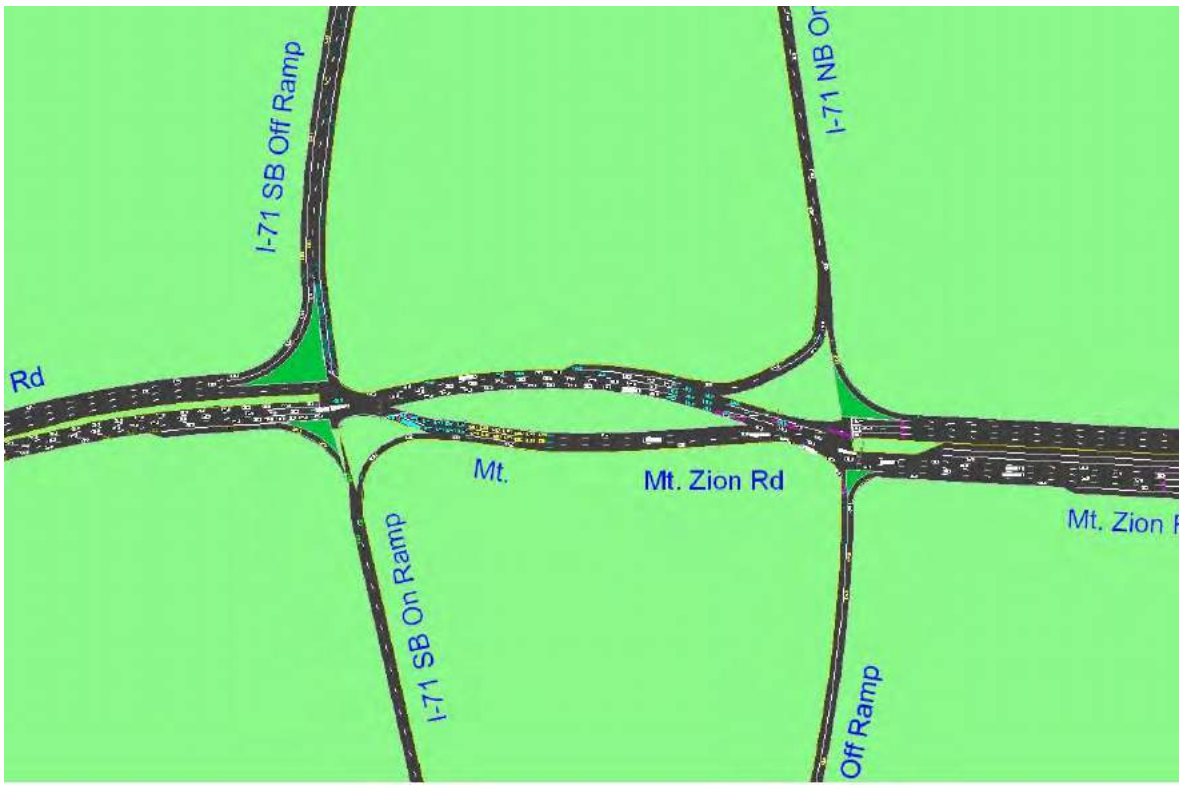


Illustration 4 - KY 536 (Mt. Zion Road) 2030 PM Peak Traffic – Build

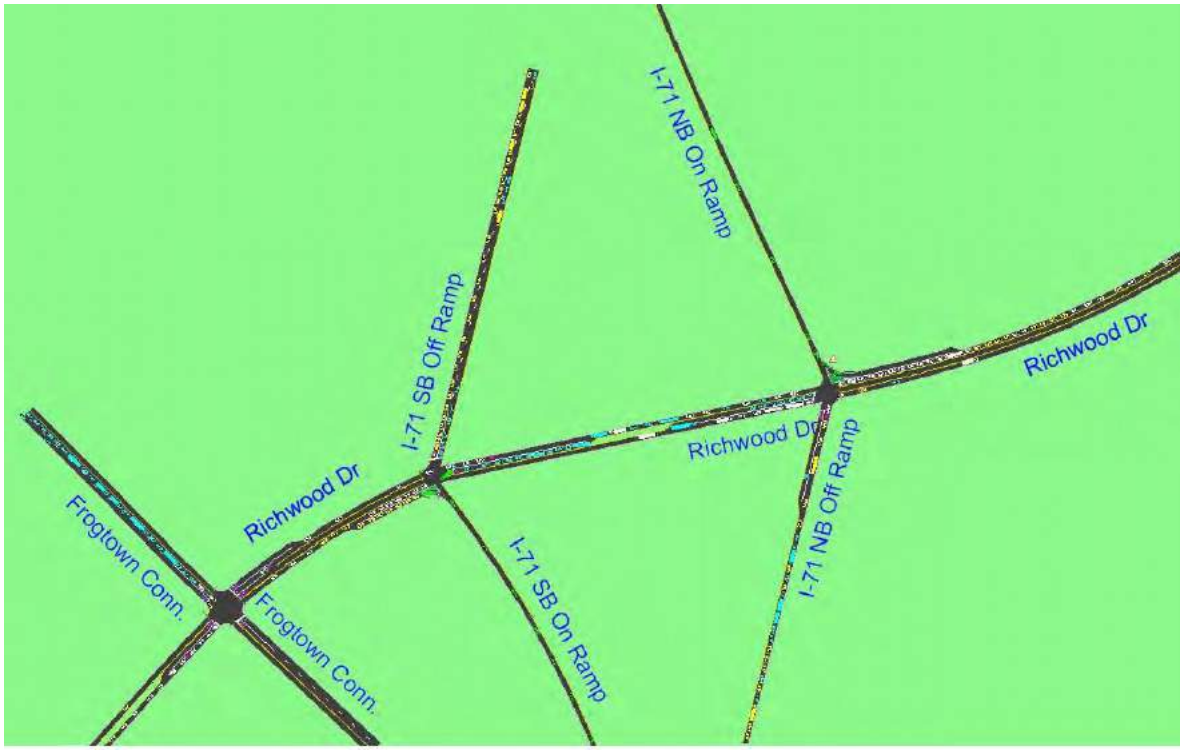


Illustration 5 - KY 338 (Richwood Road) 2030 AM Peak Traffic – No Build

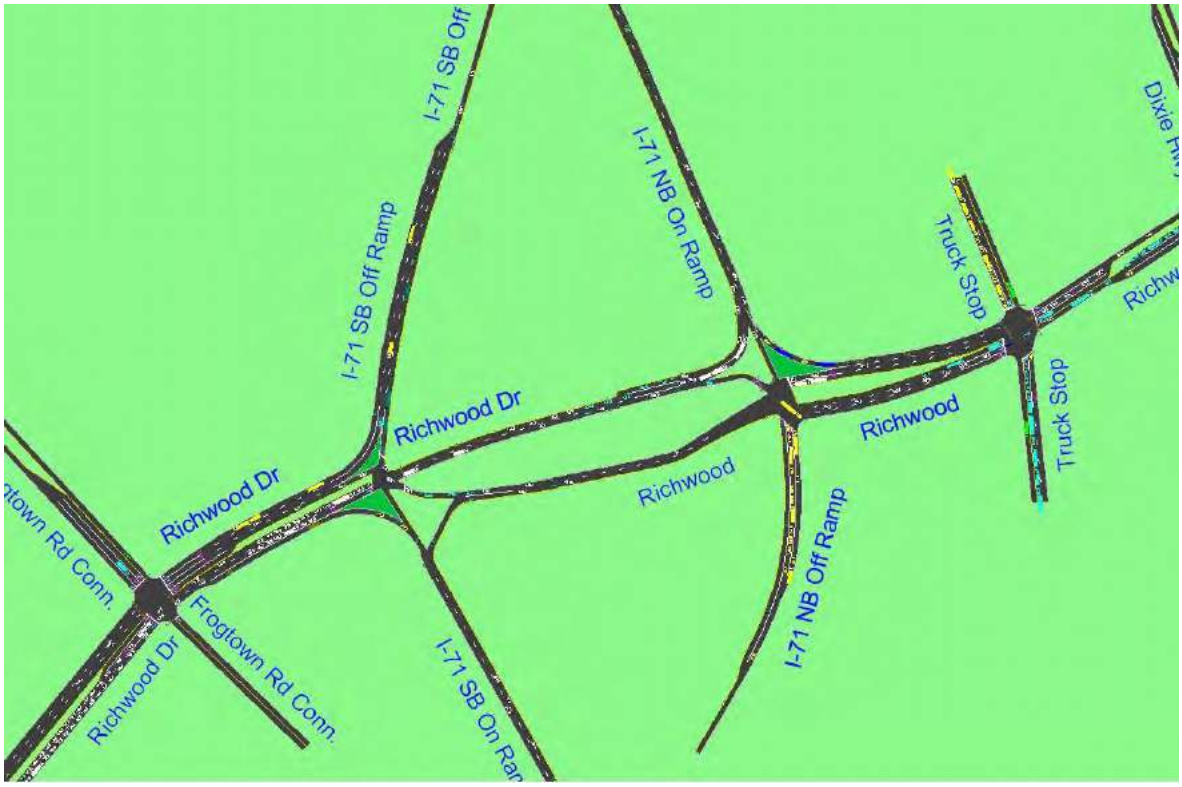


Illustration 6 - KY 338 (Richwood Road) 2030 AM Peak Traffic – Build

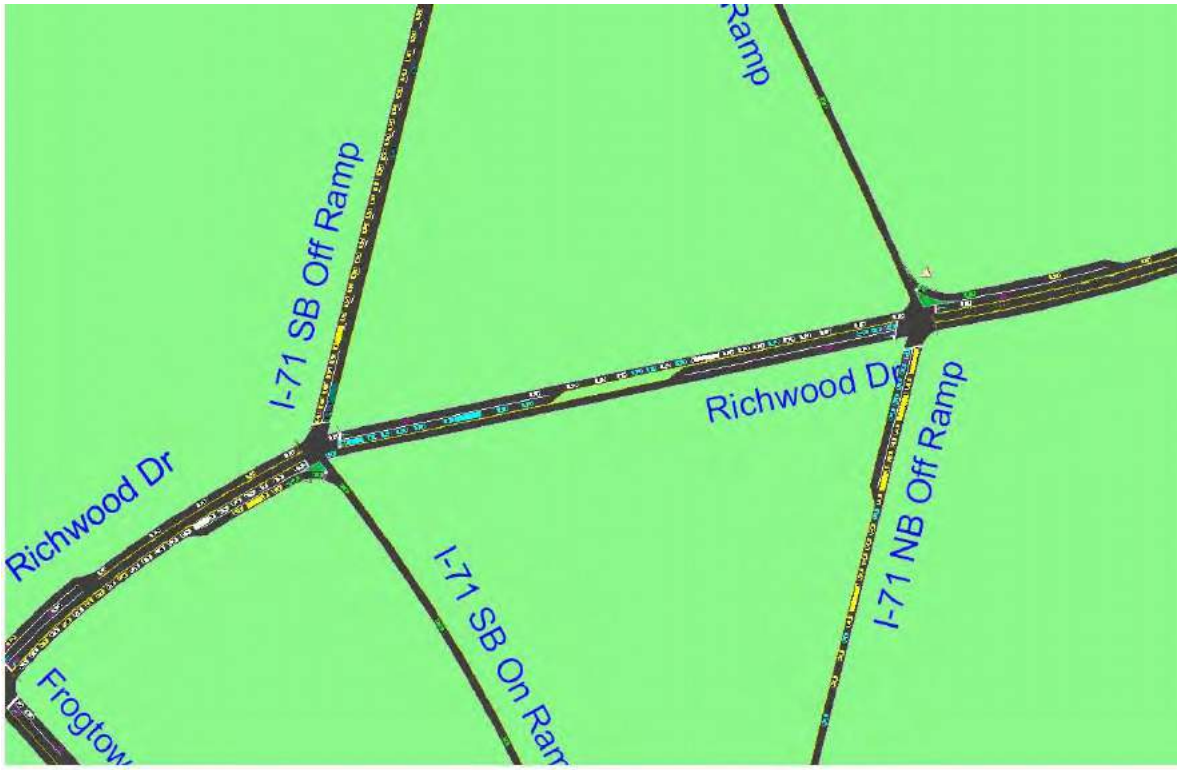


Illustration 7 - KY 338 (Richwood Road) 2030 PM Peak Traffic – No Build

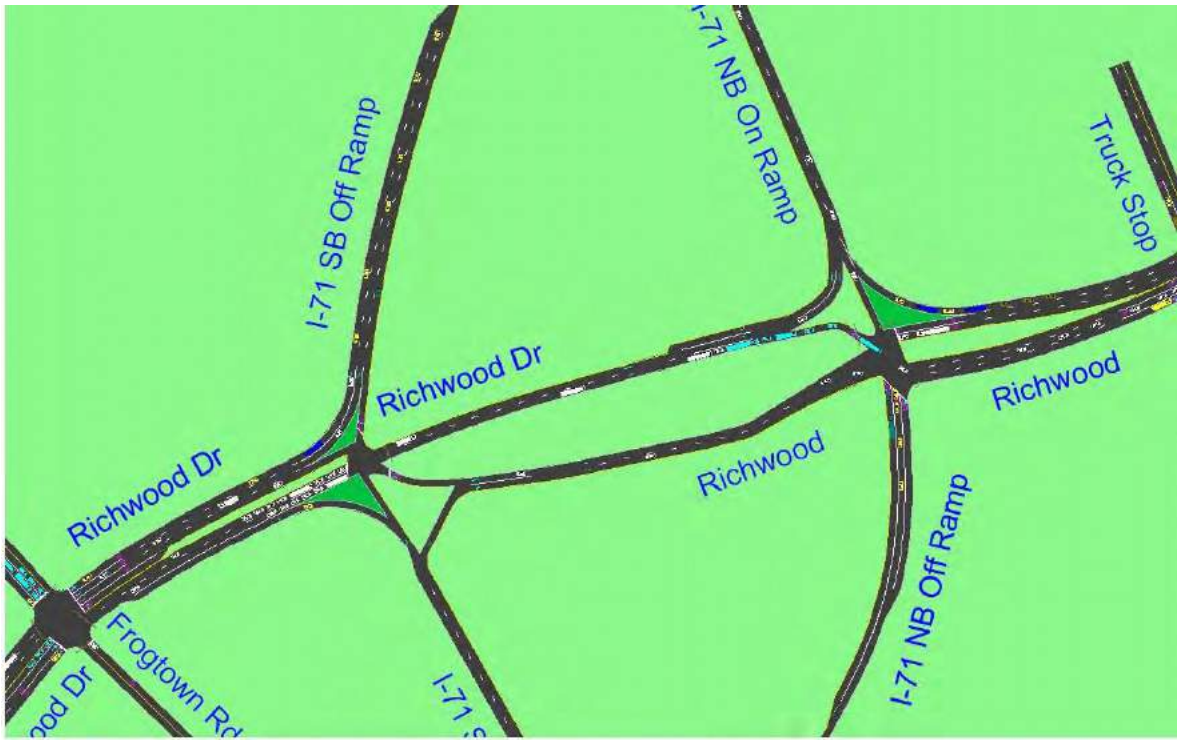


Illustration 8 - KY 338 (Richwood Road) 2030 PM Peak Traffic – Build

6.1.2 FREEWAY HCS ANALYSIS

Mainline levels of service along I-71/I-75 are summarized in **Exhibit 20**, **Pages 45 and 46**. Highway Capacity Software was used to analyze basic freeway segments, merge locations and diverge locations along I-71/I-75. The performance measure for level of service at each of these freeway segments is traffic density expressed in vehicles per mile per lane. Twenty-thirty AM and PM peak traffic volumes were analyzed for the Build and No Build conditions. As shown, many segments fail in the future under the No Build condition. This indicates the operation if I-71/I-75 in the future if auxiliary lanes are not constructed.

Future traffic operations will remain the same or improve in the Build condition. All segments operate at acceptable LOS D or better with the exception of the southbound freeway segment north of the US 42 entrance ramp. During the PM peak hour, this segment operates as LOS E. This segment is just north of where the project terminates and improvements are made. The project goal is to provide a LOS C for the traffic within the project area, but a LOS of D is acceptable if the measures required to attain a LOS C are too cost prohibitive. The No Build and Build condition have the same lane configuration at this segment and therefore operate with the same level of service.

Construction of the proposed alternatives at the KY 338 (Richwood Road) and KY 536 (Mt. Zion Road) interchanges will not degrade the operation of I-71/I-75 mainline operation. Density and level of service along I-71/I-75 remain the same or improve in the Build Condition. The HCS results are included in **Appendix 11**.

Exhibit 20. Mainline LOS: Design Year (2030) No Build and Build (graphically shown in Appendices 8 and 13)

Mainline	No Build LOS		Build LOS	
	AM	PM	AM	PM
Southbound				
North of US 42 entrance ramp	B	***E***	B	***E***
At US 42 entrance ramp	B	***F***	*	*
Between US 42 entrance ramp & Mt. Zion Road exit ramp	B	***F***	B	D
At Mt. Zion Road exit ramp	C	***F***	*	*
Between Mt. Zion Road exit ramp & entrance ramp	B	D	B	D
At Mt. Zion Road entrance ramp	C	D	B	D
Between Mt. Zion Rd entrance ramp & Richwood Rd exit ramp	B	D	B	D
At Richwood Road exit ramp	C	***F***	*	*
Between Richwood Road exit ramp & entrance ramp	B	C	B	C
At Richwood Road entrance ramp	C	C	C	C
South of Richwood Road entrance ramp	B	C	B	C
I-71, South of I-71/I-75 split	B	B	B	B
I-75, South of I-71/I-75 split	B	C	B	C

Mainline	No Build LOS		Build LOS	
	AM	PM	AM	PM
Northbound				
I-75, South of I-71/I-75 split	C	C	C	C
I-71, South of I-71/I-75 split	A	B	A	B
South of Richwood Road exit ramp	C	C	C	C
At Richwood Road exit ramp	C	C	C	C
Between Richwood Road exit ramp & entrance ramp	C	C	C	C
At Richwood Road entrance ramp	D	D	D	*
Between Richwood Rd entrance ramp & Mt. Zion Rd exit ramp	D	C	D	C
At Mt. Zion Road exit ramp	D	D	D	D
Between Mt. Zion Road exit ramp & entrance ramp	C	C	C	C
Mt. Zion Road entrance ramp	***E***	D	*	*
Between Mt. Zion Road entrance ramp & US 42 exit ramp	***E***	D	D	C
At US 42 exit ramp	***E***	D	*	*
North of US 42 exit ramp	D	C	D	C

*HCS does not calculate LOS of lane additions or drops. In these situations, the operation was simulated by assuming merge and diverge lane lengths several times the length of a standard merge or diverge. Still, these results should be worse than actual operation, and none were found to be less than LOS D. This was confirmed using *Paramics.*

Exhibit 20 (continued). Mainline LOS: Design Year (2030) No Build and Build (graphically shown in Appendices 8 and 13)

6.1.3 FREEWAY PARAMICS ANALYSIS

The microsimulation software *Paramics* was used to simulate of the traffic along the study corridor, including the rest areas, and to validate the Synchro and HCS results. The I-71/I-75 split was not included in the Paramics analysis. *Paramics* was used to analyze the merge/diverge conditions for consideration of auxiliary lanes and assessing free flow conditions at the I-71/I-75 mainline interchanges with KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Paramics confirmed that operations fail in future years as suggested in the HCS and Synchro analysis. The confirmation led to the use of Paramics to review the effectiveness of auxiliary lanes on I-71/75. Mainline speeds and densities were collected through detectors across all lanes in the Paramics model. The data were averaged from several model runs for year 2020, 2025, and 2030 conditions at points just before the gore and just past the gore. Data on mainline sections before and after any lane merges was also collected. Northbound traffic is heaviest in the morning when people are commuting into Cincinnati and therefore was analyzed during the AM peak hour. Likewise, southbound traffic is heaviest during the PM peak hour, so southbound traffic was analyzed during the PM peak hour.

Paramics' I-71/I-75 northbound AM peak hour analysis shows that without auxiliary lanes, by 2030, the freeway degrades to LOS F at the KY 536 (Mt. Zion Road) interchange. Freeway operation will still be an acceptable LOS C at the KY 338 (Richwood Road) interchange.

During the 2030 PM peak hour, I-71/I-75 southbound mainline operates as LOS F at the KY 536 (Mt. Zion Road) interchange.

Accurate modeling of the future PM peak hours without an auxiliary lane is not possible in Paramics. Without the auxiliary lane, the model does not have any capacity on the I-71/75 mainline available to place new vehicles into the network, which would be the equivalent to a LOS F. **Exhibit 21, below,** presents at what year auxiliary lanes are needed at each of the study interchange ramps across the analyzed years. Screen captures from *Paramics* are not provided for the PM Peaks because the pictures would show an unrealistically better condition since all the traffic isn't loading into the model.

Exhibit 21. Need for Auxiliary Lanes

Direction(Peak)	Mainline Location	Auxiliary Lanes Needed by 2030?
NB (AM)	Mt. Zion Entrance	Yes, after 2025
	Richwood Entrance	No
SB (PM)	Mt. Zion Exit	Yes, by 2020
	Richwood Exit	Yes, by 2025

The use of auxiliary lanes allows merging and diverging traffic to complete their movements outside the mainline traffic lanes increasing efficiency of both the on-ramp and off-ramp areas. Therefore, providing auxiliary lanes lowers mainline densities, increasing level of service and mainline speeds, thereby allowing the mainline to operate more efficiently. With auxiliary lanes the *Paramics* analysis indicates operation along the mainline improves level of service to LOS C or better at the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges during the Build Condition. Select screen captures from *Paramics* analysis that illustrate the need for the auxiliary lanes are shown at the end of this section.

Synchro does not provide operational measures of effectiveness (MOEs), such as densities or LOS values, for free-flow movements. *Paramics* was used to supplement the Synchro results in these areas. For the mainline auxiliary lane analysis, speed and density data were collected as measure of effectiveness. The MOEs showed that without improvements, the mainline operations deteriorated to unacceptable levels. The MOEs also confirmed that the interchange intersections did not adversely impact mainline operations as indicated in the Synchro analysis.

Turning speeds were obtained from *Paramics* and used to verify that free-flow movements were not experiencing delays or slow downs. The free-flow speeds of these movements are listed in **Exhibit 22, page 48**. Free flow in this instance is characterized by a single motorist maneuvering with ample space so as not to be impeded by traffic.

Low turning speeds were observed at the KY 536 (Mt. Zion Road) northbound entrance ramp in 2030. Without the northbound auxiliary lane from KY 536 (Mt. Zion Road) to US 42, the queues from the mainline merge extend through the on-ramp and reduce speeds on the ramps and into the interchange by 2030. *Paramics* microsimulation indicates queues backing into the interchange from the northbound on-ramps at KY 536 are likely to occur by 2030 without an auxiliary lane. With the northbound auxiliary lane, the speeds return to free-flow operations.

Exhibit 22. Turning Speeds at free-flow movements

Intersection	Travel Speeds (MPH) for AM (PM)		
	2020	2025	2030
KY 536 (Mt. Zion) Interchange Intersections			
KY 536 EB to I-71/I-75 NB	18 (19)	18 (19)	7** (19)
KY 536 WB to I-71/I-75 NB	35* (35*)	35* (35*)	7** (35*)
KY 536 WB to I-71/I-75 SB	28 (29)	29 (28)	29 (28)
KY 536 EB to I-71/I-75 SB	30* (30*)	30* (30*)	30* (30*)
KY 338 (Richwood) Interchange Intersections			
KY 338 EB to I-71/I-75 NB	25* (25*)	25* (25*)	25* (25*)
KY 338 WB to I-71/I-75 NB	23 (23)	23 (22)	23 (22)
KY 338 WB to I-71/I-75 SB	18 (19)	19 (18)	19 (18)
KY 338 EB to I-71/I-75 SB	25* (25*)	25* (25*)	25* (25*)

* *Paramics* results indicate free flow speeds at or above the design speed shown

** Speed shown without auxiliary lane. With auxiliary lane, speed returns to estimated free-flow conditions of approximately 26 mph.

A detailed summary of the Synchro and HCS analysis of the No Build and Build conditions is included in **Appendix 12**. It should be noted that some V/C ratios greater than 1 yielded a LOS D or E. Since detailed modeling of signal coordination was needed, the Synchro Delay Formula was used. On occasion, this method yields a very high density LOS D or E with a V/C ratio very slightly greater than 1. Figures indicating the No Build and Build 2030 AM and PM peak hour LOS, lane use and traffic volumes are included in **Appendices 13** and **8**, respectively.



Illustration 9 - *Paramics* Screen Capture of KY 536 (Mt. Zion Road) 2030 Northbound AM Peak Traffic with No Auxiliary Lane



Illustration 10 - *Paramics* Screen Capture of KY 536 (Mt. Zion Road) 2030 Northbound AM Peak Traffic with Auxiliary Lane

6.2 SAFETY

The majority of crashes on the state routes at the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges are rear end and angle crashes. Since the 2030 diverging diamond interchange alternative will reduce congestion, when compared to the 2030 No-Build condition, it is anticipated that rear-end crashes will also be reduced.

The DDI design reduces the number of conflict points by reducing the number of crossing conflicts between vehicles turning left onto the I-71/I-75 mainline and opposing traffic at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). The DDI will have 29 conflict points at the KY 536 (Mt. Zion Road) interchange compared to 36 conflict points at a conventional diamond interchange. The DDI at the KY 338 (Richwood Road) interchange will have 17 conflict points compared to 39 conflict points at a conventional diamond interchange. **Appendix 14** illustrates the number of conflict points at each interchange with a DDI and conventional diamond interchange. At each interchange, the DDI will have two crossing conflicts, compared to four crossing conflicts at a conventional interchange. Traffic signals are used to separate conflicts between vehicles, and other roadway design features, such as signs and markings, are intended to reduce the probability of driver errors that may result in crashes. Safety performance generally is better when the number of conflict points is minimized (FHWA-HRT-07-048). Because the number of conflict points will be reduced and those that do exist will be controlled, it is anticipated that the number of angle crashes will be reduced.

The curvature of the roadway that provides the skew angle of the crossovers also serves as a traffic calming feature. Speeds of vehicles at the crossovers will be reduced, thus eliminating some crashes and reducing the severity of those that do occur. It is anticipated that speeds along the state routes at the crossovers will approximate the design speed of 30 mph during non-peak hours. Video simulations that show driving a DDI were created of Paramics modeling at KY 536 (Mt. Zion Road) using actual traffic numbers and are contained on the **CD** titled, *Visualization of the Recommended Alternative*, contained in a sleeve inside the front cover of this document.

A DDI is also safer for pedestrians, as they have to cross only one direction of traffic at a time.

6.3 TURN LANE LENGTHS

Turning lane length calculations were prepared according to the procedures outlined in KYTC *Design Memo 03-09, Auxiliary Turn Lane* Policy, as well as *Highway Design*, *Section 902, At-Grade Intersections* for the signalized ramp intersections using the future (2030) traffic. The required turn lane lengths for auxiliary turn lanes associated with the Build (DDI) alternative are summarized in **Exhibit 23**, **Page 52**. The right-turn lanes for the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges are all free-flow right turn lanes. The left turn lane back-up lengths were examined to calculate the required storage for the free-flow right turn lanes onto KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Through lane back-up lengths were also examined to calculate how much storage would be required for the free-flow right turn lanes onto the I-71/I-75 northbound and southbound entrance ramps. Turn lane length calculations are included in **Appendix 15**.

Exhibit 23. Required Intersection Storage Lane Lengths

Approach	Lane	Turn Lane Length
Southbound I-71/I-75 & KY 536 (Mt. Zion Road) Exit Ramp		
Southbound (2 lane)	Left Turn Lane	880’
	Right Turn Lane	880’
Eastbound	Right Turn Lane	950’
Northbound I-71/I-75 & KY 536 (Mt. Zion Road) Exit Ramp		
Northbound	Right Turn Lane	680’
Southbound I-71/I-75 & KY 338 (Richwood Road) Exit Ramp		
Southbound (2 lane)	Left Turn Lane	930’
	Right Turn Lane	930’
Eastbound	Right Turn Lane	770'
Northbound I-71/I-75 & KY 338 (Richwood Road) Exit Ramp		
Northbound	Left Turn Lane	690’
	Right Turn Lane	690’

7.0 MASTER PLAN - CONSTRUCTION STRATEGY

The rapid growth in traffic volumes, resulting from the transitioning land uses and evolving traffic patterns, have caused the southeast Boone County transportation system to have a prematurely shortened lifespan that requires immediate attention. Travel patterns along I-71/I-75 and its parallel route to the west, US 25 (Dixie Highway), are experiencing heavy congestion that have compromised safety and have started to stunt growth for Boone County.

Prior to the onset of this IJS, KYTC identified that grade separated intersections along US 25 (Dixie Highway) at both KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) are necessary to improve the primary local routes between the intersections. Conceptual single point urban interchanges (SPUIs) were identified for each of these two intersections and Phase I design was initiated. However, due to lack of funding, the grade-separated intersections were downgraded to at-grade intersections. It is anticipated that the design for these intersections will have multiple turn lanes from US 25 onto the two state routes.

As depicted in **Exhibit 24, Page 57**, the preferred interchange improvements at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) are adjacent to the improvements under design at their respective intersections with US 25 (Dixie Highway). As the preferred interchange improvements are constructed for KY 536 (Mt. Zion Road) and KY 338 (Richwood Road), the improved US 25 (Dixie Highway) will serve as a critical corridor to maintain local access to the area. This proximity, combined with the pressing need and typical duration for reconstruction of these major transportation confluences, clearly demonstrate that the construction plans, including maintenance of traffic, temporary routing, and even construction zones, must be closely coordinated.

The preferred option identified within this IJS includes auxiliary lanes on I-71/I-75 north of KY 536 (Mt. Zion Road) to US 42 in both directions, auxiliary lanes from the rest areas south to KY 338, and the reconfiguration of the interchanges at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) into diverging diamond interchanges. These should not be constructed in isolation. Detailing an implementation program for the projects within the vicinity of the I-71/I-75 with KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) and prioritizing the investments is vitally important. Further, the combined program must balance the critical transportation safety needs with the available funding and logical improvements to maintain interstate commerce and access to the highly active residential and commercial communities which are adjacent to these projects.

There are seven (7) distinct components that need to be reviewed as an interwoven Master Plan for construction based upon the means, methods, and sequencing. Components A, B, C1, and D3 are recommended to be part of the preferred alternative for this project. These Master Plan components are discussed below:

Component A –Auxiliary Lanes at KY 536 (Mt. Zion Road): This component is recommended to be the construction of a northbound auxiliary lane along the interstate from the entrance ramp beginning at KY 536 (Mt. Zion Road) to exit ramp at US 42. A southbound auxiliary lane along the interstate from the entrance ramp beginning at US 42 continuing to the exit ramp at KY 536 (Mt. Zion Road) is also recommended. The widening required to construct these auxiliary lanes will likely include lengthening the bridge overpass at Weaver Road north of KY 536 (Mt. Zion Road)

Component B –Auxiliary Lanes at KY 338 (Richwood Road): Component B is also comprised of two parts. It is recommended that a two lane entrance ramp from KY 338 (Richwood Road) be constructed northbound on I-71/I75. The outside lane will serve as an auxiliary lane north to the entrance of the rest area. The widening of the interstate will likely require the widening of the northbound bridge on I-71/I-75 over Frogtown Road north of KY 338. Adding to the complexity, access to the northbound rest area will also need to be maintained during construction.

The second part of this component is recommended to be a southbound auxiliary lane that is developed immediately south of the bridge over Frogtown Road. This will develop into a two lane exit ramp at KY 338 (Richwood Road) with the interior lane being an option lane. This option lane will be dropped within the interchange, prior to the bridge over KY 338 (Richwood Road).

Component C1 – Reconstruction I-71/I-75 interchange with KY 536 (Mt. Zion Road): A DDI was selected as the recommended preferred option for this interchange. While partial width construction methods are available for the DDI, consideration should be given to the maintenance of traffic through the remaining primary components.

Component C2 – Reconstruction of US 25 (Dixie Highway) intersection with KY 536 (Mt. Zion Road): Phase 1 design has been initiated for at the improvements to this intersection. Multiple left turn lanes from northbound US 25 to westbound KY 536 are required. However, construction staging typically detailed in Phase 2 design is complex. The project will require access to US 25 (Dixie Highway) via both US 42 and KY 338 (Richwood Road) to maintain access to local businesses.

Components C1 and C2 can be constructed as individual projects since the extents of the respective projects meet concurrently at Sam Neace Drive.

Component D1 – Reconstruction of US 25 (Dixie Highway) intersection with KY 338 (Richwood Road: Similar to Component C2, Phase 1 design has been initiated for improvements to this intersection. However, given the proximity to Components D2 and D3, adjacency to an active freight rail line (paralleling US 25), and existing topography between the interstate and US 25 (Dixie Highway), the reconstruction of this intersection is likely the most complex of all of the components. The intersection is approximately 700 from the I-71/I-75 northbound ramp terminal.

Component D2 – Construction of frontage roads around US 25 (Dixie Highway) intersection with KY 338 (Richwood Road): Initially conceived as a temporary frontage road during the construction of Component D1, Component D2 would actually enhance the region by providing access management along both KY 338 (Richwood Road) and US 25 (Dixie Highway). Presently, only improvements to the intersection with KY 338 (Richwood Road) at the two existing truck stops and short approach segments are currently planned. The connections to US 25 will not be constructed in the near term.

Component D3 – Reconstruction of I-71/75 interchange with KY 338 (Richwood Road): Similar to Component C1, a DDI was selected as the recommended preferred option for this interchange. Final approval of the Phase 2 design of Component D1 will need to be deferred until the Phase 1 design of Component D1 is substantially complete. In fact, strong consideration should be given to completing the Phase 2 design of Components D1 and D3 simultaneously. Preferably, the project should advance in an expeditious manner

so that the Phase 1 design for Component D3 activities coincide with the major design elements of geometrics, traffic analysis, and maintenance of traffic of Component D1.

Further detail on each of these components may warrant additional subsets of design, environmental coordination, rights-of-way, and construction contracts. In addition to the safety and traffic concerns of each component, constructability factors need to be considered when defining the boundaries, subsets, order of the design, and construction contracts. These factors include, but should not be limited to:

- **Type and Duration of Interim Improvements** – An interim widening project has recently been completed at KY 536 (Mt. Zion Road) under the I-71/I-75 bridges to provide additional storage capacity for turning lanes accessing I-71/I-75 via KY 536 (Mt. Zion Road). It is anticipated that this interim condition will remain until such time as the interchange can be fully reconstructed.

- **Type and Duration of Temporary Improvements** – Temporary access plans and routes typically span no more than two construction seasons. However, due to the proximity of the major components identified above, the temporary conditions may span for over longer continuous or non-continuous construction seasons, necessitating reinforcements or rehabilitation of the temporary pavements.

- **Access to Rest Areas** – The northbound and southbound rest areas located between KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) serve heavy volumes of traffic and are the southern gateways to the Greater Cincinnati/Northern Kentucky metropolitan area. In addition to traditional rest area facilities, they include distinguishing features such as staffed information centers, substantial truck parking and rest amenities for commercial drivers. Access to these rest areas must be maintained during the interstate reconstruction process.

- **Community and Business Disruption** – While each of these components can individually be constructed over no more than two construction seasons, the overarching disruption to the communities will be significantly longer. Overlapping construction sites, shared temporary access, and rerouting of traffic may alter the travel patterns within the study area for several years. Construction cycles of over two years will typically be factors into the business plans for commercial sites.

- **Right-of-Way and Utilities** – Temporary and permanent utility relocations, and rights-of-way easements need to be addressed comprehensively. For example, a parcel requiring a temporary construction easement under Component D2 may later need a permanent easement for utility relocation. To avoid redundant property negotiations and possible utility relocation, a comprehensive right-of-way and utility relocation master plan should be developed.

- **Available Funding** – Balancing the overarching project needs and constructability with the available funding is prudent to appropriate programming of these improvements. While the desire to improve the safety conditions and increase capacity within the area bounded by I-71/I-75, US 25 (Dixie Highway), KY 536 (Mt. Zion Road), and KY 338 (Richwood Road), the constraints of funding also must be considered. It is important that the overall Master Plan for construction prioritize those areas of greatest safety concern, the temporary maintenance of traffic and access, the overall right-of-way and utility relocation required, as well as, the individual construction projects with the available funding. Each construction

project completed must be economically feasible and provide a noticeable improvement to the transportation environs.

A broad master plan is suggested to provide a prioritized ranking of the four interchange/intersection components based on present-day safety, traffic volume, and congestion. The District has identified the KY 338 (Richwood Road) interchange and the US 25 intersection as the highest priority area. This necessitates constructing Components D1, D2, D3, and B as one project. Constructing D2 makes sense since it is within the footprint of reconstruction for the DDI. Also, since the US 25 intersection is within 400 feet of Best Pal Drive, D1 needs to be constructed to adequately address lane alignments and signing for the DDI.

The next priority is constructing components C1 and A. Depending on funding these can be designed and constructed either independently or as one project. Traffic modeling has indicated that it is likely I-71/I-75 southbound between US 42 and KY 536 (Richwood Road) will have a LOS F by the year 2020 if no auxiliary lane is constructed.

Component C2 is presently the lowest priority node due to the recent economic recession. The current PM peak hour LOS is E and as the economy rebounds, development pressure will likely increase demands at this already congested intersection.



Exhibit 24:

Master Plan of Projects

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Legend

- A) Auxiliary Lanes at KY 536
- B) Auxiliary Lanes at KY 338
- C1) Improvements to I-71/I-75 at KY 536
- C2) Improvements to US 25 at KY 536
- D1) Improvements to US 25 at KY 338
- D2) Frontage Roads
- D3) Improvements to I-71/I-75 at KY 338

8.0 FUNDING

The estimated cost for the recommended preferred Build alternative (Components A, B, C1, and D3) is approximately $49.7 million. This includes right-of-way, utility, design, and construction costs for I-71/I-75 auxiliary lanes (including rest area ramps), the portion of US 25/KY 338 intersection improvements shown on the Geometric Layout sheets contained in **Appendix 5** and the KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. This estimate is based on costs associated with 2008 KYTC average unit costs for the items considered. Construction is estimated to begin in 2012; therefore, an inflation factor was included to bring the estimated cost $56.8 million in 2012 dollars. An inflation factor (4% annually) was provided by KYTC based on local observation of construction costs. The costs for right-of-way and utilities were inflated, using the same 4%, to 2011. These costs are planning level costs and will be refined as design progresses. The cost for the pavement depicted by the limits of gray shading shown in **Exhibits 16 and 17** are included in the cost estimates. The estimated costs for the auxiliary lanes are included in the respective KY 556/KY 338 interchange cost estimates. These costs do not include modifications to components C2 or D2, which may be required to align the Master Plan of projects for this area. Conceptual cost summaries are included in **Appendix 16**.

The reconstruction of the I-75/KY 536 (Mt. Zion Road) and I-75/ KY 338 (Richwood Road) interchanges are included in the *2005-2010 Kentucky Six-Year Highway Plan* (*Six-Year Plan*). The *Six-Year Plan* is KYTC's short range component of the statewide transportation plan, published in 2004, which evaluated and prioritized transportation commitments to promote fiscal responsibility when funding transportation projects.

In November 2007, the design phase funds for these projects were requested. KYTC anticipates posting the bulletins to request engineering design services in 2010.

Summary of Mt. Zion DDI Costs

	2008	2011/2012
Design	$ 2,300,000	$ 2,300,000
R/W	$ 3,692,000	$ 3,800,000
Utilities	$ 1,785,000	$ 2,100,000
Construction	$ 23,062,460	$ 27,000,000
Subtotal	**$ 30,839,460**	**$ 35,200,000**

Summary of Richwood DDI Costs

	2008	2011/2012
Design	$ 1,500,000	$ 1,600,000
R/W	$ 1,900,000	$ 2,000,000
Utilities	$ 1,512,000	$ 1,800,000
Construction	$ 13,925,276	$ 16,300,000
Subtotal	**$ 18,837,276**	**$ 21,600,000**
TOTAL	**$ 49,676,736**	**$ 56,800,000**

9.0 CONCLUSIONS

The KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges with I-71/I-75 in Northern Kentucky are currently congested and carry substantial (up 44%) truck traffic. Rapid growth of 2% to 5% per year along KY 536 and KY 338 is anticipated to continue for the foreseeable future given their proximity to Cincinnati, availability of land, interstate and airport access, and national prominence of I-75 as a major truck route.

The traffic signal analysis, performed in Synchro, and mainline analysis, performed in HCS, demonstrate that the proposed project will improve the operation of the I-71/I-75 freeway system. For validation purposes, the microsimulation software *Paramics* was used to create a visual simulation of the traffic in the entire study. Paramics confirmed that operations fail in future years as suggested in the HCS and Synchro analysis. The confirmation led to the use of Paramics to review the effectiveness of auxiliary lanes on I-71/75. For the mainline auxiliary lane analysis, speed and density data were collected as measure of effectiveness. The MOEs showed that without improvements, the mainline operations deteriorated to unacceptable levels. The MOEs also confirmed that the interchange intersections did not adversely impact mainline operations as indicated in the Synchro analysis.

Traffic operations for the following conditions were analyzed:

- A No Build (2030) Condition that reflects the geometry, lane use, traffic control, and traffic volumes that would be present if the project was not constructed.
- A Build (2030) Condition that reflects the proposed geometry, lane use, traffic control, and traffic volumes associated with the recommended preferred alternative.

The Build Condition, or Preferred Alternative, that the Stakeholder Advisory Committee has endorsed and for which KYTC is requesting FHWA approval includes the following recommendations:

- I-71/I-75 Interchange at KY 536 (Mt. Zion Road) (see **Exhibit 3**, **Exhibit 16, Exhibit 16A and Appendix 8**)
    - Convert the existing diamond interchange to a DDI.
    - Widen KY 536 (Mt. Zion Road) to 5 lanes at the west side to connect into the planned 5 lane section from I-71/I-75 to Old Union Road.
    - Provide 6 to 7 lanes between the western crossover and the 5 lane section described above.
    - Provide 3 eastbound lanes and 2 westbound lanes at the western crossover.
    - Provide 6 lanes through the interchange with widening for turn lanes, as required. Widening KY 536 does not necessitate lengthening the I-71/I-75 bridge overpasses, due the presence of the recently-constructed soil nail wall.
    - Provide 3 eastbound lanes and 3 westbound lanes at the eastern crossover.

- Provide 6 lanes, with 2 additional turning lanes, east of the interchange to Sam Neace Drive,
- Provide 5 lanes east of Sam Neace then reduce the number of lanes, when appropriate, to tie into the existing roadway section. This widening along KY 536 (Mt. Zion Road) is approximately 3,300 linear feet of construction from Tiburon Drive to Sam Neace Drive.
- Provide additional passing length on the SB entrance ramp proper and lengthen the acceleration lane along I-71/I-75.
- Improve the NB exit ramp by lengthening the deceleration lane on I-71/I-75 and provide additional storage capacity within the NB exit ramp by widening it to two lanes within the ramp proper.

Traffic analysis indicates the need for two-lane ramps and auxiliary lanes at the KY 536 (Mt. Zion Road) southbound exit and northbound entrance ramps. **Exhibit 18** shows the locations and limits of the recommended auxiliary lanes.

- Widen the following ramps to carry two lanes instead of one:
  - Southbound I-71/I-75 exit ramp to KY 536 (Mt. Zion Road) – An auxiliary lane (5th) will be added from the southbound US 42 entrance ramp. This lane will be dropped within the KY 536 interchange, prior to the bridge over KY 536 (Mt. Zion Road). An additional (6th) lane will be added approximately 1,500 feet north of the ramp in addition to the auxiliary lane. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to continue south on I-71/I-75 or exit to KY 536 (Mt. Zion Road). The total length of this auxiliary lane is approximately 8800 linear feet from where it picks up at US 42 to the end of the taper within the interchange.
  - Northbound I-71/I-75 entrance ramp from KY 536 (Mt. Zion Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside lane will continue as an auxiliary lane to US 42. The total length of this auxiliary lane from the entrance ramp lane drop to US 42 is approximately 5800 linear feet.

It is likely that Weaver Road Bridge over I-71/I-75 will have to be lengthened to accommodate the auxiliary lanes.

It should also be noted that given the anticipated traffic growth of 1.9% per year on mainline I-71/I-75, the level of service on southbound I-71/I-75 is projected to drop to LOS E, an unacceptable level, shortly after the design year (2030).

- I-71/I-75 Interchange at KY 338 (Richwood Road) (see **Exhibit 4**, **Exhibit 17, Exhibit 17A, and Appendix 8**)
  - Convert the existing diamond interchange to a DDI.
  - On KY 338 (Richwood Road), from Frogtown Road Connector to western crossover, provide 3 eastbound lanes (2 through and 1 southbound exit lane) and 3 westbound lanes (2 from the southbound exit ramp and 1 from through traffic) plus 1 left turn lane at Frogtown Road Connector.

- Provide 2 eastbound lanes and 1 westbound lane at the western crossover.
- Provide 4 lanes through the interchange, adding a turn lane from KY 338 (Richwood Road) onto the northbound entrance ramp. This results in 5 lanes under the I-71/I-75 bridge structures. With the construction of the proposed soil-nail wall, it is likely that lengthening of these structures will not be required.
- Provide 1 eastbound lane and 2 westbound lanes at the eastern crossover.
- Provide 6 lanes between the eastern crossover and Best Pal Drive.
- Tie into proposed KY 338/ US 25 intersection improvements east of Best Pal Drive. This construction constitutes approximately 3200 linear feet of construction along KY 338 (Richwood Road) from Paddock Drive to US 25.
- Lengthen the southbound entrance ramp to provide additional passing length on the uphill grade and lengthen the acceleration lane at I-71/I-75.
- Improve the northbound exit ramp by widening the ramp proper to three lanes to provide additional storage capacity on the ramp.

Traffic analysis also indicates the need for two-lane ramps and auxiliary lanes at the KY 338 (Richwood Road) southbound exit and northbound entrance ramps. **Exhibit 18** shows the locations and limits of the recommended auxiliary lanes.

- Widen the following ramp to carry two lanes instead of one lane:
  - Southbound I-71/I-75 exit ramp to KY 338 (Richwood Road) – Develop a two lane southbound exit ramp just south of the bridge over Frogtown Road. The 5th lane (auxiliary lane) will be dropped within the KY 338 interchange, prior to the bridge over KY 338 (Richwood Road). The 6th lane will be added approximately 1,500 feet north of the ramp. The 6th lane will be an exit only lane, while the adjacent (or 5th) lane will be an option lane where vehicles can choose to continue south on I-71/I-75 or exit to KY 338 (Richwood Road). The auxiliary lane length is approximately 5150 feet from just south of Frogtown Road Bridge to where the auxiliary lane is dropped within the interchange.
  - Northbound I-71/I-75 entrance ramp from KY 338 (Richwood Road) – Two lanes will merge with I-71/I-75 northbound. The outside acceleration lane will be dropped approximately 1,500 feet north of the ramp, and the inside (auxiliary) lane will continue to the rest area exit ramp. It is likely that the northbound I-71/I-75 bridge over Frogtown Road will have to be widened to accommodate the auxiliary lane. The auxiliary lane length is approximately 2400 feet from the end of the entrance ramp taper to the rest area exit ramp. Based on the grade of the ramp and the increased speed limit in the area, the large number of heavy trucks that use this entrance ramp require a longer acceleration lane to reach a reasonable merging speed.

Exhibit 15, Page 33, summarizes the number of ramp lanes for the No Build and Build conditions.

The improvement in operation as measured by the change in LOS from the No Build to the Build condition is illustrated in **Exhibits 19** and **20.**

The Build condition improves safety by reducing congestion. Presently, congestion is the leading cause of crashes at these interchanges. This trend will continue given the anticipated growth in traffic for this region.

The DDI design reduces the number of conflict points by reducing the number of crossing conflicts between vehicles turning left onto the I-71/I-75 mainline and opposing traffic at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road). Safety performance generally is better when the number of conflict points is minimized (FHWA-HRT-07-048). Because the number of conflict points will be reduced and those that do exist will be controlled, it is anticipated that the number of angle crashes will be reduced.

The curvature of the roadway that provides the skew angle of the crossovers also serves as a traffic calming feature. Speeds of vehicles at the crossovers will be reduced, thus eliminating some crashes and reducing the severity of those that do occur.

A DDI is also safer for pedestrians, as they have to cross only one direction of traffic at a time.

The present-day estimated cost for the recommended preferred build alternative is approximately $49.7 million. The reconstruction of the I-71/I-75 at KY 536 (Mt. Zion Road) and I-71/I-75 at Richwood Road interchanges is included in the 2005-2010 Kentucky Six-Year Highway Plan (Six-Year Plan). The Six-Year Plan is KYTC's short range component of the statewide transportation plan, published in 2004, which evaluated and prioritized transportation commitments to promote fiscal responsibility when funding transportation projects.

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Existing Conditions

INTERCHANGE JUSTIFICATION STUDY FOR I-71/I-75 AT KY 536 AND KY 338

Interchange Justification Study

71 75 338 536

KENTUCKY TRANSPORTATION CABINET

Item No. 6-14.01
Client: Kentucky Transportation Cabinet

July 2007

Kentucky UNBRIDLED SPIRIT

HNTB

INTERCHANGE JUSTIFICATION STUDY FOR I-71/I-75 AT KY 536 AND KY 338

Boone County, Kentucky

Existing Conditions Report

Kentucky Transportation Cabinet
Item No 6-14.01

Prepared for:

Kentucky Transportation Cabinet
District 6
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July 2007

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1.0 Introduction

1.1 Background

The purpose of this Interchange Justification Study (IJS) is to complete required analyses and provide necessary background information to support a request to modify access to the Interstate interchanges on Interstate 71/Interstate 75 (I-71/I-75) at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) in eastern Boone County, Kentucky. This document is intended to provide a preliminary evaluation of the transportation, environmental and other impacts that would arise from the modification of access at these interchanges. It marks the first step in the process of receiving Federal Highway Administration (FHWA) approval. Should FHWA officials determine that the information contained in the IJS meets their criteria for modifying interchanges, approval will be given for KYTC to undertake additional analyses, which would likely include National Environmental Policy Act (NEPA) procedures and document preparation.

An IJS is required for a new interchange or modification to an existing interchange. One requirement of an IJS is to study the impacts at the interchanges on each side of the one(s) being modified. The study area initiates at the Interchange of US42, north of KY 536. A noteworthy rest area is located along I-71/I-75 between the interchanges of KY 536 and KY 338 and is included within the study area. In addition, a system to system interchange of I-71 and I-75 is located south of the KY 338 interchange. Upon review of the draft study area, FHWA recommended expansion of the study area to KY 14 which is one interchange south of the I-71/I-75 system to system interchange.

1.2 Project History

Within the most recent decade, the study area encompassing the interchanges of of Mt. Zion Road and Richwood Road at I-71/I-75has experience overwhelming development. The resulting increase in employment, education and residential traffic has burdened the existing transportation system including I-71/I-75, Mt. Zion Road and Richwood Road in this area. These major transportation arteries have also been taxes by the general growth along one of our nations largest commercial routes namely Interstate 75.

This unprecedented growth has resulted in increased traffic congestion and comparatively high accident rates . Once considered a largely agricultural area, this community continues to transition into thriving commercial, industrial, educational, and residential areas. Based upon land use projections, by 2030, the study area will lose nearly all of its agricultural land while residential and industrial uses will approximately double.

These changes along with an overall demand on the interstate system will result in increases to both safety concerns and traffic congestion. As a result, KYTC commissioned an IJS to identify transportation related problems and needs at the interchanges and within the corridor, develop potential improvement options, and ultimately select feasible alternatives for improving access within the corridor.

1.3 Project Purpose

The purpose of this project is to improve safety and reduce congestion within the vicinity of the Mt. Zion Road and Richwood Road interchanges in Boone County, Kentucky, while maintaining the mobility of the I-71/75 corridor. Selected alternatives shall balance the operational efficiency, safety, environmental impacts, constructability, and the availability of resources on state maintained facilities.

Improvements shall maintain or enhance the viability of Interstate 71/75 as a major transportation corridor while appreciably improving the functionality and safety of the interchanges at Mt. Zion Road and Richwood Road. Alternative solutions shall maintain consistency with current KYTC standards. Probable construction sequencing shall maintain traffic flow on Interstate 71/75 and provide appropriate access along the state routes.

Enhanced connections shall maintain consistency with the comprehensive plans for Boone and Kenton Counties and scheduled projects listed in the KYTC Six-Year Highway Plan. In addition, the preferred design alternative should be consistent with other modal connections established for the area.

Improvements shall be prioritized and evaluated in consideration of potential funding strategies balanced with the effectiveness of the selected operational efficiency and safety improvements to the transportation network.

1.4 Purpose of Report

The purpose of this report is to document the current condition of the I-71/75 interchanges at KY 536 and KY 338 and provide an overview of the transportation problems to be addressed as part of this study. Documentation of the existing condition includes a summary of the land use, socioeconomic data, traffic control data, infrastructure condition, traffic congestion and crash characteristics. Geotechnical and environmental overviews are also included. The data collected and analysis conducted are summarized along with a description of the study area and justification for its selection.

1.5 Study Area

The project study area, as shown in **Figure 1**, is located in the eastern portion of Boone County, Kentucky, south of the City of Florence, east/southeast of the City of Union, and north of the City of Walton. The metropolitan City of Cincinnati, Ohio, is located approximately 15 miles northeast of the study area.

The study area begins at the KY 14/I-75 interchange (Verona Mudlick Road) and extends approximately nine miles north to approximately one-quarter mile north of United States (US) Route 42. The interstate within the study area is four lanes in each direction and contains a rest area on each side of the interstate, located approximately one and one-half miles north of the Richwood Road interchange. The Mt. Zion Road and Richwood Road interchanges are approximately 2.5 miles apart and both provide rest/wash/fueling facilities and attract large volumes of truck traffic from I-71/75 to the interchange areas.

The study area extends approximately three-quarter miles west of the Mt. Zion Road interchange to a four-way intersection at Gunpowder Road and approximately three-quarter miles east to the signalized Sam Neace Drive intersection. The study area also extends approximately one-half mile west of the Richwood Road interchange to a two-way intersection at Triple Crown Boulevard and approximately one-quarter mile east to the signalized Dixie Highway intersection. The eastbound approach to the intersection of Richwood Road and Dixie Highway is on an upward slope and traffic at the intersection is affected by the nearby railroad crossing to the east of the intersection.

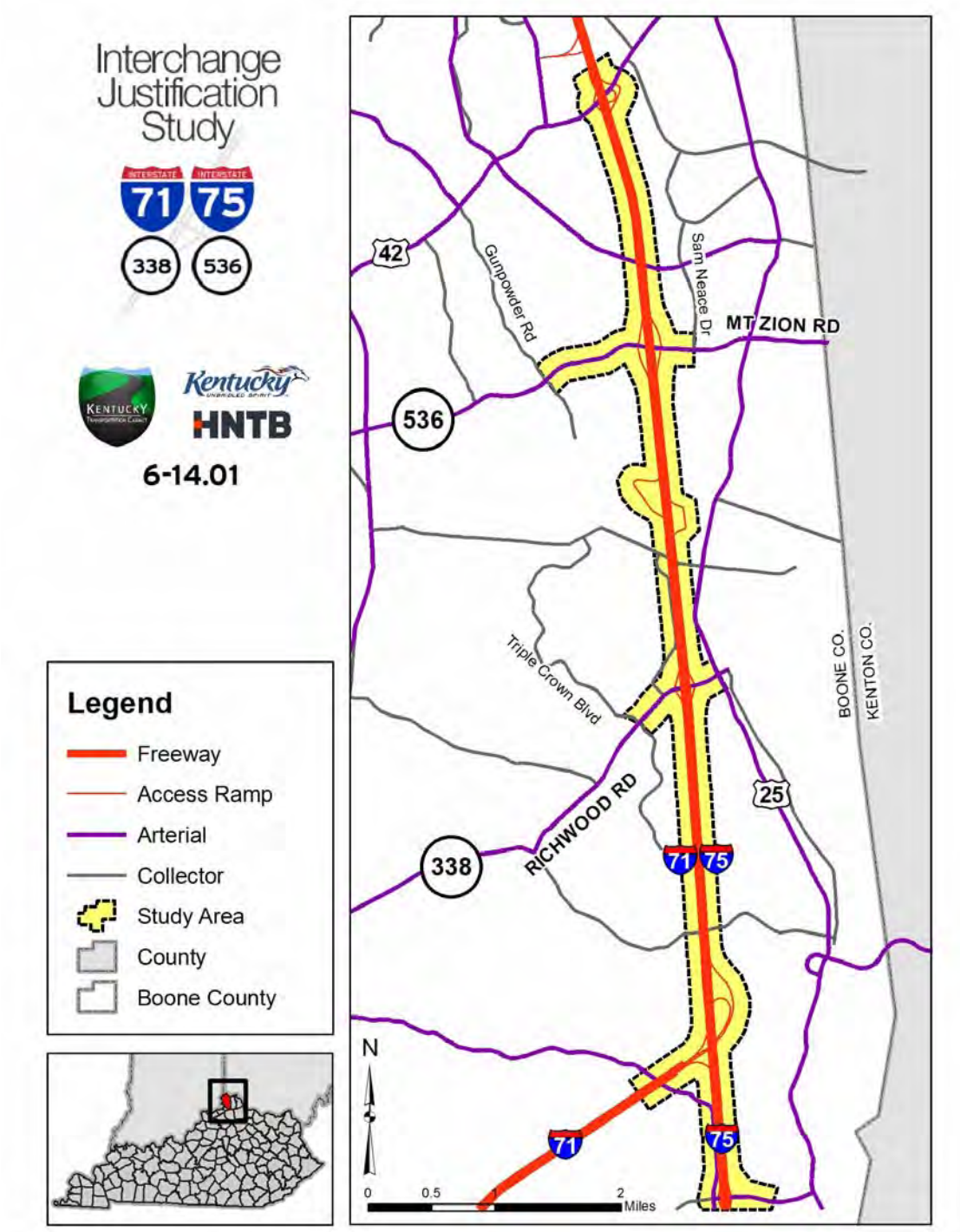


Figure 1: Project Study Area

2.0 Review of Related Studies and Current Projects

Several documents, including county, state and regional planning and transportation planning studies have been developed to address transportation improvements in the study area. Before proceeding with this Interchange Justification Study (IJS), a clear understanding of these documents is necessary to determine the range of issues and possible solutions that have been previously identified or studied.

Planning studies conducted by the KYTC, the Ohio Kentucky Indiana Regional Council of Governments (OKI), Northern Kentucky Area Planning Commission (NKAPC), Kenton County and Boone County were reviewed as part of this study. Below is a brief discussion of the planning studies and how they address transportation improvements within the study area.

In 2004, the KYTC published the *2005-2010 Kentucky Six-Year Highway Plan* (*Six-Year Plan*), which is the short range component of the statewide transportation plan. It evaluated and prioritized transportation commitments to promote fiscal responsibility when funding transportation projects. The *Six-Year Plan* concentrates on projects relating to pavement repairs, safety improvements and the reduction of traffic congestion problems in urban and metropolitan areas. It contains sixteen projects in Boone County, including the reconstruction of the I-75/KY 536 (Mt. Zion Road) and I-75/KY 338 (Richwood Road) interchanges.

In December 2006, KYTC completed *I-75 & KY 14 Interchange Study and Simulation Model* to address traffic operations and safety issues at the I-75/KY 14 interchange. Six alternatives and variations to the alternatives were identified and evaluated. The study provides short-term, low cost and long-term recommendations in order to reduce vehicle emissions/improve air quality, improve safety, improve traffic operations, reduce queue lengths and provide for the high truck volumes though the interchange. The project team agreed upon the short-term improvement of adding a northbound turn lane on KY 14 at the KY 14/KY 1292/KY 2954 intersection and possible addition of a signal actuator on the I-75 southbound ramp, including the re-phasing and re-timing of the intersection traffic signals. The project team also agreed upon a long-term solution of aligning the KY 14 that runs east and west with the KY 14 that runs to the south and then realign KY 1292 to intersect with KY 14; KY 2954 would intersect KY 1292; the southbound on and off ramps would be reconstructed and shifted to the east.

OKI's *2030 Regional Transportation Plan*, updated in 2004, amended in April 2005, February 2006, and October 2006, addresses transportation problems created by growth and development. The plan recommends implementing projects, including improving KY 536 at the I-71/75 interchange.

OKI is currently conducting a basic traffic operation study on US 42 from Gunpowder Road (KY 237) to Industrial Road (KY 1829). The purpose if this study is to address concerns about traffic conditions on this roadway and to propose short-term operational improvements. Completion is slated for late 2007.

NKAPC completed the *South Banklick Small Area Study* in September 2006 with the intention of implementing the recommendations of the *2001 Area Wide Comprehensive Plan* and to strike a balance between existing residential land uses and potential future land uses, including industrial type uses. The South Banklick study area is located immediately east of the I-71/75 at KY 536 & KY 338 IJS study area, across the Boone County line in Kenton County. According to the study, south Kenton County and adjoining areas in Boone County will continue to transform from rural to more urban uses and the existing transportation systems cannot handle anticipated traffic from future developments. Additionally, the study stresses that growth and development within the area will impact and be impacted by land use and transportation decisions beyond the study area boundaries, including adjacent areas within Boone County.

On December 13, 2006, NKAPC and Kenton County Planning Commission adopted the *Comprehensive Plan Update 2006-2026: An Area-wide Vision for Kenton County*, which updated the 2001 area-wide comprehensive plan. It summarizes recent studies and activities that have enabled Kenton County to identify key areas of traffic conditions improvements. The plan identifies several causes of congestion in the area including vehicle volume which exceeds roadway capacity, minimal traffic signal spacing, frequent access points and roadway incidents such as construction or vehicular accidents. It stresses the importance of developing the Kenton County transportation system as part of a regional network.

The *2005 Boone County Comprehensive Plan: A Blueprint for the Year 2030* was adopted by the Boone County Planning Commission in October 2005. The study indicates that Boone County, like many other growing suburban areas, has experienced acute and chronic traffic congestion on interstate highways and primary arterial roadways.

The *Boone County Transportation Plan 2030* Study (November 30, 2005), updated the original 1996 transportation plan. It develops a county-wide plan to address key transportation issues and identified long-range transportation improvement goals to improve mobility within the county as well as complimenting the *2005 Boone County Comprehensive Plan* discussed above. The *Boone County Transportation Plan 2030* identifies Boone County's interstate system as one of the busiest in all of Kentucky and stresses that actions must be taken to improve operations and reduce congestion at interchanges with I-71/75. The study identifies locations that are experiencing traffic safety and/or congestion problems.

The *Boone County Transportation Plan 2030* summarizes the following recommended projects within the study area. These projects are also listed in the OKI's Unscheduled Project List (UPL). The projected schedule of projects is depicted in **Figure 2**.

KY 338: This project proposes to widen KY 338 to five lanes from west of Triple Crown Boulevard to Dixie Highway. Item 6-18.00 in the *Six-Year Highway Plan* will enable this widening through I-71/75 with a reconstruction of the interchange. The Richwood Road widening will improve mobility for drivers traveling between south central Boone County, I-71/75, and the industrial areas to the east.

I-71/75-US 42 Interchange (KY Project Identification number 6-203.00): Average daily traffic (ADT) on US 42 near I-71/75 is approaching 40,000 vehicles per day. Heavy vehicles comprise a large portion of that traffic as they travel between the interstate and KY 1829 Industrial Road. This project will construct an additional westbound lane on US 42 from KY 1829 (Industrial Road) to I-71/75 northbound ramp.

Frogtown Connector Extension – North (6-008-C9999-4): This new road, on the north side of the present Frogtown Connector Road, would extend from Frogtown Road to Mt. Zion Road. It would complete a north-south local connection parallel to and west of I-71/75, from Mt. Zion Road at the north end to Beaver Road at the south end. The recommendation is to construct a four-lane road; alignment and right-of-way issues at the northern end may confine this section to two lanes.

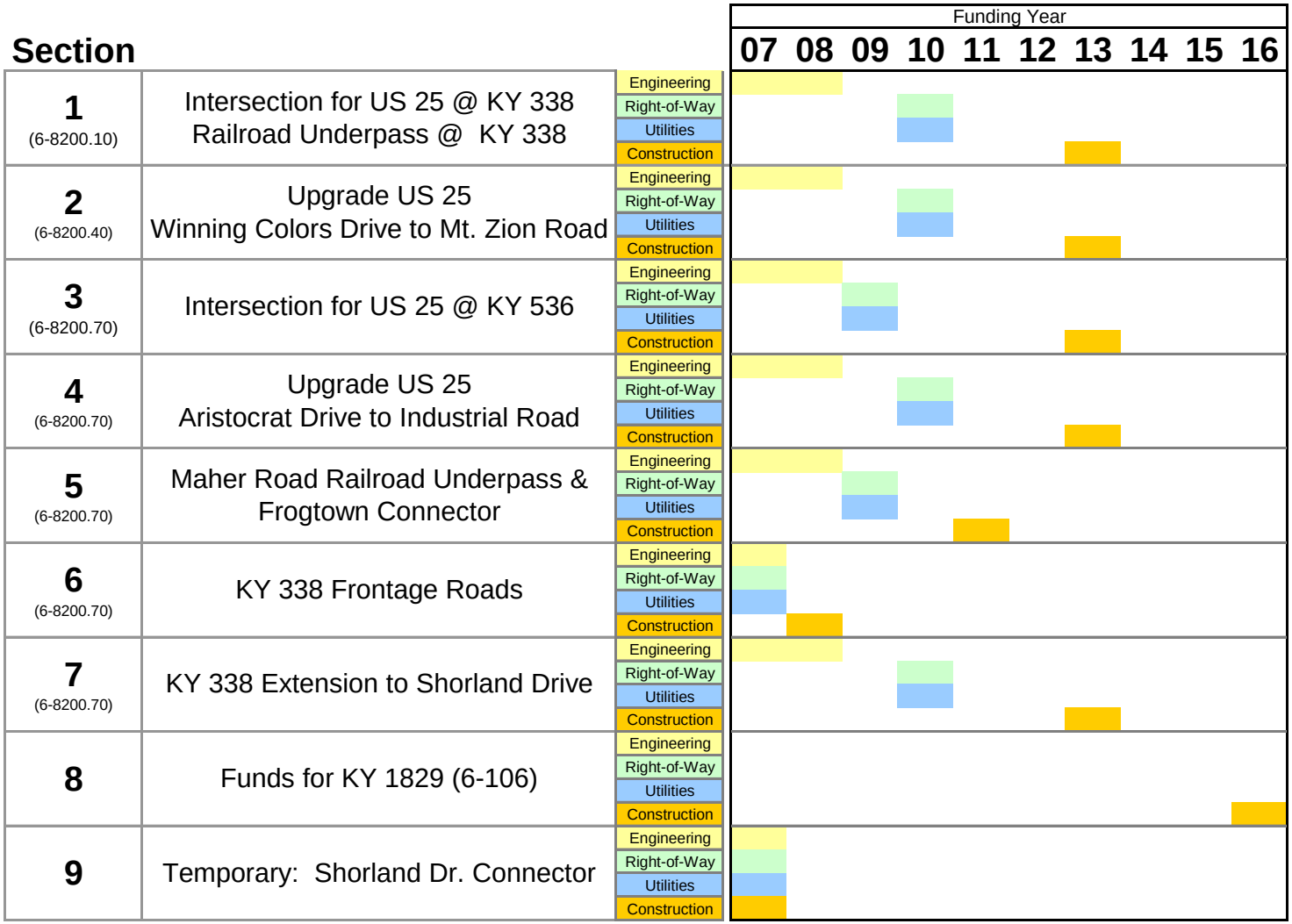
KY 3060 Frogtown Road (6-008-D3060-2.00): This project improves connectivity and east-west mobility from US 42 to US 25 Dixie Highway. There is increased residential development in this corridor. The recommendation is to widen Frogtown Road from two to four lanes.

US 25 Dixie Highway (6-008-B0025-24.00): Current efforts are underway to widen Dixie Highway to five lanes, from Industrial Road to Richwood Road (6-351). This project is in the current *Six-Year Plan*, referenced above. Traffic projections for the section to the south, from Richwood Road to the

City of Walton, reflect increased industrial development in the area as called for in the *2005 Boone County Comprehensive Plan*. The recommendation is to widen Dixie Highway to four lanes all the way to the City of Walton in order to achieve a satisfactory level of service. Year 2030 traffic projections for the segment immediately south of Richwood Road range from 55,000 to 65,000 vehicles per day, which could result in peak hour congestion even as a four-lane facility. However, Boone County intends to make privately-funded improvements to Old Lexington Road in this vicinity which would provide a local parallel alternative to Dixie Highway and would relieve some of the traffic burden. This would eliminate a need for six lanes on Dixie Highway, at least within the time frame of the current *Boone County Transportation Plan 2030*.

Maher Road-Frogtown Road Connector (6-351): The current US 25 widening project, from Industrial Road to Richwood Road, involves lowering the grade on Dixie Highway between Maher Road and Frogtown Road. This project is part of the US 25 widening. The project involves constructing a connector road from Maher Road to Frogtown Road, east of the Norfolk Southern Railroad, and constructing an east-west stub from the connector to Dixie Highway. This will allow for the elimination of at-grade rail crossings at Maher Road and Frogtown Road.

Figure 2: Recommended Projects Schedule



3.0 Land Use & Socioeconomics

Boone County is approximately 256 square miles in size and is part of the greater Cincinnati metropolitan area. It is bordered by Grant County to the south, Kenton County to the east, Hamilton County, Ohio to the north and Dearborn County, Indiana to the west. According to the US Census Bureau, from 2000 to 2005, the population increased by over 20,000 people, approximately a 24% increase. In 2007, the US Census Bureau ranked Boone County number 71 among the top 100 fastest growing counties in the US. The 2030 Boone County Comprehensive plan predicts population to increase by 121%, from 85,448 to 188,652 people, from 2000 to 2030.

Land use in the vicinity of the study area is a mix of commercial, industrial, rural/urban/suburban residential, and agricultural development. Employment is predicted to increase by 66% from 2000 to 2030. It is anticipated that additional industrial/business development will be largely located along Dixie Highway, which lies immediately east of the study area. This development will impact the function of the Mt. Zion Road and Richwood Road interchanges.

Further, along the southern portion of the study area, the City of Walton is attracting residential, commercial and industrial growth, putting additional pressure on the Richwood Road interchange area. The City of Union, due west of the study area, has been experiencing residential and commercial growth at the Mt. Zion Road interchange area for the past ten (10) years.

4.0 Environmental Justice

Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and* Low-*Income Populations, February 11, 1998*) requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of their programs, policies and activities on minority and low-income populations within the United States.

For I-71/75, OKI identified environmental justice groups based upon the agency's Environmental Justice Policy (OKI 2003). As such, environmental justice groups were expanded to include the elderly population, individuals with disabilities, and zero-car households.

OKI identified these environmental justice groups based upon 2000 census data for each Traffic Analysis Zone (TAZ). A TAZ is a geographic unit used by OKI for modeling the performance and assessing the needs of the region's transportation system. Environmental justice groups are based upon the percent of persons/households of each group within the TAZ that exceed OKI's regional average. OKI's region includes Dearborn County, Indiana, Butler, Clermont, Hamilton and Warren Counties, Ohio, and Boone, Campbell and Kenton Counties, Kentucky. Based on the 2000 census data, the regional average of each group is listed in **Table 1**. The TAZs for the socioeconomic population within the project study area for the census year 2000 is included in **Appendix 1**.

Table 1: Regional Average for each Environmental Justice Group

Group	Percent
Minority	15.9
Low Income	9.4
Zero Car	9.8
Elderly	15.4
Disabled	17.4

The definition of each environmental justice group, as recognized by OKI, is based upon the following:

- Minority – persons from every racial category, except white alone, plus all Hispanic persons
- Low Income – persons below the poverty level. In 2000, the poverty threshold for a family of four was $18,000/year
- Zero Car – housing units for which there is no car
- Elderly – individuals age 60 and older
- Disabled – non-institutionalized persons older than 5 years old with any disability that makes it difficult to go outside of the home alone or take care of personal needs

4.1 Minority

Within the study area, minority populations are not higher than the regional average. East of the study area, one traffic analysis zone (1498) has a minority population higher then the regional average. TAZ 1498 is located between KY 3503 and US 25 (see Environmental Overview, *HNTB in preparation*). Based upon the 2000 census data, this target zone has 154 individuals, 25 of whom (16%) identify themselves as a minority ethnic group.

4.2 Low Income and Zero Car Households

Within the study area, there are five traffic analysis zones where the percentage of low income populations is higher than the regional average of 9.4 percent. These zones occur in two general areas. The first area contains zones 1490, 1499, 1497, 1498, 1499, 1501, and 1503. This area is north of Mt. Zion Road and has a total of 9,168 people, 1,293 of whom (14%) are classified as low

income, based upon Census 2000 criterion. These zones also contain the areas where the percentage of zero car households is above the regional average of 9.8 percent.

TAZ 1531 also has a low income population higher than the regional average. This zone is located along the southern edge of the study area, south of KY 1292 and east of I-71. The zone contains 733 individuals, 104 of whom (14%) are classified as low income.

4.3 Elderly

Within the study area, there are four traffic analysis zones (1490, 1499, 1501, and 1503) where the percentage of elderly populations is higher than the regional average of 15.4 percent. As with the low income and zero car households, these occur north of Mt. Zion Road. These zones contain a total of 2,386 people, 490 of whom (20%) are older than 60 years of age.

4.4 Disability

Except for one target analysis zone between KY 842 and Mt. Zion Road, the traffic analysis zones east I-71/75 have disabled populations higher than the regional average. These zones (1490, 1499, 1501, 1535, 1538, and 1544) have a total population of 6,033 and 1,431 individuals (24%) classify themselves as disabled.

4.5 Environmental Justice Conclusions

Based upon the above analysis, no disproportionate impacts on environmental justice groups are anticipated at this time. Following completion of the IJS, the recommended design alternative will be evaluated in accordance with state and federal regulations, including NEPA during the final design of the interchange. The evaluation will identify specific impacts, if any, to environmental justice group.

5.0 Existing Infrastructure

KYTC provided existing as-built plans for the roadways and bridges within and immediately adjacent to the study area. The plans include roadway and bridge designs on the interstate mainlines for I-71 and I-75, Mt. Zion Road, Richwood Road proper, the entrance and exit ramps to Mt. Zion and Richwood Roads, and the connectors from Richwood Road and Dixie Highway.

The plans contain information on the reconstruction, lane additions and pavement widening, mill and overlay resurfacing projects and slide corrections. In addition to the as-built plans, KYTC provided plan information on area developments, including the proposed development along Dixie Highway, just east of the study area. The majority of the roadway plans date back to 1988 and continue to the present, while many of the bridge plans date back to the early 1960s, especially for the I-71/75 mainline, KY 536 (6-158.00) and KY 338 (6-207.00). The plans provide detailed information on the elements associated with the respective design criteria for roadway and bridges, including items such as number and use of lanes, lane width, shoulder width, vertical and horizontal clearances, superelevation and bridge loadings.

Further, KYTC provided the bridge inspection reports for the bridges within and adjacent to the study area. The latest bridge inspections were primarily performed during July 2005. Most of the interstate bridges were constructed in the early 1960s, except for those over Mt. Zion Road and Richwood Road, which were constructed in 1992 and 1993, respectively. Items on the bridge inspection reports fall into three generalized categories: structural, inventory, and appraisal. Examples of the structural and inventory items include Average Daily Traffic (ADT), design load, year built, bridge width, bridge length wearing surface and deck type. The appraisal items are subdivided into generalized categories including deck, superstructure, paint condition, substructure, channel, culvert/retaining wall and minimum vertical clearance. Typically, most items rated on recent bridge reports have conditions ratings between 6 and 7 on a scale of 1 to 10, with 10 being conditions consistent with a new bridge.

The existing plans for both roadway and bridges, in addition to the bridge inspection reports, will be used to enhance the knowledge of the existing infrastructure. The plans and reports provide critical information on dimensions and condition, especially for those items underground which cannot be easily measured.

6.0 Transportation Characteristics

6.1 Transit Operations

The Transit Authority of Northern Kentucky (TANK) provides transit services for Boone, Campbell and Kenton Counties in Northern Kentucky, as well as downtown Cincinnati, Ohio (TANK 2006). According to TANK's Transit Network Study (2006), the I-71/75 corridor has the greatest potential to create an exclusive transit way in northern Kentucky because of the high level of express services (nine routes) already operating in the corridor.

Within the study area, Route 22X (Walton Express) provides express service between Walton, Kentucky north to downtown Cincinnati, Ohio. Route 22X is a peak service route with three inbound routes running during the morning peak traffic hours and three outbound routes running during the afternoon peak traffic hours. Route 22X from the Walton Baptist Church Park-and-Ride lot continues along Dixie Highway, stopping at the Mt. Zion Road Park-and-Ride lot located east of the I-71/75 and Mt. Zion Road interchange. From there, Route 22X continues via the interstate to the downtown Cincinnati transit hub (TANK 2006a).

In 2004, ridership for Route 22X was 19,774, comprising less than 1% of TANK's total ridership (TANK 2006a). However, due to the heavy congestion resulting from heavy employment and residential growth, TANK included a transit hub in Florence, Kentucky, just north of the study area. Once complete, Route 22X will likely service the Florence hub. TANK also has plans to investigate the utilization of Route 22X for reverse-commute service from the urbanized area into Gateway College and industrial employers in the vicinity of Mt. Zion Road along Dixie Highway (TANK Transit Network Study 2006a).

6.2 Railroads

A Norfolk Southern rail line, running north and south, lies immediately east of the study area, along Dixie Highway. Crossing and/or bridging the railroad line presents concerns due to the topography. At this time, no expansion is intended by the railroad.

6.3 Traffic Volume & Vehicle Classification Information

Traffic volumes are growing rapidly in the study area. Currently, I-71/75 carries between 60,000 and 80,000 vehicles per day (vpd) while Mt Zion Road carries over 20,000 vpd and Richwood Road carries about 15,000 vpd. Exacerbating the traffic volume conditions is the heavy truck traffic which further slows the flow of traffic and accounts for many of the accidents within the area.

6.4 Levels of Service

The Levels of Services (LOS) for the Mt. Zion Road and Richwood Road interchanges, as well as the intersections located to the east and west of each interchange, including Biltmore Street, Sam Neace Drive, and Gunpowder Road are discussed below. Dixie Highway and Triple Crown Boulevard/Grand National Boulevard are the intersections located to the east and west of the Richwood Road interchange, respectively (**Appendix 2**). Existing signal timing, provided by KYTC, was used to determine the levels of service.

Methodology

Level of Service (LOS) is a quality measure describing operational conditions within a traffic stream in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Levels of service range from A (best) to F (worst). For interrupted flow conditions, such as at signalized intersections, LOS is defined in terms of total delay, which is a measure of driver discomfort, frustration, fuel consumption, increased travel time

due to geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the travel time that would result in the absence of geometric delay, traffic control, other vehicles and incidents. LOS A indicates that delay is minimal, progression is extremely favorable, and most vehicles arrive during the green light phase. For signalized intersections, LOS F generally indicates poor progression, long cycle lengths, individual cycle failures and high delays.

For free-flow conditions such as the I-71/75 mainline, LOS is defined in terms of density, which is a measure of the number of vehicles on a roadway segment averaged over space. Density is usually expressed as vehicles per mile (vpm) or vehicles per mile per lane (vpmpl). LOS A indicates that free-flow speeds prevail, maneuverability is optimal, and the effects of incidents are easily absorbed. LOS F is characterized by breakdowns in vehicular flow, slow speeds, heavy congestion, and the inability to recover from incidents. The desired LOS for this project is LOS C, which is defined as stable flow conditions by the 2000 Highway Capacity Manual. At LOS C, most drivers are comfortable, roads remain safely below but efficiently close to capacity, and posted speed is maintained. That being said, in urban areas it is generally acceptable to design to LOS D. In this case, KYTC has decided to accept LOS D if it is determined that obtaining LOS C will have significant impact(s) (i.e. environmental, cost, right of way).

A second factor to consider when defining traffic flow is the volume to capacity (v/c) ratio. The v/c ratio is a measure of the demand of traffic desiring to use the roadway compared to the ultimate capacity of the roadway. When the v/c ratio reaches or exceeds a value of 1.0, the roadway is at or exceeding capacity, respectively. For interrupted flow conditions, at signalized intersections where a “red” light can stop or interrupt the flow of traffic, both the level of service and the v/c ratio must be considered separately. There is no correlation between level of service and the v/c ratio for interrupted flow. It is very possible under interrupted flow conditions to have a level of service with a value of LOS D or LOS E and have a v/c ratio that exceeds 1.0 and is overcapacity.

Conversely, for free flow conditions, such as those for the I-71/75 mainline, there is correlation between level of service and the v/c ratio. For free flow conditions, the v/c ratio will only equal or exceed 1.0 when the level of service reaches LOS F. As a result of this correlation, generally only the level of service is considered for free flow conditions.

A series of capacity and signal timing analyses were performed to determine the existing (2006) traffic operational characteristics along Mt. Zion Road and Richwood Road in the vicinity of I-71/75. Synchro 7, a software package for modeling and optimizing traffic signal timings, was utilized to analyze levels of service at signalized intersections. To analyze levels of service at unsignalized intersections, the computerized version of the *Highway Capacity Manual 2000*, Highway Capacity Software (HCS), was utilized. HCS predicts capacity, density, speed, delay and queuing.

Existing (2006) Conditions

Mt. Zion Road Vicinity

Morning congestion along Mt. Zion Road increases as the local traffic approaches the interchange with I-71/I-75. The predominant flow of traffic consists of eastbound and northbound travel, resulting in an existing LOS B for the northbound ramp from Mt. Zion Road to I-71/I-75. The eastbound traffic flow leads to high congestion along Mt. Zion Road on the western side of the I-71/I-75 interchange. The southbound I-71/I-75 ramp and Mt. Zion Road intersection is LOS E and the next signalized intersection to the west, Mt. Zion Road and Gunpowder Road, is LOS C. The two (2) intersections to the east of the I-71/I-75 interchange, Mt. Zion Road and Biltmore Street intersection and Mt. Zion Road and Sam Neace Road/Demia Way intersection, both are LOS C.

In the evening, congestion along Mt. Zion Road is again greatest to the west of the I-71/I-75 interchange. As in the morning, congestion increases as local traffic approaches and passes through the I-71/I-75 interchange. Traffic primarily comes from the north. These conditions result in a LOS E for the southbound I-71/I-75 to Mt. Zion Road ramp, as well as a LOS B for the Mt. Zion Road and Gunpowder Road intersection, located just west of the I-71/I-75 interchange. The northbound I-71/I-75 ramp is LOS B during the evening peak hour. To the east, the Biltmore Street and Mt. Zion Road intersection are LOS C and the Sam Neace Road/Demia Way and Mt. Zion Road intersection is LOS B.

Richwood Road Vicinity

In the morning, traffic in the Richwood Road vicinity flows predominately eastbound and northbound. These conditions result in a LOS B at the northbound I-71/I-75 ramp and Richwood Road intersection. The high volume of eastbound traffic from Triple Crown Boulevard to Richwood Road results in a LOS F for the northern approach of the Triple Crown Boulevard/Grand National Boulevard intersection with Richwood Road. The southern approach has a LOS B. Because the north and south approaches are currently stop sign controlled, as the Richwood Road traffic increases, there are less gaps for the southbound left turns and the LOS drops. The Dixie Highway intersection at Richwood Road is LOS C due to a high volume of left turns from Richwood Road to Dixie Highway. The southbound ramp from I-71/I-75 to Richwood Road is LOS C.

During the evening peak hour, a high volume of traffic from southbound I-71/I-75 to Richwood Road results in a LOS D at the intersection of the ramp and roadway. Again, the high volume of eastbound traffic at the Triple Crown Boulevard/Grand National Boulevard intersection with Richwood Road results in congestion, and is a LOS E on the northern approach of the intersection. The southern approach is LOS B. The ramp from Richwood Road to northbound I-71/I-75 is LOS C. Because the north and south approaches are currently stop sign controlled, as the Richwood Road traffic increases, there are less gaps for the southbound left turns and the LOS drops. As in the morning, the high volume of left turns from Richwood Road to Dixie Highway results in congestion. The intersection is LOS C.

Average Daily Traffic

In general, the Existing (2006) Average Daily Traffic (ADT) on Mt. Zion Road varies from approximately 13,000 vehicles per day (vpd) immediately west of the I-71/75 interchange to approximately 22,000 vpd immediately east of the I-71/75 interchange. Similarly, the ADT on Richwood Road is approximately 5,600 vpd immediately west of the I-71/75 interchange to approximately 3,900 vpd immediately east of the I-71/75 interchange. The ADT for I-71/75 varies from approximately 60,000 vpd south of the Richwood Road interchange to approximately 80,000 ADT immediately north of the Mt. Zion Road interchange.

Level of Service

Figures indicating the existing lane use and traffic control as well as the AM and PM peak hour and levels of service are included in **Appendix** 2. The LOS figures provided in **Appendix 2** are based

on current traffic. As the figures illustrate, the arterials are primarily at LOS D or lower, indicating delay is becoming substantial and the roadways are reaching, or have already reached, the criteria for which they were originally designed.

Volume to Capacity

Table 2 summarizes the highest volume to capacity (v/c) ratio by movement for each of the signalized intersections for the existing condition. Currently, four (4) movements have a v/c ratio over 0.90 and one (1) movement has a v/c ratio over 1.0.

Table 2: Highest Existing (2006) v/c ratios

Intersection	Existing v/c Ratio*	
	AM	PM
Mt. Zion Road & Biltmore Street	0.76 NBT	0.95 WBT
Mt. Zion Road & Northbound Ramp	0.74 NBR	0.78 WBT
Mt. Zion Road & Southbound Ramp	0.91 SBL	1.66 WBL
Mt. Zion Road & Sam Neace Drive	0.93 WBT	0.75 WBT
Richwood Drive & Dixie Highway	0.54 EBL	0.67 EBT
Richwood Drive & Northbound Ramp	0.65 WBR	0.83 NBL
Richwood Drive & Southbound Ramp	0.94 SBL	0.98 SBR
Richwood Drive & Frogtown Connector	0.81 SET	0.82 SWT

*NBT-northbound thru; WBT-westbound thru; NBR-northbound right; WBT-westbound thru; SBL-southbound left; WBL-westbound left; EBL-eastbound left; EBT-eastbound thru; WBR-westbound right; NBL-northbound left; SBR-southbound right; southeast thru; SWT-southwest thru

6.5 Crash Data

Crash rates were calculated for the roadways within the study area for the three year period from 2004 to 2006. Crash data information obtained from the Collision Report Analysis for Safer Highways (CRASH)) database were used to calculate the crash rates for sections of I-71/I-75, KY 338, and KY 536. The crash rates were compared to the critical crash rates for the similar roadways within the state and the ratio of the two values was determined to obtain the Critical Rate Factor (CRF). Crash rates that exceed the statewide critical rate are considered to be high crash segments.

I-71/I-75

I-71/I-75 has two functional classification segments according to the KYTC HIS database. The highway segment from the Kenton County line to the KY 2951 overpass is classified as a rural interstate highway, while the segment north of KY 2951 is classified as an urban interstate. The average crash rate for a typical rural freeway segment in Kentucky is 52 crashes per 100 million vehicle miles (MVM) and the average crash rate for a typical urban freeway segment is 91 crashes per 100 MVM. Statewide average crash rates were found in the *Analysis of Traffic Crash Data in Kentucky (2001-2005)*, prepared by the Kentucky Transportation Center. **Table 3a** summarizes the crash rates for the interstate.

Table 3a: Average Crash Rate for I-71/I-75

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate	Critical Rate Factor
I-71/75 Rural	52	84	75.5	1.12
I-71/75 Urban	91	75	106.7	0.70

MVM – Crashes per 100 million vehicle miles

The section of the roadway classified as rural, essentially from KY 14 to the I-71 overpass, has a critical rate factor that exceeds one and is, therefore, an area considered to have a high crash rate. Overall, 66% of the crashes on I-71/I-75 in the study area occur during the day and 76% during dry conditions. **Figure 3a** depicts the types of crashes for I-71/75 within the study area,.

As shown in **Figure 3a**, the leading type (30.7%) of crashes for the section of I-71/75 within the study area was fixed object crashes, followed by a nearly equal percentage of rear-end (28.1%) and same side, sideswipe (24.7%) crashes. Again, most of these crashes were property damage only crashes, followed by injury crashes. There were 6 fatal crashes within the study period.

KY 536 and KY 338

Both KY 538 and KY 336 are classified as two lane urban highways and the statewide average crash rate for that type of facility is 256 crashes per 100 MVM. **Table 3b** summarizes the crash rates for the both KY 538 and KY 336.

Table 3b: Average Crash Rate for KY 538 & KY 336

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate	Critical Rate Factor
KY 338	256	2892	566.3	5.11
KY 536	256	780	379.6	2.06

MVM – Crashes per 100 million vehicle miles

The CRF for both KY 536 and KY 338 exceed one and are considered areas with a high crash rates. **Figures 3b** and **3c** shows that the majority of crashes for Mt. Zion Road (59%) and Richwood Road (37%), respectively, were rear-end crashes with angle crashes (23% for Mt. Zion Road and 26% for Richwood Road) being the next most frequent type of crash. Most of these crashes were property damage only crashes, followed by injury crashes. No fatality crashes were reported on Mt. Zion Road and Richwood Road in the study area from 2004-2006.

Overall, 81% of the crashes on KY 536 in the study area occur during the day and 76% during dry conditions. For KY 338, the percentages were 82% during the day and 79% during dry conditions.

Figure 3a: Types of Crashes along I-71/I-75

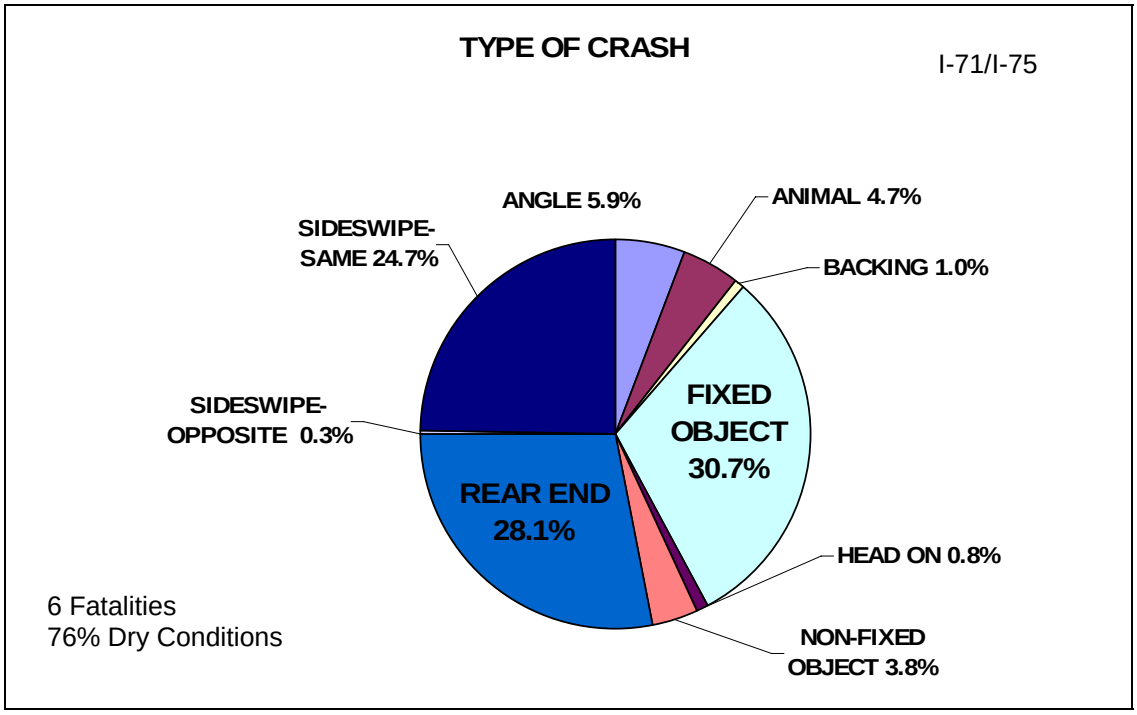


Figure 3b: Types of Crashes at Mt. Zion Road

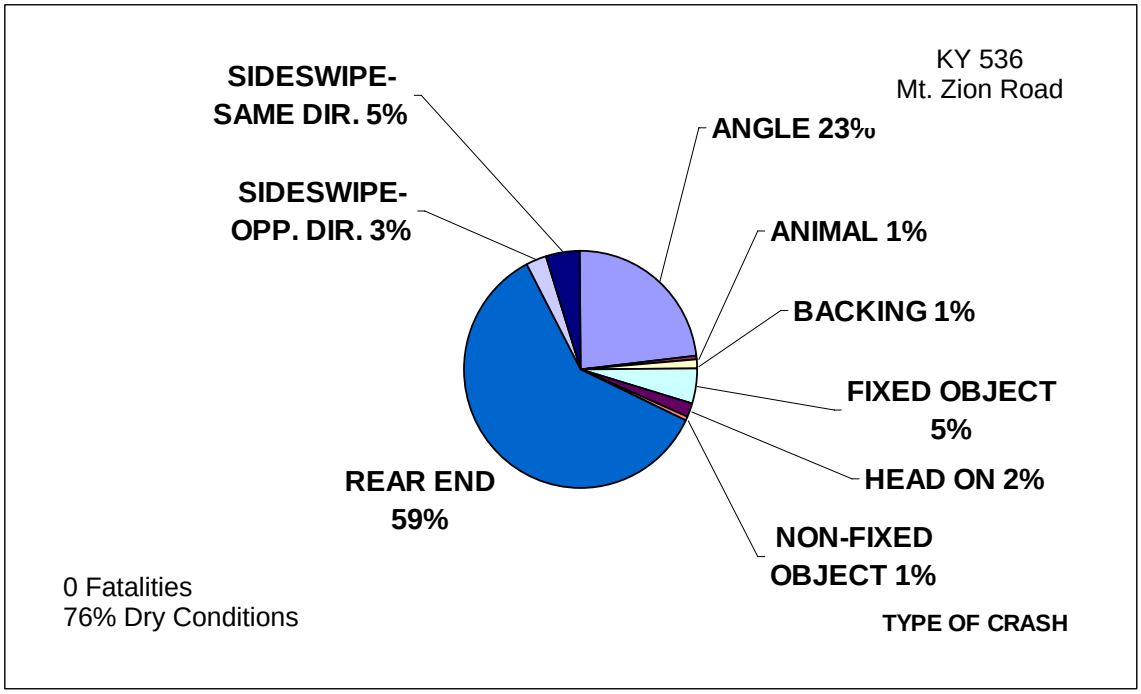
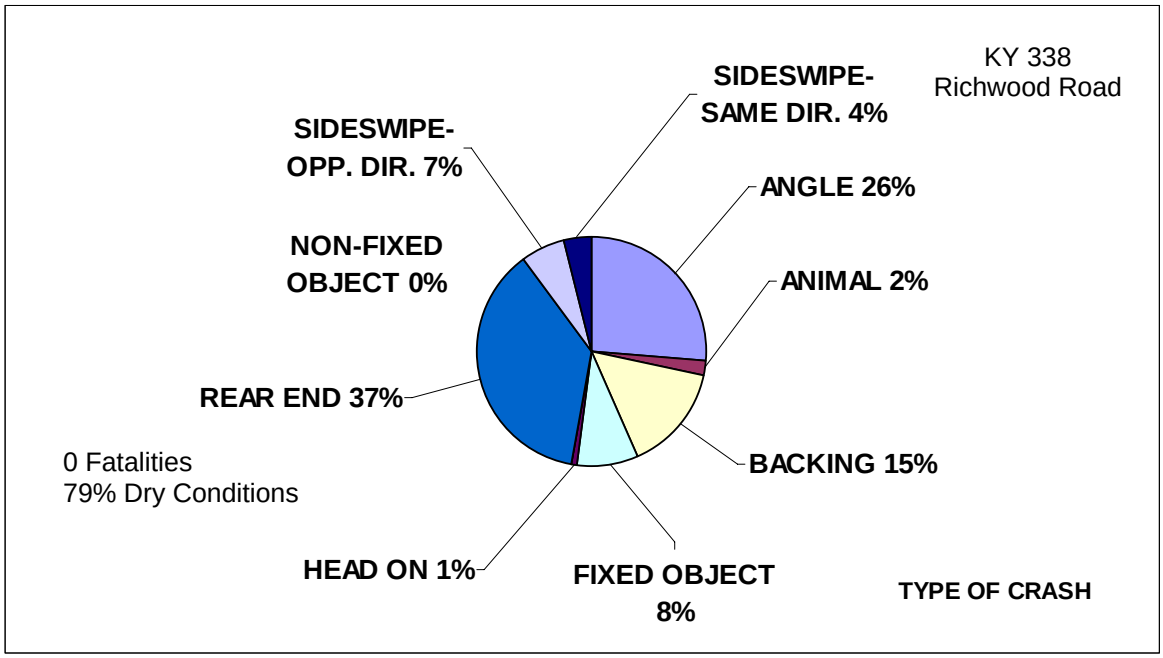


Figure 3c: Types of Crashes at Richwood Road



7.0 Utility Location

Representatives of the utility companies and local government entities with utilities potentially located in the study area were contacted as part of this study. Of these contacts, Boone County, Cincinnati Bell, Duke Energy, Eastern Kentucky Power Cooperative, Insight Communications, Ohio Valley Electric Corporation, and Time-Warner Telecom responded with utility location information. The only company that did not respond was Kentucky Data Link, multiple attempts were made but representatives never responded.

There are water pipes that range in diameter from eight to twelve inches that cross the I-71/75 mainline on either side of Richwood Road. There is also a gas line that crosses the interstate and other various conduits that are part of the sewer network that cross Richwood Road, the interstate, and the interstate ramps. Also, Insight Communications has facilities near the interchange north of Richwood on the east and west side of the interstate.

There are water pipes that range in diameter from four to twelve inches that cross the interstate just north of Mt Zion Road and cross Mt. Zion Road east of the interstate. A gas line crosses the interstate alongside Mt Zion Road, as well as an electric transmission line. A transmission line is located parallel to the interstate and interstate ramps east of the interstate and north of Mt. Zion Road. Similarly to the interchange at Richwood Road, there are various-sized conduits that are part of the sewer network that cross Mt. Zion Road, the interstate, and the interstate ramps. Insight Communications has facilities that are very near this interchange that, in all likelihood, will be affected by modification to the interchange.

8.0 Geotechnical Overview

Geotechnical investigation reports prepared from 1981 to 2007 were reviewed as part of this report. In general, the study area is located within the Upper Ordovician physiographic region, including the Bull Fork, Bellevue Tongue of the Grant Lake Limestone and the Fairview formations. The topography of the area ranges from nearly flat to moderately rolling.

Landslide geotechnical investigations along I-71/75 performed in 1981, 1982 and 1983 indicate that embankments along the highway showed signs of instability since their construction in the late 1950s and early 1960s. There were two primary causes of the slope instability. The first was due to shale formations, and the second was that construction methodologies were leaving voids in the embankment, which filled with water, leading to additional voids, settlement and slope failures.

Geotechnical investigations were performed in 1987, 1988, and 2000 for portions of Mt. Zion Road, east of I-71/75 and in 2007 for a portion of Mt. Zion Road across the I-71/75 interchange. These reports defined the soil and subsurface conditions and provided recommendations for the design and construction of the projects, including, but not limited to slope and subgrade design, footings, piles, bearing capacity and moisture content of materials used. In 2000, a geotechnical investigation was performed to eliminate an at-grade railroad crossing on Mt. Zion Road, east of the I-71/75 interchange.

In 1988, a geotechnical investigation was performed at the I-71/75 interchange at Richwood Road and recommendations were made related to footings, piles and the bearing capacity. A geotechnical investigation was performed for the I-71/75 bridge over Frogtown Road in 1988 and recommendations were made related to footings and the bearing capacity. Frogtown Road is located approximately halfway between the Mt. Zion Road and Richwood Road interchanges.

More detailed and specific location, construction and maintenance recommendations as they relate to geotechnical issues will be developed as the alternatives are advanced during the study.

9.0 Environmental Overview

An environmental overview was conducted to determine the general characteristics of the study area. Based on secondary sources and limited field verifications, the environmental overview identified potential impacts to threatened, endangered, or special concern species; national wetland inventory areas; 100-year floodplains, soil characteristics; environmental justice, cultural resources, noise and air quality, community resources, and sites with potential hazardous materials concerns.

The study area is predominantly industrial, commercial, and residential in nature. There are no floodplains, public water supplies, or libraries within the study area. In addition, no noise and air quality concerns have been identified to date. Few community resources such as schools, parks, fire stations and health care facilities occur within or immediately adjacent to the study area. National Wetland Inventory areas identify potential wetlands throughout the study area. These resources will be described in the Environmental Overview (HNTB, in preparation) and mapped as part of the project base mapping. This information will be used in part to develop and evaluate project alternatives in order to avoid and minimize impacts to these resources.

10.0 Issues and Concerns

The first of three Stakeholders Advisory Council (SAC) meetings was held on April 30, 2007 to introduce the project, share the information gathered to date and seek input from the stakeholders. Issues and concerns identified by the stakeholders regarding safety, traffic, costs, construction and the environment were discussed and are summarized below.

Safety

- The accident rates within the study area are high and getting worse.
- There is an imbalance with regional and local traffic access leading to mainline backups and intersection delays.
- Congestion needs to be reduced because the rear-end accidents occurring are largely due to the traffic congestion in the area.
- The line of sight at the I-71/I-75 northbound ramp merge is problematic and "driver courtesy" turns may be a cause of many of the accidents.
- There are conflicts with vehicle types and modes of traffic, including transit, pedestrian, bikes, cars and trucks.
- Along the mainline highway, the speed limit could potentially increase to 70 miles per hour.

Traffic

- There is no direct access to Kenton County at Richwood Drive and no connection to KY 16 from I-71/I-75 and also Chambers to KY 16.
- The roadways that cross I-71/I-75 that do not have an interchange, including Frogtown, Chambers and Weaver Roads, need to be improved to carry the cross traffic that does not need to use the interstate.
- Improvements should also include connecting Frogtown and Maher Roads.
- The parallel road system is incomplete especially on the west side of the mainline highway.
- Vehicles going east on KY 338 from the area around Triple Crown Boulevard congest the interchange and vehicles turning east off the I-71/I-75 south exit cannot turn left onto KY 338 or continue east due to traffic trying to get onto I-71/I-75 north backing up the entire area.
- The regional and local traffic operations as well as the types of traffic (i.e. cars, trucks, pedestrians and bikes) should be balanced on a multi-county level.
- The mobility should be maintained along the interstate, including during the construction phases of the project and average speeds should be balanced.
- Congestion should also be improved on the state routes.
- Access should be provided to transit.

Costs

- It may be impossible to build out of the congestion so the costs should be balanced against the level of service.
- Right-of-way acquisition and utility costs should be considered.
- Funding the entire project is the only way to go.
- Promote the investment potential of this area with the state.

Construction

- Project construction should take into consideration nearby roadway projects and construction activities should be sequenced so that the interstate lanes are maintained and access to local businesses and TANK access is also maintained.
- The project should be completed is a timely manner and disincentives for project delay should be considered.
- Coordination with the truck stop and railroad, especially near KY 338, will be necessary.

Environment

- The growth patterns of the area must be understood and the project should be consistent with local comprehensive plans.
- There are more localized flooding storm water issues than in the past and should be considered.
- The project should minimize impacts to natural areas, viewscapes and any identified potentially hazardous materials.
- Potential right-of-way acquisition and environmental justice areas should be identified.
- Access to community and emergency facilities should be provided and transit access should be maintained or enhanced.

11.0 References

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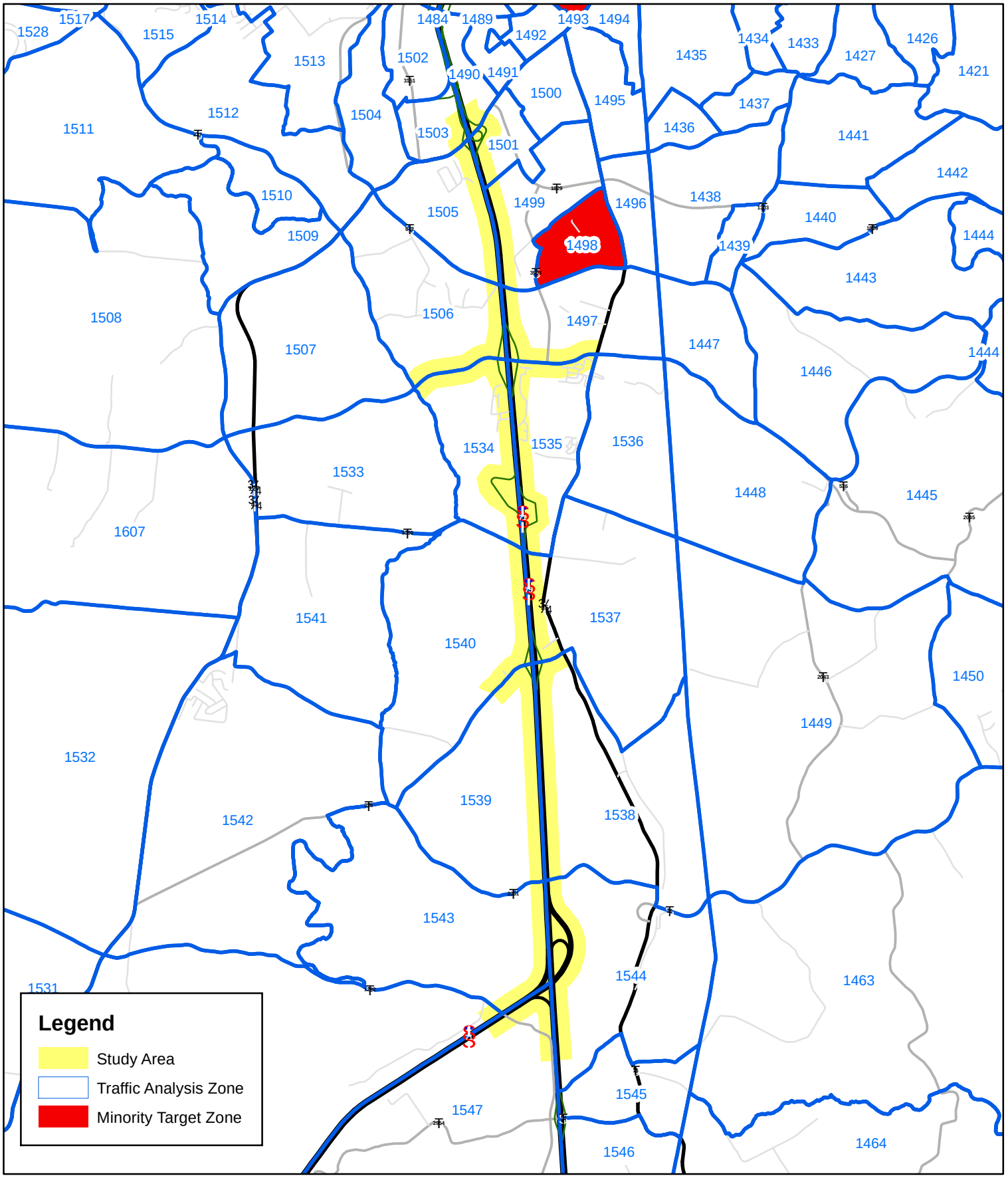
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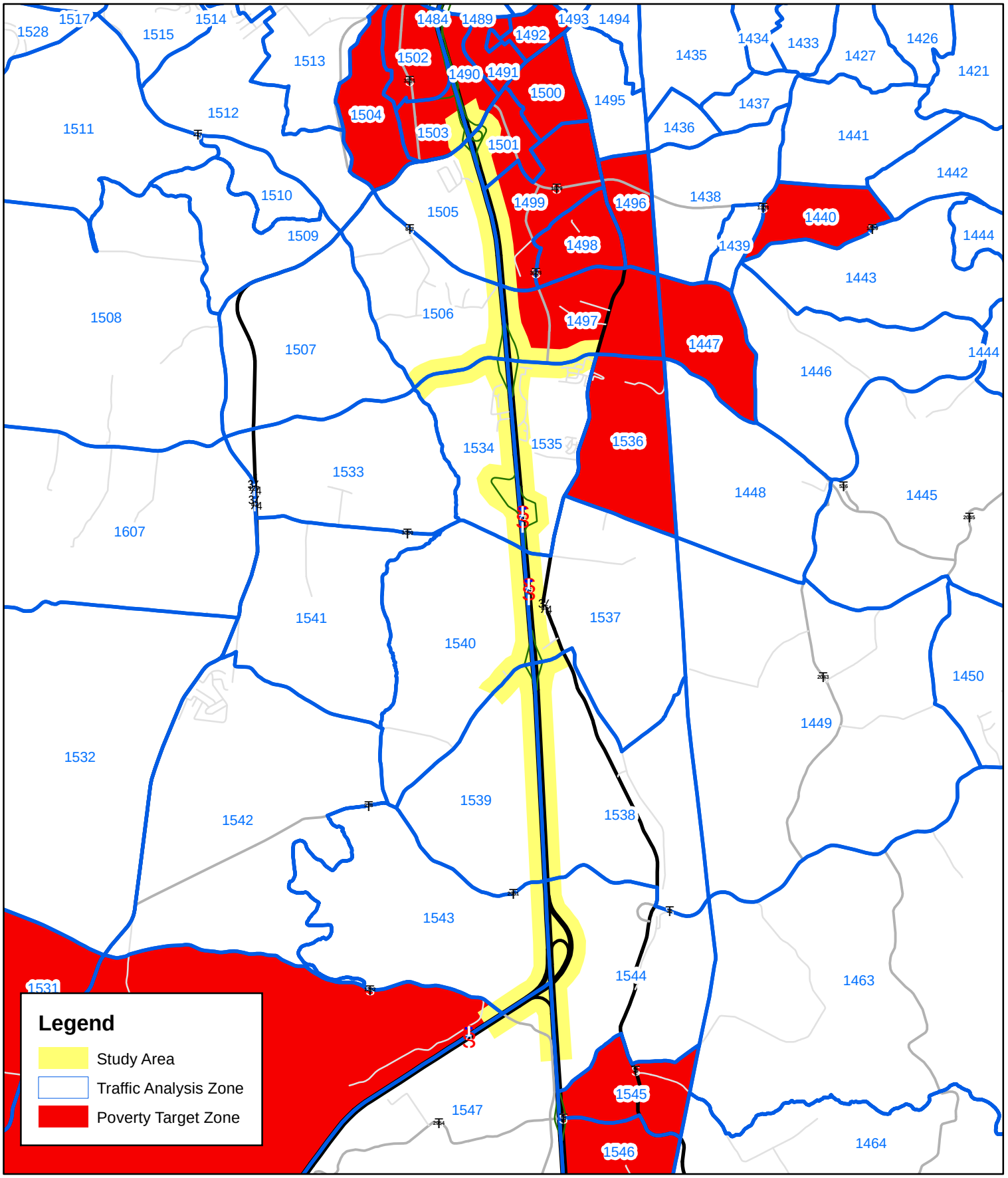
Appendix 1 – Environmental Justice Analysis by Target Analysis Zones

(Source: OKI Regional Council of Governments, 2006)

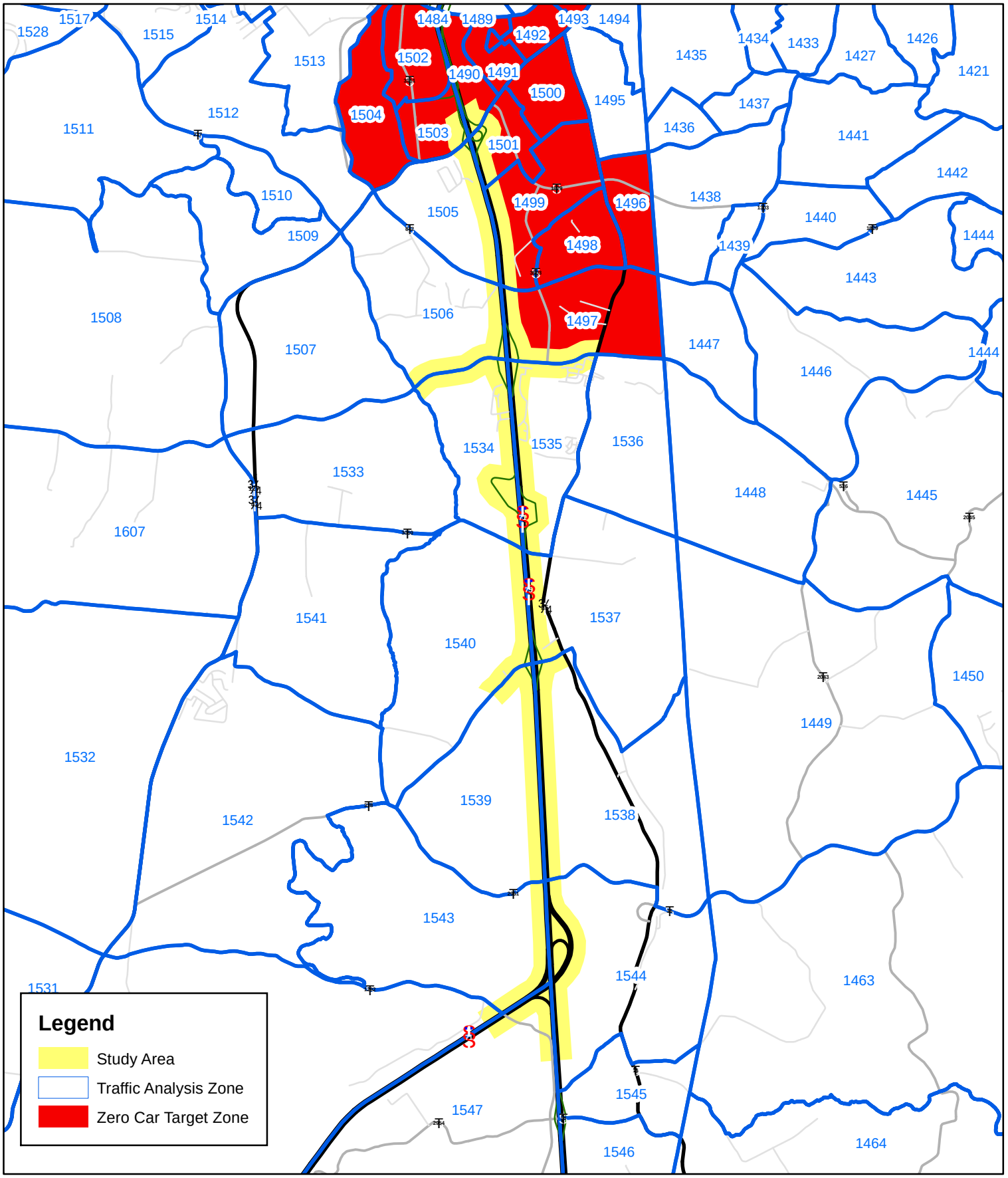
Target Zones for Minority Population in I-71/I-75 Corridor



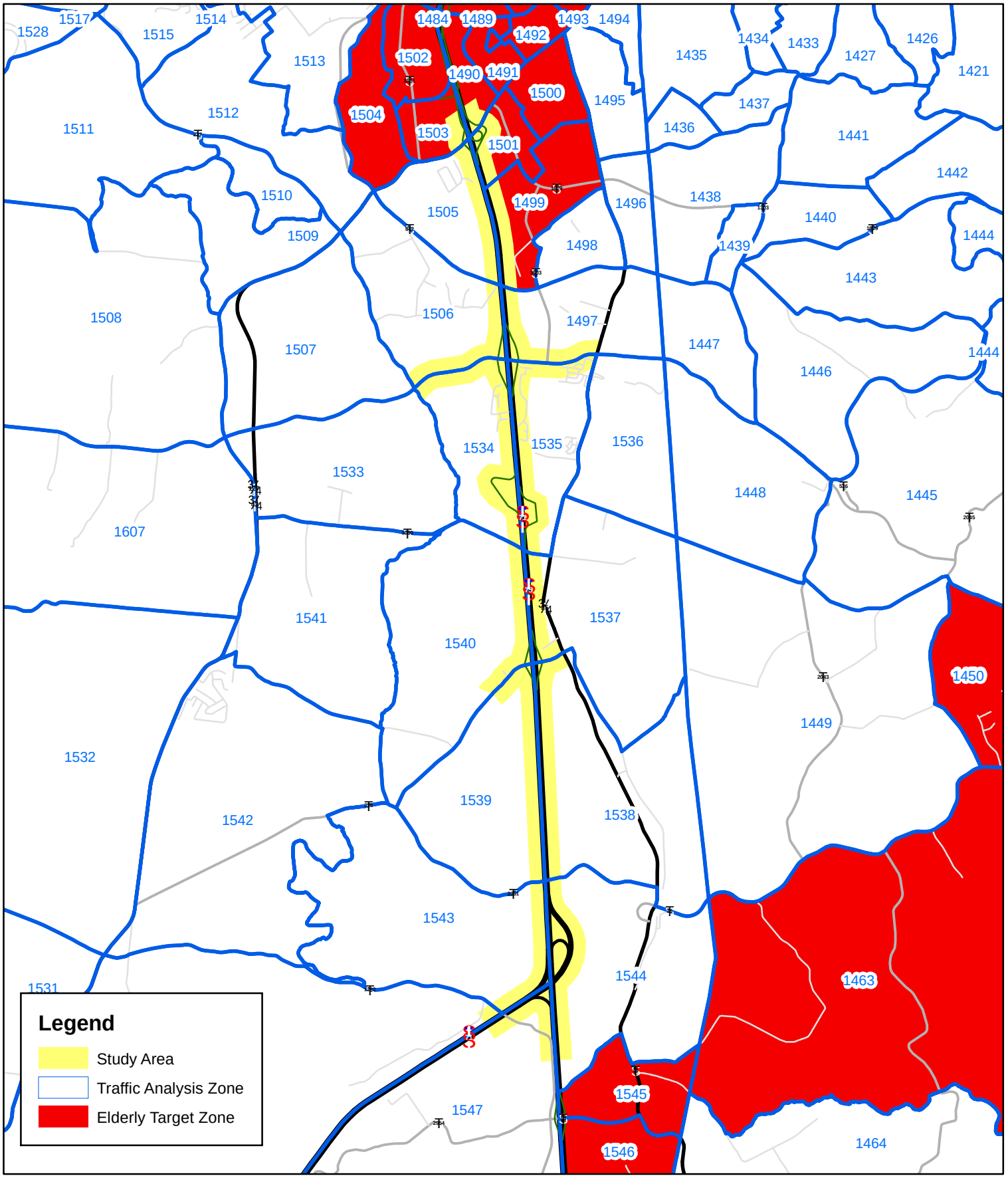
Target Zones for Population in Poverty in I-71/I-75 Corridor



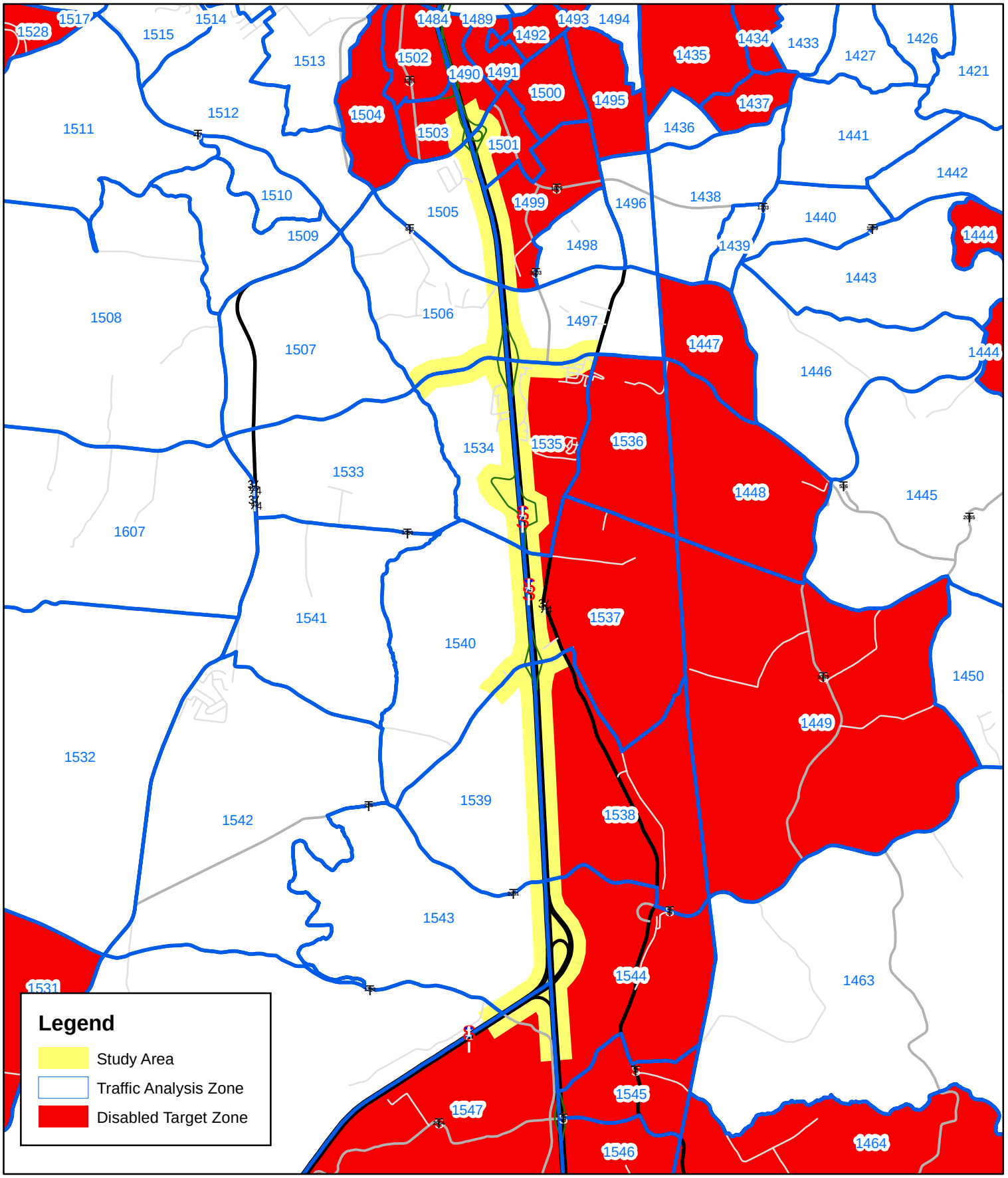
Target Zones for Zero Car Households in I-71/I-75 Corridor



Target Zones for Elderly Population in I-71/I-75 Corridor



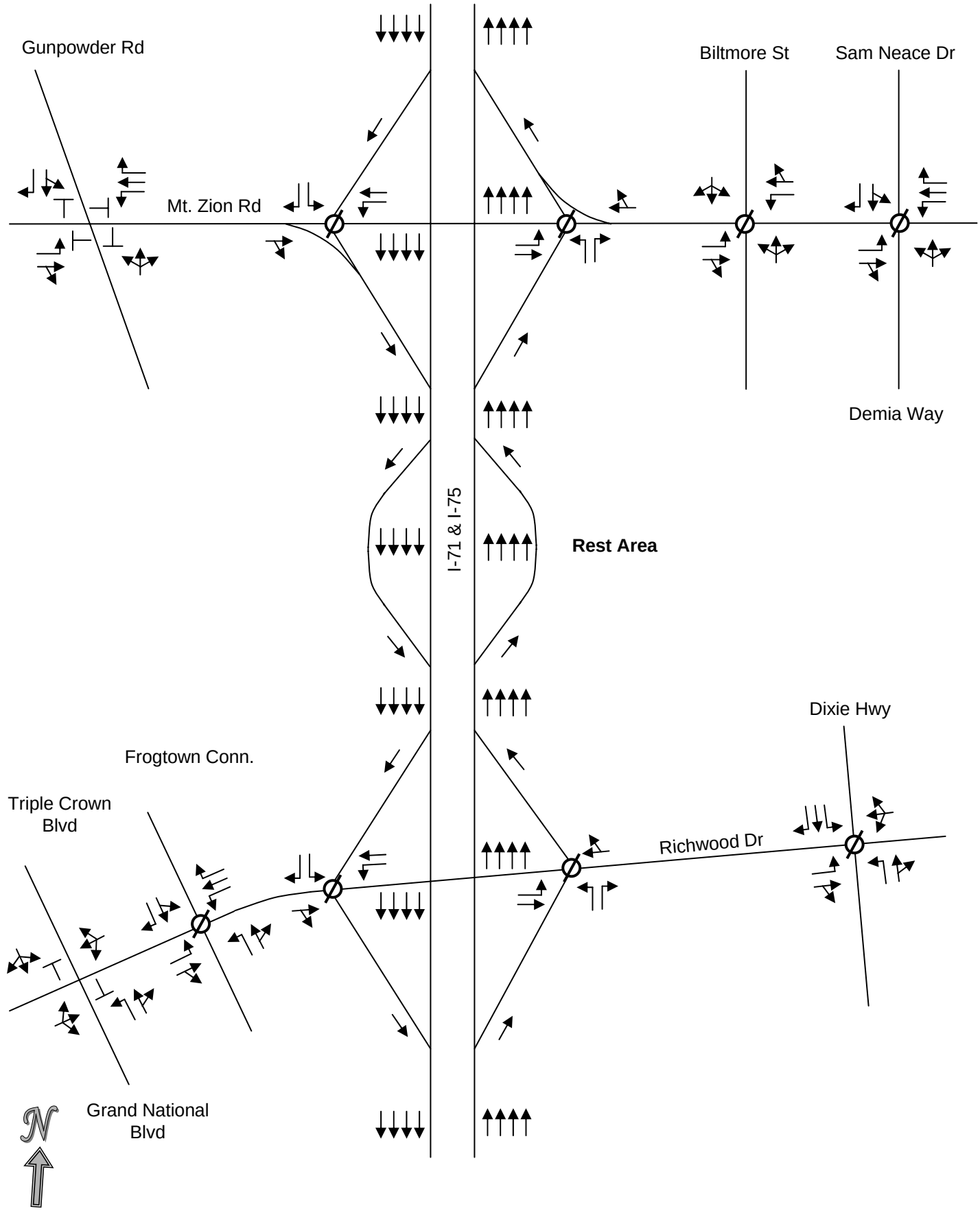
Target Zones for Population with Disabilities in I-71/I-75 Corridor



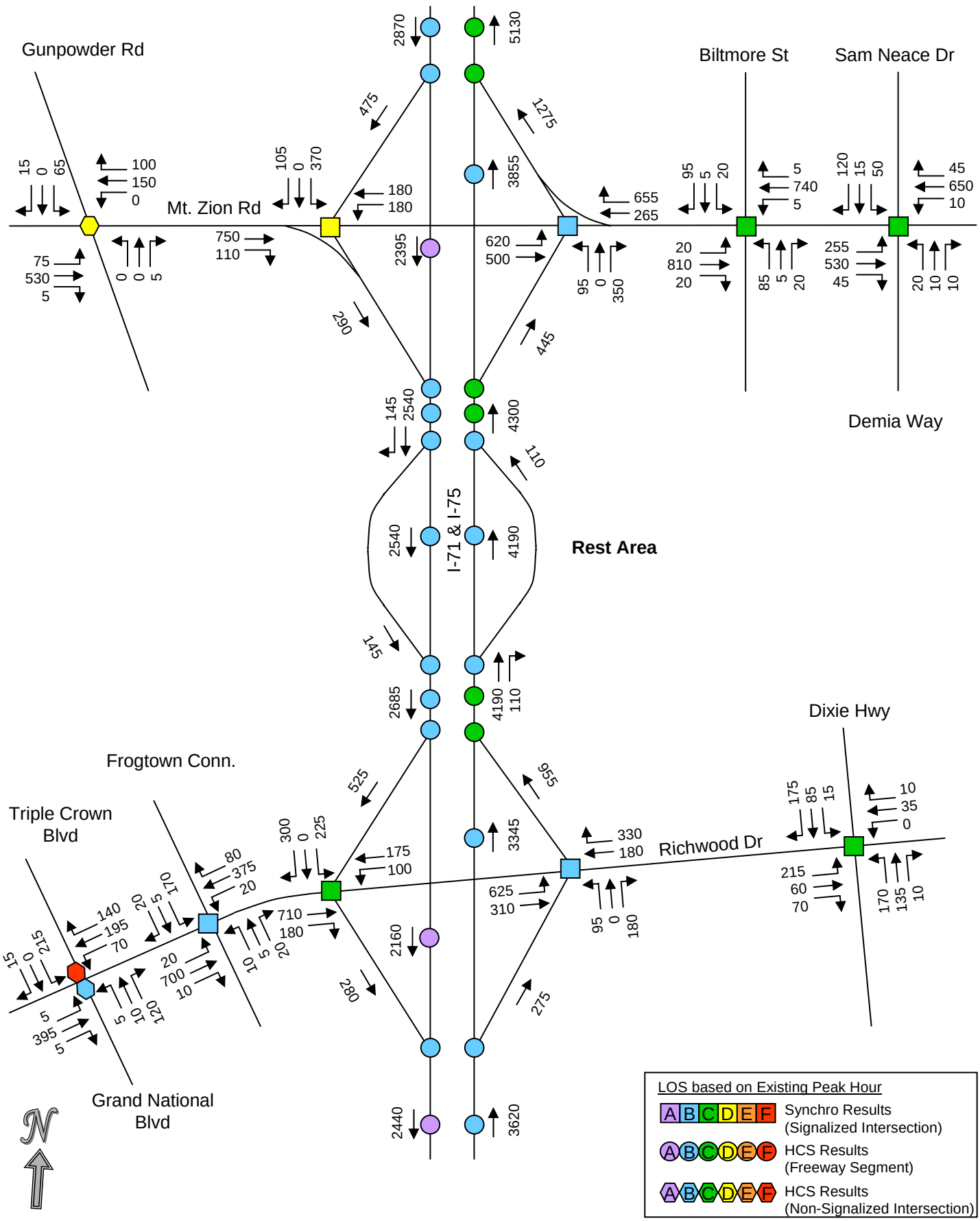
Appendix 2 – Existing Lane Use, Traffic Control,

AM & PM Peak Hour and Levels of Service

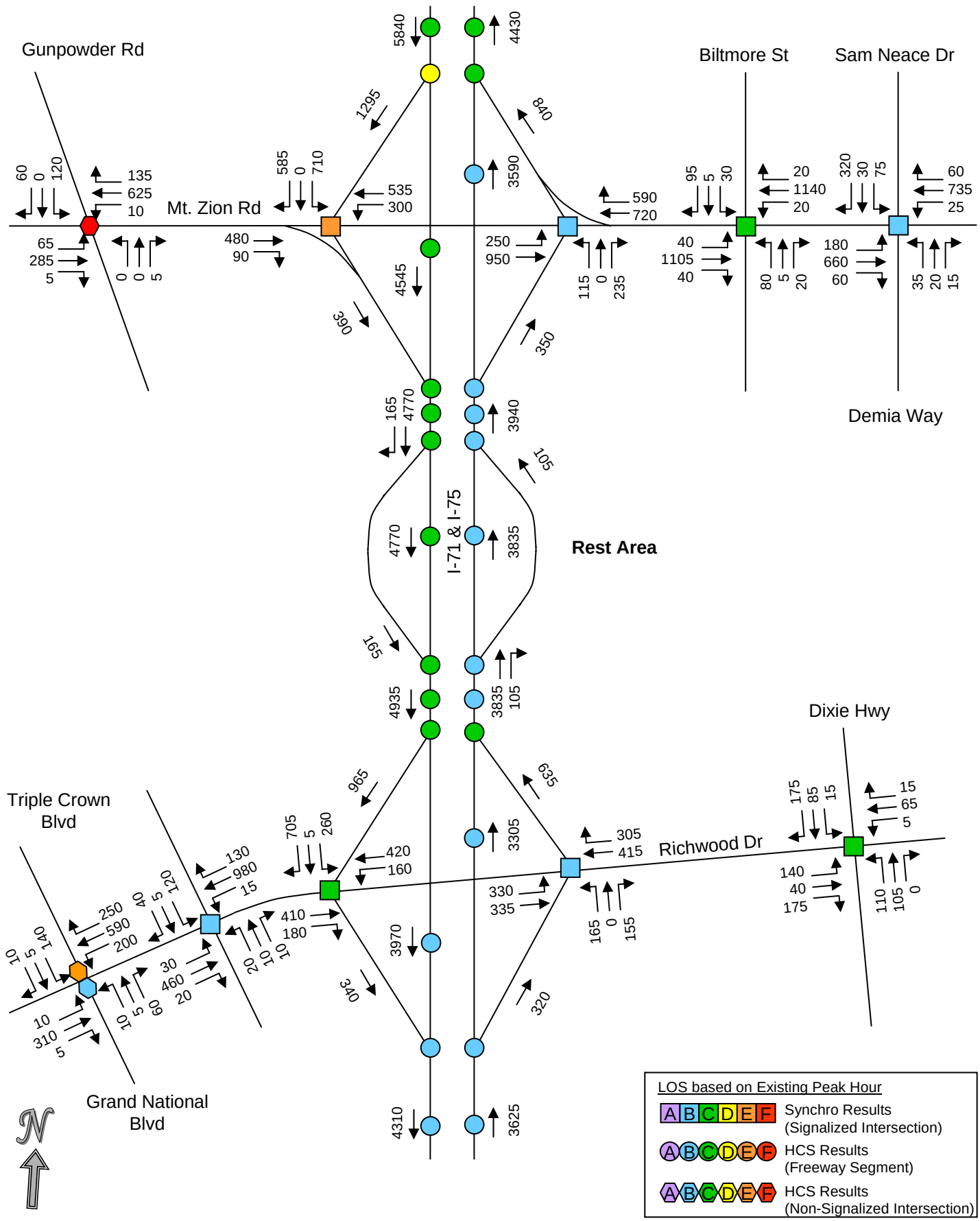
Existing Lane Use and Traffic Control



Existing AM Peak Hour and LOS



Existing PM Peak Hour and LOS









Environmental Overview

INTERCHANGE JUSTIFICATION STUDY FOR I-71/I-75 AT KY 536 AND KY 338

Interchange Justification Study

71 75 338 536

KENTUCKY TRANSPORTATION CABINET

Item No. 6-14.01
Client: Kentucky Transportation Cabinet

July 2007

Kentucky UNBRIDLED SPIRIT

HNTB

INTERCHANGE JUSTIFICATION STUDY FOR I-71/I-75 AT KY 536 AND KY 338

Boone County, Kentucky

Environmental Overview Report

Kentucky Transportation Cabinet
Item No 6-14.01

Prepared for:

Kentucky Transportation Cabinet
District 6
Boone County, Kentucky

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July 2007

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1.0 Introduction

1.1 Background

The purpose of this Interchange Justification Study (IJS) is to complete required analyses and provide necessary background information to support a request to modify access to the Interstate interchanges on Interstate 71/Interstate 75 (I-71/I-75) at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) in eastern Boone County, Kentucky. This environmental overview is intended to provide a preliminary review of the natural and man-made environs in the vicinity of these interchanges.

Should the Federal Highway Administration (FHWA) officials determine that the information contained in the IJS meets their criteria for modifying interchanges, approval will be given for the Kentucky Transportation Cabinet (KYTC) to undertake additional analyses, which would likely include National Environmental Policy Act (NEPA) procedures and document preparation. In part, this is one piece of the process necessary to comply with NEPA, as amended. NEPA was created in 1969 to ensure that agencies using federal money consider and minimize the impacts of projects to both the human-made and natural environments. The "human-made environment" includes residences, businesses, noise, and socio-economic and land use conditions of the area. The "natural environment" consists of features including streams, threatened and endangered species, and wildlife.

The environmental overview was conducted based primarily on secondary sources. The environmental overview identified potential impacts to threatened, endangered, or special concern species, national wetland inventory areas, floodplains, soil characteristics; land use, environmental justice, cultural resources, noise and air quality, community resources, and sites with potential hazardous materials concerns.

The secondary sources were supplemented with a one-day field review conducted by HNTB and Kentucky Transportation Cabinet (KYTC) personnel on March 21, 2007.

1.2 Study Area

The project study area, as shown in **Figure 1** is located in the eastern portion of Boone County, Kentucky, south of the City of Florence, east/southeast of the City of Union, and north of the City of Walton. The metropolitan City of Cincinnati, Ohio is located approximately 15 miles northeast of the study area.

The study area begins at the KY 14/I-75 interchange (Verona Mudlick Road) and extends approximately nine miles north to approximately one-quarter mile north of United States (US) Route 42. The interstate within the study area is four lanes in each direction and contains a rest area on each side of the interstate, located approximately one and one-half miles north of the Richwood Road interchange. The Mt. Zion Road and Richwood Road interchanges are approximately 2.5 miles apart and both provide rest/wash/fueling facilities and attract large volumes of truck traffic from I-71/75 to the interchange areas.

The study area extends approximately three-quarter miles west of the Mt. Zion Road interchange to a four-way intersection at Gunpowder Road and approximately three-quarter miles east to the signalized Sam Neace Drive intersection. The study area also extends approximately one-half mile west of the Richwood Road interchange to a two-way intersection at Triple Crown Boulevard and approximately one-quarter mile east to the signalized Dixie Highway intersection. The eastbound approach to the intersection of Richwood Road and Dixie Highway is on an upward

slope and traffic at the intersection is affected by the nearby railroad crossing to the east of the intersection.

2.0 Human Environment

2.1 Population Trends

Boone County is approximately 256 square miles in size and is part of the greater Cincinnati metropolitan area. It is bordered by Grant County to the south, Kenton County to the east, Hamilton County, Ohio to the north and Dearborn County, Indiana to the west. According to the US Census Bureau, from 2000 to 2005, the population increased by over 20,000 people, approximately a 24% increase. In 2007, the US Census Bureau ranked Boone County number 71 among the top 100 fastest growing counties in the US. The 2030 Boone County Comprehensive plan predicts population to increase by 121%, from 85,448 to 188,652 people, from 2000 to 2030.

2.2 Land Use

Land use in the vicinity of the study area is a mix of commercial, industrial, rural/urban/suburban residential, and agricultural development. Within the study area, the dominant land use is currently transportation infrastructure (47%) followed by residential areas (21%) and agricultural land (19). **Table 1** lists the existing land use within the study area. Existing land use for the study area was provided by the Boone County Planning Commission and analyzed using Geographic Information System (GIS). Existing land use for the area around the study is depicted on **Figure 2**.

Table 1. Existing (2007) Land Use within the Study Area

Land Use	Approximate percentage	Approximate Acreage
Agricultural	19%	412
Commercial	2%	48
Industrial	6%	129
Public/Institutional	<1%	3
Recreational	<1%	10
Residential	21%	468
Transportation	47%	1,057
Woodlands	4%	86

By 2030, according to the Boone County Comprehensive Plan, the study area will lose nearly all of its agricultural land while residential and industrial uses approximately double the existing conditions. Future land use within the study area is listed in **Table 2**.

Table 2. Future (2030) Land Use within the Study Area

Land Use	Approximate percentage	Approximate Acreage
Commercial	4%	77
Developmentally sensitive*	1%	23
Industrial	17%	389
Public/Institutional	<1%	3
Recreational	<1%	7
Residential	44%	977
Rural land**	<1%	2
Transportation	33%	735

* can include areas with an existing slope which limits urban development
**can include wooded, agricultural, recreation or low density residential areas

2.3 Employment Trends

Employment is predicted to increase by 66% from 2000 to 2030. It is anticipated that additional industrial/business development will be largely located along Dixie Highway, which lies immediately east of the study area. This development will impact the function of the Mt. Zion Road and Richwood Road interchanges.

Further, along the southern portion of the study area, the City of Walton is attracting residential, commercial and industrial growth, putting additional pressure on the Richwood Road interchange area. The City of Union, due west of the study area, has been experiencing residential and commercial growth at the Mt. Zion Road interchange area for the past ten (10) years.

2.4 Transit Operations

The Transit Authority of Northern Kentucky (TANK) provides transit services for Boone, Campbell and Kenton Counties in Northern Kentucky, as well as downtown Cincinnati, Ohio (TANK 2006). According to TANK's Transit Network Study (2006), the I-71/75 corridor has the greatest potential to create an exclusive transit way in northern Kentucky because of the high level of express services (nine routes) already operating in the corridor.

Within the study area, Route 22X (Walton Express) provides express service between Walton, Kentucky north to downtown Cincinnati, Ohio. Route 22X is a peak service route with three inbound routes running during the morning peak traffic hours and three outbound routes running during the afternoon peak traffic hours. Route 22X from the Walton Baptist Church Park-and-Ride lot continues along Dixie Highway, stopping at the Mt. Zion Road Park-and-Ride lot located east of the I-71/75 and Mt. Zion Road interchange. From there, Route 22X continues via the interstate to the downtown Cincinnati transit hub (TANK 2006a).

In 2004, ridership for Route 22X was 19,774, comprising less than 1% of TANK's total ridership (TANK 2006a). However, due to the heavy congestion resulting from heavy employment and residention growth, TANK included a transit hub in Florence, Kentucky, just north of the study area. Once complete, Route 22X will likely service the Florence hub. TANK also has plans to investigate the utilization of Route 22X for reverse-commute service from the urbanized area into Gateway College and industrial employers in the vicinity of Mt. Zion Road along Dixie Highway (TANK Transit Network Study, 2006a).

2.5 Community Facilities

Community facilities are resources that are open to, used by, or provide critical services to the general public. Generally, services provided by these resources could benefit from or be hindered by transportation conditions. These community facilities also influence the flow of traffic in their vicinity and should be considered during the development of alternatives. Examples of community facilities include schools, cemeteries, libraries, fire stations, and police stations. Information on community facilities within, and adjacent to, the study area was obtained by the Boone County Planning Commission, Geographic Information Services (2007). This data was supplemented by the field reconnaissance on March 21, 2007 and internet reviews by HNTB personnel in April 2007.

The study area consists predominantly of existing transportation right-of-way. However, within the footprint of the study area, the following community facilities have been identified: Carpenter Cemetery, Lions Park and Walton Community Park (see Section 2.11), Gateway Community College and the St. Elizabeth's Business Health Center/Sports Medicine Center. Carpenter Cemetery is located on the corner of Duffel Lane and Dixie Highway (US 25) and contains approximately 81 plots.

According to the St. Elizabeth's Medical Center Website (http://www.stelizabeth.com/) accessed on April 4, 2007, the Business Health Center/Sports Medicine Center operates Monday through Thursday from 7:30 am to 6:00 pm, Friday from 8:00 am to 5:00 pm, and Saturday 7:30 am to 12:30 pm. The Business Health Center focuses on occupational medicine, prevention, rehabilitation, workers' compensation and return-to-work strategies. No emergency or urgent care services are provided at this location.

In addition, numerous other community resources, as identified in **Table 3**, occur in the vicinity of the study area. These resources are identified on **Figures 3 and 4**, **Appendix 1**.

Table 3. Community Facilities Identified within or Near the Study Area

Resource	Street Address	City
Board of Education/Schools		
Boone County Board of Education District Office Building	8330 US 42 Highway	Florence
Ockerman Elementary School	8250 US 42 Highway	Florence
Ockerman Middle School	8300 US 42 Highway	Florence
Walton-Verona High School	30 School Road	Walton
Gateway Community and Technical College, Boone County Campus	10500 Sam Neace Drive	Walton
Parks		
Lions Park and Walton Community Park (see Section 2.11 of this document)		
Cemeteries		
Carpenter Cemetery	Corner of Duffel Lane and Dixie Highway	Florence
Emergency Services/Medical Services		
Florence Fire Station	1152 Weaver Road	Florence
St. Elizabeth Business Health Center/Sports Medicine Center	10095 Investment Way	Florence
Walton Fire-Richwood Station	261 Shorland Drive	Walton
Walton Fire Station	11 High School Court	Walton
Libraries		
Boone County Public Library, Walton Branch	21 South Main Street	Walton
Boone County Public Library, Florence Branch	7425 US 42 Highway	Florence

2.6 Environmental Justice

Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and* Low-*Income Populations, February 11, 1998*) requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of their programs, policies and activities on minority and low-income populations within the United States.

For I-71/75, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) identified environmental justice groups based upon the agency's Environmental Justice Policy (OKI 2003). As such, environmental justice groups were expanded to include the elderly population, individuals with disabilities, and zero-car households.

OKI identified these environmental justice groups based upon 2000 census data for each Traffic Analysis Zone (TAZ). A TAZ is a geographic unit used by OKI for modeling the performance and assessing the needs of the region's transportation system. Environmental justice groups are

based upon the percent of persons/households of each group within the TAZ that exceed OKI's regional average. OKI's region includes Dearborn County, Indiana, Butler, Clermont, Hamilton and Warren Counties, Ohio, and Boone, Campbell and Kenton Counties, Kentucky. Based on the 2000 census data, the regional average of each group is listed in **Table 4**. The TAZs for the socioeconomic population within the project study area for the census year 2000 is included in **Appendix 2**.

Table 4: Regional Average for each Environmental Justice Group

Group	Percent
Minority	15.9
Low Income	9.4
Zero Car	9.8
Elderly	15.4
Disabled	17.4

The definition of each environmental justice group, as recognized by OKI, is based upon the following:

- Minority – persons from every racial category, except white alone, plus all Hispanic persons
- Low Income – persons below the poverty level. In 2000, the poverty threshold for a family of four was $18,000/year
- Zero Car – housing units for which there is no car
- Elderly – individuals age 60 and older
- Disabled – non-institutionalized persons older than 5 years old with any disability that makes it difficult to go outside of the home alone or take care of personal needs

Minority

Within the study area, minority populations are not higher than the regional average. East of the study area, one traffic analysis zone (1498) has a minority population higher then the regional average. TAZ 1498 is located between KY 3503 and US 25. Based upon the 2000 census data, this target zone has 154 individuals, 25 of whom (16%) identify themselves as a minority ethnic group.

Low Income and Zero Car Households

Within the study area, there are five traffic analysis zones where the percentage of low income populations is higher than the regional average of 9.4 percent. These zones occur in two general areas. The first area contains zones 1490, 1499, 1497, 1498, 1499, 1501, and 1503. This area is north of Mt. Zion Road and has a total of 9,168 people, 1,293 of whom (14%) are classified as low income, based upon Census 2000 criterion. These zones also contain the areas where the percentage of zero car households is above the regional average of 9.8 percent.

TAZ 1531 also has a low income population higher than the regional average. This zone is located along the southern edge of the study area, south of KY 1292 and east of I-71. The zone contains 733 individuals, 104 of whom (14%) are classified as low income.

Elderly

Within the study area, there are four traffic analysis zones (1490, 1499, 1501, and 1503) where the percentage of elderly populations is higher than the regional average of 15.4 percent. As with the low income and zero car households, these occur north of Mt. Zion Road. These zones contain a total of 2,386 people, 490 of whom (20%) are older than 60 years of age.

Disability

Except for one target analysis zone between KY 842 and Mt. Zion Road, the traffic analysis zones east I-71/75 have disabled populations higher than the regional average. These zones (1490, 1499, 1501, 1535, 1538, and 1544) have a total population of 6,033 and 1,431 individuals (24%) classify themselves as disabled.

Environmental Justice Conclusions

Based upon the above analysis, no disproportionate impacts on environmental justice groups are anticipated at this time. Following completion of the IJS, the recommended design alternative will be evaluated in accordance with state and federal regulations, including NEPA during the final design of the interchange. The evaluation will identify specific impacts, if any, to environmental justice group.

2.7 Noise Quality Condition

Noise, defined as unwanted or excessive sound, is an undesirable by-product of modern society. While noise emanates from many different sources, transportation noise may be considered one of the most pervasive and difficult source to avoid and a broad based effort is needed for control. Traffic noise is increased by higher traffic volume, higher speeds, and a greater number of trucks. Vehicle noise is a combination of the noise produced by the tires, engine, and exhaust. Site specific conditions such as a steep roadway grade, vehicles accelerating on highway ramps, or trucks using their compression brake (jake brake) also increase traffic noise levels.

Effective control of the undesirable effects of highway traffic noise requires land use near highways be controlled and that abatement of noise be considered on individual federal-aid highway projects. The evaluation of noise impacts is necessary where a proposed project will:

- increase traffic volumes on an existing roadway;
- change the vehicle mix or operating speed on an existing roadway; or,
- involve the construction of new roadways or substantially change the horizontal or vertical geometrics or shielding effects of an existing roadway.

The proposed project is consistent with the current use and zoning within and near the study area. If the recommended design alternative moves travel lanes closer to noise sensitive areas including residences, hotels, parks or schools, a noise analysis will likely be required in accordance with KYTC and Federal Highway Administration (FHWA) regulations.

2.8 Air Quality Conditions

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural property, and reducing human or animal health. Eight (8) air pollutants are regulated by the United States Environmental Protection Agency (USEPA), including carbon monoxide (CO), sulfur oxides (SOx), hydrocarbons (HC), nitrogen oxides (NOx), ozone (O3), particulate matter sized 10 microns or less (PM10), particulate matter sized 2.5 microns or less (PM2.5), and lead (Pb).

The Clean Air Act Amendments (CAAA) of 1990 direct the USEPA to implement strong environmental policies and regulations that will ensure cleaner air. The legislation affects proposed transportation projects such as this project. According to Title 1, Section 101, Paragraph F of the CAAA, “No federal agency may approve, accept or fund any transportation plan, program or project unless such plan, program or project has been found to conform to any applicable State Implementation Plan (SIP) in effect under this Act.” The Final Conformity Rule defines project conformity as follows:

Conformity to an Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and that such activities will not: 1) cause or contribute to any new violation of any NAAQS in any area; 2) increase the frequency or severity of any existing violations of any NAAQS in any area; or 3) delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area.

The IJS for I-71/I-75 at KY 536 and KY 338 study area occurs entirely within Boone County. Pursuant to provisions of the Clean Air Act of 1990, USEPA designated Boone County as a basic nonattainment area for ozone under the eight-hour ozone standard in April 2004. In December 2004, USEPA also designated Boone County as a nonattainment area for fine particulate matter (PM2.5) under the annual PM2.5 standard (OKI, 2007).

Boone County is part of the Cincinnati Metropolitan Statistical Area. OKI is the metropolitan planning organization (MPO) responsible for transportation planning and air quality conformity for the region. Following the identification of the preferred design alternative and once funding has been identified, the alternative will be analyzed by OKI and incorporated into OKI's Transportation Improvement Plan (TIP) in compliance with federal regulations.

2.9 Prime & Unique Farmlands

Information for Prime and Unique Farmlands was provided by the United States Department of Agricultural, Natural Resource Conservation Service Website (www.soildatamart.nrcs.usda.gov/), which was accessed on March 1, 2007. The website provided information regarding prime and other important farmlands for Boone County, Kentucky.

Within the study area, seven (7) soil map units are classified as prime farmland. Prime farmland is defined by the United States Department of Agriculture (USDA) as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseeds crops. These soil map units are:

- Avonburg silt loam: 0-4% slope (Av)
- Captina silt loam: 2-6% slope (CaB)
- Faywood silt loam: 2-6% slope (FaB)
- Linside silt loam: 0-4% slope (Ln)
- Nicholson silt loam: 0-6% slope (NIB)
- Nolin silt loam: 0-4% slope (No)
- Rossmoyne silt loam: 0-6% slope (RsB)

Two (2) additional soil map units within the study area are classified as "Farmlands of State Wide Importance." In general, these soils are capable of producing high yields of crops if managed correctly. Soil map units designated as farmlands of state wide importance include: Nicholson silt loam: 6-12% slope (NeC) and Rossmoyne silt loam: 6-12% slope (RsC).

The nine (9) soil map units identified above account for approximately 63% or 1338 acres of the study area. It should be noted that this percentage is based on mapped soil types and not actual uses. As stated previously, most of the study area is comprised of commercial, residential, industrial and transportation uses, while little of the area is comprised of active productive agricultural lands (see **Table 1**).

2.10 Water Quality & Public Water Supplies

There are no major public water well systems within or near the study area (personal communication, Mark Jones, Kentucky Division of Environmental Protection, April 4, 2007). Most of the Northern Kentucky region purchases water from the Boone-Florence Water Commission which is supplied by the Greater Cincinnati Water Works whose major source of water is the Ohio River.

The Cities of Florence and Walton each have their own distribution system and obtain their water from the Boone-Florence Water Commission (Florence 2001 and personal communication, Mark Jones, April 4, 2007). In addition, the City of Walton, Kentucky is supplied by the Bullock Pen Water District in Grants County which is mostly supplied by Bullock Pen Lake (Mark Jones, Personal communication, April 4, 2007).

2.11 Section 4(f) Resources

Two parks are located within the study area (**Table 5 and Figure 3, Appendix 1**). It should be noted that additional National Register of Historic Places (NRHP) sites will be added to this list should KYTC identify them during their review of their files.

Lions Park is located at 29 Lions Lane in Florence. According to the Parks and Recreation Needs Assessment and Park Land Evaluation Study (City of Florence 2001), the park is two acres in size along Interstate 71/75, west of the Northern Kentucky Industrial Park with access provided by US 127. The park is controlled by the Lions Club and contains one softball/baseball diamond.

Walton Community Park (Walton Park) is located at the southern edge of the study area on Old Stephenson Mill Road in Walton, Kentucky. Walton Park is a 30-acre park that features a softball field, soccer field, tennis and volleyball courts, four (4) picnic shelters, two (2) playgrounds and restrooms.

Table 5. Section 4(f) Resources Identified within or Near the Study Area

Resource	Address
Lions Park	29 Lions Lane, Florence
Walton Community Park	Old Stephenson Mill Road, Walton

2.12 Hazardous Material Sites

Review of state and federal database files and a field reconnaissance by KYTC personnel were completed to identify areas of potential concern within the study area. Eight (8) sites of concern were identified within the study area. All eight (8) sites are gasoline/service stations located adjacent to the interchanges and are listed in **Table 6** and identified on **Figure 3, Appendix 1**. As the project proceeds beyond the IJS, additional field investigations may be necessary to determine impacts to these resources based upon the recommended design alternative.

Table 6. Gas Stations Identified within or Near the Study Area

Resource	Address
BP/Travel Centers of America	145 Richwood Road
Pilot Travel Center	118 Richwood Road
Pilot Travel Center	11229 Frontage Road
Shell/Ameristop Express	281 Richwood Road
BP/Blue Pantry	305 Richwood Road
Shell/Ameristop Express	411 Mt. Zion Road
Sunoco/75 Express Mart	430 Mt. Zion Road
BP/Mt. Zion Food Mart	321 Mt. Zion Road

2.13 Permits

As alternatives are analyzed during the IJS process, potential impacts to ecological resources will be based upon the secondary sources discussed above. This information will be used to assist in the screening of alternatives. Following selection of the preferred design alternative, specific

impacts to regulated or jurisdictional resources (i.e., historic, archeological, wetlands, streams, threatened and endangered species, sites with hazardous materials, etc.) will be identified through specific technical studies. Following the identification of impacts specific permit requirements will be identified. In general, impacts to these resources should be avoided or minimized to the greatest extent possible. Resources that can not be avoided will be mitigated in accordance with all applicable state and/or federal regulations.

3.0 Natural Environment

3.1 Threatened, Endangered or Special Concern Species

Boone County, Kentucky is within the range of nine (9) federally listed species (**Table 7**).

Table 7. Threatened & Endangered Species Known to Occur or Have the Potential to Occur within Boone County, Kentucky

Species	Status	Occurrence	Description
Myotis sodalis (Indiana Bat)	Endangered	Potential	Trees with shedding bark or cavities along riparian corridors
Lampsilis abrupta (pink mucket)	Endangered	Known occurrence	Lower Ohio River and its larger tributaries in sand and gravel
Plethobasus cooperianus (orangefoot pimpleback)	Endangered	Potential	Large rivers in gravel or mixed sand and gravel
Plethobasus cyphyus (sheepnose)	Candidate	Potential	Medium to large rivers in gravel or mixed sand and gravel
Pleurobema clava (clubshell)	Endangered	Potential	Medium to large rivers in gravel or mixed gravel and sand
Pleurobema plenum (rough pigtoe)	Endangered	Potential	Medium to large rivers in sand or gravel
Cyprogenia stegaria (fanshell)	Endangered	Potential	Medium to large rivers in gravel riffles
Obovaria retusa (ring pink)	Endangered	Potential	Large rivers in gravel or sand
Trfolium stoloniferum (running buffalo clover)	Endangered	Known occurrence	Areas of rich soils in the transition between open and forest and prairie, usually in areas disturbed by grazing or mowing

Personnel from KYTC conducted a site visit for the project area on April 4, 2007. No habitat for any listed mussel species was identified. Habitat for both Indiana bat and running buffalo clover was determined to exist within the project limits. As the process proceeds beyond the IJS, additional field investigations will be conducted to determine the presence or likely absence of either of these species based upon the recommended design alternative.

3.2 Floodways and Floodplains

Information for regulated floodways and floodplains within the study area was determined by reviewing online Flood Insurance Rate Map (FIRM) produced by the Federal Emergency Management Agency (www.msc.fema.gov/). This data was accessed on April 4, 2007.

The study area occurs within portions of unincorporated Boone County (FIRM Map Panels 2100130100B[1] [June 15, 1981] and 2100130150B [June 15, 1981]) and portions of incorporated Florence (Floodplain Community Number 210238 [July 3, 1986]). These maps indicate that no regulated floodways or floodplains occur within or near the study area.

3.3 Wetlands

Wetlands were identified based on National Wetland Inventory (NWI) Maps of the study area. NWI wetlands are identified intermittently throughout the study area (**Figure 5, Appendix 1**). While these resources have not been field verified, they will be useful in reviewing and evaluating

[1] A Letter of Map Amendment Revision (LOMAR), dated December 5, 2006 has been submitted for a flood hazard area adjacent to Treeline Drive and will not alter the conditions within or near the study area.

alternatives developed for the study. As the process proceeds beyond the IJS, technical studies will be conducted to determine actual wetland impacts based upon the recommended design alternative.

3.4 Cultural Resources

A review of the study area will be completed by KYTC. As the process proceeds beyond the IJS, additional investigations will be conducted to determine historic resources that may be impacted by the recommended design alternative.

Approximately five percent (5%) of the study area has been previously surveyed for archaeological resources. Three (3) archaeological sites (Sites 15BE288, 15BE294 and 15BE295) were examined and evaluated for potential inclusion on the NRHP. The sites were either indeterminate prehistoric isolated finds or lithic scatters and not eligible for nomination on the NRHP. A fourth site (Site 15BE534) is a Carpenter Cemetery located on the east side of I-71/75, west of Dixie Highway, just south of Duffel Lane. This site was also determined not to be eligible for listing on the NRHP, but would still require relocation under 600 KAR 3:020 if impacted by the recommended design alternative.

Since a limited amount (approximately 5%) of the study area has been analyzed, the remaining portion of the study area is considered to have the potential to impact currently unidentified archaeological resources. Undisturbed areas beyond the limits of the existing rights-of-way and undisturbed portions of the existing rights-of-way that have not been surveyed should be examined, if they will be disturbed or lie within the limits of the proposed design alternative.

4.0 References

Transit Authority of Northern Kentucky (TANK), 2006. Transit Network Study: Existing Conditions Report.

Transit Authority of Northern Kentucky (TANK), 2006a. Transit Network Study Report.

Florence, Kentucky, April 4, 2007 http://www.florence-ky.gov/water.asp#Water_System.

Florence, Kentucky. May 2001, Parks and Recreation Needs Assessment and Park Land Evaluation Study.

OKI, 2007, Amendment 4 – OKI 2030 Regional Transportation Plan.

Appendix 1 - Figures

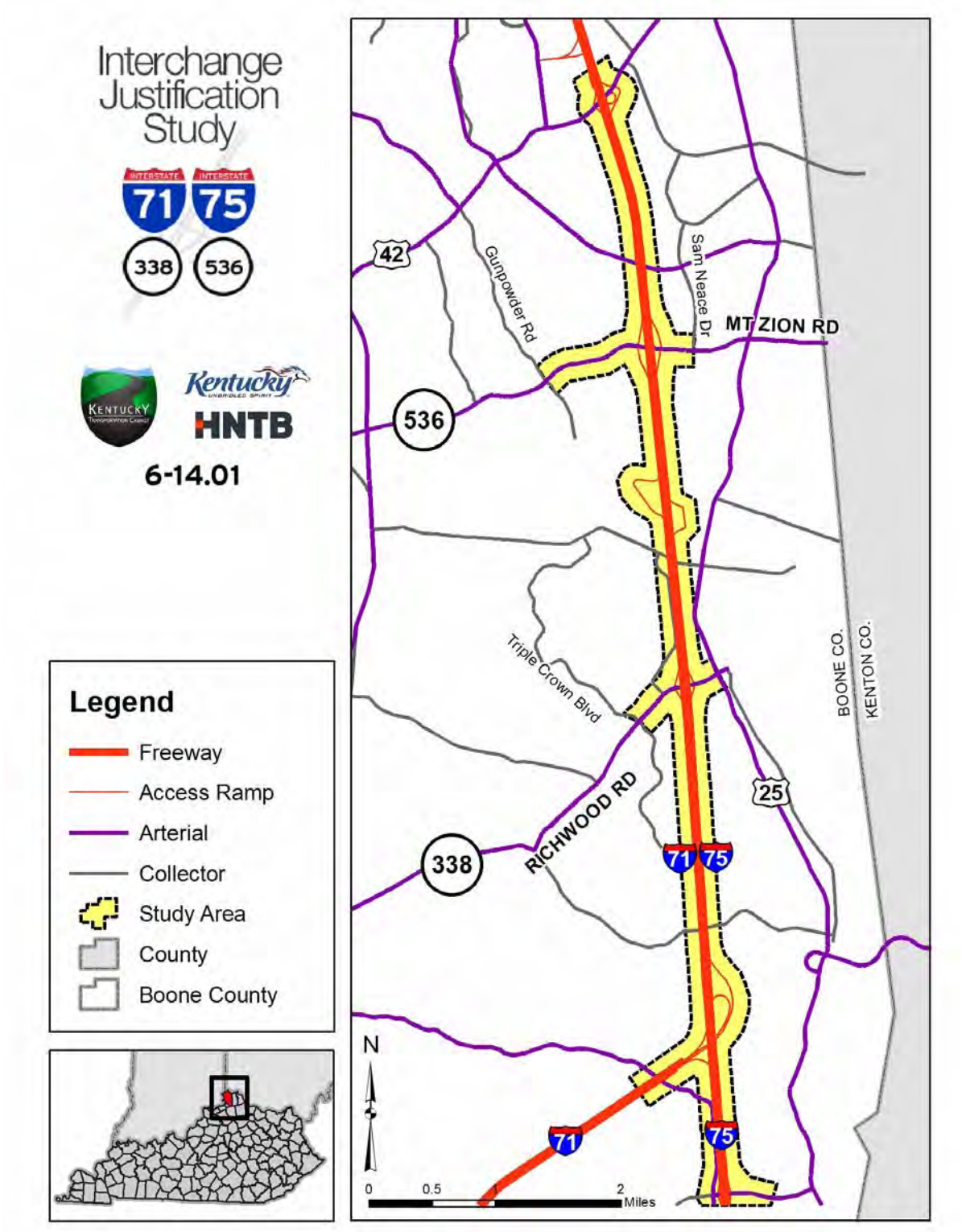


Figure 1: Project Study Area

FIGURE 2. (1 of 3) EXISTING LAND USE MAP

Sheet 1 of 3

Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

Legend

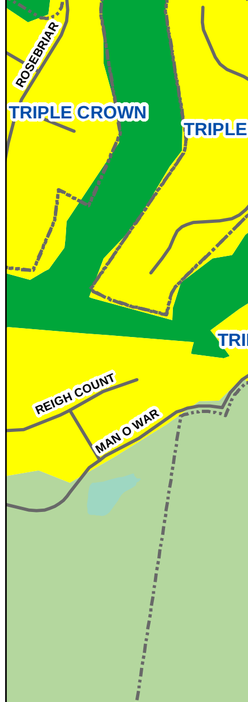
- Freeway
- Access Ramp
- Arterial
- Collector
- Local
- INDUSTRIAL
- COMMERCIAL
- URBAN/SUBURBAN DENSITY RESIDENTIAL
- RURAL DENSITY RESIDENTIAL
- PUBLIC/INSTITUTIONAL
- RECREATIONAL
- WOODLAND
- AGRICULTURAL
- TRANSPORTATION
- Railroad
- City Jurisdiction
- Subdivision
- Water Body

0 500 1,000 2,000 Feet

3

MOSBYS POINT
MELINDA
KENTUCKY AIRE ESTATES
DEBBIE
MICHAEL
VILLA
OLD LEXINGTON VILLAS
DEER TRACE
BUCK
DEER TRACE
ENTERPRISE V
BRITTANY
SOUTHAMPTON ESTATES
HEMPSTEADE
CALAVA
JASONS BLUFF
CEDARWOOD
WILD CHERRY
SHAGY BARK
DEVONSHIRE
CHESHIRE RIDGE
ELYSE
CEDARWOOD VILLAGE
CHESHIRE RIDGE
BUCKSHIRE
ASH CREEK
OAK RIDGE
KENT
UNION STATION
STATION
STORK RESUB
MAHER
ROSEBUD
HOWE ACRES
WALNUT RIDGE
DIXIE
TONYA
TREE LANE
HAMLET
STRATFORD
DONORA
FROGTOWN
HOLT PLACE
HOLT
SONNYS LAND DIVISION
MASTERS
TRIPLE CROWN
TRIPLE CROWN
PIMLICO PARK
3060
LOWER
UPPER
CLYDESDALE
TRIPLE CROWN
LAURIN
MEADOW STABLE
SECRETARIAT
TRIPLE CROWN
SILVER CHARM
FILLY
WITHERS
CALLE MARGARETTE
CALLE VICTORIA
RICHWOOD VILLAS
FROGTOWN CONNECTOR
DUFFEL
APPALOOSA
YEARLING
MUSTANG
TRIPLE CROWN
OMAHA
CHARISMATIC
HERITAGE TRAILS
CARBON
PAPER
SHORLAND
DURO
RICHWOOD INDUSTRIAL PARK
TRIPLE CROWN
FITZSIMMONS
GALLANT FOX
PADDOCK
STIRRUP
RICHWOOD COMMONS EAST
WINNING COLORS
OLD RICHWOOD
ROSEBRIAR
TRIPLE CROWN
TRIPLE CROWN
TRIPLE CROWN
LOFTUS
COUNT FLEET
TRIPLE CROWN
FRONTAGE
RICHWOOD PARK COMMERCIAL
CLAY
TRIPLE CROWN
LONGDEN
REIGH COUNT
MAN O WAR
RICHWOOD RD
OLD LEXINGTON
338
LEGENDS
FURLONG
OVERLAND
STEEPLECHASE
TRIFECTA
MARVIN PARK
CANTERING HILLS
MAIDEN
AINTREE
STEEPLECHASE
SUTHERLAND
WESSEX
SUTHERLAND
TERMAR
SAVANAH
COVENTRY
FOINAVON
RADNOR
QUEENS CUP
FOXHUNT
GRAND NATIONAL
WOODED KNOLL
FRINGE TREE
ALBRIGHT
WEXFORD
SHEFFIELD
CHATSWORTH
TRUMPETER
SHEFFELD
TRANSPORT
LOGISTICS
75
PARK SOUTH AT RICHWOOD
KENSINGTON
CUMMINGS SUBDIVISION
RES #2
RICHWOOD COUNTRY ESTATES
JAMES
SCHMIDT
WINCHESTER
GOLD CUP
WYNFAIR
CHESTER
25

Sheet 2 of 3



Interchange Justification Study

71 75 338 536

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

HNTB

Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Local
- INDUSTRIAL
- COMMERCIAL
- URBAN/SUBURBAN DENSITY RESIDENTIAL
- RURAL DENSITY RESIDENTIAL
- PUBLIC/INSTITUTIONAL
- RECREATIONAL
- WOODLAND
- AGRICULTURAL
- TRANSPORTATION
- Railroad
- City Jurisdiction
- Subdivision
- Water Body

FIGURE 2. (2 of 3) EXISTING LAND USE MAP

0 500 1,000 2,000 Feet

FIGURE 2. (3 of 3) EXISTING LAND USE MAP

Sheet 3 of 3



Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

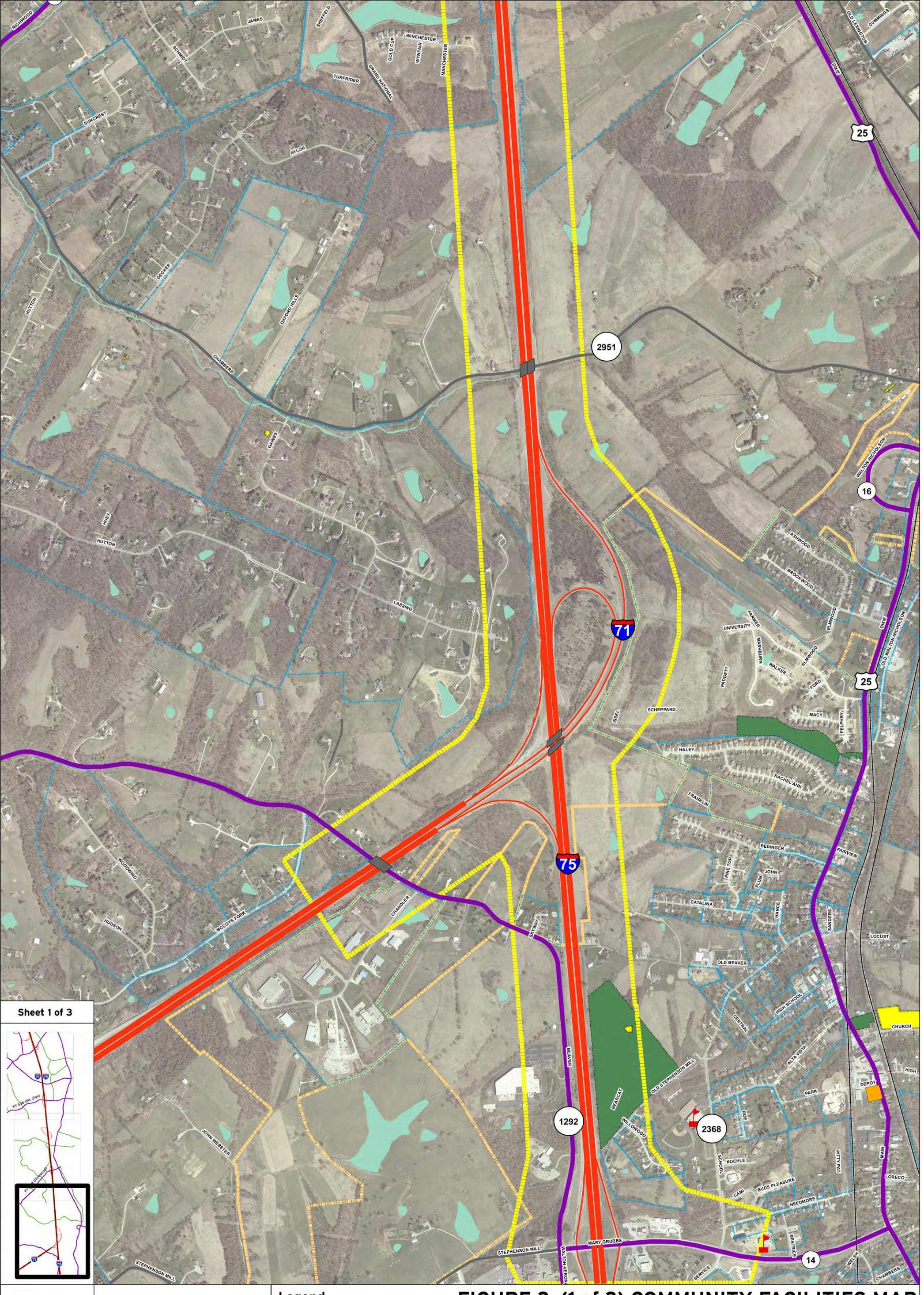
Kentucky Unbridled Spirit

HNTB

Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Local
- INDUSTRIAL
- COMMERCIAL
- URBAN/SUBURBAN DENSITY RESIDENTIAL
- RURAL DENSITY RESIDENTIAL
- PUBLIC/INSTITUTIONAL
- RECREATIONAL
- WOODLAND
- AGRICULTURAL
- TRANSPORTATION
- Railroad
- City Jurisdiction
- Subdivision
- Water Body

0 500 1,000 2,000 Feet



Sheet 1 of 3

Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

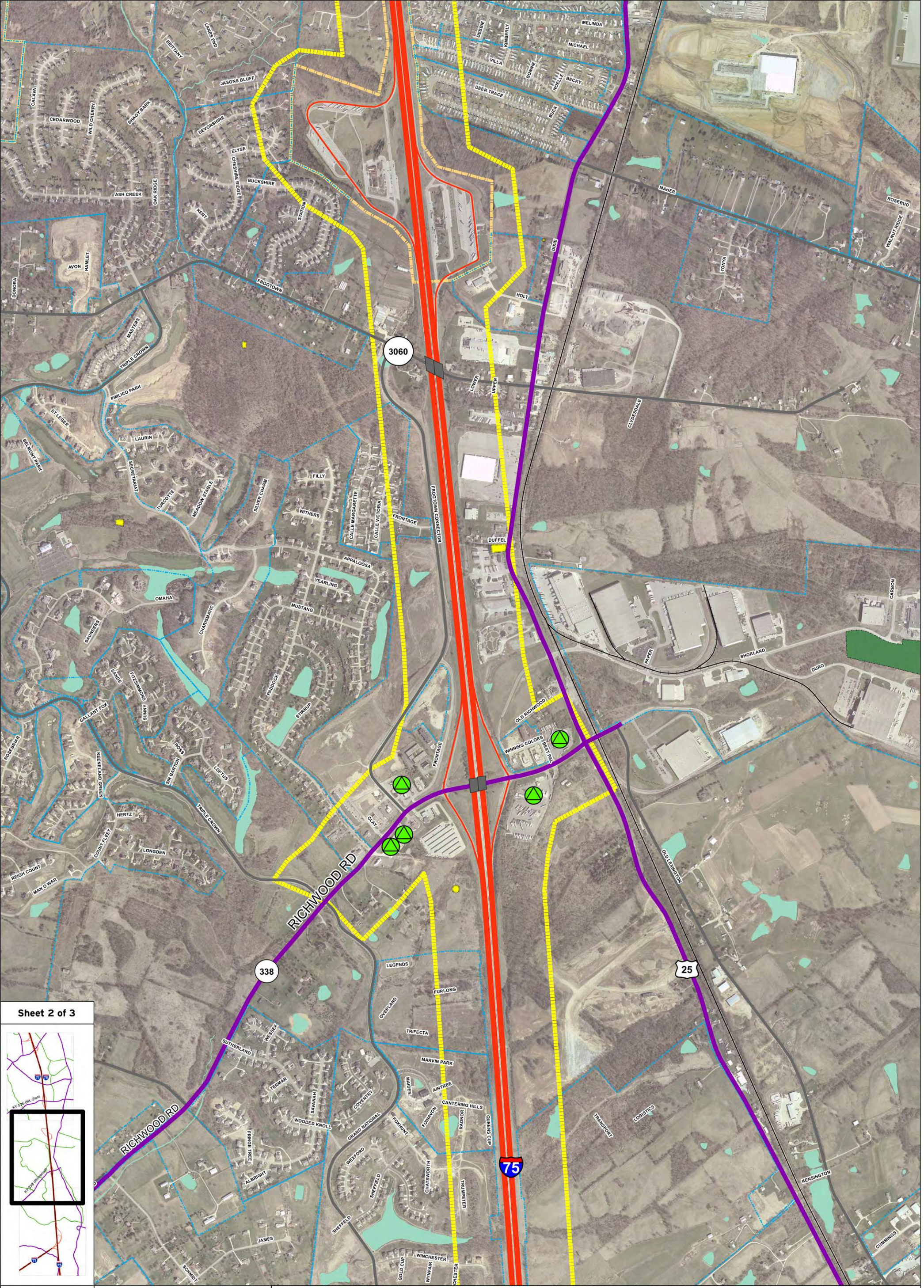
Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Park
- Cemetery
- Library
- School
- Identified Hazardous Materials

FIGURE 3. (1 of 3) COMMUNITY FACILITIES MAP

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0 500 1,000 2,000 Feet



Sheet 2 of 3

Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

Legend

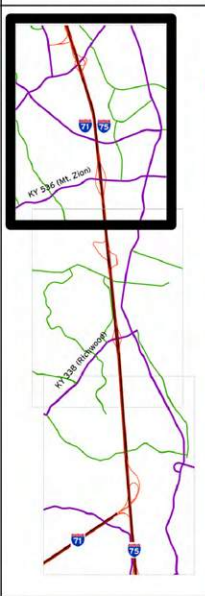
- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Park
- Cemetery
- Library
- School
- Identified Hazardous Materials

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FIGURE 3. (2 of 3) COMMUNITY FACILITIES MAP

Sheet 3 of 3



Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

FIGURE 3. (3 of 3) COMMUNITY FACILITIES MAP

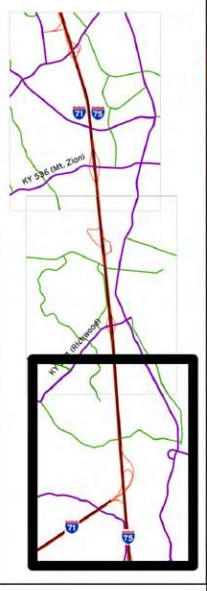
Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Park
- Cemetery
- Library
- School
- Identified Hazardous Materials

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0 500 1,000 2,000 Feet

Sheet 1 of 3



Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

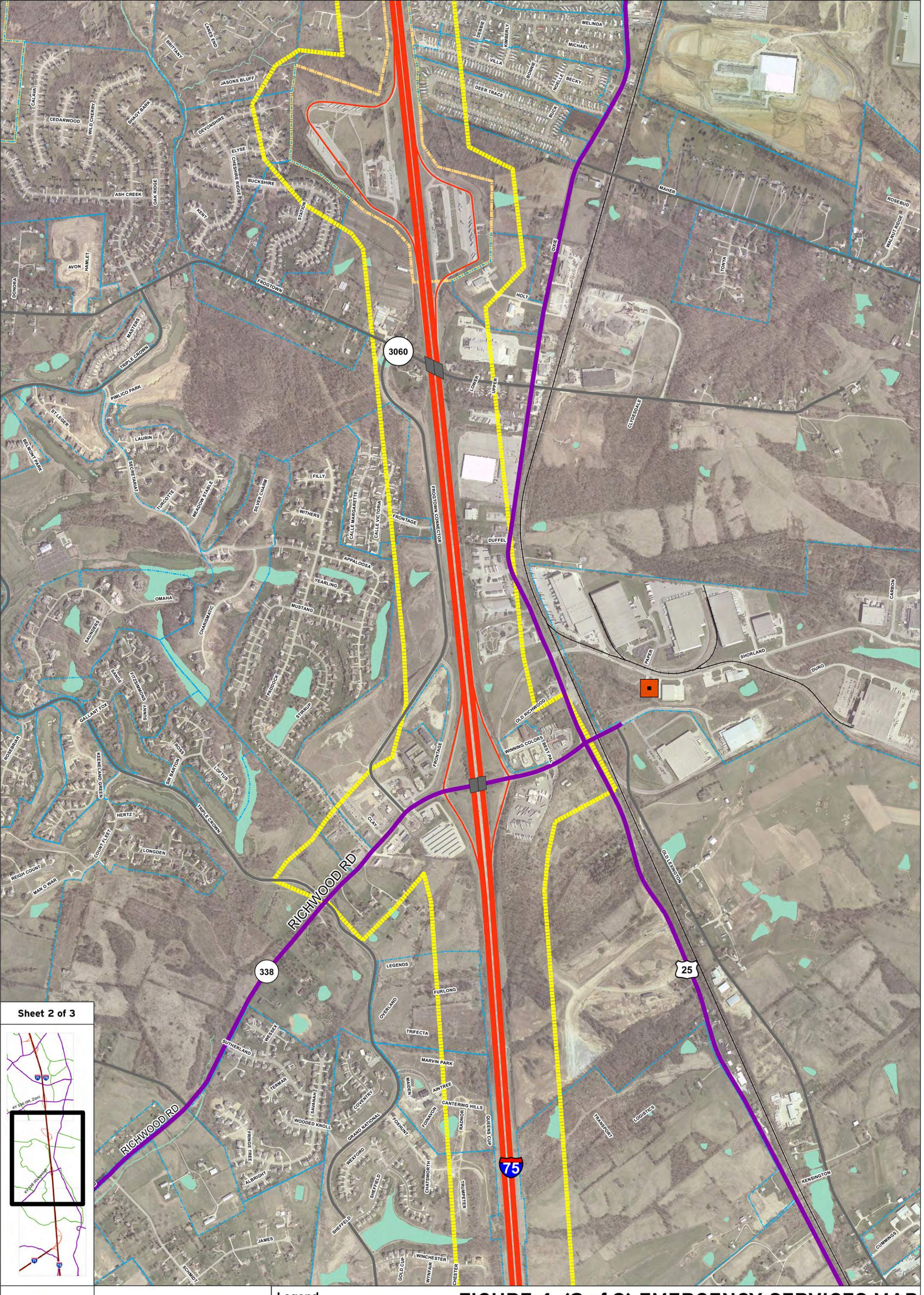
Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Medical Building
- Fire Station
- Police Station

FIGURE 4. (1 of 3) EMERGENCY SERVICES MAP

N

0 500 1,000 2,000 Feet



Sheet 2 of 3

Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

Legend

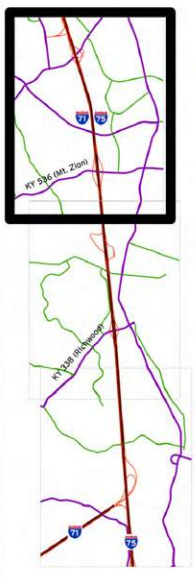
- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Medical Building
- Fire Station
- Police Station

FIGURE 4. (2 of 3) EMERGENCY SERVICES MAP

0 500 1,000 2,000 Feet

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Sheet 3 of 3



Interchange Justification Study

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KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

HNTB

Legend

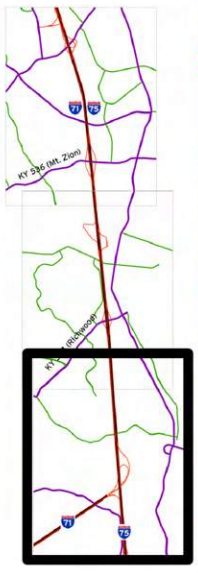
- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Water Body
- Medical Building
- Fire Station
- Police Station

FIGURE 4. (3 of 3) EMERGENCY SERVICES MAP

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Sheet 1 of 3



Interchange Justification Study

71 75

338 536

Kentucky Transportation Cabinet

Kentucky UNBRIDLED SPIRIT

HNTB

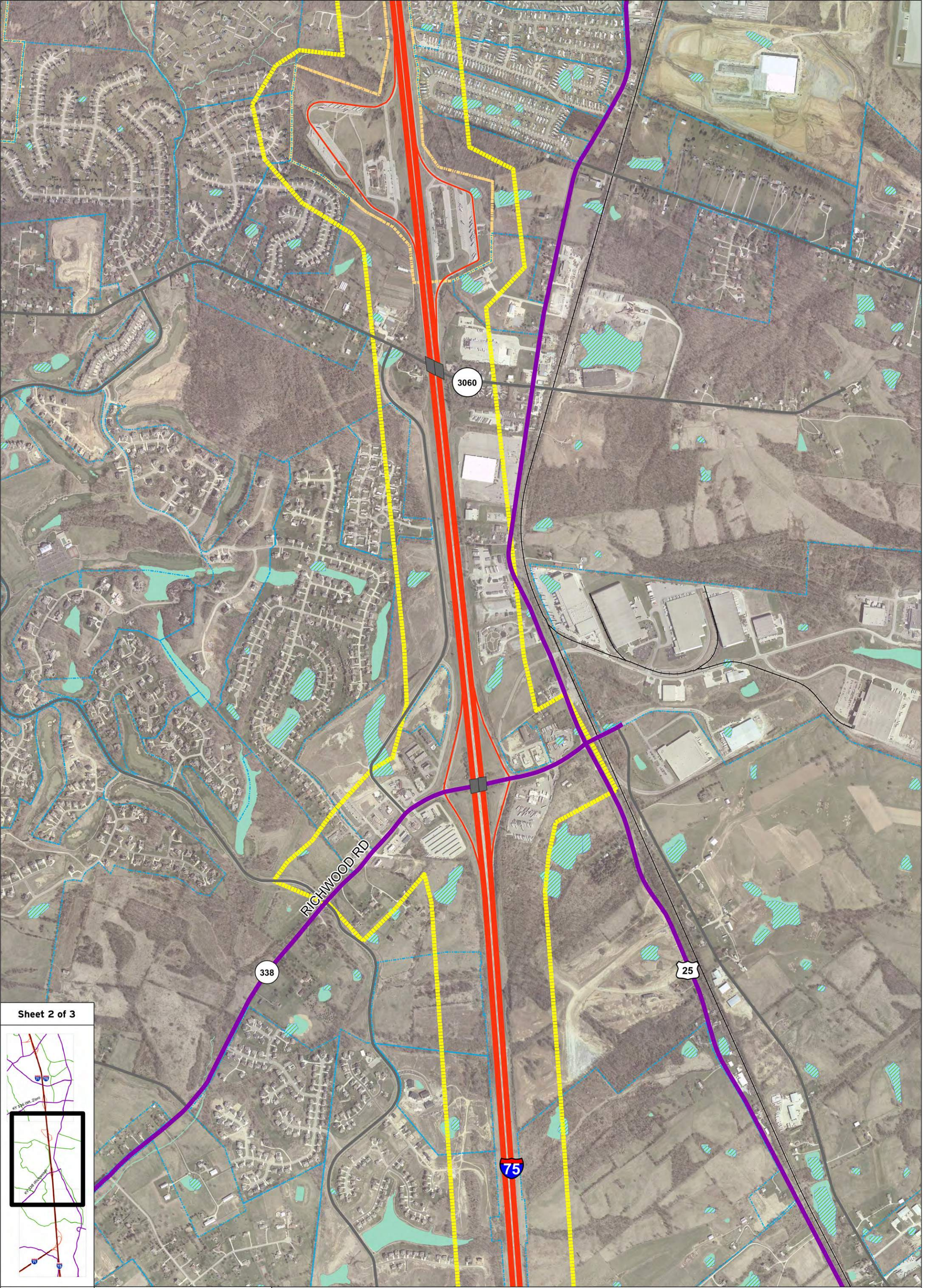
Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Floodplain
- Wetlands
- Water Body

FIGURE 5. (1 of 3) FLOODWAYS AND FLOODPLAINS MAP

0 500 1,000 2,000 Feet

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Sheet 2 of 3

Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

Legend

- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Floodplain
- Wetlands
- Water Body

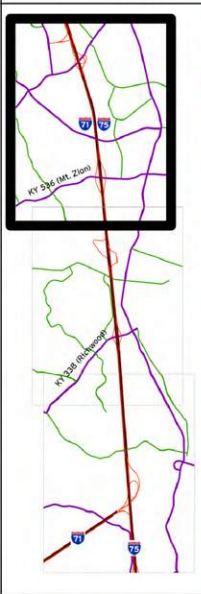
FIGURE 5. (2 of 3) FLOODWAYS AND FLOODPLAINS MAP

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FIGURE 5. (3 of 3) FLOODWAYS AND FLOODPLAINS MAP

Sheet 3 of 3



Interchange Justification Study

71 75 338 536

Kentucky Transportation Cabinet

Kentucky Unbridled Spirit

HNTB

Legend

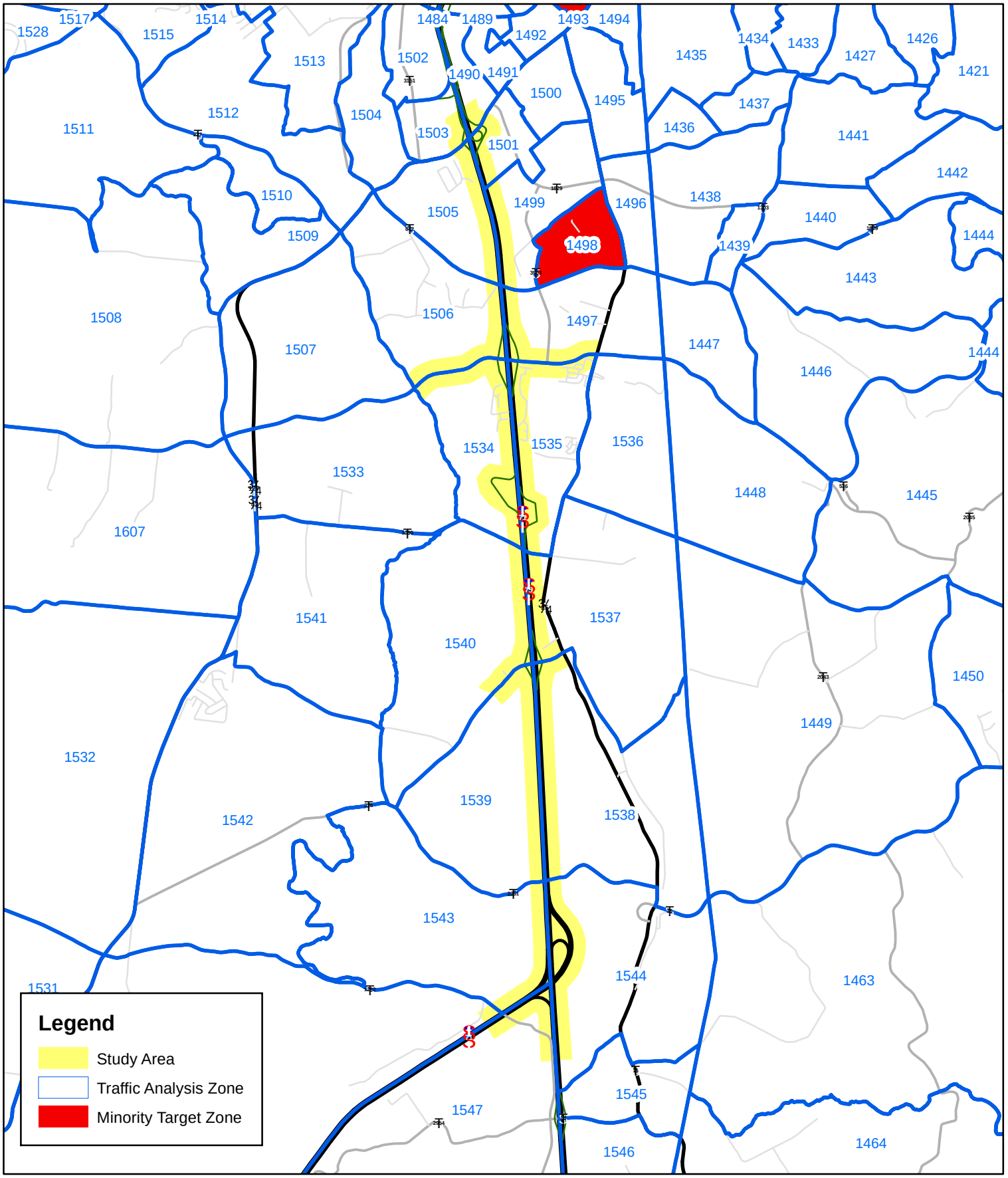
- Freeway
- Access Ramp
- Arterial
- Collector
- Railroad
- Study Area (Appr.)
- City Jurisdiction
- Subdivision
- Floodplain
- Wetlands
- Water Body

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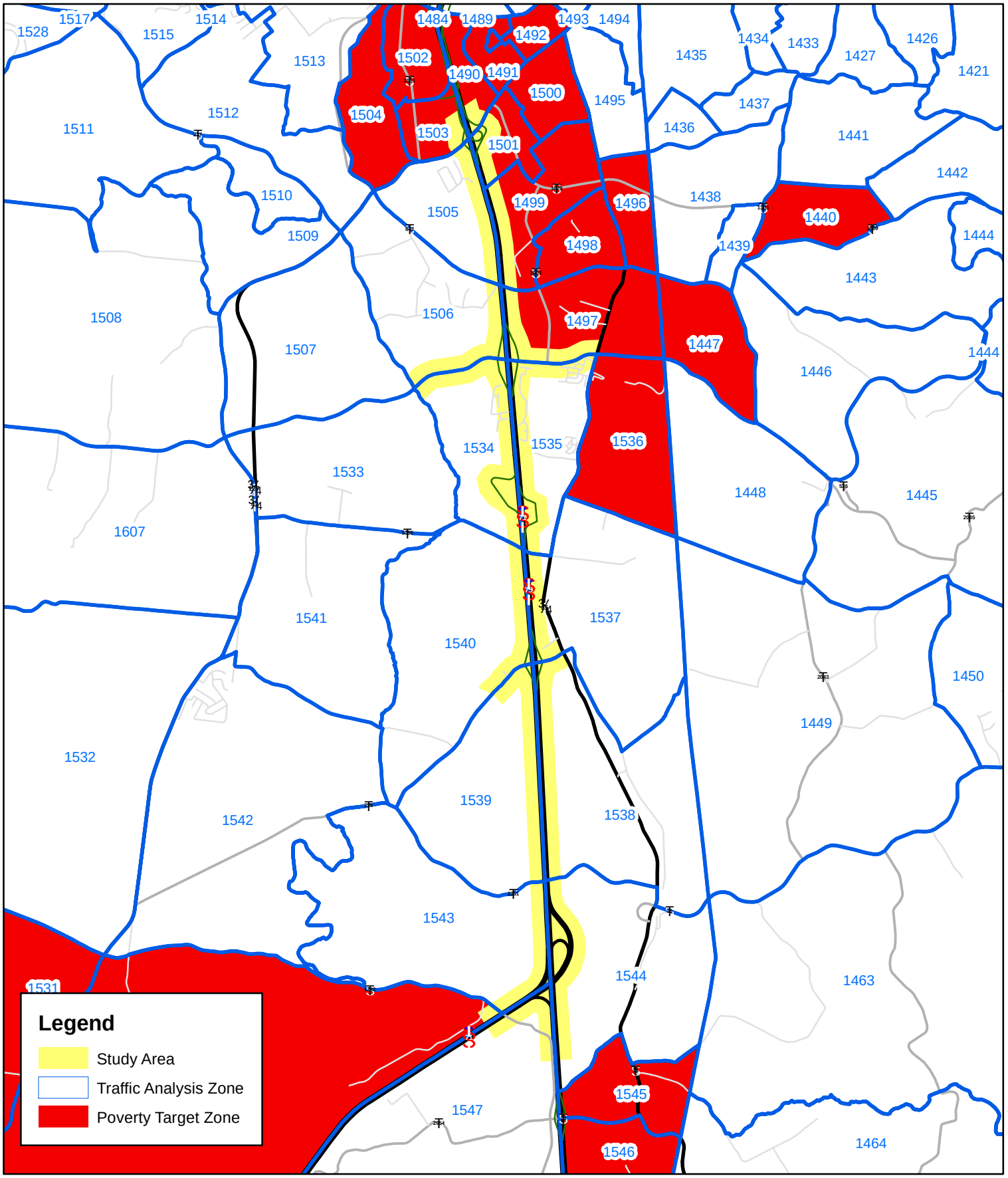
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Appendix 2 – Environmental Justice Analysis by Target Analysis Zones

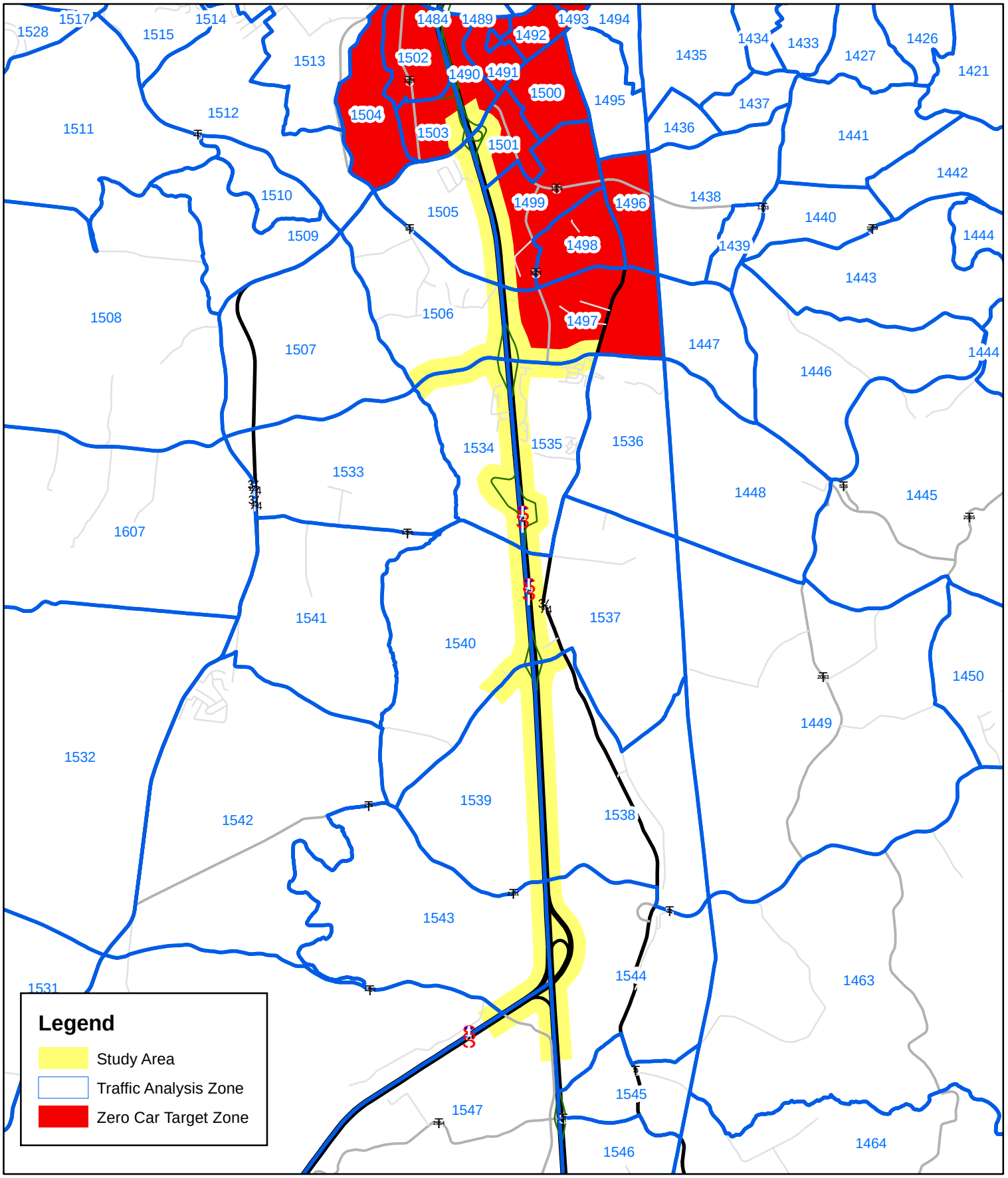
Target Zones for Minority Population in I-71/I-75 Corridor



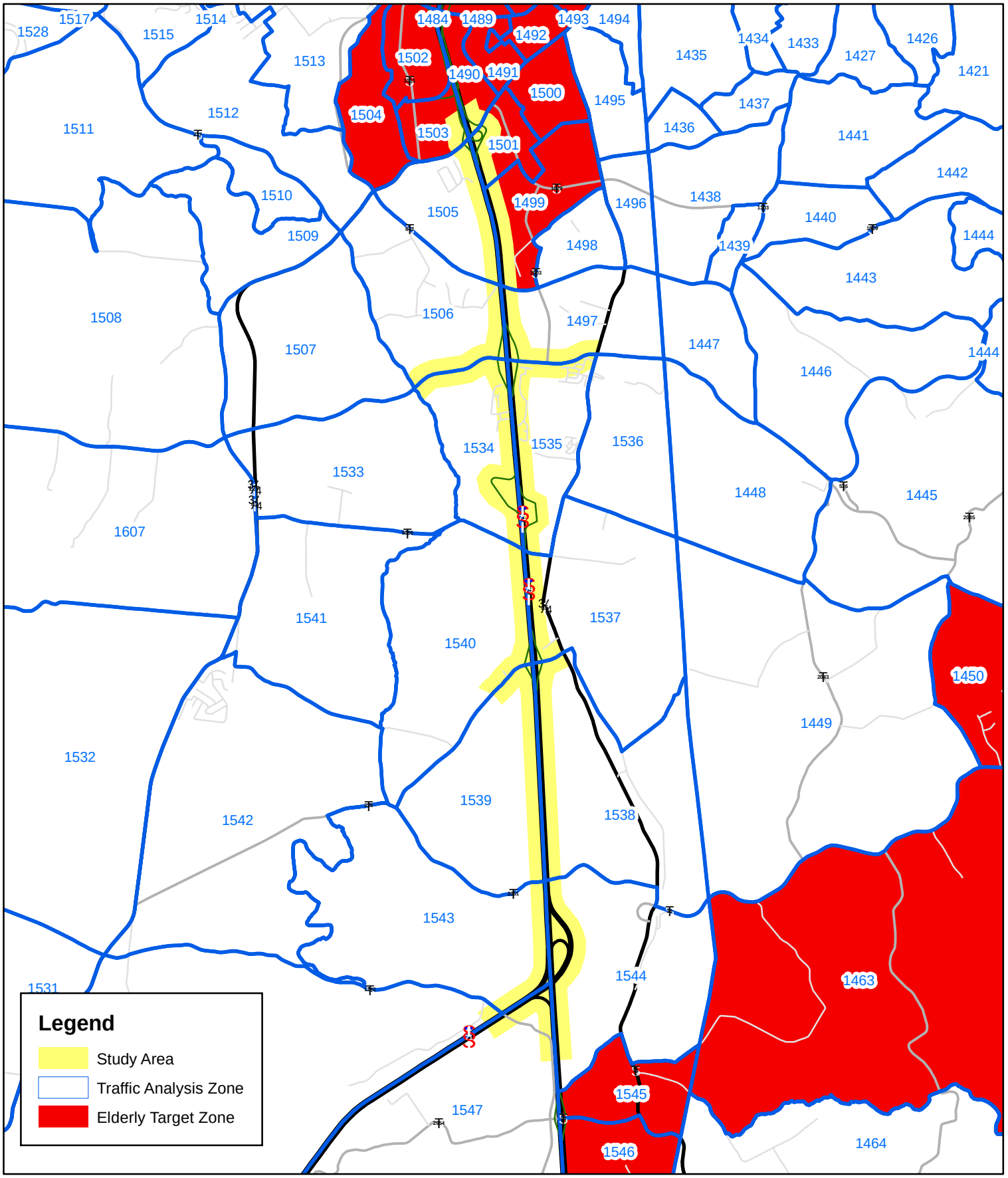
Target Zones for Population in Poverty in I-71/I-75 Corridor



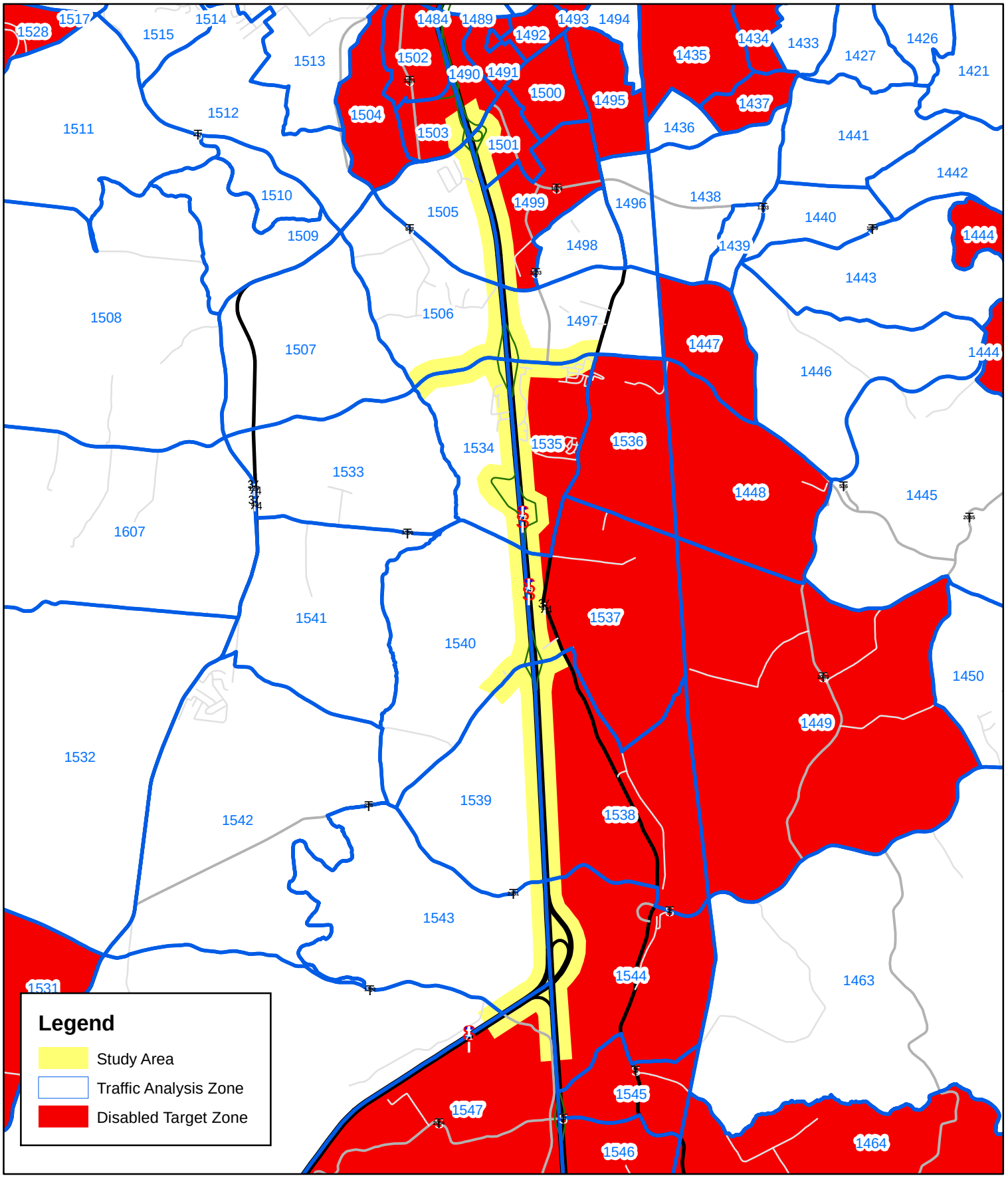
Target Zones for Zero Car Households in I-71/I-75 Corridor

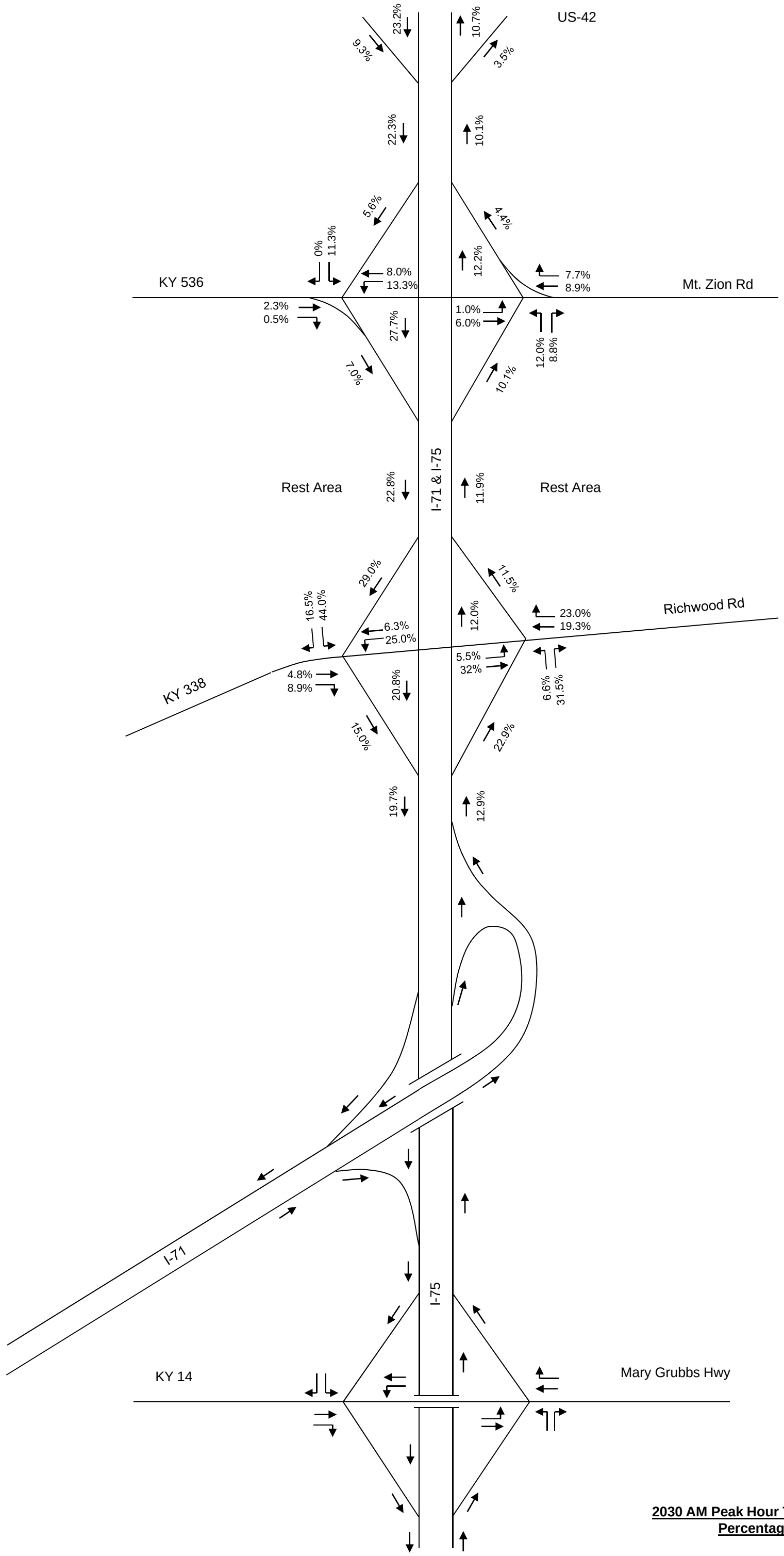


Target Zones for Elderly Population in I-71/I-75 Corridor

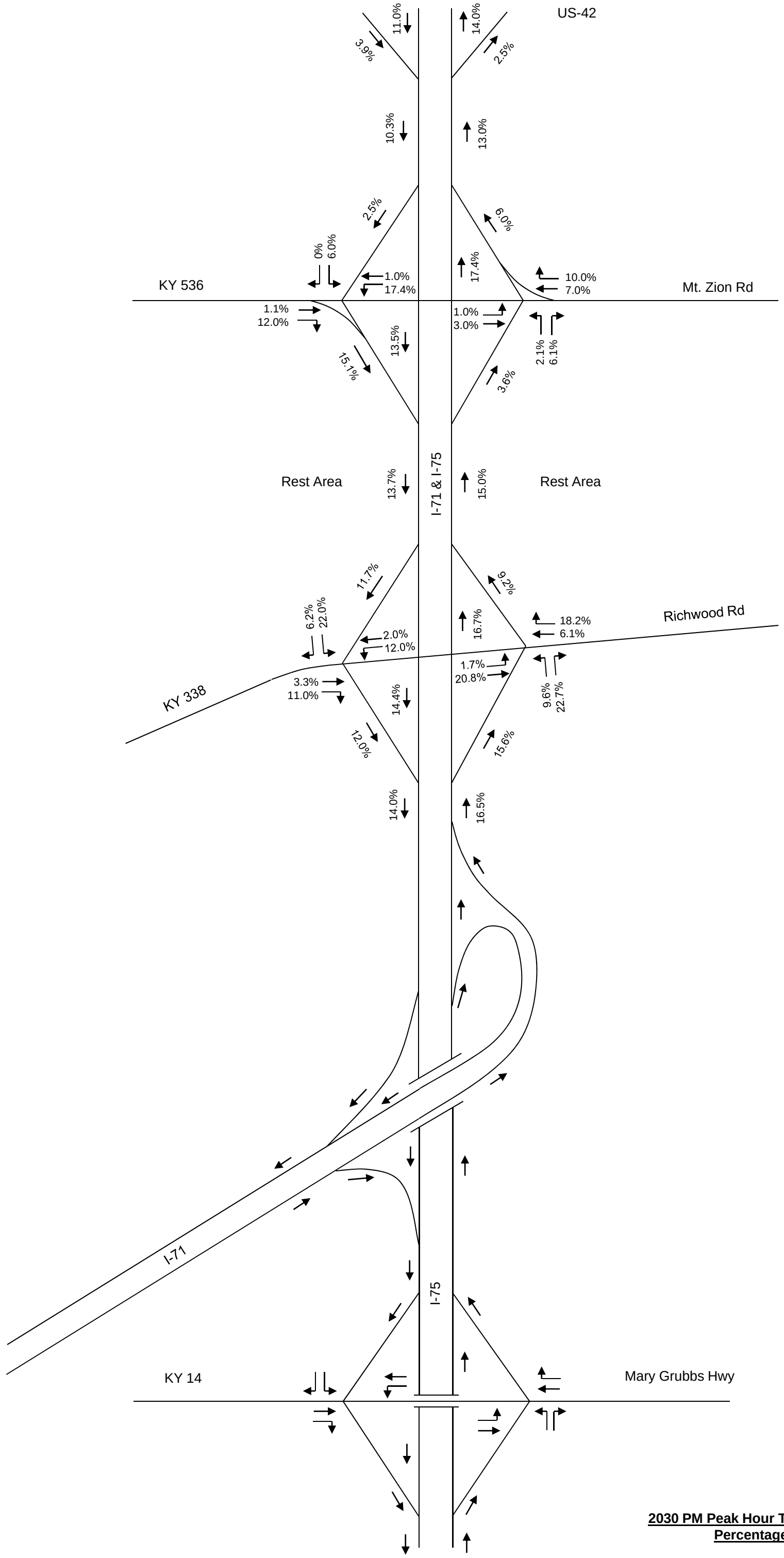


Target Zones for Population with Disabilities in I-71/I-75 Corridor





2030 AM Peak Hour Truck Traffic Percentages



2030 PM Peak Hour Truck Traffic Percentages

MEETING DOCUMENTATION

Project 6-14.01 I-71/75 Interchange Justification Study **Job #** 42560

Meeting Location KYTC D6 Office **Meeting Date** April 30, 2007

Subject Stakeholders Advisory Council

Attendees

Jim Brannon (KYTC)
Stan Lampe (N.KY Chamber of Commerce)
Paul Verst (Citizen Advisor- Verst Group Logistics)
Bob Townsend (City of Florence)
Kevin Costello (Boone County Planning Commission)
Andrew Aiello (TANK)
Rob Hans (KYTC)
Andy Reser (OKI)
Greg Sketch (Boone County)
Dan Tobergte (N.KY Tri-Ed)
Jeff Earlywine (Boone County Fiscal Court)
Dave Geohegan (Boone County Planning)
Chip Wood (Citizen Advisor– Duke Energy)
Gary Moore (Boone County)
Mike Bezold (KYTC)
Carol Callan-Ramler (KYTC)
Stacee Hans (KYTC)
Bill Madden (KYTC)
Brad Eldridge (KYTC)
Cindy Minter (HNTB)
John Moss (HNTB)
Katie Ott (HNTB)
David Yeiser (HNTB)

Invitees who did not attend

Don Kirby (City of Union)
Dennis Gordon (Northern Kentucky Area Planning Commission
Philip Trzop (City of Walton)
Jose Sepulveda (FHWA)
James Kazmierczak (Norfolk Southern)
Gary Bentle (Citizen Advisor – Boone County)
John Maher (Citizen Advisor – Union)

MEETING MINUTES

The first meeting with the Stakeholders Advisory Council (SAC) was held on April 30, 2007, from approximately 4 p.m. to 5:45 p.m. at Gateway Community and Technical College off of Mt. Zion road. There were twenty-two (22) people in attendance.

INTRODUCTIONS

Carol Callan-Ramler opened by welcoming everybody to the first SAC meeting for the Interchange Justification Study (IJS) for the interchanges of KY 536 (Mt. Zion Road) and KY 338 (Richwood Drive) at I-71/75.

She explained why the attendees were selected to be part of the SAC and why the area was chosen by the Kentucky Transportation Cabinet (KYTC) for study. She then explained the purpose of an IJS and clarified that an IJS in the past was for new access points and that a modification to an interchange used to be called an Interchange Modification Study (IMS) or Interchange Modification Report (IMR). However, the terminology was changed by the Federal Highway Administration (FHWA) and now an IJS includes all types of these interchange studies.

She further explained that the final changes recommended by the KYTC must be approved by the FHWA who has a vested interest in maintaining the traffic efficiency of I-75.

Carol clarified the study area of the project and noted that due to the high traffic and safety concerns in the area the KYTC is prepared to promptly implement the determined solutions once funding has been secured. She highlighted the fact that no new interchange is being considered due to space constraints. She then explained that HNTB Corporation was selected by the KYTC to assist in the IJS. She concluded her introductory comments by explaining the purposes of the meeting:

1. Introduce the project and the project team to the SAC, and
2. Share what the KYTC and HNTB have gathered and seek concurrence with the data.

After Carol had finished her portion of the presentation she asked the attendees to introduce themselves, explain their connection to the project area, and provide one issue from the area that concerns them. The list of issues and concerns included:

- Increased truck traffic,
- Mainline backups,
- Traffic efficiency,
- Ability for local traffic to move North/South without using the Interstate
- Keeping pace with the rest of the region
- Growth and congestion in the area
- Traffic on US 25
- Rising costs due to project delay

- Planned development in the area (2100 acres)
- Improving quality of life
- Importance of East/West connector
- Funding
- Interchanges serving Kenton County
- Development

Carol explained that the project team had an internal meeting to discuss issues in the region and that it was good to hear the same things being said by the SAC. Carol then introduced Cindy Minter, Katie Ott and John Moss (all of HNTB) and handed over the presentation to Cindy Minter.

PROJECT OVERVIEW

Cindy began by discussing the timeline for the IJS; the project study area; and other projects that are occurring, or are scheduled to occur, in or near the project area. Population and employment numbers were presented for Boone County. It was suggested that Kenton County statistics should be included in the study with regard to employment and population growth. The project team explained that for the traffic models the data used was regional and not solely Boone County. It was also noted by a member of the SAC that the displayed numbers had been updated by the U.S. Census Bureau.

Cindy then went over existing land use and zoning in the area and the existing community facilities. She also summarized the environmental justice issues in the project study area. She explained that an Environmental Overview was being prepared that will serve as a "red flag" review to aid in determining if there are issues in the project area that warrant further study.

A member of the SAC added that there had been some Environmental tasks performed previously when the Mt. Zion interchange had been built, such as cemetery relocations. He also noted that there is flooding that occurs at Mt. Zion road due to the current interchange configuration at I-71/75. The project team was not aware of this flooding issue and made note of it for future consideration when designing the alternatives.

Cindy, lastly, went over the transportation infrastructure and characteristics of the region noting the Transit Authority of Northern Kentucky (TANK) operations and the active rail line near the project corridor.

Andrew Atello, of Transit Authority of Northern Kentucky (TANK), mentioned that they provided standard commuter services in the morning and thought that this project would be a good opportunity for TANK to learn about employer's needs in the area.

After Cindy finished with her portion of the presentation she introduced Katie Ott, who presented the traffic and crash data.

Katie explained that traffic operation is commonly measured using level of service (LOS). She pointed out that the attendees had handouts in the provided folders that explained LOS further. She explained that it measures motorists perception of traffic with a LOS A defined as no delays and the ability for motorists to move as desired and a LOS F being total failure of the traffic network.

She further explained that for urban areas an LOS D is generally acceptable and that the project area is being classified as urban. Carol made the attendees aware that the objective of the alternatives derived in the study is to provide a LOS C. Cost will be one of the determining factors and if providing LOS C service becomes too cost prohibitive, LOS D will be acceptable. Katie confirmed this by saying that an LOS C is ideal, but not always financially feasible.

While Katie was explaining the handouts in the presentation, it was asked why the southbound exit ramp intersection with Mt. Zion Road was listed as an LOS C when at times there would be backup to Gunpowder Road and wondered if the model should be showing it at worse conditions. Carol explained that she had the same reaction when HNTB first showed her the model, but that the model showed an average of the four approaches to an intersection. So if two approaches are heavily congested but the other two are relatively free flowing then the intersection as a whole will be shown as average.

Another question regarding the traffic model was raised regarding if trucks operated the same as cars in the traffic model. Katie explained that trucks are analyzed differently than cars and are input into the model using a percentage of total traffic volume. She also noted that she would review the truck percentages due to their high volume observed in the field and confirm that the percentages the project team is using reflects the observed conditions.

Mike Bezold, of the KYTC, proposed that the model should show the LOS for the individual approaches instead of the intersection average to eliminate confusion. The project team concurred and made note of this change.

After the LOS discussion, Katie presented the crash data to the SAC for the three main corridors in the project area: I-71/75, Richwood Road, and Mt. Zion Road. The crash rates are significantly higher than the statewide average at Richwood Road and Mt. Zion, so this was highlighted.

Further explanation of the crash rates was requested. There was a discussion regarding how the statewide average crash rate is calculated and the meaning of the units of the crash rates, million vehicle miles (MVM). Rob Hans, of the KYTC, proposed that the crashes be shown in terms of critical rate factors (CRF), which shows the multiple of the crash rate with respect to the statewide average, instead of MVM. The project team noted this recommendation.

Katie then presented the types of crashes that were occurring in the area and noted the unusual number of backing crashes along the Richwood Road corridor. It was speculated by a member of the SAC that this may be due to trucks rolling backwards on grade when starting their vehicles.

After Katie finished her presentation on traffic and crash rates and offered to show the traffic model during the working break, she turned the meeting over to John Moss.

John introduced himself and explained the Purpose and Need Statement and how it guides the design process of the alternatives. He further explained that the project team had previously had an internal meeting to create a Draft Purpose and Need Statement, but he wanted to allow the SAC to offer their suggestions on improving this statement.

He then led the meeting into the working break and explained to the attendees how there were five boards around the room on the topics of Safety, Traffic, Cost, Construction and Environmental. The attendees were instructed to review these boards and add any concerns or issues that were not already listed. It was noted that this exercise was specifically for problems and not solutions.

After the working break the notes written on the boards were read aloud and briefly discussed, if necessary. A summary of these boards are attached at the end of these minutes. Next John read the current Draft Purpose and Need Statement and then opened the floor for comments.

Stan Lampe, of the N.KY Chamber of Commerce, provided a comment regarding the last bullet in the Draft Purpose and Need Statement as he thought it may be a hindrance to moving the project forward with the issue of funding. He added that the project team needed to be bold on funding issues and that the problems will only get worse and more costly to fix. Judge Moore added that money issues should not limit the solutions and that the project team should not let it stand in the way. Stan Lampe further

noted that the alternatives should be visionary and cited the example of when the Brent Spence Bridge was built. The project team committed to reworking the final bullet in the Draft Purpose and Need Statement.

The SAC questioned in the first sentence of the Draft Purpose and Need Statement where it states the purpose of the project is to improve transportation safety if it should be more specific, such as adding a LOS level to the verbiage. The project team stated that they did not want to put a specific LOS in the statement, but that they would reword that particular passage of the Purpose and Need Statement.

John then gave the meeting back to Carol for wrap up.

Before Carol concluded the meeting there was a brief discussion on adding access management implementation into the project. Jim Brannon asked if there were any opportunities to include access management at either Mt. Zion Road or Richwood Road. There was a general consensus that while this was a good practice, it was outside of the scope of the project.

Carol told the attendees they would receive draft meeting minutes of the SAC meeting for their review and asked if they would fill out the comment forms included in their folders before they left. She thanked Gateway Community and Technical College for their generosity in lending the space for the meeting and thanked the attendees for their participation.

As part of the closing comments, Judge Moore said that he would like to see more citizens of the project area included in the SAC. The project team concurred, and while some of the citizens invited were not able to attend, they committed to inviting more.

Attachments: Sign-in Sheet
Issue Boards
Slides presented at the meeting

The foregoing constitutes our understanding of the matters discussed and the conclusions reached. If there are any questions, corrections, omissions, or additional comments, please advise the author within five working days after receipt of these minutes.

MEETING DOCUMENTATION

Project 6-14.01 I-71/75 Interchange Justification Study **Job #** 42560

Meeting Location KYTC D6 Office **Meeting Date** July 18, 2007

Subject Stakeholders Advisory Council

Attendees

Greg Sketch (Boone County)
Kevin Costello (Boone County Planning Commission)
John Maher (Citizen Advisor – Union)
Gary Moore (Boone County)
Rob Hans (KYTC)
Chip Wood (Citizen Advisor)
Jeff Earlywine (Boone County Fiscal Court)
Andrew Aiello (TANK)
Jim Brannon (KYTC)
Gary Bentle (Citizen Advisor)
Bob Koehler (OKI)
Paul Verst (Citizen Advisor)
Stan Lampe (N.KY Chamber of Commerce)
Dennis Gordon (Northern Kentucky Area Planning Commission)
Bill Madden (KYTC)
Bob Townsend (City of Florence)
Mike Jaspers (KYTC)
Carol Callan-Ramler (KYTC)
Dave Geohegan (Boone County Planning Commission)
Brad Eldridge (KYTC)
Mike Bezold (KYTC)
Mary Murray (FHWA)
Cindy Minter (HNTB)
John Moss (HNTB)
Katie Ott (HNTB)
George Mohan (HNTB)
Lillian V. Gonzalez (HNTB)
Todd Willis (HNTB)

MEETING MINUTES

The second meeting with the Stakeholder Advisory Council (SAC) was held on July 18, 2007, from approximately 4 p.m. to 6:10 p.m. at Gateway Community and Technical College off of Mt. Zion Road. There were twenty-eight (28) people in attendance.

INTRODUCTIONS

Carol Callan-Ramler opened by welcoming returning and new members to the second SAC meeting for the Interchange Justification Study (IJS) for the I-71/I-75 at KY 536 (Mt. Zion Road) and KY 338 (Richwood Drive) interchanges. She asked the attendees to introduce themselves and all attendees stated their names and the organization with which they were associated.

She provided an overview of the cost, schedule and project highlights of the Dixie Highway project, which include two (2) single-point urban interchanges (SPUI) and six (6) frontage roads. She further explained that this IJS would take into consideration the Dixie Highway project.

Carol then introduced Cindy Minter and handed over the presentation to her.

PURPOSE AND NEED

Cindy began by pointing out that the Richwood Road alternative #2 figure had changed since the SAC members received copies of the alternatives figures and that each member had a copy of the revised figure in front of them. Cindy then presented the revised purpose and need, which addressed comments that were presented at the first SAC meeting. The revised purpose and need included the following additions:

- "…corridor while appreciably improving the functionality and safety of the interchanges at Mt. Zion Road."
- "In addition, the preferred design alternative should be consistent with other modal connections established for the area."
- "Improvements shall be prioritized and evaluated in consideration of potential funding strategies balanced with the effectiveness of the selected operational efficiency and safety improvements to the transportation network."

Cindy asked the SAC to review the revised purpose and need and provide comments. No SAC members provided comments so Cindy let the SAC members know they could contact Carol Callan-Ramler, John Moss, or Cindy Minter of they have comments in the future. She went over the schedule and let

everyone know that the third SAC meeting would be in mid-September and the IJS is scheduled to be submitted to FHWA in November.

ALTERNATIVES EVALUATION CRITERIA

Cindy then explained in detail the evaluation criteria that are considered for interchange alternatives during the IJS. The evaluation criteria include:

- Financial Measures
    - Construction Costs
    - Right of Way Costs
- Safety Benefits
    - Improvements to High Accident Locations
    - Acceleration
    - Conflict Points
    - Improves Incident Management
- Levels of Service/Mobility
    - Improves Travel Time (Capacity Constraints)
    - Freeway and Local LOS & V/C
    - Suitable Local & Interstate Truck Access
- Design
    - Efficient with Heavy Truck Volumes
    - Meet Current Design Standards
    - Provides for Pedestrians
- Socioeconomic/Environmental
    - Relocations
    - Access to/from Community & Emergency Facilities
    - Natural Areas
    - Noise/Air Quality
    - Access to Public Transportation
- Equity (Environmental Justice)
    - Equitable Distribution of Benefits and Impacts
- Implementation
    - Schedule
    - Maintain Traffic on I-71/I-75, KY 536 & KY 338

Cindy then introduced John Moss and handed over the presentation to him.

OVERVIEW OF INTERCHANGE ALTERNATIVES

John Moss provided a brief overview of the five (5) Richwood Road interchange alternatives and eight (8) Mt. Zion Road interchange alternatives. He noted that each alternative figure was expanded from the handout version to show the acceleration and deceleration lanes, levels of service, and traffic counts. John explained that for most of the alternatives for each interchange will likely require the replacement of the bridge over the I-71/I-75 mainline.

Richwood Road

First John summarized the Richwood Road interchange alternatives. They are:

1. Adding lanes to the existing diamond configuration
2. Adding an Eastbound to Northbound loop ramp
3. Diverging Diamond Interchange (DDI)
4. Single Point Urban Interchange (SPUI)
5. Roundabouts

As part of the presentation for alternative #3, John presented a video created by FHWA that illustrated the operation of a DDI interchange. A short discussion period ensued regarding this type of interchange.

Bob Koehler asked if there are any DDIs currently in use. John said that there is one in use in Versailles, France and one currently under construction in Missouri. He noted that there are transportation departments in other states considering the DDI interchanges, as well. Carol Callan-Ramler pointed out that the DDI is an important alternative to consider because it increases efficiency and minimizes right of way and construction costs. One disadvantage to this type of interchange that Carol pointed out is that drivers may be confused initially since the traffic pattern is different that what is typical.

To address this concern, Jim Brannon mentioned that there would be a visual barrier separating travel lanes in each direction that will make it so vehicles would not see traffic traveling in the opposite direction.

Kevin Costello asked why the left turn lane exit ramp traffic stops. John Moss explained that this is an example video provided by the FHWA and the DDI for the operation of the Richwood Road and Mt. Zion interchanges would be set up to maximize the efficiency of these interchanges.

Gary Moore asked if during peak traffic whether the signal could be changed. Traffic signal timing can be modified throughout the day to take into consideration peak traffic volumes. Carol Callan-Ramler also stated that back-up generators would be a necessary component of the interchange design.

Chip Wood asked how the commercial businesses south of Richwood Drive would be affected. Cindy Minter responded that the red X's on the figures indicate access points that would be closed but that alternative access would be provided.

John Moss continued reviewing the Richwood Drive interchange alternatives #4 and #5. As part of the summary of Alternative #4, John explained that the large bridge span required for the construction of the SPUI would require a greater beam depth, thus creating clearance issues on the Richwood Road. This means that either Richwood Road would have to be lowered or the I-71/75 main line would have to be raised to provide adequate clearance on Richwood Road; the latter being at an excessively high cost.

Mt. Zion Road

John Moss then summarized the Mt. Zion Road interchange alternatives. These are:

1. Adding lanes to the existing diamond configuration
2. Adding an Eastbound to Northbound loop ramp
3. Adding both an Eastbound to Northbound loop ramp and a Southbound to Eastbound loop ramp
4. Adding both an Eastbound to Northbound loop ramp and a Westbound to Southbound loop ramp
5. Diverging Diamond Interchange (DDI)
6. Single Point Urban Interchange (SPUI)
7. Roundabouts
8. Directional Eastbound to Northbound ramp (flyover ramp)

John explained that the same clearance issue associated with the SPUI that occurs at Richwood Road would also happen at Mt. Zion and that the profile of either the main line or Mt. Zion would need to be adjusted accordingly. John also stated that alternative #8 was studied but proved to be unfeasible due to the terrain in the area and the elevation of the existing mainline.

Kevin Costello asked how travelers would access the Steak and Shake restaurant. Carol Callan-Ramler responded that a new road would be needed and pointed out the proposed location shown on the handouts/exhibits.

GROUP DISCUSSION

Cindy Minter asked the SAC to focus on eliminating some of the alternatives. She explained that the SAC would split up into two groups and spend 20-30 minutes reviewing each interchange and use green, yellow and red stickers to indicate whether the alternative definitely should go forward (green), warranted further evaluation (yellow), or eliminated (red).

Gary Moore asked which alternatives do not require the replacement of the bridge structures over the I-71/I-75 mainline. Cindy Minter responded that it is still unknown whether the structures can be kept with any alternative.

During his presentation, John pointed out that the traffic numbers indicated that the Level of Service for the roundabout alternative at each interchange was poor. Gary Moore asked if the SAC should eliminate the roundabout for the Mt. Zion Road interchange. Cindy Minter requested a vote (by show of hands) to eliminate the roundabout. A majority of the council voted to eliminate the Mt. Zion Road interchange roundabout alternative. Carol Callan-Ramler then asked John Moss to remove the Mt. Zion Road fly-over ramp and roundabout alternatives from future consideration.

Kevin Costello asked if SPUIs are constructed whether drivers can handle two in a row since others will be built close by. Cindy Minter responded that this is being examined and the driver education is a concern.

Chip Wood asked about the time frame of the project as it relates to construction. Cindy Minter asked Todd Willis to explain the construction sequencing and maintenance of traffic issues associated with each alternative.

Todd Willis described the construction methods, large ticket items, and issues in general terms associated with each interchange alternative. Cindy provided a brief summary of the environmental issues for each alternative, as well.

These are:

Mt. Zion Road

- SPUI – Todd confirmed that there is not enough vertical clearance so Mt. Zion Road would have to be lowered or I-71/I-75 would have to be raised. He pointed out that this would entail major maintenance of traffic (MOT) issues and be very expensive. He also said that the MOT on the ramps would be difficult. Cindy Minter said that there would be partial takes along Mt. Zion Road because of the widening of the road.

- DDI – Todd explained that during construction, this alternative would function like it currently does and traffic flow would not change until the day the new interchange opens. Temporary signals would be needed. He said that the MOT is very feasible and that the construction costs are not very large relative to the other alternatives. Todd pointed out that for all alternatives, the I-71/I-75 traffic can be maintained at three (3) lanes in each direction, due to the presence of 12-foot wide shoulders, when the main line structure is being replaced. Cindy Minter said there would be partial takes for this alternative.
- Partial Cloverleaf – Todd explained that there are major ramp issues with this alternative and the construction period would be long, in three to four stages. MOT on the ramps is also a big issue that would extend construction time and increase the costs. Cindy Minter said there would be approximately 23 parcels impacted with some full and some partial takes, including several residential takes. Cindy said that KYTC would likely close Highland Drive and relocate its entrance further west.
- Two Loop Ramps – Todd explained that there would be three to four stages of construction like the partial cloverleaf and increased costs. A new structure would have to be built and a lot of earth would have to be moved so it would be very expensive. Cindy Minter said there are significant full takes and noise walls would most likely be necessary because of the close proximity to neighborhoods.
- One Loop Ramp – Todd said the MOT would not be too difficult and there would be two to three phases of construction. Cindy Minter said some takes would be necessary.
- Adding Lanes – Todd explained that the MOT would be easier because this alternative stays in the same footprint of the existing interchange. Cindy said there would be minimal right of way issues.
- Roundabout – This alternative was discussed in detail earlier and the SAC voted to no longer consider it.
- Directional Flyover – This alternative is no longer under consideration.

Richwood Road

- Roundabout – Todd explained that this alternative would be very difficult because there is a large amount of cut and fill as well as retaining walls that would be needed; therefore, would be costly. Cindy Minter said there would be partial takes.

Gary Moore asked if keeping the structure is possible with this alternative. Cindy Minter responded that it is possible, but would have to be studied further.

- DDI – Todd explained that the MOT issues are similar to those of Richwood Road and people may get confused once the interchange would open but it is mainly an education issue. Cindy Minter said there would be some partial takes.

- SPUI – Like the Mt. Zion Road SPUI alternative, Todd explained that there is not enough vertical clearance so Richwood Road would have to be lowered or I-71/I-75 would have to be raised. He said that this alternative is doable but would be very expensive.
- Loop Ramp – Todd said that the MOT would not be too bad. Cindy Minter said there are significant right of way takes, including the truck stop, which would be expensive and most likely involve hazardous materials issues. Carol cited that per her discussions with a developer, a contamination plume has been identified on the property east of the truck stop.
- Adding Lanes – Todd explained that there is plenty of room for this alternative and that the MOT would not be a big issue. Cindy Minter said there would be partial takes.

Dennis Gordon asked if any of the Boone County figures had been included in the traffic projections. Cindy Minter responded that the traffic reflects the region and not just a particular county.

Cindy Minter then asked the SAC to break into two groups. Carol Callan-Ramler noted that each SAC member was to only use two green stickers (alternative should go forward) for each interchange.

5:10 pm BREAKOUT SESSION

SAC members placed colored dots on their selections for those alternatives that they would like to see carried forward in the study and also for those they would like to see removed from consideration. KYTC and HNTB personnel were available to answer questions.

During the breakout session, a SAC member asked that information on driver's experience with DDIs be included in the IJS.

5:50 SAC Reconvenes

After the breakout session, John Moss stated that the SAC had recommended three alternatives at each interchange, adding lanes to the existing diamond interchanges, adding an Eastbound to Northbound loop ramp, and DDIs as the alternatives for future study.

Gary Moore asked if the IJS should address adding an interchange south of Richwood Road at the I-71/I-75 split. Carol Callan-Ramler responded that this had been discussed by the FHWA and KYTC and that I-71/I-75 should not be extended to US 25 and that such an interchange would have to be a new project. Cindy Minter added that the IJS may recommend further study. Mary Murray said that she would get back with Carol, who would in turn get back to the SAC. Stan Lampe added that it should be considered. Mike Bezold said that it is on the project needs list.

Gary Moore asked if the Frogtown Connector was outside of the scope of work because it is further west. Carol Callan-Ramler responded that at this point, it is outside the scope. Cindy Minter added that the Frogtown Connector was considered and presented to KYTC but it has a separate purpose and need so it is outside the scope of this IJS. Jim Brannon suggested that a portion of the IJS report should discuss project/action action possibilities and that it could be addressed there. John Moss said that the traffic analysis shows the need of additional lanes on the I-71/I-75 mainline between the two interchanges. John said the team would look at the SAC suggestions and move forward with preliminary alternatives and costs and reconvene with the SAC in September to select the Preferred Alternative at each interchange. The schedule is to submit the final IJS to FHWA in November.

Cindy Minter summarized the number of green, yellow and red stickers for each alternative. Carol Callan-Ramler requested that further discussion of the three remaining alternatives take place in an effort to try to narrow the remaining alternatives down to two per interchange. The conversation became a discussion of the merits and shortcomings of the Eastbound to Northbound loop ramp at Richwood Road (Alternative #2).

Regarding loops ramps, Bill Madden said that when it rains, vehicles go into the ditches. Rob Hans added that vehicles have difficulty getting their acceleration to where it needs to be when entering the highway when using loop ramps. Stan Lampe added that the right of way costs are huge. Chip Wood said he liked the loop ramp because he travels the road daily and alternative #1 does not seem to solve the issue of the trucks. Jeff Earlywine said the advantage of the loop ramp is it has a continuous right turn. Gary Moore asked the SAC whether they did not want alterative # 2 to go forward because of right-of-way costs associated with taking the truck stop. From the response of the group, it did not appear that this was an overriding factor in their decisions. Greg Sketch said that safety is a big issue because of the high volume of traffic and said that there is an opportunity to do something other than just adding lanes.

Andy Aiello suggested that the Richwood Road alternative #2 should not be kicked out at this point. Jim Brannon offered the comment that loop ramps have safety and capacity issues and there has been a national trend to remove these types of ramps. Katie Ott made the point that loop ramps can only be one (1) lane and thus, their capacity is limited.

Chip Wood said that trucks are the big problem.

It was apparent from the discussion that there were considerable concerns regarding the loop ramp alternative. It appeared that there was a greater consensus for alternatives #1 (adding lanes) and #3

(DDI) and these would be the two (2) Preliminary Engineering Alternatives carried forward into the next phase of the project. Cindy Minter thanked the SAC for the discussion on the Richwood Road Alternative #2 (loop ramp).

Greg Sketch said that for the Mt. Zion Road interchange alternatives that affect residents would be a hassle even if they were less expensive. He asked whether there was a possibility of a flyover for the Richwood Road interchange. Mike Bezold responded that a flyover ramp for the Richwood Road interchange was not feasible.

Gary Moore asked whether the loop ramp for Richwood Road would be re-examined if it was determined that the DDI was not feasible. Cindy Minter responded that two alternatives for each interchange would be evaluated and if there was a fatal flaw with one of them, an alternative that was previously eliminated would be reconsidered.

Todd Willis suggested examining the costs associated with taking the truck stop. Cindy Minter suggested that KYTC has resources to evaluate this.

Carol Callan-Ramler thanked everyone for staying an extra ten minutes and for giving great input. She said that the last twenty minutes of conversation were very helpful and productive and that she hoped everyone would come back for the third SAC meeting planned for September.

The SAC meeting adjourned at 6:10 p.m.

After the meeting the following questions were asked and it was requested that their responses be included as part of the minutes. Carol contacted Mr. Costello, who submitted the questions, for clarification of what information was being sought by the first two items. Mr. Costello was looking to find out what was the design traffic volumes for the original designs of the interchanges and what are the current traffic volumes. The wording of the first two questions has been modified to reflect the original intent of the request.

- What is the current design capacity for the I-75/Richwood Road and Mt. Zion Road Interchanges? *Reworded: What was the design (future) traffic volume for the original designs of the interchanges?* **In 1992, the future (2007) traffic in the KY 536 interchange area was projected to be 87, 972 ADT. In 1958, the future (1975) traffic for the KY 338 interchange area was projected to be 31,170 ADT.**
- What is projected design capacity for both interchanges? *Reworded: What are the current traffic volumes and what volumes were used to determine the number of lanes required for*

conceptual alternatives? The existing and design year (2030) peak hour traffic volumes for each major movement for each interchange are shown below:

Mt. Zion

Movement	Existing (vehicles/hour)	2030 (vehicles/hour)
Southbound	1295 (PM)	2340 (PM)
Northbound	1275 (AM)	2160 (AM)
Eastbound	1190 (PM)	2500 (PM)
Westbound	1120 (PM)	2265 (PM)

Richwood

Movement	Existing (vehicles/hour)	2030 (vehicles/hour)
Southbound	965 (PM)	1450 (PM)
Northbound	955 (AM)	1520 (AM)
Eastbound	935 (AM)	1555 (AM)
Westbound	1125 (PM)	1715 (PM)

- What is the projected design year? 2030
- How much of the existing and projected traffic is coming to and from Kenton County? As stated in the meeting, the traffic projections were consistent with the regional model. Analysis of the volume of traffic coming specifically from Kenton County was not part of the scope of this project.
- Is the OKI travel model or travel zone data up-to-date to reflect current and projected development activity and planning efforts in Kenton County? This would include the South Banklick Study and current and projected development activity and planning efforts in Independence? HNTB traffic modeling personnel coordinated with and received data from Cheng-I Tsai of OKI in late January 2007. Updated Traffic Analysis Zones (TAZs) were sent to KYTC in March for their concurrence. These TAZs included those areas of Kenton County pertinent to this IJS.

Attachments: Sign-in sheets
Slides presented at the meeting
Further study tally sheet

The foregoing constitutes our understanding of the matters discussed and the conclusions reached. If there are any questions, corrections, omissions, or additional comments, please advise the author within five working days after receipt of these minutes.

MEETING DOCUMENTATION

Project 6-14.01 I-71/75 Interchange Justification Study **Job #** 42560

Meeting Location Boone County Law Enforcement Center **Meeting Date** September 26, 2007

Subject Stakeholders Advisory Council Meeting #3

Attendees

Greg Sketch (Boone County)
Jeff Earlywine (Boone County Fiscal Court)
John Maher (Citizen Advisor – Union)
Gary Bentle (Citizen Advisor)
Paul Verst (Citizen Advisor)
Stan Lampe (N.KY Chamber of Commerce)
Adam Kirk (Northern Kentucky Area Planning Commission)
Kevin Costello (Boone County Planning Commission)
Dave Geohegan (Boone County Planning Commission)
Andrew Reser (OKI)
Andrew Aiello (TANK)
James Kazmierczak (Norfolk Southern)
Mary Murray (FHWA)
Jim Brannon (KYTC)
Bill Madden (KYTC)
Carol Callan-Ramler (KYTC)
Rob Hans (KYTC)
Brad Eldridge (KYTC)
Mike Bezold (KYTC)
Stacee Hans (KYTC)
Cindy Minter (HNTB)
John Moss (HNTB)
Lillian V. Gonzalez (HNTB)

MEETING MINUTES

The third meeting with the Stakeholder Advisory Council (SAC) was held on September 26, 2007, from approximately 4:10 p.m. to 5:45 p.m. at the Boone County Law Enforcement Center in Burlington, Kentucky. There were twenty-three (23) people in attendance.

INTRODUCTIONS

Carol Callan-Ramler opened by welcoming returning and new members to the third SAC meeting for the Interchange Justification Study (IJS) for the I-71/I-75 at KY 536 (Mt. Zion Road) and KY 338 (Richwood Road) interchanges. She asked the attendees to introduce themselves and all attendees stated their names.

She provided a brief overview of the first two SAC meetings and explained the purpose of the meeting would be to discuss the alternatives and determine the preferred alternative. Carol noted the location of the railroad in relation to the project area.

Carol then introduced Cindy Minter and handed over the presentation to her.

PROGRESS TO DATE

Cindy began by pointing out that the project is on schedule with regard to the SAC meetings and the development of the Interchange Justification Study. She then reviewed the conceptual alternatives and the preliminary alternatives that were chosen for further analysis at each interchange.

Cindy then introduced John Moss and handed over the presentation to him.

DISCUSSION OF PRELIMINARY ALTERNATIVES

John began by explaining that HNTB created preliminary templates, horizontal alignments, and vertical alignments for the two Preliminary Design Alternatives remaining at each interchange. From these HNTB created preliminary electronic models for the proposed conditions and compared them with the existing conditions to determine the right-of-way and utility impacts and construction limits.

John then discussed the Richwood Road preliminary design alternatives – adding lanes to the existing diamond, followed by the diverging diamond interchange (DDI). He explained that retaining walls may be needed, the access points that will be closed, signal locations, and that the I-71/I-75 bridge will require reconstruction for either alternative. He pointed out that the DDI design is similar to the

Missouri Department of Transportation's (MoDOT) DDI design. John then reviewed the lane use for each alternative.

Greg Sketch asked about right-of-way issues relating to the DDI alternative. John explained that the right-of-way impacts were similar between the two alternatives and that if retaining walls are required, their location and height would be similar for both the Richwood Road alternatives.

John then discussed the Mt. Zion Road preliminary design alternatives – adding lanes to the existing diamond, followed by the DDI. He explained that retaining walls may be needed, the access points that will be closed, signal locations, and that the I-71/I-75 bridge will require reconstruction for either alternative. John then reviewed the lane use for each alternative.

John pointed out that the footprint of the alternatives is similar with regard to the right-of-way and utility impacts, need for a new bridge, and the need for retaining walls. He discussed the evaluation criteria that were examined for each interchange alternative. The environment, cost, and construction criteria were similar enough for each alternative to not play a role in distinguishing between alternatives. The traffic and safety criteria were different for each alternative and were discussed in more detail.

John explained that in terms of traffic operations, the DDI is superior. He provided and discussed a table indicating the level of service for each alternative. He pointed out that DDI interchanges work better when the turning traffic is a heavier movement than the through traffic.

Rob Hans asked whether HNTB was looking at the design year. John replied yes, and indicated that the design year is 2030.

John then discussed the safety differences between the alternatives. He explained that the DDI has traffic calming features, reduces speed which could lead to fewer crashes. The DDI example in Versailles, France was presented. John compared the existing crash numbers and pointed out that the number of crashes at the Mt. Zion Road interchange is three times the national average of a typical standard diamond interchange.

Rob Hans asked about the similarities between these DDI alternative designs and the Versailles, France DDI. John said he would research the answer and include the information in the meeting minutes.

Follow-up Notes: *There are no traffic volume data available from the DDI in Versailles, France. However, traffic volume data for the proposed I-435/Front St. DDI in Kansas City, Missouri are available and are comparable to the I-71/I-75 interchanges with KY 338 and KY 536.*

ADT for I-435 in the year 2006 is 109,300 vehicles per day (VPD)
ADT for I-435 in the year 2026 is 129,300

ADT for Front Street in the year 2006 is 34,100 VPD
ADT for Front Street in the year 2026 is 59,800 VPD

There are similarities other than traffic between the I-435/Front St. DDI and the I-71/I-75 DDIs, particularly at the Richwood Road interchange. There is a truck stop in the NE quadrant of the I-435/Front St. Interchange and there is a cross street 470' east of the interchange. The proposed frontage roads at Richwood Road are 450' from the interchange.

John then discussed the conflict points with each interchange alternative and pointed out that there are less conflict points with the DDI alternative. John then gave his opinion that the DDI should go forward as the preferred alternative because of its superiority in terms of traffic and safety, and the fact that the costs are not higher.

Jim Brannon stated that he was not as confident about the DDI alternative as his fellow KYTC colleagues, mainly because of his concern about the Mt. Zion Road eastbound traffic in the P.M. Peak Hour. However, he stated that a level of service of B and/or C in 20 years is great. Jim pointed out that the DDI alternative is unfamiliar so if it does go forward as the preferred alternative, KYTC would stay in contact with MoDOT. Jim stated that he thinks the DDI is the better alternative.

Kevin Costello asked if drivers would be confused at the Richwood Road interchange because of the proximity of the DDI to the US 25 single point urban interchange (SPUI) to the east. Carol Callan-Ramler stated that people do not have problems at SPUIs and that she does not think driver behavior will be negative. Kevin asked whether the DDI or the SPUI would be constructed first. Jim Brannon answered that the DDI would most likely be constructed first because of the shorter time for design, construction and the small right-of-way impacts.

Mary Murray stated that public education is a concern and gave an example of how Tennessee aired television programs educating drivers how to use roundabouts.

Carol Callan-Ramler stressed that the bridges at both interchanges will have to be replaced. Cindy Minter explained that there is room for a visual barrier if the DDI alternative is chosen. John Moss stated that with the DDI alternative, there can be piers in the median and the bridge does not necessarily have to be a single span, which may lead to cost savings.

Jim Brannon stated that DDIs have been proposed in other locations around the U.S. but have been rejected because of right-of-way issues. He pointed out that the right-of-way impacts at the Mt. Zion and Richwood Road interchanges are low.

Jeff Earlywine asked whether funding would be difficult if the DDI is chosen as the preferred alternative since it is not a traditional option. Jim Brannon explained that FHWA will either fund the project or not and that he does not foresee funding being a problem if the DDI is chosen.

Greg Sketch stated that he was impressed by the level of service increase and the reduction of conflict points. He pointed out that we can learn from the MoDOT on ways to educate drivers. Kevin Costello stated that driver education is very important because of the large volume of truck traffic. Carol Callan-Ramler said that the MoDOT took the DDI to the public, but unfortunately the project is being delayed due to right-of-way issues.

Bill Madden said he was concerned about the signing from the SPUI to the DDI at KY 338.

The SAC discussed the issue of access to the truck stop. If the DDI is chosen as the preferred alternative, the proposed frontage roads intersection with Richwood Road would be closed and if the adding lanes to the existing diamond alternative is chosen as the preferred alternative, the truck stop intersection would most likely be a right-in/right-out only. The SAC expressed that showing the SPUI and the DDI together would make it easier to visualize how they would work together.
Follow-up Note: *HNTB is re-evaluating whether or not the frontage roads can remain right-in/right-out for the DDI alternative.*

Mike Bezold asked if both alternatives for Richwood Road could be carried forward to Phase 1 design. Mary Murray stated that the FHWA would be fine with moving both alternatives forward. Bill Madden also asked if the SPUI at US 25 and the Richwood Road project could be combined. Jim Brannon stated that the project team has been discussing combining the interchange projects at Mt. Zion and Richwood Roads, but adding the SPUI to the design package has not been discussed to date. Carol requested that HNTB take another look at the access to the truck stop and future frontage roads for both alternatives.

Cindy Minter requested a vote (by show of hands) for concurrence to move the DDI forward as the preferred alternative at the Mt. Zion Road and Richwood Road interchange and examine both alternatives at the Richwood Road interchange once more information is available during Phase 1 design. A majority of the council voted to on this concurrence.

Carol Callan-Ramler thanked everyone for attending the meeting and for giving great input. She said that once the preferred alternative is designed, KYTC will hold public meetings to gather additional input.

The SAC meeting adjourned at 5:45 p.m.

Attachments: Sign-in sheets
Slides presented at the meeting

The foregoing constitutes our understanding of the matters discussed and the conclusions reached. If there are any questions, corrections, omissions, or additional comments, please advise the author within five working days after receipt of these minutes.

KENTUCKY TRANSPORTATION CABINET
Department of Highways
Division of Design

DRAFT DESIGN EXECUTIVE SUMMARY

County	BOONE	Item No.	6-14.01
Federal Project No.		UPN	
MARS No.		UPN	

Project Description:

Reconstruction of I-71/I-75 Interchanges with KY 338 and KY 536 to relieve congestion on KY 338 and KY 536 and to improve safety. Project study area is from I-75/KY14 interchange to I-71/I-75 interchange with US 42.

Interstate 71/75

Roadway Classification:

Local	☐	Collector	☐	Arterial	☐	Interstate	☒
		Rural	☒	Urban	☒		

ADT (current) 104,000 ADT (2030) 176,000 DHV (2030) 15,415

Posted Speed Limit: 55 (rural) ☐ 35 (urban) ☐ Other (specify) ☒ 70 mph

Design speed selected by the Project Team 75 mph

- ☐ Concurrence in a reduced design speed to be obtained from Director of Design.
- ☐ Exception to design speed criteria will have to be obtained from FHWA.
- ☐ Exception to Design Criteria to be obtained from Director of Design.

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	3-4 each direction	3-5, each direction	3-5, each direction
Pavement Width	12'/lane	12'/lane	12'/lane
Shoulder Width, Slope	14'-8" inside, 4% 10' paved outside, 4%	14'-8" inside, 4% 10' paved outside, 4%	14'-8" inside, 4% 10' paved outside, 4%
Bridge Width	150'-4"	150'-4"	150'-4"
Minimum Radius (e_{max}=0.08)	11,459.16	11,459.16	11,459.16
Maximum Grade	2.75%	2.75%	2.75%
Minimum Sight Distance	689'	689'	689'
Border Area (urban)			

Design Criteria Notes:

KENTUCKY TRANSPORTATION CABINET
Department of Highways
Division of Design

DRAFT DESIGN EXECUTIVE SUMMARY (Continued)

KY 536

Roadway Classification:

Local ☐ Collector ☐ Arterial ☒ Interstate ☐
Rural ☐ Urban ☒

ADT (current) 18,800 ADT (2030) 52,000 DHV (2030) 5,515

Posted Speed Limit: 55 (rural) ☐ 35 (urban) ☒ Other (specify) ☒ 45
West of Highland Drive East of Highland Drive

Design speed selected by the Project Team 30

☒ Concurrence in a reduced design speed to be obtained from Director of Design.
☐ Exception to design speed criteria will have to be obtained from FHWA.
☐ Exception to Design Criteria to be obtained from Director of Design.

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	2 WB from interchange 3 EB from interchange 4 within interchange	6	6 within I/C
Pavement Width	Varies 34-36'	11'/lane	12'/lane
Shoulder Width, Slope	4' Combination	C&G	C&G
Bridge Width	N/A	N/A	N/A
Minimum Radius (e_{max}=0.04)	954.93' @e=0.06	250'	250'
Maximum Grade	4.00%	8.00%	5.00%
Minimum Sight Distance	537'	250'	339.82'
Border Area (urban)			

Design Criteria Notes:

KENTUCKY TRANSPORTATION CABINET
Department of Highways
Division of Design

DRAFT DESIGN EXECUTIVE SUMMARY (Continued)

KY 338

Roadway Classification:

Local	☐	Collector	☐	Arterial	☒	Interstate	☐
		Rural	☐	Urban	☒		

ADT (current) 10,300 ADT (2030) 28,400 DHV (2030) 3,360

Posted Speed Limit: 55 (rural) ☐ 35 (urban) ☐ Other (specify) ☒ 45

Design speed selected by the Project Team 30

☒ Concurrence in a reduced design speed to be obtained from Director of Design.
☐ Exception to design speed criteria will have to be obtained from FHWA.
☐ Exception to Design Criteria to be obtained from Director of Design.

DESIGN CRITERIA	EXISTING	TYPICAL	PROJECT TEAM RECOMMENDATION
Number of Lanes	3	5	5
Pavement Width	34'	11'/lane	12'/lane
Shoulder Width, Slope	See Below	C&G	C&G
Bridge Width	N/A	N/A	N/A
Minimum Radius (e_{max}=0.04)	1145.92' e=.033	250'	250'
Maximum Grade	5.18%	8.00%	5.00%
Minimum Sight Distance	401'	250'	520.15
Border Area (urban)			

Design Criteria Notes:

Existing Shoulders-From US 25 to the SB I-71/I-75 ramps 8' Bituminous; From the SB I-71/I-75 ramps to just west of Paddock Drive - 2' Curbed; From just west of Paddock Drive to Triple Crown Blvd. - 2' Stabilized

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.01	

EASTBOUND CURVES (KY 536)

P.I. = 4+12.13
N = 530796.5400
E = 1529970.4888
D = 64°36'00" Rt.
Dc = 6°11'15"(1) Dc = 19°05'55"(2)
T = 412.13'(1) T = 245.63'(2)
L = 374.76'(1) L = 216.83'(2)
R = 926.00'(1) R = 300.00'(2)
E = 87.57'
(1) (2)

P.I. = 7+84.11
N = 530592.9124
E = 1530358.4487
D = 54°43'30" Lt.
Dc = 15°24'08"
T = 192.52'
L = 355.31'
R = 372.00'
E = 46.86'

P.I. = 10+32.80
N = 530719.4440
E = 1530606.4443
D = 33°12'47" Rt.
Dc = 19°53'40"
T = 85.89'
L = 166.95'
R = 288.00'
E = 12.54'

P.I. = 16+28.13
N = 530654.8187
E = 1531203.1281
D = 26°30'06" Lt.
Dc = 17°03'08"
T = 79.12'
L = 155.41'
R = 336.00'
E = 9.19'

P.I. = 18+73.79
N = 530741.1110
E = 1531436.1543
D = 58°53'41" Rt.
Dc = 19°05'55"
T = 169.37'
L = 308.37'
R = 300.00'
E = 44.51'

P.I. = 21+09.85
N = 530574.9866
E = 1531644.4445
D = 35°51'18" Lt.
Dc = 19°05'55"
T = 97.06'
L = 187.74'
R = 300.00'
E = 15.31'

WESTBOUND CURVES (KY 536)

P.I. = 1+08.79
N = 530634.0319
E = 1529691.0970
D = 12°54'15" Rt.
Dc = 5°57'21"
T = 108.79'
L = 216.66'
R = 962.00'
E = 6.13'

P.I. = 7+98.34
N = 530929.2088
E = 1530315.2943
D = 77°12'49" Rt.
Dc = 19°05'55"
T = 239.55'
L = 404.29'
R = 300.00'
E = 83.90'

P.I. = 11+89.33
N = 530562.8782
E = 1530602.9808
D = 69°51'09" Lt.
Dc = 17°41'02"
T = 226.25'
L = 395.01'
R = 324.00'
E = 71.17'

P.I. = 14+24.92
N = 530653.4202
E = 1530881.7126
D = 24°10'39" Rt.
Dc = 18°21'51"
T = 66.82'
L = 131.66'
R = 312.00'
E = 7.08'

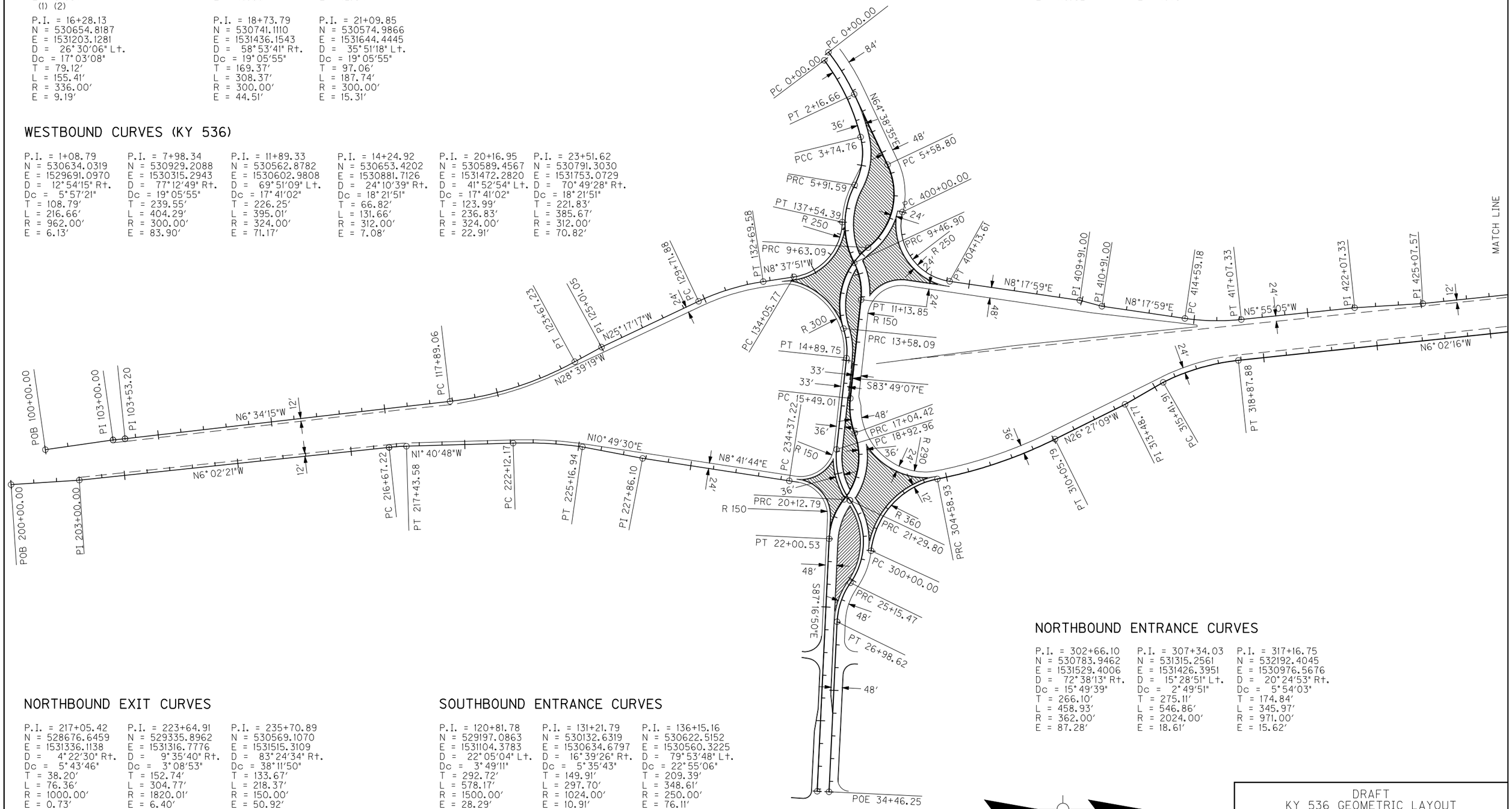
P.I. = 20+16.95
N = 530589.4567
E = 1531472.2820
D = 41°52'54" Lt.
Dc = 17°41'02"
T = 123.99'
L = 236.83'
R = 324.00'
E = 22.91'

P.I. = 23+51.62
N = 530791.3030
E = 1531753.0729
D = 70°49'28" Rt.
Dc = 18°21'51"
T = 221.83'
L = 385.67'
R = 312.00'
E = 70.82'

SOUTHBOUND EXIT CURVES

P.I. = 402+71.83
N = 530830.1927
E = 1530571.7432
D = 94°47'31" Lt.
Dc = 22°55'06"
T = 271.83'
L = 413.61'
R = 250.00'
E = 119.32'

P.I. = 415+83.90
N = 532254.7717
E = 1530791.6840
D = 14°13'04" Lt.
Dc = 5°43'46"
T = 124.71'
L = 248.15'
R = 1000.00'
E = 7.75'



NORTHBOUND ENTRANCE CURVES

P.I. = 302+66.10
N = 530783.9462
E = 1531529.4006
D = 72°38'13" Rt.
Dc = 15°49'39"
T = 266.10'
L = 458.93'
R = 362.00'
E = 87.28'

P.I. = 307+34.03
N = 531315.2561
E = 1531426.3951
D = 15°28'51" Lt.
Dc = 2°49'51"
T = 275.11'
L = 546.86'
R = 2024.00'
E = 18.61'

P.I. = 317+16.75
N = 532192.4045
E = 1530976.5676
D = 20°24'53" Rt.
Dc = 5°54'03"
T = 174.84'
L = 345.97'
R = 971.00'
E = 15.62'

NORTHBOUND EXIT CURVES

P.I. = 217+05.42
N = 528676.6459
E = 1531336.1138
D = 4°22'30" Rt.
Dc = 5°43'46"
T = 38.20'
L = 76.36'
R = 1000.00'
E = 0.73'

P.I. = 223+64.91
N = 529335.8962
E = 1531316.7776
D = 9°35'40" Rt.
Dc = 3°08'53"
T = 152.74'
L = 304.77'
R = 1820.01'
E = 6.40'

P.I. = 235+70.89
N = 530569.1070
E = 1531515.3109
D = 83°24'34" Rt.
Dc = 38°11'50"
T = 133.67'
L = 218.37'
R = 150.00'
E = 50.92'

SOUTHBOUND ENTRANCE CURVES

P.I. = 120+81.78
N = 529197.0863
E = 1531104.3783
D = 22°05'04" Lt.
Dc = 3°49'11"
T = 292.72'
L = 578.17'
R = 1500.00'
E = 28.29'

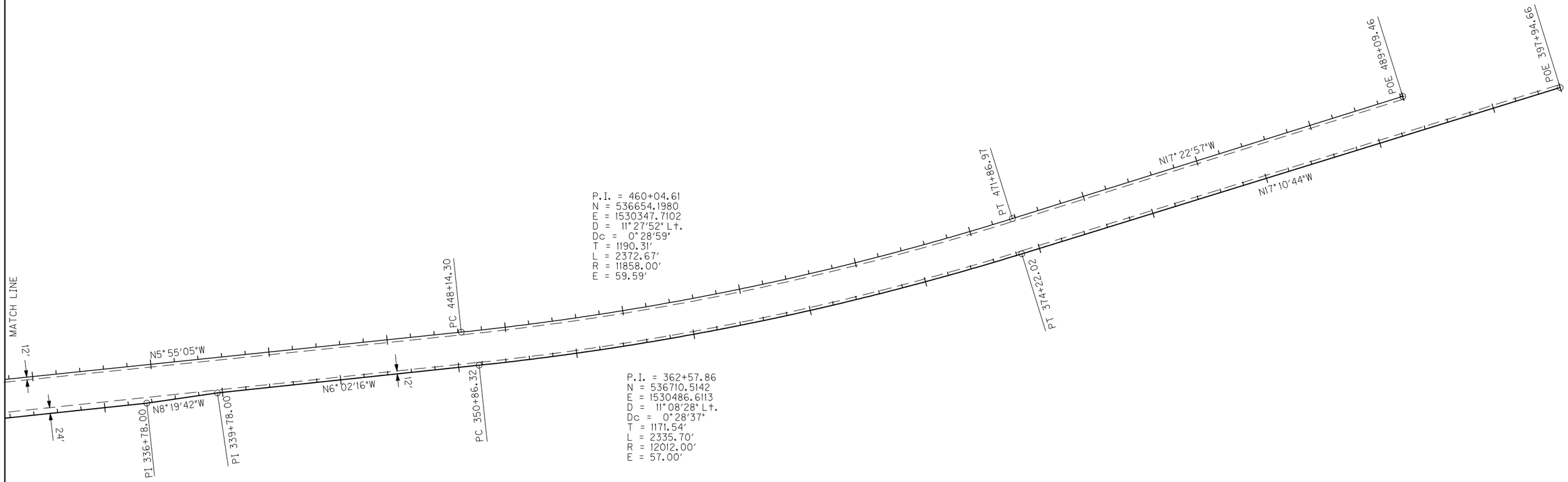
P.I. = 131+21.79
N = 530132.6319
E = 1530634.6797
D = 16°39'26" Rt.
Dc = 5°35'43"
T = 149.91'
L = 297.70'
R = 1024.00'
E = 10.91'

P.I. = 136+15.16
N = 530622.5152
E = 1530560.3225
D = 79°53'48" Lt.
Dc = 22°55'06"
T = 209.39'
L = 348.61'
R = 250.00'
E = 76.11'

SCALE: 1=400'

DRAFT
KY 536 GEOMETRIC LAYOUT
SHEET 1 OF 2

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.01	



SCALE: 1"=400'

DRAFT
KY 536 GEOMETRIC LAYOUT
SHEET 2 OF 2

COUNTY OF	ITEM NO.	SHEET NO.
BOONE	6-14.01	

EASTBOUND CURVES (KY 338)

P.I. = 7+18.81	P.I. = 10+27.07	P.I. = 12+14.03	P.I. = 13+99.69	P.I. = 18+53.44	P.I. = 20+28.42	P.I. = 22+71.74
N = 516096.2756	N = 516268.6797	N = 516273.6838	N = 516418.7957	N = 516502.6843	N = 516586.7590	N = 516478.9294
E = 1531655.1242	E = 1531913.3124	E = 1532104.2183	E = 1532238.9024	E = 1532690.5918	E = 1532844.9080	E = 1533083.7818
D = 16°39'23" Rt.	D = 32°13'53" Rt.	D = 45°37'58" Lt.	D = 36°36'47" Rt.	D = 18°03'41" Lt.	D = 52°52'38" Rt.	D = 51°22'44" Lt.
Dc = 5°23'42"	Dc = 21°52'07"	Dc = 20°54'39"	Dc = 22°55'06"	Dc = 20°02'01"	Dc = 21°52'07"	Dc = 20°54'39"
T = 155.46'	T = 75.70'	T = 115.27'	T = 82.71'	T = 45.45'	T = 130.28'	T = 131.81'
L = 308.73'	L = 147.39'	L = 218.23'	L = 159.76'	L = 90.16'	L = 241.80'	L = 245.70'
R = 1062.00'	R = 262.00'	R = 274.00'	R = 250.00'	R = 286.00'	R = 262.00'	R = 274.00'
E = 11.32'	E = 10.72'	E = 23.26'	E = 13.33'	E = 3.59'	E = 30.60'	E = 30.05'

WESTBOUND CURVES (KY 338)

P.I. = 8+97.95	P.I. = 11+99.45	P.I. = 14+30.73	P.I. = 16+12.57	P.I. = 18+83.09	P.I. = 21+28.26	P.I. = 23+46.49
N = 516249.5882	N = 516386.1873	N = 516312.2023	N = 516441.0328	N = 516492.0919	N = 516406.8205	N = 516605.6646
E = 1531750.8506	E = 1532024.7936	E = 1532255.2207	E = 1532413.9496	E = 1532682.4822	E = 1532916.2361	E = 1533086.5016
D = 23°53'07" Rt.	D = 44°18'03" Rt.	D = 56°51'53" Lt.	D = 28°17'54" Rt.	D = 30°48'26" Rt.	D = 69°28'08" Lt.	D = 35°46'53" Rt.
Dc = 7°38'22"	Dc = 21°52'07"	Dc = 22°55'06"	Dc = 20°54'39"	Dc = 20°54'39"	Dc = 22°55'06"	Dc = 20°54'39"
T = 158.63'	T = 106.66'	T = 135.36'	T = 69.07'	T = 75.49'	T = 173.33'	T = 88.45'
L = 312.66'	L = 202.58'	L = 248.12'	L = 135.33'	L = 147.33'	L = 303.12'	L = 171.11'
R = 750.00'	R = 262.00'	R = 250.00'	R = 274.00'	R = 274.00'	R = 250.00'	R = 274.00'
E = 16.59'	E = 20.88'	E = 34.29'	E = 8.57'	E = 10.21'	E = 54.21'	E = 13.92'

SOUTHBOUND EXIT CURVES

P.I. = 301+88.05	P.I. = 312+99.43
N = 516437.7487	N = 517541.2911
E = 1532084.3867	E = 1532349.3749
D = 50°21'32" Lt.	D = 15°17'17" Lt.
Dc = 14°19'26"	Dc = 2°51'53"
T = 188.05'	T = 268.42'
L = 351.57'	L = 533.65'
R = 400.00'	R = 2000.00'
E = 42.00'	E = 17.93'

SOUTHBOUND ENTRANCE CURVES

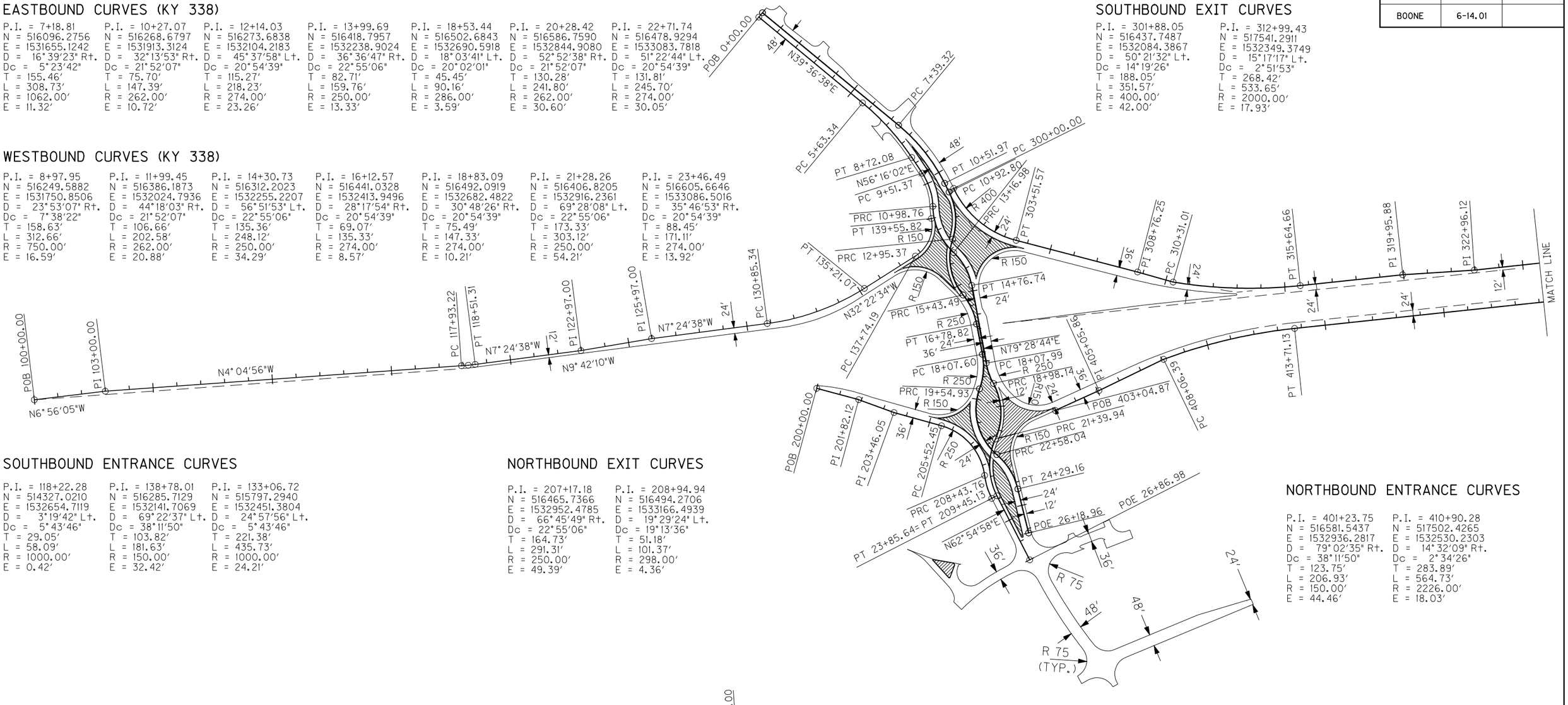
P.I. = 118+22.28	P.I. = 138+78.01	P.I. = 133+06.72
N = 514327.0210	N = 516285.7129	N = 515797.2940
E = 1532654.7119	E = 1532141.7069	E = 1532451.3804
D = 3°19'42" Lt.	D = 69°22'37" Lt.	D = 24°57'56" Lt.
Dc = 5°43'46"	Dc = 38°11'50"	Dc = 5°43'46"
T = 29.05'	T = 103.82'	T = 221.38'
L = 58.09'	L = 181.63'	L = 435.73'
R = 1000.00'	R = 150.00'	R = 1000.00'
E = 0.42'	E = 32.42'	E = 24.21'

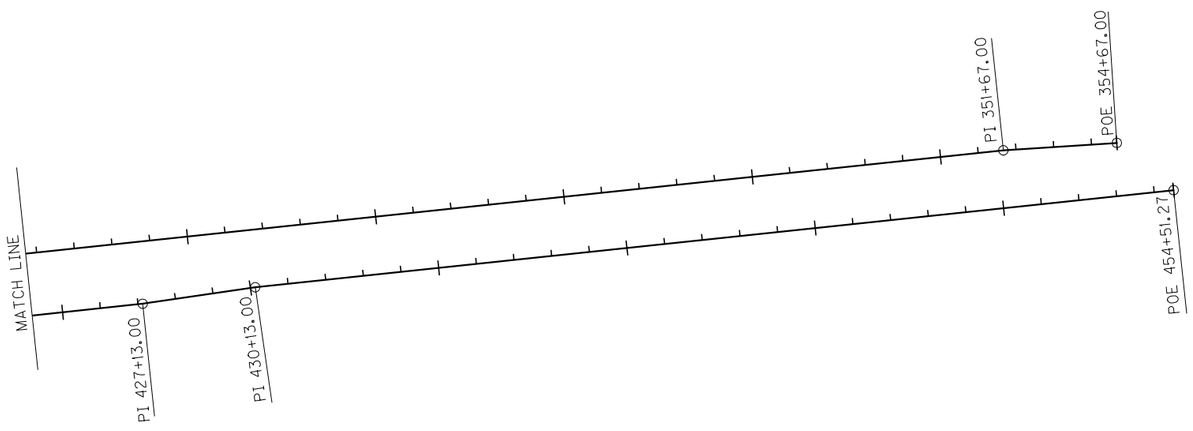
NORTHBOUND EXIT CURVES

P.I. = 207+17.18	P.I. = 208+94.94
N = 516465.7366	N = 516494.2706
E = 1532952.4785	E = 1533166.4939
D = 66°45'49" Rt.	D = 19°29'24" Lt.
Dc = 22°55'06"	Dc = 19°13'36"
T = 164.73'	T = 51.18'
L = 291.31'	L = 101.37'
R = 250.00'	R = 298.00'
E = 49.39'	E = 4.36'

NORTHBOUND ENTRANCE CURVES

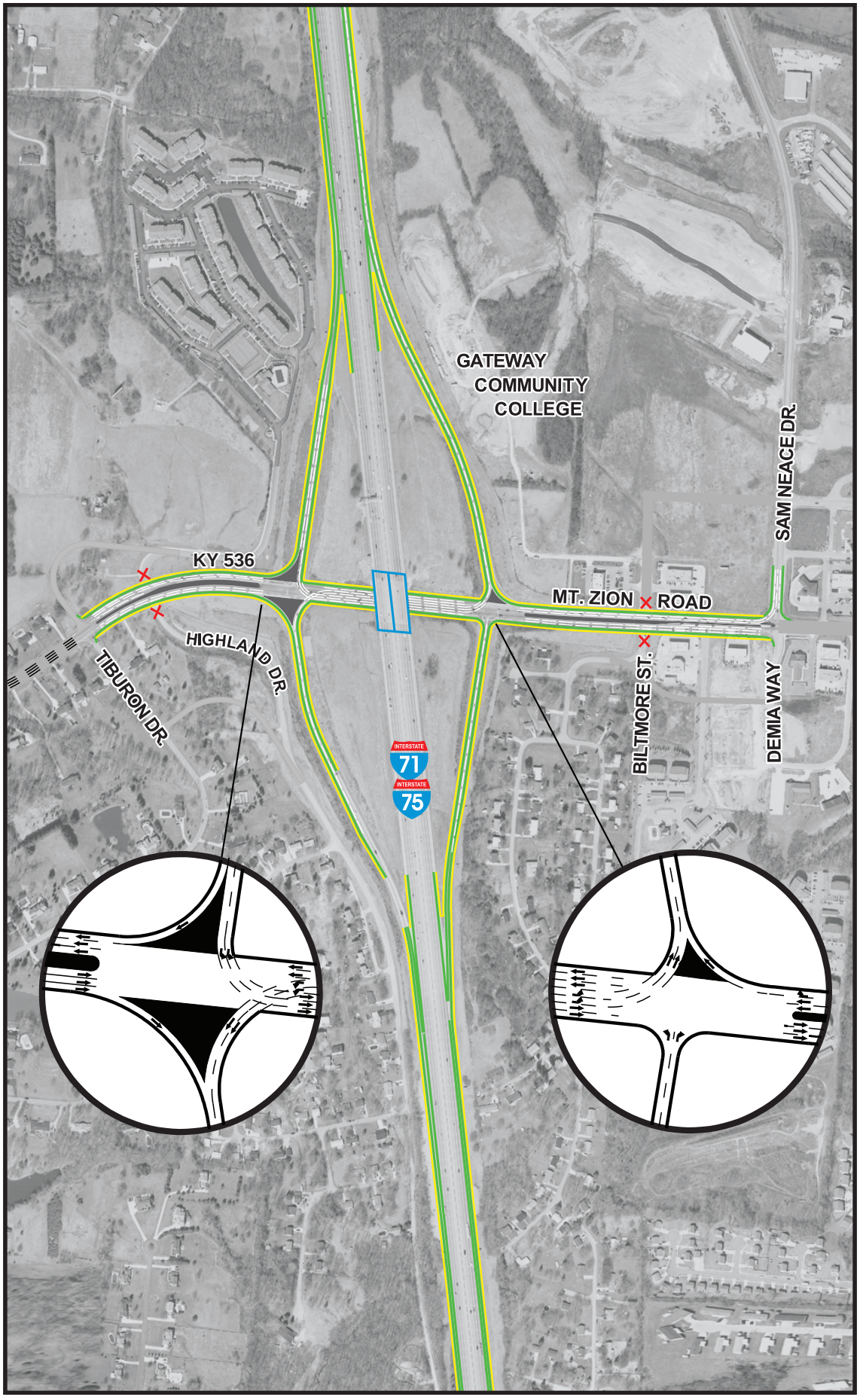
P.I. = 401+23.75	P.I. = 410+90.28
N = 516581.5437	N = 517502.4265
E = 1532936.2817	E = 1532530.2303
D = 79°02'35" Rt.	D = 14°32'09" Rt.
Dc = 38°11'50"	Dc = 2°34'26"
T = 123.75'	T = 283.89'
L = 206.93'	L = 564.73'
R = 150.00'	R = 2226.00'
E = 44.46'	E = 18.03'





SCALE: 1"=400'

DRAFT
KY 338 GEOMETRIC LAYOUT



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #1:

Adding Lanes to Existing Diamond

N
W E
S

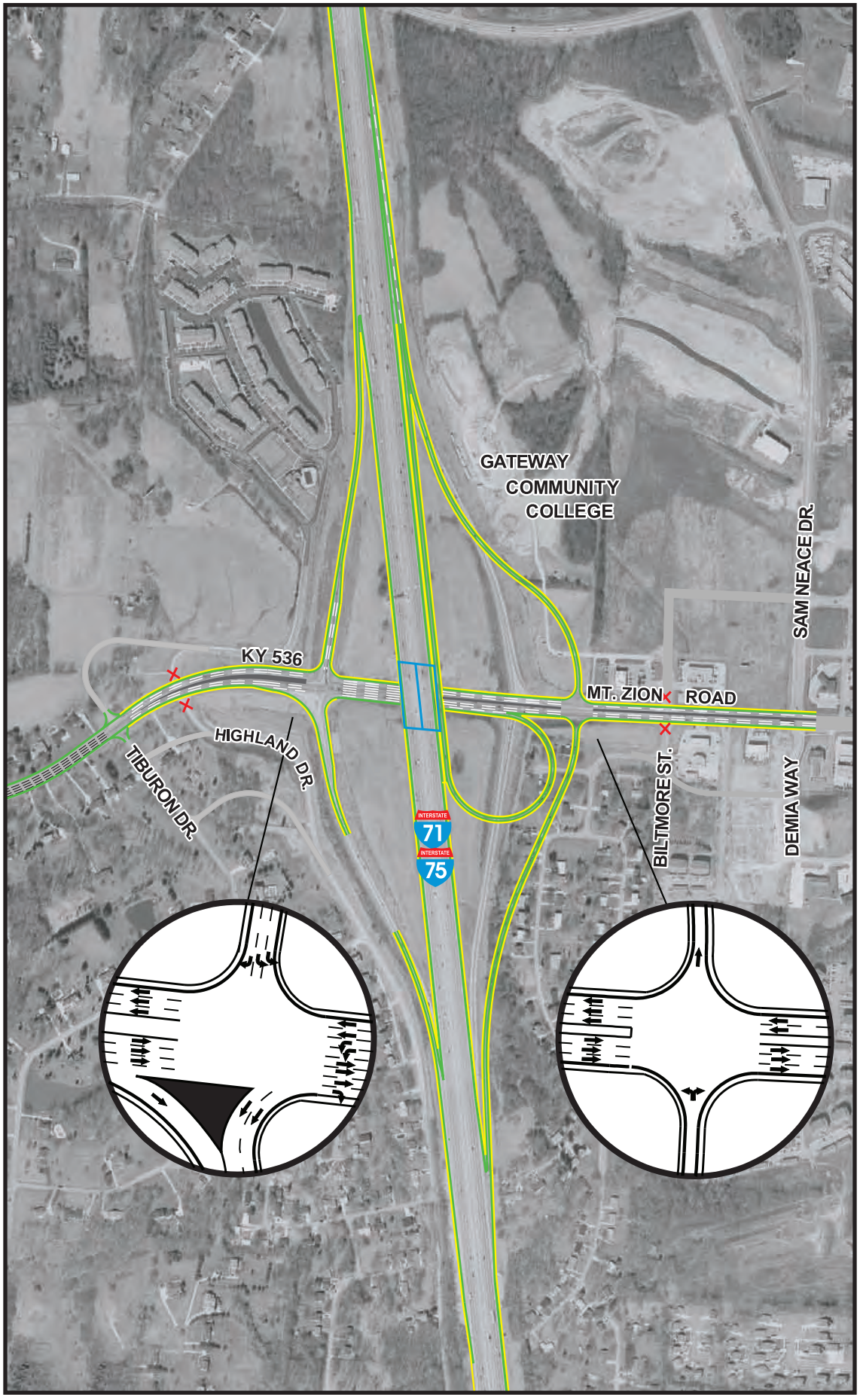
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #2:

EB to NB Loop Ramp

N W E S

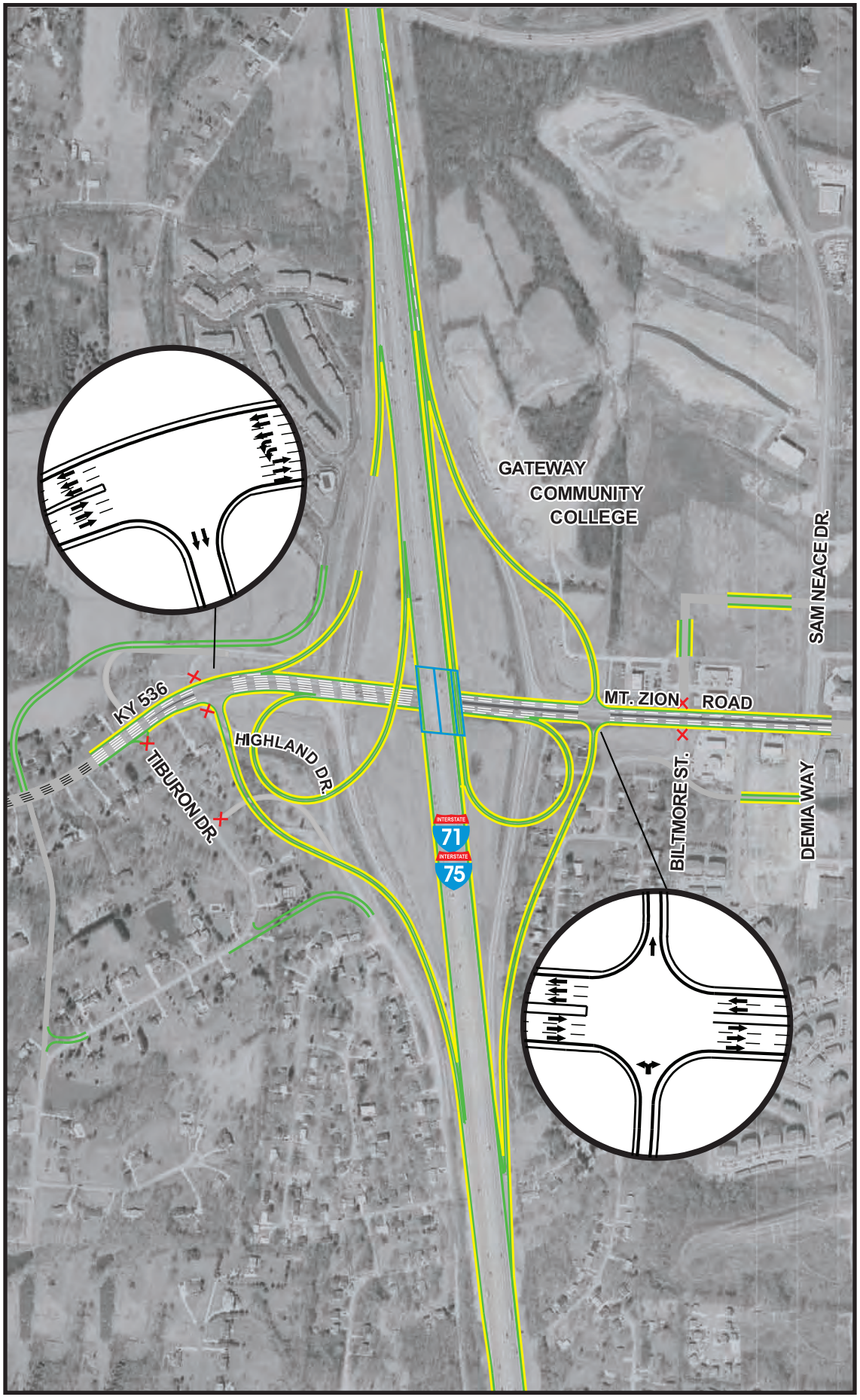
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #3:

EB to NB Loop Ramp and SB to EB Loop Ramp

N
W E
S

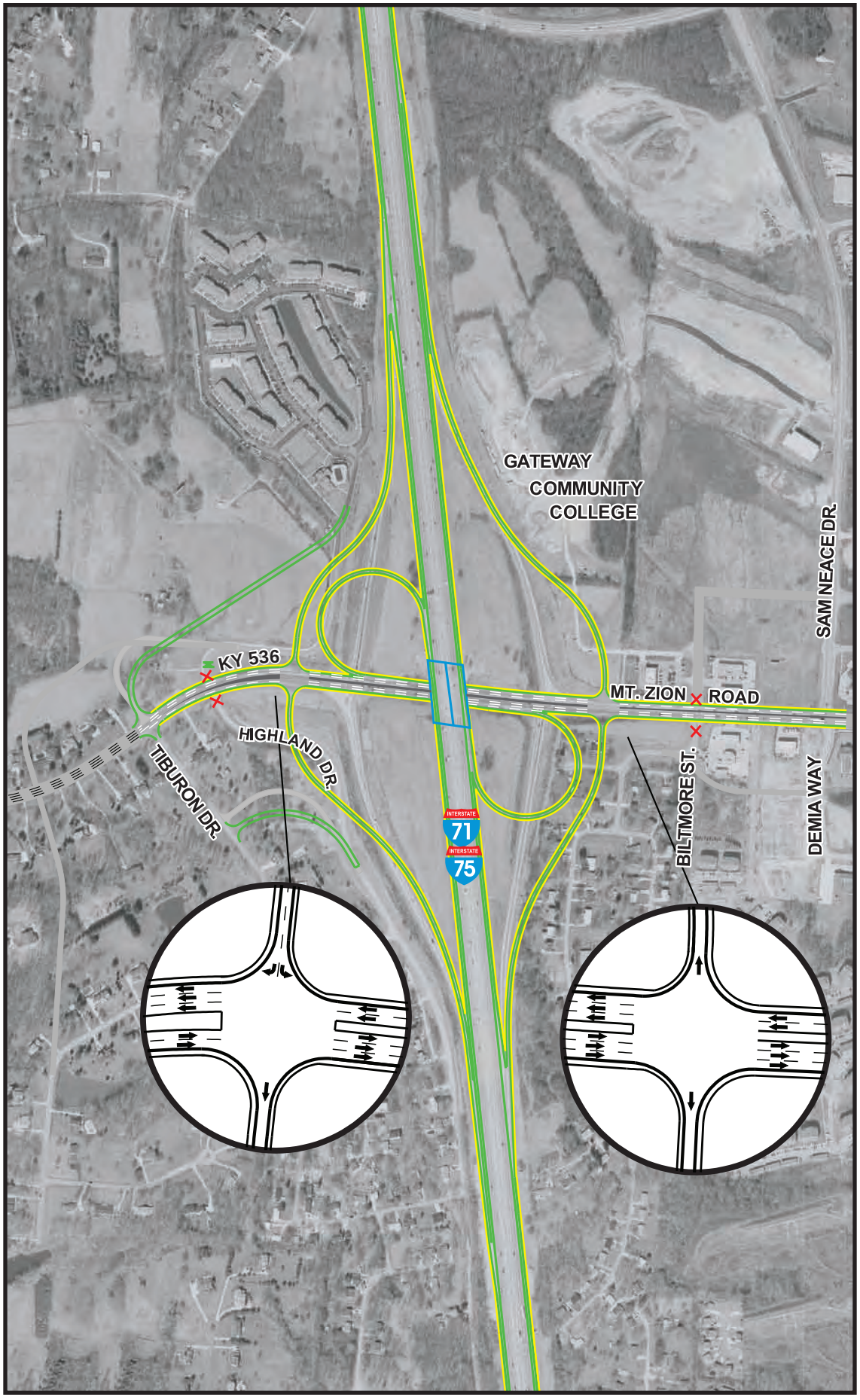
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #4:

EB to NB Loop Ramp and WB to SB Loop Ramp

N
W E
S

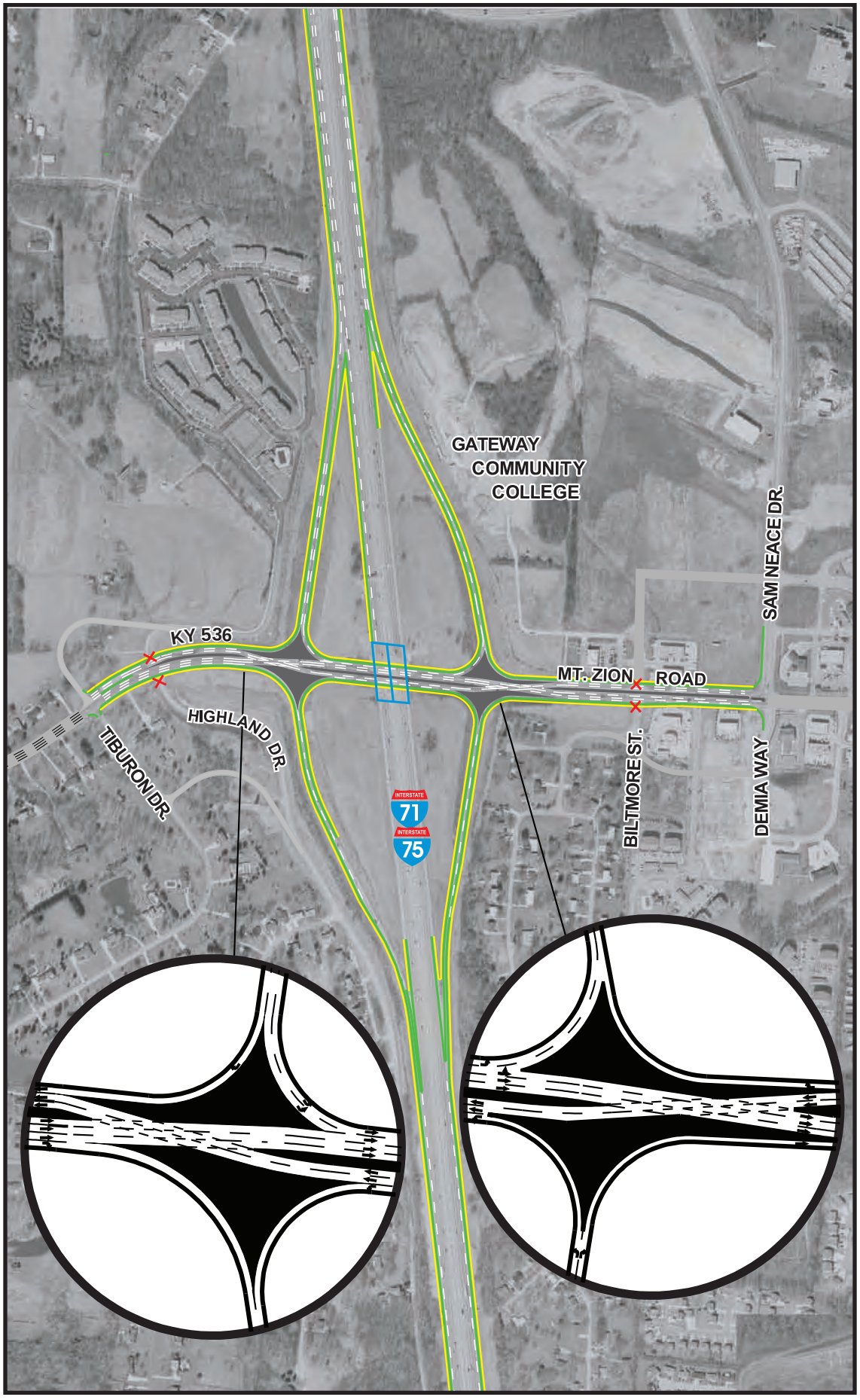
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #5:

Diverging Diamond Interchange

N
W E
S

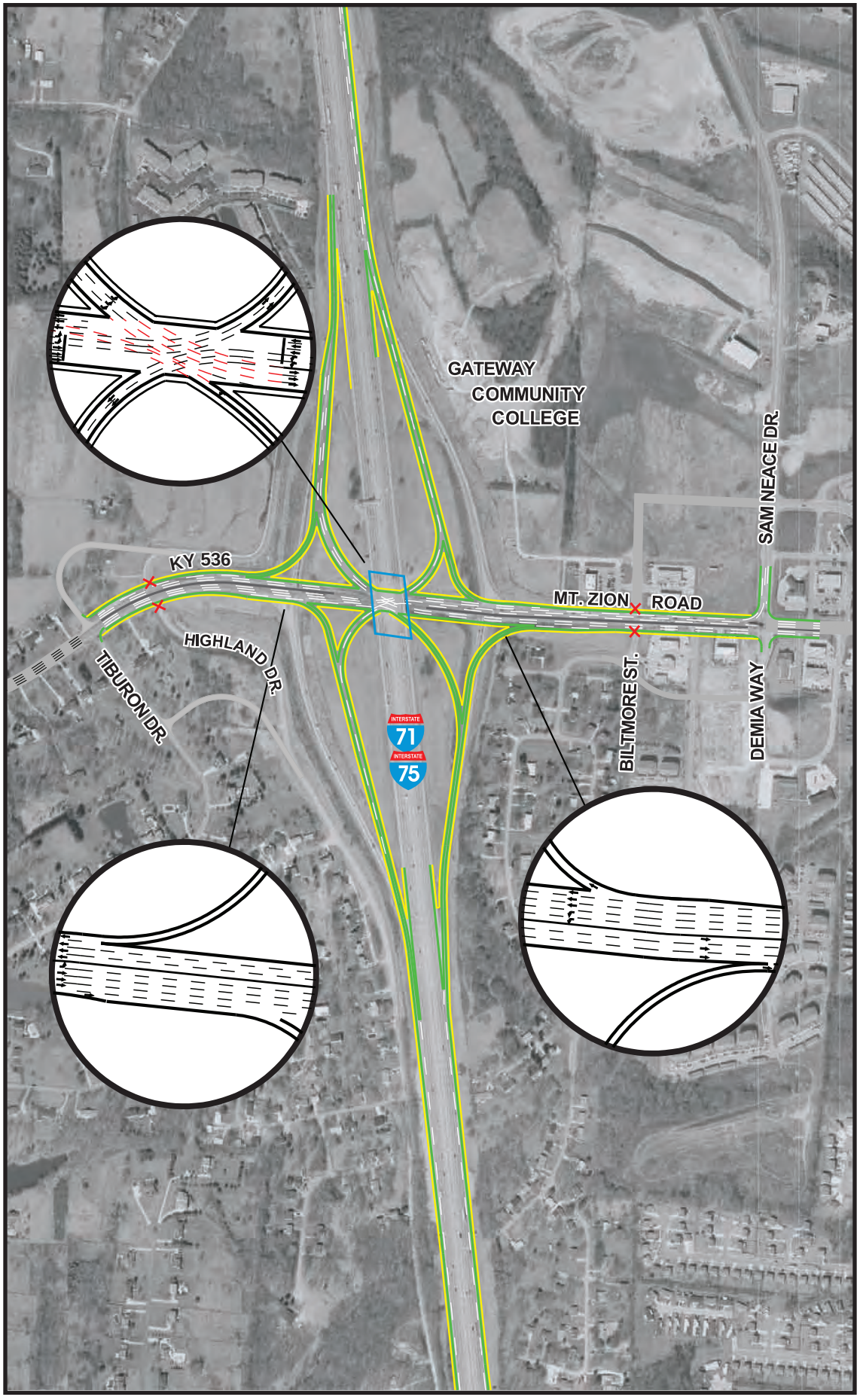
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #6:

Single-Point Urban Interchange

N
W E
S

Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #7:

Roundabout

N
W E
S

Legend

- Entrance to be closed
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

Alternative #8:

EB to NB Directional Ramp

Not Feasible

N
W E
S

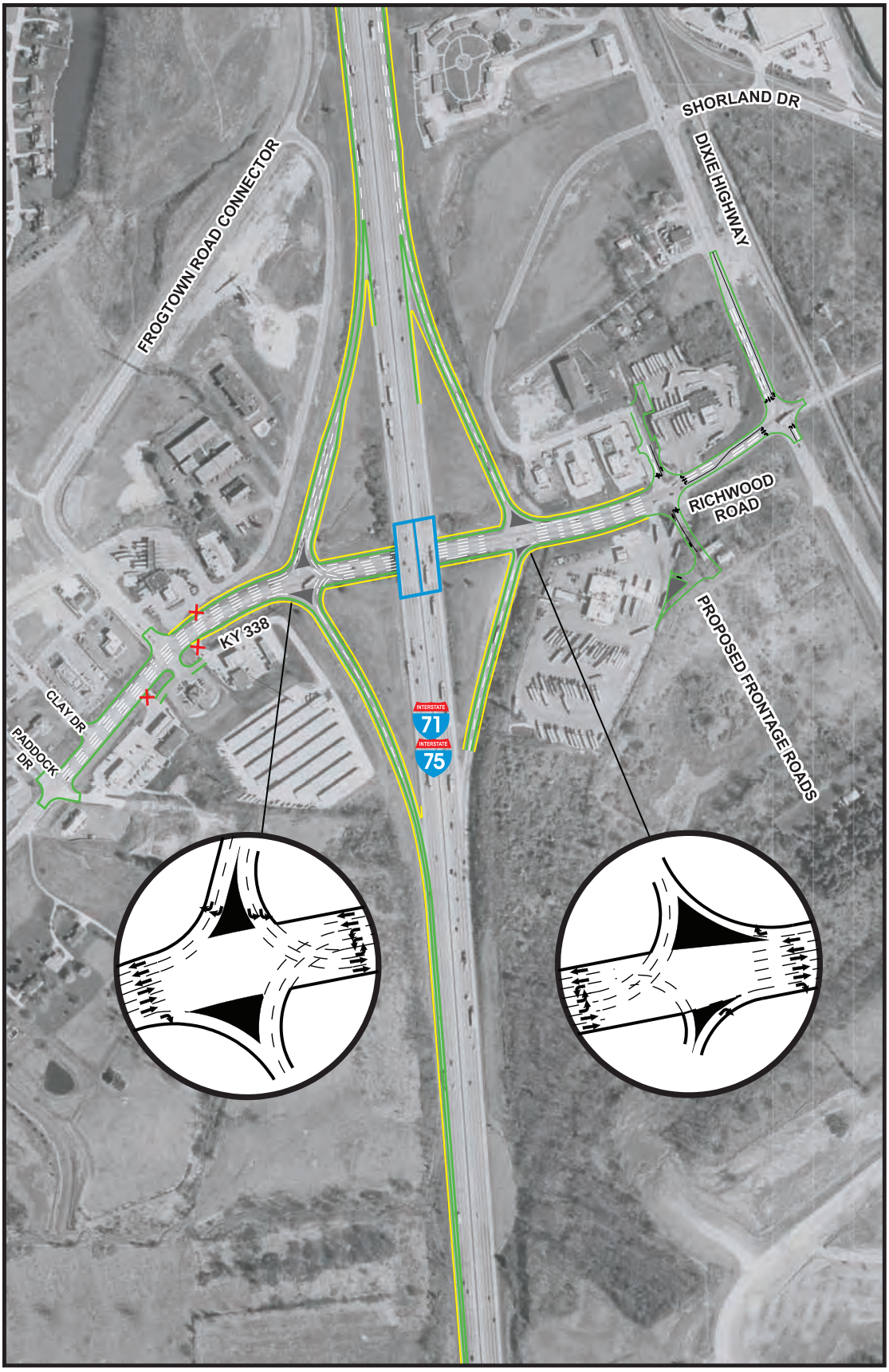
Legend

- X — Entrance to be closed
- Edge of pavement
- Lane line
- Frontage/ Approach Roads
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Alternative #1:

Adding Lanes to Existing Diamond

N
W E
S

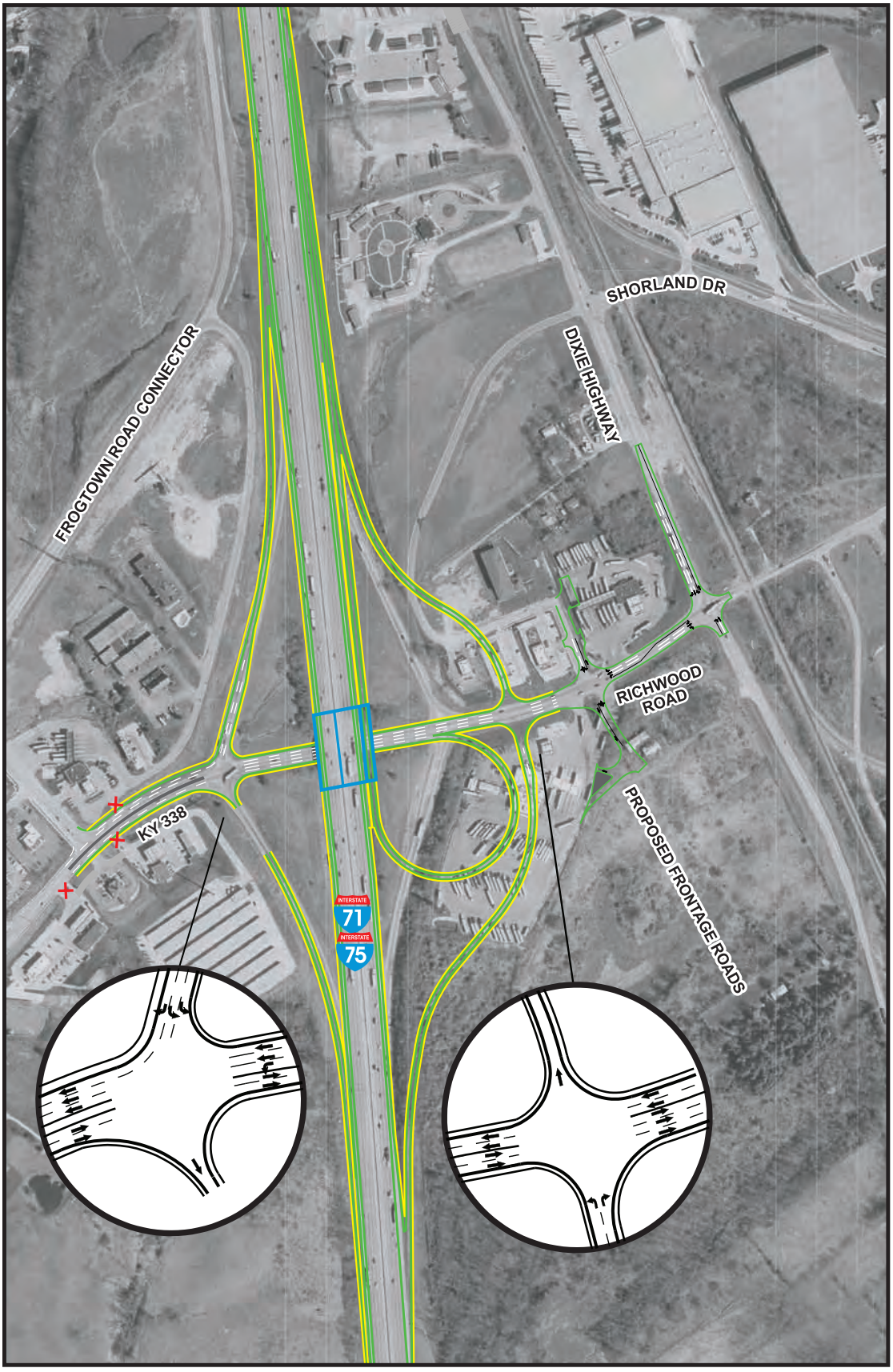
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Alternative #2:

EB to NB Loop Ramp

N W E S

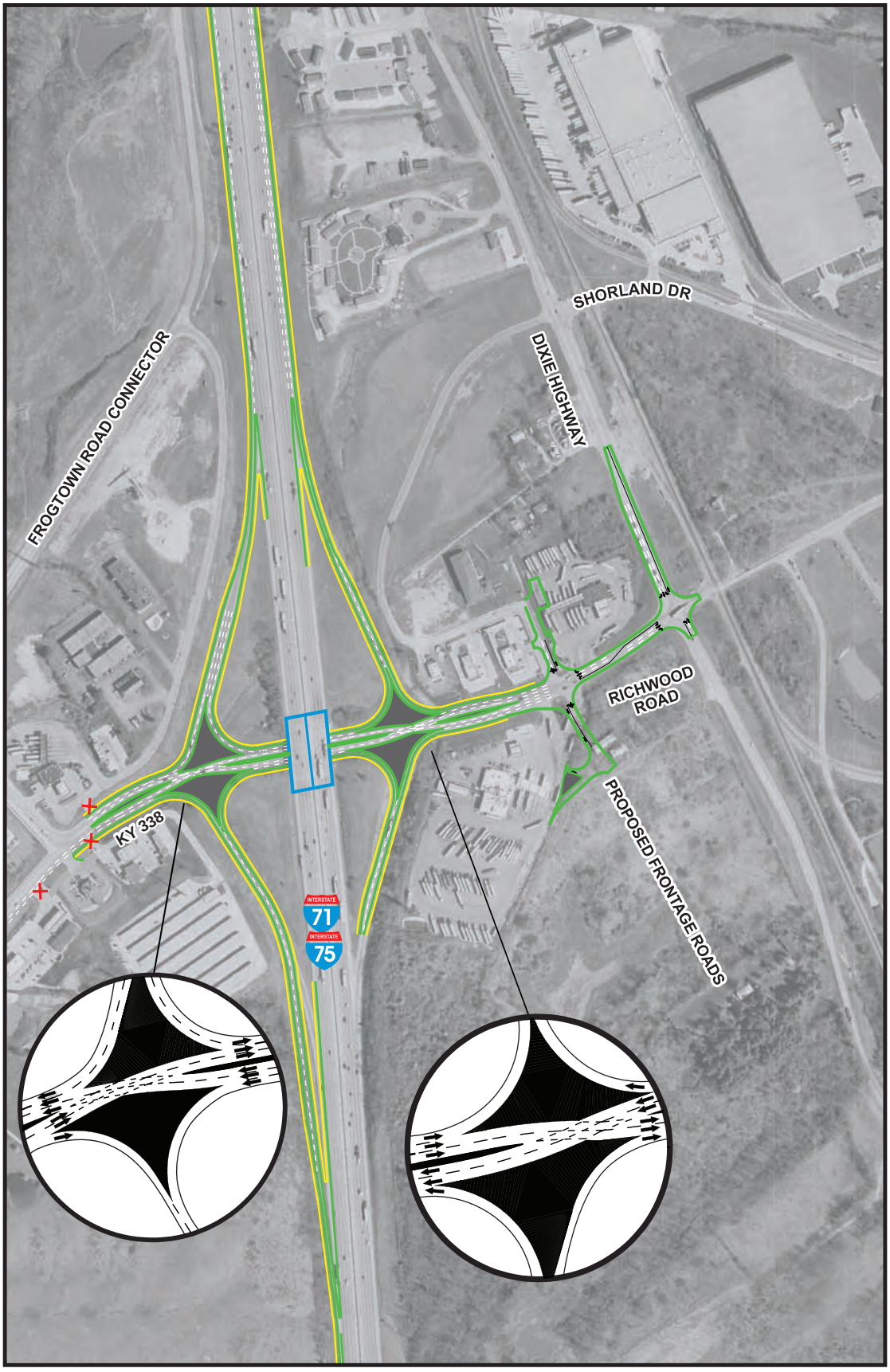
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Alternative #3:

Diverging Diamond Interchange

N W E S

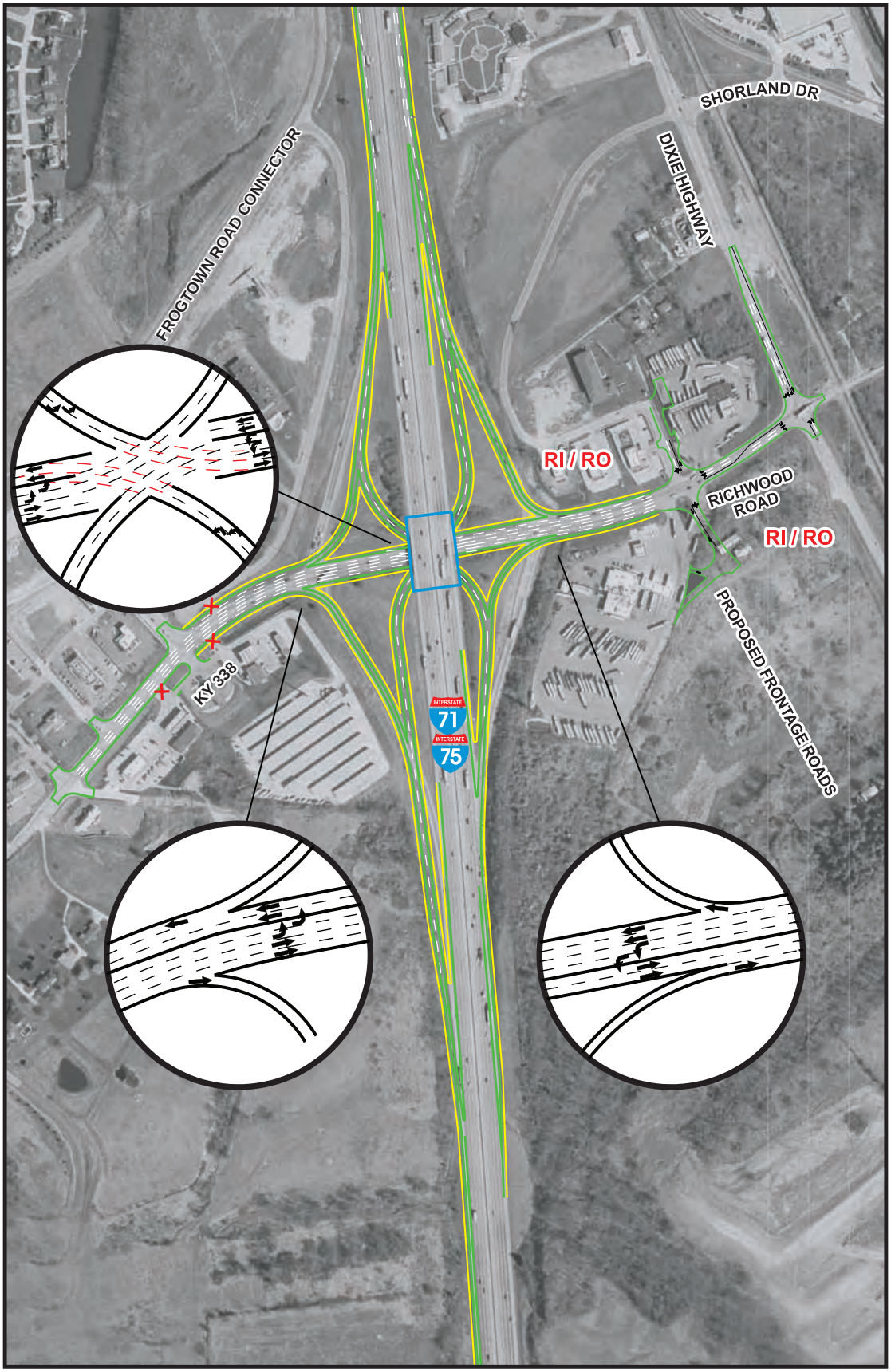
Legend

- Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Alternative #4:

Single Point Urban Interchange

N
W E
S

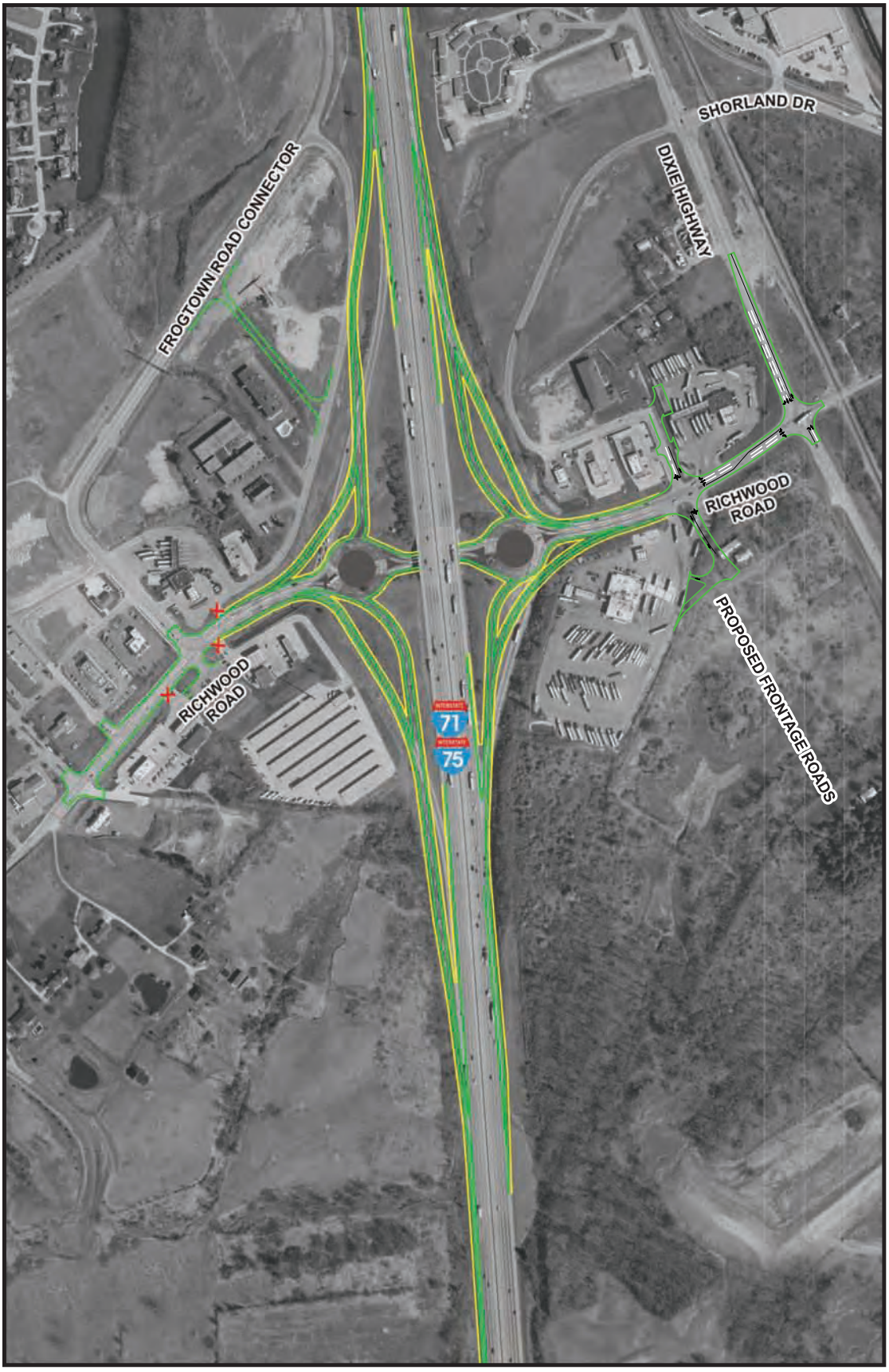
Legend

- X — Entrance to be closed
- Bridge
- Edge of pavement
- Lane line
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Alternative #5:

Roundabout

N W E S

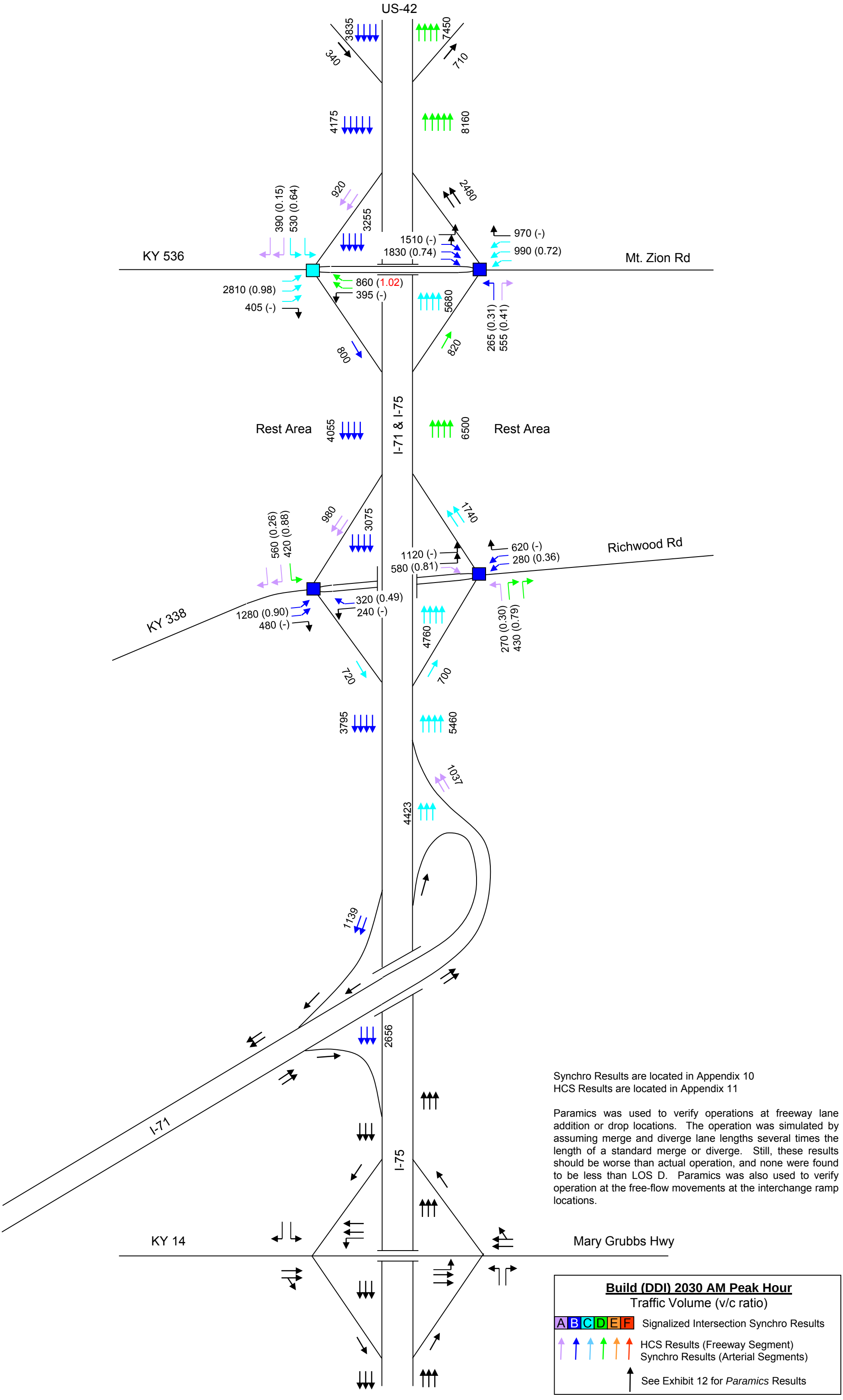
Legend

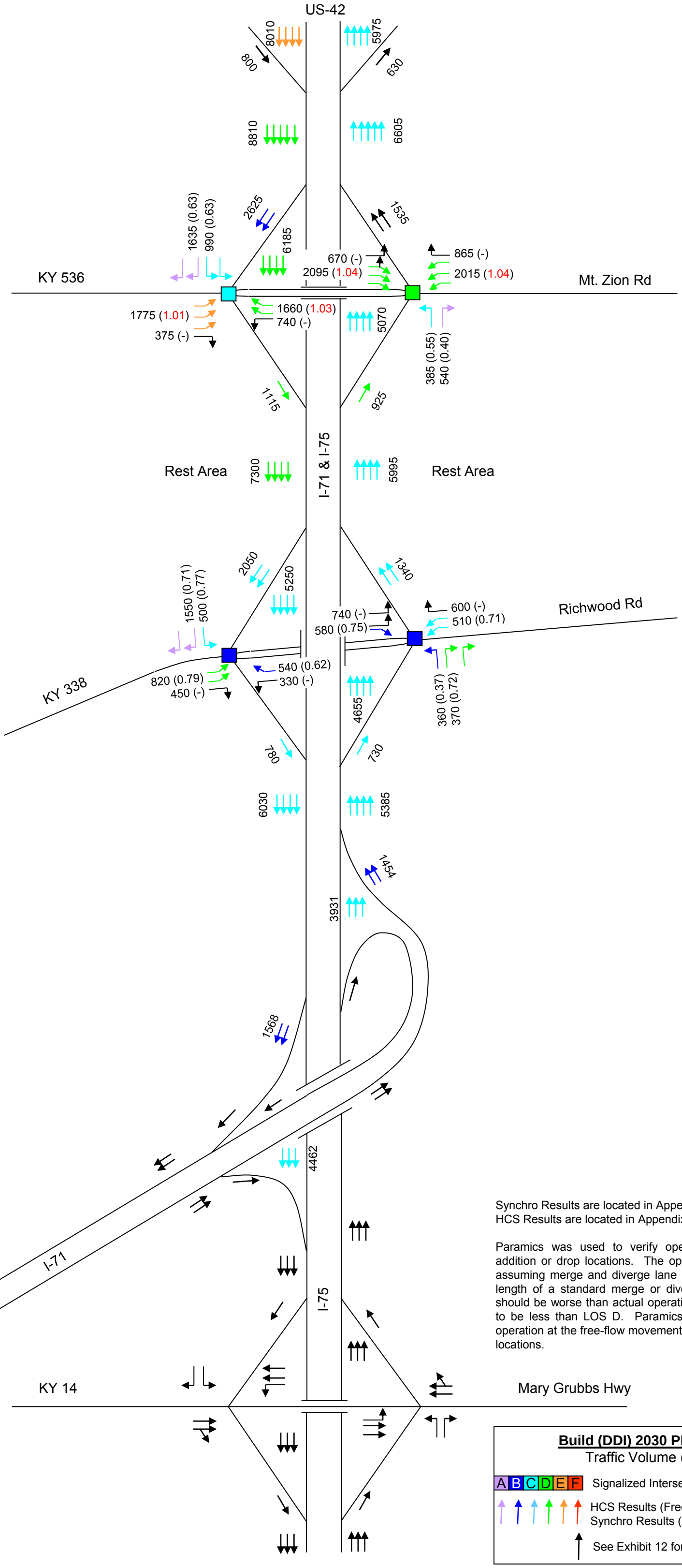
- X — Entrance to be closed
- Edge of pavement
- Lane line
- Edge of shoulder
- Islands/medians

SCALE

0 200 400 800 1,200

FEET


US-42
3835
40
7450
710
4175
8160
920
2480
390 (0.15)
530 (0.64)
3255
1510 (-)
1830 (0.74)
970 (-)
990 (0.72)
KY 536
Mt. Zion Rd
860 (1.02)
395 (-)
2810 (0.98)
405 (-)
5680
265 (0.31)
555 (0.41)
800
820
Rest Area
4055
I-71 & I-75
6500
Rest Area
980
3075
560 (0.26)
420 (0.88)
1740
1120 (-)
580 (0.81)
620 (-)
280 (0.36)
Richwood Rd
320 (0.49)
240 (-)
1280 (0.90)
480 (-)
KY 338
4760
270 (0.30)
430 (0.79)
720
700
3795
5460
1631
4423
1139
2656
I-71
I-75
KY 14
Mary Grubbs Hwy
Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11
Paramics was used to verify operations at freeway lane addition or drop locations. The operation was simulated by assuming merge and diverge lane lengths several times the length of a standard merge or diverge. Still, these results should be worse than actual operation, and none were found to be less than LOS D. Paramics was also used to verify operation at the free-flow movements at the interchange ramp locations.
Build (DDI) 2030 AM Peak Hour
Traffic Volume (v/c ratio)
A B C D E F
Signalized Intersection Synchro Results
HCS Results (Freeway Segment)
Synchro Results (Arterial Segments)
See Exhibit 12 for Paramics Results
N



Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11

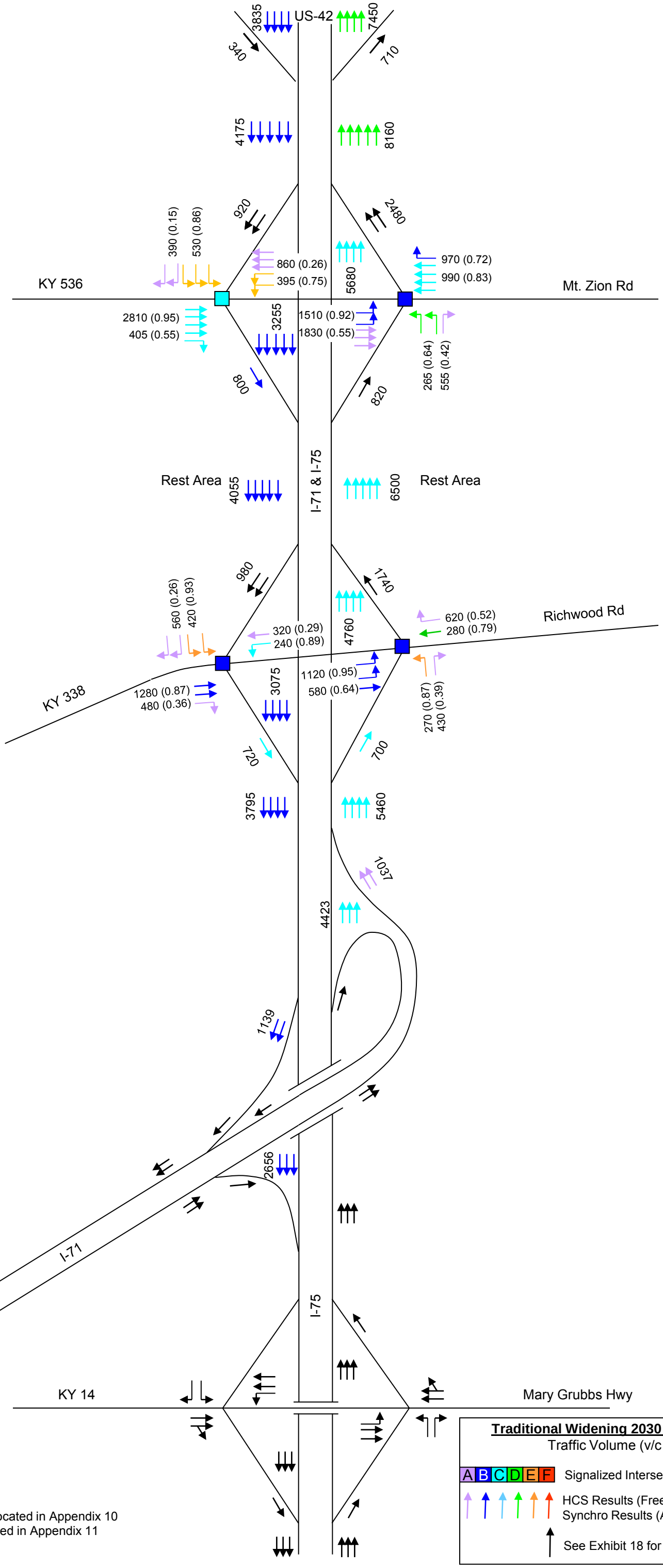
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Build (DDI) 2030 PM Peak Hour
Traffic Volume (v/c ratio)

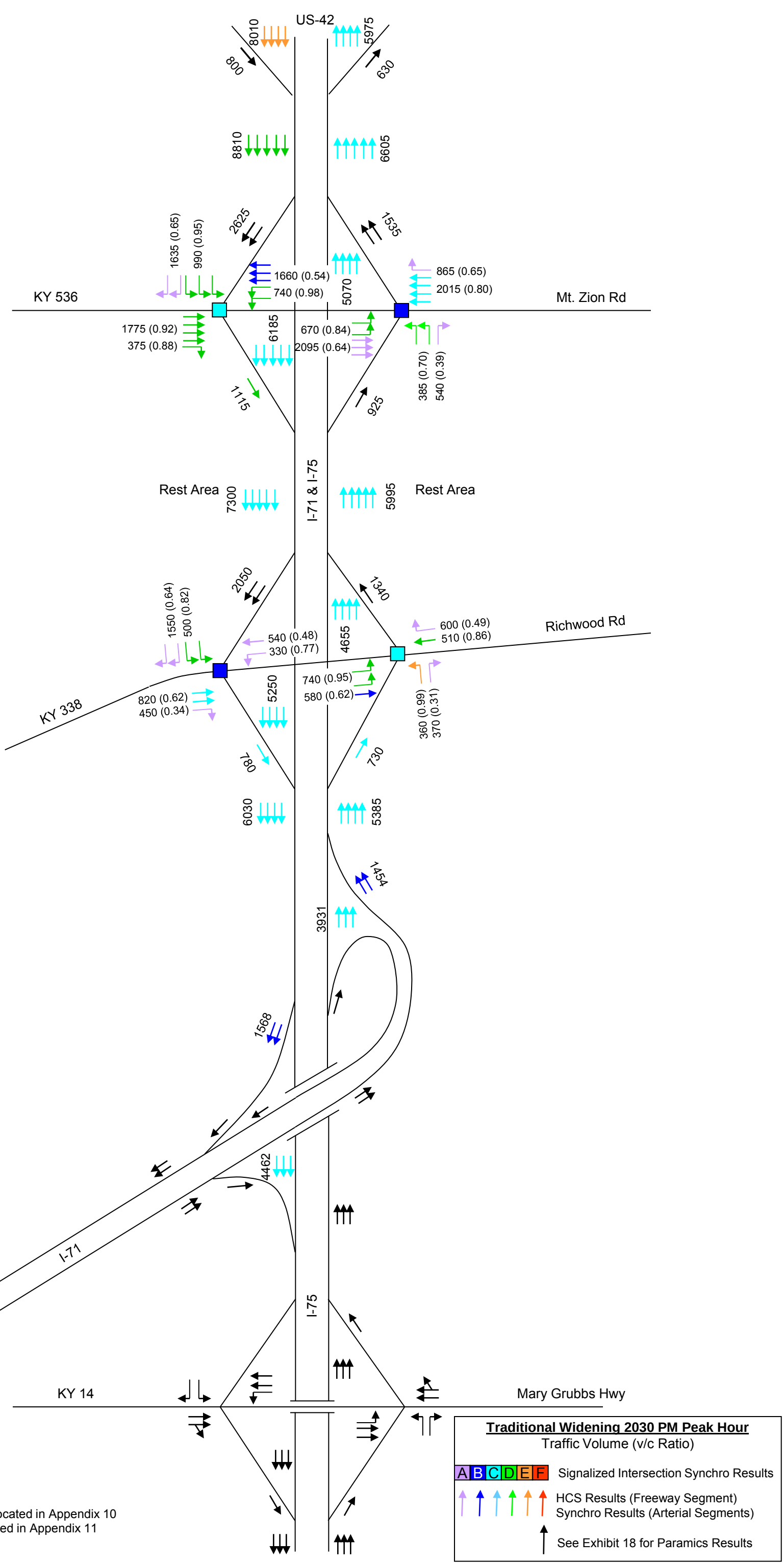
A B C D E F Signalized Intersection Synchro Results

HCS Results (Freeway Segment)
Synchro Results (Arterial Segments)

See Exhibit 12 for *Paramics* Results



Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11


US-42
8010
800
5975
630
8810
6605
2625
1635 (0.65)
990 (0.95)
1535
1660 (0.54)
740 (0.98)
5070
865 (0.65)
2015 (0.80)
KY 536
Mt. Zion Rd
1775 (0.92)
375 (0.88)
6185
670 (0.84)
2095 (0.64)
385 (0.70)
540 (0.39)
115
925
Rest Area
7300
I-71 & I-75
5995
Rest Area
2050
1550 (0.64)
500 (0.82)
1340
540 (0.48)
330 (0.77)
4655
600 (0.49)
510 (0.86)
Richwood Rd
KY 338
820 (0.62)
450 (0.34)
5250
740 (0.95)
580 (0.62)
360 (0.99)
370 (0.31)
080
730
6030
5385
1454
3931
1568
4462
I-71
I-75
KY 14
Mary Grubbs Hwy
Traditional Widening 2030 PM Peak Hour
Traffic Volume (v/c Ratio)
A B C D E F
Signalized Intersection Synchro Results
HCS Results (Freeway Segment)
Synchro Results (Arterial Segments)
See Exhibit 18 for Paramics Results
N
Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11

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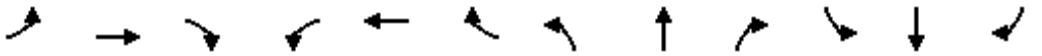
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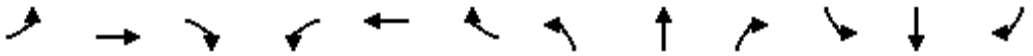
SR 338 (Richwood Drive) PM Build (DDI).....10-15



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2810	405	395	860	0	0	0	0	530	0	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	4.0	4.5	5.5					4.5		4.5
Lane Util. Factor		1.00	1.00	1.00	1.00					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		1863	1599	1597	1759					1626		1615
Flt Permitted		1.00	1.00	0.06	1.00					0.95		1.00
Satd. Flow (perm)		1863	1599	105	1759					1626		1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3054	440	429	935	0	0	0	0	576	0	424
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	3054	440	429	935	0	0	0	0	576	0	424
Heavy Vehicles (%)	0%	2%	1%	13%	8%	0%	0%	0%	0%	11%	0%	0%
Turn Type			Free	pm+pt						custom		custom
Protected Phases		2		1	6							
Permitted Phases			Free	6						4		4
Actuated Green, G (s)		59.5	100.0	73.5	73.5					16.5		16.5
Effective Green, g (s)		59.5	100.0	73.5	73.5					16.5		16.5
Actuated g/C Ratio		0.60	1.00	0.74	0.74					0.16		0.16
Clearance Time (s)		5.5		4.5	5.5					4.5		4.5
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		1108	1599	219	1293					268		266
v/s Ratio Prot		c1.64		c0.19	0.53							
v/s Ratio Perm			0.28	1.25						c0.35		0.26
v/c Ratio		2.76	0.28	1.96	0.72					2.15		1.59
Uniform Delay, d1		20.2	0.0	35.0	7.5					41.8		41.8
Progression Factor		1.00	1.00	0.75	2.56					1.00		1.00
Incremental Delay, d2		792.9	0.4	433.0	0.3					529.4		284.4
Delay (s)		813.1	0.4	459.4	19.5					571.2		326.1
Level of Service		F	A	F	B					F		F
Approach Delay (s)		710.8			157.9			0.0			467.3	
Approach LOS		F			F			A			F	

Intersection Summary			
HCM Average Control Delay	540.5	HCM Level of Service	F
HCM Volume to Capacity ratio	2.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	211.2%	ICU Level of Service	H
Analysis Period (min)	15		

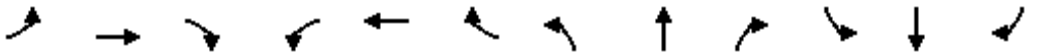
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1510	1830	0	0	990	970	265	0	555	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5			5.5	4.0	4.5		4.5			
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1787	1743			1743	1495	1612		1482			
Flt Permitted	0.09	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	175	1743			1743	1495	1612		1482			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1641	1989	0	0	1076	1054	288	0	603	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1641	1989	0	0	1076	1054	288	0	603	0	0	0
Heavy Vehicles (%)	1%	9%	0%	0%	9%	8%	12%	0%	9%	0%	0%	0%
Turn Type	pm+pt					Free	custom		custom			
Protected Phases	5	2			6							
Permitted Phases	2					Free	4		4			
Actuated Green, G (s)	73.5	73.5			38.5	100.0	16.5		16.5			
Effective Green, g (s)	73.5	73.5			38.5	100.0	16.5		16.5			
Actuated g/C Ratio	0.74	0.74			0.38	1.00	0.16		0.16			
Clearance Time (s)	4.5	5.5			5.5		4.5		4.5			
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)	620	1281			671	1495	266		245			
v/s Ratio Prot	c0.81	1.14			0.62							
v/s Ratio Perm	c1.14					0.70	0.18		c0.41			
v/c Ratio	2.65	1.55			1.60	0.71	1.08		2.46			
Uniform Delay, d1	29.4	13.2			30.8	0.0	41.8		41.8			
Progression Factor	1.11	0.57			0.95	1.00	1.00		1.00			
Incremental Delay, d2	741.5	249.1			272.2	0.3	79.0		669.7			
Delay (s)	774.2	256.7			301.5	0.3	120.7		711.5			
Level of Service	F	F			F	A	F		F			
Approach Delay (s)		490.6			152.5			520.5			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM Average Control Delay	386.3	HCM Level of Service	F
HCM Volume to Capacity ratio	2.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	211.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1775	375	740	1660	0	0	0	0	990	0	1635
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	4.0	4.5	5.5					4.5		4.5
Lane Util. Factor		1.00	1.00	1.00	1.00					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		1881	1442	1543	1881					1736		1599
Flt Permitted		1.00	1.00	0.09	1.00					0.95		1.00
Satd. Flow (perm)		1881	1442	148	1881					1736		1599
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1929	408	804	1804	0	0	0	0	1076	0	1777
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	16
Lane Group Flow (vph)	0	1929	408	804	1804	0	0	0	0	1076	0	1761
Heavy Vehicles (%)	0%	1%	12%	17%	1%	0%	0%	0%	0%	4%	0%	1%
Turn Type			Free	pm+pt						custom		custom
Protected Phases		2		1	6							
Permitted Phases			Free	6						4		4
Actuated Green, G (s)		39.5	85.0	53.5	53.5					21.5		21.5
Effective Green, g (s)		39.5	85.0	53.5	53.5					21.5		21.5
Actuated g/C Ratio		0.46	1.00	0.63	0.63					0.25		0.25
Clearance Time (s)		5.5		4.5	5.5					4.5		4.5
Vehicle Extension (s)		3.0		3.0	3.0					3.0		3.0
Lane Grp Cap (vph)		874	1442	249	1184					439		404
v/s Ratio Prot		1.03		c0.36	0.96							
v/s Ratio Perm			0.28	c1.68						0.62		c1.10
v/c Ratio		2.21	0.28	3.23	1.52					2.45		4.36
Uniform Delay, d1		22.8	0.0	26.0	15.8					31.8		31.8
Progression Factor		1.00	1.00	1.08	0.68					1.00		1.00
Incremental Delay, d2		546.9	0.5	1004.0	236.0					659.8		1516.8
Delay (s)		569.7	0.5	1032.0	246.8					691.6		1548.5
Level of Service		F	A	F	F					F		F
Approach Delay (s)		470.3			488.8			0.0			1225.3	
Approach LOS		F			F			A			F	

Intersection Summary			
HCM Average Control Delay	752.7	HCM Level of Service	F
HCM Volume to Capacity ratio	3.43		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	319.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	670	2095	0	0	2015	865	385	0	540	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5			5.5	5.5	4.5		4.5			
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1787	1845			1696	1538	1770		1524			
Flt Permitted	0.08	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	145	1845			1696	1538	1770		1524			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	728	2277	0	0	2190	940	418	0	587	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	218	0	0	14	0	0	0
Lane Group Flow (vph)	728	2277	0	0	2190	722	418	0	573	0	0	0
Heavy Vehicles (%)	1%	3%	0%	0%	12%	5%	2%	0%	6%	0%	0%	0%
Turn Type	pm+pt					Perm	custom		custom			
Protected Phases	5	2			6							
Permitted Phases	2					6	4		4			
Actuated Green, G (s)	62.5	62.5			47.5	47.5	12.5		12.5			
Effective Green, g (s)	62.5	62.5			47.5	47.5	12.5		12.5			
Actuated g/C Ratio	0.74	0.74			0.56	0.56	0.15		0.15			
Clearance Time (s)	4.5	5.5			5.5	5.5	4.5		4.5			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	309	1357			948	859	260		224			
v/s Ratio Prot	c0.29	1.23			1.29							
v/s Ratio Perm	c1.44					0.47	0.24		c0.38			
v/c Ratio	2.36	1.68			2.31	0.84	1.61		2.56			
Uniform Delay, d1	28.7	11.2			18.8	15.6	36.2		36.2			
Progression Factor	1.17	0.36			0.97	1.01	1.00		1.00			
Incremental Delay, d2	611.1	305.4			589.9	1.0	290.7		714.8			
Delay (s)	644.8	309.4			608.0	16.7	326.9		751.0			
Level of Service	F	F			F	B	F		F			
Approach Delay (s)		390.7			430.5			574.6			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM Average Control Delay	434.0	HCM Level of Service	F
HCM Volume to Capacity ratio	2.30		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	319.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWL	NWR
Lane Configurations										
Volume (vph)	0	1280	480	240	320	0	420	560	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0	7.0	7.0		4.6	4.6		
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	1.00		
Frt		1.00	0.85	1.00	1.00		1.00	0.85		
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1810	1482	1399	1792		1805	1380		
Flt Permitted		1.00	1.00	0.08	1.00		0.95	1.00		
Satd. Flow (perm)		1810	1482	116	1792		1805	1380		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1391	522	261	348	0	457	609	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1391	522	261	348	0	457	609	0	0
Heavy Vehicles (%)	0%	5%	9%	29%	6%	0%	0%	17%	0%	0%
Turn Type			Perm	pm+pt				Perm		
Protected Phases		2		1	6		8			
Permitted Phases			2	6				8		
Actuated Green, G (s)		44.0	44.0	57.0	57.0		21.4	21.4		
Effective Green, g (s)		44.0	44.0	57.0	57.0		21.4	21.4		
Actuated g/C Ratio		0.49	0.49	0.63	0.63		0.24	0.24		
Clearance Time (s)		7.0	7.0	7.0	7.0		4.6	4.6		
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		885	725	159	1135		429	328		
v/s Ratio Prot		0.77		c0.11	0.19		0.25			
v/s Ratio Perm			0.35	c0.93				c0.44		
v/c Ratio		1.57	0.72	1.64	0.31		1.07	1.86		
Uniform Delay, d1		23.0	18.1	26.4	7.5		34.3	34.3		
Progression Factor		1.06	1.10	2.21	0.06		1.00	1.00		
Incremental Delay, d2		257.8	0.6	308.6	0.5		61.9	397.1		
Delay (s)		282.3	20.5	366.7	1.0		96.2	431.4		
Level of Service		F	C	F	A		F	F		
Approach Delay (s)		210.8			157.7		287.7		0.0	
Approach LOS		F			F		F		A	

Intersection Summary			
HCM Average Control Delay	224.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	131.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1120	580	0	0	280	620	270	0	430	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0			7.0	7.0	5.5		5.5			
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1703	1397			1597	1313	1687		1223			
Flt Permitted	0.49	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	886	1397			1597	1313	1687		1223			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1217	630	0	0	304	674	293	0	467	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1217	630	0	0	304	674	293	0	467	0	0	0
Heavy Vehicles (%)	6%	36%	0%	0%	19%	23%	7%	0%	32%	0%	0%	0%
Turn Type	pm+pt					Perm	custom		custom			
Protected Phases	5	2			6							
Permitted Phases	2					6	4		4			
Actuated Green, G (s)	58.0	58.0			30.0	30.0	19.5		19.5			
Effective Green, g (s)	58.0	58.0			30.0	30.0	19.5		19.5			
Actuated g/C Ratio	0.64	0.64			0.33	0.33	0.22		0.22			
Clearance Time (s)	7.0	7.0			7.0	7.0	5.5		5.5			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	762	900			532	438	366		265			
v/s Ratio Prot	c0.37	0.45			0.19							
v/s Ratio Perm	c0.66					0.51	0.17		c0.38			
v/c Ratio	1.60	0.70			0.57	1.54	0.80		1.76			
Uniform Delay, d1	17.5	10.4			24.7	30.0	33.4		35.2			
Progression Factor	0.37	0.17			1.00	1.00	1.00		1.00			
Incremental Delay, d2	269.3	0.4			1.5	253.7	11.9		358.1			
Delay (s)	275.7	2.2			26.2	283.7	45.3		393.3			
Level of Service	F	A			C	F	D		F			
Approach Delay (s)		182.4			203.6			259.1			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM Average Control Delay	204.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	131.6%	ICU Level of Service	H
Analysis Period (min)	15		

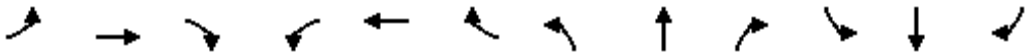
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL2	SBL	SBR	NWL	NWR
Lane Configurations											
Volume (vph)	0	820	450	330	540	0	500	0	1550	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0	7.0	7.0			4.6	4.6		
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		
Frt		1.00	0.85	1.00	1.00			1.00	0.85		
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00		
Satd. Flow (prot)		1845	1455	1530	1827			1433	1524		
Flt Permitted		1.00	1.00	0.09	1.00			0.95	1.00		
Satd. Flow (perm)		1845	1455	150	1827			1433	1524		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	891	489	359	587	0	543	0	1685	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	891	489	359	587	0	0	543	1685	0	0
Heavy Vehicles (%)	0%	3%	11%	18%	4%	0%	26%	0%	6%	0%	0%
Turn Type			Perm	pm+pt			Perm		Perm		
Protected Phases		2		1	6			8			
Permitted Phases			2	6			8		8		
Actuated Green, G (s)		36.0	36.0	53.0	53.0			50.4	50.4		
Effective Green, g (s)		36.0	36.0	53.0	53.0			50.4	50.4		
Actuated g/C Ratio		0.31	0.31	0.46	0.46			0.44	0.44		
Clearance Time (s)		7.0	7.0	7.0	7.0			4.6	4.6		
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0		
Lane Grp Cap (vph)		578	455	189	842			628	668		
v/s Ratio Prot		0.48		c0.17	0.32						
v/s Ratio Perm			0.34	c0.71				0.38	c1.11		
v/c Ratio		1.54	1.07	1.90	0.70			0.86	2.52		
Uniform Delay, d1		39.5	39.5	32.1	24.6			29.2	32.3		
Progression Factor		0.94	0.93	1.06	0.49			1.00	1.00		
Incremental Delay, d2		247.1	48.9	413.1	2.0			11.9	689.5		
Delay (s)		284.1	85.7	446.9	14.0			41.1	721.8		
Level of Service		F	F	F	B			D	F		
Approach Delay (s)		213.8			178.3			555.9		0.0	
Approach LOS		F			F			F		A	

Intersection Summary			
HCM Average Control Delay	373.8	HCM Level of Service	F
HCM Volume to Capacity ratio	2.13		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	11.6
Intersection Capacity Utilization	134.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	740	580	0	0	510	600	360	0	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0			7.0	7.0	5.5		5.5			
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	1770	1570			1696	1369	1641		1313			
Flt Permitted	0.26	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	485	1570			1696	1369	1641		1313			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	804	630	0	0	554	652	391	0	402	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	804	630	0	0	554	652	391	0	402	0	0	0
Heavy Vehicles (%)	2%	21%	0%	0%	12%	18%	10%	0%	23%	0%	0%	0%
Turn Type	pm+pt					Perm	custom		custom			
Protected Phases	5	2			6							
Permitted Phases	2					6	4		4			
Actuated Green, G (s)	76.0	76.0			47.0	47.0	26.5		26.5			
Effective Green, g (s)	76.0	76.0			47.0	47.0	26.5		26.5			
Actuated g/C Ratio	0.66	0.66			0.41	0.41	0.23		0.23			
Clearance Time (s)	7.0	7.0			7.0	7.0	5.5		5.5			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0			
Lane Grp Cap (vph)	566	1038			693	560	378		303			
v/s Ratio Prot	c0.27	0.40			0.33							
v/s Ratio Perm	c0.67					0.48	0.24		c0.31			
v/c Ratio	1.42	0.61			0.80	1.16	1.03		1.33			
Uniform Delay, d1	29.8	11.0			29.9	34.0	44.2		44.2			
Progression Factor	0.59	0.65			1.00	1.00	1.00		1.00			
Incremental Delay, d2	190.2	0.2			9.4	92.2	55.5		168.1			
Delay (s)	207.8	7.4			39.2	126.2	99.7		212.4			
Level of Service	F	A			D	F	F		F			
Approach Delay (s)		119.7			86.2			156.8			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM Average Control Delay	116.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	134.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR2	SBL2	SBR	NWL
Lane Configurations					
Volume (vph)	2810	405	530	390	860
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.91	1.00	0.97	0.88	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	5085	1599	3155	2842	3242
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	5085	1599	3155	2842	3242
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3054	440	576	424	935
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	3054	440	576	424	935
Heavy Vehicles (%)	2%	1%	11%	0%	8%
Turn Type		Free	Prot	Free	
Protected Phases	1		2		2
Permitted Phases		Free		Free	
Actuated Green, G (s)	58.0	95.0	27.0	95.0	27.0
Effective Green, g (s)	58.0	95.0	27.0	95.0	27.0
Actuated g/C Ratio	0.61	1.00	0.28	1.00	0.28
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	3105	1599	897	2842	921
v/s Ratio Prot	c0.60		0.18		c0.29
v/s Ratio Perm		0.28		0.15	
v/c Ratio	0.98	0.28	0.64	0.15	1.02
Uniform Delay, d1	18.0	0.0	29.8	0.0	34.0
Progression Factor	0.67	1.00	1.00	1.00	0.46
Incremental Delay, d2	7.4	0.2	3.5	0.1	29.9
Delay (s)	19.5	0.2	33.3	0.1	45.7
Level of Service	B	A	C	A	D
Approach Delay (s)	17.1				45.7
Approach LOS	B				D

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBT	WBR2	NBL2	NBR	SEL
Lane Configurations					
Volume (vph)	990	970	265	555	1830
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.91	1.00	1.00	1.00	0.94
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	4759	1495	1612	1482	4670
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	4759	1495	1612	1482	4670
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1076	1054	288	603	1989
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	1076	1054	288	603	1989
Heavy Vehicles (%)	9%	8%	12%	9%	9%
Turn Type		Free	Prot	Free	
Protected Phases	2		1		1
Permitted Phases		Free		Free	
Actuated Green, G (s)	30.0	95.0	55.0	95.0	55.0
Effective Green, g (s)	30.0	95.0	55.0	95.0	55.0
Actuated g/C Ratio	0.32	1.00	0.58	1.00	0.58
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	1503	1495	933	1482	2704
v/s Ratio Prot	0.23		0.18		0.43
v/s Ratio Perm		c0.70		0.41	
v/c Ratio	0.72	0.71	0.31	0.41	0.74
Uniform Delay, d1	28.7	0.0	10.3	0.0	14.7
Progression Factor	0.67	1.00	1.00	1.00	1.15
Incremental Delay, d2	2.5	2.4	0.9	0.8	0.7
Delay (s)	21.8	2.4	11.1	0.8	17.6
Level of Service	C	A	B	A	B
Approach Delay (s)	12.2				17.6
Approach LOS	B				B

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR2	SBL2	SBR	NWL
Lane Configurations					
Volume (vph)	1775	375	990	1635	1660
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.91	1.00	0.97	0.88	0.97
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	5085	1599	3155	2842	3242
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	5085	1599	3155	2842	3242
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1929	408	1076	1777	1804
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	1929	408	1076	1777	1804
Heavy Vehicles (%)	2%	1%	11%	0%	8%
Turn Type		Free	Prot	Free	
Protected Phases	1		2		2
Permitted Phases		Free		Free	
Actuated Green, G (s)	43.0	115.0	62.0	115.0	62.0
Effective Green, g (s)	43.0	115.0	62.0	115.0	62.0
Actuated g/C Ratio	0.37	1.00	0.54	1.00	0.54
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	1901	1599	1701	2842	1748
v/s Ratio Prot	c0.38		0.34		c0.56
v/s Ratio Perm		0.26		0.63	
v/c Ratio	1.01	0.26	0.63	0.63	1.03
Uniform Delay, d1	36.0	0.0	18.5	0.0	26.5
Progression Factor	1.00	1.00	1.00	1.00	1.08
Incremental Delay, d2	24.4	0.4	1.8	1.1	21.3
Delay (s)	60.4	0.4	20.3	1.1	50.0
Level of Service	E	A	C	A	D
Approach Delay (s)	49.9				50.0
Approach LOS	D				D

Intersection Summary			
HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	121.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBT	WBR2	NBL2	NBR	SEL
Lane Configurations					
Volume (vph)	2015	865	385	540	2095
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.91	1.00	1.00	1.00	0.94
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	4759	1495	1612	1482	4670
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	4759	1495	1612	1482	4670
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2190	940	418	587	2277
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	2190	940	418	587	2277
Heavy Vehicles (%)	9%	8%	12%	9%	9%
Turn Type		Free	Prot	Free	
Protected Phases	2		1		1
Permitted Phases		Free		Free	
Actuated Green, G (s)	51.0	115.0	54.0	115.0	54.0
Effective Green, g (s)	51.0	115.0	54.0	115.0	54.0
Actuated g/C Ratio	0.44	1.00	0.47	1.00	0.47
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	2111	1495	757	1482	2193
v/s Ratio Prot	c0.46		0.26		c0.49
v/s Ratio Perm		0.63		0.40	
v/c Ratio	1.04	0.63	0.55	0.40	1.04
Uniform Delay, d1	32.0	0.0	21.8	0.0	30.5
Progression Factor	0.74	1.00	1.00	1.00	0.60
Incremental Delay, d2	26.3	1.3	2.9	0.8	24.4
Delay (s)	49.8	1.3	24.7	0.8	42.7
Level of Service	D	A	C	A	D
Approach Delay (s)	35.2				42.7
Approach LOS	D				D

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR2	SBL2	SBR	NWL
Lane Configurations					
Volume (vph)	1280	480	420	560	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.88	1.00
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	3438	1482	1253	2429	1703
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	3438	1482	1253	2429	1703
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1422	533	467	622	356
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	1422	533	467	622	356
Heavy Vehicles (%)	5%	9%	44%	17%	6%
Turn Type		Free	Prot	Free	
Protected Phases	1		2		2
Permitted Phases		Free		Free	
Actuated Green, G (s)	39.0	85.0	36.0	85.0	36.0
Effective Green, g (s)	39.0	85.0	36.0	85.0	36.0
Actuated g/C Ratio	0.46	1.00	0.42	1.00	0.42
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	1577	1482	531	2429	721
v/s Ratio Prot	c0.41		c0.37		0.21
v/s Ratio Perm		0.36		0.26	
v/c Ratio	0.90	0.36	0.88	0.26	0.49
Uniform Delay, d1	21.2	0.0	22.5	0.0	17.9
Progression Factor	0.63	1.00	1.00	1.00	0.78
Incremental Delay, d2	5.6	0.4	18.5	0.3	2.3
Delay (s)	19.0	0.4	41.0	0.3	16.2
Level of Service	B	A	D	A	B
Approach Delay (s)	13.9				16.2
Approach LOS	B				B

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBT	WBR2	NBL2	NBR	SEL
Lane Configurations					
Volume (vph)	280	620	270	430	580
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.88	1.00
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	3034	1313	1687	2153	1327
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	3034	1313	1687	2153	1327
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	311	689	300	478	644
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	311	689	300	478	644
Heavy Vehicles (%)	19%	23%	7%	32%	36%
Turn Type		Free	Prot	custom	
Protected Phases	2		1	2	1
Permitted Phases		Free			
Actuated Green, G (s)	24.0	85.0	51.0	24.0	51.0
Effective Green, g (s)	24.0	85.0	51.0	24.0	51.0
Actuated g/C Ratio	0.28	1.00	0.60	0.28	0.60
Clearance Time (s)	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	857	1313	1012	608	796
v/s Ratio Prot	0.10		0.18	c0.22	c0.49
v/s Ratio Perm		0.52			
v/c Ratio	0.36	0.52	0.30	0.79	0.81
Uniform Delay, d1	24.4	0.0	8.3	28.1	13.2
Progression Factor	0.59	1.00	1.00	1.00	0.35
Incremental Delay, d2	0.7	0.8	0.7	9.9	3.9
Delay (s)	15.0	0.8	9.0	38.0	8.5
Level of Service	B	A	A	D	A
Approach Delay (s)	5.2				8.5
Approach LOS	A				A

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR2	SBL2	SBR	NWL
Lane Configurations					
Volume (vph)	820	450	500	1550	540
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	4.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.88	1.00
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	3438	1482	1253	2429	1703
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	3438	1482	1253	2429	1703
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	911	500	556	1722	600
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	911	500	556	1722	600
Heavy Vehicles (%)	5%	9%	44%	17%	6%
Turn Type		Free	Prot	Free	
Protected Phases	1		2		2
Permitted Phases		Free		Free	
Actuated Green, G (s)	37.0	110.0	63.0	110.0	63.0
Effective Green, g (s)	37.0	110.0	63.0	110.0	63.0
Actuated g/C Ratio	0.34	1.00	0.57	1.00	0.57
Clearance Time (s)	5.0		5.0		5.0
Vehicle Extension (s)	3.0		3.0		3.0
Lane Grp Cap (vph)	1156	1482	718	2429	975
v/s Ratio Prot	0.26		c0.44		0.35
v/s Ratio Perm		0.34		c0.71	
v/c Ratio	0.79	0.34	0.77	0.71	0.62
Uniform Delay, d1	33.0	0.0	18.0	0.0	15.5
Progression Factor	0.99	1.00	1.00	1.00	0.71
Incremental Delay, d2	4.6	0.5	8.0	1.8	2.4
Delay (s)	37.3	0.5	26.0	1.8	13.5
Level of Service	D	A	C	A	B
Approach Delay (s)	24.3				13.5
Approach LOS	C				B

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBT	WBR2	NBL2	NBR	SEL
Lane Configurations					
Volume (vph)	510	600	360	370	580
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.88	1.00
Frt	1.00	0.85	1.00	0.85	1.00
Flt Protected	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	3034	1313	1687	2153	1327
Flt Permitted	1.00	1.00	0.95	1.00	0.95
Satd. Flow (perm)	3034	1313	1687	2153	1327
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	567	667	400	411	644
RTOR Reduction (vph)	0	0	0	0	0
Lane Group Flow (vph)	567	667	400	411	644
Heavy Vehicles (%)	19%	23%	7%	32%	36%
Turn Type		Free	Prot	custom	
Protected Phases	2		1	2	1
Permitted Phases		Free			
Actuated Green, G (s)	29.0	110.0	71.0	29.0	71.0
Effective Green, g (s)	29.0	110.0	71.0	29.0	71.0
Actuated g/C Ratio	0.26	1.00	0.65	0.26	0.65
Clearance Time (s)	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	800	1313	1089	568	857
v/s Ratio Prot	0.19		0.24	c0.19	c0.49
v/s Ratio Perm		0.51			
v/c Ratio	0.71	0.51	0.37	0.72	0.75
Uniform Delay, d1	36.7	0.0	9.1	36.9	13.4
Progression Factor	0.80	1.00	1.00	1.00	0.67
Incremental Delay, d2	2.0	0.5	1.0	7.8	3.7
Delay (s)	31.5	0.5	10.0	44.7	12.7
Level of Service	C	A	B	D	B
Approach Delay (s)	14.7				12.7
Approach LOS	B				B

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX 11 HCS RESULTS TABLE OF CONTENTS

No Build AM Southbound Interstate Traffic Operations 11-2

No Build AM Northbound Interstate Traffic Operations 11-28

No Build PM Southbound Interstate Traffic Operations 11-54

No Build PM Northbound Interstate Traffic Operations 11-80

Build AM Southbound Interstate Traffic Operations 11-106

Build AM Northbound Interstate Traffic Operations 11-130

Build PM Southbound Interstate Traffic Operations 11-154

Build PM Northbound Interstate Traffic Operations 11-178

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	North of US 42 On Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 01

Flow Inputs and Adjustments

Volume, V	3835	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1042	v
Trucks and buses	23	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.897	
Driver population factor, fp	1.00	
Flow rate, vp	1162	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1162	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	US 42
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 02

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3835	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	340	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3835	340		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1042	92		v
Trucks and buses	23	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.897	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4648	386	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.255 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1187 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5034	9600	No
$v_{3 \text{ or } av34}$	1730 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 1859		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1859	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.293	
Space mean speed in ramp influence area,	S_R = 61.8	mph
Space mean speed in outer lanes,	S_0 = 66.8	mph
Space mean speed for all vehicles,	S = 64.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	US 42 / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 03

Flow Inputs and Adjustments

Volume, V	4175	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1135	v
Trucks and buses	22	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.901	
Driver population factor, fp	1.00	
Flow rate, vp	1259	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1259	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	18.0-	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 04

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4175	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	920	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4175	920		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1135	250		v
Trucks and buses	22	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.901	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5037	1030	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2777 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5037	9600	No
$v_{FO} = v_F - v_R$	4007	9600	No
v_R	1030	2200	No
v_3 or v_{av34}	1130 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2777		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2777	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 23.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.131	
Space mean speed in ramp influence area,	S_R = 66.3	mph
Space mean speed in outer lanes,	S_0 = 76.3	mph
Space mean speed for all vehicles,	S = 70.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 05

Flow Inputs and Adjustments

Volume, V	3255	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	885	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	995	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	995	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	14.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 06

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3255	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3255	800		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	885	217		v
Trucks and buses	25	7		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3980	900	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.191 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 760 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4880	9600	No
v_3 or v_{av34}	1610 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A} = 1592		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1592	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 21.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.303	
Space mean speed in ramp influence area,	S_R = 61.5	mph
Space mean speed in outer lanes,	S_0 = 67.5	mph
Space mean speed for all vehicles,	S = 64.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	11/1/2007
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Mt. Zion / Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 07

Flow Inputs and Adjustments

Volume, V	4055	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1102	v
Trucks and buses	23	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.897	
Driver population factor, fp	1.00	
Flow rate, vp	1229	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1229	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	17.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 08

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4055	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	980	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4055	980		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1102	266		v
Trucks and buses	23	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.897	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4914	1198	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2818 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4914	9600	No
$v_{FO} = v_F - v_R$	3716	9600	No
v_R	1198	2200	No
v_3 or v_{av34}	1048 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A}	= 2818	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2818	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 24.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.146

Space mean speed in ramp influence area, S_R = 65.9 mph

Space mean speed in outer lanes, S_0 = 76.6 mph

Space mean speed for all vehicles, S = 70.1 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 09

Flow Inputs and Adjustments

Volume, V	3075	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	836	v
Trucks and buses	21	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.905	
Driver population factor, fp	1.00	
Flow rate, vp	923	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	923	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	13.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 10

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3075	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3075	720		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	836	196		v
Trucks and buses	21	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.905	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3693	841	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.198 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 733 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4534	9600	No
$v_{3 \text{ or } av34}$	1480 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 1477		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1477	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.296	
Space mean speed in ramp influence area,	S_R = 61.7	mph
Space mean speed in outer lanes,	S_0 = 67.8	mph
Space mean speed for all vehicles,	S = 64.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 11

Flow Inputs and Adjustments

Volume, V	3795	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1031	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	1134	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1134	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-71 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 12

Flow Inputs and Adjustments

Volume, V	1139	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	310	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	681	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	681	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	12.4	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-75 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 13

Flow Inputs and Adjustments

Volume, V	2656	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	722	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	1059	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1059	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.1	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-75 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 14

Flow Inputs and Adjustments

Volume, V	4423	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1202	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.7	mi/h
Number of lanes, N	3	
Density, D	24.8	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-71 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 15

Flow Inputs and Adjustments

Volume, V	1037	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	282	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	600	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS		mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	600	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	8.6	pc/mi/ln

Level of service, LOS	A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 16

Flow Inputs and Adjustments

Volume, V	5460	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1484	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1580	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1580	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	4	
Density, D	22.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 17

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5460	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5460	700		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1484	190		v
Trucks and buses	13	23		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.939	0.897	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6321	848	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3234 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6321	9600	No
$v_{FO} = v_F - v_R$	5473	9600	No
v_R	848	2200	No
v_3 or v_{av34}	1543 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3234		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3234	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 27.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.114

Space mean speed in ramp influence area, S_R = 66.8 mph

Space mean speed in outer lanes, S_0 = 74.7 mph

Space mean speed for all vehicles, S = 70.4 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 18

Flow Inputs and Adjustments

Volume, V	4760	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1293	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1371	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1371	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	19.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 19

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4760	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1740	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4760	1740		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1293	473		v
Trucks and buses	12	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5484	2005	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = -0.033 Using Equation 4

$v_{12} = v_F (P_{FM})$ = -179 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7489	9600	No
v_3 or v_{av34}	2831 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	Yes	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	

If yes, v_{12A} = 2193 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2193	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 34.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.516	
Space mean speed in ramp influence area,	S_R = 55.6	mph
Space mean speed in outer lanes,	S_0 = 65.9	mph
Space mean speed for all vehicles,	S = 59.7	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Richwood / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 20

Flow Inputs and Adjustments

Volume, V	6500	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1766	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1872	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1872	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.0	mi/h
Number of lanes, N	4	
Density, D	28.0	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 21

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6500	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	820	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6500	820		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1766	223		v
Trucks and buses	12	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7489	936	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3793 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7489	9600	No
$v_{FO} = v - v_{FR}$	6553	9600	No
v_R	936	2200	No
v_3 or v_{av34}	1848 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3793		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3793	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 32.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.122

Space mean speed in ramp influence area, S_R = 66.6 mph

Space mean speed in outer lanes, S_0 = 73.5 mph

Space mean speed for all vehicles, S = 69.8 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 22

Flow Inputs and Adjustments

Volume, V	5680	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1543	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1636	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1636	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.2	mi/h
Number of lanes, N	4	
Density, D	23.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 23

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5680	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	2480	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5680	2480		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1543	674		v
Trucks and buses	12	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6544	2750	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = -0.126 Using Equation 4

$v_{12} = v_F (P_{FM})$ = -823 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9294	9600	No
v_3 or v_{av34}	3683 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		Yes	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2617		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2617	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 42.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 1.091	
Space mean speed in ramp influence area,	S_R = 39.4	mph
Space mean speed in outer lanes,	S_0 = 64.7	mph
Space mean speed for all vehicles,	S = 47.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	North of Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 24

Flow Inputs and Adjustments

Volume, V	8160	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2217	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2328	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2328	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	56.0	mi/h
Number of lanes, N	4	
Density, D	41.6	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	US 42
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 25

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8160	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	710	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8160	710		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	2217	193		v
Trucks and buses	10	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	9313	787	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4504 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9313	9600	No
$v_{FO} = v_F - v_R$	8526	9600	No
v_R	787	2200	No
v_3 or v_{av34}	2404 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A}	= 4504	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4504	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 38.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.109

Space mean speed in ramp influence area, S_R = 67.0 mph

Space mean speed in outer lanes, S_0 = 71.3 mph

Space mean speed for all vehicles, S = 69.1 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	North of US 42 Off Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 26

Flow Inputs and Adjustments

Volume, V	7450	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2024	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	2136	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2136	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	4	
Density, D	34.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	Southbound
From/To:	North of US 42 On Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 01

Flow Inputs and Adjustments

Volume, V	8010	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2177	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	2296	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2296	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	4	
Density, D	40.2	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	US 42
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 02

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8010	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8010	800		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	2177	217		v
Trucks and buses	11	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.948	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	9185	887	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.107 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	10072	9600	Yes
v_3 or v_{av34}	4101 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		Yes	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 3674		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3674	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 37.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.629	
Space mean speed in ramp influence area,	S_R = 52.4	mph
Space mean speed in outer lanes,	S_0 = 60.7	mph
Space mean speed for all vehicles,	S = 56.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/27/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	US 42 / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 03

Flow Inputs and Adjustments

Volume, V	8810	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2394	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2514	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2514	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S		mi/h
Number of lanes, N	4	
Density, D		pc/mi/ln

Level of service, LOS	F

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 04

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8810	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	2625	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8810	2625		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	2394	713		v
Trucks and buses	10	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	10055	2896	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 6017 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	10055	9600	Yes
$v_{FO} = v_F - v_R$	7159	9600	No
v_R	2896	2200	Yes
$v_{3 \text{ or } av34}$	2019 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 6017 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	6017	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 51.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.299

Space mean speed in ramp influence area, S_R = 61.6 mph

Space mean speed in outer lanes, S_0 = 72.8 mph

Space mean speed for all vehicles, S = 65.7 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 05

Flow Inputs and Adjustments

Volume, V	6185	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1681	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1798	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1798	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.9	mi/h
Number of lanes, N	4	
Density, D	26.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 06

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6185	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1115	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6185	1115		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1681	303		v
Trucks and buses	14	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7193	1303	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.055 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 395 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8496	9600	No
v_3 or v_{av34}	3399 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		Yes	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2877		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2877	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 34.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.511	
Space mean speed in ramp influence area,	S_R = 55.7	mph
Space mean speed in outer lanes,	S_0 = 64.0	mph
Space mean speed for all vehicles,	S = 59.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 07

Flow Inputs and Adjustments

Volume, V	7300	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1984	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2123	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2123	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.2	mi/h
Number of lanes, N	4	
Density, D	34.2	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 08

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	7300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	2050	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7300	2050		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1984	557		v
Trucks and buses	14	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	8490	2362	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 5034 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8490	9600	No
$v_{FO} = v_F - v_R$	6128	9600	No
v_R	2362	2200	Yes
v_3 or v_{av34}	1728 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 5034 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5034	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 43.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.251

Space mean speed in ramp influence area, S_R = 63.0 mph

Space mean speed in outer lanes, S_0 = 74.0 mph

Space mean speed for all vehicles, S = 67.0 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 09

Flow Inputs and Adjustments

Volume, V	5250	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1427	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1526	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1526	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	4	
Density, D	21.9	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	11/1/2007
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 10

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5250	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	780	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5250	780		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1427	212		v
Trucks and buses	14	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6106	899	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.105 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 644 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7005	9600	No
v_3 or v_{av34}	2731 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		Yes	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2442		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2442	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.366	
Space mean speed in ramp influence area,	S_R = 59.7	mph
Space mean speed in outer lanes,	S_0 = 65.2	mph
Space mean speed for all vehicles,	S = 62.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 11

Flow Inputs and Adjustments

Volume, V	6030	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1639	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1753	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1753	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.3	mi/h
Number of lanes, N	4	
Density, D	25.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 12

Flow Inputs and Adjustments

Volume, V	1568	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	426	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	912	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS		mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	912	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-75 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 13

Flow Inputs and Adjustments

Volume, V	4462	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1212	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1730	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1730	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.6	mi/h
Number of lanes, N	3	
Density, D	25.2	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-75 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 14

Flow Inputs and Adjustments

Volume, V	3931	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1068	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1545	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1545	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	3	
Density, D	22.2	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 15

Flow Inputs and Adjustments

Volume, V	1454	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	395	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	857	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	857	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	15.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 16

Flow Inputs and Adjustments

Volume, V	5385	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1463	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1588	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1588	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	4	
Density, D	22.9	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 17

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5385	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	730	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5385	730		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1463	198		v
Trucks and buses	17	16		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6351	857	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3252 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6351	9600	No
$v_{FO} = v - v_R$	5494	9600	No
v_R	857	2200	No
$v_{3 \text{ or } av34}$	1549 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3252 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3252	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 27.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.115

Space mean speed in ramp influence area, S_R = 66.8 mph

Space mean speed in outer lanes, S_0 = 74.6 mph

Space mean speed for all vehicles, S = 70.4 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 18

Flow Inputs and Adjustments

Volume, V	4655	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1265	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1372	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1372	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	19.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 19

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4655	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1340	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4655	1340		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1265	364		v
Trucks and buses	17	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5490	1522	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.028 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 151 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7012	9600	No
v_3 or v_{av34}	2669 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2196		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2196	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 30.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.417	
Space mean speed in ramp influence area,	S_R = 58.3	mph
Space mean speed in outer lanes,	S_0 = 65.9	mph
Space mean speed for all vehicles,	S = 61.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Richwood / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 20

Flow Inputs and Adjustments

Volume, V	5995	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1629	v
Trucks and buses	15	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	1751	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1751	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.4	mi/h
Number of lanes, N	4	
Density, D	25.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 21

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5995	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	925	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5995	925		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1629	251		v
Trucks and buses	15	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.930	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7005	1026	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3633 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7005	9600	No
$v_{FO} = v_F - v_R$	5979	9600	No
v_R	1026	2200	No
v_3 or v_{av34}	1686 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3633		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3633	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 31.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.130	
Space mean speed in ramp influence area,	S_R = 66.4	mph
Space mean speed in outer lanes,	S_0 = 74.1	mph
Space mean speed for all vehicles,	S = 69.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 22

Flow Inputs and Adjustments

Volume, V	5070	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1378	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1495	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1495	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.8	mi/h
Number of lanes, N	4	
Density, D	21.4	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	11/1/2007
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 23

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5070	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1535	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5070	1535		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1378	417		v
Trucks and buses	17	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5979	1719	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.003 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 17 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7698	9600	No
v_3 or v_{av34}	2981 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	Yes	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A} = 2391		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2391	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 33.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.494	
Space mean speed in ramp influence area,	S_R = 56.2	mph
Space mean speed in outer lanes,	S_0 = 65.3	mph
Space mean speed for all vehicles,	S = 60.1	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	North of Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 24

Flow Inputs and Adjustments

Volume, V	6605	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1795	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1912	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1912	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	66.4	mi/h
Number of lanes, N	4	
Density, D	28.8	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	US 42
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 25

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6605	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	630	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6605	630		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1795	171		v
Trucks and buses	13	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.939	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7646	695	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3726 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7646	9600	No
$v_{FO} = v_F - v_R$	6951	9600	No
v_R	695	2200	No
$v_{3 \text{ or } av34}$	1960 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3726		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3726	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 31.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.101

Space mean speed in ramp influence area, S_R = 67.2 mph

Space mean speed in outer lanes, S_0 = 73.0 mph

Space mean speed for all vehicles, S = 70.1 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	Northbound
From/To:	North of US 42 Off Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 26

Flow Inputs and Adjustments

Volume, V	5975	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1624	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1737	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1737	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.5	mi/h
Number of lanes, N	4	
Density, D	25.4	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	North of US 42 On Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 01

Flow Inputs and Adjustments

Volume, V	3835	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1042	v
Trucks and buses	23	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.897	
Driver population factor, fp	1.00	
Flow rate, vp	1162	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1162	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/22/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	US 42 / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 3

Flow Inputs and Adjustments

Volume, V	4175	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1135	v
Trucks and buses	22	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.901	
Driver population factor, fp	1.00	
Flow rate, vp	1007	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1007	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	14.4	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 04

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4175	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	920	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4175	920		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1135	250		v
Trucks and buses	22	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.901	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5037	1030	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2072 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5037	9600	No
$v_{FO} = v_F - v_R$	4007	9600	No
v_R	1030	4400	No
$v_{3 \text{ or } av34}$	1482 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2072		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2072	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 8.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.131

Space mean speed in ramp influence area, S_R = 66.3 mph

Space mean speed in outer lanes, S_0 = 74.9 mph

Space mean speed for all vehicles, S = 71.1 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID #5

Flow Inputs and Adjustments

Volume, V	3255	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	885	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	995	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	995	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	14.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/22/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 6

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3255	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	800	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3255	800		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	885	217		v
Trucks and buses	25	7		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3980	900	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.191 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 593 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4005	9600	No
v_3 or v_{av34}	1256 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?		No
Is v_3 or v_{av34}	> 1.5 v_{12} /2		Yes
If yes, v_{12A} = 1242		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1242	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 18.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.289	
Space mean speed in ramp influence area,	S_R = 61.9	mph
Space mean speed in outer lanes,	S_0 = 68.4	mph
Space mean speed for all vehicles,	S = 64.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Mt. Zion / Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID #7

Flow Inputs and Adjustments

Volume, V	4055	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1102	v
Trucks and buses	23	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.897	
Driver population factor, fp	1.00	
Flow rate, vp	1229	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1229	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	17.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 08

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4055	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	980	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4055	980		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1102	266		v
Trucks and buses	23	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.897	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4914	1198	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2164 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4914	9600	No
$v_{FO} = v_F - v_R$	3716	9600	No
v_R	1198	4400	No
v_3 or v_{av34}	1375 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2164		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2164	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 9.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.146

Space mean speed in ramp influence area, S_R = 65.9 mph

Space mean speed in outer lanes, S_0 = 75.3 mph

Space mean speed for all vehicles, S = 70.9 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 09

Flow Inputs and Adjustments

Volume, V	3075	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	836	v
Trucks and buses	21	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.905	
Driver population factor, fp	1.00	
Flow rate, vp	923	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	923	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	13.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 10

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3075	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3075	720		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	836	196		v
Trucks and buses	21	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.905	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3693	841	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.198 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 733 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4534	9600	No
$v_{3 \text{ or } av34}$	1480 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 1477		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1477	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.296	
Space mean speed in ramp influence area,	S_R = 61.7	mph
Space mean speed in outer lanes,	S_0 = 67.8	mph
Space mean speed for all vehicles,	S = 64.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Southbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 11

Flow Inputs and Adjustments

Volume, V	3795	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1031	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	1134	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1134	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	16.2	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-71 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 12

Flow Inputs and Adjustments

Volume, V	1139	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	310	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	681	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	681	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	12.4	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-75 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 13

Flow Inputs and Adjustments

Volume, V	2656	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	722	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	1059	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1059	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.1	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-75 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 14

Flow Inputs and Adjustments

Volume, V	4423	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1202	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.7	mi/h
Number of lanes, N	3	
Density, D	24.8	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	I-71 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 15

Flow Inputs and Adjustments

Volume, V	1037	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	282	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	600	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	600	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	10.9	pc/mi/ln

Level of service, LOS	A

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 16

Flow Inputs and Adjustments

Volume, V	5460	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1484	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1580	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1580	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	4	
Density, D	22.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 17

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5460	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5460	700		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1484	190		v
Trucks and buses	13	23		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.939	0.897	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6321	848	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3234 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6321	9600	No
$v_{FO} = v_F - v_R$	5473	9600	No
v_R	848	2200	No
v_3 or v_{av34}	1543 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3234		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3234	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.114	
Space mean speed in ramp influence area,	S_R = 66.8	mph
Space mean speed in outer lanes,	S_0 = 74.7	mph
Space mean speed for all vehicles,	S = 70.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 18

Flow Inputs and Adjustments

Volume, V	4760	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1293	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1371	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1371	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	19.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 19

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4760	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1740	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4760	1740		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1293	473		v
Trucks and buses	12	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5484	2005	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.209 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1146 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7489	9600	No
$v_{3 \text{ or } av34}$	2169 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2193		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2193	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.386	
Space mean speed in ramp influence area,	S_R = 59.2	mph
Space mean speed in outer lanes,	S_0 = 65.9	mph
Space mean speed for all vehicles,	S = 62.0	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Richwood / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 20

Flow Inputs and Adjustments

Volume, V	6500	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1766	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1872	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1872	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.0	mi/h
Number of lanes, N	4	
Density, D	28.0	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 21

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6500	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	820	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6500	820		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1766	223		v
Trucks and buses	12	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7489	936	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3793 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7489	9600	No
$v_{FO} = v_F - v_R$	6553	9600	No
v_R	936	2200	No
v_3 or v_{av34}	1848 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3793		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3793	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 32.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.122

Space mean speed in ramp influence area, S_R = 66.6 mph

Space mean speed in outer lanes, S_0 = 73.5 mph

Space mean speed for all vehicles, S = 69.8 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 22

Flow Inputs and Adjustments

Volume, V	5680	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1543	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1636	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1636	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.2	mi/h
Number of lanes, N	4	
Density, D	23.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	AM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 23

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5680	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	65.0	mph
Volume on ramp	2480	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5680	2480		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1543	674		v
Trucks and buses	12	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6544	2750	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.209 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1368 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9294	9600	No
$v_{3 \text{ or } av34}$	2588 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	

If yes, v_{12A} = 2617 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2617	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 36.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.961	
Space mean speed in ramp influence area,	S_R = 43.1	mph
Space mean speed in outer lanes,	S_0 = 64.7	mph
Space mean speed for all vehicles,	S = 50.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/22/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	North of Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 24

Flow Inputs and Adjustments

Volume, V	8160	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2217	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1863	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1863	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.1	mi/h
Number of lanes, N	5	
Density, D	27.8	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	AM
Freeway/Direction:	Northbound
From/To:	North of US 42 Off Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 26

Flow Inputs and Adjustments

Volume, V	7450	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2024	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	2136	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2136	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	4	
Density, D	34.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	Southbound
From/To:	North of US 42 On Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 01

Flow Inputs and Adjustments

Volume, V	8010	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2177	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	2296	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2296	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	4	
Density, D	40.2	pc/mi/ln

Level of service, LOS	E

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/22/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	US 42 / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 3

Flow Inputs and Adjustments

Volume, V	8810	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	2394	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2011	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2011	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	5	
Density, D	31.1	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 04

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	881	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	2625	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	881	2625		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	239	713		v
Trucks and buses	10	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1005	2896	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2404 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1005	9600	No
$v_{FO} = v_F - v_R$	-1891	9600	No
v_R	2896	4400	No
v_3 or v_{av34}	-699 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 2404		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2404	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 11.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.299

Space mean speed in ramp influence area, S_R = 61.6 mph

Space mean speed in outer lanes, S_0 = 76.8 mph

Space mean speed for all vehicles, S = 48.4 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 5

Flow Inputs and Adjustments

Volume, V	6185	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1681	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1798	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1798	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.9	mi/h
Number of lanes, N	4	
Density, D	26.5	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/22/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID NO. 6

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6185	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1115	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6185	1115		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1681	303		v
Trucks and buses	14	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7193	1303	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.055 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 288 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6554	9600	No
$v_{3 \text{ or } av34}$	2481 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2100		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2100	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 28.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.373
Space mean speed in ramp influence area,	S_R = 59.6 mph
Space mean speed in outer lanes,	S_0 = 66.1 mph
Space mean speed for all vehicles,	S = 62.5 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 7

Flow Inputs and Adjustments

Volume, V	7300	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1984	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	2123	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2123	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.2	mi/h
Number of lanes, N	4	
Density, D	34.2	pc/mi/ln

Level of service, LOS	D

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 08

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	7300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	2050	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7300	2050		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1984	557		v
Trucks and buses	14	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	8490	2362	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3955 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8490	9600	No
$v_{FO} = v_F - v_R$	6128	9600	No
v_R	2362	4400	No
v_3 or v_{av34}	2267 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3955		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3955	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 24.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.251

Space mean speed in ramp influence area, S_R = 63.0 mph

Space mean speed in outer lanes, S_0 = 71.8 mph

Space mean speed for all vehicles, S = 67.4 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 09

Flow Inputs and Adjustments

Volume, V	5250	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1427	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1526	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1526	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	4	
Density, D	21.9	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	11/1/2007
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Southbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 10

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5250	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	65.0	mph
Volume on ramp	780	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5250	780		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1427	212		v
Trucks and buses	14	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6106	899	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.105 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 644 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7005	9600	No
v_3 or v_{av34}	2731 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?	Yes	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 2442	(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2442	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.366	
Space mean speed in ramp influence area,	S_R = 59.7	mph
Space mean speed in outer lanes,	S_0 = 65.2	mph
Space mean speed for all vehicles,	S = 62.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Southbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 11

Flow Inputs and Adjustments

Volume, V	6030	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1639	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1753	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1753	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.3	mi/h
Number of lanes, N	4	
Density, D	25.7	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 12

Flow Inputs and Adjustments

Volume, V	1568	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	426	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	912	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	912	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-75 Southbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 13

Flow Inputs and Adjustments

Volume, V	4462	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1212	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1730	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1730	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.6	mi/h
Number of lanes, N	3	
Density, D	25.2	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-75 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 14

Flow Inputs and Adjustments

Volume, V	3931	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1068	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1545	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1545	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	3	
Density, D	22.2	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71 Northbound
From/To:	South of Split
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 15

Flow Inputs and Adjustments

Volume, V	1454	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	395	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	857	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	857	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	15.6	pc/mi/ln

Level of service, LOS	B

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	South of Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 16

Flow Inputs and Adjustments

Volume, V	5385	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1463	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1588	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1588	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	4	
Density, D	22.9	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 17

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5385	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	730	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5385	730		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1463	198		v
Trucks and buses	17	16		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6351	857	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3252 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6351	9600	No
$v_{FO} = v_F - v_R$	5494	9600	No
v_R	857	2200	No
$v_{3 \text{ or } av34}$	1549 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3252		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3252	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.115	
Space mean speed in ramp influence area,	S_R = 66.8	mph
Space mean speed in outer lanes,	S_0 = 74.6	mph
Space mean speed for all vehicles,	S = 70.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Richwood Off / Richwood On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 18

Flow Inputs and Adjustments

Volume, V	4655	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1265	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1372	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1372	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	19.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Richwood
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 19

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4655	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1340	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4655	1340		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1265	364		v
Trucks and buses	17	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5490	1522	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.209 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7012	9600	No
$v_{3 \text{ or } av34}$	2171 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2196		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2196	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 24.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.287	
Space mean speed in ramp influence area,	S_R = 62.0	mph
Space mean speed in outer lanes,	S_0 = 65.9	mph
Space mean speed for all vehicles,	S = 63.7	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	
Agency or Company:	HNTB
Date Performed:	09/29/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Richwood / Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 20

Flow Inputs and Adjustments

Volume, V	5995	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1629	v
Trucks and buses	15	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	1751	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1751	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.4	mi/h
Number of lanes, N	4	
Density, D	25.6	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	07/21/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - NO BUILD ID # 21

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5995	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	65.0	mph
Volume on ramp	925	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5995	925		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1629	251		v
Trucks and buses	15	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.930	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7005	1026	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3633 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7005	9600	No
$v_{FO} = v_F - v_R$	5979	9600	No
v_R	1026	2200	No
$v_{3 \text{ or } av34}$	1686 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	> 1.5 v_{12} /2	No	
If yes, v_{12A} = 3633		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3633	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 31.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.130	
Space mean speed in ramp influence area,	S_R = 66.4	mph
Space mean speed in outer lanes,	S_0 = 74.1	mph
Space mean speed for all vehicles,	S = 69.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	Mt. Zion Off / Mt. Zion On
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 22

Flow Inputs and Adjustments

Volume, V	5070	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1378	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1495	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1495	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.8	mi/h
Number of lanes, N	4	
Density, D	21.4	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	SEB
Agency/Co.:	HNTB
Date performed:	09/29/2009
Analysis time period:	PM
Freeway/Dir of Travel:	I-71/Northbound
Junction:	Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 23

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5070	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	65.0	mph
Volume on ramp	1535	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5070	1535		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	1378	417		v
Trucks and buses	17	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5979	1719	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.209 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1250 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7698	9600	No
v_3 or v_{av34}	2364 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2391		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2391	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.364	
Space mean speed in ramp influence area,	S_R = 59.8	mph
Space mean speed in outer lanes,	S_0 = 65.3	mph
Space mean speed for all vehicles,	S = 62.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/22/2009
Analysis Time Period:	PM
Freeway/Direction:	I-71/Northbound
From/To:	North of Mt. Zion
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 24

Flow Inputs and Adjustments

Volume, V	6605	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1795	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1529	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1529	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	5	
Density, D	21.9	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	SEB
Agency or Company:	HNTB
Date Performed:	07/21/2009
Analysis Time Period:	PM
Freeway/Direction:	Northbound
From/To:	North of US 42 Off Ramp
Jurisdiction:	
Analysis Year:	2030
Description:	I-71/I-75 IMS - BUILD ID # 26

Flow Inputs and Adjustments

Volume, V	5975	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1624	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1737	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1737	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.5	mi/h
Number of lanes, N	4	
Density, D	25.4	pc/mi/ln

Level of service, LOS	C

Overall results are not computed when free-flow speed is less than 55 mph.

Traffic Analysis

For interrupted flow conditions, such as at signalized intersections, LOS is defined in terms of total delay, which is a measure of driver discomfort, frustration, fuel consumption, increased travel time due to geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the travel time that would result in the absence of geometric delay, traffic control, other vehicles and incidents. LOS A indicates that delay is minimal, progression is extremely favorable, and most vehicles arrive during the green light phase. For signalized intersections, LOS F generally indicates poor progression, long cycle lengths, individual cycle failures and high delays. The level of service criteria for signalized intersections is summarized below.

Level of Service Criteria – Signalized Intersections

Signalized Intersection LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

For free-flow conditions such as the I-71/I-75 mainline, LOS is defined in terms of density, which is a measure of the number of vehicles on a roadway segment averaged over space. Density is usually expressed as vehicles per mile (vpm) or vehicles per mile per lane (vpmpl). LOS A indicates that free-flow speeds prevail, maneuverability is optimal, and the effects of incidents are easily absorbed. LOS F is characterized by breakdowns in vehicular flow, slow speeds, heavy congestion, and the inability to recover from incidents. The desired LOS for this project is LOS C, which is defined as stable flow conditions by the 2000 Highway Capacity Manual. Level of service D is considered acceptable for this project. LOS criteria for a basic freeway segment with no entering, exiting or weaving movements are listed in below.

Level of Services Criteria – Basic Freeway Segment

Basic Freeway Segment LOS	Density (vpmpl)
A	≤ 11
B	> 11 and ≤ 18
C	> 18 and ≤ 26
D	> 26 and ≤ 35
E	> 35 and ≤ 45
F	> 45

Merge and diverge areas include locations where ramp traffic enters and exits the main freeway traffic stream. Like basic freeway segments, the performance measure for level of service in merge and diverge areas is traffic density. The LOS criteria for these areas are summarized below.

Level of Service Criteria – Merge and Diverge

Merge and Diverge LOS	Density (vpmpl)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 28
D	> 28 and ≤ 35
E	> 35
F	Demand exceeds capacity

Mt. Zion Road (KY 536) Design Year (2030) Intersection Analysis

Analysis results based on Synchro 7 (detailed Synchro reports are included in Appendix 10)

Build	AM Peak Hour												PM Peak Hour											
	Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound		
Intersection	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Mt. Zion Road & I-71/I-75 South																								
Peak Hour (vehicles)		2810	405	395	860					530		390		1775	375	740	1660					990		1635
LOS		B	A	-	D					C		A		E	A	-	D					C		A
V/C ratio		0.98	0.28	-	*1.02*					0.64		0.15		*1.01*	0.26	-	*1.03*					0.63		0.63
Delay (sec/veh)		19.5	0.2	-	45.7					33.3		0.1		60.4	0.4	-	50.0					20.3		1.1
Approach LOS	B			D						-			D			D						-		
Approach Delay (sec/veh)	17.1			45.7						-			49.9			50.0						-		
Intersection LOS	C												C											
Intersection Delay (sec/veh)	22.4												33.0											
Mt. Zion Road & I-71/I-75 North																								
Peak Hour (vehicles)	1510	1830			990	970	265		555				670	2095			2015	865	385		540			
LOS	-	B			C	A	B		A				-	D			D	A	C		A			
V/C ratio	-	0.74			0.72	0.71	0.31		0.41				-	*1.04*			*1.04*	0.63	0.55		0.40			
Delay (sec/veh)	-	17.6			21.8	2.4	11.1		0.8				-	44.3			49.8	1.3	24.7		0.8			
Approach LOS	B			B			-						D			D			-					
Approach Delay (sec/veh)	17.6			12.2			-						44.3			35.2			-					
Intersection LOS	B												D											
Intersection Delay (sec/veh)	12.9												35.4											

*Freeflow rights not included in Synchro analysis. *Paramics* was used at these locations.

LOS
A
B
C
D
E
F

V/C>1.0

No Build	AM Peak Hour												PM Peak Hour											
	Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound		
Intersection	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Mt. Zion Road & I-71/I-75 South																								
Peak Hour (vehicles)		2810	405	395	860					530		390		1775	375	740	1660					990		1635
LOS		F	A	F	B					F		F		F	A	F	F					F		F
V/C ratio		*2.76*	0.28	*1.96*	0.72					*2.15*		*1.59*		*2.21*	0.28	*3.23*	*1.52*					*2.45*		*4.36*
Delay (sec/veh)		813.1	0.4	459.4	19.5					571.2		326.1		569.7	0.5	1032.0	246.8					691.6		1548.5
Delay (min/veh)		13.6	0.0	7.7	0.3					9.5		5.4		9.5	0.0	17.2	4.1					11.5		25.8
Approach LOS	F			F						F			F			F						F		
Approach Delay (sec/veh)	710.8			157.9						467.3			470.3			488.8						1225.3		
Approach Delay (min/veh)	11.8			2.6						7.8			7.8			8.1						20.4		
Intersection LOS	F												F											
Intersection Delay (sec/veh)	540.5												752.7											
Intersection Delay (min/veh)	9.0												12.5											
Mt. Zion Road & I-71/I-75 North																								
Peak Hour (vehicles)	1510	1830			990	970	265		555				670	2095			2015	865	385		540			
LOS	F	F			F	A	F		F				F	F			F	B	F		F			
V/C ratio	*2.65*	*1.55*			*1.60*	0.71	*1.08*		*2.46*				*2.36*	*1.68*			*2.31*	0.84	*1.61*		*2.56*			
Delay (sec/veh)	774.2	256.7			301.5	0.3	120.7		711.5				644.8	309.4			608.0	16.7	326.9		751.0			
Delay (min/veh)	12.9	4.3			5.0	0.0	2.0		11.9				10.7	5.2			10.1	0.3	5.4		12.5			
Approach LOS	F			F			F						F			F			F					
Approach Delay (sec/veh)	490.6			152.5			520.5						390.7			430.5			574.6					
Approach Delay (min/veh)	8.2			2.5			8.7						6.5			7.2			9.6					
Intersection LOS	F												F											
Intersection Delay (sec/veh)	386.3												434.0											
Intersection Delay (min/veh)	6.4												7.2											

*Freeflow rights not included in Synchro analysis. *Paramics* was used at these locations.

Richwood Road (KY 338) Design Year (2030) Intersection Analysis

Analysis results based on Synchro 7 (detailed Synchro reports are included in Appendix 10)

Build	AM Peak Hour												PM Peak Hour											
	Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound		
Intersection	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Richwood Road & I-71/I-75 South																								
Peak Hour (vehicles)		1280	480	240	320					420		560		820	450	330	540					500		1550
LOS		B	A	-	B					D		A		D	A	-	B					C		A
V/C ratio		0.90	0.36	-	0.49					0.88		0.26		0.79	0.34	-	0.62					0.77		0.71
Delay (sec/veh)		19.0	0.4	-	16.2					41.0		0.3		37.3	0.5	-	13.5					26.0		1.8
Approach LOS		B			B					-				C			B					-		
Approach Delay (sec/veh)		13.9			16.2					-				24.3			13.5					-		
Intersection LOS										B														
Intersection Delay (sec/veh)										15.4														
Richwood Road & I-71/I-75 North																								
Peak Hour (vehicles)	1120	580			280	620	270		430				740	580			510	600	360		370			
LOS	-	A			B	A	A		D				-	B			C	A	B		D			
V/C ratio	-	0.81			0.36	0.52	0.30		0.79				-	0.75			0.71	0.51	0.37		0.72			
Delay (sec/veh)	-	8.5			15.0	0.8	9.0		38.0				-	12.7			31.5	0.5	10.0		44.7			
Approach LOS		A			A		-							B			B		-					
Approach Delay (sec/veh)		8.5			5.2		-							12.7			14.7		-					
Intersection LOS										B														
Intersection Delay (sec/veh)										13.0														

*Freeflow rights not included in Synchro analysis. *Paramics* was used at these locations.

LOS
A
B
C
D
E
F

V/C>1.0

No Build	AM Peak Hour												PM Peak Hour											
	Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound		
Intersection	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Richwood Road & I-71/I-75 South																								
Peak Hour (vehicles)		1280	480	240	320					420		560		820	450	330	540					500		1550
LOS		F	C	F	A					F		F		F	F	F	B					D		F
V/C ratio		*1.57*	0.72	*1.64*	0.31					*1.07*		*1.86*		*1.54*	*1.07*	*1.90*	0.70					0.86		*2.52*
Delay (sec/veh)		282.3	20.5	366.7	1.0					96.2		431.4		284.1	85.7	446.9	14.0					41.1		721.8
Delay (min/veh)		4.7	0.3	6.1	0.0					1.6		7.2		4.7	1.4	7.4	0.2					0.7		12.0
Approach LOS		F			F					F				F			F					F		
Approach Delay (sec/veh)		210.8			157.7					287.7				213.8			178.3					555.9		
Approach Delay (min/veh)		3.5			2.6					4.8				3.6			3.0					9.3		
Intersection LOS										F														
Intersection Delay (sec/veh)										224.6														
Intersection Delay (min/veh)										3.7														
Richwood Road & I-71/I-75 North																								
Peak Hour (vehicles)	1120	580			280	620	270		430				740	580			510	600	360		370			
LOS	F	A			C	F	D		F				F	A			D	F	F		F			
V/C ratio	*1.60*	0.70			0.57	*1.54*	0.80		*1.76*				*1.42*	0.61			0.80	*1.16*	*1.03*		*1.33*			
Delay (sec/veh)	275.7	2.2			26.2	283.7	45.3		393.3				207.8	7.4			39.2	126.2	99.7		212.4			
Delay (min/veh)	4.6	0.04			0.4	4.7	0.8		6.6				3.5	0.1			0.7	2.1	1.7		3.5			
Approach LOS		F			F			F						F			F			F				
Approach Delay (sec/veh)		182.4			203.6			259.1						119.7			86.2			156.8				
Approach Delay (min/veh)		3.0			3.4			4.3						2.0			1.4			2.6				
Intersection LOS										F														
Intersection Delay (sec/veh)										204.5														
Intersection Delay (min/veh)										3.4														

*Freeflow rights not included in Synchro analysis. *Paramics* was used at these locations.

I-71/I-75 Mainline Design Year (2030) No Build LOS

Analysis results based on HCS (detailed HCS reports are included in Appendix 11)

No Build Traffic Operations		Mainline	Type	ID No.**	AM Peak					PM Peak				
					Volume Freeway/Ramp	% Trucks	Existing Lanes	Density (vpmpl)	2030 LOS	Volume Freeway/Ramp	% Trucks	Existing Lanes	Density (vpmpl)	2030 LOS
	<---- Traveling South	I-71/I-75 S: north of US 42 on ramp	Thru	1	3835	23.2%	4	16.6	B	8010	11.0%	4	40.2	E
		I-71/I-75 S: @ US 42 on ramp	MergeR	2	340	9.3%	1	19.7	B	800	3.9%	1	38.4	F
		I-71/I-75 S: between US 42 on ramp and Mt. Zion Road off ramp	Thru	3	4175	22.3%	4	18.0	B	8810	10.3%	4	45.0+	F
		I-71/I-75 S: @ Mt. Zion Road off ramp	DivergeR	4	920	5.6%	1	23.6	C	2625	2.5%	1	51.5	F
		I-71/I-75 S: between Mt. Zion Road off ramp and on ramp	Thru	5	3255	27.7%	5	14.2*	B	6185	13.5%	4	26.5	D
		I-71/I-75 S: @ Mt. Zion Road on ramp	MergeR	6	800	7.0%	1	21.4	C	1115	15.1%	1	34.3	D
		I-71/I-75 S: between Mt. Zion Rd on ramp and Richwood Rd off ramp	Thru	7	4055	22.8%	4	17.6	B	7300	13.7%	4	34.2	D
		I-71/I-75 S: @ Richwood Road off ramp	DivergeR	8	980	29.0%	1	24.0*	C	2050	11.7%	1	43.0	F
		I-71/I-75 S: between Richwood Road off ramp and on ramp	Thru	9	3075	20.8%	4	13.2	B	5250	14.4%	4	21.9	C
		I-480E: @ Richwood Road on ramp	MergeR	10	720	15.0%	1	20.0	C	780	12.0%	1	28.0	C
		I-71/I-75 S: south of Richwood Road on ramp	Thru	11	3795	19.7%	4	16.2	B	6030	14.0%	4	25.7	C
		I-71 S: south of I-71/I-75 split	Thru	12	1139	19.7%	2	12.4	B	1568	14.0%	2	16.6	B
		I-75 S: south of I-71/I-75 split	Thru	13	2656	19.7%	3	15.1	B	4462	14.0%	3	25.2	C
	<---- Traveling North	I-75 N: south of I-71/I-75 split	Thru	14	4423	12.9%	3	24.8	C	3931	16.5%	3	22.2	C
		I-71 N: south of I-71/I-75 split	Thru	15	1037	12.9%	2	10.9	A	1454	16.5%	2	15.6	B
		I-71/I-75 N: south of Richwood Road off ramp	Thru	16	5460	12.9%	4	22.7	C	5385	16.5%	4	22.9	C
		I-71/I-75 N: @ Richwood Road off ramp	DivergeR	17	700	22.9%	1	27.6	C	730	15.6%	1	27.7	C
		I-71/I-75 N: between Richwood Road off ramp and on ramp	Thru	18	4760	12.0%	4	19.6	C	4655	16.7%	4	19.6	C
		I-71/I-75 N: @ Richwood Road on ramp	MergeR	19	1740	11.5%	1	34.2	D	1340	9.2%	1	30.6	D
		I-71/I-75 N: between Richwood Rd on ramp and Mt. Zion Rd off ramp	Thru	20	6500	11.9%	4	28.0	D	5995	15.0%	4	25.6	C
		I-71/I-75 N: @ Mt. Zion Road off ramp	DivergeR	21	820	10.1%	1	32.4	D	925	3.6%	1	31.0	D
		I-71/I-75 N: between Mt. Zion Road off ramp and on ramp	Thru	22	5680	12.2%	4	23.6	C	5070	17.4%	4	21.4	C
		I-71/I-75 N: @ Mt. Zion Road on ramp	MergeR	23	2480	4.4%	1	42.9	E	1535	6.0%	1	33.6	D
		I-71/I-75 N: between Mt. Zion Road on ramp and US 42 off ramp	Thru	24	8160	10.1%	4	41.6	E	6605	13.0%	4	21.9	D
		I-71/I-75 N: @ US 42 off ramp	DivergeR	25	710	3.5%	1	38.5	E	630	2.5%	1	31.8	D
		I-71/I-75 N: north of US 42 off ramp	Thru	26	7450	10.7%	4	34.5	D	5975	14.0%	4	25.4	C

HCS does not calculate LOS of lane additions or drops. In these situations, the operation was simulated by assuming merge and diverge lane lengths several times the length of a standard merge or diverge. These results should be worse than actual operation, and none were found to be less than LOS D. This was confirmed using Paramics. The segments in which Paramics was used are italicized.

LOS

A
B
C
D
E
F

Notes:

Free Flow Speed: freeways 70 mph, ramps 35 mph

Lane Width 12 ft.

*HCS will only handle truck % up to 25%

(+)HCS will not yield a density over 45.0 for mainline segments

**Segment Identification number for easier comparison. ID number corresponds to HCS reports in Appendix 11

I-71/I-75 Mainline Design Year (2030) Build LOS

Analysis results based on HCS (detailed HCS reports are included in Appendix 11)

		Mainline	Type	ID No.**	AM Peak					PM Peak				
					Volume Freeway/Ramp	% Trucks	Design Lanes	Density (vpmpl)	2030 LOS	Volume Freeway/Ramp	% Trucks	Design Lanes	Density (vpmpl)	2030 LOS
Build Traffic Operations	<---- Traveling South	I-71/I-75 S: north of US 42 on ramp	Thru	1	3835	23.2%	4	16.6	B	8010	11.0%	4	40.2	E
		I-71/I-75 S: @ US 42 on ramp	*Add*		*340*	*9.3%*	*1*			*800*	*3.9%*	*1*		
		I-71/I-75 S: between US 42 on ramp and Mt. Zion Road off ramp	Thru	3	4175	22.3%	5	14.4	B	8810	10.3%	5	31.1	D
		I-71/I-75 S: @ Mt. Zion Road off ramp	*DivergeR/Option*	*4*	*920*	*5.6%*	*2*	*8.6#*	*A*	*2625*	*2.5%*	*2*	*51.5*	*B*
		I-71/I-75 S: between Mt. Zion Road off ramp and on ramp	Thru	5	3255	27.7%	4	14.2*	B	6185	13.5%	4	26.5	D
		I-71/I-75 S: @ Mt. Zion Road on ramp	MergeR	6	800	7.0%	1	18.6*	B	1115	15.1%	1	28.3	D
		I-71/I-75 S: between Mt. Zion Rd on ramp and Richwood Rd off ramp	Thru	7	4055	22.8%	4	17.6	B	7300	13.7%	4	34.2	D
		I-71/I-75 S: @ Richwood Road off ramp	DivergeR/Option	8	980	29.0%	2	9.4*#	A	2050	11.7%	2	24.8#	C
		I-71/I-75 S: between Richwood Road off ramp and on ramp	Thru	9	3075	20.8%	4	13.2	B	5250	14.4%	4	21.9	C
		I-480E: @ Richwood Road on ramp	MergeR	10	720	15.0%	1	20.0	C	780	12.0%	1	28.0	C
		I-71/I-75 S: south of Richwood Road on ramp	Thru	11	3795	19.7%	4	16.2	B	6030	14.0%	4	25.7	C
		I-71 S: south of I-71/I-75 split	Thru	12	1139	19.7%	2	12.4	B	1568	14.0%	2	16.6	B
		I-75 S: south of I-71/I-75 split	Thru	13	2656	19.7%	3	15.1	B	4462	14.0%	3	25.2	C
	<---- Traveling North	I-75 N: south of I-71/I-75 split	Thru	14	4423	12.9%	3	24.8	C	3931	16.5%	3	22.2	C
		I-71 N: south of I-71/I-75 split	Thru	15	1037	12.9%	2	10.9	A	1454	16.5%	2	15.6	B
		I-71/I-75 N: south of Richwood Road off ramp	Thru	16	5460	12.9%	4	22.7	C	5385	16.5%	4	22.9	C
		I-71/I-75 N: @ Richwood Road off ramp	DivergeR	17	700	22.9%	1	27.6	C	730	15.6%	1	27.7	C
		I-71/I-75 N: between Richwood Road off ramp and on ramp	Thru	18	4760	12.0%	4	19.6	C	4655	16.7%	4	19.6	C
		I-71/I-75 N: @ Richwood Road on ramp	MergeR	19	1740	11.5%	2	27.9#	C	1340	9.2%	2	24.4#	C
		I-71/I-75 N: between Richwood Rd on ramp and Mt. Zion Rd off ramp	Thru	20	6500	11.9%	4	28.0	D	5995	15.0%	4	25.6	C
		I-71/I-75 N: @ Mt. Zion Road off ramp	DivergeR	21	820	10.1%	1	32.4	D	925	3.6%	1	31.0	D
		I-71/I-75 N: between Mt. Zion Road off ramp and on ramp	Thru	22	5680	12.2%	4	23.6	C	5070	17.4%	4	21.4	C
		I-71/I-75 N: @ Mt. Zion Road on ramp	*Add/ MergeR*	*23*	*2480*	*4.4%*	*2*	*42.9*	E	*1535*	*6.0%*	*2*		
		I-71/I-75 N: between Mt. Zion Road on ramp and US 42 off ramp	Thru	24	8160	10.1%	5	27.8	D	6605	13.0%	5	21.9	C
		I-71/I-75 N: @ US 42 off ramp	*Drop*		*710*	*3.5%*	*1*		E	*630*	*2.5%*	*1*		
		I-71/I-75 N: north of US 42 off ramp	Thru	26	7450	10.7%	4	34.5	D	5975	14.0%	4	25.4	C

HCS does not calculate LOS of lane additions or drops. In these situations, the operation was simulated by assuming merge and diverge lane lengths several times the length of a standard merge or diverge. These results should be worse than actual operation, and none were found to be less than LOS D. This was confirmed using Paramics. The segments in which Paramics was used are italicized.

LOS
- A
- B
- C
- D
- E
- F

Notes:

Free Flow Speed: freeways 70 mph, ramps 35 mph

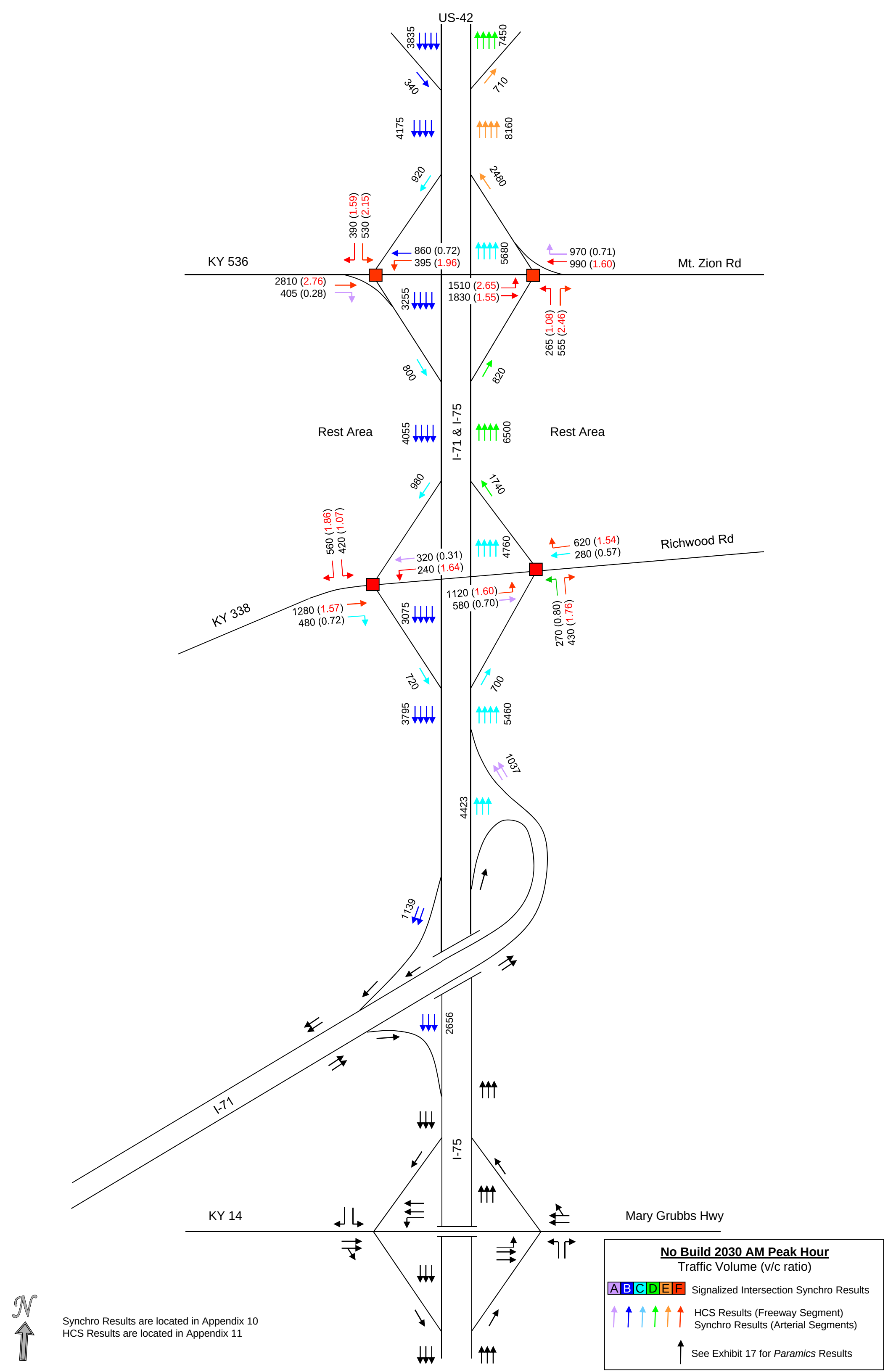
Lane Width 12 ft.

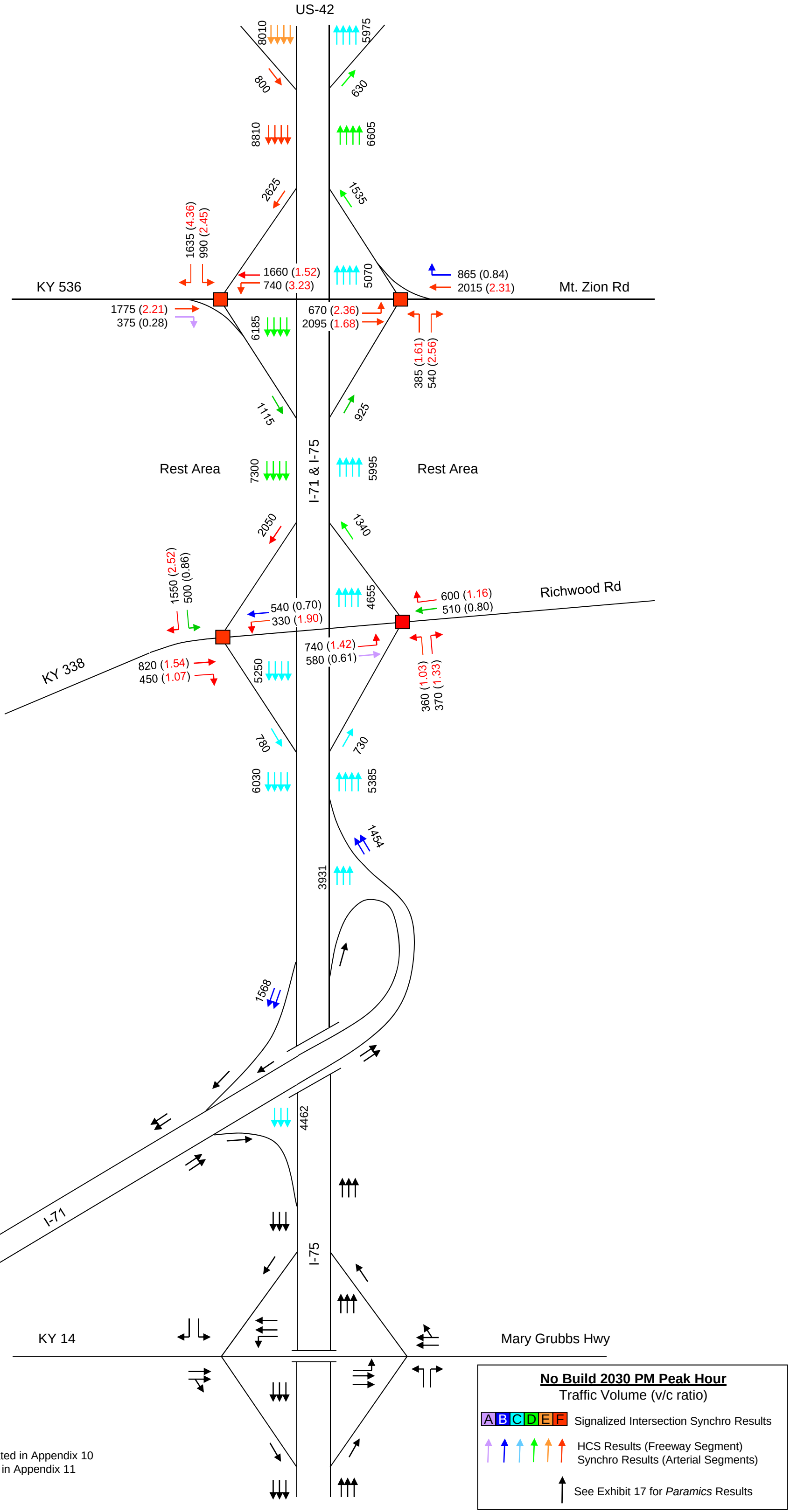
LOS left blank to be analyzed using *Paramics*

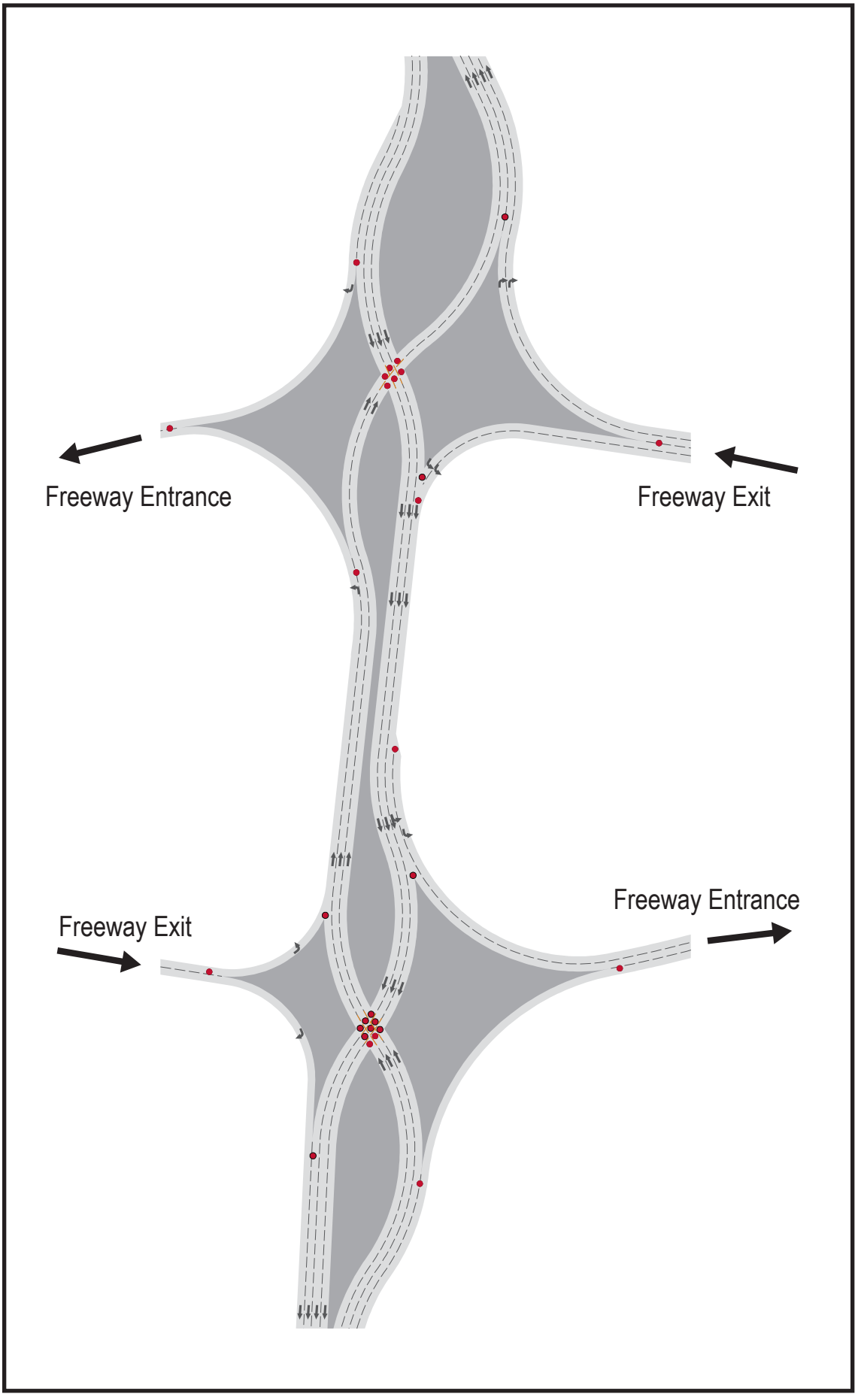
#Analyzed as multi-lane merge/diverge. LOS verified using *Paramics*

*HCS will only handle truck % up to 25%

**Segment Identification number for easier comparison. ID number corresponds to HCS reports in Appendix 11


US-42
3835
7450
340
710
4175
8160
920
2480
390 (1.59)
530 (2.15)
860 (0.72)
395 (1.96)
5680
970 (0.71)
990 (1.60)
KY 536
Mt. Zion Rd
2810 (2.76)
405 (0.28)
1510 (2.65)
1830 (1.55)
3255
265 (1.08)
555 (2.46)
800
820
Rest Area
4055
I-71 & I-75
6500
Rest Area
980
1740
560 (1.86)
420 (1.07)
320 (0.31)
240 (1.64)
4760
620 (1.54)
280 (0.57)
Richwood Rd
KY 338
1280 (1.57)
480 (0.72)
1120 (1.60)
580 (0.70)
3075
270 (0.80)
430 (1.76)
720
700
3795
5460
1037
4423
1139
2656
I-71
I-75
KY 14
Mary Grubbs Hwy
N
Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11
No Build 2030 AM Peak Hour
Traffic Volume (v/c ratio)
A B C D E F
Signalized Intersection Synchro Results
HCS Results (Freeway Segment)
Synchro Results (Arterial Segments)
See Exhibit 17 for Paramics Results


US-42
8010
5975
800
630
8810
6605
2625
535
1635 (4.36)
990 (2.45)
1660 (1.52)
740 (3.23)
5070
865 (0.84)
2015 (2.31)
KY 536
Mt. Zion Rd
1775 (2.21)
375 (0.28)
670 (2.36)
2095 (1.68)
6185
385 (1.61)
540 (2.56)
115
925
Rest Area
7300
I-71 & I-75
5995
Rest Area
2050
1340
1550 (2.52)
500 (0.86)
540 (0.70)
330 (1.90)
4655
600 (1.16)
510 (0.80)
Richwood Rd
740 (1.42)
580 (0.61)
KY 338
820 (1.54)
450 (1.07)
5250
360 (1.03)
370 (1.33)
180
730
6030
5385
1454
3931
1568
4462
I-71
I-75
KY 14
Mary Grubbs Hwy
N
Synchro Results are located in Appendix 10
HCS Results are located in Appendix 11
No Build 2030 PM Peak Hour
Traffic Volume (v/c ratio)
A B C D E F
Signalized Intersection Synchro Results
HCS Results (Freeway Segment)
Synchro Results (Arterial Segments)
See Exhibit 17 for Paramics Results



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75

338 536

KENTUCKY TRANSPORTATION CABINET

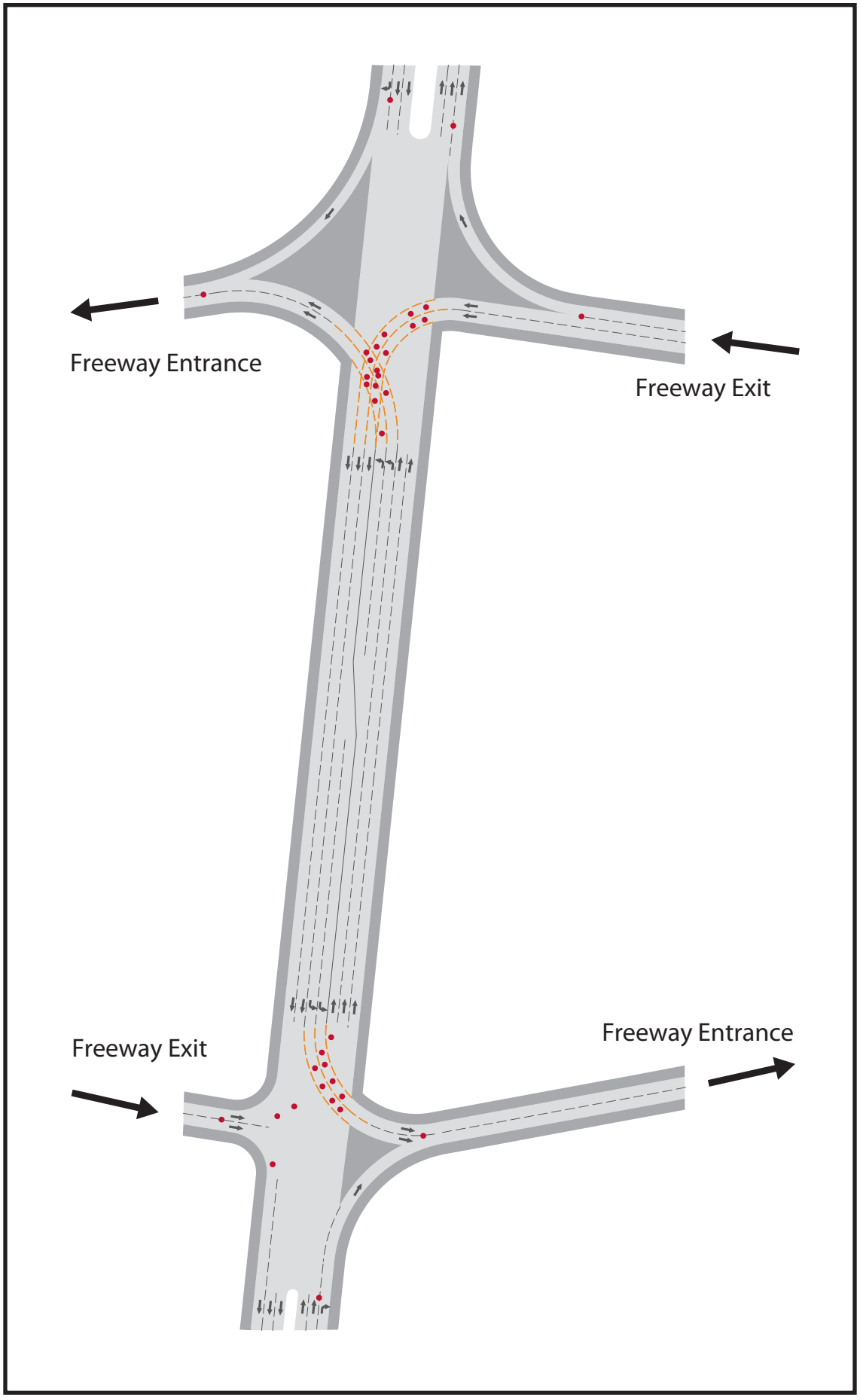
KY 536 (Mt. Zion Road)

Diverging Diamond Interchange: *29 Potential Conflict Points*

W
S N
E

Legend

- Conflict Point



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75

338 536

KENTUCKY TRANSPORTATION CABINET

KY 536 (Mt. Zion Road)

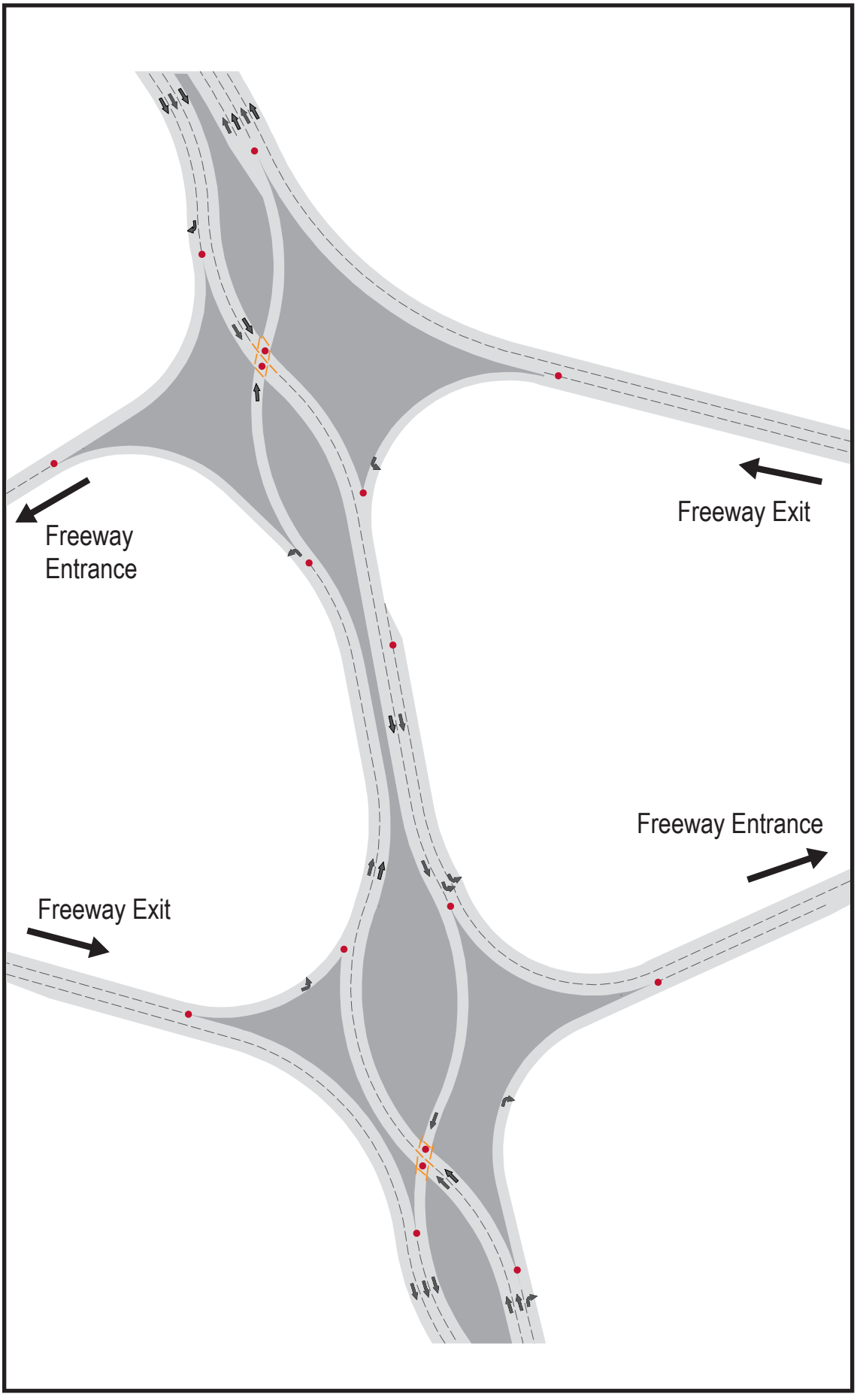
Traditional Widening:

36 Potential Conflict Points

W
S N
E

Legend

- Conflict Point



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75 KY 338 KY 536

KENTUCKY TRANSPORTATION CABINET

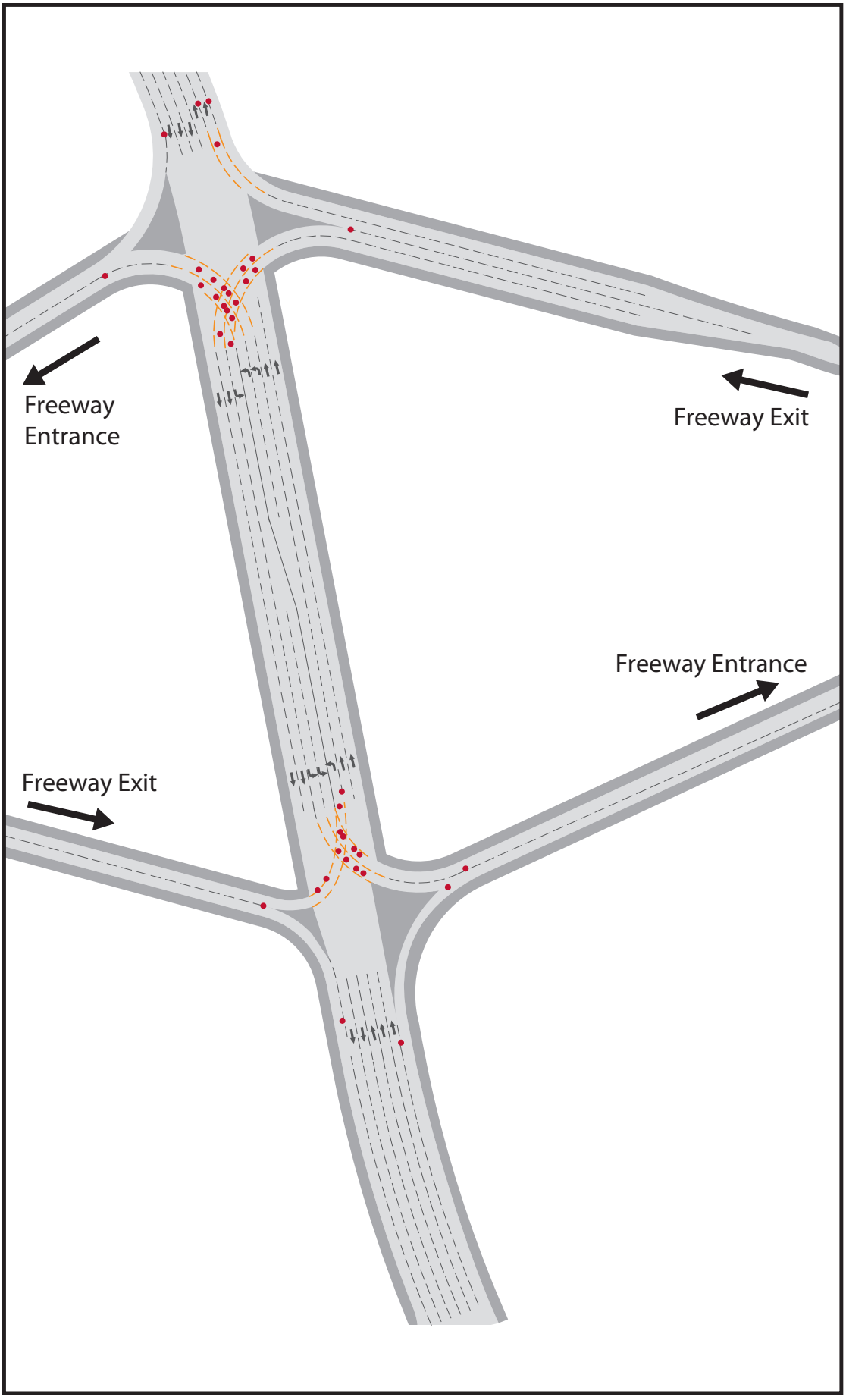
KY 338 (Richwood Road)

Diverging Diamond Interchange: *17 Potential Conflict Points*

W
S N
E

Legend

- Conflict Point



Interchange Justification Study

INTERSTATE 71 INTERSTATE 75

338 536

KENTUCKY TRANSPORTATION CABINET

KY 338 (Richwood Road)

Traditional Widening:

39 Potential Conflict Points

W
S N
E

Legend

- Conflict Point

For I-71/I-75 IJS	Job no. 42560	Sheet no. 1
Made by JRL	Checked by MAS	Backchecked by
Date 09/23/09	Date 9/25/09	Date

HNTB

I-71/I-75 Turn Lane Lengths for Mt. Zion Interchange

Southbound I-71/I-75 Entrance to Mt. Zion Road

Left Turn Lane Length

40 mph

VPH_{AM} = 530/2 lanes = 265

$P_{T_{AM}}$ = 11.3%

C = 95 s

Desirable storage from Figure 7-1 = 410'

Method 1 - 170'

Method 2 - 70' + 410' = 480

VPH_{PM} = 990/2 lanes = 495

$P_{T_{PM}}$ = 6.0%

C = 115 s

Desirable storage from Figure 7-1 = 810'

Method 1 - 170'

Method 2 - 70' + 810' = 880'

Left turn length = 880'

Right Turn Lane Length

Free-flow right turn lane.

From left turn lane backups → 880'

Right turn length = 880'

For I-71/I-75 IJS	Job no. 42560	Sheet no. 2	HNTB
Made by JRL	Checked by MHS	Backchecked by	
Date 09/23/09	Date 9/25/09	Date	

I-71/I-75 Turn Lane Lengths for Mt. Zion Interchange

Northbound I-71/I-75 Entrance to Mt. Zion Road

Right Turn Lane Length

Free-flow right turn lane. Use left turn lane back-ups

40 mph

$VPH_{AM} = 265$

$P_{T\,AM} = 12.0\%$

$C = 95$ s

Desirable storage from Figure 7-2 = 375'

Method 1 - 170'

Method 2 - 70 + 375' = 445'

$VPH_{AM} = 385$

$P_{T\,AM} = 2.1\%$

$C = 115$ s

Desirable storage from Figure 7-2 = 610'

Method 1 - 170'

Method 2 - 70' + 610' = 680'

Right turn length = 680'

For I-71/I-75 IJS	Job no. 42560	Sheet no. 3
Made by JRL	Checked by MAS	Backchecked by
Date 09/23/09	Date 9/25/09	Date

HNTB

I-71/I-75 Turn Lane Lengths for Mt. Zion Interchange

Eastbound Mt. Zion Entrance to I-71/I-75 Southbound

Free-flow right turn lane. Use through back-ups.

30 mph

VPH_{AM} = 2810/3 lanes = 937

$P_{T,AM}$ = 2.3%

C = 95 s

Desirable storage from Figure 7-3 = 810'

Method 1 - 125'

Method 2 - 810' + 50' = 860'

VPH_{PM} = 1775/3 lanes = 592

$P_{T,PM}$ = 1.1%

C = 115 s

Desirable storage from Figure 7-3 = 900'

Method 1 - 125'

Method 2 - 900' + 50' = 950'

Right turn length = 950'

For I-71/I-75 IJS	Job no. 42560	Sheet no. 4	MNTB
Made by JRL	Checked by [illegible]	Backchecked by	
Date 09/23/09	Date 9/25/09	Date	

I-71/I-75 Turn Lane Lengths for Richwood Interchange

Southbound I-71/I-75 Entrance to Richwood Road

Left Turn Lane Length

40 mph

$VPH_{AM} = 420$

$P_{T_{AM}} = 44.0\%$

$C = 855$

Desirable storage from Figure 7-4 = 620'

Method 1 - 120'

Method 2 - 70' + 620' = 690'

$VPH_{PM} = 500$

$P_{T_{PM}} = 22.0\%$

$C = 1110$

Desirable storage from Figure 7-4 = 860'

Method 1 - 170'

Method 2 - 70' + 860' = 930'

Left turn length = 930'

Right Turn Lane Length

Free-flow right turn lane.

From left turn lane backups → 930'

Right turn length = 930'

For I-71/I-75 IJS	Job no. 42560	Sheet no. 5
Made by JRL	Checked by MAS	Backchecked by
Date 09/23/09	Date 9/25/09	Date

HNTB

I-71/I-75 Turn Lane Lengths for Richwood Interchange

Northbound I-71/I-75 Entrance to Richwood Road

Left Turn Lane Length

40 mph

$VPH_{AM} = 270$

$P_{T\,AM} = 6.6\%$

C = 85 s

Desirable storage from Figure 7-5 = 320'

Method 1 - 170'

Method 2 - 70' + 320' = 390'

$VPH_{PM} = 360$

$P_{T\,PM} = 9.6\%$

C = 110 s

Desirable storage from Figure 7-5 = 620'

Method 1 - 170'

Method 2 - 70' + 620' = 690'

Left turn length = 690'

Right Turn Lane Length

Free-flow right turn lane

From left turn lane backups → 690'

Right turn length = 690'

For I-71/I-75 IJS	Job no. 42560	Sheet no. 6
Made by JRL	Checked by MHJ	Backchecked by
Date 09/23/09	Date 9/25/09	Date

HNTB

I-71/I-75 Turn Lane Lengths for Richwood Interchange

Eastbound Richwood Road Entrance to I-71/I-75 Southbound Right Turn Lane Length

Free-flow right turn lane. Use through back-ups.

30 mph

VPH_{AM} = 1280/2 lanes = 640

$P_{T_{AM}}$ = 4.8%

C_{AM} = 85s

Desirable storage from Figure 7-6 = 720'

Method 1 - 125'

Method 2 - 720' + 50' = 770'

VPH_{PM} = 820/2 lanes = 410

$P_{T_{PM}}$ = 3.3%

C_{PM} = 110s

Desirable storage from 7-6 = 650'

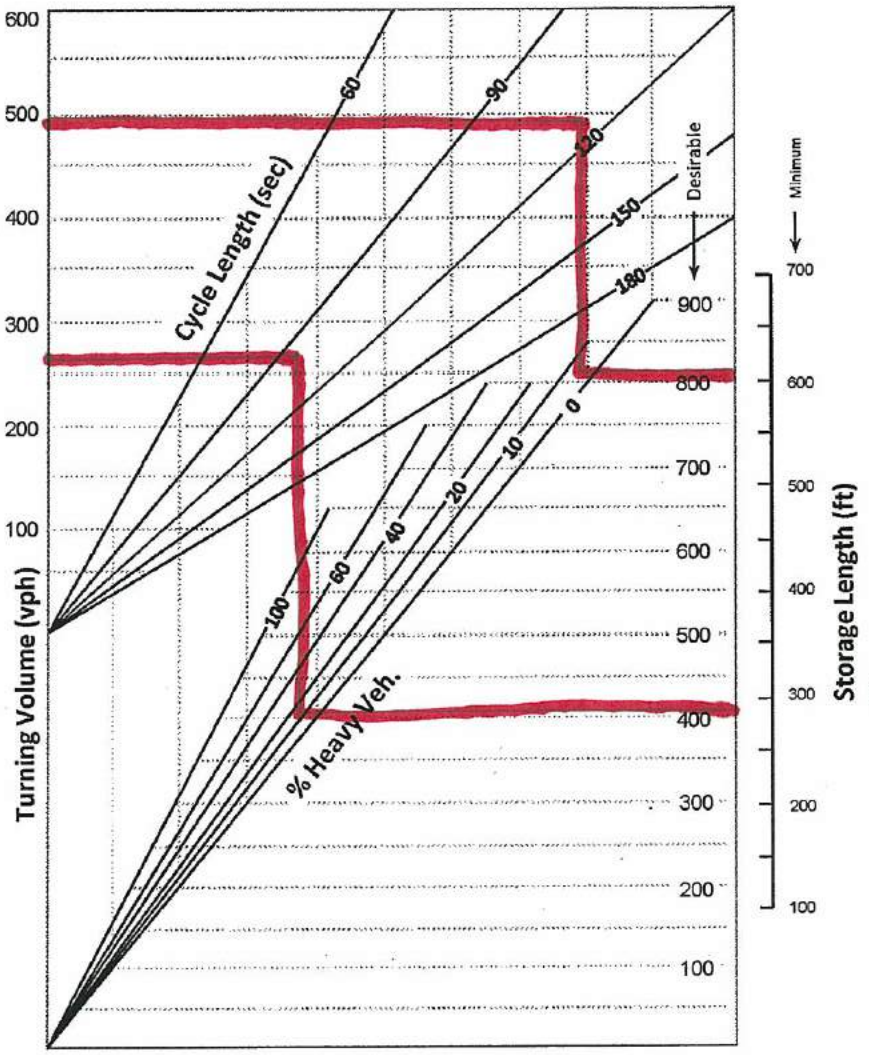
Method 1 - 25'

Method 2 - 650' + 50' = 700'

Right turn length = 770'

Figure 7-1

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



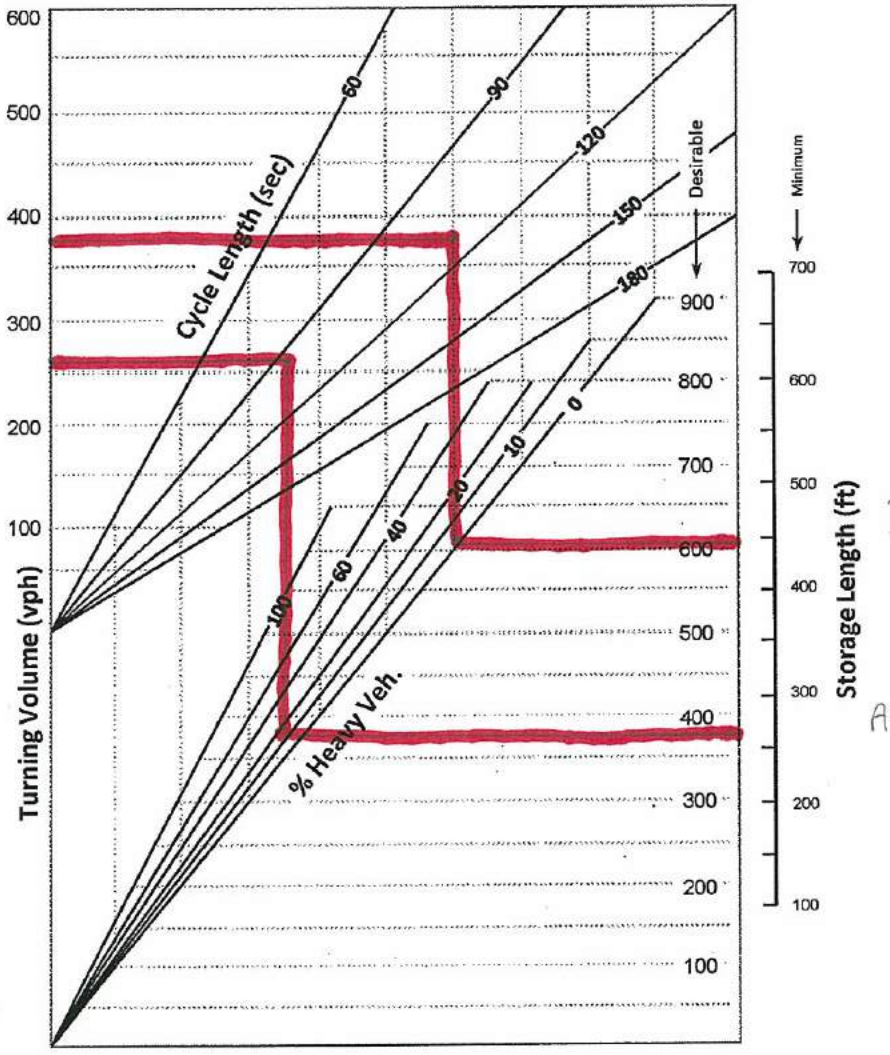
PM: Min. = 610'
Des. = 810'

AM: Min. = 290'
Des. = 410'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

Figure 7-2

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



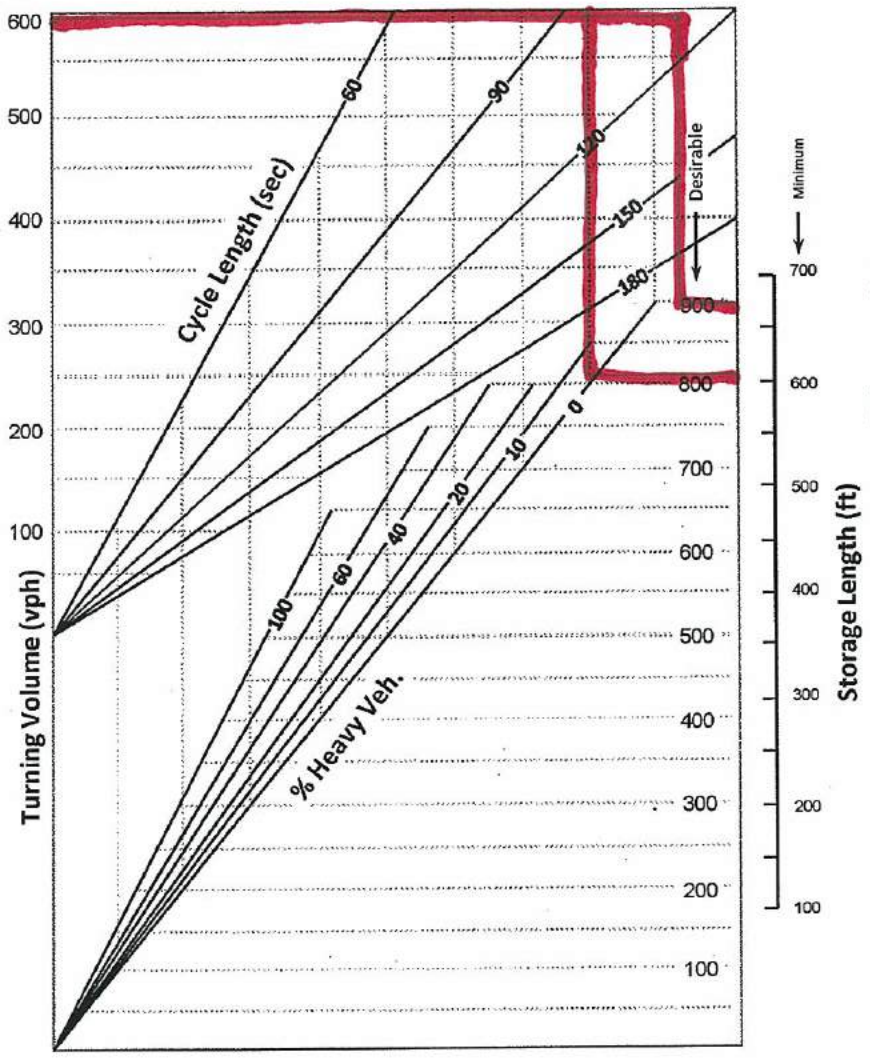
PM: Min. = 445'
Des. = 610'

AM: Min. = 260'
Des. = 375'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

Figure 7-3

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



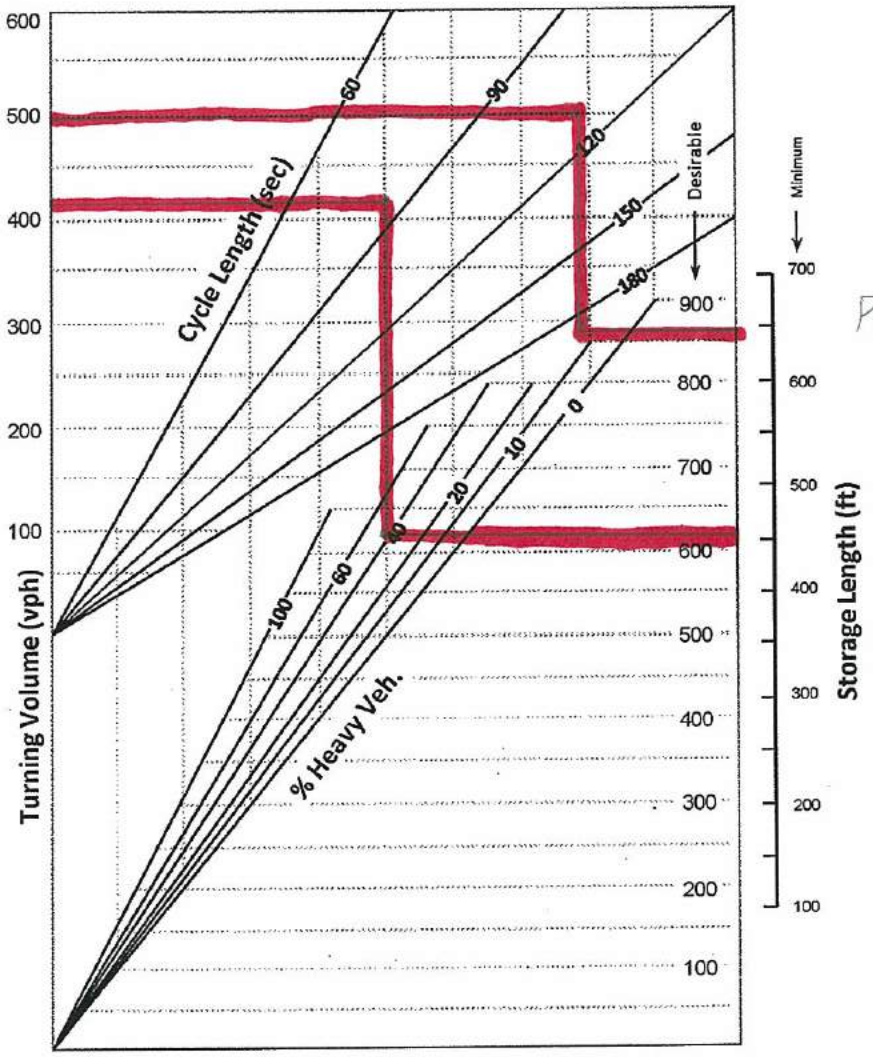
AM: Min. = 610'
Des. = 810'

PM: Min. = 675'
Des. = 900'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

Figure 7-4

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



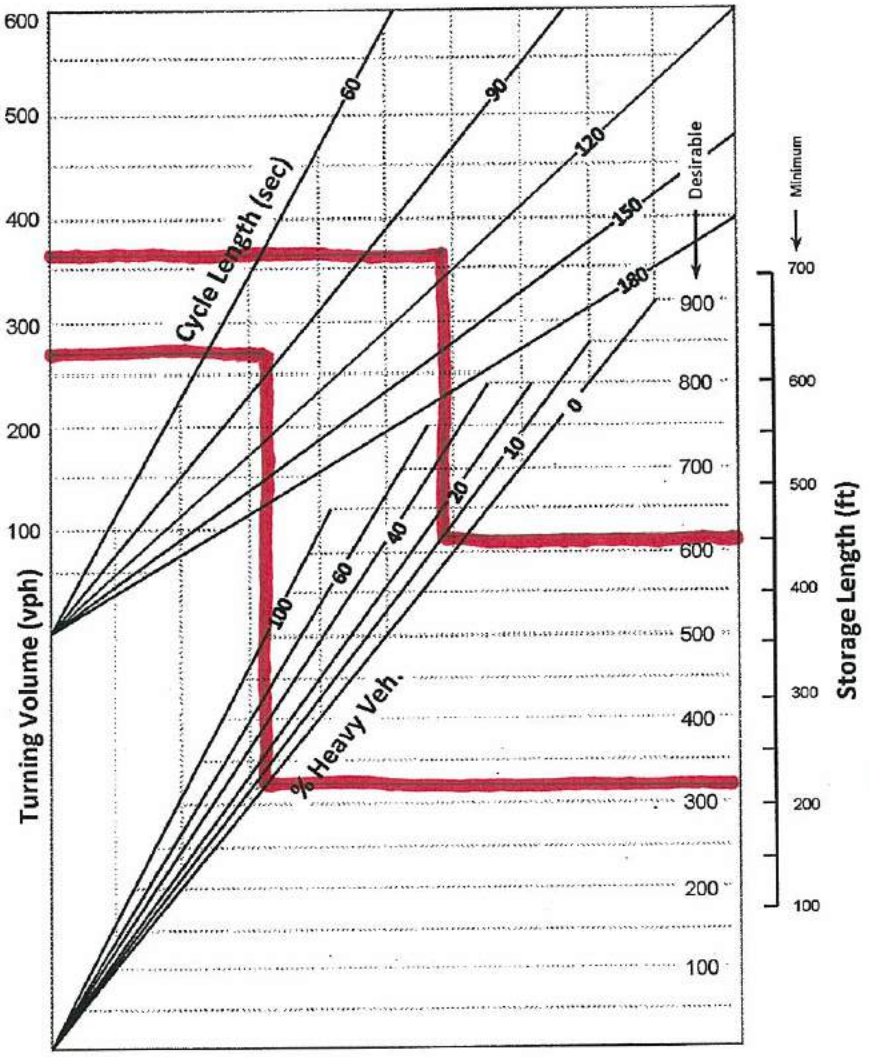
PM: Min. = 650'
Des. = 860'

AM: Min. = 450'
Des. = 620'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

Figure 7-5

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



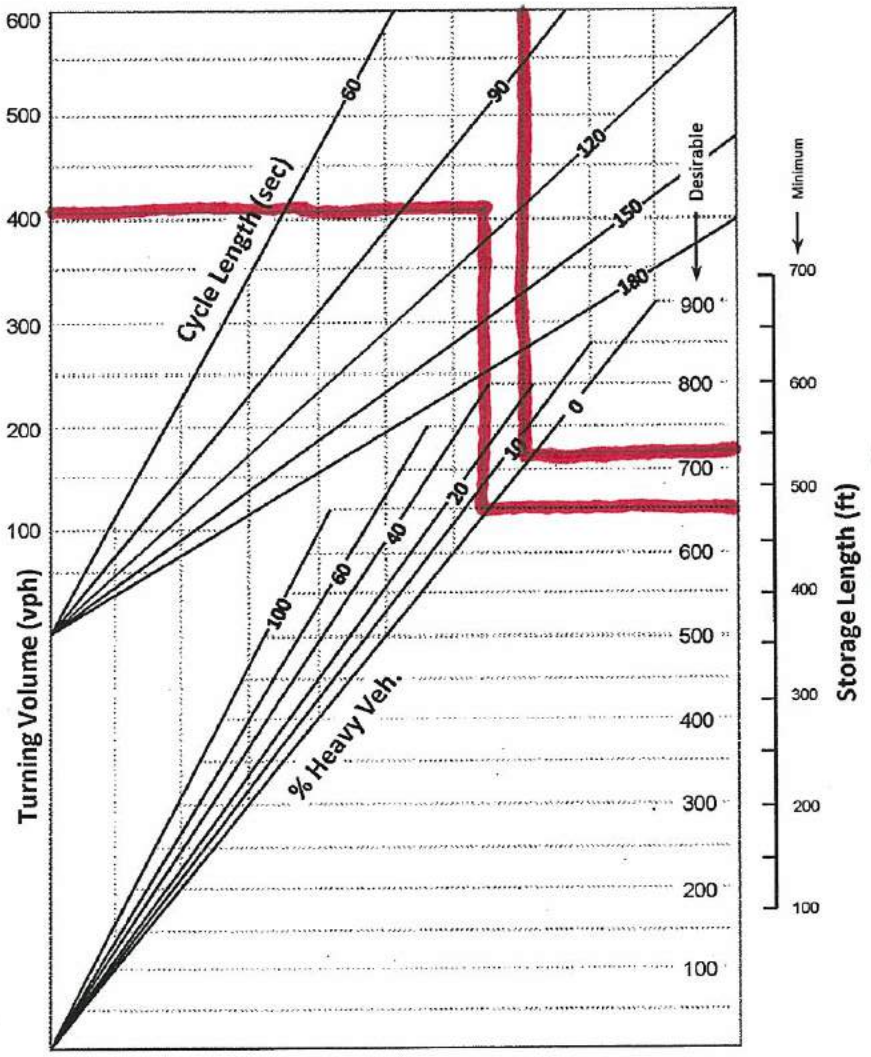
PM: Min. = 450'
Des. = 620'

AM: Min. = 220'
Des. = 320'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

Figure 7-6

Figure 7: Controlled Intersection; Left-Turn Lane Storage Calculations



AM: Min. = 540'
Des. = 720'

PM: Min. = 480'
Des. = 650'

Note: Stop controlled intersection calculations should assume a cycle length of 60 seconds.

CONCEPTUAL COSTS - Mt. Zion Road DDI

Earthwork, Pavement, Bridge, Right-of-Way, Utilities

Item No.			Measured Quantity	Measured Unit	Converted Quantity	KYTC Unit	KYTC Unit Cost	HNTB Unit Cost	Total
	Earthwork								
2200	Excavation		560000	**CY**	**N/A**	**CY**	$2.89		$1,618,400
2230	Embankment in Place		50000	**CY**	**N/A**	**CY**	$7.92		$396,000
	Interstate Driving Lane Pavement	56100 SY							
2599	Fabric-Geotextile Type IV		56100	**SY**	**N/A**	**SY**	$1.62		$90,882
1	4" DGA Base		56100	**SY**	12903	**Ton**	$18.02		$232,512
18	4" Drainage Blanket Type II Asphalt		56100	**SY**	11220	**Ton**	$45.29		$508,154
208	9" CI 4 ASPH BASE 1.50D PG64-22		56100	**SY**	27769.5	**Ton**	$58.40		$1,621,739
210	4-1/2" CI 4 ASPH BASE 1.50D PG76-22		56100	**SY**	13884.75	**Ton**	$67.90		$942,775
342	1-1/4" CI 4 Asphalt Surface 0.38A PG 76-22		56100	**SY**	3856.875	**Ton**	$75.43		$290,924
	Interstate Shoulder Pavement	42600 SY							
2599	Fabric-Geotextile Type IV		42600	**SY**	**N/A**	**SY**	$1.62		$69,012
1	4" DGA Base		42600	**SY**	9798	**Ton**	$18.02		$176,560
18	4" Drainage Blanket Type II Asphalt		42600	**SY**	8520	**Ton**	$45.29		$385,871
205	9" CI 3 ASPH BASE 1.50D PG64-22		42600	**SY**	21087	**Ton**	$59.33		$1,251,092
207	4-1/2" CI 3 ASPH BASE 1.50D PG76-22		42600	**SY**	10543.5	**Ton**	$78.14		$823,869
336	1-1/4" CI 3 Asphalt Surface 0.38A PG 76-22		42600	**SY**	2928.75	**Ton**	$64.93		$190,164
	KY Route Driving Lane Pavement	59100 SY							
2599	Fabric-Geotextile Type IV		59100	**SY**	**N/A**	**SY**	$1.62		$95,742
1	4" DGA Base		59100	**SY**	13593	**Ton**	$18.02		$244,946
219	3-1/2" CL4 ASPH BASE 1.00D PG76-22		59100	**SY**	11376.75	**Ton**	$67.90		$772,481
214	6" CL3 ASPH BASE 1.00D PG64-22		59100	**SY**	19503	**Ton**	$54.44		$1,061,743
336	1-1/4" CI 3 Asphalt Surface 0.38A PG 76-22		59100	**SY**	4063.125	**Ton**	$64.93		$263,819
	KY Route Curb								
2015	Cement Concrete Island		24500	**SY**	**N/A**	**SY**	$60.00		$1,470,000
1810	Standard Curb & Gutter		10350	**LF**	**N/A**	**LF**	$16.98		$175,743
01890	Island Header Curb Type 1		8700	**LF**	**N/A**	**LF**	$33.04		$287,448
	Environmental Contingency		1	**LS**	**N/A**	**SY**	$600,000		$600,000
	Bridge*		13752	**SF**	**N/A**	**SF**		$135.00	$1,856,520
	Right-of-Way								
	Commercial		2.93	**AC**		**AC**	$800,000		$2,344,000
	Residential		6.1	**AC**		**AC**	$180,000		$1,098,000
	Residential Structure		1	**EA**		**EA**		$250,000	$250,000
	Utility								
	Gas Lines		3500	**LF**	**N/A**			$150.00	$525,000
	Telephone		6600	**LF**	**N/A**			$150.00	$990,000
	Overhead Electrical Transmission Lines		1	**LS**	**N/A**	**LS**		$270,000	$270,000

$15,426,395	**Construction Subtotal**
$4,627,918	**Misc. Construction (30%)**
$3,008,147	**Construction Contingency (15%)**
$23,062,460	**Construction Total (2008 Dollars)**
$3,692,000	**2010 Right-of-way Subtotal**
$1,785,000	**2007 Utility Subtotal**
$2,300,000	**2008 Design**
$3,800,000	**2011 Right-of-way Subtotal (4% Inflation)**
$2,100,000	**2011 Utility Subtotal (4% Inflation)**
$27,000,000	**2012 Construction**
	4% annual inflation
$35,200,000	**Total**

NOTES:

"KYTC Unit Cost" is based on KYTC 2008 Average Unit Bid Costs
"HNTB Unit Cost" was estimated by HNTB
All asphalt quantities are based upon 110 lbs/sy/in. of depth
Crushed Aggregate and DGA quantities are based upon 115 lbs/sy/in. of depth
Drainage Blanket quantities are based upon 100 lbs/sy/in. of depth
N/A denotes "Not Applicable"
*Bridge costs include $25/SF for removal of the existing structure (Weaver Road over I-71/I-75, 382'x36')
Construction Inflation factor based information provided by KYTC
Misc. Construction is signs, lighting, drainage, barriers, fence, etc.

CONCEPTUAL COSTS - Richwood Road DDI

Earthwork, Pavement, Bridge, Right-of-Way, Utilities

Item No.			Measured Quantity	Measured Unit	Converted Quantity	KYTC Unit	KYTC Unit Cost	HNTB Unit Cost	Total
	Earthwork								
2200	Excavation		190000	**CY**	**N/A**	**CY**	$2.89		$549,100
2230	Embankment in Place		100000	**CY**	**N/A**	**CY**	$7.92		$792,000
	Interstate Driving Lane Pavement	35300							
2599	Fabric-Geotextile Type IV		35300	**SY**	**N/A**	**SY**	$1.62		$57,186
1	4" DGA Base		35300	**SY**	8119	**Ton**	$18.02		$146,304
18	4" Drainage Blanket Type II Asphalt		35300	**SY**	7060	**Ton**	$45.29		$319,747
208	9" Cl 4 ASPH BASE 1.50D PG64-22		35300	**SY**	17473.5	**Ton**	$58.40		$1,020,452
210	4-1/2" Cl 4 ASPH BASE 1.50D PG76-22		35300	**SY**	8736.75	**Ton**	$67.90		$593,225
342	1-1/4" Cl 4 Asphalt Surface 0.38A PG 76-22		35300	**SY**	2426.875	**Ton**	$75.43		$183,059
	Interstate Shoulder Pavement	25800							
2599	Fabric-Geotextile Type IV		25800	**SY**	**N/A**	**SY**	$1.62		$41,796
1	4" DGA Base		25800	**SY**	5934	**Ton**	$18.02		$106,931
18	4" Drainage Blanket Type II Asphalt		25800	**SY**	5160	**Ton**	$45.29		$233,696
205	9" Cl 3 ASPH BASE 1.50D PG64-22		25800	**SY**	12771	**Ton**	$59.33		$757,703
207	4-1/2" Cl 3 ASPH BASE 1.50D PG76-22		25800	**SY**	6385.5	**Ton**	$78.14		$498,963
336	1-1/4" Cl 3 Asphalt Surface 0.38A PG 76-22		25800	**SY**	1773.75	**Ton**	$64.93		$115,170
	KY Route Driving Lane Pavement	31300							
2599	Fabric-Geotextile Type IV		31300	**SY**	**N/A**	**SY**	$1.62		$50,706
1	4" DGA Base		31300	**SY**	7199	**Ton**	$18.02		$129,726
219	3-1/2" CL4 ASPH BASE 1.00D PG76-22		31300	**SY**	6025.25	**Ton**	$67.90		$409,114
214	6" CL3 ASPH BASE 1.00D PG64-22		31300	**SY**	10329	**Ton**	$54.44		$562,311
336	1-1/4" Cl 3 Asphalt Surface 0.38A PG 76-22		31300	**SY**	2151.875	**Ton**	$64.93		$139,721
	KY Route Curb								
2015	Cement Concrete Island		15400	**SY**	**N/A**	**SY**	$60.00		$924,000
1810	Standard Curb & Gutter		7500	**LF**	**N/A**	**LF**	$16.98		$127,350
01890	Island Header Curb Type 1		7600	**LF**	**N/A**	**LF**	$33.04		$251,104
8018	**Retaining Wall**		2800	**SF**	**N/A**	**SF**	$60.00		$168,000
	Bridge*		2520	**SF**	**N/A**	**SF**		$110.00	$277,200
	Soil- Nail Wall		1	**LS**	**N/A**	**SF**	$450,000		$450,000
	Traffic Signal (Best Pal Way)		1	**LS**	**N/A**	**SF**	$410,000		$410,000
	Right-of-Way								
	Commercial		1.74	**AC**		**AC**	$800,000		$1,392,000
	Residential		1.68	**AC**		**AC**	$180,000		$302,400
	Agricultural structure		2	**EACH**		**EACH**	$100,000		$200,000
	Utility								
	Gas Lines		2550	**LF**	**N/A**			$150.00	$382,500
	Telephone		6850	**LF**	**N/A**			$150.00	$1,027,500
	Overhead Electrical Transmission Lines		1	**LS**	**N/A**			$102,000	$102,000

$9,314,566	**Construction Subtotal**
$2,794,370	**Misc. Construction (30%)**
$1,816,340	**Construction Contingency (15%)**
$13,925,276	**Construction Total (2008 Dollars)**
$1,894,400	**2010 Right-of-way Subtotal**
$1,512,000	**2007 Utility Subtotal**
$1,500,000	**2008 Design**
$2,000,000	**2011 Right-of-way Subtotal (4% Inflation)**
$1,800,000	**2011 Utility Subtotal (4% Inflation)**
$16,300,000	**2012 Construction**
	4% annual inflation
$21,600,000	**Total**

NOTES:

"KYTC Unit Cost" is based on KYTC 2008 Average Unit Bid Costs
"HNTB Unit Cost" was estimated by HNTB
All asphalt quantities are based upon 110 lbs/sy/in. of depth
Crushed Aggregate and DGA quantities are based upon 115 lbs/sy/in. of depth
Drainage Blanket quantities are based upon 100 lbs/sy/in. of depth
N/A denotes "Not Applicable"
* Widen existing bridge NB I-71/I-75 over Frogtown Road (210'x12')
Construction Inflation factor based information provided by KYTC
Cost assumes soil-nail wall in place prior to construction of DDI.
Misc. Construction is signs, lighting, drainage, barriers, fence, etc.

APPENDIX C – COMMENTS AND COORDINATION

- Kentucky Enquirer Meeting Notice
- Public Comment Summary
- Court Reporter Transcript
- Richwood Business Association Letter
- Public Meeting Sign In Sheets
- Public Comments
- Survey Questionnaires
- KYTC Historic Architectural Investigation Form
- USFWS – Frankfort Field Office
- Kentucky Department of Fish & Wildlife Resources Tourism, Arts, and Heritage Cabinet
- Kentucky State Nature Preserves Commission
- Energy and Environment Cabinet Department for Environmental Protection Division of Water
- Kentucky of Division of Forestry
- Kentucky Geological Survey
- Air Quality InterAgency Consultation (IAC)
- Meeting Minutes

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Total Amount
$451.56

Payment Method

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Amount Due
$451.56

Payment Amount
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Sort Text
2012-11-13 14:52:01

Product		Placement/Classification	Start Date	# Inserts
ClassifiedKYMon-Tues::	Legal	0075-Legal Advertising	11/15/2012,	2
Cincinnati.com::	Legal	0075-Legal Advertising	11/15/2012,	2

PROOF

Actual Size

The Kentucky Transportation Cabinet Needs Your Input!

Concerning the Reconstruction of the I-71/75 Interchange at KY 338 (Richwood Road) Item No. 6-18

Public Information Meeting
Thursday, November 29th, 2012
5:00 - 7:00 p.m.
Florence Baptist Church
642 Mt. Zion Road
Florence, Kentucky
Open Format from 5:00 - 7:00 p.m.
Formal Presentations at 5:15 p.m. and 6:00 p.m.

The purpose of this meeting is to present concepts for the proposed reconstruction of the I-71/75 Interchange at KY 338 (Richwood Road), including approach work on KY 338 east and west of the interchange. Displays containing the various alternates still under consideration will be available for viewing and comment. Additionally, representatives from the KY Transportation Cabinet and their consultants will be available to answer questions.

Handouts containing information about the project and comment sheets / questionnaire will be available at the meeting. Written comments will be accepted during the meeting and up to 15 days after the meeting at the District Six Office address listed below.

Comments from this meeting will become a part of the official record for the project. Once compiled, the meeting record will be made available for review and copying only after an Open Records Request has been received and approved. All Open Records Requests must be submitted to the Office of Legal Services, Kentucky Transportation Cabinet, 200 Mero Street Frankfort, Kentucky 40622.

In accordance with the Americans with Disabilities Act (ADA), if anyone has a disability and requires assistance, please notify Nancy Wood no later than November 26, 2012. Please call 859-341-2700 or mail your request to the address listed below.

Please address any questions regarding this project to:

Carol Callan-Ramler, Project Manager
421 Buttermilk Pike
Covington, Kentucky 41017
Carol.Callan-Ramler@ky.gov
http://75crossings.com/ - website forthcoming
1001737091

200% Enlargement

The Kentucky Transportation Cabinet Needs Your Input!

Concerning the Reconstruction of the I-71/75 Interchange at KY 338 (Richwood Road) Item No. 6-18

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http://75crossings.com/ - website forthcoming
1001737091

Public Comment Summary
I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Name	Address	Type of Comment	Issues/ Concerns regarding the proposed improvements and the Double Crossover Diamond (DCD) Interchange	Issues with existing Interstate Access	Issues with existing Side Roads & Driveways	How often do you use this interchange?	Do you use this interchange to access your residence?	What are the 3 primary purposes of your trips on the interchange?	Do you believe presented alternatives address congestion & safety issues of:	Inter-change	KY338 East	KY338 West	US25	Has sufficient info been provided to understand operational & safety benefits of the DCD?	Was the learning video helpful in illustrating how to navigate the DCD?
Budget Concerns															
Robert Maze	456 Watkins Lane Walton, KY 41094	Comment Form	Concerned about borrowing money to build the project.	Congestion/ Long Delays, Difficulty Entering/ Exiting	Truck Traffic, Sight Distance	Daily	Yes	Shopping, Doctor, Personal Business		Yes	Yes	Yes	Yes	Yes	Yes
Mr. & Mrs. WC Simpkinson	12721 Huey Lane Walton, KY 41094	Comment Form; Court Reporter Statement	Project is too expensive in cost and time. 338 is not constructed to accommodate semi traffic because it is too narrow. Instead construct longer off-ramps for Richwood & Mt. Zion and construct semi lanes for off-ramps from 338.	Truck Traffic	Truck Traffic	Daily	Yes	Use it every time they leave home		No	No	No	No	No	Yes
Traffic Concerns															
Rodd Sonnenberg	11335 Loftus Lane Union, KY 41091	Comment Form	Project could result in excessive additional truck traffic. Truck traffic currently idles in designated no parking areas or parks overnight.	Truck Traffic	Truck Traffic	Daily	Yes	Go to Work, Shopping, Personal Business		Neutral	Neutral	Neutral	Neutral	Yes	Yes
Robin Lutes	422 Foxhunt Dr. Walton, KY	Comment Form	Familiar with Harrodsburg Road DCD and have noticed issue with congestion leading into the DCD. Concerned that it will be worse here given the number of large trucks. 18 wheeler traffic should be routed east, not into residential areas.		Truck Traffic	Daily	Yes	Go to Work, Work related business, Personal Business		No	No	No	No	Yes	Yes
Dave Schneider	10107 Ash Creek Dr. Union, KY 41091	Comment Form	Excessive traffic during construction will be an issue.	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	Truck Traffic	Daily	Yes	Go to Work, Shopping, Visit family or friends		Yes	Neutral	Yes	Yes	Yes	Yes
Eugene Pfeiffer	11103 Paddock Dr. Walton, KY 41094	Comment Form	Frogtown Connector and Paddock entry/exit will create choke points.	Truck Traffic	Difficulty Entering/ Exiting	Daily	Yes	Shopping, Doctor, Personal Business		Yes	Yes	No	Yes	No	Yes
Patricia Hester	11705 Schmidt Lane Richwood, KY 41094	Comment Form	If truck stop closes, truck traffic would stay east of interstate. Richwood Rd. entrance to 5/3 Bank should be closed due to excessive cars entering/exiting causing congestion & accidents.	Truck Traffic	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	Daily	Yes	Go to Work, Shopping, Personal Business		Yes	Yes	No	Yes	Yes	Yes
Cathryn Cornett & James Walker	538 Savannah Dr. Walton, KY 41094	Comment Form	Traffic and access to interchange back-ups during construction. Timing of traffic signals on 338 after construction.	Truck Traffic		Daily	Yes	All of the above - needs to access interchange to go anywhere		Yes	Yes	Yes	Neutral	Yes	Yes
Carolyn Juett	11519 Fringe Tree Dr. Walton, KY 41094	Comment Form	Concerned about queuing of truck traffic east of I-71/75 intersection and potential safety issues of trucks using same road as passenger cars.		Truck Traffic	3-4 times per week	Yes	Shopping, Doctor, Personal Business		Neutral	Neutral	Neutral	Yes	Yes	Yes
Nancy Rachford	nrachford@lyonsmagnus.com	Email Comment	Three truck stops at one interchange causes excessive traffic and delays. Concerned about traffic during construction and lack of safety from no advance notice of traffic delays. Suggests installing warning signs or lights for notification when there is excessive traffic.												

Public Comment Summary
I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Name	Address	Type of Comment	Issues/ Concerns regarding the proposed improvements and the Double Crossover Diamond (DCD) Interchange	Issues with existing Interstate Access	Issues with existing Side Roads & Driveways	How often do you use this interchange?	Do you use this interchange to access your residence?	What are the 3 primary purposes of your trips on the interchange?	Do you believe presented alternatives address congestion & safety issues of: Inter-change	KY338 East	KY338 West	US25	Has sufficient info been provided to understand operational & safety benefits of the DCD?	Was the learning video helpful in illustrating how to navigate the DCD?
James O'Brien	890 Richwood Rd Walton, KY 41094	Court Reporter Statement	Semi truck traffic is tearing road up. Would like to see trucks re-routed off road except for in business section											
Design Concerns														
James Jett	2335 Buttermilk Crossing # 157 Crescent Springs, KY 41017	Comment Form	Possibly insufficient distance to switch lanes.	Truck Traffic, Difficulty Entering/ Exiting		Daily	Yes	Shopping, Doctor, Personal Business	Yes	Yes	Yes	Yes	Yes	Yes
Jeff Eichhorn jeichhorn@hsabh.com	3000 G Henkle Road Lebanon, OH 45036	Comment Form	Consider alternative improvements on West - slip ramp & southbound to connect to Frogtown. State already owns R/W.	Congestion/ Long Delays	Congestion/ Long Delays	1-2 times per week	No	Go to Work, Work related business, Visit family or friends	Yes	Yes	No	Yes		Yes
Jennifer Gulick	11018 Harrison Way Walton, KY 41094	Comment Form	Prioritize integration of sustainable storm water management into final design. Sustainable & attractive landscaping should also be incorporated as it's a major entrance into Boone County. Serves on Boone County Forest Commission and is willing to offer help to make this happen. Traffic signals should be timed based on real-time data from GIS and cameras to accommodate traffic.	Congestion/ Long Delays, Truck Traffic	Congestion/ Long Delays	Daily	Yes	Work related business, Personal Business, Visit family or friends	Yes	Neutral	Neutral	Neutral	Yes	Yes
John Hart	11938 Decker Lane Walton, KY 41094	Comment Form	Inspect 20+ year old drainage structure under Richwood Rd at 5/3 Bank. Inspect stability of Richwood Rd from 5/3 Bank to end of project before completing plans & specs as sections of northern slope on Richwood Rd failed during installation of signal & guardrail last year. Evaluate stream runoff along Richwood Rd to Mudlick Creek. Evaluate backwater effect at Mudlick Creek & Chambers intersection, as flooding and temporary damming along Chambers has occurred in the past.	Congestion/ Long Delays, Truck Traffic		Daily	Yes	Work related business, Personal Business	Yes	Yes	No	Yes	Yes	Yes
Access Concerns														
Richard Crist dcrist100@gmail.com	Richwood Pointe, LLC 8800 Bankers Street, Suite #3 Florence, KY 41042	Letter	Proposed right-in/right-out traffic at Clay St makes access difficult for residents entering Richwood Pointe from West & exiting East on KY 338. Suggest traffic signal at Clay/338 intersection allowing left turns from and onto 338.											
Debora Crist dcrist100@gmail.com	Richwood Pointe, LLC 8800 Bankers Street, Suite #3 Florence, KY 41043	Letter	Proposed right-in/right-out traffic at Clay St makes access difficult for residents entering Richwood Pointe from West & exiting East on KY 338. Suggest traffic light at Clay/338 intersection allowing left turns from and onto 338.											
Bill Merrick	611 Turfrider Ct. Walton, KY 41094	Comment Form	Re-route Frogtown connector to Paddock for westbound trucks leaving Pilot.	Truck Traffic	Congestion/ Long Delays, Difficulty Entering/ Exiting	Daily	Yes	Go to Work, Work related business, Personal Business	Yes	Yes	No	Yes	Yes	Yes
Rich O'Toole GM for Pilot Travel Center	11229 Frontage Rd. Walton, KY 41094	Comment Form	Concerned about access for customers on West side of I-75. Traffic signal at Frogtown connector and left turn from Frogtown to 338 are critical.	Truck Traffic, Difficulty Entering/ Exiting	Congestion/ Long Delays, Truck Traffic Difficulty Entering/ Exiting	Daily	No	Go to Work, Work related business, Personal Business	Yes	Yes	Yes	Yes	Yes	?

Public Comment Summary
I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Name	Address	Type of Comment	Issues/ Concerns regarding the proposed improvements and the Double Crossover Diamond (DCD) Interchange	Issues with existing Interstate Access	Issues with existing Side Roads & Driveways	How often do you use this interchange?	Do you use this interchange to access your residence?	What are the 3 primary purposes of your trips on the interchange?	Do you believe presented alternatives address congestion & safety issues of:	Inter-change	KY338 East	KY338 West	US25	Has sufficient info been provided to understand operational & safety benefits of the DCD?	Was the learning video helpful in illustrating how to navigate the DCD?
Bank of Kentucky Richwood Branch by Donald Bahr EVP	320 Richwood Rd. Walton, KY 41094	Comment Form; Court Reporter Statement	Project won't allow left turn to Clay Dr. and poses an inconvenience for customers. They won't be able to access the branch or shopping center as they currently do. Median on 338 at Clay Dr. should be eliminated so customers can continue to access easily.			Daily	Yes	Go to Work, Work related business, Personal Business, Shopping		Yes	No	Yes	Yes	Yes	Yes
Raymond Riska McDonald's Corporation	2 Easton Oval, Suite 200 Columbus, OH 43219	Comment Form	Right-in/right-out makes access at Clay Dr. difficult for eastbound traffic on Richwood Dr. Dedicated road between Clay Dr. & Paddock Dr. north of Bank of KY is a possible solution.			3-4 times per month	No	Work related business						Yes	Yes
Dennis G. Davis	351 & 357 Richwood Rd. Walton, KY 41094	Comment Form	Median west of Paddock on Richwood restricts private driveways from left turn for westbound Richwood Rd. Resident insists upon retaining wall along their property to allow for mowing.	Congestion/ Long Delays, Truck Traffic	Difficulty Entering/ Exiting	Daily	Yes	Go to Work, Shopping, Doctor		Yes	Neutral	No	Neutral	Yes	Yes
Grant Groen McDonald's employee	10063 Dixie Hwy Florence, KY 41042	Comment Form	Median in front of restaurant makes it difficult for customers to exit towards highway.		Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	3-4 times per week	No	Go to Work, Work related business		Yes	Neutral	Neutral	Yes	Yes	Yes
Paul Verst	No address provided, only ph# 859-379-1201	Comment Form	Wants more info on bypass connector road leading into Richwood Industrial Park and impact on businesses. Any relocation required or displacements?	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting, Roadway Geometry	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting, Roadway Geometry	Daily	No	Go to Work, Work related business		Yes	Yes	Yes	Yes	Yes	
Louis Houllion	11619 Schmidt Lane Walton, KY 41094	Court Reporter Statement	Concerned about emergency vehicle access. Previously at 337 & Schmidt Lane (1 mile west of project) rains flooded the road. Wants to ensure this will not be an issue downstream with increase of hard surface & construction for the project.												
Dave & Sue Hill	11919 Oxford Hills Dr Walton, KY 41094	Comment Form	How will access be handled during construction and will signs be posted about road closures, etc? How quickly will it be completed once work starts?	Congestion/ Long Delays, Truck Traffic	Truck Traffic	Daily	Yes	Go to Work, Work related business, Visit family or friends						Yes	

Public Comment Summary
I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Name	Address	Type of Comment	Issues/ Concerns regarding the proposed improvements and the Double Crossover Diamond (DCD) Interchange	Issues with existing Interstate Access	Issues with existing Side Roads & Driveways	How often do you use this interchange?	Do you use this interchange to access your residence?	What are the 3 primary purposes of your trips on the interchange?	Do you believe presented alternatives address congestion & safety issues of: Inter-change	KY338 East	KY338 West	US25	Has sufficient info been provided to understand operational & safety benefits of the DCD?	Was the learning video helpful in illustrating how to navigate the DCD?
No Substantive Concerns														
George Hill	852 Keeneland Green Dr Union, KY 41091	Comment Form	Will the DCD be difficult for infrequent travelers to understand?	Congestion/ Long Delays, Roadway Geometry (Left Turn on N-75)		Daily	Yes	Go to Work, Work related business, Personal Business	Yes	Yes	Yes	Yes	Yes	Yes
Ronald Konen	11104 Paddock Dr Walton, KY 41094-8432	Comment Form		Difficulty Exiting (going East on 338 from Paddock)	Difficulty Entering/ Exiting	Daily	Yes	Shopping, Personal Business, Visit family or friends	Yes	No			Yes	Yes
Lee Scheben	10701 Meadow Stable Lane Union, KY 41091	Comment Form		Truck Traffic	Truck Traffic	Daily	Yes	Go to Work, Work related business, Personal Business	Yes	Yes		Yes	Yes	Yes
Ronald Smith	12451 Hutton Dr Walton, KY 41094	Comment Form	Strongly against plan with traffic from Frogtown Connector through Heritage Trails. *(No further explanation was provided of why they are against this plan or why this is a concern)*	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	Daily	Yes	Go to Work, Work related business, Personal Business	Neutral	Neutral	Neutral	Yes	Yes	Yes
Cindy Marks	12371 Gaines Way Walton, KY 41094	Comment Form		Congestion/ Long Delays, Difficulty Entering/ Exiting	Difficulty Entering/ Exiting	Daily	Yes	Shopping, Personal Business, Visit family or friends	Yes	Yes	Yes		Yes	Yes
Pat Sweeney	883 Catlett Dr Crittenden, KY 41030	Comment Form		Truck Traffic	Congestion/ Long Delays, Difficulty Entering/ Exiting	3-4 times per week	No	Go to Work, Work related business, Personal Business	Yes	Yes	Yes	Yes	Yes	Yes
Dan Childris	13005 Frogtown Connector Rd Walton, KY 41094	Comment Form	Would a dedicated truck ramp for SB-75 be feasible?		Truck Traffic, Difficulty Entering/ Exiting	Daily	Yes	Go to Work	Yes	Yes	Yes	Yes	Yes	Yes
Roger Wilson	1043 Hicks Pike Walton, KY 41094	Comment Form	Truck stops might relocate to better location with tax incentives.	Congestion/ Long Delays, Truck Traffic, Difficulty Entering/ Exiting	Too many truck stops	Daily	Yes	Shopping, Personal Business, I-75 access	Yes	Yes	No	Neutral	Yes	Yes
David T. Adams	10819 Sawgrass Court Union, KY 41091	Comment Form		Difficulty Entering/ Exiting	Truck Traffic, Difficulty Entering/ Exiting	Daily	Yes	Shopping, Visit family or friends, Church	Yes	Yes	Yes	Yes	Yes	Yes
Emily & Jeremey Hodges	3482 Hwy 177 W DeMossville, KY 41033	Comment Form	Seems dangerous because people don't know how to use it. Just wanted more info.	Congestion/ Long Delays, Difficulty Entering/ Exiting		Rarely	No	Trips or Vacations	Neutral	Neutral	Neutral	Neutral	No	Yes
G.A. Foltz	12363 Gaines Way Walton, KY 41094-9350	Comment Form		Delays & Left Turns		Daily	Yes	Shopping, Doctor, Personal Business	Yes	Yes	Yes	Yes	?	Yes

BOONE COUNTY TRANSPORTATION PROJECTS

I-75/KY 338 INTERCHANGE RECONSTRUCTION

PUBLIC MEETING

FLORENCE BAPTIST CHURCH

642 MT. ZION ROAD

FLORENCE, KY 41042

DATE: NOVEMBER 29, 2012

TIME: 5:00 - 7:00 P.M.



JOAN C. LACY
REPORTER
CJV REPORTING COMPANY
130 DUDLEY ROAD, SUITE 170
EDGEWOOD, KENTUCKY 41017
(859)581-9794
FAX NO. (859)581-6899
TOLL FREE 1-800-315-9687

STATEMENTS

BILL SIMPKINSON
12721 Huey Lane
Walton, KY 41094

I'm not in favor of this project for two or three reasons. My main objection is the money it's costing when our country is so far in debt. I truly believe if the approach ramps were lengthened and off to the side it would be a bigger saving and less hazardous than to have the traffic backing up on the interstate, both here at Richwood and back at Mt. Zion.

The roads, 338, are not constructed to accommodate semi traffic. I'm not including cement trucks or construction vehicles. This road is too narrow for semis. The semis should be banned from going beyond the Shell and the Pilot areas on one end, and on the other end, where Route 42 directs traffic to the interstate over 338, if the signs are going to stay up that way, then there should be additional signs to then ban semis. This road is constructed for residential traffic and occasional construction

traffic. And I repeat myself, it's not designed for semis.

I would like to see this change, because our country is so far in debt, and this is just another unnecessary expenditure. Thank you, Joan.

LOUIS HOUILLION

11619 Schmidt Lane

Walton, KY 41094

I'm concerned about the drainage at 338 and Schmidt Lane, which is a mile west of the project. This past year we had rains that covered 338 and Schmidt Lane, and if emergency vehicles had come in, they would not have been able to.

With the increase in hard surface, with the work coming up, I'm just, I want to make sure that that's covered downstream as well as on the project. That's it.

JAMES O'BRIEN

890 Richwood Road

Walton, KY 41094

My name's James O'Brien. I live at 890 Richwood Road down toward Chambers Road. I know all the construction is taking place east of where I live, but it's allowing the semi trucks, big trucks, to come down the road and tear the road up. Being a taxpayer, and I'm paying for it, I'd like to see these trucks be rerouted off of the road, except for up in the business section, if that's possible. Thank you.

JENNY GULICK

11018 Harrison Way

Walton, KY 41094

I'm a resident of the area and I serve on some Boone County, on Boone County Urban Forestry Commission, as well as being involved with some other green organizations in the area. My main suggestion and concern for this project is that when it comes to stormwater management, that it be considered to do something innovative, green, something non-traditional, to address the drainage issue.

That could be anything from the medians becoming stormwater devices in and of themselves, to the new diamonds and interchanges that are being created, making that a pervious surface. And I think it's just very important that these areas are sustainable and green and attractive.

I am offering my help and many organizations' help in Boone County to make that happen. We would love to have input on. That's it.

DONALD BAHR

10709 Crown Pointe

Union, KY 41091

I'm with the Bank of Kentucky. As far as the proposals that we've seen, with the modifications to 338, they are going to negatively impact our branch as far as the customer traffic. And the reason for that is, customers heading east on 388 will no longer be able to turn in left on Clay Drive. Now they can. There's going to be a median strip in the middle of 338 that's going to prevent people from turning left onto Clay Drive, is how you access our branch.

In addition to that, there's a shopping center behind our branch. It's called Shoppes of Richwood. And they're going to be impacted in the same way, as far as their clientele not being able to directly go into Clay Drive and go back to their stores. So that's the concern that we have.

This is a letter that's from the Richwood Business Association. It's made up of the majority of the owners of the shops that are in the Shoppes of Richwood. The owner of McDonald's is here.

There's a number of business owners that are impacted by that median strip that's going to prevent traffic heading east on 338 being able to turn left on Clay Drive. Please attach this to the record.

(CONCLUSION OF STATEMENTS.)

COMMONWEALTH OF KENTUCKY

STATE AT LARGE:

I, JOAN C. LACY, a Notary Public, within and for the Commonwealth of Kentucky, do hereby certify that the foregoing statements were taken before me at the time and place and for the purpose in the caption; that the statements were reduced to shorthand writing by me in the presence of the parties; that the foregoing is a full, true and correct transcript of the said statements so given.

WITNESS MY SIGNATURE THIS 7th day of December, 2012.

My Commission Expires: August 30, 2016.

Joan C. Lacy - Notary Public
Notary ID #473873
COMMONWEALTH OF KENTUCKY

Richwood Business Association

320 Richwood Road, Walton, KY 41094
www.richwoodbusiness.com
Facebook.com/richwoodbusiness

November 29, 2012

Mr. Rob Hans
District Manager
Kentucky Transportation Cabinet
421 Buttermilk Pike
P.O. Box 17130
Covington, KY 41017

Dear Mr. Hans:

As members of the Richwood Business Association we are writing to express our concern over the changes being proposed for the interchange at Interstate 75(I-75) and State Route 338(aka Richwood Road) in Richwood, Kentucky.

The issue with the first rendering that we saw had to do with the truck traffic exiting from I-75 and proceeding west on State Route 338 to visit the Pilot Truck Stop. This rendering showed a new road which started at the Frogtown Connector Road and emptied into Paddock Drive. In order for truck traffic to return to I-75 after visiting the Pilot Truck Stop, the trucks would have to use this new road. The result would be that truck traffic would go through a residential neighborhood, which would cause safety concerns for the residents and their children.

We have now seen a second rendering, which was just viewed this week. This plan eliminates the truck traffic going through the residential neighborhood and is certainly an improvement when compared to the first rendering.

However, we still have a major issue with a change shown in the second rendering and that is there is a median strip on State Route 338 which will not allow traffic proceeding east on this road from turning left on to Clay Drive. This will hinder automobile traffic from having access to all of the commercial establishments on Clay Drive, which include a very popular restaurant, bank and all of the retail businesses located in the Shoppes of Richwood. This median strip will also impede automobile traffic from exiting Clay Drive and proceeding east on State Route 338.

A possible solution to the issue described above would be to remove the median strip altogether, which will allow automobile traffic to flow as it is currently doing today.

The Richwood Business Association can be reached by contacting the following:

Louisa Luk - Louisa.lukeeinc@gmail.com
Larry Barger – larry@atlaselectricmotor.com
Becky Flynn – bflynn@bankofky.com

Your consideration to our concerns will be greatly appreciated.

Sincerely,

The Richwood Business Association
320 Richwood Road
Walton, KY 41094

Becky Flynn
Bank of Kentucky

Louisa Luk
Raymond's Hong Kong Cafe

Raymond Luk
Raymond's Hong Kong Cafe

Jessica Mastronardo
Padgett & Mastronardo, PLLC

Victor Patel
Holiday Inn Express

Grant Groen
Archways McDonald's

Tony Bailey
Tony Bailey Photography

Larry Barger
Atlas Electric Motor Service and Sales

Paula Cialdini
Amore' Hair Salon

Craig Grabow
Central Lawncare

Victor Patel
owner

Mary Beth Paul
Mary Beth Paul
Gourmet Delights, LLC

David Weiner
Skyline Chili - Richwood

Rob Rhodes
First Church of Christ

Rich O'Toole
Pilot Travel Centers

Greg Schrand
GSE, Inc.

Dean Wisner
Pilot Travel Centers

Dan E. Childress
Valvoline / Four D Mgt

Dan S. Childress
Valvoline / C C & Sons, Inc.

John Adams
Snappy Tomato Pizza

Richwood Hopez LLC

Cc: Boone County Judge/Executive Gary W. Moore
State Senator John Schickel
State Representative Adam Koenig
State Representative Sal Santoro

Boone 6-18

Total
23 KYTC + Consult
108 visitors

SIGN IN SHEET

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name	Address	Email (optional)
Genita Kiser	KYTC - D-6	
ROB HANS	KYTC D-6	
Stacee Hans	KYTC D6	
Eric Hackworth	KYTC D6	
MIKE BEZOLD	KYTC D6	
Cayce Callan-Ramler	KYTC D6	
Robert Yeager	KYTC D-6	
Carl Chaffetz	Parsons	
Shawn Washer	FTH	
KYLE JOINER	FTH	
Clay Johnson	FTH	
Dave Ayala	Parsons	
Glen White	KYTC-D6-R/W	
Francis Stephens	KYTC-D6-R/W	
Jason Rankin	KYTC-D6-R/W	
Nancy Wood	KYTC- D6	
Rob Davis	KYTC-D6	
Kelly Woodrum	KYTC-D6	
JAMES SIMPSON	KYTC C.O.	
SCOTT SCHURMAN	KYTC-DEA-CO	
NICHOLAS HENDRIX	KYTC-D6	
SPENCER STORK	KYTC-D6	
SCOTT D PENNINGTON	KYTC D-6	

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

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Name	Address	Email (optional)
TOM & MARIE BADER	11035 STIRRUP LN, WALTON, KY 41094	tlbl@insightbb.com
JAMES O'BRIEN	890 Richwood Rd. WALTON KY. 41094	
Jim & Paula Cialdini	11055 Clay Dr. Walton Ky 41094	JCialdini@fuse.net
Lewis Richards	988 Hogreffe Rd Dndp. Ky 41051	
ROBIN LUTES	~~100~~ FOXHUNT DR WALTON KY 41094	
JAMES ROBINSON	11048 STIRRUP LN. WALTON KY 4094	
Byron & Cindy Marks	12371 Gaines Way, Walton, Ky 41094	cjmarks@insightbb.com
Dennis Courtney	11362 Old Lexington Pike Walton KY 41094	
Pat Sweeney	883 Cotterill Dr. Crittenden Ky 41030	sweeneyp@whitecastle.com
RON SMITH	12451 HUTTON DR WALTON Ky 41094	
MARK JACOB	2157 W HORIZON DR HEBRON KY 41048	mjacob@id.com
DEAN WISNER	118 RICHWOOD RD. WALTON, KY 41094	DWISNER24@GMAIL.COM
JACK LEVERMANN	3563 JENNY LANE, ERLANGER, KY 41018	
BILL MERRICK	411 TURFRIDER CT WALTON, KY 41094	BCMERRICK@YAHOO.COM
GEORGE & BARB HILL	~~852~~ KENELAND GREEN DR. UNION, KY	
Rich O'Toole	11229 Frontage Rd. WALTON, Ky 41094	STORE321@Pilottravelcenters.com
Laura Mutchler	10976 Arcaro Ln Union 41091	LBTMutchler@hotmail.com
Willie J Smith	2355 Rice Rch., Union, KY 41091	WSmithRSi@AOL.com
Barbara Columbus	11048 Stirrup Ln. Walton, Ky 41094	barbarajohnson@insightbb.com
SAL SANTORO	576 WATERLOO CT FLOR KY 41042	SAL.SANTORO@LMC.KY.GOV
D'Anna Kloeker	11996 Decker Ln Walton	tkloeker@insightbb.com
Helen Boyle	12042 Decker Ln. Walton	BOYLEHJ@FUSE.NET

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

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Name	Address	Email (optional)
JOHN MAHER	10733 CROWN POINTE DR UNION	JMAHER5365@GMAIL.COM
TIM OEHLER	10063 DIXIE HWY	
JOE SZYBISTY	11028 PADDOCK WALTON, KY 41094	JOES3437@AOL.COM
Cyndi Karen	11303 Dixie Hwy, Walton, KY 41094	cyndi.slade@gmail.com
Michael & Richard Williamson	11061 Paddock Dr. Walton, Ky. 41094	MICHOL@INSIGHTBB.COM
BRIAN & GILLIAN TURNER	482 MUSTANG DRIVE WALTON KY 41094	BRIANTICE@MSN.COM
Lou Houillion	11619 SCHMIDT LN 41094	
DAVID T. ADAMS	10819 SAWGRASS LN UNION KY 41091	
Sally Deer	11311 Loftus Lane Union Ky 41091	sedeel@gmail.com
TOM TAYLOR	728 COUNT FLEET DR	1TOMTOM@FUSE.NET
VIRGINIA + GENE PFEIFFER	11103 PADDOCK ~~ST~~ RICHWOOD 41094	
JENNY GULICK	11018 HARRISON WAY WALTON KY 41094	gulickjennifer@yahoo.com
Becky Flynn The Bank of KY	320 Richwood Road Walton Ky 41094	bflynn@bankofky.com
MARK TRAUTWEIN	11300 COUNTY CT WALTON KY 41094	
RANDY BARLOW	10092 OLD UNION R. UNION KY	
BOB & KAREN MAZE	456 WITHERS LANE, WALTON, KY	BAMAZE49@AOL.COM
JOSEPH E RICHARDS	471 FAIRFIELD CT WALTON KY 41094	JOSEPHERICHARDSIRC@YAHOO.COM
~~Robert~~ L. Adams	1073 Charley Ct Union, KY 41091	bob.adams4k@yahoo.com
Jennifer Carolan-Shaw	Stantec, Lex KY	
JASON BARTLETT	Stantec	

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
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Name	Address	Email (optional)
Don Davis	11278 Loftus Lane Union Ky 41091	
Emily Hodges	3482 Hwy 177 W Demossville Ky 41033	
Charles V. Caldwell	1303 Dixie Hwy Walton, Ky 41094	
Louisa Luk	11051 Clay Drive Walton KY 41094	
Jeff Jasper	685 Beth Lane Lex KY 40503	
Sherry Skelton	11027 Stirrup Lane Walton, Ky 41094	
Dennis Davis	357 Richwood Rd Walton. Ky 41094	
Rodd Sonnenberg	11335 Loftus Ln Union Ky 41091	
Dick Davis	11281 Loftus Lane Union Ky 41091	
Gil Simpkinson	12791 Hucy Love Walton Ky 41094	
Grant Graden	1220 Grays Peak Covington, KY 41011	grant@archwaysmcd.com
Carolyn Juett	11519 Fringe Tree Dr Walton, Ky 41094	
Dolgures Ryan	11712 Richwood Church Rd Walton	
Lana Daut	1887 Richwood Rd Walton	
John Hart	11938 Decker Lane Walton	
Gerri Miracle	461 Richwood Rd Walton	d.miracle@insightbb.com
G.A. Folk	12363 Gaines, Walton, Ky	
Jim Doepker	12 Highland Ave. Ft. Thomas KY 41075	
Tina Young	145 Richwood Rd Walton, Ky 41094	
Cathryn L. Cornett	538 Savannah Dr Walton Ky 41094	

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
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Name	Address	Email (optional)
Mats Carver	126 East Second Street Covington	
Adam Howard	Boone Co Fiscal Court 2950 Washington, Burlington	ahoward@boonecountyky.org
Donna Skuris	11075 Dixie Hwy Suite 201 Walton Ky 41094	dondar63@hotmail.com
Chester Armstrong	166 N Main St Walton Ky 41094	
Dan Penfield	1047 Spectacular Bid, Union, Ky	dtenfelde@gmail.com
Bob Zeisler	300 Shorland Dr	bzeisler@verstgroup.com
Kevin Costello	2950 Washington St.	kcostello@boonecountyky.org
Robin Hill	762 Frogtown Rd Union, Ky 41091	
Jeff Eichhorn	3000 Glenbrook Drive	jeichhorn@hsdbh.com
Robert Benton	11406 Old Lexington Rd	
Jay Bayer	1109 Audubon Rd,	JayBayer@BayerBeaver.com
Karen Butt	12391 Hutton Rd Walton Ky 41091	
MERT CALDWELL	11303 DIXIE HIGHWAY, WALTON, KY 41094	~0~
Lori Rosenberger	11814 Suncrest Dr. Walton, Ky. 41094	
Dave Hill	11919 Oxford Hills Walton KY 41094	davehill@hellmannlumber.com
Bob + Bonnie Maddox	759 Mt Zion Florence Ky. 41042	

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

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Name	Address	Email (optional)
Bob Roark	10918 Paddock Dr Walton Ky 41094	croark@hotmail.com
George B. Mar P.E. P.S.	P.O. Box 212, Covington, Ky. 41012	NONE
James Dunning	7094 Clark Cmk 41042-4101	
Dave Schneider	10107 Ash Creek Union KY 4109	schneiderdavidr@yahoo.com
JOHN MOCKER	969 RIVA RIDGE CT 41091	jmocker@rallyppi.com
LEE SCHEBEN	10701 Meadow Stable Ln Union Ky 41091	leescheben@fuse.net
DAN & PAM STENGER	557 MUSTANG DR WALTON, Ky 41094	DAN.STENGER@INSIGHTBB.COM
Greg Schrand	281 Richwood Rd. Walton	g.schrand@insight66.com
Dan Childs	13005 Grogan Corners Rd Union 41091	
Roger Wilson	1043 Hicks Pike	RAWilson41094@ABL.com

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I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name	Address	Email (optional)
TED WINGROVE	11011 STIRROP LN WALTON KY 41094	TWINGROVE69@YAHOO.com
DON Bahr	10709 Crown Pointe, Union, KY	dbahr@bankofky.com
Richard Hockenberry	315 MAIDEN ST WALTON KY 41094	RichHock@Yahoo.com
RAYMOND RISKA (McDonalds)	2 Easton Oval, Suite 200, Col OH 43219	
FRANK SHEPHERD	4254 TULLER RD DUBLIN OH	
Patricia Hester	11705 Schmidt Lane Walton Ky 41094	
Sam DANT	1387 RICHWOOD Rd. WALTON Ky 41094	
John Wales	240 Shoreland Drive, Walton Ky 41094	
DonReichard	12368 GAINES WAY Walton, Ky 41094	DONREICHARD@YAHOO
JIM JETT	2335 BUTTERMILK CROSSING #157 - Crescent Springs, Ky.	
LORI MATTELKAT	500 THOMAS MORE PARKWAY	LORIMATTELKAT@TOWNEPROPERTIES.com
Jo Ann Rawlen	11053 Paddock Dr Walton, Ky	
James K. Berling	1 Triple Crown Blvd Boone County	JWBERLING@FUSE.NET
Ron GUTTRIDGE	644 AYLON LANE, RICHWOOD, Ky 41094	r.guthridge@insightbb.com
ROY WILSON	10927 APPALOOSA DR. WALTON, Ky 41094	ROYAWILSON5@INSIGHTBB.COM
PATRICIA WILSON	" " " " "	
Rob Martin	211 Grandview Drive Ste 235 Ft Mitchell 41017	martacltd@yahoo.com
John MADDOX	876 Kenneland Green Dr Union Ky 41091	JMaddox@fuse.net
Hank Fedders	11704 Schmidt Ln Walton Ky 41094	
Ron Komen	11104 Paddock Dr WALTON Ky	

Callan-Ramler, Carol (KYTC-D06)

From: Callan-Ramler, Carol (KYTC-D06)
Sent: Friday, November 30, 2012 10:32 AM
To: 'nrachford@LyonsMagnus.com'
Cc: Wood, Nancy (KYTC-D06)
Subject: RE: I-75 Richwood interchange project | 18 - Response to Public Comment

Hello Ms. Rachford,

My name is Carol Callan-Ramler. I am the project manager for the Richwood Road Interchange Project. I want to acknowledge that your comments have been received and will be included with other public comments we are receiving as a result of the public meeting we held last night.

In response to your comments:

1. The KY Transportation Cabinet does not have voice into what sorts of developments get established along a corridor. That is addressed by local county governments and municipalities. You need to voice this concern to them.
2. For several years now, across the interstates in our region, ARTEMIS signs have been operational. This is a multi-million system and is monitored 24/7. This system provides the type of alerting/warning to which you are asking. The signs are located at strategic locations, but given the expense of each respective sign, the signs cannot be located every mile or so.

With respect to the proposed project improvements, I'm attaching a link to our project website: www.75crossings.com

Therein you will find the displays and handout materials from last night's meeting. There is a questionnaire with the materials. Please take a moment to fill it out and send it into us.

For Richwood Road, in the vicinity of Best Pal and the industrial park, Richwood Road will be lowered so as to go underneath both Dixie Highway and the Norfolk Southern Railroad. The two at-grade RR crossings at Shorland Drive and Richwood Road will be removed. Dixie Highway will remain at its current elevation and will be bridged over Richwood Road. Ramps will be provided along Dixie Hwy. to connect the roads. Further, a signalized intersection will be provided at Best Pal (the side street that leads to Burger King). The entrances to the two truck stops will come off of Best Pal; their drives will not connect directly to Richwood Road.

Thank you for your comments and if you have further questions, please send them my way.

Best Regards,

Carol

Carol Callan-Ramler, P.E.
KY Transportation Cabinet
District 6
421 Buttermilk Pike
Covington, KY 41017
859-341-2707 x272

From: Wood, Nancy (KYTC-D06)
Sent: Thursday, November 29, 2012 11:41 AM

To: Callan-Ramler, Carol (KYTC-D06)
Subject: FW: I-75 Richwood interchange project

From: Nancy Rachford [mailto:nrachford@LyonsMagnus.com]
Sent: Thursday, November 29, 2012 10:47 AM
To: Wood, Nancy (KYTC-D06)
Subject: I-75 Richwood interchange project

My name is Nancy Rachford and I work in the Industrial Business Park across the railroad tracks from 338. What I have to say is, at this point, is too late but I must opinionate nonetheless. From time to time I indulge myself in eating at a Burger King which faces 338 and happens to sit right off the interchange. It is amazing to me why our local planning people would have ever allowed 3 !!!! truck stops to be located at one interchange. Really???? I do not care what time of day I am sitting and watching this traffic but it is always clogged, backed up, etc. due to the slow moving semi's. Who in the world designed this years ago? So the first thing I have to say is do NOT allow any more truck stops to be built at this location. Also, whatever is done(especially during the construction phase)needs to NOT impede the flow of traffic any worse than what is already happening. Rush hour, holidays are the worst times for traffic backing up on the expressway. It is just a matter of time before someone is killed because they weren't paying attention to the backed up traffic on the expressway. Can't the state install warning signs, lights when the traffic starts to back up to a dangerous level on the expressway now before someone dies? My daughter already rear-ended someone at that exit but thank God it was not serious.

Sincerely,
Nancy Rachford

Callan-Ramler, Carol (KYTC-D06)

From: Wood, Nancy (KYTC-D06)
Sent: Thursday, November 29, 2012 11:47 AM
To: 'Nancy Rachford'
Cc: Hans, Robert (KYTC-D06); Callan-Ramler, Carol (KYTC-D06)
Subject: RE: I-75 Richwood interchange project

Ms Rachford –

Thank you for your comment. I invite you to attend the Public Meeting tonight, the Kentucky Transportation Cabinet Needs Your Input!

Concerning the Reconstruction of the I-71/75 Interchange at KY 338 (Richwood Road)
Item No. 6-18
Thursday, November 29th, 2012
5:00 – 7:00 p.m.

Florence Baptist Church
642 Mt. Zion Road
Florence, Kentucky

Also, check out the information on the 75 Crossings website:
http://75crossings.com/ky-338/

I will forward your email to the project team. Again, I encourage you to stop by tonight.

Nancy Wood

From: Nancy Rachford [mailto:nrachford@LyonsMagnus.com]
Sent: Thursday, November 29, 2012 10:47 AM
To: Wood, Nancy (KYTC-D06)
Subject: I-75 Richwood interchange project

My name is Nancy Rachford and I work in the Industrial Business Park across the railroad tracks from 338. What I have to say is, at this point, is too late but I must opinionate nonetheless. From time to time I indulge myself in eating at a Burger King which faces 338 and happens to sit right off the interchange. It is amazing to me why our local planning people would have ever allowed 3 !!!! truck stops to be located at one interchange. Really???? I do not care what time of day I am sitting and watching this traffic but it is always clogged, backed up, etc. due to the slow moving semi's. Who in the world designed this years ago? So the first thing I have to say is do NOT allow any more truck stops to be built at this location. Also, whatever is done(especially during the construction phase)needs to NOT impede the flow of traffic any worse than what is already happening. Rush hour, holidays are the worst times for traffic backing up on the expressway. It is just a matter of time before someone is killed because they weren't paying attention to the backed up traffic on the expressway. Can't the state install warning signs, lights when the traffic starts to back up to a dangerous level on the expressway now before someone dies? My daughter already rear-ended someone at that exit but thank God it was not serious.

Sincerely,
Nancy Rachford

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November 27, 2012

BB Paddock

To whom it may concern:

On behalf of the homeowners of Heritage Trails, we want our opposition to the alternate plan noted. We wish to avoid any and all truck traffic with the installation of a signalized intersection at Richwood and Paddock.

We feel you should be made aware of our position and we are firm in our resolve that no truck traffic bends into and through our residential area.

Sincerely,

Kevin Walsh

President

Heritage Trails Homeowners Association

ddr/JCS

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Robert MAZE

Address 456 Withers Lane Walton, KY

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☑	☐	
Truck Traffic	☐	☑	
Difficulty Entering / Exiting	☑	☐	
Sight Distance (cite where)	☐	☑	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☒ To go shopping
- ☒ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	_____
b. KY338 East	☒ Yes	☐ No	☐ Neutral	_____
c. KY338 West	☒ Yes	☐ No	☐ Neutral	_____
d. US25	☒ Yes	☐ No	☐ Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

I AM Concerned that We Will Borrow More Money to Build this -

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Rodd Sonnenberg

Address 11335 Loftus Ln Union KY 41091

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☒	Trucks overnight idle engines creating lots of diesel smoke! I live in Triple Crown and my Deck & Furniture is coated with Black smoke. I feel this improvement will bring more trucks!
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	
Other:			

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [ ] To conduct work related business
- [x] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____
- [x] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☐ No	☐ Neutral	I believe the improvement will invite more trucks for food, fuel + overnight. Not good!
c. KY338 West	☐ Yes	☐ No	☐ Neutral	
d. US25	☐ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

See comment in #5.



Kentucky
UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

Again additional truck traffic

Drivers parking in "no parking areas"
Example; currently a number of trucks
park all night in Plaza (behind Mc Donald's)
They leave trash and waste bottles behind
and idle trucks all night.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name JAMES JOTT

Address 2335 BUTTERMILK CROSSING #157, Crescent Springs, Ky. 41017

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☒	☐	northbound
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☒ To go shopping
- ☒ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☒ Yes	☐ No	☐ Neutral	
c. KY338 West	☒ Yes	☐ No	☐ Neutral	
d. US25	☒ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

Is there enough distance to switch lanes when needed





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Jeff Eichhorn : jeichhorn@hsabh.com

Address 3000 G Henkle Road Leb, OH 45036

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☒	
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☐ Daily
- ☐ 3-4 times per week
- ☒ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☐ Yes ☒ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☑ To go to place of work
- ☑ To conduct work related business
- ☐ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☑ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☑ Yes	☐ No	☐ Neutral	
b. KY338 East	☑ Yes	☐ No	☐ Neutral	
c. KY338 West	☐ Yes	☑ No	☐ Neutral	Consider Slip Ramp for Union-Frenchtown Rd
d. US25	☑ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____





INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

Consider other improvements on west including a s/o ramp & southbound to connect into Frogtown.

State already owns ROW.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name ROBIN LUTES

Address 422 FOXHUNT DR WALTON, KY

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☒	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [x] To conduct work related business
- [x] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____

- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	Those are 2 separate
b. KY338 East	☐ Yes	☐ No	☐ Neutral	issues in my mind.
c. KY338 West	☐ Yes	☐ No	☐ Neutral	I use Harrodsburg DCD
d. US25	☐ Yes	☐ No	☐ Neutral	regularly as my son lives there. The main

ISSUE I see is congestion leading ~~in to~~ the DCD.

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

Harrodsburg does not have much 18 wheeler traffic either

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

* → Not the DCD itself; just the impact to the areas & traffic leading into it.
* → Also would be helpful to address lights & turn lanes into businesses, like Snap Fitn etc.

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

I WOULD LOVE TO SEE 18 WHEELER TRAFFIC ROUTED TO THE EAST ONLY AND AVOID MIXING THEM INTO RESIDENTIAL TRAFFIC ON THE WEST OF I 75.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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3

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Dave Schneider

Address 10107 Ash Creek Dr Union, KY 41091

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☑	☐	
Truck Traffic	☑	☑	
Difficulty Entering / Exiting	☑	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [ ] To conduct work related business
- [ ] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____
- [x] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [x] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	
b. KY338 East	[ ] Yes	[ ] No	[x] Neutral	
c. KY338 West	[x] Yes	[ ] No	[ ] Neutral	
d. US25	[x] Yes	[ ] No	[ ] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

No, looks like it would work well around the heavy truck traffic.





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

phasing plans

1) traffic flow during reconstruction could be an issue.
2) trucks are the major cause of slow flow in this area.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name BILL MERRICK

Address 611 TURFRIDER CT. 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☒	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☒	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	
Other: DOES NOT HANDLE TRAFFIC VOLUME WELL			

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [x] To conduct work related business
- [x] To conduct personal business
- [ ] To go to or take kids to school
- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends
- [ ] Other (please explain): _____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	
b. KY338 East	[x] Yes	[ ] No	[ ] Neutral	
c. KY338 West	[ ] Yes	[x] No	[ ] Neutral	SHOULD RE-ROUTE FROG TWN CNNCTR TO ~~Spanish~~ PADDOCK
d. US25	[x] Yes	[ ] No	[ ] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

I LIKE IT - INGENIOUS

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

Re-Routing the FROGTOWN CNNCTR FOR TRUCKS LEAVING A PIKE (WEST) needs a solution different from business preference. It doesn't address L.T. Issue

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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Boone 6-18

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Richwood Pointe, LLC
8800 Bankers Street, Suite #3
Florence, KY 41042
859-283-2260
dcrist100@gmail.com

November 27, 2012

Robert Hans, Chief District Engineer
Kentucky Department of Highways
District 6
421 Buttermilk Pike
Covington, KY 41017

Subject: Proposed Revisions to I-75/KY 338 Interchange, Boone County

Mr. Hans:

Richwood Pointe is a commercial development consisting of 20 acres at the North end of Clay Street off of KY 338. The site is fully developed with utilities, water retention and "ready to build on".

If the proposed right-in/right-out traffic flow at Clay Street and KY 338 is done, it will make it very difficult to access this site for the thousands of residents coming from the subdivisions on the West side of the development; as well as exiting it to the East on KY 338. Therefore, we suggest a traffic light be installed at the Clay/338 intersection allowing left turns from and onto 338. (It would probably have to be synchronized with the light at 338 and Frogtown Connector Road).

If this can't be accomplished, we suggest Clay Street, Paddock Drive and the drive between The Bank of Kentucky and Richwood Shops all be upgraded to allow suitable traffic flow through them; enabling traffic to-and-from the West better ingress and egress.

We appreciate your consideration of our suggestions for this serious problem we face with the proposed revisions.

Sincerely,

Richard Crist

Richwood Pointe, LLC
Richard Crist, Member

Boone 6-18

RECEIVED DEC 0 3 2012

Richwood Shops, LLC
8800 Bankers Street, Suite #3
Florence, KY 41042
859-283-2260
dcrist100@gmail.com

November 27, 2012

Robert Hans, Chief District Engineer
Kentucky Department of Highways
District 6
421 Buttermilk Pike
Covington, KY 41017

Subject: Proposed Revisions to I-75/KY 338 Interchange, Boone County

Mr. Hans:

Richwood Shops is a retail center on Clay Street, North and adjacent to The Bank of Kentucky on KY 338. It is a very busy center with two restaurants and ten other offices and businesses.

If the proposed right-in/right-out traffic flow at Clay Street and KY 338 is done, it will make it very difficult to access this site for the thousands of residents coming from the subdivisions on the West side of the development; as well as exiting it to the East on KY 338. Therefore, we suggest a traffic light be installed at the Clay/338 intersection allowing left turns from and onto 338. (It would probably have to be synchronized with the light at 338 and Frogtown Connector Road).

If this can't be accomplished, we suggest Clay Street, Paddock Drive and the drive between The Bank of Kentucky and Richwood Shops all be upgraded to allow suitable traffic flow through them; enabling traffic to-and-from the West better ingress and egress.

I'm sure The Bank of Kentucky and McDonalds face the same problems with the present plan.

We're out of town and couldn't attend the November 29th meeting. Please enter our suggestions with the data being obtained in this matter, as it is of great importance to our businesses.

Thank you for your assistance.

Sincerely,

Debora Crist

Richwood Shops, LLC
Debora Crist, Member

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name George Hilf

Address 852 Keeneland Green Drive, Union, KY

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☐	MORNINGS ARE CONGESTED
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☒	☐	Left Turn on N-75 is difficult when traveling East from TC
Other:			

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☒ To go to place of work	☐ To go shopping
☒ To conduct work related business	☐ To go to the doctor
☒ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☐ To visit family or friends
☐ Other (please explain): _____	

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	If these plans
b. KY338 East	☒ Yes	☐ No	☐ Neutral	improve safety like
c. KY338 West	☒ Yes	☐ No	☐ Neutral	what was built in
d. US25	☒ Yes	☐ No	☐ Neutral	Lexington I am very supportive,

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

Will the DCD be difficult for infrequent travelers to understand?



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INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

I have no concerns. This seems like it was well planned.

Thank you for sharing.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name JENNIFER GULICK

Address 11018 HARRISON WAY WALTON, KY 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☒	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☒ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____

- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☒ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☐ No	☒ Neutral	
c. KY338 West	☐ Yes	☐ No	☒ Neutral	
d. US25	☐ Yes	☐ No	☒ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

NO



Kentucky
UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

1. I THINK IT'S VITALLY IMPORTANT TO ADDRESS STORMWATER ISSUES IN A SUSTAINABLE WAY. NON-TRADITIONAL, "GREEN" SOLUTIONS SHOULD BE A PRIORITY IN THE FINAL DESIGN AND NOT BE CONSIDERED "ALTERNATES". ALL MEDIANS, OPEN SPACE, MEDIANS, AND SHOULDERS SHOULD BE PART OF AN INTEGRATED, INNOVATIVE STORMWATER SYSTEM.
2. ALL LIGHTS SHOULD BE TIMED BASED ON REAL-TIME SITUATIONS. CAMERAS AND GIS DATA CAN BE MONITORED TO ALTER TIMING TO ACCOMODATE TRAFFIC.
3. SUSTAINABLE, BUT ATTRACTIVE LANDSCAPING SHOULD BE FUNDED BY THE PROJECT (MAINTENANCE PARTNERSHIPS CAN BE CREATED). THIS EXIT IS A MAJOR ENTRANCE INTO BOONE COUNTY AND SHOULD LOOK ATTRACTIVE

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name _____ Ronald Konen _____

Address _____ 11104 Paddock Dr. Walton, KY 41094-8432 _____

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☐	
Difficulty Entering (Exiting)	☒ (forgot)	☒	going East on 338 From Paddock
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☑ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☑ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☑ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☒ No	☐ Neutral	going East From Paddock IC
c. KY338 West	☐ Yes	☐ No	☐ Neutral	
d. US25	☐ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____







9. **Please discuss any general comments or concerns for the proposed improvements.**

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Lu Schuler

Address 10701 Meadow Stable Ln Warsaw

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☒	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☒ To go to place of work	☐ To go shopping
☒ To conduct work related business	☐ To go to the doctor
☒ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☐ To visit family or friends

☐ Other (please explain): _____

_____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	_____
b. KY338 East	☒ Yes	☐ No	☐ Neutral	_____
c. KY338 West	☐ Yes	☐ No	☐ Neutral	Eliminate truck stop - keep
d. US25	☒ Yes	☐ No	☐ Neutral	all truck traffic to East side I-75

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____







9. Please discuss any general comments or concerns for the proposed improvements.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name RONALD SMITH

Address 12451 HUTTON DR WALTON KY 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☑	☑	TRUCK TRAFFIC
Truck Traffic	☑	☑	TRUCKS BLOCKING ROADS AT INTER SECTIONS
Difficulty Entering / Exiting	☑	☑	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☑ To go to place of work	☐ To go shopping
☑ To conduct work related business	☐ To go to the doctor
☑ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☐ To visit family or friends

☐ Other (please explain): _____

_____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☑ Neutral	_____
b. KY338 East	☐ Yes	☐ No	☑ Neutral	_____
c. KY338 West	☐ Yes	☐ No	☑ Neutral	_____
d. US25	☑ Yes	☐ No	☐ Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

One plans shows most traffic from Frogtown Connector thru Heritage Trails. I am strongly against this plan.

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

Just Hope it keeps the truck traffic moving.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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KENTUCKY TRANSPORTATION CABINET

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Cindy Marko

Address 12371 Gaines Way
Walton, KY 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access/Egress	Side Roads & Driveways	Comments
Congestion, long delays	☑	☐	Interstate egress - Exiting to I-75 during rush hour & you're getting stuck in traffic!!
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☑	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No



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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☑ To conduct personal business
- ☐ To go to or take kids to school
- ☑ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☑ To visit family or friends
- ☐ Other (please explain): _____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☑ Yes	☐ No	☐ Neutral	
b. KY338 East	☑ Yes	☐ No	☐ Neutral	
c. KY338 West	☑ Yes	☐ No	☐ Neutral	
d. US25	☐ Yes	☐ No	☑ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?** No





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

We have lived in Richwood since 1988. When we bought Kroger's putting in a super store 20 years ago I did the traffic study. I also check the status of the road annually (usually rated D-). We welcome these improvements!

I remember the first fast food place that went in (Wendy's). My three sons were ecstatic! The other businesses went in and was dismayed that they did not have interior roads. There all too many close calls with vehicles pulling out in front of me when they don't have the right of way. Also, what's with the dog-leg entrance to the Bread + Waffle House?! How did that even get approved?!

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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KENTUCKY TRANSPORTATION CABINET

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name EUGENE PFEIFFER

Address 11103 PADLOCK DR WALTON, KY 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☒	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. **How often do you use this interchange (Check 1)?**

☒ Daily
☐ 3-4 times per week
☐ 1-2 times per week
☐ 3-4 times per month
☐ 1 time per month
☐ Never
☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☒ To go shopping
- ☒ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☒ Yes	☐ No	☐ Neutral	
c. KY338 West	☐ Yes	☒ No	☐ Neutral	
d. US25	☒ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☒ No THE PRESENTER CITED THE I75–TURFWAY ROAD INTERCHANGE AS A WELL USED EXAMPLE, IF THIS BE SO THEN IT SHOULD BE A TRENT TO WATCH EXITING TO FIND FOOD AND RE-ENTER THE HIGHWAY.

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No HOW THEY CAN ACCESS BUSINESSES AND RE-ENTER IS ANOTHER MATTER

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

THE USE OF FROGTOWN CONNECTOR AND PADDOCK OR A ENTRY/EXIT FOR LOCAL BUSINESSES WILL CREATE CHOKE POINTS YOU MUST DEAL WITH.



9. Please discuss any general comments or concerns for the proposed improvements.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Rich O'Toole

Address 11229 Frontage Rd. Walton, Ky 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☑	
Truck Traffic	☑	☑	
Difficulty Entering / Exiting	☑	☑	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: I am the GM at the Pilot TRAVEL Center on the Westside of I-75. My concerns surround the Access And egress for my customers

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☐ Yes ☑ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☒ To go to place of work
- ☒ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	A light at Frogtown
b. KY338 East	☒ Yes	☐ No	☐ Neutral	Connector is critical
c. KY338 West	☒ Yes	☐ No	☐ Neutral	Left turn from Frogtown
d. US25	☒ Yes	☐ No	☐ Neutral	Connector to 338 Also critical

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☐ Yes ☐ No ?

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____



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9. Please discuss any general comments or concerns for the proposed improvements.

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421 Buttermilk Pike
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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name John Hart

Address 11938 Decker Lane, Walton, KY 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☐	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☒ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☒ Yes	☐ No	☐ Neutral	
c. KY338 West	☐ Yes	☒ No	☐ Neutral	
d. US25	☒ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

See attached comments





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

See attached comments

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
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Comments for:

I-71/75 @ KY 338 (Richwood Road) Interchange Reconstruction

Public Meeting – November 29, 2012

1. Inspect and evaluate the existing drainage structure under Richwood Road at the 5/ 3 Bank. The last modification to this structure was done concurrently with the development of Triple Crown subdivision and is probably 20 + years old.

2. Inspect and evaluate the stability of Richwood Road from the 5/3 Bank to the end of the project prior to the completion of plans and specifications. Last year during the installation of the traffic signal and guardrail near or at the Steeple Chase and Triple Crown subdivisions, sections of Richwood Rd failed on the northern slope of the roadway.

3. During the final design, evaluate any increase in runoff by reason of the project to the western portion of the stream along Richwood Rd to Mudlick Creek. At the Mudlick Creek intersection, adjacent to Chambers Road, evaluate any backwater effect caused by the runoff from the project. Sections of Chambers Road are known to flood and even a temporary damming or backwater effect will cause additional flooding along Chambers Rd.

4. Timely completion of the DCD is critical for Richwood residents and industry. Accordingly consider requiring the Contractor to prepare and manage his work with a Network Analysis Schedule. Careful monthly monitoring of this schedule and the Contractor's performance will allow the Transportation Dept to effectively manage the project for timely completion of the work. It is imperative that construction completion is not prolonged as it was at the intersection of US 42 and Pleasant Road project

5. Because timely project completion is paramount and this is a relatively new type of intersection for Kentucky, consider the use of "Best Value Contracting" for the selection of the Contractor rather than just the low bid. Briefly, in best value contracting, the price along with the capability, experience, management capability, and other desired factors of the contractor is evaluated for project success and the project may or may not go the low bidder. Again, the contractor should pursue the work to the end and not be absent from the site as was the case at US 42 and Pleasant Valley Road project.

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Pat Sweeney

Address 883 Catlett Dr. Crittenden Ky 41030

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☒	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☒	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☐ Daily
- ☒ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☐ Yes ☒ No

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [x] To conduct work related business
- [x] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____

- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	
b. KY338 East	[x] Yes	[ ] No	[ ] Neutral	
c. KY338 West	[x] Yes	[ ] No	[ ] Neutral	
d. US25	[x] Yes	[ ] No	[ ] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

N/A

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

N/A

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Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name The Bank of Kentucky Richwood Branch By Donald Bahr, E.V.P.

Address 320 Richwood Rd, Walton, KY 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: The Bank of Kentucky and myself do not have any issues with the current configuration & surrounding roadway except for issue of east bound traffic on KY 338 not being able to turn left to Clay Drive.

2. **How often do you use this interchange (Check 1)?**

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☑ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☑ To go to place of work
- ☑ To conduct work related business
- ☐ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☑ To go shopping
- ☑ To go to the doctor
- ☑ To take trips or vacations
- ☑ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☑ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☑ No	☐ Neutral	The access to Clay Drive is being eliminated for cars going east on KY338.
c. KY338 West	☑ Yes	☐ No	☐ Neutral	
d. US25	☑ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

No



Kentucky
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INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

The issue The Bank of Kentucky has with the changes being proposed for KY 338 is that cars going east will not be able to make a left Turns to Clay Drive. The ingress/egress to Clay Drive off of KY338 in the proposals we have seen will only allow right in and right out. The only way to our branch bank is off of Clay Drive. According to what is being proposed in order for traffic to get to our branch bank, cars will either have to Turn left on Paddock at the Frogtown Connector and then take the road that runs behind our branch and McDonald's to access Clay Drive. Both of these options create an inconvenience for our customers when compared to today's traffic flow. The concern with the proposed traffic flow is that approximately 75% of our customers from the west side of our branch and travel east on KY 338 to do their banking with us. A solution to the problem described above would be to eliminate the median strip on KY 338 in front of Clay Drive so that traffic going east on KY 338 can continue to turn left to Clay Drive.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Dan Childers (Home) Louisville Trust Co

Address 1687 Walter Madison Walton Ky 13005 Frostown Connector Walton Ky

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☑	
Difficulty Entering / Exiting	☐	☑	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☑ To go to place of work
- ☐ To conduct work related business
- ☐ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____

- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☑ Yes	☐ No	☐ Neutral	
b. KY338 East	☑ Yes	☐ No	☐ Neutral	
c. KY338 West	☑ Yes	☐ No	☐ Neutral	
d. US25	☑ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

_____

_____





INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

Although unlikely would a dedicated truck only CD ramp for SB 75 be feasible? See attached

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
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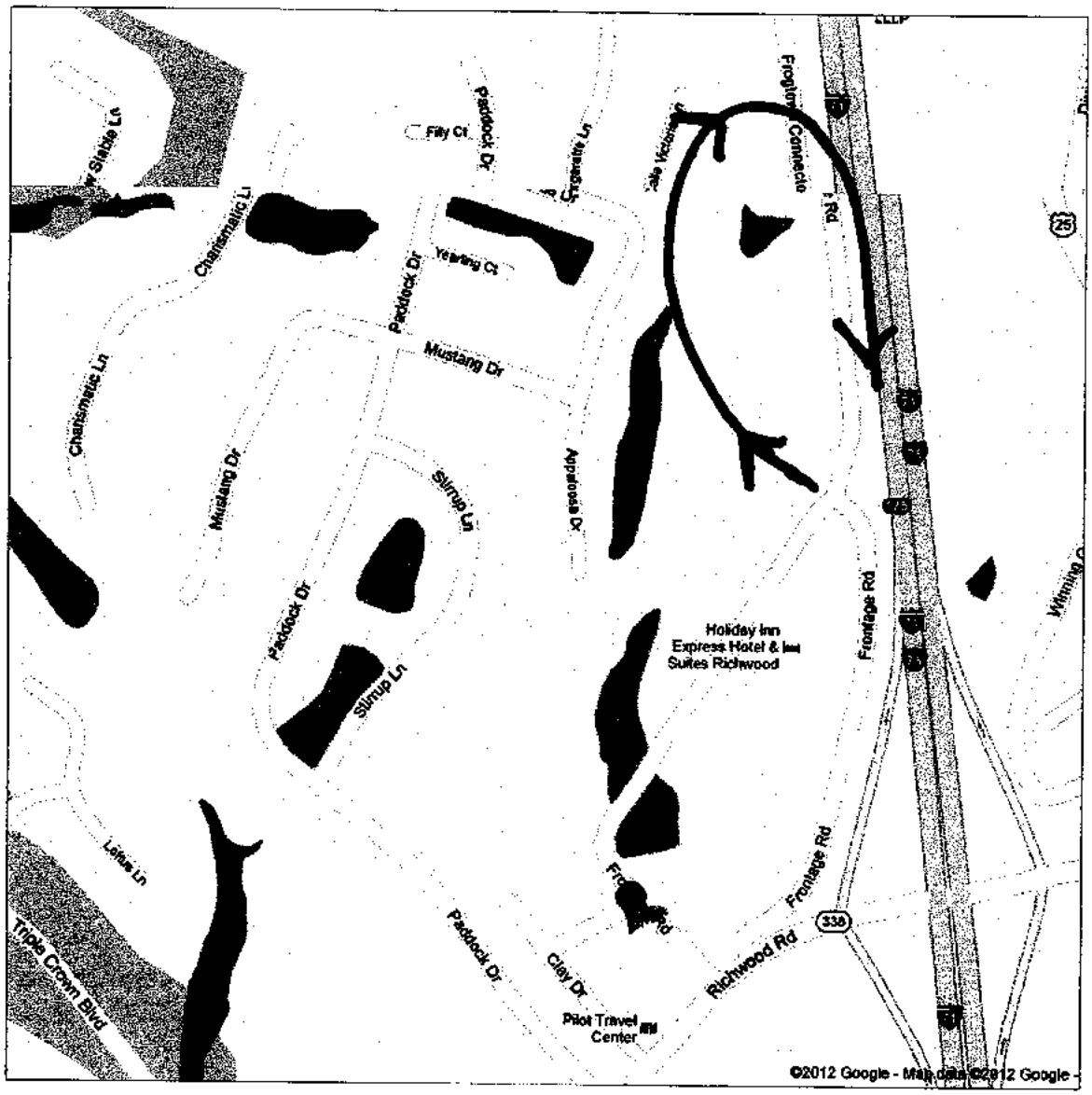
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Google

Address **13005 Frogtown Connector Rd**
Walton, KY 41094

Get Google Maps on your phone
Text the word "GMAPS" to 466453



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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Patricia Hester

Address 11705 Schmidt Lane Richwood, Ky 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☑	5th/3rd bank exit on Richwood Rd
Truck Traffic	☑	☑	close truckstop West of
Difficulty Entering / Exiting	☐	☑	5th/3rd bank exit on I-75
Sight Distance (cite where)	☐	☐	Richwood Rd
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [ ] To conduct work related business
- [x] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____
- [x] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	
b. KY338 East	[x] Yes	[ ] No	[ ] Neutral	
c. KY338 West	[ ] Yes	[x] No	[ ] Neutral	See #9
d. US25	[x] Yes	[ ] No	[ ] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

NO



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INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

No truckstop was supposed to be west of I-75/71. If you closed the truckstop, all truck traffic and congestion would stay east of interstate.

the Richwood Road entrance to 5th/3rd Bank needs to be closed. Too many cars entering and/or exiting causing accidents and congestion.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Roger A. Wilson

Address 1043 Hicks Pike, Walton Ky 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☐	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☒	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	Too many Truck Stops

Other: Waffle House, Pilot and that section is difficult to get in and out of for business.

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other_____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☒ To go shopping
- ☐ To conduct work related business
- ☐ To go to the doctor
- ☒ To conduct personal business
- ☐ To take trips or vacations
- ☐ To go to or take kids to school
- ☐ To visit family or friends
- ☒ Other (please explain): Only path to interstate 75 from my house.

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	The West (Pilot) Truck Stop needs an incentive to move To the Eastside of I-75 on US 25. This would open up Traffic through Richwood.
b. KY338 East	☒ Yes	☐ No	☐ Neutral	
c. KY338 West	☐ Yes	☒ No	☐ Neutral	
d. US25	☐ Yes	☐ No	☒ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?** No!
I believe The Triple Crown community maybe interested in helping with incentive for all Truck Stops To move To the Eastside of I-75, just a thought!

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

I believe that with the right incentives, the Truck Stops would relocate to a better Location. Maybe a Tax incentive would be interesting to the Pilot on the westside of I-75. The other issue was, there was no side street to access the three business on the southside of 338 Rt. I did see that was going to be added.

Thanks for Listening.
Tayce Callan

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name David T. Adams

Address 10819 Sawgrass Court Union KY 41091

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☒	
Difficulty Entering / Exiting	☒	☒	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☐ To go to place of work	☒ To go shopping
☐ To conduct work related business	☐ To go to the doctor
☐ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☒ To visit family or friends

☒ Other (please explain): To Go to Church

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	
b. KY338 East	☒ Yes	☐ No	☐ Neutral	
c. KY338 West	☒ Yes	☐ No	☐ Neutral	
d. US25	☒ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

NONE



9. Please discuss any general comments or concerns for the proposed improvements.

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Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Raymond Riska, McDonald's Corporation

Address 2 Easton Oval, Suite 200, Columbus OH 43219

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: None

2. How often do you use this interchange (Check 1)?

- ☐ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☒ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other

3. Do you use this interchange to access your residence?

☐ Yes ☒ No

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☐ To go to place of work	☐ To go shopping
☒ To conduct work related business	☐ To go to the doctor
☐ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☐ To visit family or friends

☐ Other (please explain): _____

_____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	_____
b. KY338 East	☐ Yes	☐ No	☐ Neutral	_____
c. KY338 West	☐ Yes	☐ No	☐ Neutral	_____
d. US25	☐ Yes	☐ No	☐ Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

Yes, Access to and from eastbound traffic on Richwood Drive will become confusing.

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

McDonald's concern is access from and to eastbound traffic on Richwood Drive. The right in / right out access at Clay Drive eliminates an intuitive and easy return to eastbound Richwood Rd. An addition of a dedicated road between Clay Drive and Paddock Drive located to the North of the Bank of Ky property could provide the McDonald's customer easy access to eastbound Richwood Rd.

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name DENNIS G. DAVIS (ALSO MANAGER OF

Address 357 Richwood Road 351 Richwood Rd. PROPERTY)

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☑	☐	TRAFFIC SIGNALS NOT SYNCHRONIZED
Truck Traffic	☑	☐	Should be restricted ON WEST SIDE !
Difficulty Entering / Exiting	☐	☑	MY DRIVE WAY CANNOT BE RIGHT TURN ONLY !!
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: SINCE There ARE 2 TRUCK STOPS ON the EAST SIDE OF I71/75 (INCLUDING ANOTHER PILOT) THE PILOT ON The WEST SIDE Should BE restricted TO CARS ONLY !

2. How often do you use this interchange (Check 1)?

- ☑ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☑ Yes ☐ No

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [ ] To conduct work related business
- [ ] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____
- [x] To go shopping
- [x] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	
b. KY338 East	[ ] Yes	[ ] No	[x] Neutral	
c. KY338 West	[ ] Yes	[x] No	[ ] Neutral	SEE # 9
d. US25	[ ] Yes	[ ] No	[x] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

SINCE MT ZION WAS GREATLY IMPROVED RECENTLY, THE RICHWOOD CROSSOVER SHOULD BE DONE BEFORE MT ZIONS CROSSOVER.





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

It appeared on the overhead maps that there is a concrete island west of Paddock on Richwood Road. This cannot be allowed to happen. It restricts private driveways from turning left to travel west on Richwood Road. Also Boone County Planning and Zoning has already approved a "commercial" curb cut between 357 and 377 Richwood. This access was approved as full turns after Richwood Road was improved to 3 lanes and a signal was installed at Grand National and Triple Crown Blvd, both of which have been completed.

Also I will insist on a retaining wall along my property so I can properly mow my property. I was mis-lead by the County to believe I could mow the steep incline. I cannot!

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Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Grant Groen

Address 10063 Dixie Hwy Florence, KY 41042

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☑	My concern is our customers exiting our McDonald's restaurant. With the new median being put in, in front of our restaurant, customers wont be able to turn left out.
Truck Traffic	☐	☑	
Difficulty Entering / Exiting	☐	☑	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	
Other:			

2. How often do you use this interchange (Check 1)?

- ☐ Daily
- ☑ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other

3. Do you use this interchange to access your residence?

☐ Yes ☑ No

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☑ To go to place of work
- ☑ To conduct work related business
- ☐ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☑ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☐ No	☑ Neutral	
c. KY338 West	☐ Yes	☐ No	☑ Neutral	
d. US25	☑ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☑ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

No, again my only concern is customers being able to exit our parking lot in a safe, timely manner



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INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

I hope that you will reconsider alternatives to the median being placed in front of our restaurant. We generate alot of traffic at this McDonald's location, and I fear this proposal makes it extremely inconvenient for our customers to exit the restaurant and drive towards the highway.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Emily Hodges & Jeremey Hodges

Address 3482 Hwy 177 W Demossville Ky 41033

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☐	
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☒	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☐ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☒ 1 time per month; rarely
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☐ Yes ☒ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☐ To go to place of work	☐ To go shopping
☐ To conduct work related business	☐ To go to the doctor
☐ To conduct personal business	☒ To take trips or vacations
☐ To go to or take kids to school	☐ To visit family or friends

☐ Other (please explain): _____

_____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	_____
b. KY338 East	☐ Yes	☐ No	☐ Neutral	_____
c. KY338 West	☐ Yes	☐ No	☐ Neutral	_____
d. US25	☐ Yes	☐ No	☐ Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☒ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

It seems more dangerous only because people do not know how to treat it.



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INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

I came only for a class at NKU. How will it affect people that don't use this highway, don't live around here or are visiting nearby? How will it affect roads that flow into it?

I just wanted more info.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name PAUL VERST - VERST GROUP LOGISTICS

Address _____

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☒	
Truck Traffic	☒	☒	
Difficulty Entering / Exiting	☒	☒	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☒	☒	

Other: _____

_____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☐ Yes ☒ No

KENTUCKY TRANSPORTATION CABINET

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4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [x] To conduct work related business
- [ ] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____

_____

- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	_____
b. KY338 East	[x] Yes	[ ] No	[ ] Neutral	_____
c. KY338 West	[x] Yes	[ ] No	[ ] Neutral	_____
d. US25	[x] Yes	[ ] No	[ ] Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

- [x] Yes
- [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

- [ ] Yes
- [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

WISH WE COULD MOVE TIMETABLE UP. CONGESTION GETS WORSE AS MORE BUSINESSES AND RESIDENCES MOVE IN.





INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

WOULD LIKE A BETTER OR FURTHER DIALOG ON THE BY-PASS CONNECTOR ROAD LEADING INTO THE RICHWOOD INDUSTRIAL PARK AND THE POTENTIAL IMPACT ON BUSINESES; ANY RELOCATIONS REQUIRED OR DISPLACEMENTS

PAUL VERST

859-379-1201

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Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
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Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name G. A. Foltz

Address 12363 Gaines Way
Walton, KY 41094-9350

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☐	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	
Other: Delays + Left turns			

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

☐ To go to place of work	☒ To go shopping
☐ To conduct work related business	☒ To go to the doctor
☒ To conduct personal business	☐ To take trips or vacations
☐ To go to or take kids to school	☒ To visit family or friends

☐ Other (please explain): _____

_____

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☒ Yes	☐ No	☐ Neutral	_____
b. KY338 East	☒ Yes	☐ No	☐ Neutral	_____
c. KY338 West	☒ Yes	☐ No	☐ Neutral	_____
d. US25	☒ Yes	☐ No	☐ Neutral	_____

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☐ No [redacted] ?

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

No

_____



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9. **Please discuss any general comments or concerns for the proposed improvements.**

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Cathryn Cornett and James Walker

Address 538 Savannah Dr Walton Ky 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☐	Trucks turning I75 N from 338 W do not yeild to cars turning I 75 N from 338 E.
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

_____

2. **How often do you use this interchange (Check 1)?**

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [ ] To conduct work related business
- [ ] To conduct personal business
- [ ] To go to or take kids to school
- [x] Other (please explain): To go anywhere! I live 1 mile from the interchange. 99% of our household travel involves the 338/I-75 interchange.
- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [ ] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	[x] Yes	[ ] No	[ ] Neutral	It works for Circle 4 and Ky 68 in Lexington.
b. KY338 East	[x] Yes	[ ] No	[ ] Neutral	
c. KY338 West	[x] Yes	[ ] No	[ ] Neutral	
d. US25	[ ] Yes	[ ] No	[x] Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

[x] Yes [ ] No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

① Access and traffic patterns / delays during work commute times while the construction is ongoing

② Timing of traffic signals to prevent delays on ky 338 after construction.





INTERSTATE 75 crossover interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

- We use the double Crossover diamond in Fayette County and it works well.
- Extend the ~~two~~ ~~lanes~~ lanes on 338W until Sutherland Rd. At that point, use one lane as left turn only and have only one lane continue west.
- Ease of access to the interchange along 338 during and after construction is paramount. A malfunction at the Triple Crown light caused a one mile trip to take approximately 20 minutes in order to gain highway access. The lack of services along 338 (grocery, doctor, etc) means our residents must use the highway entrances during construction. Three years of access delays during construction will be unacceptable.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name CAROLYN JUETT

Address 11519 FRINGE TREE DR WALTON, KY 41094

1. **What are your issues associated with the existing interchange and the surrounding roadways?**

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	OUR ONE ISSUE IS THE LARGE
Truck Traffic	☐	☒	NUMBER OF TRUCKS THAT
Difficulty Entering / Exiting	☐	☐	USE RICHWOOD ROAD BETWEEN
Sight Distance (cite where)	☐	☐	US 42 AND THE INTERSTATE.
Roadway Geometry (cite where)	☐	☐	MORE TO THE ISSUE THEIR

Other: SPEED AND HOGGING OF RICHWOOD WITH NO REGARD TO ON COMING TRAFFIC

2. **How often do you use this interchange (Check 1)?**

- ☐ Daily
- ☒ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other_____

3. **Do you use this interchange to access your residence?**

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT



4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☒ To conduct personal business
- ☐ To go to or take kids to school
- ☐ Other (please explain): _____
- ☒ To go shopping
- ☒ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☐ No	☐ Neutral	LAST PAGE
c. KY338 West	☐ Yes	☐ No	☐ Neutral	
d. US25	☒ Yes	☐ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

MY CONCERN IS THAT THE INTERCHANGE IS BETTER SUITED FOR CAR TRAFFIC THAN CAR & TRUCK TRAFFIC



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INTERSTATE crossover 75 interchanges

9. Please discuss any general comments or concerns for the proposed improvements.

A FEW DAYS AGO I WAS EXITING I71/75 S AT KY338 TO GO WEST. AT THE SAME TIME, 4 SEMIS EXITED, ALL TURNING LEFT TO GO EAST ON KY 338. WITH THE NEW PROPOSED INTERSECTION, I JUST CANNOT SEE HOW THEY WILL BE ABLE TO MOVE OVER AND NOT INTERFERE WITH THOSE VEHICLES WANTING TO GET ON I71/75 N.

ALTHOUGH THE PILOT ON THE WEST SIDE OF THE INTERSECTION RECEIVES ALOT OF TRUCK TRAFFIC, THE VAST MAJORITY OF THE TRUCK TRAFFIC GOES TO THE EAST AND IT IS NOT UNUSUAL TO HAVE A LINE OF 4 OR 5 SEMIS, I JUST HAVE TROUBLE BELIEVING THIS MASS OF TRUCKS WILL BE ABLE TO SMOOTHLY MOVE THROUGH THIS "TYPE" OF INTERCHANGE WITH THE CARS.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

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www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Mr. & Mrs. W. C. Simpkinson

Address 12721 Huey Ln, Walton, KY 41094 ★

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	Less semi Traffic from 338.
Truck Traffic	☒	☒	Construct 2 Lane exit Ramp
Difficulty Entering / Exiting	☐	☐	from/off I 75 exit Leves To the
Sight Distance (cite where)	☐	☐	Connector Road for Semi's To
Roadway Geometry (cite where)	☐	☐	pilot & T/A. This will

Other: Eliminate the expence of O."pcs.

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☐ To conduct work related business
- ☐ To conduct personal business
- ☐ To go to or take kids to school
- ☒ Other (please explain): I use this every time I leave home
- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☒ No	☐ Neutral	
b. KY338 East	☐ Yes	☒ No	☐ Neutral	
c. KY338 West	☐ Yes	☒ No	☐ Neutral	
d. US25	☐ Yes	☒ No	☐ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☒ No

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

My recommendations would be much less costly & completed much sooner. The "DCD" is much to expensive in cost & Time

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

Construct Longer off Ramps for Richwood & Mt. Zion
forget the DCD
Construct semi Lanes for off Ramps & bew semis from 338

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

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INTERSTATE 75 crossover interchanges

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name Dave & Sue Hill

Address 11919 Oxford Hills Dr. Walton 41094

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☒	☐	occasionally experience long delays
Truck Traffic	☒	☒	Trucks sometimes come down to Chambers & have to turn around & they realize they're going the wrong way
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: _____

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- [x] To go to place of work
- [x] To conduct work related business
- [ ] To conduct personal business
- [ ] To go to or take kids to school
- [ ] Other (please explain): _____
- [ ] To go shopping
- [ ] To go to the doctor
- [ ] To take trips or vacations
- [x] To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☐ Neutral	
b. KY338 East	☐ Yes	☐ No	☐ Neutral	
c. KY338 West	☐ Yes	☐ No	☐ Neutral	
d. US25	☐ Yes	☐ No	☐ Neutral	Never seen a problem at 25 & 338

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☒ Yes ☐ No But missed the presentation - looked at pictures etc. Will go to web for more information.

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☐ Yes ☐ No Did not see it -

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

How will access be handled during construction?
How quickly will it be completed, once work is started?
When will you post signs alerting us to closures etc?

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

See previous question –

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

Kentucky UNBRIDLED SPIRIT

RECEIVED JAN 8 2013

Survey Questionnaire

I-71/75 @ KY338 (Richwood Road) Interchange Reconstruction

Item No 6-18.00
Public Meeting – November 29, 2012

Name _____

Address _____

1. What are your issues associated with the existing interchange and the surrounding roadways?

	Interstate Access	Side Roads & Driveways	Comments
Congestion, long delays	☐	☐	
Truck Traffic	☒	☐	
Difficulty Entering / Exiting	☐	☐	
Sight Distance (cite where)	☐	☐	
Roadway Geometry (cite where)	☐	☐	

Other: CONTINUED GROWTH OF AREA (HOMES) THAT CANNOT BE SUPPORTED BY INFRASTRUCTURE & DISTRIBUTION CENTERS ON US 25 INCREASING TRUCK TRAFFIC ALREADY SLOWED BY TRUCK STOPS ON 338.

2. How often do you use this interchange (Check 1)?

- ☒ Daily
- ☐ 3-4 times per week
- ☐ 1-2 times per week
- ☐ 3-4 times per month
- ☐ 1 time per month
- ☐ Never
- ☐ Other _____

3. Do you use this interchange to access your residence?

☒ Yes ☐ No

INTERSTATE 75 crossover interchanges

4. **If you use this interchange now, what are the 3 primary purposes of your trips (Check 3)?**

- ☐ To go to place of work
- ☒ To conduct work related business
- ☐ To conduct personal business
- ☒ To go to or take kids to school
- ☒ Other (please explain): To Go ANYWHERE UNLESS I-75 or I-71 BACKED UP

- ☐ To go shopping
- ☐ To go to the doctor
- ☐ To take trips or vacations
- ☐ To visit family or friends

5. **Do you believe the alternatives presented address the congestion and safety issues associated with:**

				Comments
a. Interchange	☐ Yes	☐ No	☒ Neutral	SPACE BETWEEN LIGHTS (ADD 1)
b. KY338 East	☐ Yes	☒ No	☐ Neutral	TRUCK STOP
c. KY338 West	☐ Yes	☐ No	☒ Neutral	
d. US25	☐ Yes	☐ No	☒ Neutral	

6. **Has sufficient information been provided to assist you with understanding the operational and safety benefits of the Double Crossover Diamond Interchange?**

☐ Yes ☒ NOT REALLY → 338 IS UNIQUE COMPARED TO OTHERS WHICH WAS MOSTLY CARS. SHOW EXAMPLES WHERE 10% OF TRAFFIC ARE TRUCKS

7. **Was the Learning Video helpful in illustrating how to navigate through the Double Crossover Diamond Interchange?**

☒ Yes ☐ No

8. **Do you have any issues/concerns/comments regarding the proposed Double Crossover Diamond Interchange?**

SPACE BETWEEN LIGHTS COULD BACK UP RESIDENTIAL STREETS

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

INTERSTATE 75 crossover interchanges

9. **Please discuss any general comments or concerns for the proposed improvements.**

IT WOULD CHANGE DAILY DRIVE ROUTINE OF GETTING COFFEE AT LOCAL BUSINESS BECAUSE OF ACCESS AND BACK-TRACKING (TRAVELING FROM TOWNE BLVD TO I-75). WOULD MOST LIKELY SHOP OTHER AREAS FOR FOOD. BUSINESS OWNERS CURRENTLY HAVE LIMITED TIME IN AREA & THIS COULD MAKE WORSE FOR THEM. BUY OUT THE PILOT TO IMPROVE PROPOSAL, WHICH WOULD MAKE IT EASIER FOR TAXPAYERS THAT UTILIZE THESE ROADS SEVERAL TIMES DAILY VS. TRUCKS THAT MAY STOP WEEKLY OR MONTHLY - AS THEY HAVE OTHER OPTIONS.

Comment forms will be accepted tonight at the meeting or at the address listed below until December 14, 2012.

Carol Callan-Ramler, P.E.
Kentucky Transportation Cabinet, District 6
421 Buttermilk Pike
Covington, KY 41017
(859)-341-2707 x272

If you wish to review the exhibits presented at this meeting or view other documents and information please visit the project website at:

www.75crossings.com

Thank You For Your Participation

KENTUCKY TRANSPORTATION CABINET

Kentucky UNBRIDLED SPIRIT

Version 1.0
June 14, 2011
6-18.00

KYTC Historic Architectural Investigation Form

KYTC Item No: 6-18.00 County: Boone
Route: Richwood Rd & I75/I71 Project Description: Richwood Rd & I75/71 Improvement Project between US 25 and Paddock Avenue

Project Type listed in Attachment 1 (in Section 106 Programmatic Agreement)?

☐ Yes

☑ No (Continue)

Project Type listed in Attachment 2 (in Section 106 Handbook)?

☑ Yes (List project activity types) #9 Modernization of a Hwy

☐ No (This project is not considered a small scale project under the Section 106 Programmatic Agreement. This checklist cannot be used. Process with full baseline or joint memorandum)

☐ No (However, SHPO has agreed that this project may be documented using the Historic Architectural Investigation Form)

Project Area of Potential Effect is defined as:

☑ Within 150 feet of project centerline (Small Scale Project - within existing corridor)

☐ Within view shed of project (Discuss): _____

☐ Other (Discuss): _____

Are there Historical Resources within the project APE (per KHC database)?

☑ Yes

☐ No

☐ N/A (Explain):

Are there Historical Resources (50 years old or older) identified within the project APE based on field investigations?

☑ Yes

☐ No

Date of Field Investigation: December 2012

Investigator Name(s): Rebecca Horn Turner

Discuss Basis for finding (Historic Mapping, PVA, Building Permit, Date of Construction, Deed/Title, etc.):
CH Survey 6-351.00 Boone Co for US 25.

NRHP listed or potentially eligible sites/districts (> 50 years old) are:

☑ Present within the APE (Continue)

Sections below to be completed by KYTC Architectural Historian

---

Discuss eligibility determinations (criteria, integrity):
Site 9 in a Cultural Historic Survey of the Proposed Reconstruction and Widening of US 25 from KY 338 to KY 1829 in Boone Co. determined eligible by SHPO in a letter dated March 14, 2003. No other sites have been identified within the project area.

Determination of Effect (when eligible sites have been identified):

☐ No Historic Properties Affected

☑ No Adverse Effect (May result in Section 4(f) *De minimis* finding – Document appropriately)

☐ Adverse Effect

Discuss No Effect/No Adverse Effect Determination:

The 6-18.00 project will require a small taking from within the NR boundaries of Site 9. The taking will not diminish the intergrity of the structure. Therefore a recommended No Adverse/De Minimus is appropriate.

☐ No Historic Properties

☑ No Adverse Effect to Historic Properties

As Determined By:

Rebecca W. Turner — 12/10/12
KYTC HISTORIAN — **Date**

[signature] — 1-16-13
SHPO Representative — **Date**

[signature] — 1/14/13
~~**FHWA AREA ENGINEER**~~ — **Date**

Attachments: Recommended by: Bernadette Dupont 1/14/13

☑ Map Showing APE and identified Historic Resources

☑ Individual Site Maps

☑ Photographs

☑ Project Plans

☐ KHC Site Survey Forms

☐ Other (Describe): _____

☐ Copy EPM

☐ Copy DEC

☐ Copy DEA Architectural Historian

☐ Copy FHWA (w/De minimis Memo if appropriate)

☐ Copy SHPO

U.S. Department
of Transportation
Federal Highway Administration

Kentucky Division Office
Sepulveda, Division Administrator

Vest Broadway
kfort, KY 40601
502) 223-6720
(502) 223-6735

December 10, 2012

Lindy Casebier, Interim Executive Director
And State Historic Preservation Office
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601

Subject: *De Minimis* Determination
I75/71 and Richwood Road Improvement Project between US 25 and Paddock Ave.
Boone County, Kentucky
KYTC Item No. 6-18.00

Dear Mr. Dennen:

After review of the information provided to us by KYTC, it appears that the project will be taking a small portion from within the National Register of Historic Places eligible property at the corner of US 25 and Richwood Road to be used in the above-mentioned improvement project. Because the minimal impacts associated with the proposed roadway will not adversely affect the activities, features, and attributes that qualify the resource for protection under section 4(f), FHWA is making a No Adverse Effect Determination for this project. We are asking that you concur with our determination of No Adverse Effect and that the *de minimis* rule be applied.

If you have any questions, please contact me at your convenience.

Anthony Goodman
Environmental Specialist
Federal Highway Administration

Lindy Casebier
Interim Executive Director
Kentucky Heritage Council
State Historic Preservation Office





From: Phil_DeGarmo@fws.gov
Sent: Friday, March 23, 2012 2:18 PM
To: Seth Bishop
Subject: Re: KY 338 Reconstruction Project at 1-71/75, Boone Co., KY

Seth,

Thank you for the follow up. Please use the species list as proposed below.

Sincerely,

Phil DeGarmo
USFWS- Frankfort, KY Field Office
330 W. Broadway, Rm 265
Frankfort, KY 40601

502-695-0468 ext. 110 (office)
502-229-8830 (cell)
502-695-1024 (fax)
Phil_DeGarmo@fws.gov
"Seth Bishop" <sbishop@redwingeco.com>

"Seth Bishop" **<sbishop@redwingeco.com>**
03/19/2012 09:39 AM

To<phil_degarmo@fws.gov>
cc
SubjectKY 338 Reconstruction Project at 1-71/75, Boone Co., KY

Phil,

Redwing is doing the ecological assessment for the KY Transportation Cabinet's KY 338 Reconstruction Project at 1-71/75 in Boone County, Kentucky. As part of the agency coordination portion of this assessment, we submitted a letter (see attachment) to your office on February 6 requesting information on federally-threatened and endangered species and their critical habitat that may occur with the study area for the proposed project. We also obtained a list of the federally-protected species that are known to occur or have the potential to occur in Boone County from your office's website. I wanted to follow up with you and see if the USFWS wants to provide any species lists, comments, or concerns about the project. Or, would you prefer that we use the species list from your website to address federally-protected species that may occur within the project study area?

Please let me know how the USFWS would like to proceed. Feel free to contact me if you have any questions or need additional information.

Thanks,

Seth

Seth Bishop
Staff Ecologist
Redwing Ecological Services, Inc.
1139 South Fourth St.
Louisville, KY 40203

Phone: (502) 625-3009
Fax: (502) 625-3077
Cell: (502) 330-6881

[attachment "USFWS Request.pdf" deleted by Phil DeGarmo/R4/FWS/DOI]

KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES
TOURISM, ARTS, AND HERITAGE CABINET

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
Fax (502) 564-0506
fw.ky.gov

Marcheta Sparrow
Secretary

Dr. Jonathan W. Gassett
Commissioner

13 February 2012

Seth R. Bishop
Staff Ecologist
Redwing Ecological Services, Inc.
1139 South Fourth Street
Louisville, KY 40203

RE: Request for Information
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076
KYTC Item No. 6-18.00

Dear Mr. Bishop:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information regarding the subject project. The Kentucky Fish and Wildlife Information System indicates no federally-threatened/endangered species are known to occur within close proximity to the project site. The state-listed Henslow's Sparrow is known to occur within the project boundary. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

It appears that the proposed project has the potential to impact wetland habitats. The KDFWR recommends that you look at the appropriate US Department of Interior National Wetland Inventory Map (NWI) and the appropriate county soil surveys to determine where the proposed project may impact wetlands. Additionally, field verification may be needed to determine the extent and quality of wetland habitats within the project area. Any planning should include measures designed to eliminate and/or reduce impacts to wetland habitats. If impacts cannot be avoided, mitigation should be properly designed and proposed to offset the losses. KDFWR will recommend, at a minimum, a 2:1 mitigation ratio for any permanent loss or degradation of wetland habitats.

To minimize indirect impacts to aquatic resources, strict erosion control measures should be developed and implemented prior to construction to minimize siltation into streams and storm water drainage systems located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

I hope this information is helpful to you, and if you have questions or require additional information, please call me at (502) 564-7109 extension 4453.

Sincerely,

Dan Stoelb
Wildlife Biologist

Cc: Environmental Section File

Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

Donald S. Dott, Jr.
Director

Commonwealth of Kentucky
Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, Kentucky 40601-1403
502-573-2886 Voice
502-573-2355 Fax

January 30, 2012

Redwing Ecological Services
1139 South Fourth Street
Louisville, KY 40203

Data Request 12-069

Dear Mr. Bishop:

This letter is in response to your data request of January 25, 2012 for the KY 338 Reconstruction Project at I-71/75 project. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Kentucky State Nature Preserves Commission occur near the project area on the Union and Independence USGS Quadrangles, as shown on the map provided. Please see the attached reports for more information, which reflect analysis of the project area with three buffers applied:

1-mile for all records – 2 records
5-mile for aquatic records – 1 record
5-mile for federally listed species – 4 records
10-mile for mammals and birds – 10 records

Trifolium stoloniferum (Running buffalo clover, federally endangered, KSNPC threatened) is known to occur within five miles of the project area. This plant grows in mesic soils that receive filtered light. It is recommended that a thorough search be conducted by a qualified biologist in the months of May through July if suitable habitat will be disturbed. The optimal time to search is in May, during its flowering period. Areas to search include stream banks, bars, and terraces, footpaths, dirt roads, and grazed bottomlands.

Ammodramus henslowii (Henslow's Sparrow, KSNPC special concern, federal species of management concern) is associated with fallow hayfields, ungrazed pastures with scattered small trees and tall weeds, grassland, and brushland.

Passerculus sandwichensis (Savannah Sparrow, KSNPC special concern) can be found in

sparsely vegetated grasslands such as pastures.

Thyromanes bewickii (Bewick's Wren, KSNPC special concern, federal species of management concern) can be found in brushy areas, thickets, scrub in open country, open and riparian woodlands, and in country towns and farms.

Tyto alba (Barn Owl, KSNPC special concern) can be found in hollow trees, old buildings, barns, silos and other abandoned structures. Before demolition of existing structures, it should be determined that these birds are not present.

Myotis sodalis (Indiana myotis, federally listed endangered, KSNPC endangered) has been reported within five miles of the project area. This record is not based on a visual observation but from an Anabat call. A thorough survey for this species should be conducted by a qualified biologist if suitable habitat will be disturbed. The survey should include a search for potential roost and winter sites, and a mistnetting census at numerous points within the proposed corridor, particularly in preferred summer habitat. Summer foraging habitats include upland forests, bottomland forests and riparian corridors. Suitable roost and winter sites include sandstone and limestone caves, rockhouses, clifflines, auger holes, and abandoned mines. In order to avoid impacts to bats, bottomland forests and riparian corridors, particularly near caves, should not be disturbed.

I would like to take this opportunity to remind you of the terms of the data request license, which you agreed upon in order to submit your request. The license agreement states "Data and data products received from the Kentucky State Nature Preserves Commission, including any portion thereof, may not be reproduced in any form or by any means without the express written authorization of the Kentucky State Nature Preserves Commission." The exact location of plants, animals, and natural communities, if released by the Kentucky State Nature Preserves Commission, may not be released in any document or correspondence. These products are provided on a temporary basis for the express project (described above) of the requester, and may not be redistributed, resold or copied without the written permission of the Kentucky State Nature Preserves Commission's Data Manager (801 Schenkel Lane, Frankfort, KY, 40601. Phone: (502) 573-2886).

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.

If you have any questions or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Sara Hines
Data Manager

SLD/SGH

Enclosures: Data Report and Interpretation Key

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

February 14, 2012

Mr. Seth R. Bishop
Redwing Ecological Services, Inc.
1139 South Fourth Street
Louisville, Kentucky 40203

RE: Information Request
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076
KYTC Item No. 6-18.00

Dear Mr. Bishop:

In reviewing the information and map supplied with your letter of January 25, 2012 for this project, there are no OSRWs or special classified surface waters in the area of interest. The nearest assessed stream to your interest area is South Fork Gunpowder Creek. It is not supporting primary contact recreation (PCR) from river mile 4.1 to 6.8 due to fecal coliform (pathogen indicator); this segment extends to the northwest side of the I-71/75 rest area just south of the northern terminus of your outlined project boundary.

I found no groundwater tracer data or groundwater recharge area delineations surrounding this transportation corridor. Additionally, based on the geologic map this area is underlain predominantly by the Bull Fork Formation, which is characterized by moderately-developed karst drainage. The Bull Fork Formation is described as interbedded limestone and shale (Luft, 1969). The geologic map notes the presence of small, shallow sinkholes developed in the Bull Fork Formation and the underlying Bellevue Tongue of the Grant Lake Limestone. The Grant Lake Limestone is present only at the extreme southern tip of the project area. The absence of verified groundwater tracer data does not mean that karst drainage, and its inherent susceptibility to contamination, is not present. Furthermore, based on hydrogeologic factors, this area was designated as having moderate sensitivity to groundwater pollution by Ray and others (1994) on the *Groundwater Sensitivity Regions of Kentucky* map. This area is moderately sensitive to groundwater pollution.

Any activities with the potential to impact surfacewater or groundwater resources should proceed with caution. Proper BMPs associated with required construction permit(s) are necessary to prevent pollutants associated with the construction activities.

If you have any further questions please contact me at (502) 564-3410. Thank you for the opportunity to comment on specific aquatic resources in this project area.

Sincerely,

Randall G. Payne

Randall G. Payne
Environmental Scientist

From: Wright, James (EEC) [James.Wright@ky.gov]
Sent: Monday, March 19, 2012 4:15 PM
To: sbishop@redwingeco.com
Subject: KY 338 Reconstruction Project - Boone Co
Mr. Bishop,

Thank you for inquiring about the forest resources located within the proposed project area in Boone County, KY. We were able to take a quick survey of the area and did not see any significant area of concern on the forest impact of the project. Most woodlots consist of small trees that are of average quality and species. In addition, there are no recorded Big Trees or State Forests within the project area. I hope this helps, and please let me know if we can be of anymore assistance. Thanks.

James R. Wright
District Forester
Bluegrass District
Kentucky Division of Forestry
1-800-866-0876

From: Currens, James C [currens@email.uky.edu]
Sent: Monday, February 20, 2012 2:04 PM
To: sbishop@redwingeco.com
Cc: SGentry177@aol.com
Subject: Your requests to KSS for cave data

Dear Mr. Bishop,

I've finally worked my way down through the pile to your request for cave locations [redacted] and I75 in Boone County. [redacted] In regard to Boone County, the Kentucky Speleological Survey does not have records in the vicinity of the I-75 exchange, further I do not think the KSS has any records of caves in the county.

Cordially,

KGS Representative to KSS

James C. Currens, M.S., Ky RPG
Karst Hydrogeologist
Kentucky Geological Survey, Univ. of Ky.
Rm 228 MMRB, 504 Rose Street
Lexington, KY 40506

Office: 859-323-0526
Personal mobile: 859-533-6000

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

The purpose of this checklist is to provide the required PROJECT LEVEL documentation to aid the interagency consultation group in the determination of project type, i.e.

*1) **Exempt** -* Exempt from $PM_{2.5}$ project-level conformity determination,
*2) **Not Exempt, Not of Concern-*** Not Exempt, but not of local air quality concern (does not require further analysis), or
*3) **Of Concern** -* Of local air quality concern and, therefore, requiring a hot-spot analysis.

This checklist is only intended as a tool to assist with the $PM_{2.5}$ project-level conformity determination and does not replace regulatory requirements in the Transportation Conformity Rule (40 CFR Part 93), nor associated guidance. Any decisions regarding a particular conformity determination or hot-spot analysis will be made based on the statute and regulations, after appropriate public input. A statement regarding the $PM_{2.5}$ hot-spot consideration should be included as an element in NEPA documentation. This completed and signed checklist, along with a copy of the $PM_{2.5}$ project-level conformity determination, if required, should also be included. Additionally, proof of interagency consultation and public involvement, if required, as well as any other supporting documentation, should be included.

Use the "Tab" or "Page Down" key to maneuver within this document.

STEP 1: PROJECT IDENTIFICATION

A. KYTC Six Year Plan Item Number: **6-18**

B. Project Name/Short Description: **I-71/75 & KY 338 (Richwood Rd.) interchange reconfiguration and access improvements**

C. County (click on box & select from drop-down menu)**:** **Boone**

D. $PM_{2.5}$ Nonattainment or Maintenance Area (click on box & select from drop-down menu)**:** **Northern KY**

E. $PM_{2.5}$ Designation (click on box & select from drop-down menu)**:** **Maintenance**

F. $PM_{2.5}$ Standard Associated with Designation (click on box & select from drop-down menu)**:** **annual**

G. Additional Project Information:

G. Additional Project Information:

A. Purpose and Need of the Project

The purpose of this project is to improve safety and reduce congestion at the I-71/I-75 and KY 338 (Richwood Road) interchange and within the KY 338 (Richwood Road) corridor, and to develop and implement a comprehensive access management plan for KY 338 (Richwood Road) between Triple Crown Boulevard and US 25 (Dixie Highway). The project needs include improving safety, reducing congestion, and improving access to businesses.

The KYTC completed an Intersection Justification Study (IJS) in 2010. The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. The analysis compared observed crash rates against statewide critical crash rates for comparable facilities to obtain a Critical Rate Factor (CRF). A CRF that exceeds 1.0 indicates that the number of crashes exceeds the number that should occur on that roadway and is considered to be a high crash location. KY 338 (Richwood Road) exhibitis higher crash rates than the statewide average for similar roadways.

KY 338 (Richwood Road) from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of 1.0 with the highest CRF being exhibited between the 1-71/I-75 underpass and the

southbound ramps. The CRF in this area is 2.56. Overall, the majority of crashes on KY 338 (Richwood Road) in the study area occurred during the day and under dry conditions, indicating that neither weather nor darkness are a primary cause of crashes.

Crash data was also reviewed for three intersections on US 25 (Dixie Highway): (1) Shorland Drive/Winning Colors Drive, (2) KY 338 (Richwood Road), and (3) Logistics Boulevard. KY 338 (Richwood Road) was the only intersection that exceeded a CRF of 1.0 with a total of 66 crashes and a CRF of 3.7. Overall, most of the crashes at this intersection occurred during the day and under clear or cloudy conditions.

Norfolk Southern Railroad owns an active track that parallels US 25 (Dixie Highway) immediately west of the roadway that typically carries 30 or more trains per day. The proximity to US 25 (Dixie Highway) creates safety concerns at its crossings of KY 338 (Richwood Road) and Shorland Drive.

The I-71/I-75 KY 338 (Richwood Road) interchange currently experiences intermittent periods of congestion. The IJS documented that in 2030 the I-71/I-75 ramp intersections with KY 338 (Richwood Road) would operate at an unacceptable Level of Service (LOS). Further analysis using more recent traffic counts indicate that almost every signalized intersection along KY 338 (Richwood Road) would operate at an unacceptable LOS in 2030 under No Build conditions.

The KY 338 (Richwood Road) corridor is dominated by retail and commerical uses that depend on short visits and are based on a high volume of visitors. As the corridor has developed over the last several decades, acess to developing locations was provided as needed, with no comprehensive plan for drive locations or intersection controls. The result is a corridor with poor access management: numerous drive locations over a relatively short length that provides little accommodation in the form of turn lanes or signalization for entering and existing vehicles. This condition leads to an inefficient corridor for vehicles moving within or through the area and can contribute to both congestion and safety issues.

B. Route name, route number, project length, and mile locations

Route Name/Route Number: I-71/I-75 and KY 338 (Richwood Road)
Project Length:
The project has independent utility and would provide a fully functional road segment without any additional transportation improvements beyond the project limits. The project's logical termini along US 25 (Dixie Highway) extend from approximately 0.75 mile south of KY 338 (Richwood Road) to approximately 0.25 mile north of Shorland Drive. The project's logical termini along I-71/I-75 extend from approximately 1.5 miles north of KY 338 (Richwood Road) to approximately one mile south of KY 338 (Richwood Road). Logical termini for improvements to the connector road network extend approximately 0.25 mile north of KY 338 (Richwood Road) along Frogtown Connector Road and approximately 0.75 mile west of I-71/I-75 along KY 338 (Richwood Road). Road improvements may extend beyond these termini; however the need for this project is limited to the intersections and connecting roadway.
Mile Locations:
From the Six Year Plan:
Reconstruct the KY 338 (Richwood Road) Interchange
06-18.00
Length: 0.100 Begin MP: 175.217 End MP: 175.622

Reconstruct the KY 338 (Richwood Road) interchange
06-18.01
Length: 0.100 Begin MP: 175.314 End MP: 175.414

C. Number of current and future lanes (clearly indicate if any lanes are "turn only lane")

The build alternative converts the I-71/I-75 and KY 338 (Richwood Road) existing diamond interchange to a Double Crossover Diamond Interchange (DCD). The DCD takes the traffic that is heading westbound (which is normally on the north side of a road) and crosses it over to the south side of the road. It does the opposite for the eastbound traffic, taking them from the south side of the road to the north side. Once through the interchange, the lanes crossover again and return to a traditional configuration. Both crossover locations would be controlled by traffic signals. By crossing over the travel lanes within the interchange, left turn movements to and from the interstate ramps can be completed without conflicting with through traffic.

This alternative would not alter the I-71/I-75 bridge over KY 338 (Richwood Road); nor would it modify the through lanes or the overall capacity of the interstate. Initial concepts for the interchange included consideration of providing auxiliary lanes between the KY 338 (Richwood Road) interchange and the rest areas to the north. During detailed analysis of the interchange and the merge/diverge areas on the ramps, it was determined that these auxiliary lanes were not required and that standard ramp tapering would be appropriate.

In order to provide the additional lanes required on KY 338 (Richwood Road), the spill slope on the north side of the road would be removed and replaced with a soil nail wall, providing sufficient space for three eastbound travel lanes (one through lane, one turn lane, and one shared lane). The existing KY 338 (Richwood Road) roadway would be converted to two westbound lanes. A similar soil nail wall would replace the spill slope on the south side of the road, providing space for an 8-foot wide multi-use path.

The interchange ramps would be modified to efficiently manage entrance and exit movements at the interstate and to accommodate turn lanes at KY 338 (Richwood Road). The northbound entrance ramp to I-71/I-75 would be widened to two lanes accommodating two left turn lanes from eastbound KY 338 (Richwood Road). A single right turn lane from westbound KY 338 (Richwood Road) would merge into the ramp. The two lane ramp would continue for approximately 1,200 feet before dropping to a single lane for 1,700 feet and then becoming a 840-foot merge lane into I-71/I-75.

The southbound exit ramp would begin approximately 1,500 feet north of the existing exit ramp, widen to two lanes for approximately 1,000 feet, and then widen to four lanes (two right turn lanes and two left turn lanes) at the approach to the intersection. Both the right and left turn movements would be signal-controlled. Right turning traffic would be permitted to make a right-turn-on-red.

The southbound entrance ramp would be widened to two lanes, one each coming from eastbound and westbound KY 338 (Richwood Road). The two lane ramp would continue for 1,000 feet before dropping to a single lane for 2,000 feet and then becoming a 350-foot merge lane into I-71/I-75.

The northbound exit ramp would remain a single lane exit, widening to three lanes – two right turn lanes and one left turn lane – at the approach to the intersection. The right turn movement would be signal-controlled with right-turn-on-red permitted for both lanes. The left turn lane would be a free movement (uncontrolled), with a dedicated receiving lane on KY 338 (Richwood Road).

D. Capacity Adding or Non Capacity Adding

Non capacity adding on the mainline interstate. Capacity will be added on Richwood road.

E. Identify intersecting roads that will be impacted

KY 338 (Richwood Road):

- Triple Crown Blvd/National Blvd
- Paddock Drive
- Clay Drive
- Frogtown Connector Road
- Southbound I-71/I-75 ramps
- Northbound I-71/I-75 ramps
- Best Pal Drive
- US 25 (Dixie Highway)

US 25 (Dixie Highway):

- Winning Colors Drive/Shorland Drive
- Logistics Blvd

H. NEPA Document Type (click on box & select from drop-down menu): **CE-3**

I. Project Sponsor (click on box & select from drop-down menu): **KYTC**
(if "other", describe)

J. Included in a "Conforming" MPO TIP or STIP? **yes**
(MPO-Metropolitan Planning Organization; Transportation Improvement Program (TIP); State Transportation Improvement Program (STIP))

K. Location of project in TIP/STIP (list name of document and page number or amendment number):
FY 2013-2016 STIP Exhibit A page 4 of 127
FY2014-2017 OKI TIP page BOO 8-3

L. Is this Project in the Area Travel Demand Model?

M. Was this Project Found to be "An Air Quality Project" for Regional Conformity?

STEP 2: EXEMPT STATUS

☒ **NOT AN EXEMPT PROJECT.** ***Go to STEP 3.***

☐ **EXEMPT PROJECT** (those listed in 40 CFR 93.126 and traffic signal synchronization projects under 93.128).
IAC review and approval are required to confirm that project is exempt. Select one from the list below. Include IAC review and approval documentation with this checklist, but no $PM_{2.5}$ project-level conformity is required and no further documentation is needed. ***Go to STEP 6.***

Air Quality
- ☐ Bicycle and pedestrian facilities
- ☐ Continuation of ride-sharing and van-pooling promotion activities at current levels

Mass Transit
- ☐ Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR part 771
- ☐ Construction of small passenger shelters and information kiosks
- ☐ Construction or renovation of power, signal, and communications systems
- ☐ Operating assistance to transit agencies
- ☐ Purchase of new buses and rail cars to replace existing vehicles or for minor expansion of the fleet. In PM10 and PM2.5 nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan
- ☐ Purchase of office, shop, and operating equipment for existing facilities
- ☐ Purchase of operating equipment for vehicles (e.g., radios, fareboxes, lifts, etc.)
- ☐ Purchase of support vehicles
- ☐ Reconstruction or renovation of transit building and structures (e.g., rail or bus building, storage and maintenance facilities, stations, terminals and ancillary structures)
- ☐ Rehabilitation of transit vehicles – In PM10 and PM2.5 nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan
- ☐ Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way

Safety
- ☐ Adding medians
- ☐ Emergency relief (23 U.S.C. 125)
- ☐ Emergency truck pullovers
- ☐ Fencing
- ☐ Guardrails, median barriers, crash cushions
- ☐ Hazard Elimination Program
- ☐ Increasing Sight Distance
- ☐ Lighting improvements
- ☐ Pavement marking demonstration
- ☐ Pavement resurfacing and/or rehabilitation
- ☐ Railroad/highway crossing
- ☐ Railroad/highway crossing warning devices
- ☐ Reconstructing bridges (no additional travel lanes)
- ☐ Safer non-Federal-aid system roads
- ☐ Safety improvement program
- ☐ Safety roadside rest areas
- ☐ Shoulder improvements
- ☐ Skid treatments
- ☐ Traffic control devices and operating assistance other than signalization projects.
- ☐ Truck Climbing lanes outside the urbanized area
- ☐ Widening narrow pavement (no additional travel lanes)

Other
- ☐ Acquisition of scenic easement
- ☐ Directional and information signs
- ☐ Emergency or hardship advance land acquisitions (23 CFR 710.503 (d))
- ☐ Engineering to assess social, economic, and environmental effects of the proposed action or alternative to that action
- ☐ Noise attenuation
- ☐ Planting, landscaping, etc
- ☐ Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational, or capacity changes
- ☐ Sign removal
- ☐ Specific activities which do not involve or lead directly to construction, such as:
  - Federal-aid systems revisions
  - Grants for training and research programs
  - Planning activities conducted pursuant to titles 23 and 49 USC
  - Planning and technical studies
- ☐ Traffic signal synchronization (40 CFR 93.128)
- ☐ Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities)

STEP 3: TRAFFIC INFORMATION

A. Worst Case Scenario

a. **Location** (usually an intersection): **KY 338 and US-25; I-71/75 ramps and KY338**

b. **Year** (usually the open-to-traffic year): **2019**

c. **Justification for worst case year chosen** (include forecasting assumptions): **2019 is expected open to traffic year. EPA regulations on new vehicle emmissions should cause concentrations to decrease with time.**

B. Project Data

a. **Project Data for Current Year (2011)**
(use worst case scenario; if at an intersection, include both roadways individually and in total; if at an intersection, average AADT on either side of intersection to obtain AADT for roadway at intersection)

i. **Annual Average Daily Traffic (AADT):**
KY 338 between Best Pal & US-25: **14675**
KY 338 East of US-25: **3500**
US-25 between Winning Colors/Shorland Drive & KY 338: **11964**
US-25 between KY 338 & Logistic Blvd: **9290**
SB I-71/I-75 Off-ramp: **13357**
NB I-71/I-75 On-ramp: **12314**
SB I-71/I-75 On-ramp: **3930**
NB I-71/I-75 Off-ramp: **3841**
KY 338 between I-71/I-75 On/Off ramps: **15791**

ii. **Percentage and/or number of diesel vehicles (trucks and buses):**

KY 338 between Best Pal & US-25: **12% 1761**
KY 338 East of US-25: **13% 455**
US-25 between Winning Colors/Shorland Drive & KY 338: **10% 1196**
US-25 between KY 338 & Logistic Blvd: **6% 557**
SB I-71/I-75 Off-ramp: **15% 2004**
NB I-71/I-75 On-ramp: **8% 985**
SB I-71/I-75 On-ramp: **13% 511**
NB I-71/I-75 Off-ramp: **16% 615**
KY 338 between I-71/I-75 On/Off ramps: **10% 1191**

iii. **Intersections at Level of Service D, E, or F:**
Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

SB I-71/I-75 Off Ramp: **F**
KY 338 and Paddock Drive: **F**
KY 338 and Triple Crown Blvd: **D**
US-25 and Shorland Drive: **E**

b. Project Data for Worst Case Year for No Action Scenario

(use worst case scenario; if at an intersection, include both roadways individually and in total)

i. Annual Average Daily Traffic (AADT):

KY 338 between Best Pal & US-25: **17460**
KY 338 East of US-25: **4258**
US-25 between Winning Colors/Shorland Drive & KY 338: **14095**
US-25 between KY 338 & Logistics Blvd: **10466**
SB 1-71/I-75 Off-ramp: **16081**
NB I-71/I-75 On-ramp: **14860**
SB I-71/I-75 On-ramp: **5535**
NB I-71/I-75 Off-ramp: **5467**
KY 338 between I-71/I-75 On/Off ramps: **19247**

ii. Percentage and number of diesel vehicles (trucks and buses):

KY 338 between Best Pal & US-25: **14% 2444**
KY 338 East of US-25: **15% 639**
US-25 between Winning Colors/Shorland Drive & KY 338: **11% 1677**
US-25 between KY 338 & Logistics Blvd: **6% 727**
SB 1-71/I-75 Off-ramp: **17% 2734**
NB I-71/I-75 On-ramp: **9% 1337**
SB I-71/I-75 On-ramp: **13% 720**
NB I-71/I-75 Off-ramp: **18% 984**
KY 338 between I-71/I-75 On/Off ramps: **11% 2117**

iii. Intersections at Level of Service D, E, or F:

Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

Not determined for 2019, but would be expected to be similar to existing. (or somewhat worse due to the additional traffic)

iv. Impact of No Action:

c. Project Data for Worst Case Year for Build Scenario

(use worst case year and location; if at an intersection, include both roadways individually and in total)

i. Annual Average Daily Traffic (AADT):

KY 338 between Best Pal & US-25: **17460**

KY 338 East of US-25: **4258**

US-25 between Winning Colors/Shorland Drive & KY 338: **14095**

US-25 between KY 338 & Logistics Blvd: **10466**

SB I-71/I-75 Off-ramp: **16081**

NB I-71/I-75 On-ramp: **14860**

SB I-71/I-75 On-ramp: **5535**

NB I-71/I-75 Off-ramp: **5467**

KY 338 between I-71/I-75 On/Off ramps: **19247**

ii. Percentage and number of diesel vehicles (trucks and buses):

KY 338 between Best Pal & US-25: **14% 2444**

KY 338 East of US-25: **15% 639**

US-25 between Winning Colors/Shorland Drive & KY 338: **11% 1677**

US-25 between KY 338 & Logistics Blvd: **6% 727**

SB I-71/I-75 Off-ramp: **17% 2734**

NB I-71/I-75 On-ramp: **9% 1337**

SB I-71/I-75 On-ramp: **13% 720**

NB I-71/I-75 Off-ramp: **18% 984**

KY 338 between I-71/I-75 On/Off ramps: **11% 2117**

iii. Intersections at Level of Service D, E, or F:

Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

No intersections operating at D, E or F.

iv. Impact of Project:

Project improves traffic flow and provides better level of service.

STEP 4: AIR QUALITY CONCERN DETERMINATION

☒ **NOT PROJECT OF AIR QUALITY CONCERN.** *Hot-spot analysis is NOT required. However, InterAgency Consultation (IAC) approval is required. Provide checklist and other relevant documentation to IAC. IAC will determine level of public involvement required. Use space provided to summarize data and rationale for this conclusion.*

(*Refer to EPA's March 2006 guidance, EPA420-B-06-902, and FHWA's FAQ document, for complete details*).

Go to STEP 6.

☐ **PROJECT OF AIR QUALITY CONCERN.** *Select one from the list below. Hot-spot analysis IS required. Convene interagency consultation (IAC) meeting and begin to create the hot-spot analysis document.* ***Go to STEP 5.***

☐ New or expanded highway projects with a significant number of, or increase in, diesel vehicles (e.g., 125,000 AADT and 10,000 (8%) diesel truck traffic) Note: The example of 125,000 AADT and 10,000 (8%) diesel truck traffic are not exact threshold values and should not be viewed as such.

☐ Project affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.

☐ New bus and rail terminals and transfer points that have significant number of diesel vehicles congregating at a single location.

☐ Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

☐ Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} and $PM_{2.5}$ applicable implementation plan or implementation plan submissions, as appropriate, as sites of violation or possible violation.

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

STEP 5: ANALYSIS AND DOCUMENTATION (for Project of Air Quality Concern)

The following is a summary of documentation to be included for $PM_{2.5}$ hot-spot analysis and does not replace information that will be provided for a full quantitative analysis if this analysis is required.

Documentation to be included for the $PM_{2.5}$ Hot-spot Analysis

- ☐ Description of project (location, design and scope; date project is expected to be open, i.e., what part of 93.123(b) (1) applies)
- ☐ Description of type of emissions considered in the analysis
- ☐ Contributing Factors
  - Air Quality
  - Transportation and traffic conditions
  - Built and natural environment
  - Meteorology, climate and seasonal data
  - Adopted emissions control measures
- ☐ Consider full time frame of area's LRTP
- ☐ Description of existing conditions
- ☐ Description of changes resulting from project
- ☐ Description of method chosen
- ☐ Description of analysis years
- ☐ Examine year in which emissions are expected to peak
- ☐ Profession judgment of impact
- ☐ Discussion of why project will not cause a violation of either the annual or 24-hour standard
- ☐ Discussion of any mitigation measures
- ☐ Written commitments for mitigation
- ☐ Conclusion on how project meets 40 CFR 93.116 and 93.123

STEP 6: MEETING, NOTICES, DATES

A. IAC Approval Date: 11/26/2013
(Project sponsor is lead; attach meeting minutes, if applicable, and/or hard copies of applicable e-mails showing IAC review request and approval)

B. Public Involvement

a. Public review & comment period (should be consistent with NEPA process; list dates, and if applicable, attach copy of public notice and newspaper proof of publication):

b. Public concerns addressed (if applicable include hard copy or e-mails with cc to IAC):

STEP 7: SIGNATURES

Project Manager — Date: 12-2-13

Division of Environmental Analysis Representative — Date: 12/2/2013

Burgin, Daniel (KYTC)

From: Callan-Ramler, Carol (KYTC-D06)
Sent: Thursday, November 14, 2013 9:08 AM
To: Burgin, Daniel (KYTC); Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Dines, Jennifer; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: RE: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

Hi Daniel,

There is one edit to the text below: "This will also allow KY 338 traffic to pass ~~over~~ *under* the railroad"

Thanks,

Carol

From: Burgin, Daniel (KYTC)
Sent: Tuesday, November 12, 2013 11:32 AM
To: Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Dines, Jennifer; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

Dear Interagency Consultation Group:

This email is being sent as a request for consultation on the PM 2.5 hot-spot determination for KYTC project 6-18.

This project involves reconfiguring the interchange at I-71/I-75 and Richwood Road (KY 338) to a Double Crossover Diamond. Also included in the project is widening of Richwood Road to two thru lanes in each direction between in the vicinity of the interchange. A Single Point Urban interchange will be created to replace the at-grade intersection of US 25 and KY 338. This will also allow KY 338 traffic to pass over the railroad, where an existing at grade crossing forces traffic to idle while waiting. The project is intended to relieve congestion and improve traffic flow. The traffic forecasts are the same for build and no-build scenarios because the project is not expected to create additional trips.

A map of the planned improvements has been attached along with the PM 2.5 Project-level Checklist.

KYTC believes this project to be "Not a Project of Air Quality Concern" and thus does not require a quantitative PM 2.5 hotspot analysis.

Please provide your comments on this determination no later than close of business Tuesday November 26, 2013. No response from your agency will be assumed agreement with this determination.

Thanks,

Daniel Burgin
Air Quality and Traffic Noise Specialist
Division of Environmental Analysis
Kentucky Transportation Cabinet
Phone: (502) 782-5038

Burgin, Daniel (KYTC)

From: Maleski, Mike [Mike.Maleski@epa.state.oh.us]
Sent: Friday, November 22, 2013 5:19 PM
To: Burgin, Daniel (KYTC)
Cc: Maietta.Anthony@epa.gov
Subject: RE: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

Daniel,

Ohio EPA agrees that this is not a project of air quality concern.

Mike Maleski
Ohio EPA, Division of Air Pollution Control
Phone: 614-644-1961
Fax: 614-644-3681

From: Burgin, Daniel (KYTC) [mailto:Daniel.Burgin@ky.gov]
Sent: Tuesday, November 12, 2013 11:32 AM
To: Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Dines, Jennifer; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; rkoehler@oki.org; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

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Thanks,

Daniel Burgin
Air Quality and Traffic Noise Specialist
Division of Environmental Analysis
Kentucky Transportation Cabinet
Phone: (502) 782-5038

Burgin, Daniel (KYTC)

From: Forgacs, Joe (EEC)
Sent: Tuesday, November 26, 2013 8:22 AM
To: Burgin, Daniel (KYTC); Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Dines, Jennifer; Dupont, Bernadette ; Ferris, Gale; Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: RE: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

Hi Daniel,

Based on review of the project or projects listed below, the Division is in agreement with KYTC's recommendations. The Division concurs with the "not exempt, not of air quality concern" classification and that no hot spot analysis is required.

Thanks,

Have a good week..

Joe Forgacs, Environmental Technologist III
Kentucky Division for Air Quality
Program Planning & Administration Branch
Evaluation Section
Phone: (502) 564-3999, extension 4422
Fax: (502) 564-4666
E-mail: Joe.Forgacs@ky.gov

From: Burgin, Daniel (KYTC)
Sent: Tuesday, November 12, 2013 11:32 AM
To: Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Dines, Jennifer; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

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Thanks,

Daniel Burgin
Air Quality and Traffic Noise Specialist
Division of Environmental Analysis
Kentucky Transportation Cabinet
Phone: (502) 782-5038

Burgin, Daniel (KYTC)

From: Smith, Dianna [Smith.Dianna@epa.gov]
Sent: Tuesday, November 26, 2013 10:49 AM
To: Burgin, Daniel (KYTC); Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Jennifer.Dines@epa.state.oh.us; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; Gowins, John (EEC); Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC); Smith, Dianna
Subject: RE: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction
Attachments: PM 2.5 hotspot checklist- 6-18.docx

Hello Daniel,

Thanks for sending this for our review. We have completed our review and agree that these project(s) do NOT appear to be a "Project of Concern" per the Transportation Conformity Rule, and thus meets the statutory and regulatory requirements for PM 2.5 hotspots without a qualitative analysis.

Dianna B. Smith
Environmental Scientist
Air Quality Modeling and Transportation
(404) 562-9207
e-mail smith.dianna@epa.gov

From: Burgin, Daniel (KYTC) [mailto:Daniel.Burgin@ky.gov]
Sent: Tuesday, November 12, 2013 11:32 AM
To: Adams, Vanessa; Aiello, Andrew; Allen, Michelle; Altiri,Sean (EEC); Arkell, Reggie; Baukert, Frank; Blakely, Pamela; Bourne, Vickie (KYTC); Braun, Paul J.; Brunello, Nino; Buckel, Larry; Burkett, Frank; Butch Gaut; Byram, Mark; Callan-Ramler, Carol (KYTC-D06); Jennifer.Dines@epa.state.oh.us; Dupont, Bernadette ; Ferris, Gale; Forgacs, Joe (EEC); Garcia Crews, Terry; Gosman, Richelle; john.gowins@ky.gov; Hans, Robert (KYTC-D06); Hans, Stacee (KYTC-D06); Harrod, Justin (KYTC); Heil, Larry; Hurst, Andrew; Koehler, Robert ; Laylock, Sharon (KYTC-D06); Maietta, Anthony; Maleski, Mike; Mitchell, Jay; Mokadi, Elad; Moore, Dave; Nsonwu, Emmanuel; Oesterling, Leigh; Reser, Andy; Ross, Steve (KYTC); Seals, Shawn ; Smith, Dianna; Smith, Steve; Spencer, Lori; Walton, Sara; Werner, David
Cc: Schurman, Scott (KYTC)
Subject: PM 2.5 Concurrence for KYTC Item number 6-18 Richwood Road interchange reconstruction

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Please provide your comments on this determination no later than close of business Tuesday November 26, 2013. No response from your agency will be assumed agreement with this determination.

Thanks,

Daniel Burgin
Air Quality and Traffic Noise Specialist
Division of Environmental Analysis
Kentucky Transportation Cabinet
Phone: (502) 782-5038

Florence & Hutcheson
An ICA Company

COMPOSITE MEETING MINUTES, Dates 7-10-12, 10-31-12 & 11-8-12

MEETING NO. 1 MINUTES

PROJECT: Richwood Road – I71/I75 Improvement Project
Item No. 6-18.00, Boone County

PURPOSE: Preliminary Line & Grade / Select Preferred Alternative

MEETING DATE: July 10, 2012

PLACE: NKAPC Offices

PREPARED BY: Bob Gustafson

ATTENDEES:

Name	Organization	Email
Michael Loyselle	FHWA	michael.loyselle@dot.gov
Carol Callan-Ramler	KYTC D-6	carol.callan-ramler@ky.gov
Robert Yeager	KYTC D-6	robert.yeager@ky.gov
Mike Bezold	KYTC D-6	mike.bezold@ky.gov
Rick Davis	KYTC D-6	rick.davis@ky.gov
Stacee Hans	KYTC D-6 Environmental	stacee.hans@ky.gov
James Minckley	KYTC D-6	james.minckley@ky.gov
Thomas Witt	KYYC D-6	thomas.witt@ky.gov
Kelly Woodrum	KYTC D-6	kelly.woodrum@ky.gov
Renee Stephens	KYTC D-6	renee.stephens@ky.gov
Dan White	KYTC D-6	daniel.white@ky.gov
Tony Blau	KYTC D-6 Utilities	tony.blau@ky.gov
Scott Pennington	KYTC D-6 Boone Co	scott.pennington@ky.gov
Nicholas Hendrix	KYTC D-6 Boone Co	nicholas.hendrix@ky.gov
Greg Kreutzjans	KYTC D-6	greg.kreutzjans@ky.gov
Rebecca Turner	KYTC DEA	rebecca.turner@ky.gov
James Simpson	KYTC CO Design	jim.simpson@ky.gov
Paul Looney	KYTC CO Design	paul.looney@ky.gov
Boday Borres	KYTC CO	boday.borres@ky.gov
Brent Sweger	KYTC CO	brent.sweger@ky.gov
Lindsay Carter	KYTC CO Traffic	lindsay.carter@ky.gov
Jason Hyatt	KYTC CO Traffic	jason.hyatt@ky.gov
Allen Rust	KYTC CO Rails	allen.rust@ky.gov
Tom Capshaw	KYTC CO Utilities	thomas.capshaw@ky.gov
Tony Beckham	KYTC Geotech	tony.beckham@ky.gov
Erik Scott	KYTC Geotech	erik.scott@ky.gov
Greg Sketch	Boone County Engineer	gsketch@boonecountyky.org

ATTENDEES (cont.):

Name	Organization	Email
Glenn Hardin	Stantec	glenn.hardin@stantec.com
Brian Aldridge	Stantec	brian.aldridge@stantec.com
Dave Ayala	Parsons	dave.ayala@parsons.com
Carl Chaifetz	Parsons	carl.chaifetz@parsons.com
Nivas Dammalapati	Parsons	nivas.dammalapati@parsons.com
Dan Prevost	Parsons	daniel.prevost@parsons.com
Shawn Washer	Florence & Hutcheson	swasher@flohut.com
Doug Moore	Florence & Hutcheson	dmoore@flohut.com
Pete Szak	Florence & Hutcheson	dmoore@flohut.com
Todd White	Florence & Hutcheson	twhite@flohut.com
Bob Gustafson	Florence & Hutcheson	bgustafson@flohut.com

The Preliminary Line and Grade meeting for the purpose of selecting a preferred alternative was held at the NKAPC Offices on July 10, 2012 at 9:00 am. After introductions the Project Team began a presentation of the project.

OVERVIEW

The project consists of construction of a Double Crossover Diamond (DCD) interchange at the I-71/75 interchange at KY338 along with improvements to KY338 and US25, including access management enhancements. Auxiliary lanes will also be constructed along I-71/75. It was noted that in the immediate area there are 12 other projects that are either in design, slated for future construction or have been recently constructed.

PROJECT DESIGN CONSTRAINTS

- Historic Property – Richwood General Store on US25 was previously deemed eligible for the National Register. The proposed historic boundary is shown to the edge of existing pavement on US25.
- There are two existing at-grade crossings of the Norfolk Southern Railroad at KY338 and Shorland Drive. Trains travel rapidly thru this area and one goal of the project is to eliminate the Shorland Drive Crossing and construct a grade separation at the KY338 crossing.
- Norfolk Southern Railroad has a service spur (laydown yard for RR ties and ballast) between the RR tracks and US25 to the west. This service area will have to be relocated, possibly within the project limits.
- Traffic in the project area generally exhibits greater than 30% trucks mainly due to three truck stops being located at this interchange.
- Many utilities along KY338 and US25.

EARLY PROJECT DECISIONS

- High Mast lighting will be used at the interchange.
- Signals will utilize mast arms within the limits of the DCD. Regardless of pavement type, signal detectors shall be loops in the pavement.

Early Project Decisions (cont.)

- Early Coordination with the Norfolk Southern Railroad (NSRR) revealed the following:
  - Plate Girders with concrete deck is preferred bridge design
  - 3-span spill thru design preferred over single span with breast wall abutment
  - Bridge substructure should be constructed to accommodate triple tracks
  - Clearance between beams should be at least 18 inches for inspection and maintenance
  - M.S.E. retaining walls are not permitted
  - NSRR safety personnel will need to be onsite during all construction activities
  - Cranes to be clear of tracks when train passes
  - A minimum of 20 feet offset required to sheet piling. No earth anchors or soil nails.
  - RR detour will be designed for 50 mph, no slowing of trains.
  - RR spur design with max 10 degree curve.

ENVIRONMENTAL OVERVIEW

Project Purpose and Need (DRAFT)

The purpose of the KY338 (Richwood Road) project is to provide a safe, efficient multi-modal roadway network that supports existing and planned businesses while maintaining the mobility of the I-71/I-75 corridor.

Note: This was the draft Purpose and Need (P&N) statement presented at this meeting. The P&N is still to be reviewed by the project team and revised before preparation of the Categorical Exclusion document.

Needs:

1. Improve Safety
   - KY338 Critical Rate Factor (CRF) = 3.01
   - 2 accidents in the past 3 years at the Shorland RR crossing
2. Reduce Congestion
   - Existing (2006) – LOS C/D at interchange ramp intersections
   - No Build (2030) – Essentially all intersections with the project fail, LOS F
3. Improve Access Management
   - Multiple access points and proximity to intersections
   - Large driveway openings

Additional Goals:

1. Improved Pedestrian Environment
   - Limited sidewalks on KY338
   - No sidewalks on US25 (SW proposed on adjacent projects)
   - Limited sidewalks on adjacent streets
2. Support Stakeholder Involvement

3. Improve Access Management

Noted Environmental Information:

- Project setting is 72% Transportation / Urban Land
- Historic Property (Richwood General Store) was previously determined eligible for the National Register. Boundary of proposed designation is to the edge of pavement on US25.
- Potential ecological impacts to Indiana Bat and Running Buffalo clover. A Biological Assessment will be required.

CONCEPTUAL ALTERNATIVES

This project is comprised of four distinct parts:

1. I-71/75 DCD Interchange @ KY338
2. Construction of auxiliary lanes on I-71/75
3. Capacity and access management improvements on KY338 and US25 on the east side of the interstate
4. Capacity and access management improvements on KY338 west side of the interstate

With construction of the DCD interchange with auxiliary lanes I-71/75 decided, conceptual alternatives were evaluated on the east and west side of I-71/75 to increase capacity and improve access management. The Conceptual Alternatives that were evaluated at prior meetings are as follows:

EAST ALTERNATIVES

Alternative E1:

SPUI Interchange of KY338 @ US25. Best Pal Drive is signalized. ***This alternative was advance to this meeting for consideration.***

Alternative E2:

SPUI Interchange of KY338 @ US25, shifted approximately 800 feet to the south to avoid any impacts to the historic property. This alternative was dropped from consideration prior to this meeting because it was the most expensive alternative and there is another avoidance alternative.

Alternative E3:

At-grade intersection of KY338 @ US25. Best Pal Drive is right-in / right-out only with frontage roads connecting to US25. ***This alternative was advance to this meeting for consideration.***

Alternative E4:

This alternative was a hybrid intersection of KY338 @ US25. The intersection of KY338 and US25 was shifted to the south to a “T” intersection. Traffic wanting to go east under the RR turned left at Best Pall Drive. Project team indicated was a very unorthodox configuration and also funnels all traffic thru the Best Pal intersection. This design could be confusing to motorists and difficult to sign. For these reasons this alternative was dropped from consideration prior to this meeting.

Alternative E5:

Roundabouts at both Best Pal Drive and US25. Because of the large volume of trucks, especially on the east side of the interstate, this alternative was dropped from consideration prior to this meeting.

WEST ALTERNATIVES

Alternative W1:

This alternative relocated Frogtown Road Connector to the location of the Clay Drive intersection with signal. Right-in, right-out only access was provided between signals on KY338 and a frontage road was constructed on the south side for access. This alternative was dropped from consideration prior to this meeting because the new signalized intersection did not provide for the volume of traffic generated at Paddock Drive.

Alternative W2:

This alternative was essentially the same as W1 but relocated Frogtown Road Connector to the location of the Paddock Drive intersection with signal. Paddock Drive was relocated to intersect with relocated Frogtown. This alternative was dropped from consideration prior to this meeting because the traffic simulation failed.

Alternative W3:

This alternative is essentially what was shown in the IJS with a signal at Frogtown. This alternative was refined and later renamed and carried forward to this meeting as Alternative W9.

Alternative W4:

This alternative was proposed as roundabouts at the existing locations of the Frogtown Road Connector and Paddock Drive. The project team decided that two roundabouts on KY338 at close proximity would not be desirable and to possibly investigate a single roundabout. For these reasons this alternative was dropped from consideration prior to this meeting.

Alternative W5:

This alternative is essentially the same as W2 but replaces the signal on KY338 with a roundabout. It was eventually determined that any two lane roundabout on KY338 would fail. For this reasons this alternative was dropped from consideration prior to this meeting.

Alternative W6:

For this alternative relocated Frogtown tees into Paddock Drive. The Paddock Drive intersection with KY338 is reconstructed as a roundabout. It was eventually determined that any two lane roundabout on KY338 would fail. For this reasons this alternative was dropped from consideration prior to this meeting.

Alternative W7:

This alternative is exactly the same as Alternative W6 with the roundabout at KY338 replaced with a signal. ***This alternative was advance to this meeting for consideration.***

Alternative W8:

For this alternative relocated Frogtown tees into Paddock Drive. The Paddock Drive intersection @ KY338 and the Frogtown @ Paddock Drive are reconstructed as a roundabouts. It was eventually determined that any two lane roundabout on KY338 would fail. Also the single lane roundabout at the Paddock/Frogtown intersection failed. For these reasons this alternative was dropped from consideration prior to this meeting.

Alternative W9:

This alternative is a refinement of Alternative W3. This alternative signalizes Frogtown and Paddock at their existing intersection locations with KY338 with the addition of lanes on KY338. Access is limited to right-in, right-out only from the DCD to west of Paddock. ***This alternative was advance to this meeting for consideration.***

Alternative W10:

This alternative is essentially alternative W9 with a roundabout at the Paddock @ KY338 intersection in lieu of signal. It was eventually determined that any two lane roundabout on KY338 would fail. For this reasons this alternative was dropped from consideration prior to this meeting.

VISSIM MICRO-SIMULATIONS

For presentation purposes at this meeting, and to model the traffic thru the entire project limits, the east and west alternatives were randomly paired as follows:

E1 – DCD – W9

E3 – DCD – W7

When looking at system total travel time, average speed, and system total delay, the alternatives performed almost identically. It was also noted that the east and west alternative pairs could be swapped and the system would operate the same. One noted difference from observation of the simulations was that for Alternative W9, southbound I-71/I-75 exiting traffic backed up on the ramp to the auxiliary lane.

ALTERNATIVE COMPARISION MATRIX

After presentation of the VISSIM models, a comparison matrix (attached) was passed out to attendees. This matrix summarized the results of and evaluation made for each alternative. The evaluation was performed for Engineering Criteria including construction costs, right of way impacts, utility impacts and environmental impacts.

SPECIFIC COMMENTS & DECSIONS

The attendees were given some time to review the comparison matrix and exhibits. After this review the following items were discussed:

1. At the intersection of KY 338 and SB I-71/75 off-ramp, the SB I-71/75 off-ramp to WB KY 338 right-turn traffic has two right-turn lanes and was originally modeled with a yield control for Alternative W-7. The inside right-turn lane was modeled to yield to the WB KY 338 thru traffic approaching from the crossover signal on a single lane. To increase safety the KYTC wanted signal control for this right turning traffic, allowing right on red. This change would eliminate the weaving condition for the WB KY 338 thru traffic that wants to turn right at Frogtown Road. *Note: The VISSIM model was revised during the course of the meeting. With this signal added the model performed similarly to the yield condition.*
2. Another suggestion to eliminate the same weaving area that was discussed by extending the median further west past Frogtown connector to separate WB through traffic from the SB to WB Ramp traffic. This would only be considered if a signal didn't work at the SB to WB ramp. The signal did work with Right on Red so this suggestion did not move forward.
3. It was suggested to shorten the Frontage Road on Alternative E3 similar to that shown for Alternative E1.
4. Investigate left turn into Best Pal (Pilot) with no left turn out. Would be a two phase signal.
5. Rebecca Turner indicated that Alternative E1 should likely result in a "No Adverse Effect" and a *De minimis* Section 4(f) finding. However, because it may be a greater impact than E3, the analysis must be clear that E3 is not an acceptable alternative. Otherwise 4(f) and 106 dictate that the lower impact alternative must be selected. Also she will approach SHPO to discuss the potential for the

access drive from Winning Colors and whether it is appropriate/necessary. In an effort to reduce impact, it may actually increase it.

6. Greg Sketch, Boone County Engineer, indicated concern about Alternative W7 by intersecting Paddock with relocated Frogtown Road Connector. This would place more traffic on Paddock, including a large percentage of trucks, which is mainly a residential access. He will confer with the County Judge. He also stated his preference for Alternative E1 (SPUI).
7. Michael Loyselle indicated his preference for not letting the widening of the I-71/I-75 bridge over Frogtown Road to be a constraint for establishing the beginning of the southbound auxiliary lane if necessary for operation.
8. It was noted that pedestrian volumes are so low they were not considered in the VISSIM model.
9. Right of way costs for acquisition of the on Alternative W9 would be on the order of $2M.
10. KYTC C.O. Traffic prefer Alternative W7 because W9 backs up traffic to the interstate.
11. Geotechnical section: Retaining walls close to R/W. 2:1 slopes greater than 10 feet could have some failures. Soil nails under I-71/I-75 acceptable.
12. Utilities: One group will be designing the water and sewer relocations and will coordinate with F&H. Be aware of the Ten State standards for water and sewer because of the tight corridor.
13. Construction: Can build most of SPUI (Alternative E1) outside of existing traffic patterns. Railroad detour to be constructed first. Maintain 3 lanes of traffic thru I-71/I-75 bridge at all times.
14. Maintenance of Traffic (MOT) was discussed in detail and all alternatives are constructible. On the east side, Alternative E1 is less complex to construct and has simpler MOT than Alternative E3. The main reason for this is that for Alternative E3, both KY338 and US25 have to be lowered approximately 30 feet to construct their at-grade and still provide a grade separation for the Norfolk Southern RR with KY338, whereas for Alternative E1 only KY338 is lowered. Alternative E3 requires more extensive diversions and the detouring of traffic around the frontage roads that will require complex temporary signage.
15. With Alternative E-3, traffic loses sight of destination by having to traverse the distance around the frontage road. The T/A Truck Stop entrance will be right-in / right-out only requiring exiting traffic returning to the Interstate to take the frontage road to US25, then back to KY338 having to take lefts at 2 signals. This adds approximately 2,500 ft. of travel to this movement. Best Pal will be right-in / right -out only. Traffic coming from the interstate wanting to access Best Pal (Pilot, White Castle, Arby's, Burger King and Comfort Inn) will have to travel to US25, take a left at the signal then left on the frontage road to access Best Pal from the north. This adds approximately 3,600 ft. of travel to this movement.
16. Alternative W7 Access Roads seem intuitive, destinations stay in sight.
17. For Alternative E1, access to the T/A Truck Stop will need some adjustments. May need to wait until coordination with owners.

After much discussion the Project Team recommended Alternative E1 and Alternative W7. These alternatives are recommended in conjunction with the Double Crossover Diamond Interchange and the auxiliary lanes on I-71/I-75.

END OF 7-10-2012 MINUTES

MEETING NO. 2 MINUTES

PROJECT: Richwood Road – I71/I75 Improvement Project
Item No. 6-18.00, Boone County

PURPOSE: Preliminary Line & Grade (Overview / Supplemental Meeting)

MEETING DATE: October 31, 2012

PLACE: FHWA Offices Frankfort, Kentucky

PREPARED BY: Bob Gustafson

ATTENDEES:

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Glenn Hardin	Stantec	glenn.hardin@stantec.com
Bob Gustafson	Florence & Hutcheson	bgustafson@flohut.com

After introductions the meeting attendees were given and overview of the information presented at the July 10, 2012 Preliminary Line and Grade Inspection, including copies of the Power Point presentation, plans, cost estimates and alternative comparison matrix. A general discussion ensued revolving around all aspects of the project and the preferred alternatives E-1 and W-7 selected at the July 10, 2012 meeting. Alternative W-7 modified the intersection of KY338 @ Frogtown Connector to a Right-In/Right-Out configuration and created a new roadway that rerouted traffic wanting to head east on KY338 to a new intersection with Paddock Drive. This configuration merged commercial traffic with traffic from the residential neighborhoods accessed by Paddock Drive.

Ms. Callan-Ramler related that since the Preliminary Line and Grade meeting, the project team has received multiple comments from the public citing their displeasure with Alternative W-7. Their comments concerning Alternative W-7 were essentially as follows:

- It merged tractor trailers with cars approximately 1,600 feet sooner.
- It merged tractor trailers with all other commercial traffic accessing the proposed new roadway between Frogtown Connector and Paddock Drive.
- The proposed intersection with this new roadway and Paddock Drive would likely operate in a fashion that tractor trailers could clog the intersection making it difficult for the residents to exit.
- The neighborhood which uses Paddock as access has previously been very vocal when other developments were proposed in this area; it is anticipated that they will be so again because of the first three bullet items.

- Access, particularly to the Shell Station in the SW quadrant adjacent to the SB ramp, was significantly hampered; a lawsuit was already being suggested.
- It was also noted in comments that if Best Pal to the east could have a signal, why couldn't Frogtown Road Connector. It is approximately the same distance from the DCD signal at the crossover.

Ms. Callan-Ramler indicated there have been a handful of meetings with individuals which have also included a state senator for this area.

A discussion of these public comments followed. The FHWA indicated that in light of the public opposition and design changes that occurred on the Item No. 6-14 DCD project, in addition to the project delay, the FHWA recommended re-considering Alternative W-3 with modifications to overcome the issues why it had been initially eliminated. Alternative W-3 was refined as Alternative W-9 for the Preliminary Line and Grade inspection that addressed the capacity issues on KY338 by adding additional thru lanes.

END OF 10-31-2012 MINUTES

MEETING NO. 3 MINUTES

PROJECT: Richwood Road – I71/I75 Improvement Project
Item No. 6-18.00, Boone County

PURPOSE: Revisit Preferred Alternative

MEETING DATE: November 8, 2012

PLACE: KYTC District 6 Office

ATTENDEES:

Name	Organization
Carol Callan-Ramler	KYTC D-6
Robert Hans	KYTC D-6
Robert Yeager	KYTC D-6
Mike Bezold	KYTC D-6
Stacee Hans	KYTC D-6 Environmental

This meeting was held to discuss public concerns with Alternative W-7 and the input received from the FHWA at the October 31, 2012 meeting. In light of all of the new information received since the Preliminary Line and Grade inspection held on July 10th, the attendees deemed it prudent to reconsider the preferred alternative on the west side of the DCD and recommend Alternative W-9 as the preferred alternative. Alternative W-9 is to be refined as much as feasible to reduce any backups on the SB exit ramp and the access on the south side of the Frogtown Connector Road intersection will be revised to be similar to what was shown on Alternative W-3. It requires the acquisition of the Huntington Bank located on the south side of KY338 opposite of Frogtown Connector Road

END OF 11-8-2012 MINUTES

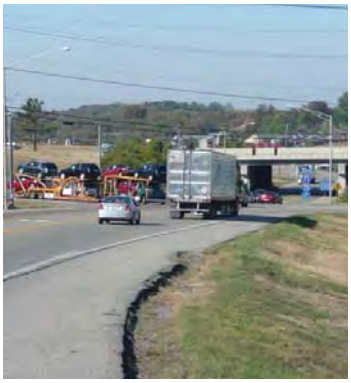
APPENDIX D – SOCIOECONOMIC ASSESSMENT BASE STUDY

I-71/I-75 – KY338

Socioeconomic Assessment Base Study







Project Item No. 6-18.00 | Boone County | January 2013

PREPARED BY

PARSONS

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PREPARED FOR:

KENTUCKY TRANSPORTATION CABINET

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I-71/I-75 – KY 338 (Richwood Road)

Interchange Improvement Project

Boone County, Kentucky

Item Number 6-18.00

Socioeconomic Assessment

January 2013

Prepared for:

Kentucky Transportation Cabinet

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1.0 INTRODUCTION

In 2011, the Kentucky Transportation Cabinet (KYTC) contracted with the Florence & Hutcheson/Parsons Team to undertake the Categorical Exclusion (CE) and supporting base studies for the KY 338 (Richwood Road) Interchange Improvement Project.

The approximately 307-acre study area, shown in Figures 1 and 2 in Appendix A is located at the KY 338 (Richwood Road) interchange at 1-71/1-75 (Exit 175), near the community of Richwood, Boone County, Kentucky. The proposed project involves five primary elements:

- The reconstruction of the KY 338 (Richwood Road) interchange with I-71/I-75 to a Double Crossover Diamond type interchange (DCDI) as recommended by the project Interchange Justification Study (IJS): 6-14.01 ("Interchange Justification Study," 2010)
- Improvements to the existing KY 338 (Richwood Road) intersection with US 25 (Dixie Highway) to address existing and projected operational issues.
- Grade separation of the KY 338 (Richwood Road) crossing of the Norfolk Southern Railroad and closure of the Shorland Drive crossing.
- The addition of auxiliary lanes to I-71/I-75 between the KY 338 (Richwood Road) interchange and the rest area to the north, including the widening of the I-71/I-75 bridge over Frogtown Road.
- Access management improvements, including the possible construction of new access roads, required to ensure that KY 338 (Richwood Road) operates efficiently.

Based on these improvements, the study area will consist of:

- KY 338 (Richwood Road) from 1,000 feet west of Triple Crown Boulevard to Duro Way (approximately 1.5 miles)
- US 25 (Dixie Highway) from 2,000 feet south of KY 338 (Richwood Road) to 2,000 feet north of KY 338 (Richwood Road) (approximately 0.75 miles)
- I-71/I-75 from 2,000 feet south of KY 338 (Richwood Road) to approximately 6,000 feet north of KY 338 (Richwood Road) (approximately 1.9 miles)
- The undeveloped and underdeveloped areas to the east of I-71/I-75 on either side of KY 338 (Richwood Road) that may be utilized for maintenance of traffic (MOT) during construction or for supplemental access roads.

Preparation of a socioeconomic base study is required for inclusion into the projects Categorical Exclusion (CE) document. The purpose of this document is to evaluate the project's potential to impact local land use, community facilities, neighborhoods, economic resources, and disadvantaged groups.

2.0 PURPOSE AND NEED

The needs for this project include improving safety, reducing congestion, and improving access to businesses. Selected alternatives shall balance the operational efficiency, safety, environmental impacts, constructability, and the availability of resources on state maintained

facilities. Other goals and objectives of the project include garnering support from project stakeholders and minimizing the environmental impact of the project.

The purpose of this project is to reconstruct the I-71/I-75 and KY 338 (Richwood Road) interchange to improve safety and reduce congestion and to develop and implement a comprehensive access management plan for KY 338(Richwood Road) between Triple Crown Boulevard and US 25 (Dixie Highway).

3.0 ALTERNATIVES

This project includes improvements to:

- The I-71/I-75 interchange at KY 338 (Richwood Road),
- I-71/I-75 between the Frogtown Road underpass and the KY 338 (Richwood Road) interchange,
- The KY 338 (Richwood Road) intersection with US 25 (Dixie Highway), and
- KY 338 (Richwood Road) between I-71/I-75 and Triple Crown Boulevard.

I-71/I-75 and KY 338 (Richwood Road) Interchange and I-71/I-75 Auxiliary Lanes: The existing KY 338 (Richwood Road) diamond interchange will be converted to a double crossover diamond interchange (DCDI). The DCDI takes the traffic that is heading westbound (which is normally on the north side of a road) and crosses it over to the south side of the road. It does the opposite for the eastbound traffic, taking them from the south side of the road to the north side. Once through the interchange, the lanes crossover again and return to a traditional configuration. By crossing over the travel lanes within the interchange, the left turn movements do not conflict with oncoming traffic.

On I-71/I-75, auxiliary lanes will be added to the north of the interchange to increase capacity and improve geometrics to facilitate passenger and truck traffic entering and exiting I-71/I-75. In the southbound direction, an auxiliary lane will be added to I-71/I-75 south of the existing bridge over Frogtown Road and will become an exit only lane at the KY 338 (Richwood Road) off-ramp. The northbound entrance ramp from KY 338 (Richwood Road) will be extended as an auxiliary lane, becoming an exit-only lane to the rest area north of Frogtown Road.

East Alternatives – KY 338/US 25 Intersection and Access Management: The project includes improvements to KY 338 (Richwood Road) east of its interchange with I-71/I-75 including access management measures, grade-separation or closure of the two at-grade railroad crossings, and modifications to the intersection with US 25 (Dixie Highway).

Alternative E1 – SPUI: This alternative converts the intersection of KY 338 (Richwood Road) and US 25 (Dixie Highway) into a Single Point Urban Interchange (SPUI). Both KY 338 (Richwood Road) and US 25 (Dixie Highway) will be widened to two lanes in each direction within the project limits. KY 338 (Richwood Road) will be routed under US 25 (Dixie Highway) and the Norfolk Southern Railroad, which will remain at roughly their existing elevations. US 25 (Dixie Highway) will be reconstructed from approximately Logistics

Boulevard to Duffel Lane, with two lanes in each direction. The Shorland Drive at-grade railroad crossing will be closed. A signal will be added at the Best Pal Drive intersection with KY 338 (Richwood Road) and Best Pal Drive will be extended to connect with Old Richwood Road; the Old Richwood Road intersection with US 25 (Dixie Highway) will be closed due to its proximity to the new SPUI. The geometric layout of Alternative E1 is shown on Figure 3 in Appendix A.

Alternative E3 – At-Grade Intersection: This alternative reconstructs the KY 338 (Richwood Road) and shifts its intersection with US 25 (Dixie Highway) to the south of its current location. The intersection will be an at-grade, signalized intersection, but will be lowered approximately 25 feet from its current elevation, allowing KY 338 (Richwood Road) to pass under the Norfolk Southern Railroad. Both KY 338 (Richwood Road) and US 25 (Dixie Highway) will be widened to two lanes in each direction within the project limits. East of US 25 (Dixie Highway), KY 338 (Richwood Road) will be realigned, connecting to Shorland Drive, just west of the fire station. Best Pal Drive will become a right-in/right-out intersection with KY 338 (Richwood Road). It will be extended north to provide access to Old Richwood Road and to Winning Colors Drive, both of which will retain access to US 25 (Dixie Highway) via stop-controlled intersections. The Truck Stops of America facility will be provided with right-in/right-out only access at KY 338 (Richwood Road), but will be provided a new access road to US 25 (Dixie Highway). The geometric layout of Alternative E3 is shown on Figure 4 in Appendix A.

West Alternatives – KY 338 (Richwood Road) Access Management: To ensure that the KY 338 (Richwood Road) interchange with I-71/I-75 continues to meet operational requirements, access management measures are required within the commercial district west of the interchange. These alternatives begin at the ramp intersections and continue to approximately 1,000 feet west of Triple Crown Boulevard.

Alternative W7: KY 338 (Richwood Road) will be widened to two lanes in each direction from the interchange to 1,000 feet west of Triple Crown Boulevard. The Paddock Drive and Triple Crown Boulevard intersections will be signalized. The existing Frogtown Connector and Clay Drive intersections will become right-in/right-out only. All direct business drives onto KY 338 (Richwood Road) in the area will be closed. The Paddock Drive intersection will become the primary access point for commercial businesses in the area. South of KY 338 (Richwood Road), a new access road will be constructed behind the businesses fronting on KY 338 (Richwood Road) terminating at the access drive to the storage facility. North of KY 338 (Richwood Road), Frogtown Connector will be realigned ("New Frogtown Connector") to terminate at Paddock Drive, where a new signal will be installed. West of Triple Crown Boulevard, KY 338 (Richwood Road) transitions back to its existing two lane configuration. The geometric layout of Alternative W7 is shown on Figure 5 in Appendix A.

Alternative W9: KY 338 (Richwood Road) will be widened to two eastbound lanes and three westbound lanes from the interchange to Triple Crown Boulevard. The Frogtown Connector, Paddock Drive, and Triple Crown Boulevard intersections will all be signalized. The existing Clay Drive intersection will become right-in/right-out only. All direct business drives onto KY 338 (Richwood Road) from the north side of the road will be closed. Only the BP gas station on the south side will retain right-in/right-out only access. At Paddock Road, the bank on the south

side of KY 338 (Richwood Road) will be displaced to provide an access road to adjacent businesses. West of Triple Crown Boulevard, KY 338 (Richwood Road) transitions back to its existing two lane configuration. The geometric layout of Alternative W9 is shown on Figure 6 in Appendix A.

4.0 LAND USE

Historical Land Use: The 1949 aerial photography of the project area reveals entirely rural land uses with fragmented wood lots and forested ravines. There was a relatively concentrated cluster of homes extending west along KY 338 (Richwood Road) from the intersection with US 25 (Dixie Highway). Prior to the construction of the I-71/I-75 interstate the main transportation corridor through the area was US 25 (Dixie Highway) and a rail line that ran approximately parallel to US 25 (Dixie Highway). The project area remained relatively unchanged through 1955. The 1960 aerial shows, what appears to be, the construction of I-71/I-75. The construction of the interstate and its interchange with KY 338 (Richwood Road) severed existing KY 338 (Richwood Road) leaving several homes and at least one business intact. These homes, most of which are now vacant, are still standing south of Old Richwood Road, the northeast quadrant of the current interchange. The 1969 aerial photography shows the I-71/I-75 facility and the development of the gas station/truck stop in the southeastern quadrant of the new interchange. Many of the rural subdivisions and some limited commercial development that exist in the northeast quadrant of the KY 338 (Richwood Road) interchange first appear in the 1979 aerials; these include: Richwood Villas, Heritage Trails subdivision, and the beginnings of Triple Crown subdivision. Also shown in the 1979 aerial is an increase in commercial development between I-71/I-75 and US 25 (Dixie Highway). The 1985 aerial shows the continued commercial development of the project area especially in the southwest quadrant of the interchange. Commercial development in the area of what would become Shorland Drive is beginning to appear in the 1989 aerials along with construction of a rail spur to access this area. Further development in this area continues through the 1993 and 1997 aerials and appears to be complete in the 2003 aerials. Historical aerials are included in Appendix A.

Baseline Conditions: A majority of the growth in Boone County is occurring adjacent to I-71/I-75. In addition, land use across the county is changing from predominately agricultural to residential and commercial. Most of the project area consists of commercial, industrial, residential, and agricultural development. Within the project area, the primary land use is currently transportation infrastructure (30%) followed by agricultural land (27%) and industrial areas (8%). Existing land use was provided by the Boone County Planning Commission and analyzed using a Geographic Information System (GIS). Table 1 lists the existing land use within the project area. Figure 7 in Appendix A further illustrates the existing land uses.

Table 1. Existing (2012) Land Use within the Project Area

Land Use	Approximate Percentage	Approximate Acreage
Agricultural	27%	83
Commercial	21%	64
High Suburban Density	<1%	1
Industrial	8%	23
Rural Density Residential	6%	18
Suburban Density Residential	<1%	1
Transportation	30%	93
Woodlands	7%	21

Source: Boone County Planning Commission

Project Compatibility with Existing Land Use Plans: The goals of the project and all build alternatives are consistent with the goals and objectives for development in the project area discussed in the 2030 Boone County Comprehensive. The entirety of the project area that is anticipated to see additional commercial development has already been zoned for commercial purposes and therefore this project and its associated indirect impacts are consistent with current land use plans. During coordination conducted for, and documented in, the IJS (2010) local officials have indicated that the completion of the KY 338 (Richwood Road) Interchange Project is consistent with plans to further develop the area into a regional distribution hub. As described in the Historic Land Use section which follows, high-density suburban residential, commercial, and industrial developments are occurring around the project area, prior to any changes being made to the existing transportation network.

Growth Inducement: The number of people living in Boone County is increasing. Overall, the population density for Boone County increased from 89 persons per square mile in 1960 to 383 persons per square mile in 2010 (Boone County Planning Commission, 2010). The 2010 Boone County Comprehensive Plan projects the rapid growth to continue, with the county's population increasing 121% from 85,448 people in 2000 to 188,652 people in the year 2030. This project will accommodate this growth trend while facilitating future growth in the county and within the immediate vicinity of the interchange. Specifically both eastern alternatives may contribute to the development of vacant land on the east side of the interchange by providing an improved access road connecting the proposed facility to existing businesses. The reconstructed interchange will improve safety and operational efficiency as the volumes grow and the access management measures will improve operations and mobility within the KY 338 (Richwood Road) corridor.

Cumulative and Indirect Impacts: A significant and beneficial indirect impact anticipated to result from implementation of the proposed project is the continued progression of this area as an attractive development site for businesses and industry. Residential development is also expected to increase in the project vicinity due to safer driving conditions and reduction in roadway congestion. According to the Boone County Comprehensive Plan, the project area by 2030 will lose nearly all of its agricultural uses while residential and industrial uses will almost double. An additional indirect impact that may occur is the change in land use as the urban area of Florence

expands toward the south and development of the industrial park continues. A cumulative impact that may result from the project is the continued conversion of open land to developed industrial, commercial, and residential areas. While many of these development trends are already occurring, this project will continue to facilitate this progression.

5.0 COMMUNITY RESOURCES

Neighborhood and community cohesiveness are contingent upon many factors. Age, income, and marital status can be influencing factors of community cohesion. In addition, minority and ethnic communities represent differing levels of cohesion. Schools, parks, and other public amenities (grocery stores, restaurants, etc.) also play a role in cohesion. Community cohesion can be viewed more simply as an established interdependency within a neighborhood where the community members have recognized interpersonal relationships with one another. In general well established neighborhoods have a greater potential to contain elements that may promote community cohesion.

Neighborhoods within or immediately adjacent to the study area that have the potential to contain elements that may promote community cohesion were identified. Neighborhoods identified included Heritage Trails Subdivision, Triple Crown Subdivision, Steeplechase Apartment Homes, and Richwood Villas. Figure 8 in Appendix A shows existing neighborhoods within the study area.

Of these neighborhoods Triple Crown Subdivision and Steeplechase Apartment homes contained elements of community cohesion such as community pools, tennis courts, and in the case of Triple Crown subdivision, a golf course. It should be noted that Heritage Trails Subdivision is connected to Triple Crown Subdivision via Secretariat Run and may share some of these resources.

Residential development east of I-71/I-75 is disjointed and interspersed within large scale commercial development severely limiting the potential for the development of community cohesion.

No homes would be displaced within these neighborhoods and no loss of access would occur under any of the build alternatives. Overall no loss of community cohesion is anticipated to result from this project.

Identification of Community Resources:

Community facilities and services were evaluated based on an expanded study area. This larger study area was defined as a 1,500 foot buffer of the study area defined in Section 1.0.

Community facilities and services include, but are not limited to: religious facilities (churches, mosques, synagogues, etc.), hospitals, schools, emergency facilities (fire, police, etc.), libraries, day-care centers, cemeteries, shopping centers, public transportation, and recreational properties (Section 4(f) properties).

Religious Facilities: There are no religious facilities located within the expanded study area.

Hospitals: No hospitals are located within the expanded study area.

Schools: One school district, Boone County Unified, is located within the expanded study area. There are no schools located within the expanded study area; however, schools within the above mentioned district may have bus routes that utilize this corridor (B. Crider, personal communication, e-mail, June 21, 2012). All correspondence is included in Appendix B

Fire Stations and Emergency Medical Services (EMS): One fire station is within the expanded study area. Walton Fire Station #2 is located at 261 Shorland Drive, within the industrial park. The proposed facility will maintain connectivity for emergency services in and adjacent to the study area. Emergency vehicles currently use either Shorland Drive or KY 338 (Richwood Road) to exit the industrial park. Both eastern alternatives propose eliminating access to US 25 (Dixie Highway) from Shorland Drive. This closure will require all emergency vehicles to use the reconstructed KY 338 (Richwood Road) intersection/interchange at US 25 Dixie Highway) to exit the industrial park.

This route revision is not likely to notably increase emergency response time within the study area or elsewhere in the county. The Shorland Drive intersection allows only right turns onto northbound US 25 (Dixie Highway), although emergency vehicles may be permitted to turn left. The intersection is also immediately adjacent to an at-grade crossing of the Norfolk Southern tracks, which carry 30+ trains per day. This creates both a safety risk for emergency vehicles as well as a delay risk if they were required to wait for a passing train. Further, the operations of the existing intersection of KY 338 (Richwood Road) and US 25 (Dixie Highway) is projected to deteriorate to LOS D and F in 2030 in the AM and PM peak periods, respectively. In contrast, Alternatives E1 and E3 are projected to operate at LOS B and C, respectively and should provide safe, efficient egress for emergency vehicles. Other response times will also be reduced as the proposed facility would provide for more efficient travel through the area. The build alternatives are anticipated to improve the level of safety for all vehicles traveling through the KY 338 (Richwood Road) interchange by improving capacity and overall Level of Service (LOS). Figure 8 in Appendix A shows the location of fire and EMS within the study area.

Libraries: There are no libraries located within the expanded study area.

Daycare Centers: One daycare center is located within the expanded study area. The Little Red School House, a pre-kindergarten learning center, is located at 11247 Paddock Drive. This property will not be directly impacted by the proposed improvements. Access to this daycare center will be similar to existing conditions with either western alternative. A concern was raised by some residents regarding the realignment of Frogtown Connector under Alternative W7. The new road would create a new intersection across from the daycare center and would increase the volume of traffic using Paddock Road to the south of the daycare.

Cemeteries: One cemetery, Carpenters Cemetery, is located within the expanded study area. This cemetery is located in the southwest quadrant of the intersection of US 25 (Dixie Highway) and Duffell Lane. While this cemetery is within the expanded study area it is not within the limits of construction for any of the proposed alternatives and no impact to this site is

anticipated. Anticipated noise levels will be predicted at this site in the Traffic Noise Impact Analysis.

Shopping Centers: Two retail shopping centers are located within the project area. One shopping center is located west of Clay Drive and one east of Clay Drive, both located to the north of KY 338 (Richwood Road) and behind other businesses that have frontage on KY 338 (Richwood Road). Alternative W7 would potentially modify the ingress and egress patterns for both shopping centers. Alternative W9 would have no direct impact on the shopping centers but would likely make accessing these resources easier. On October 17, 2012 KYTC staff met with the Richwood Business Association; at the meeting, association members raised concerns about the change in access to the shopping centers under Alternative W7.

Public Transportation: The Transit Authority of Northern Kentucky (TANK) services the project area with one bus route, the Walton Express route (Smartmaps, 2010). This route runs three times daily during the week using US 25 (Dixie Highway) through the study area. The TANK will receive advance notification of MOT plans and of any potential temporary closures during construction.

Police Stations: When incidents occur within the project limits, law enforcement in the project area is provided by either the City of Florence Police Department of the Boone County Sheriff's Office. No police or sheriff stations are located in the project area.

Parks: The Boone County Parks system has an extensive system of 20 unique parks throughout the county. None of these parks are located in the expanded study area adjacent to the build alternatives. Similarly, no public parks or recreational areas are planned in the study area.

Other recreational facilities within the study include community swimming pools, tennis courts, playgrounds, and a golf course. These resources are owned by and only available to residents and guests of the communities within which they lie. Access to these resources will not be affected by any of the build alternatives.

Impacts on Travel Patterns: Impacts to traffic patterns will be dependent on the combination of alternatives selected. The various impacts to travel patterns for the alternatives being considered are discussed below.

Alternative E1: Alternative E1 would extend Best Pal Drive to the north, connecting it to Winning Colors Drive, providing access to US 25 (Dixie Highway). A similar roadway would be constructed to the south of KY 338 (Richwood Road). The intersection of these two roads with KY 338 (Richwood Road) would be signalized; their intersections with US 25 (Dixie Highway) would be stop-controlled. Access to and from the two truck stops and other commercial business would be exclusively from these new service roads; existing access points to KY 338 (Richwood Road) would be removed. The new signalized intersection and interconnected service road system would improve access to existing businesses and future development sites in the area.

Alternative E3: Alternative E3 would create a similar service road system to Alternative E1; including a new signal at Best Pal Drive, with comparable benefits to access. Alternative E3 would, like Alternative E1, close Shorland Drive prior to its intersection with US 25 (Dixie Highway), requiring all industrial park traffic to utilize the new interchange at KY 338 (Richwood Road) and US 25 (Dixie Highway).

Alternative E3 would close Shorland Drive prior to its intersection with US 25 (Dixie Highway), requiring all industrial park traffic to utilize the improved KY 338/US 25 intersection.

Alternative W7: Alternative W7 would involve the reconfiguration of existing access roads within the commercial area north of KY 338. This reconfiguration would provide a more direct connection between Frogtown Connector and Paddock Drive, maintain access to existing businesses and eliminate the need for a signalized intersection at Richwood Road and Frogtown Connector. Traffic currently making a left onto Richwood from Frogtown connector would be routed to a signalized intersection at Paddock Drive. Access to KY 338 (Richwood Road) for businesses on the south side of KY 338 would be provided by a backage road connecting to a signalized intersection at Paddock Drive. At the October, 17 2012 meeting of the Richwood Business Association, which was attended by KYTC staff, concerns were raised regarding the alternative's impacts on accessibility to businesses on the north side of KY 338 (Richwood Road).

Alternative W9: The most noticeable impacts to travel patters associated with Alternative W9 would be the reconfigured right–in-only access points for the Shell and BP retail gas stations south of KY 338 (Richwood Road) and the new signal and access road at Frogtown Connector Road. This access road will provide enhanced mobility for traffic on Paddock drive to access businesses along Clay Drive.

Overall the proposed alternatives will greatly improve the overall flow of traffic throughout the study area. Any potential negative impacts to travel patterns during construction will be minor and temporary. Upon completion of the interchange reconstruction there will be no overall impacts to travel patterns. All alternatives propose utilizing a Double Crossover Diamond Interchange configuration. Motorists, including EMS and bus drivers, will need to use caution while adjusting to the revised traffic pattern through the interchange.

Economic Impacts: Economic impacts were considered based on a study area generally encompassing the dense retail district bordering KY 338 (Richwood Road) and the large commercial facilities along and east of US 25 (Dixie Highway). This project will have a net benefit on the economic vitality of the project area and on established business districts. Inadequate public capital formation, i.e, the lack of new highway facilities and inadequate maintenance levels are a main cause of inefficiencies and lost revenues. Along KY 338 (Richwood Road) an improved access road system will enhance ingress and egress to the established businesses. Improvements to US 25 (Dixie Highway) will facilitate truck access to the commercial distribution facilities to the south. The new service road system east of I-71/I-75 will provide improved access to areas that are proposed for development in the Boone County Comprehensive Plan and could accelerate their development. The addition of auxiliary lanes to I-

71/I-75 will improve the capacity of the facility and allow for better operation of the proposed interchange.

As described in Section 7 below, Alternative W9 would require the relocation of one business.

Mobility: All alternatives, through reconfigured roadways and improved traffic patterns will enhance the mobility of motorists and pedestrians throughout the project area. See Section 10.0 for a full discussion of pedestrian improvements.

Consultation with Community, City, or County Officials: This project includes an extensive public involvement program which started during the development of the IJS and will continue through construction. This program is designed to ensure that the public has numerous opportunities to learn about project developments and that the project team has the opportunity to learn about individual and community concerns. As the project progresses the project's website will serve an important role in the dissemination of information and the gathering of input (www.75crossings.com). As part of the public involvement program a public information meeting was held on November 29th, 2012 to introduce the public to the project. This meeting combined an open house format with a formal presentation. Comments from the public meeting will be summarized and addressed in the CE document.

To date agency coordination has included responses received to coordination letters sent out as part of the Ecological Assessment Report. Consultation with the community and city and county officials has consisted of a public information meeting, Boone County Quarterly Meetings, a meeting with the Richwood Business Association, and several meetings with individual property owners. During the public meeting, members of the community met with the design team and KYTC to address their concerns and answer questions about the project. This project was discussed during several Boone County Quarterly Meetings. Typical attendees to these meeting included the Boone County Economic Development Director, the County Planner, and County Engineer. A project representative has also attended a meeting held by the Richwood Business Association on October 17, 2012 in order to inform them of the alternatives under consideration. Coordination with agencies and local officials will likely continue throughout the project process.

Cumulative and Indirect Impacts: The proposed improvements will have positive and beneficial indirect impacts on community facilitates. Improved traffic flow will reduce response times for emergency services, improve access to retail centers, and provide safer bus routes for the local school district. The community facilities in the area will have sufficient capacity to handle growth documented in the Boone County Comprehensive Plan.

6.0 REPLACEMNT HOUSING/COMMERCIAL FACILITIES

Baseline Conditions: The area surrounding the KY 338 (Richwood Road) interchange is currently in a phase of continued growth with few vacant commercial facilities. As new businesses move into the area, the existing commercial facilities typically do not meet the needs of the new business so the business constructs its own facility on vacant parcels, which are still

plentiful. No residential relocations are required for this project so no replacement housing will be required.

As described in Section 7.0, one commercial business would be displaced under Alternative W9. Currently no facilities exist within the project area that would be a suitable replacement for the lost commercial business. However several currently undeveloped parcels exist within the study area that are zoned for commercial use and would be suitable for development of a replacement commercial facility.

Cumulative and Indirect Impacts: KYTC is developing the KY 536 (Mt. Zion Road) concurrently with the KY 338 (Richwood Road) project. The KY 536 (Mt. Zion Road) project may require the relocation of up to three businesses. There is some likelihood that these businesses would choose to relocate within the KY 338 (Richwood Road) project area. There are sufficient appropriate development parcels within the area to accommodate the relocations of both projects.

7.0 RELOCATIONS AND DISPLACEMENTS

Baseline Conditions: A secondary goal of the project is to minimize impacts on the local residential and business community. As shown in Table 2, Alternative W9 would require the relocation of a single business. No residential displacements would be required by any of the alternatives.

Table 2. Relocations for Each Alternative

Alternative	Residential Relocations	Commercial Relocations
E1	0	0
E3	0	0
W7	0	0
W9	0	1

Of the four feasible alternatives only one, W9, has the potential to relocate a commercial facility. The facility, a Huntington National Bank, is located at 287 Richwood Road and is estimated to have 15 employees. The Huntington Bank would be displaced by the construction of a new signalized intersection at Frogtown Road Connector, as shown on Figure 6 in Appendix A. Unique attributes of the current site include convenient access for customers, high visibility from the existing road, and safe traffic flow patterns for the drive-through and ATM banking. These attributes can be reasonably replicated by relocating the business to one of several vacant sites along Frontage Road. The vacant sites may be slightly less desirable from a convenience and visibility standpoint as these sites are slightly further removed from the existing road. The current location of this branch is ideally suited near a concentrated residential area, is on a major commuting route, and appropriately spaced between other branches. Due to these factors there is a strong likelihood that this branch would relocate within the immediate vicinity of the current location. The relocation of this branch to interchanges north of KY 338 (Richwood Road) would

put it in conflict with other existing branches. Relocating this branch to the south would isolate it from large residential centers. This potential relocation is not anticipated to result in a significant social, economic, or cultural loss to the community; however, if the bank were not able or willing to relocate in the immediate vicinity there may be a noticeable loss of convenient banking options in the area.

The Huntington Bank parcel would be removed from the tax rolls and become property of the state. The potential loss of tax revenue for the project area resulting from the projects potential displacement represents a very small percentage of the total tax base. The real estate tax impacts are minimal and likely to be offset by economic growth resulting from the improved transportation network in the corridor.

The potential relocation of this Huntington National Bank branch has the potential to cause the temporary unemployment of approximately 15 employees. This employee number was estimated based on research of similar facilities (Timothy H. Hannan & Gerald A. Hanweck, 2008). Since there are several other Huntington Bank branches within 10 miles of the relocated branch, it is likely that employees may be temporarily transferred to other branches.

Benefits would be made available for all commercial properties displaced by the proposed KY 338 (Richwood Road) Interchange Improvement Project in accordance with 42 USC 4601-4655, 49 CFR Part 24, Title VI of the Civil Rights Act of 1966. Mitigation measures for displaced businesses include moving expenses, retribution for direct loss of tangible property, and replacement property search. As described in Section 6.0, numerous vacant development parcels are available in the immediate area. Many of these parcels would be suitable locations for a new bank branch and it is anticipated that no unique barriers to relocation exist for this business.

This project will require no residential displacements. If as the design progresses, there becomes a need to acquire a residential property, relocation assistance and benefits would be made available to all individuals displaced in accordance with the following guidelines:

- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1964: United States Code (USC) Title 42, Articles 4601 through 4655 (42 USC 4601-4655)

- Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs: Code of Federal Regulations (CFR), Title 49, Subtitle A, Part 24 (49 CFR 24)

- Title VI of the Civil Rights Act of 1966

Cumulative and Indirect Impacts: If the Huntington Bank relocates to a new location (rather than close this branch entirely), it would accelerate the development of one commercial property. Given the availability of developable land in the immediate area, it is not anticipated that this would have any impact on the local real estate market. The relocation of the bank would also redistribute trips on the local roadway network. Assuming the new location is within an existing commercial area suitable for this type of business, the number of daily trips to the facility is unlikely to cause a substantive impact on the roadway network.

Competing Projects/Economic Development: According to the Ohio, Kentucky, Indiana (OKI) Regional Council of Governments 2012-2015 Transportation Improvement Program (TIP) and KYTC Statewide Transportation Improvement Program (STIP) there are several projects that could potentially compete with this project for relocation sites. These projects are as follows;

- KY 536 (Mt. Zion Road) widening Limits from Hathaway Road to I-75, including 500 ft. north and south of the KY 536/US42 intersection and 500 ft. north along Gunpowder Road
- Reconstruction of the I-71/I-75 Interchange with KY 536 (Mt. Zion Road)
- Added Auxiliary Lanes from KY 536 (Mt. Zion Road) to US 42.

The KY 536 (Mt. Zion Road) interchange project currently has the potential to relocate up to three businesses. Neither of the other projects is anticipated to require any relocations. These businesses, if they are forced to relocate as a result of the KY 536 (Mt. Zion Road) project, may put pressure on the availability of vacant parcels in the KY 338 (Richwood Road) project area.

The 2010 Boone County Comprehensive Plan recommends that commercial growth on the west side of the interchange should be adequately buffered from existing and planned residential uses. There are currently vacant parcels north of Frontage Road between the commercial areas associated with the interchange and the residential communities. Use of these parcels as potential relocation sites would eliminate the recommended buffer between the commercial and residential areas.

Alternative Descriptions:

Alternative E1 –Alternative E1 will not require displacement of any residential or commercial structures and maintain access via the new signal at Best Pal Drive and the new service road network to all existing businesses by maintaining the existing access points for the commercial properties north and south of KY 338 (Richwood Road).

Alternative E3 –Alternative E3 will not require displacement of any residential or commercial structures and will maintain access to all existing businesses via the new signal at Best Pal Drive and the new service road network.

Alternative W7 - Alternative W7 will not require displacement of any residential or commercial structures and will maintain access to all existing businesses via access roads connecting Frogtown Connector to Paddock Drive and a new backage road behind the businesses fronting the south side of KY 338.

Alternative W9 - Alternative W9 will require the displacement of one commercial property. At Paddock Road, the bank on the south side of KY 338 (Richwood Road) will be displaced to provide access to adjacent businesses. Potential problems that may be realized when trying to relocate the bank may include finding an appropriate site with suitable ingress/egress patterns, and locating a site that has comparable visibility from the proposed facility. Several undeveloped sites exist along Frontage Road north of KY 338 (Richwood Road). While these sites may not

provide comparable visibility to the existing facility the site would be able to be configured to allow for adequate ingress/egress movements.

8.0 FARMLAND

Baseline Conditions: Historically, agriculture has played a central role in the economy of Boone County. Like many of the surrounding counties, Boone County has relied upon soybeans, corn, wheat, tobacco, hay, cattle, and hogs to support its agricultural economy. Over the last half century, urban development (residential, industrial, and commercial) has spread throughout the area surrounding Cincinnati and Covington, reducing the amount of land available for agriculture.

Current zoning can be used to predict future development of agricultural land. Within the project corridor the majority of the land currently zoned as agricultural is not currently being used for row crops or pasture. One parcel at the northern end of the project, north of Frogtown Road, appears to be used as a nursery. Field surveys have not identified any impacts to land currently in agricultural production. Zoning and associated potential developments are discussed in Section 4.0.

Acres Impacted: Depending on the combination of alternatives selected, impacted farmland acreage will vary. For the purposes of this study the combination of alternatives with the largest overall footprint was presented to the United States Department of Agriculture Natural Resource Conservation Service (USDA-NRCS) . The USDA-NRCS has identified 14.5 acres of prime and unique farmland and 10.8 acres of statewide important or local important farmland within the footprint.

Farmland and Prime Farmland Impacts: Prime farmland soils exist within the study area. As defined by the USDA, Natural Resources Conservation Service (NRCS), prime farmland is “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (i.e., land that could be cropland, pastureland, rangeland, forest land or other land but not urban built-up land or water).” These soils must also be protected from flooding and not be susceptible to ponding for long periods of time in order to be considered prime farmland. Soil types and quantities within the study area are shown in Table 4.

Table 3. Soil Summary by Map Unit

Map Unit Symbol	Map Unit Name	Rating	Acres in Study Area
FcC	Faywood Silty Slay Loam, 6 to 12 percent slopes slopes	Farmland of statewide importance	17
FcD	Faywood Silty Slay Loam, 6 to 12 percent slopes slopes	Not prime Farmland	83
FdD3	Faywood silty clay, 12 to 20 percent slopes, severely eroded	Not prime Farmland	43
NIB	Nicholson silt loam, 0 to 6 percent slopes	All areas are prime farmland	59
NIC	Nicholson silt loam, 6 to 12 percent slopes	Farmland of statewide importance	26
RsB	Rossmoyne silt loam, 0 to 6 percent slopes	All areas are prime farmland	34
RsC	Rossmoyne silt loam, 6 to 12 percent slopes	Farmland of statewide importance	40

Source: USDA-NRCS Web Soil Survey

AD1006: As required by the Farmland Protection Policy Act (FPPA), the Farmland Conversion Impact Rating Form (Form NRCS AD-1006) was submitted to the NRCS Boone County Field Office. The USDA Farmland Conversion Impact Rating Form provides a summary of the anticipated disturbed acreage for each alternative. This form was submitted to the NRCS for their input and is shown as Figure 9. The combined impacts of the two alternatives that would have the most potential to impact prime farmland were evaluated in the AD-1006. The combination of these build alternatives received a total corridor assessment value of 116, less than the 160 points required to consider alternative Actions (e.g. alternate routes, alternative interchange configurations, etc.) that could reduce adverse impacts associated with the build alternatives. In an e-mail received on November 19, 2012, the District Conservationist for Boone County concluded that since the project area is already designated as “committed to development” no prime farmland conversion is taking place. (G. Steverson, personal communication, November 19, 2012). All correspondence is included in Appendix B.

Cumulative and Indirect Impacts: Further development of open land east of the interchange is likely as the growth of commercial development continues in this area. If future development continues, the need for new vacant land may increase the likelihood for potential farmland to be converted to residential and commercial uses. This potential for cumulative and indirect impacts to farmland would be roughly equal for each alternative.

Figure 9. Farmland Impact Conversion Rating Form

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 11/12/12			
Name of Project KY 338 (Richwood Raod) Interchange		Federal Agency Involved Federal Highway			
Proposed Land Use Highway ROW Transportataion		County and State Boone County, Kentucky			
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 11/12/12		Person Completing Form:	
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ✓ NO ☐	Acres Irrigated		Average Farm Size 101	
Major Crop(s) Corn, Hay	Farmable Land In Govt. Jurisdiction Acres: 97,308 % 63.32	Amount of Farmland As Defined in FPPA Acres: 68,32[illegible] % 43.8			
Name of Land Evaluation System Used NRCS - Boone Co.	Name of State or Local Site Assessment System -	Date Land Evaluation Returned by NRCS 11/19/12			

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	47.0			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	47.0			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	14.5			
B. Total Acres Statewide Important or Local Important Farmland	10.8			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	.0003			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	.40			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	83			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	10			
2. Perimeter In Non-urban Use	(10)	5			
3. Percent Of Site Being Farmed	(20)	3			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	0			
6. Distance To Urban Support Services	(15)	10			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	4			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	1			
TOTAL SITE ASSESSMENT POINTS	160	33	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	83	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	33	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	116	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

9.0 ENVIRONMENTAL JUSTICE (EJ)

In accordance with Executive Order 12898 (February 11, 1994), population and income data were summarized (Sections 6.1) and assessed for relevance to potential EJ concerns. According to the Federal Highway Administration's publication FHWA-EP-00-013, EJ has three fundamental principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Baseline Conditions:

Population: The 2000 population of Boone County was 85,991 according to US Census data. It increased 28% to 118,811 in 2010. During the same decade the population of Kentucky increased 4.7%. In 2010 the study area (represented by Census Tracts 706.06, 705.05, and 706.07) had a population of 13,466.

Population projections for the labor market area (Boone, Campbell, Gallatin, Grant, Kenton and Pendleton Counties in Kentucky; Clermont, Hamilton, and Warren Counties in Ohio; and Dearborn and Ohio Counties in Indiana) are shown in Table 5 to demonstrate anticipated growth.

Table 4. Population Projections

Area	2010	2015	2020	2025	2030
Labor Market Area	1,685,600	1,743,794	1,798,762	1,842,239	1,885,971
Northern Kentucky	368,867	391,090	414,033	435,566	455,700

Source: Stats Indiana (http://www.stats.indiana.edu/pop_proj/), Kentucky State Data Center (http://ksdc.louisville.edu), and Ohio Development Services Agency (http://development.ohio.gov/)

Age: In 2010, the largest ten-year age group in Boone County was 5-14 (18.0%) followed by 35-44 years (15.8%). The smallest age groups were the older citizens in the 85+ age group (0.5%) followed by the 75-84 (2.5%). All other ten-year age groups fall between these percentages. All age groups were evenly dispersed with regard to gender.

Ethnic Characteristics: According to the 2010 Census the ethnic diversity of Kentucky is 87.8% white, 7.8% black, 3.1% hispanic and 1.3% other races. Boone County has a population of 118,811 people, of which 9,761 (8.2%) were non-white. The ethnic diversity of the study area is 12,811 (95.1%) white, 154 (1.1%) black, and 502 (3.7%) other races. Additional data in Table 2 shows similar ethnic diversity trends for Northern Kentucky and the Labor Market Area.

Table 5. Population Distribution 2010

	Northern Kentucky		Labor Market Area		Study Area	
	Population	Percentage	Population	Percentage	Population	Percentage
White	339,659	92.4%	1,375,039	81.9%	12,810	95.1%
Black	12,641	3.4%	228,483	13.6%	154	1.1%
Asian, Pacific	4,734	1.3%	31,443	1.9%	252	1.9%
American Indian	648	0.2%	3,209	0.2%	18	0.1%
Hispanic Origin	9,925	2.7%	39,875	2.4%	215	1.6%

Source: U.S. Department of Commerce, Bureau of the Census, 2010

Housing Characteristics: In 2010, Boone County had 46,260 year-round housing units of which 42,140 (91.1%) were occupied, leaving 4,120 (8.9%) for sale or rent (Table 6). Of the occupied housing units, 31,971 (75.9%) were owner-occupied and had a median value of $182,300. The remaining housing units, 10,169 (24.1%) were renter-occupied, with median rent of $843 per month.

Boone County shows a strong growth trend with a higher percentage of houses being built after 1969, 84.8%, than the state percentage of 62.8%. The number of housing units in Boone County built before 1940 was 1,436 (3.1%) compared to 221,084 (11.5%) statewide. Census tract information shows that the most commonly owned price range for houses in Boone County was $200,000 to $299,000 with 8,751 (27.4%) houses. The second most common price range was $150,000 to 199,999 with 7,574 (23.7%) homes. Housing characteristics are shown in Table 5.

Table 6. Housing Characteristics

	Kentucky	Boone County
Total Housing Units	1,928,617	46,260
Occupied Housing Units	1,684,348	42,140
Median Housing Value	121,600	182,300
Median Rent Value	613	843
Housing Units built after 1969 (%)	*62.8%*	*84.8%*

Source: General Housing Characteristics, U.S. Census Bureau, Census, 2010

Labor Force and Employment: The Boone County labor market area had an estimated labor supply of 63,131 persons available for work in 2010. This included 3,562 people who were unemployed. Employment in agriculture related areas is 0.7% of the labor force in Boone County. As previously stated, the labor force for Northern Kentucky and labor market area is expected to increase.

In 2010, Northern Kentucky's rate of unemployment was 10.2%, while Kentucky's was 10.5% (Table 7). Northern Kentucky and its respective labor market area have a slightly higher unemployment rate than the statewide average in Kentucky and the national average in the U.S.

Table 7. Unemployment Rate from 2006 to 2010 (%)

Year	Northern Kentucky Labor Market Area	Kentucky	U.S.
2006	4.9	5.7	4.6
2007	4.7	5.5	4.6
2008	5.8	6.4	5.8
2009	9.7	10.5	9.3
2010	10.2	10.5	9.6

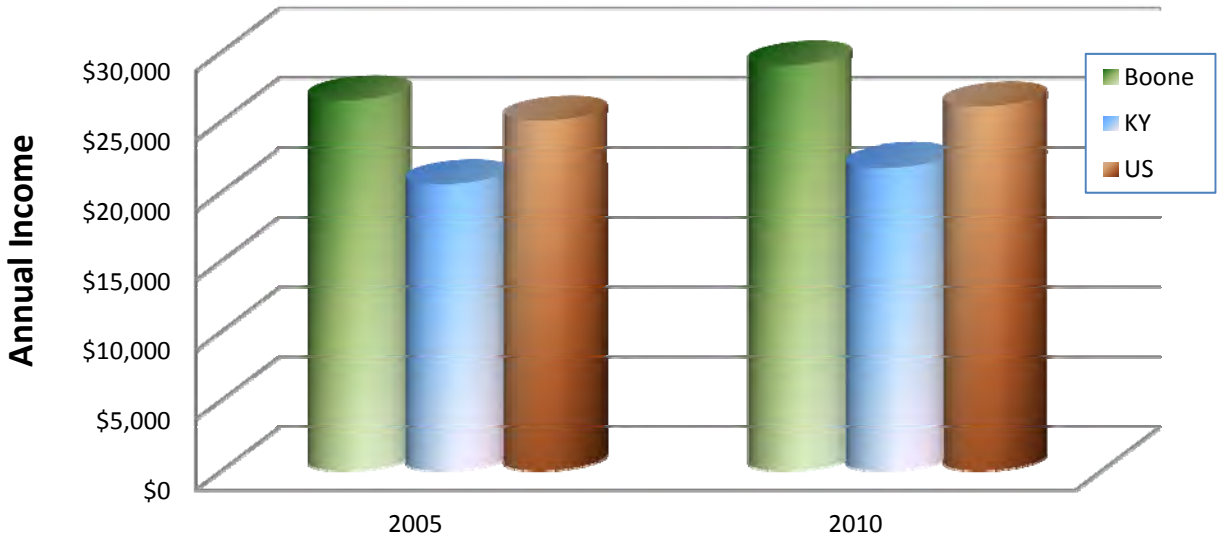
Source: Kentucky State Data Center, University of Louisville and Kentucky Cabinet for Economic Development, 2010

In 2010, the educational services, and health care and social assistance category was the major source of employment in Boone County with 12,362 (20.8%) employees; the manufacturing category was next with 7,868 (13.3%) employees; and retail trade accounted for 7,242 (12.2%) employees. Fidelity Investments is currently the top private sector employer in the county. Other large employers in the area are Comair, Toyota Motor Engineering and Manufacturing, Citicorp Credit Services, and Schwans Global Supply.

In 2009, Boone County had 2,874 business establishments. Retail accounted for 463 (16%) of the businesses; Construction 278 (10%); Other 249 (9%); Hospitality 270 (9%); and Health Care 229 (8%).

Per Capita Income: Per capita personal income in Boone County increased 9.5% from $26,494 in 2005 to 29,010 in 2010. The state had an increase of 5.6% and the US had an increase of 4.1% during the same period. The per capita personal income of Boone County is above both the state and national average (Figure 10). Individuals below the poverty level increased between 2000 and 2010 in Boone County from 5.5% to 11.2% and in Kentucky from 15.4% to 19.0%. Census Tract data for Boone County shows $75,000 to $99,000 income was the most common, with 7,999 (19.0%) households. The second most common income bracket was $50,000 to $74,999 with 7,294 (17.3%) households in 2010.

Figure 10. Per Capita Income Comparison between 2005 and 2010

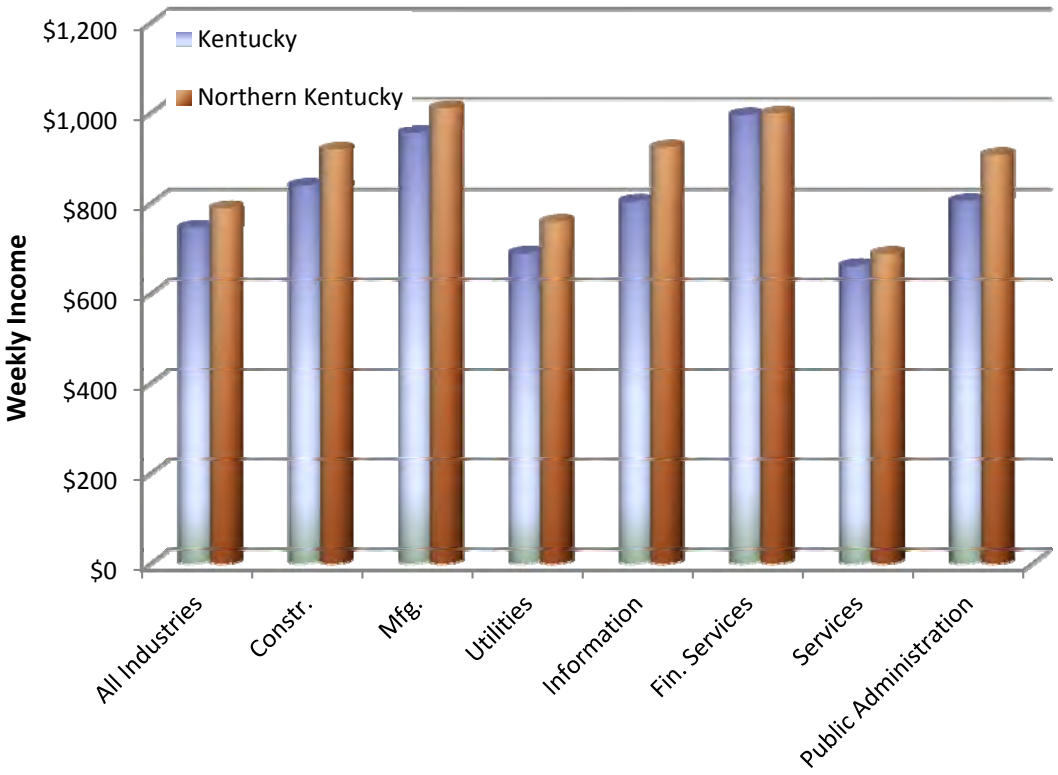


Source: Kentucky Cabinet for Economic Development, 2010

Figure 11 shows a comparison of the average weekly wages for various industries in Northern Kentucky and the state of Kentucky in 2010. Except for mining, the average weekly wages in Northern Kentucky are generally better than wages throughout the state.

Impacts: This project will not require the relocation of any residential properties. Since no residential relocation will be required, disproportionate adverse impacts to low-income or minority populations will not be realized. Overall, the project will improve circulation and safety in the project area for all users.

Figure 11. Comparison of Average Weekly Wages, 2010



Source: Kentucky Cabinet for Economic Development, 2010

10.0 PEDESTRIAN AND BICYCLE FACILITIES

Existing facilities: Existing KY 338 (Richwood Road) is a Urban Arterial roadway facility that accommodates high traffic volumes and a high percentage of trucks; therefore, it does not mix pedestrian traffic with vehicle traffic. Currently there is a sidewalk on the north and south side of KY 338 (Richwood Road) at the western limit of the study area. The sidewalk on the north side connects Triple Crown Boulevard to Frogtown Connector and much of the retail development in between. On the south side of KY 388 (Richwood Road) the sidewalk extends from a residential just west of Paddock Drive to approximately Frogtown connector. The current facility utilizes a curb and gutter drainage system through the majority of the study area with no shoulders, severely limiting the existing facilities' potential for bicycle/pedestrian use. There are no current trails or greenways in the study area. In the OKI Bike Route Guide, KY 338 (Richwood Road) from Triple Crown Boulevard through US 25 (Dixie Highway) is categorized as "Not Recommended for Bicycle Travel". This guide also lists US 25 (Dixie Highway) as an "Alternate Bike Route" that should be used with caution because of traffic and/or terrain.

Opportunities to enhance: All of the build alternatives (E1, E3, W7, and W9) would provide bicycle and pedestrian access throughout the KY 338 (Richwood Road) corridor, continuing under I-71/I-75. This access would be accomplished using eight-foot and five-foot sidewalks connecting to the existing sidewalk network on the west side of the project. Where sidewalks intersect roadways, ramps compliant with the Americans with Disabilities Act (ADA) will be utilized.

Alternative W9 includes a sidewalk on the south side of KY 338 (Richwood Road) starting at Triple Crown Drive to the west and continuing through the interchange. On the north side of KY 338 (Richwood Road) a sidewalk will be provided starting at an existing footpath originating in the Triple Crown Subdivision. From the footpath the sidewalk will continue east crossing Paddock Drive, Clay Drive, and Frogtown Connector Road. At Paddock Drive and Frogtown connector Road connections will be provided to existing and future pedestrian facilities. The locations of the sidewalks proposed under Alternative W9 are shown in Figure 6 in Appendix A.

Alternative W7, like alternative W9 includes a sidewalk on the south side of KY 338 (Richwood Road) staring at Triple Crown Drive to the west and continues through the interchange under I-71/I-75. On the north side of KY 338 (Richwood Road) a sidewalk will be provided starting at an existing footpath originating in the Triple Crown Subdivision. From the footpath the sidewalk will continue east crossing Paddock Drive, Clay Drive, and Frogtown Connector Road. Alternative W7 also provides a sidewalk along the south side of the access road that runs behind the businesses fronting KY 338 (Richwood Road). Connections between these two sidewalks are provided along Frogtown Connector Road and Paddock Drive. The locations of the sidewalks proposed under Alternative W7 are shown in Figure 5 in Appendix A.

The proposed sidewalk will continue through the interchange on the south side of the crossover lanes.

Sidewalks proposed for Alternatives E1 and E3 both start at the eastern terminus of Alternatives W7 and W9. From that point both alternatives continue the sidewalk to US 25 (Dixie Highway). At US 25 (Dixie Highway) the sidewalk splits and runs north and south along the west side of US 25 (Dixie Highway). From the junction of US 25 (Dixie Highway) the proposed sidewalk also continues east under the railroad and into the commercial development.

Cumulative and Indirect Impacts: As previously discussed, the existing KY 338 (Richwood Road) interchange does not provide for pedestrian and/or bicycle movement along or across the facility. Therefore this project will serve to enhance existing pedestrian and bicycle facilities by constructing new sidewalks. By providing access through the interchange this project has the potential to spur construction of additional pedestrian facilities on future adjacent projects.

11.0 VISUAL IMPACTS

Baseline Conditions: Visual and aesthetic resources were identified by examining the existing visual corridor and the proposed plans for each alternative. The visual corridor takes into account the entire landscape. For the purposes of the KY 338 (Richwood Road) Interchange Project, the visual corridor includes two main aspects: views to the proposed facility and views from the

proposed facility. Views to the proposed road include what is seen from a fixed vantage point where the visual corridor is viewed on a repetitive basis by residents, drivers, or pedestrians. Views from the road are experienced by roadway travelers, such as commuters, haulers, or tourists. As roadway travelers, these viewers have a broader exposure to the visual corridor than adjacent residents.

Figure 12. Project Area Photographs





The visual corridor of the existing facility, west of I-71/I-75, is characterized by concentrated commercial/retail development and mostly scattered individual home sites with some planned residential development (subdivisions). The visual corridor east of I71/I-75 is dominated by fast food restaurants, retail gas stations/truck stops, vacant lots, and commercial distribution centers.

View to/from Proposed Facility: Views to the road and from the road were examined to determine the impacts to visual resources associated with the proposed alternatives.

Views to the roadway from existing commercial and residential properties would change to include a widened road and additional sidewalks in certain areas. Views from the proposed facility would remain similar to existing conditions with the exception of additional retaining wall that would be required for an access road associated with Alternative W7 (see Figure 12). This retaining wall would allow for an access road to be constructed between the retail/commercial development and the storage facility on the south side of KY 338 (Richwood Road).

The Single Point Urban Interchange (SPUI) at KY 338 (Richwood Road) and US 25 (Dixie Highway) included in Alternative E1 would occupy more area than the current at-grade intersection, bringing the road closer to neighboring properties. The combination of this new interchange and lowering KY 338 (Richwood Road) under the existing railroad grade changes the view from the road through this section. The view from KY 338 (Richwood Road) through this underpass section will be dominated by retaining wall on either side of the road. Grade changes associated with the underpass of KY 338 (Richwood Road) under the railroad will also affect views across the roadway from the businesses near the proposed underpass. This interchange is in an urbanized industrial area and any potential change will not change the current setting.

Cumulative and Indirect Impacts: Cumulative and indirect impacts to the visual landscape resulting from the project will be dependent on any additional commercial businesses that may develop within the project area. Potential development would alter the landscape by removing trees, shrubs, and grasses replacing them with commercial buildings.

12.0 CONSTRUCTION ACTIVITIES

As noted in previous sections, there are several environmental impacts that could result during construction activities. These impacts could be controlled, minimized, or mitigated through careful construction practices and methods. General construction impacts associated with the build alternatives are outlined in subsequent sections.

Waste and Borrow Sites: The locations of borrow and waste disposal sites are generally not known until the project is let for construction. In general practice, the contractor selects the sites on a case by case basis. Contractors must comply with all permitting requirements for borrow locations, and follow other applicable KYTC Standard Specifications. Based on current design estimates all alternatives will result in a net waste of material totaling 31,000 cubic yards (cy) for Alternative E1, 28,000 cy for Alternative E3 108,000 cy for Alternative W7, and 75,000 cy for Alternative W9. Prior to their use, these sites would be assessed for impacts to resources such as archaeological resources, wetlands, streams, etc., and appropriate measures would be employed to avoid or minimize impacts, if any. If impacts were to occur, the contractor, with KYTC oversight, would obtain required permits. Due to the cost of mitigation that is often required when using sites that would result in impacts to resources, contactors often elect to identify and choose other sites in a different location that would avoid the impacts. Solid waste generation resulting from construction should be short-term and confined to the vicinity of the project area. In most cases the construction contractors use existing agricultural fields near the construction sites for borrow/waste sites as they are much easier to use and have low potential to impact protected environmental resources.

Dust, Noise, and Erosion Control: Construction activities could have a short-term impact on air quality conditions if uncontrolled. Dust (particulates) is the pollutant of primary concern during construction activities. Smoke associated with the potential burning of cleared vegetation or other solid waste is another concern.

Dust can be generated in association with excavation and earth moving, cement, asphalt and aggregate handling, heavy equipment operation over haul roads, and wind erosion of exposed areas and material storage piles. Local weather conditions and level of operation would play a significant role in the amount of dust generated.

An increase in project area noise levels would occur during roadway construction activities. Land uses that would be sensitive to vehicular noise would also be sensitive to construction noise. The actual level of noise impact during this period, however, would be a function of the number and type of equipment used, proper maintenance of the construction equipment, and type of construction activities.

Control of erosion from the construction site and the retention of siltation on the site are the two principal concerns of drainage related construction impacts. Additional concerns during construction are disturbances related to noise and dust. These impacts can be minimized through erosion and sediment control measures referred to as Best Management Practices (BMPs). Using prescribed measures, erosion, sedimentation, noise and dust can be significantly reduced at or near the construction sites(s). These erosion and sediment control measures would likely become permanent features in the roadway construction.

The selected contractor will be required to follow KYTC Standard Specification and local regulations regarding dust, noise, and erosion control.

During construction, traffic will be maintained by altering traffic patterns to accommodate construction activities. Detailed Maintenance of Traffic (MOT) plans will be prepared during the final design of the project. As design progresses coordination with local officials will be undertaken to minimize the impact on public services such as emergency facilities and bus routes.

13.0 SECTION 4(f) RESOURCES

Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 (49 USC 303) requires DOT agencies to avoid impacts to Section 4(f) properties unless there are no feasible and prudent alternatives for avoiding the use of the property. Public parks, public recreation areas, wildlife and waterfowl refuges, and historic sites can be Section 4(f) resources. For purposes of Section 4(f), a historic site is significant only if it is on or eligible for the National Register of Historic Places (NRHP), unless FHWA determines that the application of Section 4(f) is otherwise appropriate.

No recreational or refuge properties currently exist within the project area. One historic property, the Richwood General Store, located in the northwest corner of the intersection of Old Richwood road and US 25 (Dixie Highway), was found to be eligible for listing on the NRHP. Alternatives E1 and E3 would each require a small strip of right of way from this site. Impacts to this site and full documentation of the project's effect under Section 106 of the National Historic Preservation Act and Section 4(f) will be prepared separate from this report.

14.0 SECTION 6(f) RESOURCES

A search of the National Park Service Database identified 15 resources within Boone County purchased with or improved by Land and Water Conservation Fund (LWCF) grants. The search confirmed that none of these resources would be affected by any of the alternatives. This project will not impact property acquired or improved via LWCF grants.

15.0 SAFETY

List of Road Deficiencies: The I-71/I-75 KY 338 (Richwood Road) interchange exhibits crash rates higher than the statewide average for similar roadways. A majority of those crashes are types, rear end and angle, that are consistent with those typically found in areas with high

congestion. By reducing congestion, it is anticipated that these types of crashes will be reduced as well.

Crash Analysis: The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. The analysis compared observed crash rates against statewide critical crash rates for comparable facilities to obtain a Critical Rate Factor (CRF). A CRF that exceeds 1.0 indicates that the number of crashes exceeds the number that should occur on that roadway, and is considered to be a high crash location.

On KY 338 (Richwood Road), the entire segment from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of one, with the highest CRF being exhibited between the I-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. The CRF drops to below one west of the Frogtown Road Connector. The most frequent type of crash was rear end crash with 37 percent, followed by angle crashes at 26 percent. Overall, 82 percent of the crashes on KY 338 in the study area occurred during the day and 79 percent under dry conditions.

Parsons reviewed crash data for three intersections on US 25 (Dixie Highway): (1) Shorland Drive/Winning Colors Drive, (2) KY 338 (Richwood Road), and (3) Logistics Boulevard. Crash data was obtained from KYTC and compared to average and critical crash rates for comparable intersections documented in the September 2009 University of Kentucky research report, "Analysis of Traffic Crash Data in Kentucky (2004-2008)". The US 25 (Dixie Highway) intersection with KY 338 (Richwood Road) exhibits a CRF of 3.7, indicating a location of concern. The intersection experienced a total of 66 crashes over the three-year study period. Angle, backing, rear-end, and sideswipe-same crashes each accounted for approximately 20 percent of all crash types. Overall, 61 percent of the crashes at this intersection occurred during the day and 88 percent under clear or cloudy conditions. The other two intersections had CRFs below 1.0.

Crime Rate: From 1999 to 2007 reported crime in Boone County has grown by 52%. During that same timeframe violent crime has risen by 88%. This project is not anticipated to have a negative effect on the crime rate of Boone County.

Cumulative and Indirect: The build alternatives are anticipated to improve the level of safety for motorists traveling though the corridor by improving signalized traffic flow and providing roadway geometrics more suitable for the large number of trucks that use this interchange.

16.0 SUMMARY

Overall this project is anticipated to have a long term net benefit on socioeconomic resources in the study area. With the exception of a single business relocation associated with Alternative W9 this project will benefit the socioeconomic vitality of the area. The short term construction impacts and potential relocation of one business is a minor impact when compared to the long-term employment and productivity benefits for Boone County, and the State of Kentucky.

Table 8. Socioeconomic Impact Matrix

Socioeconomic Criteria	Build Alternatives						No-Build
	W-7	W-9	DCD	E-1	E-3	Aux Lanes	
Compatible with Local Land Use/Development Plans	Yes	Yes	Yes	Yes	Yes	Yes	No
Community Resources	Low	Low	Low	Low	Low	Low	Medium
Employment Impacts	0	15	0	0	0	0	0
Relocations and Displacements	0	1 (Comm.)	0	0	0	0	0
Farmland	Low	Low	No-Impact	Low	Low	No-Impact	No-Impact
Environmental Justice	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact
Compatible with Local Bike/Pedestrian Plans	Yes	Yes	Yes	Yes	Yes	Yes	No-Impact
Visual Impacts	Low	Low	Low	Low	Low	Low	No-Impact
Construction Activities	Low	Low	Low	Low	Low	Low	No-Impact
4(f) Resources	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact
6(f) Resources	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact	No-Impact

17.0 REFERENCES

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Kentucky Cabinet for Economic Development. (n.d.). *Personal Income*. Retrieved from http://www.thinkkentucky.com/EDIS/cmnty/cmntyindex.aspx?param=1

Kentucky Transportation Cabinet, (2010). *Interchange Justification Study for I-71/I-75 at KY 536 and KY 338* (Item 6-14.01). Retrieved from website: http://75crossings.com/ky-338/documents/

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Ohio, Kentucky, Indiana (OKI) Regional Council of Governments. (2011). *Fiscal Years 2012-2015: Transportation Improvement Program.*

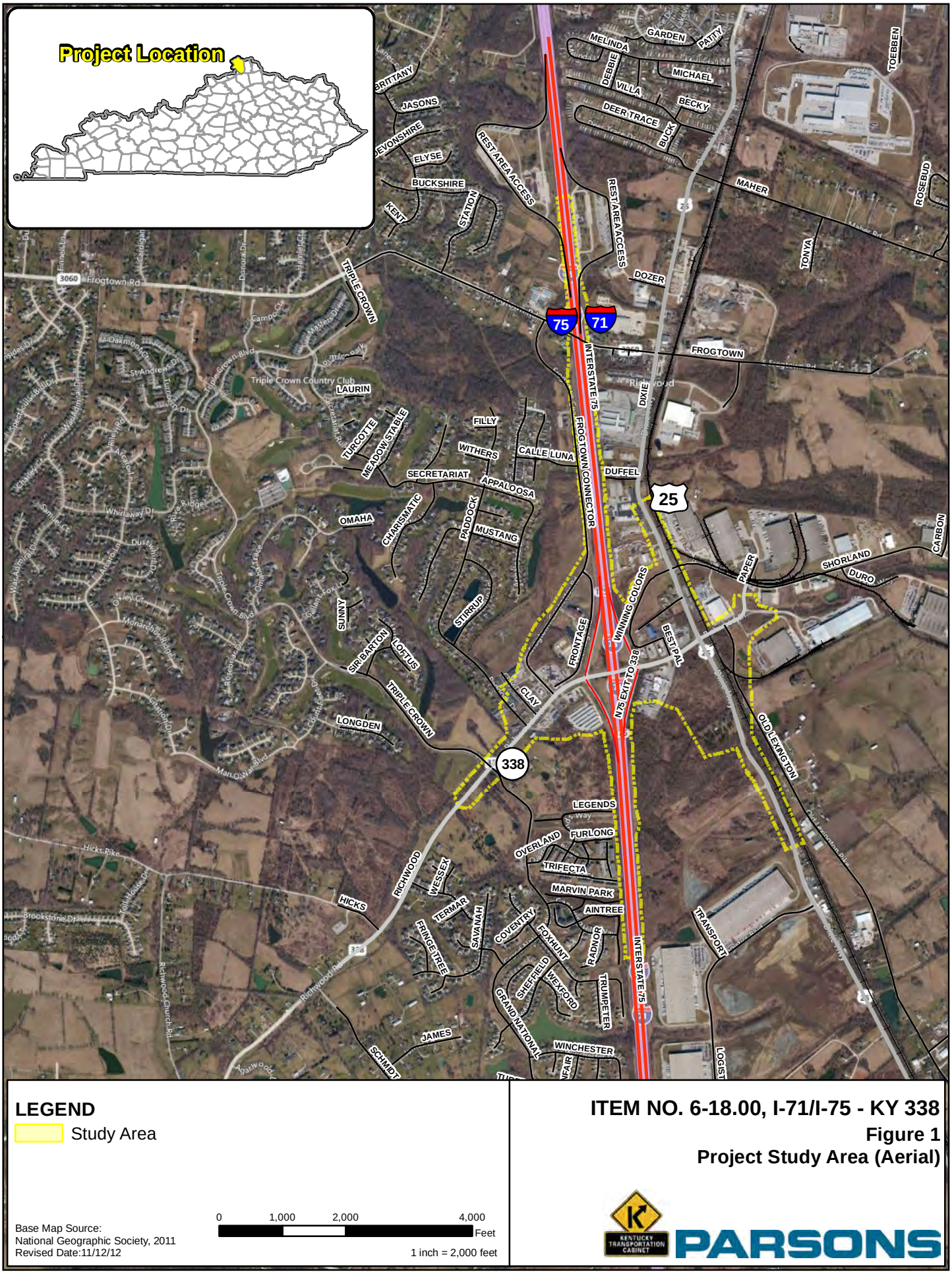
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed [10/4/12]

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United States Department of Commerce. (2012). Retrieved from http://2010.census.gov/2010census/popmap/ipmtext.php?fl=21

Appendix A

GRAPHICS



LEGEND

Study Area

Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

ITEM NO. 6-18.00, I-71/I-75 - KY 338

Figure 1

Project Study Area (Aerial)

KENTUCKY TRANSPORTATION CABINET

PARSONS

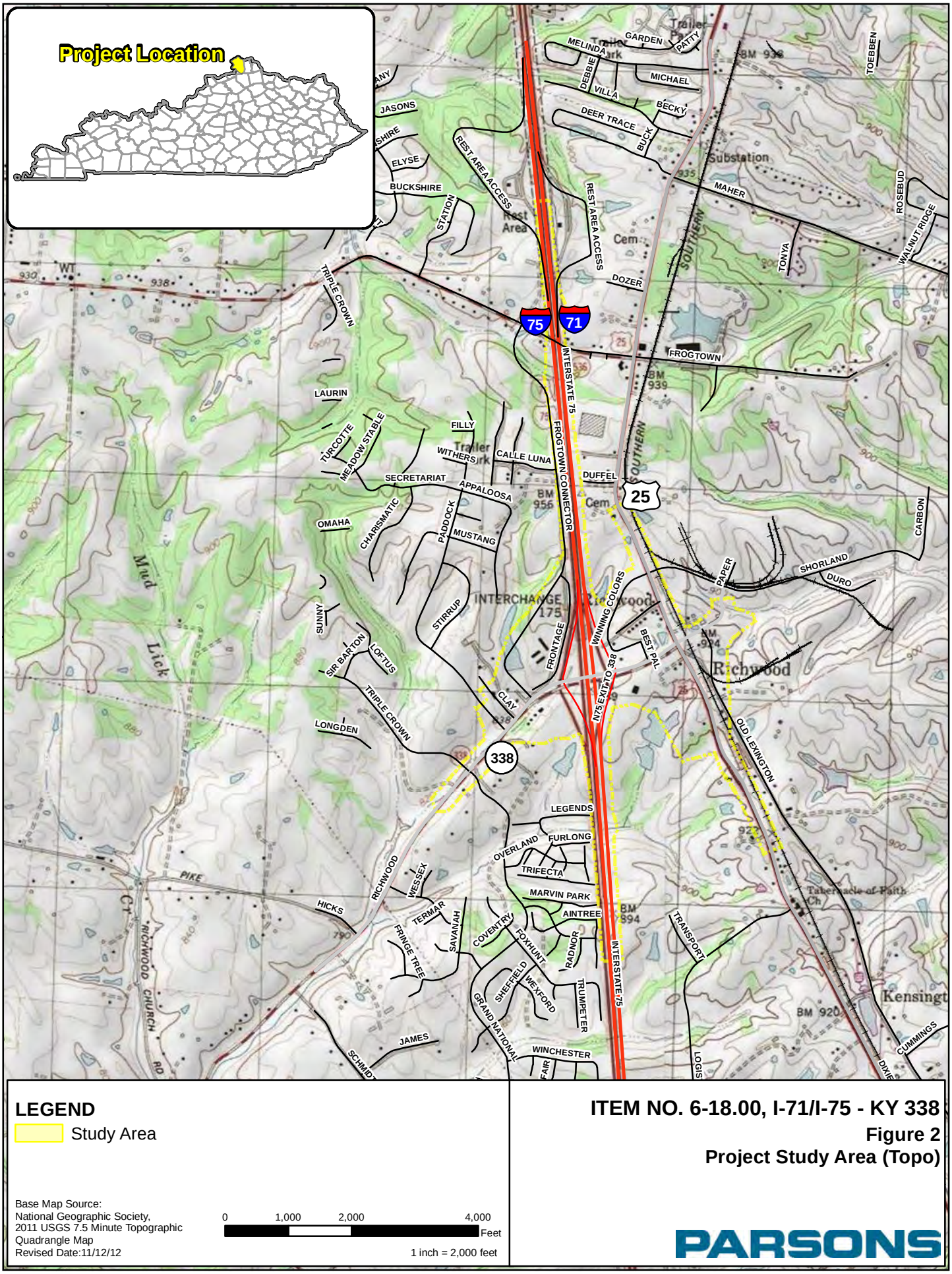

Project Location
LEGEND
Study Area
ITEM NO. 6-18.00, I-71/I-75 - KY 338
Figure 2
Project Study Area (Topo)
Base Map Source:
National Geographic Society,
2011 USGS 7.5 Minute Topographic
Quadrangle Map
Revised Date:11/12/12
0 1,000 2,000 4,000
Feet
1 inch = 2,000 feet
PARSONS



Figure 3 Alternative E-1



Figure 4. Alternative E3

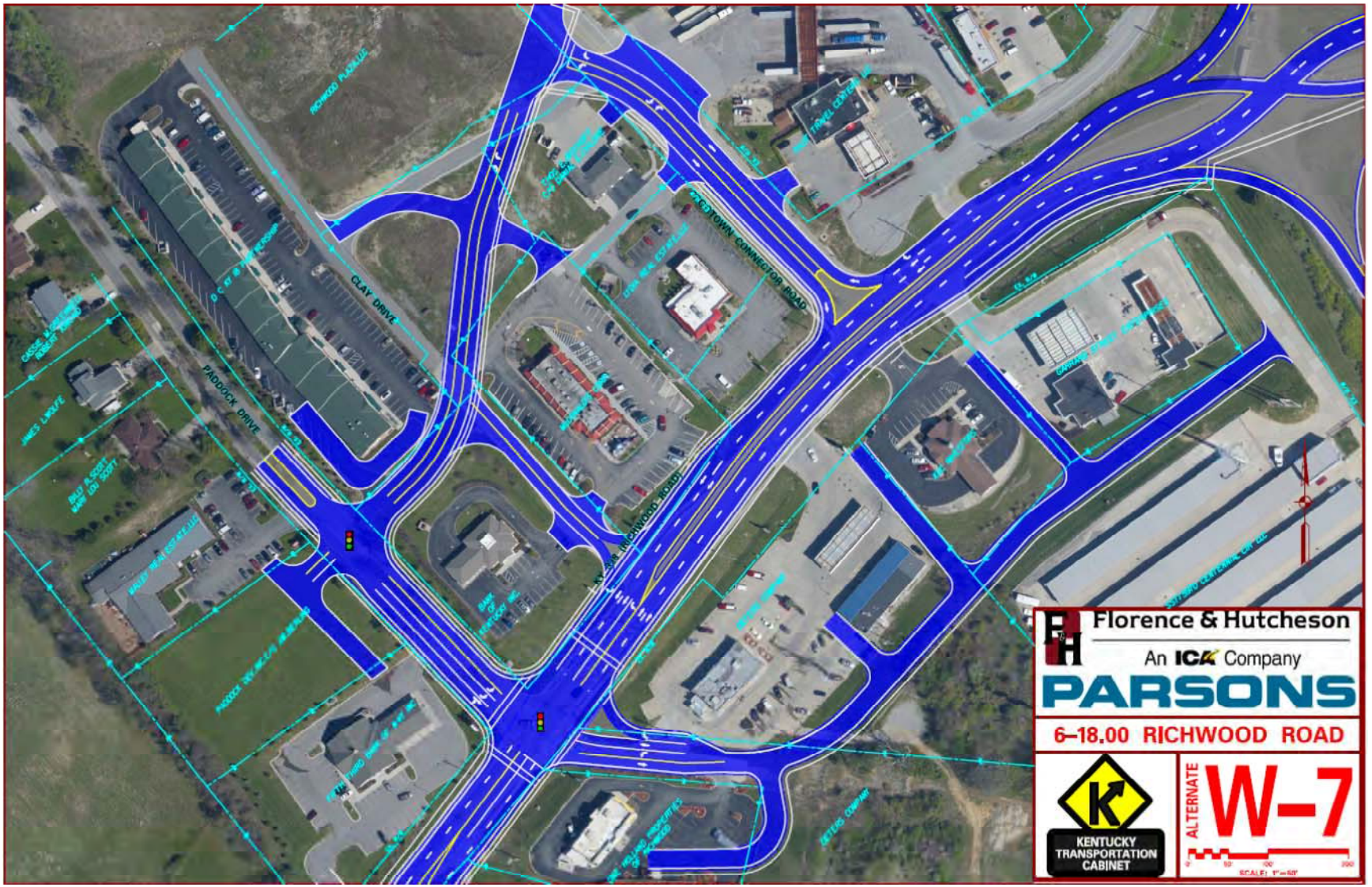


Figure 5. Alternative W7

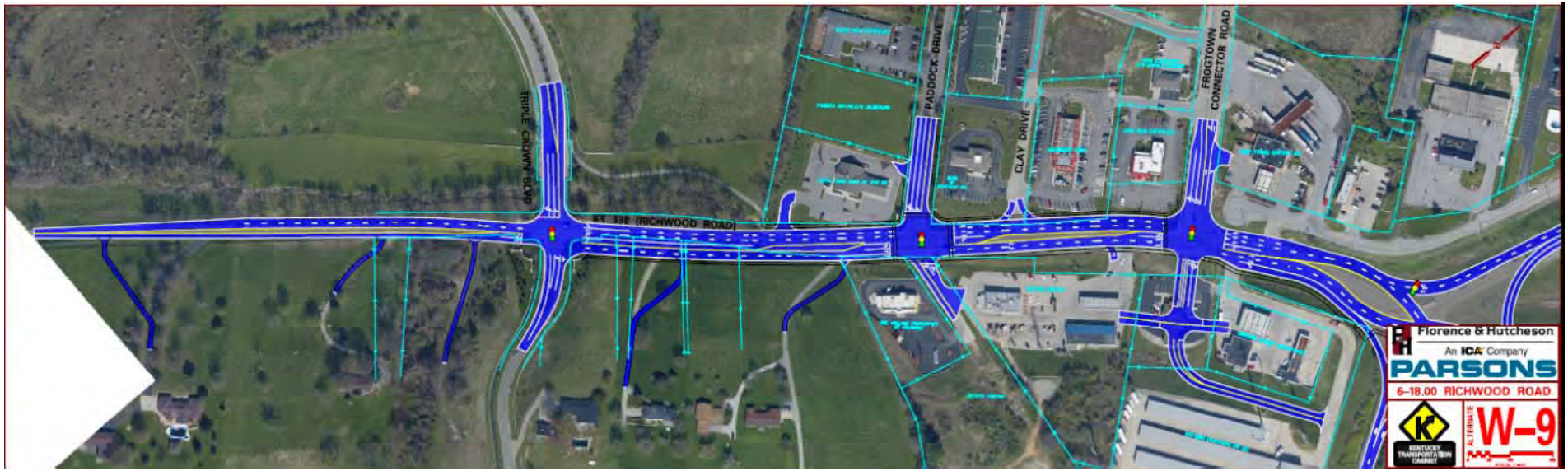
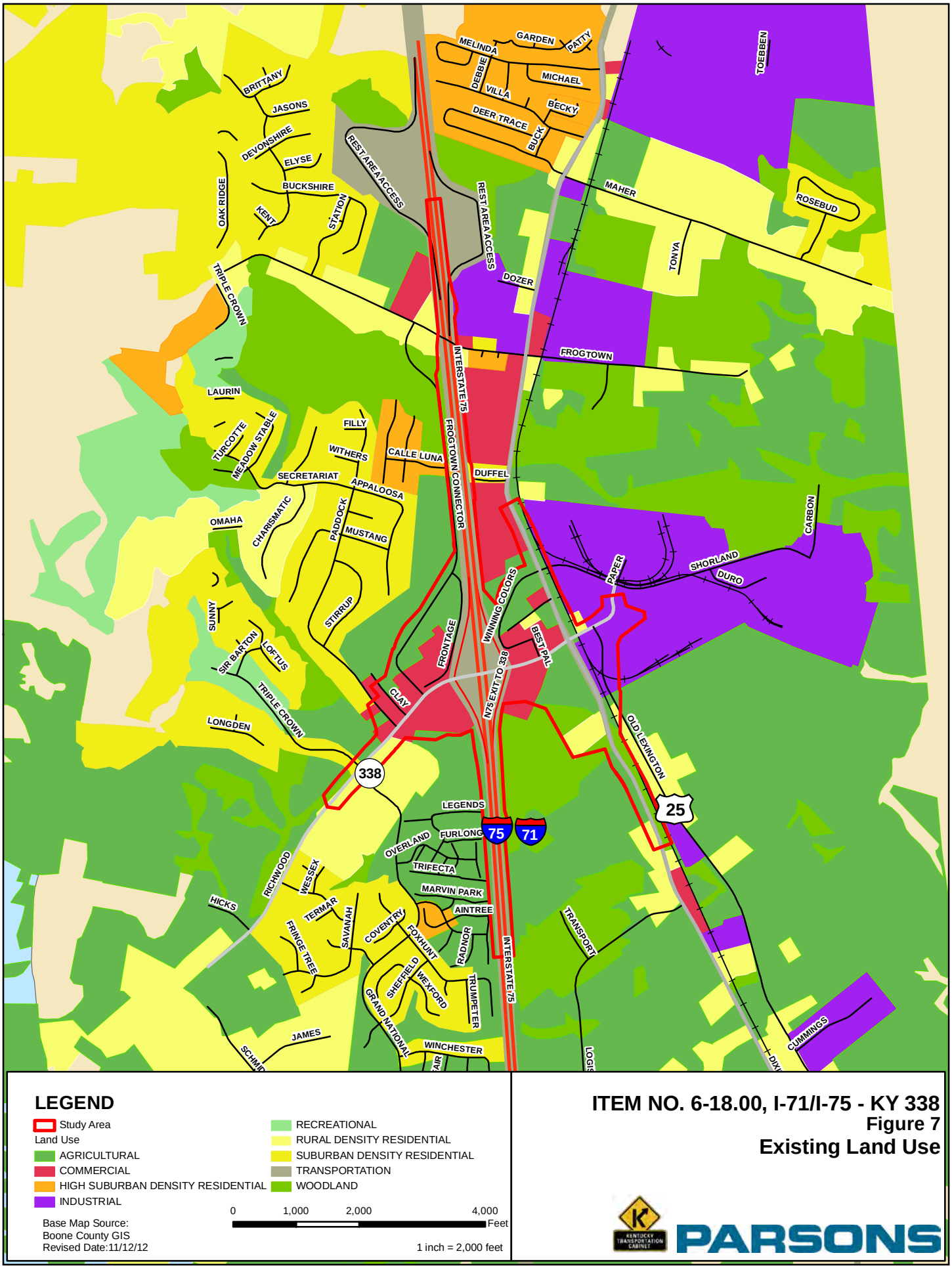
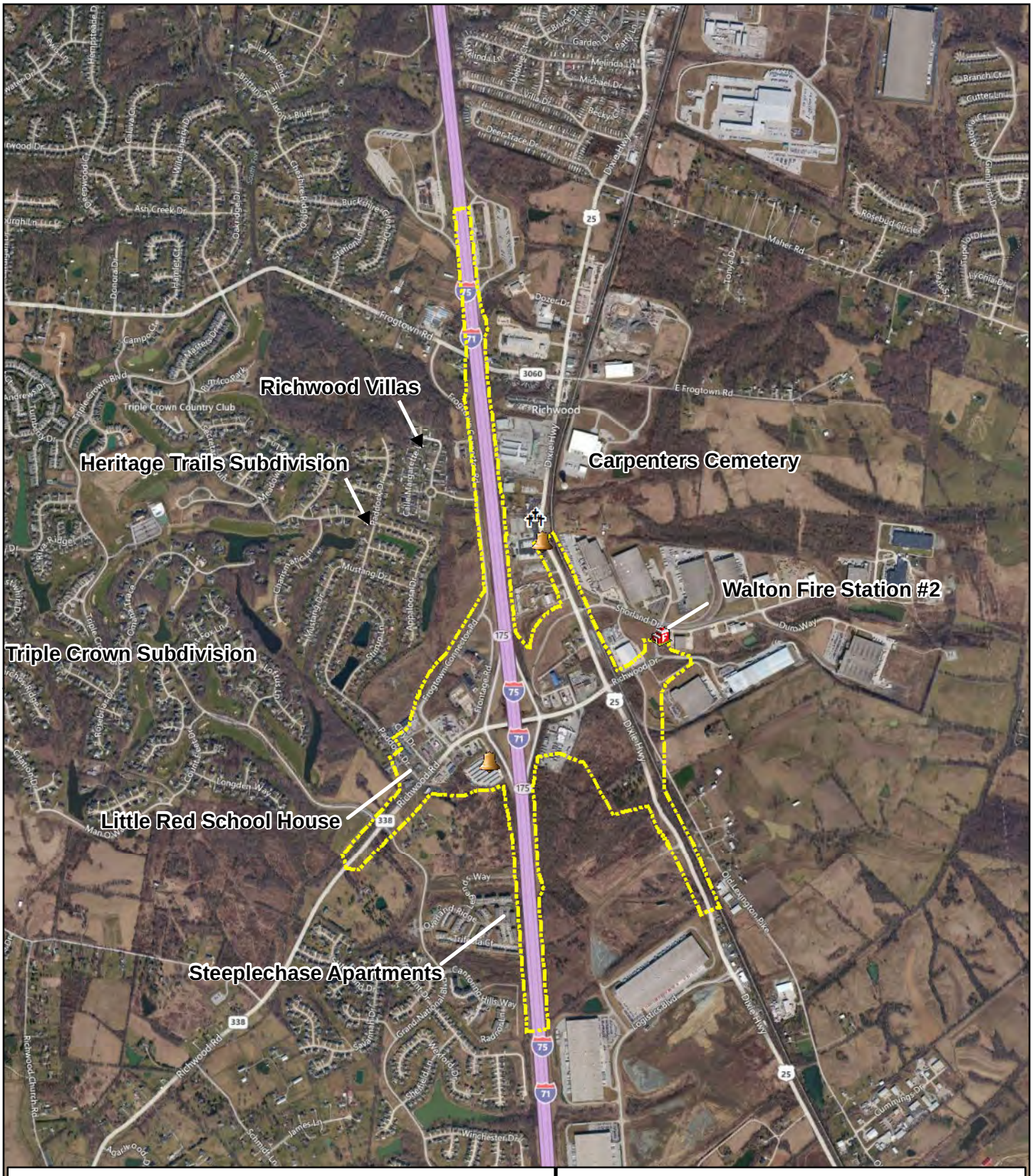


Figure 6. Alternative W9


MELINDA
GARDEN
PATTY
DEBBIE
VILLA
MICHAEL
BECKY
DEER TRACE
BUCK
TOEBBEN
BRITTANY
JASONS
DEVONSHIRE
ELYSE
BUCKSHIRE
KENT
OAK RIDGE
STATION
REST AREA ACCESS
REST AREA ACCESS
MAHER
ROSEBUD
TONYA
DOZER
TRIPLE CROWN
INTERSTATE 75
FROGTOWN
LAURIN
FILLY
WITHERS
CALLE LUNA
TURCOTTE
MEADOW STABLE
SECRETARIAT
APPALOOSA
DUFFEL
FROGTOWN CONNECTOR
OMAHA
CHARISMATIC
PADDOCK
MUSTANG
CARBON
PAPER
SHORLAND
DURO
SUNNY
STIRRUP
WINNING COLORS
FRONTAGE
BEST PAL
SIR BARTON
LOFTUS
N75 EXIT TO 338
CLAY
TRIPLE CROWN
OLD LEXINGTON
LONGDEN
338
LEGENDS
25
FURLONG
75
71
OVERLAND
TRIFECTA
RICHWOOD
WESSEX
MARVIN PARK
HICKS
TERMAR
AINTREE
TRANSPORT
SAVANAH
COVENTRY
FOXHUNT
RADNOR
FRINGE TREE
INTERSTATE 75
SHEFFIELD
WEXFORD
TRUMPETER
GRAND NATIONAL
JAMES
WINCHESTER
CUMMINGS
LEGEND
Study Area
Land Use
AGRICULTURAL
COMMERCIAL
HIGH SUBURBAN DENSITY RESIDENTIAL
INDUSTRIAL
RECREATIONAL
RURAL DENSITY RESIDENTIAL
SUBURBAN DENSITY RESIDENTIAL
TRANSPORTATION
WOODLAND
0
1,000
2,000
4,000
Feet
Base Map Source:
Boone County GIS
Revised Date:11/12/12
1 inch = 2,000 feet
ITEM NO. 6-18.00, I-71/I-75 - KY 338
Figure 7
Existing Land Use
KENTUCKY TRANSPORTATION CABINET
PARSONS


Richwood Villas
Heritage Trails Subdivision
Carpenters Cemetery
Walton Fire Station #2
Triple Crown Subdivision
Little Red School House
Steeplechase Apartments
Richwood
Triple Crown Country Club
Frogtown Rd
E Frogtown Rd
Dixie Hwy
Maher Rd
Richwood Rd
Sportland Dr
Old Lexington Pike
Ash Creek Dr
Dozer Dr
Deer Trace Dr
Mustang Dr
Longden Way
Winchester Dr
Frontage Rd
Triple Crown Blvd
Rosebud Circle
Glenhurst Dr
Branch Ct
Cutter Ln
Melinda Ln
Michael Dr
Becky Ct
Garden Dr
Bruce Dr
Tonya Dr
Lyonia Dr
Duro Way
Richwood Church Rd
Logistics Blvd
Cummings Dr
Applewood Dr
Stonelyn Ln
Foxtrot Ln
Roseberry Dr
Champions Ct
Man O War Blvd
Triple Crown Ln
Tumberry Dr
Andrews Dr
Campo Ct
Donora Dr
Hamlet Ct
Cheshire Ridge Dr
Buckshire Ct
Oakridge Dr
Galleria Dr
Wild Cherry Dr
Lakes Edge
Brittany Trail
Lacys Bluff
Walter Dr
Hampstead Dr
Caliel Margaret Dr
Meadow Ln
Claiborne Ln
Fox Ln
Morfus Ln
Triple Crown Ct
Ridge Ln
Ridge Dr
Pebble Creek Dr
Richwood Rd
Oakridge Ridge
Triplicata Ct
Grand National Blvd
Carlton Hills Way
Radnor Ln
Sawmill Dr
Wexford Ln
Sheffield Ln
James Ln
Schmidt Ln
Garlwood Dr
Dupont Way
Tonya Dr

Appendix A-1

HISTORICAL AERIALS

KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.5
February 01, 2012

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

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Date EDR Searched Historical Sources:

Aerial Photography February 01, 2012

Target Property:

118 Richwood Rd

Walton, KY 41094

Year	***Scale***	***Details***	***Source***
1949	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: May 03, 1949	EDR
1952	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: March 30, 1952	EDR
1955	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: January 01, 1955	EDR
1960	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: April 20, 1960	EDR
1969	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: May 16, 1969	EDR
1979	Aerial Photograph. Scale: 1"=1000'	Panel #: 38084-H6, Union, KY;/Flight Date: November 17, 1979	EDR
1985	Aerial Photograph. Scale: 1"=1000'	Panel #: 38084-H6, Union, KY;/Flight Date: April 17, 1985	EDR
1989	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: April 13, 1989	EDR
1993	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: April 10, 1993	EDR
1993	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Composite DOQQ - acquisition dates: April 10, 1993	EDR
1997	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: March 21, 1997	EDR
2006	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Year: 2006	EDR
2008	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Year: 2008	EDR


INQUIRY #: 3249682.5
YEAR: 1949
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1952
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1955
= 500'
N



INQUIRY #: 3249682.5

YEAR: 1960

= 500'

N


INQUIRY #: 3249682.5
YEAR: 1969
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1979
= 1000'
N


INQUIRY #: 3249682.5
YEAR: 1985
= 1000'
N


INQUIRY #: 3249682.5
YEAR: 1989
= 750'
N


INQUIRY #: 3249682.5
YEAR: 1993
= 750'
N


INQUIRY #: 3249682.5
YEAR: 1993
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1997
= 750'
N


INQUIRY #: 3249682.5
YEAR: 2006
= 500'
N


INQUIRY #: 3249682.5
YEAR: 2008
= 500'
N

Appendix B

CORRESPONDENCE

Connolly, Richard

From: Crider, Barb [barb.crider@boone.kyschools.us]
Sent: Thursday, June 21, 2012 5:53 AM
To: Connolly, Richard
Subject: FW: Boone County Bus Route Map
Attachments: S45C-112062012280.pdf

Please find attached a map of the area effected with bus/routing information attached. If you have any questions, please give me a call.

Thank you

Barbara Crider

☎ 859-384-5340
859-384-5344
barb.crider@boone.kyschools.us
5505 North Bend Rd, Burlington, KY 41005

Connolly, Richard

From: Steverson, Greta - NRCS, Burlington, KY [Greta.Steverson@ky.usda.gov]
Sent: Monday, November 19, 2012 10:36 AM
To: Connolly, Richard
Subject: RE: KY 338 Richwood Road Interchange Improvement
Attachments: KY 338 Interchange Project.pdf

From: Connolly, Richard [mailto:Richard.Connolly@parsons.com]
Sent: Monday, November 12, 2012 1:01 PM
To: Steverson, Greta - NRCS, Burlington, KY
Subject: KY 338 Richwood Road Interchange Improvement

Greta,

Attached you will find a partially completed AD-1006 form along with a figure showing the proposed construction limits and study area. Please fill out part IV and return at your earliest convenience. Please let me know if you need to see any more detail with the figures or if I can provide any additional data.

Thanks.
Richard J. Connolly, CPESC
Senior Environmental Planner
PARSONS
101 W. Ohio Suite 2121
Indianapolis IN 46204
Ph. (317) 616-1004

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Appendix C

GUIDANCE AND ACCOUNTABILITY FORM

Required	Complete	DEA	CATEGORY	DATA SOURCES
Insert check mark as appropriate			**LAND USE**	US Census Bureau Website, www.bea.com/bea/regional/bearfacts, www.thinkkentucky.com (Research and Statistics – Deskbook of Economic Statistics), http://cpba.louisville.edu/ksdc (KY State Data Center) Interviews with local, regional officials, review of land use maps, municipal and ADD reports, field visits, KYTC Div of Planning reports.
X			Establish Baseline Conditions (Existing Land Use, include exhibit.).	
X			Discuss Project Compatibility with Existing Land Use Plans.	
X			Discuss Growth Inducement (Current Development Trends, Indirect Effects of the Project on Land Use Patterns, Population Density, & Growth Rate.	
X			Discuss Cumulative and Indirect Impacts	
			COMMUNITY RESOURCES	Field visits, interviews with local officials (including elected officials, police and fire departments, health agencies, non-profit organizations), local realtors, PVA offices, reviews of local maps and plans, US Census reviews of commuting patterns, interviews with neighborhood associations, church leaders, etc.
X			Establish baseline conditions for existing neighborhoods and communities and cohesion.	
X			Identify community resources including parks, churches, schools, shopping, emergency services, libraries, etc.	
X			Discuss impacts on travel patterns, accessibility, community facilities, economic vitality in project area & on established business districts.	
X			Discuss Mobility.	
X			Reference any consultation with community, city or county officials.	
X			Discuss cumulative and indirect Impacts.	

			REPLACEMENT HOUSING/AVAILABLE COMMERCIAL FACILITIES	Local officials, real estate agents and listings, PVA figures, Cross reference data to determine listing value, sale value, assessed PVA value to determine actual value and its proximity to the listed value. Reference past five years of sales activities to determine the stability of the market and to make best estimate for the future year (continued in next segment).
X			Establish baseline conditions for available housing and commercial/industrial facilities based on current market data.	
N/A			Discuss coordination with MPO or other governmental agencies to identify other proposed projects or activities that would compete for favorable housing.	
X			Discuss cumulative and indirect impacts.	
			RELOCATIONS AND DISPLACEMENTS	www.apartment.com Determine if construction projects are anticipated within the same timeframe of this project. If there are projects, will they provide competition in the housing market for residents associated with this project? Seek roadway, airport, commercial development projects, etc. This info can be found through the Six-Year Plan, local interviews, newspaper articles, chambers of commerce and interviews with local and regional officials. When assessing options for commercial and non-profit relocations, determine the function of affected site and the level of necessity for it to remain within the project area – are its customers dependent upon it remaining nearby? www.kytc.state.ky.us/planning/maps.shtm
X			Establish baseline Conditions (Identify number & type of relocations – residential, commercial, industrial, etc.).	
N/A			Reference the Conceptual Stage Relocation Report.	
N/A			Discuss Relocation Assistance Program (Last Resort Housing), Title VI of the Civil Rights Act, 1966.	
X			Include statement if applicable that the acquisition and relocation program will be conducted in accordance with the Uniform Relocation	
N/A			Discuss mobility for physically challenged residents.	
X			Include table to summarize relocations for each alternate.	
X			Discuss cumulative and indirect impacts.	
N/A			Discuss number of right-of-way sections and 6-year plan time frames for each section identified if applicable.	
X			Cite competing projects/economic development initiatives that could compete for each right-of-way section identified.	
X			All proposed alternates identified and discussed.	
X			Anticipated problems and solutions for all proposed alternates thoroughly discussed.	
X			Secondary sources of information (such as census records, contact with local and community leaders, economic reports) cited.	
X			Relocation information presented in sufficient detail to adequately explain relocation impacts for each alternate.	

			RELOCATION AND DISPLACEMENTS (continued)	
N/A			Displaced community(s) affected by the project discussed including divisive or disruptive effects, special relocation considerations, and measures proposed to resolve relocation concerns.	Field visits should include after hours visits to the area when most residents are at home. This will maximize efforts at determining ages, physical limitations (handicap license plates), number of children, some signs of interdependency between households, etc. Socioeconomic data collected, such as percentages of residents living at or below the poverty level within affected census tract(s) will be utilized along with field observations and official interviews to determine conditions within and adjacent to the project corridors.
N/A			Anticipated impacts to communities and potential adverse environmental factors present in areas adequately discussed.	
N/A			Last Resort Housing Funds discussed, and if necessary, recommendations of how to remedy these types of displacements.	
			Report for each proposed alternate provides discussion of the types of homes to be acquired including estimates of:	
N/A			Number of residential displacements.	
N/A			Number of owners/tenants being displaced.	
N/A			Income ranges in dollars of displaced residents.	
N/A			Percentages of minority residences being displaced.	
N/A			Percentage of displaced elderly residences.	
N/A			Percentage of residences with five or more family members.	
X			Nonresidential displacements estimates include:	
X			Number of employees.	
X			Owner/Tenant.	
X			Potential impacts on displaced establishments.	
X			Unique attributes of the nonresidential establishments.	
X			Estimated availability of replacement sites.	
X			Likelihood of relocation by those displaced.	
X			Social, economic, cultural loss to community by those displaced.	

			FARMLAND	
X			Establish baseline conditions and identify farmland in the project corridor.	Field visits, coordination with county USDA/NRCS offices, LESA form, Kentucky Agricultural Statistics publication - call 800-928-5277 for latest edition (No charge). ww.nass.usda.gov/ky/
X			Discuss acres impacted.	
X			Discuss farmland and prime farmland impacts.	
X			Include NRCS/LESA form AD 1006.	
X			Discuss feasible alternative to avoid farmland impacts	
X			Discuss cumulative and indirect impacts.	
			ENVIRONMENTAL JUSTICE	
X			Establish baseline conditions (i.e. racial diversity, income levels, family clusters, etc).	These conditions are accessible through the various local contacts, websites and field trips as described in previous sections.
X			Include statement of project compliance with E.O. 12898, Environmental Justice guidance.	
X			Discuss avoidance, minimization, and mitigation if applicable.	
X			Discuss cumulative and indirect impacts.	
			PEDESTRIAN AND BICYCLE FACILITIES	
X			Establish baseline conditions by identifying existing facilities and their uses for transportation and/or recreation.	State Highway Maps, interviews with local officials and reviews of local planning maps (when available). www.kytc.state.ky.us/Multimodal/bicycle.htm
X			Discuss opportunities for providing pedestrian and/or bicycle facilities thereby increasing mobility of this mode of transportation.	
X			Discuss cumulative and indirect impacts.	

			VISUAL IMPACTS	
X			Establish baseline conditions (existing viewshed).	Field visits, and interviews with local officials and residents. Reviews of design plans.
		X	Discuss view of proposed road from surrounding area and view of the proposed road. Include impacts and/or anticipated enhancements to viewshed after construction.	
X			Discuss cumulative and indirect impacts.	
			CONSTRUCTION ACTIVITIES	Refer to KYTC Standard Specifications for Road & Bridge Construction. Kentucky Department of Highways Standard Specifications for Road and Bridge Construction
X			Discuss waste and borrow sites.	
X			Discuss dust, noise, erosion controls.	
			4(f) RESOURCES	Reviews of local maps, interviews with local officials, field trips.
X			Identify 4(f) resources	
X			Separate 4(f) documentation to be prepared.	
			6(f) RESOURCES	
X			Identify 6(f) resources.	
			SAFETY	KYTC traffic studies Interviews with local emergency officials. Interviews with local elected officials. Field trip observations.
X			List road deficiencies (lack of shoulders, curve deficiencies, etc.)	
		X	Crash analysis of existing roadway(s) including existing conditions and design year.	
X			Discuss crime rates; existing and projected.	
X			Discuss cumulative and indirect impacts.	
			OTHER ISSUES	N/A
		X	Discuss unresolved issues or situations, which are anticipated and not included in the previous areas. Include impacts, suggested mitigation and commitments. Establish baseline and discuss cumulative and indirect impacts if applicable.	

			SUMMARY	
X			Brief discussion summarizing the impacts and mitigation commitments for the project. Include results and commendations.	N/A
X			Include matrix which scores and compares impacts for each alternate.	
X			Explain methodology(ies) incorporated in making determinations of impacts.	
X			Guidance and Accountability Form included in submitted base study report.	

Comments: Discuss supplemental information, guidance or instructions that required deviation from the checklist. Discuss all categories which contain "NA" in the "Complete" columns of this format. Comments regarding the content and format of this form and/or its applicability may also be submitted through this section.

Commitments to be Implemented: Identify any commitments that are documented within the study. Specify the nature of the commitment, to whom it was or should be made, when the commitment should be acted upon, etc.

Mitigation and Special Issues: Identify mitigation measures that are specified within the report, if any. Also, identify any special issues that are addressed within the document that should be considered by the Project Team as it makes decisions regarding the project.

SIGNATURE PAGE

I have reviewed the project documentation and attest that those responsible for its preparation are familiar with the requirements set forth in the checklist above and that proper management controls were in effect throughout the course of document development to assure that the document is complete, thorough and addresses all applicable checklist components.

Prime Consultant — Date: 6/19/13

Recommended for Approval by:

KYTC/DEA Environmental Project Manager/Reviewer — Date: 5/6/13

Project Manager — Date: 5-9-13

APPENDIX E – HISTORIC RESOURCES

Kentucky Transportation	



Figure 11. Site 9, Richwood store



Figure 12. Site 9, Side elevation of Richwood store



Figure 15. Site 9, Proposed National Register boundary

Education, Arts and Humanities Cabinet

KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

Paul E. Patton
Governor
Marlene M. Helm
Cabinet Secretary

David L. Morgan
Executive Director and
SHPO

March 14, 2003

Mr. David M. Waldner, Director
Division of Environmental Analysis
Kentucky Transportation Cabinet
125 Holmes Street
Frankfort, KY 40622

Re: A Cultural Historic Survey of the Proposed Reconstruction and Widening of US 25 from KY 338 to KY 1829, Boone County, Kentucky. (Item No. 6-~~292.10~~)
351.00

Dear Mr. Waldner:

The State Historic Preservation Office has received for review and approval the above referenced cultural historic survey completed by C. Finney and J. Kirkwood of Cultural Resource Analysts, Inc. We concur that Site 1 (BE-550), Site 2 (BE-551), Site 3 (BE-1331), Site 4 (BE-552; demolished), Site 5 (BE-1332), Site 6 (BE-651; demolished), Site 7 (BE-650; demolished), Site 8 (BE-652), Site 11 (BE-202; demolished), Site 12 (be-585), Site 13 (BE-584), Site 14 (BE-1334), Site 15 (BE-201; demolished), Site 16 (BE-1335), Site 17 (BE-1336), Site 19 (BE-583), Site 20 (BE-1337), Site 21 (BE-582), Site 23 (BE-580), Site 24 (BE-583), Site 25 (BE-1338), Site 26 (BE-1339), Site 27 (BE-199; demolished), Site 28 (BE-649; demolished), Site 31 (BE-645; demolished), Site 32 (BE-647), Site 33 (BE-1340), Site 34 (BE-642; demolished), Site 35 (BE-644), Site 36 (BE-641), Site 37 (BE-643), Site 38 (BE-640), Site 39 (BE-639), Site 40 (BE-637), Site 41 (BE-1341), Site 42 (BE-636), Site 43 (BE-638; demolished), and Site 44 (BE-635) are not eligible for listing on the National Register individually or within the context of a historic district. We also concur that Site 9 (BE-1333), Site 18 (BE-200), Site 22 (BE-581), and Site 29 (BE-198) are eligible for listing and agree with the determination that No Effect to these properties will result from the construction of any proposed alignment.

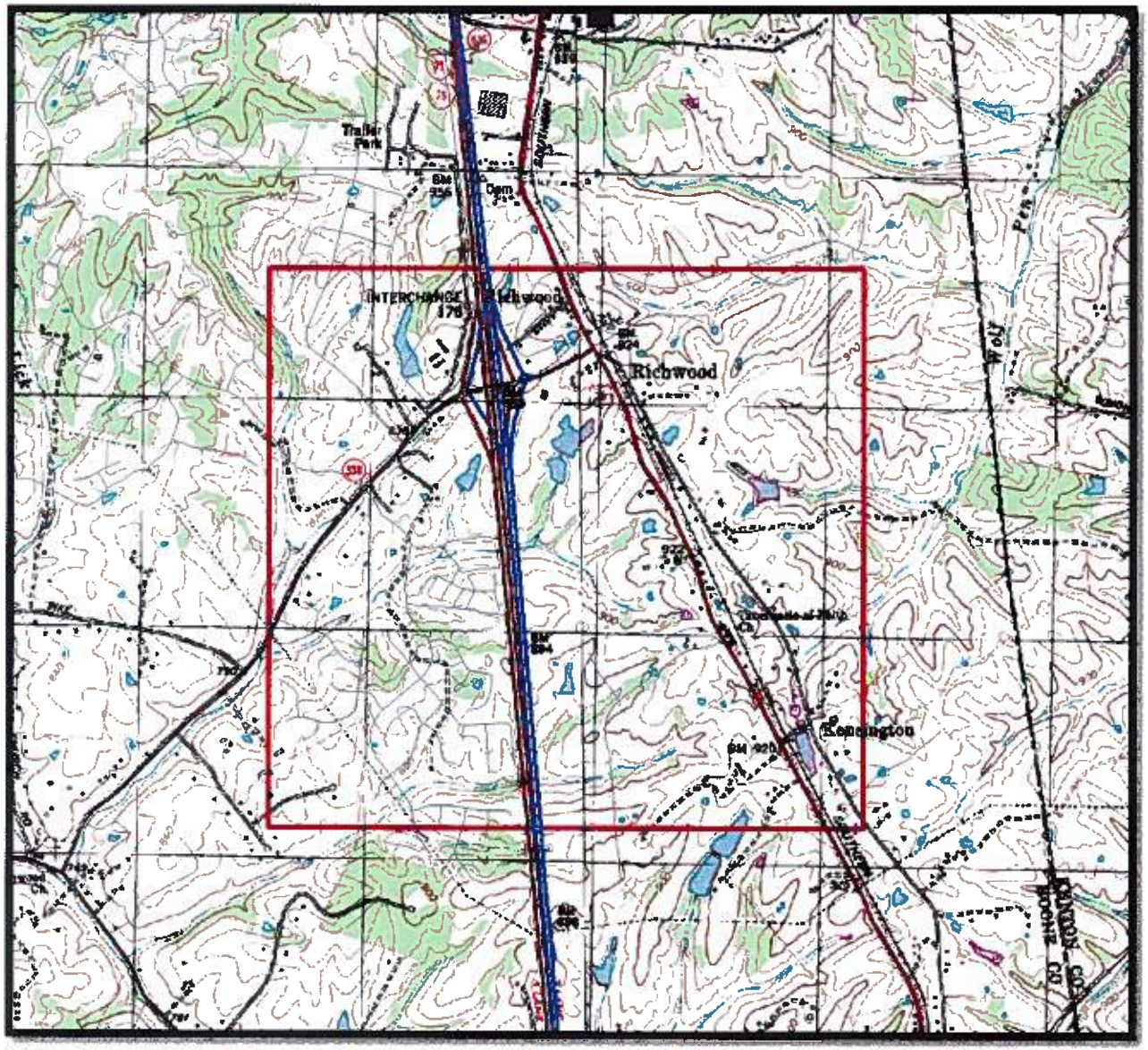
We are in disagreement, however, with the determination that Site 10 (BE-586) and Site 30 (BE-648) lack eligibility potential. Both appear to be good, intact examples of the Craftsman Bungalow house form and potentially eligible under Criteria C. However, based upon review of the project mapping it does not appear that Site 10 or Site 30 will experience any effect from the proposed alignments and further discussion regarding eligibility and

effect will therefore not be required.

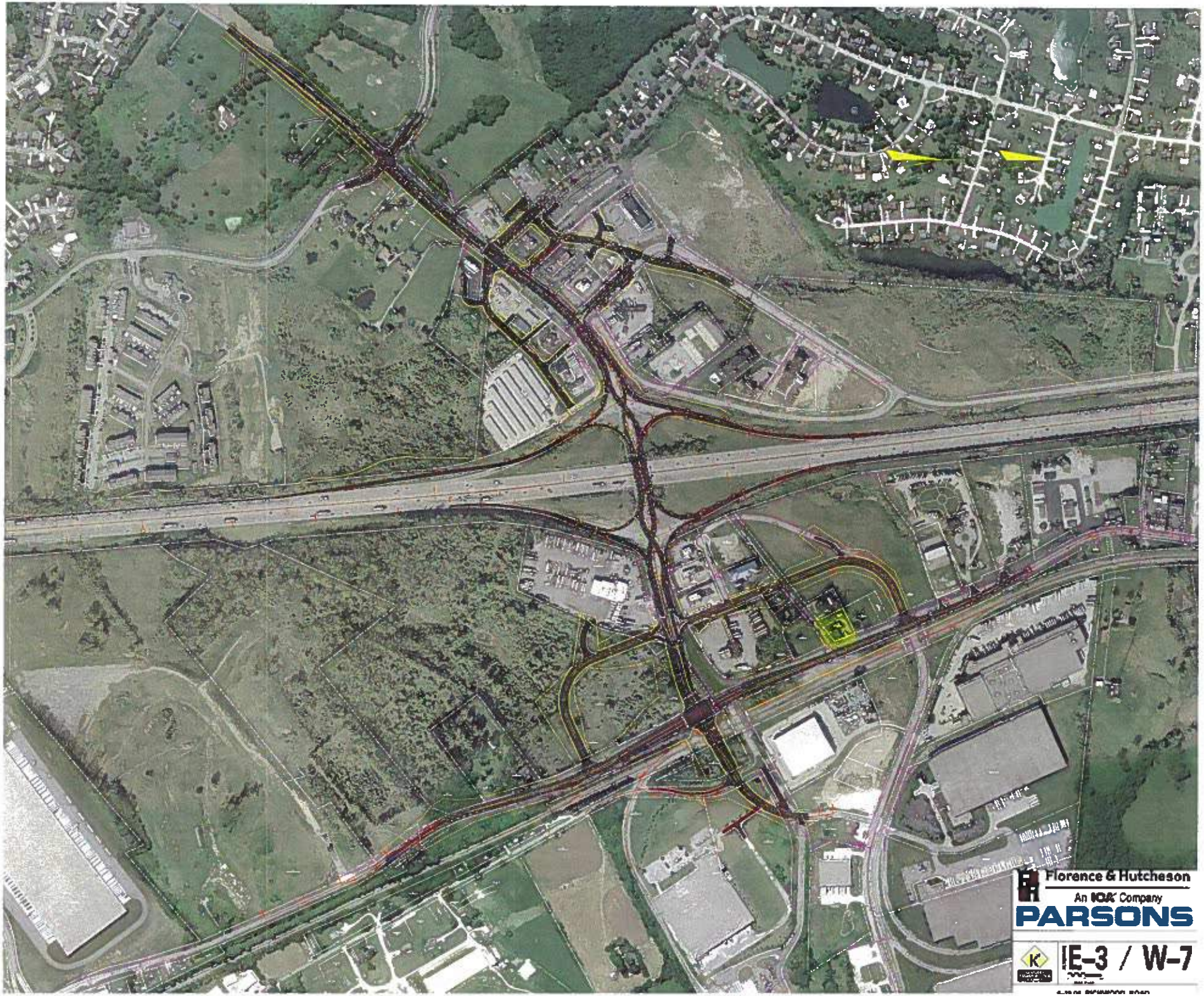
In accordance with 36CFR Part 800.4(d) of the Advisory Council's revised regulations our finding is that there is No Effect on Historic Properties for this undertaking. Should you have any questions, please feel free to contact Craig Potts of my staff at (502) 564-7005 ext. 121.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer



USGS Topographic Map, Union and Independence Quads


Florence & Hutcheson
An HDR Company
PARSONS
E-3 / W-7

APPENDIX F – ARCHAEOLOGICAL RESOURCES

Phase I Archaeology Survey for the Proposed KY 338 Interchange with I-71/I-75 Reconstruction Project (Item No. 6-18.00) in Boone County, Kentucky

By

Chuck Mustain and David Lamp

Phase I Archaeology Survey for the Proposed KY 338 Interchange with I-71/I-75 Reconstruction Project (Item No. 6-18.00) in Boone County, Kentucky

By

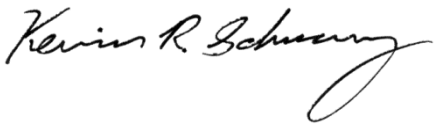
Chuck Mustain and David Lamp

Office of State Archaeology Number: FY13-7427

Submitted By:
Kevin R. Schwarz, PhD, RPA
ASC Group, Inc.
800 Freeway Drive North, Suite 101
Columbus, Ohio 43229-5439
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Submitted To:
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2550 Irvin Cobb Drive
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270.444.9691

Lead Agency: Kentucky Transportation Cabinet and Federal Highway Administration



Kevin R. Schwarz, PhD, RPA
Principal Investigator

July 31, 2013

ABSTRACT

ASC Group, Inc., conducted a Phase I archaeological survey for the proposed KY 338 Interchange with I-71/I-75 Reconstruction (Item No. 6-18.00) project in Boone County, Kentucky. The Office of State Archaeology registration number for the project is FY13-7427.

The project area is irregularly shaped, primarily extending along I-71/I-75, US 25, and KY 338 and encompassing approximately 29.45 ha (72.78 ac) of mostly roadsides and existing roadways in the uplands of the Outer Bluegrass region between Mud Lick Creek and the Wolf Pen Branch of Banklick Creek. It has mixed land use that can be characterized as commercial, industrial, and residential.

Nine previous archaeological projects have been reported on within the 2-km (1.2-mi) buffer around the project area, all of which are Phase I surveys. Three of the projects encompass portions of the current project area. Although no previously identified sites are located within the project area, the Kentucky Office of State Archaeology listed nine sites within the 2-km (1.2-mi) buffer area surrounding the project area. Historic cartographic information indicates that 16 nineteenth-century buildings once stood within or adjacent to the project area. Four appear to correspond to extant buildings shown on USGS mapping. There is also a cemetery shown on an 1883 atlas, which is the Carpenter Family Cemetery (15Be534) that was documented during a survey for reconstruction of US 25. Although prehistoric and historic activity occurred within the project area and the region surrounding it, the Area of Potential Effect is mostly in areas that have been disturbed by modern development and it was determined that it is unlikely that any intact archaeological deposits would be present.

The archaeological survey utilized a combination of visual inspection and shovel probes to examine the project area. No archaeological deposits were encountered during the survey. A substantial portion of the project area east of the interchange was previously surveyed and was visually inspected and photographed. Most of the project area was found to be sloping or cut and fill, often both. Shovel probes were excavated in the relatively level areas. Based on the results of the current survey, the undertaking will not affect any significant archaeological resources and no further work is recommended.

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INTRODUCTION

Under contract with Florence and Hutcheson, Inc., ASC Group, Inc., conducted a Phase I archaeological survey for the KY 338 Interchange with I-71/I-75 Reconstruction (Item No. 6-18.00) project in Boone County, Kentucky (Figure 1). The Office of State Archaeology (OSA) registration number for the project is FY13-7427.

The proposed undertaking involves the reconstruction of an existing diamond interchange and several of the surrounding roadways, including the intersection of US 25 and KY 338. The Area of Potential Effect (APE) for direct effects, i.e., the area within which the proposed construction will occur, is irregularly shaped, extending 3.07 km (1.91 mi) along I-71/I-75, 1.72 km (1.07 mi) along US 25, and 1.45 km (.90 mi) along KY 338 with a 342 m (1,120.8 ft) extension into an industrial area east of US 25 (Figure 2). The 29.45-ha (72.78-ac) project area has mixed land use and can be characterized as commercial, industrial, and residential and the bulk of the project area comprises existing roadways and roadsides (Plates 1–4).



Plate 1. Roadside along I-71/I-75 in Area 1; facing north-northwest.



Plate 2. Roadside along I-71/I-75 in Area 1; facing north-northwest.



Plate 3. Roadside along I-71/I-75 in Area 3; facing north.



Plate 4. Previously surveyed roadside along KY 338 in Area 5; facing east.

Modern development, including road and highway construction, aboveground and underground utilities, commercial development (Plates 5 and 6), and landscaping, etc., have disturbed the vast majority of the project area. In addition, the entrance/exit ramps to I-71/I-75 (Plate 7) as well as various storm drainages and utilities have served to dissect the project area into small, noncontiguous portions.



Plate 5. Previously surveyed roadside along US 25 in Area 5; facing north-northeast.



Figure 1. Portion of the Boone County highway map showing the vicinity of the project area.

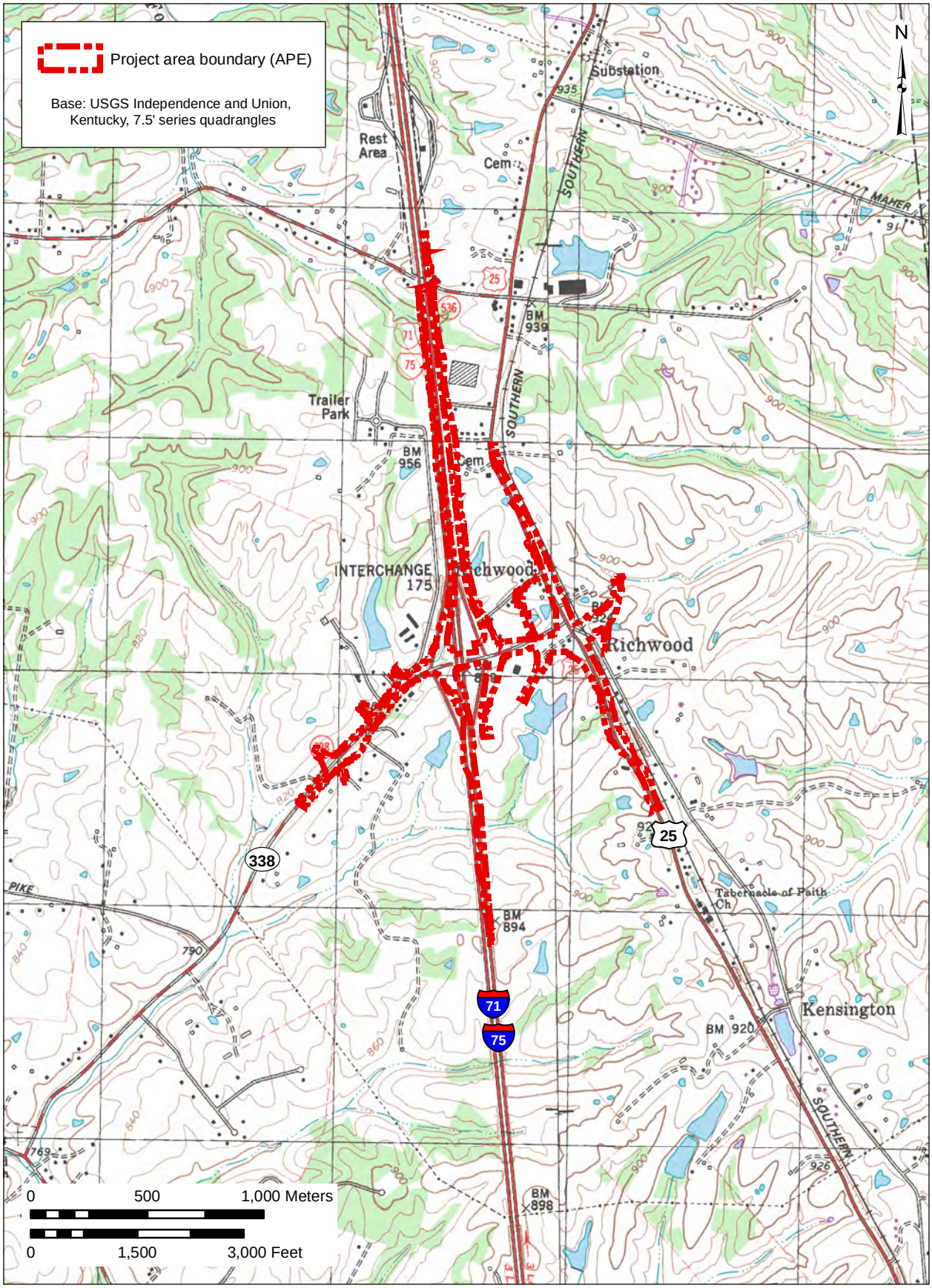


Figure 2. Portions of the 1987 Independence, KY and 1984 Union, KY quadrangles (USGS 7.5' topographic maps) showing the project area (APE).



Plate 6. Roadside along KY 338 in Area 6; facing southwest.



Plate 7. Roadside along exit ramp from I-71/I-75 in Area 4; facing south-southwest.

Situated in the uplands of the Outer Bluegrass region (Kentucky Geological Survey 2006) and containing rolling and undulating terrain dissected by numerous ravines and small stream valleys, the APE is located between Mud Lick Creek and the Wolf Pen Branch of Banklick Creek. The vast majority of the project area is composed of ridgetops and hillsides, much of which is cut and fill, but it also includes a portion of a small creek bottom. The soil survey of Boone, Campbell, and Kenton counties, Kentucky indicates that the soils within the project area belong to the Faywood-Nicholson association (United States Department of Agriculture, Soil Conservation Service 1989).

The purpose of this investigation is to provide information for compliance with Section 106 of the National Historic Preservation Act of 1966. The survey was completed in accordance with *Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines* (Federal Register 1983). The federal standards are supplemented by the Kentucky State Historic Preservation Office, Kentucky Heritage Council *Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports* (Sanders 2006). The goals of this survey were to identify and document all archaeological resources in the project area, and to determine if any of the identified resources might be eligible for inclusion in the National Register of Historic Places (NRHP). The evaluation of eligibility follows the NRHP criteria for evaluation (Andrus 1997).

The literature review was conducted October 5, 2012, by Samiran Chanchani, PhD, and includes information from a September 21, 2012 site check (FY13-7427) provided by the Kentucky OSA. Chuck Mustain supervised the fieldwork for the Phase I archaeological survey on December 10–14, 2012. The field technicians for the project were David Lamp, Scott Shupe, and Jeff White. The principal investigator is Kevin Schwarz, PhD, RPA, and Shaune Skinner, MA, RPA, served as the project manager.

No archaeological resources were previously documented within the project area or encountered during the survey so the undertaking will not impact any historic cultural resources. The notes, photographs, and other project materials will be curated at the University of Kentucky, OSA. This report outlines the methods and results of this Phase I cultural resources survey.

PREVIOUS ARCHAEOLOGICAL RESEARCH

After receipt of the September 21, 2012, site check (FY13-7427) information provided by OSA, ASC Group's Samiran Chanchani, PhD, conducted the literature review October 5, 2012. His research included a data collection from the site files and reports at OSA in Lexington and a review of maps and the cemetery database at the

Kentucky Historical Society in Frankfort. Records were also checked at the Kentucky State Library and Archives in Frankfort and the Boone County Public Library in Burlington.

No Historic Landmarks or sites listed in the NRHP are present within or near the project area. Although no previously identified sites are located within the project area, OSA listed nine sites within the 2-km (1.2-mi) buffer area surrounding the project area (Table 1). These include two nineteenth- and twentieth-century farms, two cemeteries, a scatter of historic artifacts, and four prehistoric lithic scatters. One of the prehistoric sites is associated with the Fort Ancient culture and another has Archaic and Fort Ancient components. All the prehistoric sites are open habitations without mounds. Although not within the project area, the Carpenter Family Cemetery (15Be534) is immediately adjacent to the northern terminus along US 25. Saunders and Kirkwood (2003) state that the Carpenter Family Cemetery (15Be534) and the Grubbs Family Cemetery (15Be535) may be eligible for listing in the NRHP. However, cemeteries are not generally eligible for listing and to be eligible they must meet one of the four main Criteria for Evaluation (A–D) as well as either Criteria Consideration C or D (Andrus 1997; Potter and Boland 1992). Neither of the Criteria Considerations are discussed in their evaluations of the sites nor does it appear that either would meet one of them.

Nine archaeological projects have been reported on within the 2-km (1.2-mi) buffer around the project area (Figure 3; Table 2). Two of them (Saunders and Kirkwood [2003] and Paternostro [2008]) are associated with a reconstruction project for US 25, which has yet to be built. These projects encompass substantial portions of the current project area east of I-71/I-75. They include areas along KY 338 (Plates 8 and 9), Best Pal Drive (Plate 10), Old Richwood Road (Plate 11), US 25 (Plates 12–16), Old Lexington Pike (Plate 17), and Paper Boulevard (Plate 18). Aside from these roadside areas, the previously surveyed portions of the project area also included a railroad bed (Plates 19–21) and a few overgrown areas (Plates 22–24). The only site they documented near the project area is the Carpenter Family Cemetery (15Be534) [Plate 25]. A small portion of the project area extends into the area surveyed by Schock (1984). No sites were documented during five of the nine surveys.

Many buildings dating to the nineteenth and early twentieth centuries are known to exist or have existed in the region, and those that are no longer standing may have become archaeological sites. The likelihood of encountering these types of sites within the project area is best determined through an examination of early cartographic sources.

The Walton Precinct map in the D. J. Lake and Company (1833) *Atlas of Boone, Kenton and Campbell Counties, Kentucky* depicts 16 buildings and a cemetery within or adjacent to the project area (Figure 4). Each Historic Map Building Location (HMBL) was assigned a number and Figure 3 shows their locations on USGS topographic mapping. Four of them (HMBL 1, HMBL 5, HMBL 9, and HMBL 16) correspond to buildings shown on the USGS map. Most of the HMBLs are houses, but HMBL 7 is a toll house along the Beaver Lick and Richwood Turnpike (present-day KY 338), HMBL 11 is the depot at Richwood Station, HMBL 14 is labeled "Section House," and HMBL 16 is Lampton School (D. J. Lake and Company 1883). HMBL 16 is probably a bit south of the project area rather than immediately adjacent to it. The cemetery shown on the atlas is the Carpenter Family Cemetery (15Be534) documented by Saunders and Kirkwood (2003) during their survey for reconstruction of US 25.

Clearly there was prehistoric and historic activity in the region surrounding the project area. Both prehistoric and historic sites occur on similar landforms and in settings similar to those within the project area.

Table 1. Inventoried Archaeological Sites within 2 km of the Project Area.

Project Name: KY 338 Interchange with I-71/I77 Reconstruction (Item No. 6-18.00) Collection Date: October 5, 2012
Data Collector's Name: Samiran Chanchani

Site Number	Site Type; Temporal Period	Landform; Distance to water (m)	Elevation (m amsl)	Site Dimensions (m^2)	National Register Status; Date Recorded (Reference); Condition
15Be289	Open habitation w/o mounds; unassigned prehistoric	Ridge; 100	277	500	Recommended not eligible; recorded October 27, 1984 (Schock 1984); destroyed
15Be290	Historic farm/residence; 1801−1900	Ridge; 120	280	1,500	Not assessed; recorded October 27, 1984 (Schock 1984); destroyed
15Be291	Historic farm/residence; 1851−1950	Ridge; 400	274	300	Not assessed; recorded October 27, 1984 (Schock 1984); destroyed
15Be533	Open habitation w/o mounds; 1801−1950	Ridge; 2,200	290	650	Recommended not eligible; recorded November 8, 2002 (Saunders and Kirkwood 2003); 76−99% disturbed
15Be534	Cemetery; 1751−2000	Dissected upland; 1,400	284	1,500	Recommended potentially eligible; recorded November 7, 2002 (Saunders and Kirkwood 2003); apparently undisturbed
15Be535	Cemetery; 1751−2000	Dissected upland; 1,200	276	63	Recommended potentially eligible; recorded November 8, 2002 (Saunders and Kirkwood 2003); apparently undisturbed
15Be579	Open habitation w/o mounds; unassigned prehistoric	Ridge; 12	250	265	Recommended not eligible; recorded April 23, 2009 (Curran and Barber 2009); destroyed
15Ke12	Open habitation w/o mounds; Archaic and Fort Ancient	Terrace; 15	244	Unrecorded	Recommended not eligible; recorded December 1, 1975 and updated October 27, 1984 (Boisvert 1975; Schock 1984); less than 25% disturbed
15Ke105	Open habitation w/o mounds; Fort Ancient	Hillside; 30	250	Unrecorded	Recommended not eligible; recorded October 27, 1984 (Schock 1984); 26−50% disturbed

Figure 3. Portions of the 1987 Independence, KY and 1984 Union, KY quadrangles (USGS 7.5' topographic maps) showing the previous cultural resources investigations, Historic Map Building Locations (HMBL), and a previously inventoried cultural resource within and adjacent to the project area.

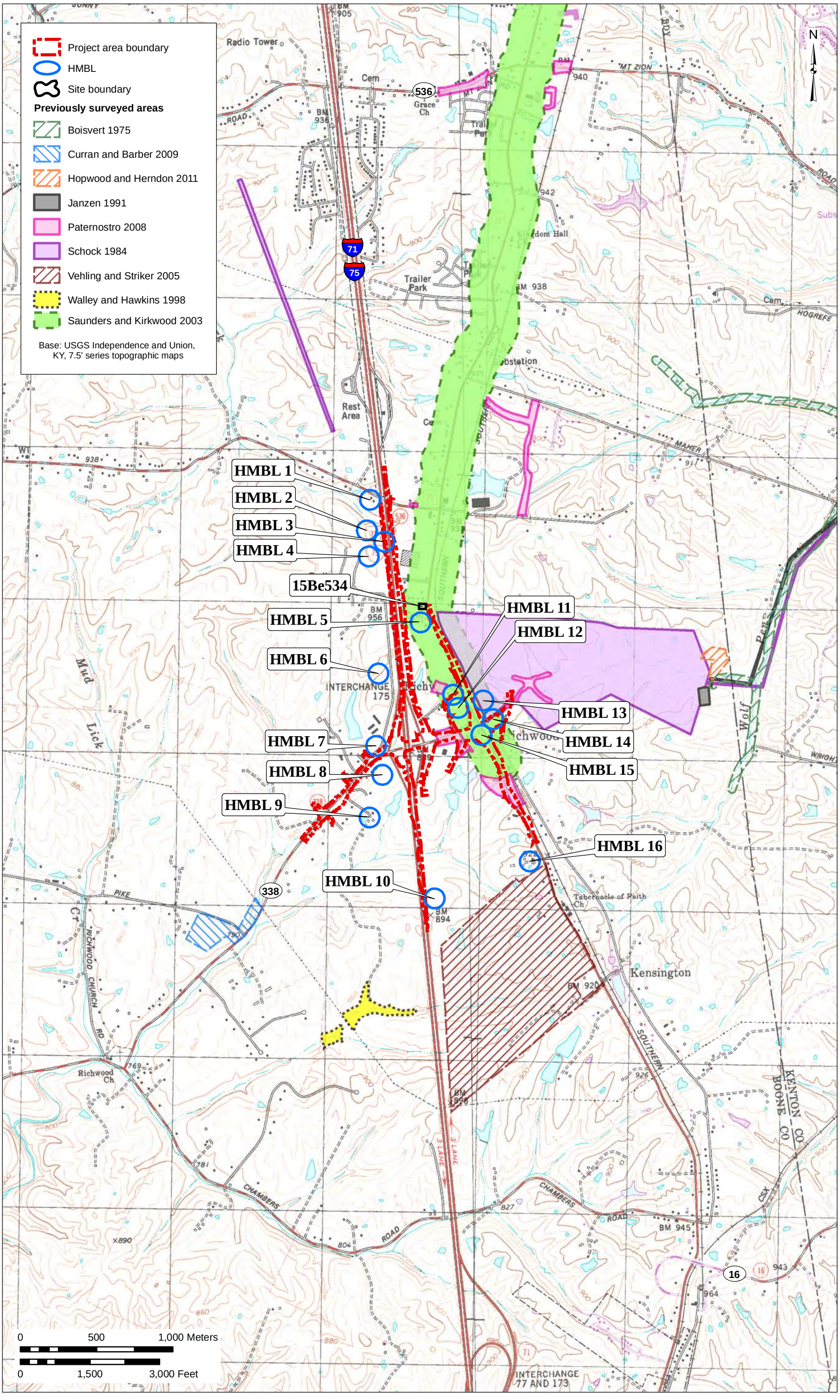


Figure 3
7

Table 2. Previous Archaeological Surveys Completed within 2 km of the Project Area.

Project Name: KY 338 Interchange with I-71/I77 Reconstruction (Item No. 6-18.00) Collection Date: October 5, 2012
Data Collector's Name: Samiran Chanchani

Citation	Type of Project	Sites Documented	Summary
Boisvert 1975	Phase I survey for flood control in the Banklick Creek Watershed	15Ke5−15Ke13	Four areas along various drainages within the Banklick Creek watershed that included 242 ha that would be inundated or affected by construction of flood control structures were examined. Nine sites were documented, eight of which would have been affected by the project and were recommended for further work due to the limited nature of the initial survey effort.
Schock 1984	Phase I survey for Duro industrial park and associated sewer	15Be289−15Be291, 15Ke11, 15Ke12, 15Ke104, and 15Ke105	A 99-ha area for an industrial park and 6.8 km along two linear areas for associated water and sewer lines were surveyed. Five new sites and two previously recorded sites (15Ke11 and 15Ke12) were investigated. Only three of the sites (15Be289, 15Ke11, and 15Ke105) would be impacted by the project. Site 15Ke11 had already been recommended for further work by Boisvert (1975). No further work was recommended at either of the other two because they were not deemed eligible for the NRHP. No recommendations regarding the other four sites were made.
Janzen 1991	Phase I survey for Duro electrical substation	None	Approximately .8 ha of a plowed field with excellent surface visibility were surveyed. No archaeological sites were documented. There is also a linear extension to the north that is not specifically addressed in the report text.
Walley and Hawkins 1998	Phase I survey for Steeplechase Subdivision retention ponds	None	Approximately 4.2 ha of mostly slope along an intermittent stream were surveyed. Deep testing was conducted in alluvium in the bottom land along with shovel testing of the surface soils. No sites were documented.
Saunders and Kirkwood 2003	Phase I survey for US 25 reconstruction	15Be532−15Be535	A 7.1-km corridor encompassing 212 ha of industrial, residential, and agricultural areas was surveyed. The corridor followed US 25 and was approximately centered on the existing roadway. Two of the sites (15Be534 and 15Be535) are cemeteries that were recommended for further work. The other two sites were not deemed eligible for the NRHP and no further work was recommended.
Vehling and Striker 2005	Phase I survey for the Park South development	None	The APE under jurisdiction of the US Army Corps of Engineers included 32 ha of primarily undeveloped uplands. Two isolated prehistoric artifacts were documented, neither of which was designated a site. No further work was recommended, but it was noted that the project would affect areas outside the US Army Corps of Engineer's jurisdiction and further testing of these areas could be needed if other federal agencies became involved in the project.
Paternostro 2008	Phase I survey for US 25 reconstruction	None	Ten areas encompassing 11.3 ha along US 25 were surveyed. These were additional frontage areas along the road associated with the earlier project conducted by Saunders and Kirkwood (2003). No sites were documented.
Curran and Barber 2009	Phase I survey for East Kentucky Power Cooperative substation	15Be579	Approximately 6.9 ha were surveyed for the substation and associated trunk lines. One small site (15Be579) was recorded. It was not deemed eligible for the NRHP and no further work was recommended.
Hopwood and Herndon 2011	Phase I survey for Messier-Bugatti USA substation	None	Approximately 2 ha were surveyed for the substation and associated trunk lines. No sites were documented.



Plate 8. Previously surveyed roadside along KY 338 in Area 5; facing east-northeast.



Plate 9. Previously surveyed wooded hilltop south of KY 338 in Area 5; facing east.



Plate 10. Previously surveyed area along Best Pal Drive in Area 5; facing north.



Plate 11. Previously surveyed area along Old Richwood Road in Area 5; facing northeast.



Plate 12. Previously surveyed roadside along US 25 in Area 5; facing south-southeast.



Plate 13. Previously surveyed roadside along US 25 in Area 5; facing south-southeast.



Plate 14. Previously surveyed roadside along US 25 in Area 5; facing southeast.



Plate 15. Previously surveyed roadside along US 25 in Area 5; facing south.



Plate 16. Previously surveyed roadside along US 25 in Area 5; facing south.



Plate 17. Previously surveyed roadside along Old Lexington Pike in Area 5; facing south.



Plate 18. Previously surveyed sloping wet area in the industrial park north of Richwood Drive in Area 5; facing north.



Plate 19. Previously surveyed roadside between the Norfolk Southern railroad tracks and US 25 in Area 5; facing south-southeast.



Plate 20. Previously surveyed roadside between the Norfolk Southern railroad tracks and US 25 in Area 5; facing northwest.



Plate 21. Previously surveyed Norfolk Southern railroad tracks and scrubby area east of US 25 in Area 5; facing northeast.



Plate 22. Previously surveyed wooded hilltop south of KY 338 in Area 5; facing north-northeast.



Plate 23. Previously surveyed wooded hilltop south of KY 338 in Area 5; facing south-southwest.

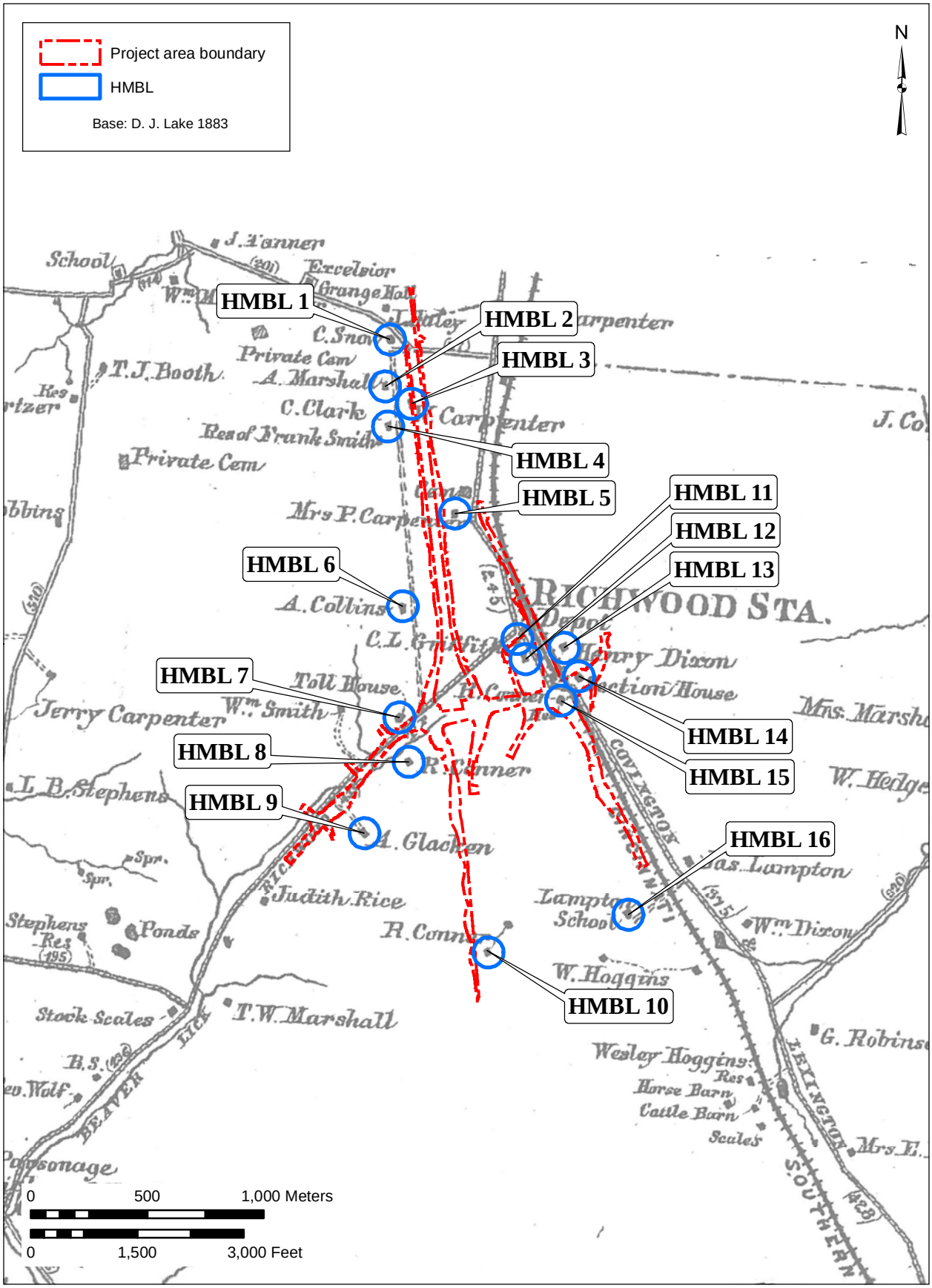


Figure 4. Portion of *Atlas of Boone, Kenton, and Campbell Counties, Kentucky* (D. J. Lake 1883) showing the Historic Map Buildings Locations (HMBL) within or adjacent to project area.



Plate 24. Previously surveyed scrubby area between the Norfolk Southern railroad tracks and the industrial park in Area 5; facing west.



Plate 25. The Carpenter Family Cemetery (15Be534), which is adjacent to Area 5 at the northern terminus of the project area along US 25; facing west.

It is likely that prehistoric remains existed in or near the project area, but because most of the project area is restricted to the areas within or adjacent to existing roads and highways in areas of relatively intensive development, it is considered unlikely that any have survived to the present intact. Several of the buildings shown on the D. J. Lake and Company (1883) atlas are adjacent to the project area. However, it is suspected these buildings were either torn down prior to the installation of I-71/I-75, or torn down as a result of the installation of I-71/I-75. Any building foundation remains or associated archaeological scatters would have been impacted or destroyed by the interstate installation and subsequent rework or other improvements. There could be primary or secondary archaeological deposits associated with any of them within the project area. However, as with prehistoric sites, because of the disturbed nature of the project area it is unlikely that any have survived intact to the present.

ARCHAEOLOGICAL FIELD METHODS

Two methods of investigation were utilized during the Phase I archaeological survey: visual inspection and shovel probe excavation. The entire project area is visually inspected to identify readily visible archaeological resources, such as mounds, earthworks, and building or structure remnants, and to document areas of disturbance. Visual inspection, as the name implies, is a visual examination of areas.

Shovel probe excavation is a subsurface testing strategy utilized to determine the presence of archaeological resources in relatively level areas where the surface visibility is less than 50 percent. The shovel probes are excavated 20 m (66 ft) apart, with the exception of areas near HMBLs, where the interval was reduced to 10 m (33 ft). All of the intervals were paced. Units are 30 cm (12 in) in diameter and are typically excavated to a minimum depth of 5 cm (2 in) into the subsoil, but do not exceed 50 cm (20 in) in depth. Soil from the shovel probes is screened through 0.25-in hardware cloth to facilitate the recovery of artifacts. Reduced interval shovel probing utilized 10-m (33-ft) intervals at or near selected HMBL locations. Reduced intervals were utilized in areas where it was thought there was a reasonable likelihood of encountering historic remains based on the proximity to HMBLs, local soil conditions, and evidence of disturbance. Notes are taken on each shovel probe, recording soil characteristics and the presence/absence of cultural material. Shovel probes are designated with a trinomial consisting of the Area Number followed by the Transect Number and then the Unit Number (e.g., 1-2-3).

Additional field notes are also kept recording information including field conditions, methods of investigation, location of shovel probes, photographs, etc. Photographs of the project area are taken as deemed appropriate. A record of the photographs is kept in a photo log. The locations of datum points for each area are recorded using a Trimble GeoXT Global Positioning System (GPS) unit. The locations of photographs and shovel probes are also recorded with the GPS unit.

PHASE I SURVEY RESULTS AND CONCLUSIONS

ARCHAEOLOGICAL SURVEY

The project area for the proposed reconstruction of the I-71/I-75 interchange with KY 338 is situated in the uplands of the Outer Bluegrass region (Kentucky Geological Survey 2006) between Mud Lick and the Wolf Pen Branch of Banklick Creek in Boone County, Kentucky (Figures 1 and 2). The uplands containing the project area are made up of rolling and undulating terrain dissected by numerous ravines and small stream valleys. The undertaking involves the reconstruction of an existing diamond interchange and several of the surrounding roadways. The project area is irregularly shaped, extending 3.07 km (1.91 mi) along I-71/I-75, 1.72 km (1.07 mi) along US 25, and 1.45 km (.90 mi) along KY 338 with a 342 m (1,120.8 ft) extension into an industrial area east of US 25. The project area, which is the APE for direct effects, is defined as the proposed construction limits and includes 29.45 ha (72.78 ac) of mostly roadsides and existing roadways.

The fieldwork for the project was conducted December 10–14, 2012 with additional fieldwork occurring July 1–3, 2013. The project area was divided into six areas (Figures 5–9). Areas 1–4 are in the southwest, southeast, northeast, and northwest quadrants of the interchange, respectively. Nearly all of Areas 1–4 are inside the fence along the edges of the highway (Figures 5–7). Area 5 includes the area east of the interchange and Area 6 encompasses the area west of I-71/I-75. Most of Area 5 had been previously surveyed. No archaeological sites were documented within the project area.

Sixteen buildings depicted on the *Atlas of Boone, Kenton and Campbell Counties, Kentucky* (D. J. Lake and Company 1883) are within or adjacent to the project area and were designated HMBLs 1–16 (Figures 3, 4 and 5–9). Testing intervals were reduced by half (i.e., to 10-m [33-ft] intervals) to look for sites at the HMBLs in areas sloping less than 15 percent that had not been part of a previous survey.

AREA 1

There was a small part of Area 1 that extended a few meters outside the fence on top of a hill just south of the interchange. Five shovel probes (Transect 1) were excavated in this relatively intact area. The stratigraphy observed consisted of a ca. 10-cm–20-cm (4-in–8-in) deep A horizon of dark yellowish brown (10YR 4/6) silt loam above more brownish yellow (10YR 6/6) clayey B-horizon soils (Figure 10). Most of Area 1 is sloping cut and fill. However, in addition to the shovel-tested hilltop in Area 1, there are small, relatively level disturbed areas above both sides of the southbound entrance ramp where 11 shovel probes were excavated (Transects 2–4) [Plate 26].



Plate 26. Roadside above entrance ramp to I-71/I-75 in Area 1; facing north-northwest. Shovel probing identified disturbed soils in this location.

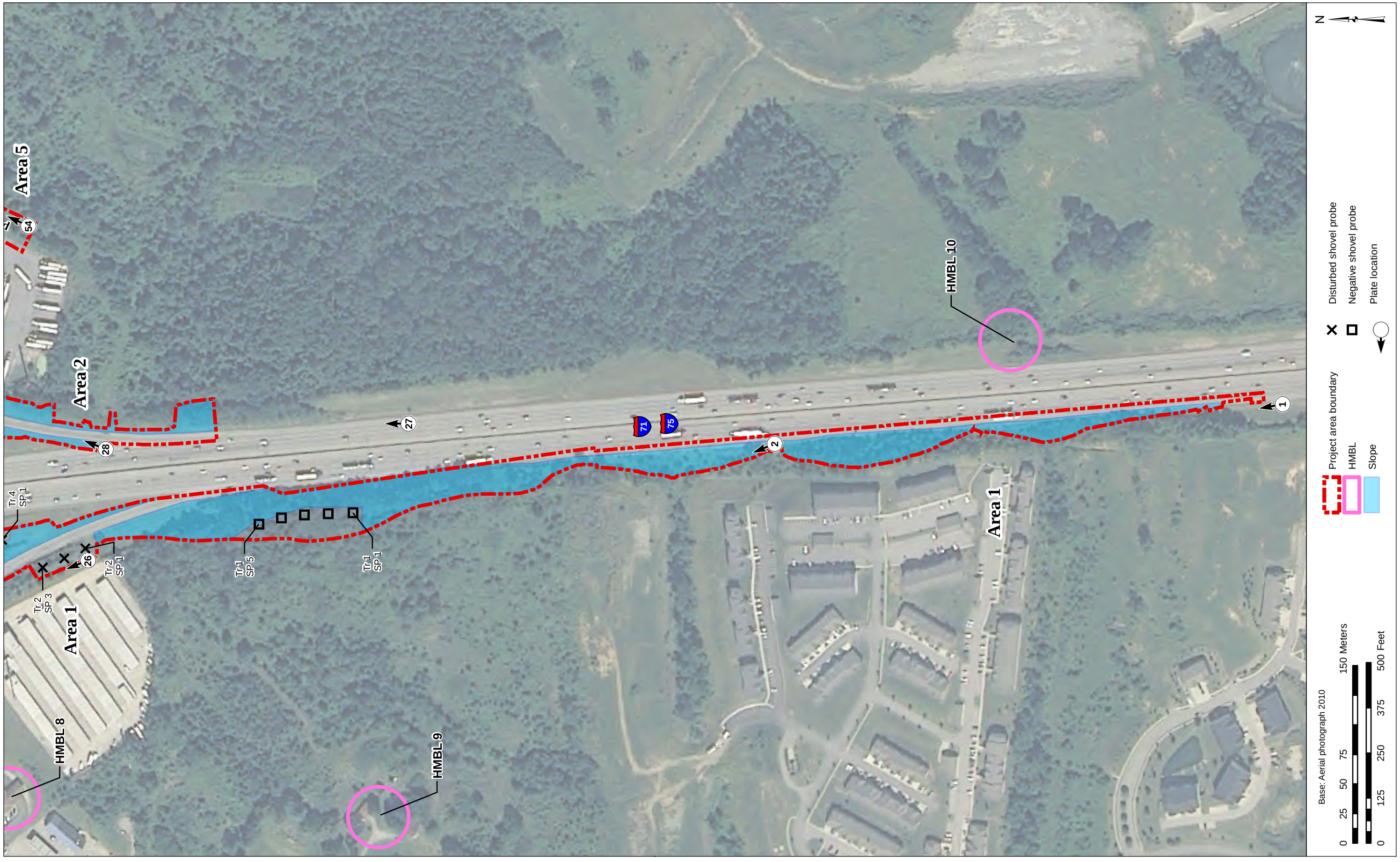


Figure 5. Aerial map detailing the cultural resources investigation in the southern part of the project area and keyed to the plates.

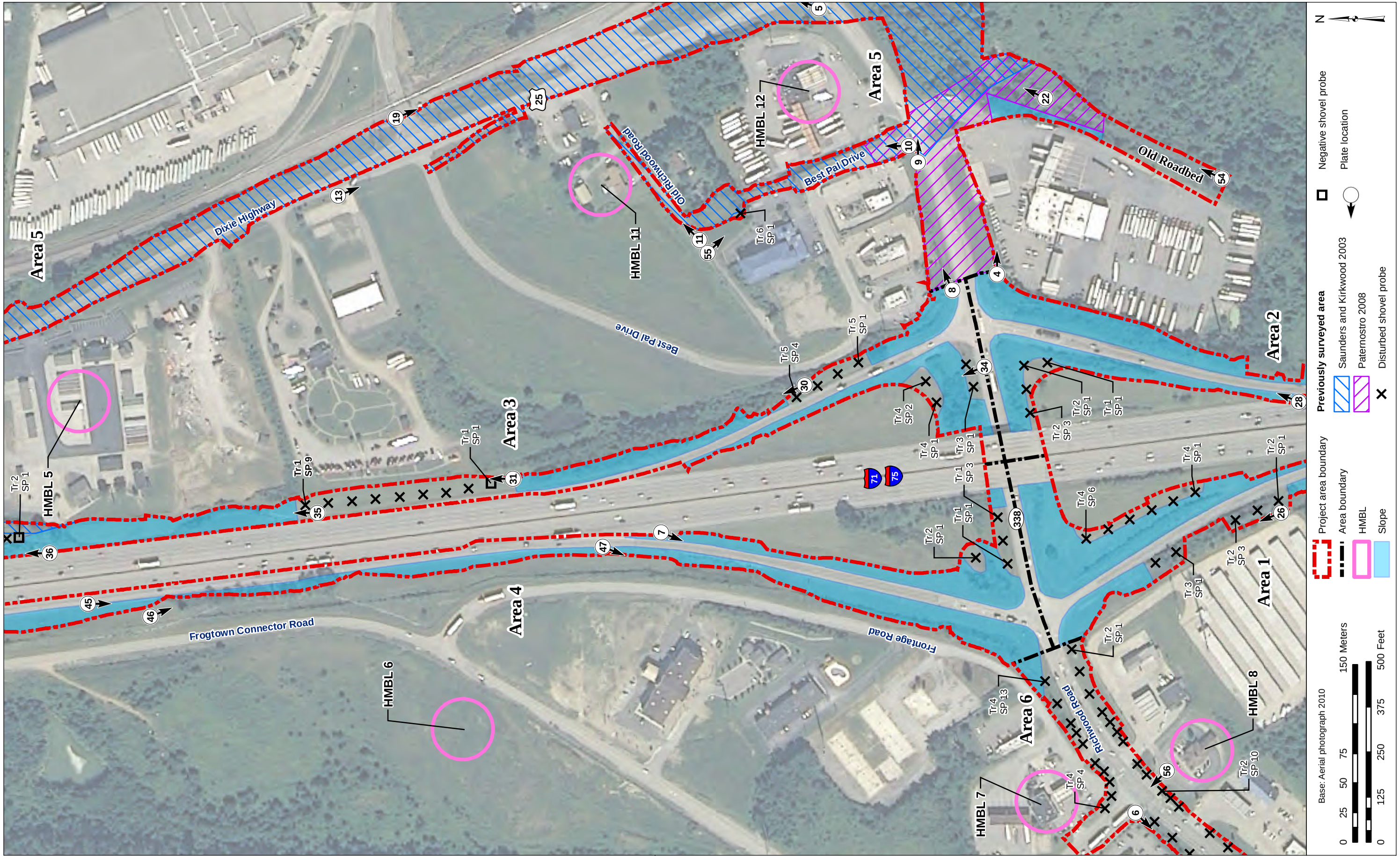


Figure 6. Aerial map detailing the cultural resources investigation in the central part of the project area and keyed to the plates.

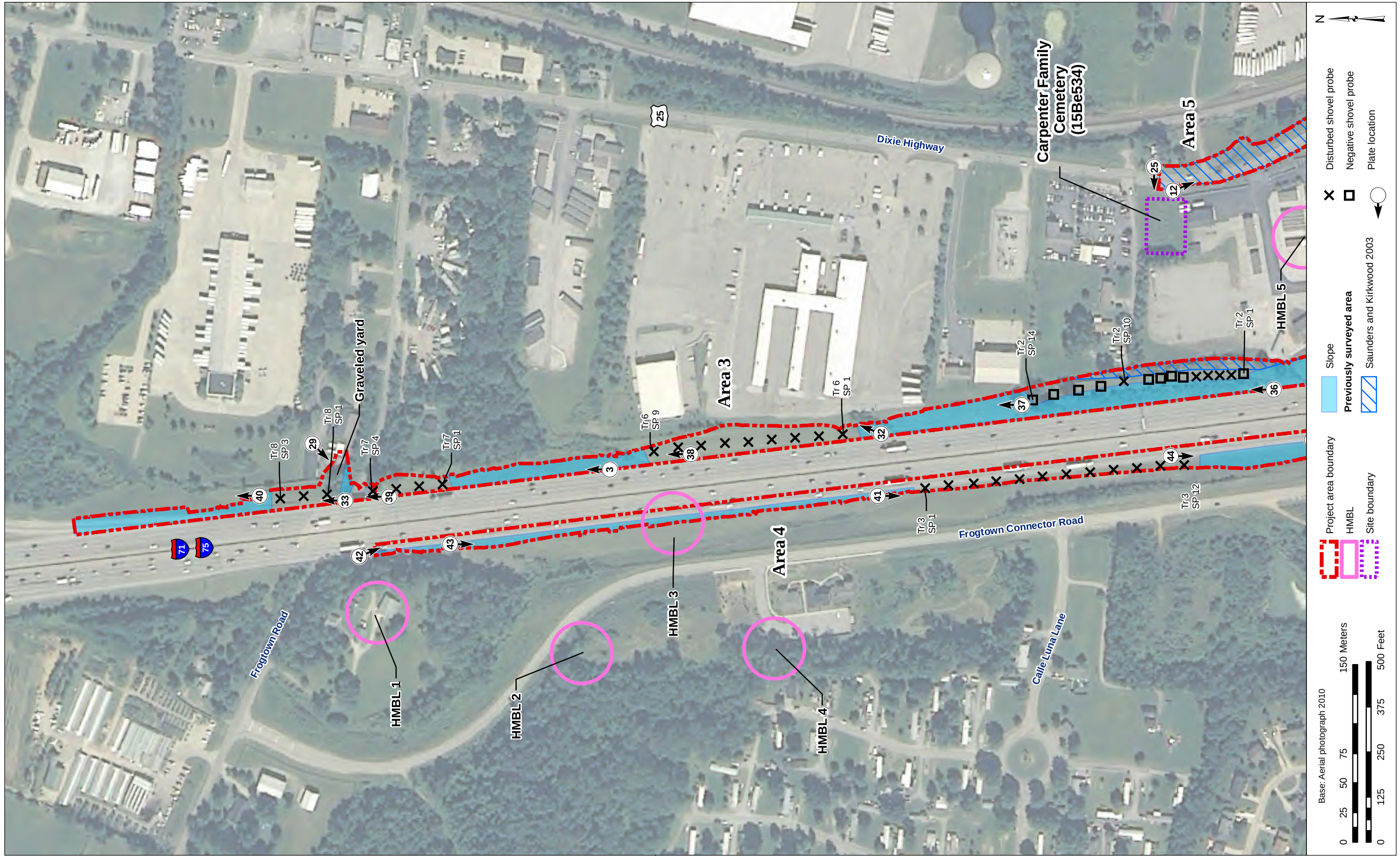


Figure 7. Aerial map detailing the cultural resources investigation in the northern part of the project area and keyed to the plates.

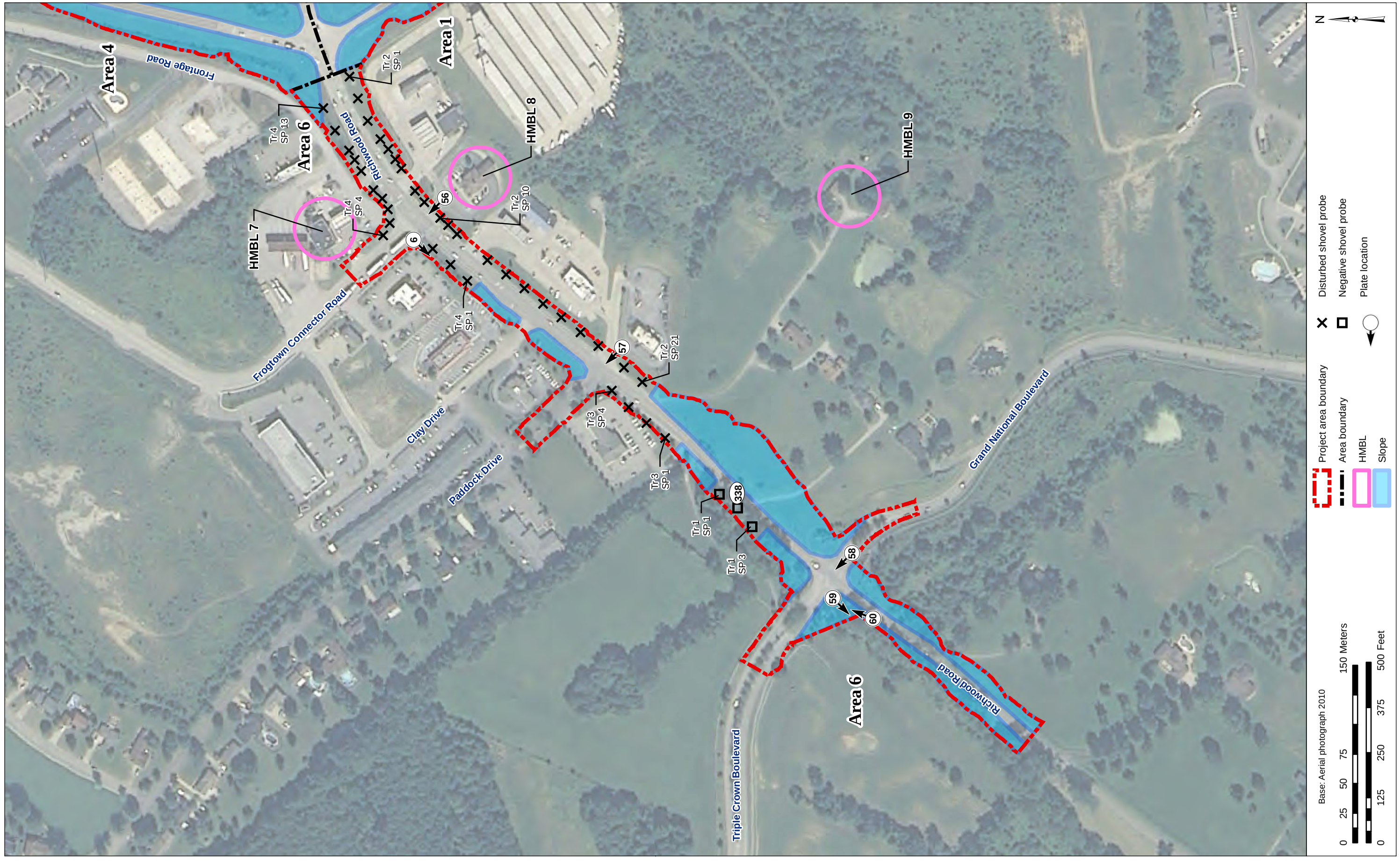


Figure 8. Aerial map detailing the cultural resources investigation in the western part of the project area and keyed to the plates.

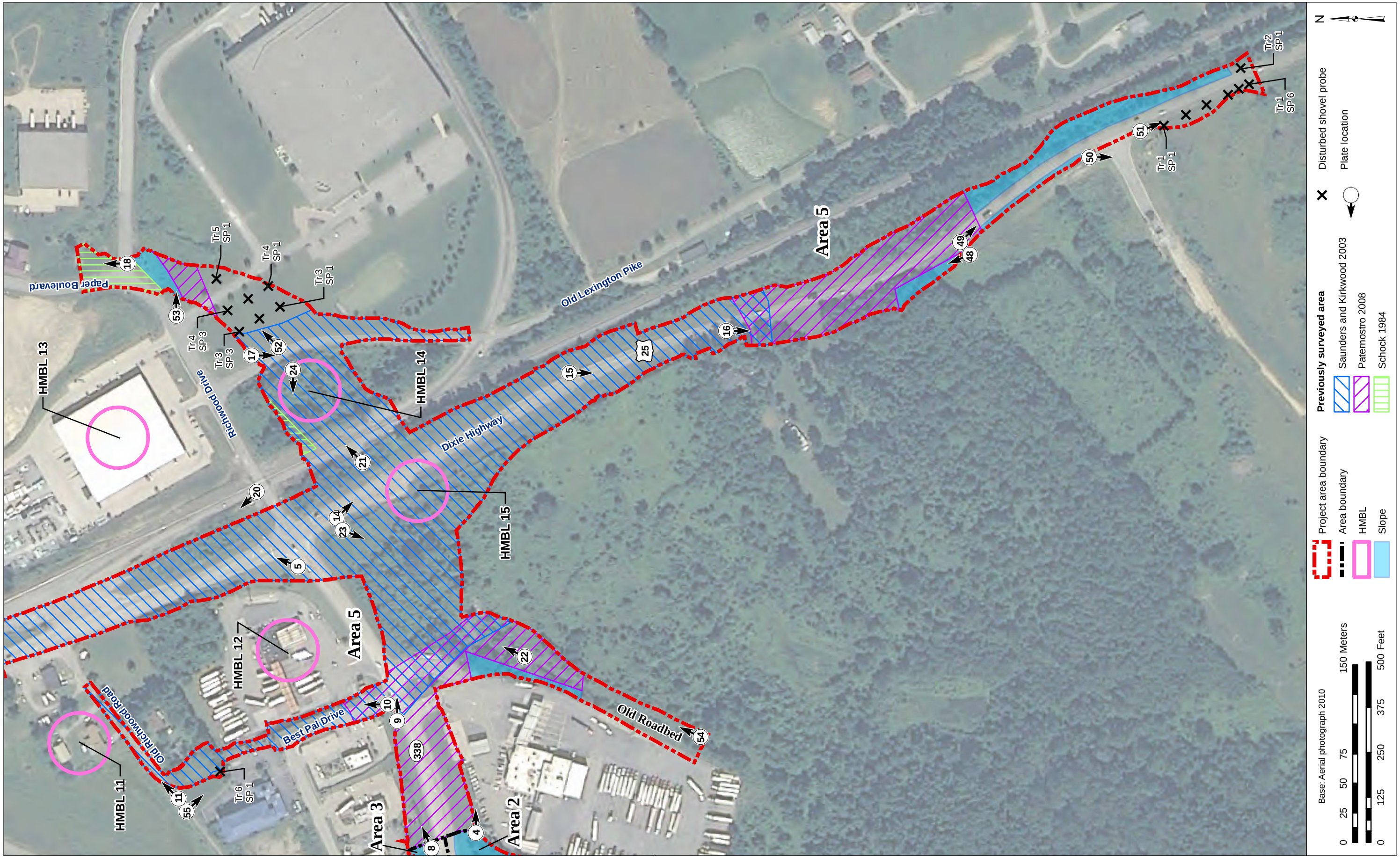


Figure 9. Aerial map detailing the cultural resources investigation in the eastern part of the project area and keyed to the plates.



Figure 10. Soil profile documented in Shovel Probe 1-1-3.

Soil profiles in these areas typically consisted of an upper stratum of ca. 11 cm–24 cm (4.3 in–9.5 in) thick layer of firm to compact dark yellowish brown (10YR 4/4) gravelly silty clay loam, often mottled with gray (10YR 5/1) [Figure 11]. It was generally underlain by yellowish brown (10YR 5/4) gravelly silty clay subsoil that was also occasionally mottled with gray (10YR 5/1). Gravel inclusions and concrete fragments were frequently encountered throughout both strata. The mottled, compacted soils and the presence of concrete and gravel inclusions suggest that these strata have been heavily disturbed and thus, are unlikely to contain cultural features or artifacts.

The rest of Area 1 was visually inspected only because it was composed of slopes in excess of 15 percent.

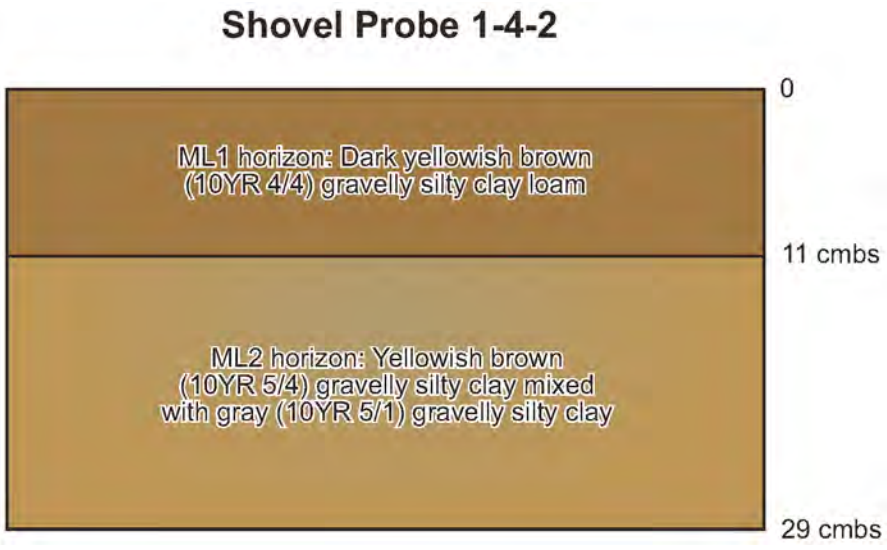


Figure 11. Soil profile documented in Shovel Probe 1-4-2.

AREA 2

All of Area 2 is heavily sloping cut and fill and was visually inspected (Plate 27). Four shovel probes were excavated at the top of the slope along the edge of the project area (Transects 1 and 2) [Plate 28]. Soils in this area all showed clear evidence of disturbance in the form of mixed gravelly made land (ML) soils in this area of cut and fill. Shovel Probe 2-2-1 (Figure 12) is a representative shovel probe from this area. It contained a single stratum of yellowish brown (10YR 5/6) gravelly clay loam mottled with gray (10YR 5/1) clay and clay loam. Concrete fragments were encountered throughout the excavated shovel probes.



Plate 27. Roadside along I-71/I-75 in Area 2; facing north.



Plate 28. Exit ramp from I-71/I-75 in Area 2; facing northeast.

AREA 3

Area 3 included the portion of the project area situated east of I71/I75 and north of KY 338 (Figures 6 and 7). Part of it is outside the fence, just north of Frogtown Road. It is a graveled yard at a kennel (Plate 29).



Plate 29. Graveled lot at kennel east of I-71/I-75 in Area 3; facing southwest.

There were several relatively level areas within Area 3, most of which were disturbed as evidenced by the testing results detailed below (Plates 30–33). Forty-six shovel probes were used to examine the soil conditions in Area 3. Soils in the disturbed areas were mixed, some with large amounts of gravel (Figure 13). Transect 2 was relatively intact area just north of the reported location of HMBL 5 (Figures 6 and 7). Due to its proximity to the HMBL and the intact soils, the testing interval was reduced to 10 m (32.8 ft) for Shovel Probes 3-2-1 through 3-2-9. A typical intact soil profile in this portion of Transect 2 contained a ca. 13-cm–34-cm (5-in–13-in) deep brown (10YR 4/3) silt loam A horizon overlying light brownish yellow to brownish yellow (10YR 6/4-10YR 6/6) silty clay loam B-horizon soils (Figure 14). Four disturbed shovel probes were excavated inside the interchange, on the project boundary (Plate 34). They were situated in an area of cut and fill at the top of the sloping edges of a ditch.

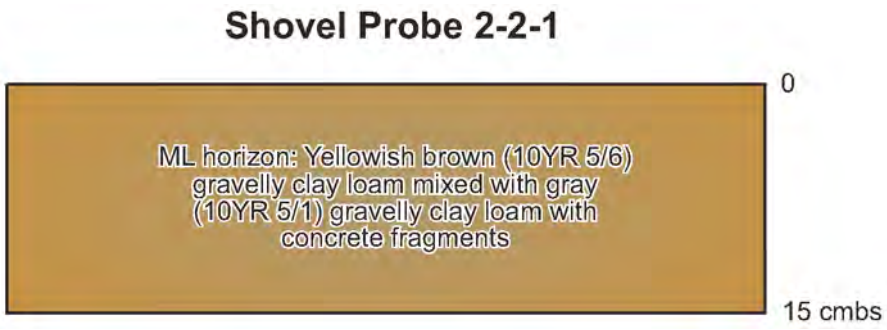


Figure 12. Soil profile documented in Shovel Probe 2-2-1.

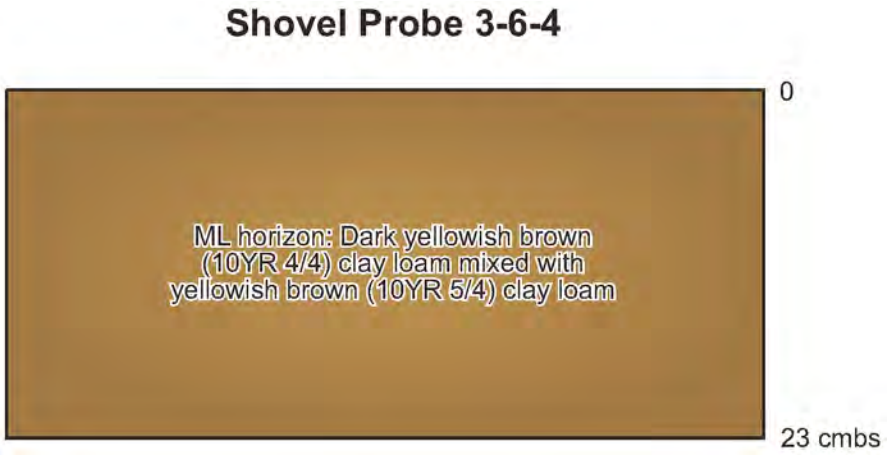


Figure 13. Soil profile documented in Shovel Probe 3-6-4.

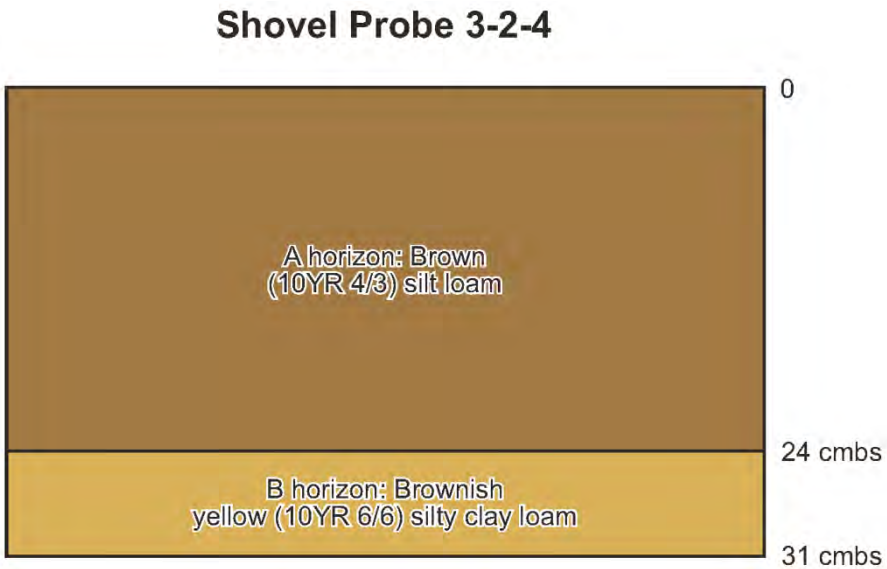


Figure 14. Soil profile documented in Shovel Probe 3-2-4.



Plate 30. Roadside along entrance ramp to I-71/I-75 in Area 3; facing north-northwest.



Plate 31. Roadside along I-71/I-75 in Area 3; facing north.



Plate 32. Roadside along I-71/I-75 in Area 3; facing north-northeast.



Plate 33. Roadside along I-71/I-75 in Area 3; facing north.



Plate 34. Roadside along I-71/I-75 in Area 3; facing north-northwest. Shovel probing indicated that flatter portions in foreground and background are disturbed soils.

A representative shovel probe at this location contained a single stratum of dark yellowish brown (10YR 4/6) gravelly clay mottled with dark yellowish brown (10YR 4/4) and gray (10YR 5/1) clays (Figure 15). These are interpreted as disturbed made land (ML horizon soils). The rest of the area was sloping and mostly cut and fill, all of which was visually inspected (Plates 35–40). A narrow section of Area 3 was surveyed by Saunders and Kirkwood (2003). This previously surveyed portion of Area 3 is outside the highway fence and adjacent to the level area where Transect 2 is located.

AREA 4

There are three relatively level areas within Area 4 (Figures 6 and 7). All of them appeared disturbed and 16 shovel probes (Transects 1–3) were excavated to document the disturbance. A single transect of 12 shovel probes was excavated parallel to I71/I75 (Plate 41). Nine of them had been entirely stripped of the topsoil by road construction, leaving only a thin, 1 cm–2 cm (.4 in–.8 in) O horizon overlying dark yellowish brown (10YR 4/6) clay subsoil. The remaining four shovel probes contained disturbed made land (ML horizon soils), in the form of a dark yellowish brown (10YR 4/4) clay loam mottled with yellowish brown (10YR 5/6) clay loam [Figure 16]. Four shovel probes were also excavated inside the interchange. They are on the project boundary in an area of cut and fill at the top of the sloping edges of a ditch.

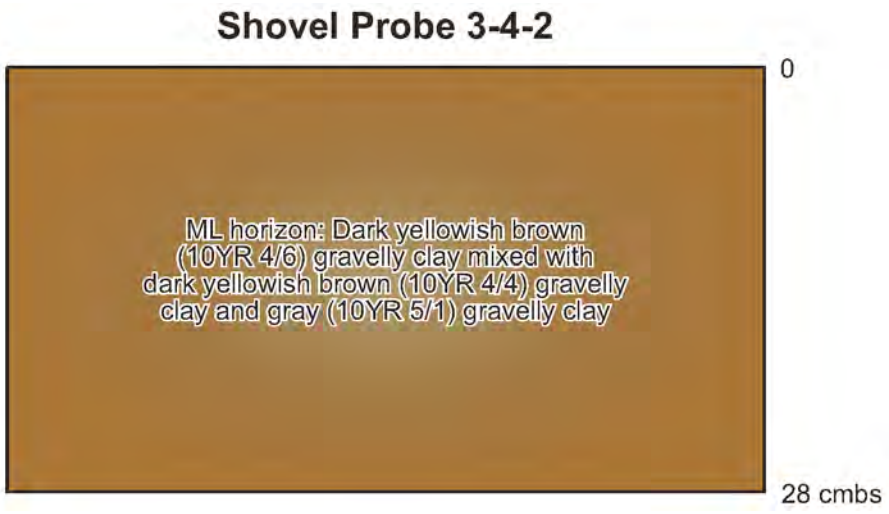


Figure 15. Soil profile documented in Shovel Probe 3-4-2.

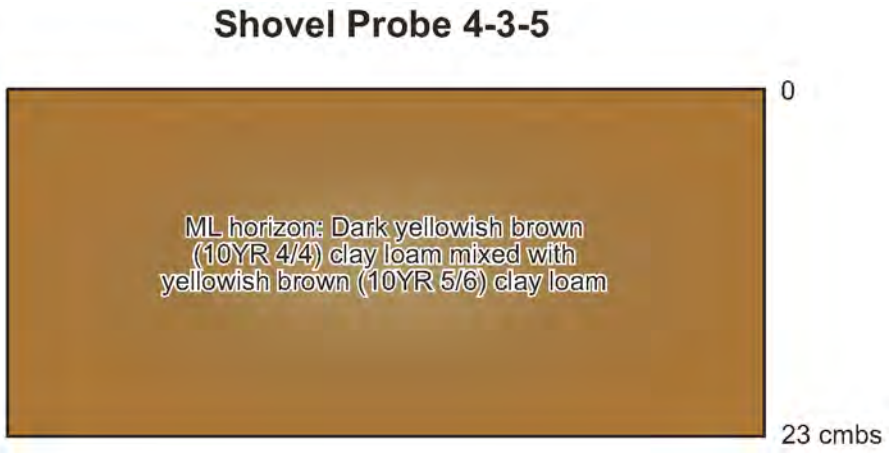


Figure 16. Soil profile documented in Shovel Probe 4-3-5.



Plate 35. Roadside along I-71/I-75 in Area 3; facing north.



Plate 36. Roadside along I-71/I-75 in Area 3; facing north.



Plate 37. Roadside along I-71/I-75 in Area 3; facing north.



Plate 38. Roadside along I-71/I-75 in Area 3; facing north.



Plate 39. Roadside along I-71/I-75 in Area 3; facing north.



Plate 40. Roadside along I-71/I-75 in Area 3; facing north.



Plate 41. Roadside along I-71/I-75 in Area 4; facing south.

A typical shovel probe from inside the interchange consisted of a single layer of made land (ML horizon soils), consisting of yellowish brown (10YR 5/4) gravelly clay mixed with gray (10YR 5/1) gravelly clay [Figure 17]. The rest of Area 4 is sloping and mostly cut and fill that was visually inspected (Plates 42–47).

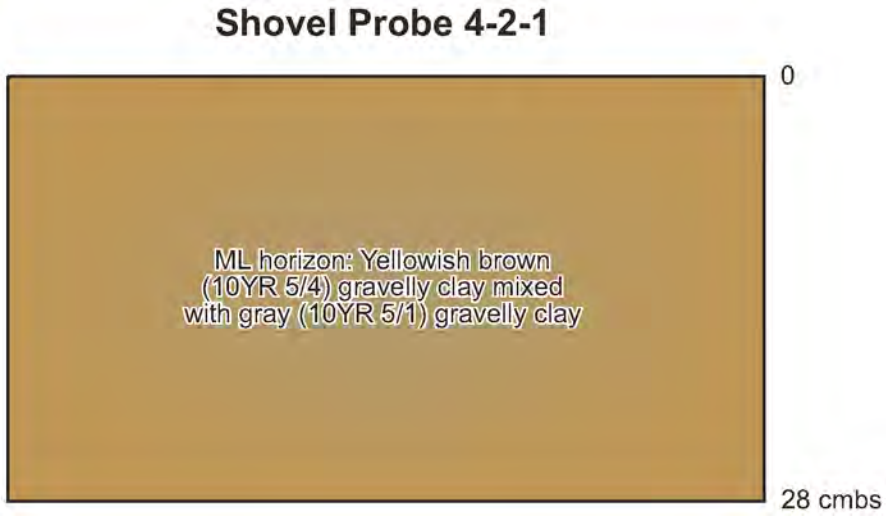


Figure 17. Soil profile documented in Shovel Probe 4-2-1.



Plate 42. Roadside along I-71/I-75 in Area 4; facing south-southeast.



Plate 43. Roadside along I-71/I-75 in Area 4; facing south.



Plate 44. Roadside along I-71/I-75 in Area 4; facing south.



Plate 45. Roadside along I-71/I-75 in Area 4; facing south.



Plate 46. Roadside along I-71/I-75 in Area 4; facing south-southeast.



Plate 47. Roadside along exit ramp from I-71/I-75 in Area 4; facing south-southwest.

AREA 5

Area 5 includes the portion of the project area east of the interchange (Figures 6, 7, and 9). It extends a short distance along KY 338 and then cuts south of the existing roadway across a wooded hill to US 25. A large portion of Area 5 extends along US 25 to the north and south of KY 338 and another portion extends across the railroad tracks into an industrial park. The majority of Area 5 was surveyed in conjunction with a US 25 reconstruction project (Paternostro 2008; Saunders and Kirkwood 2003) and two other small parts were surveyed as part of the development of the industrial park (Schock 1984) [Table 2; Plates 8, 9, 12, and 13]. The previously surveyed areas were visually inspected and photographed. The Carpenter Family Cemetery (15Be534) is located adjacent to the northern terminus of the project area along US 25 (Table 2; Plate 25). It does not extend into the project area.

Area 5 includes six small subareas that were not previously surveyed. Two of them are located along US 25 near the southern terminus of the project area, two are inside and industrial park near Richwood Drive, and two are small areas slightly east of the interchange.

The two areas along US 25 near the project area's southern terminus are mostly sloping. The parts adjacent to the road are cut and fill (Figure 9; Plates 48–51). Seven shovel probes were excavated in relatively level areas of the fill (Transects 1 and 2) to confirm they were disturbed. Shovel Probe 5-1-5 (Figure 18) is representative of this portion of Area 5. It contained a 24-cm (9.5-in) thick layer of dark yellowish brown (10YR 4/4) silty clay loam that was mottled with yellowish brown (10YR 5/6) silty clay loam.



Plate 48. Roadside along US 25 in Area 5; facing north-northwest.



Plate 49. Roadside along US 25 in Area 5; facing southeast.



Plate 50. Roadside along US 25 in Area 5; facing south.



Plate 51. Roadside along US 25 in Area 5; facing south-southeast.

The areas near the industrial park near Richwood Drive include two small portions of lawn outside one of the buildings in the industrial park. They fell between the three previous surveys conducted in that area. One is fill, which was confirmed with a series of seven shovel probes (Transects 3–5) [Plate 52]. A representative shovel probe in this area consisted of an approximately 25-cm (9.8-in) thick layer of yellowish brown (10YR 5/4) silty clay loam that was mixed with dark yellowish brown (10YR 4/4) silt clay (Figure 19). It is interpreted as made land (ML horizon soil). The area other is sloping fill (Plate 53) that was visually inspected. There were two areas east of the interchange. One was an area of fill along the back edge of a retaining wall (Plate 54) and the other was gravel fill along a slightly raised road (Plate 55). A shovel probe confirmed the disturbance (Transect 6, Shovel Probe 1) behind the retaining wall.

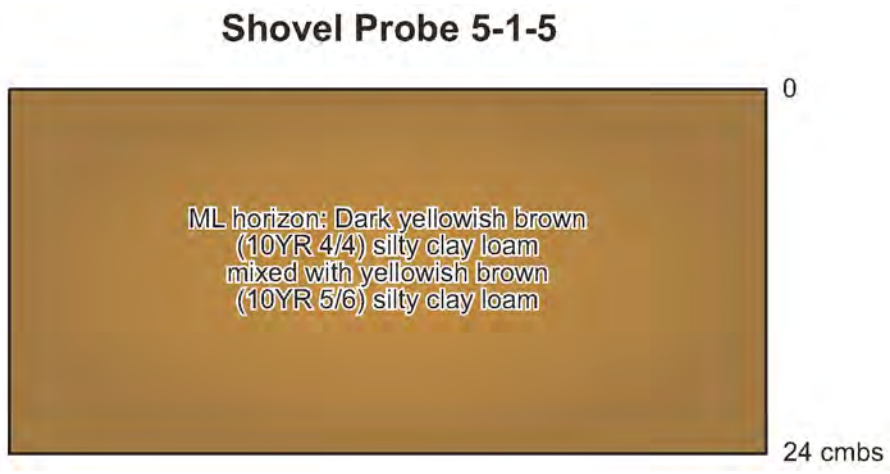


Figure 18. Soil profile documented in Shovel Probe 5-1-5.

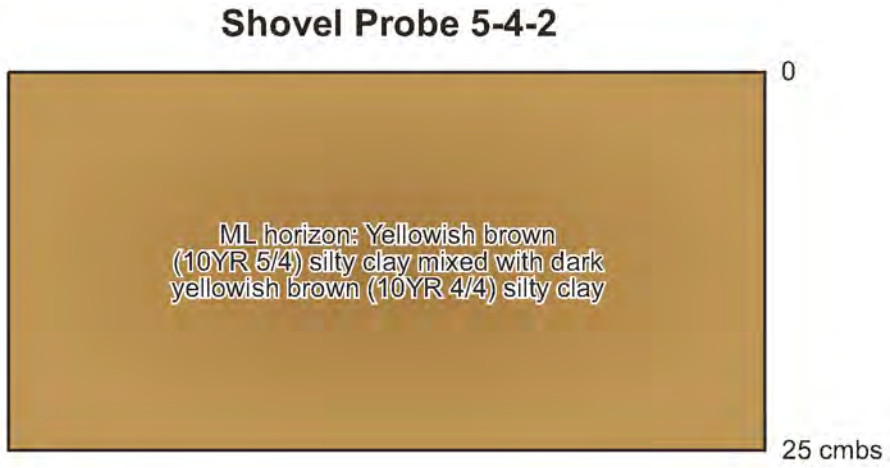


Figure 19. Soil profile documented in Shovel Probe 5-4-2.

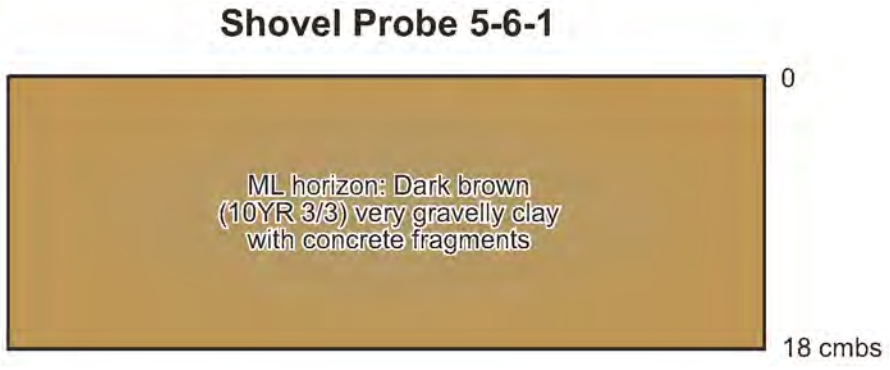


Figure 20. Soil profile documented in Shovel Probe 5-6-1.



Plate 52. Grassy lawn in the industrial park east of Old Lexington Pike in Area 5; facing northeast.



Plate 53. Sloping wet area in the industrial park south of Richwood Drive in Area 5; facing east.



Plate 54. Old roadbed in Area 5; facing north-northeast.



Plate 55. Vacant lot on Old Richwood Road in Area 5; facing southeast.

It was composed of an 18-cm (7-in) thick dark brown (10YR 3/3) very gravelly clay made land (ML horizon soils) with concrete fragments (Figure 20). No shovel probes were excavated in the gravel roadbed. Visual inspection determined that the roadbed was disturbed.

AREA 6

Area 6 is west of the I-71/I-75 interchange (Figure 8). It passes through a commercial area and extends into a residential area west of the highway. It is primarily along KY 338, but there are four extensions along side roads. The ones along Frogtown Connector Road (Plate 56), Paddock Drive (Plate 57), and Grand National Boulevard (Plate 58) are entirely on the existing pavement. The fourth extension is along Triple Crown Boulevard and includes some sloping fill around a culvert adjacent to KY 338 as well as the paved road (Plates 59 and 60).



Plate 56. Frogtown Connector Road north of KY 338 in Area 6; facing northwest.



Plate 57. Paddock Drive north of KY 338 in Area 6; facing northwest.



Plate 58. Triple Crown Boulevard north of KY 338 in Area 6; facing northwest.



Plate 59. Roadside along KY 338 in Area 6; facing southwest.



Plate 60. Roadside along KY 338 in Area 6 showing the fill around the culvert; facing north-northeast.

The rest of Area 6 is along the sides of KY 338 and is primarily composed of cut and fill soils, much of which is sloping. Forty-one shovel probes were excavated in the relatively level areas and all but one of these areas was found to be disturbed. The disturbed areas included all of Transects 2–4.

A representative soil profile from the disturbed portions of Area 6 (Shovel Probe 6-2-13) is included as Figure 21. It contained a 26-cm (10.2-in) thick layer of yellowish brown (10YR 5/6) clay loam mottled with dark yellowish brown (10YR 4/6) clay loam. Asphalt fragments were also present. Soil variability was low with regard to the soil texture, although the inclusions present and the degree to which they occurred in a given unit varied widely. Aside from the asphalt fragments already noted, concrete and gravel were encountered. Soils were often times compacted, making excavation more difficult. There is a small portion of creek bottom on the north side of KY 338 that was intact and three shovel probes (Shovel Probes 6-1-1 through 6-1-3) were excavated in this area. It is at the talus of adjacent hillside and the shovel probes indicated there was at least 50 cm (20 in) of dark yellowish brown (10YR 4/4) silty clay loam A-horizon soils that are interpreted as colluvium (as opposed to alluvium) in this area (Figure 22). The colluvial nature of the soil means that recovering intact cultural materials from this portion of the project area would be unlikely since the soils were redeposited from the surrounding slopes. No soil change was observed in any of the three shovel probes in this area. The drainage is a small intermittent tributary to Mud Lick Creek. It has been partially channelized where it passes through culverts and there do not appear to be any deep alluvial deposits associated with it in the project area.

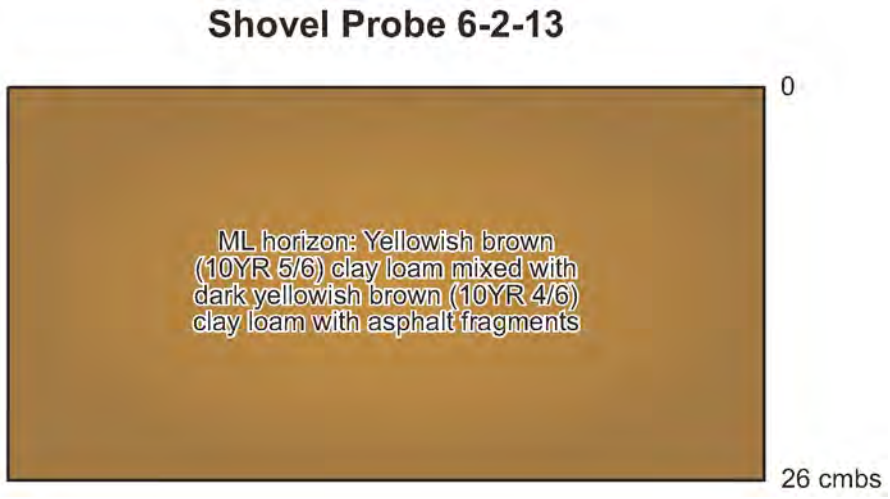


Figure 21. Soil profile documented in Shovel Probe 6-2-13.

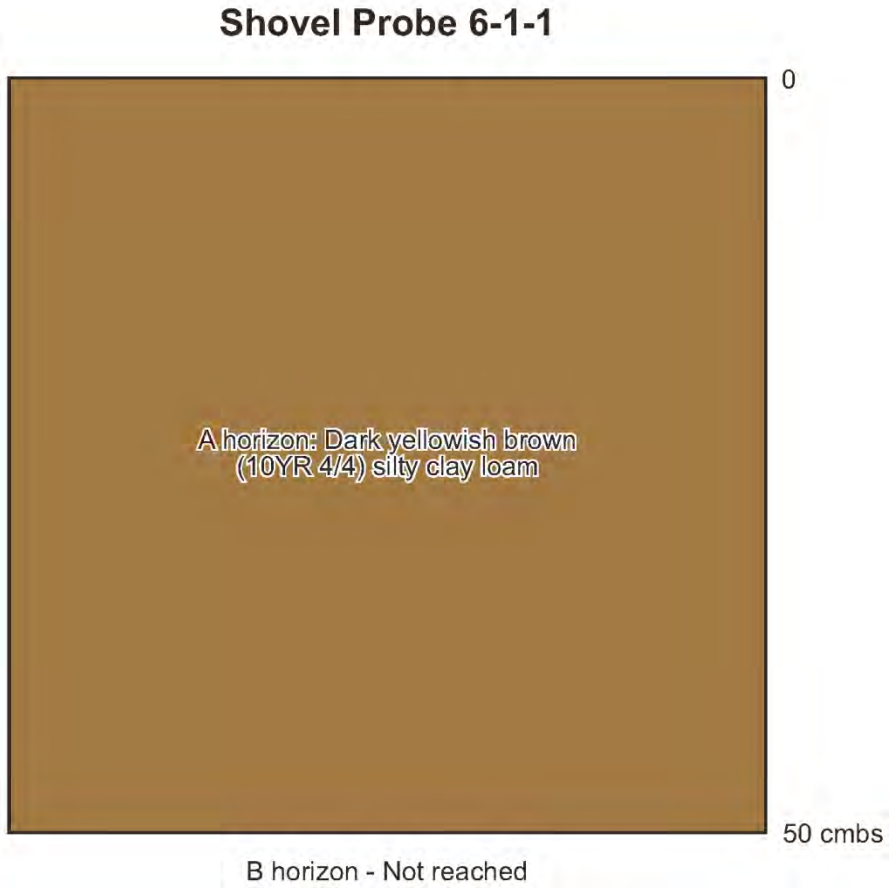


Figure 22. Soil profile documented in Shovel Probe 6-1-1.

Two HMBLs were recorded near Area 6. HMBL 7 was along the west side of KY 338, near the northeast terminus of Area 6. HMBL 8 was situated directly south of HMBL 7, along the east side of KY 338 (Figure 8). The testing interval was reduced from 20 m (66 ft) to 10 m (33 ft) near these locations in order to test for archaeological materials related to them. Shovel Probes 6-4-4 through 6-4-11 were excavated along Frogtown Connector Road and KY 338 near HMBL 7, while Shovel Probes 6-2-4 through 6-2-12 were excavated along KY 338 near HMBL 8. All of the probes were disturbed. Shovel Probes 6-4-5 and 6-4-11 were disturbed shovel probes excavated near HMBL 7. Shovel Probe 6-4-5 contained a 9-cm (3.5-in) thick layer of dark yellowish brown (10YR 4/4) silt loam topsoil which was underlain by yellowish brown (10YR 5/4) clay. Gravel and concrete fragments throughtout this layer. Shovel Probe 6-4-11 contained a single layer of yellowish brown (10YR 5/8) clay with brown (10YR 4/4) vertical striations. Shovel Probes 6-2-5 and 6-2-11 demonstrate the nature of the disturbance noted near HMBL 8. Shovel Probe 6-2-5 contained a 30-cm (11.8-in) thick layer of compact dark yellowish brown (10YR 4/6) clay mottled with gray (10YR 6/1) clay. Sandstone fragments were noted throughout the shovel probe. Shovel Probe 6-2-11 contained a 31-cm (12.2-in) thick layer of yellowish brown (10YR 5/6) silty clay mottle with dark yellowish brown (10YR 4/6) and gray (10YR 5/1).

SUMMARY OF SURVEY IN RELATION TO HMBLS

Nearly all of the project area is disturbed, previously surveyed, or sloping, and HMBL 5 is the only one near a relatively level and somewhat intact area that had not been surveyed. Nine shovel probes were excavated in the portion of Area 3 near HMBL 5, but no artifacts were recovered from any of them. Five of the shovel probes along the disturbed roadside of KY 338 in Area 6 are near HMBL 7, and eight more on the other side of the road are near HMBL 8, but no intact soils were encountered in any of them. Three of the shovel probes excavated in the disturbed area at the south end of Area 5 were in the vicinity of HMBL 16. HMBL 3 is within the project area within the I-71/I-75 right-of-way, but all of the project area in its vicinity is sloping cut and fill so no shovel probes were excavated. HMBLs 11–15 are within or adjacent to previously surveyed areas. The portions of the project area in the vicinity of HMBLs 1, 2, 4, 6, 9, and 10 are sloping cut and fill so no shovel probes were excavated. No archaeological remains were encountered that could be associated with any of the HMBLs.

CONCLUSIONS

Nearly the entire project was disturbed, previously surveyed, or both, comprising cut and fill areas along roadsides, much of which was sloping. A total of 138 shovel probes documented the relatively level areas of the project area, 120 of which had profiles documenting disturbance and 18 shovel probes were excavated in the few relatively intact and habitable areas. No archaeological deposits were encountered. Sixteen HMBLs were identified during the literature review. No cultural remains associated with any of them were encountered within the project area. The lack of sites can be attributed to the high level of disturbance coupled with the primarily sloping terrain and does not reflect a lack of prehistoric and historic activity. Based on the results of the current survey and past projects (Paternostro 2008; Saunders and Kirkwood 2003; Schock 1984), the undertaking will not affect any significant archaeological resources. A management recommendation of No Archaeological Sites Present is made. No further work is recommended.

SUMMARY

ASC Group conducted a Phase I archaeological survey for the proposed KY 338 Interchange with I-71/I-75 Reconstruction (Item No. 6-18.00) project in Boone County, Kentucky. The project area is irregularly shaped, primarily extending along I-71/I-75, US 25, and KY 338 and encompassing approximately 29.45 ha (72.78 ac) of mostly roadsides and existing roadways in the uplands of the Outer Bluegrass region (Kentucky Geological Survey 2006) between Mud Lick Creek and the Wolf Pen Branch of Banklick Creek. It has mixed land use that can be characterized as commercial, industrial, and residential

Nine archaeological projects have been reported on within the 2-km (1.2-mi) buffer around the project area, all of which are Phase I surveys. Three of the projects encompass portions of the current project area. Although no previously identified sites are located within the project area, OSA listed nine sites within the 2-km (1.2-mi) buffer area surrounding the project area. Historic cartographic information indicates that 16 nineteenth-century buildings once stood within or adjacent to the project area. Four appear to correspond to extant buildings shown on USGS mapping. There is also a cemetery shown on the D. J. Lake (1883) atlas, which is the Carpenter Family Cemetery (15Be534) that was documented by Saunders and Kirkwood (2003) during their survey for reconstruction of US 25. Although prehistoric and historic activity occurred within and in the region surrounding the project area, the APE is mostly in areas that have been disturbed by modern development and it was determined that it is unlikely that any intact archaeological deposits would be present

The archaeological survey utilized a combination of visual inspection and shovel probes to examine the project area. No archaeological deposits were encountered during the survey. A substantial portion of the project area east of the interchange was previously surveyed and was visually inspected and photographed. Most of the project area was found to be sloping or cut and fill, often both. Shovel probes were excavated in the relatively level areas. Based on the results of the current survey, the undertaking will not affect any significant cultural resources and no further work is recommended.

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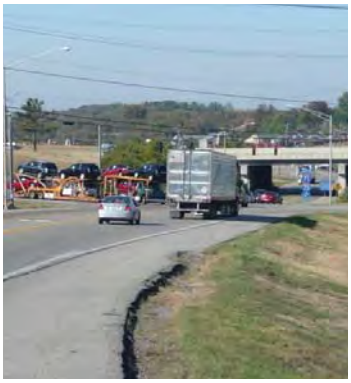
APPENDIX G – TRAFFIC NOISE IMPACT® ANALYSIS

I-71/I-75 – KY338

Traffic Noise Impact Analysis







Project Item No. 6-18.00 | Boone County | February 2013

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KENTUCKY TRANSPORTATION CABINET

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I-71/I-75 – KY 338 (Richwood Road)

Interchange Improvement Project

Boone County, Kentucky

Item Number 6-18.00

TRAFFIC NOISE IMPACT ANALYSIS

February 2013

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Kentucky Transportation Cabinet

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LIST OF ABBREVIATED TERMS

CFR	Code of Federal Regulations
dB(A)	A-weighted Decibels
FHWA	Federal Highway Administration
KYTC	Kentucky Transportation Cabinet
Leq	Equivalent Sound Level
Leq(h)	1-Hour A-weighted Equivalent Sound Level
LOS	Level of Service
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
TNIA	Traffic Noise Impact Assesment
TNM	FHWA Traffic Noise Model Version 2.5
VPH	Vehicles Per Hour

1.0 EXECUTIVE SUMMARY

The project includes improvements to KY 338 east of its interchange with I-71/I-75 including access management measures, grade-separation or closure of the two at-grade railroad crossings, and modifications to the intersection with US 25/Dixie Highway. On the western side of the interchange access management measures are required within the commercial district west of the interchange. These alternatives begin at the ramp intersections and continue to approximately 1,000 feet west of Triple Crown Boulevard.

A Traffic Noise Impact Analysis was conducted for the KY 338 (Richwood Road) Interchange Improvement Project. The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.5 was used to model existing and proposed noise levels. For this study 90 representative receptors were used to represent 164 dwelling units. Existing noise levels range from 47.8 dB(A) to 74.4 dB(A) for the 90 receptors analyzed . Predicted noise levels for the "No Build Alternative" range from 48.9 dB(A) to 75.3 dB(A). Predicted noise levels for the Preferred Alternative (W9/E1) range from 49.1 dB(A) to 76.4 dB(A). Because numerous design year noise levels have been predicted to approach or exceed the FHWA Noise Abatement Criteria (NAC) for Category B and C land uses, the project has been found to have traffic noise impacts. Based on the Kentucky Transportation Cabinet (KYTC) Noise Analysis and Abatement Policy, the feasibility and reasonableness of noise barriers were evaluated at all locations in the project area where noise impacts were identified under the future build alternative. Based on this evaluation, two feasible barriers were identified for this project (NB1 and NB2). Of these barrier only one, NB1 also met the cost reasonableness criteria. NB 1 is located on the west side of I-71/I-75, south of KY 338 and would provide abatement for the Legends of Steeplechase Apartments.

Table ES-1 Recommended Noise Barrier

Barrier ID	Location	Barrier Length	Benefited Receptors
NB 1	West of I71/I-75, South of KY 338	2,830	78

2.0 INTRODUCTION

2.1 Purpose of the Traffic Noise Impact Analysis

The purpose of this Traffic Noise Impact Analysis (Analysis) is to evaluate noise impacts and abatement for the section of I-71/I-75 from approximately 0.8 miles north of KY 338 to approximately 1.2 miles south of KY 338 to be improved as part of the I-71/I-75 – KY 338 Interchange Improvement project in Boone County.

This analysis was prepared in accordance with governing document 23 Code of Federal Regulations (CFR) Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise.

3.0 PROJECT DESCRIPTION

The approximately 307-acre study area is located at the KY 338 interchange at 1-71/1-75 (Exit 175), near the community of Richwood, Kentucky. The study area extends approximately 0.8 mile south and 1.2 miles north of the 1-71/1-75 and KY 338 interchange to accommodate interstate lane widening. To the west of the interchange, the study area extends along KY 338 from the interstate to approximately 1,000 feet west of Triple Crown Boulevard and north to Frogtown Connector Road. Construction in this area will consist of additional travel lanes, intersection improvements and access management measures. To the east of the interchange, the study area consists of the KY 338/US 25 intersection area, which will be reconstructed as a grade separated interchange. The study area is located on the Union 7.5-minute USGS topographic quadrangle map.

The majority of vacant land within the project area is currently planned and zoned for either residential or commercial development.

3.1 Purpose of Project

The KYTC completed an Interchange Justification Study (IJS) (2010), which identified converting the existing KY 338 diamond interchange at I71/I-75 to a double crossover diamond as the preferred design approach to meet the project need. The purpose of this project is to improve safety and reduce congestion at the I-71/I_75 and KY 338 interchange and within the KY 338 corridor, and to develop and implement a comprehensive access management plan for KY 338 between Triple Crown Boulevard and US 25.

The KY 338 Interchange Justification Study documented that the KY 338 interchange with I-71/I-75 is currently congested and carries substantial (up to 33%) truck traffic due to the truck stops at the interchange and the industrial park immediately east of US 25. According to the IJS rapid growth of 2% to 5% per year on KY 338 is anticipated to continue for the foreseeable future given its proximity to Cincinnati, availability of land, interstate and airport access, and national prominence of I-75 as a major truck route. Also, the Norfolk Southern Rail, which runs parallel to US 25, supports 28 to 36 trains per day, which adds to the traffic delays and presents safety hazards from two at-grade railroad crossings within the study area. Twelve crashes, including three injuries, have occurred in the last five years at the two intersections leading to or from the at-grade railroad crossings.

The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. This data shows that that the number of crashes on KY 338 exceeds the number that should occur on the roadway. This project will increase the safety of this roadway.

3.2 Project Termini

The project's logical termini along US 25 extend from approximately 0.75 mile south of KY 338 to approximately 0.25 mile north of Shorland Drive. The project's logical termini along I-71/I-75 extend from approximately 1.5 miles north of KY 338 to approximately 1 mile south of KY 338 . Logical termini for improvements to the connector road network extend approximately 0.25 mile north of KY 338 along Frogtown Connector Road and approximately 0.75 mile west of I-71/75 along KY 338 The length of improvements for the major roadways in the project are two miles, one mile, and one mile for I-71/I75, KY338 and US 25 respectively. 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. According to 23 CFR 772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with Federal Highway Administration (FHWA) noise standards.

3.3 Existing Facility

Located in Boone County, KY 338 is classified as a Urban Arterial throughout the project area. KY 338, from just west of Paddock Drive to its intersection with US 25 consists of two 12 foot lanes with a 12 foot center turn lane. Beyond these limits to the east and west, KY 338 consists of a single lane in either direction. I-71/I-75 is an Urban Interstate with four lanes in each direction. Its interchange with KY 338 is a traditional diamond-type interchange with single-lane entrance and exit ramps. Approximately one mile north of the interchange, KYTC operates and maintains rest area facilities on either side of the interstate. US 25 is an Urban Arterial with one lane in each direction. Local planning and zoning is controlled by the Boone County Planning Commission.

3.4 Proposed Facility

The project includes improvements to KY 338 east of its interchange with I-71/I-75 including access management measures, grade-separation or closure of the two at-grade railroad crossings, and modifications to the intersection with US 25/Dixie Highway. On the western side of the interchange access management measures are required within the commercial district west of the interchange. These alternatives begin at the ramp intersections and continue to approximately 1,000 feet west of Triple Crown Boulevard.

For the purposes of this study only the preferred alternatives were analyzed. East of the interchange alternative E1 was selected as the preferred alternative. West of the interchange Alternative W9 was selected as the preferred alternative. Descriptions of the individual preferred segments and interchange reconfiguration are included below.

<u>I-71/I-75 and KY 338 (Richwood Road) Interchange and I-71/I-75 Auxiliary Lanes</u>

The existing KY 338 (Richwood Road) diamond interchange will be converted to a double crossover diamond interchange (DCDI). The DCDI takes the traffic that is heading westbound (which is normally on the north side of a road) and crosses it over to the south side of the road. It does the opposite for the eastbound traffic, taking them from the south side of the road to the

north side. Once through the interchange, the lanes crossover again and return to a traditional configuration. By crossing over the travel lanes within the interchange, the left turn movements do not conflict with oncoming traffic.

Alternative E1 - SPUI

This alternative converts the intersection of KY 338 and US 25 into a Single Point Urban Interchange (SPUI). Both KY 338 and US 25 will be widened to two lanes in each direction within the project limits. KY 338 will be routed under US 25 and the Norfolk Southern Railroad, which will remain at roughly their existing elevations. US 25 will be reconstructed from approximately Logistics Boulevard to Duffel Lane, with two lanes in each direction. The Shorland Drive at-grade railroad crossing will be closed. A signal will be added at the Best Pal Drive intersection with KY 338 and Best Pal Drive will be extended to connect with Old Richwood Road; the Old Richwood Road intersection with US 25 will be closed due to its proximity to the new SPUI. The geometric layout of Alternative E-1 is shown on Figure 3 in Appendix A.

Alternative W9

KY 338 will be widened to two eastbound lanes and three westbound lanes from the interchange to Triple Crown Boulevard. The Frogtown Connector, Paddock Drive, and Triple Crown Boulevard intersections will all be signalized. The existing Clay Drive intersection will become right-in/right-out only. All direct business drives onto KY 338 from the north side of the road will be closed. Only the BP gas station on the south side will retain right-in/right-out only access. At Paddock Road, the bank on the south side of KY 338 will be displaced to provide access to adjacent businesses. West of Triple Crown Boulevard, KY 338 transitions back to its existing two lane configuration. The geometric layout of Alternative W-9 is shown on Figure 4 in Appendix A.

3.5 Identified Alternatives Analyzed

In accordance with the KYTC GAF this analysis focused on the changes in the noise environment between existing conditions and the design year (2030) projections for the No Build and Preferred (E1/W9) alternatives.

4.0 EXISTING NOISE LEVELS

4. 1 Existing Land Uses

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Single-family residences, multi-family residences, cemeteries, and hotels were identified as Activity Category B, C, and E land uses in the project area.

As required by the Noise Analysis and Abatement Policy, although all developed land uses are evaluated in this analysis, noise abatement is only considered for areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential backyards and common use areas at multi-family residences.

For the majority of the project one receptor was modeled for a single corresponding dwelling unit. However, in cases where a single modeled receptor would accurately predict noise levels

for more than one dwelling unit (apartment complexes, closely built homes) multiple dwelling units were assigned to a single modeled receptor.

4.2 Measurement Conditions

A field noise study was conducted in accordance with the procedures prescribed in the KYTC Noise Abatement and Analysis Policy. The following is a summary of the procedures used to collect short-term sound level data.

Short-term monitoring was conducted at five locations on July 16, 2012 using a Larson-Davis Model 820 Precision Type 1 sound level meter (serial number 1691). Measurements were taken over a 20-minute period at each site. Short-term monitoring was conducted at Activity Category B and C land uses. The short-term measurement locations are identified in Appendix A. The results of the short-term monitoring are discussed in Section 3.3.

During the short-term measurements, field staff attended each meter. Leq values were collected during the measurement period. The calibration of the meter was checked before and after the measurement using a Larson-Davis Model CAL 200 calibrator (serial number 8806).

Traffic on I-71/I-75 was classified and counted during calibration noise measurements. Vehicles were classified as automobiles, medium-duty trucks, or heavy-duty trucks. An automobile was defined as a vehicle with two axles and four tires that are designed primarily to carry passengers. Small vans and light trucks were included in this category. Medium-duty trucks included all cargo vehicles with two axles and six tires. Heavy-duty trucks included all vehicles with three or more axles. The posted speed on I-71/I-75 is 65 mph.

Short-term measurement 1 (ST1) was started at 2:25 pm on Monday, July 16th 2012 and ran for 20 minutes. This measurement was conducted in the lot of a commercial business at 10833 Dixie Highway. This measurement was initially intended to take place within the Frogtown Road Mobile Home Park but a large number of active dogs as well as frequent activity by residents made this location unsuitable for noise measurements. The temperature during this measurement was 94° F, the relative humidity was 45%, the wind was out of the west at 2.6 mph. and the skies were partly cloudy. During this measurement I-71/I-75 was the dominant noise source. Meteorological conditions were recorded using a Kestrel 3000 pocket weather meter. This noise measurement was taken with a LD 820 noise level meter which was calibrated at 2:22 pm on the same day the noise measurement was taken. I-71/I-75 was dry during this measurement.

Short-term measurement 2 (ST2) was started at 9:45 am on Monday, July 16th 2012 and ran for 20 minutes. This measurement was conducted in the lot near the residence at 540 Calle Luna Lane. The temperature during this measurement was 83° F, the relative humidity was 59%, the wind was out of the west at 3.8 mph. and the skies were partly cloudy. During this measurement I-71/I-75 was the dominant noise source. Meteorological conditions were recorded using a Kestrel 3000 pocket weather meter. This noise measurement was taken with a LD 820 noise level meter which was calibrated at 9:41 am on the same day the noise measurement was taken. I-71/I-75 was dry during this measurement.

Short-term measurement 3 (ST3) was started at 10:40 am on Monday, July 16th 2012 and ran for 20 minutes. This measurement was conducted in the back yard of the residence at 125 Old Richwood Road. The temperature during this measurement was 94° F, the relative humidity was 66%, the wind was out of the west at 2.0 mph. and the skies were mostly sunny. During this

measurement I-71/I-75 was the dominant noise source. Meteorological conditions were recorded using a Kestrel 3000 pocket weather meter. This noise measurement was taken with a LD 820 noise level meter which was calibrated at 10:38 am on the same day the noise measurement was taken. I-71/I-75 was dry during this measurement.

Short-term measurement 4 (ST4) was started at 1:32 pm on Monday, July 16th 2012 and ran for 20 minutes. This measurement was conducted immediately adjacent to the pool area of te hotel at 11165 Frontage Road. The temperature during this measurement was 94° F, the relative humidity was 42.5%, the wind was out of the west at 5.5 mph. and the skies were clear. During this measurement I-71/I-75 was the dominant noise source. Meteorological conditions were recorded using a Kestrel 3000 pocket weather meter. This noise measurement was taken with a LD 820 noise level meter which was calibrated at 1:30 pm on the same day the noise measurement was taken. I-71/I-75 was dry during this measurement.

Short-term measurement 5 (ST5) was started at 11:41 1m on Monday, July 16th 2012 and ran for 20 minutes. This measurement was conducted adjacent to the porch of an apartment building on Furlong Way within the Legends at Steeple Chase Apartments. The temperature during this measurement was 98° F, the relative humidity was 49%, the wind was out of the west at 1.2 mph. and the skies were clear. During this measurement I-71/I-75 was the dominant noise source. Meteorological conditions were recorded using a Kestral 3000 pocket weather meter. This noise measurement was taken with a LD 820 noise level meter which was calibrated at 11:34 pm on the same day the noise measurement was taken. I-71/I-75 was dry during this measurement.

4.3 Noise Measurement Results

The existing noise environment in the project area is characterized below based on short-term noise monitoring that was conducted. Monitoring locations are shown in Appendix A.

Table 4-1 summarizes the results of the short-term noise monitoring conducted in the project area. Traffic volume and speed measurements on I-71/I-75 were taken concurrently with each short term noise measurement for use in model verification.

Table 4-1 Summary of Short-Term Measurements

Position	Address	Land Uses	Start Time	Duration (minutes)	Measured $L_{eq(h)}$
ST-1	10833 Dixie Highway	Commercial	2:25 p.m.	20	69.0
ST-2	540 Calle Luna Lane	Residential	9:45 a.m.	20	60.6
ST-3	125 Old Richwood Road	Residential	10:40 a.m.	20	62.6
ST-4	11165 Frontage Road	Hotel (Pool Area)	1:32 p.m.	20	64.4
ST-5	Furlong Way, Legends Apartments	Residential	11:41 a.m.	20	68.8

Note: Refer to Appendix A for measurement locations.

4.4 Noise Model Validation

TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at the measurement locations. As shown in Table 4-2, comparing the modeled and measured noise levels using observed traffic counts confirms the applicability of the model to the study area. Modeled noise levels are within 3 decibels of measured noise levels at all modeled locations.

This represents reasonable correlation between the measured and modeled existing values, thus validating the model. Therefore, no calibration of the model was made.

Table 4-2 Comparison of Measured to Predicted Sound Levels in the TNM Model

Measurement Position	Measured Sound Level (dB(A))	Predicted Sound Level (dB(A))	Difference between Measured and Predicted (dB(A))
ST1	69.0	68.5	0.5
ST2	60.6	63.1	2.5
ST3	62.6	62.3	0.3
ST4	64.4	67.2	2.8
ST5	68.8	69.6	0.8

4.5 Predicted Existing Noise Levels

Noise-sensitive receptors are those locations where activities that could be affected by increased traffic noise levels occur (e.g., residences, motels, churches, schools, parks, and libraries). Existing noise levels are determined for the most commonly used outdoor living area at sensitive receptors. No interior receptors were identified in the project area. For residences, this is typically the backyard or front porch. Noise-sensitive receptors are located throughout the project area along I-71/I-75 (see Figure 1 in Appendix A). A total of 90 sensitive receptors representing 164 dwelling units were identified in the project area for analysis as part of the noise study. The locations of these receptors are shown on Figure 1 (Appendix) and information regarding land use category and the number of receptors is provided in Table B-1 (Appendix B).These receptors include all Category B, C, and E land uses located within approximately 500 feet of the alignments.

5.0 DEVELOPMENT OF DESIGN YEAR NOISE LEVELS

5.1 Noise Level Predictions

Table B-2 in Appendix B summarizes the traffic noise modeling results for existing conditions and design-year conditions with and without noise barriers. These predictions utilize predicted loudest hour traffic conditions to ensure a conservative estimate of noise levels. Federal Highway Administration Traffic Noise Model 2.5 (TNM 2.5) was used to model existing, no build and proposed noise levels. Vehicle types represented in the model include cars/light trucks, medium trucks, and heavy trucks. The comparison to existing conditions is included in the analysis to identify traffic noise impacts under 23 CFR 772. The comparison to the No Build alternative indicates the direct effect of the project.

Modeling results in Table B-2 in Appendix B indicate that predicted traffic noise levels for the design-year with-project conditions approach (i.e. within 1 dB(A)) or exceed the NAC of 67 dB(A) Leq(h) for Activity Category B. One Category E land use, a hotel swimming pool, was identified within the study area. Based on an interview with the hotel management staff concerning the frequency of pool usage by guests, and following the equivalent residences calculation prescribed in the KYTC Noise analysis and Abatement Policy, this pool will qualify as one residence. No Category E receptors are predicted to approach or exceed the NAC of 72 dB(A) Leq(h) for Activity Category E. Therefore, traffic noise impacts are predicted to occur at Activity Category B and C land uses within the project area, and noise abatement must be

considered. Traffic noise at one Activity C land use, Carpenters Cemetery, was predicted to approach or exceed the NAC of 67 dB(A) in the exiting, no build, and design year. The dominant traffic noise generator impacting Carpenters Cemetery is US 25. Since US 25 lacks access control a feasible noise barrier could not be constructed at this location.

Predicted noise levels for Category B, C and E receptors under the No Build Alternative range from 48.9 dB(A) to 75.3 dB(A) at the receptors analyzed and are up to 3.5 dB(A) greater than under existing conditions. Predicted noise levels for Category B, C and E receptors under the Future Build Alternative range from 49.1 dB(A) to 76.4 dB(A) at the receptors analyzed and are up to 2.8 dB(A) greater than under existing conditions. Noise level increases of less than three dB(A) are generally not perceptible to the human ear and are well below the threshold that KYTC defines as substantial (greater than or equal to 10 dB(A). Noise impacts, where predicted noise levels meet or exceed 66 dB(A), were identified at 36 receptors for this alternative. This is eight more impacted dwelling units than under existing conditions. Noise impacts are predicted within the Frogtown Road Mobile Home Park, Carpenters Cemetery, and the Legends at Steeplechase Apartments. Each of these locations have been predicted to approach or exceed the NAC under existing conditions.

6.0 CONSTRUCTION NOISE

During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction

Table 6-1 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about six dB(A) per doubling of distance.

Table 6-1 Construction Equipment Noise

Equipment	Maximum Noise Level (dB(A) at 50 feet)
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82

Source: U.S. Environmental Protection Agency 1971.

No adverse noise impacts from construction are anticipated because construction noise would be short-term, intermittent, and overshadowed by local traffic noise. Further, implementing the following measures would minimize the temporary noise impacts from construction:

- All equipment will have sound-control devices that are no less effective than those provided on the original equipment. No equipment will have an unmuffled exhaust.

- As directed by KYTC, the contractor will implement appropriate additional noise mitigation measures, including changing the location of stationary construction equipment, turning off

idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, and installing acoustic barriers around stationary construction noise sources.

It will be the responsibility of KYTC to monitor construction noise and to advise contractor of any violation of maximum allowable noise.

7.0 NOISE ABATEMENT RECOMMENDATIONS AND CONCLUSION

In accordance with 23 CFR 772 and the KYTC Noise Abatement Policy guidelines, noise abatement is considered where noise impacts are predicted in areas of frequent human use that would benefit from a lowered noise level. Potential noise abatement measures identified in the Noise Analysis and Abatement Policy include the following:

- Avoiding the impact by using design alternatives, such as altering the horizontal and vertical alignment of the project;
- Constructing noise barriers;
- Acquiring property to serve as a buffer zone;
- Using traffic management measures to regulate types of vehicles and speeds; and
- Acoustically insulating public-use or nonprofit institutional structures.

Alteration of the roadway geometry would not be feasible. The preferred alternative has been developed to best meet the transportation needs of the corridor while minimizing impacts to the immediate area and meeting the purpose of the project. Horizontal geometry changes significant enough to affect noise levels at receptor locations would be cost prohibitive and is not a practical alternative. Thus any changes to these alignments would be limited, and have only minimal effects on sound levels.

Noise barriers placed along roadways on State-owned right-of way can effectively shield locations from traffic-related noise. A barrier's feasibility is based on its acoustic effectiveness, which depends on the area's geometry, the barrier's configuration, and the effects of other (unblocked) noise sources. Noise barriers were evaluated, and the results are described below.

Vacant or undeveloped property may be acquired to provide a buffer zone from noise generating facilities. However, there is no vacant land in the study area that, if acquired, would provide effective abatement as a buffer zone.

Traffic management measures would not be effective for this project. Traffic management measures that could reduce sound levels include "traffic calming" actions, such as reducing volumes, especially truck volumes, or travel speeds. Such measures are not consistent with the transportation needs in the area or purpose of the project.

Insulation of public structures and nonprofit institutions is not relevant, since there are no public-use or nonprofit institutional structures impacted by the project. Interior noise levels at public-use or nonprofit institutional structures are not anticipated to be above interior NAC levels.

All of these abatement options have been considered. However, because of the configuration and location of the project, abatement in the form of noise barriers is the only abatement that is suited for this project.

Feasibility of Abatement

Feasibility analysis deals with engineering considerations to determine if a particular form of abatement can actually have an effect on the traffic noise levels at a receptor. It also takes into account such considerations as topography, drainage, safety, and access/maintenance needs (which may include right-of-way considerations). To be feasible, an abatement measure must provide a substantial noise reduction (>5 dB(A)) for a reasonable percentage of impacted receptors to warrant consideration. Though the objective of the proposed abatement shall be to achieve the noise reduction design goal (7dB(A) for a minimum of 40% of all benefitted receptors), if a proposed barrier will not provide a minimum 5 dB(A) reduction for more than 50% of the impacted receptors, it will not be considered acoustically feasible.

Reasonableness of Abatement

"Reasonable" means that KYTC believes abatement of traffic noise impacts is prudent based on consideration of the three following factors:

1. Cost Effectiveness

   To determine cost effectiveness, the estimated cost of constructing a noise barrier (including installation and additional necessary construction such as foundations or guardrail and based on the engineers best estimate of total barrier costs) will be divided among the number of benefited receptors (those who would receive a reduction of at least 5 dB(A). A cost of $35,000 or less per benefited receptor is considered to be “cost effective”. A base cost of $30 per square foot was used to estimate the cost of each barrier. Additional consideration shall be afforded by allowing a higher than average cost for each benefitted receptor that is predicted to experience either an increase of 10 dB(A) or greater from the existing condition or predicted noise levels exceeding 77 dB(A). No receptors within the study area are projected to experience noise changes significant enough to warrant additional consideration.

2. Noise Reduction Design Goal

   KYTC’s noise reduction design goal is 7 dB(A) for a minimum of 40% of all benefitted receptors. For the purpose of determining cost effectiveness of a proposed abatement measure, benefitted receptors are considered those that will receive and minimum 5dB(A) noise reduction. Noise reduction estimates shall be solely based upon the results of the TNM. Receptors receiving less than 5 dB(A) reduction in noise from a proposed

abatement measure shall not be considered as a benefitted receptor for the purposes of calculating cost effectiveness.

3. Desires of the Benefitted Receptors

If noise abatement is determined to be feasible and cost effective, then potentially affected property owners will be surveyed to determine whether they do or do not want noise abatement. When the majority of benefitted receptors property owners, engaged through the public involvement process, are opposed to construction of a noise barrier, KYTC will give deference to these opinions in making a final determination regarding the reasonableness of these measures regardless of whether the proposal satisfies all other criteria for consideration. Similarly, where the majority of the benefitted receptors and property owners involved in the public involvement process are in support of noise barrier construction, and the proposal satisfies all other criteria for consideration outlined in this policy, KYTC shall incorporate the abatement measures into the project. It should be noted that if the benefitted receptors reject a noise barrier and then later change their opinion, the project would be considered a Type II project by FHWA. Since KYTC does not have a Type II program, noise abatement would only be considered as described in the Traffic Noise Abatement Considerations for State Funded Retrofit Projects section of the Noise Analysis and Abatement Policy.

7.1 Noise Abatement Recommendations

The results of the noise abatement analysis can be geographically divided into three main areas of study, the Richwood Villa Mobile Home Park, the Frogtown Road Mobile Home Park, and the Legends of Steeplechase Apartment Homes.

Richwood Villa Mobile Home Park: This area was represented by four receptors, R6 through R9. The modeled existing noise levels for these receptors ranged from 58.9 dB(A) to 60.7 dB(A). Predicted design year noise levels ranged from 61.5 dB(A) to 63.3 dB(A) thus not approaching or exceeding the NAC.

Frogtown Road Mobile Home Park: This area was represented in the model by 10 receptors, R78 through R88. The modeled existing noise levels for these receptors ranged from 60.8 dB(A) to 70.8 dB(A). Predicted design year noise levels ranged from 63.1 dB(A) to 73.0 dB(A) thus exceeding the NAC threshold for residential receptors. Four of the ten receptors were predicted to exceed the NAC with increases over the existing ranging from 1.1 dB(A) to 1.3 dB(A). In order to consider abatement for the impacted receptors, a barrier was modeled that would provide a substantial noise reduction (>5dB(A)) for the impacted receptors. This barrier would be approximately 1,200 ft long, and range in height from two feet to 20 feet. Noise attenuation realized by this barrier would range from 5.0 dB(A) to 7.7(dB(A) for the impacted receptors. Based on a cost of $30/square foot, the cost used to determine the cost effectiveness of this barrier was $526,700. The cost per benefitted receptor for this barrier would be $131,700. A $35,000 Cost per Benefitted Receptor (CBR) is established as a reasonable maximum for this value. Since the CBR for this barrier exceeded the threshold and shall not be considered cost effective and shall not be incorporated into the project.

Legends of Steeplechase Apartment Homes: This area was represented in the model by 72 receptors, R22 through R44. At each receptor a first, second, and third floor receptor was modeled representing two dwelling units. The modeled existing noise levels for these receptors ranged from 47.8 dB(A) to 74.4 dB(A). Predicted design year noise levels ranged from 49.1 dB(A) to 76.4 dB(A) thus exceeding the NAC threshold for residential receptors. 31 of the 72 receptors were predicted to exceed the NAC with increases over the existing ranging from 0.0 dB(A) to 2.6 dB(A). In order to consider abatement for the impacted receptors, a barrier was modeled that would provide a substantial noise reduction (>5dB(A)) for the impacted receptors. This barrier would be approximately 2,800 ft long, and range in height from two feet to 18 feet. Noise attenuation realized by this barrier would range from 5.0 dB(A) to 10.4(dB(A) for the impacted receptors. Based on a cost of $30/square foot, the cost used to determine the cost effectiveness of this barrier was $1,029,000. Based on a total of 78 benefitted receptors the cost per benefitted receptor for this barrier would be $13,200. A $35,000 is established as a reasonable maximum for this value. Since the CBR for this barrier did not exceed the threshold it shall be considered cost effective and will be a candidate for noise barrier construction.

Barrier Analysis Summary

A detailed abatement evaluation was conducted at two locations within the corridor.

Each noise barrier evaluated has been analyzed for feasibility based on achievable noise reduction and engineering considerations. The first two reasonableness criteria (cost effectiveness and noise reduction design goal) were evaluated for each noise barrier found to be acoustically feasible. Of the two feasible noise barriers analyzed along the project, one (NB1), met KYTC's reasonable criteria. Table B-3 provided in Appendix B summarizes the reasonable analysis of each feasible barrier. Table B-2 in Appendix B summarizes results at receptor locations for the each noise barrier that has been evaluated in detail for this project. The final decision on implementation of abatement measures will be made after completion of the project design and the public involvement process.

7.2 Noise Abatement Conclusions

Based on the Kentucky Transportation Cabinet (KYTC) Noise Analysis and Abatement Policy, the feasibility and reasonableness of noise barriers were evaluated at all locations in the project area where noise impacts were identified under the future build alternative. Based on this evaluation, one feasible and cost effective barrier was identified for this project: NB 1 is located on the west side of I-71/I-75, south of KY 338 and would provide abatement for the Legends of Steeplechase Apartments.

7.3 Coordination with Local Officials

Land adjacent to the highway within the project area is currently used as commercial or residential properties. The majority of the vacancy land within the project area is currently zoned for commercial and residential use. Proposed contours shown on Figure 2 in Appendix A

illustrate the approximate noise levels for currently undeveloped land. These predicted levels can be shared with local planning agencies to minimize noise related impacts to adjacent properties.

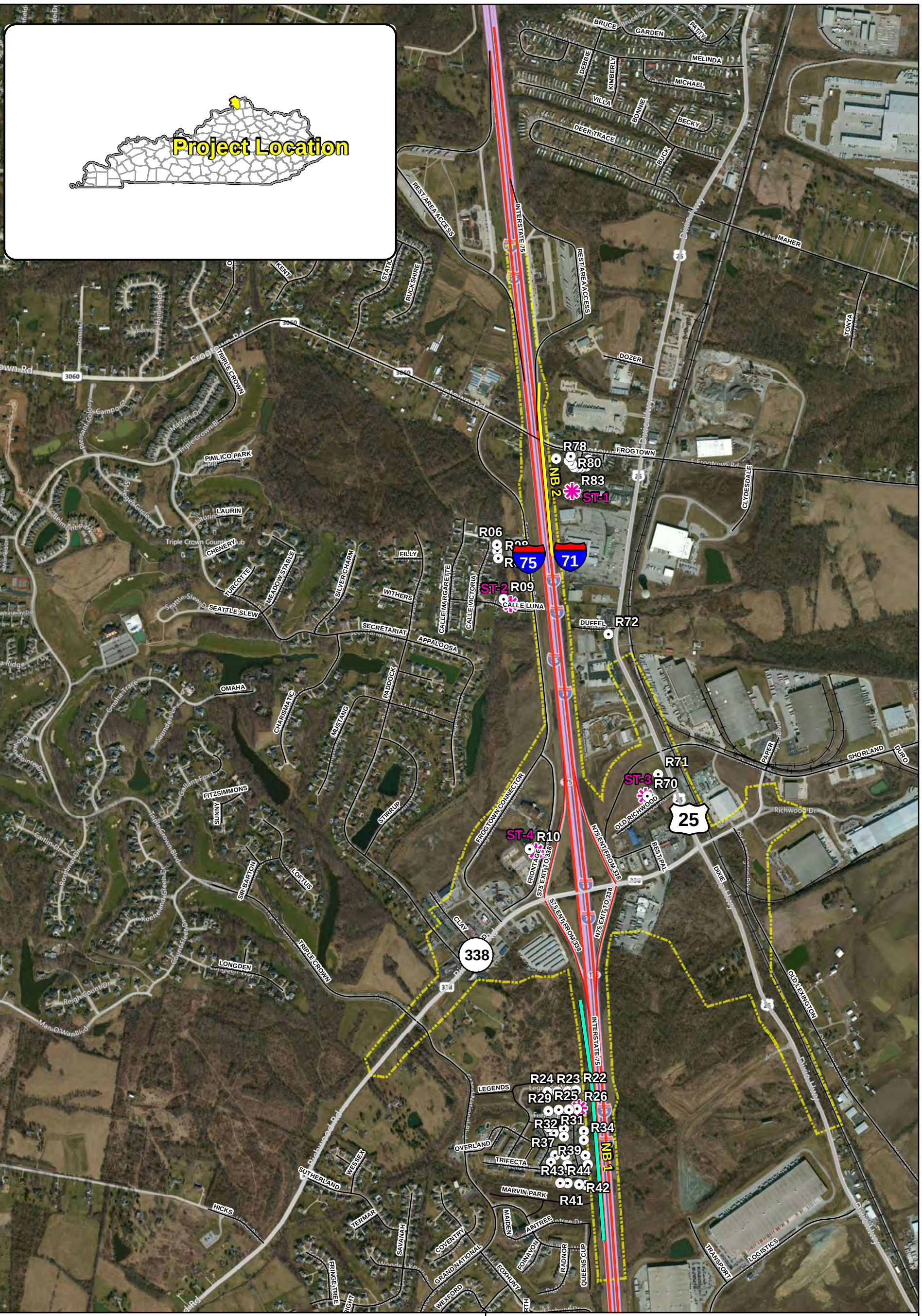
8.0 INDIRECT AND CUMULATIVE IMPACTS

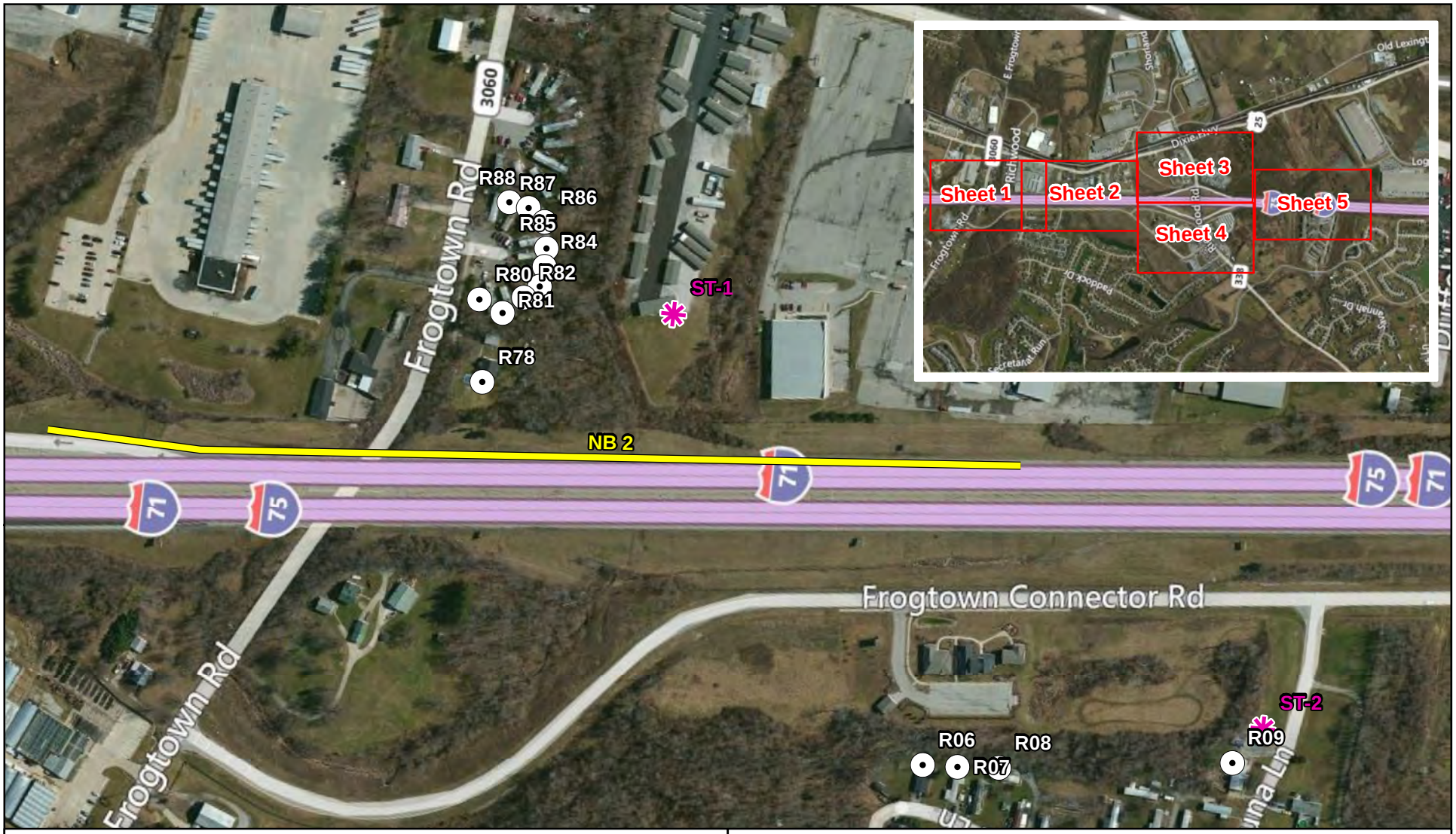
Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. A cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. As the projected commercial and residential development of the study area continues the additional traffic will increase noise levels on the existing roads. This project will facilitate that development. To an extent local planning can help place noise sensitive development further away from noise generators.

Future Design Revisions

If pertinent parameters change substantially during the continuing project design, the noise abatement decision may be changed or eliminated from the final project design.

Appendix A
Figures


Project Location
BRUCE
GARDEN
PATTY
MELINDA
DEBBIE
KIMBERLY
MICHAEL
VILLA
BONNIE
BECKY
DEER TRACE
BUCK
REST AREA ACCESS
INTERSTATE 75
MAHER
KENT
BUCKSHIRE
3060
Frogtown Rd
TRIPLE CROWN
Campo Ct
Masters Dr
Triple Crown Blvd
PIMLICO PARK
LAURIN
Triple Crown Country Club
CHENERY
TURCOTTE
MEADOW STABLE
SILVER CHARM
FILLY
WITHERS
SEATTLE SLEW
SECRETARIAT
APPALOOSA
CALLE MARGARETTE
CALLE VICTORIA
CALLE LUNA
R06
R09
ST-2
R78
R80
R83
ST-1
NB 2
75
71
FROGTOWN
CLYDESDALE
DUFFEL
R72
OMAHA
CHARISMATIC
MUSTANG
PADDOCK
STIRRUP
FITZSIMMONS
SUNNY
SIR BARTON
LOFTUS
LONGDEN
FRONTAGE
FROGTOWN CONNECTOR
R71
ST-3
R70
OLD RICHWOOD
25
Richwood Dr
PAPER Blvd
SHORLAND
DURO
TONYA
DOZER
ST-4
R10
I75 EXIT TO 338
I75 ENT FROM 338
I75 ENT FROM 339
BEST PAL
DIXIE Hwy
338
CLAY
LEGENDS
R24
R23
R22
R29
R25
R26
R31
R32
R34
R37
R39
R43
R44
R42
R41
NB 1
OVERLAND
TRIFECTA
MARVIN PARK
SUTHERLAND
WESSEX
HICKS
TERMAR
SAVANAH
COVENTRY
GRAND NATIONAL
FOXHUNT
MAIDEN
AINTREE
FOINAVON
RADNOR
QUEENS CUP
WEXFORD
FRINGE TREE
TRANSPORT
LOGISTICS
OLD LEXINGTON
LEGEND
Study Area
Noise Receptors
Barriers Considered
Feasible and Reasonable Barriers
Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12
0
750
1,500
3,000
Feet
1 inch = 1,083 feet
ITEM NO. 6-18.00, I-71/I-75 - KY 338
Project Study Area
PARSONS



LEGEND

- Noise Receptors
- Measurement Locations
- Barriers Considered

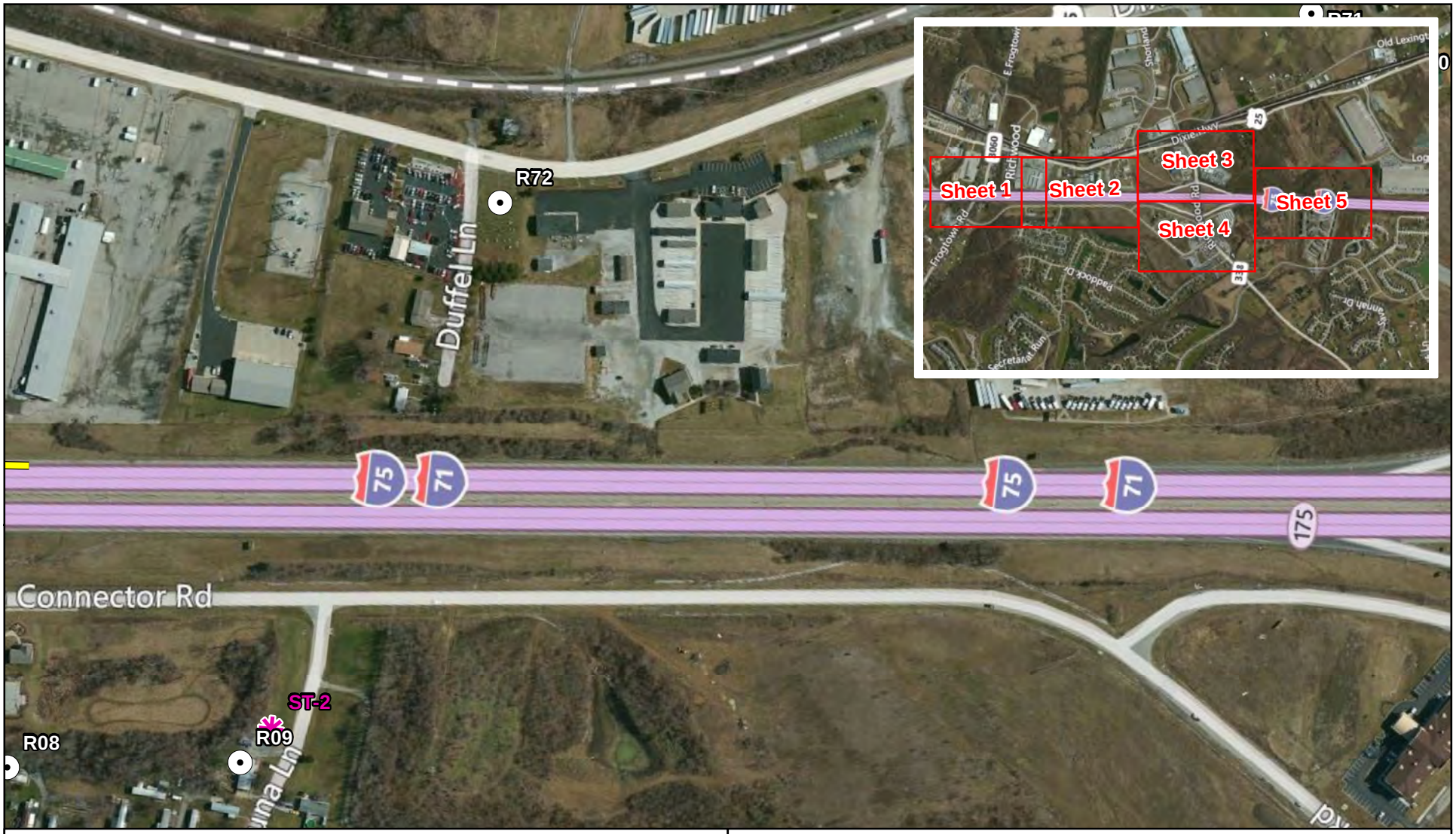
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Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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Measurement & Modeling Locations
Figure 2 Sheet 1

PARSONS



LEGEND

- Modeled Noise Receptors
- Measurement Locations
- Barriers Considered

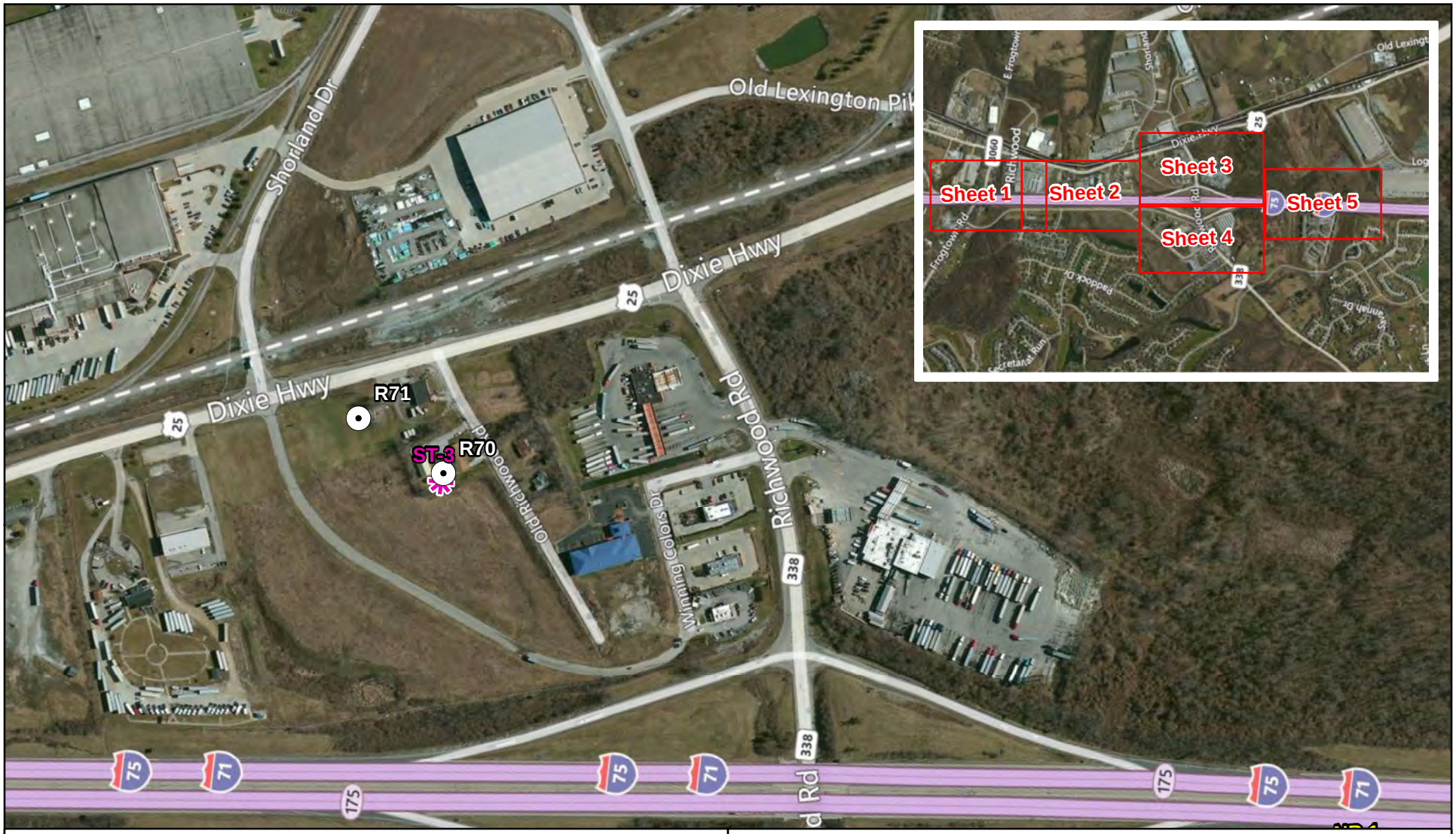
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Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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Measurement & Modeling Locations
Figure 2 Sheet 2

PARSONS



LEGEND

- Noise Receptors
- Measurement Locations
- Barriers Considered

0 125 250 500 Feet

Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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Measurement & Modeling Locations
Figure 2 Sheet 3

PARSONS



LEGEND

- Noise Receptors
- Measurement Locations
- Barriers Considered

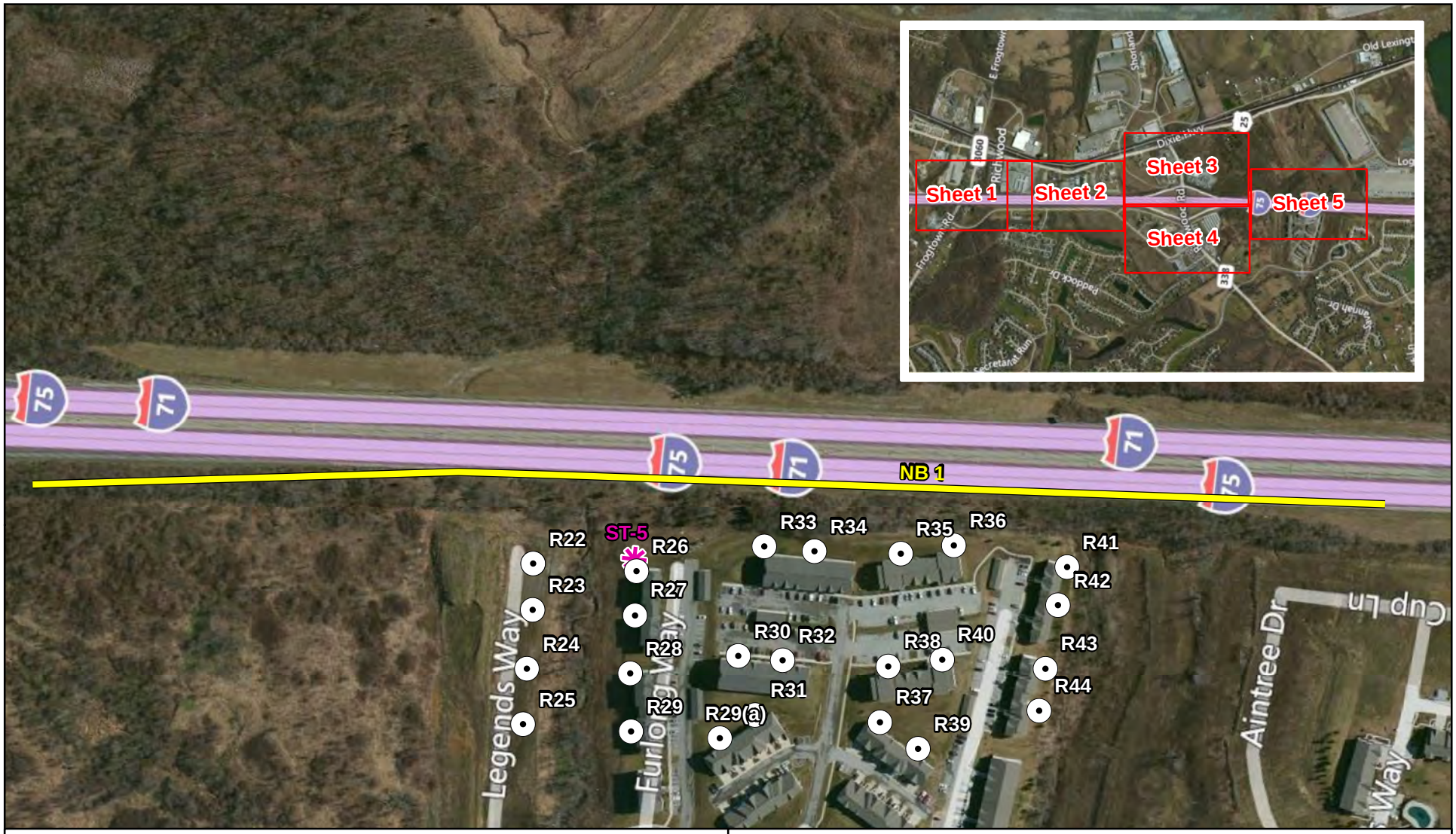
0 125 250 500 Feet

Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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Measurement & Modeling Locations
Figure 2 Sheet 4

PARSONS



LEGEND

- Noise Receptors
- Measurement Locations
- Barriers Considered

0 125 250 500 Feet

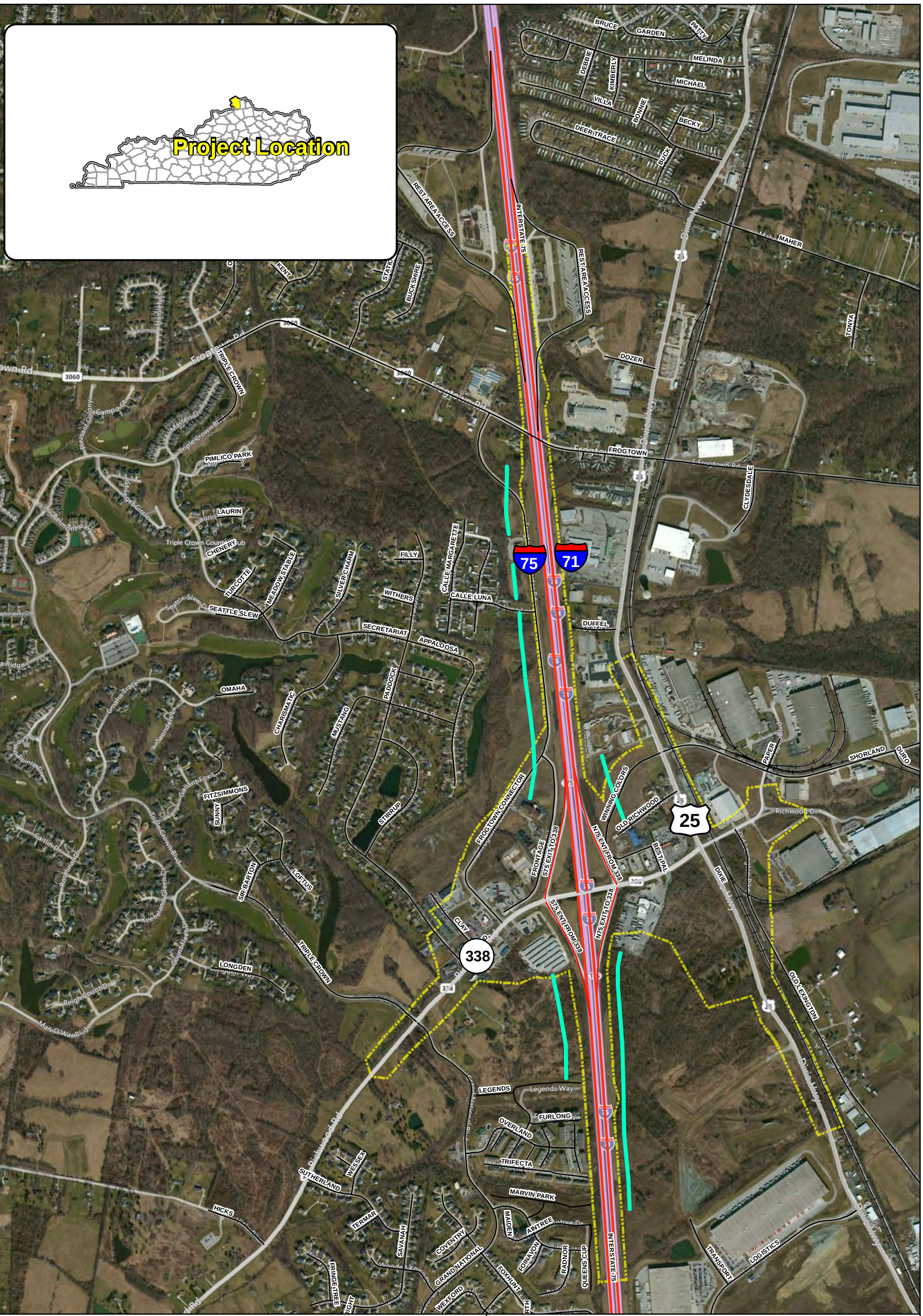
Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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Measurement & Modeling Locations

Figure 1 Sheet 5

PARSONS



LEGEND

Future 66 dBA Contour

Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 750 1,500 3,000 Feet

1 inch = 1,083 feet

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Future 66 dBA Contour Figure

PARSONS



Figure 3 Alternative E-1

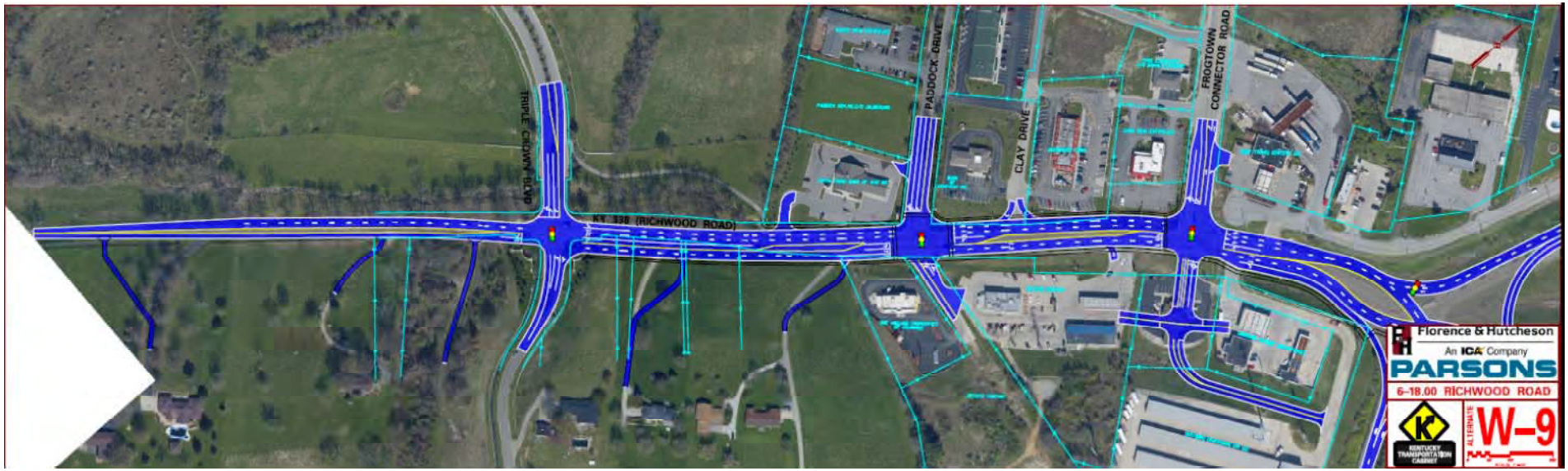
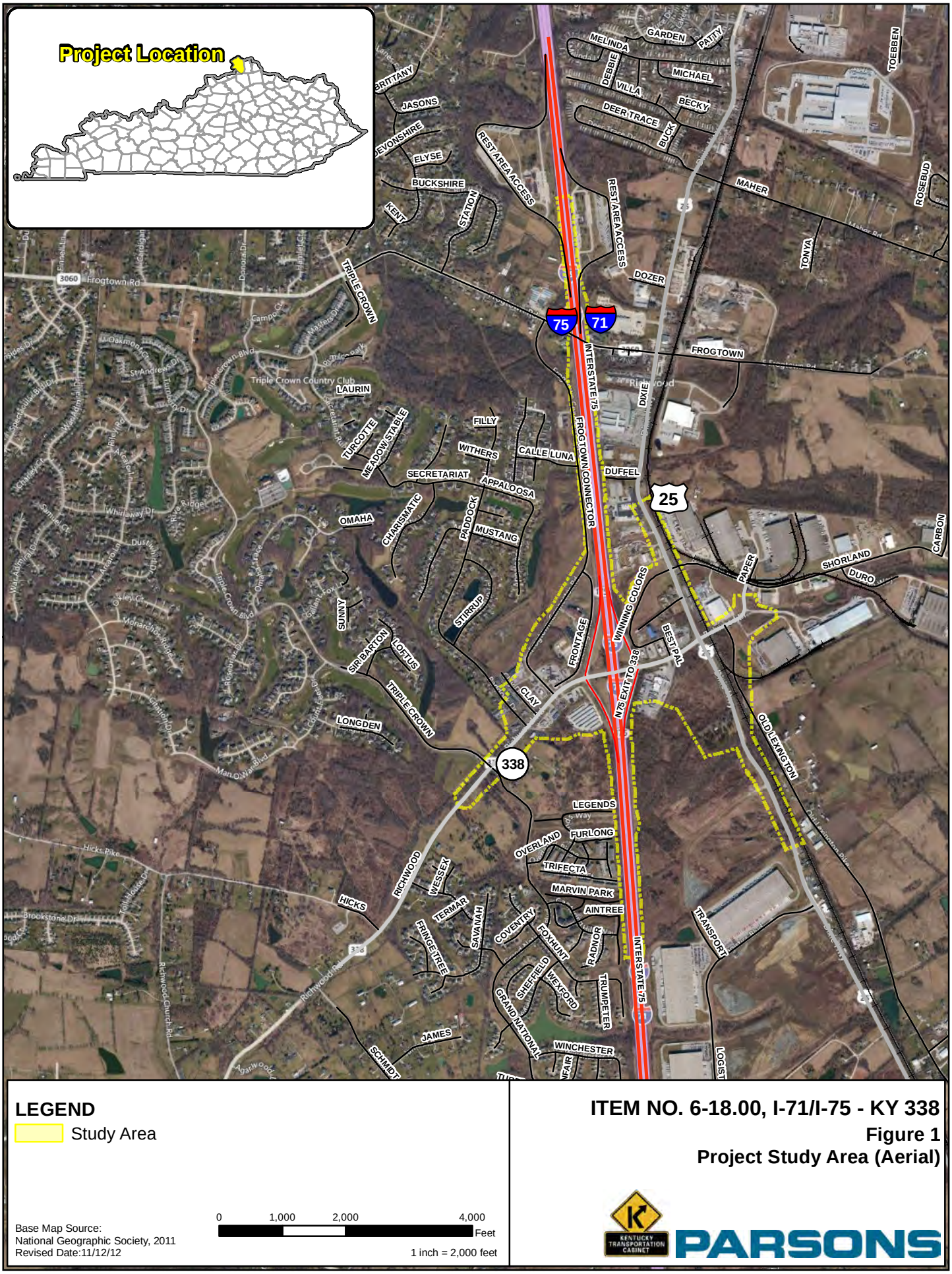


Figure 4. Alternative W9



LEGEND

Study Area

Base Map Source:
National Geographic Society, 2011
Revised Date:11/12/12

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

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Figure 1

Project Study Area (Aerial)

KENTUCKY TRANSPORTATION CABINET

PARSONS



Figure 3 Alternative E-1

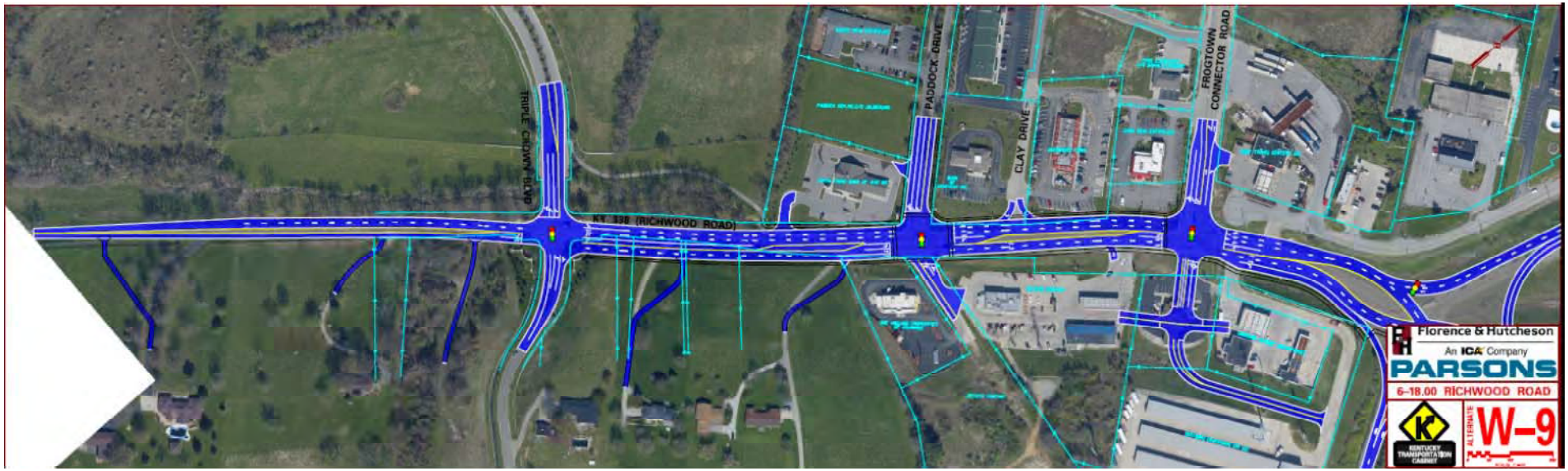


Figure 4. Alternative W9



LEGEND

- Noise Receptors
- Measurement Locations
- Feasible and Reasonable Barriers

0 125 250 500 Feet

Base Map Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers

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NB-1 Preliminary Wall Heights

PARSONS

Appendix B
Tables

Table B-1 – Identification of Receptors

Receptor ID	Land Use	Activity Category (NAC)	NAC level	Number of Dwelling Units	Distance from Existing Facility	Distance From Proposed Alternatives
R06	Residential	B	67	1	507	507
R07	Residential	B	67	1	510	510
R08	Residential	B	67	1	511	511
R09	Residential	B	67	1	497	497
R10	Hotel Pool	E	72	1	282	282
R22 First Floor	Residential	B	67	2	186	186
R22 Second Floor	Residential	B	67	2	186	186
R22 Third Floor	Residential	B	67	2	186	186
R23 First Floor	Residential	B	67	2	282	282
R23 Second Floor	Residential	B	67	2	282	282
R23 Third Floor	Residential	B	67	2	282	282
R24 First Floor	Residential	B	67	2	404	404
R24 Second Floor	Residential	B	67	2	404	404
R24 Third Floor	Residential	B	67	2	404	404
R25 First Floor	Residential	B	67	2	498	498
R25 Second Floor	Residential	B	67	2	498	498
R25 Third Floor	Residential	B	67	2	498	498
R26 First Floor	Residential	B	67	2	192	192
R26 Second Floor	Residential	B	67	2	192	192
R26 Third Floor	Residential	B	67	2	192	192
R27 First Floor	Residential	B	67	2	295	295
R27 Second Floor	Residential	B	67	2	295	295
R27 Third Floor	Residential	B	67	2	295	295
R28 First Floor	Residential	B	67	2	405	405
R28 Second Floor	Residential	B	67	2	405	405
R28 Third Floor	Residential	B	67	2	405	405
R29 First Floor	Residential	B	67	2	527	527
R29 Second Floor	Residential	B	67	2	527	527
R29 Third Floor	Residential	B	67	2	527	527
R29 (a) First Floor	Residential	B	68	2	533	533
R29 (a) Second	Residential	B	69	2	533	533
R29(a) Third Floor	Residential	B	70	2	533	533

Table B-1 – Identification of Receptors

Receptor ID	Land Use	Activity Category (NAC)	NAC level	Number of Dwelling Units	Distance from Existing Facility	Distance From Proposed Alternatives
R30 First Floor	Residential	B	67	2	448	448
R30 Second Floor	Residential	B	67	2	448	448
R30 Third Floor	Residential	B	67	2	448	448
R31 First Floor	Residential	B	67	2	482	482
R31 Second Floor	Residential	B	67	2	482	482
R31 Third Floor	Residential	B	67	2	482	482
R32 FirstFloor	Residential	B	67	2	448	448
R32 Second Floor	Residential	B	67	2	448	448
R32 Third Floor	Residential	B	67	2	448	448
R33 First Floor	Residential	B	67	2	130	130
R33 Second Floor	Residential	B	67	2	130	130
R33 Third Floor	Residential	B	67	2	130	130
R34 First Floor	Residential	B	67	2	136	136
R34 Second Floor	Residential	B	67	2	136	136
R34 Third Floor	Residential	B	67	2	136	136
R35 First Floor	Residential	B	67	2	133	133
R35 Second Floor	Residential	B	67	2	133	133
R35 Third Floor	Residential	B	67	2	133	133
R36 First Floor	Residential	B	67	2	123	123
R36 Second Floor	Residential	B	67	2	123	123
R36 Third Floor	Residential	B	67	2	123	123
R37 First Floor	Residential	B	67	2	485	485
R37 SecondFloor	Residential	B	67	2	485	485
R37 Third Floor	Residential	B	67	2	485	485
R38 First Floor	Residential	B	67	2	445	445
R38 Second Floor	Residential	B	67	2	445	445
R38 Third Floor	Residential	B	67	2	445	445
R39 First Floor	Residential	B	67	2	535	535
R39 Second Floor	Residential	B	67	2	535	535
R39 Third Floor	Residential	B	67	2	535	535
R40 First Floor	Residential	B	67	2	433	433
R40 Second Floor	Residential	B	67	2	433	433
R40 Third Floor	Residential	B	67	2	433	433

Table B-1 – Identification of Receptors

Receptor ID	Land Use	Activity Category (NAC)	NAC level	Number of Dwelling Units	Distance from Existing Facility	Distance From Proposed Alternatives
R41 First Floor	Residential	B	67	2	145	145
R41 Second Floor	Residential	B	67	2	145	145
R41 Third Floor	Residential	B	67	2	145	145
R42 First Floor	Residential	B	67	2	227	227
R42 Second Floor	Residential	B	67	2	227	227
R42 Third Floor	Residential	B	67	2	227	227
R43 First Floor	Residential	B	67	2	357	357
R43 Second Floor	Residential	B	67	2	357	357
R43 Third Floor	Residential	B	67	2	357	357
R44 First Floor	Residential	B	67	2	445	445
R44 Second Floor	Residential	B	67	2	445	445
R44 Third Floor	Residential	B	67	2	445	445
R70	Residential	B	67	2	145	126
R71	Residential	B	67	2	358	325
R72	Cemetery	C	67	1	545	534
R78	Residential	B	67	1	153	153
R80	Residential	B	67	1	324	324
R81	Residential	B	67	1	294	294
R82	Residential	B	67	1	328	328
R83	Residential	B	67	1	351	351
R84	Residential	B	67	1	391	391
R85	Residential	B	67	1	430	430
R86	Residential	B	67	1	485	485
R87	Residential	B	67	1	513	513
R88	Residential	B	67	1	525	525

Table B-2 – Existing and Predicted Noise Levels

Receptor ID	Existing Noise Level	No-Build Noise Level	Design Year Noise Level w/o Barrier	No-Build Against Existing	Build Against Existing	Design Year Noise Level with 5 dB(A) Barrier	Noise Barrier Reduction	Benefitted Receptor	Noise Abatement Criteria (NAC)	Impact Type A/E=Approaching or Exceeding
R06	60.7	62.3	63.3	1.6	2.6	-	-	N	67	None
R07	58.9	60.5	61.5	1.6	2.6	-	-	N	67	None
R08	60.9	62.5	63.6	1.6	2.7	-	-	N	67	None
R09	59.2	60.9	62.0	1.7	2.8	-	-	N	67	None
R10	68.6	69.2	69.3	0.6	0.7	-	-	N	72	None
R22 First Floor	67.1	68.0	67.4	0.9	0.3	59.6	7.8	Y	67	A/E
R22 Second Floor	69.0	69.9	69.5	0.9	0.5	61.3	8.2	Y	67	A/E
R22 Third Floor	71.5	72.4	73.3	0.9	1.8	62.9	10.4	Y	67	A/E
R23 First Floor	64.4	65.3	65.6	0.9	1.2	58.6	7.0	Y	67	None
R23 Second Floor	67.1	68.0	68.4	0.9	1.3	61.3	7.1	Y	67	A/E
R23 Third Floor	69.5	70.4	71.1	0.9	1.6	62.8	8.3	Y	67	A/E
R24 First Floor	62.4	63.3	63.8	0.9	1.4	57.9	5.9	Y	67	None
R24 Second Floor	65.4	66.3	67.4	0.9	2.0	60.9	6.5	Y	67	A/E
R24 Third Floor	67.5	68.3	69.2	0.8	1.7	62.6	6.6	Y	67	A/E
R25 First Floor	60.1	61.0	61.5	0.9	1.4	56.6	4.9	N	67	None
R25 Second Floor	63.1	64.0	65.3	0.9	2.2	59.9	5.4	Y	67	None
R25 Third Floor	65.0	65.9	66.8	0.9	1.8	61.8	5.0	Y	67	A/E
R26 First Floor	64.2	65.2	65.5	1.0	1.3	58.1	7.4	Y	67	None
R26 Second Floor	67.8	68.7	70.4	0.9	2.6	60.7	9.7	Y	67	A/E
R26 Third Floor	69.2	70.1	71.0	0.9	1.8	62.6	8.4	Y	67	A/E
R27 First Floor	62.4	63.3	63.9	0.9	1.5	57.3	6.6	Y	67	None
R27 Second Floor	65.5	66.4	67.8	0.9	2.3	60.1	7.7	Y	67	A/E
R27 Third Floor	67.1	67.9	68.7	0.8	1.6	61.9	6.8	Y	67	A/E
R28 First Floor	59.5	60.4	60.8	0.9	1.3	56.0	4.8	N	67	None

Table B-2 – Existing and Predicted Noise Levels

Receptor ID	Existing Noise Level	No-Build Noise Level	Design Year Noise Level w/o Barrier	No-Build Against Existing	Build Against Existing	Design Year Noise Level with 5 dB(A) Barrier	Noise Barrier Reduction	Benefitted Receptor	Noise Abatement Criteria (NAC)	Impact Type A/E=Approaching or Exceeding
R28 Second Floor	62.9	63.8	64.9	0.9	2.0	59.2	5.7	Y	67	None
R28 Third Floor	64.7	65.6	66.4	0.9	1.7	60.9	5.5	Y	67	A/E
R29 First Floor	58.3	61.3	59.4	3.0	1.1	55.4	4.0	N	67	None
R29 Second Floor	61.3	64.6	63.5	3.3	2.2	58.6	4.9	N	67	None
R29 Third Floor	62.9	66.4	64.8	3.5	1.9	60.3	4.5	N	67	None
R29 (a) First Floor	48.8	49.8	50.1	1.0	1.3	47.8	2.3	N	68	None
R29 (a) Second Floor	47.8	48.9	49.1	1.1	1.3	46.1	3.0	N	69	None
R29 (a) Third Floor	53.3	54.2	54.4	0.9	1.1	52.2	2.2	N	70	None
R30 First Floor	48.6	49.5	49.8	0.9	1.2	47.4	2.4	N	67	None
R30 Second Floor	48.8	49.7	50.0	0.9	1.2	47.0	3.0	N	67	None
R30 Third Floor	54.7	55.5	55.6	0.8	0.9	53.5	2.1	N	67	None
R31 First Floor	50.8	51.7	51.8	0.9	1.0	50.2	1.6	N	67	None
R31 Second Floor	51.8	52.7	52.7	0.9	0.9	51.1	1.6	N	67	None
R31 Third Floor	59.3	60.0	60.0	0.7	0.7	59.0	1.0	N	67	None
R32 First Floor	50.0	50.9	50.7	0.9	0.7	49.5	1.2	N	67	None
R32 Second Floor	51.9	52.7	52.7	0.8	0.8	51.3	1.4	N	67	None
R32 Third Floor	60.0	60.7	60.7	0.7	0.7	60.0	0.7	N	67	None
R33 First Floor	65.0	65.9	66.3	0.9	1.3	60.5	5.8	Y	67	A/E
R33 Second Floor	70.7	71.6	71.5	0.9	0.8	64.1	7.4	Y	67	A/E
R33 Third Floor	72.5	73.4	73.1	0.9	0.6	65.9	7.2	Y	67	A/E
R34 First Floor	67.2	68.1	68.1	0.9	0.9	63.0	5.1	Y	67	A/E
R34 Second Floor	71.0	71.9	71.4	0.9	0.4	65.0	6.4	Y	67	A/E
R34 Third Floor	73.1	74.0	73.7	0.9	0.6	66.8	6.9	Y	67	A/E
R35 First Floor	62.0	63.0	63.4	1.0	1.4	60.6	2.8	N	67	None
R35 Second Floor	70.9	71.8	69.7	0.9	-1.2	64.6	5.1	Y	67	A/E

Table B-2 – Existing and Predicted Noise Levels

Receptor ID	Existing Noise Level	No-Build Noise Level	Design Year Noise Level w/o Barrier	No-Build Against Existing	Build Against Existing	Design Year Noise Level with 5 dB(A) Barrier	Noise Barrier Reduction	Benefitted Receptor	Noise Abatement Criteria (NAC)	Impact Type A/E=Approaching or Exceeding
R35 Third Floor	73.0	73.9	73.4	0.9	0.4	66.3	7.1	Y	67	A/E
R36 First Floor	69.1	70.0	70.0	0.9	0.9	63.6	6.4	Y	67	A/E
R36 Second Floor	72.6	73.6	74.4	1.0	1.8	66.2	8.2	Y	67	A/E
R36 Third Floor	74.4	75.3	76.4	0.9	2.0	69.1	7.3	Y	67	A/E
R37 First Floor	58.9	59.7	59.8	0.8	0.9	57.9	1.9	N	67	None
R37 Second Floor	62.9	63.7	63.6	0.8	0.7	61.1	2.5	N	67	None
R37 Third Floor	64.6	65.4	65.3	0.8	0.7	62.5	2.8	N	67	None
R38 First Floor	58.2	58.9	59.0	0.7	0.8	57.8	1.2	N	67	None
R38 Second Floor	60.7	61.4	61.2	0.7	0.5	59.3	1.9	N	67	None
R38 Third Floor	62.4	63.1	63.0	0.7	0.6	61.0	2.0	N	67	None
R39 First Floor	57.1	58.0	57.9	0.9	0.8	55.1	2.8	N	67	None
R39 Second Floor	59.9	60.8	60.4	0.9	0.5	57.7	2.7	N	67	None
R39 Third Floor	63.9	64.7	64.5	0.8	0.6	61.3	3.2	N	67	None
R40 First Floor	54.7	55.5	55.2	0.8	0.5	54.5	0.7	N	67	None
R40 Second Floor	57.2	58.0	57.9	0.8	0.7	56.7	1.2	N	67	None
R40 Third Floor	60.9	61.8	61.8	0.9	0.9	60.6	1.2	N	67	None
R41 First Floor	67.3	68.3	67.6	1.0	0.3	60.9	6.7	Y	67	A/E
R41 Second Floor	72.0	73.0	69.9	1.0	-2.1	62.9	7.0	Y	67	A/E
R41 Third Floor	73.0	73.9	72.3	0.9	-0.7	64.2	8.1	Y	67	A/E
R42 First Floor	66.4	67.4	65.1	1.0	-1.3	58.6	6.5	Y	67	None
R42 Second Floor	68.3	69.3	66.4	1.0	-1.9	60.4	6.0	Y	67	A/E
R42 Third Floor	69.2	70.2	68.5	1.0	-0.7	62.1	6.4	Y	67	A/E
R43 First Floor	63.9	64.9	63.8	1.0	-0.1	58.5	5.3	Y	67	None
R43 Second Floor	65.7	66.7	66.1	1.0	0.4	60.4	5.7	Y	67	A/E
R43 Third Floor	68.0	68.9	68.0	0.9	0.0	62.2	5.8	Y	67	A/E

Table B-2 – Existing and Predicted Noise Levels

Receptor ID	Existing Noise Level	No-Build Noise Level	Design Year Noise Level w/o Barrier	No-Build Against Existing	Build Against Existing	Design Year Noise Level with 5 dB(A) Barrier	Noise Barrier Reduction	Benefitted Receptor	Noise Abatement Criteria (NAC)	Impact Type A/E=Approaching or Exceeding
R44 First Floor	61.3	62.3	61.7	1.0	0.4	57.1	4.6	N	67	None
R44 Second Floor	62.9	63.9	63.6	1.0	0.7	59.3	4.3	N	67	None
R44 Third Floor	65.7	66.6	65.6	0.9	-0.1	61.2	4.4	N	67	None
R70	60.3	61.4	61.3	1.1	1.0	-	-	-	67	None
R71	62.0	64.6	63.4	2.6	1.4	-	-	-	67	None
R72 Cemetery	66.1	67.4	68.1	1.3	2.0	-	-	-	67	A/E
R78	70.8	71.9	73.0	1.1	2.2	65.3	7.7	Y	67	A/E
R80	65.6	66.9	68.1	1.3	2.5	61.7	6.4	Y	67	A/E
R81	65.2	66.5	67.7	1.3	2.5	61.5	6.2	Y	67	A/E
R82	63.8	65.1	66.2	1.3	2.4	61.2	5.0	Y	67	A/E
R83	62.7	63.9	65.0	1.2	2.3	60.8	4.2	N	67	None
R84	61.8	63.1	64.1	1.3	2.3	60.4	3.7	N	67	None
R85	61.1	62.4	63.5	1.3	2.4	60.2	3.3	N	67	None
R86	60.9	62.2	63.2	1.3	2.3	60.1	3.1	N	67	None
R87	60.9	62.2	63.2	1.3	2.3	60.0	3.2	N	67	None
R88	60.8	62.1	63.1	1.3	2.3	59.9	3.2	N	67	None

Table B-3 Noise Barrier Reasonableness Analysis Worksheet

Barrier #	Existing Noise Levels Leq(H) dBA	Range of Future Noise Levels		Barrier Characteristics						# of Dwelling Units Attenuated (Min 5dBA)	Cost/Unit	Feasible and Cost Effective
		W/O Barriers Leq(dBA)	Barrier Leq(dBA)	Noise Reduction (dBA) *	Length (ft)	Height (range)	Height (Average)	Total Barrier Area(sw ft)	Cost			
1	47.8-74.4	49.1-76.4	46.1-69.1	5.0-10.4	2.800	2-18	12	34,318	$1,029,500	78	$13,200	Y
2	60.8-70.8	62.1-71.9	59.9-65.3	5.0-7.7	1,200	2-20	14.5	17,558	$526,700	4	$131,700	N

*For benefitted receptors

Summary of Noise Abatement Analysis for the Preferred Alternative

Barrier #	Percentage of Benefited Receptors which Receive 7dBA or Greater Noise Reduction (%)	Percentage of Impacted Receptors which Receive 5dBA or Greater Noise Reduction (%)	Existing Noise Levels Leq(H) dBA	Range of Future Noise Levels		Barrier Characteristics							# of D/Us Attenuated (Min 5dBA)	Cost/Unit	Noise Barrier Effectiveness			Feasible and Cost Effective
				W/O Barriers Leq(dBA)	Barrier Leq(dBA)	Noise Reduction (dBA) *	Length (ft)	Beginning and End Point	Height (range)	Height (ft Average)	Total Barrier Area(sw ft)	Cost[1]			Design Goal Achieved[2]	Acoustic Feasibility Achieved [3]	Cost Effective Achieved [4]	
1	46.2	125.6	47.8-74.4	49.1-76.4	46.1-69.1	5.0-10.4	2,800	420+45 - 445+40	2-18	12	34,318	$1,029,500	78	$13,200	Y	Y	Y	Y
2	25.0	100.0	60.8-70.8	62.1-71.9	59.9-65.3	5.0-7.7	1,200	506+40 - 518+40	2-20	14.5	17,558	$526,700	4	$131,700	N	Y	N	N

Notes:

[1] Estimated cost of the barriers is based on the surface area cost of $30 per square foot of barrier wall a recommended by KYTC.

[2] A design goal of 7 dBA noise reduction for a minimum of 40 percent of all benefitting receptors is required.

[3] Acoustic effectiveness of a barrier was judged by providing a noise reduction of 5 dBA or greater at 50 percent or more of the impacted receptors

[4] Cost effectiveness was based on KYTC unit cost of $35,000 per benefiting receptor (CBR).

Table E-2 Revised Noise Barrier Descriptions

Appendix C

Measurement Field Forms and Equipment Calibration Records

FIELD SURVEY FORM

PROJECT: KY 338 Richwood Road		ENGINEER: R. Connolly A. Ball	DATE: 7-16
MEASUREMENT ADDRESS: 10833 Dixie Highway Clayton Mobile Homes	CITY:	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial	SITE NO.: ST-1

SOUND LEVEL METER: ☐ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ LD-2900 ☐ _____	MICROPHONE: ☐ WIND SCREEN ☐ NON-POLAR ☐ POLARIZED ☐ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM	PRE AMP: ☐ LD-900 ☐ LD-828 ☐ _____	NOTES: SYSTEM PWR: ☒ BAT ☐ AC (observations at start of measurement) TEMP: 94 °F R.H.: 45 % WIND SPEED: 26 MPH TOWARD (DIR): E SKIES: Mostly Sunny CAMERA _____ PHOTO NOs. _____
SERIAL #: 1691	SERIAL #: 3002	SERIAL #: 2674	

CALIBRATOR: ☐ LD CA250 ☐ 200 S/N 8806

Freq, Hz.: ☐ 250 ☐ 1000 ☐

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time

Before 114.0 / 113.9 / 7.3 / 14:22

After 114.0 / 113.8 / 7.3 / 14:47

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☐ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☒ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:

Dist. to Center of Nearest Lane 318'

☐ Video ☐ Radar

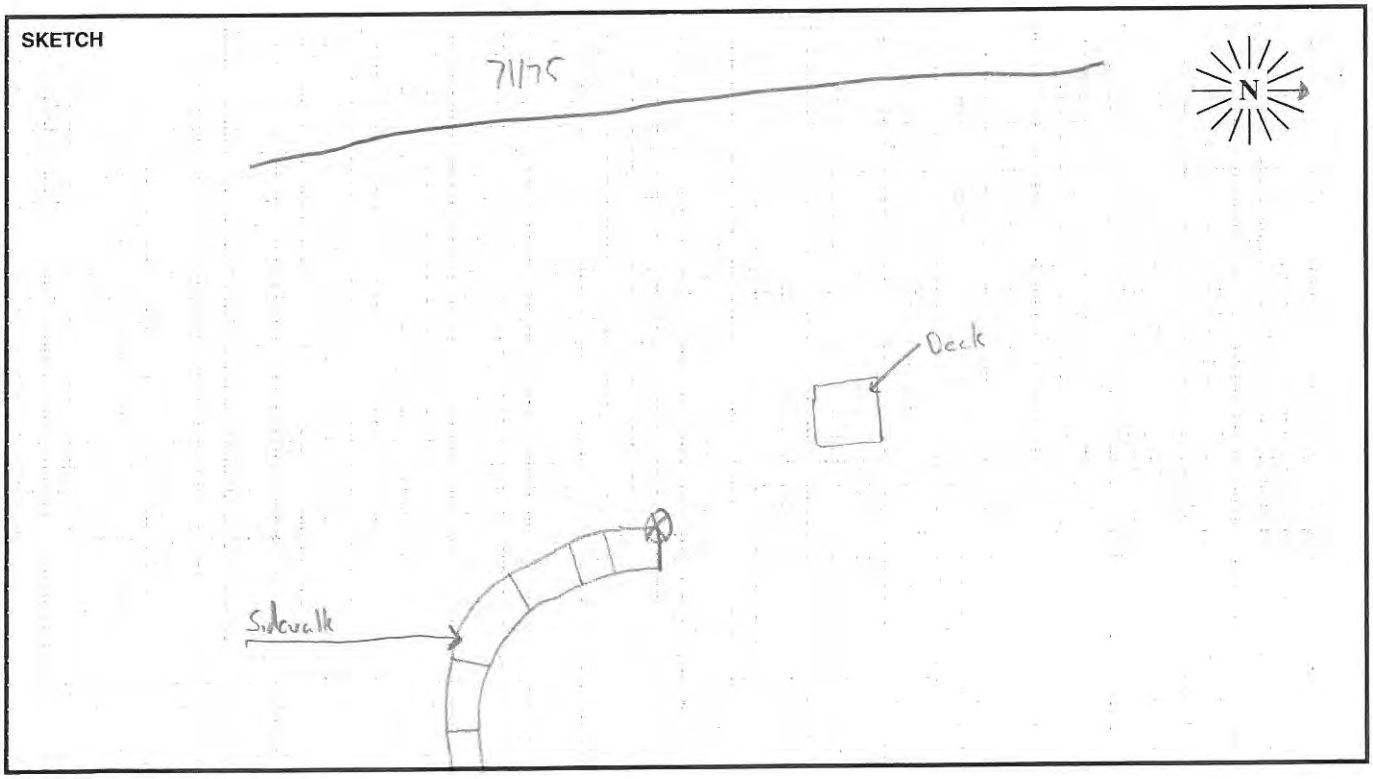
Counts

	AT	MT	HT
NB	946	18	171
SB	881	36	180

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}^{90}	L_{80}^{67}	L_{50}^{50}	L_{25}^{33}	L_{10}	L_{01}^{5}	L_{MAX}	L_{EQ}	NOTES:
7-16	14:25	14:45	58.0	64.1	66.4	67.9	69.4	71.6	72.6	84.1	69.0	5240028.8 4228443.3

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: KY338 Richwood Road		ENGINEER: R. Connolly, A. Ball	DATE: 7-16
MEASUREMENT ADDRESS: 540 Calle Luna (Vacant)	CITY:	☒ Single-Family ☐ Multi-Family ☐ Recreational ☐ Commercial	SITE NO.: ST-2

SOUND LEVEL METER: ☐ LD-870 ☒ LD-820 ☐ LD-824 ☐ LD-812 ☐ LD-2900 ☐ _____	MICROPHONE: ☐ WIND SCREEN ☐ NON-POLAR ☐ POLARIZED ☐ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM	PRE AMP: ☐ LD-900 ☐ LD-828 ☐ _____	NOTES: SYSTEM PWR: ☒ BAT ☐ AC (observations at start of measurement) TEMP: 83 °F R.H.: 59 % WIND SPEED: 3.8 MPH TOWARD (DIR): E SKIES: P+ly Cloudy CAMERA _____ PHOTO NOs. _____
SERIAL #: 1691	SERIAL #: 3002	SERIAL #: 2674	

CALIBRATOR: ☐ LD CA250 ☐ _____ S/N 8806 — Freq, Hz.: ☐ 250 ☐ 1000 ☐

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time

Before 114.0 / 114.0 / 7.6 / 9.41

After 114.0 / 114.0 / 7.6 / 10:07

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☐ SLOW ☐ 1/1 OCT ☐ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:
- Airplane overhead set L max

Dist. to Center of Nearest Lane: 415

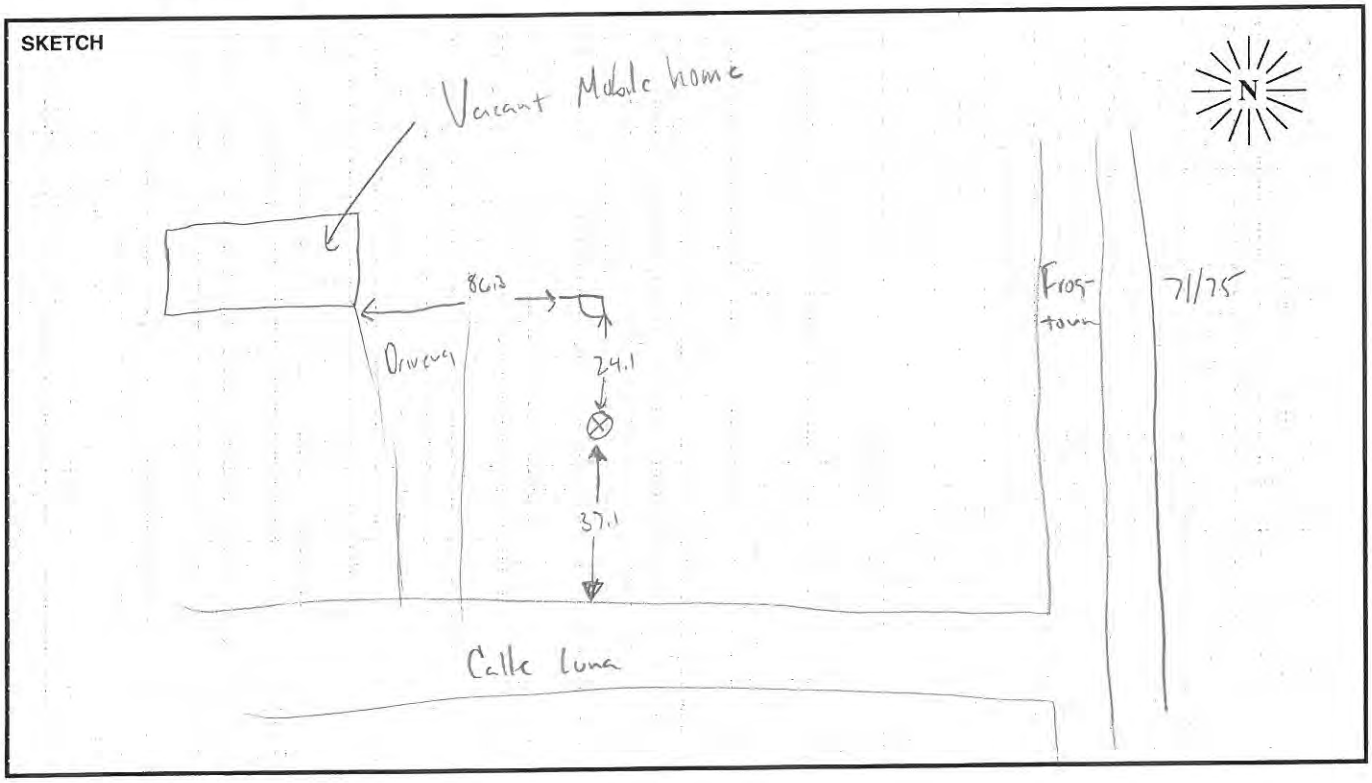
☒ Video ☐ Radar

Counts	AT	MT	HT
NB	815	30	131
SB	698	36	174

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
7-16	9:45	10:05	53.0	55.8	57.4	58.4	59.4	62.0	69.1	77.3	60.6	4 cars on Calle Luna 1st dominant
												523933 0.4 4227093.2 936

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: KY338 Richwood Road		ENGINEER: R. Connolly, A. Ball	DATE: 7-16
MEASUREMENT ADDRESS: 124 Old Richwood Road	CITY:	☒ Single-Family ☐ Multi-Family ☐ Recreational ☐ Commercial	SITE NO.: ST-3

SOUND LEVEL METER: ☐ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ LD-2900 ☐ _____	MICROPHONE: ☐ WIND SCREEN ☐ NON-POLAR ☐ POLARIZED ☐ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM	PRE AMP: ☐ LD-900 ☐ LD-828 ☐ _____	NOTES: SYSTEM PWR: ☐ BAT ☐ AC (observations at start of measurement) TEMP: 94 °F R.H.: 66 % WIND SPEED: 2.0 MPH TOWARD (DIR): E SKIES: Mostly Sunny CAMERA _____ PHOTO NOs. _____
SERIAL #: 1691	SERIAL #: 3002	SERIAL #: 26074	

CALIBRATOR: ☐ LD CA250 ☐ _____ S/N 8806 — Freq, Hz.: ☐ 250 ☐ 1000 ☐

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time

Before 114.0 / 114.1 / 7.3 / 10:38

After 114.0 / 114.0 / 7.3 / 11.02

METER SETTINGS: ☐ A-WTD ☐ LINEAR ☐ SLOW ☐ 1/1 OCT ☐ INTERVALS _____ - MINUTE ☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES:

Dist. to Center of Nearest Lane 754

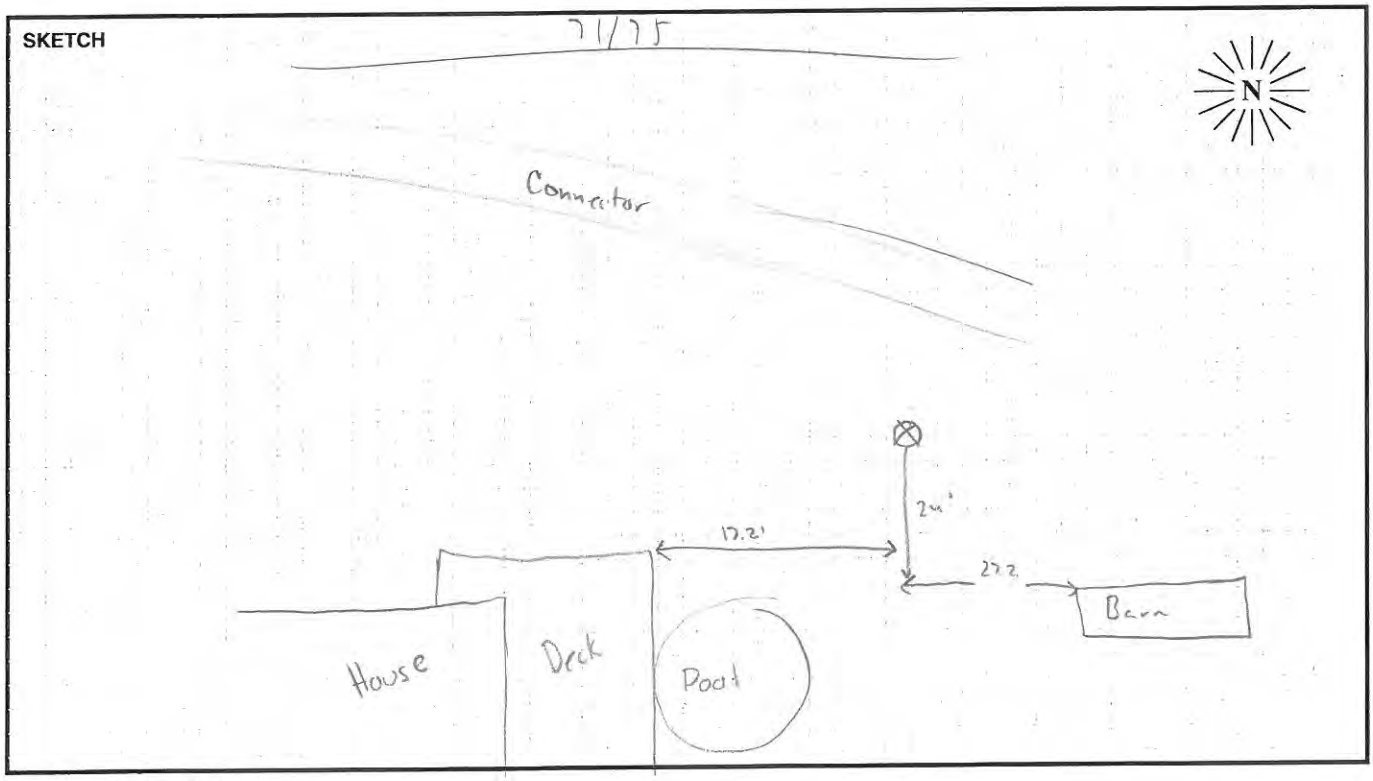
☐ Video ☐ Radar

Counts	AT	MT	HT
NB	355	18	153
SB	513	26	108

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
7-16	10:40	11:00	55.0	56.6	59.2	61.2	62.8	65.0	66.0	77.3	62.6	
												5240929.1 4224880.5 909

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: KY 338 Richwood Rd		ENGINEER: R. Connell, A. Ball	DATE: 7-16
MEASUREMENT ADDRESS: 11165 Eronalodge Pool Frontage Rd	CITY:	☐ Single-Family ☐ Multi-Family ☐ Recreational ☒ Commercial	SITE NO.: ST-4

SOUND LEVEL METER: ☐ LD-870 ☒ LD-820 ☐ LD-824 ☐ LD-812 ☐ LD-2900 ☐ _____	MICROPHONE: ☐ WIND SCREEN ☐ NON-POLAR ☐ POLARIZED ☐ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM	PRE AMP: ☐ LD-900 ☐ LD-828 ☐ _____	NOTES: SYSTEM PWR: ☐ BAT ☐ AC (observations at start of measurement) TEMP: 94 °F R.H.: 42.5 % WIND SPEED: 5.5 MPH TOWARD (DIR): E SKIES: Mostly Sunny CAMERA _____ PHOTO NOs. _____
SERIAL #: 1691	SERIAL #: 3002	SERIAL #: 2679	

CALIBRATOR: ☐ LD CA250 ☐ _____ S/N 8806 — Freq, Hz. ☐ 250 ☐ 1000 ☐

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time

Before 114.0 / 114.1 / 7.3 / 13:30

After 114.0 / 114.0 / 7.3 / 15:58

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☐ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES: Dist. to Center of Nearest Lane _____ ☐ Video ☐ Radar

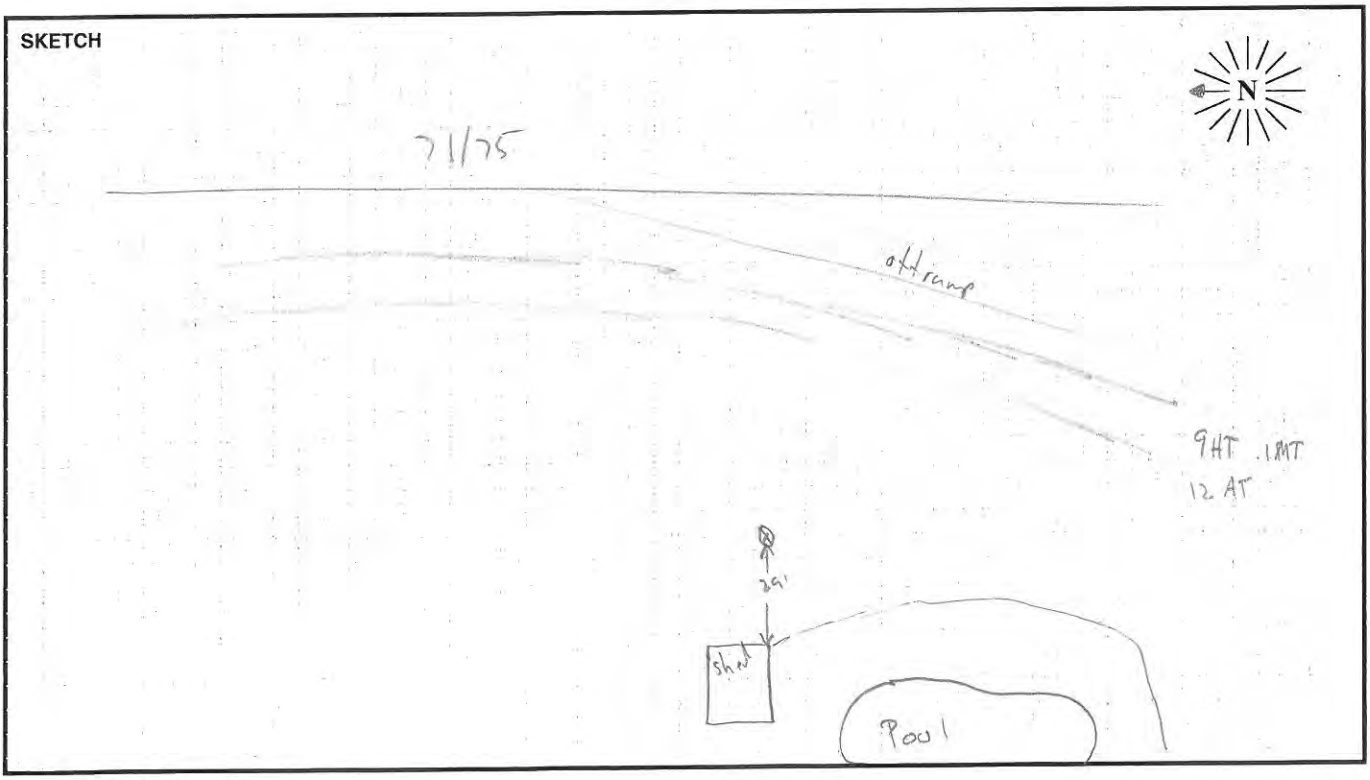
Counts

	AT	MT	HT
NB	770	38	132
SB	751	29	121

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
7-16	12:32	12:52	54.2	58.2	61.2	63.1	64.7	67.4	68.7	75.4	64.4	
												523 9665.6 4124 24231.6 881

SKETCH



PARSONS

FIELD SURVEY FORM

PROJECT: KY338 Richwood Road		ENGINEER: R. Connolly, A. Ball	DATE: 7-16
MEASUREMENT ADDRESS: Furlong Way Legends Apts	CITY:	☐ Single-Family ☐ Recreational ☒ Multi-Family ☐ Commercial	SITE NO.: ST-5

SOUND LEVEL METER: ☐ LD-870 ☐ LD-820 ☐ LD-824 ☐ LD-812 ☐ LD-2900 ☐ _____	MICROPHONE: ☐ WIND SCREEN ☐ NON-POLAR ☐ POLARIZED ☐ 1/2-INCH ☐ FREEFIELD ☐ 1-INCH ☐ RANDOM	PRE AMP: ☐ LD-900 ☐ LD-828 ☐ _____	NOTES: SYSTEM PWR: ☒ BAT ☐ AC (observations at start of measurement) TEMP: 98 °F R.H.: 49.1 % WIND SPEED: 1.2 MPH TOWARD (DIR): E SKIES: Mostly Sunny CAMERA _____ PHOTO NOs. _____
SERIAL #: 16491	SERIAL #: 30032	SERIAL #: 26724	

CALIBRATOR: ☐ LD CA250 ☐ _____ S/N 88036

Freq, Hz.: ☐ 250 ☐ 1000 ☐

CALIBRATION RECORD: Input, dB / Reading, dB / Offset, dB / Time

Before 114.0 / 113.9 / 7.3 / 11:34

After 114.0 / 113.9 / 7.3 / 12:04

METER SETTINGS:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☐ INTERVALS _____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☐ L_N PERCENTILE VALUES

NOTES: Dist. to Center of Nearest Lane 179' ☐ Video ☐ Radar

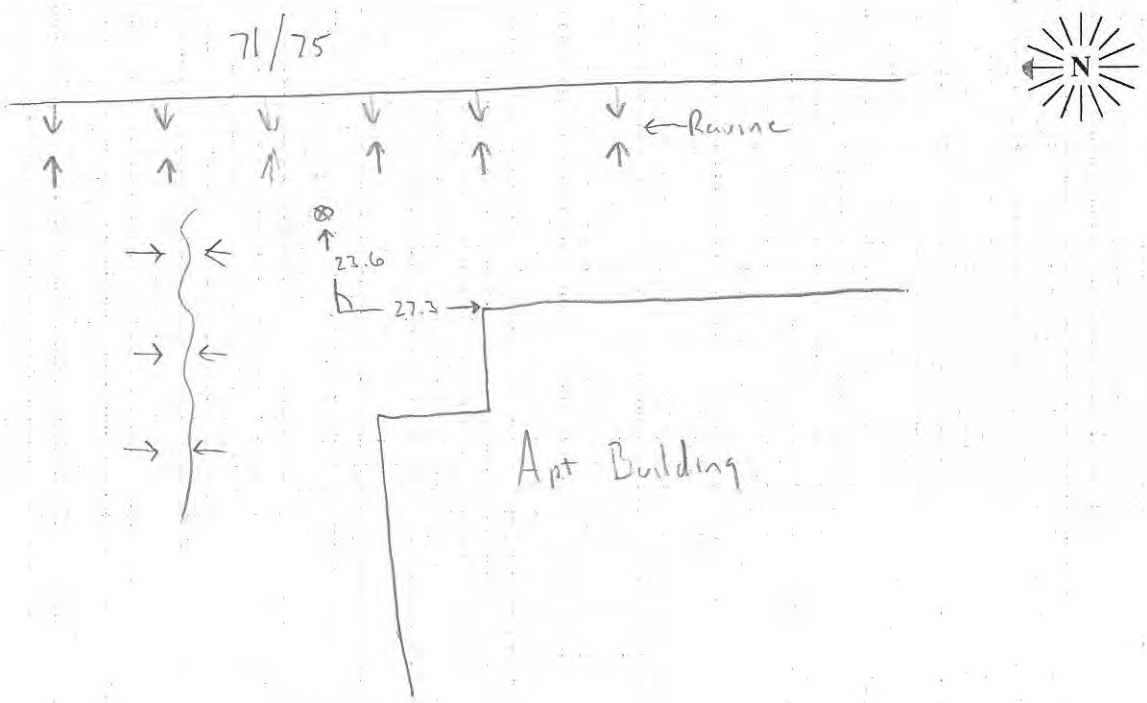
Counts:

	AT	MT	HT
NB	673	25	151
SB	604	15	120

MEAS. TYPE: ☐ Long Term ☒ Short Term

DATE	START TIME	STOP TIME	L_{MIN}	L_{99}	L_{90}	L_{50}	L_{25}	L_{10}	L_{01}	L_{MAX}	L_{EQ}	NOTES:
7-16	11:41	12:01	55.2	61.1	64.9	67.1	68.9	72.1	73.4	82.8	68.8	Ravine
												524 0121.9
												422 1058.1

SKETCH



PARSONS

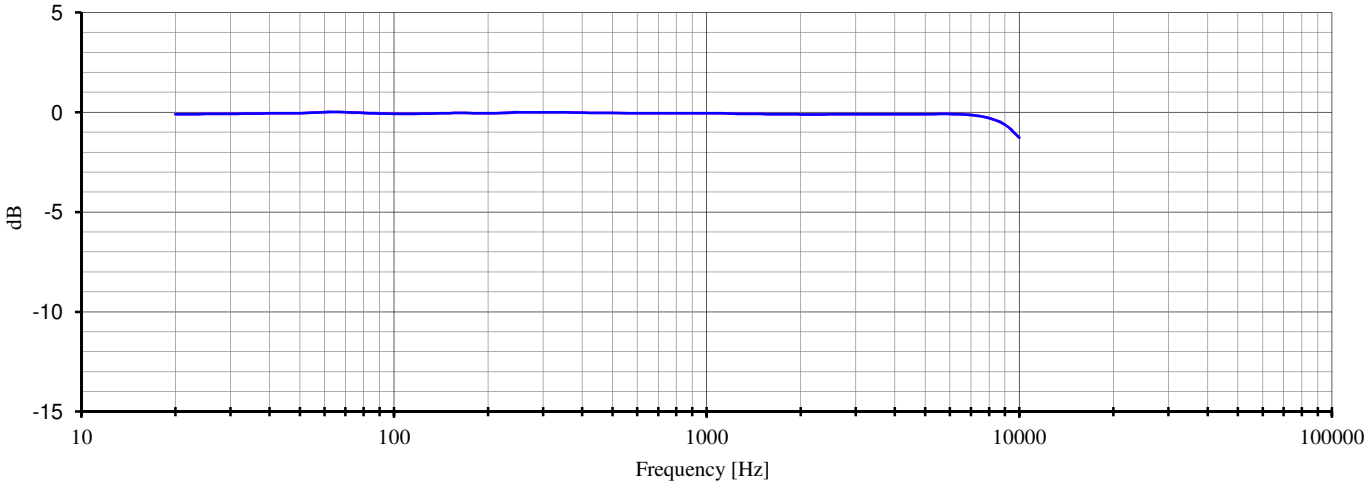
THE MODAL SHOP INC.
A PCB GROUP CO.

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

~Certificate of Calibration~

Description: Pressure Microphone
Manufacturer: Larson Davis
Model Number: 2560
Serial Number: 3002

Customer : TMS Rental



Test Results:

Sensitivity:	**250 Hz**	**1 kHz**	
	-25.84	-25.89	dB re. 1V/Pa
	51.07	50.77	mV/Pa
Cal. Results:	In Tolerance		

Frequency Response Characteristics : The curve is the pressure response recorded by electrostatic actuator.

Sensitivity : The stated sensitivity is the open-circuit sensitivity. When used with a typical preamplifier the sensitivity will be 0.2 dB lower.

Polarization Voltage : 200 V

Traceability : The calibration is traceable through 822/278767-10.

Notes :

Calibration results relate only to the items calibrated.
This certificate may not be reproduced, except in full, without written permission.
This calibration is performed in compliance with ISO 9001, ISO 17025 and ANSI Z540.
Measurement uncertainty at 95% confidence level: 0.30 dB.
Calibrated per procedure PRD-P204.

User Note : As Found / As Left: In Tolerance.

Calibration Date:	23-Jan-2012	12:14:18	Temperature:	71 (22)	°F (°C)
Due Date:			Humidity:	30	%
Operator :	Ed Devlin		Ambient Pressure:	1006	mbar
Approval:					

ACCREDITED

Reference Equipment Used:

Manuf.	*Model*	*Serial*	*Cal. Date*	*Due Date*
GRAS	40AG	58093	9/14/2011	9/14/2012

Certificate of Calibration and Conformance

Instrument Model **820**, Serial Number **1691** was calibrated on January 20, 2012. The instrument meets factory specifications according to The Modal Shop Production Test Procedure PRD-P227, ISO 10012, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: January 20, 2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2239	0760 / 0109	12 Months	4/7/2012	2011-138647

Certified Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

AMBIENT TEMPERATURE: 73.4°F RELATIVE HUMIDITY: 32%

Notes

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 10012. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

Due to state-of-the-art limitations, 4:1 calibration ratios are not possible on pressure measurement standards, microphones and acoustic calibrators. Calibration ratios for these types of devices are limited to 1:1.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Ed Devlin Signature: _____

Service Center: The Modal Shop, Inc.

THE MODAL SHOP INC.
A PCB GROUP CO.

The Modal Shop
3149 East Kemper Road
Cincinnati, OH 45241
Ph (513) 351-9919
FAX (513) 458-2172

~Conformance Certificate~

THE MODAL SHOP INC
A PCB GROUP CO.

3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

Description: **PCB**

Model: **PRM828**

Serial Number: **2674**

Asset Number:

Customer: **TMS Rental**

Notes:
The subject instrument was tested under operating procedures intended to implement the requirements of ISO 9001, ISO 17025 and ANSI Z540. This document certifies that the instrument met the following specification upon its return to the customer. Unless otherwise noted, the reported value is both "as found" and "as left" data. Results relate only to the items calibrated. This certificate may not be reproduced, except in full, without written permission.

Test Results:
Measured Gain: -1.61 dB with 18 pF loading
Frequency Response within ±0.2 dB with 18 pF loading
20.0 Hz - 20000.0 Hz

Upon receipt for calibration, the instrument was found to be:
WITHIN the stated tolerance of the manufacturer's specification.

Note: As Found / As Left: In Tolerance.

Test Conditions:

Temperature:	**21 °C (71 °F)**	Test Date:	**4/10/2012 14:08**
Humidity:	**16%**	Due Date:	
Pressure:	**994 mbar**	Technician:	**Ed Devlin**
		Approval:	

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-149536

Instrument Model CAL200, Serial Number 8806, was calibrated on 28SEP2011. The instrument meets factory specifications per Procedure D0001.8190.

New Instrument
Date Calibrated: 28SEP2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2504	12 Months	29NOV2011	17865-1
PCB	1502B02FJ15PSIA	1342	12 Months	06DEC2011	3374488329
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis CAL200 Acoustic Calibrator, SN: 8806
Certificate of Measured Output

Performance at Reference Conditions

Nominal Level (dB SPL):	94	114
Measured Level (dB SPL):	**94.02**	**114.00**
Expanded Uncertainty (dB):	0.154	0.149
Level Error Limit (dB):	±0.35	±0.35
Nominal Frequency (Hz):	1000	1000
Measured Frequency (Hz):	**1000.3**	**1000.3**
Expanded Uncertainty (Hz):	0.2	0.2
Frequency Error Limit (Hz):	±10.0	±10.0
Measured Distortion (%):	0.46	0.42
Expanded Uncertainty (%):	0.25	0.25
Distortion Limit (%):	2.0	2.0

The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity.

Environmental Conditions

Temperature (°C):	22	23
Relative Humidity (%):	36	36
Static Pressure (kPa):	101.2	101.2

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2504
Open Circuit Sensitivity: 11.439 mV/Pascal
Uncertainty: 0.130 dB

Influence of Static Pressure

Nominal Level (dB SPL): 114

Nominal Pressure (kPa)	Pressure (kPa)	Level Change (dB)	Frequency Change (Hz)	Distortion (%)
108.0	108.0	-0.03	0.00	0.42
101.3	101.4	0.00	0.00	0.42
92.0	92.0	0.01	-0.00	0.43
83.0	82.9	-0.00	-0.00	0.45
74.0	74.0	-0.07	-0.01	0.47
65.0	65.1	-0.20	-0.01	0.50
Expanded Uncertainty:	1.0	0.04	0.20	0.25
Limit:		±0.30	±10.0	2.0

Reference microphone corrections applied.

Environmental Conditions

Temperature (°C):	20
Relative Humidity (%):	45

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2504

Static pressure was measured with a calibrated Motorola pressure sensor MPX2100AP.
Temperature and humidity was measured with a calibrated Fluke 1620A sensor.
Expanded uncertainty of environmental measurements: 0.3 °C, 3 %RH, 1.0 kPa
Uncertainty values are given at 95% confidence level (k = 2).

A Sound Level Meter can be calibrated to a level (L) defined as: L = measured level + pressure sensitivity
or if a Sound Level Meter is calibrated using the nominal level, the adjustments to data (X) are defined as:
X = measured level - nominal level - pressure sensitivity

Appendix D

TNM Data Tables

No Build Output

PTG
RJC

31 January 2013
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KY 338
RUN: No-Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R02	1	1	0.0	76.1	66	76.1	10	Snd Lvl	76.1	0.0	8	-8.0
R06	2	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
R07	3	1	0.0	60.5	66	60.5	10	----	60.5	0.0	8	-8.0
R08	4	1	0.0	62.5	66	62.5	10	----	62.5	0.0	8	-8.0
R09	5	1	0.0	60.9	66	60.9	10	----	60.9	0.0	8	-8.0
R10	6	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	6	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PTG
RJC

31 January 2013
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KY 338
RUN: No-Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R22 First Floor	1	2	0.0	68.0	66	68.0	10	Snd Lvl	68.0	0.0	8	-8.0
R22 Second Floor	2	2	0.0	69.9	66	69.9	10	Snd Lvl	69.9	0.0	8	-8.0
R22 Third Floor	3	2	0.0	72.4	66	72.4	10	Snd Lvl	72.4	0.0	8	-8.0
R23 First Floor	4	2	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0
R23 Second Floor	5	2	0.0	68.0	66	68.0	10	Snd Lvl	68.0	0.0	8	-8.0
R23 Third Floor	6	2	0.0	70.4	66	70.4	10	Snd Lvl	70.4	0.0	8	-8.0
R24 First Floor	8	2	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R24 Second Floor	9	2	0.0	66.3	66	66.3	10	Snd Lvl	66.3	0.0	8	-8.0
R24 Third Floor	10	2	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0
R25 First Floor	11	2	0.0	61.0	66	61.0	10	----	61.0	0.0	8	-8.0
R25 Second Floor	12	2	0.0	64.0	66	64.0	10	----	64.0	0.0	8	-8.0
R25 Third Floor	13	2	0.0	65.9	66	65.9	10	----	65.9	0.0	8	-8.0
R29(a) First Floor	14	2	0.0	49.8	66	49.8	10	----	49.8	0.0	8	-8.0
R29(a) Second Floor	15	2	0.0	48.9	66	48.9	10	----	48.9	0.0	8	-8.0
R29(a) Third Floor	16	2	0.0	54.2	66	54.2	10	----	54.2	0.0	8	-8.0
R26 First Floor	17	1	0.0	65.2	66	65.2	10	----	65.2	0.0	8	-8.0
R26 Second Floor	18	1	0.0	68.7	66	68.7	10	Snd Lvl	68.7	0.0	8	-8.0
R26 Third Floor	19	1	0.0	70.1	66	70.1	10	Snd Lvl	70.1	0.0	8	-8.0
R27 First Floor	20	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R27 Second Floor	21	1	0.0	66.4	66	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
R27 Third Floor	22	1	0.0	67.9	66	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
R28 First Floor	23	1	0.0	60.4	66	60.4	10	----	60.4	0.0	8	-8.0
R28 Second Floor	24	1	0.0	63.8	66	63.8	10	----	63.8	0.0	8	-8.0

R28 Third Floor	25	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
R28 (a) First Floor	26	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
R28 (a) Second Floor	27	1	0.0	62.1	66	62.1	10	----	62.1	0.0	8	-8.0
R28 (a) Third Floor	28	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
R29 First Floor	29	1	0.0	61.3	66	61.3	10	----	61.3	0.0	8	-8.0
R29 Second Floor	30	1	0.0	64.6	66	64.6	10	----	64.6	0.0	8	-8.0
R29 Third Floor	31	1	0.0	66.4	66	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
R30 First Floor	32	1	0.0	49.5	66	49.5	10	----	49.5	0.0	8	-8.0
R30 Second Floor	33	1	0.0	49.7	66	49.7	10	----	49.7	0.0	8	-8.0
R30 Third Floor	34	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R31 First Floor	35	1	0.0	51.7	66	51.7	10	----	51.7	0.0	8	-8.0
R31 Second Floor	36	1	0.0	52.7	66	52.7	10	----	52.7	0.0	8	-8.0
R31 Third Floor	37	1	0.0	60.0	66	60.0	10	----	60.0	0.0	8	-8.0
R32 FirstFloor	38	1	0.0	50.9	66	50.9	10	----	50.9	0.0	8	-8.0
R32 Second Floor	39	1	0.0	52.7	66	52.7	10	----	52.7	0.0	8	-8.0
R32 Third Floor	40	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
R33 First Floor	41	1	0.0	65.9	66	65.9	10	----	65.9	0.0	8	-8.0
R33 Second Floor	42	1	0.0	71.6	66	71.6	10	Snd Lvl	71.6	0.0	8	-8.0
R33 Third Floor	43	1	0.0	73.4	66	73.4	10	Snd Lvl	73.4	0.0	8	-8.0
R34 First Floor	44	1	0.0	68.1	66	68.1	10	Snd Lvl	68.1	0.0	8	-8.0
R34 Second Floor	45	1	0.0	71.9	66	71.9	10	Snd Lvl	71.9	0.0	8	-8.0
R34 Third Floor	46	1	0.0	74.0	66	74.0	10	Snd Lvl	74.0	0.0	8	-8.0
R35 First Floor	47	1	0.0	63.0	66	63.0	10	----	63.0	0.0	8	-8.0
R35 Second Floor	48	1	0.0	71.8	66	71.8	10	Snd Lvl	71.8	0.0	8	-8.0
R35 Third Floor	49	1	0.0	73.9	66	73.9	10	Snd Lvl	73.9	0.0	8	-8.0
R36 First Floor	50	1	0.0	70.0	66	70.0	10	Snd Lvl	70.0	0.0	8	-8.0
R36 Second Floor	51	1	0.0	73.6	66	73.6	10	Snd Lvl	73.6	0.0	8	-8.0
R36 Third Floor	52	1	0.0	75.3	66	75.3	10	Snd Lvl	75.3	0.0	8	-8.0
R37 First Floor	53	1	0.0	59.7	66	59.7	10	----	59.7	0.0	8	-8.0
R37 SecondFloor	54	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
R37 Third Floor	55	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0
R38 First Floor	56	1	0.0	58.9	66	58.9	10	----	58.9	0.0	8	-8.0
R38 Second Floor	57	1	0.0	61.4	66	61.4	10	----	61.4	0.0	8	-8.0
R38 Third Floor	58	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
R39 First Floor	59	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R39 Second Floor	60	1	0.0	60.8	66	60.8	10	----	60.8	0.0	8	-8.0
R39 Third Floor	61	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
R40 First Floor	62	1	0.0	55.5	66	55.5	10	----	55.5	0.0	8	-8.0
R40 Second Floor	63	1	0.0	58.0	66	58.0	10	----	58.0	0.0	8	-8.0
R40 Third Floor	64	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0

R41 First Floor	65	1	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0
R41 Second Floor	66	1	0.0	73.0	66	73.0	10	Snd Lvl	73.0	0.0	8	-8.0
R41 Third Floor	67	1	0.0	73.9	66	73.9	10	Snd Lvl	73.9	0.0	8	-8.0
R42 First Floor	68	1	0.0	67.4	66	67.4	10	Snd Lvl	67.4	0.0	8	-8.0
R42 Second Floor	69	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0
R42 Third Floor	70	1	0.0	70.2	66	70.2	10	Snd Lvl	70.2	0.0	8	-8.0
R43 First Floor	71	1	0.0	64.9	66	64.9	10	----	64.9	0.0	8	-8.0
R43 Second Floor	72	1	0.0	66.7	66	66.7	10	Snd Lvl	66.7	0.0	8	-8.0
R43 Third Floor	73	1	0.0	68.9	66	68.9	10	Snd Lvl	68.9	0.0	8	-8.0
R44 First Floor	74	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
R44 Second Floor	75	1	0.0	63.9	66	63.9	10	----	63.9	0.0	8	-8.0
R44 Third Floor	76	1	0.0	66.6	66	66.6	10	Snd Lvl	66.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	90	0.0	0.0	0.0
All Impacted	38	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Build Output

PTG
RJC

31 January 2013
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KY 338(Richwood Road) Interchange
RUN: Proposed
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R02	1	1	0.0	76.1	66	76.1	10	Snd Lvl	76.1	0.0	8	-8.0
R06	2	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
R07	3	1	0.0	61.5	66	61.5	10	----	61.5	0.0	8	-8.0
R08	4	1	0.0	63.6	66	63.6	10	----	63.6	0.0	8	-8.0
R09	5	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
R10	6	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	6	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

PTG
RJC

31 January 2013
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KY 338(Richwood Road) Interchange
RUN: Proposed
BARRIER DESIGN: v_1

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R26 First Floor	22	2	0.0	65.5	66	65.5	10	----	58.1	7.4	8	-0.6
R26 Second Floor	23	2	0.0	70.4	66	70.4	10	Snd Lvl	60.7	9.7	8	1.7
R26 Third Floor	24	2	0.0	71.0	66	71.0	10	Snd Lvl	62.6	8.4	8	0.4
R27 First Floor	25	2	0.0	63.9	66	63.9	10	----	57.3	6.6	8	-1.4
R27 Second Floor	26	2	0.0	67.8	66	67.8	10	Snd Lvl	60.1	7.7	8	-0.3
R27 Third Floor	27	2	0.0	68.7	66	68.7	10	Snd Lvl	61.9	6.8	8	-1.2
R28 First Floor	28	2	0.0	60.8	66	60.8	10	----	56.0	4.8	8	-3.2
R28 Second Floor	29	2	0.0	64.9	66	64.9	10	----	59.2	5.7	8	-2.3
R28 Third Floor	30	2	0.0	66.4	66	66.4	10	Snd Lvl	60.9	5.5	8	-2.5
R29(a) First Floor	34	2	0.0	50.1	66	50.1	10	----	47.8	2.3	8	-5.7
R29(a) Second Floor	35	2	0.0	49.1	66	49.1	10	----	46.1	3.0	8	-5.0
R29(a) Third Floor	36	2	0.0	54.4	66	54.4	10	----	52.2	2.2	8	-5.8
R30 First Floor	37	2	0.0	49.8	66	49.8	10	----	47.4	2.4	8	-5.6
R30 Second Floor	38	2	0.0	50.0	66	50.0	10	----	47.0	3.0	8	-5.0
R30 Third Floor	39	2	0.0	55.6	66	55.6	10	----	53.5	2.1	8	-5.9
R31 First Floor	40	2	0.0	51.8	66	51.8	10	----	50.2	1.6	8	-6.4
R31 Second Floor	41	2	0.0	52.7	66	52.7	10	----	51.1	1.6	8	-6.4
R31 Third Floor	42	2	0.0	60.0	66	60.0	10	----	59.0	1.0	8	-7.0
R32 FirstFloor	43	2	0.0	50.7	66	50.7	10	----	49.5	1.2	8	-6.8
R32 Second Floor	44	2	0.0	52.7	66	52.7	10	----	51.3	1.4	8	-6.6
R32 Third Floor	45	2	0.0	60.7	66	60.7	10	----	60.0	0.7	8	-7.3
R33 First Floor	46	2	0.0	66.3	66	66.3	10	Snd Lvl	60.5	5.8	8	-2.2
R33 Second Floor	47	2	0.0	71.5	66	71.5	10	Snd Lvl	64.1	7.4	8	-0.6

R33 Third Floor	48	2	0.0	73.1	66	73.1	10	Snd Lvl	65.9	7.2	8	-0.8
R34 First Floor	49	2	0.0	68.1	66	68.1	10	Snd Lvl	63.0	5.1	8	-2.9
R34 Second Floor	50	2	0.0	71.4	66	71.4	10	Snd Lvl	65.0	6.4	8	-1.6
R34 Third Floor	51	2	0.0	73.7	66	73.7	10	Snd Lvl	66.8	6.9	8	-1.1
R35 First Floor	52	2	0.0	63.4	66	63.4	10	----	60.6	2.8	8	-5.2
R35 Second Floor	53	2	0.0	69.7	66	69.7	10	Snd Lvl	64.6	5.1	8	-2.9
R35 Third Floor	54	2	0.0	73.4	66	73.4	10	Snd Lvl	66.3	7.1	8	-0.9
R36 First Floor	55	2	0.0	70.0	66	70.0	10	Snd Lvl	63.6	6.4	8	-1.6
R36 Second Floor	56	2	0.0	74.4	66	74.4	10	Snd Lvl	66.2	8.2	8	0.2
R36 Third Floor	57	2	0.0	76.4	66	76.4	10	Snd Lvl	69.1	7.3	8	-0.7
R37 First Floor	58	2	0.0	59.8	66	59.8	10	----	57.9	1.9	8	-6.1
R37 SecondFloor	59	2	0.0	63.6	66	63.6	10	----	61.1	2.5	8	-5.5
R37 Third Floor	60	2	0.0	65.3	66	65.3	10	----	62.5	2.8	8	-5.2
R38 First Floor	61	2	0.0	59.0	66	59.0	10	----	57.8	1.2	8	-6.8
R38 Second Floor	62	2	0.0	61.2	66	61.2	10	----	59.3	1.9	8	-6.1
R38 Third Floor	63	2	0.0	63.0	66	63.0	10	----	61.0	2.0	8	-6.0
R39 First Floor	64	2	0.0	57.9	66	57.9	10	----	55.1	2.8	8	-5.2
R39 Second Floor	65	2	0.0	60.4	66	60.4	10	----	57.7	2.7	8	-5.3
R39 Third Floor	66	2	0.0	64.5	66	64.5	10	----	61.3	3.2	8	-4.8
R40 First Floor	67	2	0.0	55.2	66	55.2	10	----	54.5	0.7	8	-7.3
R40 Second Floor	68	2	0.0	57.9	66	57.9	10	----	56.7	1.2	8	-6.8
R40 Third Floor	69	2	0.0	61.8	66	61.8	10	----	60.6	1.2	8	-6.8
R41 First Floor	70	2	0.0	67.6	66	67.6	10	Snd Lvl	60.9	6.7	8	-1.3
R41 Second Floor	71	2	0.0	69.9	66	69.9	10	Snd Lvl	62.9	7.0	8	-1.0
R41 Third Floor	72	2	0.0	72.3	66	72.3	10	Snd Lvl	64.2	8.1	8	0.1
R42 First Floor	73	2	0.0	65.1	66	65.1	10	----	58.6	6.5	8	-1.5
R42 Second Floor	74	2	0.0	66.4	66	66.4	10	Snd Lvl	60.4	6.0	8	-2.0
R42 Third Floor	75	2	0.0	68.5	66	68.5	10	Snd Lvl	62.1	6.4	8	-1.6
R43 First Floor	76	2	0.0	63.8	66	63.8	10	----	58.5	5.3	8	-2.7
R43 Second Floor	77	2	0.0	66.1	66	66.1	10	Snd Lvl	60.4	5.7	8	-2.3
R43 Third Floor	78	2	0.0	68.0	66	68.0	10	Snd Lvl	62.2	5.8	8	-2.2
R44 First Floor	79	2	0.0	61.7	66	61.7	10	----	57.1	4.6	8	-3.4
R44 Second Floor	80	2	0.0	63.6	66	63.6	10	----	59.3	4.3	8	-3.7
R44 Third Floor	81	2	0.0	65.6	66	65.6	10	----	61.2	4.4	8	-3.6
R22 First Floor	123	2	0.0	67.4	66	67.4	10	Snd Lvl	59.6	7.8	8	-0.2
R22 Second Floor	124	2	0.0	69.5	66	69.5	10	Snd Lvl	61.3	8.2	8	0.2
R22 Third Floor	125	2	0.0	73.3	66	73.3	10	Snd Lvl	62.9	10.4	8	2.4
R23 First Floor	126	2	0.0	65.6	66	65.6	10	----	58.6	7.0	8	-1.0
R23 Second Floor	128	2	0.0	68.4	66	68.4	10	Snd Lvl	61.3	7.1	8	-0.9
R23 Third Floor	129	2	0.0	71.1	66	71.1	10	Snd Lvl	62.8	8.3	8	0.3

R24 First Floor	130	2	0.0	63.8	66	63.8	10	----	57.9	5.9	8	-2.1
R24 Second Floor	131	2	0.0	67.4	66	67.4	10	Snd Lvl	60.9	6.5	8	-1.5
R24 Third Floor	132	2	0.0	69.2	66	69.2	10	Snd Lvl	62.6	6.6	8	-1.4
R25 First Floor	133	2	0.0	61.5	66	61.5	10	----	56.6	4.9	8	-3.1
R25 Second Floor	134	2	0.0	65.3	66	65.3	10	----	59.9	5.4	8	-2.6
R25 Third Floor	135	2	0.0	66.8	66	66.8	10	Snd Lvl	61.8	5.0	8	-3.0
R29 First Floor	150	2	0.0	59.4	66	59.4	10	----	55.4	4.0	8	-4.0
R29 Second Floor	152	2	0.0	63.5	66	63.5	10	----	58.6	4.9	8	-3.1
R29 Third Floor	153	2	0.0	64.8	66	64.8	10	----	60.3	4.5	8	-3.5

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	144	0.7	4.9	10.4
All Impacted	62	5.0	7.0	10.4
All that meet NR Goal	14	8.1	8.8	10.4

PTG
RJC

31 January 2013
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: KY 338(Richwood Road) Interchange
RUN: Proposed
BARRIER DESIGN: version2

ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R82	112	1	0.0	66.2	66	66.2	10	Snd Lvl	61.2	5.0	8	-3.0
R83	113	1	0.0	65.0	66	65.0	10	----	60.8	4.2	8	-3.8
R84	114	1	0.0	64.1	66	64.1	10	----	60.4	3.7	8	-4.3
R85	115	1	0.0	63.5	66	63.5	10	----	60.2	3.3	8	-4.7
R86	116	1	0.0	63.2	66	63.2	10	----	60.1	3.1	8	-4.9
R78	108	1	0.0	73.0	66	73.0	10	Snd Lvl	65.3	7.7	8	-0.3
R79	109	1	0.0	63.4	66	63.4	10	----	59.5	3.9	8	-4.1
R80	110	1	0.0	68.1	66	68.1	10	Snd Lvl	61.7	6.4	8	-1.6
R81	111	1	0.0	67.7	66	67.7	10	Snd Lvl	61.5	6.2	8	-1.8
R87	117	1	0.0	63.2	66	63.2	10	----	60.0	3.2	8	-4.8
R88	118	1	0.0	63.1	66	63.1	10	----	59.9	3.2	8	-4.8

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	11	3.1	4.5	7.7
All Impacted	4	5.0	6.3	7.7
All that meet NR Goal	0	0.0	0.0	0.0

TRANSPORTATION CABINET
Frankfort, Kentucky 40622
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Steven L. Beshear
Governor

Michael W. Hancock, P.E.
Secretary

April 15, 2013

Mr. Richard Connolly
Parsons
9300 Shelbyville Road, Suite 1301
Louisville, Kentucky 40222

SUBJECT: Traffic Noise Impact Analysis
I-71/I-75 – KY 338
Boone County
KYTC Item # 6-18.00

Dear Mr. Connolly:

The Division of Environmental Analysis is approving the subject base study, the conclusions of which are to be incorporated in the draft environmental document. A copy of the Guidance and Accountability Form is attached for your reference. If you have any questions, please contact Thomas A. Koos at (502) 564-7250.

Sincerely,

David M. Waldner, Director
Division of Environmental Analysis

DW/tk

c: Scott Schurman, (w/a)
Stacee Hans, D-6 (w/a)
Files (w/a)

Kentucky Transportation Cabinet
Division of Environmental Analysis

TC 58-42
7/2011

Noise Analysis and Abatement - Guidance and Accountability

Baseline Prepared by:	Parsons	Author:	Richard Connolly and Tony Pakeltis	Firm:	Parsons
County:	Boone County, Kentucky	Route:	KY 338	Item No.:	6-18.00
Project Description:	Design and construction will include reconstructing KY 338 at I-71/75 into a double crossover diamond, with a grade seperated interchange at KY 338 and U.S. 25, including removal of two at-grade railroad crossings.				
Prime Consultant:	Florence and Hutchenson				
Due Date:	Submittal Date:	Submittal Draft #:		Approval Date:	

Instructions:

Baseline Prepared by: Name of author/firm that prepared the study. County: Name of county(ies) within which the project is located.
Route: Name of highway for which the project is intended. Include route designation and number as applicable (i.e. US 60, Winchester Rd.)
Item No.: Item number as it appears in the contract and Six Year Plan which corresponds with the project.
Description: Official description of the project as it appears in the Six Year Plan.
Prime Consultant: Name of the Phase I Design and Environmental Consultant (prime contract holder) for the project.
Due Date: Date that the project is due as agreed upon in contract negotiation.
Date of Submittal/Submittal Draft Number: Date of submittal and draft being submitted (1st, 2nd, 3rd) in appropriate sections.
Approval Date: Date baseline is approved by DEA (DEA use only).
For "Required" column: √ indicates all applicable areas of focus (DEA's responsibility).
For "Completed" column: use Y for yes and NA for not applicable as necessary (Consultant's responsibility).
For "DEA" Column: DEA will use √ for all areas that adequately address concerns, and "I" for those that are insufficient in coverage.
"Comment" page: Discuss supplemental information, guidance or instructions, if any, that required deviation from the checklist. Discuss all categories which contain "NA" in the "Complete" columns of this format. Comments regarding the content and format of this form and/or its applicability may also be submitted in the comments section.
"Commitments to be Implemented" page: Identify any commitments that are documented within the study. Specify the nature of the commitment, to whom it was or should be made, when the commitment should be enacted upon, etc.
"Mitigation and Special Issues" page: Identify mitigation measures that are specified within the report, if any. Also, identify any special issues that are addressed within the document that should be considered by the Project Team as it makes decisions regarding the project.
"Signature" page: Signatures of Prime Consultant and KYTC/DEA Environmental Project Manager/Reviewer will attest that the base study meets the requirements set forth in this checklist. Signatures of KYTC Project Manager and District Environmental Coordinator ensure that the findings of the report, including impacts to the projet and mitigation measures have been presented to the project development team and are acceptable.
Completed form is to be delivered to KYTC with the document. Previous checklists for the document, or a copy thereof, shall be attached to the current checklist.

Required	Complete	DEA	CATEGORY
Insert check mark as appropriate			**GENERAL**
√	Y	✓	Base study written in clear, concise manner. Reviewer able to duplicate results and conclusion from data presented.
√	Y	✓	Correct grammar and spelling present.
√	Y	✓	Correct use of metric and English systems present.
√	Y	✓	Tables and exhibits correctly labeled.
			TITLE PAGE
√	Y	✓	Identify Base Study as Traffic Noise Impact Analysis.
√	Y	✓	Author prequalified for Noise Traffic Noise Impact Analysis.
√	Y	✓	Project title present.
√	Y	✓	Project county/counties included in description.
√	Y	✓	Item Number included.
			TABLE OF CONTENTS
√	Y	✓	Topics listed by headings in order of appearance in document.
√	Y	✓	Tables listed in numerical order.
√	Y	✓	Exhibits & figures listed in numerical order.
√	Y	✓	Appendices listed in alphabetical order.
			EXECUTIVE SUMMARY/ABSTRACT
√	Y	✓	Brief description of the proposed project
√	Y	✓	Summary of work conducted, including number of receptors and results of analysis
√	Y	✓	Statement regarding the recommendation of abatement measures

Item No:

			INTRODUCTION
√	Y	✓	Statement that analysis prepared in accordance with governing document 23 code of Federal Regulations (CFR) Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." and the Kentucky Transportation Cabinet Noise Analysis and Abatement Policy.
			PROJECT DESCRIPTION
√	Y	✓	Purpose and Need of project summarized.
√	Y	✓	Project termini and length identified.
√	Y	✓	Roadway geometrics of existing facilities described.
√	Y	✓	Roadway geometrics of proposed project described.
√	Y	✓	Exhibits identified in project description agree with location exhibits presented.
√	Y	✓	Identification of all alternates analyzed.
√	Y	✓	Areas controlled under local planning and zoning are identified
			EXISTING NOISE LEVELS AND VALIDATION OF NOISE MODEL
√	Y	✓	Date, time (peak hour) and weather conditions for included measurements.
√	Y	✓	Description, of traffic noise data collection and calibration methods, including brand name and type of equipment used to monitor traffic noise.
√	Y	✓	Measurements utilized to calibrate the most current FHWA approved highway traffic noise prediction model.
√	Y	✓	Model results confirmed within +/- 3dBA of existing field measurements.
			DEVELOPMENT OF DESIGN YEAR NOISE LEVELS
√	Y	✓	Noise level predictions calculated for Design Year utilizing the most current FHWA approved highway traffic noise model (TNM).
√	Y	✓	Description of the most current FHWA approved TNM model, including vehicle-types represented in model.

Item No:

			COMPARATIVE RECEPTOR SITE ANALYSIS
√	Y	✓	*Description of each receptor site* including total number of representative receptors
√	Y	✓	Correct land use category identified with respective design Noise Abatement Criteria (NAC) presented and listed in "Identification of Receptors" table
√	Y	✓	Identification and discussion of receptors with no external use that require internal monitoring
√	Y	✓	Distance from existing roadway and proposed alternates presented and listed in "Identification of Receptors" table.
√	Y	✓	Quantitative discussion summarizing future impacts on all receptors and listed in "Existing and Predicted Noise Levels" table. Site number, existing, no-build, and build noise levels in Leq and Design NAC Leq.
√	Y	✓	Existing, no-build and design (build) noise levels in text and tables in agreement with those listed in TNM runs for existing, no-build and build alternates.
			NOISE ABATEMENT RECOMMENDATIONS AND CONCLUSION
√	Y	✓	Assessment of noise impact of project according to FHWA (23 CFR 772) and KYTC Noise Analysis and Abatement Policy guidelines.
√	Y	✓	Summary statement of quantitative impacts on all receptor sites for no-build and build alternates compared to existing noise levels and Noise Abatement Criteria.
√	Y	✓	Discuss the noise reduction design goal and acoustic feasibility for the abatement measure
√	Y	✓	Discuss cost effectiveness showing calculation of Cost per Benefitted Receptor (CBR) and consideration of equivalent residences for non-residential land uses.
√	Y	✓	Discuss other reasonableness considerations and document adjustments to CBR calculation
√	Y	✓	Discuss noise impacts for which no reasonable and feasible mitigation has been identified
√	Y	✓	Discuss reasonable and feasible noise abatement measures that would likely be incorporated into the project (i.e., noise barrier walls, berms, truck restrictions, vertical separations, speed limits.) State that the final decision on implementation of abatement measures will be made after completion of the project design and the public involvement process
√	Y	✓	Statement regarding need for coordination with local officials per KYTC Noise Analysis and Abatement Policy.
√	Y	✓	Where local planning and zoning requirements exist, include a commitment for providing predicted noise information on selected alternative to local officials.

Item No:

			INDIRECT AND CUMULATIVE IMPACTS
√	Y	✓	Definition of Indirect and Cumulative Impacts
√	Y	✓	Discussion of what types of impacts are anticipated and where they would occur
			CONSTRUCTION NOISE
√	Y	✓	Discussion consistent with KYTC Noise and Abatement Policy regarding contractor requirements to restrict or reduce transmission of noise during construction activity.
			APPENDIX
√	Y	✓	Existing field monitoring sheets included.
√	Y	✓	Existing calibration runs, no-build and build TNM computer printouts for all analyzed alternatives included.

Comments: Discuss supplemental information, guidance or instructions that required deviation from the checklist. Discuss all categories which contain "NA" in the "Complete" columns of this format. Comments regarding the content and format of this form and/or its applicability may also be submitted through this section.

Item No:

Commitments to be Implemented: Identify any commitments that are documented within the study. Specify the nature of the commitment, to whom it was or should be made, when the commitment should be acted upon, etc.

Where local government exercises control over land development through planning and zoning ordinances, KYTC shall share predicted noise levels along highway corridors and techniques that can be used to minimize highway noise related impacts to adjacent properties. KYTC shall provide this information to local officials for all Type I projects developed within these local jurisdictions.

Information developed through the KYTC environmental process will be made available to appropriate local officials by the Chief District Engineer for use in evaluating proposed land use changes. The KYTC will provide the best estimates of future highway traffic noise levels for both developed and undeveloped lands in the immediate vicinity of the project. For undeveloped properties, KYTC shall provide minimum buffer distances to structures that should be maintained in order to prevent the occurrence of traffic noise impacts. This can be accomplished by developing noise contours or providing other data to adequately convey the information. This shall be incorporated within the final environmental document for the project, which shall be provided to the local officials

Mitigation and Special Issues: Identify mitigation measures that are specified within the report, if any. Also, identify any special issues that are addressed within the document that should be considered by the Project Team as it makes decisions regarding the project.

One barrier (NB1) met both the reasonableness and feasibleness criteria. NB1 is located on the west side of I-71/I-75, south of KY 338 and would provide abatement for the Legends of Steeplechase Apartments.

SIGNATURE PAGE

I have reviewed the project documentation and attest that those responsible for its preparation are familiar with the requirements set forth in the checklist above and that proper management controls were in effect throughout the course of document development to assure that the document is complete, thorough and addresses all applicable checklist components.

Tony Pabutti. — Prime Consultant

4/11/13 — Date

Recommended for Approval by:

Thomas A Rooz ENVTECH III — KYTC/DEA Environmental Project Manager/Reviewer

4/15/2013 — Date

Carole C. Ramley — Project Manager

4-15-13 — Date

APPENDIX H - AIR QUALITY ANALYSIS

- $PM_{2.5}$ Checklist
- $PM_{2.5}$ Additional Project Information
- ADT Map

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

The purpose of this checklist is to provide the required PROJECT LEVEL documentation to aid the interagency consultation group in the determination of project type, i.e.

1) ***Exempt -*** Exempt from $PM_{2.5}$ project-level conformity determination,
2) ***Not Exempt, Not of Concern-*** Not Exempt, but not of local air quality concern (does not require further analysis), or
3) ***Of Concern -*** Of local air quality concern and, therefore, requiring a hot-spot analysis.

This checklist is only intended as a tool to assist with the $PM_{2.5}$ project-level conformity determination and does not replace regulatory requirements in the Transportation Conformity Rule (40 CFR Part 93), nor associated guidance. Any decisions regarding a particular conformity determination or hot-spot analysis will be made based on the statute and regulations, after appropriate public input. A statement regarding the $PM_{2.5}$ hot-spot consideration should be included as an element in NEPA documentation. This completed and signed checklist, along with a copy of the $PM_{2.5}$ project-level conformity determination, if required, should also be included. Additionally, proof of interagency consultation and public involvement, if required, as well as any other supporting documentation, should be included.

Use the "Tab" or "Page Down" key to maneuver within this document.

STEP 1: PROJECT IDENTIFICATION

A. KYTC Six Year Plan Item Number: 6-18.00

B. Project Name/Short Description: 1-71/I-75 and KY 338 (Richwood Road) improvements and KY 338 (Richwood Road) corridor and access improvements.

C. County (click on box & select from drop-down menu)**: Boone**

D. $PM_{2.5}$ Nonattainment or Maintenance Area (click on box & select from drop-down menu)**: Northern Kentucky/Cincinnati Area**

E. $PM_{2.5}$ Designation (click on box & select from drop-down menu)**: Maintenance**

F. $PM_{2.5}$ Standard Associated with Designation (click on box & select from drop-down menu)**: Annual**

G. Additional Project Information: See Attached.

Information should include, but is not limited to:

a. Purpose and need of the project.
b. Route name, route number, project length, and mile point locations
c. Number of current and future lanes (clearly indicate if any lanes are "turn lane only")
d. Identify as "Capacity Adding" or "Non Capacity Adding" project
e. Identify intersecting roads that will be impacted

H. NEPA Document Type (click on box & select from drop-down menu)**: CE Level 3**

I. Project Sponsor (click on box & select from drop-down menu)**: State**

(if "other", describe)

J. Included in a "Conforming" MPO TIP or STIP? Yes

(MPO-Metropolitan Planning Organization; Transportation Improvement Program (TIP); State Transportation Improvement Program (STIP))

K. Location of project in TIP/STIP (list name of document and page number or amendment number): STIP, September 2010, Page #103. TIP, Page #77

L. Is this Project in the Area Travel Demand Model? Yes

M. Was this Project Found to be "An Air Quality Project" for Regional Conformity? No

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

STEP 2: EXEMPT STATUS

☒ **NOT AN EXEMPT PROJECT.** ***Go to STEP 3.***

☐ **EXEMPT PROJECT** (those listed in 40 CFR 93.126 and traffic signal synchronization projects under 93.128).
IAC review and approval are required to confirm that project is exempt. Select one from the list below. Include IAC review and approval documentation with this checklist, but no $PM_{2.5}$ project-level conformity is required and no further documentation is needed. ***Go to STEP 6.***

Air Quality
☐ Bicycle and pedestrian facilities
☐ Continuation of ride-sharing and van-pooling promotion activities at current levels

Mass Transit
☐ Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR part 771
☐ Construction of small passenger shelters and information kiosks
☐ Construction or renovation of power, signal, and communications systems
☐ Operating assistance to transit agencies
☐ Purchase of new buses and rail cars to replace existing vehicles or for minor expansion of the fleet. In PM10 and PM2.5 nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan
☐ Purchase of office, shop, and operating equipment for existing facilities
☐ Purchase of operating equipment for vehicles (e.g., radios, fareboxes, lifts, etc.)
☐ Purchase of support vehicles
☐ Reconstruction or renovation of transit building and structures (e.g., rail or bus building, storage and maintenance facilities, stations, terminals and ancillary structures)
☐ Rehabilitation of transit vehicles – In PM10 and PM2.5 nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan
☐ Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way

Safety
☐ Adding medians
☐ Emergency relief (23 U.S.C. 125)
☐ Emergency truck pullovers
☐ Fencing
☐ Guardrails, median barriers, crash cushions
☐ Hazard Elimination Program
☐ Increasing Sight Distance
☐ Lighting improvements
☐ Pavement marking demonstration
☐ Pavement resurfacing and/or rehabilitation
☐ Railroad/highway crossing
☐ Railroad/highway crossing warning devices
☐ Reconstructing bridges (no additional travel lanes)
☐ Safer non-Federal-aid system roads
☐ Safety improvement program
☐ Safety roadside rest areas
☐ Shoulder improvements
☐ Skid treatments
☐ Traffic control devices and operating assistance other than signalization projects.
☐ Truck Climbing lanes outside the urbanized area
☐ Widening narrow pavement (no additional travel lanes)

Other
☐ Acquisition of scenic easement
☐ Directional and information signs
☐ Emergency or hardship advance land acquisitions (23 CFR 710.503 (d))
☐ Engineering to assess social, economic, and environmental effects of the proposed action or alternative to that action
☐ Noise attenuation
☐ Planting, landscaping, etc
☐ Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational, or capacity changes
☐ Sign removal
☐ Specific activities which do not involve or lead directly to construction, such as:
- Federal-aid systems revisions
- Grants for training and research programs
- Planning activities conducted pursuant to titles 23 and 49 USC
- Planning and technical studies

☐ Traffic signal synchronization (40 CFR 93.128)
☐ Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities)

STEP 3: TRAFFIC INFORMATION

A. Worst Case Scenario

a. Location (usually an intersection): **KY 338 and I-71/I-75 southbound on/off ramps.**

b. **Year** (usually the open-to-traffic year): **2030**

c. Justification for worst case year chosen (include forecasting assumptions): **2030 was selected because it has the highest projected traffic volumes.**

B. Project Data

a. Project Data for Current Year
(use worst case scenario; if at an intersection, include both roadways individually and in total; if at an intersection, average AADT on either side of intersection to obtain AADT for roadway at intersection)

i. Annual Average Daily Traffic (AADT): See attached table.

ii. Percentage and/or number of diesel vehicles (trucks and buses): See attached table.

iii. Intersections at Level of Service D, E, or F: See attached table.
Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

b. Project Data for Worst Case Year for No Action Scenario
(use worst case scenario; if at an intersection, include both roadways individually and in total)

i. Annual Average Daily Traffic (AADT): See attached table.

ii. Percentage and number of diesel vehicles (trucks and buses): See attached table.

iii. Intersections at Level of Service D, E, or F: See attached table.
Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

iv. Impact of No Action: The majority of the study area currently operates below acceptable levels of service, with failing LOS in both the AM and PM peak hours, generally LOS D to LOS F. The No Build Alternative would not improve traffic flow or levels of service, because neither capacity nor demand along the interstate or at the interchanges would be altered. Because congestion would not be alleviated, higher emissions compared to the Build Scenario would be expected.

c. Project Data for Worst Case Year for Build Scenario

(use worst case year and location; if at an intersection, include both roadways individually and in total)

i. Annual Average Daily Traffic (AADT): See attached table.

ii. Percentage and number of diesel vehicles (trucks and buses): See attached table.

iii. Intersections at Level of Service D, E, or F: See attached table.

Level of Service (LOS) refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

iv. Impact of Project: The project has been designed to reduce congestion and improve traffic flow. It was stated in the IJS regarding the double crossover diamond interchange:

FHWA has found that at higher traffic volumes, delays were reduced by 15 to 60 percent and throughput was increased between 10 to 30 percent for DDI versus a conventional diamond interchange. There results were published in the FHWA Techbrief FHWA-HRT-09-054. It should be noted that the DDI alternatives for this project have additional capacity with respect to LOS and are expected to be functional five years beyond the design year.

The project also includes access management measures along KY 338 (Richwood Road) east of its interchange with I-71/I-75 and within the commercial district west of the interchange. The project would result in an improved LOS. Analysis for future conditions (2030) indicates that under a No Build scenario, all the intersections would fail. However, under the Build scenario all of the intersections would operate at LOS of A, B, or C except for US-25 and Logistics Boulevard.

Overall, these improvements would result in fewer emissions than the No Build scenario.

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

STEP 4: AIR QUALITY CONCERN DETERMINATION

☒ **NOT PROJECT OF AIR QUALITY CONCERN.** *Hot-spot analysis is NOT required. However, InterAgency Consultation (IAC) approval is required. Provide checklist and other relevant documentation to IAC. IAC will determine level of public involvement required. Use space provided to summarize data and rationale for this conclusion.*
(*Refer to EPA's March 2006 guidance, EPA420-B-06-902, and FHWA's FAQ document, for complete details*).

Go to STEP 6.

☐ **PROJECT OF AIR QUALITY CONCERN.** *Select one from the list below. Hot-spot analysis IS required. Convene interagency consultation (IAC) meeting and begin to create the hot-spot analysis document.* ***Go to STEP 5.***

☐ New or expanded highway projects with a significant number of, or increase in, diesel vehicles (e.g., 125,000 AADT and 10,000 (8%) diesel truck traffic) Note: The example of 125,000 AADT and 10,000 (8%) diesel truck traffic are not exact threshold values and should not be viewed as such.

☐ Project affecting intersections that are at LOS D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.

☐ New bus and rail terminals and transfer points that have significant number of diesel vehicles congregating at a single location.

☐ Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

☐ Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} and $PM_{2.5}$ applicable implementation plan or implementation plan submissions, as appropriate, as sites of violation or possible violation.

$PM_{2.5}$ PROJECT LEVEL CHECKLIST

STEP 5: ANALYSIS AND DOCUMENTATION (for Project of Air Quality Concern)

The following is a summary of documentation to be included for $PM_{2.5}$ hot-spot analysis and does not replace information that will be provided for a full quantitative analysis if this analysis is required.

Documentation to be Included for the $PM_{2.5}$ Hot-spot Analysis

- ❑ Description of project (location, design and scope; date project is expected to be open, i.e., what part of 93.123(b) (1) applies)
- ❑ Description of type of emissions considered in the analysis
- ❑ Contributing Factors
  - o Air Quality
  - o Transportation and traffic conditions
  - o Built and natural environment
  - o Meteorology, climate and seasonal data
  - o Adopted emissions control measures
- ❑ Consider full time frame of area's LRTP
- ❑ Description of existing conditions
- ❑ Description of changes resulting from project
- ❑ Description of method chosen
- ❑ Description of analysis years
- ❑ Examine year in which emissions are expected to peak
- ❑ Profession judgment of impact
- ❑ Discussion of why project will not cause a violation of either the annual or 24-hour standard
- ❑ Discussion of any mitigation measures
- ❑ Written commitments for mitigation
- ❑ Conclusion on how project meets 40 CFR 93.116 and 93.123

STEP 6: MEETING, NOTICES, DATES

A. IAC Approval Date:

(Project sponsor is lead; attach meeting minutes, if applicable, and/or hard copies of applicable e-mails showing IAC review request and approval)

B. Public Involvement

a. Public review & comment period (should be consistent with NEPA process; list dates, and if applicable, attach copy of public notice and newspaper proof of publication):

b. Public concerns addressed (if applicable include hard copy or e-mails with cc to IAC):

STEP 7: SIGNATURES

Project Manager Date

Division of Environmental Analysis Representative Date

$PM_{2.5}$ PROJECT LEVEL CHECKLST: 1-71/I-75 and KY 338 (Richwood Road) improvements and KY 338 (Richwood Road) corridor and access improvements

G. Additional Project Information:

A. Purpose and Need of the Project

The purpose of this project is to improve safety and reduce congestion at the I-71/I-75 and KY 338 (Richwood Road) interchange and within the KY 338 (Richwood Road) corridor, and to develop and implement a comprehensive access management plan for KY 338 (Richwood Road) between Triple Crown Boulevard and US 25 (Dixie Highway). The project needs include improving safety, reducing congestion, and improving access to businesses.

The KYTC completed an Intersection Justification Study (IJS) in 2010. The IJS reviewed crash data in the corridor for the three year period from 2004 to 2006. The analysis compared observed crash rates against statewide critical crash rates for comparable facilities to obtain a Critical Rate Factor (CRF). A CRF that exceeds 1.0 indicates that the number of crashes exceeds the number that should occur on that roadway and is considered to be a high crash location. KY 338 (Richwood Road) exhibitis higher crash rates than the statewide average for similar roadways.

KY 338 (Richwood Road) from US 25 (Dixie Highway) to the Frogtown Road Connector has a CRF in excess of 1.0 with the highest CRF being exhibited between the 1-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. Overall, the majority of crashes on KY 338 (Richwood Road) in the study area occurred during the day and under dry conditions, indicating that neither weather nor darkness are a primary cause of crashes.

Crash data was also reviewed for three intersections on US 25 (Dixie Highway): (1) Shorland Drive/Winning Colors Drive, (2) KY 338 (Richwood Road), and (3) Logistics Boulevard. KY 338 (Richwood Road) was the only intersection that exceeded a CRF of 1.0 with a total of 66 crashes and a CRF of 3.7. Overall, most of the crashes at this intersection occurred during the day and under clear or cloudy conditions.

Norfolk Southern Railroad owns an active track that parallels US 25 (Dixie Highway) immediately west of the roadway that typically carries 30 or more trains per day. The proximity to US 25 (Dixie Highway) creates safety concerns at its crossings of KY 338 (Richwood Road) and Shorland Drive.

The 1-71/I-75 KY 338 (Richwood Road) interchange currently experiences intermittent periods of congestion. The IJS documented that in 2030 the I-71/I-75 ramp intersections with KY 338 (Richwood Road) would operate at an unacceptable Level of Service (LOS). Further analysis using more recent traffic counts indicate that almost every signalized intersection along KY 338 (Richwood Road) would operate at an unacceptable LOS in 2030 under No Build conditions.

The KY 338 (Richwood Road) corridor is dominated by retail and commerical uses that depend on short visits and are based on a high volume of visitors. As the corridor has developed over the last several decades, acess to developing locations was provided as needed, with no comprehensive plan for drive locations or intersection controls. The result is a corridor with poor access management: numerous drive locations over a relatively short length that provides

little accommodation in the form of turn lanes or signalization for entering and existing vehicles. This condition leads to an inefficient corridor for vehicles moving within or through the area and can contribute to both congestion and safety issues.

B. Route name, route number, project length, and mile locations

Route Name/Route Number: I-71/I-75 and KY 338 (Richwood Road)

Project Length:

The project has independent utility and would provide a fully functional road segment without any additional transportation improvements beyond the project limits. The project's logical termini along US 25 (Dixie Highway) extend from approximately 0.75 mile south of KY 338 (Richwood Road) to approximately 0.25 mile north of Shorland Drive. The project's logical termini along I-71/I-75 extend from approximately 1.5 miles north of KY 338 (Richwood Road) to approximately one mile south of KY 338 (Richwood Road). Logical termini for improvements to the connector road network extend approximately 0.25 mile north of KY 338 (Richwood Road) along Frogtown Connector Road and approximately 0.75 mile west of I-71/I-75 along KY 338 (Richwood Road). Road improvements may extend beyond these termini; however the need for this project is limited to the intersections and connecting roadway.

Mile Locations:
From the Six Year Plan:
Reconstruct the KY 338 (Richwood Road) Interchange
06-18.00
Length: 0.100 Begin MP: 175.217 End MP: 175.622

Reconstruct the KY 338 (Richwood Road) interchange
06-18.01
Length: 0.100 Begin MP: 175.314 End MP: 175.414

C. Number of current and future lanes (clearly indicate if any lanes are "turn only lane")

On I-71/I-75, auxiliary lanes will be added to the north of the interchange to increase capacity and improve geometrics to facilitate passenger and truck traffic entering and exiting I-71/I-75. In the southbound direction, an auxiliary lane will be added to I-71/I-75 south of the existing bridge over Frogtown Road and will become an exit only lane at the KY 338 (Richwood Road) off-ramp. The northbound entrance ramp from KY 338 (Richwood Road) will be extended as an auxiliary lane, becoming an exit-only lane to the rest area north of Frogtown Road.

KY 338 (Richwood Road) will be widened to two lanes in each direction from just east of US 25 (Dixie Highway) to I-71/I-75. KY 338 (Richwood Road) will be widened to two eastbound lanes and three westbound lanes from the I-71/I-75 interchange to Triple Crown Boulevard. West of Triple Crown Boulevard, KY 338 (Richwood Road) transitions back to its existing two lane configuration.
US 25 (Dixie Highway) will be reconstructed from approximately Logistics Boulevard to Duffel Lane, with two lanes in each direction.

D. Capacity Adding or Non Capacity Adding

Non capacity adding

E. Identify intersecting roads that will be impacted

KY 338 (Richwood Road):

- Triple Crown Blvd/National Blvd
- Paddock Drive
- Clay Drive
- Frogtown Connector Road
- Southbound I-71/I-75 ramps
- Northbound I-71/I-75 ramps
- Best Pal Drive
- US 25 (Dixie Highway)

US 25 (Dixie Highway):

- Winning Colors Drive/Shorland Drive
- Logistics Blvd

STEP 3: TRAFFIC INFORMATION

Table 1: Average Daily Traffic and Percent of Trucks

Location	2011		2019		2030	
	ADT	% Trucks	ADT	% Trucks	ADT	% Trucks
I-71/I-75 North of KY 338 & On/Off ramps	104,928	15%	122,493	15%	146,644	15%
I-71/I-75 South of KY 338 & On/Off ramps	87,028	16%	102,301	16%	123,301	16%
SB 1-71/I-75 Off-ramp	13,357	15%	16,081	17%	19,827	20%
NB I-71/I-75 On-ramp	12,314	8%	14,860	9%	18,360	11%
SB I-71/I-75 On-ramp	3,930	13%	5,535	13%	7,741	14%
NB I-71/I-75 Off-ramp	3,841	16%	5,467	18%	7,703	20%
Location						
KY 338 West of Triple Crown	9,269	2%	11,822	2%	15,333	2%
KY 338 between Triple Crown & Paddock	15,464	2%	19,351	2%	24,695	2%
KY 338 between Paddock & Frogtown	17,970	2%	22,402	2%	28,496	2%
KY 338 between Frogtown Connector & SB 1-71/I-75 On/Off ramps	19,842	6%	24,666	6%	31,300	7%
KY 338 between I-71/I-75 On/Off ramps	15,791	10%	19,247	11%	24,000	12%
KY 338 between NB 1-71/I-75 On/Off ramps & Best Pal	14,816	17%	17,672	20%	21,600	23%
KY 338 between Best Pal & US-25	14,675	12%	17,460	14%	21,290	17%
KY 338 East of US-25	3,500	13%	4,258	15%	5,300	17%
Location						
US-25 North of Frogtown	14,293	8%	14,907	9%	15,752	11%
US-25 between Frogtown & Winning Colors/Shorland Drive	11,038	8%	14,095	9%	18,299	10%
US-25 between Winning Colors/Shorland Drive & KY 338	11,964	10%	15,246	11%	19,758	13%
US-25 between KY 338 & Logistic Blvd	9,290	6%	12,124	6%	16,020	7%
US-25 South of Logistics Blvd	8,020	4%	10,466	4%	13,830	5%

Table 2: Level of Service (LOS)

Intersection Number	Intersection Location	Existing (2011) LOS	1st Year (2019) LOS	No Build (2030) LOS	Build (2030) LOS
1	SB I-71/I-75 Off Ramp	**F**	**A**	**F**	**A**
	KY 338 @ I-71/I-75 West Crossover		**B**		**B**
2	NB I-71/I-75 Off Ramp	**B**	**A**	**F**	**A**
	KY 338 @ I-71/I-75 East Crossover		**B**		**B**
3	KY 338 and Best Pal Drive	**B**	**B**	**F**	**B**
4	KY 338 and US-25	**C**	**C**	**F**	**C**
5	KY 338 and Frogtown Connector	**C**	**C**	**F**	**C**
6	KY 338 and Clay Drive	**C**	**N/A**	**F**	**N/A**
7	KY 338 and Paddock Drive	**F**	**B**	**F**	**B**
8	KY 338 and Triple Crown Blvd	**D**	**C**	**F**	**C**
9	US-25 and Logistics Blvd	**A**	**B**	**F**	**F**
10	US-25 and Shorland Drive	**E**	**A**	**F**	**A**



Base Map Source:
National Geographic Society, 2011

0 500 1,000 2,000 Feet

Legend

2011 ADT
2030 ADT

Average Daily Traffic (ADT) Diagram

Reconstruction of KY 338
Interchange with I-71/I-75
Item Number 6-18

PARSONS

APPENDIX I – ENVIRONMENTAL SITE ASSESSMENT - PHASE I

ENVIRONMENTAL SITE ASSESSMENT – PHASE 1

Kentucky Transportation Cabinet (KYTC)
Item No. 6-18.00, I-75/I-71 @ KY338
Richwood Road Interchange

Walton, Kentucky



July 2013

Prepared For:

Kentucky Transportation Cabinet (KYTC)



Presented By:

Florence & Hutcheson
CONSULTING ENGINEERS

flohut.com

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ENVIRONMENTAL SITE ASSESSMENT

PHASE 1

KENTUCKY TRANSPORTATION CABINET (KYTC)
ITEM NO. 6-18.00, I-75 / I-71 @ KY338 Richwood Road Interchange

BOONE COUNTY, KENTUCKY

1. INTRODUCTION

A Phase I Environmental Site Assessment (ESA) was conducted by Florence & Hutcheson, Inc. (F&H) for a total of 934+/- acres of property(s) currently owned by various commercial, industrial, and residential occupants adjacent to the I-75/I-71 & KY 338 (Richwood Rd) interchange in Boone County, Kentucky. The proposed project consists of the reconstruction of the KY 338 interchange with I-75/I-71 (Exit 175) into a double crossover diamond-type interchange, while also including various roadway access management improvements. This assessment will cover the range of potential contaminants found within the scope of Comprehensive Environmental Response, Comprehensive and Liability Act (CERCLA) and petroleum products hereto, established from the American Society for Testing and Materials (ASTM) per Designation E 1527-05 *(Standard Practice for Environmental Site Assessments: Phase 1 Site Assessment Process)*. This study will also follow the Kentucky Transportation Cabinet's (KYTC) *Environmental Procedures Manual (Revised 2012*), and current KYTC *Hazardous Materials/UST Guidance and Accountability (GAF)* guidelines.

1.1 Purpose

The purpose of the site assessment was to conduct an "All Appropriate Inquiry" (AAI) consisting of past or present store owner/community interviews, review of historical regulatory sources, searches for recorded environmental cleanup liens, reviews of Federal, State, or local government records (all where applicable) and field reviews to determine the presence or likely presence of a hazardous substance or petroleum products on the subject property(s), also including any other potential sources of environmental information pertinent to the study area. All potential findings will be identified and determined if any potential release or potential release is deemed a Recognizable Environmental Conditions (REC) or a De minis (non REC – No Impact) condition.

1.2 Detailed Scope of Services

The scope of services performed for this ESA is consistent with the *ASTM E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, the KYTC Environmental Procedures Manual (Updated 2012), and*

current *KYTC Hazardous Materials/UST Guidance and Accountability (GAF) guidelines*, and the

The selected tasks completed are and include, but not limited to the following:

- Reviewing site maps including U.S.G.S topographic maps, geological maps, groundwater maps, and any other historical mapping (i.e. Sandborn) found beneficial to this effort;
- City directory(s) research (when available) of past/present property descriptions for subject property and adjacent properties, if applicable;
- Researching current and past land ownership of the subject property(s) and history of project site use, if applicable;
- Review of Fire Insurance Maps in and around property site, if applicable;
- Governmental environmental records search including NPL (Superfund sites), CERLIS, RCRA, IC/EC Registries and ERNS List impact sites;
- Interviewing present owners of the assessed site(s) as well as the surrounding properties (if applicable), to obtain knowledge about the history of use of the assessed property(s) as well as any surrounding property which might impact the project site(s);
- Reviewing federal, state, and local lists of known hazardous/toxic substance data sites and emergency response/remedial action data sites within a one mile radius of the subject tract being assessed;
- Close inspection of the subject property(s) with particular attention given to the areas where improvements exist or have existed;
- Reviewing groundwater (hydrogeologic) and/or geologic mapping (when available) to determine direction of groundwater flow and subsurface formations;
- Utilizing most current Geographic Information Systems (GIS) database information for past/present subject property history;
- Correspondence with the Kentucky Division of Waste Management, Underground Storage Tank (UST) Division – Closure Section for all UST documentation of registered UST's within the state of Kentucky;
- Brownfield and landfill database searches for permitted solid waste disposal facilities and their current status (active/closed); and
- Address listings for Underground Storage Tank locations, if applicable.

1.3 Significant Assumptions

1. The scope of work included herein does not include "Additional Issues" as identified in Item 13.1.5 of ASTM E 1527-05;

2. No sampling, waste characterization, testing or environmental investigations was performed;

3. Field reconnaissance was limited to a walking and driving visual inspection of the entire study area. The use of mechanical lifts, booms, boats etc. or other equipment was not utilized;

4. This Phase 1 ESA report is to be interpreted in a manner consistent with that described in ASTM E 1527-05.

2. EXECUTIVE SUMMARY

Separate field visits combined with a visual and physical inspection of the various study area parcels have helped determine that the study area does contain some environmental "findings." All findings are listed below in **Table 1** and are graphically located within **Exhibit D**. Field reconnaissance pictures of all environmental findings can be located within **Appendix E**.

2.1 Main Concerns

Several environmental findings were documented throughout the study area. Over half of all findings were related to an existing travel center or gasoline station facility. Typical commercial traffic volumes from automobiles and especially heavy truck traffic can be accountable for these environmental hazards.



Petroleum based spill(s) with drainage into storm drain

Petroleum-based spills documented near adjacent gasoline fueling centers present the most identifiable environmental concerns. Over a period of time, automotive petroleum release locations will eventually flow into nearby storm drains and then find their way eventually into lakes, streams, and rivers. It's estimated that over 180 million gallons of used motor oil is released into our waters each year. Used motor oil is the largest single source of oil production in our lakes, streams, and rivers today.

2.2 Number of Sites

A total of 7 individual sites contain all findings listed within **Table 1**. The majority of findings (4) were associated with Travel Centers of America (T/A), while the remaining findings were located at separate locations scattered

throughout the proposed study area boundary. Of these 7 individual site locations, all but one location is identified from a commercial land use.

2.3 Findings

A total of **10** findings were documented from 4 separate field reconnaissance visits. All but one location was identified within a commercial land use and most locations are typically not very large in size. The majority of these "finds" are generally located in close proximity to Exit 175, with many sites associated with gasoline/travel center facilities.



Domestic trash located at vacant hotel lot

Each "finding" was analyzed to determine its potential for a *Recognizable Environmental Condition (REC)* or if the finding was determined to be *De Minimis* (finding of no impact). A REC is synonymous with the All Appropriate Inquiry's (AAI's) objective to identify conditions indicative of releases or threatened releases of hazardous substances on, at, in, or adjacent to the subject property. This also includes physically observable or an obvious threat that is likely to lead to a release. From the 10 "findings" located from this study, not one site was identified to be a REC. While each location does have hazardous potential, it was determined that no finding exhibited the size and/or chemical composition sufficient for REC status.



Used tires located adjacent to commercial structure

It should be mentioned that *data gap* identification is also noteworthy and sometimes unavoidable depending upon the amount of information gathered for a particular study and can potentially lead to a REC. It is sometimes impossible to completely link all activities that have occurred at any one location throughout a large amount of time. Consequently, a contingent or documented timeline for all potential findings was not applicable for this effort.



Abandoned asphalt pile located at vacant hotel lot

Based on individual store manager interviews, review of historical regulatory data, historical topographic/aerial mapping, and state/federal database records searches, the proposed reconstruction of the KY 338 & I-75/I-71 interchange does **not likely** contain any known future recognizable environmental conditions (REC's) located within the study area. Furthermore, preliminary design alternatives focus on construction efforts typically within the existing right-of-way, with only minor encroachment of adjacent commercial, industrial, and residential

parcel tracts. Therefore, it is our determination that future construction at this interchange commence **without the necessity** of further environmental investigation.

However, it is recommended that potential construction near any existing facility containing underground storage tanks (UST's) be completed with prior communication from the *Kentucky Transportation Cabinet, Kentucky Department of Waste Management – UST Branch*. Proper acknowledgement of all UST locations, with regard to the proposed construction limits boundary, should be obtained before initial construction activities begin.

TABLE 1 – ENVIRONMENTAL FINDINGS			
Item:	***Findings:***	***REC / No Impact (De minimis) Condition:***	***Data Gaps:***
1.	Remnants of **lime material** utilized for site cleanup in front of Blue Pantry (BP)	No Impact	No
2.	Automotive **oil leakage** draining along roadway curb and eventually into storm drain near Cummings Inc.	No Impact	Yes
3.	**Commercial/domestic (trash) dumping** including automobile tires and air conditioner unit in vacant hotel lot behind Waffle House	No Impact	No
4.	Temporary **roadway salt** (winter) storage location adjacent to US 25 (Dixie Hwy)	No Impact	No
5.	Abandoned pile of **asphalt**	No Impact	No
6.	**Petroleum spill(s)** – drainage into nearby storm drain at Travel Centers of America	No Impact	Yes
7.	**Domestic dumping** and **asphalt** remnants behind Travel Centers of America	No Impact	No
8.	Unknown **spill substances** associated with large garbage containers at Travel Centers of America	No Impact	Yes
9.	**Petroleum** based spill at Travel Centers of America	No Impact	Yes
10.	Collection of **used tires** dumped behind commercial property	No Impact	No

3. SITE DESCRIPTION

The following site description was based upon 4 field reconnaissance visits performed between February 21st - 24th, 2012.

3.1 Location and Legal Description

The study area is located within the City of Walton, in eastern Boone County, Kentucky. This site is located at the intersection of Richwood Rd (KY 338) and interstates 75 & 71 (I-75/I-71) at Exit 175, and found 17 miles southwest of Cincinnati, Ohio. The study area is bordered to the north by the City of Florence, to the south by the City of Walton, bounded by the community of Richwood in the east and adjacent to the Triple Crown Country Club to the west. The entire study area is depicted on 2007 color aerial photography and a U.S.G.S. topographic quad mapping labeled **Exhibits A & B - Appendix A)**.

3.2 Site Vicinity and General Characteristics

The study area encompasses 934.5 +/- acres of land and has a central location of 38°55'1.10" north latitude and 84°37'44.80" west longitude. The study area was established by identifying individual parcels tracts associated within the proposed construction limits boundary, while also including those parcels found immediately adjacent to these properties. A total of 179 parcel tracts were identified by this criterion.



View looking north across Richwood Rd (KY 338) at Exit 175

The general topography of the study area can be characterized as mostly rolling to moderately hilly, disturbed/developed terrain. The highest ground elevations are generally located along the I-75/I-71 corridor near the northernmost portion of the study area with elevations ranging from 930–950 feet, while elevations in the southwestern portion of the study area offer the lowest values of 830+/- feet. The landscape is generally void of forested areas, except for a small grouping of deciduous trees located between I-75/I-71 and US 25 (Dixie Hwy) in the southeastern corner of the study area **(See Exhibit B - Appendix A)**. The remainder of the study area has seen continued commercial and industrial development adjacent to Exit 175 and areas to the north, while residential development continues along the western edge of the study area bounary.

There are no known stream systems located within the study area. However, several tributary and manmade drains (ditches) are located south of Exit 175. A total of 8 separate bodies of water are located within the study area, totaling over 8.4 acres in size. The majority of these water bodies can be located near the southwestern corner of the study area, near Triple Crown Boulevard. There are no other known water bodies adjacent to the proposed construction limits boundary for this study.



Heavy truck fueling activity at Pilot Travel Center

FEMA Flood Zone Q3 data was reviewed for this study, but no known flood zone areas exist within the study area.

3.3 Current Use of Property(s)

The study area has a diverse list of land uses among its 179 parcel tracts and includes the following: 87 commercial parcels, 67 residential parcels, 16 agricultural parcels, and 9 industrial parcels **(See Exhibit C – Appendix A)**. From that list, commercial, industrial, agricultural, and transportation land uses are most prevalent within the study area. Commercial tracts can be found bordering the I-75/71 corridor along both the east & west sides of Exit 175 and Richwood Rd, while industrial land uses are typically located towards the easternmost portion of the study area. Agricultural lands are generally located along the southern & westernmost portions of the study area, while transportation land uses include the I-75/I-71 corridor and other right-of-way alignments such as Dixie Highway (US 25) and Richwood Rd (KY 338).

Preliminary studies indicate that the majority of potential construction will be initiated upon the eastern portion of the study area. This area contains several commercial parcels located immediately adjacent to I-75/I-71 at Exit 175. Industrial parcels can be located beyond US 25 (Dixie Hwy) to the east, but should not be impacted from potential construction. The remaining parcels at this location are mostly undeveloped agricultural or woodland land uses. No other known land uses are identified at this time.



Fifth Third Bank located along the northwest side of Richwood Rd

Exit 175 is commonly known to most local residents as a "truck stop" interchange. Active trucking establishments such as *Pilot Travel Center* and *Travel Centers of America (T&A)* are located on both the eastern and western sides of the interchange. Heavy truck activity is almost an all-day certainty at these fueling centers.

3.4 Descriptions of Structures and Other Improvements

The study area currently contains several known existing structures from several different land uses. The proposed construction limits boundary is an indicator of how many properties and/or structures might possibly be affected from this proposed development **(See Exhibit C – Appendix A)**.

A total of 76 structures are located within the proposed construction limits boundary and includes the following building types: 40 commercial structures, 27 detached structures (includes storage units), 7 residential structures, 1 industrial structure, and 1 governmental (fire station) structure. Commercial structures account for over half of all structures located within the proposed construction limits boundary and are typically located along Richwood Rd, immediately adjacent to Exit 175. No other structures were observed within the proposed construction limits boundary.



Boone Florence Water Commission (BFWC) - 2,000,000 gallon water tank

The study area is currently supplied by water from the Northern Kentucky Water District, with a total of 28,600 +/- linear feet of water line located within the proposed construction limits boundary. This length also includes two separate transmission lines that are currently owned by the City of Walton. One water tank constructed in 2008 is located outside the proposed construction limits boundary, but within the overall study area and immediately adjacent to the Norfolk Southern Railway easement, near US 25 (Dixie Hwy). This tank holds approximately 2,000,000 gallons of water and services up to 30,000 customers in the immediate Walton area and other areas outside the study area within Boone County. No other water systems are known at this time.

A total of 16 water-well sites were identified within the study area. GIS database information obtained from the *Kentucky Division of Water - Groundwater Branch*, disclosed that the majority of these well sites are located between 4 existing gasoline stations adjacent to Exit 175 and includes: 9 monitored wells at Travel Centers of America (T/A), 4 monitored wells at Pilot Travel Center #278, 2 monitored wells at Pilot Travel Center #321, and 1 monitored well at the Richwood Shell. Averaged well depths from all 16 sites is near 18.8 feet +/-.

Sanitation District No. 1 is responsible for the collection and treatment of Northern Kentucky's wastewater, as well as regional storm water management. The district serves 33 communities in Boone, Campbell, and Kenton Counties in Northern Kentucky. The proposed construction limits boundary in Walton, contains a total of 17,720 +/- linear feet of sewer (wastewater) lines and owns two separate sewer treatment plants. No other sewer systems are known at this time.

Electrical service to the study area is provided by Duke Energy and/or Owen Electric Corporation, Inc. Duke Energy also provides natural gasoline to the study area. No other electric or natural gasoline providers are known at this time.

3.5 Current Uses of Adjoining Properties

The study area encompasses over 934 +/- acres and includes over 128 adjoining parcel tracts **(See Exhibit C - Appendix A)**. A GIS database search listed a total of 5 separate land use classifications that exist within these adjoined tracts and includes residential, commercial, industrial, agricultural, and woodland properties. However, field reconnaissance and aerial photography review has determined that many land use changes have occurred since the GIS dataset was last updated from the Boone County GIS.



Residential structure adjacent to Appaloosa Drive and study area parcel #70.

Associated adjoining property types vary in classification in various locations which border the study area boundary and include the following:

- A total of 115 adjoining residential parcels are associated with study area tracts #119, 112, 120, 52, 33, 111, 82, 32, 80, 70, 38, 37, 0, 57, 58, 66, 61, 76, and 106. The majority of these adjoining residential tracts are generally

located upon the western side of the study area along Richwood and Paddock Road(s). The few remaining tracts can be found adjacent to I-75/71, to the northeast section of the study area. Adjoining residential parcels account for almost half of all adjoined property;

- Only 6 adjoining industrial parcels were located adjacent to the study area and include tracts #77, 63, 11, 126, 106 and 19. Industrial parcels are predominantly located along the eastern study area boundary, adjacent to Shorland Road and US 25, east of the community of Richwood;

- Commercial properties are generally located inside the study area boundary and typically do not border residential parcels. However, 3 commercial parcels do adjoin study area tracts #90, 69, and 57 and are located in the southeastern portion of the study area. All other commercial properties are generally bordered by transportational land uses;



Commercial property located within study area parcel #46

- A total of 2 agriculture parcels adjoin the study area boundary in the southeastern portion of the study area and includes study area tracts #63 and 106. All remaining agricultural properties are typically bordered by transportational land uses;

- Woodland parcels contain the last remaining adjoined land use tracts within the study area and include study area tracts #82 and 9. With continuing commercial, industrial, and residential growth adjcent to Exit 175, woodland parcels will most likey become non-existant within the near future.

4. USER PROVIDED INFORMATION

Information provided from the Kentucky Transportation Cabinet (KYTC), included landowner and property tract information for all parcels within the entire proposed construction limits boundary, for the proposed I-71/I-75 @ KY338 Richwood Road (KY 338) interchange improvements. The KYTC also provided a copy of the preliminary Environmental Overview Report for the *Interchange Justification Study for I-75/I-71 at KY 536 and KY 338* study, which was prepared by HNTB Corporation in July 2007. This overview contained preliminary UST information which helped form the base line of this environmental site assessment.

4.1 Title Records

Parcel ownership data was provided to Florence & Hutcheson, Inc. by the Kentucky Transportation Cabinet (KYTC) and included those properties generally located near Exit 175. An expanded deed search dating back to 1940 was not completed due to the excessive number of study area parcels (179) identified for this study.

4.2 Property Owner or Occupant Information

The vast majority of proposed construction planned for Exit 175, will be performed within the existing right-of-way boundary, currently owned by the state of Kentucky. Preliminary planning and design concepts are currently underway, with several different design alternatives being evaluated by the KYTC. It is not known at this time the exact number of parcels that will be impacted from this design effort, or just how large the construction limits boundary will become. The proposed study area boundary for this study was created utilizing a "worse-case" scenario, which included many parcels that adjoined the proposed construction limits boundary.

4.3 Reason for Performing Phase 1

The Kentucky Transportation Cabinet (KYTC) has retained Florence & Hutcheson, Inc. to provide professional engineering services for the proposed improvements to the I-71/I-75 @ KY338 Richwood Road (KY 338) Interchange. The proposed improvements include construction of a Double Crossover Diamond Interchange at I-71/I-75 @ KY338 Richwood Road (KY 338) and reconstruction of the existing intersection of Richwood Road (KY 338) at US 25 (Dixie Highway). The project will also include reconstruction and widening of KY338 and US 25. Hence, the KYTC is requesting the completion of an ESA Phase 1 document to help provide the necessary environmental services for a Categorical Exclusion Level 3 (CE3) document.

5. RECORDS REVIEW

Environmental data records research was accomplished from in-house environmental GIS database analysis, outside environmental data requests, and local government inquiries.

5.1 Standard Environmental Records Sources

A search of government records report was conducted by *Environmental Data Resources Inc. (EDR),* which included a 1-mile radius map search for past/present EPA sites, a historic Sanborn map search, a topographic map search, a historical aerial imagery search, and a city directory search. However, only EPA site location data, historic topographic mapping, and historical aerial photography were identified for this study. No Sanborn mapping or historic city directory information was identified.

An in-house GIS based environmental search was also conducted, which did not yield any other known EPA confirmed site locations within or immediately adjacent to the study area. The complete EDR records inventory can be found in **Appendix B**, while information regarding leaking storage tanks/releases at both Pilot Travel Center facilities and Travel Centers of America can be located within **Appendix C.**

A total of **4** separate EPA site occurrences were located within study area, per the *EDR Summary Radius Search Report* and thru dialogue with the *Division of Waste Management - Underground Storage Tank Branch* **(See Exhibit D - Appendix A).** Of these 4 sites, 3 sites have more than one identifiable environmental occurrence and includes the following:

- **Continental Web Press of Kentucky** (125 Richwood Road) – Listed within EPA's *Resource Conservation and Recovery Act (RCRA)* and small quantity generators (SQG's) database for monthly hazardous waste between 100 kg and 1,000 kg;

- **Travel Centers of America (BP)** (145 Richwood Road) – Listed within the *SB193 State and Tribal* leaking storage tank lists database, for facilities that have performed closure activities at a regulated UST facility and have known soil and/or groundwater contamination. Listed within the *Petroleum Storage Tank Environmental Assurance Fund (PSTEAF)* reimbursement procedures database and within the *Underground Storage Tank Branch (USTB)* database for reimbursement facilities requiring corrective action and within the *Resource Conservation and Recovery Act (RCRA), Non-Generators (NonGen) list for sites that do not generate hazardous waste*. Also listed on the *Underground Storage Tank* database that contains listing of all registered UST's from the *Department of Environmental Protection's Owner/Facility Report of All Tanks Regardless of Status List*;



View of new concrete pad constructed on top of 3existing gasoline UST tanks at T/A

- **Pilot Travel Center #321** (11229 Frontage Road) - Listed within the *SB193 State and Tribal* leaking storage tank lists database, for facilities that have performed closure activities at a regulated UST facility and have known soil and/or groundwater contamination. Listed on the *Petroleum Storage Tank Environmental Assurance Fund (PSTEAF)* reimbursement procedures database, located within the *Underground Storage Tank Branch (USTB)* database for reimbursement facilities requiring corrective action. Listed within the *Underground Storage Tank* database that contains listing of all registered UST's from the *Department of Environmental Protection's Owner/Facility Report of All Tanks Regardless of Status List*; and



East wall of former UST location being dug out to facilitate new tanks (KY Div. of Waste Management – UST Branch)

- **Pilot Travel Center #278** (118 Richwood Road) - Listed within several federal database lists, most notably the *SB193 State and Tribal* leaking storage tank lists database, for facilities that have performed closure activities at a regulated UST facility and have known soil and/or groundwater contamination. Listed on the *State Hazardous Waste Sites (SWHS)* records database (similar to federal CERCLIS) for sites planned for cleanup using state funding, identified from the Department of Environmental Protection's Uncontrolled Site Branch list. Listed on the *Underground Storage Tank* database that contains listing of all registered UST's from the *Department of Environmental Protection's Owner/Facility Report of All Tanks Regardless of Status List*. Listed within the

Financial Assurance database from funding created by state legislation and submitted to EPA for approval. Listed within the *Facility Index System (FINDS)* database for facilities regulated by the EPA. Listed within the National *Pollutant Discharge Elimination System (NPDES)* program for regulating potential water pollution, and listed on the *Aerometric Information Retrieval System (AIRS)* for releases of potential air pollutants.



Large detention pond and associated oil/water separator unit adjacent to Best Pal Drive

An "open records" request was also initiated with the *Division of Waste Management (KDWM), Underground Storage Tank Branch – Closure Section* within the Kentucky Transportation Department (KYTC), to acquire the latest UST information/status among the 5 gasoline stations and their associated UST's. Over 1,000 scanned facility files were downloaded for all 5 individual gasoline stations adjacent to Exit 175. Of these 5 gasoline stations, 3 gasoline stations have had reported UST leakage and/or release events of particular significance *(i.e. Federal SB193 listed),* which involved state coordination thru the *Kentucky Division of Waste Management – Underground Storage Tank Branch* and included:

- **Pilot Travel Center #278** (118 Richwood Road)
- **Pilot Travel Center #321** (11229 Frontage Road)
- **Travel Centers of America (BP)** (145 Richwood Road)

The **Travel Centers of America (BP)** located at 145 Richwood Road, **(1)** notified the *Division of Waste Management (DOWM) – UST Branch* on 3/27/90 of a violation dated 3/16/90, regarding a problem cause by an overflowing of an underground storage tank (1,000 gallon) that contained waste motor oil. The overflow being caused by the entrance of water into the tank along with the oil and the contents became full much faster than projected. Environmental Enterprises Inc. was contacted and cleanup initiated that same day. Cleanup was completed on that same evening with a short re-visit on 3/23/90 to assess the prior service completed. Lost product was recovered and was held for proper disposal. The large amount of water was determined to come from high pressure spraying earlier in the week by Roto Rooter. An alarm system was installed, which will notify Pilot of the tank reaching approximately 70% of its capacity. Atec, a firm from Cincinnati, was contacted and conducted the required testing of soil for the background levels testing. No other documentation was located for this event.

Another event **(2)** was reported to KDWM of a suspected release on September 15th and 23rd, 1998 as one 1,000 gallon used oil tank (UST) and one 8,000 gallon new oil UST were both being excavated and permanently removed from this site. On September 15th, 1998, free product in the form of 3/8 inch thick floating layer of oil was observed in the used oil tank pit upon removal of a 1,000 gallon tank. Both tanks had been previously emptied of product in preparation for removal from the ground. On September 23rd, 1998, a sheen was observed on the water in the new oil tank pit upon removal of the 8,000 gallon UST. As before, the tank had previously been emptied of product in preparation for removal.

The September 15th release was immediately removed by Grubb Oil Company of Cincinnati, Ohio on that same day using a vacuum truck. An estimated volume of 1,000 gallons used oil/water mixture was removed and transported to Grubb's facility for recycling. No special or unusual methods to reduce safety hazards from exposure to the oil/water mixtures on soil or water were necessary since work perimeters were established around the soil stockpile and tank pit itself.

The September 23rd release was pumped directly to the onsite oil/water separator (OWS) on that same day, under the Kentucky Polluntant Discharge Elimination System (KPDES) permit no. KY0002801, which expired in 2002. The OWS is part of the on-site facility wastewater management system for discharges associated with freight truck servicing. An estimated volume of water in excess of 1,000 gallons and having a trace sheen was pumped to the OWS. As before, no special or unusual methods to reduce safety hazards from exposure to the oil/water mixtures on soil or water were necessary, and no recharge of water into the tank pit was observed after initial removal.

Both releases were documented in an *Initial Abatement/Free Product Recovery Report* documented and sent to the *Kentucky Department of Environmental Protection – UST Branch* on November 18, 1998. No further documentation or follow up correspondence was located for this event.

The **Pilot Travel Center #278** located at 118 Richwood Road, notified *Division of Waste Management (DOWM) – UST Branch* on 7/03/02 regarding a release caused by a mechanical line leak detector flange of a diesel fuel line on 10/18/01. A total of 91.1 gallons of free phase diesel was recovered thru adjacent monitoring wells and another 20 gallons of product was removed from the vault area. Environmental Serivces, Inc. (GES) was contacted by Pilot of the suspected release and arrived upon site on 10/19/01. M&M Construction also arrived on 10/19/01 and conducted excavation of the site in order to determine the source of the leak. The damaged section of the line was replaced and prompt containment/cleanup of the spill was initiated. The area was properly blocked off and marked with cones, flagging, and warning tape. In 2008, the UST Branch reviewed and agreed that this site had satisfied the requirements of Kentucky Revised Statutes Chapter 224, Subchapter 60 and 401 Kentucky Administrative Regulations Chapter 42 applicable to closure and/or corrective action therefore, no further action was required.

The **Pilot Travel Center #321** located at 11229 Frontage Road notified *Division of Waste Management (DOWM) – UST Branch* of a release caused by a leaking diesel UST that was observed on 9/08/09. Several automobiles had fueled in the morning hours between 8:00-11:00am and reported that attempts to drive each vehicle were hindered from fuelling at this gas station. Copied documentation between Pilot and the DOWM was not located however, permanent UST closure documentation was identified from 9/12/08 verifying the both parties correspondence. Pictures of this event are located within **Appendix C**, which clearly detail the vastness of this event. Documentation of "no further action" was also not identified, but the extraction and replacement of new UST's at this location verifies that proper corrective action and guidance from the DOWM was initialized.

5.2 Physical Setting Source(s)

A review of U.S.G.S. topographic mapping was conducted to assess the physical geographic setting of the property site. An historical topographic search provided by EDR, contains several maps beginning in 1955 and includes additional maps dated from 1961, 1969, 1982, 1984, and 1987 and covers the communities of Union and Independence, Ky. In-house topographic map research was also conducted, which detailed the most recent digital raster graphics (drg) mapping thru the year 2002.
An aerial photography screening was also conducted by EDR, which yielded several historic images beginning in 1949 and continuing thru 1952, 1955, 1960, 1969, 1979, 1985, 1989, 1993, 1997, 2006, and 2008, respectively. In-house aerial photography research was also conducted, with color aerial imagery downloaded from 2007 and is the basis for all exhibit's within this report. Imagery from the Boone County GIS was also obtained with one-foot and half-foot imagery pixels. This imagery was utilized for analysis, but lacked the necessary completed coverage for exhibits and was therefore, not used.

6. SITE RECONNAISSANCE

A total of 4 separate site visits were conducted for this effort. Site reconnaissance included the completion of a visual and physical observation of the property(s), a documented picture index of each property within the study area, and an exterior-interior review of land and/or buildings on site, if applicable. A land use listing of several field reconnaissance pictures taken throughout the study area is included in **Appendix D**. It should be noted that a site reconnaissance checklist was not completed for this effort due to the extreme number of properties identified within the study area boundary.

6.1 Methodology and Limiting Conditions

Site reconnaissance efforts included a visual and physical inspection of the various study area parcels and their potential to become considered a "Recognizable Environmental Condition" (REC's). Foot and automobile reconnaissance was conducted across the entire study area, where access was attainable or deemed necessary. Some property tract locations were partially inaccessible to the extent, that reasonable access was no longer feasible. High average daily traffic (ADT) volumes also hindered site accessibility in several locations along Richwood Road and sites adjacent to I-75/I-71.

6.2 General Site Setting

The study area has changed considerably throughout its history. Known as nothing more than a farming community back in the late 1940's, the study area has seen many improvements over the past 70 years. With construction of the I-75/I-71 interstate system around the mid 1960's, the study area has prospered and slowly grown from commercial, industrial, and residential development. Today, the study area is comprised



Commercially zoned undeveloped property adjacent to Frogtown Connector Road

of continued commercial and residential development within the western portions of the study area and mostly industrial growth throughout the eastern portion of the study area. The I-75/I-71 corridor has also played a key role in the development of the study area with increasing commercial and industrial traffic associated with Northern Kentucky and the Greater Cincinnati Area. Traffic congestion has also increased from continued residential growth along Richwood Road (KY 338), including various subdivisions and apartment complex development.

6.3 Exterior Observations

Separate reconnaissance visits revealed many commercial structures including various eating establishments and most notably, gasoline stations facilities. Gasoline stations typically contain a varied number of underground storage tank units, which contain different blends of automotive gasoline and diesel fuels. A total of 5 separate gasoline station facilities and associated UST tanks were identified from visual reconnaissance, store manager interviews, and *EDR Radius Report* verification. Gasoline stations are located immediately adjacent to both Exit 175 northbound and southbound on/off ramps and include the following:

- **Blue Pantry (British Petroleum - BP)** gasoline station is located at #305 Richwood Road in Walton, Ky. This station currently utilizes **3** separate UST units that consist of 2 – 10,000 gal. gasoline tanks (regular unleaded/premium) and 1 – 10,000 gal. diesel tank. No other UST's are known at this location;

- **Richwood Shell – USA** gasoline station is located at #281 Richwood Road in Walton, Ky. This station currently utilizes **4** separate UST units that consist of 3 – 10,000 gal. gasoline tanks (regular unleaded/premium/premium) and 1 – 10,000 gal. diesel tank. No other UST's are known at this location;

- **Pilot Travel Center, LLC (#321)** is located at #11229 Frontage Road in Walton, Ky. This travel center currently utilizes **6** separate UST units that consist of 2 – (16,000 / 9,000 gal.) gasoline tanks (regular unleaded/premium) and 4 - 20,000 gal. diesel tanks. No other UST's are known at this location;

- **Pilot Travel Center, LLC (#278)** is located at #118 Richwood Road in Walton, Ky. This travel center currently utilizes **8** separate UST units that consist of 3 – 12,000 gal. gasoline tanks (regular unleaded/premium/premium), 4 – 20,000 gal. diesel tanks, and 1 kerosene tank that is not currently active. The storage tanks are collectively located along the eastern and western paved areas of the property. Pilot also utilizes an on-site detention pond, which contains an oil-water separator that separates surface drainage substances from the parking lot and fueling areas. This oil-water separator may be impacted by entrance reconstruction and, if it is, a Phase II ESA is recommended. No other UST's are known at this location;



Pilot Travel Center located at 118 Richwood Road

- **Travel Centers of America (BP)** is located at #145 Richwood Road in Walton, Ky. This travel and service maintenance center currently utilizes **10** separate UST units that consist of 3 - 10,000 gal. gasoline tanks (regular unleaded/premium/premium) and 4 - 20,000 gal. diesel tanks, 1 used oil tank, 1 new oil tank, and 1 new Diesel Exhaust Fluid (DSF) tank currently under construction, per EPA guidelines. The storage tanks are collectively located along the northern property line adjacent to Richwood Road (KY 338). T/A also utilizes a detention pond located south of the rear parking lot, which includes an oil-water separator. No other UST's are known at this time.

Several other commercial, industrial, and residential structures exist within the immediate study area and/or construction limits boundary **(See Exhibit C – Appendix A)**. Most structures can be located adjacent to Richwood Road (KY 338), while others are generally scattered along US 25 (Dixie Hwy). Structures located along Richwood Road (KY 338) include 11 commercial sites, 6 residential sites, 1 industrial complex, and 1 self-storage facility. Structures located along US 25 (Dixie Hwy) include 11 residential sites, 12 commercial sites, and 5 industrial sites.

6.4 Interior Observations

Not applicable.

6.5 Geology

Geologic formation(s) and rock-type data for the study area was analyzed thru GIS data sets obtained from the *United States Department of Agriculture (USDA) - Natural Resource Conservation Service (NRCS) GeoSpatial Data Gateway* web portal, the *Kentucky Geologic Survey (KGS),* and from GeoCheck physical setting information from *EDR Services*. This data revealed that the study area lies above the *Bull Fork Formation*, created in the Early Ordovician Period **(See Exhibit E - Appendix A)** and considered part of the Bluegrass (physiographic) Region. Rocks deposited during the first half of the Ordovician Period occur entirely below the surface not only within the study area, but throughout all of Kentucky. Typical bedrock depths within the study area are typically greater than 40 inches.

The Bull Fork Formation is associated with underlain strata outcrops within Upper Ordovician rocks in Northern Kentucky and is estimated to have a thickness of at least 60 + meters in depth. Primary fossiliferrous, inter-bedded rock types within this formation generally consist of limestone and shale layers. An example of Ordovician Period strata would be the exposed limestone cliffs of the Kentucky River Palisades.

6.6 Hydrology and Hydrogeology

The study area is primarily associated with Ordovician-age inter-bedded limestone and shale. Although there is some typical karst topography within this region, the study area does not possess sinkhole type features. According to the *Kentucky Division of Water - Groundwater Branch,* the majority of the study area contains locally integrated karst drainage areas. Groundwater yields in relation to springs and wells are highly variable, but usually enough to support domestic needs. Groundwater sensitivity ratings are also fairly variable. Hydrology is strongly influenced by the amount of shale in the subsurface, which impedes the infiltration of precipitation.

Groundwater characteristics are in turn a product of upper hydrologic movement and/or activity. Rock layers from the Outer Bluegrass region generally have low sensitivity rating of around #2 or #3 (out of 5). Hyrdogeologic sensitivity ratings are a product of 3 primary hydrogeologic components: Recharge, Flow, and Dispersion.



Eroded limestone bedrock associated with an unnamed stream system along Richwood Road

General study area surface water is estimated to flow in a south/southwestern direction, with areas east of US 25 (Dixie Highway) flowing directly east. Ground water flow is assumed to have the same characteristics as surface water. However, it should be noted that groundwater mapping can be an ever changing therefore, the KDOW) suggests that boundaries of interest should properly surveyed to determine appropriate exactness.

6.7 Soils

Prime farmland, as defined by the United States Department of Agriculture (USDA), is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. For this study, soil research and analysis was obtained from downloaded Geographic Information System (GIS) digital data files acquired through the *NRCS Soil Survey Geographic (NRCS),* in conjunction with tabular soil data from the Soil Survey Geographic Database (SSURGO).

The study area consists of a variety of soil zones, including the *Faywood Silty Clay/Loam* series (418.7 ac.), the *Rossmoyne Silt Loam* series (259.1 ac.), and the *Nicholson Silt Loam* series (129.7 ac.), which occur more frequently within the study area **(See Exhibit F - Appendix A)**. Each of these soil types when found within slopes between 0–6%, are considered to be "prime farmland" soils. Soil slopes that are between 6–12% are considered "farmland of statewide importance," and lastly, soil types that exhibit slopes over 12% are **not** considered prime farmland soils. Soil zones throughout the study area typically exhibit slow infiltration rates and are well drained. Average water table depths are generally more than 6 feet.



Nicholson Silt Loam soil typed adjacent to Old Lexington Pike and US 25

While the study area does contain many "prime farmland" soil types, the majority of these soils have already seen vast commercial, industrial, and residential development on top of them. Today, agriculture within the study area is almost completely obsolete. Some minor areas toward the southeastern most corner of the study area do still exhibit some farming/cropland practices, but nothing that would interfere with the proposed future development at the Exit 175.

7. INTERVIEWS

Interviews were conducted with 5 separate gasoline/service station managers and one fire chief from the City of Walton. A brief discussion summary is included below from all 6 interviews. Complete documentation of each individual interview is provided in **Appendix E**.

7.1 Interview with Store Managers

- A personal interview with Mrs. Tonya Johns, current store manager of Richwood Shell, was conducted on February 21st, 2012. Mrs. Johns stated that Shell currently contains 4 underground storage tanks (UST's) and has only known this property site to be utilized as a convenience store only;

- A personal interview with Mr. Kevin Burris, current store manager of Blue Pantry (BP), was conducted on February 21st, 2012. Mr. Burris stated that the Blue Pantry currently contains 3 underground storage tanks (UST's). He also stated that this this property site was a vacant lot before the construction of the current facility and identified the substance dumped in front of the store to be lime, which was utilized to treat a unknown substance caused from nearby clogged storm drains during a past storm;

- A personal interview with Mr. Rich O' Toole, current store manager of Pilot Travel Center (#1), was conducted on February 23rd, 2012. Mr. O' Toole stated that Pilot currently contains 6 underground storage tanks (UST's) and in 2008 discovered a leaking UST, which was removed and replaced accordingly. He also mentioned that this location was merely a gasoline station and not open to trucking like it today;

- A personal interview with Mr. Dean Wisner, current store manager of Pilot Travel Center (#2), was conducted on February 22nd, 2012. Mr. Wisner stated that Pilot currently contains 7 underground storage tanks (UST's) and this location was previously just and open pond that eventually was drained for commercial development;

- A personal interview with Mrs. Tina Young, current store manager of Travel Centers of America (T/A), was conducted on February 22nd, 2012. Mrs. Young stated that Pilot contains 7 underground storage tanks (UST's), with existing construction of another "diesel exhaust fluid" (DF) tank currently in progress. She also mentions that this structure was built in the mid-1960's.

7.2 Interview with local Fire Chief

A personal interview with Mr. Allen Roberts, current Deputy Fire Chief of the Walton Fire District, was conducted on February 24th, 2012. Mr. Roberts acknowledged that the Exit 175 area has been commercially developed since the early 1980's and that **no other UST's currently exist outside of the 5 gasoline stations** in operation today. Mr. Roberts also stated that he was aware of several small fuel spills at various locations at Exit 175, but nothing large or environmentally concerning.

8. CONCLUSIONS

Florence and Hutcheson Inc. has performed a Phase 1 Environmental Site Assessment in conformance with the scope and limitations of the ASTM Practice and the Kentucky Transportation Cabinet's (KYTC) Environmental Procedures Manual (Revised 2012). Based upon store manager interviews, review of historical regulatory data, historical topographic/aerial mapping, and state/federal database records searches, it appears likely that **no known recognizable environmental conditions** are associated with the study area at this time.

Visual evidence from separate field reconnaissance visits did confirm that debris from commercial/domestic dumping, the presence of used automobile/mower tires, and several small petroleum spills, as well as other remaining environmental conditions listed in **Table 1,** are existent within the study area. However, their presence does not render further action, nor do they present any recognizable environmental conditions associated with the study area.

Likewise, all 28 underground storage tanks (UST's) located within the study area, have been verified and determined to be in proper working order. There is no evidence to suggest that any potential environmental condition exists at this time.

9. RECOMMENDATIONS

Based on individual store manager interviews, review of historical regulatory data, historical topographic/aerial mapping, and state/federal database records searches, the proposed reconstruction of the KY 338 & I-75/I-71 interchange does **not likely** contain any known future recognizable environmental conditions (REC's) located within the study area. Preliminary design alternatives focus on construction efforts typically within the existing right-of-way, with only minor encroachment of adjacent commercial, industrial, and residential parcel tracts. The one exception is the oil-water separator located on the west side of the **Pilot Travel Center, LLC (#278)** that may be impacted by reconstruction of the entrance to the property. If impacts are anticipated a Phase II ESA is recommended.

It is recommended that potential construction near any existing facility containing underground storage tanks (UST's) be completed with prior communication from the *Kentucky Transportation Cabinet, Kentucky Department of Waste Management – UST Branch*. Proper acknowledgement of all UST locations, with regard to the proposed construction limits boundary, should be obtained before initial construction activities begin.

10. REFERENCES

A listing of all applicable report references which was utilized for completion of this assessment and includes the following:

- *ASTM Designation E 1527-05 (Standard Practice for Environmental Site Assessments: Phase 1 Site Assessment Process);*

- *Kentucky Transportation Cabinet's (KYTC) Environmental Procedures Manual (Revised 2012);*
- *KYTC Hazardous Materials/UST Guidance and Accountability (GAF) guidelines;*
- *Environmental Data Resources Inc. (EDR) – (EPA records search, historic mapping, and city directory listings data);*
- *Boone County Water District – Annual Drinking Water Quality Report (July 1, 2011);*
- *US Environmental Protection Agency (EPA) – (Superfund site location and Brownfields data);*
- *Kentucky Office of Technology – Division of Geographic Information (GIS data);*
- *Natural Resource Conservation Service (NRCS) – Web Soil Survey (National Cooperative Soil Survey) - (Farmland Classification - Boone, Campbell, and Kenton Counties);*
- *Kentucky Division of Waste Management – Kentucky Transportation Cabinet (KYTC) – (GIS database research);*
- *Kentucky Division of Water – Groundwater Branch (Groundwater Sensitivity Regions – GIS);*
- *United States Environmental Protection Agency (EPA) – (Underground Storage Tanks);*
- *Kentucky transportation Cabinet (KYTC) - Division of Environmental Analysis - (Underground Storage Tanks – Hazardous Materials); and*
- *Environmental Protection Agency (EPA) – Underground Storage Tanks (Region 4).*

11. SIGNATURE(S) OF ENVIRONMENTAL PROFESSIONAL(S)

I, Shane E. Shelby declare that, to the best of my professional knowledge and belief, have meet the definition of *Environmental Professional* as defined in 40 CRF 312.10 and have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the "*All Appropriate Inquiries*" in conformance with standards and practices set forth in 40 CFR Part 312 and performed due diligence with regard to this site assessment and followed procedures stated within the *Kentucky Transportation Cabinet's (KYTC) Environmental Procedures Manual (Revised 2012),* and current *KYTC Hazardous Materials/UST Guidance and Accountability (GAF*) guidelines.

FLORENCE & HUTCHESON, INC.



Shane E. Shelby, GISP
Environmental Planner

12. QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONAL(S)

Shane E. Shelby, GISP:

- Baccalaureate of Science degree (Geography) – Murray State University 1994;
- ASTM Environmental Site Assessments For Commercial Real Estate Course training – 2011;
- 9+ years environmental science experience – NEPA based; and
- Registered Geographic Information Systems Professional (GISP)

APPENDIX A:

BOONE COUNTY

TRIPLE CROWN
Triple Crown Country Club
TRIPLE CROWN
TRIPLE CROWN
SUTHERLAND
HERITAGE TRAILS
SONNYS LAND DIVISION
UNION STATION
CHESHIRE RIDGE
STEEPLECHASE
RICHWOOD POINTE
RICHWOOD VILLAS
RICHWOOD COMMONS EAST
STEERLECHASE
STEEPLECHASE
Rest Area (South)
FLORENCE
Rest Area (North)
(EXIT 175)
HOLT PLACE
DEER TRACE
OLD LEXINGTON VILLAS
RICHWOOD PARK COMMERCIAL
Richwood
KENTUCKY AIRE ESTATES
RICHWOOD PARK 75
PARK SOUTH AT RICHWOOD
RICHWOOD INDUSTRIAL PARK
HOWE ACRES
PROJECT

Legend:

- Study Area
- Potential Construction Limits
- Corporate Boundary
- Towns & Communities
- Parcels
- Railroad
- Waterbody(s)
- Streams & Drains

Boone County
Project Location
KENTUCKY

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			DESIGNED BY:	SES
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY:	SES
ISSUE	DATE	DESCRIPTION	CHECKED BY:	JEP

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(1" = 900)

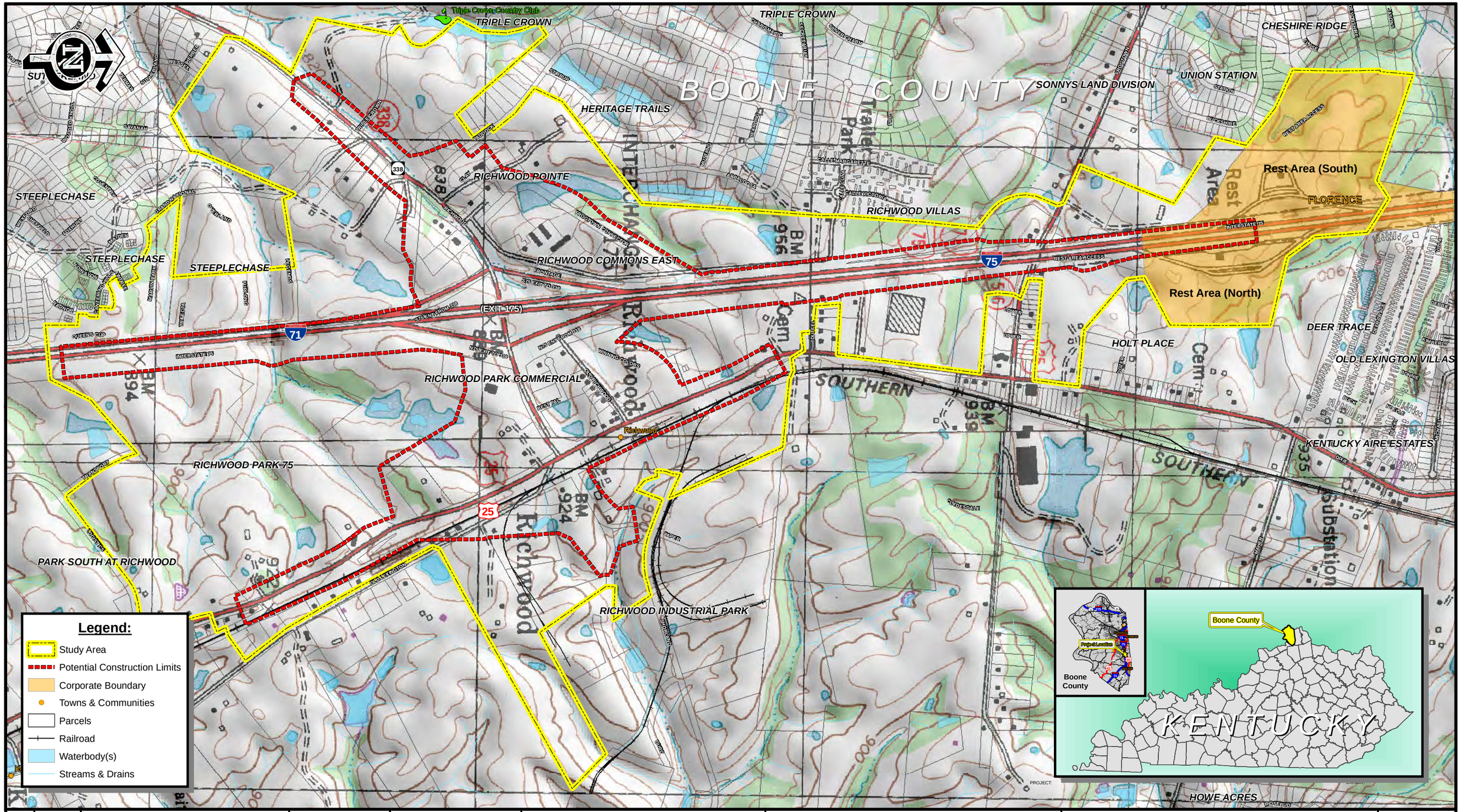
200 MERO STREET
FRANKFORT, KY 40622
(502) 564-4890

Florence & Hutcheson
CONSULTING ENGINEERS
2550 IRVIN COBB DRIVE
PADUCAH, KY 42003
(270) 444-9691

PROJECT:
PHASE 1 ENVIRONMENTAL ASSESSMENT
KYTC - ITEM NO. 6-18.00, I-71/75 - KY338
(BOONE CO)

TITLE:
PROJECT LOCATION MAP
(AERIAL)

EXHIBIT:
A



ISSUE	DATE	DESCRIPTION	
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			DESIGNED BY: SES
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY: SES
			CHECKED BY: JEP

0 450 900 Feet

GRAPHICAL SCALE (1" = 900)

200 MERO STREET
FRANKFORT, KY 40622
(502) 564-4890

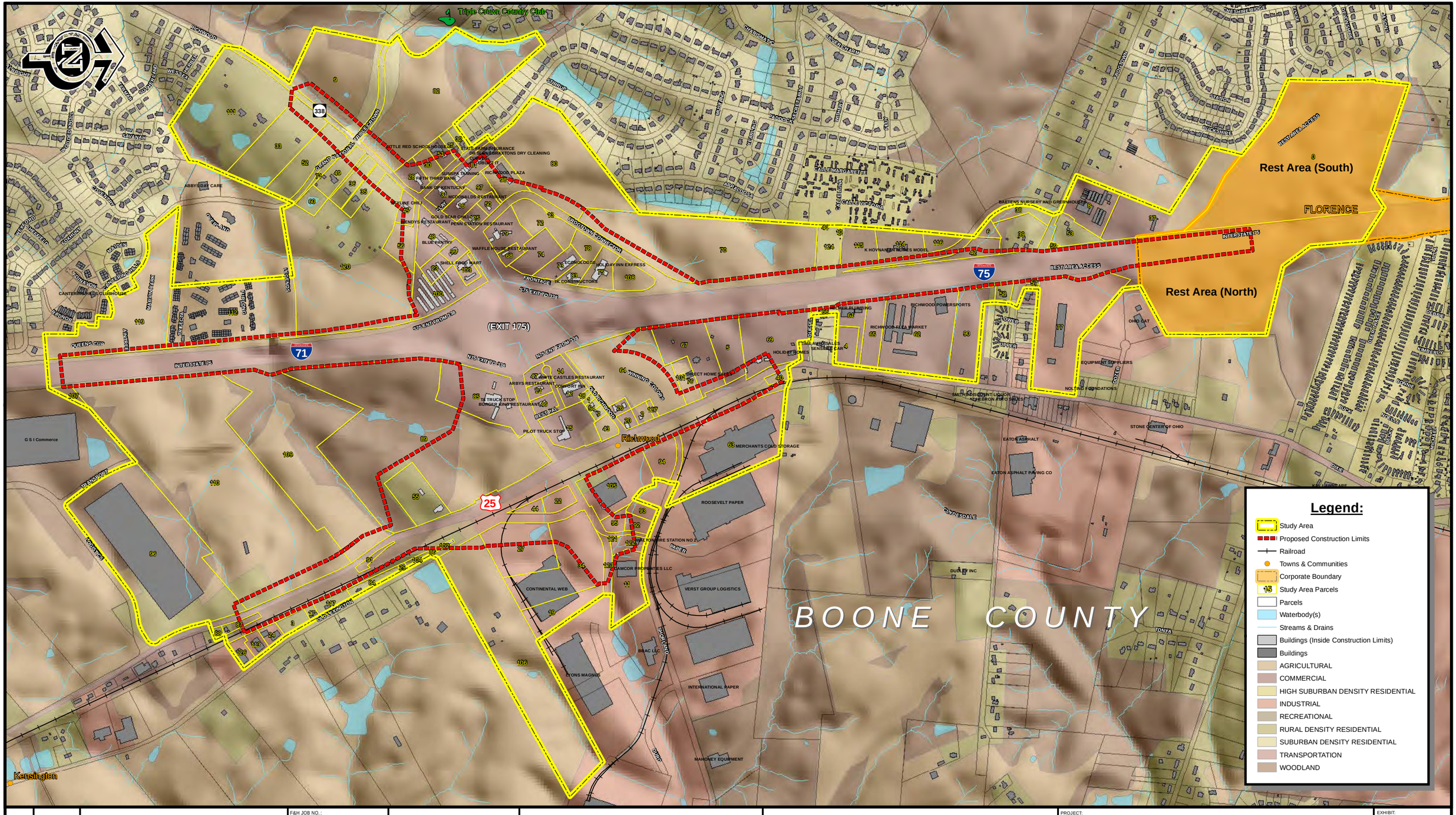
Florence & Hutcheson
CONSULTING ENGINEERS

2550 IRVIN COBB DRIVE
PADUCAH, KY 42003
(270) 444-9691

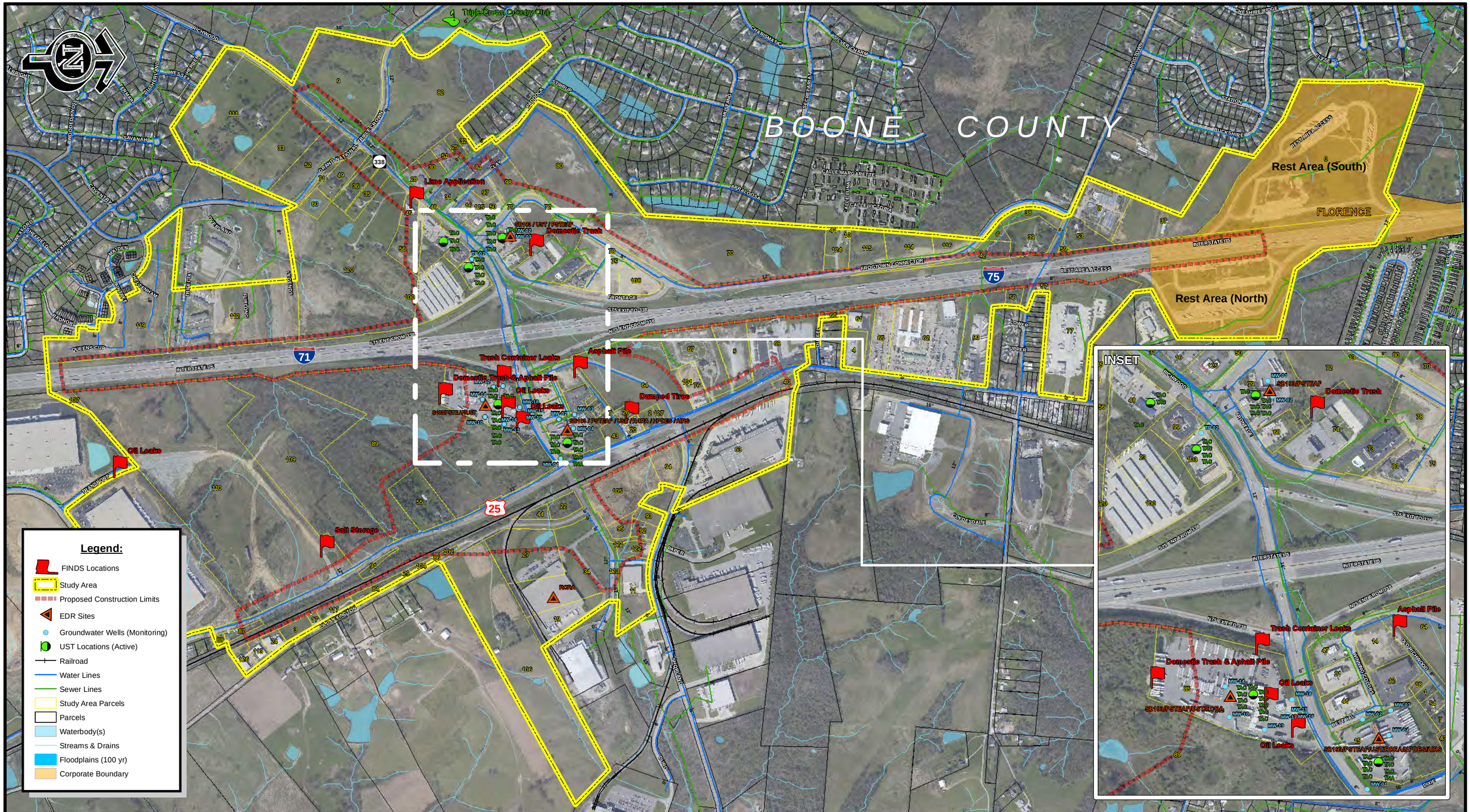
PROJECT:
PHASE 1 ENVIRONMENTAL ASSESSMENT
KYTC - ITEM NO. 6-18.00, I-71/75 - KY338
(BOONE CO)

TITLE:
PROJECT LOCATION MAP
(TOPOGRAPHIC)

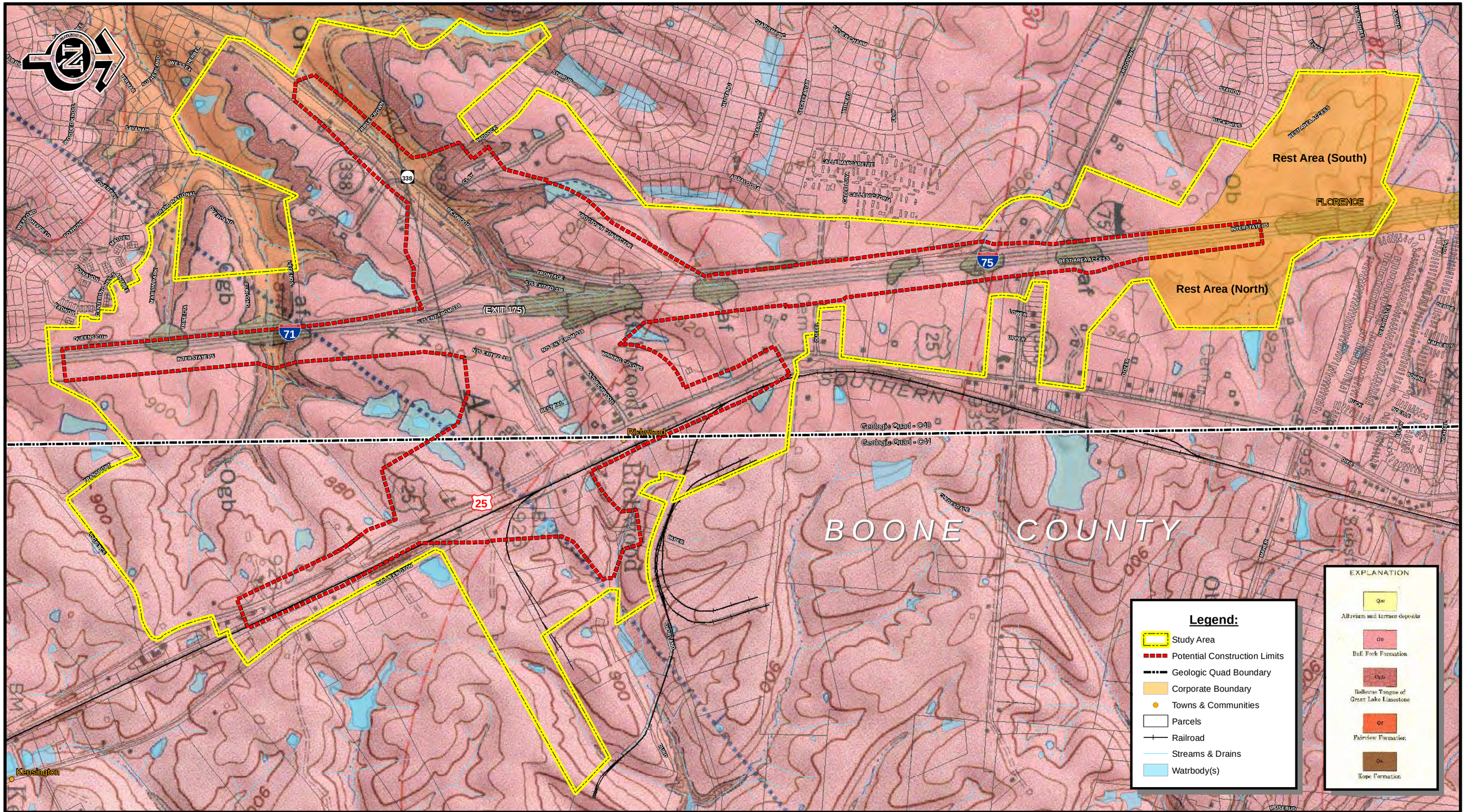
EXHIBIT:
B



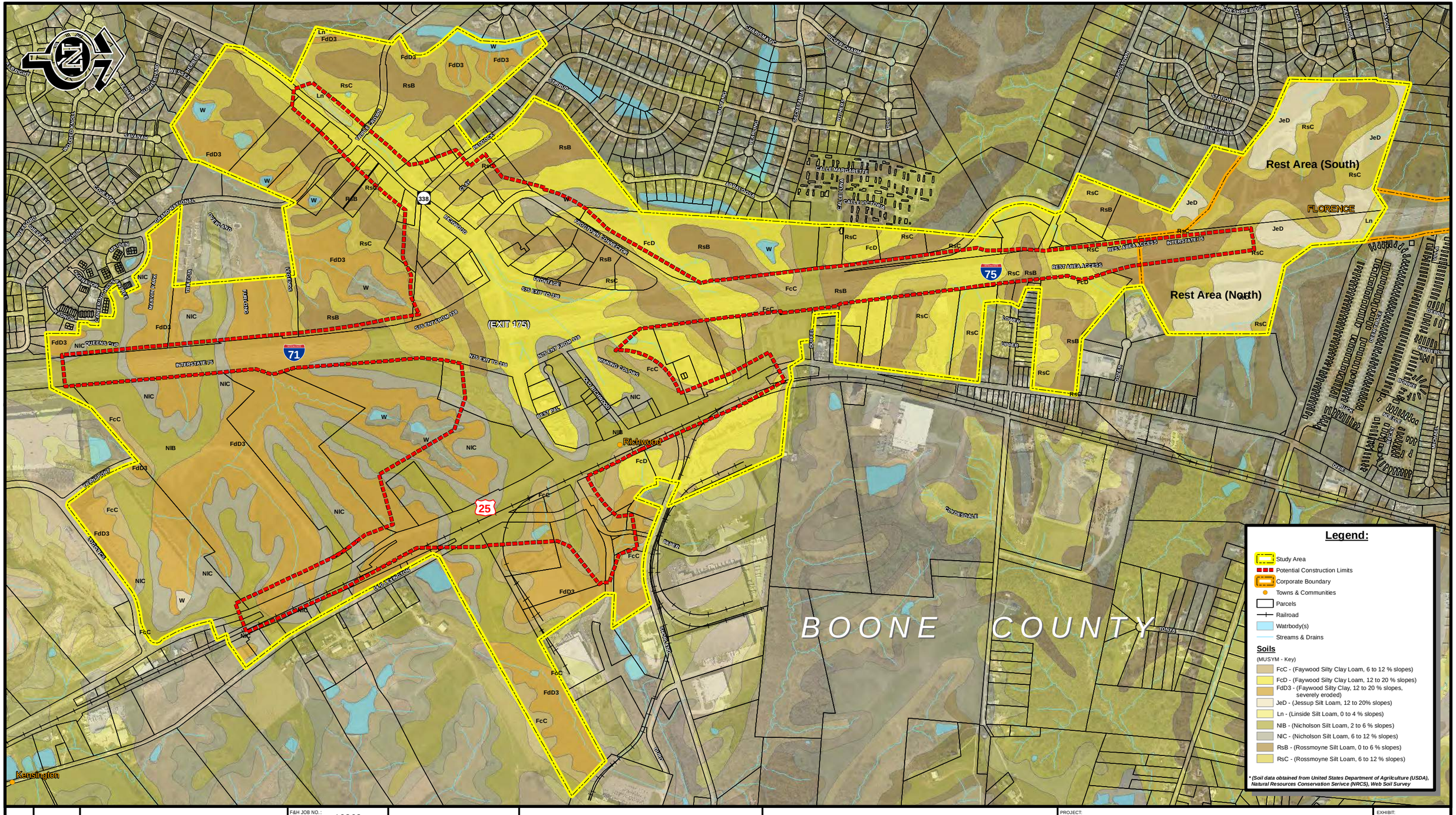
			F&H JOB NO.: 10263	0 450 900 Feet GRAPHICAL SCALE (1" = 900)	200 MERO STREET FRANKFORT, KY 40622 (502) 564-4890	Florence & Hutcheson Consulting Engineers 2550 IRVIN COBB DRIVE PADUCAH, KY 42003 (270) 444-9691	PROJECT: PHASE 1 ENVIRONMENTAL ASSESSMENT RICHWOOD ROAD (KY338) - INTERCHANGE STUDY KYTC - ITEM NO. 6-18.00 (BOONE CO)
			DESIGNED BY: SES				
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY: SES				TITLE: LANDUSE MAP
ISSUE	DATE	DESCRIPTION	CHECKED BY: JEP				EXHIBIT: C



			F&H JOB NO.: 10263	0 450 900 Feet *GRAPHICAL SCALE (1" = 900)*	200 MERO STREET FRANKFORT, KY 40622 (502) 564-4890	Florence & Hutcheson Consulting Engineers 2550 IRVIN COBB DRIVE PADUCAH, KY 42003 (270) 444-9691	PROJECT: **PHASE 1 ENVIRONMENTAL ASSESSMENT RICHWOOD ROAD (KY338) - INTERCHANGE STUDY KYTC - ITEM NO. 6-18.00 (BOONE CO)**
			DESIGNED BY: SES				
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY: SES				TITLE: ENVIRONMENTAL MAP
ISSUE	DATE	DESCRIPTION	CHECKED BY: JEP				EXHIBIT: D



			F&H JOB NO.: 10263	0 450 900 Feet GRAPHICAL SCALE (1" = 900)	200 MERO STREET FRANKFORT, KY 40622 (502) 564-4890	Florence & Hutcheson CONSULTING ENGINEERS 2550 IRVIN COBB DRIVE PADUCAH, KY 42003 (270) 444-9691	PROJECT: **PHASE 1 ENVIRONMENTAL ASSESSMENT KYTC - ITEM NO. 6-18.00, I-71/75 - KY338 (BOONE CO)**	EXHIBIT: E
			DESIGNED BY: SES					
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY: SES				TITLE: GEOLOGY MAP	
ISSUE	DATE	DESCRIPTION	CHECKED BY: JEP					



			F&H JOB NO.: 10263	0 450 900 Feet GRAPHICAL SCALE (1" = 900)	200 MERO STREET FRANKFORT, KY 40622 (502) 564-4890	Florence & Hutcheson CONSULTING ENGINEERS 2550 IRVIN COBB DRIVE PADUCAH, KY 42003 (270) 444-9691	PROJECT: PHASE 1 ENVIRONMENTAL ASSESSMENT KYTC - ITEM NO. 6-18.00, I-71/75 - KY338 (BOONE CO)
			DESIGNED BY: SES				
0	03/20/12	PRELIMINARY MAPPING	DRAWN BY: SES				TITLE: SOILS MAP
ISSUE	DATE	DESCRIPTION	CHECKED BY: JEP				EXHIBIT: F

APPENDIX B:

KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.3
January 31, 2012

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

1/31/12

Site Name:
KY Item No. 6-18.00 - Boone
118 Richwood Rd
Walton, KY 41094

Client Name:
Florence & Hutcheson, Inc.
2550 Irvin Cobb Drive
Paducah, KY 42002

EDR Inquiry # 3249682.3

Contact: Shane Shelby

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Florence & Hutcheson, Inc. were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: KY Item No. 6-18.00 - Boone Co. I-71/75 - KY
Address: 118 Richwood Rd
City, State, Zip: Walton, KY 41094
Cross Street:
P.O. # NA
Project: Richwood Rd KY 338 - I-75/71
Certification # C695-4264-B5D9

Sanborn® Library search results
Certification # C695-4264-B5D9

UNMAPPED PROPERTY

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KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.4
January 31, 2012

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

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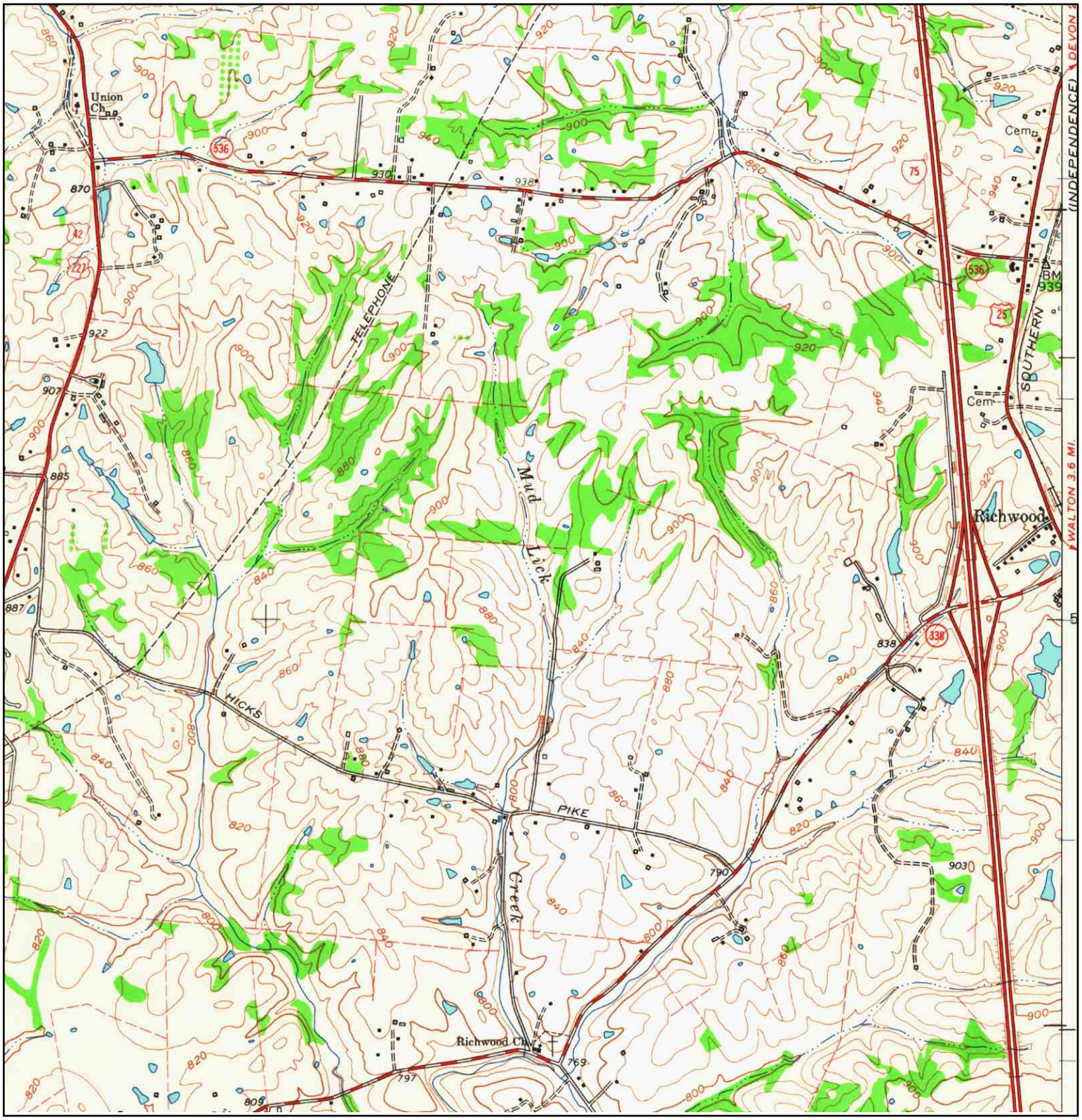
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Historical Topographic Map



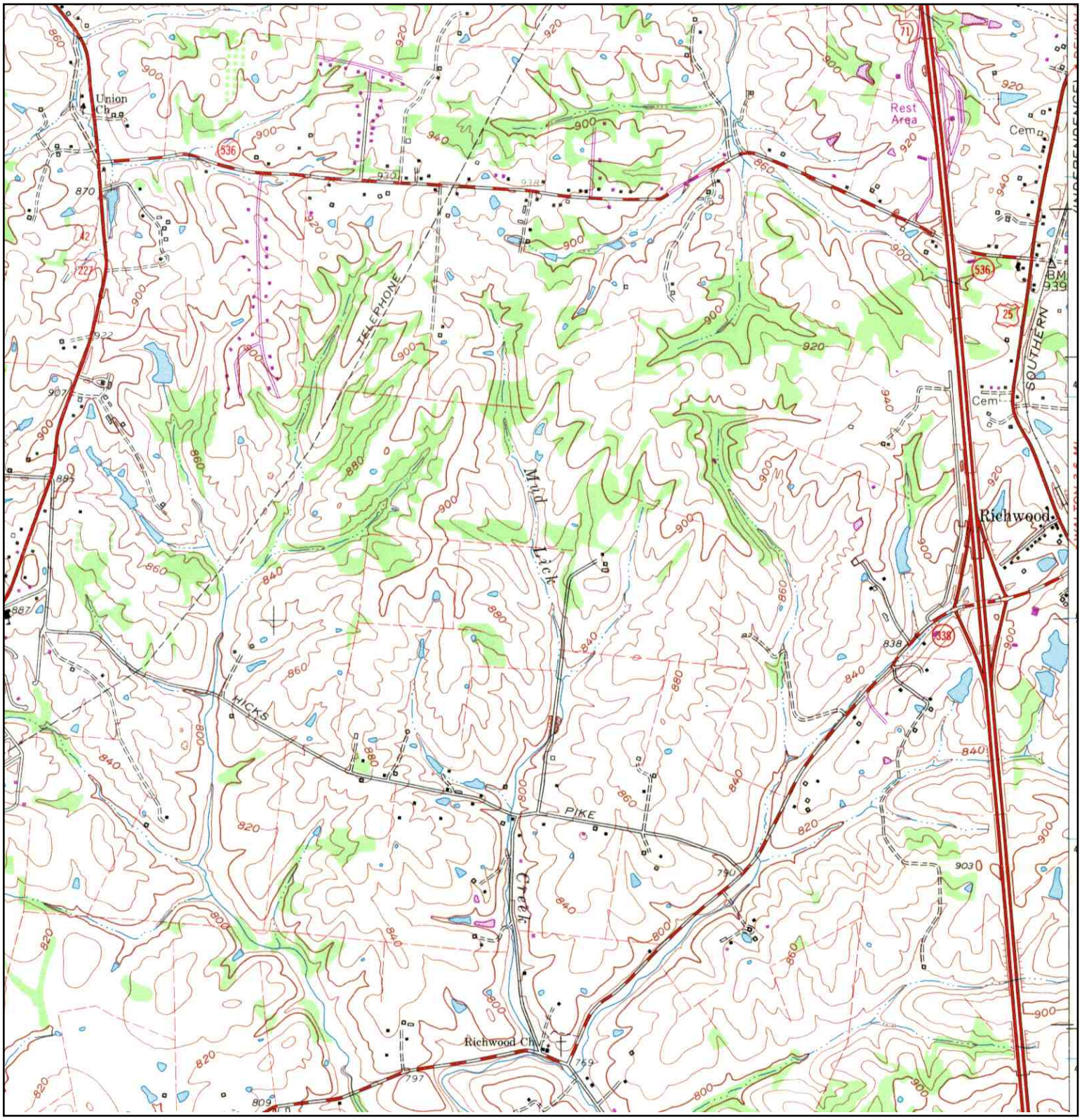
N	TARGET QUAD NAME: UNION MAP YEAR: 1955 SERIES: 7.5 SCALE: 1:24000	SITE NAME: KY Item No. 6-18.00 - Boone Co. I-71/75 - ADDRESS: 118 Richwood Rd Walton, KY 41094 LAT/LONG: 38.9191 / -84.6253	CLIENT: Florence & Hutcheson, Inc. CONTACT: Shane Shelby INQUIRY#: 3249682.4 RESEARCH DATE: 01/31/2012

Historical Topographic Map



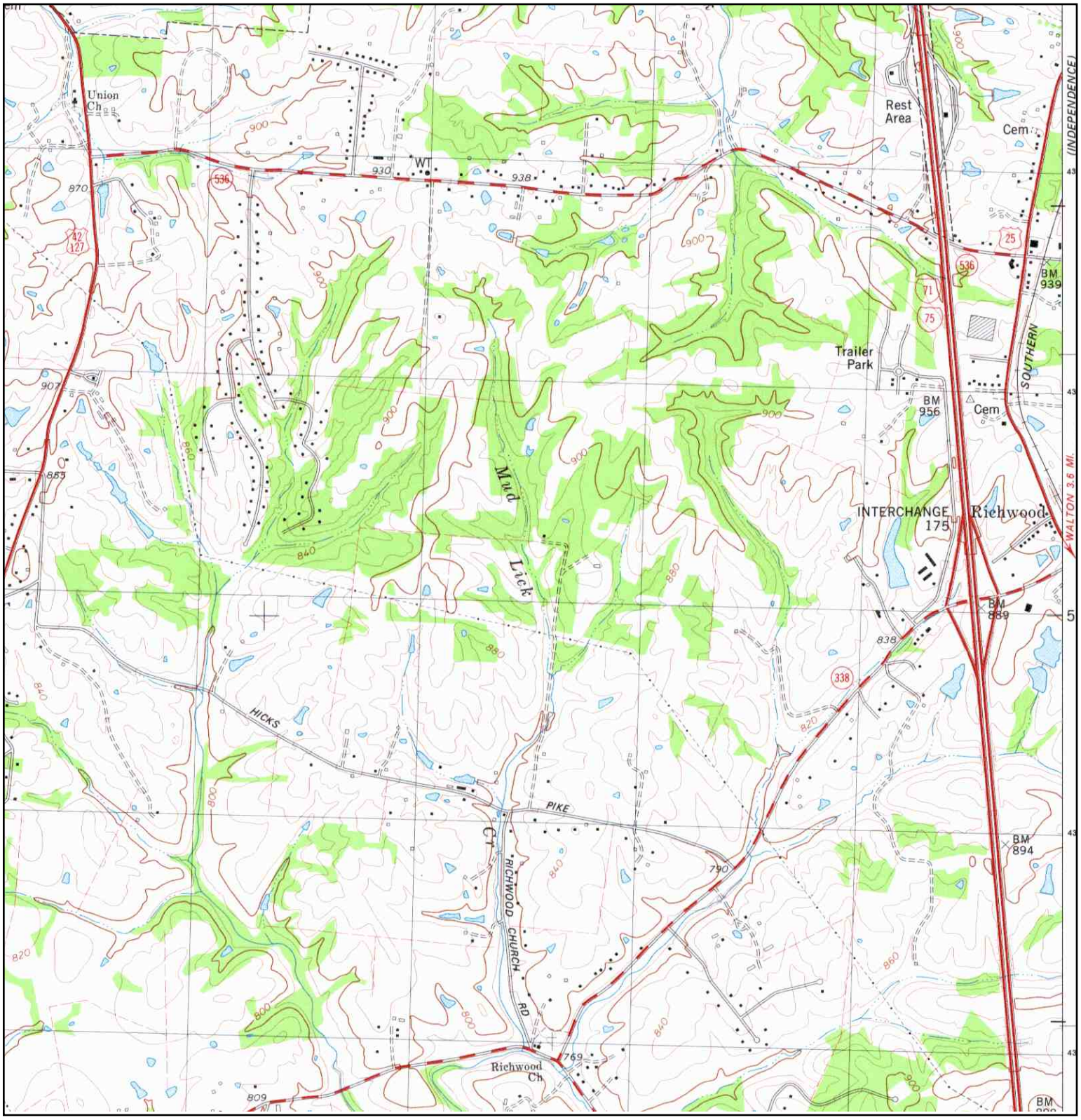
N	TARGET QUAD		SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 -	CLIENT:	Florence & Hutcheson, Inc.
	NAME:	UNION			CONTACT:	Shane Shelby
	MAP YEAR:	1961	ADDRESS:	118 Richwood Rd Walton, KY 41094	INQUIRY#:	3249682.4
					RESEARCH DATE:	01/31/2012
	SERIES:	7.5	LAT/LONG:	38.9191 / -84.6253		
	SCALE:	1:24000				

Historical Topographic Map



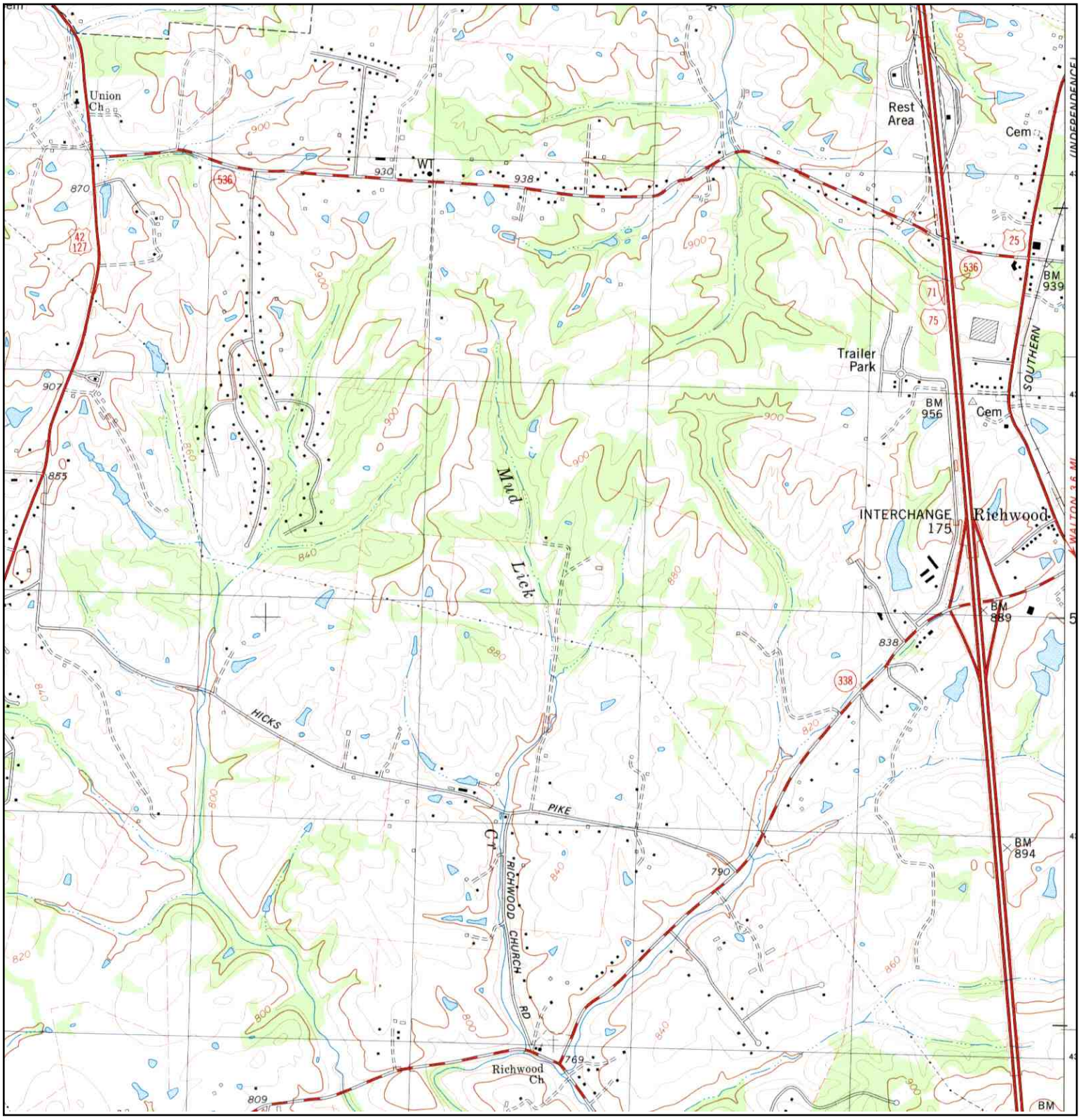
N	TARGET QUAD				
	NAME:	UNION	SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 -	CLIENT: Florence & Hutcheson, Inc.
	MAP YEAR:	1969	ADDRESS:	118 Richwood Rd	CONTACT: Shane Shelby
	PHOTOREVISED FROM :	1961		Walton, KY 41094	INQUIRY#: 3249682.4
	SERIES:	7.5	LAT/LONG:	38.9191 / -84.6253	RESEARCH DATE: 01/31/2012
	SCALE:	1:24000			

Historical Topographic Map



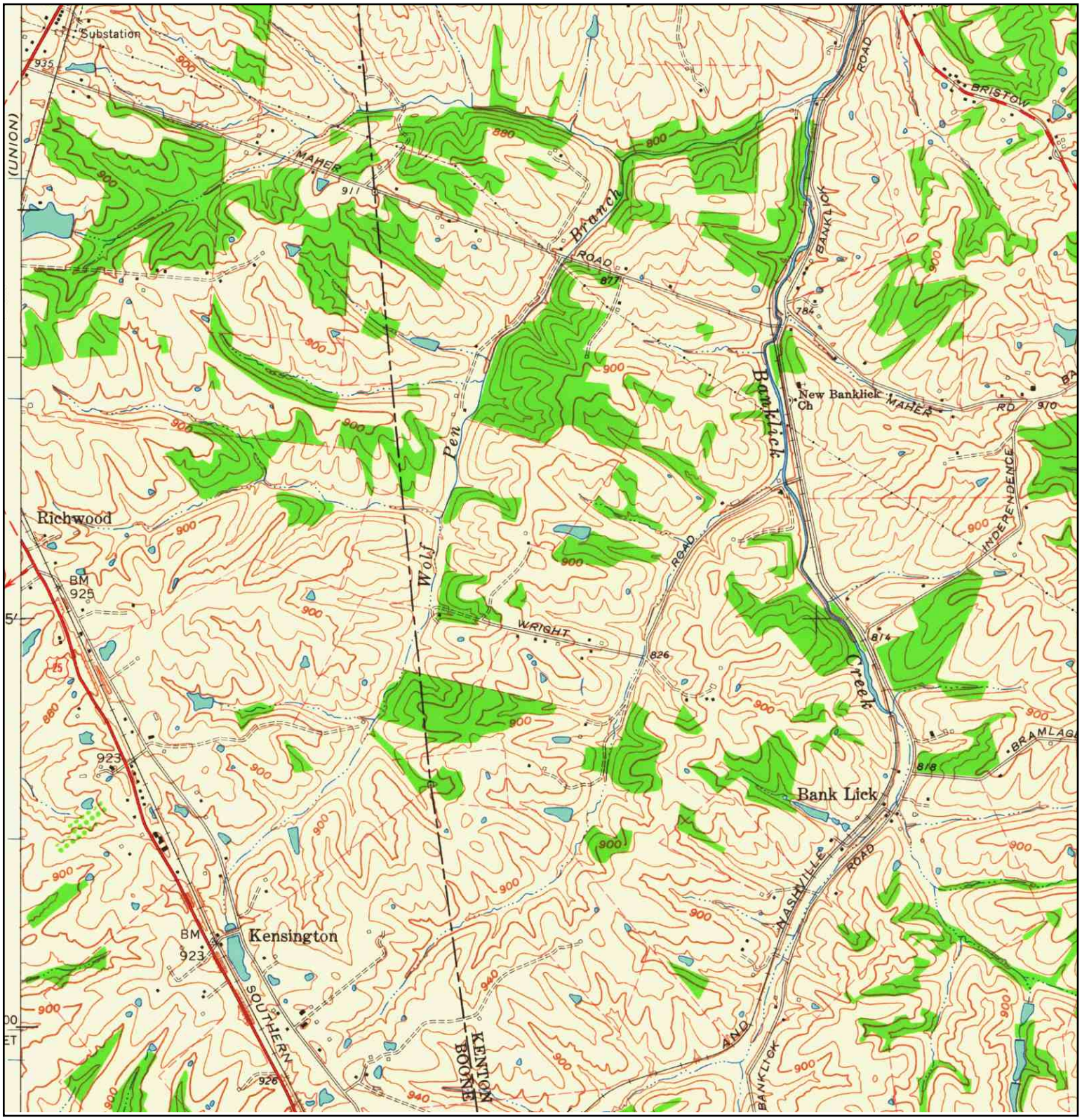
N	TARGET QUAD NAME: UNION MAP YEAR: 1982 SERIES: 7.5 SCALE: 1:24000	SITE NAME: KY Item No. 6-18.00 - Boone Co. I-71/75 - ADDRESS: 118 Richwood Rd Walton, KY 41094 LAT/LONG: 38.9191 / -84.6253	CLIENT: Florence & Hutcheson, Inc. CONTACT: Shane Shelby INQUIRY#: 3249682.4 RESEARCH DATE: 01/31/2012

Historical Topographic Map



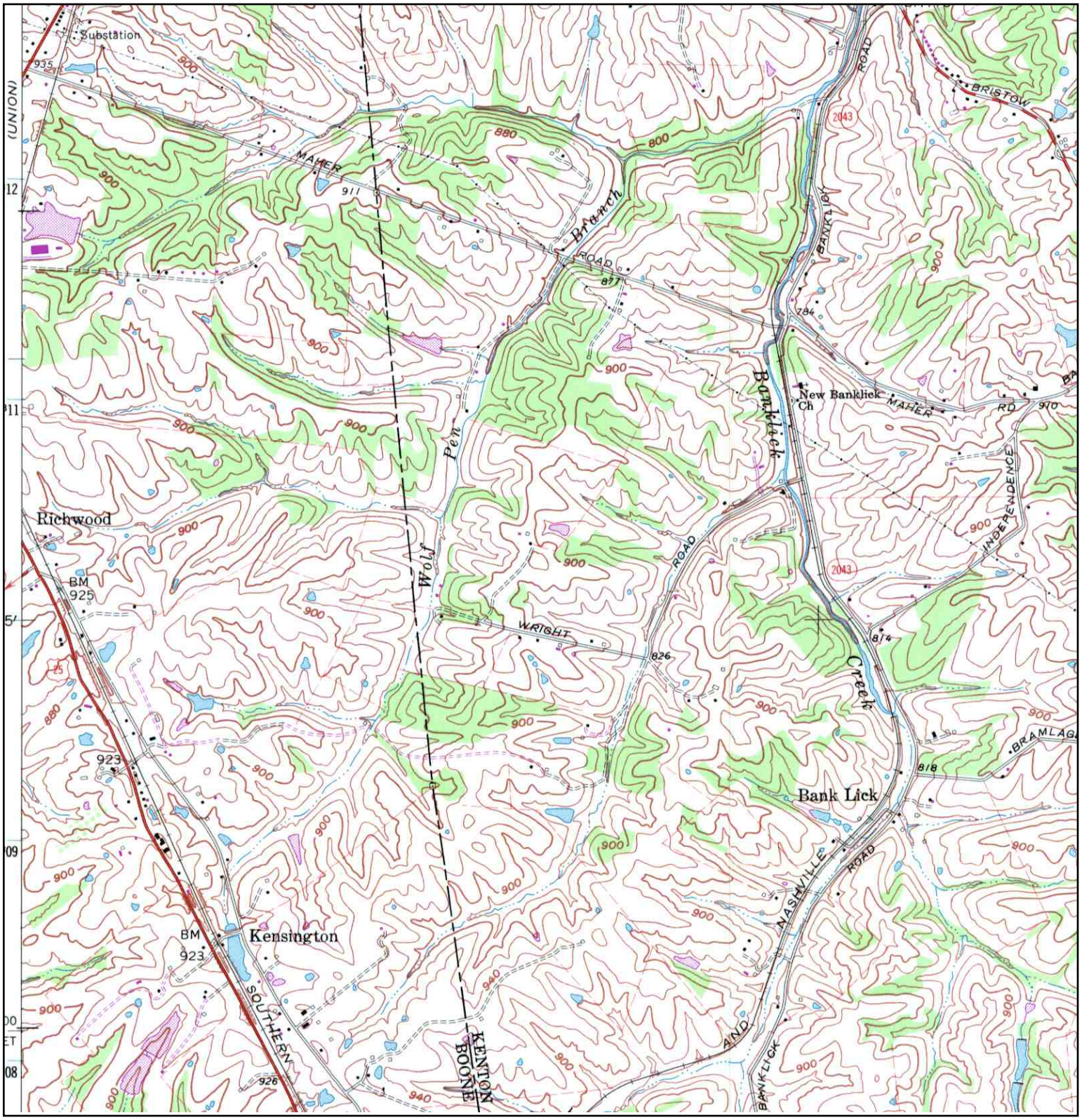
N	TARGET QUAD				
	NAME:	UNION	SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 -	CLIENT: Florence & Hutcheson, Inc.
	MAP YEAR:	1984	ADDRESS:	118 Richwood Rd	CONTACT: Shane Shelby
	PHOTOINSPECTED FROM :	1982		Walton, KY 41094	INQUIRY#: 3249682.4
	SERIES:	7.5	LAT/LONG:	38.9191 / -84.6253	RESEARCH DATE: 01/31/2012
	SCALE:	1:24000			

Historical Topographic Map



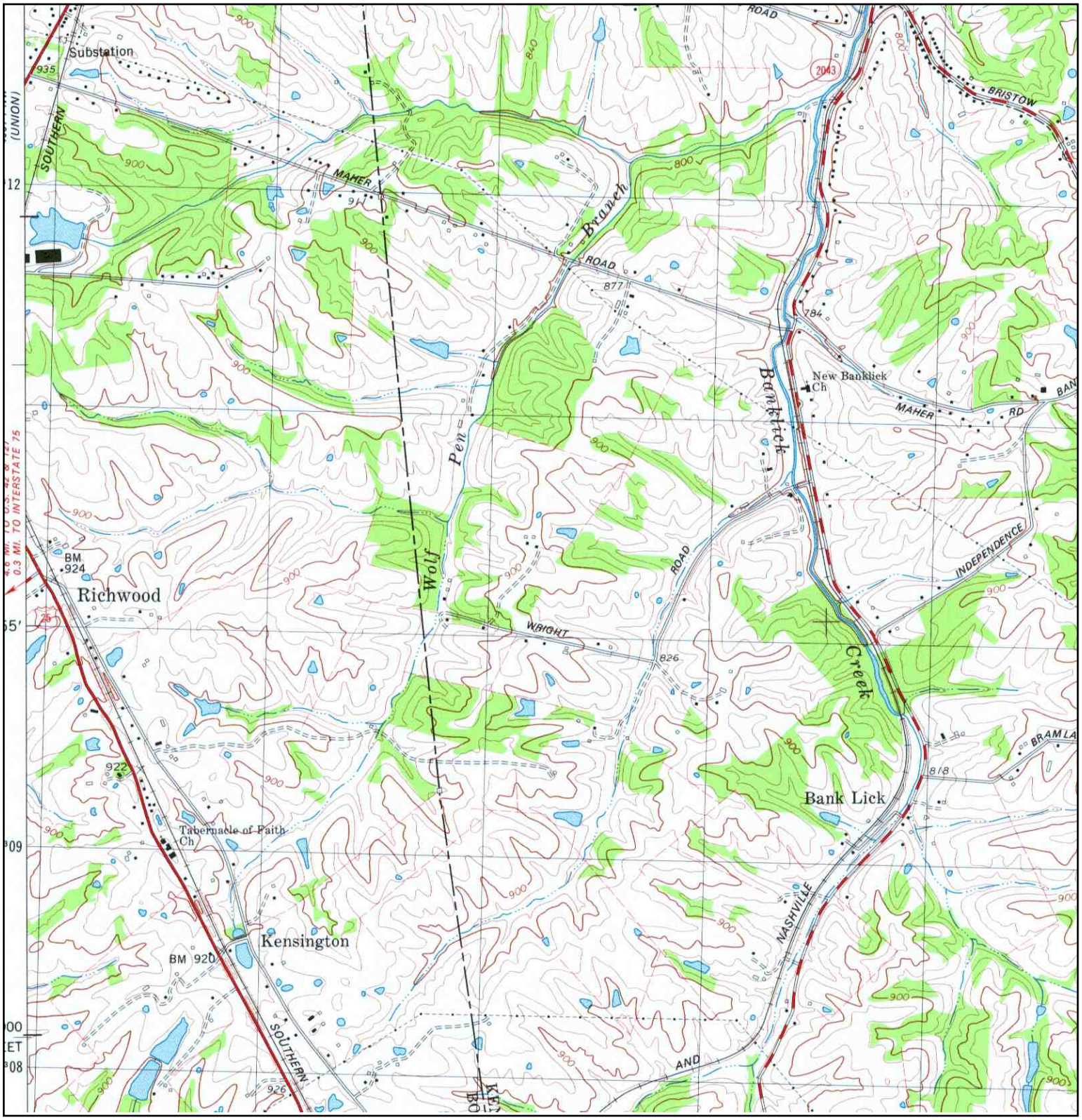
N	ADJOINING QUAD NAME: INDEPENDENCE MAP YEAR: 1961 SERIES: 7.5 SCALE: 1:24000	SITE NAME: KY Item No. 6-18.00 - Boone Co. I-71/75 - ADDRESS: 118 Richwood Rd Walton, KY 41094 LAT/LONG: 38.9191 / -84.6253	CLIENT: Florence & Hutcheson, Inc. CONTACT: Shane Shelby INQUIRY#: 3249682.4 RESEARCH DATE: 01/31/2012

Historical Topographic Map



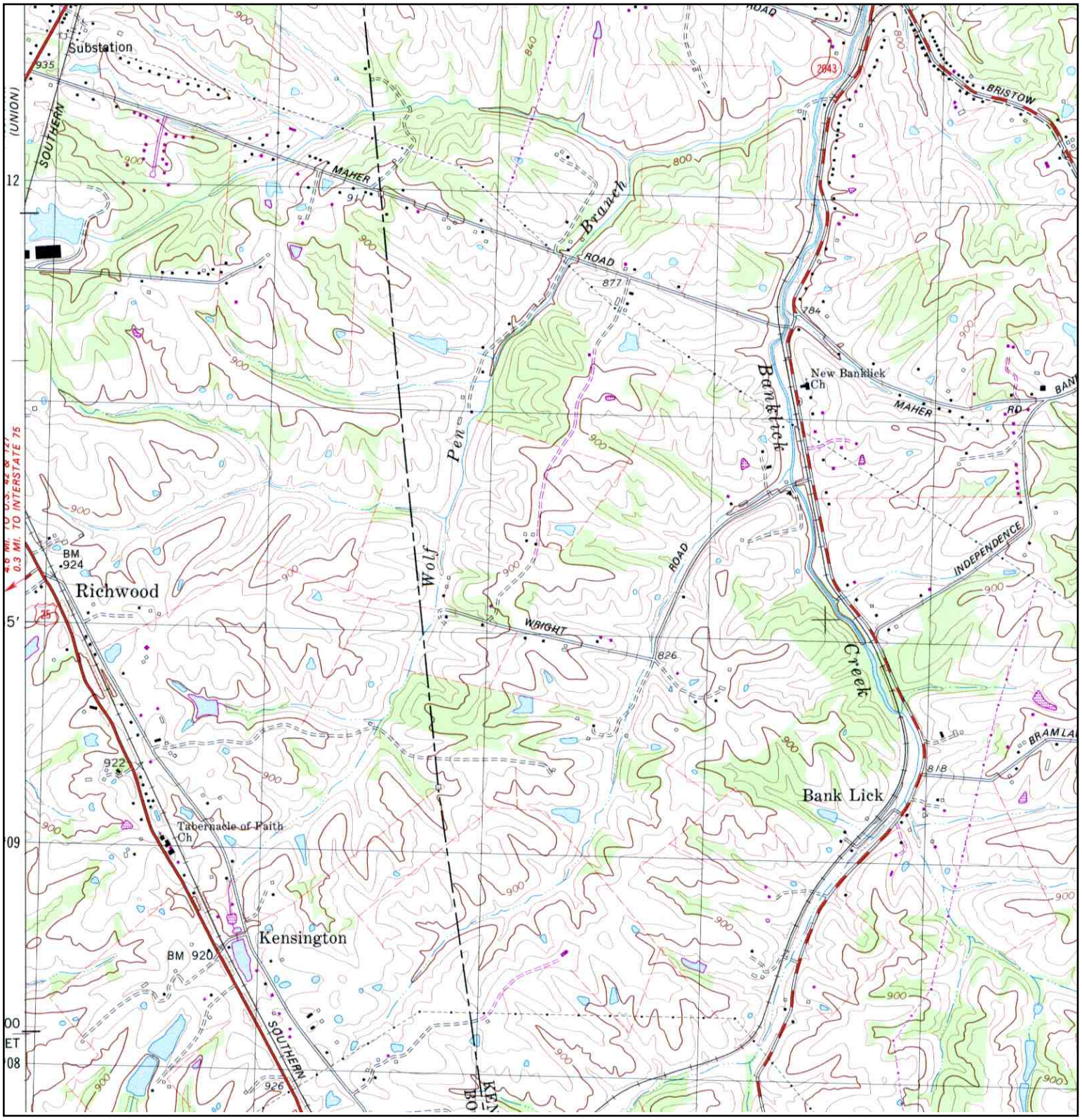
N	ADJOINING QUAD		SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 -	CLIENT: Florence & Hutcheson, Inc.
	NAME:	INDEPENDENCE			CONTACT: Shane Shelby
	MAP YEAR:	1969	ADDRESS:	118 Richwood Rd	INQUIRY#: 3249682.4
	PHOTOREVISED FROM :	1961		Walton, KY 41094	RESEARCH DATE: 01/31/2012
	SERIES:	7.5	LAT/LONG:	38.9191 / -84.6253	
	SCALE:	1:24000			

Historical Topographic Map



N	ADJOINING QUAD		SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 -	CLIENT: Florence & Hutcheson, Inc.
	NAME:	INDEPENDENCE			CONTACT: Shane Shelby
	MAP YEAR:	1981	ADDRESS:	118 Richwood Rd	INQUIRY#: 3249682.4
				Walton, KY 41094	RESEARCH DATE: 01/31/2012
	SERIES:	7.5			
	SCALE:	1:24000	LAT/LONG:	38.9191 / -84.6253	

Historical Topographic Map



N	ADJOINING QUAD NAME: INDEPENDENCE MAP YEAR: 1987 PHOTOREVISED FROM :1981 SERIES: 7.5 SCALE: 1:24000	SITE NAME: KY Item No. 6-18.00 - Boone Co. I-71/75 - ADDRESS: 118 Richwood Rd Walton, KY 41094 LAT/LONG: 38.9191 / -84.6253	CLIENT: Florence & Hutcheson, Inc. CONTACT: Shane Shelby INQUIRY#: 3249682.4 RESEARCH DATE: 01/31/2012

KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.5
February 01, 2012

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www.edrnet.com

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Date EDR Searched Historical Sources:

Aerial Photography February 01, 2012

Target Property:

118 Richwood Rd

Walton, KY 41094

Year	***Scale***	***Details***	***Source***
1949	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: May 03, 1949	EDR
1952	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: March 30, 1952	EDR
1955	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: January 01, 1955	EDR
1960	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: April 20, 1960	EDR
1969	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Date: May 16, 1969	EDR
1979	Aerial Photograph. Scale: 1"=1000'	Panel #: 38084-H6, Union, KY;/Flight Date: November 17, 1979	EDR
1985	Aerial Photograph. Scale: 1"=1000'	Panel #: 38084-H6, Union, KY;/Flight Date: April 17, 1985	EDR
1989	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: April 13, 1989	EDR
1993	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: April 10, 1993	EDR
1993	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Composite DOQQ - acquisition dates: April 10, 1993	EDR
1997	Aerial Photograph. Scale: 1"=750'	Panel #: 38084-H6, Union, KY;/Flight Date: March 21, 1997	EDR
2006	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Year: 2006	EDR
2008	Aerial Photograph. Scale: 1"=500'	Panel #: 38084-H6, Union, KY;/Flight Year: 2008	EDR


INQUIRY #: 3249682.5
YEAR: 1949
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1952
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1955
= 500'
N



INQUIRY #: 3249682.5

YEAR: 1960

= 500'

N


INQUIRY #: 3249682.5
YEAR: 1969
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1979
= 1000'
N


INQUIRY #: 3249682.5
YEAR: 1985
= 1000'
N


INQUIRY #: 3249682.5
YEAR: 1989
= 750'
N


INQUIRY #: 3249682.5
YEAR: 1993
= 750'
N


INQUIRY #: 3249682.5
YEAR: 1993
= 500'
N


INQUIRY #: 3249682.5
YEAR: 1997
= 750'
N


INQUIRY #: 3249682.5
YEAR: 2006
= 500'
N


INQUIRY #: 3249682.5
YEAR: 2008
= 500'
N

KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.2s
January 31, 2012

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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GEOCHECK ADDENDUM

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

118 RICHWOOD RD
WALTON, KY 41094

COORDINATES

Latitude (North):	38.9191000 - 38° 55' 8.76''
Longitude (West):	84.6253000 - 84° 37' 31.08''
Universal Tranverse Mercator:	Zone 16
UTM X (Meters):	705881.2
UTM Y (Meters):	4310272.5
Elevation:	905 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	38084-H6 UNION, KY
Most Recent Revision:	1984
East Map:	38084-H5 INDEPENDENCE, KY
Most Recent Revision:	1987

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	2010
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
PILOT TRAVEL CENTER #278 118 RICHWOOD ROAD WALTON, KY 41094	FINDS SHWS Facility Status: Closed UST	N/A
PILOT CORPORATION TRAVEL CENTER # 118 RICHWOOD RD., I-75 WALTON, KY 41094	FINANCIAL ASSURANCE	N/A
PILOT TRAVEL CENTER #278 118 RICHWOOD RD WALTON, KY 41094	SB193 NPDES AIRS	N/A

EXECUTIVE SUMMARY

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Facilities List

EXECUTIVE SUMMARY

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

ENG CONTROLS ---------- Engineering Controls Site Listing
INST CONTROL ---------- State Superfund Database

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Voluntary Cleanup Program Sites

State and tribal Brownfields sites

BROWNFIELDS ---------- Kentucky Brownfield Inventory

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
HIST LF ---------- Historical Landfills
SWRCY ---------- Recycling Facilities
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
CDL ---------- Clandestine Drub Lab Location Listing
US HIST CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information
LUCIS ---------- Land Use Control Information System

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- State spills

Other Ascertainable Records

DOT OPS ---------- Incident and Accident Data

EXECUTIVE SUMMARY

DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
DRYCLEANERS	Drycleaner Listing
LEAD	Environmental Lead Program Report Tracking Database
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH DOE	Sleam-Electric Plan Operation Data
COAL ASH	Coal Ash Disposal Sites
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA)

of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/15/2011 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CONTINENTAL WEB PRESS OF KENTU	***125 RICHWOOD ROAD***	***S 0 - 1/8 (0.040 mi.)***	***4***	***16***

State- and tribal - equivalent CERCLIS

SHWS: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Environmental Protection's Uncontrolled Site Branch List.

A review of the SHWS list, as provided by EDR, and dated 09/26/2011 has revealed that there are 2 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BRINKMAN OIL CO Facility Status: Closed	***10945 DIXIE HWY***	***NNW 1/2 - 1 (0.553 mi.)***	***13***	***64***
EATON ASPHALT PAVING CO INC Facility Status: Closed	212 E FROGTOWN RD.	N 1/2 - 1 (0.840 mi.)	14	71

State and tribal leaking storage tank lists

SB193: The inventory indicates facilities that have performed permanent closure activities at a regulated underground storage tank facility and have known soil and/or groundwater contamination.

A review of the SB193 list, as provided by EDR, and dated 09/05/2006 has revealed that there is 1 SB193 site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TRAVEL CENTER OF AMERICA #0214	145 RICHWOOD RD	SSW 0 - 1/8 (0.068 mi.)	B5	25

PSTEAF: The Underground Storage Tank Branch (USTB) has ranked all PSTEAF reimbursable facilities requiring corrective action, in accordance with 401 KAR 42:290. Directive letters will be issued on the basis of facility ranking and available PSTEAF funding in sequential order as ranked. For example, Rank 2 facilities will be issued directives before Rank 3 facilities.

A review of the PSTEAF list, as provided by EDR, and dated 10/07/2011 has revealed that there are 2 PSTEAF sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WALTON TRAVEL CENTER	***145 RICHWOOD RD***	***SSW 0 - 1/8 (0.068 mi.)***	***B7***	***28***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
PILOT TRAVEL CENTER #321	***11229 FRONTAGE RD***	***WSW 1/4 - 1/2 (0.416 mi.)***	***12***	***55***

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Protection's Owner/Facility Report of All Tanks Regardless of Status list.

A review of the UST list, as provided by EDR, and dated 09/13/2011 has revealed that there are 3 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WALTON TRAVEL CENTER	***145 RICHWOOD RD***	***SSW 0 - 1/8 (0.068 mi.)***	***B7***	***28***
SCOT TRUCK STOP	142 OLD RICHWOOD RD	NW 0 - 1/8 (0.102 mi.)	8	44
TRADER SALVAGE	11139 DIXIE HWY	N 0 - 1/8 (0.121 mi.)	9	51

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA-NonGen: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA-NonGen list, as provided by EDR, and dated 06/15/2011 has revealed that there are 3 RCRA-NonGen sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CINCINNATI SOUTH TRAVELCENTER	***145 RICHWOOD ROAD***	***SSW 0 - 1/8 (0.068 mi.)***	***B6***	***25***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
TENNECO TRUCK STOP	***I75 & 338***	***WSW 1/8 - 1/4 (0.244 mi.)***	***C10***	***52***
CHEVRON USA PRODUCTS CO INC	***I-75 & KY 338***	***WSW 1/8 - 1/4 (0.244 mi.)***	***C11***	***53***

EXECUTIVE SUMMARY

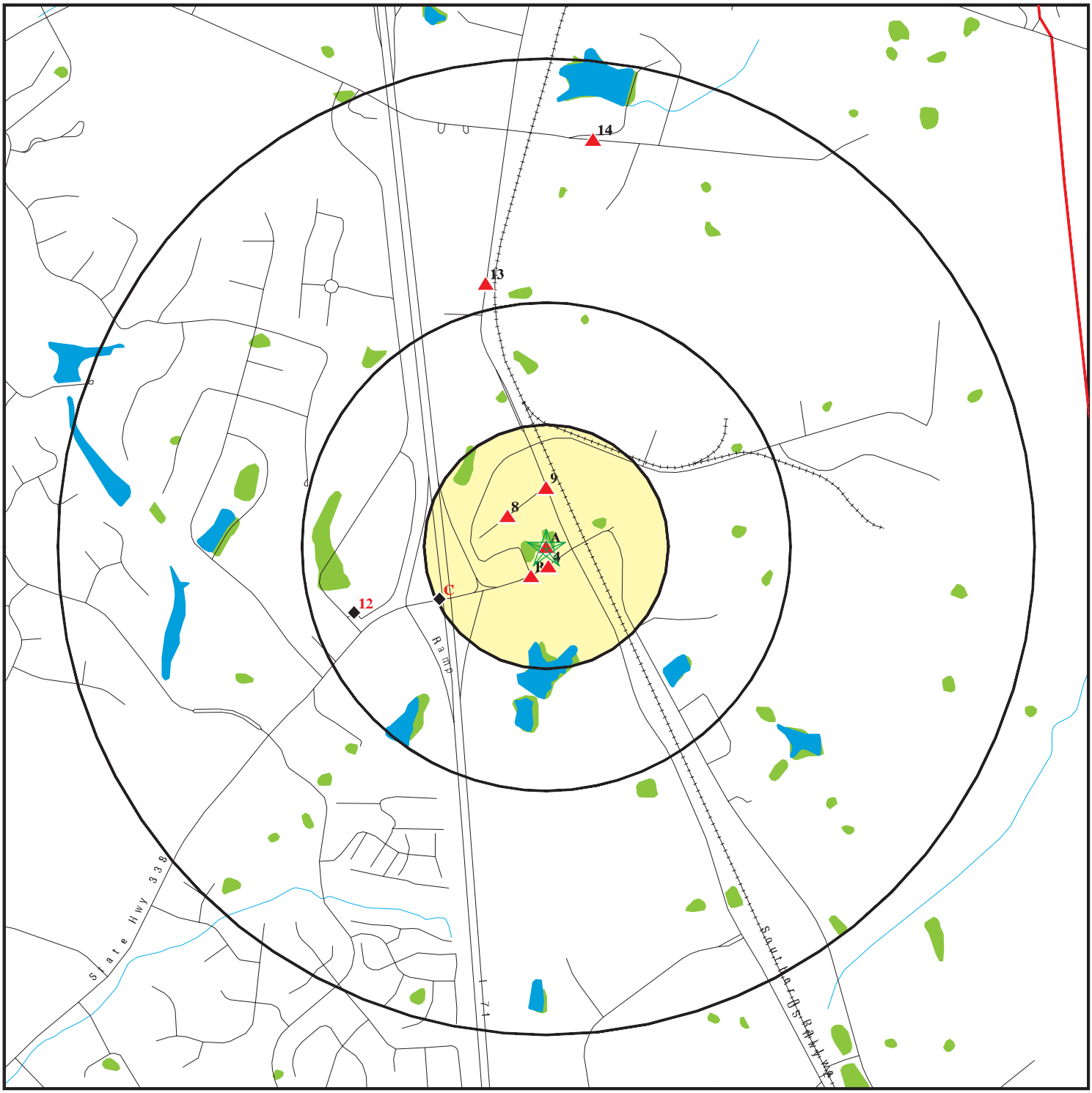
Due to poor or inadequate address information, the following sites were not mapped. Count: 64 records.

Site Name	Database(s)
ABITIBI PAPER RETRIEVER	SWRCY, NPDES
ABITIBI PAPER RETRIEVER	SWRCY
KENTON COUNTY AIRPORT	RCRA-TSDF, CERC-NFRAP, CORRACTS, RCRA-CESQG, US INST CONTROL, FINDS
BRIDGE FOREMAN OFFICE	SHWS
DELTA AIR LINES	SHWS
I 75 N REST AREA - BOONE CO	SHWS
I 75 S REST AREA - BOONE CO	SHWS
ACE DORAN TRUCKING I-75 FUEL SPILL	SHWS
GUARDIAN LIFE INSURANCE FUEL OIL S	SHWS
I.C.G. RAILROAD DERAILMENT	SHWS
SEARS STORE NO 1730	SHWS
SUNNYBROOK MERCURY SITE	SHWS
BOONE CO BOARD OF EDUCATION	SHWS
MIDDLE CREEK - COAST GUARD AID	SHWS
GUNPOWDER - COAST GUARD AID	SHWS
GUNPOWDER CREEK DRUM	SHWS
I 71 S WEIGH STATION DRUMS - BOONE	SHWS
WASHINGTON MUTUAL BANK PROPERTY	SHWS
CSX TRANSPORTATION DIESEL SPILL	SHWS
I 71 S WEIGH STATION - BOONE CO	SHWS
I 75 S WEIGH STATION - KENTON CO	SHWS
MCELROY BP	SHWS
SPEEDWAY SUPERAMERICA LLC 9692	UST, PSTEAF
MCINTOSCH SERVICE	UST, PSTEAF
MOUNTAIN ENTERPRISES INC - GRASSY	AIRS
HARPER PROPERTIES INC	UST, AIRS
KROGER FUEL CENTER 424	UST, AIRS
SPEEDWAY SUPER AMERICA#9692	SB193
MCINTOSH SERVICE	SB193
SUNOCO 0016-5530	UST
SEARS STORE NO 1730	UST
SPEEDWAY #7073	UST
DETERS CO INC	UST
UNION PUBLIC UTILITY STATION	UST
REEVES COLLISION SERVICE	UST
AMERISTOP FOOD MART 29113	UST
PARCEL 16 (ITEM NO 6-133.0)	UST
KENTON COUNTY WATER DISTRICT NO. 1	RCRA-NonGen, FINDS
KENTON COUNTY DRUMS	RCRA-NonGen, FINDS
TOM'S AUTO BODY	RCRA-NonGen, FINDS
PARCEL 16 ITEM NO. 6-133-0	RCRA-NonGen, FINDS
KROGER CO-STORE 424	RCRA-CESQG
ROUTE 338 BEAVER ROAD	ERNS
EASTBEND STATION RT 338	ERNS
EASTBEND STATION RT 338	ERNS
INTERSTATE 75, EXIT 171	ERNS
T.A TRUCK STOP INST. 75	ERNS
KY 1829 WIDENING	FINDS
BOONE COUNTY HIGH SCHOOL	FINDS
37181 - THORNTONS INC #556	FINDS
CELLCO - NORTH FLORENCE	FINDS
CINCINNATI GAS & ELECTRIC - EAST B	FINDS
AUTOZONE STORE NO. 3591	FINDS
60310 - MCINTOSCH SERVICE	FINDS
DUKE ENERGY KENTUCKY - EAST BEND G	TSCA
CINN/NORTHERN KY INTL AIRPORT	NPDES
CINCINNATI/N KY INTL AIRPORT	NPDES

EXECUTIVE SUMMARY

KY 1829 WIDENING	NPDES
BOONE COUNTY HIGH SCHOOL	NPDES
HOUSTON RD - BOONE CO	NPDES
NO SITE OFFICE	NPDES
KYTC 071160 ITEM 06-0203.00	NPDES
AUTOZONE STORE NO. 3591	NPDES
BOONE INN	FINANCIAL ASSURANCE

OVERVIEW MAP - 3249682.2s



0 1/4 1/2 1 Miles

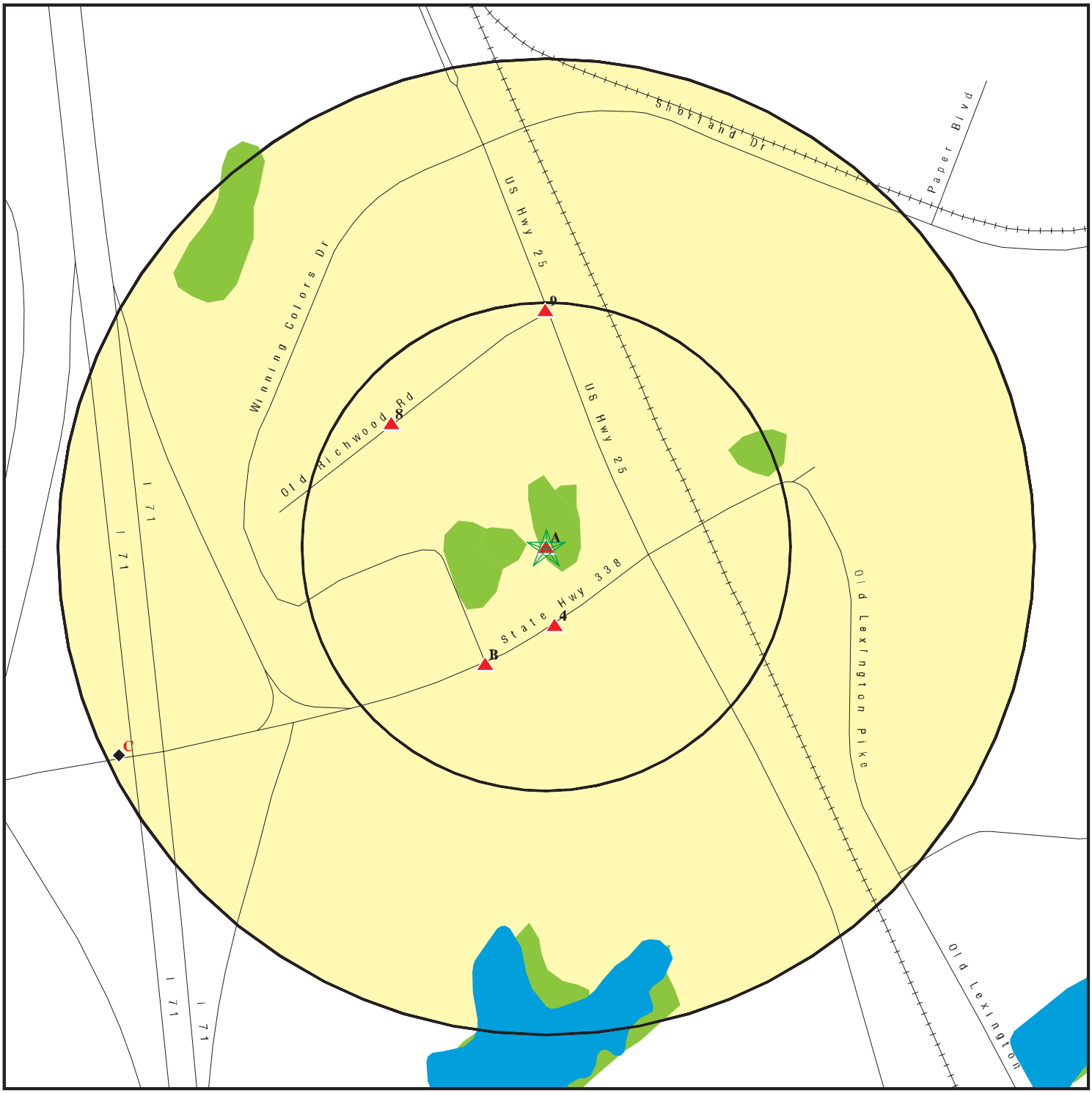
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338	CLIENT:	Florence & Hutcheson, Inc.
ADDRESS:	118 Richwood Rd Walton KY 41094	CONTACT:	Shane Shelby
LAT/LONG:	38.9191 / 84.6253	INQUIRY #:	3249682.2s
		DATE:	January 31, 2012 1:29 pm

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DETAIL MAP - 3249682.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338	CLIENT: Florence & Hutcheson, Inc.
ADDRESS: 118 Richwood Rd Walton KY 41094	CONTACT: Shane Shelby INQUIRY #: 3249682.2s
LAT/LONG: 38.9191 / 84.6253	DATE: January 31, 2012 1:30 pm

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MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.000	0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS		0.500	0	0	0	NR	NR	0
FEDERAL FACILITY		1.000	0	0	0	0	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		0.500	0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.000	0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		0.500	0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG		0.250	0	0	NR	NR	NR	0
RCRA-SQG		0.250	1	0	NR	NR	NR	1
RCRA-CESQG		0.250	0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
Federal ERNS list								
ERNS		TP	NR	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	X	1.000	0	0	0	2	NR	2
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		0.500	0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
SB193	X	0.500	1	0	0	NR	NR	1
PSTEAF		0.500	1	0	1	NR	NR	2
INDIAN LUST		0.500	0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	X	0.250	3	0	NR	NR	NR	3

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN UST		0.250	0	0	NR	NR	NR	0
FEMA UST		0.250	0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS		0.500	0	0	0	NR	NR	0
INST CONTROL		0.500	0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		0.500	0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI		0.500	0	0	0	NR	NR	0
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
HIST LF		0.500	0	0	0	NR	NR	0
SWRCY		0.500	0	0	0	NR	NR	0
INDIAN ODI		0.500	0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		TP	NR	NR	NR	NR	NR	0
CDL		TP	NR	NR	NR	NR	NR	0
US HIST CDL		TP	NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		TP	NR	NR	NR	NR	NR	0
SPILLS		TP	NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.250	1	2	NR	NR	NR	3
DOT OPS		TP	NR	NR	NR	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS	X	TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
DRYCLEANERS		0.250	0	0	NR	NR	NR	0
NPDES	X	TP	NR	NR	NR	NR	NR	0
AIRS	X	TP	NR	NR	NR	NR	NR	0
LEAD		TP	NR	NR	NR	NR	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
SCRD DRYCLEANERS		0.500	0	0	0	NR	NR	0
COAL ASH DOE		TP	NR	NR	NR	NR	NR	0
COAL ASH		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE	X	TP	NR	NR	NR	NR	NR	0
PCB TRANSFORMER		TP	NR	NR	NR	NR	NR	0
COAL ASH EPA		0.500	0	0	0	NR	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.000	0	0	0	0	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1 **PILOT TRAVEL CENTER #278** **FINDS** **1004509135**
Target **118 RICHWOOD ROAD** **SHWS** **N/A**
Property **WALTON, KY 41094** **UST**

Site 1 of 3 in cluster A

Actual:
905 ft.

FINDS:

Registry ID: 110001242637

Environmental Interest/Information System

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

CRITERIA AND HAZARDOUS AIR POLLUTANT INVENTORY

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

SHWS:

Status:	**Closed**
Description:	Fuel tanker accident
Longitude:	-84.65420000000
Latitude:	38.8994
Subject Item County:	Boone
Sub Item Longitude:	38.8994
Subject Item Address:	118 Richwood Rd
Subject Item Address2:	Not reported
Subject Item City,St,Zip:	Walton, KY 41094
Regulatory Desc:	State Superfund
Closure Option:	Option A No Action Necessary
Side SG:	DSL spill-1,400 gals
Closure Date:	2010-09-01

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

UST:

Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	5
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	REG
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	1/9/2005
Last Pipe Test Date:	12/31/2006
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	6
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	PRM
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	1/9/2005
Last Pipe Test Date:	12/31/2006
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	7
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	4/7/2009
Last Pipe Test Date:	4/7/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	8
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	4/7/2009

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Last Pipe Test Date:	4/7/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	9
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	4/7/2009
Last Pipe Test Date:	4/7/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	10
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/3/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	4/7/2009
Last Pipe Test Date:	4/7/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2712008
Facility ID:	228

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Subject Item Id:	11
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/3/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	4000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	1/9/2005
Last Pipe Test Date:	12/31/2006
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	2712008
Facility ID:	228
Subject Item Id:	4
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized

PILOT TRAVEL CENTER #278 (Continued) **1004509135**

Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1988
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	REG
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	1/9/2005
Last Pipe Test Date:	12/31/2006
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	3/18/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	84 39 15.12
Longitude:	38 53 57.84
Subject Item Category Code:	STOR
Internal Document ID:	0

A2 **PILOT CORPORATION TRAVEL CENTER #278** **FINANCIAL ASSURANCE** **S108018606**
Target **118 RICHWOOD RD., I-75** **N/A**
Property **WALTON, KY 41094**

Site 2 of 3 in cluster A

Actual:
905 ft.

FINANCIAL ASSURANCE2:

Region:	2
Account:	FRA
Site ID:	2712008
Coverage Amount:	Up to 1 million dollar limit coverage
Effective Period:	Would be from the time of the release to the end of the clean up
Max of Acc_Date:	03/28/2003

A3 **PILOT TRAVEL CENTER #278** **SB193** **S106059483**
Target **118 RICHWOOD RD** **NPDES** **N/A**
Property **WALTON, KY 41094** **AIRS**

Site 3 of 3 in cluster A

Actual:
905 ft.

KY SENATE BILL 193 INVENTORY:

KY SENATE BILL 193 INVENTORY:	CLW
Facility ID:	2712008
Soil / Groundwater:	Soil
Agency Interest Number:	228

NPDES:

Federal Facility ID:	Not reported
Facility Status:	ACTIVE
KY DES #:	KY0089010
Total App# Design Flow (MGD):	0
Total Actual Average Flow (MGD):	0
Horizontal Collect Method Desc:	Not reported
Ownership:	Not reported
Facility Addr 2:	HWYS 25 & 338
Inactive Date:	Not reported
Design Capacity:	6.1000000000000004E-3
Fee Category:	NPIND
SIC Code:	5989
Lat/Long:	3855080 / -8437290
Lat/Long Method:	A
USGS Hydrologic Basin Code:	5090203
Facility Stream Segment:	Not reported
Facility Mileage Indicator:	Not reported
Basin Code:	521
Basin Code Description:	OR/OHIO R-MAIN STEM
DMR Contact:	JOEY CUPP
Contact Telephone:	8655887488
Mailing Address:	PILOT TRAVEL CENTERS LLC
Mailing Address 2:	5508 LONAS RD
Mailing City,St,Zip:	KNOXVILLE, TN 37909
Permit Issued:	09/10/2007
Permit Expires:	10/31/2012
SIC Code Description:	FUEL DEALERS, NEC
Reveiving Waters:	MUDLICK CRK
Major/Minor:	MINOR

AIRS:

Facility:	2101500672
Alt Facility Name:	Pilot Oil Corporation
Alt Facility End Date:	Not reported
Contact Name:	Ms. Cindy Spradling
Contact Addr:	PO Box 10146
City:	Knoxville
State:	TN
Zip:	37909
Phone:	423-588-7488
Daq contact fax:	Not reported
Daq contact email:	Not reported
Emps:	1
Plant Class Descr.:	R; Registered Source
Principal Product:	FUEL

PILOT TRAVEL CENTER #278 (Continued) **S106059483**

Acreage:	0.5
Latitude/Longitude:	38.8994 / -84.654200
SIC:	5541
SIC Desc:	Gasoline Service Stations
NAIC:	44711
NAIC Desc:	Gasoline Stations with Convenience Stores
AI Id:	228
AI Start Date:	06/19/2002
AI End Date:	Not reported
DAQ AI Type:	RETAIL- Retail Trade, Gasoline Stations (447)
DAQ Reg Comment:	Not reported
Mailing Address Line 2:	Not reported
Mailing Address Line 3:	Not reported
SCC:	40399999, 40400414, 40600301, 40600307, 40600401, 40600402
State Plant Class Code:	R000
Inspector Assigned AI:	Maria Schmitt
Last Inspection Lead:	Not reported
Last Inspection Date:	Not reported
Air Programs:	0-SIP Source
Air Subparts:	Not Applicable

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4 **CONTINENTAL WEB PRESS OF KENTUCKY** **RCRA-SQG** **1001077380**
South **125 RICHWOOD ROAD** **FINDS** **KYR000003822**
< 1/8 **WALTON, KY 41094**
0.040 mi.
213 ft.

Relative:
Higher

Actual:
918 ft.

RCRA-SQG:

Date form received by agency:	08/30/2010
Facility name:	CONTINENTAL WEB PRESS OF KENTUCKY
Facility address:	125 RICHWOOD ROAD WALTON, KY 41094
EPA ID:	KYR000003822
Mailing address:	RICHWOOD ROAD WALTON, KY 41094
Contact:	WILLIAM J SCARPACI
Contact address:	RICHWOOD ROAD WALTON, KY 41094
Contact country:	US
Contact telephone:	(859) 485-1500
Contact email:	Not reported
EPA Region:	04
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	KENNETH FIELD
Owner/operator address:	1430 INDUSTRIAL DR ITASCA, IL 60143
Owner/operator country:	Not reported
Owner/operator telephone:	(859) 485-1500
Legal status:	Private

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Owner/Operator Type: Owner
Owner/Op start date: 01/01/0001
Owner/Op end date: Not reported

Owner/operator name: UNKNOWN
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 09/10/2003
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 08/14/2009
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/12/2008
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/11/2007
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/12/2006
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/12/2005
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/13/2004
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Date form received by agency: 09/10/2003
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/03/2002
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 10/02/2001
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 09/08/2000
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Date form received by agency: 08/27/1999
Facility name: CONTINENTAL WEB PRESS OF KENTUCKY
Classification: Small Quantity Generator

Hazardous Waste Summary:
Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

Waste code: D035
Waste name: METHYL ETHYL KETONE

Waste code: F005
Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 09/29/2010
Date achieved compliance: 09/29/2010
Violation lead agency: State
Enforcement action: VERBAL INFORMAL
Enforcement action date: 09/29/2010
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 09/08/2008
Date achieved compliance: 09/08/2008
Violation lead agency: State
Enforcement action: VERBAL INFORMAL
Enforcement action date: 09/08/2008
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: Not reported
Area of violation: Universal Waste - Small Quantity Handlers
Date violation determined: 07/11/2007
Date achieved compliance: 08/27/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: Not reported
Area of violation: TSD IS-Preparedness and Prevention
Date violation determined: 07/11/2007
Date achieved compliance: 08/27/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: Not reported
Area of violation: Generators - Pre-transport
Date violation determined: 07/11/2007
Date achieved compliance: 08/27/2007
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 07/11/2007
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:010 2

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Area of violation: Generators - Records/Reporting
Date violation determined: 02/11/2005
Date achieved compliance: 03/25/2005
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/11/2005
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 35:030 7(1)
Area of violation: Generators - Pre-transport
Date violation determined: 02/11/2005
Date achieved compliance: 03/25/2005
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 02/11/2005
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 35:180 5
Area of violation: Generators - General
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:040 3
Area of violation: Generators - Records/Reporting
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:030 5(4)(E)
Area of violation: Generators - Records/Reporting

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:030 5(4)2
Area of violation: Generators - Records/Reporting
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:030 5(1)(B)
Area of violation: Generators - General
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 35:020 6(4)
Area of violation: Generators - Records/Reporting
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 35:020 6(1,2)
Area of violation: Generators - Records/Reporting
Date violation determined: 11/07/2001

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 37:010 7
Area of violation: LDR - General
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:030 5(3)(A)2
Area of violation: Generators - General
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Regulation violated: SR - 32:100
Area of violation: Generators - Manifest
Date violation determined: 11/07/2001
Date achieved compliance: 01/03/2002
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/07/2001
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Evaluation Action Summary:
Evaluation date: 09/29/2010
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Date achieved compliance: 09/29/2010
Evaluation lead agency: State

Evaluation date: 09/08/2008
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 09/08/2008
Evaluation lead agency: State

Evaluation date: 09/06/2007
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Generators - Pre-transport
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 09/06/2007
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: TSD IS-Preparedness and Prevention
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 09/06/2007
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Universal Waste - Small Quantity Handlers
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 07/11/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Universal Waste - Small Quantity Handlers
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 07/11/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 07/11/2007
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD IS-Preparedness and Prevention
Date achieved compliance: 08/27/2007
Evaluation lead agency: State

Evaluation date: 03/29/2005
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 02/11/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Records/Reporting
Date achieved compliance: 03/25/2005
Evaluation lead agency: State

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

Evaluation date: 02/11/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Pre-transport
Date achieved compliance: 03/25/2005
Evaluation lead agency: State

Evaluation date: 02/11/2002
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 01/03/2002
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 11/07/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Records/Reporting
Date achieved compliance: 01/03/2002
Evaluation lead agency: State

Evaluation date: 11/07/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - Manifest
Date achieved compliance: 01/03/2002
Evaluation lead agency: State

Evaluation date: 11/07/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 01/03/2002
Evaluation lead agency: State

Evaluation date: 11/07/2001
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 01/03/2002
Evaluation lead agency: State

Evaluation date: 12/30/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

FINDS:

Registry ID: 110003246292

Environmental Interest/Information System
AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is

CONTINENTAL WEB PRESS OF KENTUCKY (Continued) **1001077380**

used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

CRITERIA AND HAZARDOUS AIR POLLUTANT INVENTORY

B5 **TRAVEL CENTER OF AMERICA #02141** **SB193** **S105701265**
SSW **145 RICHWOOD RD** **N/A**
< 1/8 **WALTON, KY 41094**
0.068 mi.
357 ft. **Site 1 of 3 in cluster B**

Relative:
Higher

Actual:
908 ft.

KY SENATE BILL 193 INVENTORY:
KY SENATE BILL 193 INVENTORY: CLW
Facility ID: 6719008
Soil / Groundwater: Soil
Agency Interest Number: 265

B6 **CINCINNATI SOUTH TRAVELCENTER** **RCRA-NonGen** **1000173629**
SSW **145 RICHWOOD ROAD** **FINDS** **KYD000831123**
< 1/8 **RICHWOOD, KY 41094**
0.068 mi.
357 ft. **Site 2 of 3 in cluster B**

Relative:
Higher

Actual:
908 ft.

RCRA-NonGen:
Date form received by agency: 01/02/1991
Facility name: TRUCKSTOPS OF AMERICA
Facility address: 145 RICHWOOD ROAD
RICHWOOD, KY 41094
EPA ID: KYD000831123
Mailing address: RICHWOOD ROAD
RICHWOOD, KY 41094
Contact: ROGER LISTER
Contact address: 145 RICHWOOD ROAD
RICHWOOD, KY 41094
Contact country: US
Contact telephone: (606) 485-4111
Contact email: Not reported
EPA Region: 04
Land type: Facility is not located on Indian land. Additional information is not known.
Classification: Non-Generator

CINCINNATI SOUTH TRAVELCENTER (Continued) **1000173629**

Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: TRUCKSTOPS OF AMERICA, INC.
Owner/operator address: 145 RICHWOOD ROAD
RICHWOOD, KY 41094
Owner/operator country: Not reported
Owner/operator telephone: (606) 485-4111
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Hazardous Waste Summary:
Waste code: NONE
Waste name: None

Facility Has Received Notices of Violations:
Regulation violated: SS - KRS 224:876
Area of violation: Generators - General
Date violation determined: 03/01/1991
Date achieved compliance: 04/12/1991
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 03/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 7
Final penalty amount: 7
Paid penalty amount: 0

Regulation violated: SS - KRS 224:876
Area of violation: Generators - General
Date violation determined: 03/01/1991
Date achieved compliance: 04/12/1991
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL

CINCINNATI SOUTH TRAVELCENTER (Continued) **1000173629**

Enforcement action date: 03/01/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 0
Final penalty amount: 0
Paid penalty amount: 0

Evaluation Action Summary:
Evaluation date: 04/12/1991
Evaluation: COMPLIANCE SCHEDULE EVALUATION
Area of violation: Generators - General
Date achieved compliance: 04/12/1991
Evaluation lead agency: State

Evaluation date: 01/30/1991
Evaluation: NON-FINANCIAL RECORD REVIEW
Area of violation: Generators - General
Date achieved compliance: 04/12/1991
Evaluation lead agency: State

FINDS:

Registry ID: 110003220372

Environmental Interest/Information System

US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

PCS (Permit Compliance System) is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

B7 **WALTON TRAVEL CENTER** **UST** **U001184225**
SSW **145 RICHWOOD RD** **PSTEAF** **N/A**
< 1/8 **WALTON, KY 41094**
0.068 mi.
357 ft. **Site 3 of 3 in cluster B**

Relative:
Higher

Actual:
908 ft.

UST:

Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	11
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	12
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported

WALTON TRAVEL CENTER (Continued) **U001184225**

Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	13
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA

WALTON TRAVEL CENTER (Continued) **U001184225**

Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	14
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL

WALTON TRAVEL CENTER (Continued) **U001184225**

Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	15
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported

WALTON TRAVEL CENTER (Continued) **U001184225**

Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	16
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	AUTOMATIC TANK GAUGING
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Unknown
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	LTT
Pipe Rel Detect Suc Code:	ALT
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	9/15/1998
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	USED OIL
Capacity in Gallons:	1000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR

WALTON TRAVEL CENTER (Continued) **U001184225**

Internal Document ID: 0

Sequence Id: 6719008
Facility ID: 265
Subject Item Id: 1
Tank Status: **Tank active**
Inert Material Code: Not reported
Tank Material: FIBERGLASS REINFORCED PLASTIC
Tank External Protection: AUTOMATIC TANK GAUGING
Tank Internal Protection: NA
Tank Overfill Protection: Flow Restrictor
Pipe Material: Fiberglass Reinforced Plastic
Pipe External Protection: NA
Pipe Type: Pressurized
Pipe Release Detection: LTT
Pipe Rel Detect Suc Code: NON
Pipe Leak Detect Code: MLD
Installation Date: 12/16/1992
Closed In Place Date: Not reported
Relined Date: Not reported
Last Contained Date: Not reported
Closed in Place Date: Not reported
Removed Date: Not reported
Change in Service Date: Not reported
Tank Pit Num: Not reported
Compartment Num: 1
Tank Substance Code: REG
Capacity in Gallons: 10000
Tank Manufctr Code: FRP
Pipe Manufctr Code: AMR
Last Tank Test Date: 5/31/2007
Last Pipe Test Date: 6/23/2009
Lining Insp Date: Not reported
Last Cp Test Date: Not reported
Added To Flex Date: 6/15/2009
Added To Piping Date: Not reported
Added To Tank Date: Not reported
Piping Installation Date: Not reported
Owner Name: TA Operating LLC
Owner Address: 24601 Center Ridge Rd
Owner Address2: Not reported
Owner Address3: Not reported
Owener City,St,Zip: Westlake, OH 441455634
Owner Phone: 440-808-7406
Latitude: 84 37 34.6
Longitude: 38 55 00.4
Subject Item Category Code: STOR
Internal Document ID: 0

Sequence Id: 6719008
Facility ID: 265
Subject Item Id: 2
Tank Status: **Tank active**
Inert Material Code: Not reported
Tank Material: FIBERGLASS REINFORCED PLASTIC
Tank External Protection: AUTOMATIC TANK GAUGING
Tank Internal Protection: NA

WALTON TRAVEL CENTER (Continued) **U001184225**

Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	LTT
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	PLS
Capacity in Gallons:	10000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	6/15/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	3
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	AUTOMATIC TANK GAUGING
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	LTT
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported

WALTON TRAVEL CENTER (Continued) **U001184225**

Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	PRM
Capacity in Gallons:	10000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	6/15/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	4
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR

WALTON TRAVEL CENTER (Continued) **U001184225**

Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	5
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd

WALTON TRAVEL CENTER (Continued) **U001184225**

Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	7
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008

WALTON TRAVEL CENTER (Continued) **U001184225**

Facility ID:	265
Subject Item Id:	8
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	9
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown

WALTON TRAVEL CENTER (Continued) **U001184225**

Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	17
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	AUTOMATIC TANK GAUGING
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Unknown
Pipe External Protection:	Unknown
Pipe Type:	Suction
Pipe Release Detection:	Check Valve
Pipe Rel Detect Suc Code:	CKV
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1985
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	9/20/1998

WALTON TRAVEL CENTER (Continued) **U001184225**

Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	NEW OIL
Capacity in Gallons:	8000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	18
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	DOUBLE WALL FIBERGLASS
Tank External Protection:	INTERSTITIAL MONITORING/SECONDARY CONTAINMENT
Tank Internal Protection:	NA
Tank Overfill Protection:	Exempt From Overfill Prevention
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	NA
Pipe Release Detection:	None
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	NA
Installation Date:	9/20/1998
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	USED OIL
Capacity in Gallons:	1000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported

WALTON TRAVEL CENTER (Continued) **U001184225**

Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	19
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	DOUBLE WALL FIBERGLASS
Tank External Protection:	INTERSTITIAL MONITORING/SECONDARY CONTAINMENT
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Suction
Pipe Release Detection:	None
Pipe Rel Detect Suc Code:	CKV
Pipe Leak Detect Code:	NA
Installation Date:	9/28/1998
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	NEW OIL
Capacity in Gallons:	8000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	7/9/2008
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	6/15/2009
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634

WALTON TRAVEL CENTER (Continued) **U001184225**

Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	6
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	12/16/1992
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	FRP
Pipe Manufctr Code:	AMR
Last Tank Test Date:	5/31/2007
Last Pipe Test Date:	6/23/2009
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	TA Operating LLC
Owner Address:	24601 Center Ridge Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-7406
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6719008
Facility ID:	265
Subject Item Id:	10
Tank Status:	**Tank removed/verified**

WALTON TRAVEL CENTER (Continued) **U001184225**

Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1969
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	12/16/1992
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Travel Centers of America
Owner Address:	24601 Center Ridge Rd Ste 200
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Westlake, OH 441455634
Owner Phone:	440-808-4431
Latitude:	84 37 34.6
Longitude:	38 55 00.4
Subject Item Category Code:	STOR
Internal Document ID:	0

PSTEAF:

Facility Id:	265
AI Number:	265
UST Id Number:	6719008
Rank:	3
Financial Account:	Not reported
USTB Technical Reviewer:	Hokanson

8
NW
< 1/8
0.102 mi.
536 ft.

SCOT TRUCK STOP
142 OLD RICHWOOD RD
WALTON, KY 41094

UST **U001184224**
N/A

Relative:
Higher

Actual:
907 ft.

UST:

Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	1
Tank Status:	**Tanks exempted/registered in error**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1901
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	FUEL OIL
Capacity in Gallons:	99
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	2
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported

SCOT TRUCK STOP (Continued) **U001184224**

Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	3
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA

SCOT TRUCK STOP (Continued) **U001184224**

Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	5
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL

SCOT TRUCK STOP (Continued) **U001184224**

Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	6
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported

SCOT TRUCK STOP (Continued) **U001184224**

Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	8
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	10000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR

SCOT TRUCK STOP (Continued) **U001184224**

Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	9
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	4
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA

SCOT TRUCK STOP (Continued) **U001184224**

Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	6718008
Facility ID:	69289
Subject Item Id:	7
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	FIBERGLASS REINFORCED PLASTIC
Tank External Protection:	NON
Tank Internal Protection:	NA
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported

SCOT TRUCK STOP (Continued) **U001184224**

Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	1/8/1993
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	5000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Truckstops Of America Corp
Owner Address:	200 PUBLIC SQUARE
Owner Address2:	Not reported
Owner Address3:	12 P
Owener City,St,Zip:	Cleveland, OH 44114
Owner Phone:	216-256-4176
Latitude:	-84.626398
Longitude:	38.920187
Subject Item Category Code:	STOR
Internal Document ID:	0

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9 **TRADER SALVAGE** **UST** **U003415762**
North **11139 DIXIE HWY** **N/A**
< 1/8 **RICHWOOD, KY 41094**
0.121 mi.
640 ft.

Relative:
Higher

Actual:
928 ft.

UST:

Sequence Id:	2697008
Facility ID:	69649
Subject Item Id:	1
Tank Status:	**Tanks exempted/registered in error**
Inert Material Code:	Not reported
Tank Material:	UNKNOWN
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Unknown
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1901
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported

TRADER SALVAGE (Continued) **U003415762**

Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	EMPTY
Capacity in Gallons:	500
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Estate Of Opal Robinson
Owner Address:	10975 Dixie Hwy
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	Not reported
Latitude:	-84.625839
Longitude:	38.921827
Subject Item Category Code:	STOR
Internal Document ID:	0

C10 **TENNECO TRUCK STOP** **RCRA-NonGen** **1000312055**
WSW **I75 & 338** **FINDS** **KYD981854383**
1/8-1/4 **RICHWOOD, KY 41094**
0.244 mi.
1286 ft. **Site 1 of 2 in cluster C**

Relative:
Lower

Actual:
880 ft.

RCRA-NonGen:

Date form received by agency:	03/10/1987
Facility name:	TENNECO TRUCK STOP
Facility address:	I75 & 338 RICHWOOD, KY 41094
EPA ID:	KYD981854383
Mailing address:	FRONTAGE ROAD WALTON, KY 41094
Contact:	ESTILL HURSTON
Contact address:	11229 FRONTAGE ROAD WALTON, KY 41094
Contact country:	US
Contact telephone:	(606) 485-1085
Contact email:	Not reported
EPA Region:	04
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	TENNECO OIL CO.
Owner/operator address:	11229 FRONTAGE ROAD WALTON, KY 41094
Owner/operator country:	Not reported
Owner/operator telephone:	(606) 485-1085
Legal status:	Private
Owner/Operator Type:	Owner

TENNECO TRUCK STOP (Continued) **1000312055**

Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Hazardous Waste Summary:
Waste code: NONE
Waste name: None

Violation Status: No violations found

FINDS:

Registry ID: 110008363029

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

C11 **CHEVRON USA PRODUCTS CO INC** **RCRA-NonGen** **1001077397**
WSW **I-75 & KY 338** **FINDS** **KYR000003996**
1/8-1/4 **WALTON, KY 41094**
0.244 mi.
1286 ft. **Site 2 of 2 in cluster C**

Relative:
Lower

Actual:
880 ft.

RCRA-NonGen:
Date form received by agency: 09/19/1996
Facility name: CHEVRON USA PRODUCTS CO INC
Facility address: I-75 & KY 338
WALTON, KY 41094
EPA ID: KYR000003996
Mailing address: P.O. BOX 1706
ATLANTA, GA 30301
Contact: BILL CHANDLER
Contact address: P.O. BOX 1706
ATLANTA, GA 30301
Contact country: US

CHEVRON USA PRODUCTS CO INC (Continued) **1001077397**

Contact telephone: (510) 842-5931
Contact email: Not reported
EPA Region: 04
Classification: Non-Generator
Description: Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:
Owner/operator name: CHEVRON USA
Owner/operator address: P.O. BOX 1706
ATLANTA, GA 30301
Owner/operator country: Not reported
Owner/operator telephone: (510) 842-5931
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Hazardous Waste Summary:
Waste code: NONE
Waste name: None

Violation Status: No violations found

FINDS:

Registry ID: 110002067101

Environmental Interest/Information System
AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

CHEVRON USA PRODUCTS CO INC (Continued) **1001077397**

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

12
WSW
1/4-1/2
0.416 mi.
2196 ft.

PILOT TRAVEL CENTER #321
11229 FRONTAGE RD
WALTON, KY 41094

UST **U004010402**
NPDES **N/A**
AIRS
PSTEAF

Relative:
Lower

Actual:
860 ft.

UST:

Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	3
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1984
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	STU
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	9/28/2008
Added To Flex Date:	9/28/2008
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	4
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1984
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	STU
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	9/28/2008
Added To Flex Date:	9/28/2008
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	5
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1984
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	STU
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	9/28/2008
Added To Flex Date:	9/28/2008
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	6
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Electronic Leak Detection
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	ELD
Installation Date:	1/1/1984

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Closed In Place Date:	9/12/2008
Relined Date:	Not reported
Last Contained Date:	9/12/2008
Closed in Place Date:	Not reported
Removed Date:	9/12/2008
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	5/4/2007
Added To Flex Date:	7/30/2004
Added To Piping Date:	7/30/2004
Added To Tank Date:	9/24/1998
Piping Installation Date:	1/1/1984
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	7
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Electronic Leak Detection
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	ELD
Installation Date:	1/1/1984
Closed In Place Date:	9/12/2008
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	9/12/2008
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	12000

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	5/4/2007
Added To Flex Date:	7/30/2004
Added To Piping Date:	7/30/2004
Added To Tank Date:	9/24/1998
Piping Installation Date:	1/1/1984
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	8
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Electronic Leak Detection
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	ELD
Installation Date:	1/1/1984
Closed In Place Date:	9/12/2008
Relined Date:	Not reported
Last Contained Date:	9/12/2008
Closed in Place Date:	Not reported
Removed Date:	9/12/2008
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	5/4/2007
Added To Flex Date:	7/30/2004
Added To Piping Date:	7/30/2004
Added To Tank Date:	9/24/1998
Piping Installation Date:	1/1/1984

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	2558008
Facility ID:	229
Subject Item Id:	9
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Automatic Shutoff Device
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	MLD
Installation Date:	1/1/1984
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	20000
Tank Manufctr Code:	STU
Pipe Manufctr Code:	FRP
Last Tank Test Date:	5/16/2007
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	9/28/2008
Added To Flex Date:	9/28/2008
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Sequence Id:	Not reported
Facility ID:	229
Subject Item Id:	10
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic
Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	ELD
Installation Date:	9/17/2008
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	2
Tank Substance Code:	REG
Capacity in Gallons:	16000
Tank Manufctr Code:	ACT
Pipe Manufctr Code:	FRP
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	Not reported
Facility ID:	229
Subject Item Id:	10
Tank Status:	**Tank active**
Inert Material Code:	Not reported
Tank Material:	SWM
Tank External Protection:	STATISTICAL INVENTORY RECONCILIATION
Tank Internal Protection:	NA
Tank Overfill Protection:	Flow Restrictor
Pipe Material:	Fiberglass Reinforced Plastic

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

Pipe External Protection:	NA
Pipe Type:	Pressurized
Pipe Release Detection:	Statistical Inventory Reconciliation
Pipe Rel Detect Suc Code:	NON
Pipe Leak Detect Code:	ELD
Installation Date:	9/17/2008
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	Not reported
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	PRM
Capacity in Gallons:	9000
Tank Manufctr Code:	ACT
Pipe Manufctr Code:	FRP
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Pilot Travel Centers LLC
Owner Address:	5508 Lonas Rd
Owner Address2:	Not reported
Owner Address3:	Not reported
Owener City,St,Zip:	Knoxville, TN 37909
Owner Phone:	865-588-7488
Latitude:	-84.6325
Longitude:	38.917222
Subject Item Category Code:	STOR
Internal Document ID:	0

NPDES:

Federal Facility ID:	Not reported
Facility Status:	ACTIVE
KY DES #:	KY0080772
Total App# Design Flow (MGD):	0
Total Actual Average Flow (MGD):	0
Horizontal Collect Method Desc:	Not reported
Ownership:	Not reported
Facility Addr 2:	Not reported
Inactive Date:	Not reported
Design Capacity:	8.5999999999999993E-2
Fee Category:	NPIND
SIC Code:	5541
Lat/Long:	3854590 / -8437570
Lat/Long Method:	A
USGS Hydrologic Basin Code:	5090203
Facility Stream Segment:	Not reported
Facility Mileage Indicator:	Not reported
Basin Code:	521
Basin Code Description:	OR/OHIO R-MAIN STEM

PILOT TRAVEL CENTER #321 (Continued) **U004010402**

DMR Contact:	JASON MCCAIN
Contact Telephone:	8655887488
Mailing Address:	JOEY CUPP / ENV COMP MGR
Mailing Address 2:	PO BOX 10146
Mailing City,St,Zip:	KNOXVILLE, TN 37939
Permit Issued:	09/10/2007
Permit Expires:	10/31/2012
SIC Code Description:	GASOLINE SERVICE STATIONS
Reveiving Waters:	MUD LICK CRK / UT
Major/Minor:	MINOR

AIRS:

Facility:	2101500654
Alt Facility Name:	Pilot Corporation
Alt Facility End Date:	Not reported
Contact Name:	Ms. Cindy Spradling
Contact Addr:	PO Box 10146
City:	Knoxville
State:	TN
Zip:	37909
Phone:	423-588-7488
Daq contact fax:	Not reported
Daq contact email:	Not reported
Emps:	5
Plant Class Descr.:	R; Registered Source
Principal Product:	GASOLINE
Acreage:	0
Latitude/Longitude:	38.91722200 / -84.632499
SIC:	5541
SIC Desc:	Gasoline Service Stations
NAIC:	44711
NAIC Desc:	Gasoline Stations with Convenience Stores
AI Id:	229
AI Start Date:	06/19/2002
AI End Date:	Not reported
DAQ AI Type:	RETAIL- Retail Trade, Gasoline Stations (447)
DAQ Reg Comment:	Not reported
Mailing Address Line 2:	Not reported
Mailing Address Line 3:	Not reported
SCC:	40400414, 40600301, 40600307, 40600401, 40600402
State Plant Class Code:	R000
Inspector Assigned AI:	Maria Schmitt
Last Inspection Lead:	Not reported
Last Inspection Date:	Not reported
Air Programs:	0-SIP Source
Air Subparts:	Not Applicable

PSTEAF:

Facility Id:	229
AI Number:	229
UST Id Number:	2558008
Rank:	3
Financial Account:	FRA
USTB Technical Reviewer:	Hokanson

13
NNW
1/2-1
0.553 mi.
2922 ft.

BRINKMAN OIL CO
10945 DIXIE HWY
WALTON, KY 41094

SHWS **U001441856**
UST **N/A**

Relative:
Higher

Actual:
944 ft.

SHWS:

Status:	**Closed**
Description:	BRINKMAN OIL CO. (Closed: Non-Incident)
Longitude:	-84.62757999999
Latitude:	38.926920000000
Subject Item County:	Boone
Sub Item Longitude:	38.926920000000
Subject Item Address:	10945 Dixie Hwy
Subject Item Address2:	Not reported
Subject Item City,St,Zip:	Walton, KY 41094
Regulatory Desc:	Petroleum Cleanup
Closure Option:	Non-Incident
Side SG:	37614
Closure Date:	1998-08-26

UST:

Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	1
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1976
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	KEROSENE
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co

BRINKMAN OIL CO (Continued) **U001441856**

Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	2
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1976
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	15000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0

BRINKMAN OIL CO (Continued) **U001441856**

Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	3
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1976
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	DIESEL
Capacity in Gallons:	15000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0

Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	4
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel

BRINKMAN OIL CO (Continued) **U001441856**

Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1976
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	5
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1901
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported

BRINKMAN OIL CO (Continued) **U001441856**

Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	12000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	6
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1976
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/17/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	6000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported

BRINKMAN OIL CO (Continued) **U001441856**

Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	7
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	SINGLE WALL STEEL
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Single Wall Steel
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1978
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	GASOLINE
Capacity in Gallons:	6000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported

BRINKMAN OIL CO (Continued) **U001441856**

Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0
Sequence Id:	553008
Facility ID:	52647
Subject Item Id:	8
Tank Status:	**Tank removed/verified**
Inert Material Code:	Not reported
Tank Material:	UNKNOWN
Tank External Protection:	NON
Tank Internal Protection:	Unknown
Tank Overfill Protection:	Unknown
Pipe Material:	Unknown
Pipe External Protection:	Unknown
Pipe Type:	Unknown
Pipe Release Detection:	Unknown
Pipe Rel Detect Suc Code:	UNK
Pipe Leak Detect Code:	NA
Installation Date:	1/1/1979
Closed In Place Date:	Not reported
Relined Date:	Not reported
Last Contained Date:	Not reported
Closed in Place Date:	Not reported
Removed Date:	6/16/1989
Change in Service Date:	Not reported
Tank Pit Num:	Not reported
Compartment Num:	1
Tank Substance Code:	KEROSENE
Capacity in Gallons:	20000
Tank Manufctr Code:	Not reported
Pipe Manufctr Code:	Not reported
Last Tank Test Date:	Not reported
Last Pipe Test Date:	Not reported
Lining Insp Date:	Not reported
Last Cp Test Date:	Not reported
Added To Flex Date:	Not reported
Added To Piping Date:	Not reported
Added To Tank Date:	Not reported
Piping Installation Date:	Not reported
Owner Name:	Brinkman Oil Co
Owner Address:	260 Old Nicholson Rd
Owner Address2:	PO Box 587
Owner Address3:	Not reported
Owener City,St,Zip:	Walton, KY 41094
Owner Phone:	859-485-4177
Latitude:	-84.62758
Longitude:	38.92692
Subject Item Category Code:	STOR
Internal Document ID:	0

14
North
1/2-1
0.840 mi.
4433 ft.

EATON ASPHALT PAVING CO INC
212 E FROGTOWN RD.
WALTON, KY 41094

SHWS

S108311748
N/A

Relative:
Higher

Actual:
914 ft.

SHWS:

Status:	**Closed**
Description:	ASTs leaked
Longitude:	-84.62166700000
Latitude:	38.933889000000
Subject Item County:	Boone
Sub Item Longitude:	38.931159999999
Subject Item Address:	212 E Frogtown Rd
Subject Item Address2:	Not reported
Subject Item City,St,Zip:	Walton, KY 41094
Regulatory Desc:	Petroleum Cleanup
Closure Option:	Option C Restored
Side SG:	DSL spill
Closure Date:	1999-08-18

Count: 64 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
BOONE COUNTY	S108900400	CINN/NORTHERN KY INTL AIRPORT	BOONE COUNTY		NPDES
BOONE COUNTY	S108901179	CINCINNATI/N KY INTL AIRPORT	NEW FBO APRON @ TOWER DR		NPDES
COVINGTON	S109943870	BRIDGE FOREMAN OFFICE	JCT OF E 2ND ST / ROEBLING	41094	SHWS
ERLANGER	S111026016	DELTA AIR LINES	DONALDSON RD	41042	SHWS
FLORENCE	S108311964	MOUNTAIN ENTERPRISES INC - GRASSY	KY 1773 W	41042	AIRS
FLORENCE	S110778091	KY 1829 WIDENING	KY 1829	41042	NPDES
FLORENCE	1014719796	KY 1829 WIDENING	KY 1829	41042	FINDS
FLORENCE	U004137567	SUNOCO 0016-5530	8460 RT 42	41042	UST
FLORENCE	S109365212	I 75 N REST AREA - BOONE CO	I 75 N	41042	SHWS
FLORENCE	S109365211	I 75 S REST AREA - BOONE CO	I 75 S	41042	SHWS
FLORENCE	S107466965	ACE DORAN TRUCKING I-75 FUEL SPILL	I 75	41042	SHWS
FLORENCE	S107467233	GUARDIAN LIFE INSURANCE FUEL OIL S	BLDG	41042	SHWS
FLORENCE	1010508805	BOONE COUNTY HIGH SCHOOL	7056 BURLINGTON PIKE	41042	FINDS
FLORENCE	S108902901	BOONE COUNTY HIGH SCHOOL	7056 BURLINGTON PIKE	41042	NPDES
FLORENCE	S107152364	I.C.G. RAILROAD DERAILMENT	CLAXTON RD	41042	SHWS
FLORENCE	1000416658	KENTON COUNTY AIRPORT	DONALDSON HWY	41042	RCRA-TSDF, CERC-NFRAP, CORRA RCRA-CESQG, US INST CONTROL, FINDS
FLORENCE	S111341636	HOUSTON RD - BOONE CO	HOUSTON RD	41042	NPDES
FLORENCE	1014717741	37181 - THORNTONS INC #556	8104 US HWY 42	41042	FINDS
FLORENCE	1000826571	KENTON COUNTY WATER DISTRICT NO. 1	INDUSTRIAL ROAD	41042	RCRA-NonGen, FINDS
FLORENCE	U004148166	SEARS STORE NO 1730	3000 MALL RD	41042	UST
FLORENCE	S106884134	SEARS STORE NO 1730	3000 MALL RD	41042	SHWS
FLORENCE	S108900562	NO SITE OFFICE	NW OF FLORENCE	41042	NPDES
FLORENCE	S106884146	SUNNYBROOK MERCURY SITE	SUNNYBROOK DR	41042	SHWS
FLORENCE	1012314803	CELLCO - NORTH FLORENCE	7500 TURFWAY ROAD	41042	FINDS
FLORENCE	S106884126	BOONE CO BOARD OF EDUCATION	8330 USHY 42	41042	SHWS
FLORENCE	S105701261	SPEEDWAY SUPER AMERICA#9692	8240 USHY 42	41042	SB193
FLORENCE	U004118469	SPEEDWAY #7073	8699 USHY 42	41042	UST
FLORENCE	U003989954	DETERS CO INC	8450 USHY 42	41042	UST
FLORENCE	U003991225	SPEEDWAY SUPERAMERICA LLC 9692	8240 USHY 42	41042	UST, PSTEAF
FLORENCE	U003990316	HARPER PROPERTIES INC	8063 USHY 42	41042	UST, AIRS
MCVILLE	S106884114	MIDDLE CREEK - COAST GUARD AID	KY 18	41091	SHWS
RABBIT HASH	2000524694	ROUTE 338 BEAVER ROAD	ROUTE 338 BEAVER ROAD	41091	ERNS
RABBIT HASH	96506478	EASTBEND STATION RT 338	EASTBEND STATION RT 338	41091	ERNS
RABBIT HASH	96510552	EASTBEND STATION RT 338	EASTBEND STATION RT 338	41091	ERNS
RABBIT HASH	1014198639	DUKE ENERGY KENTUCKY - EAST BEND G	6293 STHY 338 BEAVER ROAD	41091	TSCA
UNION	S106884112	GUNPOWDER - COAST GUARD AID	KY 338	41091	SHWS
UNION	S106884139	GUNPOWDER CREEK DRUM	KY 338	41091	SHWS
UNION	U001441145	UNION PUBLIC UTILITY STATION	HWY 42	41091	UST
UNION	S110041926	ABITIBI PAPER RETRIEVER	10400 HWY 42	41091	SWRCY, NPDES
UNION	S106884141	I 71 S WEIGH STATION DRUMS - BOONE	I 71 S	41091	SHWS
UNION	1014718151	CINCINNATI GAS & ELECTRIC - EAST B	E BEND STA	41091	FINDS

Count: 64 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
UNION	S110491745	KYTC 071160 ITEM 06-0203.00	USHY 42	41091	NPDES
UNION	1011862152	KROGER CO-STORE 424	8825 USHY 42	41091	RCRA-CESQG
UNION	U003885738	KROGER FUEL CENTER 424	8825 USHY 42	41091	UST, AIRS
UNION	U003876707	REEVES COLLISION SERVICE	10829 USHY 42	41091	UST
UNION	S106884144	WASHINGTON MUTUAL BANK PROPERTY	10894 USHY 42	41091	SHWS
UNION	S110041916	ABITIBI PAPER RETRIEVER	8899 USHY 42	41091	SWRCY
UNION	U003989558	AMERISTOP FOOD MART 29113	10326 USHY 42	41091	UST
WAHON	1000826365	KENTON COUNTY DRUMS	OLD DECOURSEY ROAD	41094	RCRA-NonGen, FINDS
WALTON	S109365255	CSX TRANSPORTATION DIESEL SPILL	KY 25	41094	SHWS
WALTON	1004706151	TOM'S AUTO BODY	US 25S BOX 468A	41094	RCRA-NonGen, FINDS
WALTON	S109615460	I 71 S WEIGH STATION - BOONE CO	I 71 S	41094	SHWS
WALTON	S109615461	I 75 S WEIGH STATION - KENTON CO	I 75 S	41094	SHWS
WALTON	S106884136	MCELROY BP	I 75 & STEPHENSON MILL RD	41094	SHWS
WALTON	2008889145	INTERSTATE 75, EXIT 171	INTERSTATE 75, EXIT 171		ERNS
WALTON	S108011886	BOONE INN	BOX 704 & I 75 WALTONEXIT	41094	FINANCIAL ASSURANCE
WALTON	S110777755	AUTOZONE STORE NO. 3591	CHESTNUT DR	41094	NPDES
WALTON	1014718129	AUTOZONE STORE NO. 3591	CHESTNUT DR	41094	FINDS
WALTON	1000979303	PARCEL 16 ITEM NO. 6-133-0	MAIN STREET, US 25	41094	RCRA-NonGen, FINDS
WALTON	92285452	T.A TRUCK STOP INST. 75	T.A TRUCK STOP INST. 75		ERNS
WALTON	U001743407	PARCEL 16 (ITEM NO 6-133.0)	USHY 25 MAIN ST	41094	UST
WALTON	1014718765	60310 - MCINTOSCH SERVICE	25 USHY S	41094	FINDS
WALTON	S106059511	MCINTOSH SERVICE	25 USHY S	41094	SB193
WALTON	U003990865	MCINTOSCH SERVICE	25 USHY S	41094	UST, PSTEAF

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 01/11/2012
Next Scheduled EDR Contact: 04/23/2012
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 01/11/2012
Next Scheduled EDR Contact: 04/23/2012
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 01/10/2012
Next Scheduled EDR Contact: 04/23/2012
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 11/29/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/13/2012
Next Scheduled EDR Contact: 04/23/2012
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 11/29/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 08/19/2011
Date Data Arrived at EDR: 08/31/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 132

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/14/2011
Next Scheduled EDR Contact: 02/27/2012
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 01/05/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 01/05/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 01/05/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 01/05/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 12/30/2011
Date Data Arrived at EDR: 12/30/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 12/09/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 12/30/2011
Date Data Arrived at EDR: 12/30/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 11

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 12/09/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 10/03/2011
Date Data Arrived at EDR: 10/04/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 38

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/18/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: State Leads List

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 09/26/2011
Date Data Arrived at EDR: 09/26/2011
Date Made Active in Reports: 10/28/2011
Number of Days to Update: 32

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facilities List

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 12/15/2011
Date Data Arrived at EDR: 12/16/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 31

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Semi-Annually

State and tribal leaking storage tank lists

SB193: SB193 Branch Site Inventory List

The inventory indicates facilities that have performed permanent closure activities at a regulated underground storage tank facility and have known soil and/or groundwater contamination.

Date of Government Version: 09/05/2006
Date Data Arrived at EDR: 09/13/2006
Date Made Active in Reports: 10/18/2006
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 01/16/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: No Update Planned

PSTEAF: Facility Ranking List

The Underground Storage Tank Branch (USTB) has ranked all PSTEAF reimbursable facilities requiring corrective action, in accordance with 401 KAR 42:290. Directive letters will be issued on the basis of facility ranking and available PSTEAF funding in sequential order as ranked. For example, Rank 2 facilities will be issued directives before Rank 3 facilities.

Date of Government Version: 10/07/2011
Date Data Arrived at EDR: 10/18/2011
Date Made Active in Reports: 11/01/2011
Number of Days to Update: 14

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 01/18/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/01/2011
Date Data Arrived at EDR: 11/01/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 10

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 11/01/2011
Next Scheduled EDR Contact: 02/13/2012
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/01/2011
Date Data Arrived at EDR: 11/21/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 50

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 12/05/2011
Date Data Arrived at EDR: 12/07/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 12/14/2011
Date Data Arrived at EDR: 12/15/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 26

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Semi-Annually

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 59

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 11/02/2011
Date Data Arrived at EDR: 11/04/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 7

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 12/07/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 40

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 12/07/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 11/28/2011
Date Data Arrived at EDR: 11/29/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 42

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/01/2011
Date Data Arrived at EDR: 11/01/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 10

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/31/2011
Next Scheduled EDR Contact: 02/13/2012
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 12/14/2011
Date Data Arrived at EDR: 12/15/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 26

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 07/01/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 18

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 11/01/2011
Date Data Arrived at EDR: 11/21/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 50

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 11/02/2011
Date Data Arrived at EDR: 11/04/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 7

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Quarterly

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 01/16/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Site Listing
A listing of sites that use engineering controls.

Date of Government Version: 09/26/2011
Date Data Arrived at EDR: 09/26/2011
Date Made Active in Reports: 10/28/2011
Number of Days to Update: 32

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

INST CONTROL: State Superfund Database
A list of closed sites in the State Superfund Database. Institutional controls would be in place at any site that uses Contained or Managed as a Closure Option.

Date of Government Version: 09/26/2011
Date Data Arrived at EDR: 09/26/2011
Date Made Active in Reports: 11/01/2011
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Cleanup Program Sites
Sites that have been accepted into the Voluntary Cleanup Program or have submitted an application.

Date of Government Version: 09/26/2011
Date Data Arrived at EDR: 09/26/2011
Date Made Active in Reports: 11/01/2011
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 10/04/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 38

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 01/06/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Kentucky Brownfield Inventory

The Kentucky Brownfield Program has created an inventory of brownfield sites in order to market the properties to those interested in brownfield redevelopment. The Kentucky Brownfield Program is working to promote the redevelopment of these sites by helping to remove barriers that prevent reuse, providing useful information to communities, developers and the public and encouraging a climate that fosters redevelopment of contaminated sites.

Date of Government Version: 11/16/2011
Date Data Arrived at EDR: 11/18/2011
Date Made Active in Reports: 12/05/2011
Number of Days to Update: 17

Source: Division of Compliance Assistance
Telephone: 502-564-0323
Last EDR Contact: 01/23/2012
Next Scheduled EDR Contact: 05/07/2012
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 06/27/2011
Date Data Arrived at EDR: 06/27/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/27/2011
Next Scheduled EDR Contact: 04/09/2012
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 12/21/2011
Next Scheduled EDR Contact: 04/09/2012
Data Release Frequency: No Update Planned

SWRCY: Recycling Facilities

A listing of recycling facilities located in the state of Kentucky.

Date of Government Version: 10/26/2010
Date Data Arrived at EDR: 11/04/2010
Date Made Active in Reports: 01/11/2011
Number of Days to Update: 68

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 01/27/2012
Next Scheduled EDR Contact: 05/07/2012
Data Release Frequency: Varies

HIST LF: Historical Landfills

This solid waste facility listing contains detail information that is not included in the landfill listing. A listing with detail information is no longer available by the Department of Environmental Protection.

Date of Government Version: 05/01/2003
Date Data Arrived at EDR: 03/30/2006
Date Made Active in Reports: 05/01/2006
Number of Days to Update: 32

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 11/07/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 10/07/2011
Date Data Arrived at EDR: 12/09/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 32

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Quarterly

CDL: Clandestine Drub Lab Location Listing

Clandestine drug lab site locations.

Date of Government Version: 09/26/2011
Date Data Arrived at EDR: 09/26/2011
Date Made Active in Reports: 10/17/2011
Number of Days to Update: 21

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 09/09/2011
Date Data Arrived at EDR: 09/16/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/22/2011
Next Scheduled EDR Contact: 03/05/2012
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 10/04/2011
Date Data Arrived at EDR: 10/04/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 38

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/03/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Annually

SPILLS: State spills

A listing of spill and/or release related incidents.

Date of Government Version: 11/16/2011
Date Data Arrived at EDR: 11/18/2011
Date Made Active in Reports: 12/14/2011
Number of Days to Update: 26

Source: DEP, Emergency Response
Telephone: 502-564-2380
Last EDR Contact: 01/23/2012
Next Scheduled EDR Contact: 05/07/2012
Data Release Frequency: Varies

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (404) 562-8651
Last EDR Contact: 01/05/2012
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/29/2011
Date Data Arrived at EDR: 08/09/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 94

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 11/08/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/20/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 12/09/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/01/2011
Date Data Arrived at EDR: 11/18/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 53

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 12/27/2011
Next Scheduled EDR Contact: 04/16/2012
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 09/28/2011
Date Data Arrived at EDR: 12/14/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 27

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/14/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/29/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 09/08/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 21

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 12/07/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/01/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 131

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 12/02/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/27/2011
Next Scheduled EDR Contact: 04/09/2012
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 11/28/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 11/28/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/30/2012
Next Scheduled EDR Contact: 05/14/2012
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 11/10/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 12/21/2011
Next Scheduled EDR Contact: 04/09/2012
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/20/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/21/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 60

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 12/12/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/12/2012
Next Scheduled EDR Contact: 04/23/2012
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/02/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 119

Source: EPA
Telephone: (404) 562-9900
Last EDR Contact: 12/13/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/30/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Biennially

DRYCLEANERS: Drycleaner Listing

A listing of drycleaner facility locations.

Date of Government Version: 12/07/2011
Date Data Arrived at EDR: 12/08/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 39

Source: Department of Environmental Protection
Telephone: 502-573-3382
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

NPDES: Permitted Facility Listing

A listing of permitted wastewater facilities.

Date of Government Version: 12/15/2011
Date Data Arrived at EDR: 12/20/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 27
Source: Department of Environmental Protection
Telephone: 502-564-3410
Last EDR Contact: 11/14/2011
Next Scheduled EDR Contact: 02/27/2012
Data Release Frequency: Varies

AIRS: Permitted Airs Facility Listing
A listing of permitted Airs facilities.

Date of Government Version: 12/07/2011
Date Data Arrived at EDR: 12/08/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 39
Source: Department of Environmental Protection
Telephone: 502-573-3382
Last EDR Contact: 12/05/2011
Next Scheduled EDR Contact: 03/19/2012
Data Release Frequency: Varies

LEAD: Environmental Lead Program Report Tracking Database
Lead Report Tracking Database

Date of Government Version: 01/19/2011
Date Data Arrived at EDR: 04/19/2011
Date Made Active in Reports: 05/09/2011
Number of Days to Update: 20
Source: Department of Public Health
Telephone: 502-564-4537
Last EDR Contact: 11/14/2011
Next Scheduled EDR Contact: 02/27/2012
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34
Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/20/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54
Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 01/23/2012
Next Scheduled EDR Contact: 05/07/2012
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/20/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: N/A

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/04/2011
Next Scheduled EDR Contact: 02/13/2012
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/08/2011
Next Scheduled EDR Contact: 03/26/2012
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 01/18/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites

A listing of coal ash pond site locations.

Date of Government Version: 02/15/2011
Date Data Arrived at EDR: 02/17/2011
Date Made Active in Reports: 03/15/2011
Number of Days to Update: 26

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/07/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing

Financial Assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/07/2011
Date Data Arrived at EDR: 11/07/2011
Date Made Active in Reports: 12/05/2011
Number of Days to Update: 28

Source: Department of Environmental Protection
Telephone: 502-564-5981
Last EDR Contact: 11/07/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

FINANCIAL ASSURANCE 3: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 12/15/2011
Date Data Arrived at EDR: 12/23/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 24

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/07/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing

A listing of financial assurance information.

Date of Government Version: 12/19/2011
Date Data Arrived at EDR: 12/19/2011
Date Made Active in Reports: 01/23/2012
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 502-564-6716
Last EDR Contact: 11/07/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 11/21/2011
Date Data Arrived at EDR: 11/22/2011
Date Made Active in Reports: 12/22/2011
Number of Days to Update: 30

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/22/2011
Next Scheduled EDR Contact: 03/05/2012
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 07/20/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 22

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/20/2012
Next Scheduled EDR Contact: 04/30/2012
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 11/01/2011
Date Data Arrived at EDR: 11/08/2011
Date Made Active in Reports: 12/22/2011
Number of Days to Update: 44

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 11/08/2011
Next Scheduled EDR Contact: 02/20/2012
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 12/01/2009
Date Made Active in Reports: 12/14/2009
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/23/2012
Next Scheduled EDR Contact: 05/07/2012
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 06/24/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 6

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 11/28/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/15/2011
Number of Days to Update: 27

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/19/2011
Next Scheduled EDR Contact: 04/02/2012
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Certified Child Care Homes
Source: Cabinet for Families & Children
Telephone: 502-564-7130

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Polygon Features
Source: Environmental Protection & Public Protection Cabinet
Telephone: 502-564-5174

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

KY ITEM NO. 6-18.00 - BOONE CO. I-71/75 - KY 338
118 RICHWOOD RD
WALTON, KY 41094

TARGET PROPERTY COORDINATES

Latitude (North):	38.9191 - 38° 55' 8.76''
Longitude (West):	84.6253 - 84° 37' 31.08''
Universal Tranverse Mercator:	Zone 16
UTM X (Meters):	705881.2
UTM Y (Meters):	4310272.5
Elevation:	905 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	38084-H6 UNION, KY
Most Recent Revision:	1984
East Map:	38084-H5 INDEPENDENCE, KY
Most Recent Revision:	1987

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

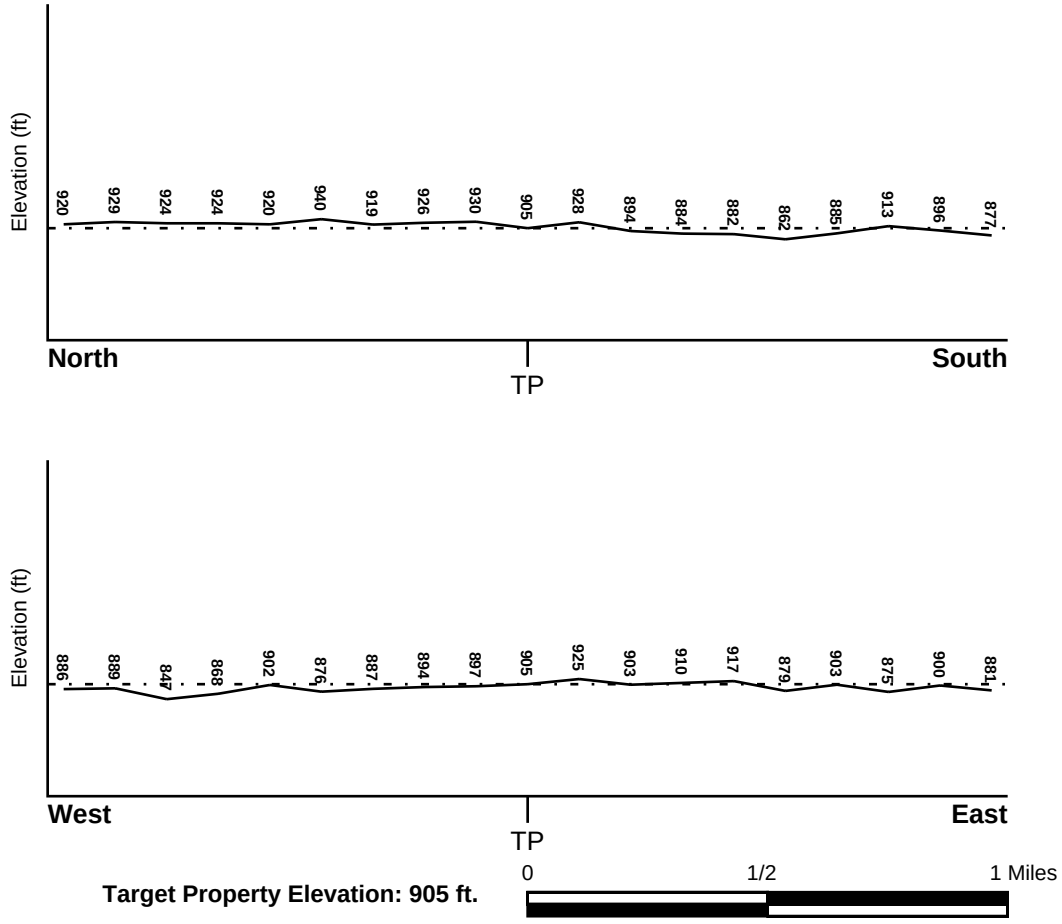
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
BOONE, KY	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 21015C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
UNION	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Paleozoic
System:	Ordovician
Series:	Upper Ordovician (Cincinnatian)
Code:	O3 *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	LOWELL
Soil Surface Texture:	silt loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel:	HIGH
Depth to Bedrock Min:	> 40 inches
Depth to Bedrock Max:	> 40 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	11 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
2	11 inches	23 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 2.00 Min: 0.20	Max: 6.50 Min: 4.50
3	23 inches	53 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 0.60 Min: 0.20	Max: 7.80 Min: 5.10
4	53 inches	57 inches	unweathered bedrock	Not reported	Not reported	Max: 0.06 Min: 0.00	Max: 0.00 Min: 0.00

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: silty clay loam
flaggy - silty clay loam
flaggy - silty clay

Surficial Soil Types: silty clay loam
flaggy - silty clay loam
flaggy - silty clay

Shallow Soil Types: silty clay loam

Deeper Soil Types: silty clay
weathered bedrock
clay
loam
silt loam

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	KY4000000068702	0 - 1/8 Mile ESE
A2	KY4000000068699	0 - 1/8 Mile SW
A3	KY4000000068700	0 - 1/8 Mile SW
A4	KY4000000068697	0 - 1/8 Mile SW
A5	KY4000000068698	0 - 1/8 Mile SW
A6	KY4000000068693	0 - 1/8 Mile SW
A7	KY4000000068688	0 - 1/8 Mile SW
A8	KY4000000068687	0 - 1/8 Mile SW
A9	KY4000000068689	0 - 1/8 Mile SW
A10	KY4000000068691	0 - 1/8 Mile SW
A11	KY4000000068690	0 - 1/8 Mile SW
A12	KY4000000068696	1/8 - 1/4 Mile WSW
A13	KY4000000068695	1/8 - 1/4 Mile WSW
A14	KY4000000068694	1/8 - 1/4 Mile WSW
A15	KY4000000068692	1/8 - 1/4 Mile WSW
B16	KY4000000068679	1/8 - 1/4 Mile SW
B17	KY4000000068670	1/8 - 1/4 Mile SSW
B18	KY4000000068669	1/8 - 1/4 Mile SSW
B19	KY4000000068671	1/8 - 1/4 Mile SSW
B20	KY4000000068673	1/8 - 1/4 Mile SSW
B21	KY4000000068672	1/8 - 1/4 Mile SSW
B22	KY4000000068684	1/8 - 1/4 Mile WSW
B23	KY4000000068685	1/8 - 1/4 Mile WSW
B24	KY4000000068686	1/8 - 1/4 Mile WSW
B25	KY4000000068675	1/8 - 1/4 Mile SW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

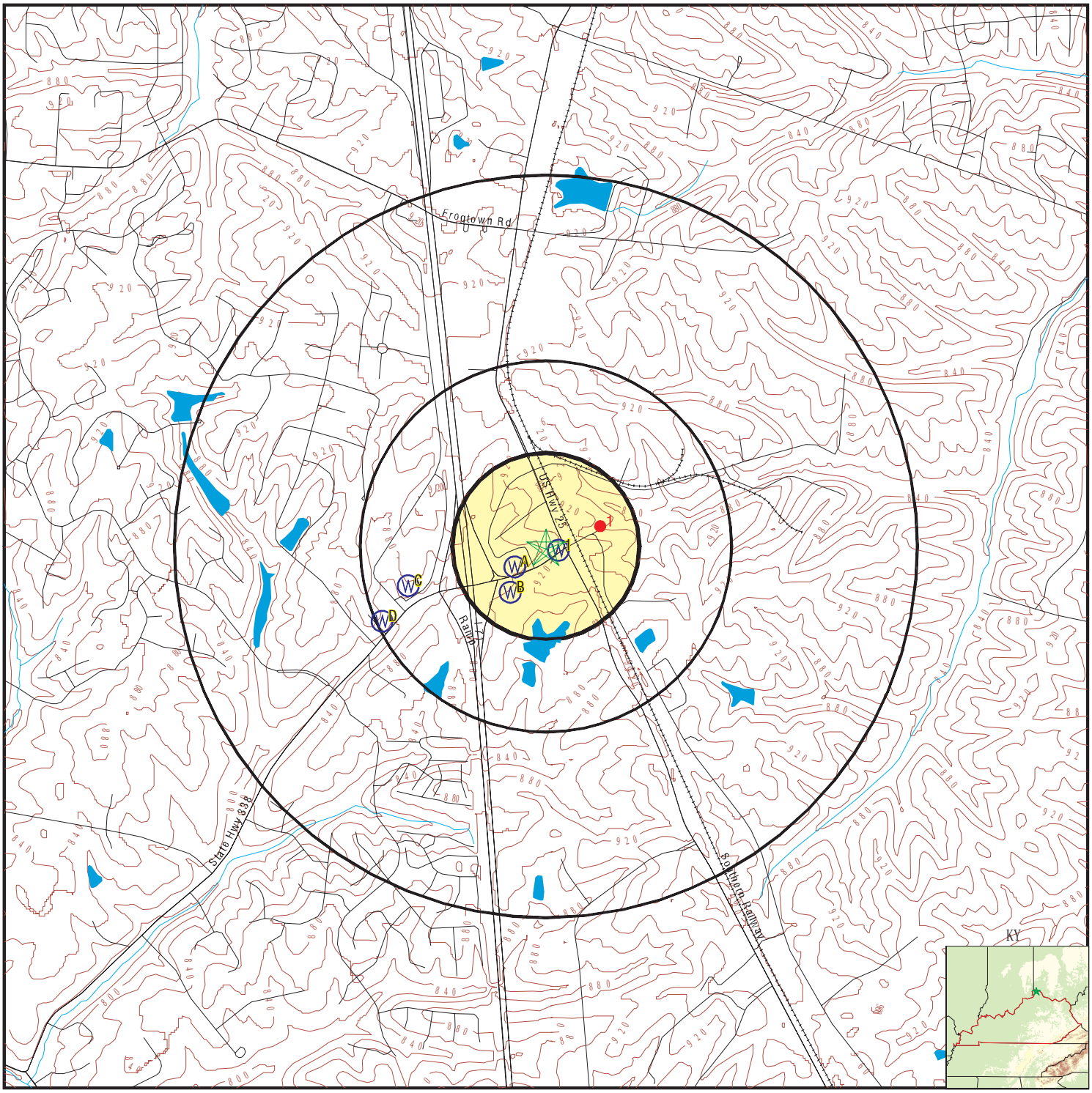
MAP ID	WELL ID	LOCATION FROM TP
B26	KY4000000068668	1/8 - 1/4 Mile SSW
B27	KY4000000068666	1/8 - 1/4 Mile SSW
C28	KY4000000068682	1/4 - 1/2 Mile WSW
C29	KY4000000068681	1/4 - 1/2 Mile WSW
C30	KY4000000068683	1/4 - 1/2 Mile WSW
C31	KY4000000068677	1/4 - 1/2 Mile WSW
C32	KY4000000068678	1/4 - 1/2 Mile WSW
C33	KY4000000068676	1/4 - 1/2 Mile WSW
D34	KY4000000068665	1/4 - 1/2 Mile WSW
D35	KY4000000068659	1/4 - 1/2 Mile WSW
D36	KY4000000068658	1/4 - 1/2 Mile WSW
D37	KY4000000068662	1/4 - 1/2 Mile WSW
D38	KY4000000068661	1/4 - 1/2 Mile WSW
D39	KY4000000068660	1/4 - 1/2 Mile WSW
D40	KY4000000068664	1/4 - 1/2 Mile WSW
D41	KY4000000068663	1/4 - 1/2 Mile WSW
D42	KY4000000068657	1/4 - 1/2 Mile WSW
D43	KY4000000068656	1/4 - 1/2 Mile WSW

OTHER STATE DATABASE INFORMATION

STATE OIL/GAS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	KYOG80000143447	1/8 - 1/4 Mile ENE

PHYSICAL SETTING SOURCE MAP - 3249682.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Oil, gas or related wells

SITE NAME:	KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338	CLIENT:	Florence & Hutcheson, Inc.
ADDRESS:	118 Richwood Rd Walton KY 41094	CONTACT:	Shane Shelby
LAT/LONG:	38.9191 / 84.6253	INQUIRY #:	3249682.2s
		DATE:	January 31, 2012 1:30 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
1 **ESE** **0 - 1/8 Mile** **Higher**	**KY WELLS**	**KY4000000068702**

Location i:	314858		
North lati:	38.91895		
West longi:	-84.62467		
Akgwa numb:	80047928	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	05/12/2003
Site id:	KY4000000068702		

	Database	EDR ID Number
A2 **SW** **0 - 1/8 Mile** **Lower**	**KY WELLS**	**KY4000000068699**

Location i:	53507		
North lati:	38.9184		
West longi:	-84.62633		
Akgwa numb:	80013889	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/09/1994
Site id:	KY4000000068699		

	Database	EDR ID Number
A3 **SW** **0 - 1/8 Mile** **Lower**	**KY WELLS**	**KY4000000068700**

Location i:	53505		
North lati:	38.9184		
West longi:	-84.62633		
Akgwa numb:	80013887	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/09/1994
Site id:	KY4000000068700		

	Database	EDR ID Number
A4 **SW** **0 - 1/8 Mile** **Lower**	**KY WELLS**	**KY4000000068697**

Location i:	53506		
North lati:	38.9184		
West longi:	-84.62633		
Akgwa numb:	80013890	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/09/1994
Site id:	KY4000000068697		

	Database	EDR ID Number
A5 **SW** **0 - 1/8 Mile** **Lower**	**KY WELLS**	**KY4000000068698**

Location i:	53508		
North lati:	38.9184		
West longi:	-84.62633		
Akgwa numb:	80013888	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/09/1994
Site id:	KY4000000068698		

A6
SW **KY WELLS** **KY4000000068693**
0 - 1/8 Mile
Lower

Location i:	53504		
North lati:	38.91839		
West longi:	-84.62633		
Akgwa numb:	80014453	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/09/1994
Site id:	KY4000000068693		

A7
SW **KY WELLS** **KY4000000068688**
0 - 1/8 Mile
Lower

Location i:	48228		
North lati:	38.91812		
West longi:	-84.62689		
Akgwa numb:	80001516	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/27/1992
Site id:	KY4000000068688		

A8
SW **KY WELLS** **KY4000000068687**
0 - 1/8 Mile
Lower

Location i:	48226		
North lati:	38.91812		
West longi:	-84.62689		
Akgwa numb:	80001510	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/24/1992
Site id:	KY4000000068687		

A9
SW **KY WELLS** **KY4000000068689**
0 - 1/8 Mile
Lower

Location i:	48229		
North lati:	38.91812		
West longi:	-84.62689		
Akgwa numb:	80001515	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/27/1992
Site id:	KY4000000068689		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

A10
SW
0 - 1/8 Mile
Lower

KY WELLS **KY4000000068691**

Location i:	48227		
North lati:	38.91812		
West longi:	-84.62689		
Akgwa numb:	80001514	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/24/1992
Site id:	KY4000000068691		

A11
SW
0 - 1/8 Mile
Lower

KY WELLS **KY4000000068690**

Location i:	48230		
North lati:	38.91812		
West longi:	-84.62689		
Akgwa numb:	80001511	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/23/1992
Site id:	KY4000000068690		

A12
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068696**

Location i:	51108		
North lati:	38.9184		
West longi:	-84.62745		
Akgwa numb:	80006912	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	02/23/1993
Site id:	KY4000000068696		

A13
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068695**

Location i:	51109		
North lati:	38.9184		
West longi:	-84.62745		
Akgwa numb:	80006914	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	02/23/1993
Site id:	KY4000000068695		

A14
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068694**

Location i:	51107		
North lati:	38.9184		
West longi:	-84.62745		
Akgwa numb:	80006913	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	02/23/1993
Site id:	KY4000000068694		

A15
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068692**

Location i:	51106		
North lati:	38.91839		
West longi:	-84.62745		
Akgwa numb:	80006911	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	02/23/1993
Site id:	KY4000000068692		

B16
SW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068679**

Location i:	48840		
North lati:	38.91729		
West longi:	-84.62717		
Akgwa numb:	80008663	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	04/27/1993
Site id:	KY4000000068679		

B17
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068670**

Location i:	49150		
North lati:	38.91701		
West longi:	-84.62661		
Akgwa numb:	80010053	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/19/1993
Site id:	KY4000000068670		

B18
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068669**

Location i:	49148		
North lati:	38.91701		
West longi:	-84.62661		
Akgwa numb:	80010055	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/22/1993
Site id:	KY4000000068669		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

B19
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068671**

Location i:	49149		
North lati:	38.91701		
West longi:	-84.62661		
Akgwa numb:	80010052	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/19/1993
Site id:	KY4000000068671		

B20
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068673**

Location i:	49147		
North lati:	38.91701		
West longi:	-84.62661		
Akgwa numb:	80010054	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/29/1993
Site id:	KY4000000068673		

B21
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068672**

Location i:	49151		
North lati:	38.91701		
West longi:	-84.62661		
Akgwa numb:	80010056	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/23/1993
Site id:	KY4000000068672		

B22
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068684**

Location i:	50259		
North lati:	38.91812		
West longi:	-84.62801		
Akgwa numb:	80009023	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/26/1993
Site id:	KY4000000068684		

B23
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068685**

Location i:	50260		
North lati:	38.91812		
West longi:	-84.62801		
Akgwa numb:	80009021	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/23/1993
Site id:	KY4000000068685		

B24
WSW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068686**

Location i:	50261		
North lati:	38.91812		
West longi:	-84.62801		
Akgwa numb:	80009022	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	08/23/1993
Site id:	KY4000000068686		

B25
SW
1/8 - 1/4 Mile
Lower

KY WELLS **KY4000000068675**

Location i:	48839		
North lati:	38.91728		
West longi:	-84.62717		
Akgwa numb:	80008664	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	04/27/1993
Site id:	KY4000000068675		

B26
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068668**

Location i:	49146		
North lati:	38.917		
West longi:	-84.62661		
Akgwa numb:	80010051	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/18/1993
Site id:	KY4000000068668		

B27
SSW
1/8 - 1/4 Mile
Higher

KY WELLS **KY4000000068666**

Location i:	48225		
North lati:	38.91673		
West longi:	-84.62689		
Akgwa numb:	80001507	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	07/23/1992
Site id:	KY4000000068666		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

C28
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068682**

Location i:	52663		
North lati:	38.91784		
West longi:	-84.63189		
Akgwa numb:	80000290	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	04/29/1994
Site id:	KY4000000068682		

C29
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068681**

Location i:	52661		
North lati:	38.91784		
West longi:	-84.63189		
Akgwa numb:	80000288	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	04/28/1994
Site id:	KY4000000068681		

C30
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068683**

Location i:	52662		
North lati:	38.91784		
West longi:	-84.63189		
Akgwa numb:	80000289	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	04/28/1994
Site id:	KY4000000068683		

C31
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068677**

Location i:	46825		
North lati:	38.91729		
West longi:	-84.63245		
Akgwa numb:	80000277	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	01/11/1993
Site id:	KY4000000068677		

C32
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068678**

Location i:	46826		
North lati:	38.91729		
West longi:	-84.63245		
Akgwa numb:	80000276	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	01/11/1993
Site id:	KY4000000068678		

C33
WSW **KY WELLS** **KY4000000068676**
1/4 - 1/2 Mile
Lower

Location i:	46824		
North lati:	38.91728		
West longi:	-84.63245		
Akgwa numb:	80000278	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	01/11/1993
Site id:	KY4000000068676		

D34
WSW **KY WELLS** **KY4000000068665**
1/4 - 1/2 Mile
Lower

Location i:	57069		
North lati:	38.91618		
West longi:	-84.63328		
Akgwa numb:	80028801	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/10/1995
Site id:	KY4000000068665		

D35
WSW **KY WELLS** **KY4000000068659**
1/4 - 1/2 Mile
Lower

Location i:	55105		
North lati:	38.91617		
West longi:	-84.63328		
Akgwa numb:	80016052	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	03/15/1995
Site id:	KY4000000068659		

D36
WSW **KY WELLS** **KY4000000068658**
1/4 - 1/2 Mile
Lower

Location i:	57068		
North lati:	38.91617		
West longi:	-84.63328		
Akgwa numb:	80028802	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/10/1995
Site id:	KY4000000068658		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

D37
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068662**

Location i:	51347		
North lati:	38.91618		
West longi:	-84.63356		
Akgwa numb:	80010954	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/18/1993
Site id:	KY4000000068662		

D38
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068661**

Location i:	52984		
North lati:	38.91618		
West longi:	-84.63356		
Akgwa numb:	80010958	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/18/1993
Site id:	KY4000000068661		

D39
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068660**

Location i:	51348		
North lati:	38.91618		
West longi:	-84.63356		
Akgwa numb:	80013190	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	05/13/1994
Site id:	KY4000000068660		

D40
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068664**

Location i:	51505		
North lati:	38.91618		
West longi:	-84.63356		
Akgwa numb:	80010955	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/18/1993
Site id:	KY4000000068664		

D41
WSW
1/4 - 1/2 Mile
Lower

KY WELLS **KY4000000068663**

Location i:	52985		
North lati:	38.91618		
West longi:	-84.63356		
Akgwa numb:	80012309	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	05/13/1994
Site id:	KY4000000068663		

D42
WSW **KY WELLS** **KY4000000068657**
1/4 - 1/2 Mile
Lower

Location i:	51346		
North lati:	38.91617		
West longi:	-84.63356		
Akgwa numb:	80010956	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/18/1993
Site id:	KY4000000068657		

D43
WSW **KY WELLS** **KY4000000068656**
1/4 - 1/2 Mile
Lower

Location i:	51345		
North lati:	38.91617		
West longi:	-84.63356		
Akgwa numb:	80010957	Site type:	Mine
Primary us:	Monitoring - Ambient	Constructi:	11/18/1993
Site id:	KY4000000068656		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

1
ENE **OIL_GAS** **KYOG80000143447**
1/8 - 1/4 Mile

Api:	Not Reported	Kgs recno:	2342
Letter :	DD	Number :	59
Section :	23	Fns:	1150
Ns:	S	Few :	1700
Ew:	E	Surf elev:	920.000
Usgs quad:	INDEPENDENCE	County:	BOONE
Org farm:	GRIMES, JOHN		
Org oper:	UNKNOWN		
Org wellno:	1	Td:	1283
Tdfm:	368KNOX	Deepst pay:	000
Iof ip:	Not Reported	Org wclass:	NFW
Org result:	D&A	Cmpl date:	12/31/00
Plug date:	06/29/93	Plug afdvt:	Not Reported
Core:	Not Reported	Cuttings:	2103
Elog:	Not Reported	Plotsymbol:	D&A
Kgs permit:	Not Reported		
Images:	http://kgs.uky.edu/oilgasimages/0/0/0/0/2/R00002342/R00002342.djvu?djvuopts&thumbnails=yes&menu=yes&zoom=page		
Bore type:	V	Rec lat27:	38.920
Rec lng27:	-84.623	Rec lat83:	38.920
Rec lng83:	-84.623		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: KY Radon

Radon Test Results

Zip	Test Date	Test Result
41094	2/5/2003	3.10
41094	9/28/2003	3.30
41094	4/1/2004	4.40
41094	4/1/2004	10.10
41094	5/3/2004	0.50
41094	11/25/2004	2.20
41094	1/17/2005	4.30
41094	1/17/2005	2.20
41094	1/17/2005	1.00
41094	1/17/2005	0.40
41094	1/17/2005	0.20
41094	1/17/2005	0.20
41094	1/17/2005	0.20
41094	1/18/2005	0.20
41094	1/18/2005	0.30
41094	1/18/2005	1.60
41094	1/25/2005	0.20
41094	1/25/2005	0.20

Federal EPA Radon Zone for BOONE County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 41094

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	1.900 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Polygon Features
Source: Environmental Protection & Public Protection Cabinet
Telephone: 502-564-5174

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Kentucky Water Well Records Database
Source: Kentucky Geological Survey
Telephone: 859-257-5500
Water Wells in Kentucky. Data from the Kentucky Ground Water Data Repository.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Kentucky Geological Survey
Telephone: 859-257-5500
Oil and gas well locations in the state of Kentucky

RADON

State Database: KY Radon
Source: Department of Public Health
Telephone: 502-564-4856
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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KY Item No. 6-18.00 - Boone Co. I-71/75 - KY 338
118 Richwood Rd
Walton, KY 41094

Inquiry Number: 3249682.6
February 01, 2012

The EDR-City Directory Abstract

Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR CITY DIRECTORY ABSTRACT

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening report designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

NO COVERAGE

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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Environmental Data Resources, Inc.
440 Wheelers Farms Road
Milford, CT 06461
Phone: (203) 783-0300
Fax : (203) 783-0303

INVOICE

Ship Date	Account #	Invoice
02/01/2012	2017117	**3249682**

Bill To:

Shane Shelby
Florence & Hutcheson, Inc.
2550 Irvin Cobb Drive
P.O. Box 7267
Paducah, KY 42002

Ship To :

Shane Shelby
Florence & Hutcheson, Inc.
2550 Irvin Cobb Drive
P.O. Box 7267
Paducah, KY 42002

Terms	Order Date	Order Time	Caller	Account Executive
Payable Upon Receipt	01/31/2012	13:01:04	Shane Shelby	AJ Penna

Research Service	Price	Zip	Taxable / Delivery		PO#	Project #	Project/Site Name or Description
EDR Standard Package	$325.00	41094			NA	Richwood Rd KY 338	KY Item No. 6-18.00 - Boone Co. I-71/75 KY 338 118 Richwood Rd
-Radius Map With Geo			N/T				
-Certified Sanborn Map Rpt			N/T				
-Historical Topo Map			N/T				
-Aerial Photo Search			N/T				
-City Directory Search			N/T				
TOTAL DUE :	**$325.00**						

Please remember to include invoice numbers and amounts with your payment.

Total Amount Due: $325.00

Remit Payment To:
Environmental Data Resources, Inc.
440 Wheelers Farms Road
Milford, CT 06461

Pay By Credit Card
Call 1-800-352-0050 and ask for an Accounts Receivable representative.

For invoice inquiries, contact your Account Executive.
Thank you for your business!

APPENDIX C:

Compliance
testing & technology
N108 W13131 Bradley Way Ste. 600 • Germantown, WI • 53022
(262) 297-2220

VOLUMETRIC LINE TEST

UST SEP23'11 PM 1:01

SITE: State Facility #

TravelCenters of America #28

I-75/I-71 & Rt 338, exit 175

Walton KY 41094-9526

DATE: 07/29/2010

CONTACT: Jana Jackson

PHONE: 859-485-4111

JOB #: T3 050924

Test Number	3	2	2	
Sump Pump #	1A	2A	3A	
Product	Unleaded	Midgrade	Premium	
Manufacturer	Red Jacket	Red Jacket	Red Jacket	
Isolation (pump)	Ball Valve	Ball Valve	Ball Valve	
Isolation (disp.)	Shear Valve	Shear Valve	Shear Valve	
Test Pressure	40 psi	40 psi	40 psi	
Initial Cyl. Level	0.0250	0.0650	0.0650	
Final Cyl. Level	0.0250	0.0650	0.0650	
Begin Time	0040	2350	2350	
End Time	0110	0020	0020	
Change in Time	30 min.	30 min.	30 min.	
Change in Volume	0.0000	0.0000	0.0000	
Leak Rate	0.0000	0.0000	0.0000	
Pass/Fail	Pass	Pass	Pass	

Line Test Method	Acurite	Acurite	Acurite	

Technician Sean Grider

Signature Sean Grider

Certification # 2054 LTN

Exp Date 08/24/2011

Comments:

Compliance
testing & technology
N108 W13131 Bradley Way Ste. 600 • Germantown, WI • 53022
(262) 252-2200

VOLUMETRIC LINE TEST

SITE: State Facility # _____
TravelCenters of America #28
I-75/I-71 & Rt 338, exit 175
Walton KY 41094-9526

DATE: 07/29/2010
CONTACT: Jana Jackson
PHONE: 859-485-4111
JOB #: T3 050924

Test Number		1	1	
Sump Pump #	4T	5T	6T	7T
Product	Diesel	Diesel	Diesel	Diesel
Manufacturer	Manifolded	Appleton	Appleton	Manifolded
Isolation (pump)		Ball Valve	Ball Valve	
Isolation (disp.)		Shear Valve	Shear Valve	
Test Pressure		50 psi	50 psi	
Initial Cyl. Level		0.0850	0.0850	
Final Cyl. Level		0.0850	0.0850	
Begin Time		0950	0950	
End Time		1020	1020	
Change in Time		30 min.	30 min.	
Change in Volume		0.0000	0.0000	
Leak Rate		0.0000	0.0000	
Pass/Fail		Pass	Pass	
Line Test Method		Acurite	Acurite	

Technician Sean Grider **Signature** Sean Grider

Certification # 2054 LTN **Exp Date** 08/24/2011

Comments:

Compliance
testing & technology
N108 W13131 Bradley Way Ste. 600 • Germantown, WI • 53022
(262) 502-2181

MECHANICAL / ELECTRONIC

LEAK DETECTOR CERTIFICATION

SITE: State Facility # _____

TravelCenters of America #28

I-75/I-71 & Rt 338, exit 175

Walton KY 41094-9526

DATE: 7/29/2010

CONTACT: Jana Jackson

PHONE: 859-485-4111

JOB #: T3 050924

Sump #	1A	2A	3A	
Product	Unleaded	Midgrade	Premium	
LD Manufacturer	Red Jacket	vaporless	Red Jacket	
Mechanical LD Model	DLD	LD-2000	DLD	
Electronic LD Model	N/A	N/A	N/A	
Sump Condition	Wet, Standing water.	Wet, Standing water.	Wet, Standing water.	
Operating Pressure (PSI)	26	24	26	
Opening Time (Sec)	2	2	1	
Metering Pressure (PSI)	10	12	10	
Functional Element Holding Pressure	16	14	16	
Leak Rate LD Detected (GPH)	3.0 gph	3.0 gph	3.0 gph	
Does LD Detect 3 GPH Leak Rate?	Yes	Yes	Yes	

Technician Sean Grider **Signature** Sean Grider

Comments:

Compliance
testing & technology
N168 W13131 Bradley Way Ste. 600 • Germantown, WI • 53022
(262) 502-2210

MECHANICAL / ELECTRONIC

LEAK DETECTOR CERTIFICATION

SITE: State Facility # _____

TravelCenters of America #28

I-75/I-71 & Rt 338, exit 175

Walton KY 41094-9526

DATE: 7/29/2010

CONTACT: Jana Jackson

PHONE: 859-485-4111

JOB #: T3 050924

Sump #	4T	5T	6T	7T
Product	Diesel	Diesel	Diesel	Diesel
LD Manufacturer	N/A	FE Petro	FE Petro	N/A
Mechanical LD Model	N/A	MLD-D	MLD-D	N/A
Electronic LD Model	N/A	N/A	N/A	N/A
Sump Condition	Wet, Tight	Wet, Tight	Wet, Tight	Wet, Tight
Operating Pressure (PSI)	-	34	34	-
Opening Time (Sec)	-	2	3	-
Metering Pressure (PSI)	-	22	22	-
Functional Element Holding Pressure	-	34	34	-
Leak Rate LD Detected (GPH)	-	3.0 gph	3.0 gph	-
Does LD Detect 3 GPH Leak Rate?	Manifolded	Yes	Yes	Manifolded

Technician Sean Grider **Signature** Sean Grider

Comments:

Spill Bucket Testing Report Form

This form is intended for use by contractors performing periodic testing of UST spill containment structures. The completed form and printouts from tests (if applicable) should be provided to the facility owner/operator for submittal to the local regulatory agency.

1. FACILITY INFORMATION

Facility Name:	**TravelCenters of America #28**	Date of Testing:	**07/29/2010**
Facility Address:	**I-75/I-71 & Rt 338, exit 175 Walton**	**KY**	**41094-9526**
Facility Contact:	**Jana Jackson**	Phone:	**859-485-4111**
Date Local Agency Was Notified of Testing:			
Name of Local Agency Inspector (*if present during testing*)			

2. TESTING CONTRACTOR INFORMATION

Company Name:	**Compliance Testing & Technology**
Technician Conducting Test:	**Sean Grider**
Credentials:	○ State Licensed Contractor ○ State Licensed Tester ◉ N/A
License Type:	License Number:

3. SPILL BUCKET TESTING INFORMATION

Test Method Used:	○ Pressure ○ Vacuum ◉ Hydrostatic ○ Other (Specify)
Test Equipment Used:	**Visual Test**

	Spill Box # **1A**	Spill Box # **2A**	Spill Box # **3A**	Spill Box #
Wait time between applying test medium and starting test:	**0**	**0**	**0**	
Test Start Time:	**2330**	**2330**	**2330**	
Initial Reading (R_I)(Inches)	**8**	**9**	**8**	
Test End Time:	**0030**	**0030**	**0030**	
Final Reading (R_F)(Inches)	**8**	**9**	**8**	
Test Duration:	**60 min.**	**60 min.**	**60 min.**	
Change in Reading (R_F-R_I)	**0**	**0**	**0**	
Pass/Fail Threshold or Criteria:	**0 " Level Change**	**0 " Level Change**	**0 " Level Change**	
Test Result:	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**	☐ **Pass** ☐ **Fail**

Comments - *Include detailed description of failures, repairs made and / or recomended.*

CERTIFICATION OF TECHNICIAN RESPONSIBLE FOR CONDUCTING THIS TESTING

I hereby certify that all the information contained in this report is true, accurate.

Technician's Signature Sean Grider Date: **07/29/2010**

Spill Bucket Testing Report Form

This form is intended for use by contractors performing periodic testing of UST spill containment structures. The completed form and printouts from tests (if applicable) should be provided to the facility owner/operator for submittal to the local regulatory agency.

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Facility Name:	**TravelCenters of America #28**		Date of Testing:	**07/29/2010**
Facility Address:	**I-75/I-71 & Rt 338, exit 175**	**Walton**	**KY**	**41094-9526**
Facility Contact:	**Jana Jackson**		Phone:	**859-485-4111**
Date Local Agency Was Notified of Testing:				
Name of Local Agency Inspector (*if present during testing*)				

2. TESTING CONTRACTOR INFORMATION

Company Name:	**Compliance Testing & Technology**
Technician Conducting Test:	**Sean Grider**
Credentials:	○ State Licensed Contractor ○ State Licensed Tester ◉ N/A
License Type:	License Number:

3. SPILL BUCKET TESTING INFORMATION

Test Method Used:	○ Pressure ○ Vacuum ◉ Hydrostatic ○ Other (Specify)
Test Equipment Used:	**Visual Test**

	Spill Box # **4T**	Spill Box # **5T**	Spill Box # **6T**	Spill Box # **7T**
Wait time between applying test medium and starting test:	**0**	**0**	**0**	**0**
Test Start Time:	**2330**	**2330**	**2330**	**2330**
Initial Reading (R_I)(Inches)	**8**	**8**	**8**	**8**
Test End Time:	**0030**	**0030**	**0030**	**0030**
Final Reading (R_F)(Inches)	**8**	**8**	**8**	**8**
Test Duration:	**60 min.**	**60 min.**	**60 min.**	**60 min.**
Change in Reading (R_F-R_I)	**0**	**0**	**0**	**0**
Pass/Fail Threshold or Criteria:	**0 " Level Change**	**0 " Level Change**	**0 " Level Change**	**0 " Level Change**
Test Result:	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**

Comments - *Include detailed description of failures, repairs made and / or recomended.*

CERTIFICATION OF TECHNICIAN RESPONSIBLE FOR CONDUCTING THIS TESTING

I hereby certify that all the information contained in this report is true, accurate.

Technician's Signature Sean Grider Date: **07/29/2010**

Spill Bucket Testing Report Form

This form is intended for use by contractors performing periodic testing of UST spill containment structures. The completed form and printouts from tests (if applicable) should be provided to the facility owner/operator for submittal to the local regulatory agency.

1. FACILITY INFORMATION

Facility Name:	**TravelCenters of America #28**	Date of Testing:	**07/29/2010**
Facility Address:	**I-75/I-71 & Rt 338, exit 175 Walton**	**KY**	**41094-9526**
Facility Contact:	**Jana Jackson**	Phone:	**859-485-4111**
Date Local Agency Was Notified of Testing:			
Name of Local Agency Inspector (*if present during testing*)			

2. TESTING CONTRACTOR INFORMATION

Company Name:	**Compliance Testing & Technology**
Technician Conducting Test:	**Sean Grider**
Credentials:	○ State Licensed Contractor ○ State Licensed Tester ◉ N/A
License Type:	License Number:

3. SPILL BUCKET TESTING INFORMATION

Test Method Used:	○ Pressure ○ Vacuum ◉ Hydrostatic ○ Other (Specify)
Test Equipment Used:	**Visual Test**

	Spill Box # **8L**	Spill Box # **9L**	Spill Box #	Spill Box #
Wait time between applying test medium and starting test:	**0**	**0**		
Test Start Time:	**2330**	**2330**		
Initial Reading (R_I)(Inches)	**5**	**6**		
Test End Time:	**2430**	**2430**		
Final Reading (R_F)(Inches)	**5**	**6**		
Test Duration:	**60 min.**	**60 min.**		
Change in Reading (R_F-R_I)	**0**	**0**		
Pass/Fail Threshold or Criteria:	**0 " Level Change**	**0 " Level Change**		
Test Result:	☒ **Pass** ☐ **Fail**	☒ **Pass** ☐ **Fail**	☐ **Pass** ☐ **Fail**	☐ **Pass** ☐ **Fail**

Comments - *Include detailed description of failures, repairs made and / or recomended.*

CERTIFICATION OF TECHNICIAN RESPONSIBLE FOR CONDUCTING THIS TESTING

I hereby certify that all the information contained in this report is true, accurate.

Technician's Signature Sean Grider Date: **07/29/2010**

Kentucky Environmental and Public Protection Cabinet
Department for Environmental Protection
Division of Waste Management
Underground Storage Tank Branch

CERTIFICATE OF NOTIFICATION FOR UNDERGROUND STORAGE TANK(S)

UST FACILITY/SITE IDENTIFICATION NUMBER: 6719008

FISCAL YEAR 2004 - 2005

ISSUED TO:

TRAVEL CENTERS OF AMERICA
24601 CENTER RIDGE RD

STE 200
WESTLAKE, OH 441455634

FACILITY LOCATION:

CINCINNATI SOUTH TRAVEL CENTER
145 RICHWOOD RD

WALTON, KY 41094

The Division of Waste Management hereby issues the above named installation a Certificate of Notification for the underground storage tank(s) specified below. This Certificate is issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto solely for the purpose of notifying the public that the underground storage tank(s) specified below have been registered with the Division of Waste Management. Conformance with all applicable laws and regulations is the responsibility of the registrant. All rights of inspection by representatives of the Division of Waste Management are reserved.

TANK INFORMATION

TANK #	*SIZE*	*SUBSTANCE*	*INSTALLED*	*TK STATUS*
11	10000	GAS	Dec-16-1992	TAC
12	10000	GAS	Dec-16-1992	TAC
13	10000	GAS	Dec-16-1992	TAC
14	20000	DSL	Dec-16-1992	TAC
15	20000	DSL	Dec-16-1992	TAC
16	20000	DSL	Dec-16-1992	TAC
17	20000	DSL	Dec-16-1992	TAC
18	1000	UOL	Sep-20-1998	TAC
19	8000	NOL	Sep-28-1998	TAC

THIS CERTIFICATE IS ISSUED TO ACKNOWLEDGE REMITTANCE OF FEES FOR THE FISCAL YEAR INDICATED ABOVE AND MUST BE POSTED IN A CONSPICUOUS LOCATION AT THE ABOVE REFERENCED FACILITY.

THIS CERTIFICATE IS ISSUED TO ACKNOWLEDGE REMITTANCE OF FEES FOR THE FISCAL YEAR INDICATED ABOVE AND MUST BE POSTED IN A CONSPICUOUS LOCATION AT THE ABOVE REFERENCED FACILITY.

Environmental and Public Protection Cabinet
Kentucky Department for Environmental Protection
Division of Waste Management

Activity: CIV20070001 Investigation

Lead Investigator: Fant, Michael

Agency Interest/Permit ID: 265

Agency Interest Name: Walton Travel Center

Agency Interest Address: 145 Richwood Rd
Walton, KY 41094

Program: UST

County: Boone

Type of Agency Interest: RETAIL- Retail Trade, Gasoline Stations (447)

Agency Interest Contact: **Title:** **Phone:**

Purpose: Investigation

Inspection Type: Incident Investigation

Inspection Date: 05/15/2007 **Start Time:** 12:30 PM **End Time:** 01:15 PM

Latitude: 38.91677800 **Longitude:** -84.62627800

Coordinate Collection Method: Decimal Degrees

Incident ID(s): 2258812

General Comments:

On May 15, 2007 Inspectors Michael Fant and Rodney Polly responded to a notification of petroleum contamination on a vacant property adjacent to Walton Travel Center. The report was made as a result of a limited phase II investigation conducted on the adjacent property. A copy of this investigation was provided to Inspector Fant by Dave Plummer of Travel Centers of America (TA). The contamination on the adjacent property is in close proximity to an area where eight USTs were removed in 1992. A No Further Action letter was issued by the Underground Storage Tank Branch for this removed on December 17, 1996.

Physical inspection of the property and TA on May 15, 2007 did not reveal any current releases. A full technical compliance inspection was conducted by Inspector Fant on July 2, 2007 and all tanks and piping were found to have passing release detection results for the past 12 months. No violations were noted during that inspection.

TA contracted PSARA Technologies to perform a Limited Site Check Investigation. This investigation was completed on June 25, 2007. Four borings were placed around the former tank pit. One groundwater sample from these borings contained benzene concentrations above the regulatory limit. This incident is being referred to the Underground Storage Tank Branch for further action.

Person(s) Interviewed:

Name	Organization
David Plummer	TA Corporate Environmental

Status/Comments:

GINS3

Requirement	Status	Results or Comments
Suspected Release: If the release of regulated substances has been discovered at the site or in the surrounding area, has a suspected release been reported as required? Provide details and list TEMPO incident number, if available. [401 KAR 42:050]. [40 CFR 280.50(a)]	C	**Suspected release was reported by Travel Centers of America on May 5, 2007 as a result of a limited phase II investigation performed on an adjacent property.**

Investigator: **Title:** **Date:**

- [ ] N - Not Applicable
- [ ] E - Not Evaluated
- [ ] V - Out of Compliance-NOV
- [X] C - No Violations observed
- [ ] I - No Violations obs-but impending viol trends obs
- [ ] D - Out of Compliance-Violations Documented
- [ ] O - Out of Comp-LOW non-recurrent Adm. or O&M

Received By: **Title:** **Date:**

Delivery Method:

TravelCenters of America

David A. Plummer, C.P.G.
Environmental Associate
TravelCenters of America
24601 Center Ridge Road
Westlake, Ohio 44145-5634
440-808-4431
440-808-3307 facsimile
plummer.dave@tatravelcenters.com

RECEIVED
UST BRANCH
2007 FEB 12 P 1:01

February 8, 2007

Underground Storage Tank Branch
Compliance Section
81 C. Michael Davenport Boulevard
Frankfort, Kentucky 40601

RE: TravelCenters of America
145 Richwood Road
Walton, Boone County
Agency Interest ID No. 265

To Whom It May Concern:

I have enclosed a copy of the certificate of insurance for the above referenced site regarding releases from the underground storage tank system(s) at the site. This information is provided as requested in the January 23, 2007 letter submitted by the Underground Storage Tank Branch.

If you have questions concerning this, please do not hesitate to contact me.

Sincerely,

David A. Plummer, C.P.G.
Environmental Associate

Enclosure

cc: file

CERTIFICATE OF INSURANCE

NAME: Travelcenters of America, Inc.
ADDRESS: SEE SCHEDULE BELOW

POLICY NUMBER: ST 8086424

ENDORSEMENT: Not applicable

PERIOD OF COVERAGE: June 1, 2006 - June 1, 2007

NAME OF INSURER: COMMERCE AND INDUSTRY INSURANCE COMPANY
ADDRESS OF INSURER: 70 PINE STREET
NEW YORK, NY 10270

NAME OF INSURED: Travelcenters of America, Inc.
ADDRESS OF INSURED: 24601 Center Ridge Road, Suite 200
Westlake, OH 44145-5634

CERTIFICATION:

1. COMMERCE & INDUSTRY INSURANCE COMPANY, the Insurer, as identified above, hereby certifies that it has issued liability insurance covering the following underground storage tank(s):

Coverage provided for Covered Locations and Underground Storage Tank Systems,

on the attached schedule, with is part of the policy listed above,

for taking corrective action and compensating third parties for bodily injury and property damage caused by accidental releases in accordance with and subject to the limits of liability, exclusions, conditions and other terms of the policy arising from operating the underground storage tank(s) identified above.

The limits of liability are $1,000,000 each occurrence and $2,000,000 annual aggregate, exclusive of legal defense costs, which are subject to a separate limit under the policy. This coverage is provided under ST 8086424. The effective date of said policy is June 1, 2006.

2. The Insurer further certifies the following with respect to the insurance described in Paragraph 1:

a. Bankruptcy or insolvency of the insured shall not relieve the Insurer of its obligations under the policy to which this certificate applies.

b. The Insurer is liable for the payment of amounts within any deductible applicable to the policy to the provider of corrective action or damaged third party, with a right of reimbursement by the insured for any such payment made by the Insurer. This provision does not apply with respect to that amount of any deductible for which coverage is demonstrated under another mechanism or combination of mechanisms as specified in 40 CFR 280.95-280.102.

CI2240

c. Whenever requested by a Director of an implementing agency, the Insurer agrees to furnish to the Director a signed duplicate original of the policy and all endorsements.

d. Cancellation or any other termination of the insurance by the Insurer, except for non-payment of premium or misrepresentation by the insured, will be effective only upon written notice and only after the expiration of 60 days after a copy of such written notice is received by the insured. Cancellation for non-payment of premium or misrepresentation by the insured will be effective only upon written notice and only after expiration of a minimum of 10 days after a copy of such written notice is received by the insured.

e. The insurance covers claims otherwise covered by the policy that are reported to the Insurer within six months of the effective date of cancellation or non-renewal of the policy except where the new or renewed policy has the same retroactive date or a retroactive date earlier than that of the prior policy, and which arise out of any covered occurrence that commenced after the policy retroactive date, if applicable, and prior to such policy renewal or termination date. Claims reported during such extended reporting period are subject to the terms, conditions, limits, including limits of liability, and exclusions of the policy.

I hereby certify that the wording of this instrument is identical to the wording in 40 CFR 280.97 (b) (2) and that the Insurer is licensed to transact the business of insurance in one or more states.

Signature of Authorized Representative of Insurer
Douglas E. Gahagan
Regional Manager- National Accounts
Authorized Representative of Commerce & Industry Insurance Company
80 Pine Street, 2nd floor
New York, NY 10005

6719-008

Spade Corporation

Mechanical & Environmental
Contractors To The Petroleum Industry
475 Connector Road • P.O. Box 316
Georgetown, Kentucky 40324

Phone (502) 863-2121
FAX (502) 863-0449

September 25, 1992

ORIGINAL

KENTUCKY DIVISION OF WASTE MANAGEMENT
Underground Storage Tank Branch
14 Reilly Road
Frankfort Kentucky 40601

RECEIVED
SEP 28 11 18 AM '92
UST BRANCH

ATTN: Doyle Mills

RE: 20-day Abatement Report
Cincinnati South Truckstops of America
Interstate 75 and State Highway 338
Richwood, Kentucky
GeoScience Project #2088

Mr. Mills:

This letter serves as the "Initial Abatement Report" for a release suspected and reported to KDWM by Truckstops of America on September 21, 1992, at the above referenced facility. This report is prepared in accordance with requirements set forth in 40 CFR 280.62 and equivalent state regulations.

While digging for the installation of new underground storage tanks (USTs) at the above referenced site, a mixture of phase separated hydrocarbons and water was observed seeping into the new excavation. The liquid appeared to be draining from a previously existing piping trench which supplied a nearby gasoline service island. The exact quantity of the release is unknown at this time but it was possibly less than the reportable amount (25 gallons). Also, isolated zones of hydrocarbon impacted soils were observed in the near surface bedrock (weathered shale). Excavated material removed as part of the tank installation was stockpiled on and covered by polyethylene sheeting. All material suspected of being hydrocarbon affected as indicated by visual, olfactory, and field scan (with a photoionizing detector) was taken to Epperson Waste Disposal, a permitted landfill in Williamstown, Kentucky. Material believed not to have been hydrocarbon affected was stockpiled separately on and covered by plastic sheeting. Composite samples of this soil stockpile were delivered to a laboratory and tested for potential Benzene, Toluene, Xylene and Ethylbenzene (BTEX) concentrations. A decision regarding the final destination of this stockpile is pending. If hydrocarbon affected water is encountered in the excavation(s), a one-time

Affiliated Companies

GEOSCIENCE CONSULTANTS, INC.
Environmental Engineers & Consultants

WHITEHOUSE ELECTRIC, INC.
Industrial Controls & Wiring

OCT 0 8 1992

permit to discharge through granular activated carbon (GAC) drums will be applied for through the Kentucky Division of Water (KDOW). Miami Valley Maintenance, Sharonville, Ohio is executing tank installation operations while Jergens Contractors, Dayton, Ohio is performing the excavation activities.

Spade Corporation has been retained by Truckstops of America to complete a Closure Assessment Report for the removal of several pre-existing tanks at the site. The report will summarize installation of the new tanks, removal and disposal activities as well as provide disposal documentation.

If you have any questions or comments, feel free to contact our office.

Sincerely,

SPADE CORPORATION

Tim Crumbie

Tim Crumbie
Geologist

cc: Mr. Dave Schiele; Truckstops of America,
Mr. Doug Parker; Truckstops of America,
Ms. Peg Chandler; BP Oil Company

IA/SC/RPRC

PSARA TECHNOLOGIES, INC.

Nov 24 11 23 AM 98

November 18, 1998

Mr. Abraham Maleki
Kentucky Department for Environmental Protection
Underground Storage Tank Branch
14 Reilly Road
Frankfort, Kentucky 40601

ORIGINAL

Regarding: Initial Abatement/Free Product Recovery Report
TravelCenters of America Site No. 02141
145 Richwood Road, Walton, Boone County, Kentucky
Site ID # 671008
PN 30350.04

Dear Mr. Maleki:

Submitted herewith are two unbound copies of the Initial Abatement/Free Product Recovery (FPR) Report for the above-referenced site. One 1000-gallon used oil underground storage tank (UST) and one 8000-gallon new oil UST were excavated and permanently removed from this site on September 15 and 23, 1998, respectively. Miami Valley Maintenance (MVM) was the certified UST removal/upgrade contractor. PSARA Technologies provided environmental oversight and closure sampling services.

A site vicinity map and the locations of the two USTs on the TravelCenters of America (TA) site are shown in Figures 1 and 2, respectively, in Attachment 1. A copy of the completed Initial Abatement Checklist is provided in Attachment 2.

INITIAL RESPONSE

On September 15, 1998, free product in the form of a 3/8-in.-thick floating layer of oil was observed in the used oil tank pit upon removal of the 1000-gallon tank. The tank had previously been emptied of product in preparation for removal from the ground. No explosive conditions or other hazards to people or property were observed. The release was subsequently reported to Mr. Joseph Schmidt of the Environmental Response Section by Mr. Dave Plummer of TravelCenters of America. The ERT number C0434 was assigned to this release.

ENVIRONMENTAL
CONSULTANTS

10925 Reed Hartman Highway
Suite 220
Cincinnati, OH 45242
TEL: 513.791.4418
FAX: 513.791.5797
E-MAIL: mailbox@psara.com

On September 23, 1998, a sheen was observed on the water in the new oil tank pit upon removal of the 8000-gallon UST. As before, the tank had previously been emptied of product in preparation for removal from the ground, no explosive conditions or other hazards to people or property were observed, and the release was reported to Mr. Joseph Schmidt of the Environmental Response Section by Mr. Dave Plummer of TravelCenters of America. The same ERT number, C0434 was also assigned to this release.

INITIAL ABATEMENT

Used Oil UST

As an initial containment and cleanup effort, the used oil / water mixture was removed by Grubb Oil Company of Cincinnati, Ohio, on September 15, 1998 using a vacuum truck. An estimated volume of 1000-gallons of used oil/water mixture was removed and transported to Grubb's facility at 1925 Eastern Avenue, Cincinnati, Ohio, 45202 for recycling. No water or product were observed to recharge into the tank pit, and no ongoing monitoring or subsequent dewatering of the tank pit was therefore required. Water disposal documentation will be submitted as part of the Closure Assessment Report (CAR) now in preparation.

No special or unusual methods to reduce safety hazards from exposure to the oil/water mixture on soil or water were necessary since work area perimeters were established around the soil (tank pit backfill) stockpile and tank pit itself.

New Oil UST

As an initial containment and cleanup effort, the water having a trace sheen was pumped directly to the onsite oil/water separator (OWS) on September 23, 1998, under Kentucky Pollutant Discharge Elimination System (KPDES) permit no.: KY0002801, which expires in May, 2002. The OWS is part of the facility wastewater management system permitted for discharges associated with the servicing of freight trucks (changing of oil and other automotive fluids). A copy of the oil/water separator discharge permit is provided in Attachment 3.

An undetermined volume of water in excess of 1000-gallons and having a trace sheen was pumped to the OWS. As before, no special or unusual methods to reduce safety hazards from exposure to the oil/water mixture on soil or water were necessary, and no recharge of water into the tank pit was observed after initial removal. For this reason, no ongoing monitoring or subsequent dewatering of the tank pit was required.

We appreciate your assistance in closing these two USTs. A Closure Assessment Report (CAR) is now in preparation and will be submitted in a few weeks. In the meantime, please call me at (513) 791-4418 if you have questions or need additional information.

Sincerely,

PSARA TECHNOLOGIES, INC.

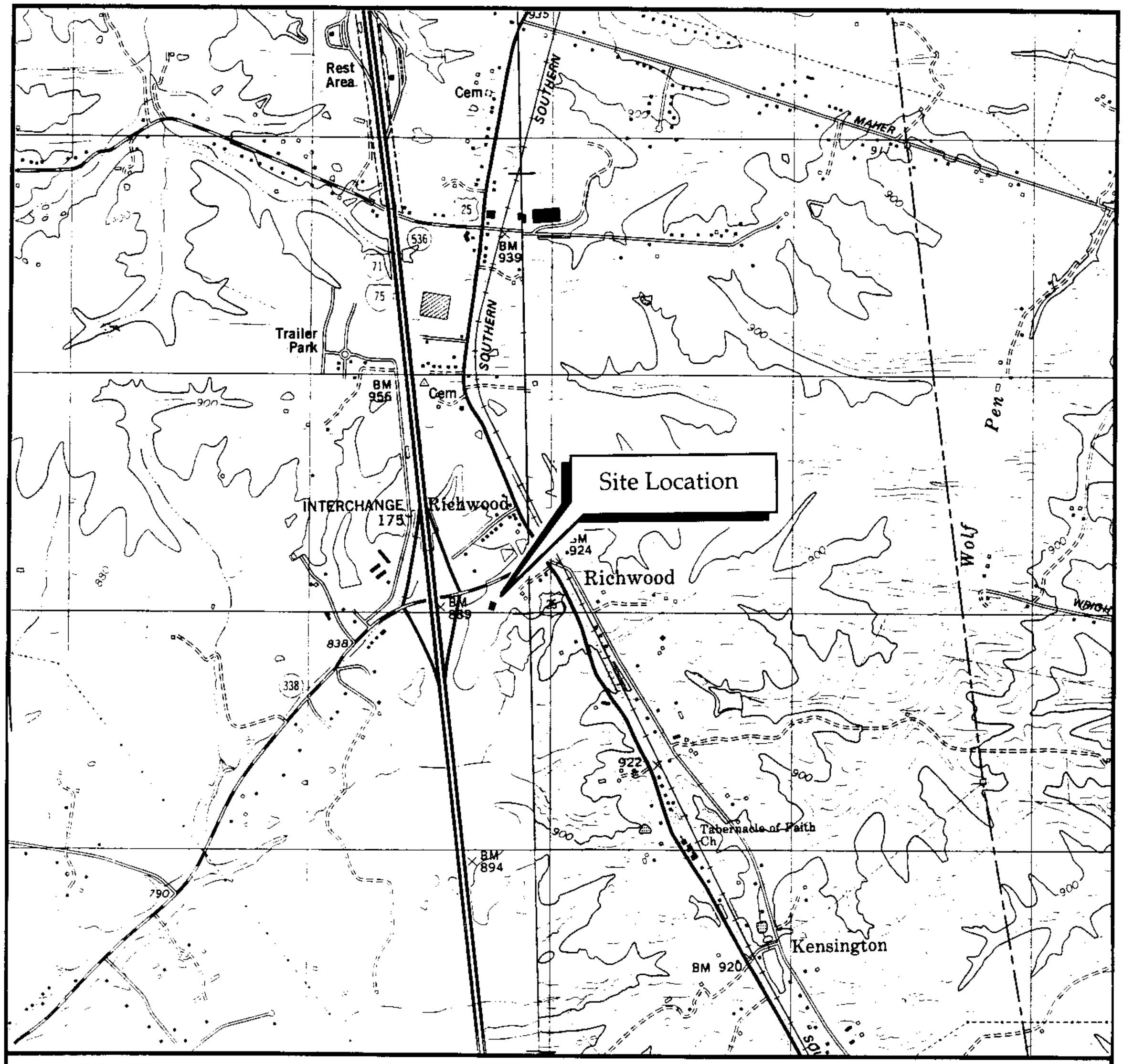
Richard M. McCandless, P.E., P.G.
Senior Engineer

Attachments

cc: D. Plummer

ATTACHMENT 1

FIGURES



PSAPA TECHNOLOGIES, INC.

LEGEND

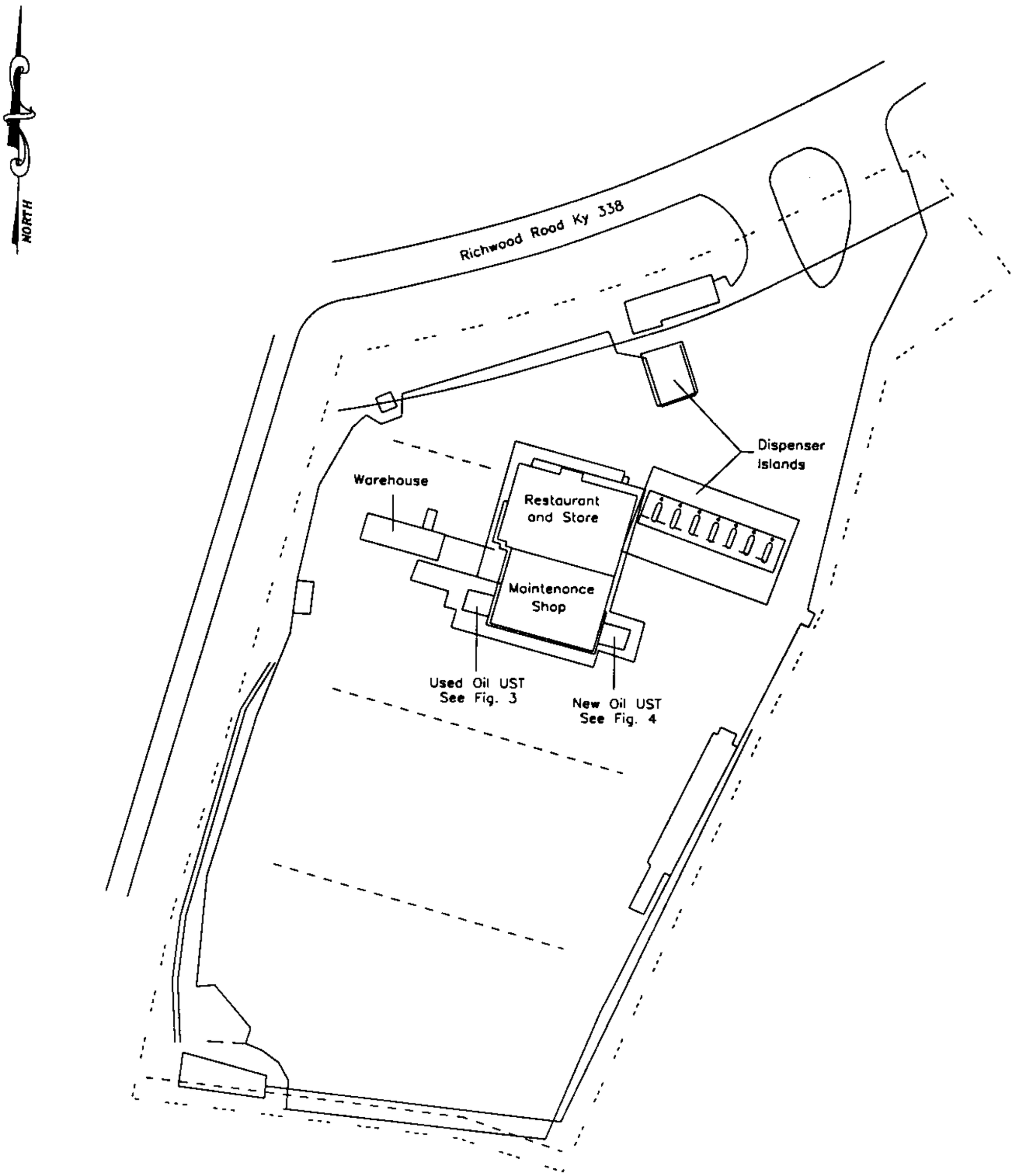
USGS 7.5 Minute Quadrangle:

Union, Kentucky
38084-H6-TF-024

TRAVEL CENTER OF AMERICA

Figure 1.
Site Location Map
Site No. 02141
145 Richwood Road, Walton, Kentucky

Drawn By:	*Date:*	*Scale:*
RMM	10/13/98	1:24000



35004SLM.DWG

PSARA TECHNOLOGIES, INC.

LEGEND

TRAVELCENTERS OF AMERICA

Figure 2.
Site Layout Map
TA Facility No. 02141
145 Richwood Road
Walton, Kentucky

Drawn By:	*Date:*	*Scale:*
SAH	10-16-98	NTS

ATTACHMENT 2

Initial Abatement Checklist

INITIAL ABATEMENT CHECKLIST

Site Name: Travel Centers of America County Boone

Location: I-71/75 and S.R. 338 UST ID# 671008

Instructions:

Place a yes or a no next to the items included in the Initial Abatement Report which shall be submitted within twenty (20) days after confirmation of a release of a regulated substance from an Underground Storage Tank (UST) system(s). If any item is not applicable, write NA for "not applicable" in the appropriate space and provide a brief explanation at the back of this checklist. The complete checklist shall be submitted with both the original and the copy of the initial abatement report in order to expedite review of the initial abatement report.

1.0 Initial Response

Yes 1.1 Was the release immediately reported to the Environmental Response Section?

Yes 1.2 Is the ERT number recorded and referenced in the report?

Yes 1.3 The ERT number for the site is C0434

No 1.4 Were immediate actions necessary to prevent further releases?

No 1.5 Is a description of actions taken to prevent further release included in the report?

Yes 1.6 Was prompt containment and cleanup of the spill initiated to prevent or reduce environmental impact?

No 1.7 Were any potential risks of fire or explosion found as a result of the release of a regulated substance?

Yes 1.8 Is a description of all efforts taken to protect the safety of people and property from vapors, fire or explosion included in the report?

Yes 1.9 Is a description of all containment and/or cleanup efforts included in the report?

2.0 Initial Abatement

No 2.1 Was it necessary to remove product from any Underground Storage Tank system(s)?

Yes 2.2 Is a summary of visual inspections of the release included in the report?

No 2.3 Was continued monitoring necessary to reduce fire and/or safety hazards?

N/A 2.4 Is a description of the monitoring procedure included in the report?

Yes 2.5 Was contaminated soil or water excavated or otherwise exposed to the air?

No 2.6 Is soil and/or water laboratory analysis submitted?

Yes 2.7 Is a summary of methods used to reduce safety hazards from exposed contaminated soils and/or waters included in the report?

3.0 Sheen or Free Product Recovery

Yes 3.1 Was the presence or absence of a sheen or free product determined?

No Yes 3.2 Was the ERT immediately contacted to report any sheen or free product found?

Yes 3.3 Was the immediate recovery of a sheen and/or free product initiated?

Yes 3.4 Is a summary of recovery methods and the volume recovered included in the report?

No Yes 3.5 Is a Recovery Report submitted to the Division within forty-five (45) days after confirmation of the presence of a sheen or free product?

The undersigned, first being duly sworn, state that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate and complete. The undersigned further acknowledges that KRS 224.99-010 provides for penalties for submitting false information.

Company Name TRAVEL CENTER of AMERICA, Site No. 02141

Name and title of Individual Whose Signature Appears Below David A. Plummer Environmental Associate

Signature* David A. Plummer

Date of Signature 11/17/98

Subscribed and sworn to before me by DAVID A. PLUMMER.

This the 17TH **Day of** NOVEMBER, **19** 98

Notary Public Sandra Waldemarson

My Commission Expires DECEMBER 14, 2002

Location of Commission CLEVELAND, OHIO

SANDRA WALDEMARSON
NOTARY PUBLIC, STATE OF OHIO
Recorded in Cuyahoga County
My Comm. Expires Dec. 14, 2002

***NOTE**: If the individual signing this is someone other than the president or secretary of a corporation, attach a notarized copy of power of attorney, or resolution of the board of directors which grants the individual the legal authority to represent the company. (Does not apply to a single proprietorship or partnership.)

TravelCenters of America

January 20, 1998

To whom it may concern:

Re: **Delegation of Authority for Environmental Affairs**

Authority is hereby delegated to the following individuals to sign documents, reports, letters or other correspondence related to environmental affairs on behalf of TravelCenters of America:

George Strickland - Director; Construction, Environmental, and Maintenance

Glenn McArdle - Manager, Environmental Engineering

Kathleen Scheutzow - Project Manager, Environmental

Emily Gloeckler - Environmental Associate

David Plummer - Environmental Associate

Edwin P. Kuhn
President & CEO
TravelCenters of America

pc: T. Doane
S. Lee

24601 Center Ridge Road, Suite 200 Westlake, OH 44145-5634 (440) 808-9100

ATTACHMENT 3

KPDES Discharge Permit

KPDES



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0002801

AUTHORIZATION TO DISCHARGE UNDER THE KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

TA Operating Company
24601 Center Ridge Road-Suite 300
Westlake, Ohio 44145-5634

is authorized to discharge from a facility located at

Truckstops of America
145 Richwood Road
Walton, Kentucky 41094
Boone County

to receiving waters named

Unnamed Tributary of Mud Lick Creek

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. The permit consists of this cover sheet, and Part I 2 page(s), Part II 1 page(s) and Part III 1 page(s).

This permit shall become effective on JUN - 1 1997

This permit and the authorization to discharge shall expire at midnight MAY 3 1 2002

APR - 4 1997
Date Signed

Jack A. Wilson, Director
Division of Water

Robert W. Logan
Commissioner

Printed on Recycled Paper

OCT-20-1998 14:51

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) serial number(s): 002 - Storm water runoff from the fueling areas.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	kg/day(lbs/day)		Other Units(Specify)			
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow, m^3/day (MGD)	Report	Report	N/A	N/A	1/Discharge*	Instantaneous
Total Suspended Solids	N/A	N/A	30 mg/l	60 mg/l	1/Discharge*	Grab
Oil and Grease	N/A	N/A	10 mg/l	15 mg/l	1/Discharge*	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/discharge* by grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): nearest accessible point after final treatment, but prior to actual discharge or mixing with receiving waters.

* Samples shall be taken once per discharge but, no less frequently than once per month. Permittee may take additional samples in order to meet monthly average limitations. If no discharge occurs during a monthly report period, then record a "no discharge" statement on the monthly Discharge Monitoring Report (DMR).

P.03/06

B. Schedule of Compliance

The permittee shall achieve compliance with all requirements on the effective date of this permit.

STANDARD CONDITIONS FOR KPDES PERMIT

The permittee is also advised that all KPDES permit conditions in KPDES Regulation 401 KAR 5:065, Section 1 will apply to all discharges authorized by this permit.

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

PART III

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each month must be reported on a preprinted Discharge Monitoring Report (DMR) Form which will be mailed to you. Each month's completed DMR must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the month for which monitoring results were obtained.

Division of Water
Florence Regional Office
7964 Kentucky Drive, Suite #8
Florence, Kentucky 41042
ATTN: Mr. Kevin Flowers

Kentucky Natural Resources and
Environmental Protection Cabinet
Dept. for Environmental Protection
Division of Water
Inventory & Data Management
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 thru 5:080 and KRS 224, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

Truckstops of America
Boone
6719-008
89-191

TA TRUCKSTOPS of AMERICA

145 RICHWOOD ROAD · I–71 AND I–75 AT KY 338 · WALTON, KY 41094

RECEIVED
MAR 27 1990
UST PROGRAM

Commonwealth of Kentucky
Natural Resources and Environmental Protection Cabinet
Department of Environmental Protection
Division of Waste Management
Underground Storage Tank Section
18 Reilly Road
Frankfort, Ky 40601

Attn: Joan Cullen-Lollis

Dear Ms. Cullen-Lollis:

I am in receipt of the Notice of Violation dated 3/16/90 regarding the Truckstops of America, 145 Richwood Rd., Walton, Ky 41094.

The initial problem was caused by an overflowing of an underground storage tank (1000 gallon) was for waste motor oil. The overflow being caused by the entrance of water into the tank along with the oil and the contents becoming full faster than projected.

Environmental Enterprises Incorporated was contacted and the cleanup initiated the same day. Their cleanup was completed on the same evening with a short visit on 3/23/90 to check on the situation. Lost product was recovered and is being held for disposal.

The tank which was involved was pumped out the evening of the 16th and 600 gallons of water was found to be in the tank, along with 500 gallons of oil. The large amount of water was felt to be due to the cleaning of the drain lines with a high pressure water system earlier in the week by Roto Rooter. This was the first (and only) time this method of cleaning the drains was used.

An alarm system on the tank is completely functunal and should preclude any further incidents of this type. This alarm system notifies us of the tank reaching approximately 70% of its capacity. This allows time for the proper removal of product before a total capacity is reached. Employees and management staff have been retrained on the proper procedures for handling the alarm and procedures were reviewed as to what to do if any spill may ever occur.

TRUCKSTOPS of AMERICA

Atec, a firm out of Cincinnati, has been contacted and they will conduct the required testing of the soil for the background levels testing. I will be notified of the results upon completion.Upon receipt of the results additional corrective action will be conducted as needed to meet the requirements.

Please feel free to contact me with any question you may have regarding this matter at (606) 485-4111.

Sincerely,

Steve Furrow

Steve Furrow
General Manager
Truckstops of America
Walton, Kentucky

CUSTOMER ACCIDENT AND/OR CUSTOMER PROPERTY DAMAGE REPORT

NOTE: DO NOT USE THIS FORM TO REPORT DAMAGE TO PILOT PROPERTY

(REFER TO CUSTOMER ACCIDENT AND PROPERTY DAMAGE REPORTING PROCEDURES)

MANAGER	PHONE NUMBER	STORE/LOCATION CODE	0321 YOUR STORE #	TC CONCEPT TYPE
Rich O Toole	859-485-1327			

STORE ADDRESS: 11229 Frontage Rd. Walton, Ky 41094

CUSTOMER: (ALL INFORMATION BELOW MUST BE COMPLETED):

NAME: Bobby Saylor PHONE NUMBER: 859-567-2337

ADDRESS: 2110 Highway 1130 Sanders, Ky 41083

DATE OF BIRTH: _____ WAS THIS PERSON INJURED? YES (NO)

TIME OF ACCIDENT	DATE OF ACCIDENT	EMPLOYEE TO WHOM ACCIDENT REPORTED	DATE & TIME ACCIDENT RPT'D TO MANAGER
8:07 (AM) PM	9/8/08	Rich O Toole	9/8/08 11:30 (AM) PM

DESCRIPTION OF ACCIDENT (STATE HOW THE ACCIDENT HAPPENED AND THE CONDITIONS UNDER WHICH IT HAPPENED):

Mr. Saylor purchased 20.975 gals of reg. unleaded gas at 8:07 AM. His truck immediately started running rough. He took it to Automasters and was told that there is water in the fuel

DESCRIPTION OF INJURY (STATE TYPE OF INJURY AND PART OF BODY AFFECTED):

WAS MEDICAL ATTENTION NECESSARY? YES NO WAS MEDICAL ATTENTION RECEIVED? YES NO

NAME, ADDRESS AND PHONE NUMBER OF ANY WITNESSES

1. NAME: _____ PHONE NUMBER: _____

   ADDRESS: _____

   WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

   NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

2. NAME: _____ PHONE NUMBER: _____

   ADDRESS: _____

   WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

   NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

DESCRIPTION OF VEHICLE AND/OR PROPERTY DAMAGED

VEHICLE:

YEAR 2000 MAKE Chev. MODEL Box COLOR White LICENSE #: 13592Y STATE Ky.

NAME, ADDRESS AND PHONE NUMBER OF OWNER OF VEHICLE IF DIFFERENT FROM DRIVER. (SEE BELOW*):

NAME: C&K Plumbing PHONE NUMBER: 859-567-2337

ADDRESS: 2110 Highway 1130 Sanders, Ky 41083

INSURANCE COMPANY NAME AND ADDRESS: _____

POLICY #: _____

DESCRIPTION OF PROPERTY DAMAGED: Water in gas

SIGNATURE OF INJURED PARTY OR DRIVER:	DATE: 9-8-08
SIGNATURE OF MANAGER:	DATE: 9-8-08
SIGNATURE OF MANAGER ON DUTY:	DATE: 9-8-08

***IF RENTAL VEHICLE, CONTACT OFFICE IMMEDIATELY.**

CUSTOMER ACCIDENT AND/OR CUSTOMER PROPERTY DAMAGE REPORT

NOTE: DO NOT USE THIS FORM TO REPORT DAMAGE TO PILOT PROPERTY

(REFER TO CUSTOMER ACCIDENT AND PROPERTY DAMAGE REPORTING PROCEDURES)

MANAGER: Rich O'Toole	PHONE NUMBER 859-485-1327	STORE/LOCATION CODE:	0 321 (YOUR STORE #)	TC (CONCEPT TYPE)

STORE ADDRESS: 11229 Frontage Rd. Walton, Ky 41094

CUSTOMER: (ALL INFORMATION BELOW MUST BE COMPLETED):

NAME: Tom Garriga PHONE NUMBER: 513-319-8182

ADDRESS: 7135 Vailsgate Ct. Libertytwaship, Ohio 45011

DATE OF BIRTH: _____ WAS THIS PERSON INJURED? YES (NO)

TIME OF ACCIDENT	DATE OF ACCIDENT	EMPLOYEE TO WHOM ACCIDENT REPORTED	DATE & TIME ACCIDENT RPT'D TO MANAGER
7:19 (AM) PM	9/8/08	Rich O'Toole	9/8 (AM) PM

DESCRIPTION OF ACCIDENT (STATE HOW THE ACCIDENT HAPPENED AND THE CONDITIONS UNDER WHICH IT HAPPENED):

Mr. Garriga bought gas and his car immediately starting running rough. He had the car towed and got a rental car. He purchased a gas can & has a gas sample.

DESCRIPTION OF INJURY (STATE TYPE OF INJURY AND PART OF BODY AFFECTED):

WAS MEDICAL ATTENTION NECESSARY? YES NO WAS MEDICAL ATTENTION RECEIVED? YES NO

NAME, ADDRESS AND PHONE NUMBER OF ANY WITNESSES

1. NAME: _____ PHONE NUMBER: _____

ADDRESS: _____

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

2.. NAME: _____ PHONE NUMBER: _____

ADDRESS: _____

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

DESCRIPTION OF VEHICLE AND/OR PROPERTY DAMAGED

VEHICLE:

YEAR 1998 MAKE Honda MODEL Accord COLOR Green LICENSE #: EKW6114 STATE Oh

NAME, ADDRESS AND PHONE NUMBER OF OWNER OF VEHICLE IF DIFFERENT FROM DRIVER (SEE BELOW*):

NAME: Tom Garriga PHONE NUMBER: 513319-8182

ADDRESS: 7135 Vailsgate Ct. Liberty Township, Ohio 45011

INSURANCE COMPANY NAME AND ADDRESS: _____

POLICY #: _____

DESCRIPTION OF PROPERTY DAMAGED: water in gas

Tom R Garriga

SIGNATURE OF INJURED PARTY OR DRIVER:	DATE:
SIGNATURE OF MANAGER:	DATE: 9-8-08
SIGNATURE OF MANAGER ON DUTY:	DATE: 9-8-08

***IF RENTAL VEHICLE, CONTACT OFFICE IMMEDIATELY.**

CUSTOMER ACCIDENT AND/OR CUSTOMER PROPERTY DAMAGE REPORT

NOTE: DO NOT USE THIS FORM TO REPORT DAMAGE TO PILOT PROPERTY

(REFER TO CUSTOMER ACCIDENT AND PROPERTY DAMAGE REPORTING PROCEDURES)

MANAGER	PHONE NUMBER	STORE/LOCATION CODE:	0321 YOUR STORE #	TC CONCEPT TYPE
Rich O'Toole	859-485-1327			

STORE ADDRESS: 11229 Frontage Rd. Walton, Ky 41094

CUSTOMER: (ALL INFORMATION BELOW MUST BE COMPLETED):

NAME: Rodney Beagle PHONE NUMBER: 859-384-9427

ADDRESS: 523 Rosebud Cir. Walton, Ky 41094

DATE OF BIRTH: _____ WAS THIS PERSON INJURED? YES (NO)

TIME OF ACCIDENT	DATE OF ACCIDENT	EMPLOYEE TO WHOM ACCIDENT REPORTED	DATE & TIME ACCIDENT RPT'D TO MANAGER
8:30 (AM) PM	9/8/08	Rich O'Toole	9/8/08 9:10 (AM) PM

DESCRIPTION OF ACCIDENT (STATE HOW THE ACCIDENT HAPPENED AND THE CONDITIONS UNDER WHICH IT HAPPENED):

MR. Beagle bought $30 Reg unleaded GAS at. APPROX. 8:30AM. When he tried to drive on the interstate, the CAR bogged down. He limped it home

DESCRIPTION OF INJURY (STATE TYPE OF INJURY AND PART OF BODY AFFECTED):

WAS MEDICAL ATTENTION NECESSARY? YES NO WAS MEDICAL ATTENTION RECEIVED? YES NO

NAME, ADDRESS AND PHONE NUMBER OF ANY WITNESSES

1. NAME: _____ PHONE NUMBER: _____

ADDRESS: _____

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

2.. NAME: _____ PHONE NUMBER: _____

ADDRESS: _____

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: _____ PHONE NUMBER: _____

DESCRIPTION OF VEHICLE AND/OR PROPERTY DAMAGED

VEHICLE:

YEAR 2000 MAKE Ford MODEL Taurus COLOR Grey LICENSE #. _____ STATE Ky.

NAME, ADDRESS AND PHONE NUMBER OF OWNER OF VEHICLE IF DIFFERENT FROM DRIVER. (SEE BELOW*):

NAME: Ron Beagle PHONE NUMBER: 859-384-9427

ADDRESS: 523 Rosebud Cir Walton, Ky 41094

INSURANCE COMPANY NAME AND ADDRESS: Barnes Ins.

POLICY #: _____

DESCRIPTION OF PROPERTY DAMAGED: Bad gas

Ron Beagle

SIGNATURE OF INJURED PARTY OR DRIVER:	DATE:
SIGNATURE OF MANAGER: Rich O'Toole	DATE: 9-8-08
SIGNATURE OF MANAGER ON DUTY: Rich O'Toole	DATE: 9-8-08

*IF RENTAL VEHICLE, CONTACT OFFICE IMMEDIATELY.

CUSTOMER ACCIDENT AND/OR CUSTOMER PROPERTY DAMAGE REPORT

NOTE: DO NOT USE THIS FORM TO REPORT DAMAGE TO PILOT PROPERTY

(REFER TO CUSTOMER ACCIDENT AND PROPERTY DAMAGE REPORTING PROCEDURES)

MANAGER	PHONE NUMBER	STORE/LOCATION CODE:	0 321 (YOUR STORE #)	50 (CONCEPT TYPE)
Rich O'Toole	859-485-1337			

STORE ADDRESS: 11229 Frontage Rd.

CUSTOMER: (ALL INFORMATION BELOW MUST BE COMPLETED)

NAME: Rita Harmon (Employee) PHONE NUMBER: 859-823-0532

ADDRESS: 641 Cynthiana St Williamstown, Ky 41097

DATE OF BIRTH: 10-23-58 WAS THIS PERSON INJURED? YES (NO)

TIME OF ACCIDENT	DATE OF ACCIDENT	EMPLOYEE TO WHOM ACCIDENT REPORTED	DATE & TIME ACCIDENT RPT'D TO MANAGER
3:24 (AM) PM	9/8/08	Rich O'Toole	8:00 (AM) PM

DESCRIPTION OF ACCIDENT (STATE HOW THE ACCIDENT HAPPENED AND THE CONDITIONS UNDER WHICH IT HAPPENED):

MRS. HARMON bought 10 gals. of REG UNleaded on pump #2. When she attempted to leave work at 8AM her car would not start. Ran N9

DESCRIPTION OF INJURY (STATE TYPE OF INJURY AND PART OF BODY AFFECTED):

WAS MEDICAL ATTENTION NECESSARY? YES NO WAS MEDICAL ATTENTION RECEIVED? YES NO

NAME, ADDRESS AND PHONE NUMBER OF ANY WITNESSES

1. NAME: PHONE NUMBER:

ADDRESS:

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: PHONE NUMBER:

2.. NAME: PHONE NUMBER:

ADDRESS:

WAS WITNESS AN EMPLOYEE? YES NO WAS WITNESS A CUSTOMER? YES NO

NAME OF EMPLOYER OF WITNESS: PHONE NUMBER:

DESCRIPTION OF VEHICLE AND/OR PROPERTY DAMAGED

VEHICLE:

YEAR 2002 MAKE Chev. MODEL Cavalier COLOR Gold LICENSE #. _____ STATE Ky

NAME, ADDRESS AND PHONE NUMBER OF OWNER OF VEHICLE IF DIFFERENT FROM DRIVER. (SEE BELOW*):

NAME: Not Different PHONE NUMBER: Same

ADDRESS:

INSURANCE COMPANY NAME AND ADDRESS: Unitrin Auto - Home & Auto Jacksonville, FL 32256-6017 POLICY #: H.B. 787278

DESCRIPTION OF PROPERTY DAMAGED:

See Above

SIGNATURE OF INJURED ~~PARTY~~ OR DRIVER: Rita Harmon	DATE:
SIGNATURE OF MANAGER: Rich O'Toole	DATE: 9-8-08
SIGNATURE OF MANAGER ON DUTY: Rich O'Toole	DATE: 9-8-08

*IF RENTAL VEHICLE, CONTACT OFFICE IMMEDIATELY.

ERNIE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
ENVIRONMENTAL RESPONSE SECTION
300 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

TERESA J. HILL
SECRETARY

May 15, 2007

Mr. Jason McCain
Pilot Travel Center #321
11229 Frontage Rd
Walton, KY 41094

Re: **Environmental Emergency Declared**
AI ID: 229
AI Name: Pilot Travel Center #321
Activity ID: EIA20070001
Boone County, KY

Dear Mr. McCain:

Due to the continued presence of petroleum observed in each of the three diesel tank sumps at the above referenced facility, the Environmental Response Section of the Kentucky Department for Environmental Protection is notifying you that an official emergency has been declared at the above referenced facility effective 9:00 AM on May 15, 2007. As part of this emergency declaration, you are being directed to conduct the following actions: 1) continue on-going vacuum truck work to extract all free product observed in each of the diesel tank sumps; 2) install two 4" minimum extraction/monitoring wells in appropriate down-gradient locations to assess and recover potential off-site product encountered and 3) immediately perform a precision test on each of the four diesel tanks using an approved test method capable of detecting a 0.1 gph leak rate. The declared emergency status shall remain in effect until the cabinet officially terminates the emergency status.

Some expenses may be reimbursed for emergency actions. In order to avoid reimbursement related delays, please contact the Claims and Payment Section of the Underground Storage Tank Branch at 502-564-5981 or 800-928-7782. Please include the above referenced AI ID number and AI name on all documents submitted to the Underground Storage Tank Branch. Submit the original documentation and one (1) copy of any information sent to the Branch. Failure to comply with this request will delay the review process.

If you have any questions or wish to discuss this correspondence concerning the emergency please contact me at 502-564-2150.

Sincerely,

Robert Francis

Robert N. Francis, Supervisor
Environmental Response Section
Department for Environmental Protection

cc: Jason Denlinger, Pangean

ERNIE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
ENVIRONMENTAL RESPONSE SECTION
300 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

TERESA J. HILL
SECRETARY

May 22, 2007

Mr. Jason McCain
Pilot Travel Center #321
11229 Frontage Rd
Walton, KY 41094

Re: **Environmental Emergency Declared**
AI ID: 229
AI Name: Pilot Travel Center #321
Activity ID: EIA20070001
Boone County, KY

Dear Mr. McCain:

This letter is in reference to the release reported on April 10, 2007 (Incident # 2257613). The Environmental Response Section of the Kentucky Department for Environmental Protection is notifying you that the official emergency that was declared at 9:00 AM on May 15, 2007, has ended as of 9:00 AM on May 21, 2007.

This incident is being referred to the Underground Storage Tank Branch for review which may result in further remedial actions. Please remember that some expenses may be reimbursed for emergency actions. In order to avoid reimbursement related delays, please contact the Claims and Payment Section of the Underground Storage Tank Branch at 502-564-5981 or 800-928-7782. Please include the above referenced AI ID number and AI name on all documents submitted to the Underground Storage Tank Branch. Submit the original documentation and one (1) copy of any information sent to the Branch. Failure to comply with this request will delay the review process.

If you have any questions regarding this environmental emergency, please contact me at 502-564-2150.

Sincerely,

Robert Francis

Robert N. Francis, Supervisor
Environmental Response Section
Department for Environmental Protection

cc: Jason Denlinger, Pangean

Kentucky Energy and Environment Cabinet
Department for Environmental Protection
Division of Waste Management
Underground Storage Tank Branch

UST FACILITY REQUIREMENTS

Owner:
Pilot Travel Centers LLC
5508 Lonas Rd
Knoxville, TN 37909

UST Facility:
Pilot Travel Center #321
11229 Frontage Rd
Walton, KY 41094
Boone County

AI ID #: 229

In an effort to offer compliance assistance, the Underground Storage Tank (UST) Branch has outlined specific requirements necessary for your site to comply with 401 KAR 42:020, 030, and/or 040. This document outlines what the UST Branch has registered. If any of this information is not correct, please contact **Jamie Nielsen** at 502-564-5981 x4773 or by email at Jamie.Nielsen@ky.gov.

Registered Tanks:

Tank Number	Capacity (gal)	Substance Stored	Status
1 - 1	20000	DSL Diesel	TAC Active
2 - 1	20000	DSL Diesel	TAC Active
3 - 1	20000	DSL Diesel	TAC Active
4 - 1	20000	DSL Diesel	TAC Active
8 - 1	9000	GAS-PRM-Prem Unl Gas	TAC Active
8 - 2	16000	GAS-UNL-Reg Unl Gas	TAC Active

Required Tests:

	LAST TEST DATE	TEST DUE DATE
Cathodic Protection Test	09-28-2008	09-28-2011
Line Leak Detector Operational Test	09-14-2010	09-14-2011

All testing results must be submitted to the UST Branch within 30 days of the test date.

Division of Waste Management
UST Branch, 2nd Floor
200 Fair Oaks Lane
Frankfort, KY 40601
Fax: 502-564-0094

AI ID #: 229

KEY POINTS

- Spill buckets should be kept free of liquid and debris.
- UST systems in temporary closure must maintain corrosion protection and contain less than 1" of product or conduct monthly release detection.
- All confirmed and suspected releases must be reported to the Environmental Response Team (ERT) Hotline (1-800-928-2380).
- An amended UST Facility Registration Form DEP7112 must be submitted to the UST Branch if the UST facility changes ownership, removes/adds tanks, has a new operator, changes the product in a tank, and/or changes tank status.
- Additional programmatic information can be found on our Web site at http://waste.ky.gov/ust.
- Please note that compliance with the requirements of this letter may not result in complete compliance with the provisions of KRS Chapter 224 and the regulations promulgated pursuant thereto.

ORIGINAL

PANGEAN
CMD
ASSOCIATES

RECEIVED
DIVISION OF WASTE MANAGEMENT
2007 MAY -4 P 2:38

May 3, 2007

Mr. Brad Highley
Kentucky Department for Environmental Protection
Division of Waste Management
81 C. Micheal Davenport Blvd.
Frankfort, Kentucky 40601

RE: Initial Abatement Report
Pilot Travel Centers LLC No. 321
11229 Frontage Road
Walton, Boone County, Kentucky
Pangean-CMD Project No. PT-000321-01

AI 229

Dear Mr. Highley:

On behalf of our client Pilot Travel Centers LLC (Pilot), Pangean-CMD Associates, Inc., (Pangean-CMD) is submitting this Initial Abatement Report for the above-referenced facility. The Initial Abatement Report is in response to a faulty leak detector that occurred at the facility on April 10, 2007.

Summary of the Events of the Release

Below is a chronological listing of the events that have occurred at the facility since the time of the release. For your convenience, photographs and a copy of field notes of the events performed on site are provided in Attachment A and B, respectively

- The release of approximately 50 gallons of diesel fuel was first observed by Mr. Jim Edds, Regional Maintenance Supervisor for Pilot, on April 10, 2007, around 10:00 AM. Mr. Edds was performing a routine scheduled maintenance stop at the facility when he noted the fuel pooled up in one of the three motor sumps for the diesel underground storage tank (UST) cavity. This was the motor sump on the western side of the diesel UST cavity. Visual observation of the leak detector indicated it as an obvious release point. The diesel pump island was then shut down by Pilot until the lines could be repaired and passed a tightness test.

- The release was contained to the western motor sump area and none was released to the surface or other underground conduits/sensitive receptors in the immediate area.

- For emergency response purposes, the diesel fuel was placed in the oil water (O/W) separator located on site by the Pilot Regional Maintenance Supervisor. This material will be removed by Pilot the week of April 30, 2007, and a waste manifest will be forwarded upon receipt.

- M&M Services, Inc., was contacted to repair the faulty leak detector and Grau Equipment was there to test the diesel lines and dispensers. Upon successful completion of the repairs the lines and dispensers passed and were put back in operation around 9:40 PM on April 10, 2007.

A copy of the 12-month CITLDS Continual Reconciliation Report, annual tightness testing and tightness testing performed on April 10, 2007, are attached for your review.

Findings and Conclusions

Pilot plans to remove the diesel fuel from the O/W separator during the week of April 30, 2007. Waste manifest for that event will be forwarded upon receipt. Continued scheduled maintenance will be able to pick up on these types of mechanical releases in the future.

Please contact Mr. Jason McCain of Pilot at (865) 588-7488, extension 2438, or me at (513) 576-1999, if you have any questions regarding this application.

Sincerely,

PANGEAN-CMD ASSOCIATES, INC.

Jason D. Denlinger
Branch Manager

Enclosures

c: Jason A. McCain – Pilot Travel Centers LLC
Project File

ATTACHMENT A

PHOTOGRAPHS

ATTACHMENT B

COPY OF FIELD NOTES

Location _____ Date _____

Project / Client _____

DATE: 10 APR 07

TIME: IN 2:30 PM

OUT 10:00 PM

LOCATION: PILOT #321

FRONTAGE RD

WALTON, KY

TASK: EP FOR SITE

PERFORMED:

- MET W/ JIM EDDS (PILOT MAINT.), MICKY MUEZ & JOHN ROH GRAD
- CALLED IN RELEASE TO KDEP
- LEAK DETECTOR ON WESTERN PUMP PUMP WAS OBVIOUSLY LEAKING. FUEL FILLED WEST SUMP PUMP MANHOLE.
- WATER FOUND IN MIDDLE & EASTERN SUMP PUMP MANHOLES. WATER PUMPED VIA TRASH PUMP TO OWS. RESULT "BUBBLED" INTO EASTERN SUMP PUMP MANHOLES. NEED TO CHECK THIS AS WELL.

Location _____ Date _____

Project / Client _____

- 4:00 PM. CHECKED ONS FEEDBACK. AS CLEAN, DOCKING AND CATCH BASINS
- 4:10 PM. CHECKED DISPLACED PALS AT THE DIESEL ISLANDS DO FUEL TO PALS
- 4:15 PM. CHECKED REPAIR MADE TO WESTERN SUMP PUMP. DIESEL LEAK DETECTOR THREADS WERE LEAKING & GRAL REPLACED W/A NEW ONE APPEARS TO BE HOLDING. GRAD SETTING D FOR A LINE TEST.
- ~ 4:20 PM. STARTED LINE TEST
- ~ 4:45 PM LINE AND LEAK DETECTORS PASSED

ATTACHMENT C

COPY OF 12-MONTH CITLDS CONTINUAL RECONCILIATION REPORTS

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	03/01/2006-03/31/2006	P	03/31/2006
03 -U	24000 (2M)	03/01/2006-03/31/2006	P	03/31/2006
04 -D	80000 (4M)	03/01/2006-03/31/2006	I	03/31/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	03/01/2006-03/31/2006	P	03/31/2006
03 -U	24000 (2M)	03/01/2006-03/31/2006	P	03/31/2006
04 -D	80000 (4M)	03/01/2006-03/31/2006	I	03/31/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	03/01/2006-03/31/2006	0.030	0.015
03 -U	24000 (2M)	03/01/2006-03/31/2006	0.040	0.020
04 -D	80000 (4M)	03/01/2006-03/31/2006	0.200	0.100

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	04/01/2006-04/30/2006	P	04/30/2006
03 -U	24000 (2M)	04/01/2006-04/30/2006	P	04/30/2006
04 -D	80000 (4M)	04/01/2006-04/30/2006	I	04/30/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	04/01/2006-04/30/2006	P	04/30/2006
03 -U	24000 (2M)	04/01/2006-04/30/2006	P	04/30/2006
04 -D	80000 (4M)	04/01/2006-04/30/2006	I	04/30/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	04/01/2006-04/30/2006	0.030	0.015
03 -U	24000 (2M)	04/01/2006-04/30/2006	0.120	0.060
04 -D	80000 (4M)	04/01/2006-04/30/2006	0.140	0.070

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	05/01/2006-05/31/2006	P	05/31/2006
03 -U	24000 (2M)	05/01/2006-05/31/2006	P	05/31/2006
04 -D	80000 (4M)	05/01/2006-05/31/2006	P	05/31/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	05/01/2006-05/31/2006	P	05/31/2006
03 -U	24000 (2M)	05/01/2006-05/31/2006	P	05/31/2006
04 -D	80000 (4M)	05/01/2006-05/31/2006	P	05/31/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	05/01/2006-05/31/2006	0.030	0.015
03 -U	24000 (2M)	05/01/2006-05/31/2006	0.050	0.025
04 -D	80000 (4M)	05/01/2006-05/31/2006	0.130	0.065

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	06/01/2006-06/30/2006	P	06/30/2006
03 -U	24000 (2M)	06/01/2006-06/30/2006	P	06/30/2006
04 -D	80000 (4M)	06/01/2006-06/25/2006	I	06/25/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	06/01/2006-06/30/2006	P	06/30/2006
03 -U	24000 (2M)	06/01/2006-06/30/2006	P	06/30/2006
04 -D	80000 (4M)	06/01/2006-06/25/2006	I	06/25/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	06/01/2006-06/30/2006	0.030	0.015
03 -U	24000 (2M)	06/01/2006-06/30/2006	0.100	0.050
04 -D	80000 (4M)	06/01/2006-06/25/2006	0.180	0.090

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	07/01/2006-07/31/2006	Pass	07/31/2006
03 -U	24000 (2M)	07/01/2006-07/31/2006	Pass	07/31/2006
04 -D	80000 (4M)	07/01/2006-07/31/2006	Pass	07/31/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	07/01/2006-07/31/2006	Pass	07/31/2006
03 -U	24000 (2M)	07/01/2006-07/31/2006	Pass	07/31/2006
04 -D	80000 (4M)	07/01/2006-07/31/2006	Pass	07/31/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	07/01/2006-07/31/2006	0.030	0.015
03 -U	24000 (2M)	07/01/2006-07/31/2006	0.110	0.055
04 -D	80000 (4M)	07/01/2006-07/31/2006	0.200	0.100

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	08/14/2006-08/31/2006	Pass	08/31/2006
03 -U	24000 (2M)	08/14/2006-08/31/2006	Pass	08/31/2006
04 -D	80000 (4M)	08/14/2006-08/31/2006	Pass	08/31/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	08/14/2006-08/31/2006	Pass	08/31/2006
03 -U	24000 (2M)	08/14/2006-08/31/2006	Pass	08/31/2006
04 -D	80000 (4M)	08/14/2006-08/31/2006	Pass	08/31/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	08/14/2006-08/31/2006	0.030	0.015
03 -U	24000 (2M)	08/14/2006-08/31/2006	0.080	0.040
04 -D	80000 (4M)	08/14/2006-08/31/2006	0.180	0.090

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	09/01/2006-09/30/2006	Pass	09/30/2006
03 -U	24000 (2M)	09/01/2006-09/30/2006	Pass	09/30/2006
04 -D	80000 (4M)	09/01/2006-09/17/2006	Pass	09/17/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	09/01/2006-09/30/2006	Pass	09/30/2006
03 -U	24000 (2M)	09/01/2006-09/30/2006	Pass	09/30/2006
04 -D	80000 (4M)	09/01/2006-09/17/2006	Pass	09/17/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	09/01/2006-09/30/2006	0.030	0.015
03 -U	24000 (2M)	09/01/2006-09/30/2006	0.080	0.040
04 -D	80000 (4M)	09/01/2006-09/17/2006	0.120	0.060

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	10/01/2006-10/31/2006	Pass	10/31/2006
03 -U	24000 (2M)	10/01/2006-10/31/2006	Pass	10/31/2006
04 -D	80000 (4M)	10/01/2006-10/31/2006	Pass	10/31/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	10/01/2006-10/31/2006	Pass	10/31/2006
03 -U	24000 (2M)	10/01/2006-10/31/2006	Pass	10/31/2006
04 -D	80000 (4M)	10/01/2006-10/31/2006	Pass	10/31/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	10/01/2006-10/31/2006	0.030	0.015
03 -U	24000 (2M)	10/01/2006-10/31/2006	0.150	0.075
04 -D	80000 (4M)	10/01/2006-10/31/2006	0.180	0.090

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	11/01/2006-11/30/2006	Pass	11/30/2006
03 -U	24000 (2M)	11/01/2006-11/30/2006	Pass	11/30/2006
04 -D	80000 (4M)	11/01/2006-11/30/2006	Pass	11/30/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	11/01/2006-11/30/2006	Pass	11/30/2006
03 -U	24000 (2M)	11/01/2006-11/30/2006	Pass	11/30/2006
04 -D	80000 (4M)	11/01/2006-11/30/2006	Pass	11/30/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	11/01/2006-11/30/2006	0.030	0.015
03 -U	24000 (2M)	11/01/2006-11/30/2006	0.110	0.055
04 -D	80000 (4M)	11/01/2006-11/30/2006	0.170	0.085

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	12/01/2006-12/16/2006	Pass	12/16/2006
03 -U	24000 (2M)	12/01/2006-12/16/2006	Pass	12/16/2006
04 -D	80000 (4M)	12/01/2006-12/16/2006	Pass	12/16/2006

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	12000	12/01/2006-12/16/2006	Pass	12/16/2006
03 -U	24000 (2M)	12/01/2006-12/16/2006	Pass	12/16/2006
04 -D	80000 (4M)	12/01/2006-12/16/2006	Pass	12/16/2006

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	12000	12/01/2006-12/16/2006	0.150	0.075
03 -U	24000 (2M)	12/01/2006-12/16/2006	0.170	0.085
04 -D	80000 (4M)	12/01/2006-12/16/2006	0.200	0.100

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	01/01/2007-01/31/2007	Pass	01/31/2007
03 -R	23675 (2M)	01/01/2007-01/31/2007	Pass	01/31/2007
04 -D	78527 (4M)	01/01/2007-01/31/2007	Pass	01/31/2007

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	01/01/2007-01/31/2007	Pass	01/31/2007
03 -R	23675 (2M)	01/01/2007-01/31/2007	Pass	01/31/2007
04 -D	78527 (4M)	01/01/2007-01/31/2007	Pass	01/31/2007

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	11784	01/01/2007-01/31/2007	0.040	0.020
03 -R	23675 (2M)	01/01/2007-01/31/2007	0.190	0.095
04 -D	78527 (4M)	01/01/2007-01/31/2007	0.200	0.100

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	02/01/2007-02/28/2007	Pass	02/28/2007
03 -R	23675 (2M)	02/01/2007-02/28/2007	Pass	02/28/2007
04 -D	78527 (4M)	02/01/2007-02/28/2007	Pass	02/28/2007

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	02/01/2007-02/28/2007	Pass	02/28/2007
03 -R	23675 (2M)	02/01/2007-02/28/2007	Pass	02/28/2007
04 -D	78527 (4M)	02/01/2007-02/28/2007	Pass	02/28/2007

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	11784	02/01/2007-02/28/2007	0.030	0.015
03 -R	23675 (2M)	02/01/2007-02/28/2007	0.080	0.040
04 -D	78527 (4M)	02/01/2007-02/28/2007	0.140	0.070

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	Pilot Travel Centers
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 321 – W90555
Facility Location	11229 Frontage Road
	Walton, KY

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	03/01/2007-03/31/2007	Pass	03/31/2007
03 -R	23675 (2M)	03/01/2007-03/31/2007	Pass	03/31/2007
04 -D	78527 (4M)	03/01/2007-03/31/2007	Pass	03/31/2007

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	11784	03/01/2007-03/31/2007	Pass	03/31/2007
03 -R	23675 (2M)	03/01/2007-03/31/2007	Pass	03/31/2007
04 -D	78527 (4M)	03/01/2007-03/31/2007	Pass	03/31/2007

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	11784	03/01/2007-03/31/2007	0.030	0.015
03 -R	23675 (2M)	03/01/2007-03/31/2007	0.080	0.040
04 -D	78527 (4M)	03/01/2007-03/31/2007	0.160	0.080

ATTACHMENT D

COPY OF ANNUAL TIGHNESS TESTING

ENTERED

SERVICE ORDER SUMMARY

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax (614) 847-3933

Customer:

Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909

Location:

Pilot # 0321
Attn: Manager
2246 State Route 45

Walton, KY

Customer Phone: (865) 588-7488 ext.

Facility Phone:

Service Order # 0219015
Invoice #: 0219015
Customer PO #:

Test Date: 5/11/2006
Test Technician: William Nelson

Dispatched For:

Precision Tank, Line & LD test

Notes/Comments:

All testing passed. When breaker marked DSL is turned off, cannot pump RUL or PUL.

CERTIFICATE OF PRECISION TANK TESTING

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax: (614) 847-3933

QUALITY • INTEGRITY • COMMITMENT

Service Order #: 0219015

Test Date: 5/11/2006

Customer:
Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909
Customer PO #:

Facility:
Pilot # 0321
2246 State Route 45

Walton, KY
Site Contact: Manager
UST Site ID:

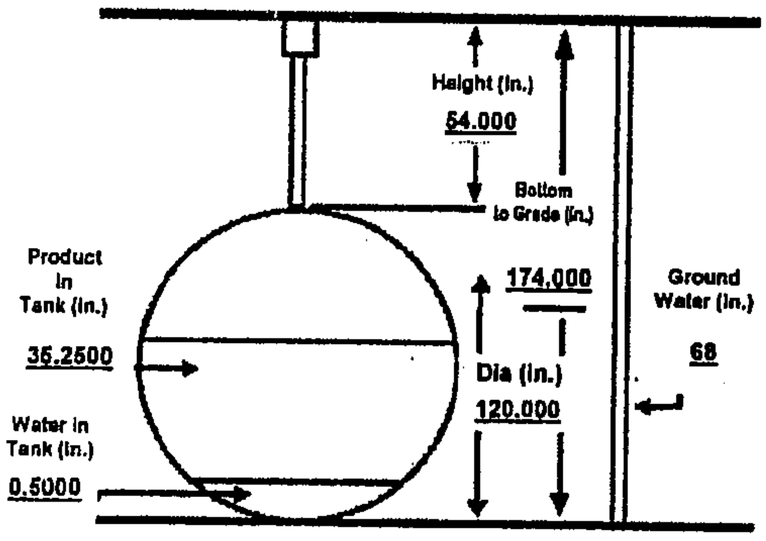
Tank Test Method: ***EZY3 LOCATOR PLUS*** *– Equipment Manufactured By Estabrook's, Inc. 1-877-368-7215*

TANK INFORMATION

Test #: 01
Product: Diesel maste(r)

Total Tank Volume: 20,000 gal.
Product Volume: 35.2500 inches
Water Volume in Tank: 0.5000 inches
Ullage Volume: 84.7500 inches

Depth of Groundwater Determined By:
Well by pad



WATER SENSOR CALIBRATION

Added:	150 Cal#1	125 Cal#2	125 Cal#3
Average:	133		

Water Intrusion Test Period:
Began: 08:30
Ended: 09:30

Calculation for Test Period:

133 (Ave. Cal.) / 3780 = 0.0352 ("A" Factor) / .05

= 0.7037 Time of Test (hrs)

PRESSURE SENSOR CALCULATION

35.2500 INCHES OF PRODUCT	X	.031 WEIGHT OF PRODUCT	=	1.0927	PSI (1)
0.5000 INCHES OF WATER IN TANK	X	.036	=	0.0180	PSI (2)
Line 1 + Line 2 = Total Positive Head Pressure in Tank			=	1.1108	PSI (3)
68.0000 INCHES OF WATER OUTSIDE TANK	X	.036	=	2.4480	PSI (4)
Total Head Pressure Minus Outside Water Pressure			=	-1.3373	PSI (5)
Always add 0.5 PSI			+	0.5	
NOTE: If Line 6 is less Than 0.5 PSI Line 7 shall be 0.5 PSI			=	-0.8373	PSI (6)
TEST PRESSURE			=	0.5000	PSI (7)

	TIME	PRESSURE
Blower Started:	07:45	0.00
Test Press Reached:	00:08	0.50
Blower Turned Off:	08:04	0.52
Test Began:	08:04	0.52
Test Ended:	08:08	0.51

THE RESULTS OF THE PRECISION TANK TIGHTNESS TEST:

✓ **TIGHT TANK**
THIS UNDERGROUND STORAGE TAN PASSES THE CRITERIA SET FORTH BY THE MANUFACTURER AND THE U.S. EPA.

Comments: Tight Tank passed.

WATER SENSOR INDICATES:

✓ **NO WATER INTRUSION DETECTED**

Comments: No water intrusion

Testing Performed By: William Nelson
Certification(s): EZY 3 Locator Plus Certificate 33-3529

KY Wts & Measures Registration #1501

CERTIFICATE OF PRECISION TANK TESTING

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax: (614) 847-3933

QUALITY • INTEGRITY • COMMITMENT

Service Order #: 0219015

Test Date: 5/11/2006

Customer:
Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909
Customer PO #:

Facility:
Pilot # 0321
2246 State Route 45

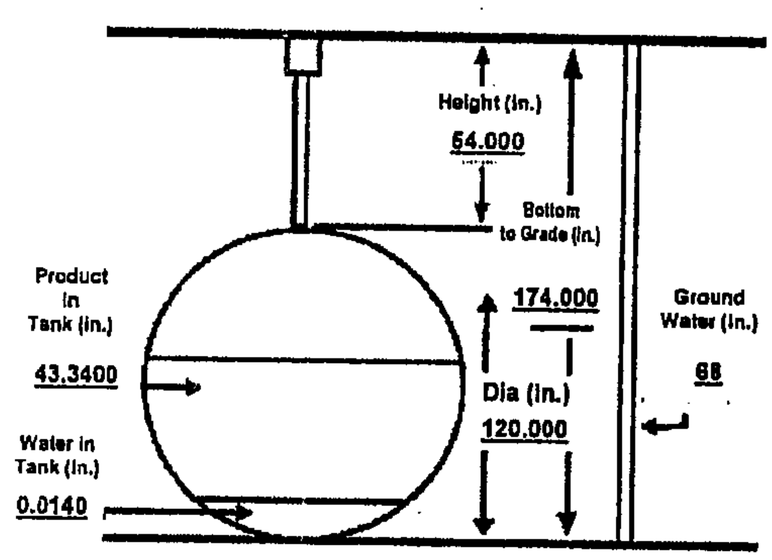
Walton, KY
Site Contact: Manager
UST Site ID:

Tank Test Method: ***EZY3 LOCATOR PLUS*** *– Equipment Manufactured By Estabrook's, Inc. 1-877-368-7215*

TANK INFORMATION

Test #: 02
Product: Diesel
Total Tank Volume: 20,000 gal.
Product Volume: 43.3400 inches
Water Volume in Tank: 0.0140 inches
Ullage Volume: 76.6600 inches

Depth of Groundwater Determined By:
Well by pad



WATER SENSOR CALIBRATION

	Cal#1	Cal#2	Cal#3
Added:	125	125	125

Average: 125

Water Intrusion Test Period:
Began: 08:30
Ended: 09:30

Calculation for Test Period:

125 (Ave. Cal.) / 3780 = 0.0331 ("A" Factor) / .05

= 0.6614 Time of Test (hrs)

PRESSURE SENSOR CALCULATION

43.3400 INCHES OF PRODUCT	X	.031 WEIGHT OF PRODUCT	=	1.3435	PSI (1)
0.0140 INCHES OF WATER IN TANK	X	.036	=	0.0005	PSI (2)
Line 1 + Line 2 = Total Positive Head Pressure in Tank			=	1.3440	PSI (3)
68.0000 INCHES OF WATER OUTSIDE TANK	X	.036	=	2.4480	PSI (4)
Total Head Pressure Minus Outside Water Pressure			=	-1.1040	PSI (5)
Always add 0.5 PSI NOTE: If Line 6 is less Than 0.5 PSI Line 7 shall be 0.5 PSI			+	0.5	
			=	-0.6040	PSI (6)
TEST PRESSURE			=	0.5000	PSI (7)

	TIME	PRESSURE
Blower Started:	07:45	0.00
Test Press Reached:	08:00	0.50
Blower Turned Off:	08:04	0.52
Test Began:	08:04	0.52
Test Ended:	08:12	0.51

THE RESULTS OF THE PRECISION TANK TIGHTNESS TEST:

✓ **TIGHT TANK**
THIS UNDERGROUND STORAGE TAN PASSES THE CRITERIA SET FORTH BY THE MANUFACTURER AND THE U.S. EPA.

Comments: Tight Tank passed

WATER SENSOR INDICATES:

✓ **NO WATER INTRUSION DETECTED**

Comments: No water intrusion

Testing Performed By: William Nelson
Certification(s): EZY 3 Locator Plus Certificate 33-3529

KY Wts & Measures Registration #1501

CERTIFICATE OF PRECISION TANK TESTING

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax: (614) 847-3933

QUALITY • INTEGRITY • COMMITMENT

Service Order #: 0219015

Test Date: 5/11/2006

Customer:
Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909
Customer PO #:

Facility:
Pilot # 0321
2246 State Route 45

Walton, KY
Site Contact: Manager
UST Site ID:

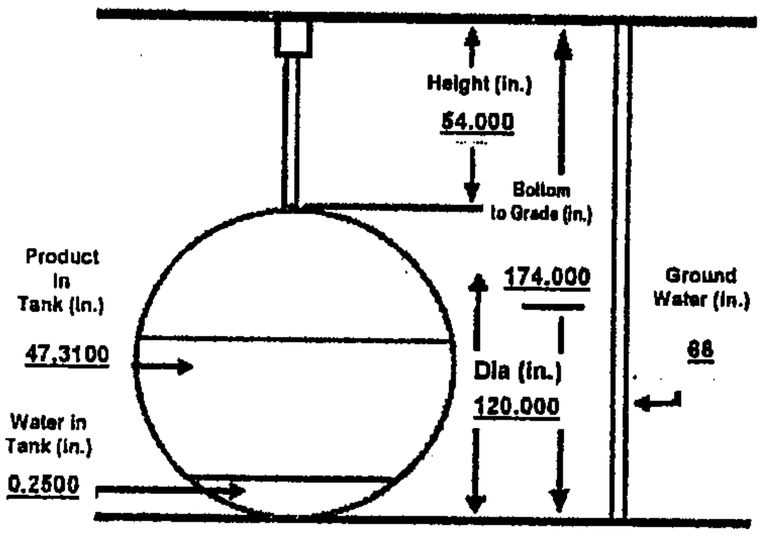
Tank Test Method: ***EZY3 LOCATOR PLUS*** *– Equipment Manufactured By Estabrook's, Inc. 1-877-368-7215*

TANK INFORMATION

Test #: 03
Product: Diesel maste(r)

Total Tank Volume: 20,000 gal.
Product Volume: 47.3100 inches
Water Volume in Tank: 0.2500 inches
Ullage Volume: 72.6900 inches

Depth of Groundwater Determined By:
Well By Pad



WATER SENSOR CALIBRATION

	Cal#1	Cal#2	Cal#3
Added:	125	150	150

Average: 141

Water Intrusion Test Period:
Began: 10:30
Ended: 11:30

Calculation for Test Period:

141 (Ave. Cal.) / 3780 = 0.0373 ("A" Factor) / .05

= 0.7460 **Time of Test (hrs)**

PRESSURE SENSOR CALCULATION

47.3100 INCHES OF PRODUCT	X	.031 WEIGHT OF PRODUCT	=	1.4666	PSI (1)
0.2500 INCHES OF WATER IN TANK	X	.036	=	0.0090	PSI (2)
Line 1 + Line 2 = Total Positive Head Pressure in Tank			=	1.4756	PSI (3)
68.0000 INCHES OF WATER OUTSIDE TANK	X	.036	=	2.4480	PSI (4)
Total Head Pressure Minus Outside Water Pressure			=	-0.9724	PSI (5)
Always add 0.5 PSI			+	0.5	
NOTE: If Line 6 is less Than 0.5 PSI Line 7 shall be 0.5 PSI			=	-0.4724	PSI (6)
TEST PRESSURE			=	0.5000	PSI (7)

	TIME	PRESSURE
Blower Started:	09:45	0.00
Test Press Reached:	10:00	0.60
Blower Turned Off:	10:04	0.52
Test Began:	10:04	0.52
Test Ended:	10:08	0.51

THE RESULTS OF THE PRECISION TANK TIGHTNESS TEST:

✓ **TIGHT TANK**
THIS UNDERGROUND STORAGE TAN PASSES THE CRITERIA SET FORTH BY THE MANUFACTURER AND THE U.S. EPA.

Comments: Tight Tank passed

WATER SENSOR INDICATES:

✓ **NO WATER INTRUSION DETECTED**

Comments: No water intrusion

Testing Performed By: William Nelson
Certification(s): EZY 3 Locator Plus Certificate 33-3529

KY Wts & Measures Registration #1501

CERTIFICATE OF PRECISION TANK TESTING

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax: (614) 847-3933

QUALITY • INTEGRITY • COMMITMENT

Service Order #: 0219015

Test Date: 5/11/2006

Customer:
Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909
Customer PO #:

Facility:
Pilot # 0321
2246 State Route 45

Walton, KY
Site Contact: Manager
UST Site ID:

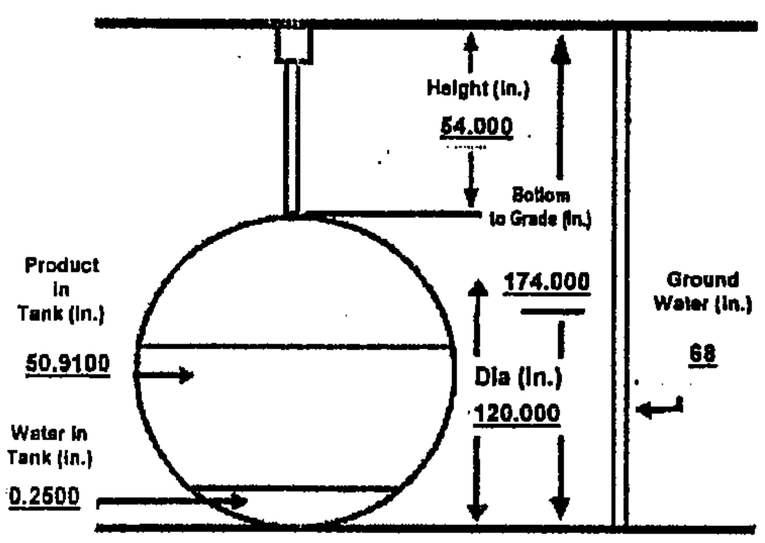
Tank Test Method: ***EZY3 LOCATOR PLUS*** *-- Equipment Manufactured By Estabrook's, Inc. 1-877-368-7215*

TANK INFORMATION

Test #: 04
Product: Diesel

Total Tank Volume: 20,000 gal.
Product Volume: 50.9100 inches
Water Volume in Tank: 0.2500 inches
Ullage Volume: 69.0900 inches

Depth of Groundwater Determined By:
Well by pad



WATER SENSOR CALIBRATION

Added:	150	125	125
	Cal#1	Cal#2	Cal#3

Average: 133

Water Intrusion Test Period:
Began: 10:30
Ended: 11:30

Calculation for Test Period:

133 / 3780 = 0.0352 / .05
Ave. Cal. "A" Factor

= 0.7037 Time of Test (hrs)

PRESSURE SENSOR CALCULATION

50.9100 INCHES OF PRODUCT	X	.031 WEIGHT OF PRODUCT	=	1.5782	PSI (1)
0.2500 INCHES OF WATER IN TANK	X	.036	=	0.0090	PSI (2)
Line 1 + Line 2 = Total Positive Head Pressure in Tank			=	1.5872	PSI (3)
68.0000 INCHES OF WATER OUTSIDE TANK	X	.036	=	2.4480	PSI (4)
Total Head Pressure Minus Outside Water Pressure			=	-0.8608	PSI (5)
Always add 0.5 PSI			+	0.5	
NOTE: If Line 6 is less Than 0.5 PSI Line 7 shall be 0.5 PSI			=	-0.3608	PSI (6)
TEST PRESSURE			=	0.5000	PSI (7)

	TIME	PRESSURE
Blower Started:	09:45	0.00
Test Press Reached:	10:00	0.50
Blower Turned Off:	10:04	0.52
Test Began:	10:04	0.52
Test Ended:	10:12	0.51

THE RESULTS OF THE PRECISION TANK TIGHTNESS TEST:

✓ **TIGHT TANK**
THIS UNDERGROUND STORAGE TAN PASSES THE CRITERIA SET FORTH BY THE MANUFACTURER AND THE U.S. EPA.

Comments: Tight Tank passed

WATER SENSOR INDICATES:

✓ **NO WATER INTRUSION DETECTED**

Comments: No water intrusion

Testing Performed By: William Nelson
Certification(s): EZY 3 Locator Plus Certificate 33-3529

KY Wts & Measures Registration #1501

CERTIFICATE OF LINE AND LEAK DETECTOR TESTING

US TANK ALLIANCE, INC.
7400 Skyline Drive E., Suite A
Columbus, OH 43235
Phone: (614) 847-3666 Fax: (614) 847-3933

Service Order #: 0219015

Test Date: 5/11/2006

Customer:
Pilot Travel Centers, LLC
Attn: Jason McCain
5508 Lonas Road

Knoxville, TN 37909

Customer PO #

Facility:
Pilot # 0321
2246 State Route 45

Walton, KY

Site Contact: Manager

UST Site ID:

Line Test Method: Acurite

Leak Detector Test Method: FTA

	Line Test #: 1	Line Test #: 2
Product:	Diesel	Diesel
Description:		
PumpType:	Pressure	Pressure
Line Material:	SW FRP	SW FRP
Line Diam. (In.):	3.0	2.0
Line Length (ft.):	150	150
Test PSI:	55	55
Start Time:	08:30	09:15
Initial Level:	0.0525	0.0800
Final Level:	0.0500	0.0800
EndTime:	09:00	09:45
Duration (min.):	30	30
Leak Rate (gph):	-0.0025	0.0000
Results:	PASS	PASS
Impact Valve(s) Operational:	YES	YES
LD Make:	Veeder Root	Veeder Root
LD Model:	FX1V	PLLD
LD Serial#:		
Leak Rate (gph):	3.0	3.0
Operating PSI:	28.0	32.0
Resiliency (ml):	110	
Metering PSI:	16	
Opening Time:	3.0	
LD Results:	PASS	PASS
New LD Make:		
New LD Model:		
New LD Serial#:		
New LD Results:		

Comments: Lines and LD's passed

Testing Performed By: William Nelson

Certification(s): Hasstech Acurite Line Tester Cert. 1176.LTN

KY Wts & Measures Registration #15015

DATA CHART
For Use With

STATION NUMBER Pilot 321 DATE 7-3-06

1 LOCATION 11289 Frontage rd (Street No. and/or County) Walton (City) Ky (State) (Telephone No.)

2 OWNER (Name) (Address) (Representative) (Position) (Telephone No.)

3 OPERATOR (Name) (Owner, Mgr. or Other) (Address (If Different from Location)) (Telephone No.)

4 REASON FOR TEST line repair

5 TEST REQUESTED BY Jason McCain (Name) (Position) (Telephone No.)

6 SPECIAL INSTRUCTIONS:

7 CONTRACTOR OR COMPANY MAKING TEST MECHANIC(S) NAME M & M

8 IS A TANK TEST TO BE MADE WITH THIS LINE TEST? ☐ YES ☑ NO

9 MAKE AND TYPE OF PUMP OR DISPENSERS (SUCTION OR SUBMERSIBLE) Shp Submersible

10 WEATHER 90° Sunny TEMPERATURE RANGES ____ °F ____ °C

11 LINES OVER (Concrete, Dirt Fill, etc.) Concrete

12 APPROXIMATE BURIAL DEPTH 3 feet

11 IDENTIFY EACH LINE AS TESTED	12 TIME (MILITARY)	13 LOG OF TEST PROCEDURES, AMBIENT TEMPERATURE, WEATHER, ETC.	14 PRESSURE psi OR kPa BEFORE	14 PRESSURE psi OR kPa AFTER	15 VOLUME READING BEFORE	15 VOLUME READING AFTER	15 VOLUME NET CHANGE	16 REMARKS SIZE, LENGTH & TYPE OF LINE; FLEX CONNECTORS CONSTRUCTIONS; REPAIRS AND COMMENTS
Diesel	14:15		0	60	.099	.017	.082	125 ft + 3" fiberglass
	14:30		60	60	.017	.017	—	
	14:45		60	60	.017	.017	—	
	15:00		60	60	.017	.017	—	
	15:09		60	60	.017	.017	—	
		bleed back	60	0	.017	.077	.060	

07/10/2006 16:52 8597811451 MIDVALLEY SUPPLY PAGE 02/03

TEST RESULTS

Tests were made on the above line systems in accordance with test procedures prescribed for as detailed on attached test charts with the results as follows:

Line Identification	Meets Criteria	Net Volume Change Per Hour	Date Tested
Diesel	Pass	.000	7-3-06

67 CONTRACTOR CERTIFICATION

Technician

Signature

Certification # KYM010105130 70

Cindy Spradling

From: Jeff Ellis
Sent: Monday, January 08, 2007 1:50 PM
To: Cindy Spradling
Subject: 321 Line Leak test results

Hey Cindy,

Store 321 is the only store that brought back any informaiton. I will send you another email with how I get this.

Thanks,

JAN 8, 2007 1:45 PM

Pilot #321
11229 Frontage rd.
Walton KY

good test pass

WPLLD LINE LEAK TEST RESULT

W 1:REG UNL LINE

3.0 GAL/HR RESULTS:

LAST TEST:
JAN 8, 2007 1:39 PM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 123
SINCE MIDNIGHT : 64

0.20 GAL/HR RESULTS:

JAN 8, 2007 1:22 AM PASS
JAN 4, 2007 2:14 AM PASS
DEC 31, 2006 4:25 AM PASS
DEC 27, 2006 1:22 AM PASS
DEC 23, 2006 11:40 PM PASS
DEC 21, 2006 12:58 AM PASS
DEC 17, 2006 2:44 AM PASS
DEC 13, 2006 2:20 AM PASS
DEC 13, 2006 1:18 AM PASS
DEC 11, 2006 3:37 AM PASS

0.10 GAL/HR RESULTS:

DEC 13, 2006 2:36 AM PASS
DEC 9, 2006 3:21 AM FAIL
JUN 4, 2006 1:50 AM PASS
NOV 28, 2005 4:44 AM PASS
FEB 9, 2005 1:39 AM PASS
MAY 17, 2004 4:14 AM PASS
JUL 30, 2003 4:38 AM PASS
JAN 25, 2003 3:30 AM PASS

1/8/2007

Cindy Spradling

From: Jeff Ellis
Sent: Monday, January 08, 2007 1:50 PM
To: Cindy Spradling
Subject: 321 Line Leak test results

Hey Cindy,

Store 321 is the only store that brought back any informaiton. I will send you another email with how I get this.

Thanks,

JAN 8, 2007 1:45 PM

Pilot #321
11229 Frontage rd.
Walton KY

gasoline test pass

WPLLD LINE LEAK TEST RESULT

W 1:REG UNL LINE

3.0 GAL/HR RESULTS:

LAST TEST:
JAN 8, 2007 1:39 PM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 123
SINCE MIDNIGHT : 64

0.20 GAL/HR RESULTS:

JAN 8, 2007 1:22 AM PASS
JAN 4, 2007 2:14 AM PASS
DEC 31, 2006 4:25 AM PASS
DEC 27, 2006 1:22 AM PASS
DEC 23, 2006 11:40 PM PASS
DEC 21, 2006 12:58 AM PASS
DEC 17, 2006 2:44 AM PASS
DEC 13, 2006 2:20 AM PASS
DEC 13, 2006 1:18 AM PASS
DEC 11, 2006 3:37 AM PASS

0.10 GAL/HR RESULTS:

DEC 13, 2006 2:36 AM PASS
DEC 9, 2006 3:21 AM FAIL
JUN 4, 2006 1:50 AM PASS
NOV 28, 2005 4:44 AM PASS
FEB 9, 2005 1:39 AM PASS
MAY 17, 2004 4:14 AM PASS
JUL 30, 2003 4:38 AM PASS
JAN 25, 2003 3:30 AM PASS

1/8/2007

NO-VENT TEST ABORTS:
0 OUT OF 10 TEST

W 2:SUPER LINE

3.0 GAL/HR RESULTS:

LAST TEST:
JAN 8, 2007 1:37 PM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 171
SINCE MIDNIGHT : 83

0.20 GAL/HR RESULTS:

JAN 8, 2007 4:44 AM PASS
JAN 8, 2007 3:05 AM PASS
JAN 8, 2007 1:49 AM PASS
JAN 6, 2007 6:39 AM PASS
JAN 6, 2007 5:19 AM PASS
JAN 6, 2007 3:14 AM PASS
JAN 6, 2007 2:35 AM PASS
JAN 2, 2007 10:54 PM PASS
DEC 31, 2006 4:24 AM PASS
DEC 27, 2006 1:05 AM PASS

0.10 GAL/HR RESULTS:

JUL 6, 2006 4:09 AM PASS
JAN 1, 2006 5:14 AM PASS
JUN 27, 2005 3:31 AM PASS
DEC 19, 2004 3:00 AM PASS
DEC 16, 2004 12:43 AM FAIL
JUN 16, 2004 4:17 AM PASS
DEC 16, 2003 3:43 AM PASS
MAR 20, 2003 1:46 AM PASS

NO-VENT TEST ABORTS:
0 OUT OF 10 TEST

W 3:DIESEL LINE

3.0 GAL/HR RESULTS:

LAST TEST:
JAN 8, 2007 1:38 PM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 35
SINCE MIDNIGHT : 19

0.20 GAL/HR RESULTS:

JAN 6, 2007 2:20 AM PASS
JAN 2, 2007 4:45 PM PASS

DEC 31, 2006 12:58 AM PASS
DEC 27, 2006 8:38 PM PASS
DEC 25, 2006 1:51 AM PASS
DEC 21, 2006 11:03 PM PASS
DEC 19, 2006 9:59 AM PASS
DEC 15, 2006 5:18 PM PASS
DEC 13, 2006 2:31 AM PASS
DEC 9, 2006 10:27 PM PASS

0.10 GAL/HR RESULTS:

JUL 26, 2006 1:28 AM PASS
JAN 23, 2006 8:05 AM PASS
JUL 23, 2005 4:49 PM PASS
JAN 22, 2005 1:49 AM PASS
JUL 22, 2004 9:07 PM PASS
JAN 22, 2004 4:57 AM PASS
JUL 22, 2003 8:34 PM PASS
JAN 20, 2003 9:33 PM PASS

NO-VENT TEST ABORTS:
0 OUT OF 10 TEST

Jeff Ellis
Store Systems Support
Pilot Travel Centers, LLC.
865-588-7488 ext. 2315

ATTACHMENT E

COPY OF TIGHTNESS TEST PERFORMED ON APRIL 10, 2007

4489 Mary Ingles Hwy
Silver Grove KY 41085
859-781-0402 Office
859-781-1451 Fax

M & M Service, Inc.

To:	Cindy Spradling	**Fax:**	865-297-1477
From:	Amy Harris	**Date:**	4/26/2007
Re:	Pilot 321	**Pages:**	2
CC:			

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Notes:

04/26/2007 18:32 500 MID VALLEY PAGE 01/02

M&M SERVICE, INC.
SERVICE STATION EQUIPMENT SPECIALIST

MID-VALLEY SUPPLY

~ Over 10 Years of Superior Service ~

LEAK DETECTOR TEST REPORT

I personally performed a test on diesel tank 4 +6 leak detector at station Pilot 321 on 4-22-7 and found them to be operating properly.

Signed Christopher C Brech

Headquarters

4489 Mary Ingles Highway ✦ Silver Grove, KY 41085 ✦ 859.781.0402 ✦ Fax: 859.781.1451

04/26/2007 18:32 500 MID VALLEY PAGE 02/02

Steven L. Beshear
Governor

ENERGY AND ENVIRONMENT CABINET

Leonard K. Peters
Secretary

Department for Environmental Protection
Division of Waste Management
8020 Veterans Memorial Dr, Suite 110
Florence, Kentucky 41042
www.kentucky.gov

September 12, 2008

Joey Cupp
5508 Lonas Dr
Knoxville TN 37918

RE: Pilot Travel Center #321
Walton KY, 41094
AI# 229
UST ID# 2558-008

Dear Mr. Cupp:

This letter acknowledges receipt of your Notice of Intent (NOI) to Permanently Close Underground Storage Tank System form (DEP #7114) for the above referenced facility. Notice was received by the Division on September 11, 2008. Although, permanent closure may not begin until fourteen (14) days after receipt of this notice of intent, a waiver from this requirement has been granted. Therefore, closure may begin on **September 12, 2008**. If this approved removal date is delayed, you must provide written notice to this office to reschedule an acceptable date. Failure to comply with this requirement will adversely affect the owner or operator's eligibility for reimbursement.

As outlined in 401 KAR 42:070 and 42:080, a Closure Assessment Report form (DEP #8055) and a Classification Guide must be submitted to the Division of Waste Management, Underground Storage Tank Branch within ninety (90) days after permanent closure. These forms are to be completed for permanent closure (removal or closure in place) of tanks and/or piping.

Effective April 1, 1991 the State Fire Marshal's Office (SFMO), currently known as the Division of Fire Prevention, initiated the administration of a certification program for Underground Petroleum Storage Tank Contractors. Anyone performing tank closures must be certified by this SFMO program. Proof of certification must be supplied to the Division of Waste Management representative(s) during tank removal operations. Remember to locate and mark all utilities and develop a site safety plan before closure activities begin.

Please be advised that owners/operators seeking reimbursement for corrective action through the Petroleum Storage Tank Environmental Assurance Fund shall submit an Application for Assistance DEP6063/08/06 upon confirmation of a release in accordance with 401 KAR 42:250 Section 2(1). For additional information about closure notification requirements or financial assistance, you may contact the Underground Storage Tank Branch at (800) 928-7782 or visit the UST Branch web page link located at www.waste.ky.gov.

If you have any questions concerning this acknowledgement letter please contact this office at the number listed below.

Sincerely,

Donna McClanahan

Donna McClanahan
Administrative Specialist III
Division of Waste Management
Florence Regional Office
Phone: (859) 525-4923
Fax: (859) 292-6657

cc: Florence Regional Office
E-file

September 11, 2008

Mr. Adam Fritsch
KY DEP, Division of Water
Florence Regional Office
8020 Veterans Memorial Drive
Suite 110
Florence, KY 41042

Re: Pilot Travel Center #321, Walton, KY, AI #229

Dear Mr. Fritsch:

Attached is the Notification of Intent to Permanently Close UST System for Pilot Travel Center #321 in Walton, KY. I will send an original copy to your office for delivery tomorrow, September 12, 2008.

Pilot is requesting that the 14 day notification period be waived. We would like to begin construction immediately.

If you need additional information, please contact me at 865-474-2826.

Thank you,

Joey Cupp
Environmental Manager

Attachment

NOTICE OF INTENT TO PERMANENTLY CLOSE UNDERGROUND STORAGE TANK SYSTEM

KENTUCKY DEPARTMENT FOR ENVIRONMENTAL PROTECTION	Return Completed Form To: Regional Office responsible for county in which tank system is being closed. For more information call: Regional Office	STATE USE ONLY

SUBMIT A MINIMUM OF TWO WEEKS (14 CALENDAR DAYS) PRIOR TO PERMANENT CLOSURE OF TANK SYSTEM.

OWNERSHIP OF TANK SYSTEM

Pilot Travel Centers LLC
OWNER NAME

5508 Lonas Dr.
MAILING ADDRESS

Knoxville, TN 37918
CITY STATE ZIP CODE

Joey Cupp
CONTACT PERSON

865-474-2826
AREA CODE/ TELEPHONE NUMBER

LOCATION OF TANK SYSTEM

229
AGENCY INTEREST NUMBER

Pilot Travel Center #321
SITE NAME

11229 Frontage Rd
STREET, COUNTY ROAD, HIGHWAY, OR STATE ROAD

Walton KY 41094
CITY STATE ZIP CODE

Boone
COUNTY

CONTACT INFORMATION PERTAINING TO PERMANENT CLOSURE

1. Name of company/person in charge of permanent closure activities: Joey Cupp
2. Area code and telephone number for company/person in charge of permanent closure activities:
3. Name of company/person performing the actual tank system permanent closure: to be determined

1. TYPE OF CLOSURE:(MARK ONE) ✓ Removal from Ground ◇ Closure in Place ◇ Piping Only ◇ Change in Service
2. Number of Tanks to be permanently closed at above location: 3
3. Indicate the cleaning method for each tank: scraping, tank bottoms put in 55gal drums
4. If the tank is to be closed in place, type of fill material to be used: -
5. Name of laboratory where samples will be sent: SPL
6. Closure date scheduled: 9-12-08
7. If piping only, indicate substance contained in system: -

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I certify that the submitted information is true, accurate, and complete KRS 224.99-010(4) provides for penalties for submitting false information, including the possibility of fine and imprisonment.

SIGNATURE	NAME & TITLE	DATE SIGNED
Joey Cupp	Joey Cupp Environmental Mgr.	9-11-08

CHECK APPROPRIATE BOX: ✓ OWNER ◇ OPERATOR ◇ CONSULTANT/CONTRACTOR

DESCRIPTION OF UNDERGROUND STORAGE TANK SYSTEM

DEP7114/01/06

(Complete for each tank system at this location)

Tank I.D. No. (e.g. 123) or Arbitrarily Assigned Sequential Number.	TANK NO.	TANK NO.	TANK NO.	TANK NO.	TANK NO.
1. Status of Tank (PLEASE MARK APPROPRIATE BOX)	1	2	3		
Currently in Use (TAC)	☑	☑	☑	☐	☐
Temporarily Out of Use (TTC)	☐	☐	☐	☐	☐
Change in Service (TCS)	☐	☐	☐	☐	☐
2. Estimated Date Installed (Month and Year)	1983	1983	1983		
3. Estimated Total Capacity (Gallons)	12,000	12,000	12,000		
4. Material of Construction (PLEASE MARK APPROPRIATE BOX)					
Steel (SST)	☑	☑	☑	☐	☐
Double Wall Steel (DST)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic (FRP)	☐	☐	☐	☐	☐
Double Wall Fiberglass (DWF)	☐	☐	☐	☐	☐
Steel Interior lined with Fiberglass (SIF)	☐	☐	☐	☐	☐
Unknown (UNK)	☐	☐	☐	☐	☐
Other, please specify (OTH)	☐	☐	☐	☐	☐
5. Internal Protection for Tank (PLEASE MARK APPROPRIATE BOX)					
Fiberglass/Double Wall (FDP)	☐	☐	☐	☐	☐
None (NON)	☐	☐	☐	☐	☐
Interior Lining (e.g. epoxy lining) (ILP)	☑	☑	☑	☐	☐
Unknown (UNK)	☐	☐	☐	☐	☐
Other, please specify (OTH)	☐	☐	☐	☐	☐
6. External Protection (PLEASE MARK APPROPRIATE BOX)					
Cathodic Protection (CCP)	☑	☑	☑	☐	☐
Dielectric Coated (DIE)	☐	☐	☐	☐	☐
Double Wall Fiberglass (DWF)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic (FRP)	☐	☐	☐	☐	☐
Field-Installed Cathodic Protection (FCP)	☐	☐	☐	☐	☐
Impressed Current Cathodic Protection (ICP)	☐	☐	☐	☐	☐
None (NON)	☐	☐	☐	☐	☐
Unknown (UNK)	☐	☐	☐	☐	☐
Other Protection (OTH)	☐	☐	☐	☐	☐
7. Material of Piping Construction (PLEASE MARK APPROPRIATE BOX)					
Double Wall Steel (DST)	☐	☐	☐	☐	☐
Double Wall Fiberglass (DWF)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic (FRP)	☐	☐	☐	☐	☐
Flexible Wall (FLX)	☐	☐	☐	☐	☐
Steel (SST)	☑	☑	☑	☐	☐
Unknown (UNK)	☐	☐	☐	☐	☐
Other, please specify (OTH)	☐	☐	☐	☐	☐
8. Substance Currently or Previously Stored In Greatest Quantity by Volume (PLEASE MARK ALL APPROPRIATE BOX(ES)					
Gasoline (GAS)	☑	☑	☑	☐	☐
Diesel (DSL)	☐	☐	☐	☐	☐
Kerosene (KER)	☐	☐	☐	☐	☐
Used Oil (UOL)	☐	☐	☐	☐	☐
New Oil (NOL)	☐	☐	☐	☐	☐
Fuel Oil (FOL)	☐	☐	☐	☐	☐
Aviation Fuel (JET)	☐	☐	☐	☐	☐
CERCLA Hazardous Substance (HAZ)	☐	☐	☐	☐	☐
Unknown Substance (UNK)	☐	☐	☐	☐	☐
Empty (EMP)	☐	☐	☐	☐	☐
Other Substance, please specify (OTH)	☐	☐	☐	☐	☐



Clean Fuels was onsite removing water from both regular unleaded tanks when DEP inspectors arrived at the site.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 9, 2008
Adam Fritsch



This is the siphon bar between the two regular unleaded tanks. At that time the manifold bar was suspected to be the entry point for the water in the tanks.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 9, 2008
Adam Fritsch



The siphon bar between the two regular unleaded tanks was replaced. It was later ruled out that the siphon bar was not the point of entry for the water.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 11, 2008
Adam Fritsch



Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 11, 2008
Adam Fritsch



When inspector Adam Fritsch arrived at the site the tanks had already been removed from the pit. The concrete was removed on September 12, 2008 in preparation for the tank removal. However, the tanks floated that night and were removed as a safety precaution.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



Pump islands for gasoline tanks.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



Tank pit after tanks were removed.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



The pit was carved out of solid bedrock. Trapped pit water was observed. The water was pumped into a frac tank and sampled for BTEX.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



Stockpile soil was stored on plastic.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



Frac tank for pit water.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



Picture verifying that the North wall was solid bedrock.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



View of soil conditions surrounding the gasoline dispensers.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



View of East wall verifying that the walls of the pit were bedrock.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



View of West wall verifying that the walls of the pit were bedrock.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 13, 2008
Adam Fritsch



This is the tank pit excavation after all backfill material had been removed. The tank pit was a 35'L x45'W cube cut out of bedrock. There was no odor or visible contamination observed.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 15, 2008
Adam Fritsch



This is the East wall being dug out to facilitate the new tanks.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 15, 2008
Adam Fritsch



A Highland Tanks Mfg. Co. steel Fiberglass clad compartmented tank was at the site and was going to be installed to replace the three faulty tanks that had been removed.

Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 15, 2008
Adam Fritsch



Pilot #321
AI#229, UST#2558-008
Boone County, KY
September 15, 2008
Adam Fritsch

Groundwater & Environmental Services, Inc.

11550 Enterprise Park Drive • Cincinnati, Ohio 45241 • (513) 772-5848 • FAX (513) 772-5857

2002 NOV -6 P 1:46

DIVISION OF WASTE MGMT.
U.S.T. BRANCH

November 2, 2002

Mr. Brad Highley
Kentucky Department for Environmental Protection
Division of Waste Management, UST Branch
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

ORIGINAL

RE: Responses to Comments on Initial Site Check Report
Pilot Travel Center #278
118 Richwood Road
Richwood, Boone County
UST ID # 2712-008
Incident # 63220

Dear Mr. Highley:

This letter provides responses to Kentucky Department of Environmental Protection (KDEP) comments on the Initial Site Check Report and Free Product Recovery Report for the above referenced facility. A copy of the September 5, 2002 KDEP letter requesting additional information is provided in Attachment A. Attachment B provides comments responses and Attachment C provides supporting Figures.

Please contact me at (513) 772-5848 if you should have any questions.

Respectfully submitted,
Groundwater & Environmental Services, Inc.

Loren Conrad
Senior Project Manager

cc: Jason McCain (Pilot)
GES Project File

Attachment A

KDEP Additional Information Request Letter dated September 5, 2002

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

RECEIVED SEP - 9 2002

September 5, 2002

PILOT TRAVEL CENTERS LLC
5508 LONAS DRIVE
PO BOX 10146
KNOXVILLE TN 37939

RE: Pilot Travel Center #278
118 Richwood Road (I-75 Exit)
Walton - Boone County
UST ID#: 2712-008 Incident #: 63220

Dear Underground Storage Tank Owner:

The Division of Waste Management has reviewed the information received on June 20, July 3, and August 5, 2002, submitted by GES of Cincinnati, Ohio. Based on this review, the Division requests the following:

1. The Site Check report indicates that the exact depth of the diesel tank pit is not know but that the depth is estimated to be approximately 12.5' bgs. Is this estimate based on the dimensions of the tanks? What are the dimensions of the tanks? How deep to the tops of the tanks?
2. What are the dimensions of the tank pits? Did the borings advanced in December 2001 adequately assess the tank pit areas based on the pit dimensions? Where was the broken flange located?
3. Reports have indicated that free product has been removed from four tank pit wells on site. Specifically, one report stated, "A total of 91.153 gallons of LNAPL's has been recovered from monitoring wells NED, SWD, NEG, SWG, and the diesel vault since free product recovery efforts began. Was diesel product removed from the gasoline/kerosene tank pit? Is gasoline product present in the gasoline/kerosene tank pit? Have the piping and pump island areas ever been assessed?
4. The laboratory's "Sample Receipt Checklist" indicates that the April 2002 samples were received at 11°C. Were the samples properly packed with ice? Are the results acceptable?

Please submit two (2) copies of the above-requested information to the Division by Friday, November 1, 2002. Please include the site number and the site name on all documents submitted. Always submit the original and one (1) copy of any information sent to this office. Failure to comply with this request will delay the review process. *Failure to meet the deadline may impact your eligibility with the Fund.*

If you have any questions regarding this matter, please contact me at 800-928-4273 or 502-564-6716, ext. 343.

Sincerely,

A. Bradley Highley

Brad Highley, Geologist
Closure Section
Underground Storage Tank Branch
Division of Waste Management

cc: OPSTEAF, file/sc/dfrq, Brad Highley (2)

GES
2700 EAST KEMPER ROAD
CINCINNATI OH 45241

EDUCATION PAYS
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Attachment B

Comment Responses

Response to Comments
Kentucky Department of Environmental Protection
Pilot Travel Center #278
118 Richwood Road
Walton-Boone County
UST ID # 2712-008
Incident # 63220
Received September 9, 2002

KDEP Comment #1:
The Site Check report indicates that the exact depth of the diesel tank pit is not known but that the depth is estimated to be approximately 12.5.' bgs. Is this estimate based on the dimensions of the tanks? What are the dimensions of the tanks? How deep to the tops of the tanks?

Response:
A stick measurement of the tank depth taken prior to the initial site check field activities indicated that the depth to the tank bottom was 12.3 feet. Assuming that the tank pit bottom is one (1) foot below the tank bottom in accordance with the American Petroleum Institute (API) Recommended Practice 1615 – Installation of Underground Petroleum Storage System, the tank pit depth is estimated to be approximately 13.3 feet bgs.

KDEP Comment #2:
What are the dimensions of the tank pits? Did the borings advanced in December 2001 adequately assess the tank pit areas based on the pit dimensions? Where was the broken flange located?

Response:
Based on dimensions presented on a tank layout drawing for this facility (Attachment C), the diesel tank pit is estimated to be 43.5 feet by 39 feet. Since the source location was identified and the release duration was limited, the Site Check borings were located in areas that were most likely to exhibit impact as specified in 401 KAR 42:060, Site Check Outline, Section 7.1. Further site investigation (FSI) that would include installation of bedrock wells is likely necessary to verify that impact is limited to the UST system excavation. If KDEP requires additional FSI, GES will coordinate with the UST Branch to develop and appropriate alternative sampling plan.

As stated in the Initial Site Check Report, an excavation event on October 19, 2001, identified the leak source on the eastern portion of the tank pit, near the middle tank (see Executive Summary, Section 4.0, and Figure 3 of the Initial Site Check Report). The excavated area is depicted as a shaded area on Figure 3, presented in Attachment C.

KDEP Comment #3:
Reports have indicated that free product has been removed from the four tank pit wells on site. Specifically, one report stated, "A total of 91.153 gallons of LNAPL's has been

recovered from monitoring wells NED, SWD, NEG, SWG, and the diesel vault since free product recovery efforts began." Was diesel product removed from the gasoline/kerosene tank pit? Is gasoline product present in the gasoline/kerosene tank pit? Have the piping and pump islands ever been assessed?

Response:
Free product that has been identified as diesel has been observed in the gasoline/kerosene tank pit wells. The most recent Free Product Recovery Report, dated October 16, 2002, indicates that 2.18 gallons of free product have been recovered from the gasoline/kerosene tank pit wells. All product recovered from the gasoline/kerosene tank pit wells has been diesel product.

To date, investigation of the product piping and dispenser islands has not been conducted.

KDEP Comment #4:
The laboratory's "Sample Receipt Checklist" indicates that the April samples were received at 11°C. Were the samples properly packed with ice? Are the results acceptable?

Response:
GES assumes that the reviewer is referring to the December 7, 2001, soil samples collected during the initial site check. The laboratory receipt form from that sampling event indicates that the samples were received at 11°C.

GES' standard practice for sample packaging includes wrapping jars in bubble wrap, placing the jar in a plastic bag, lining the cooler with bubble wrap and a garbage bag, placing double-bagged ice packages in contact with the jars, and enclosing contents within a cooler. This procedure was employed during shipment of samples collected during the site check.

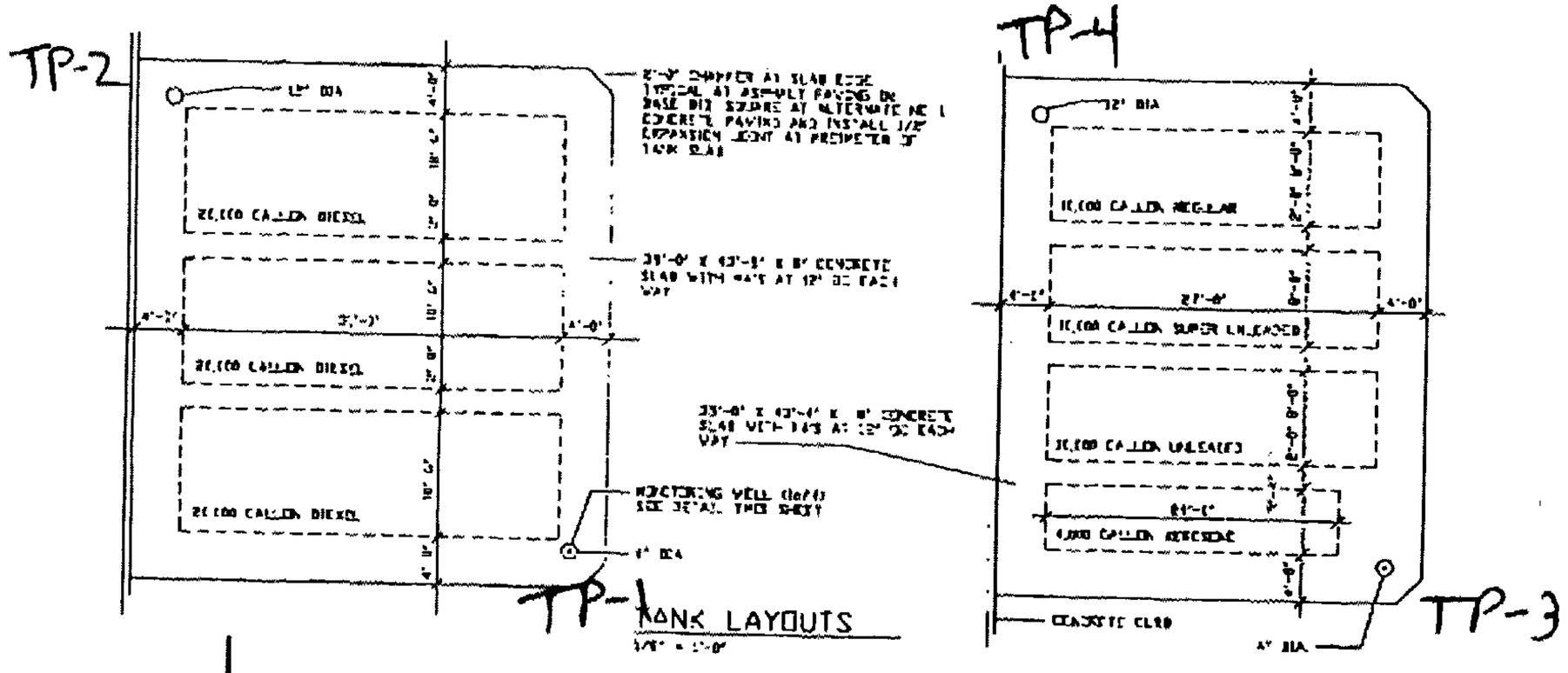
A temperature blank was not included with the sample shipment, therefore, the location where the temperature was recorded at the laboratory is not known.

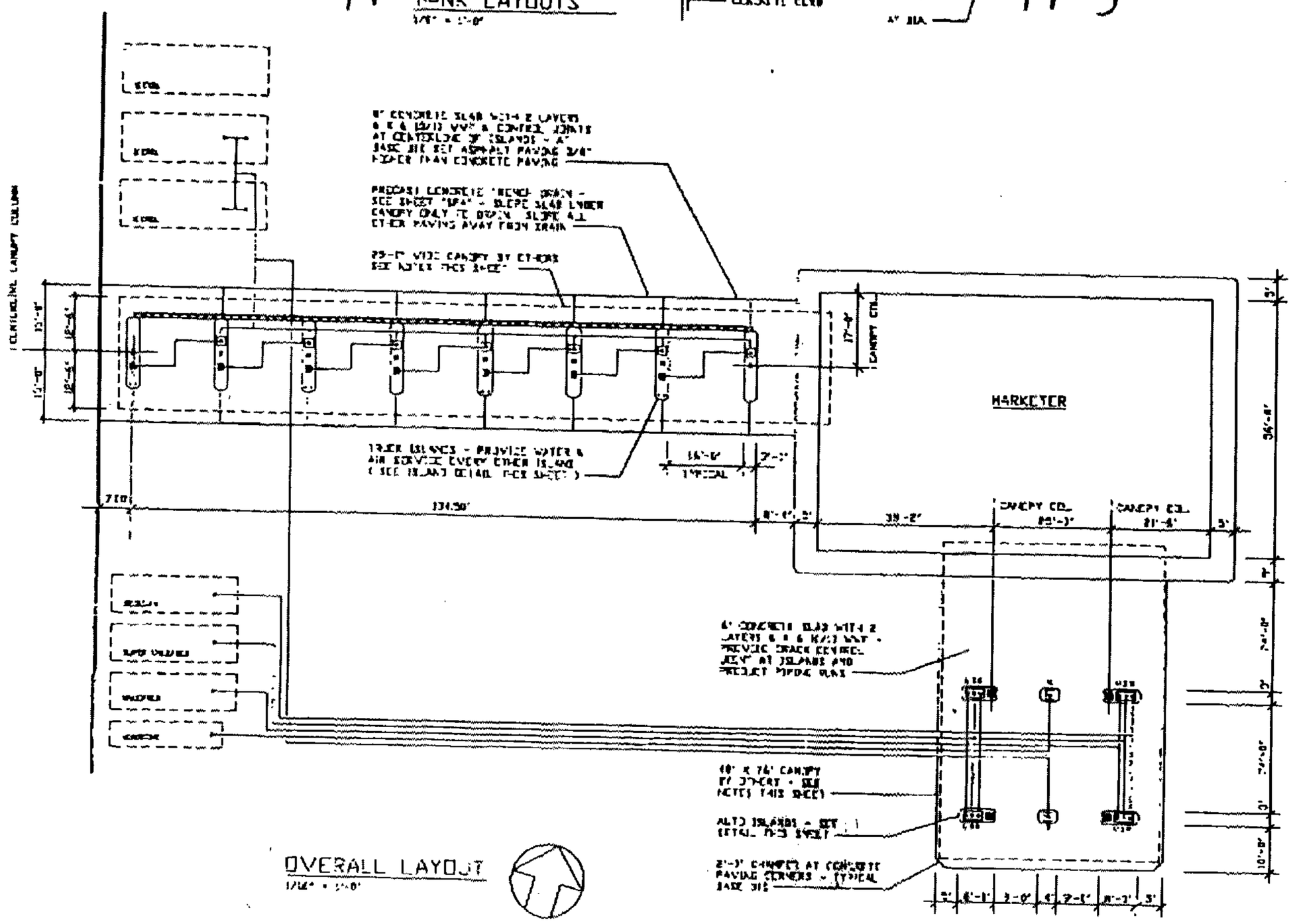
The samples were shipped on 12/6/01 and received at SPL Laboratories in Scott Louisiana on 12/7/01. Standard laboratory practice is to store samples in a refrigerated environment until the analysis process begins. The samples were all extracted on 12/10 and analyzed on 12/13/01. National Functional Guidelines for validation of analytical data indicate that when sample temperatures exceed the required temperature range (4 °C +/- 2 °C) upon receipt, the samples should be analyzed within 7 days. In these instances, the sample integrity is compromised, however, the analytical results are considered useable as estimated values. The initial site check samples were analyzed on the seventh day following collection, thus, the results are useable for their intended purpose.

Attachment C

Figures

DEC-06-2001(THU) 10:19 PILOT DESIGN (FAX)8654502840 P.001/001
N:\Historical Pilot\JAZZ\278\F1025d2.dwg Thu Dec 06 10:07:59 2001 WHIB





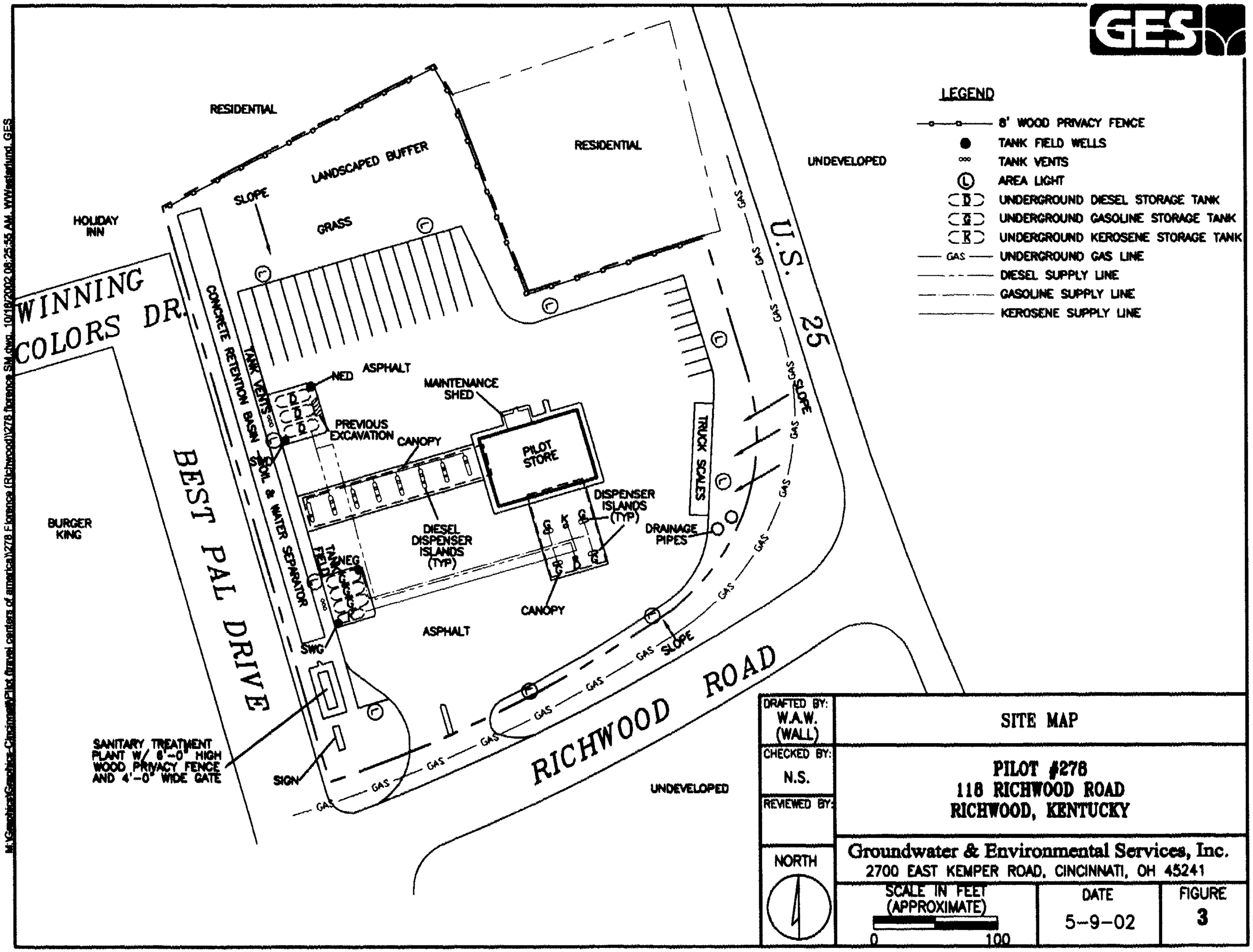
859 · 485 · 6113

TO: DAVE HOWARD

diesel 31 ft.

gas 27 feet

K 24 feet



M:\Graphics\Cincinnati\Pilot (travel centers of america)\278 Florence (Richwood)\278 florence SM.dwg, 10/18/2002 08:25:55 AM, WWesterlund, GES

Kentucky Energy and Environment Cabinet
Department for Environmental Protection
Division of Waste Management
Underground Storage Tank Branch

UST FACILITY REQUIREMENTS

Owner:
Pilot Travel Centers LLC
5508 Lonas Rd
Knoxville, TN 37909

UST Facility:
Pilot Travel Center #278
118 Richwood Rd
Walton, KY 41094
Boone County

AI ID #: 228

In an effort to offer compliance assistance, the Underground Storage Tank (UST) Branch has outlined specific requirements necessary for your site to comply with 401 KAR 42:020, 030, and/or 040. This document outlines what the UST Branch has registered. If any of this information is not correct, please contact **Jamie Nielsen** at 502-564-5981 x.4773 or by email at Jamie.Nielsen@ky.gov.

Registered Tanks:

Tank Number	Capacity (gal)	Substance Stored	Status
1 - 1	12000	GAS Gasoline	TAC Active
2 - 1	12000	GAS Gasoline	TAC Active
3 - 1	12000	GAS Gasoline	TAC Active
4 - 1	20000	DSL Diesel	TAC Active
5 - 1	20000	DSL Diesel	TAC Active
6 - 1	20000	DSL Diesel	TAC Active
7 - 1	20000	DSL Diesel	TAC Active
8 - 1	4000	DSL Diesel	TAC Active

Required Tests:

	LAST TEST DATE	TEST DUE DATE
Cathodic Protection Test *for flex connectors	03-18-2009	03-18-2012
Line Leak Detector Operational Test	09-24-2009	09-24-2010

All testing results must be submitted to the UST Branch within 30 days of the test date.

In addition, the UST Branch is unable to verify the tank and piping material. Please submit documentation verifying the piping is made of fiberglass material and tanks are fiberglass clad (i.e. installation invoices, maintenance work orders, or signed State Fire Marshal permits) to the address below.

Division of Waste Management
UST Branch, 2nd Floor
200 Fair Oaks Lane
Frankfort, KY 40601
Fax: 502-564-0094

AI ID #: 228

KEY POINTS

- Spill buckets should be kept free of liquid and debris.
- UST systems in temporary closure must maintain corrosion protection and contain less than 1" of product or conduct monthly release detection.
- All confirmed and suspected releases must be reported to the Environmental Response Team (ERT) Hotline (1-800-928-2380).
- An amended UST Facility Registration Form DEP7112 must be submitted to the UST Branch if the UST facility changes ownership, removes/adds tanks, has a new operator, changes the product in a tank, and/or changes tank status.
- Additional programmatic information can be found on our Web site at http://waste.ky.gov/ust.
- Please note that compliance with the requirements of this letter may not result in complete compliance with the provisions of KRS Chapter 224 and the regulations promulgated pursuant thereto.

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
UNDERGROUND STORAGE TANK BRANCH
200 FAIR OAKS LANE, 2ND FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

March 27, 2009

PILOT TRAVEL CENTERS #278
118 RICHWOOD ROAD
WALTON KENTUCKY 41094

RE: AI #: 228 UST #: 2712-008
Pilot Travel Center #278
118 Richwood Rd
Walton, Boone County
Applicable Regulation(s): 1996 Regulations
UST System(s): Release Date: February 27, 2005
Incident #: 191868

Dear Sir or Madam:

The Underground Storage Tank Branch (UST Branch) has reviewed the information received on December 28, 2008, and other relevant information received to date. From your analyses, the UST Branch agrees that this site has satisfied those requirements of Kentucky Revised Statutes Chapter 224, Subchapter 60 and 401 Kentucky Administrative Regulations Chapter 42 applicable to closure and/or corrective action. Therefore, no further action is required, at this time.

The UST Branch has based this determination on information submitted by Pangean CMD Associates and reserves all rights to require additional monitoring, testing or other actions necessary to protect public health and the environment if the UST Branch determines there is need for further investigation.

All monitoring wells shall be properly decommissioned in accordance with 401 KAR 6:310 within thirty (30) days from the date of determination that the monitoring well(s) are unsuitable for use as monitoring wells or within thirty (30) days of receiving a no further action letter from the Cabinet. If you have monitoring wells that are required for another investigation that is ongoing, then you may contact the UST Branch to apply for a variance to this monitoring well decommissioning requirement.

This letter serves as authorization for eligible applicants to submit a cost estimate on the appropriate worksheet in order to acquire pre-approval of site restoration costs in accordance with 401 KAR 42:250.

The regulations pertaining to this letter may be accessed at the UST Branch Web site http://www.waste.ky.gov/branches/ust. If you have any questions regarding the requested information, please contact the UST Branch at 502-564-5981.

Sincerely,

Amy Siewert

Amy Siewert, AE I Section Supervisor
Underground Storage Tank Branch
Division of Waste Management

GROUNDWATER & ENVIRONMENTAL SERVICES INC
11550 ENTERPRISE PARK DRIVE
CINCINNATI OH 45241

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
UNDERGROUND STORAGE TANK BRANCH
200 FAIR OAKS LANE, 2ND FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

March 27, 2009

PILOT TRAVEL CENTERS #278
118 RICHWOOD ROAD
WALTON KENTUCKY 41094

RE: AI #: 228 UST #: 2712-008
Pilot Travel Center #278
118 Richwood Rd
Walton, Boone County
Applicable Regulation(s): 1996 Regulations
UST System(s): Release Date: November 15, 2006
Incident #: 2251073

Dear Sir or Madam:

The Underground Storage Tank Branch (UST Branch) has reviewed the information received on December 28, 2008, and other relevant information received to date. From your analyses, the UST Branch agrees that this site has satisfied those requirements of Kentucky Revised Statutes Chapter 224, Subchapter 60 and 401 Kentucky Administrative Regulations Chapter 42 applicable to closure and/or corrective action. Therefore, no further action is required, at this time.

The UST Branch has based this determination on information submitted by Pangean CMD Associates and reserves all rights to require additional monitoring, testing or other actions necessary to protect public health and the environment if the UST Branch determines there is need for further investigation.

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The regulations pertaining to this letter may be accessed at the UST Branch Web site http://www.waste.ky.gov/branches/ust. If you have any questions regarding the requested information, please contact the UST Branch at 502-564-5981.

Sincerely,

Amy Siewert

Amy Siewert, AE I Section Supervisor
Underground Storage Tank Branch
Division of Waste Management

GROUNDWATER & ENVIRONMENTAL SERVICES INC
11550 ENTERPRISE PARK DRIVE
CINCINNATI OH 45241

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
UNDERGROUND STORAGE TANK BRANCH
200 FAIR OAKS LANE, 2ND FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

March 27, 2009

PILOT TRAVEL CENTERS #278
118 RICHWOOD ROAD
WALTON KENTUCKY 41094

RE: AI #: 228 UST #: 2712-008
Pilot Travel Center #278
118 Richwood Rd
Walton, Boone County
Applicable Regulation(s): 1996 Regulations
UST System(s): Release Date: October 18, 2001
Incident #: 63220

Dear Sir or Madam:

The Underground Storage Tank Branch (UST Branch) has reviewed the information received on December 28, 2008, and other relevant information received to date. From your analyses, the UST Branch agrees that this site has satisfied those requirements of Kentucky Revised Statutes Chapter 224, Subchapter 60 and 401 Kentucky Administrative Regulations Chapter 42 applicable to closure and/or corrective action. Therefore, no further action is required, at this time.

The UST Branch has based this determination on information submitted by Pangean CMD Associates and reserves all rights to require additional monitoring, testing or other actions necessary to protect public health and the environment if the UST Branch determines there is need for further investigation.

All monitoring wells shall be properly decommissioned in accordance with 401 KAR 6:310 within thirty (30) days from the date of determination that the monitoring well(s) are unsuitable for use as monitoring wells or within thirty (30) days of receiving a no further action letter from the Cabinet. If you have monitoring wells that are required for another investigation that is ongoing, then you may contact the UST Branch to apply for a variance to this monitoring well decommissioning requirement.

This letter serves as authorization for eligible applicants to submit a cost estimate on the appropriate worksheet in order to acquire pre-approval of site restoration costs in accordance with 401 KAR 42:250.

The regulations pertaining to this letter may be accessed at the UST Branch Web site http://www.waste.ky.gov/branches/ust. If you have any questions regarding the requested information, please contact the UST Branch at 502-564-5981.

Sincerely,

Amy Siewert

Amy Siewert, AE I Section Supervisor
Underground Storage Tank Branch
Division of Waste Management

C: File
GROUNDWATER & ENVIRONMENTAL SERVICES INC
11550 ENTERPRISE PARK DRIVE
CINCINNATI OH 45241

Groundwater & Environmental Services, Inc.

11550 Enterprise Park Drive • Cincinnati, Ohio 45241 • (513) 772-5848 • FAX (513) 772-5857

April 15, 2005

ORIGINAL

Mr. Eric Maddox
Kentucky Department for Environmental Protection
Division of Waste Management, UST Branch
Frankfort Office Park
14 Reily Road
Frankfort, KY 40601

RECEIVED
2005 APR 20 A 11:18
KY. DIV. OF WASTE MGMT.
U.S.T. BRANCH

RE: Initial Site Check Report
Pilot Travel Center #278
118 Richwood Road
Richwood, Boone County, Kentucky
UST ID # 2712-008
Incident # 191868

228

Dear Mr. Maddox:

GES Project No. 10-00265

Groundwater & Environmental Services, Inc. (GES) is pleased to submit the Initial Site Check report for the above referenced site. If you have any questions or comments regarding these findings, please do not hesitate to contact us at (513) 772-5848.

Respectfully submitted,
Groundwater & Environmental Services, Inc.

Nathan R. Stroup
Staff Scientist

Daniel S. Rasor
Project Manager

Attachments

cc: GES Project File
GES Reimbursement File
Jason McCain (Pilot Travel Centers, LLC)

INITIAL SITE CHECK REPORT
Pilot Travel Center #278
118 Richwood Road
Richwood, Boone County, Kentucky

Prepared for:

Jason McCain
Pilot Travel Centers, LLC
5508 Lonas Road
Knoxville, TN 37939

Prepared by:

Groundwater & Environmental Services, Inc.
11550 Enterprise Park Drive
Cincinnati, OH 45241

April 2005

INITIAL SITE CHECK REPORT

Pilot Travel Center #278
118 Richwood Road
Richwood, Boone County, Kentucky
UST ID #: 2712-008
Incident #: 191868

Prepared for:

Pilot Travel Centers, LLC
5508 Lonas Road
Knoxville, Tennessee 37919

Prepared by:

Groundwater & Environmental Services, Inc.
11550 Enterprise Park Drive
Cincinnati, Ohio 45241

Project No. 10-00265

Nathan R. Stroup
Staff Scientist

Daniel S. Rasor
Project Manager

April 15, 2005

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FIGURES

Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	Soil Analytical Map (March 29, 2005)

TABLES

Table 1	Free Product Recovery Data
Table 2	Soil Analytical Data

ATTACHMENTS

Attachment A	Site Photographs
Attachment B	Line Tightness Test Results
Attachment C	Repair Records
Attachment D	Leak Detection Records
Attachment E	Boring Logs
Attachment F	Analytical Report and Chain-of-Custody
Attachment G	Well Log Search
Attachment H	Facility Classification Guide
Attachment I	Site Check Report Checklist
Attachment J	Certification of Site Check Report

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1.0 EXECUTIVE SUMMARY

On February 27, 2005, Pilot Travel Centers, LLC (Pilot) informed Groundwater and Environmental Services, Inc. (GES) of a suspected release within the diesel underground storage tank (UST) cavity at Pilot Travel Center #278, located in Richwood, Kentucky. Pilot's onsite personnel discovered the release on February 27, 2005 as a result of the diesel UST system being on "low-flow" for most of the day. "Low-flow" occurs when there is a possible leak in the system, minimizing the amount of product released. Pilot's statistical inventory reconciliation (SIR) records did not indicate the presence of a release. Therefore, Pilot was not able to determine the quantity of product lost or the date when the release began.

Line tightness tests were performed on the UST system on February 27, 2005. The diesel product lines failed the tank tightness test performed. On February 27, 2005, GES oversaw the excavation of a top portion of the diesel UST cavity. M&M Service, Inc. (M&M) performed the excavation in an effort to identify and resolve the source of the release. During the excavation activities, a mechanical line leak detector flange was discovered to be broken. A photograph of the leaking flange is included in Attachment A. Upon replacement of the flange on February 27, 2005, results of a subsequent precision test indicated that the source of the release had been eliminated.

The prompt removal of free product associated with this release was initiated to reduce the environmental impact. M&M removed all liquid from the three (3) foot (ft) by three (3) ft piping manifold vault within the diesel UST cavity. On February 27 and 28, 2005 GES personnel removed approximately 5.38 gallons of free product from the tank-pit wells. All product removed was placed into the onsite oil water separator.

A Site Check was conducted at the site on March 25, 2005 in accordance with Kentucky Administrative Regulation (KAR) Title 401, 42:050 and 2:060. During this investigation, six (6) soil borings were installed on the northern, eastern, and southern sides of the UST cavity. Analytical results of the investigation did not yield constituent concentrations exceeding laboratory detection limits.

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2.0 SITE IDENTIFICATION AND LOCATION

The subject site is Pilot Travel Center #278 located at 118 Richwood Road in Richwood, Boone County, Kentucky. The UST facitity identification number for this facility is 2712-008. The facility is an active retail diesel and gasoline fueling station. The facility also houses a Subway restaurant and convenience store.

The site is located at west longitude 84° 37′ 28″ and north latitude 38° 55′ 9″. A copy of the Independence, KY quadrangle United States Geological Survey (USGS) topographic map has been included as Figure 1. A detailed site plan is included as Figure 2.

The owner/operator of the property and USTs located at the facility is:

Pilot Travel Centers LLC
5508 Lonas Drive
Knoxville, Tennessee 37939
(865) 588-7488

3.0 UNDERGROUND STORAGE TANK HISTORY

There are currently eight (8) USTs located onsite of which there are three (3) 12,000-gallon capacity USTs utilized for the storage of gasoline, four (4) of which are 20,000-gallon capacity USTs used for the storage of diesel fuel, and one (1) of which is 4,000-gallon capacity UST utilized for the storage of kerosene. All eight (8) tanks were installed in 1988.

3.1 Previous Release and Remedial Action

On October 18, 2001, a release occurred in the same location as the current release and was documented in the *Initial Site Check Report* submitted to the Kentucky Department for Environmental Protection (KDEP) on June 18, 2002. This release was also caused by a leaking flange in the diesel UST cavity. A subsurface investigation and subsequent free product recovery efforts were initiated at the site following the release.

Upon KDEP's request, an Additional Evaluation (AE) was submitted to the KDEP on June 13, 2003. During Additional Evaluation Activities, monitoring well MW-1 was installed at the site. The AE concluded that petroleum constituent concentration in native soils and groundwater were below KDEP Class 3 Table 1 action levels. Free product remained at the site following the AE, and bi-monthly free product recovery events were proposed. Free Product Recovery (FPR) events continued until May 2004. Historical free product gauging data is included as Table 1.

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4.0 ABATEMENT MEASURES

On February 27, 2005, M&M responded to the release by performing a line tightness test at the site. The line leak was traced to a joint on the eastern side of the diesel UST cavity. This area around the joint was subsequently excavated and repaired. A photograph of the excavated joint prior to repair is included in Attachment A. The area listed as "Excavation" on the Site Map (Figure 2) is where the leaking joint was located. M&M personnel pumped all liquid located within the three (3) ft by three (3) ft piping manifold vault within the diesel UST cavity to the onsite oil/water separator. A photograph of the vault being evacuated is included in Attachment A.

On February 27, 2005, in order to investigate the extent of the release, GES personnel gauged all tank pit monitoring wells (NED, SED, NEG, and SWG) at the site as well as the onsite groundwater monitoring well (MW-1). Two (2) tank pit monitoring wells exist in each of the UST cavities located onsite for a total of four (4) tank pit monitoring wells. The wells have been identified as the northeast diesel (NED), southwest diesel (SWD), northeast gas (NEG), and southwest gas (SWG). Figure 2 depicts the locations of the tank pit monitoring wells as well as the groundwater monitoring well. Measurable free product was detected in tank pit monitoring wells NED, SWD, and SWG. GES personnel removed approximately 3.46 gallons of free product from the tank pit monitoring wells. The product removal was done utilizing a polyvinyl chloride (PVC) bailer. All product removed was placed into the onsite oil water separator.

On February 28, 2005, GES personnel returned to the site to gauge the four tank pit monitoring wells. Free Product was detected in SWD and SWG. A total of 1.92 gallons of free product was removed from the tank pit monitoring wells and placed into the onsite oil water separator. It is not likely that all product found in the four tank pit monitoring wells can be attributed to the current release. When FPR activities were terminated initially in 2004 following the previous release, product remained in NED and SWD, indicating that any product released into the UST cavities is likely compounded with product from the previous release. Table 1 shows all gauging data from the FPR events.

No fumes have occurred in nearby structures or within identified subsurface utilities.

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5.0 RELEASE DETECTION

Tank and line tightness tests were performed on January 9, 2005, prior to the release. All systems passed this test. M&M conducted a line tightness test on February 27, 2005 to attempt to locate the source of the release. All tank and line tightness test results are included in Attachment B. All onsite repairs were performed by M&M Services, Inc. All repair records for the site are included in Attachment C.

This facility is transitioning from utilizing a Monthly Statistical Inventory Reconciliation Reports (SIR) system to a PetroNetwork S3 CITLDS Continual Reconciliation Report (CITLDS) for its leak detection. Copies of both the SIR and CITLDS from the three months leading up to the release are included in Attachment D. Each of the reports indicates the inventory controls were within compliance and do not indicate the presence of a release.

6.0 FIELD INVESTIGATIONS

On March 29, 2005, SCS Environmental Contracting, Inc. (SCS), under the direction of GES, installed six (6) soil borings (B-1 through B-6) at the site. The site map includes the location of all soil borings performed at the site. All borings were advanced to at least 2.5 feet (ft) below the bottom of the UST cavity or until refusal. No alternative sampling plan was necessary. All boring depths were documented in the soil boring logs included in Attachment E. The depth of the UST cavity on site is estimated to be approximately 12.5 feet below surface grade. Soil borings B-4 and B-6 were advanced to a depth of 15 ft below ground surface (bgs), where they met Geoprobe refusal. Soil borings B-1, B-2, and B-3 were advanced to a depth of 16 ft bgs. It was not possible to install soil boring B-5 below the bottom of the UST cavity due to Geoprobe refusal at 10 ft bgs. Wet soil was encountered at two ft bgs in soil borings B-2 and B-3, but was believed to be accumulated runoff from trapped between the asphalt and native clay beneath. No true groundwater was encountered in any of the soil borings; therefore, hydrogeologically downgradient groundwater sampling was not conducted. This made it impossible to obtain an accurate groundwater depth. Upon completion, all remaining soil cuttings were placed back into their respective borings and immediately closed with a bentonite seal and asphalt cap. Photographs of the borings are included in Attachment A.

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7.0 ANALYTICAL REQUIREMENTS

All soil samples were submitted to SPL Laboratories located in Traverse City, MI. Because of the leaking diesel delivery line, soil samples were analyzed for polynuclear aromatic hydrocarbons (PAH) by United States Environmental Protection Agency (USEPA) Solid Waste (SW) 846 Method 8270. In addition, due to the presence of gasoline and kerosene USTs located onsite, soil samples were also analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) by USEPA SW846 method 8260. All constituent concentrations were below laboratory detection limits. Soil analytical results are included in Table 2 and a Soil Analytical Map is included as Figure 3. The analytical report and chain-of-custody are included in Attachment F.

8.0 SITE GEOLOGY AND HYDROGEOLOGY

The site's soil is part of the Faywood series, specifically consisting of Faywood sitly clay loam, 12 to 20 percent slopes, as defined in the *Soil Survey of Boone, Campbell, and Kenton Counties, Kentucky.* This type of soil is described as having severe erosion risk and a low organic-matter content with a moderately fine texture.

The onsite observations were generally consistent with the description provided by the county soil survey. Soils were light brown or mottled brown and gray silty clay with limestone fragments of varying sizes encountered in small amounts throughout. Boring logs provided in Attachment E provide a detailed description of the characteristics of the soil encountered at each level of the boring. No new monitoring wells were constructed. No wells were used to collect a one-time groundwater sample.

A well log search was performed during the previous Site Check activities in 2002 to determine the facility classification under KDEP regulation 401 KAR 42:080. According to the well log search performed by the Kentucky Geological Survey, the only wells found within a 1,000-ft radius are monitoring wells. No water supply wells are within this radius. An additional well log search was conducted in April, 2005, to ensure that no new potable water wells were installed within a 1,000-ft radius of the site. Correspondence from KDEP indicated that no potable water wells were located within a 1,000-ft radius of the site. The well log search results are included in Attachment G.

A petroleum UST system facility classification guide was completed and is included in Attachment H. According to the classification guide, this facility meets the Class III requirements.

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9.0 WASTE HANDLNG PROCEDURES

All soils generated during the subsurface investigation were placed back into their respective borings, which were capped with a bentonite seal and asphalt cap. All free product and water removed during FPR events was placed into the onsite oil and water separator. The minimal amount of pea gravel removed during the product line excavation was placed back into the excavation.

10.0 HEALTH AND SAFETY

GES developed a site-specific health and safety plan for the activities to be conducted onsite. All GES personnel and GES-contracted companies involved in onsite remediation efforts were required to sign the health and safety plan upon arrival to the site.

11.0 CONCLUSIONS

In conclusion, upon analyzing soil data collected from the subsurface, it is believed that impact from the release has not migrated to the native soils surrounding the diesel UST cavity.

"An Equal Opportunity Employer"

Figures

Tables

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
NED (4")	10/30/2001	5.76	5.25	0.51	0.33
NED (4")	11/20/2001	6.50	4.75	1.75	1.14
NED (4")	11/30/2001	4.65	3.12	1.53	0.99
NED (4")	12/6/2001	4.11	3.15	0.96	0.62
NED (4")	12/10/2001	3.84	3.55	0.29	0.19
NED (4")	12/21/2001	3.54	3.16	0.38	0.25
NED (4")	12/24/2001	3.41	3.15	0.26	0.17
NED (4")	1/7/2002	4.50	3.80	0.70	0.46
NED (4")	1/18/2002	4.50	3.75	0.75	0.49
NED (4")	1/25/2001	4.45	3.45	1.00	0.65
NED (4")	2/1/2002	5.35	4.35	1.00	0.65
NED (4")	2/5/2002	6.00	4.65	1.35	0.88
NED (4")	2/8/2002	6.00	4.40	1.60	1.04
NED (4")	2/12/2002	6.45	4.70	1.75	1.14
NED (4")	2/19/2002	6.23	4.40	1.83	1.19
NED (4")	2/21/2002	6.34	4.46	1.88	1.22
NED (4")	2/28/2002	6.56	4.80	1.76	1.14
NED (4")	3/1/2002	6.56	4.83	1.73	1.12
NED (4")	3/5/2002	6.60	4.80	1.80	1.17
NED (4")	3/8/2002	6.54	4.79	1.75	1.14
NED (4")	3/13/2002	6.60	4.62	1.98	1.29
NED (4")	3/15/2002	6.60	4.68	1.92	1.25
NED (4")	3/20/2002	6.59	4.54	2.05	1.33
NED (4")	3/22/2002	6.57	4.52	2.05	1.33
NED (4")	3/29/2002	6.31	4.30	2.01	1.31
NED (4")	4/2/2001	6.61	4.31	2.30	1.50
NED (4")	4/8/2002	6.60	4.10	2.50	1.63
NED (4")	4/12/2002	6.60	4.13	2.47	1.61
NED (4")	4/15/2002	6.48	4.46	2.02	1.31
NED (4")	4/19/2002	6.66	4.24	2.42	1.57
NED (4")	4/22/2002	6.63	4.09	2.54	1.65
NED (4")	4/26/2002	6.60	4.14	2.46	1.60
NED (4")	4/30/2002	6.61	3.77	2.84	1.85
NED (4")	5/3/2002	6.60	3.80	2.80	1.82
NED (4")	5/9/2002	6.60	3.54	3.06	1.99
NED (4")	5/17/2002	6.60	3.22	3.38	2.20
NED (4")	5/31/2002	6.60	3.39	3.21	2.09
NED (4")	6/7/2002	5.87	3.90	1.97	1.28
NED (4")	6/14/2002	5.75	3.91	1.84	1.20
NED (4")	6/28/2002	6.85	4.24	2.61	1.70
NED (4")	7/5/2002	6.82	4.37	2.45	1.59
NED (4")	7/19/2002	6.87	4.45	2.42	1.57
NED (4")	8/2/2002	6.69	4.90	1.79	1.16

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
NED (4")	8/12/2002	6.68	5.15	1.53	0.99
NED (4")	8/22/2002	7.00	5.35	1.65	1.07
NED (4")	9/12/2002	7.00	5.72	1.28	0.83
NED (4")	9/23/2002	7.01	5.46	1.55	1.01
NED (4")	10/14/2002	5.01	3.44	1.57	1.02
NED (4")	11/4/2002	4.46	3.40	1.06	0.69
NED (4")	12/6/2002	6.54	3.31	3.23	2.10
NED (4")	1/13/2003*	4.85	3.02	1.83	1.19
NED (4")	2/21/2003	4.94	2.85	2.09	1.36
NED (4")	3/28/2003	4.50	2.90	1.60	1.04
NED (4")	6/2/2003	3.40	2.52	0.88	0.57
NED (4")	7/3/2003	3.10	2.59	0.51	0.33
NED (4")	7/16/2003	2.70	2.65	0.05	0.03
NED (4")	8/7/2003	2.83	2.57	0.26	0.17
NED (4")	8/25/2003	3.10	2.85	0.25	0.16
NED (4")	9/5/2003	2.83	2.70	0.13	0.08
NED (4")	9/15/2003	4.80	3.49	1.31	0.85
NED (4")	10/3/2003	3.20	3.10	0.10	0.07
NED (4")	10/6/2003	3.90	3.01	0.89	0.58
NED (4")	11/18/2003	2.58	2.57	0.01	0.01
NED (4")	3/31/2004	2.28	2.01	0.27	0.18
NED (4")	4/14/2004	3.08	2.55	0.53	0.34
NED (4")	5/5/2004	2.78	2.48	0.30	0.20
NED (4")	5/11/2004	2.79	2.53	0.26	0.17
NED (4")	2/27/2005	3.02	2.40	0.62	0.40
NED (4")	2/28/2005	7.75	NA	NA	NA

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
SWD (10")	10/30/2001	NG	NG	NG	NG
SWD (10")	11/20/2001	NG	NG	NG	NG
SWD (10")	11/30/2001	3.14	NA	NA	NA
SWD (10")	12/6/2001	3.60	NA	NA	NA
SWD (10")	12/10/2001	4.04	NA	NA	NA
SWD (10")	12/21/2001	3.66	NA	NA	NA
SWD (10")	12/24/2001	3.65	NA	NA	NA
SWD (10")	1/7/2002	4.05	NA	NA	NA
SWD (10")	1/18/2002	NG	NG	NG	NG
SWD (10")	1/25/2001	NG	NG	NG	NG
SWD (10")	2/1/2002	4.00	NA	NA	NA
SWD (10")	2/5/2002	4.10	NA	NA	NA
SWD (10")	2/8/2002	4.20	NA	NA	NA
SWD (10")	2/12/2002	4.40	NA	NA	NA
SWD (10")	2/19/2002	4.00	NA	NA	NA
SWD (10")	2/21/2002	4.42	NA	NA	NA
SWD (10")	2/28/2002	5.41	NA	NA	NA
SWD (10")	3/1/2002	5.41	NA	NA	NA
SWD (10")	3/5/2002	4.90	NA	NA	NA
SWD (10")	3/8/2002	5.55	NA	NA	NA
SWD (10")	3/13/2002	4.81	4.79	0.02	0.12
SWD (10")	3/15/2002	4.82	NA	NA	NA
SWD (10")	3/20/2002	3.20	3.15	0.05	0.29
SWD (10")	3/22/2002	4.82	NA	NA	NA
SWD (10")	3/29/2002	4.80	4.79	0.01	0.06
SWD (10")	4/2/2001	3.20	3.16	0.04	0.23
SWD (10")	4/8/2002	4.45	4.40	0.05	0.29
SWD (10")	4/12/2002	3.16	NA	NA	NA
SWD (10")	4/15/2002	4.76	NA	NA	NA
SWD (10")	4/19/2002	3.54	NA	NA	NA
SWD (10")	4/22/2002	3.26	NA	NA	NA
SWD (10")	4/26/2002	4.05	3.90	0.15	0.88
SWD (10")	4/30/2002	4.07	3.99	0.08	0.47
SWD (10")	5/3/2002	4.03	3.91	0.12	0.70
SWD (10")	5/9/2002	3.29	3.11	0.18	1.06
SWD (10")	5/17/2002	4.22	4.15	0.07	0.41
SWD (10")	5/31/2002	4.08	3.95	0.13	0.76
SWD (10")	6/7/2002	3.97	3.81	0.16	0.94
SWD (10")	6/14/2002	4.52	4.45	0.07	0.41
SWD (10")	6/28/2002	5.02	4.81	0.21	1.23
SWD (10")	7/5/2002	4.45	4.37	0.08	0.47
SWD (10")	7/19/2002	5.44	5.14	0.30	1.76
SWD (10")	8/2/2002	5.67	5.45	0.22	1.29

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
SWD (10")	8/12/2002	5.85	5.70	0.15	0.88
SWD (10")	8/22/2002	6.95	6.80	0.15	0.88
SWD (10")	9/12/2002	6.59	5.68	0.91	5.34
SWD (10")	9/23/2002	5.68	5.66	0.02	0.12
SWD (10")	10/14/2002	4.53	3.44	1.09	6.40
SWD (10")	11/4/2002	4.13	4.05	0.08	0.47
SWD (10")	12/6/2002	4.27	4.25	0.02	0.12
SWD (10")	1/13/2003*	4.50	4.48	0.02	0.08
SWD (10")	2/21/2003	3.60	2.95	0.65	2.65
SWD (10")	3/28/2003	4.85	3.82	1.03	4.20
SWD (10")	6/2/2003	5.24	3.78	1.46	5.96
SWD (10")	7/3/2003	5.55	4.89	0.66	2.69
SWD (10")	7/16/2003	4.23	3.05	1.18	4.81
SWD (10")	8/7/2003	4.76	3.45	1.31	5.34
SWD (10")	8/25/2003	6.45	4.29	2.16	8.81
SWD (10")	9/5/2003	5.31	4.18	1.13	4.61
SWD (10")	9/15/2003	6.68	4.58	2.10	8.57
SWD (10")	10/3/2003	5.95	4.40	1.55	6.32
SWD (10")	10/6/2003	6.35	4.10	2.25	9.18
SWD (10")	11/18/2003	2.58	2.57	0.01	0.04
SWD (10")	3/31/2004	4.89	2.75	2.14	8.73
SWD (10")	4/14/2004	4.55	2.70	1.85	7.55
SWD (10")	5/5/2004	5.77	3.12	2.65	10.81
SWD (10")	5/11/2004	5.18	3.10	2.08	8.49
SWD (10")	2/27/2005	2.93	2.26	0.67	2.73
SWD (10")	2/28/2005	5.45	5.00	0.45	1.84

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
NEG (4")	11/30/2001	0.40	0.35	0.05	0.03
NEG (4")	12/6/2001	1.93	1.91	0.02	0.01
NEG (4")	12/10/2001	1.73	1.70	0.03	0.02
NEG (4")	12/21/2001	1.72	1.70	0.02	0.01
NEG (4")	12/24/2001	1.73	1.72	0.01	0.01
NEG (4")	1/7/2002	1.45	1.43	0.02	0.01
NEG (4")	1/18/2002	1.40	NA	NA	NA
NEG (4")	1/25/2001	1.68	1.43	0.25	0.16
NEG (4")	2/1/2002	1.52	1.50	0.02	0.01
NEG (4")	2/5/2002	1.61	1.60	0.01	0.01
NEG (4")	2/8/2002	2.23	NA	NA	NA
NEG (4")	2/12/2002	1.70	1.65	0.05	0.03
NEG (4")	2/19/2002	1.60	1.59	0.01	0.01
NEG (4")	2/21/2002	1.26	1.25	0.01	0.01
NEG (4")	2/28/2002	1.74	1.71	0.03	0.02
NEG (4")	3/1/2002	1.74	1.72	0.02	0.01
NEG (4")	3/5/2002	1.61	1.60	0.01	0.01
NEG (4")	3/8/2002	1.72	1.71	0.01	0.01
NEG (4")	3/13/2002	1.60	1.59	0.01	0.01
NEG (4")	3/15/2002	1.59	NA	NA	NA
NEG (4")	3/20/2002	6.59	NA	NA	NA
NEG (4")	3/22/2002	2.27	NA	NA	NA
NEG (4")	3/29/2002	1.51	NA	NA	NA
NEG (4")	4/2/2002	1.54	NA	NA	NA
NEG (4")	4/8/2002	1.50	1.49	0.01	0.01
NEG (4")	4/12/2002	1.46	NA	NA	NA
NEG (4")	4/15/2002	1.55	NA	NA	NA
NEG (4")	4/19/2002	1.54	NA	NA	NA
NEG (4")	4/22/2002	1.27	NA	NA	NA
NEG (4")	4/26/2002	1.50	NA	NA	NA
NEG (4")	4/30/2002	1.51	NA	NA	NA
NEG (4")	5/3/2002	1.46	NA	NA	NA
NEG (4")	5/9/2002	2.22	2.20	0.02	0.01
NEG (4")	5/17/2002	1.33	1.32	0.01	0.01
NEG (4")	5/31/2002	1.35	1.34	0.01	0.01
NEG (4")	6/7/2002	1.30	NA	NA	NA
NEG (4")	6/14/2002	0.35	NA	NA	NA
NEG (4")	6/28/2002	1.04	NA	NA	NA
NEG (4")	7/5/2002	1.55	NA	NA	NA
NEG (4")	7/19/2002	1.41	NA	NA	NA
NEG (4")	8/2/2002	1.45	NA	NA	NA
NEG (4")	8/12/2002	1.41	NA	NA	NA
NEG (4")	8/22/2002	1.38	NA	NA	NA

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
NEG (4")	9/12/2002	1.44	NA	NA	NA
NEG (4")	9/23/2002	1.29	NA	NA	NA
NEG (4")	10/14/2002	1.44	NA	NA	NA
NEG (4")	11/4/2002	2.04	2.02	0.02	0.01
NEG (4")	12/6/2002	1.52	1.30	0.22	0.14
NEG (4")	1/13/2003*	2.65	2.53	0.12	0.08
NEG (4")	2/21/2003	1.39	1.35	0.04	0.03
NEG (4")	3/28/2003	1.80	1.70	0.10	0.07
NEG (4")	6/2/2003	1.65	1.60	0.05	0.03
NEG (4")	7/3/2003	1.66	1.61	0.05	0.03
NEG (4")	7/16/2003	1.61	1.60	0.01	0.01
NEG (4")	8/7/2003	1.43	1.38	0.05	0.03
NEG (4")	8/25/2003	1.64	1.62	0.02	0.01
NEG (4")	9/5/2003	2.05	2.02	0.03	0.02
NEG (4")	9/15/2003	2.28	2.27	0.01	0.01
NEG (4")	10/3/2003	1.75	1.65	0.10	0.07
NEG (4")	10/6/2003	1.65	1.63	0.02	0.01
NEG (4")	11/18/2003	1.66	1.65	0.01	0.01
NEG (4")	3/31/2004	1.10	1.02	0.08	0.05
NEG (4")	4/14/2004	1.00	NA	NA	NA
NEG (4")	5/5/2004	1.00	NA	NA	NA
NEG (4")	5/11/2004	1.00	NA	NA	NA
NEG (4")	2/27/2005	1.11	NA	NA	NA
NEG (4")	2/28/2005	0.80	NA	NA	NA

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
SWG (10")	10/30/2001	NA	NA	NA	NA
SWG (10")	11/20/2001	NA	NA	NA	NA
SWG (10")	11/30/2001	NA	NA	NA	NA
SWG (10")	12/6/2001	2.25	2.20	0.05	0.29
SWG (10")	12/10/2001	2.22	2.20	0.02	0.12
SWG (10")	12/21/2001	2.13	NA	NA	NA
SWG (10")	12/24/2001	2.13	NA	NA	NA
SWG (10")	1/7/2002	2.30	NA	NA	NA
SWG (10")	1/18/2002	NG	NG	NG	NG
SWG (10")	1/25/2001	NG	NG	NG	NG
SWG (10")	2/1/2002	3.50	NA	NA	NA
SWG (10")	2/5/2002	2.21	2.20	0.01	0.06
SWG (10")	2/8/2002	1.84	NA	NA	NA
SWG (10")	2/12/2002	2.20	NA	NA	NA
SWG (10")	2/19/2002	2.25	NA	NA	NA
SWG (10")	2/21/2002	2.25	NA	NA	NA
SWG (10")	2/28/2002	2.20	NA	NA	NA
SWG (10")	3/1/2002	2.21	NA	NA	NA
SWG (10")	3/5/2002	2.80	NA	NA	NA
SWG (10")	3/8/2002	2.21	NA	NA	NA
SWG (10")	3/13/2002	2.20	NA	NA	NA
SWG (10")	3/15/2002	2.21	NA	NA	NA
SWG (10")	3/20/2002	2.20	NA	NA	NA
SWG (10")	3/22/2002	2.97	NA	NA	NA
SWG (10")	3/29/2002	2.19	NA	NA	NA
SWG (10")	4/2/2001	NG	NG	NG	NG
SWG (10")	4/8/2002	2.19	NA	NA	NA
SWG (10")	4/12/2002	2.20	NA	NA	NA
SWG (10")	4/15/2002	2.23	NA	NA	NA
SWG (10")	4/19/2002	2.20	NA	NA	NA
SWG (10")	4/22/2002	1.96	NA	NA	NA
SWG (10")	4/26/2002	2.22	2.20	NA	NA
SWG (10")	4/30/2002	2.22	NA	NA	NA
SWG (10")	5/3/2002	2.19	NA	NA	NA
SWG (10")	5/9/2002	1.33	1.32	0.01	0.06
SWG (10")	5/17/2002	2.19	2.10	0.09	0.53
SWG (10")	5/31/2002	2.21	NA	NA	NA
SWG (10")	6/7/2002	2.20	2.18	0.02	0.12
SWG (10")	6/14/2002	2.20	NA	NA	NA
SWG (10")	6/28/2002	2.21	2.20	0.01	0.06
SWG (10")	7/5/2002	2.20	NA	NA	NA
SWG (10")	7/19/2002	2.21	2.20	0.01	0.06
SWG (10")	8/2/2002	2.23	2.21	0.02	0.12

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
SWG (10")	8/12/2002	2.23	2.20	0.03	0.18
SWG (10")	8/22/2002	2.20	NA	NA	NA
SWG (10")	9/12/2002	2.23	2.21	0.02	0.12
SWG (10")	9/23/2002	2.22	2.21	0.01	0.06
SWG (10")	10/14/2002	2.23	NA	NA	NA
SWG (10")	11/4/2002	1.50	NA	NA	NA
SWG (10")	12/6/2002	2.20	NA	NA	NA
SWG (10")	1/13/2003*	2.60	2.58	0.02	0.08
SWG (10")	2/21/2003	NG	NG	NA	NA
SWG (10")	3/28/2003	2.42	2.25	0.17	0.69
SWG (10")	6/2/2003	2.30	2.25	0.05	0.20
SWG (10")	7/3/2003	2.26	2.24	0.02	0.08
SWG (10")	7/16/2003	2.28	2.23	0.05	0.20
SWG (10")	8/7/2003	2.25	2.23	0.02	0.08
SWG (10")	8/25/2003	2.26	2.22	0.04	0.16
SWG (10")	9/5/2003	1.26	1.25	0.01	0.04
SWG (10")	9/15/2003	2.23	2.21	0.02	0.08
SWG (10")	10/3/2003	2.23	2.22	0.01	0.04
SWG (10")	10/6/2003	2.25	2.23	0.02	0.08
SWG (10")	11/18/2003	2.22	2.21	0.01	0.04
SWG (10")	3/31/2004	2.15	2.13	0.02	0.08
SWG (10")	4/14/2004	2.21	NA	NA	NA
SWG (10")	5/5/2004	2.16	NA	NA	NA
SWG (10")	5/11/2004	2.23	NA	NA	NA
SWG (10")	2/27/2005	2.18	2.10	0.08	0.33
SWG (10")	2/28/2005	2.17	2.15	0.02	0.08

TABLE 1

FREE PRODUCT RECOVERY DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Monitoring Well	Date	Depth to Water (ft)	Depth to Product (ft)	Product Thickness (ft)	Amount Recovered (gal)
Vault (3')	10/19/2002	Initial response to diesel release			20.00
Vault (3')	3/5/2002	2.65	2.60	0.05	2.64
Vault (3')	3/13/2002	2.41	2.29	0.12	6.34
Vault (3')	3/15/2002	2.38	2.28	0.10	5.28
Vault (3')	3/20/2002	2.10	2.03	0.07	3.70
Vault (3')	3/22/2002	2.37	2.31	0.06	3.17
				Total Recovered Product To Date:	242.43

Notes:

NA = Not Applicable, No Product Detected

(10") = Well Diameter

* - Starting in January 2003, FPR conducted using pneumatic pump

NG = Not Gauged

TABLE 2

SOIL ANALYTICAL DATA

Pilot #278

118 Richwood Road

Richwood, Kentucky

Sample ID	Date	Benzene	Toluene	Ethylbenzene	Xylenes	Chrysene	Benzo(a) anthracene	cPAH*	nPAH*	Napthalene
		U.S. EPA Method 8021B (µg/kg)				US EPA Method 8310 (µg/kg)				
B-1 (4-6')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-1(14-16')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-2 (12-14')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-2 (14-16')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-3 (12-14')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-3 (14-16')	03/29/05	<25	<25	<25	<25	<300	<150	<300	<330	<330
B-4 (12-14')	03/29/05	<25	<50	<50	<150	<300	<150	<300	<330	<330
B-4 (14-15')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-5 (4-6')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-5 (8-10')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
B-6 (8-10')	03/29/05	<25	<50	<50	<150	<300	<150	<300	<330	<330
B-6 (14-15')	03/29/05	<5	<5	<5	<5	<300	<150	<300	<330	<330
KDEP Class III Soil Table 1		**2,000**	**18,000**	**30,000**	**50,000**	**15,000**	**150**	**300**	**10,000**	**5,000**

Notes:

µg/kg - micrograms per kilogram

* - results were obtained by using highest constituent result from cPAH or nPAH

cPAH constituents: Benzo(a)apyrene, Benzo(b)fluoroanthene, Benzo(k)fluoroanthene, Dibenzo(a,h)-anthracene, and Indeno(1,2,3)pyrene

nPAH constituents: Acenaphthene, Acenaphthylene, Anthracene, Benzo(ghi)perlene, Fluoroanthene, Fluorene, Phenanthrene, and Pyrene

Attachment A
Site Photographs

Attachment B
Line Tightness Test Results

278 ST

AAA Tank Testers

P.O. Box 789
Braselton, GA 30517-0789
(706) 654-1580 Toll Free (800) 749-2219

Date Completed: 01/09/2004

Invoice Number: 200309090

Test Site: Pilot #278
118 Richwood Road
Walton KY

Bill To: Pilot Corporation
5508 Lonas Road
Knoxville TN 37939-

CERTIFICATE OF TEST RESULTS

Certified test results for the test site are summarized below. Testing has been conducted in accordance with all federal and local regulations.

TANK TEST RESULTS

Tank:	Type of Test	Product	Tank Capacity	Tank Diameter	Tank Test Result	Volume Change	Ullage Result
1	System 5000	Diesel	20,000	118	PASS	N/A	PASS
2	System 5000	Diesel	20,000	118	PASS	N/A	PASS
3	System 5000	Diesel	20,000	118	PASS	N/A	PASS
4	System 5000	Diesel	20,000	118	PASS	N/A	PASS

LINE AND LEAK DETECTOR TEST RESULTS

Tank	LineType:	Product	Volume Change	Line Test Results	Leak Detector	Leak Detector Results	Serial #
1	Pressure	Diesel	-0.008	PASS	Yes	PASS	030701-9453

Comments:

Tested (7) satellites with the main Diesel line.

Test conducted by: Gene Anderson

Technician Certification Number: GAA0108013104E

Gene Anderson

Technician's signature

DATA SHEET

Petro-Tite Line Tightness Test

Location: Pilot #278	Contact:	Customer: Pilot Corporation
Tested: 116 Richwood Road	Title:	5508 Lonas Road
Walton KY	Phone:	Knoxville TN 37939-

			Pass Start	Pass End	Vol. Start	Vol. End	Vol Net Change
TankID 1	7:15 AM	1st Reading	50	45	0.043	0.040	-0.003
LineID 1	7:30 AM	2nd Reading	50	48	0.040	0.039	-0.001
Product: Diesel		3rd Reading					
Start Time 7:00 AM		4th Reading					

LineType:	Pressure
BleedBack	0.049
Line Test Rate	-0.008
Line Test Result	PASS

Attachment C
Repair Records

M&M SERVICE, INC.
SERVICE STATION EQUIPMENT SPECIALIST
~ 10 Years of Superior Service ~

4-15-05

Pilot Travel Centers
5508 Lonas Drive
Knoxville, TN 37939
ATTN: Dennis McFarlin

RE: Line Repair Pilot 278

Dennis,

M&M Service Inc. repaired a leak in a 3" fiberglass diesel line near 5 hp submergible. The leak was repaired and a line test was performed by certified Petro tite tester.

Thank you,
Mick Meyer
V.P.

Locations
601 Mary Ingles Highway ✦ Silver Grove, KY 41085 ✦ 859.781.0402 ✦ Fax: 859.781.1451
12354 Virginia Boulevard ✦ Ashland, KY 41102 ✦ 606.929.9597 ✦ Toll Free: 877.929.9597 ✦ Fax: 606.929.9798

Attachment D
Leak Detection Records

Monthly Statistical Inventory Reconciliation (SIR) Report
February, 2005

PIL4

Company:	PILOT CORP.	Phone:	800/562-6210
Address:	P.O. BOX 10146 KNOXVILLE, TN 37939-0146		

Station:	STORE #278	Phone:	N/A
Address:	118 RICHWOOD ROAD WALTON, KY 41094		

SIR Provider:	USTMAN	Phone:	(303) 986-8011
SIR Version:	95.2B	Report Date:	03/15/2005

Tank	Tank and Line Status	Calculated Leak Rate gph	Product	Capacity Gallons	Sales Gallons	Deliveries Gallons
05	Pass	0.05	DIESEL	20000	246562	253873
06	Pass	0.05	DIESEL	20000	333075	340126
07	Pass	-0.10	DIESEL	20000	258025	260293
08	Pass	-0.10	DIESEL	20000	280254	282225

VEEDER-ROOT USTMAN

Veeder-Root Service Company dba USTMAN
12265 W. Bayaud Ave. • Suite 300 • Lakewood, CO 80228
1-800-253-8054 • (303) 986-8011 • FAX (303) 986-8227

Monthly Statistical Inventory Reconciliation (SIR) Report
January, 2005

PILA

Company:	PILOT CORP.	Phone:	800/562-6210
Address:	P. O. BOX 10146 KNOXVILLE, TN 37939-0146		

Station:	STORE #278	Phone:	N/A
Address:	118 RICHWOOD ROAD WALTON, KY 41094		

SIR Provider:	USTMAN	Phone:	(303) 986-8011
SIR Version:	95.2B	Report Date:	03/01/2005

Tank	Tank and Line Status	Calculated Leak Rate gph	Product	Capacity Gallons	Sales Gallons	Deliveries Gallons
05	Pass	-0.01	DIESEL	20000	336636	319828
06	Pass	0.07	DIESEL	20000	281944	265529
07	Pass	-0.09	DIESEL	20000	306059	290364
08	Pass	0.00	DIESEL	20000	381743	366195

VEEDER-ROOT USTMAN

Veeder-Root Services Company dba/USTMAN
12565 W. Bayaud Ave. ¶ Suite 300 * Lakewood, CO 80228
1-800-253-8054 * (303) 986-8011 * FAX (303) 986-8227

Monthly Statistical Inventory Reconciliation (SIR) Report
December, 2004

PIL4

Company:	PILOT CORP.	Phone:	800/562-6210
Address:	P. O. BOX 10146 KNOXVILLE, TN 37939-0146		

Station:	STORE #297	Phone:	N/A
Address:	5555 EAST MARGARET AVENUE TERRE HAUTE, IN 47805		

SIR Provider:	USTMAN	Phone:	(303) 986-8011
SIR Version:	95.2B	Report Date:	01/26/2005

Tank	Tank and Line Status	Calculated Leak Rate gph	Product	Capacity Gallons	Sales Gallons	Deliveries Gallons
05	Pass	-0.13	DIESEL	20000	166183	163564
06	Pass	-0.12	DIESEL	20000	167763	165148
07	Pass	-0.13	DIESEL	20000	166183	163564
08	Pass	-0.13	DIESEL	20000	166183	163564

VEEDER-ROOT USTMAN

Veeder-Root Services Company dba/USTMAN
12265 W. Bayaud Ave. * Suite 300 * Lakewood, CO 80228
1-800-253-8054 * (303) 986-8011 * FAX (303) 986-8227

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER
	5508 Lonas Road
	Knoxville, TN 37909
Facility Name	PILOT-WALTON – 278 – W90555
Facility Location	118 Richwood Road
	Walton, KY 41094

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	02/11/2005-02/28/2005	P	02/28/2005
02 -F	20000	02/01/2005-02/28/2005	P	02/28/2005
03 -U	10000	02/01/2005-02/28/2005	P	02/28/2005
04 -D	80000 (4M)	02/01/2005-02/28/2005	P	02/28/2005
05 -K	4000	02/01/2005-02/28/2005	P	02/28/2005

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	02/11/2005-02/28/2005	P	02/28/2005
02 -F	20000	02/01/2005-02/28/2005	P	02/28/2005
03 -U	10000	02/01/2005-02/28/2005	P	02/28/2005
04 -D	80000 (4M)	02/01/2005-02/28/2005	P	02/28/2005
05 -K	4000	02/01/2005-02/28/2005	P	02/28/2005

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	10000	02/11/2005-02/28/2005	0.030	0.015
02 -F	20000	02/01/2005-02/28/2005	0.030	0.015
03 -U	10000	02/01/2005-02/28/2005	0.030	0.015
04 -D	80000 (4M)	02/01/2005-02/28/2005	0.090	0.045
05 -K	4000	02/01/2005-02/28/2005	0.030	0.015

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 278 – W90555
Facility Location	118 Richwood Road Walton, KY 41094

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	01/01/2005-01/31/2005	P	01/31/2005
02 -F	20000	01/01/2005-01/31/2005	P	01/31/2005
03 -U	10000	01/01/2005-01/31/2005	P	01/31/2005
04 -D	80000 (4M)	01/01/2005-01/31/2005	P	01/31/2005
05 -K	4000	01/01/2005-01/31/2005	P	01/31/2005

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	01/01/2005-01/31/2005	P	01/31/2005
02 -F	20000	01/01/2005-01/31/2005	P	01/31/2005
03 -U	10000	01/01/2005-01/31/2005	P	01/31/2005
04 -D	80000 (4M)	01/01/2005-01/31/2005	P	01/31/2005
05 -K	4000	01/01/2005-01/31/2005	P	01/31/2005

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	10000	01/01/2005-01/31/2005	0.030	0.015
02 -F	20000	01/01/2005-01/31/2005	0.030	0.015
03 -U	10000	01/01/2005-01/31/2005	0.130	0.065
04 -D	80000 (4M)	01/01/2005-01/31/2005	0.180	0.090
05 -K	4000	01/01/2005-01/31/2005	0.030	0.015

PetroNetwork S3
CITLDS Continual Reconciliation Report

This report provides the results of continual reconciliation testing for tanks and associated lines for monthly monitoring.

Tank Owner	PILOT TRAVEL CENTER 5508 Lonas Road Knoxville, TN 37909
Facility Name	PILOT-WALTON – 278 – W90555
Facility Location	118 Richwood Road Walton, KY 41094

Tank Monitoring Report

Tank ID – Product	Tank Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	12/01/2004-12/31/2004	P	12/31/2004
02 -F	10000	12/01/2004-12/31/2004	P	12/31/2004
03 -U	10000	12/01/2004-12/31/2004	P	12/31/2004
04 -D	40000 (4M)	12/01/2004-12/31/2004	P	12/31/2004
05 -K	4000	12/01/2004-12/31/2004	P	12/31/2004

Line Monitoring Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	System Status Pass Fail Inconclusive	Test Date
01 -S	10000	12/01/2004-12/31/2004	P	12/31/2004
02 -F	10000	12/01/2004-12/31/2004	P	12/31/2004
03 -U	10000	12/01/2004-12/31/2004	P	12/31/2004
04 -D	40000 (4M)	12/01/2004-12/31/2004	P	12/31/2004
05 -K	4000	12/01/2004-12/31/2004	P	12/31/2004

Monthly Monitoring Data Quality Report

Associated Tank ID – Product	Tank System Capacity	Period Covered	Minimum Detectable Leak (gph)	Threshold (gph)
01 -S	10000	12/01/2004-12/31/2004	0.030	0.015
02 -F	10000	12/01/2004-12/31/2004	0.030	0.015
03 -U	10000	12/01/2004-12/31/2004	0.080	0.040
04 -D	40000 (4M)	12/01/2004-12/31/2004	0.160	0.080
05 -K	4000	12/01/2004-12/31/2004	0.030	0.015

Attachment E
Boring Logs

SOIL BORING LOG:B-1

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**16'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0					Asphalt	
-1	0.7	B-1 (0-2')	-	100	Dry, stiff, mottled greenish gray and light brown silty clay, no odor	
-2						
-3	0.7	B-1 (2-4')	-	100		
-4						
-5	0.9	B-1 (4-6')	-	50		*Sample submitted for analysis
-6					Gray and light brown, mottled, silty clay, wet 2" seem at 8', no odor	
-7	0.3	B-1 (6-8')	-	50		
-8						
-9	NA	B-1 (8-10')	-	15	Dry, light brown silty clay with dark brown mottling, 10% 2" stone fragments, no odor	
-10						
-11	0.8	B-1 (10-12')	-	20	Greenish gray and light brown, very soft, mottled sandy clay, 0.25" wet seams throughout, no odor	
-12						
-13	0.6	B-1 (12-14')	-	50	Dry, greenish gray silty clay, high plasticity, no odor	
-14					Brown, stiff clay, no odor	*Sample submitted for analysis
-15	0.9	B-1 (14-16')	-	50	Very soft, greenish gray and brown clay, saturated seam, no odor	
-16					Brown, stiff clay, no odor	*Target depth reached at 16' bgs

SOIL BORING LOG:B-2

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**16'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0					Asphalt	
-1	0.9	B-2 (0-2')	-	100	Light brown silty clay with some gray mottling. ~0.5" stone-large 3" stone at 2', no odor	
-2						
-3	0.8	B-2 (2-4')	-	100	Wet, greenish gray and brown, silty mottled clay with 50% 2" stone fragments, no odor	
-4						
-5	1.2	B-2 (4-6')	-	30	Wet, light brown silty clay with 10% 0.25" stone fragments, stiff, no odor	
-6						
-7	1.1	B-2 (6-8')	-	50	Moist, light brown, stiff silty clay with 5% very small stones, no odor	
-8						
-9	1.1	B-2 (8-10')	-	30		
-10						
-11	1.3	B-2 (10-12')	-	50	Dry, light brown and greenish gray mottled stiff clay, no odor	
-12						*Sample submitted for analysis
-13	1.3	B-2 (12-14')	-	75		
-14						*Sample submitted for analysis
-15	1.4	B-2 (14-16')	-	75		
-16						*Target depth reached at 16' bgs

SOIL BORING LOG:B-3

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**16'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0					Asphalt	
-1	1.7	B-3 (0-2')	-	100	Wet, light brown stone and silty clay, no odor	
-2						
-3	1.5	B-3 (2-4')	-	100	Mix of wet and dry, light brown silty clay with 20% 1"-2" stone, no odor	
-4						
-5	1.9	B-3 (4-6')	-	100	Slightly moist, light brown and gray, gravelly clay, no odor	
-6						
-7	0.7	B-3 (6-8')	-	100	Wet, brown gray, mottled silty clay with 15% 1"-2" stone, no odor	
-8						
-9	1.6	B-3 (8-10')	-	100	Moist, brown and gray, mottled, soft silty clay with 10% gravel, no odor	
-10						
-11	2.2	B-3 (10-12')	-	100	Dry, dark gray silty clay with 10% gravel, no odor	
-12						
-13	12.8	B-3 (12-14')	-	100	Dry, dark brown silty clay with organics, no odor	*Sample submitted for analysis
-14						
-15	4.7	B-3 (14-16')	-	100	Dry, greenish gray, stiff silty clay, no odor	*Sample submitted for analysis
-16						*Target depth reached at 16' bgs

SOIL BORING LOG:B-4

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**15'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0					Asphalt	
-1	1.6	B-4 (0-2')	-	100	Dry, brown and gray mottled, silty, gravelly clay, soft, no odor	
-2						
-3	2.4	B-4 (2-4')	-	100	Dry, brown and gray, soft, mottled silty clay with 5% pebbles, soft, no odor	
-4						
-5	0.7	B-4 (4-6')	-	100	Dry, brown and gray, stiff, medium plasticity, silty clay with 5% gravel, no odor	
-6						
-7	1.2	B-4 (6-8')	-	100		
-8						
-9	1.2	B-4 (8-10')	-	100		
-10						
-11	2.9	B-4 (10-12')	-	100	Dry, brown, medium plasticity, silty clay with black marks intermingled throughout, no odor	
-12						*Sample submitted for analysis
-13	3.1	B-4 (12-14')	-	100	3"-4" Rock fragments	
-14					Gray, very stiff, low plasticity clay, no odor	*Sample submitted for analysis
-15	1.0	B-4 (14-15')	-	100		*Refusal at 15' bgs

SOIL BORING LOG:B-5

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**10'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0					Asphalt	
-1	1.8	B-5 (0-2')	-	100	Dry, light brown, medium plasticity silty clay, no odor	
-2						
-3	1.7	B-5 (2-4')	-	100	Dry, light brown, medium plasticity silty clay with 10% large rock fragments, no odor	
-4						
-5	2.0	B-5 (4-6')	-	75	Dry, light brown, high plasticity silty clay, no odor	*Sample submitted for analysis
-6						
-7	1.8	B-5 (6-8')	-	90		
-8						
-9	1.2	B-5 (8-10')	-	100	Dry, light brown, medium plasticity, silty clay with 5% #4 stone, no odor	*Sample submitted for analysis
-10						*Refusal at 10' bgs

SOIL BORING LOG:B-6

Groundwater and Environmental Services, Inc.

PROJECT:	**Pilot 278**	DRILLING METHOD:	**Geoprobe**
SITE LOCATION:	**118 Richwood Road, Richwood, KY**	SAMPLING METHOD:	**Acetate Sleeve**
DATE COMPLETED:	**March 25, 2005**	TOTAL DEPTH:	**15'**
LOGGED BY:	**Nate Stroup**	GROUND ELEVATION:	**NA**
DRILLING CO:	**SCS Environmental**		

Depth (feet)	PID (ppm)	Sample ID	Blow Counts	Recovery (percent)	Lithology (Modified Burmister)	Comments
0						
-1	1.9	B-6 (0-2')	-	100	Dry, light brown, soft silty clay with 5% 0.25" rock fragments, no odor	
-2						
-3	2.6	B-6 (2-4')	-	100		
-4						
-5	26.7	B-6 (4-6')	-	100	Dry, dark gray, medium plasticity, silty clay, no odor	
-6						
-7	50.7	B-6 (6-8')	-	100	Dry, brown, medium plasticity silty clay with 5% #20 stone, very slight petroleum odor	
-8						
-9	51.8	B-6 (8-10')	-	100		*Sample submitted for analysis
-10						
-11	6.4	B-6 (10-12')	-	100	Dry, light gray silty clay with 10% 2" stone fragments, no odor	
-12						
-13	9.9	B-6 (12-14')	-	100	Dry, light gray, very stiff silty clay with 50% 1-2" stone fragments, no odor	
-14						
-15	6.7	B-6 (14-15')	-	100		*Sample submitted for analysis *Refusal at 15' bgs

Attachment F

Analytical Report and Chain-of-Custody

MICHIGAN LABORATORY
459 HUGHES DRIVE
TRAVERSE CITY, MICHIGAN 49686
PHONE (231) 947-5777
FAX (231) 947-7455
www.spl-inc.com

LABORATORY REPORT

SPL WORKORDER NUMBER(s): 05-03-703

Prepared for: PILOT CORPORATION, INC.

Sampled By: GES, INC.

Site: RICHWOOD,, KY

Project: PILOT #278

Approved by:

S L Grenda

S. L. Grenda, Laboratory Manager

Date: APR 12 2005

Gary R. Byar, Project Manager

This report consists of 45 pages

The results relate only to the samples tested.

All results are reported on an as is (wet) basis, except where otherwise indicated.

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Houston, TX 77054
(713) 660-0901
Dean Joiner

SPL - Louisiana
500 Ambassador Caffery Parkway
Scott, LA 70583
(337) 237-4775
Tony Duhon

SPL - Michigan
459 Hughes Drive
Traverse City, MI 49686
(231) 947-5777

Company: PILOT CORPORATION, INC.
Site: RICHWOOD,, KY
Project No.:
Project: PILOT #278

8260 Volatile Results Summary

04-06-2005

SPL ID MATRIX FLAG	CLIENT ID DATE SAMPLED DATE ANALYZED	BENZENE PQL UNITS	TOLUENE PQL UNITS	ETHYLBEN. PQL UNITS	XYLENES PQL UNITS	NAPHTHAL. PQL UNITS	CUMENE PQL UNITS	1,2,4TMB PQL UNITS	1.3.5TMB PQL UNITS	EDC PQL UNITS	EDB PQL UNITS	2-M.NAP. PQL UNITS	MTBE PQL UNITS
0503703-01 SOIL	B-1 (4-6) 03/29/2005 09:30:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-02 SOIL	B-1 (14-16) 03/29/2005 09:45:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-03 SOIL	B-2 (12-14) 03/29/2005 10:40:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-04 SOIL	B-2 (14-16) 03/29/2005 11:00:00 04/04/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-05 SOIL	B-3 (12-14) 03/29/2005 11:30:00 04/04/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-06 SOIL	B-3 (14-16) 03/29/2005 11:45:00 03/31/2005	ND 25 µg/Kg	ND 25 µg/Kg	ND 25 µg/Kg	ND 25 µg/Kg								
0503703-07 SOIL	B-4 (12-14) 03/29/2005 12:50:00 03/30/2005	ND 25 µg/Kg	ND 50 µg/Kg	ND 50 µg/Kg	ND 150 µg/Kg								
0503703-08 SOIL	B-4 (14-15) 03/29/2005 13:00:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-09 SOIL	B-5 (4-6) 03/29/2005 13:30:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								
0503703-10 SOIL	B-5 (8-10) 03/29/2005 13:50:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								

ND = Not Detected.
8260B, Volatile Organics

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8260 Volatile Results Summary 04-06-2005

Company: PILOT CORPORATION, INC.
Site: RICHWOOD,, KY
Project No.:
Project: PILOT #278

SPL ID MATRIX FLAG	CLIENT ID DATE SAMPLED DATE ANALYZED	BENZENE PQL UNITS	TOLUENE PQL UNITS	ETHYLBEN. PQL UNITS	XYLENES PQL UNITS	NAPHTHAL. PQL UNITS	CUMENE PQL UNITS	1,2,4TMB PQL UNITS	1.3.5TMB PQL UNITS	EDC PQL UNITS	EDB PQL UNITS	2-M.NAP. PQL UNITS	MTBE PQL UNITS
0503703-11 SOIL	B-6 (8-10) 03/29/2005 14:20:00 03/30/2005	ND 25 µg/Kg	ND 50 µg/Kg	ND 50 µg/Kg	ND 150 µg/Kg								
0503703-12 SOIL	B-6 (14-15) 03/29/2005 14:40:00 03/31/2005	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg	ND 5 µg/Kg								

ND = Not Detected.
8260B, Volatile Organics

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Certificate of Analysis No. M1-0503703-01

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-1 (4-6)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 09:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	96	33	148
Toluene-d8	56.5 µg/Kg	110	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 19:33:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-01

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-1 (4-6)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 09:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	73	21	94
2-Fluorobiphenyl	µg/Kg	78	12	106
Terphenyl-d14	µg/Kg	89	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 07:29:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 17:30:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-02

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-1 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 09:45:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	96	33	148
Toluene-d8	56.5 µg/Kg	110	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 21:06:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. MI-0503703-02

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-1 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 09:45:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	330	µg/Kg
Benzo (a) anthracene	ND	300	µg/Kg
Benzo (b) fluoranthene	ND	150	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	300	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	330	µg/Kg
	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	73	21	94
2-Fluorobiphenyl	µg/Kg	82	12	106
Terphenyl-d14	µg/Kg	93	20	125

ANALYZED BY: HLA
EXTRACTED BY: LB
METHOD: 8270C, Semivolative organics-PAH
DATE/TIME: 04/02/2005 08:01:00
DATE/TIME: 03/29/2005 17:30:00
NOTES: * - Practical Quantitation Limit
NA - Not Analyzed
ND - Not Detected

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-03

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-2 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 10:40:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	96	33	148
Toluene-d8	56.5 µg/Kg	110	66	151
4-Bromofluorobenzene	56.5 µg/Kg	101	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 20:35:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-03

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-2 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 10:40:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	64	21	94
2-Fluorobiphenyl	µg/Kg	72	12	106
Terphenyl-d14	µg/Kg	87	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 08:33:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 17:45:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-04

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-2 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:00:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	96	33	148
Toluene-d8	56.5 µg/Kg	110	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 04/04/2005 17:26:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
459 HUGHES DRIVE
TRAVERSE CITY, MICHIGAN 49686
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Certificate of Analysis No. M1-0503703-04

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-2 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:00:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	330	µg/Kg
Benzo (a) anthracene	ND	300	µg/Kg
Benzo (b) fluoranthene	ND	150	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	300	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	330	µg/Kg
	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	69	21	94
2-Fluorobiphenyl	µg/Kg	81	12	106
Terphenyl-d14	µg/Kg	89	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 09:06:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 17:45:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-05

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-3 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	92	33	148
Toluene-d8	56.5 µg/Kg	108	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 04/04/2005 17:57:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
459 HUGHES DRIVE
TRAVERSE CITY, MICHIGAN 49686
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www.spl-inc.com

Certificate of Analysis No. M1-0503703-05

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-3 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	70	21	94
2-Fluorobiphenyl	µg/Kg	74	12	106
Terphenyl-d14	µg/Kg	82	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 09:38:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:00:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
459 HUGHES DRIVE
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PHONE (231) 947-5777
FAX (231) 947-7455
www.spl-inc.com

Certificate of Analysis No. M1-0503703-06

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-3 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:45:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	25	µg/Kg
Ethylbenzene	ND	25	µg/Kg
Toluene	ND	25	µg/Kg
Xylenes (total)	ND	25	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	96	33	148
Toluene-d8	56.5 µg/Kg	112	66	151
4-Bromofluorobenzene	56.5 µg/Kg	113	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 22:08:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
459 HUGHES DRIVE
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www.spl-inc.com

Certificate of Analysis No. M1-0503703-06

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-3 (14-16)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 11:45:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	74	21	94
2-Fluorobiphenyl	µg/Kg	84	12	106
Terphenyl-d14	µg/Kg	94	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 10:10:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:00:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-07

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-4 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 12:50:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	25	µg/Kg
Ethylbenzene	ND	50	µg/Kg
Toluene	ND	50	µg/Kg
Xylenes (total)	ND	150	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	50 µg/Kg	80	33	148
Toluene-d8	50 µg/Kg	96	66	151
4-Bromofluorobenzene	50 µg/Kg	100	43	142

ANALYZED BY: DWC DATE/TIME: 03/30/2005 18:40:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-07

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-4 (12-14)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 12:50:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	73	21	94
2-Fluorobiphenyl	µg/Kg	79	12	106
Terphenyl-d14	µg/Kg	88	20	125

ANALYZED BY: HLA DATE/TIME: 04/02/2005 10:42:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:15:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-08

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-4 (14-15)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:00:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	94	33	148
Toluene-d8	56.5 µg/Kg	106	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 15:58:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-08

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-4 (14-15)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:00:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	69	21	94
2-Fluorobiphenyl	µg/Kg	78	12	106
Terphenyl-d14	µg/Kg	90	20	125

ANALYZED BY: HLA DATE/TIME: 04/03/2005 12:19:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:15:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. M1-0503703-09

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-5 (4-6)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	92	33	148
Toluene-d8	56.5 µg/Kg	108	66	151
4-Bromofluorobenzene	56.5 µg/Kg	101	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 15:27:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

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Certificate of Analysis No. MI-0503703-09

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-5 (4-6)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:30:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	68	21	94
2-Fluorobiphenyl	µg/Kg	73	12	106
Terphenyl-d14	µg/Kg	81	20	125

ANALYZED BY: HLA DATE/TIME: 04/03/2005 12:51:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:30:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-10

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-5 (8-10)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:50:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	88	33	148
Toluene-d8	56.5 µg/Kg	108	66	151
4-Bromofluorobenzene	56.5 µg/Kg	103	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 14:56:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-10

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-5 (8-10)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 13:50:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	73	21	94
2-Fluorobiphenyl	µg/Kg	73	12	106
Terphenyl-d14	µg/Kg	96	20	125

ANALYZED BY: HLA DATE/TIME: 04/03/2005 01:24:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:30:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-11

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-6 (8-10)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 14:20:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	25	µg/Kg
Ethylbenzene	ND	50	µg/Kg
Toluene	ND	50	µg/Kg
Xylenes (total)	ND	150	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	50 µg/Kg	80	33	148
Toluene-d8	50 µg/Kg	96	66	151
4-Bromofluorobenzene	50 µg/Kg	98	43	142

ANALYZED BY: DWC DATE/TIME: 03/30/2005 20:05:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-11

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-6 (8-10)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 14:20:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	66	21	94
2-Fluorobiphenyl	µg/Kg	76	12	106
Terphenyl-d14	µg/Kg	87	20	125

ANALYZED BY: HLA DATE/TIME: 04/03/2005 01:56:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:45:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. MI-0503703-12

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-6 (14-15)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 14:40:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	µg/Kg
Ethylbenzene	ND	5	µg/Kg
Toluene	ND	5	µg/Kg
Xylenes (total)	ND	5	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	56.5 µg/Kg	94	33	148
Toluene-d8	56.5 µg/Kg	112	66	151
4-Bromofluorobenzene	56.5 µg/Kg	97	43	142

ANALYZED BY: DWC DATE/TIME: 03/31/2005 16:29:00
METHOD: 8260B Soil, Volatile Organics
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

MICHIGAN LABORATORY
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Certificate of Analysis No. M1-0503703-12

PILOT CORPORATION, INC.
5508 Lonas Road
Knoxville, TN 37909
ATTN: Jason McCain

DATE: 04/06/2005

PROJECT: PILOT #278
SITE: RICHWOOD,, KY
SAMPLED BY: GES, INC.
SAMPLE ID: B-6 (14-15)

PROJECT NO:
MATRIX: SOIL
DATE SAMPLED: 03/29/2005 14:40:00
DATE RECEIVED: 03/29/2005

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	330	µg/Kg
Acenaphthylene	ND	330	µg/Kg
Acenaphthene	ND	330	µg/Kg
Fluorene	ND	330	µg/Kg
Phenanthrene	ND	330	µg/Kg
Anthracene	ND	330	µg/Kg
Fluoranthene	ND	330	µg/Kg
Pyrene	ND	330	µg/Kg
Chrysene	ND	300	µg/Kg
Benzo (a) anthracene	ND	150	µg/Kg
Benzo (b) fluoranthene	ND	300	µg/Kg
Benzo (k) fluoranthene	ND	300	µg/Kg
Benzo (a) pyrene	ND	300	µg/Kg
Dibenzo (a,h) anthracene	ND	300	µg/Kg
Benzo (g,h,i) perylene	ND	330	µg/Kg
Indeno (1,2,3-cd) pyrene	ND	300	µg/Kg

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	µg/Kg	76	21	94
2-Fluorobiphenyl	µg/Kg	79	12	106
Terphenyl-d14	µg/Kg	95	20	125

ANALYZED BY: HLA DATE/TIME: 04/03/2005 01:29:00
EXTRACTED BY: LB DATE/TIME: 03/29/2005 18:45:00
METHOD: 8270C, Semivolative organics-PAH
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: NELAC Accreditation #100407 Soil results reported in wet weight.

QUALITY CONTROL

DOCUMENTATION

XPFILES - Utility to Transfer GC/MS data files to Floppy - GRB

Data Files Batched to Floppy Drive A: 03-31-2005 12:54:25

A:\DATA\4C30011.TXT	0503619-06A
A:\DATA\4C30012.TXT	0503619-09A
A:\DATA\4C30013.TXT	0503619-011
A:\DATA\4C30014.TXT	0503619-08A
A:\DATA\4C30015.TXT	0503703-07A
A:\DATA\4C30018.TXT	0503703-11A

Files on Drive A: in A:\DATA directory
Use VOCBATCH or SVOCBAT to batch above files into SAM readable file

N505C300401.00

8260B LCS Recovery Sheet

Acq. Method File: 8260PW
Sample Name: 50 ppb LCS STD (99079-56-16)
Instrument Name: VOA4
Sample Multiplier: 1
Spike concentration: 50
Analyzed by: DWC
Date: 30 Mar 2005 1:01 pm
Batch # : MS05C30040100

Compound	Sample Results	% Recovery	Lower Limit	Upper Limit
1,1-Dichloroethene	56.53	113	67	135
Trichloroethene	46.99	94	76	111
Toluene	49.24	98	80	115
Chlorobenzene	46.78	94	72	118
Benzene	48.41	97	76	127

Spike Recovery and RPD Summary Report - WATER

Method Path : C:\MSDCHEM\1\METHODS\
Method File : 8260PW.M
Title : 8260B Water Method
Last Update : Thu Mar 31 09:53:45 2005
Response Via : Initial Calibration
Batch ID : MS05C30040100

Datafile Path: C:\MSDCHEM\1\DATA\05C30\

------Sample-------

File : 4C30010.D
Name : 0503533-25A Acq Time: 30 Mar 2005 4:19 pm

------Spike--------

File : 4C30004.D
Name : 0503533-25A MS (99079-56-16) Acq Time: 30 Mar 2005 1:29 pm

--Spike Duplicate--

File : 4C30005.D
Name : 0503533-25A MSD (99079-56-16) Acq Time: 30 Mar 2005 1:57 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	0.0	2500	2937	2569	117	103	13	16	56-132
Trichloroethene	0.0	2500	2231	2164	89	87	3	14	62-112
Toluene	5.1	2500	2389	2242	96	90	6	8	70-120
Chlorobenzene	0.0	2500	2361	2302	94	92	3	8	65-116
Benzene	0.3	2500	3314	2230	133	89	39#	13	50-174

- Fails Limit Check

8260B Method Blank Report

Acq. Method File:	8260PW
Sample Name:	MeOH BLANK
Instrument Name:	VOA4
Sample Multiplier:	50
Analyzed by:	DWC
Date:	30 Mar 2005 3:51 pm
Batch ID:	MS05C30040100

Compound	Sample Results (µg/Kg)	PQL
Dichlorodifluoromethane	ND	100
Chloromethane	ND	250
Vinyl Chloride	ND	25
Bromomethane	ND	250
Chloroethane	ND	250
Trichlorofluoromethane	ND	100
Acetone	ND	750
t-Butanol	ND	2500
1,1-Dichloroethene	ND	50
Iodomethane	ND	100
Methylene Chloride	ND	250
Carbon disulfide	ND	250
Acrylonitrile	ND	750
Methyl-tertiary-butyl ether	ND	50
trans-1,2-Dichloroethene	ND	50
cis-1,2-Dichloroethene	ND	50
Diisopropyl ether	ND	50
Vinyl acetate	ND	750
1,1-Dichloroethane	ND	50
Ethyl-tertiary-butyl ether	ND	50
2-Butanone	ND	750
2,2-Dichloropropane	ND	250
Chloroform	ND	50
Bromochloromethane	ND	100
1,1-Dichloropropene	ND	50
Tertiary-amyl-methyl ether	ND	50
1,2-Dichloroethane	ND	50
Trichloroethene	ND	50
2-Chloroethylvinylether	ND	500
4-Methyl-2-pentanone	ND	750
2-Hexanone	ND	750
Toluene	ND	100
1,3-Dichloropropane	ND	50
Tetrachloroethene	ND	50
Chlorobenzene	ND	50
Ethylbenzene	ND	50
1,1,1,2-Tetrachloroethane	ND	100
m,p-Xylene	ND	100

Compound	Sample Results (µg/Kg)	PQL
o-Xylene	ND	50
Styrene	ND	50
Isopropylbenzene	ND	250
1,2,3-Trichloropropane	ND	100
trans-1,4-Dichloro-2-butene	ND	50
n-Propylbenzene	ND	100
1,3,5-Trimethylbenzene	ND	100
Bromobenzene	ND	50
2-Chlorotoluene	ND	50
4-Chlorotoluene	ND	50
t-butylbenzene	ND	50
1,2,4-Trimethylbenzene	ND	100
sec-butylbenzene	ND	50
p-Isopropyltoluene	ND	50
1,3-Dichlorobenzene	ND	100
1,1,2,2-Tetrachloroethane	ND	100
1,1,1-Trichloroethane	ND	50
Carbon Tetrachloride	ND	50
Benzene	ND	25
1,2-Dichloropropane	ND	50
Bromodichloromethane	ND	100
Dibromomethane	ND	250
cis-1,3-Dichloropropene	ND	50
trans-1,3-Dichloropropene	ND	50
1,1,2-Trichloroethane	ND	50
Dibromochloromethane	ND	100
1,2-Dibromoethane	ND	250
Bromoform	ND	100
1,4-Dichlorobenzene	ND	100
n-butylbenzene	ND	50
1,2-Dichlorobenzene	ND	100
1,2-Dibromo-3-chloropropane	ND	250
Hexachlorobutadiene	ND	50
1,2,4-Trichlorobenzene	ND	250
Naphthalene	ND	250
1,2,3-Trichlorobenzene	ND	250
2-Methylnaphthalene	ND	250

** SPL QUALITY CONTROL REPORT **

Matrix: Water

Reported on: 03/31/05
Analyzed on: 03/30/05
Analyst: AS

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

METHANE
Method GPA 2261-90

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)	
ID Number	Blank ug/L	Result ug/L	Added ug/L	Result ug/L	Recovery %	Result ug/L	Recovery %	(%)	RPD Max	% REC
SPIKE_BLANK	ND	ND	35	37	106	35	100	5.8	20	72 -134

-0503130

Samples in batch:

0503645-ALL 0503703-ALL 0503730-ALL

COMMENTS:

```
XFILES   - Utility to Transfer GC/MS data files to Floppy  - GRB

Data Files Batched to Floppy Drive A:  04-05-2005     10:47:48

A:\DATA\5C31008.TXT              0503703-10A
A:\DATA\5C31009.TXT              0503703-09A
A:\DATA\5C31010.TXT              0503703-08A
A:\DATA\5C31011.TXT              0503703-12A
A:\DATA\5C31012.TXT              0503683-01A
A:\DATA\5C31013.TXT              0503683-02A
A:\DATA\5C31017.TXT              0503703-01A
A:\DATA\5C31019.TXT              0503703-03A
A:\DATA\5C31020.TXT              0503703-02A
A:\DATA\5C31022.TXT              0503703-06A

Files on Drive A: in A:\DATA directory
Use VOCBATCH to batch above files into SAM readable file
```

MSOSC31050100

8260B LCS Recovery Sheet

Acq. Method File: 8260PS
Sample Name: 50 ppb LCS STD (99079-56-16)
Instrument Name: VOA5
Sample Multiplier: 1
Spike concentration: 50
Analyzed by: DWC
Date: 31 Mar 2005 12:22 pm
Batch ID: MS05C31050100

Compound	Sample Results	% Recovery	Lower Limit	Upper Limit
1,1-Dichloroethene	47.74	95	53	135
Trichloroethene	53.06	106	64	131
Toluene	49.73	99	68	127
Chlorobenzene	50.98	102	73	128
Benzene	49.10	98	61	138

Spike Recovery and RPD Summary Report - SOIL

Method : C:\HPCHEM\1\METHODS\8260PS.M (RTE Integrator)
Title : 8260B Soil Method
Last Update : Mon Mar 07 11:41:26 2005
Response via : Initial Calibration
Batch ID : MS05C31050100

Non-Spiked Sample: 5C17010.D

	Spike Sample	Spike Duplicate Sample
File ID :	5C31004.D	5C31005.D
Sample :	0503293-07A MS (99079-56-14)	0503293-07A MSD (99079-56-14)
Acq Time:	31 Mar 2005 12:53 pm	31 Mar 2005 1:24 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	0.0	50	57	57	114	114	0	28	47-136
Trichloroethene	0.0	50	56	55	112	110	1	23	54-130
Toluene	1.7	50	58	57	112	110	2	31	67-123
Chlorobenzene	0.0	50	54	53	109	105	4	22	60-130
Benzene	0.2	50	67	67	134	133	1	29	47-172

- Fails Limit Check

8260B Method Blank Report

Acq. Method File:	8260PS
Sample Name:	BLANK
Instrument Name:	VOA5
Sample Multiplier:	1
Analyzed by:	DWC
Date:	31 Mar 2005 2:25 pm
Batch ID:	MS05C31050100

Compound	Sample Results (µg/Kg)	PQL
Dichlorodifluoromethane	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5
Acetone	ND	100
t-Butanol	ND	100
1,1-Dichloroethene	ND	5
Iodomethane	ND	10
Methylene Chloride	ND	10
Carbon disulfide	ND	25
Acrylonitrile	ND	10
Methyl-tertiary-butyl ether	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	ND	5
Diisopropyl ether	ND	10
Vinyl acetate	ND	50
1,1-Dichloroethane	ND	5
Ethyl-tertiary-butyl ether	ND	10
2-Butanone	ND	25
2,2-Dichloropropane	ND	5
Chloroform	ND	5
Bromochloromethane	ND	10
1,1-Dichloropropene	ND	5
Tertiary-amyl-methyl ether	ND	10
1,2-Dichloroethane	ND	5
Trichloroethene	ND	5
2-Chloroethylvinylether	ND	10
4-Methyl-2-pentanone	ND	25
2-Hexanone	ND	25
Toluene	ND	5
1,3-Dichloropropane	ND	5
Tetrachloroethene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
1,1,1,2-Tetrachloroethane	ND	5
m,p-Xylene	ND	10

Compound	Sample Results (µg/Kg)	PQL
o-Xylene	ND	5
Styrene	ND	5
Isopropylbenzene	ND	5
1,2,3-Trichloropropane	ND	5
trans-1,4-Dichloro-2-butene	ND	5
n-Propylbenzene	ND	5
1,3,5-Trimethylbenzene	ND	5
Bromobenzene	ND	5
2-Chlorotoluene	ND	5
4-Chlorotoluene	ND	5
t-butylbenzene	ND	5
1,2,4-Trimethylbenzene	ND	5
sec-butylbenzene	ND	5
p-Isopropyltoluene	ND	5
1,3-Dichlorobenzene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Benzene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
Dibromomethane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Dibromochloromethane	ND	5
1,2-Dibromoethane	ND	5
Bromoform	ND	5
1,4-Dichlorobenzene	ND	5
n-butylbenzene	ND	5
1,2-Dichlorobenzene	ND	5
1,2-Dibromo-3-chloropropane	ND	5
Hexachlorobutadiene	ND	5
1,2,4-Trichlorobenzene	ND	5
Naphthalene	ND	5
1,2,3-Trichlorobenzene	ND	5
2-Methylnaphthalene	ND	5

8270 PNA Soil Spike Recovery Sheet

Sample Identification : 0503703-01B
Matrix : Soil
Method : 8270
Analysis Date : 04/02/05
Analyst : HLA
Batch ID : MS05D0207001

Compound	Blank Conc.	Sample Conc.	LCS Conc.	LCS % Rec. (2)	QC Limits % Rec.
Naphthalene	ND	0	2477	75	33-102
Acenaphthylene	ND	0	2648	80	30-122
Acenaphthene	ND	0	2567	78	30-119
Fluorene	ND	0	2690	82	36-119
Phenanthrene	ND	0	2739	83	33-131
Anthracene	ND	0	2839	86	35-124
Fluoranthene	ND	0	2745	83	34-141
Pyrene	ND	0	2282	69	33-138
Benzo (a) Anthracene	ND	0	2382	72	32-139
Chrysene	ND	0	2236	68	30-147
Indeno (1,2,3 - cd) Pyrene	ND	0	1903	58	24-171
Benzo (b) Fluoranthene	ND	0	2934	89	24-141
Benzo (k) Fluoranthene	ND	0	3708	112	34-133
Benzo (a) Pyrene	ND	0	3361	102	35-138
Dibenz (a,h) anthracene	ND	0	3434	104	34-141
Benzo (g,h,i) Perylene	ND	0	3308	100	37-143

Compound	MS Conc.	MSD Conc.	MS % Rec. (1)	MSD % Rec.(1)	Rel. % Diff.	RPD Max	QC Limits % Recovery
Naphthalene	2249	1102	68	33	68	34	30-85
Acenaphthylene	2619	1830	79	55	35	35	29-102
Acenaphthene	2656	1859	80	56	35	36	34-92
Fluorene	2711	2115	82	64	25	35	40-96
Phenanthrene	2649	2532	80	77	5	34	37-112
Anthracene	2919	2648	88	80	10	32	34-107
Fluoranthene	2595	2496	79	76	4	46	24-130
Pyrene	2309	2196	70	67	5	56	23-133
Benzo (a) Anthracene	2327	2159	71	65	7	42	24-124
Chrysene	2389	2169	72	66	10	37	24-126
Indeno (1,2,3 - cd) Pyrene	1903	1149	58	35	49	43	16-141
Benzo (b) Fluoranthene	2811	2871	85	87	2	51	15-121
Benzo (k) Fluoranthene	3510	3564	106	108	2	46	18-122
Benzo (a) Pyrene	3338	3254	101	99	3	52	17-124
Dibenz (a,h) anthracene	3159	2452	96	74	25	39	27-130
Benzo (g,h,i) Perylene	3089	2095	94	63	38	43	25-128

ND = Not Detected
(1) Matrix spike limits are advisory only.
(2) LCS recoveries are mandatory.

0503703.01B-12B

XFILES - Utility to Transfer GC/MS data files to Floppy - GRB

Data Files Batched to Floppy Drive A: 04-11-2005 14:28:05

A:\DATA\5D04010.TXT	0503683-09A
A:\DATA\5D04011.TXT	0503683-11A
A:\DATA\5D04012.TXT	0503683-04A
A:\DATA\5D04013.TXT	0503683-06A
A:\DATA\5D04015.TXT	0503683-03A
A:\DATA\5D04016.TXT	0503703-04A
A:\DATA\5D04017.TXT	0503703-05A
A:\DATA\5D04018.TXT	0503749-02A
A:\DATA\5D04019.TXT	0503752-01A
A:\DATA\5D04020.TXT	0503749-04A
A:\DATA\5D04021.TXT	0503749-03A
A:\DATA\5D04022.TXT	0503749-01A
A:\DATA\5D04023.TXT	0503744-01A
A:\DATA\5D04024.TXT	0503744-02A
A:\DATA\5D04025.TXT	0503749-05A
A:\DATA\5D04026.TXT	0503744-03A

Files on Drive A: in A:\DATA directory
Use VOCBATCH to batch above files into SAM readable file

MS05D04050100

Spike Recovery and RPD Summary Report - Soil

Method : C:\HPCHEM\1\METHODS\8260PS.M (RTE Integrator)
Title : 8260B Soil Method
Last Update : Mon Mar 07 11:41:26 2005
Response via : Initial Calibration
Batch ID : MS05D04050100

Non-Spiked Sample: 5C17010.D

	Spike Sample	Spike Duplicate Sample
File ID :	5D04005.D	5D04006.D
Sample :	0503293-07A MS (99079-56-16)	0503293-07A MSD (99079-56-16)
Acq Time:	4 Apr 2005 10:49 am	4 Apr 2005 12:20 pm

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	0.0	50	50	49	100	98	1	28	47-136
Trichloroethene	0.0	50	53	53	106	106	1	23	54-130
Toluene	1.7	50	56	55	109	107	2	31	67-123
Chlorobenzene	0.0	50	52	51	104	101	3	22	60-130
Benzene	0.2	50	61	59	122	117	4	29	47-172

- Fails Limit Check

8260PS.M Mon Apr 11 14:15:06 2005 VOA4

8260B LCS Recovery Sheet

Acq. Method File:	8260PS
Sample Name:	50 ppb LCS STD (99079-56-16)
Instrument Name:	VOA5
Sample Multiplier:	1
Spike concentration:	50
Analyzed by:	DWC
Date:	4 Apr 2005 10:19 am
Batch ID:	MS05D04050100

Compound	Sample Results	% Recovery	Lower Limit	Upper Limit
1,1-Dichloroethene	52.61	105	53	135
Trichloroethene	57.93	116	64	131
Toluene	56.36	113	68	127
Chlorobenzene	56.79	114	73	128
Benzene	57.12	114	61	138

8260B Method Blank Report

Acq. Method File:	8260PS
Sample Name:	BLANK
Instrument Name:	VOA5
Sample Multiplier:	1
Analyzed by:	DWC
Date:	4 Apr 2005 1:52 pm
Batch ID:	MS05D04050100

Compound	Sample Results (µg/Kg)	PQL
Dichlorodifluoromethane	ND	10
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5
Acetone	ND	100
t-Butanol	ND	100
1,1-Dichloroethene	ND	5
Iodomethane	ND	10
Methylene Chloride	ND	10
Carbon disulfide	ND	25
Acrylonitrile	ND	10
Methyl-tertiary-butyl ether	ND	5
trans-1,2-Dichloroethene	ND	5
cis-1,2-Dichloroethene	ND	5
Diisopropyl ether	ND	10
Vinyl acetate	ND	50
1,1-Dichloroethane	ND	5
Ethyl-tertiary-butyl ether	ND	10
2-Butanone	ND	25
2,2-Dichloropropane	ND	5
Chloroform	ND	5
Bromochloromethane	ND	10
1,1-Dichloropropene	ND	5
Tertiary-amyl-methyl ether	ND	10
1,2-Dichloroethane	ND	5
Trichloroethene	ND	5
2-Chloroethylvinylether	ND	10
4-Methyl-2-pentanone	ND	25
2-Hexanone	ND	25
Toluene	ND	5
1,3-Dichloropropane	ND	5
Tetrachloroethene	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
1,1,1,2-Tetrachloroethane	ND	5
m,p-Xylene	ND	10

Compound	Sample Results (µg/Kg)	PQL
o-Xylene	ND	5
Styrene	ND	5
Isopropylbenzene	ND	5
1,2,3-Trichloropropane	ND	5
trans-1,4-Dichloro-2-butene	ND	5
n-Propylbenzene	ND	5
1,3,5-Trimethylbenzene	ND	5
Bromobenzene	ND	5
2-Chlorotoluene	ND	5
4-Chlorotoluene	ND	5
t-butylbenzene	ND	5
1,2,4-Trimethylbenzene	ND	5
sec-butylbenzene	ND	5
p-Isopropyltoluene	ND	5
1,3-Dichlorobenzene	ND	5
1,1,2,2-Tetrachloroethane	ND	5
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Benzene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
Dibromomethane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Dibromochloromethane	ND	5
1,2-Dibromoethane	ND	5
Bromoform	ND	5
1,4-Dichlorobenzene	ND	5
n-butylbenzene	ND	5
1,2-Dichlorobenzene	ND	5
1,2-Dibromo-3-chloropropane	ND	5
Hexachlorobutadiene	ND	5
1,2,4-Trichlorobenzene	ND	5
Naphthalene	ND	5
1,2,3-Trichlorobenzene	ND	5
2-Methylnaphthalene	ND	5

PDF-FULL ☒
PDF-SUM ☒

SPL, Inc. RUSH

Analysis Request & Chain of Custody Record

IA-2

SPL Workorder No: 0503703

133723

page 1 of 2

Client Name: GES Pilot

Address/Phone: 5508 Lonas Rd Knoxville, TN 37909

Client Contact: Jason McCain / Nate Strap (GES)

Project Name: Pilot 278

Project Number:

Project Location: Richwood, KY

Invoice To: Pilot (see above)

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: BTEX/MTBE 8260 (WS)	Requested Analysis: PAH 8270
B-1 (4-6)	3/25/05	0930		X	S	G	4	1	1	X	X
B-1 (14-16)		0945		X			4	1		X	X
B-2 (12-14)		1040		X			4	1		X	X
B-2 (14-16)		1100		X			4	1		X	X
B-3 (12-14)		1130		X			4	1		X	X
B-3 (14-16)		1145		X			4	1		X	X
B-4 (12-14)		1250		X			4	1		X	X
B-4 (14-15)		1300		X			4	1		X	X
B-5 (4-6)		1330		X			4	1		X	X
B-5 (8-10)		1350		X			4	1		X	X

Client/Consultant Remarks: Please forward results to Nate Strap at GES nstrap@gesonline Fax: 513 772-5852

Laboratory remarks:

Intact? ☒ Y ☐ N

Temp: 9 13

Requested TAT

24hr ☐ 72hr ☒

48hr ☐ Standard ☐

Other ☐ _____

Special Reporting Requirements: Fax Results ☐ Raw Data ☐ Standard QC ☐ Level 3 QC ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial):

	date	time	
1. Relinquished by Sampler: Nate Strap	3/28/05	1100	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date 3/29/05	time	6. Received by Laboratory:

☐ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

☒ 459-Hughes Drive, Traverse City, MI 49684 (616) 947-5777 RUSH

500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No. 240090

0503703

page 2 of 2

Client Name: Pilot

Address: 5508 Lonas Rd Knoxville, T 37909

Phone/Fax:

Client Contact: Nate Strop (GES) Email: nstrop@gesonline.com

Project Name/No.: Pilot 278

Site Name: Pilot 278

Site Location: Richmond, KY

Invoice To: Pilot (see above Ph:

matrix: W=water S=soil O=oil SL=sludge X=other

bottle: P=plastic A=amber glass G=glass V=vial X=other

size: 1=1 liter 4=4oz 40=vial 8=8oz 16=16oz X=other

pres.: 1=HCl 2=HNO3 3=H2SO4 X=other

Number of Containers

Requested Analysis: BTEX 8260; PAH 8270

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers	BTEX 8260	PAH 8270
B-6 (8-10)	3/25/05	1420		X	S	G	4	1	1	X	X
B-6 (14-15)	2	1440		X	1	1	4	1	1	X	X

Client/Consultant Remarks: Please forward results to Nate Strop at GES email (Above) or fax (615)772-5857

Laboratory remarks:

Intact? Y N

Ice? Y N

Temp: 3.3

Requested TAT

Contract ☐ 72hr ☒

24hr ☐ Standard ☐

48hr ☐

Other ☐ _____

Special Reporting Requirements Results: Fax ☐ Email ☒ PDF ☒

Standard QC ☐ Level 3 QC ☐ Level 4 QC ☐ TX TRRP ☐ LA RECAP ☐

Special Detection Limits (specify):

PM review (initial):

	date	time	
1. Relinquished by Sampler: Nate Strop	3/28/05	1100	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date 3/29/05	time 0945	6. Received by Laboratory:

☐ 8880 Interchange Drive
Houston, TX 77054 (713) 660-0901

☒ 500 Ambassador Caffery Parkway
Scott, LA 70583 (337) 237-4775

☒ 459 Hughes Drive
Traverse City, MI 49686 (231) 947-5777

Attachment G

Well Log Search Results

Nathan Stroup

From: Shuttleworth, John (EPPC DEP DOW) [John.Shuttleworth@ky.gov]
Sent: Tuesday, April 12, 2005 3:29 PM
To: Nathan Stroup

Nate: Per your request a search of our database for an area within a 1000 foot radius of the area you indicated on the provided map (84 degrees, 37 minutes, 28 seconds Longitude and 38 degrees 55 minutes 9 seconds of
latitude) was conducted. The search turned up no water wells in this area. Please be aware that if a well was drilled pre-law (prior to Aug of 1985) or if the a well was drilled illegally or the driller failed to turn in the required notification, a well could be present without our knowledge.

If I can be of further assistance please do not hesitate to contact me.

John W. Shuttleworth, Supervisor
Data Management and Support Section
Groundwater Branch
Ky. Division Of Water

UNIVERSITY OF KENTUCKY

KENTUCKY GEOLOGICAL SURVEY

228 Mining and Mineral Resources Building
University of Kentucky
Lexington, KY 40506-0107
Phone (606) 257-5500
Fax (606) 257-1147

May 14, 2002

Nate Stroup
GES
2700 E. Kemper Road
Cincinnat, Ohio 45241

Dear Nate:

The results of the data search you requested on 05/14/2002 are as follows:

LATITUDE	LONGITUDE	RADIUS	NUMBER OF HYDROLOGIC SITES FOUND	TYPE(S)	COMMENTS
N38° 55' 09"	W084° 37' 28"	1,000 feet	23	Monitoring wells	Project: Pilot #278

Water Data Repository, and may not be representative of all hydrologic sites (i.e., wells, springs) in the search area. Water wells were not required to be registered with the State prior to 1985.

If this data search revealed any **PUBLIC** water supply wells, or if you have identified public water supply wells on your site that are not indicated by this search, then you must contact the Kentucky Division of Water (DOW), Groundwater Branch, to determine whether your site is located within a **wellhead protection area**. Until further notice, you do not have to contact DOW concerning wellhead protection areas if neither of the above cases apply. The contact persons at DOW are Ms. Beverly Oliver or Mr. Ernie Ellison at (502) 564-3410.

Thank you for your interest in the Survey. Please do not hesitate to call should you have questions or comments about the data, or if we can be of further assistance.

Sincerely,

Richard A. Smath

Richard A. Smath
Geologist
Office of Geologic Information

Water Well Header Report

gwa No.	Record Id.	Quad Name	County Name	Latitude	Longitude	Surf Ele.	Agency	Site Type	Primary Use	PWSID	Const End	Total Depth	Bedrock Depth	Static H2O
001507	657	Union	Boone	38° 55' 0"	84° 37' 37"	905	Kentucky Division of Water	Water Well	Monitoring		7/23/1992	8	8	
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
001510	658	Union	Boone	38° 55' 5"	84° 37' 37"	882.4	Kentucky Division of Water	Water Well	Monitoring		7/24/1992	23	23	8
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
001511	659	Union	Boone	38° 55' 5"	84° 37' 37"	880.2	Kentucky Division of Water	Water Well	Monitoring		7/23/1992	23	23	9.94
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE—PEORIA, IL 61614 (309)688-6785							
001514	660	Union	Boone	38° 55' 5"	84° 37' 37"	881.8	Kentucky Division of Water	Water Well	Monitoring		7/24/1992	23	23	11.92
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
001515	661	Union	Boone	38° 55' 5"	84° 37' 37"	881.1	Kentucky Division of Water	Water Well	Monitoring		7/27/1992	7.5	7.5	5.72
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
001516	662	Union	Boone	38° 55' 5"	84° 37' 37"	882.8	Kentucky Division of Water	Water Well	Monitoring		7/27/1992	13.5	13.5	11.27
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
008664	19958	Union	Boone	38° 55' 2"	84° 37' 38"	905	Kentucky Division of Water	Water Well	Monitoring		4/27/1993	10	10	1.5
wner's Name: CHEVRON USA INC							2300 WINDY RIDGE PARKWAY SUITE 800---MARIETTA, GA 30067 (404)984-4190							
010051	20269	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/18/1993	17	5.4	0.93
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
010052	20270	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/19/1993	25	8.3	3.55
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
010053	20271	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/19/1993	25	5.5	1.05
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
010054	20272	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/29/1993	25	4.5	7.13
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
010055	20273	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/22/1993	25	5.25	9.82
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
010056	20274	Union	Boone	38° 55' 1"	84° 37' 36"	910	Kentucky Division of Water	Water Well	Monitoring		3/23/1993	25	7	11.31
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
006911	22586	Union	Boone	38° 55' 6"	84° 37' 39"	876.0	Kentucky Division of Water	Water Well	Monitoring		2/23/1993	22	21.68	17.73
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
006913	22587	Union	Boone	38° 55' 6"	84° 37' 39"	880.9	Kentucky Division of Water	Water Well	Monitoring		2/23/1993	14	14	5.63
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
006912	22588	Union	Boone	38° 55' 6"	84° 37' 39"	881	Kentucky Division of Water	Water Well	Monitoring		2/23/1993	14	14	10.84
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
006914	22589	Union	Boone	38° 55' 6"	84° 37' 39"	874.9	Kentucky Division of Water	Water Well	Monitoring		2/23/1993	12.8	12.8	12.41
wner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
014453	25592	Union	Boone	38° 55' 6"	84° 37' 35"	900	Kentucky Division of Water	Water Well	Monitoring		8/9/1994	21	21	
Owner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
013890	25593	Union	Boone	38° 55' 6"	84° 37' 35"	900	Kentucky Division of Water	Water Well	Monitoring		8/9/1994	17	17	
Owner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							

This search is current as of: 5/14/2002

Ver. 3.1 6/00

Water Well Header Report

kgwa No.	Record Id.	Quad Name	County Name	Latitude	Longitude	Surf Ele.	Agency	Site Type	Primary Use	PWSID	Const End	Total Depth	Bedrock Depth	Static H2O
)013889	25594	Union	Boone	38° 55' 6"	84° 37' 35"	900	Kentucky Division of Water	Water Well	Monitoring		8/9/1994	15.5	15.5	
Owner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
)013888	25595	Union	Boone	38° 55' 6"	84° 37' 35"	900	Kentucky Division of Water	Water Well	Monitoring		8/9/1994	18	18	
Owner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
)013887	25596	Union	Boone	38° 55' 6"	84° 37' 35"	900	Kentucky Division of Water	Water Well	Monitoring		8/9/1994	13	13	
Owner's Name: BP AMERICA INC							4965 NORTH GRANDVIEW DRIVE---PEORIA, IL 61614 (309)688-6785							
)008663	32286	Union	Boone	38° 55' 2"	84° 37' 38"	905	Kentucky Division of Water	Water Well	Monitoring		2/29/1996	8	8	3.7
Owner's Name: CHEVRON USA INC							2300 WINDY RIDGE PARKWAY SUITE 800—MARIETTA, GA 30067 (404)984-4190							

A Groundwater Repository search using 38° 55' 9" north latitude and 84° 37' 28" west longitude with a radius of 0.19 miles produced --- 23 wells.

This search is current as of: 5/14/2002

Water Well Casing Report

gwa No.	Record Id.	Case Start Date	Cased From	Cased To	Casing Length	Hole Inside Dia.	Casing Inside Dia.	Casing Type	Screen Slot Size
001507	657								
		7/23/1992	0.00	2.50	2.50	9	4	PVC	
		7/23/1992	2.50	7.50	5.00	9	4	PVC SCREEN	
001510	658								
		7/24/1992	0.00	7.50	7.50	9	4	PVC	
		7/24/1992	7.50	22.50	15.00	9	4	PVC SCREEN	
001511	659								
		7/23/1992	0.00	7.50	7.50	9	4	PVC	
		7/23/1992	7.50	22.50	15.00	9	4	PVC SCREEN	
001514	660								
		7/24/1992	0.00	7.50	7.50	9	4	PVC	
		7/24/1992	7.50	22.50	15.00	9	4	PVC SCREEN	
001515	661								
		7/27/1992	0.00	2.00	2.00	9	4	PVC	
		7/27/1992	2.00	7.00	5.00	9	4	PVC SCREEN	
001516	662								
		7/27/1992	0.00	3.00	3.00	9	4	PVC	
		7/27/1992	3.00	13.00	10.00	9	4	PVC SCREEN	
0008664	19958								
		4/27/1993	0.00	2.00	2.00	8	2	PVC	
		4/27/1993	2.00	10.00	8.00	8	2	PVC SCREEN	
0010051	20269								
		3/18/1993	0.00	5.40	5.40	8	4	PVC	
		3/18/1993	5.40	6.13	0.73	5.6300	4	PVC	
		3/18/1993	6.13	15.63	9.50	5.6300	4	PVC SCREEN	
0010052	20270								
		3/19/1993	0.00	8.30	8.30	8	4	PVC	
		3/19/1993	8.30	8.71	0.41	5.6300	4	PVC	
		3/19/1993	8.71	23.20	14.49	5.6300	4	PVC SCREEN	
0010053	20271								
		3/19/1993	0.00	5.50	5.50	8	4	PVC	
		3/19/1993	5.50	8.27	2.77	5.6300	4	PVC	
		3/19/1993	8.27	22.77	14.50	5.6300	4	PVC SCREEN	

Water Well Casing Report

gwa No.	Record Id.	Case Start Date	Cased From	Cased To	Casing Length	Hole Inside Dia.	Casing Inside Dia.	Casing Type	Screen Slot Size
0010054	20272								
		3/29/1993	0.00	4.50	4.50	8	4	PVC	
		3/29/1993	4.50	9.32	4.82	5.6300	4	PVC	
		3/29/1993	9.32	23.83	14.51	5.6300	4	PVC SCREEN	
0010055	20273								
		3/22/1993	0.00	5.25	5.25	8	4	PVC	
		3/22/1993	5.25	9.67	4.42	5.6300	4	PVC	
		3/22/1993	9.67	24.17	14.50	5.6300	4	PVC SCREEN	
0010056	20274								
		3/23/1993	0.00	7.00	7.00	8	4	PVC	
		3/23/1993	7.00	8.50	1.50	5.6300	4	PVC	
		3/23/1993	8.50	23.00	14.50	5.6300	4	PVC SCREEN	
0006911	22586								
		2/23/1993	0.00	6.69	6.69	9	4	PVC	
		2/23/1993	6.69	21.70	15.01	9	4	PVC SCREEN	
0006913	22587								
		2/23/1993	0.00	4.00	4.00	9	4	PVC	
		2/23/1993	4.00	14.00	10.00	9	4	PVC SCREEN	
0006912	22588								
		2/23/1993	0.00	4.00	4.00	9	4	PVC	
		2/23/1993	4.00	14.00	10.00	9	4	PVC SCREEN	
0006914	22589								
		2/23/1993	0.00	2.80	2.80	9	4	PVC	
		2/23/1993	2.80	12.80	10.00	9	4	PVC SCREEN	
0014453	25592								
		8/9/1994	0.00	6.00	6.00	8.25	2	PVC	
		8/9/1994	6.00	15.00	9.00	8.25	2	PVC SCREEN	
0013890	25593								
		8/9/1994	0.00	4.00	4.00	8.25	2	PVC	
		8/9/1994	4.00	17.00	13.00	8.25	2	PVC SCREEN	
0013889	25594								
		8/9/1994	0.00	5.50	5.50	8.25	2	PVC	
		8/9/1994	5.50	15.50	10.00	8.25	2	PVC SCREEN	

Water Well Casing Report

rgwa No.	Record Id.	Case Start Date	Cased From	Cased To	Casing Length	Hole Inside Dia.	Casing Inside Dia.	Casing Type	Screen Slot Size
X013888	25595								
		8/9/1994	0.00	3.00	3.00	8.25	2	PVC	
		8/9/1994	3.00	18.00	15.00	8.25	2	PVC SCREEN	
)013887	25596								
		8/9/1994	0.00	3.00	3.00	8.25	2	PVC	
		8/9/1994	3.00	13.00	10.00	8.25	2	PVC SCREEN	
)008663	32286								
		4/27/1993	0.00	2.00	2.00	8	2	PVC	
		4/27/1993	2.00	8.00	6.00	8	2	PVC SCREEN	
		2/29/1996	0.00	8.00	8.00			PLUGGED	

Water Well Lithology Report

Ogwa No.	Record Id.	Litho From	Litho To	Thickness	Lithologic Description	H2O Description	Flow Units
)001507	657						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	BROWN SILTY CLAY WITH GRAVEL, DAMP NO ODOR		0
		5.00	7.00	2.00	BROWN WEATHERED SHALE AND LIMESTONE, DAMP, SLIGHT HYDROCARBON ODOR		0
)001510	658						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	GRAY SILTY CLAY WITH GRAVEL AND ORGANICS, STRONG HYDROCARBON ODOR		0
		5.00	7.00	2.00	GRAY SILTY CLAY WITH GRAVEL AND ORGANICS, STRONG HYDROCARBON ODOR		0
		10.00	12.00	2.00	BROWN SANDY CLAY WITH GRAVEL, NO ODOR		0
		15.00	17.00	2.00	BROWN AND GRAY MOTTLED SILTY CLAY WITH GRAVEL, DAMP NO ODOR		0
		20.00	22.00	2.00	BROWN SILTY CLAY WITH GRAVEL, WEATHERED SHALE AND LIMESTONE FRAGMENTS		0
		23.00	23.00		AUGER REFUSAL		0
)001511	659						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	BROWN AND GRAY SILTY CLAY WITH GRAVEL MOIST		0
		5.00	7.00	2.00	BROWN AND GRAY SILTY CLAY WITH GRAVEL MOIST		0
		10.00	12.00	2.00	BROWN AND GRAY SILTY CLAY WITH GRAVEL MOIST		0
		15.00	17.00	2.00	GRAY SILTY CLAY WITH SAND AND GRAVEL, MOIST		0
		20.00	22.00	2.00	BROWN SILTY CLAY WITH GRAVEL, DAMP		0
		23.00	23.00		AUGER REFUSAL		0
)001514	660						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	BROWN SILTY CLAY WITH ROCK FRAGMENTS		0
		5.00	7.00	2.00	BROWN SILTY CLAY WITH ROCK FRAGMENTS		0
		10.00	12.00	2.00	GRAY SILTY CLAY WITH ROCK FRAGMENTS		0
		15.00	17.00	2.00	GRAY SILTY CLAY WITH ROCK FRAGMENTS		0
		20.00	22.00	2.00	GRAY SILTY CLAY WITH ROCK FRAGMENTS		0
		23.00	23.00		AUGER REFUSAL		0
X001515	661						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	BROWN SILTY CLAY WITH GRAVEL		0
		5.00	7.00	2.00	BROWN AND GRAY SILTY CLAY		0
		7.50	7.50		AUGER REFUSAL		0

Water Well Lithology Report

gwa No.	Record Id.	Litho From	Litho To	Thickness	Lithologic Description	H2O Description	Flow Units
)001516	662						
		0.00	1.00	1.00	ASPHALT AND GRAVEL FILL		0
		1.00	3.00	2.00	BROWN AND GRAY SILTY CLAY WITH GRAVEL		0
		5.00	7.00	2.00	BROWN AND GRAY SILTY CLAY WITH GRAVEL		0
		10.00	12.00	2.00	BROWN SILTY CLAY		0
		13.50	13.50		AUGER REFUSAL		0
)008664	19958						
		0.00	1.00	1.00	BLACKTOP AND DENSE GRADE AGGREGATE		0
		1.00	10.00	9.00	REDDISH BROWN CLAY SILT		0
)010051	20269						
		0.00	0.50	0.50	ASPHALT SURFACE		0
		0.50	5.40	4.90	GREEN GRAY SILTY CLAY		0
		5.40	17.00	11.60	INTERBEDDED LIMESTONE AND SHALE, GRAY		0
)010052	20270						
		0.00	0.50	0.50	ASPHALT SURFACE		0
		0.50	6.50	6.00	GREEN BROWN SANDY CLAY WITH LIMESTONE FLOATERS		0
		6.50	8.19	1.69	GREEN SILTY CLAY AND WEATHERED SHALE		0
		8.19	25.00	16.81	INTERBEDDED LIMESTONE AND SHALE, GRAY		0
)010053	20271						
		0.00	0.50	0.50	ASPHALT SURFACE		0
		0.50	5.50	5.00	WEATHERED LIMESTONE AND SHALE		0
		5.50	25.00	19.50	INTERBEDDED LIMESTONE AND SHALE, GRAY		0
)010054	20272						
		0.00	0.50	0.50	ASPHALT SURFACE		0
		0.50	4.50	4.00	GREEN GRAY SILTY CLAY WITH LIMESTONE FLOATERS		0
		4.50	25.00	20.50	INTERBEDDED LIMESTONE AND SHALE, GRAY		0
)010055	20273						
		0.00	0.50	0.50	ASPHALT SURFACE		0
		0.50	5.25	4.75	BROWN SILTY SANDY CLAY, FEW FRAGMENTS OF LIMESTONE ROCK		0
		5.25	25.00	19.75	INTERBEDDED LIMESTONE AND SHALE, GRAY		0

Water Well Lithology Report

gwa No.	Record Id.	Litho From	Litho To	Thickness	Lithologic Description	H2O Description	Flow	Units
010056	20274							
		0.00	0.50	0.50	GRASS, SURFACE		0	
		0.50	7.00	6.50	BROWN AND GRAY SILTY CLAY, FEW ROCK FRAGMENTS		0	
		7.00	25.00	18.00	INTERBEDDED LIMESTONE AND SHALE, GRAY		0	
006911	22586							
		0.00	1.00	1.00	ASPHALT AND CRUSHED LIMESTONE		0	
		1.00	12.00	11.00	BROWN SILTY CLAY WITH GRAY MOTTLING AND SOME GRAVEL, MOIST		0	
		12.00	14.00	2.00	GRAY CLAY WITH A TRACE OF GRAVEL, MOIST		0	
		14.00	16.00	2.00	NO SAMPLE		0	
		16.00	22.00	6.00	BROWN HIGHLY WEATHERED SHALE WITH INTERBEDDED LIMESTONE, MOIST		0	
006913	22587							
		0.00	1.00	1.00	ASPHALT AND CRUSHED LIMESTONE		0	
		1.00	2.00	1.00	GREENISH GRAY CLAY WITH SOME GRAVEL, MOIST		0	
		2.00	4.00	2.00	GREENISH GRAY CLAY WITH GRAVEL, WOOD, BRICK, MOIST		0	
		4.00	10.00	6.00	BROWN CLAY WITH GRAY MOTTLING, MOIST		0	
		10.00	12.00	2.00	BROWN HIGHLY WEATHERED SHALE WITH LIMESTONE FRAGMENTS, MOIST		0	
		12.00	14.00	2.00	BROWN HIGHLY WEATHERED SHALE WITH INTERBEDDED LIMESTONE, VERY MOIST		0	
006912	22588							
		0.00	1.00	1.00	ASPHALT AND CRUSHED LIMESTONE		0	
		1.00	2.00	1.00	BROWN SANDY CLAY WITH GRAVEL, MOIST		0	
		2.00	4.00	2.00	DARK BROWN TO GRAY CLAY WITH SOME GRAVEL		0	
		4.00	10.00	6.00	DARK BROWN TO GRAY CLAY, MOIST		0	
		10.00	12.00	2.00	BROWN HIGHLY WEATHERED SHALE WITH LIMESTONE FRAGMENTS, MOIST		0	
006914	22589							
		0.00	1.00	1.00	ASPHALT AND CRUSHED LIMESTONE		0	
		1.00	2.00	1.00	GREENISH GRAY CLAY WITH SOME GRAVEL		0	
		2.00	4.00	2.00	GREENISH GRAY CLAY WITH GRAVEL, WOOD, BRICK, MOIST		0	
		4.00	10.00	6.00	BROWN CLAY WITH GRAY MOTTLING MOIST		0	
		610.00	812.00	202.00	BROWN HIGHLY WEATHERED SHALE WITH LIMESTONE FRAGMENTS, MOIST		0	
014453	25592							
		0.00	0.50	0.50	ASPHALT		0	
		0.50	2.00	1.50	GRAVEL		0	
		2.00	21.00	19.00	CLAY BROWN STIFF		0	

Water Well Lithology Report

gwa No.	Record Id.	Litho From	Litho To	Thickness	Lithologic Description	H2O Description	Flow	Units
0013890	25593							
		0.00	0.50	0.50	ASPHALT		0	
		0.50	2.00	1.50	GRAVEL		0	
		2.00	17.00	15.00	CLAY BROWN STIFF		0	
0013889	25594							
		0.00	0.50	0.50	ASPHALT		0	
		0.50	2.00	1.50	GRAVEL		0	
		2.00	15.50	13.50	CLAY BROWN STIFF		0	
0013888	25595							
		0.00	0.50	0.50	ASPHALT		0	
		0.50	2.00	1.50	GRAVEL		0	
		2.00	18.00	16.00	CLAY BROWN STIFF		0	
0013887	25596							
		0.00	0.50	0.50	ASPHALT		0	
		0.50	2.00	1.50	GRAVEL		0	
		2.00	13.00	11.00	CLAY BROWN SRIFF		0	
0008663	32286							
		0.00	1.00	1.00	BLACKTOP AND DENSE GRADE AGGREGATE		0	
		1.00	8.00	7.00	REDDISH BROWN CLAY SILT		0	

Attachment H
Facility Classification Guide

Attachment I
Site Check Report Checklist

SITE CHECK REPORT CHECKLIST

Site Name Pilot Travel Center #278 County Boone
Location 118 Richwood Rd. Richwood, KY UST I.D. # 2712-008

Check off each item included in the site check report. Omitted items shall be addressed in the report's cover letter. The complete checklist shall be submitted with each copy of the final report in order to expedite review of the site check report.

Check Response

1.0 Executive Summary

p. 1 1.1 Provide a detailed description of the incident that initiated the site check.
p. 8 1.2 Summarize the results of the field investigations.
p. 9 1.3 Outline conclusions and additional actions.

2.0 Site Identification and Location

p. 5 2.1 List the site name, location, and the UST identification number.
Fig. 1 2.2 Provide the applicable section of a USGS topographic map indicating the exact location of the site. The map shall be to scale with north arrow, legend, quadrangle name, etc.
Fig. 2 2.3 Provide a detailed, site-specific map for the facility which is to scale and includes a north arrow, legend, etc.
p. 5 2.4 List the longitude and latitude of the tank pit area(s).
Att. A 2.5 Submit site photographs with descriptions.

3.0 Site History

p. 5 3.1 List the site's street address, city, and county.
p. 5 3.2 Include the property owner's name, address, and telephone number.
p. 5 3.3 Provide the facility operator's name, address, and telephone number.
p. 5 3.4 Submit a summary of the commercial and private activities at the site.

4.0 Underground Storage Tank History

p. 5 4.1 Provide a history of the underground storage tank and piping systems on site (all tanks and piping past/present, age, size, contents, construction, etc.).
p. 1 4.2 Submit data on the nature and estimated quantity of the release.

5.0 Abatement Measures

p. 6 5.1 Report if free phase product or fumes in nearby structures were encountered.
p. 6 5.2 Provide a report detailing free phase product and vapor recovery efforts for the facility.
p. 6 5.3 Submit information summarizing initial abatement activities.

6.0 Release Detection

Att. B 6.1 Provide a copy of the most recent tank and line tightness test.
Att. C 6.2 Provide a copy of the repair records for the last twelve (12) months.
Att. D 6.3 Provide leak detection records for three (3) months prior to the release.

7.0 Field Investigations

Fig. 3 7.1 Provide a site sketch indicating the locations of all soil borings and soil samples collected with their total depths in relation to the underground storage tanks and all piping.
NA 7.2 Provide information and documentation of UST Branch approval on the use of an alternative sampling plan if necessary.

Att. E 7.3 Provide information on the total depth of soil borings and monitoring wells. For sites within a carbonate bedrock area with potential subsurface solution channel flow, include documentation that the UST Branch was contacted prior to continuation of installation of wells.
NA

_____ 7.4 Submit information on hydrogeologically downgradient groundwater samples, if required as specified in Section 4.2 of the Underground Storage Tank System Closure Outline.

NA 7.5 Submit results of any water samples collected and include information on the methods used to collect the water sample.

NA 7.6 Provide information on the depth to groundwater and details on how the information was obtained.

NA 7.7 Provide information on the proper abandonment of any soil borings or monitoring wells.

NA 7.8 Provide documentation that all monitoring wells were drilled, constructed, altered, tagged, abandoned, and reported as per 401 KAR 6:310.

8.0 Analytical Results

AttF 8.1 Provide chain-of-custody records.

AttF 8.2 Submit analytical results including the SW 846 method numbers, method detection limits, sample preservation, sampling equipment, decontamination procedures, sample containers, sample size, sample holding times, etc.

Fig3 8.3 Provide a map indicating the contaminant levels of each major constituent and the locations of the sampling points.

9.0 Site Geology / Hydrogeology

p. 8 9.1 Describe the local and regional geology and hydrogeology based upon scientific publications.

p. 8 9.2 Describe the site's geology and hydrogeology based upon information from soil borings and monitoring well drilling.

9.3 Provide drilling logs depicting the total depth, lithologies, and field screening results.

Att. E 9.4 Submit Monitoring Well Record Form # DEP 8043 or Kentucky UST Assessment Well Form #DEP 5033 for wells used to collect a one-time groundwater sample. Indicate the depth and length of the screen, blank casing, filter pack bentonite seal, grout seal, as well as a discussion on the integrity of the wells;etc.
NA

10.0 Waste Handling Procedures

p. 9 10.1 Give a summary of the handling, storage, and disposal of waste generated during the investigation.

NA 10.2 Provide disposal receipts, manifests, or other documentation of proper disposal of waste generated during the site check.

11.0 Health and Safety

p. 9 11.0 Note an adherence to a site-specific health and safety plan.

12.0 Submittal of the Final Report

Cover 12.0 Provide one (1) original and one (1) copy of the site check report including this checklist. The facility identification number (I.D.#) shall be written on the front page of every document submitted.

13.0 Additional Information or Sampling

NA 13.0 Provide information on any additional information or sampling as required by the Cabinet.

Attachment J

Certification of Site Check Report

Site Check Report Checklist
(Continued)

CERTIFICATION OF SITE CHECK REPORT

Under the requirements of KRS Chapters 322 and 322A, this Site Check Report Checklist shall be completed and signed by a Professional Engineer (P.E.) registered with the Kentucky Board of Registration for Professional Engineers and Land Surveyors, or a Professional Geologist (P.G.) registered with the Kentucky Board of Registration for Professional Geologists.

Signature_____

Date_____

Name and Title (Typed or Print)_____

Registration Number, Date and Seal_____

The undersigned, first being duly sworn, states that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate and complete. The undersigned further acknowledges that KRS 224.99-010 provides for penalties for submitting false information.

Company Name Pilot Travel Centers, LLC.

Name and Title of Individual Whose Signature Appears Below Jason.McCain, Environmental Specialist

Signature* Jason A. McCain

Date of Signature 4.13.05

Subscribed and sworn to before me by himself

This the 13 Day of April 19 2005

Notary Public Patricia A. Wolfram

My Commission Expires 2/6/06

Location of Commission State of Ohio - clermont County

*NOTE: If the individual signing this is someone other than the president or secretary of a corporation, attach a notarized copy of power of attorney, or resolution of the board of directors which grants the individual the legal authority to represent the company. (Does not apply to a single proprietorship or partnership.)

Patricia A Wolfram
Notary Public State of Ohio
My Commission Expires 02-06-06

CERTIFICATION OF SITE CHECK REPORT

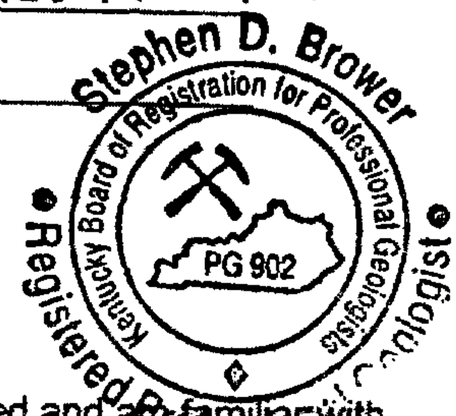
Under the requirements of KRS Chapters 322 and 322A, this Site Check Report Checklist shall be completed and signed by a Professional Engineer (P.E.) registered with the Kentucky Board of Registration for Professional Engineers and Land Surveyors, or a Professional Geologist (P.G.) registered with the Kentucky Board of Registration for Professional Geologists.

Signature Stephen D. Brower

Date 4/13/05

Name and Title (Typed or Print) STEPHEN D. BROWER, SR. P.M.

Registration Number, Date and Seal PG 902 4/13/05



The undersigned, first being duly sworn, states that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate and complete. The undersigned further acknowledges that KRS 224.99-010 provides for penalties for submitting false information.

Company Name Pilot Travel Centers, LLC.

Name and Title of Individual Whose Signature Appears Below Jason McCain, Environmental Specialist

Signature*_____

Date of Signature_____

Subscribed and sworn to before me by_____

This the_____ Day of _____, 19_____

Notary Public_____

My Commission Expires_____

Location of Commission_____

*NOTE: If the individual signing this is someone other than the president or secretary of a corporation, attach a notarized copy of power of attorney, or resolution of the board of directors which grants the individual the legal authority to represent the company. (Does not apply to a single proprietorship or partnership.)

ORIGINAL

INITIAL RESPONSE AND ABATEMENT/ FREE PRODUCT RECOVERY

Pilot #278
118 Richwood Road
Richwood, Boone County, KY
KDEP ID # 2712008

RECEIVED
2002 JUL -3 P 12:38
KY. DIV. OF WASTE MGMT.
U.S.T. BRANCH

Prepared for:

Pilot Travel Centers, LLC
5508 Loans Rd.
Knoxville, TN 37939

Prepared by:

Groundwater & Environmental Services, Inc.
2700 East Kemper Road
Cincinnati, Ohio 45241

Prepared by:

Nathan R. Stroup
Associate Environmental Scientist

Reviewed by:

Brad Turney
Project Manager

June 2002

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2.0	INITIAL ABATEMENT	1
3.0	INITIAL FREE PRODUCT RECOVERY	2
4.0	FREE PRODUCT RECOVERY FOR OCTOBER-MAY	2

FIGURES

Figure 1 Site Plan

TABLES

Table 1 Free Product Recovery

INITIAL ABATEMENT CHECKLIST

INTRODUCTION

Groundwater and Environmental Services, Inc. (GES) was contracted by Pilot Travel Centers, LLC (Pilot) to document initial response activities upon discovery of free phase diesel fuel located in a tank pit well at Pilot Travel Center #278 located at 118 Richwood Road, Richwood, KY. In addition, GES was contracted to conduct weekly free product recovery activities. This report is being submitted in general accordance with the KDEP 401 KAR 42:060 Release Response and Initial Abatement Requirements Outline, Section 3.4 October 1995.

1.0 INITIAL RESPONSE

On October 18, 2001, Pilot contacted GES and informed them of a suspected release near the diesel UST pit. GES personnel arrived onsite at 7:30 AM, October 19, 2001. Jason McCain from Pilot arrived onsite at 8:20 AM. M&M Construction arrived onsite at 10:00 AM to conduct excavation. The initial response was reported to the Environmental Response Section by Jason McCain. The ERT number for the site is 63220. M&M construction excavated a portion of the tank pit in order to find the source of the release. The source of the release was a mechanical line leak detector flange. In order to prevent further releases, the damaged section was replaced. Prompt containment and cleanup of the spill was initiated to reduce environmental impact.

Any potential risks of fire or explosion due to the release were mitigated. In order to protect the safety of people from vapors, fire, or explosion, GES personnel completely blocked off the affected area with cones, flags, and warning tape. Only authorized personnel with proper personal protective equipment (PPE) were allowed in the area. Product was identified in a 3 foot by 3 foot vault in the diesel tank pit. In an effort to clean up the product found in the vault, GES personnel removed approximately 20 gallons of product from the vault. This was done using a polyvinyl chloride (PVC) bailer.

2.0 INITIAL ABATEMENT

As stated above, it was necessary to remove product from a vault near the affected area. After 20 gallons were removed from the vault, the system was left idle to see if product would come back into the system. Shortly thereafter, a visual inspection showed that the tank pit area was once again saturated with diesel. Continued monitoring will be conducted through soil borings to test the condition of the soil and quarterly monitoring of groundwater. A minimal amount of pea gravel was moved to reach the leaking fitting. This pea gravel was returned to the excavation upon completion of the repair activities. No soil samples were collected. In order to reduce safety hazards from exposed contaminated soils and water, GES personnel isolated the work area with plastic cones, orange flags, and caution tape around the entire work area. Only authorized personnel with proper PPE were allowed in the work area.

3.0 SHEEN OR FREE PRODUCT RECOVERY

Free product was encountered in the diesel pit area. The ERT was immediately contacted to report the free product. Immediate recovery of the product was initiated. This was conducted at the vault nearest the release. Twenty (20) gallons of free product were recovered initially. Free product recovery efforts were initiated on a daily basis during the month of October and have continued, at a minimum, on a weekly basis.

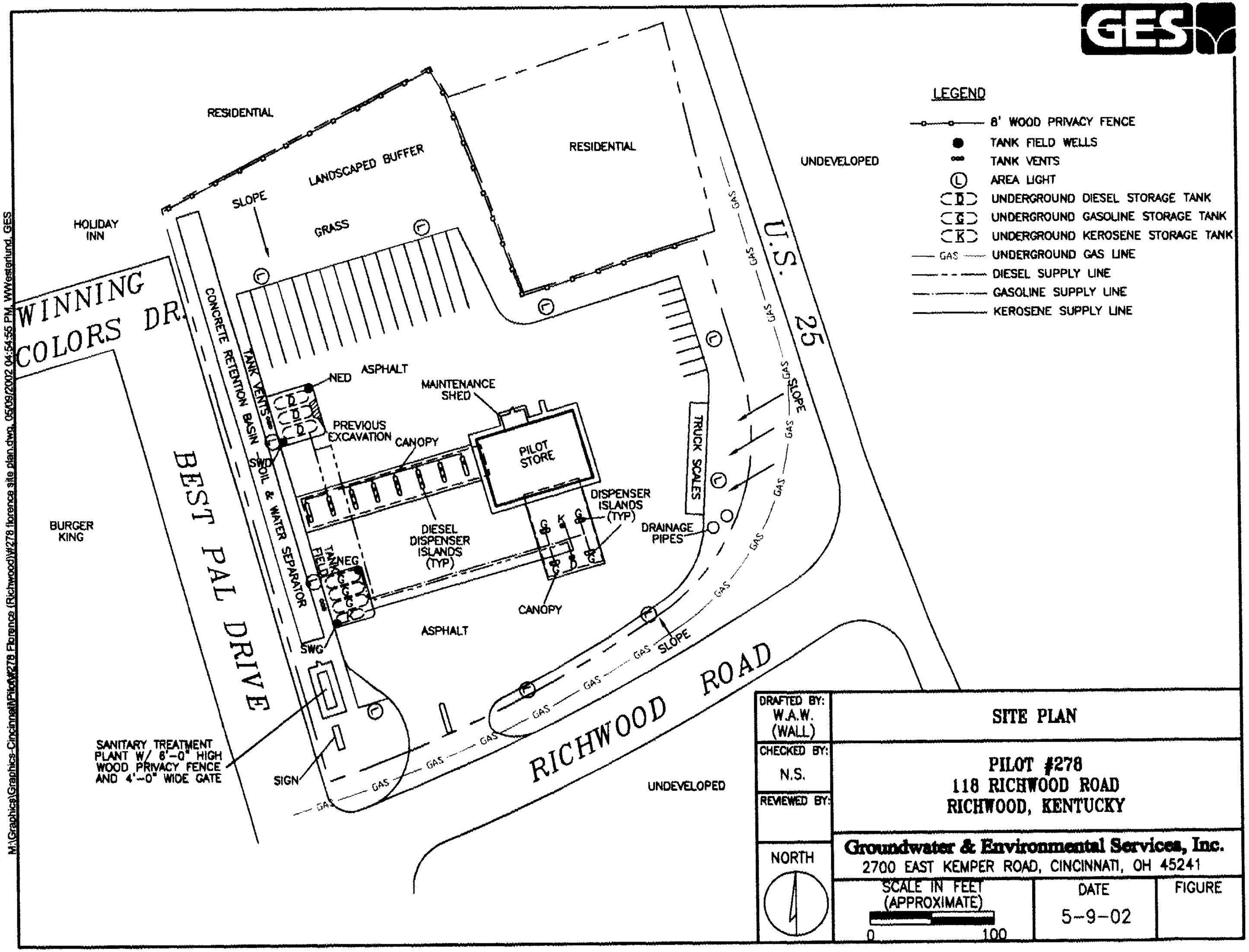
4.0 FREE PRODUCT RECOVERY FOR OCTOBER-MAY

As a result of the discovery of light non-aqueous phase liquids (LNAPLs), product recovery activities were initiated immediately by Pilot onsite maintenance personnel. Pilot personnel conducted free product recovery efforts daily during the month of October on tank pit well NED. Pilot personnel utilized a tank gauging stick to measure the amount of free product in all tank pit wells located onsite. Upon confirmation that free product was present, all product observed was removed utilizing a 1.5-inch diameter disposable bailer. Due to GES personnel conducting gauging and removal of the free product from these wells utilizing an interface probe, the data collected from Pilot onsite maintenance personnel was not utilized in this report.

GES personnel gauged all tank pit wells and the diesel vault for free product on October 30, 2001. Free product recovery efforts were generally conducted once a week from October 18, 2001 through January 2002. Due to the apparently increasing levels of free product in tank pit well NED, free product recovery efforts were generally conducted twice a week from February 2002 through April 2002. Beginning in the month of May 2002, GES reduced the free product recovery efforts to once a week. The locations of the monitoring wells and the diesel vault are shown on Figure 1.

During recovery activities conducted by GES environmental representatives from October 2001 through May 2002, product thickness levels were determined using an oil/water interface probe capable of detecting LNAPL's to the nearest ± 0.01 foot. The free-product was removed from the monitoring wells using a 1.5-inch disposable polyethylene bailer until all visible product was recovered. All recovered product/water was placed into an onsite oil-water separator. A total of 91.153 gallons of LNAPL's has been recovered from monitoring wells NED, SWD, NEG, SWG, and the diesel vault since free product recovery efforts began. Please note that this does not include the amount of free product removed by Pilot maintenance personnel. All product recovered is believed to be diesel fuel. A summary of historical free product removal is provided in Table 1.

FIGURES



M:\Graphics\Graphics-Cincinnati\Pilot\#278 Florence (Richwood)\#278 florence site plan.dwg, 05/09/2002 04:54:55 PM, WWesterlund, GES

DRAFTED BY: W.A.W. (WALL)	SITE PLAN
CHECKED BY: N.S.	PILOT #278 118 RICHWOOD ROAD RICHWOOD, KENTUCKY
REVIEWED BY:	
NORTH	Groundwater & Environmental Services, Inc. 2700 EAST KEMPER ROAD, CINCINNATI, OH 45241
SCALE IN FEET (APPROXIMATE) 0 100	DATE 5-9-02 / FIGURE

TABLE 1
FREE-PRODUCT REMOVAL

Pilot #278
118 Richwood Rd
Richwood KY

Monitoring Well	Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Free-Product Removed (gallons)
NED (4")	10/30/2001	5.25	5.76	0.51	0.332
	11/20/2001	4.75	6.50	1.26	1.138
	11/30/2001	3.12	4.65	1.53	0.995
	12/06/2001	3.15	4.11	0.96	0.624
	12/10/2001	3.55	3.84	0.29	0.189
	12/21/2001	3.16	3.54	0.38	0.247
	12/24/2001	3.15	3.41	0.26	0.169
	01/07/2002	3.80	4.50	0.70	0.455
	01/18/2002	3.75	4.50	0.75	0.488
	01/25/2001	3.45	4.45	1.00	0.650
	02/01/2002	4.35	5.35	1.00	0.650
	02/05/2002	4.65	6.00	1.35	0.878
	02/08/2002	4.40	6.00	1.60	1.040
	02/12/2002	4.70	6.45	1.75	1.138
	02/19/2002	4.40	6.23	1.83	1.190
	02/21/2002	4.46	6.34	1.88	1.222
	02/28/2002	4.80	6.56	1.76	1.144
	03/01/2002	4.83	6.56	1.73	1.125
	03/05/2002	4.80	6.60	1.80	1.170
	03/08/2002	4.79	6.54	1.75	1.138
	03/13/2002	4.62	6.60	1.98	1.287
	03/15/2002	4.68	6.60	1.92	1.248
	03/20/2002	4.54	6.59	2.05	1.333
	03/22/2002	4.52	6.57	2.05	1.333
	03/29/2002	4.30	6.31	2.01	1.307
	04/02/2001	4.31	6.61	2.30	1.495
	04/08/2002	4.10	6.60	2.50	1.625
	04/12/2002	4.13	6.60	2.47	1.606
	04/15/2002	4.46	6.48	2.02	1.313
	04/19/2002	4.24	6.66	2.42	1.573
	04/22/2002	4.09	6.63	2.54	1.651
	04/26/2002	4.14	6.60	2.46	1.599
	04/30/2002	3.77	6.61	2.84	1.846
	05/03/2002	3.80	6.60	2.80	1.820
	05/09/2002	3.54	6.60	3.06	1.989
	05/17/2002	3.22	6.60	3.38	2.197
	05/31/2002	3.39	6.60	3.21	2.087

TABLE 1 (continued)
FREE-PRODUCT REMOVAL

Pilot #278
118 Richwood Rd
Richwood KY

Monitoring Well	Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Free-Product Removed (gallons)
	10/30/2001	NG	NG	NG	NG
	11/20/2001	NG	NG	NG	NG
	11/30/2001	NA	3.14	NA	NA
	12/06/2001	NA	3.60	NA	NA
	12/10/2001	NA	4.04	NA	NA
	12/21/2001	NA	3.66	NA	NA
	12/24/2001	NA	3.65	NA	NA
	01/07/2002	NA	4.05	NA	NA
	01/18/2002	NG	NG	NG	NG
	01/25/2001	NG	NG	NG	NG
	02/01/2002	NA	4.00	NA	NA
	02/05/2002	NA	4.10	NA	NA
	02/08/2002	NA	4.20	NA	NA
	02/12/2002	NA	4.40	NA	NA
	02/19/2002	NA	4.00	NA	NA
	02/21/2002	NA	4.42	NA	NA
	02/28/2002	NA	5.41	NA	NA
	03/01/2002	NA	5.41	NA	NA
SWD (12")	03/05/2002	NA	4.90	NA	NA
	03/08/2002	NA	5.55	NA	NA
	03/13/2002	4.79	4.81	0.02	0.117
	03/15/2002	NA	4.82	NA	NA
	03/20/2002	3.15	3.20	0.05	0.294
	03/22/2002	NA	4.82	NA	NA
	03/29/2002	4.79	4.80	0.01	0.059
	04/02/2001	3.16	3.20	0.04	0.235
	04/08/2002	4.40	4.45	0.05	0.293
	04/12/2002	NA	3.16	NA	NA
	04/15/2002	NA	4.76	NA	NA
	04/19/2002	NA	3.54	NA	NA
	04/22/2002	NA	3.26	NA	NA
	04/26/2002	3.90	4.05	0.15	0.881
	04/30/2002	3.99	4.07	0.08	0.470
	05/03/2002	3.91	4.03	0.12	0.704
	05/09/2002	3.11	3.29	0.18	1.057
	05/17/2002	4.15	4.22	0.07	0.411
	05/31/2002	3.95	4.08	0.13	0.763

TABLE 1 (continued)
FREE-PRODUCT REMOVAL

Pilot #278
118 Richwood Rd
Richwood KY

Monitoring Well	Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Free-Product Removed (gallons)
NEG (4")	11/30/2001	0.35	0.40	0.05	0.033
	12/06/2001	1.91	1.93	0.02	0.013
	12/10/2001	1.70	1.73	0.03	0.020
	12/21/2001	1.70	1.72	0.02	0.013
	12/24/2001	1.72	1.73	0.01	0.007
	01/07/2002	1.43	1.45	0.02	0.013
	01/18/2002	NA	1.40	NA	NA
	01/25/2001	1.43	1.68	0.25	0.163
	02/01/2002	1.50	1.52	0.02	0.013
	02/05/2002	1.60	1.61	0.01	0.007
	02/08/2002	NA	2.23	NA	NA
	02/12/2002	1.65	1.70	0.05	0.033
	02/19/2002	1.59	1.60	0.01	0.007
	02/21/2002	1.25	1.26	0.01	0.007
	02/28/2002	1.71	1.74	0.03	0.020
	03/01/2002	1.72	1.74	0.02	0.013
	03/05/2002	1.60	1.61	0.01	0.007
	03/08/2002	1.71	1.72	0.01	0.007
	03/13/2002	1.59	1.60	0.01	0.007
	03/15/2002	NA	1.59	NA	NA
	03/20/2002	NA	6.59	NA	NA
	03/22/2002	NA	2.27	NA	NA
	03/29/2002	NA	1.51	NA	NA
	04/02/2002	NA	1.54	NA	NA
	04/08/2002	1.49	1.50	0.01	0.007
	04/12/2002	NA	1.46	NA	NA
	04/15/2002	NA	1.55	NA	NA
	04/19/2002	NA	1.54	NA	NA
	04/22/2002	NA	1.27	NA	NA
	04/26/2002	NA	1.50	NA	NA
	04/30/2002	NA	1.51	NA	NA
	05/03/2002	NA	1.46	NA	NA
	05/09/2002	2.20	2.22	0.02	0.013
	05/17/2002	1.32	1.33	0.01	0.007
	05/31/2002	1.34	1.35	0.01	0.007

TABLE 1 (continued)
FREE-PRODUCT REMOVAL

Pilot #278
118 Richwood Rd
Richwood KY

Monitoring Well	Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Free-Product Removed (gallons)
SWG (12")	10/30/2001	NA	NA	NA	NA
	11/20/2001	NA	NA	NA	NA
	11/30/2001	NA	NA	NA	NA
	12/06/2001	2.20	2.25	0.05	0.293
	12/10/2001	2.20	2.22	0.02	0.117
	12/21/2001	NA	2.13	NA	NA
	12/24/2001	NA	2.13	NA	NA
	01/07/2002	NA	2.30	NA	NA
	01/18/2002	NG	NG	NG	NG
	01/25/2001	NG	NG	NG	NG
	02/01/2002	NA	3.50	NA	NA
	02/05/2002	2.20	2.21	0.01	0.059
	02/08/2002	NA	1.84	NA	NA
	02/12/2002	NA	2.20	NA	NA
	02/19/2002	NA	2.25	NA	NA
	02/21/2002	NA	2.25	NA	NA
	02/28/2002	NA	2.20	NA	NA
	03/01/2002	NA	2.21	NA	NA
	03/05/2002	NA	2.80	NA	NA
	03/08/2002	NA	2.21	NA	NA
	03/13/2002	NA	2.20	NA	NA
	03/15/2002	NA	2.21	NA	NA
	03/20/2002	NA	2.20	NA	NA
	03/22/2002	NA	2.97	NA	NA
	03/29/2002	NA	2.19	NA	NA
	04/02/2001	NG	NG	NG	NG
	04/08/2002	NA	2.19	NA	NA
	04/12/2002	NA	2.20	NA	NA
	04/15/2002	NA	2.23	NA	NA
	04/19/2002	NA	2.20	NA	NA
	04/22/2002	NA	1.96	NA	NA
	04/26/2002	2.20	2.22	NA	NA
	04/30/2002	NA	2.22	NA	NA
	05/03/2002	NA	2.19	NA	NA
	05/09/2002	1.32	1.33	0.01	0.059
	05/17/2002	2.10	2.19	0.09	0.528
	05/31/2002	NA	2.21	NA	NA

TABLE 1 (continued)
FREE-PRODUCT REMOVAL

Pilot #278
118 Richwood Rd
Richwood KY

Monitoring Well	Date	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Free-Product Removed (gallons)
Vault (3')	10/19/2002	Initial response to diesel release			20.000
	03/05/2002	2.60	2.65	0.05	2.640
	03/13/2002	2.29	2.41	0.12	6.336
	03/15/2002	2.28	2.38	0.10	5.280
	03/20/2002	2.03	2.10	0.07	3.696
	03/22/2002	2.31	2.37	0.06	3.168
				Total	91.153

notes:

NA Not Applicable
NG Not Gauged

INITIAL ABATEMENT CHECKLIST

INITIAL ABATEMENT CHECKLIST

Site Name: Pilot #278 County Boone

Location: 118 Richwood Rd. UST ID# 2712008
Richwood, Ky

Instructions:

Place a yes or a no next to the items included in the Initial Abatement Report which shall be submitted within twenty (20) days after confirmation of a release of a regulated substance from an Underground Storage Tank (UST) system(s). If any item is not applicable, write NA for "not applicable" in the appropriate space and provide a brief explanation at the back of this checklist. The complete checklist shall be submitted with both the original and the copy of the initial abatement report in order to expedite review of the initial abatement report.

1.0 Initial Response

Yes 1.1 Was the release immediately reported to the Environmental Response Section?

Yes 1.2 Is the ERT number recorded and referenced in the report?

Yes 1.3 The ERT number for the site is 63220 .

Yes 1.4 Were immediate actions necessary to prevent further releases?

Yes 1.5 Is a description of actions taken to prevent further release included in the report?

Yes 1.6 Was prompt containment and cleanup of the spill initiated to prevent or reduce environmental impact?

No 1.7 Were any potential risks of fire or explosion found as a result of the release of a regulated substance?

Yes 1.8 Is a description of all efforts taken to protect the safety of people and property from vapors, fire or explosion included in the report?

Yes 1.9 Is a description of all containment and/or cleanup efforts included in the report?

2.0 Initial Abatement

No 2.1 Was it necessary to remove product from any Underground Storage Tank system(s)?

Yes 2.2 Is a summary of visual inspections of the release included in the report?

No 2.3 Was continued monitoring necessary to reduce fire and/or safety hazards?

No 2.4 Is a description of the monitoring procedure included in the report?

Yes 2.5 Was contaminated soil or water excavated or otherwise exposed to the air?

No 2.6 Is soil and/or water laboratory analysis submitted?

Yes 2.7 Is a summary of methods used to reduce safety hazards from exposed contaminated soils and/or waters included in the report?

3.0 Sheen or Free Product Recovery

Yes 3.1 Was the presence or absence of a sheen or free product determined?

Yes 3.2 Was the ERT immediately contacted to report any sheen or free product found?

Yes 3.3 Was the immediate recovery of a sheen and/or free product initiated?

Yes 3.4 Is a summary of recovery methods and the volume recovered included in the report?

No 3.5 Is a Recovery Report submitted to the Division within forty-five (45) days after confirmation of the presence of a sheen or free product?

The undersigned, first being duly swom, state that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate and complete. The undersigned further acknowledges that KRS 224.99-010 provides for penalties for submitting false information.

Company Name Pilot TRavel Center, LLC

Name and title of Individual Whose Signature Appears Below Jason McCain, Environmental Specialist

Signature* Jason A. McCain

Date of Signature 6·25-02

Subscribed and sworn to before me by himself

This the 25 **Day of** June, **19** 2002

Notary Public Patricia A. Wolffram

My Commission Expires Patricia A. Wolffram Notary Public State of Ohio My Commission Expires 02-06-06

Location of Commission

***NOTE**: If the individual signing this is someone other than the president or secretary of a corporation, attach a notarized copy of power of attorney, or resolution of the board of directors which grants the individual the legal authority to represent the company. (Does not apply to a single proprie[illegible] partnership.)

PANGEAN
CMD
ASSOCIATES

UST 04MAY'09 PM 3:00

May 1, 2009

Ms. Amy Siewert
Underground Storage Tank Branch
Division of Waste Management
Department of Environmental Protection
Environmental and Public Protection Cabinet
200 Fair Oaks Lane
Frankfort, Kentucky 40601

RE: Monitoring Well Abandonment Variance Request
Pilot Travel Centers LLC No. 278
118 Richwood Road
Walton, Boone County, KY 41094
AI No. 228; UST ID #2712-008
Pangean-CMD Project No.: PT-000278-02

Dear Ms. Siewert:

We are in receipt of "No Further Action" letters dated March 27, 2009, for incident numbers 63220, 191868, and 2251073 for the above-referenced facility (the Site). These letters effectively close investigation of all releases related to underground storage tanks at the Site. However, an investigation of an aboveground petroleum release identified in November 2006 is currently on-going at the Site at the direction of the Kentucky Department for Environmental Protection, Superfund Branch (Superfund Branch).

As part of an approved work plan for the aboveground release investigation, groundwater samples are to be collected from the existing monitoring wells at the Site in the near future. A copy of the work plan approval letter is provided in **Attachment 1**. Therefore, on behalf of the site owner, Pilot Travel Centers (Pilot), Pangean-CMD Associates (Pangean) is requesting a variance to the requirement that monitoring wells at the site be abandoned within thirty days of receipt of an NFA. Approval is requested to postpone abandonment of the monitoring wells at the Site until thirty days after investigation of the aboveground petroleum release is completed and no further action status for that release has been obtained from the Superfund Branch.

601-C BROOKLYN AVENUE · MILFORD, OH 45150 · TELEPHONE: 513-576-1999 · FACSIMILE: 513-576-1555

Please contact me at 513-576-1999 extension 12, if you have any questions regarding this variance request.

Best regards,

PANGEAN-CMD ASSOCIATES, INC.

Paul D. Rucker, PG, CC
Senior Project Manager

Attachment

ec: Joey Cupp – Pilot Travel Centers LLC
Project File

ATTACHMENT 1

KDEP Superfund Branch
Work Plan Approval Letter
March 9, 2009

ENERGY AND ENVIRONMENT CABINET

Steven L. Beshear
Governor

Leonard K. Peters
Secretary

Department for Environmental Protection
Division of Waste Management
200 Fair Oaks Lane
Frankfort, Kentucky 40601-1190
www.kentucky.gov

March 9, 2009

RECEIVED MAR 12 2009

Kevin R. Collins
Pangean, CMD, Associates
228 Mill Street, Suite 100
Milford, OH 45150

RE: Pilot Travel Centers LLC, Above Ground Petroleum Release
AI# 228
Walton, Boone County, Kentucky

Dear Mr. Collins:

The Kentucky Division of Waste Management (KDWM) has reviewed the Work Plan Response for the 2006 Surface Release that occurred at the Pilot Travel Center in Walton Kentucky. The KDWM finds the plan acceptable with the exception of using 401 KAR 42:080 Class III Soil Table 1 which are Underground Storage Tank Branch Regulations. The Superfund Branch uses 401 KAR 100:030 and KRS 224.01-405 which uses U. S. EPA Region 9 PRG levels, 2002 version. Please submit the required characterization by June 1, 2009. If you have any questions please contact me in Frankfort at (502) 564-6716.

Sincerely,

Lawrence H. Howard, P.G.
Petroleum Cleanup Section
Superfund Branch

C: Project File

APPENDIX D:

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/24/12

Property Owner WALTON FIRE DISTRICT OFFICE Telephone# (859) 485-7439
Address MR. ALLEN ROBERTS (Deputy Chief)
12600 TOWN CENTRE DRIVE
Parcel # WALTON, KY 41094 D.B. & Page —

Checklist:

Current and past use of site? MR. Roberts states that this AREA (EXIT 175) has been commercialized since 1981. Also stated that NO other UST's outside of the current gas stations exist in this AREA.

Wells, sewers, field tiles? Not to his Knowledge.

Storage tanks – above or below ground? YES. Located at all gas stations, but no where else within the study area to his knowledge.

Fertilizer or Fuel spills? Small quantity spills, but nothing large in size or major to his knowledge.

Any dumping? Not to his knowledge.

Any environmental concerns? Not to his knowledge.

Any additional comments… N/A

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/23/12

Property Owner PILOT TRAVEL CENTER (#278) Telephone# 1-800-562-6210
corporate #:
Address MR. DEAN WISNER - MANAGER (2yrs.)
#118 RICHWOOD Rd
Parcel # WALTON, KY 41094 D.B. & Page —

Checklist:

Current and past use of site? MR. WISNER STATES THAT THIS LOCATION WAS AN OPEN AREA POND THAT WAS DRAINED FOR CONSTRUCTION.

Wells, sewers, field tiles? NOT TO HIS KNOWLEDGE.

Storage tanks – above or below ground? YES. THERE ARE 7 UST TANKS ON SITE. 3 GASOLINE TANKS (REG. UNLEADED / MID-GRADED PREMIUM) 3 DIESEL TANKS (IN BACK) & 1 KEROSENE TANK THAT IS NOT CURRENTLY ACTIVE!

Fertilizer or Fuel spills? SOME MINOR FUEL SPILLS, BUT NOTHING OF ANY SIZE.

Any dumping? NOT TO HIS KNOWLEDGE.

Any environmental concerns? NOT TO HIS KNOWLEDGE.

Any additional comments... STATION HAS A RETENTION POND THAT COLLECTS SURFACE DRAINAGE FROM PARKING LOT / FUELING AREA.

→ NOT AWARE OF ANY PREVIOUS EPA ISSUES TO DATE.
→ SITE HAS A GROUND WATER PROTECTION PLAN IN PLACE.

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/21/12

Property Owner Blue Pantry (BP) Telephone# (859) 485-6227
Address Kevin Burress (Manager)
#305 Richwood Rd.
Parcel # Walton, Ky 41094 D.B. & Page —

Checklist:

Current and past use of site? Mr. Burress stated that the building site was a vacant lot until constructed.

Wells, sewers, field tiles? Not to his knowledge.

Storage tanks – above or below ground? Yes, 3 UST's are present on the property. (Reg. unleaded / super / 1 Diesel)

Fertilizer or Fuel spills? Lime was recently spread At front of store near drainage ditch as preventative measure for substance washed up from clogged storm drain.

Any dumping? Not to his knowledge.

Any environmental concerns? Not to his knowledge.

Any additional comments… N/A

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/21/12

Property Owner RICHWOOD SHELL Telephone# (859) 485-4030
Address TONYA JOHNS (MANAGER)
#281 RICHWOOD RD.
Parcel # WALTON, KY 41094 D.B. & Page —

Checklist:

Current and past use of site? MRS. JOHNS has stated that this site has always been a retail / convenience store only, to her knowledge.

Wells, sewers, field tiles? Not to her knowledge.

Storage tanks – above or below ground? YES, 4 UST's are on site.
(reg. unleaded / mid-grade / super / diesel).

Fertilizer or Fuel spills? Not to her knowledge.

Any dumping? Not to her knowledge.

Any environmental concerns? Not to her knowledge.

Any additional comments… N/A

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/22/12

Property Owner TRAVEL CENTERS of AMERICA (TA) Telephone# (859) 485-4161
Address TINA Young (MANAGER) 22yrs.
#145 RICHWOOD ROAD
Parcel # WALTON, KY 41094 D.B. & Page —

Checklist:

Current and past use of site? MRS. Young states that this site has been developed commercially for over 30 years!

Wells, sewers, field tiles? Not to her Knowledge.

Storage tanks – above or below ground? YES. A total of 10 UST's are on site including these are: 3 gasoline tanks (reg. unleaded/midgrade/premium), 4 diesel tanks, 1 used oil tank, 1 new oil tank & 1 newly constructed diesel exhaust fluid tank – per EPA.

Fertilizer or Fuel spills? Not to her Knowledge.

Any dumping? Not to her Knowledge.

Any environmental concerns? Not to her Knowledge.

Any additional comments… T/A has a retention pond located in the back of the parking lot, which contains an oil/water separator.
→ Construction of a "DE" tank (Diesel Exhaust Fluid) is currently under construction adjacent to remaining UST's.

KYTC 6-18.00 Richwood Rd.
Address: Richwood Rd. (Exit 175)
City / State: Walton, Ky
Job # 10263 – Phase 1 Environmental Site Assessment (ESA)
Property Owner Interview

Date 2/23/12

Property Owner: Pilot Travel Center #321 Telephone# (859) 485-1327
Address: Rich O'Toole (Manager) #11229 Frontage Rd. Walton, Ky 41094
Parcel #: D.B. & Page:

Checklist:

Current and past use of site? Mr. O'Toole states that this Pilot station location opened in 1989. Before 1989, just a regular gas station was here. Now this location is open for trucking.

Wells, sewers, field tiles? Not to his Knowledge

Storage tanks – above or below ground? Yes. There are 6 UST tanks on the premises according to Mr. O'Toole. 2 gas tanks (reg. unleaded/ premium) and 4 diesel tanks. Both gas tanks has a mixer that makes "mid" grade.

Fertilizer or Fuel spills? One event around 2009 that had leaking truck (18-wheel) which had leak & Pilot took action to report issue with KYTC.

Any dumping? Not to his Knowledge.

Any environmental concerns? Not to his Knowledge.

Any additional comments… Mr. O'Toole explained how all fuel pumps are tested twice a year per State Reg's. About 4 yrs. ago a gas tank began to leak & mixed w/ groundwater which contaminated fuel tank. Tank was removed / replaced shortly thereafter.

APPENDIX E:

“FINDS” Photo Log:

Item	Description	Photos
1	Lime remnants left from prior application	#0282
2	Domestic trash located at vacant hotel parking lot	0395
3	Roadway salt storage adjacent to US 25	0414
4	Asphalt pile located at vacant hotel parking lot	0525
5	Petroleum-based automotive spills adjacent to storm drain	0576
6	Commercial & domestic trash dumping located at vacant hotel parking lot	0587
7	Petroleum-based spills adjacent to trash bin at Travel Centers of America (T/A)	0594
8	Potential petroleum spill(s) in front parking lot at Travel Centers of America (T/A)	0611
9	Dumped tires located at commercial building adjacent to US 25	0635
10	Potential petroleum spill(s) adjacent to Cummings, Inc. adjacent to Transport Dr.	0369

Environmental Site Assessment
"FINDS"



0282



0395



0414



0525



0576



0587

Environmental Site Assessment
"FINDS" (cont.)



0594



0611



0635



0369

APPENDIX J – ECOLOGICAL ASSESSMENT REPORT

REDWING ECOLOGICAL SERVICES, INC.
1139 South Fourth Street • Louisville, KY 40203 • Phone 502.625.3009 • Fax 502.625.3077

June 5, 2012 ***DRAFT***

Mr. Dan Prevost
Principal Planner
Parsons Corporation
2443 Crowne Point Drive
Sharonville, Ohio 45241

Subject: **Ecological Assessment Report**
KY 338 Reconstruction Project at I-71/I-75
Boone County, Kentucky
KYTC Item No. 6-18.00
Redwing Project 10-076

Dear Mr. Prevost:

Redwing Ecological Services, Inc. (Redwing) is pleased to submit this ecological assessment report in support of the proposed Kentucky Highway 338 Reconstruction Project at I-71/I-75 in Boone County, Kentucky. This report is intended to identify significant ecological features in the vicinity of the proposed project and to assist the Kentucky Transportation Cabinet in evaluating the environmental effects of the proposed roadway alignment alternatives. Table 1 below compares the Eastern Alternatives E1 and E3 and Table 2 below compares Western Alternatives W7 and W9.

Table 1: Comparison of Eastern Alternatives E1 and E3

Resource		Alternative E1		Alternative E3	
		Impact	Mitigation Required	Impact	Mitigation Required
Significant Ecological Resources		None	No	None	No
Macroinvertebrates		Not Assessed	No	Not Assessed	No
Fishes		Not Assessed	No	Not Assessed	No
Surface Waters	Intermittent	225 linear feet; all poor quality	Yes	130 linear feet; all poor quality	Yes
	Ephemeral	410 linear feet; all poor quality	Yes	475 linear feet; all poor quality	Yes
	Open Water	0	No	0	No
Flora		No significant difference	No	No significant difference	No
Birds, Mammals, Amphibians, Reptiles		No significant difference	No	No significant difference	No
Wetlands		0.049 acre	Yes	0.062 acre	Yes
Habitats	Upland Woods	3.10 acres	No	1.61 acres	No
	Scrub-Shrub	7.64 acres	No	6.82 acres	No
	Old Field	0.71 acres	No	1.21 acres	No
	Agricultural	0 acres	No	0 acres	No
State and Federal T&E Species		Unknown, will require a BA	Unknown	Unknown, will require a BA	Unknown

Table 2: Comparison of Western Alternatives W7 and W9

Resource		Alternative W7		Alternative W9	
		Impact	Mitigation Required	Impact	Mitigation Required
Significant Ecological Resources		None	No	None	No
Macroinvertebrates		Not Assessed	No	Not Assessed	No
Fishes		Not Assessed	No	Not Assessed	No
Surface Water	Intermittent	1,065 linear feet; all poor quality	Yes	1,050 linear feet; all poor quality	Yes
	Ephemeral	15 linear feet; all poor quality	No	15 linear feet; all poor quality	No
	Open Water	0	No	0	No
Flora		No significant difference	No	No significant difference	No
Birds, Mammals, Amphibians, Reptiles		No significant difference	No	No significant difference	No
Wetlands		0.139 acre	Yes	0.161 acre	Yes
Habitats	Upland Woods	9.63 acres	No	9.51 acres	No
	Scrub-Shrub	6.13 acres	No	4.26 acres	No
	Old Field	0.74 acres	No	0	No
	Agricultural	0	No	0	No
State and Federal T&E Species		Unknown, will require a BA	Unknown	Unknown, will require a BA	Unknown

The Ecological Assessment Report concludes that the Eastern Alternative E3 and Western Alternative W9 minimize impacts to the overall ecological community. E3 impacts less intermittent stream length and less potential Indiana bat habitat (upland woods) compared to E1. W9 impacts less intermittent stream length, and less potential Indiana bat habitat (upland woods), scrub-shrub habitat, and old field habitat than W7. Both W7 and W9 impact approximately the same amount of potential running buffalo clover habitat. However, should Alternatives E1 or W7 be chosen, the overall ecological loss will not be significantly different.

We appreciate the opportunity to work with you on this important project. If you have any questions regarding this overview, please do not hesitate to call Seth Bishop or Neil Guthals at (502) 625-3009.

Sincerely,

DRAFT

Seth R. Bishop
Staff Ecologist

DRAFT

Neil A. Guthals
Senior Ecologist

File: 10-076/Reports/Ecological Baseline Report Draft 6-5-12

Attachment: Ecological Assessment Report – KY 338 Reconstruction Project at I-71/I-75

DRAFT

ECOLOGICAL ASSESSMENT REPORT

KENTUCKY TRANSPORTATION CABINET
KY 338 RECONSTRUCTION PROJECT AT I-71/I-75
BOONE COUNTY, KENTUCKY
KYTC ITEM: 6-18.00

Prepared for:

KENTUCKY TRANSPORTATION CABINET

June 5, 2012

DRAFT

ECOLOGICAL ASSESSMENT REPORT

KY 338 RECONSTRUCTION PROJECT AT I-71/I-75

KYTC ITEM: 6-18.00

Prepared for:

KENTUCKY TRANSPORTATION CABINET

Prepared by:

REDWING ECOLOGICAL SERVICES, INC.

DRAFT

Seth R. Bishop
Staff Ecologist

DRAFT

Neil A. Guthals
Senior Ecologist

June 5, 2012

EXECUTIVE SUMMARY

The proposed Kentucky Highway 338 (KY 338, Richwood Road) Reconstruction Project at Interstate 71/Interstate 75 (I-71/I-75) is located in Boone County, Kentucky, near the community of Richwood and can be found on the Union USGS topographic quadrangle map (Exhibit 1). The purpose of the KY 338 Reconstruction Project at I-71/I-75 is to increase safety, improve functionality, and reduce traffic delays at the existing interchange. The purpose of this assessment is to identify significant ecological resources within the study area and proposed project impact areas through a combination of agency correspondence, office research, and a field assessment.

A study area was developed that encompasses approximately 307 acres around the KY 338/I-71/I-75 interchange where reconstruction activities are planned for the proposed project. From the interchange, the study area extends along I-71/I-75 approximately 0.8 mile south and 1.2 miles north to include sections where lane widening will occur. To the west of the interchange, the study area is located along KY 338 and encompasses areas where lanes will be widened and tie-ins to existing roadways will be constructed. To the east of the interchange, the study area consists of the KY 338/U.S. Highway 25 (US 25) intersection, which will include the construction of new access roads, tie-ins to existing roadways, grade separation with the railroad, and potentially the construction of a new interchange with US 25.

The study area is dominated by urban habitats including commercial development, transportation infrastructure, residential development, and agriculture. Natural habitats within the study area include old field, scrub-shrub, upland woods, wetlands, open water, and streams. The study area includes five intermittent streams, 16 ephemeral streams, 13 wetlands, and one open water pond. No caves, rockshelters, springs, or sinkholes were observed within the study area.

Based on coordination and review of available database information from the U.S. Fish and Wildlife Service, the Kentucky State Nature Preserves Commission, and the Kentucky Department of Fish and Wildlife Resources, numerous state and federally-listed species are known to occur in the vicinity of the project. Federally-listed species known to occur in the vicinity of the project and with potential habitat within the study area include the Indiana bat (***Myotis sodalis***) and running buffalo clover (***Trifolium stoloniferum***).

~~Five~~ alternatives were assessed, including two eastern alternatives and two western alternatives for the reconstruction project. Alternative E3 and W9 provide slightly reduced overall ecological impacts for the proposed project. Alternative E3 and W9:

- impact fewer intermittent streams, thus minimizing potential sediment inputs
- impact smaller amounts of the upland woods habitat, which is the higher quality habitat within the study area
- impact a smaller amount of potential foraging and summer roost habitats for the Indiana bat (upland woods habitat)
- impact fewer individual Indiana bat summer roost trees

Based on a strict comparison of the available alternatives, it is recommended that KYTC proceed with Alternative E3 and W9 as it is presented in this report. However, should Alternative E1 or W7 be chosen, the overall ecological loss will not be significantly different.

Compensatory mitigation for stream and wetland impacts will be determined through the permitting process for Sections 404 and 401 of the Clean Water Act by the U.S. Army Corps of Engineers (USACE) and Kentucky Division of Water (KDOW), respectively. Mitigation, if required, may be achieved through the use of an approved wetland bank or payment to the Kentucky Wetland and Stream Mitigation Fund. The USFWS will likely request a Biological Assessment to address potential impacts to federally-listed species with habitat within the project area.

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2. Aerial Photograph Map
3. Eastern Alternatives Map
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5. Karst Potential Map
6. Soil Survey Map
7. Eleven-Digit HUC and NHD Streams Map
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Photographs

Appendix A – Agency Correspondence
Appendix B – Rapid Bioassessment Protocol (RBP) Forms
Appendix C – Flora Species List
Appendix D – Fauna Species List
Appendix E – Wetland Determination Data Forms

1.0 PROJECT DESCRIPTION

The Kentucky Transportation Cabinet (KYTC) proposes the reconstruction of Kentucky Highway 338 (KY 338, Richwood Road) at the Interstate-71/Interstate-75 (I-71/I-75) interchange (including the KY 338/U.S. Highway 25 intersection to the east) in Boone County, Kentucky (Exhibits 1 and 2). This report presents an assessment of significant ecological features within the study area of the proposed KY 338 Reconstruction Project and the impacts to the ecological features from the proposed project alternatives. Provided in the sections below is a discussion of the project purpose and need, project location and description, Eastern and Western Alternatives, and a summary of this ecological study.

1.1 Purpose and Need

The KYTC completed an Interchange Justification Study (2010), which identified ~~the current project~~ as the preferred design approach to meet the project need. The purpose of this project is to increase safety, improve functionality, and reduce traffic delays experienced at and within the immediate vicinity of the I-71/I-75 and KY 338 interchange, and thereby enhancing the viability of I-71/I-75 as a major transportation corridor.

The KY 338 Interchange Justification Study documented that the KY 338 (Richwood Road) interchange with I-71/I-75 is currently congested and carries substantial (up 33%) truck traffic due to the truck stops at the interchange and the industrial park immediately east of US 25. Rapid growth of 2% to 5% per year along the KY 338 interchange is anticipated to continue for the foreseeable future given its proximity to Cincinnati, availability of land, interstate and airport access, and national prominence of I-75 as a major truck route. Also, the Norfolk Southern Rail, which runs parallel to US 25, supports 28 to 36 trains per day, which adds to the traffic delays and presents safety hazards from two at-grade railroad crossings within the study area. Twelve crashes, including three injuries, have occurred in the last five years at the two intersections leading to or from the at-grade railroad crossings.

The average daily traffic (ADT) on Richwood Road is approximately 10,300 immediately west of the I-71/I-75 interchange to approximately 15,500 immediately east of the I-71/I-75 interchange. The ADT for I-71/I-75 varies from approximately 74,100 south of the Richwood Road interchange to approximately 104,000 immediately north of the Mt. Zion Road interchange.

As part of the KY 338 Interchange Justification Study, crash rates were calculated for the roadways within the study area for the three year period from 2004 to 2006. Crash data obtained from the Collision Report Analysis for Safer Highways (CRASH) database were used to calculate the crash rates for sections of I-71/I-75 and KY 338. The crash rates were compared to the critical crash rates for the similar roadways within the state, and the ratio of the two values was determined to obtain the Critical Rate Factor (CRF). A CRF that exceeded 1.0 was considered a high crash location. I-71/I-75 is classified as an urban interstate

within the study area, and does not exceed the statewide average crash rate (CRF < 1). KY 338 is classified as a three-lane urban arterial. Table 1 below summarizes the crash data for KY 338 within the study area. The overall CRF for KY 338 (Richwood Road) substantially exceeds one. On KY 338, the entire segment from US 25 to the Frogtown Road Connector has a CRF in excess of one, with the highest CRF being exhibited between the I-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. The CRF drops to below one west of the Frogtown Road Connector. The most frequent type of crash was rear-end crash with 37%, followed by angle crashes at 26%. Overall, 82% of the crashes on KY 338 in the study area occurred during the day and 79% under dry conditions. For KY 338, property damage only crashes were the most frequently occurring, followed by injury crashes. There were no fatal crashes on KY 338 within the study area from 2004 to 2006.

Table 1: 2004-2006 Average Crash Rate for KY 338

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate (100 MVM)	Critical Crash Rate Factor
KY 338 (Richwood Road)	256	1,703.2	566.3	3.01

MVM – Crashes per 100 million vehicle miles

1.2 Project Location and Description

The approximately 307-acre study area is located at the KY 338 interchange at I-71/I-75 (Exit 175), near the community of Richwood, Kentucky (Exhibit 1). The study area extends approximately 0.8 mile south and 1.2 miles north of the I-71/I-75 and KY 338 interchange to accommodate interstate lane widening. To the west of the interchange, the study area extends along KY 338 from the interstate to approximately 1,000 feet west of Triple Crown Boulevard and north to Frogtown Connector Road. Construction in this area will consist of lane widening and tie-ins to existing roads used to access the commercial developments in the area. To the east of the interchange, the study area consists of the KY 338/US 25 intersection area, which will be reconstructed and reconfigured (Exhibit 1). The study area is located on the Union 7.5-minute USGS topographic quadrangle map.

The project will include the following primary elements:

- Reconstructing the existing diamond-style KY 338 interchange into a double crossover diamond interchange;
- Addition of auxiliary lanes on I-71/I-75 between the interchange and the rest area, located approximately 1.0 miles to the north;
- Reconstruction of the KY 338 intersection with US 25; this may include a relocated at-grade intersection or a grade-separated interchange;
- Grade-separation of two railroad crossings located adjacent to US 25: at Richwood Road and at Shorland Drive; and
- Implementation of access management and intersection improvements along Richwood Road between Triple Crown Boulevard and US 25.

1.3 Eastern Alternative (Parsons to provide descriptions of the alternatives)

The proposed project includes two eastern alternatives identified as Eastern Alternative 1 (E1) and Eastern Alternative 3 (E3) (Exhibit 3). The disturbance limits for E1 result in approximately 29.66 acres of impact and this alternate has a more southern intersection of KY 338 and US 25. The disturbance limits for E3 result in approximately 26.64 acres of impact and this alternate has a more northern intersection of KY 338 and US 25, along with a northern tie-in to Winning Colors Boulevard and a second southern tie-in to US 25.

1.4 Western Alternative

The proposed project includes two western alternatives identified as Western Alternative 7 (W7) and Western Alternative 9 (W9) (Exhibit 4). Each of the western alternatives includes the auxiliary lanes on I-71/I-75 from the KY 338 interchange to the north and south. The disturbance limits for W7 result in approximately 84.30 acres of impact and includes the reconstruction of KY 388 and tie-ins to Frogtown Connecter Road, Clay Drive, Paddock Drive, and Triple Crown Boulevard. The disturbance limits for W9 result in approximately 83.84 acres of impact.

1.5 Ecological Study Summary

This report provides an ecological assessment of the proposed KY 338 Reconstruction Project at I-71/I-75. An ecological survey of the study area was conducted in February and March 2012 by Redwing Ecological Services, Inc. (Redwing). This report has been prepared following the KYTC – Division of Environmental Analysis, "Ecological Study Format Guidance and Accountability Form" (Rev. 6/05).

The following topics will be discussed in this report:

- Correspondence with State and Federal Agencies
- Environmental Setting
- Study Methodologies
- Sampling Results
- Impacts and Suggested Mitigation Measures
- Short Term Versus Long Term Productivity
- Irreversible and Irretrievable Commitment of Resources
- Alternative Analysis and Recommendations

Exhibits, Photographs, and Appendices, which include agency coordination letters, Rapid Bioassessment Protocol (RBP) forms, flora and faunal species lists, and Routine Wetland Determination Forms, are included as part of this document.

2.0 CORRESPONDENCE WITH STATE AND FEDERAL AGENCIES

Relevant state and federal agencies were contacted regarding the potential for significant ecological resources to occur within the study area. Agencies that were contacted include the United States Fish and Wildlife Service (USFWS), Kentucky Department of Fish and Wildlife Resources (KDFWR), Kentucky State Nature Preserves Commission (KSNPC), Kentucky Division of Water (KDOW), Kentucky Division of Forestry (KDOF), Kentucky Geological Survey (KGS), Natural Resources Conservation Service (NRCS), and Kentucky Speleological Society (KSS). The proposed study area is not located within a national forest or national park; therefore, consultation with the United States Forest Service and the National Park Service were not conducted. Copies of correspondence letters from these state and federal agencies are provided as Appendix A. Agency correspondence is summarized below.

2.1 United States Fish and Wildlife Service

A consultation letter was sent to the USFWS field office in Frankfort, Kentucky, on February 6, 2012, requesting information regarding federally-listed species and/or critical habitat that occur or have the potential to occur in the study area. A follow up email regarding the initial information request was sent to the USFWS on March 19, 2012. In an email dated March 23, 2012, the USFWS recommended using the list of federally-listed species on their website to determine which species have the potential to occur within the study area. This list included one bat, one plant, and seven freshwater mussel species that are known to occur or have the potential to occur in Boone County, Kentucky (USFWS, 2008). Sheepnose mussel (***Plethobasus cyphyus***) was federally-listed in 2012. These species are summarized in the following Table 2.

Table 2: Federally-Protected Species of Boone County, Kentucky

Group	Scientific Name	Common Name	Legal* Status	Known** Potential
Mammal	***Myotis sodalis***	Indiana Bat	E	K
Mussels	***Cyprogenia stegaria***	Fanshell	E	P
	Lampsilis abrupta	Pink Mucket	E	K
	Obovaria retusa	Ring Pink	E	P
	Plethobasus cooperianus	Orangefoot Pimpleback	E	P
	Plethobasus cyphyus	Sheepnose	E	P
	Pleurobema clava	Clubshell	E	P
	Pleurobema plenum	Rough Pigtoe	E	P
Plant	***Trifolium stoloniferum***	Running Buffalo Clover	E	K

* E = Endangered, C = Candidate

** K = Known occurrence record within the county, P = Potential for the species to occur within the county based upon historic range, proximity to known occurrence records, biological, and physiographic characteristics

2.2 Kentucky Department of Fish and Wildlife Resources

A consultation letter was sent to the KDFWR office in Frankfort, Kentucky, on January 25, 2012, requesting information regarding state and federally-listed species and/or critical habitat that may occur in

the study area. The KDFWR responded by letter on February 13, 2012, stating that no federally threatened or endangered species are known to occur within the study area. However, the letter noted that the state-listed Henslow's Sparrow is known to occur within the study area. The response letter also stated that the project has the potential to impact wetland habitats and that the project design should attempt to eliminate and/or reduce these impacts. The KDFWR recommended reviewing the appropriate U.S. Department of the Interior National Wetland Inventory (NWI) Maps and county soil surveys to determine where wetland impacts may occur and to verify the extent of these impacts through field verification. To minimize indirect impacts to aquatic resources, the KDFWR recommended using strict erosion control measures to minimize siltation into streams and storm water drainage systems within the study area.

In addition to the consultation letter, a database maintained by the KDFWR of known occurrences of state and federally-listed species was reviewed for the Union quadrangle (KDFWR, 2012). No records of federally-threatened or endangered species were found in the database for the Union quadrangle. However, the database contains records of several state-listed species for the Union quadrangle, including five bird, two amphibian, and one insect species. These species are summarized in the following Table 3.

Table 3: State and Federally-Listed Species on Union, Kentucky Quadrangle

Group	Scientific Name	Common Name	Federal* Status	State* Status
Amphibians	***Plethodon cinereus***	Redback Salamander	N	S
	Rana pipiens	Northern Leopard Frog	N	S
Birds	***Actitis macularius***	Spotted Sandpiper	N	E
	Ammodramus henslowii	Henslow's Sparrow	N	S
	Circus cyaneus	Northern Harrier	N	T
	Corvus ossifragus	Fish Crow	N	S
	Pooecetes gramineus	Vesper Sparrow	N	E
Insect	***Calephelis borealis***	Northern Metalmark	N	T

* E = Endangered; T = Threatened; S = Special Concern; N = None

2.3 Kentucky State Nature Preserves Commission

An electronic data request was submitted to the KSNPC on January 25, 2012, requesting that the agency search the Natural Heritage Database for documented occurrences of state and federally-listed species and exemplary natural communities within or in the vicinity of the study area. In a reply dated January 30, 2012, the KSNPC identified two records within one mile of the study area, four records for federally-listed species within five miles of the study area, one record for aquatic species within five miles of the study area, and ten records for mammals and birds within ten miles of the study area. These species are summarized in the following Table 4.

Table 4: Species Identified by KSNPC as Potentially Occurring Near Proposed Project

Group	Scientific Name	Common Name	Federal* Status	State* Status
Aquatic Snail	***Lioplax sulculosa***	Furrowed Lioplax	N	S
Birds	***Aimophila aestivalis***	Bachman's Sparrow	SOMC	E
	Ammodramus henslowii	Henslow's Sparrow	SOMC	S
	Passerculus sandwichensis	Savannah Sparrow	N	S
	Thryomanes bewickii	Bewick's Wren	SOMC	S
	Tyto alba	Barn Owl	N	S
Mammal	***Myotis sodalis***	Indiana Bat	E	E
Plant	***Trifolium stoloniferum***	Running Buffalo Clover	E	T

* E = Endangered; T = Threatened; S = Special Concern; SOMC = Species of Management Concern; N = None

2.4 Kentucky Division of Water

A consultation letter was sent to the KDOW, Water Quality Branch, on January 25, 2012, requesting information regarding significant aquatic resources occurring in the study area, including Wild and Scenic Rivers, special use waters, municipal water intakes, groundwater recharge areas, karst aquifers, toxic pollutants, and water quality information. A reply letter from the KDOW, dated February 20, 2012, stated that there are no Outstanding State Resource Waters or other special use waters within the study area. The KDOW also noted that no groundwater tracer data or groundwater recharge area delineations were found in or near the study area. Based on the hydrogeologic factors within the study area, the KDOW designates this area as having moderate sensitivity to groundwater pollution and advises that proper Best Management Practices (BMPs) associated with required construction permit(s) are necessary to prevent pollutants from entering groundwater.

A consultation letter was submitted to the KDOW – KORA Coordinator on January 25, 2012, requesting information regarding water quality studies performed within the study area. Numerous Kentucky Pollutant Discharge Elimination System (KPDES) permits were provided from KDOW on April 9, 2012. The large amount of KPDES permits issued within the study area confirms the urbanized nature of the area and the extent of previous development. The KPDES permits are not included in this report.

2.5 Kentucky Division of Forestry

A consultation letter was sent to the KDOF office in Frankfort, Kentucky, on January 25, 2012, requesting information regarding significant forestry resources, including state and national champion trees and state forests, in the study area. In an email received on March 19, 2012, the KDOF replied that no state or national champion trees or state forests are located in the study area. The KDOF also stated that they visited the study area and did not see any significant areas of concern regarding impacts from the project to forested areas, citing that most of the woodlots consist of small trees that are of average quality and species.

2.6 Kentucky Geological Survey

A consultation letter was sent to the KGS, Water Resources Section, in Lexington, Kentucky, on January 25, 2012, requesting information regarding geologic features and geologically significant areas within the study area. The KGS does not perform interpretive analyses of specific projects due to liability issues. The KGS has published pertinent geologic and groundwater information for Kentucky to a variety of websites. These websites were reviewed by Redwing for information regarding groundwater and geologically significant areas, such as karst features or springs, within the study area. A discussion of the review of significant geological information is provided in Section 5.1-Literature and Office Review Results.

2.7 Natural Resources Conservation Service

A consultation letter was sent to the NRCS office in Burlington, Kentucky, on January 25, 2012, requesting information regarding hydric soils, prior converted or farmed wetlands, and prime farmland located in the study area. A follow up call was made, but no reply has been received as of the completion of this report. Soil data for the study area was obtained from the ***Soil Survey of Boone, Campbell, and Kenton Counties, Kentucky*** and the U.S. Department of Agriculture Web Soil Survey. This data is discussed in Section 3.5-Soils.

2.8 Kentucky Speleological Society

A data review request was submitted by email to the KSS on January 27, 2012, regarding the location of known cave and mine portals within a five kilometer radius of the study area. In an email response on February 20, 2012, the KSS replied that they have no record of caves or mine portals within the study area or Boone County.

3.0 ENVIRONMENTAL SETTING

The general environmental setting of the study area is presented below in terms of climate, physiography, topography, geology, soils, watersheds, land use, and floral community.

3.1 Climate

The ***Soil Survey of Boone, Kenton, and Campbell Counties, Kentucky*** describes the climate of Boone County as temperate and humid, with average temperatures of about 33° F for January and about 76° F for July. The yearly average temperature is about 54° F. Average rainfall is approximately 40 inches per year. The growing season in Boone County typically lasts about 186 days (USDA, 1989).

3.2 Physiography

Boone County is one of the northern-most counties in Kentucky and lies within the Outer Bluegrass Physiographic Region. This region is characterized as a moderately to deeply dissected upland, with flat-topped ridges in the north-central portion of the county (McGrain and Currens, 1978). Kentucky has been further separated into seven distinct ecoregions based on physical and biological similarities, such as geology, topography, soils, vegetation, and land-use. The study area is located within the Outer Bluegrass Ecoregion, which is described as rolling to hilly and contains sinkholes, springs, entrenched rivers, and intermittent and perennial streams. Local relief is variable and the ecoregion is mostly underlain by Upper Ordovician limestone and shale (EPA, 2012).

3.3 Topography

Based on the Union USGS 7.5-minute topographic quadrangle map, the general topography of the study area is flat to gently sloping, with some variation along stream drainages (Exhibit 1); however, extensive development in the study area has altered the original topography, especially around the KY 338 interchange with I-71/I-75. This portion of the study area was modified during construction of the interstate and associated ramps, causing the interstate to be elevated above the surrounding land. The areas to the west and east of the interchange were disturbed during construction of the commercial and industrial developments and are now flatter than the original topography. The study area along the I-71/I-75 and US 25 corridors was also disturbed during grading activities to create the rail and road beds. Elevations in the study area range from approximately 956 feet above mean sea level (msl) in the northern portion to approximately 838 feet above msl in the western portion; however, these elevations have likely changed since the Union quadrangle map was last updated in 1984.

3.4 Geology

The geologic formations associated with the study area were formed during the Upper Ordovician period and consist of the Bull Fork Formation, Fairview Formation, and Grant Lake Limestone. The majority of the study area is underlain by the Bull Fork formation, which is composed of interbedded limestone and shale. The western portion of the study area along KY 338 and a small section along I-71/I-75 in the southern portion are underlain by the Fairview Formation and Grant Lake Limestone. The Fairview Formation contains interbedded limestone and shale, and the Grant Lake Limestone is composed of limestone. Within the study area, there are no known significant geologic features, such as faults, and it is mapped as having a moderate potential for karst (Exhibit 5) (KGS, 2012a).

3.5 Soils

The study area contains soils from the Faywood, Lindside, Nicholson, and Rossmoyne series (Exhibit 6). Several of these soils are considered prime farmland soils or farmland soils of statewide importance. The erosion hazard ratings for these soils range from slight to severe for roads. None of the soils in the study area are classified as hydric, and most are mapped on areas that have been disturbed during construction of the interstate and commercial and industrial developments (USDA, 1989). The soils in the study area and their ratings are summarized in the following Table 5.

Table 5: Soils Located within the Study Area

Soil Name	Farmland Classification	Erosion Hazard	Hydric Rating
Faywood silty clay loam, 6 to 12 percent slopes	Farmland of statewide importance	Severe	Not hydric
Faywood silty clay loam, 12 to 20 percent slopes	Not prime farmland	Severe	Not hydric
Faywood silty clay, 12 to 20 percent slopes	Not prime farmland	Severe	Not hydric
Lindside silt loam, 0 to 3 percent slopes	All areas are prime farmland	Slight	Not hydric
Nicholson silt loam, 0 to 6 percent slopes	All areas are prime farmland	Moderate	Not hydric
Nicholson silt loam, 6 to 12 percent slopes	Farmland of statewide importance	Severe	Not hydric
Rossmoyne silt loam, 0 to 6 percent slopes	All areas are prime farmland	Moderate	Not hydric
Rossmoyne silt loam, 6 to 12 percent slopes	Farmland of statewide importance	Severe	Not hydric

3.6 Watershed

The study area is located within portions of two 8-digit hydrologic unit code (HUC) watersheds: Middle Ohio-Laughery (HUC 05090203) and Licking (HUC 05100101). In addition, the study area is located within three 11-digit HUC watersheds (Exhibit 7). These include: 1) the Mud Lick Creek 2 (Fuller Branch) watershed (HUC 05090203200), which includes the majority of the study area; 2) the Gunpowder Creek 2 watershed (HUC 05090203190) in the northern portion of the study area; and 3) the Banklick Creek (HUC 05100101290) watershed in the extreme eastern portion of the study area (KDOW, 2012a).

Due to the development of most of the study area, surface water is primarily collected in a series of drainage ditches and culverts, which flow into tributaries and streams in the area. In the northern portion of the study area, collected surface water flows into unnamed tributaries of South Fork, which flows north and enters Gunpowder Creek (Exhibit 7). Collected surface water in the western, southern, and eastern (west of US 25) portions of the study area drains into unnamed tributaries of Mud Lick Creek (Exhibit 7). In the eastern portion of the study area (east of US 25), collected surface water flows into unnamed tributaries of Wolf Pen Branch, which flows east into Banklick Creek (Exhibit 7). Gunpowder Creek and Mud Lick Creek flow directly into the Ohio River to the west of the study area, and Banklick Creek flows into the Licking River northeast of the study area.

Floodplain information for the study area was obtained from the Federal Emergency Management Agency's (FEMA) Q3 digital flood data, as appended by the state of Kentucky. The data shows that the entire study area is located outside of the 100-year floodplain (Exhibit 8).

3.7 Land Use

According to the U.S. Geological Survey National Land Cover Database (2005), the majority of the study area (approximately 90%) is developed, ranging from areas of high intensity development to areas of open space around developments. The remaining land is classified as pasture/hay and deciduous forest, which primarily occurs in the southeastern portion of the study area (USGS, 2005).

3.8 Floral Community

Based on a review of ***Deciduous Forests of Eastern North America*** (Braun, 1950), the study area is located in the Bluegrass section of the Western Mesophytic Forest region. This region extends from the western escarpment of the Cumberland and Allegheny Plateaus in the east to the loess bluffs of the Mississippi River in the west. The region extends north from northern Alabama and Mississippi; to the southern boundary of the Wisconsin glaciation in Ohio and Indiana; to the southern boundary of the Illinoian glaciation farther west. The Western Mesophytic Forest region is typically a mosaic pattern of climax vegetation types compared to the single climax types of the Mixed Mesophytic Forest region to the east.

The Bluegrass section is a roughly circular area in the north-central portion of Kentucky, with a diameter of almost 100 miles. It is bound to the north by the Illinoian glacial margin, to the south and west by the belt of the Knobs, and to the east by the Cumberland Plateau. The Bluegrass section has experienced extensive disturbance due to urbanization; therefore, it is difficult to ascertain the species composition of the area prior to European settlement. Species frequently observed among older trees include bur oak (***Quercus macrocarpa***), chinquapin oak (***Q. muhlenbergii***), white oak (***Q. alba***), blue ash (***Fraxinus quadrangulata***), white ash (***F. americana***), hackberry (***Celtis occidentalis***), sugar maple (***Acer saccharum***),

shagbark hickory (***Carya ovata***), black cherry (***Prunus serotina***), honey locust (***Gleditsia triacanthos***), Kentucky coffeetree (***Gymnocladus dioicus***), American elm (***Ulmus americana***), Ohio buckeye (***Aesculus glabra***), and red mulberry (***Morus rubra***) (Braun, 1950). Due to the extensive development of the study area, the natural floral community has been drastically altered. Nearly all of the forested areas have been cleared, and most of the study area is dominated by invasive species or maintained lawn.

4.0 METHODS

The methods used to conduct the ecological assessment of the study area are presented below in terms of literature and office review, aquatic sampling, terrestrial sampling, wetland sampling, and state and federal threatened/endangered species sampling.

4.1 Literature and Office Review

Consultation letters were submitted to the following state and federal agencies regarding the proposed project: USFWS, KDFWR, KSNPC, KDOW, KDOF, KGS, NRCS, and KSS. In addition to formal correspondence, the USFWS, KDFWR, and KSNPC websites were consulted to help determine state and federally-listed species that could potentially occur within the study area. The species identified on these lists are addressed in Section 4.5.

Materials consulted during the office review of the study area included the Union quadrangle map, aerial photography, floodplain maps, watershed maps, geologic maps, physiographic maps, NWI maps, and USDA soil survey maps.

4.2 Aquatic Sampling Methods

Aquatic habitat in the study area was identified and characterized based on the office review and field assessments. Streams and ponds within the study area were identified from the Union quadrangle map and the USGS/U.S. Environmental Protection Agency (USEPA) 24K National Hydrography Dataset (NHD). The field assessment methodologies are presented in more detail below.

4.2.1 Stream Habitat

The delineation of streams within the study area was completed based on the presence/absence of an ordinary high water mark (OHWM), defined bed and bank features, and flow regimes. The flow regime of each stream was determined based on field conditions. Streams that did not exhibit flowing water and did not exhibit riffle/pool complexes were considered ephemeral. Streams that exhibited flowing water, water that originated at a seep or spring, and riffle/pool complexes were considered intermittent. Streams that exhibited flowing water, well-defined riffle/pool complexes, and biological communities (macroinvertebrates and fish) were considered perennial. Photographs were taken of the aquatic features documented in the study area.

Stream quality was assessed using the Rapid Bioassessment Protocol (RBP) developed by the USEPA and the KDOW. A variety of physical stream habitat parameters were evaluated in this assessment, including:

- Bottom substrate and available cover for macroinvertebrates and fish
- Embeddedness of bottom materials
- Stream flow
- Stream channel alteration
- Stream bottom scouring and sediment deposition
- Pool-riffle/run-bend ratios
- Stream bank stability and erosion
- Stream bank vegetation and degree of coverage

Numerical values based on USEPA scoring criteria were assigned to each of these habitat parameters. The resulting scores were then compiled and compared to scores for other streams within the Bluegrass bioregion to determine if the reach is fully supporting, partially supporting, or not supporting its designated use. The quality of streams was then interpreted based on if it was meeting the designated use: Fully Supporting (Excellent), Partially Supporting (Average), or Not Supporting (Poor).

4.2.2 Fish, Macroinvertebrate, and Mussel Surveys

Per the negotiated scope with KYTC, fish, macroinvertebrate, and mussel surveys were not conducted as part of this assessment. This determination was based on the limited habitat for these aquatic species, as the project is located in an urbanized landscape, in which many of the streams have been impacted through prior development, and are situated in the upper reaches of the local watersheds.

4.3 Terrestrial Sampling Methods

Terrestrial assessment of the study area consisted of a habitat delineation, a qualitative floral survey, and a qualitative faunal survey conducted during the field assessments. No species-specific surveys were performed as part of this study. The qualitative survey methodologies are presented in greater detail below.

4.3.1 Habitat Delineation

A terrestrial habitat delineation of the study area consisted of categorization of the study area into similar land use and habitat types, comprising transportation/urban land use, upland woods, scrub/shrub, old field, and agriculture.

4.3.2 Floral Survey

The qualitative floral survey consisted of identifying plant species observed in the study area and compiling an overall species list by habitat type. Plant species not recognized in the field were collected and later identified using standard botanical keys.

4.3.3 Faunal Survey

During the qualitative faunal survey, animal species observed within the study area were identified and an overall species list was compiled. Presence of faunal species was determined through direct observation, remains, vocalizations, scat, and tracks.

4.4 Wetland Sampling Methods

Known wetland locations were obtained using the USFWS NWI Wetlands Map (USFWS, 2012). In addition, USDA soil survey maps were used to identify areas of hydric soil. A wetland delineation was conducted by Redwing wetland scientists which documented the presence/absence of hydric soils, wetland hydrology, and hydrophytic vegetation per the guidelines of the ***Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*** (USACE, 2010). Soil, hydrology, and vegetation data were collected on Wetland Determination Data Forms.

4.5 State and Federal Threatened/Endangered Species Sampling Methods

Based on the literature review and coordination with the resource agencies, 14 species listed as state or federally-threatened or endangered were identified as occurring or having the potential to occur in the vicinity of the study area. Eight additional species are listed as special concern/species of management concern or are candidates for listing. However, only the nine species listed as federally-threatened or endangered are addressed further under this assessment. Due to the limited timeframe of the assessment, sampling for the identified species was limited to the delineation of potential habitat within the study area for each species and species-specific surveys were not performed.

5.0 SAMPLING RESULTS

The results of the ecological assessment of the study area are presented below in terms of the literature and office review, aquatic sampling, terrestrial habitat sampling, wetland sampling, and state and federal threatened/endangered species sampling.

5.1 Literature and Office Review Results

Summaries of the comments received from the consulted state and federal agencies are presented in Section 2.0. The written responses from these agencies are included as Appendix A.

The Union quadrangle map depicts the study area as relatively flat, with several small stream drainages interspersed throughout the area (Exhibit 1). Nearly all of the flat land within the study area has been developed, which has resulted in the filling or channelization of some drainages within the study area. Drainages within the study area are associated with unnamed tributaries of Mud Lick Creek, Wolf Pen Branch, and South Fork. Most of the study area west of US 25 drains southwest towards Mud Lick Creek, with the exception of the northern portion along I-71/I-75, which drains northwest into South Fork. To the east of US 25, the study area drains east towards Wolf Pen Branch. The Federal Emergency Management Agency Q3 Flood Data documents that the study area is not located in the 100-year floodplain (Exhibit 8).

Geologic maps show that the study area is underlain by interbedded limestone and shale and has a moderate potential for karst (Exhibit 5). No caves or sinkholes are mapped within the study area, and none were identified during the field investigation (KGS, 2012a).

A search for springs and wells showed that 28 monitoring wells are located within the study area. These wells exhibit groundwater elevations from approximately 838 feet above msl to 912 feet above msl. No springs were identified within the study area during the review (KGS, 2012a).

The NWI map identifies ten water/wetland features within the study area (Exhibit 9). These features are summarized in the following Table 6. Based on the field assessment, eight of these features are no longer present as they have either been drained or filled due to development. Wetlands 1, 2, and 3 appear to be remnants of the former mapped ponds that have been altered by development.

Table 6: NWI Wetlands within Proposed Study Area

Number	Cowardin Classification*	Type	Corresponds To
1	PUBHh	Freshwater Pond	Wetlands 1 and 2
2	PUBHh	Freshwater Pond	N/A
3	PUBHh	Freshwater Pond	N/A
4	PUBHh	Freshwater Pond	N/A
5	PEM1Fh	Freshwater Emergent Wetland	N/A
6	PUBHh	Freshwater Pond	N/A
7	PEM1Fh	Freshwater Emergent Wetland	N/A
8	PUBHh	Freshwater Pond	N/A
9	PUBHh	Freshwater Pond	Wetland 3
10	PUBHh	Freshwater Pond	N/A

* Cowardin Classification: PUBHh = palustrine, unconsolidated bottom, permanently flooded, diked/impounded;
PEM1Fh palustrine, emergent, persistent, semipermanently flooded, diked/impounded

5.2 Aquatic Sampling Results

The results of the aquatic sampling are presented below in terms of streams, open waters, and fish, macroinvertebrates, and mussels.

5.2.1 Streams

During the field assessments, physical characteristics were collected for five intermittent streams and 16 ephemeral streams that were identified in the study area (Exhibit 10). All streams are considered to be jurisdictional; however, the USACE has not made a formal determination. Stream characteristics are discussed in greater detail below.

Intermittent Streams: Five intermittent streams totaling 1,980 linear feet were identified in the study area during the field assessments (Exhibit 10). Four of these streams (Intermittent Streams 1, 3, 4, and 5) were identified on the Union quadrangle map and the NHD dataset during the in-house review and their presence was verified during the field assessments. Intermittent Stream 2 was identified during the field assessments. All five streams are classified as “Poor” quality under the Rapid Bioassessment Protocol (RBP) for the Bluegrass Bioregion and have been impacted to some degree through piping or channelization. These streams are typically small, first or second-order streams with relatively small watersheds. Dimensions range from two to ten feet wide and one to six inches deep, with substrates consisting of silt/clay, gravel, cobble, boulders, and bedrock. The canopy cover along these streams ranges from partially exposed to fully shaded and typically consists of species such as black walnut (***Juglans nigra***), box elder (***Acer negundo***), green ash (***Fraxinus pennsylvanica***), and bush honeysuckle (***Lonicera maackii***). RBP forms for each stream are included in Appendix B and the streams are shown in Photographs 1 through 5. A summary of each intermittent stream is included below in Table 7.

Table 7: Intermittent Streams Identified within the Study Area

Intermittent Stream	Length	RBP Score	Quality
1	1,315	132	Poor
2	195	135	Poor
3	330	127	Poor
4	90	125	Poor
5	50	126	Poor
Total	**1,980**		

Ephemeral Streams: Sixteen ephemeral streams totaling 1,760 linear feet were identified in the study area during the field assessments (Exhibit 10). The ephemeral streams range in size from six inches to two and a half feet wide, with bank heights from three inches to three feet. Substrates are predominantly silt, with a few streams also containing gravel, cobble, or boulders. Nearly all of the streams exhibited small amounts of flowing water during the field assessments due to recent rain events prior to the field assessment.

Due to their small size and low flow, the ephemeral streams were not evaluated using the RBP method. Photographs of ephemeral streams are presented in the photographs section of this report. A summary of each ephemeral stream is included below in Table 8.

Table 8: Ephemeral Streams Identified within Study Area

Ephemeral Stream	Length	Quality
1	35	Poor
2	80	Poor
3	20	Poor
4	520	Poor
5	55	Poor
6	105	Poor
7	50	Poor
8	135	Poor
9	60	Poor
10	245	Poor
11	290	Poor
12	75	Poor
13	25	Poor
14	15	Poor
15	10	Poor
16	40	Poor
Total	**1,760**	

5.2.2 Open Waters

One open water pond was identified in the study area during the field assessments (Exhibit 10). This 0.365-acre pond is man made and appears to have been created as a retention basin during the

development of an industrial facility. The pond is considered jurisdictional, due to its connection to Ephemeral 9 and Ephemeral 10; however, if the pond is utilized as a water control structure it would not be considered a jurisdictional water. A formal determination for this feature should be made by the USACE.

5.2.3 Fish, Macroinvertebrate, and Mussel Surveys

Per the negotiated scope with KYTC, fish, macroinvertebrate, and mussel surveys were not conducted as part of this assessment. This determination was based on the limited habitat for these aquatic species, as the project is located in an urbanized landscape, in which many of the streams have been impacted through prior development and are situated in the upper reaches of the local watersheds.

5.3 Terrestrial Sampling Results

The results of the terrestrial sampling are presented below in terms of floral survey, faunal survey, and the delineation of terrestrial habitats.

5.3.1 Floral Survey

The floral survey of the study area resulted in the identification of 68 plant species within four habitat types. All of these species are common in this area of the state and were expected to be present within the study area. Many of the plants in the study area are invasive or ornamental species that have been planted or have become established in areas of disturbance. No state or federally-listed threatened or endangered plants were documented during the survey. A list of the plant species identified in each habitat type is included in Appendix C, Tables 1 through 5.

5.3.2 Faunal Survey

During the faunal survey, evidence of use by 23 species of animals was observed in the study area. These included 14 bird, six mammal, two crayfish, and one mussel species. Most of the avian species were observed in the urban areas and the old field and scrub habitats. The mammal species were primarily documented in the large undeveloped area in the southeastern portion of the study area and along the US 25 right-of-way (ROW). The giant floater (***Pyganodon grandis***) mussel and the ***Cambarus*** species of crayfish were also found in the undeveloped area within the depression of an old pond. No reptiles or amphibians were documented during the field assessments. This result is not unexpected, as the field assessments were conducted in the winter months when temperatures were low. No state or federally-listed threatened or endangered animals were observed in the study area. A list of the faunal species documented in the study area is included in Appendix D.

5.3.3 Terrestrial Habitats

The natural habitat types present in the study area include old field, scrub-shrub, upland woods, wetland (Section 5.4), and agricultural areas. The majority of the study area is dominated by urban areas associated with commercial and industrial developments, road and railroad ROWs, and residential areas. These urban areas consist of maintained lawns dominated by invasive grass species and ornamental shrubs and trees. The remaining habitat types in the study area are interspersed amongst these developed areas. Table 9 below presents the type and acreage of each habitat and land use in the study area. The location of each habitat is presented on Exhibit 11.

Table 9: Habitats/Landuse Acreages within Study Area

Habitats/Land Use	Acres	%
Transportation/Urban Land	223.0	72.6
Upland Woods	39.0	12.7
Scrub/Shrub	31.0	10.1
Old Field	12.7	4.0
Wetland	0.531	0.2
Agricultural	0.4	0.1
Open Water Pond	0.365	0.1
Total Acres	**307**	

Old field habitat typically occurs in areas that have been previously disturbed during development and have not been maintained, allowing the area to revegetate. This habitat type is typically dominated by invasive grasses and common, early-successional, herbaceous species. Scrub-shrub habitat is found along the fence rows and property lines between developments, along the road and railroad ROWs, and in undeveloped areas. This habitat type is composed of common and invasive shrub and herbaceous species, with a few young, small trees also present in some areas. A few larger trees are found in the upland woods habitat, which is primarily found in the stream drainages and along some of the road and railroad ROWs in the study area. Agricultural habitat is sparse and consists of a portion of one corn field along the eastern edge of the study area. The largest undeveloped area is located in the southeastern portion of the study area and contains all three habitat types; however, most of this area appears to have been disturbed in the past.

5.4 Wetland Sampling Results

During the field assessments, 13 wetland areas were identified in the study area. Wetland Determination Forms for 24 data points are included in Appendix E. Of these 13 wetland areas, 11 are considered to be jurisdictional (0.398 acre). The two remaining wetland areas appear isolated due to the lack of a connection to downstream waters of the U.S. (0.132 acre). The preliminary jurisdictional status of each wetland was determined by Redwing; however, the final jurisdictional determination will be performed by the USACE. Each of the wetlands is described in Table 10 below and presented on Exhibit 10. Photographs of each wetland are presented in the photograph section of this report.

Table 10: Wetland Acreage and Jurisdictional Status within the Study Area

Wetland	Acres	Status	Classification	Quality
1	0.035	Jurisdictional	PEM1C	Low
2	0.009	Isolated	PEM1C	Low
3	0.004	Jurisdictional	PEM1C	Low
4	0.029	Jurisdictional	PEM1C	Low
5	0.044	Jurisdictional	PEM1C	Low
6	0.023	Jurisdictional	PEM1C	Low
7	0.018	Jurisdictional	PEM1C	Low
8	0.022	Jurisdictional	PEM1C	Low
9	0.023	Jurisdictional	PEM1C	Low
10	0.123	Isolated	PEM1C	Low
11	0.047	Jurisdictional	PEM1C	Low
12	0.121	Jurisdictional	PEM1C	Low
13	0.032	Jurisdictional	PEM1C	Low
Total	**0.530**			
Total Jurisdictional	**0.398**			
Total Isolated	**0.132**			

* Based on Redwing delineation; USACE has not made a formal determination

Wetlands 1 and 2: Wetland 1 (0.035 acre) and Wetland 2 (0.009 acre) are located along the western boundary of the study area, west of the KY 338 interchange with I-71/I-75 (Exhibit 10, Sheet 3). Wetland 1 is considered jurisdictional due to the presence of a surface connection to a storm drain that flows into a jurisdictional stream. Wetland 2 is considered isolated, based on the lack of a surface connection to a jurisdictional stream or other waters of the U.S. Wetland 1 is dominated by emergent vegetation, such as rough barnyard grass (***Echinochloa muricata***), broadleaf cattail (***Typha latifolia***), large-fruit beggar-ticks (***Bidens coronata***), and blunt spikerush (***Eleocharis obtusa***). Wetland 2 is dominated by emergent vegetation that includes Frank's sedge (***Carex frankii***), blunt spikerush (***Eleocharis obtusa***), tall fescue (***Festuca arundinacea***), and fox sedge (***Carex vulpinoidea***). These species are listed as obligate wetland (OBL), facultative wetland (FACW), and facultative upland (FACU) in the ***National List of Plants that Occur in Wetlands***. The location of Wetland 1 and 2 is noted on the NWI map (Exhibit 9) as a freshwater pond with a Cowardin classification of PUBHh (palustrine, unconsolidated bottom, permanently flooded, diked/impounded). However, the field assessments revealed that the pond has been drained and is no longer present. The Cowardin classification for these wetlands is PEM1C (palustrine, emergent, persistent, seasonally flooded) (Cowardin et al., 1979).

According to the ***Soil Survey of Boone, Campbell, and Kenton Counties, Kentucky***, the soils underlying Wetlands 1 and 2 consist of Faywood silty clay loam, which is not listed as hydric. However, Data Points 2 and 4 documented hydric soils in these locations. Field evidence of wetland hydrology included inundation, saturation, and the FAC-neutral test. These wetlands are located in an area that has been previously disturbed and were likely created as a result of this disturbance. Due to their small size, the

functions provided by these wetlands are limited to water quality improvement. Due to previous disturbance and the small size of the wetlands, both are considered low quality.

Wetlands 3 and 4: Wetland 3 (0.004 acre) and Wetland 4 (0.029 acre) are located in the large undeveloped area in the southeastern portion of the study area and are associated with Ephemeral Stream 4 (Exhibit 10, Sheet 5). Both wetlands are considered jurisdictional due to the presence of surface connections to a jurisdictional stream. Wetland 3 is dominated by emergent vegetation, such as soft rush (***Juncus effusus***), soft-stem bulrush (***Scirpus validus***), and broadleaf cattail. Wetland 4 is dominated by broadleaf cattail. These species are listed as OBL and FACW (Reed et al., 1988). The location of Wetland 3 is noted on the NWI map (Exhibit 9) as a freshwater pond with a Cowardin classification of PUBHh (palustrine, unconsolidated bottom, permanently flooded, diked/impounded). However, the field assessments revealed that the pond has been drained and is no longer present. The Cowardin classification for these wetlands is PEM1C (Cowardin et al., 1979).

Due to the former freshwater pond at the location of Wetland 3, the ***Soil Survey of Boone, Campbell, and Kenton Counties, Kentucky*** classifies the area as water and does not list any soil data. However, Data Point 7 documented hydric soils in this location. The soils underlying Wetland 4 consist of Faywood silty clay, which is not listed as hydric (USDA, 1989). Data Point 9 documented hydric soils in this location. Field evidence of wetland hydrology was saturation. The functions provided by these wetlands are limited to water quality improvement. Based on their small size and limited diversity of plant species, Wetlands 3 and 4 are considered low quality.

Wetlands 5 and 6: Wetland 5 (0.044 acre) and Wetland 6 (0.023 acre) are located in the southeastern portion of the study area along US 25 (Exhibit 10, Sheet 5). Wetland 5 is associated with Intermittent Stream 2 and is considered jurisdictional due to a surface connection to a jurisdictional stream. Wetland 6 is also considered jurisdictional due to a surface connection to a jurisdictional stream. Wetland 5 is dominated by emergent vegetation, that includes reed canary grass (***Phalaris arundinacea***) and swamp smartweed (***Polygonum hydropiperoides***). Wetland 6 is dominated by emergent vegetation such as soft rush, green bulrush (***Scirpus atrovirens***), and common boneset (***Eupatorium perfoliatum***). These species are listed as OBL and FACW (Reed et al., 1988). The Cowardin classification for these wetlands is PEM1C (Cowardin et al. 1979).

The soils underlying Wetland 5 consist of Faywood silty clay, which is not listed as hydric (USDA, 1989). Data Points 11 and 13 documented hydric soils in these locations. Field evidence of wetland hydrology included inundation, saturation, and the FAC-neutral test. The functions provided by these wetlands include water quality improvement and minimal water storage. Based on the small size of these wetlands and the limited diversity of plant species, Wetlands 5 and 6 are considered low quality.

Wetlands 7, 8, and 9: Wetland 7 (0.018 acre), Wetland 8 (0.022 acre), and Wetland 9 (0.023 acre) are located along the eastern boundary of the study area, east of the KY 338 interchange with I-71/I-75 (Exhibit 10, Sheet 2). Wetland 7 is associated with Ephemeral Stream 10, Wetland 8 is associated with Intermittent Stream 3, and Wetland 9 is associated with Intermittent Stream 3 and Ephemeral Stream 13. All three wetlands are considered jurisdictional due to the presence of surface connections to jurisdictional streams. Wetland 7 is dominated by emergent vegetation, such as rice cutgrass (***Leersia oryzoides***), broadleaf cattail, and soft rush. Wetland 8 is dominated by emergent vegetation that includes fox sedge, rice cutgrass, and soft rush. Wetland 9 is dominated by broadleaf cattail. These species are listed as OBL and FACW (Reed et al., 1988). The Cowardin classification for these wetlands is PEM1C (Cowardin et al., 1979).

The soils underlying Wetlands 7, 8, and 9 consist of Faywood silty clay, which is not listed as hydric (USDA, 1989). Data Points 16, 18, and 19 documented hydric soils at these locations. Field evidence of wetland hydrology included saturation and oxidized rhizospheres on living roots. Functions provided by these wetlands include water quality improvement and water storage. Due to their small size and limited diversity of plant species, Wetlands 7, 8, and 9 are considered low quality.

Wetland 10: Wetland 10 (0.123 acre) is located in the eastern portion of the study area, north of KY 338 and west of US 25 (Exhibit 10, Sheet 2). Wetland 10 appears isolated based on the lack of connection to a jurisdictional stream or other waters of the U.S. Wetland 10 is dominated by emergent vegetation that includes spreading bentgrass (***Agrostis stolonifera***), broadleaf cattail, and soft rush. These species are listed as OBL and FACW (Reed et al., 1988). The Cowardin classification for this wetland is PEM1C (Cowardin et al., 1979).

The soils underlying Wetland 10 consist of Faywood silty clay loam, which is not listed as hydric (USDA, 1989). Data Point 20 documented hydric soils at this location. Field evidence of wetland hydrology was saturation. The functions provided by this wetland are limited to water quality improvement. Based on the limited diversity of plant species, Wetland 10 is considered low quality.

Wetlands 11, 12, and 13: Wetland 11 (0.047 acre), Wetland 12 (0.121 acre), and Wetland 13 (0.032 acre) are located within the ROW of I-71/I-75. Wetlands 11 and 12 are located in the western portion of the study area north of KY 338 and are associated with Intermittent Stream 1 (Exhibit 10, Sheet 3). Wetland 13 is located in the northern portion of the study area south of the rest area and is connected to the interstate drainage system (Exhibit 10, Sheet 1). All three wetlands are considered jurisdictional due to surface connections to jurisdictional streams. Wetland 11 is dominated by emergent vegetation, such as soft rush, broadleaf cattail, rice cutgrass, and Frank's sedge. Wetland 12 is dominated by broadleaf cattail. Wetland 13 is dominated by emergent vegetation that consists of broadleaf cattail, flat-top fragrant-golden-rod (***Euthamia graminifolia***), and devils' beggar-ticks (***Bidens frondosa***). These species

are listed as OBL, FACW, and facultative (FAC) (Reed et al., 1988). The Cowardin classification for these wetlands is PEM1C (Cowardin et al., 1979).

The soils underlying Wetlands 11, 12, and 13 consist of Faywood silty clay loam, which is not listed as hydric (USDA 1989). However, Data Points 22, 23, and 24 documented hydric soils at these locations. Field evidence of wetland hydrology included inundation, saturation, and the FAC-neutral test. Functions provided by these wetlands include water quality improvement and water storage. These wetlands occur in drainage areas that were created during the construction of I-71/I-75. Due to the disturbed nature of these wetlands and the limited diversity of plant species, Wetlands 11, 12, and 13 are considered low quality.

5.5 State and Federal Threatened/Endangered Species Sampling Results

Based on the state and federal agency coordination conducted as part of Section 2.0, 22 state and/or federally-listed species were identified as potentially occurring within the study area. Table 11 identifies these species, including their protected status and habitat description.

Table 11: Identified State and Federally Listed Species

Scientific Name	Common Name	Federal* Status	State* Status	Habitat Description
Species Not Addressed Further Under This Assessment				
Amphibians				
Plethodon cinereus	Redback Salamander	N	S	Damp microhabitats in wooded areas; inside logs, under leaf litter, or under surface objects during day.
Rana pipiens	Northern Leopard Frog	N	S	Northern leopard frogs live in the vicinity of springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually they are in or near permanent water with rooted aquatic vegetation.
Aquatic Snail				
Lioplax sulculosa	Furrowed Lioplax	N	S	Rivers and streams, in moderate to strong currents in soft depositional areas that gather around and under large stones.
Birds				
Actitis macularius	Spotted Sandpiper	N	E	Seacoasts and shores of lakes, ponds, and streams, sometimes in marshes; prefers shores with rocks, wood, or debris.
Aimophila aestivalis	Bachman's Sparrow	SOMC	E	Early successional areas with scattered saplings (often pines), bushes, or understory, brushy or overgrown hillsides, overgrown fields with thickets and brambles.
Ammodramus henslowii	Henslow's Sparrow	SOMC	S	Open fields and meadows with relatively thick/dense grass interspersed with weeds or shrubby vegetation.
Circus cyaneus	Northern Harrier	N	T	Marshes, meadows, grasslands, and cultivated fields.
Corvus ossifragus	Fish Crow	N	S	Beaches, bays, lagoons, inlets, swamps, near marshes, and, less frequently, deciduous or coniferous woodland. In inland situations, primarily in bald cypress swamps and along major watercourses; also garbage dumps and towns
Passerculus sandwichensis	Savannah Sparrow	N	S	Open areas, especially grasslands, tundra, meadows, bogs, farmlands, grassy areas with scattered bushes, and marshes.
Pooecetes gramineus	Vesper Sparrow	N	E	Habitats include plains, prairies, dry shrub lands, savannas, weedy pastures, fields, sagebrush, arid scrub, and woodland clearings.
Thryomanes bewickii	Bewick's Wren	SOMC	S	Brushy areas, thickets and scrub in open country, open and riparian woodland. Found in rural towns and farmsteads.
Tyto alba	Barn Owl	N	S	Open and partly open country in a wide variety of situations, often around human habitation. In northern winter, often roosts in dense conifers; also roosts in nest boxes if available.
Insect				
Calephelis borealis	Northern Metalmark	N	T	Habitats are openings within forested or wooded areas. Such openings may be natural outcrops, shale or limestone barrens, glades or powerline right of ways.
Species Addressed Further Under This Assessment				
Mammal				
Myotis sodalis	Indiana Bat	E	E	Summer foraging habitat in upland forest, bottomland forests, and riparian corridors. Winter habitat in caves, rock shelters, cliff lines, and mines.
Mussels				
Cyprogenia stegaria	Fanshell	E	E	Medium to large rivers in sand and gravel.
Lampsilis abrupta	Pink Mucket	E	E	Medium to large rivers in sand and gravel.
Obovaria retusa	Ring Pink	E	E	Medium to large rivers in sand and gravel.
Plethobasus cooperianus	Orangefoot Pimpleback	E	E	Large rivers in sand and gravel.
Plethobasus cyphyus	Sheepnose	E	S	Medium to large rivers in sand and gravel.
Pleurobema clava	Clubshell	E	E	Small to large rivers in sand and gravel.
Pleurobema plenum	Rough Pigtoe	E	E	Medium to large rivers in sand and gravel.
Plant				
Trifolium stoloniferum	Running Buffalo Clover	E	T	Old trails, traces, and roads; grazed bottomlands, streambanks, lawns, shoals, and cemeteries with native vegetation, well-drained and mesic soils, and filtered to partial light.

* E = Endangered; T = Threatened; S = Species of Concern; SOMC = Species of Management Concern; C = Candidate; N = None

Nine federally-endangered species are known to occur or have the potential to occur in the study area and are addressed further under this assessment. No specific surveys for these federally-endangered species were conducted during this assessment. These surveys would need to be performed in order to determine potential impacts from this project to these species. The following Table 12 summarizes the results of the assessment and each species is discussed in more detail below.

Table 12: Identified Protected Species within Study Area

Scientific Name	Common Name	Federal* Status	Occurrence**	Habitat in Study Area	Species Observed
Mammal					
Myotis sodalis	Indiana Bat	E	K	Yes	No
Mussels					
Pleurobema clava	Clubshell	E	P	No	No
Cyprogenia stegaria	Fanshell	E	P	No	No
Plethobasus cooperianus	Orangefoot Pimpleback	E	P	No	No
Obovaria retusa	Ring Pink	E	P	No	No
Lampsilis abrupta	Pink Mucket	E	K	No	No
Pleurobema plenum	Rough Pigtoe	E	P	No	No
Plethobasus cyphyus	Sheepnose	E	P	No	No
Plant					
Trifolium stoloniferum	Running Buffalo Clover	E	K	Yes	No

* E = Endangered
** K = Known occurrence record within Boone County; P = Potential for the species to occur within Boone County based upon historic range, proximity to known occurrence records, biological, and physiographic characteristics.

Indiana Bat: No Indiana bats were documented in the study area during the field assessment. However, the KSNPC Natural Heritage Database shows Indiana bat echolocation calls being recorded within five miles of the study area, which may indicate the presence of this species in the vicinity of the study area. The USFWS considers the study area to be located within an area of potential habitat for the Indiana bat, based on a map of known Indiana bat habitat that was developed by the USFWS Kentucky Field Office (Exhibit 12). Potential habitat occurs in areas where suitable summer and/or winter roosting, foraging, and travel habitat exists for the Indiana bat. Suitable summer roosting habitat refers to a tree (live or dead) with a diameter-at-breast-height (DBH) of five inches or greater that has exfoliating bark, crevices, or cracks that could provide suitable roosting locations for Indiana bats. The study area is located approximately 6.25 miles east of a Known Maternity Summer Habitat (Exhibit 12).

During the field assessment, limited summer roosting habitat for the Indiana bat was identified in the upland woods habitat within the study area. This habitat consisted of individual trees and narrow, linear patches of trees along the road and railroad ROWs, fence rows, and drainages (Photograph 24). Most of these trees were live, relatively young, and offered few roosting locations for Indiana bats. Approximately 39.0 acres of potential Indiana bat habitat (upland woods) was identified within the survey area. Additionally a total of 18 older live trees and dead trees were identified in the study area outside of the upland woods habitat that provide potential roosting locations for this species (Exhibit 11). One primary maternity roost tree was identified during the survey which is located along the northwest side of KY 338 west of the I-71/I-75 Interchange (Exhibit 11, Sheet 2). A primary maternity roost tree is a dead or partially

dead tree that is at least 9 inches DBH with cracks, crevices, and/or loose or exfoliating bark. As a result of this assessment, suitable summer roosting habitat for the Indiana bat is present in the study area.

Suitable winter habitat for the Indiana bat is restricted to caves, abandoned mines, and rock shelters used as hibernacula. None of these features were identified within the study area during the field assessment, and no known Indiana bat hibernacula are located within 10 miles of the study area.

Clubshell, Fanshell, Orangefoot Pimpleback, Ring Pink, Pink Mucket, Rough Pigtoe, Sheepnose: No federally-endangered mussels were documented in the study area during the field assessment. The seven freshwater mussel species identified during the office research and agency coordination typically inhabit small to large rivers; however, no rivers or large streams are present in the study area. The intermittent streams identified during the field assessment are of poor quality and do not provide suitable habitat for these species.

Running Buffalo Clover: No running buffalo clover plants were identified in the study area during the field assessment; however, the field assessment was not preformed during the flowering period of this species. The KSNPC Natural Heritage Database documents that this endangered plant is known to occur within five miles of the project area. This plant typically grows in mesic woodlands in partial to filtered sunlight where there is a pattern of moderate, periodic disturbance for a prolonged period, such as mowing, trampling, or grazing. This species has been reported from a variety of disturbed woodland habitats, including floodplains, streambanks, ravines, grazed woodlots, mowed paths (e.g. cemeteries and lawns), and old logging roads.

During the field assessment, portions of the study area that may provide suitable habitat for running buffalo clover were examined, including streambanks, ravines, old fields, and mowed areas. Most of these areas were not considered to be suitable habitat for this species because they lack partial to filtered sunlight, have no pattern of periodic disturbance, and contain herbaceous and shrub layers dominated by invasive species, such as bush honeysuckle. However, one area of suitable habitat for running buffalo clover was identified in the study area. This area is located along the streambanks of Intermittent Stream 1, which parallels KY 338 in the western portion of the study area (Exhibit 11, Sheets 2 and 3; Photograph 25). The potential habitat area is approximately 2.96 acres. The habitat in this area was deemed suitable for this species due to the presence of a wooded riparian corridor that provides partial to filtered sunlight and because the area is frequently mowed, providing a pattern of disturbance. Although several invasive herbaceous species are present that are known to provide direct competition to running buffalo clover, the periodic disturbance from mowing may allow this species to compete in this area. As a result, suitable habitat for running buffalo clover is present in this portion of the study area.

6.0 IMPACTS AND SUGGESTED MITIGATION MEASURES

As presented in Sections 1.3 and 1.4, two Eastern Alternatives and two Western Alternatives were considered in this ecological assessment. Impacts resulting from the proposed alternatives and suggested mitigation measures are presented below for significant ecological resources, aquatic ecosystems, streams, terrestrial ecosystems, wetlands, and state and federal threatened/endangered species.

6.1 Significant Ecological Resources

Based on the state and federal agency correspondence, office review, and field assessment, no significant ecological resources are known to occur within the study area. No Outstanding State Resource Waters or other special use waters, state or federally-protected land, state or national forests, champion trees, caves, or other geologically significant areas were identified during the field assessment of the study area.

6.2 Aquatic Ecosystems

The proposed project will result in direct impacts to the aquatic ecosystem through the filling or culverting of surface waters as described below in Section 6.3. The identified aquatic ecosystems in this assessment does not represent undisturbed conditions or habitats not provided elsewhere in the vicinity of the project. A discussion of indirect and cumulative impacts to the aquatic ecosystem is provided below with potential mitigation measures.

6.2.1 Indirect Impacts

Indirect impacts are caused by the proposed project that occur at a later date or at a location farther removed from the project. Indirect impacts to the aquatic ecosystem resulting from this project include the potential for increased runoff from additional road surfaces, removal of wooded riparian corridors, and increased erosion and sediment deposition to downstream channels.

6.2.2 Cumulative Impacts

Cumulative impacts are caused by the incremental impact of the action when added to other past, present, and future impacts. Reasonably foreseeable cumulative impacts associated with this project include the loss of streams from increased development within the study area.

6.2.3 Mitigation Measures

Soil loss to streams in the vicinity of the project will be minimized through the use of established erosion protection and sediment control practices. Impacts to wooded areas have been minimized to the extent

possible as exhibited by the dominance of urban land impacts (ranging from 16.91 to 79.90 acres) compared with upland woods habitat impacts (ranging from 1.61 to 9.63 acres). Further mitigation measures are not required for foreseeable indirect impacts.

6.3 Surface Waters

Potential impacts to surface waters as a result of this project are described below in terms of streams and open waters.

6.3.1 Streams

Stream impacts will be minimized to the extent possible during final design of the project; however, anticipated direct impacts to streams associated with each alternative are discussed in more detail below. Stream impacts associated with the project are presented in Table 13 below and Exhibit 10. Mitigation for unavoidable stream impacts will be determined through the permitting process under Sections 404 and 401 of the Clean Water Act as administered by the USACE and KDOW, respectively, but may include payment to the Kentucky Wetland and Stream Mitigation Fund.

Alternative E1 will impact a total of 225 linear feet of poor quality intermittent stream and 410 feet of poor quality ephemeral stream. Alternative E3 will impact a total of 130 linear feet of poor quality intermittent stream and 475 feet of poor quality ephemeral stream. Alternative W7 will impact a total of 1,065 linear feet of poor quality intermittent stream and 15 linear feet of ephemeral streams. Alternative W9 will impact a total of 1,050 linear feet of poor quality intermittent stream and 15 linear feet of ephemeral streams. Table 13 below presents stream impacts for the Eastern and Western Alternatives.

Table 13: Stream Impact for Eastern and Western Alternatives

	Length in Study Area	Quality	Stream Order	Alternative				Impact Type	Drainage Area (ac)
				E1	E3	W7	W9		
Intermittent 1	1,315	Poor	1			1,040	1,025	Pipe	245
Intermittent 2	195	Poor	<1	180	130			Pipe	30
Intermittent 3	330	Poor	1	45				Pipe	65
Intermittent 4	90	Poor	1						
Intermittent 5	50	Poor	2			25	25	Pipe	245
Total	**1,980**			**225**	**130**	**1,065**	**1,050**		
Ephemeral 1	35	Poor	<1						
Ephemeral 2	80	Poor	<1						
Ephemeral 3	20	Poor	<1						
Ephemeral 4	520	Poor	<1		265			Fill	30
Ephemeral 5	55	Poor	<1		5			Fill	2
Ephemeral 6	105	Poor	<1						
Ephemeral 7	50	Poor	<1	50	50			Fill	1
Ephemeral 8	135	Poor	<1	135	5			Fill	3
Ephemeral 9	60	Poor	<1	35	10			Fill	1
Ephemeral 10	245	Poor	<1						
Ephemeral 11	290	Poor	<1	190	140			Fill	12
Ephemeral 12	75	Poor	<1						
Ephemeral 13	25	Poor	<1						
Ephemeral 14	15	Poor	<1						
Ephemeral 15	10	Poor	<1						
Ephemeral 16	40	Poor	<1			15	15	Pipe	25
Total	**1,760**			**410**	**475**	**15**	**15**		

6.3.2 Open Waters

There are no proposed impacts to Open Water Pond 1 (Exhibit 10, Sheet 2) from any of the proposed alternatives.

6.4 Terrestrial Ecosystems

Impacts to terrestrial ecosystems were analyzed in terms of floral community, faunal community, and terrestrial habitats. These subjects are discussed in more detail below in terms of potential impacts and suggested mitigation.

6.4.1 Floral Community

Impacts to floral communities within the disturbance limits of the project area are similar across the Eastern and Western Alternatives, respectively. In relation to other habitats within the study area the upland woods have higher quality habitats, the scrub/shrub have moderate-quality habitats, and the old fields have lower-quality habitats based on the level of and time since human impact. Unique floral species potentially occurring in the study area are limited to running buffalo clover (***Trifolium stoloniferum,*** federally-listed endangered, state listed threatened***)***. This species is discussed in Section 6.6.

Mitigation: Impacts to floral communities have been mitigated through minimization of disturbances to higher quality habitats. Further mitigation is not proposed.

6.4.2 Faunal Community

Impacts to the faunal communities within the disturbance limits of the project area pose no significant difference between the different alternatives. Due to the mobile nature of most faunal species and the close proximity of the alternatives, there is no significant difference in the impacts to bird, mammal, amphibian, and reptile species between the alternatives. Both Eastern and Western Alternatives will result in habitat loss for faunal species, but the majority of the habitat taken by the project will be existing urban land, which is heavily altered and provides minimal wildlife habitat. Terrestrial habitat impacts are further described in the following section. Unique faunal species potentially occurring in the study area are limited to the Indiana bat (***Myotis sodalis,*** federally-listed endangered, state-listed endangered). This species is discussed in Section 6.6.

Mitigation: Impacts to faunal communities have been mitigated through minimization of disturbances to higher quality habitats. Further mitigation is not proposed.

6.4.3 Terrestrial Habitats

The two Eastern Alternatives have total land impacts of 29.66 and 26.64 acres for E1 and E3, respectively. The two Western Alternatives have total land impacts of 96.54 acres for W7 and 87.20 acres for W9.

Impacts: For all the alternatives, the majority of impacts will be to urban land, with 18.16 acres and 16.91 acres for E1 and E3 and 79.90 acres and 73.27 acres for W7 and W9, respectively. For the Eastern Alternatives, E1 has more upland woods and scrub/shrub impacts and fewer old field and wetland impacts compared to E3. For the Western Alternatives, W7 has more upland woods, scrub/shrub, and old field impacts compared to W9. Table 14 presents a summary of habitat impacts by alternative.

Table 14: Habitat Impact for Eastern and Western Alternatives

	Acreage in Study Area	E1	E3	W7	W9
Transportation /Urban Land	223	18.16	16.91	79.90	73.27
Upland Woods	39.0	3.10	1.61	9.63	9.51
Scrub/Shrub	31.0	7.64	6.82	6.13	4.26
Old Field	12.7	0.71	1.21	0.74	0
Wetland	0.531	0.049	0.092	0.139	0.161
Agricultural	0.4	0	0	0	0
Open Water Pond	0.365	0	0	0	0
Total	307	29.66	26.64	96.54	87.20

Mitigation: Mitigation measures for adverse effects to terrestrial habitats is limited to minimization of impacts to the upland woods habitat. As discussed previously, the heavily disturbed transportation and urban land habitat will be impacted to a greater extent as a result of this project. Further mitigation measures are not proposed.

6.5 Wetlands

Wetland impacts and proposed mitigation measures for the alternatives are presented on Exhibit 10 and discussed below.

Impacts: Total impacts to wetlands from the proposed Alternatives E1, E3, W7, and W9 are 0.049, 0.092, 0.139, and 0.161 acre, respectively. Jurisdictional impacts associated with Alternative E1 total 0.049 compared to E3 with 0.062 acre. Jurisdictional impacts associated with Alternatives W7 and W9 total 0.139 and 0.161 acre, respectively. Table 15 below presents wetland impacts by each alternative.

Table 15: Wetland Impacts by Eastern and Western Alternative

	Status	Acreage in Study Area	E1	E3	W7	W9
Wetland 1	Jurisdictional	0.035				
Wetland2	Isolated	0.009				
Wetland 3	Jurisdictional	0.004		0.004		
Wetland 4	Jurisdictional	0.029		0.029		
Wetland 5	Jurisdictional	0.044	0.044	0.029		
Wetland 6	Jurisdictional	0.023				
Wetland 7	Jurisdictional	0.018				
Wetland 8	Jurisdictional	0.022	0.005			
Wetland 9	Jurisdictional	0.023				
Wetland 10	Isolated	0.123		0.030		
Wetland 11	Jurisdictional	0.047			0.018	0.040
Wetland 12	Jurisdictional	0.121			0.121	0.121
Wetland 13	Jurisdictional	0.032				
Total		**0.530**	**0.049**	**0.092**	**0.139**	**0.161**
Total Jurisdictional		**0.398**	**0.049**	**0.062**	**0.139**	**0.161**
Total Isolated		**0.132**	**0**	**0.030**	**0**	

Mitigation: Compensatory mitigation for wetland impacts will be required through the permitting process for Sections 404 and 401 of the Clean Water Act by the USACE and KDOW, respectively. This may be achieved through the use of an approved wetland bank or in-lieu fee payment.

6.6 Threatened and Endangered Species

Potential impacts to federal threatened/endangered species were determined based on the presence of habitat, or direct observations of protected species known to occur within or around the study area. The USFWS has not replied to initial correspondence, but will likely request that a Biological Assessment be completed prior to construction to assess impacts to federally-listed species. Based on this study, the Biological Assessment should address the Indiana bat, mussel species, and running buffalo clover. Impacts to these species and any required mitigative measures will be addressed through coordination with the USFWS under the Biological Assessment.

6.6.1 Mammal Species – Indiana Bat

No Indiana bats were observed during the field assessment. However, the upland woods habitat represents potential foraging areas and marginal roosting habitat for the Indiana bat within the study area. Additionally, 18 potential Indiana bat summer roost trees were identified outside the upland woods habitat and one primary roost tree was identified in the study area. Table 16 below identifies each alternative and its impact on potential Indiana bat habitat (upland woods habitat), individual summer roost trees, and the

primary roost tree. Alternative E1 (3.10 acres) results in 1.49 acres more impact compared to Alternative E3 (1.61 acres) and impacts two more summer roost trees. Alternative W7 (9.63 acres) results in 0.12 acre more impact compared to Alternative W9 (9.51 acres) and impacts one more summer roost tree. None of the alternatives impact the primary roost tree.

Table 16: Potential Indiana Bat Habitat Impact by Alternative

	Study Area	E1	E3	W7	W9
Upland Woods – Potential Indiana Bat Habitat (ac)	39.012	3.10	1.61	9.63	9.51
# of Summer Roost Trees	18	4	2	3	2
# of Primary Roost Trees	1	N/A	N/A	0	0

6.6.2 Mussel Species

Seven federally-listed mussels are known to occur in Boone County. Typical habitat for these mussel species is small to large rivers. The streams within the study area do not provide suitable habitat; therefore, direct impacts to mussel species are not anticipated as a result of this project.

Potential indirect impacts from the project could include alteration or removal of wooded riparian corridors, increased downstream sediment deposition due to construction activities, and runoff of fuel, pesticides, or other hazardous materials. These potential impacts are assumed to be the same for all of the alternatives and will be minimized through the use of appropriate best management practices.

6.6.3 Plant Species – Running Buffalo Clover

No individuals of running buffalo clover were observed during the field assessment; however, a survey during the flowering season was not completed as part of this assessment. One area of suitable habitat for running buffalo clover was identified in the study area totaling approximately 2.96 acres. This area is located along the streambanks of Intermittent Stream 1, which parallels KY 338 in the western portion of the study area (Exhibit 11, Sheet 2 and 3). Table 17 below identifies each alternative and its impact on this potential running buffalo clover habitat. The Eastern Alternatives have no impact on this area. Alternative W7 (1.55 acre) has slightly more impact to potential running buffalo clover habitat than Alternative W9 (1.54 acre).

Table 17: Potential Running Buffalo Clover Habitat Impact by Alternative

	Acreage in Study Area	E1	E3	W7	W9
Potential Running Buffalo Clover Habitat	2.96	N/A	N/A	1.55	1.54

6.6.4 Mitigation

Mitigation measures for federal threatened/endangered species includes minimization of impacts to prime habitat areas, minimization of riparian tree clearing, use of proper equipment staging and fueling areas, and enhanced erosion control measures. Further mitigation requirements for federally-listed species will be determined through coordination with the USFWS under the Biological Assessment process.

7.0 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Several short-term and long-term impacts to the aquatic and terrestrial ecosystems by the proposed project have been identified throughout this report. Implementation of any construction alternative will result in the permanent elimination of upland woods, scrub/shrub, old field habitat, as well as impacts to intermittent and ephemeral streams and wetlands. These impacts will result in disturbances to both floral and faunal populations. Long-term impacts include the permanent loss of vegetation communities and wildlife communities within the limits of disturbance and the creation of movement barriers. Short-term impacts to faunal communities from the proposed project could include disturbance by construction activities, disruption of local movement patterns of animal species, and displacement of those species to other suitable habitats. Long-term impacts to animal communities may include the loss of local migration routes for some species, loss of nesting habitat for both bird and mammal populations, and the loss of general habitat for food and shelter for many species.

Although this project will result in short-term and long-term impacts to the terrestrial ecosystems in the study area, the overall impacts to the ecosystem will be limited, since a majority of the impact areas of both Eastern and Western Alternatives have been disturbed by previous tree clearing and vegetation maintenance associated with roadway construction, agriculture, and urban development. In addition, the existing terrestrial ecosystems within the study area do not exhibit rare or unique species or habitats and are representative of habitats commonly found throughout the region. Thus, similar plant communities exist in the vicinity of the project, and animal populations will generally be able to relocate and find suitable habitat in nearby areas.

Development of the project could potentially have indirect impacts to downstream aquatic ecosystems resulting from stormwater runoff from the construction site resulting in short-term threats to aquatic and terrestrial fauna. Short-term impacts may include increased sedimentation, turbidity, suspended solids, and water temperatures. These impacts may also lead to stream habitat degradation and decreased aquatic fauna. Best management practices should be used to minimize the impacts to these aquatic resources.

Given the limited habitat provided within the study area and the limited anticipated impacts, disturbances to the short-term and long-term productivity of this area will be minimal.

8.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This study has identified several commitments of physical, human, natural, or financial resources, which may be irreversible. First, the land used in construction for the proposed project may be considered an irreversible commitment of land resources during the time period for which the relocated roadway is in operation. However, should a greater use develop for this land in the future, it could be converted to other uses though this possibility is not envisioned at the present time. Second, the implementation of the proposed project will require a significant one-time commitment of public financial resources, which, though not retrievable, will be offset in the future by increased operational efficiency resulting from an improved roadway.

Potential irreversible commitment of terrestrial resources will include the permanent loss of upland woods, scrub/shrub, and old field habitats within the impact area of the project. The elimination of habitat will affect both floral and faunal populations. Long-term impacts include the loss of vegetation communities within the impact area. Short-term impacts to faunal communities from the proposed project could include the disturbance by construction activities and the disruption of local movement patterns of animal species. Long-term impacts to animal communities may include the loss of local migration routes for some species, loss of nesting habitat for both bird and mammal populations, and the loss of general habitat for food and shelter for some species.

While this project will result in short-term and long-term impacts to the terrestrial habitats in the project area, the overall ecological impacts will be limited since the majority impact areas are already highly disturbed, do not exhibit rare or unique species or habitats, and are representative of habitats commonly found throughout the vicinity of the project. Thus, animal populations will generally be able to find and relocate to suitable habitat in nearby areas.

No irreversible commitment of aquatic resources from this project is anticipated due to the use of best management practices during construction and the location of the project.

9.0 ALTERNATIVES ANALYSIS AND RECOMMENDATIONS

The recommended Eastern Alternative for this project is E3 and the recommended Western Alternative for this project is W9. The preference for these alternatives is summarized below in terms of significant ecological resources, aquatic ecosystems, surface waters, wetlands, terrestrial ecosystems, and state and federal threatened or endangered species. Table 18 summarizes anticipated impacts to the terrestrial and aquatic ecosystems.

Table 18: Impact Summary per Alternative

Feature	Alternative Impact			
	E1	**E3**	**W7**	**W9**
Intermittent Stream (lf)	225	130	1,065	1,050
Ephemeral Stream (lf)	410	475	15	15
Jurisdictional Wetland (ac)	0.049	0.062	0.139	0.161
Open Water Pond (ac)	0	0	0	0
Upland Woods/Indiana Bat Habitat (ac)	3.10	1.61	9.63	9.51
Scrub Shrub (ac)	7.64	6.82	6.13	4.26
Old Field (ac)	0.71	1.21	0.74	0
Agricultural (ac)	0	0	0	0
# of Summer Roost Trees	4	2	3	2
# of Primary Roost Trees	N/A	N/A	0	0
Running Buffalo Clover Habitat (ac)	N/A	N/A	1.55	1.54

9.1 Significant Ecological Resources

There is no significant difference between the Alternatives with respect to impacts to significant ecological resources.

9.2 Aquatic Ecosystems

There is no significant difference between the Alternatives with respect to impacts to the aquatic ecosystems.

9.3 Surface Waters and Wetlands

Alternative E3 impacts less intermittent stream (225 linear feet) compared to Alternative E1 (130 linear feet), but Alternative E3 impacts more ephemeral stream (475 linear feet compared to 410 linear feet). Alternative E3 (0.062 acre) impacts slightly more jurisdictional wetland compared to Alternative E1 (0.049 acre). Alternative W9 impacts less intermittent stream (1,050 linear feet) compared to Alternative W7 (1,065 linear feet), and both alternatives impact 15 feet of ephemeral stream. Alternative W7 (0.139 acre) impacts slightly more jurisdictional wetland compared to W9 (0.161 acre).

9.4 Terrestrial Ecosystems

Alternative E3 impacts less upland woods (1.61 acre) and scrub/shrub (6.82 acre) habitat compared to Alternative E1 (3.10 and 7.64 acres). Alternative W9 impacts less upland woods (9.51 acre) and scrub/shrub (4.26 acre) habitat compared to Alternative W7 (9.63 and 6.13 acres).

9.5 State and Federal Threatened/Endangered Species

Alternative E3 (1.61 acres, 2 trees) impacts less potential Indiana bat habitat and fewer potential individual roost trees than Alternative E1 (3.10 acres, 4 trees), and neither Eastern Alternative will impact potential running buffalo clover habitat. Alternative W7 (9.63 acres) results in 0.12 acre more impact compared to Alternative W9 (9.51 acres) and impacts one more summer roost tree. None of the alternatives impact the primary roost tree. Both W7 and W9 have similar impacts to potential running buffalo clover habitat (1.5 acre).

9.6 Recommendation

Alternative E3 and W9 have slightly fewer ecological impacts compared to Alternative E1 and W7. These preferred alternatives:

- impact fewer intermittent streams, thus minimizing potential sediment inputs
- impact smaller amounts of the upland woods habitat, which is the higher quality habitat within the study area
- impact a smaller amount of potential foraging and summer maternity roost habitats for the Indiana bat (upland woods habitat).
- impact fewer individual Indiana bat roost trees

Based on a strict comparison of the available alternatives, it is recommended that KYTC proceed with Alternative E3 and W9 as it is presented in this report. However, should Alternative E1 or W7 be chosen, the overall ecological loss will not be significantly different.

10.0 SUMMARY

The Kentucky Transportation Cabinet (KYTC) proposes the reconstruction of the Kentucky Highway 338 (KY 338) interchange at I-71/I-75 (including KY 338/US 25 interchange to the east) in Boone County, Kentucky. The purpose of this project is to increase safety, improve functionality, and reduce traffic delays experienced at and within the immediate vicinity of the I-71/I-75 and KY 338 interchange, thereby enhancing the viability of I-71/I-75 as a major transportation corridor. This report presents an assessment of significant ecological features within the study area of the proposed KY 338 Reconstruction Project and the impacts to the ecological features from the proposed alternatives.

This report provides an ecological analysis of the proposed project, following the "Ecological Study Format Guidance and Accountability Form" developed by the Kentucky Transportation Cabinet - Division of Environmental Analysis. The methods and results used to conduct the ecological study include: literature and office review; terrestrial and wetland sampling; and state and federal threatened/endangered species habitat assessment. Five alternatives were assessed, including two eastern alternatives and three western alternatives for the reconstruction project.

The study area includes five intermittent streams, 16 ephemeral streams, 13 wetlands, and one open water pond. Alternative E3 and W9 provides a slightly lower amount of overall ecological impact for the proposed project. Alternative E3 and W9:

- impact fewer intermittent streams, thus minimizing potential sediment inputs
- impact smaller amounts of the upland woods habitat, which is the higher quality habitat within the study area
- impact a smaller amount of potential foraging and summer maternity roost habitat for the Indiana bat (upland woods habitat)
- impact fewer individual Indiana bat summer roost trees

The USFWS will likely request a Biological Assessment to address potential impacts to federally-listed species with habitat within the project area.

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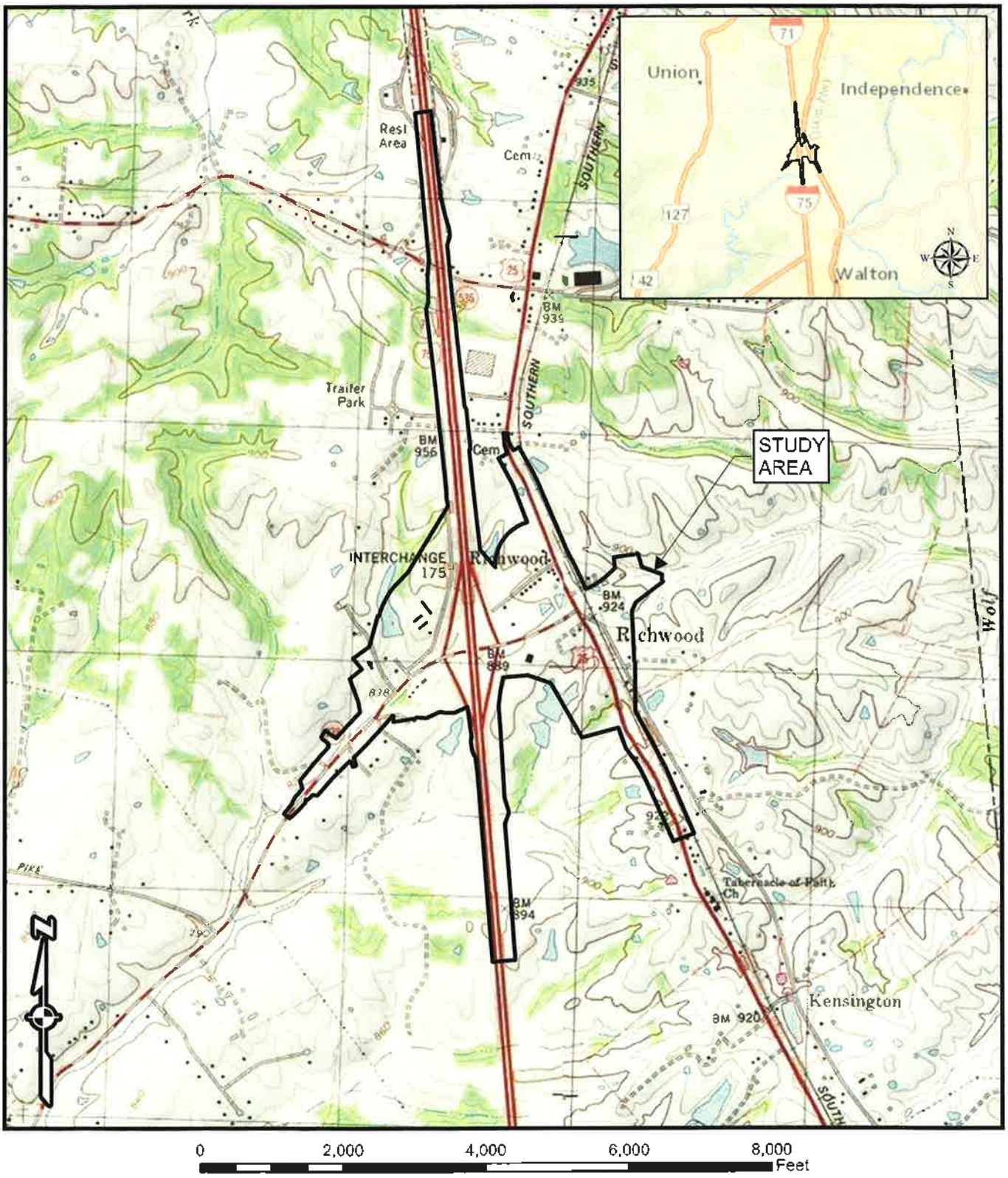
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EXHIBITS

Source: USA Topo Maps, Copyright:© 2011 National Geographic Society, i-cubed. USGS 7.5-Minute Topographic Quadrangle Map - Union, Kentucky



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KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

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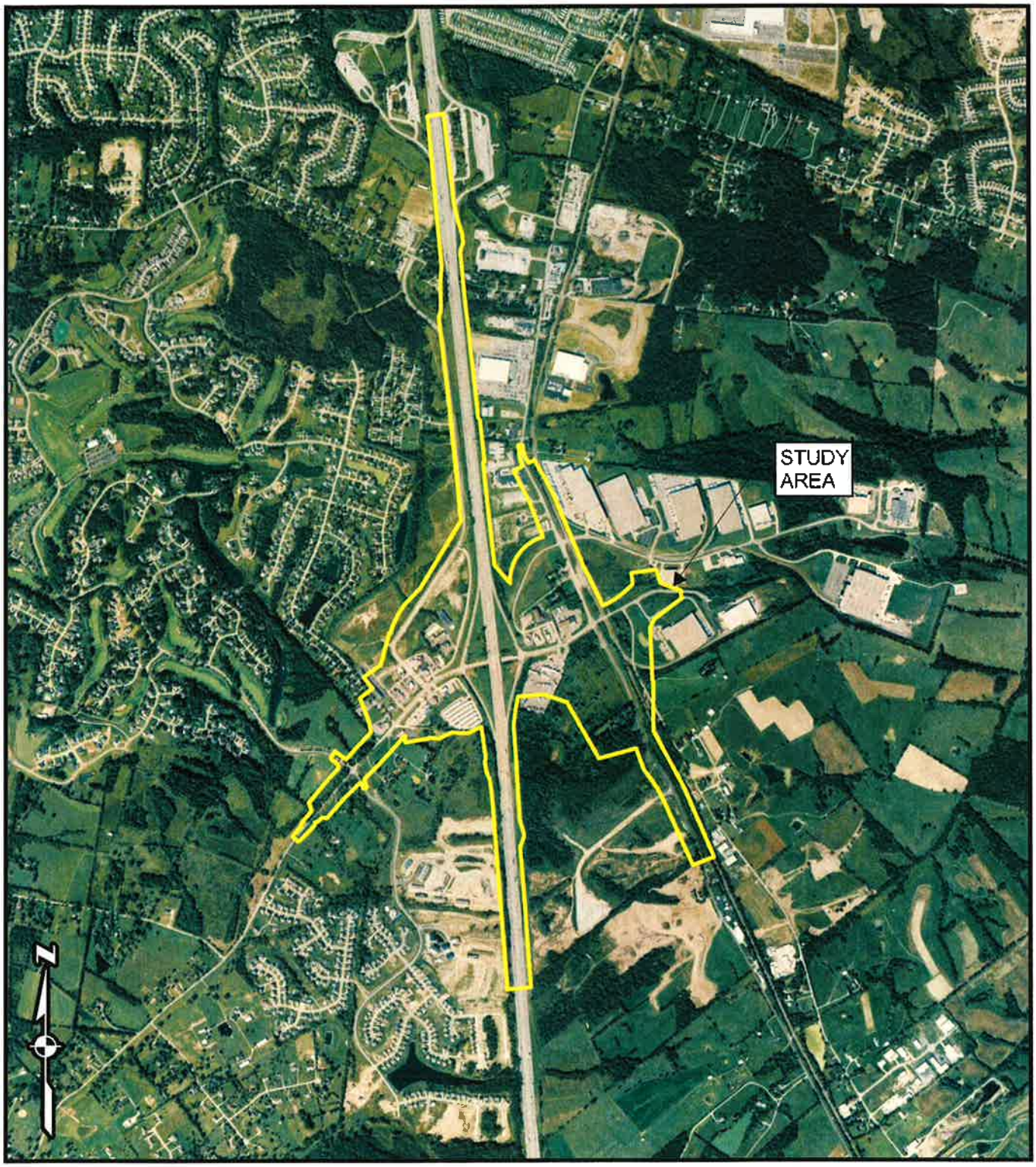
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REVISED DATE 5.04.2012 | DRAWN BY EDB

SITE LOCATION MAP

EXHIBIT 1

Source: Bing Maps Aerial, (c) 2010 Microsoft Corporation and its data suppliers



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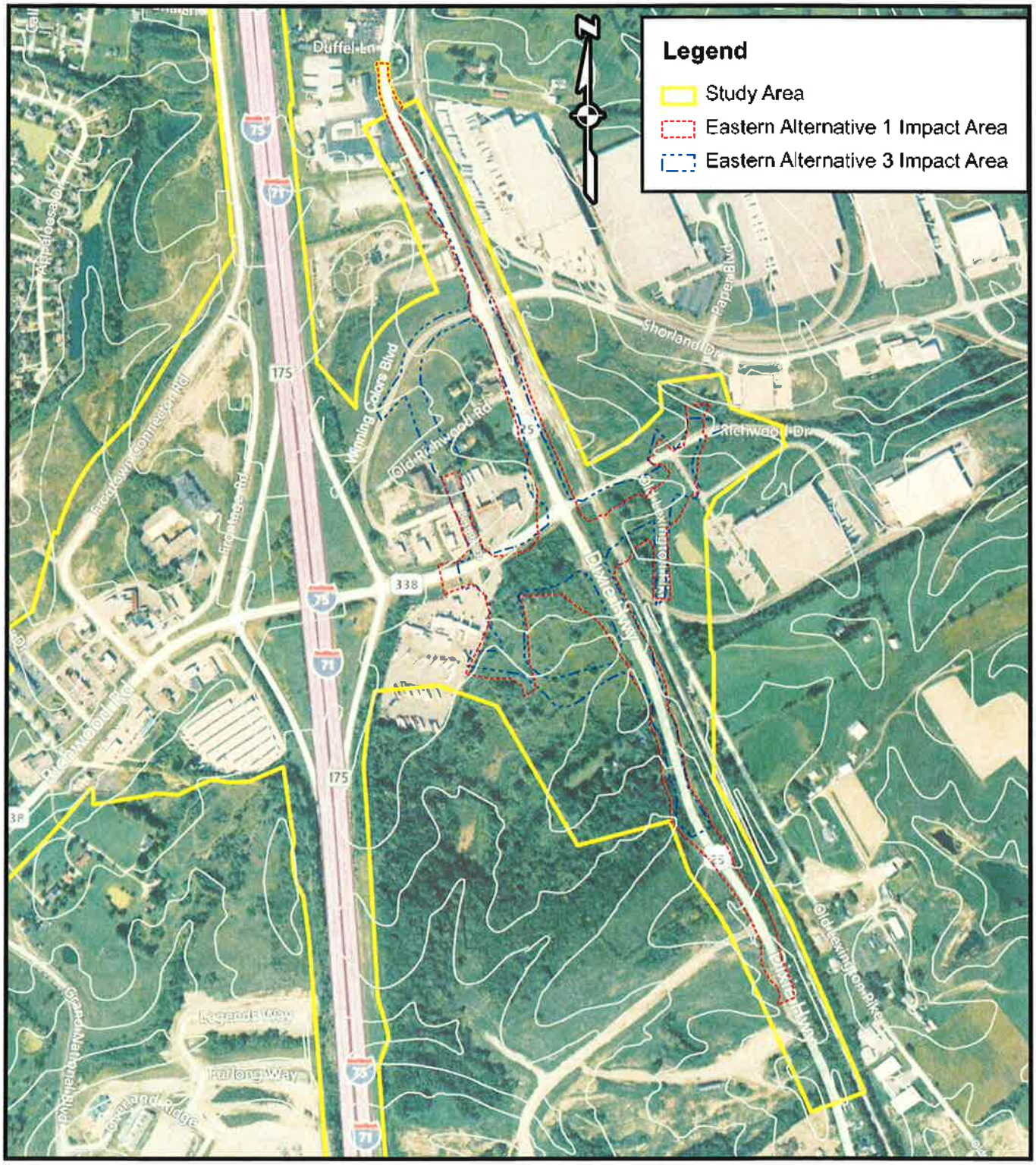
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AERIAL PHOTOGRAPH MAP

EXHIBIT 2

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



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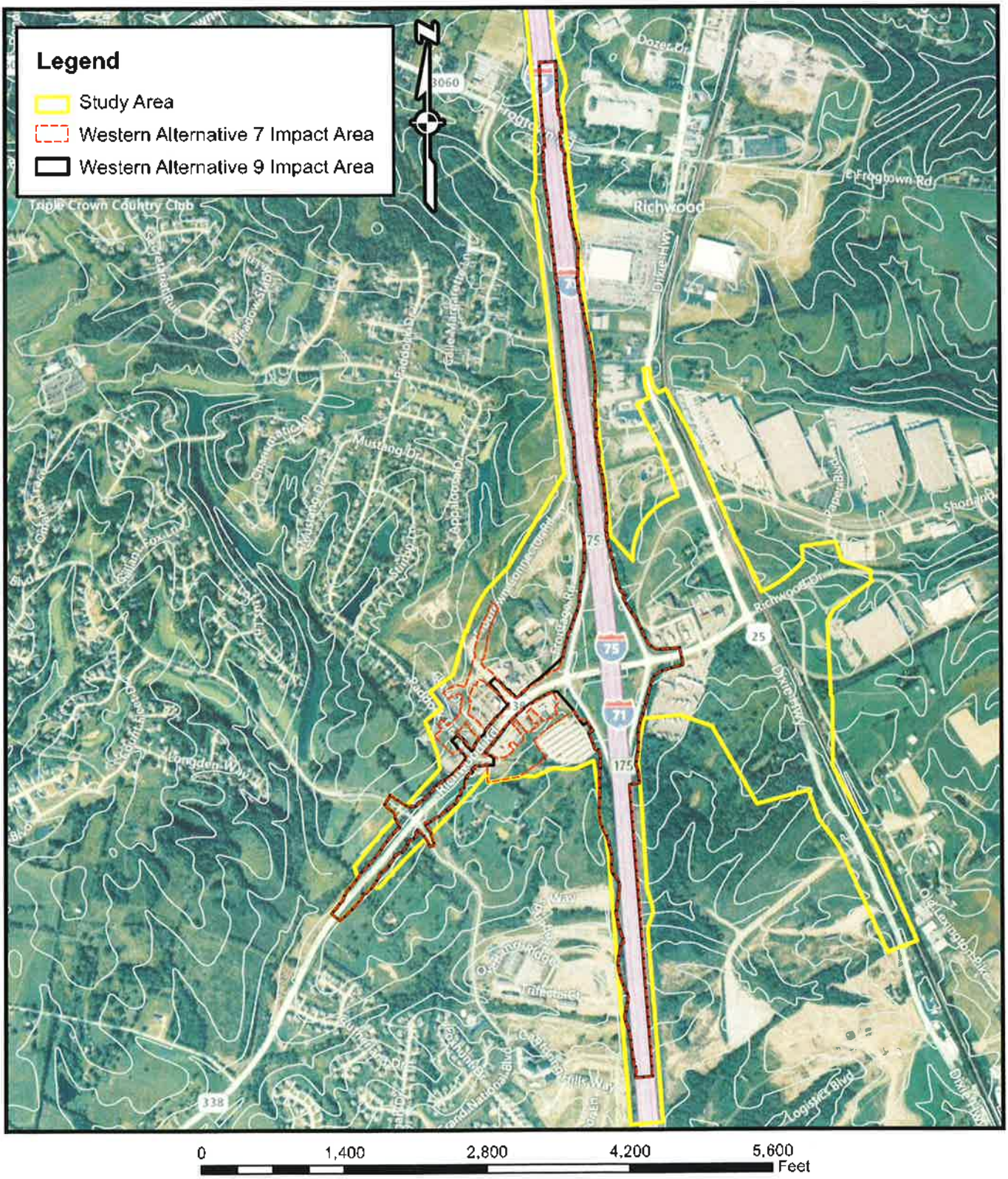
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EASTERN ALTERNATIVES MAP

EXHIBIT 3

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



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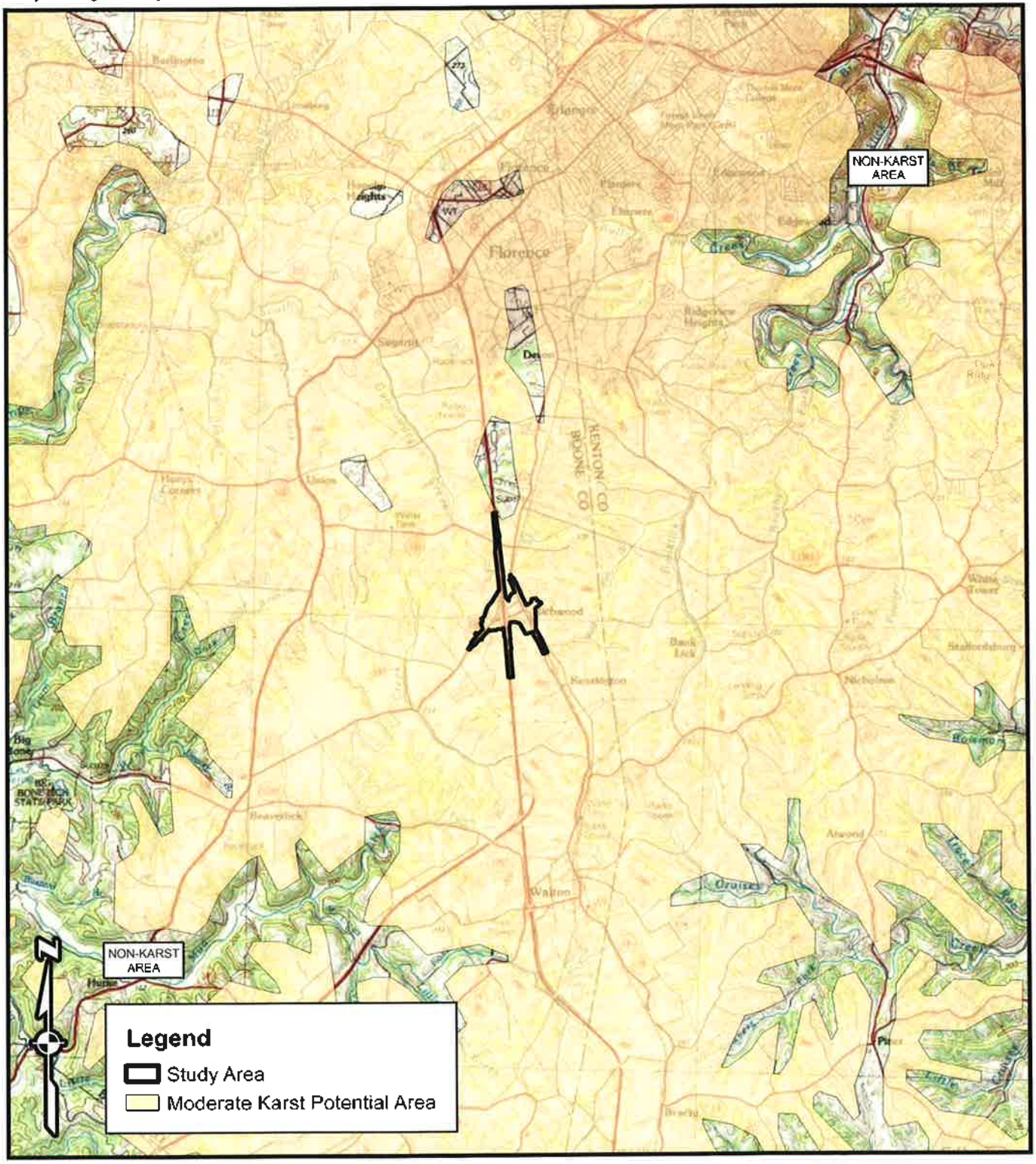
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WESTERN ALTERNATIVES MAP

EXHIBIT 4

Source: USA Topo Maps, Copyright:© 2011 National Geographic Society, i-cubed. USGS 7.5-Minute Topographic Quadrangle Map - Union, Kentucky.
Kentucky Geologic Survey - Karst Occurrence in Kentucky (2005)



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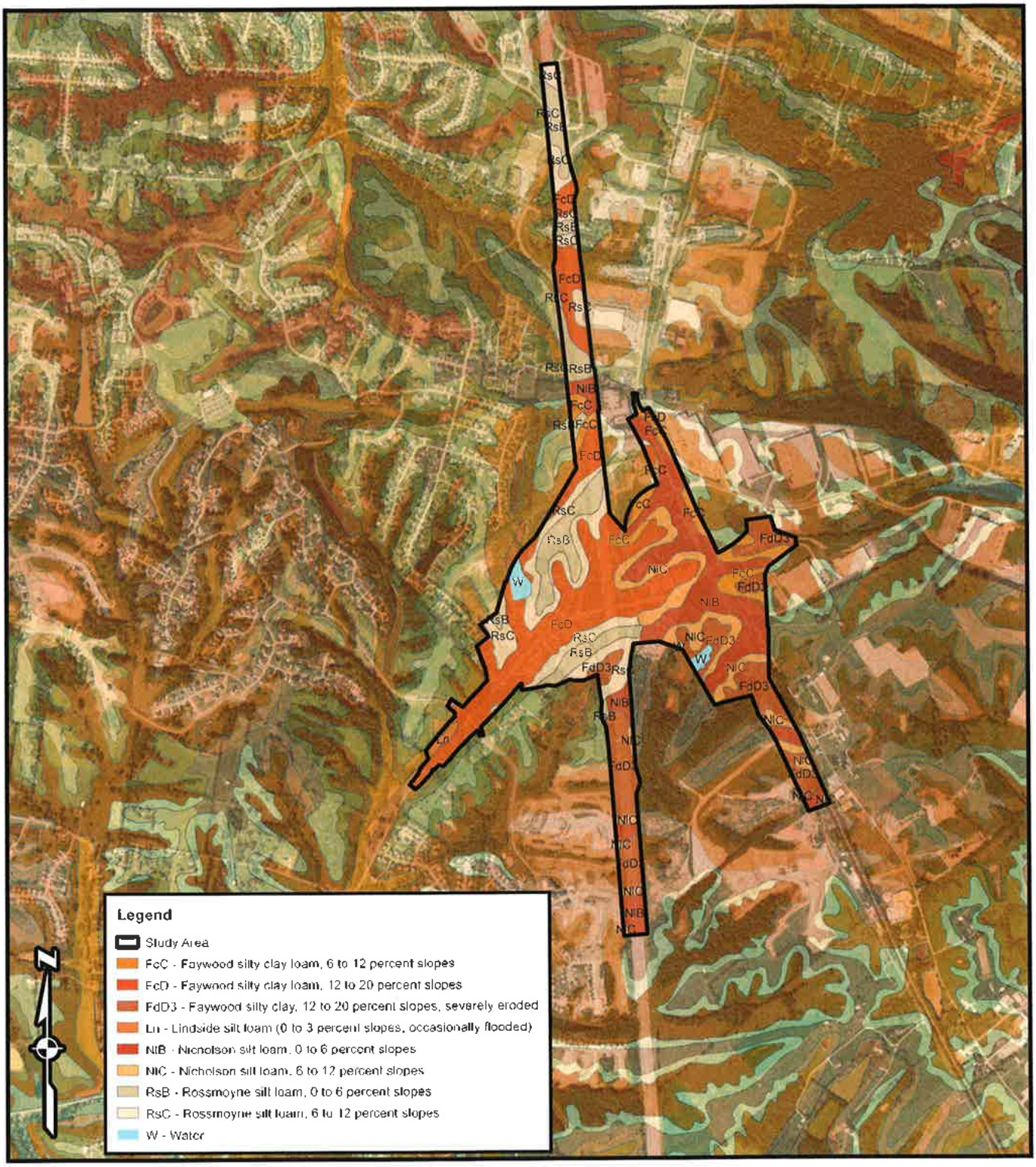
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ITEM NO: 6-18.00
FILE: Redwing/10-076-01/Figures/KARST
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KARST POTENTIAL MAP

EXHIBIT 5

Source: Bing Maps Aer al, (c) 2010 Microsoft Corporation and its data suppliers; Federal Emergency Management Agency, Q3 Flood Data, Boone County, Kentucky, 2007



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BOONE COUNTY, KENTUCKY

SOIL SURVEY MAP

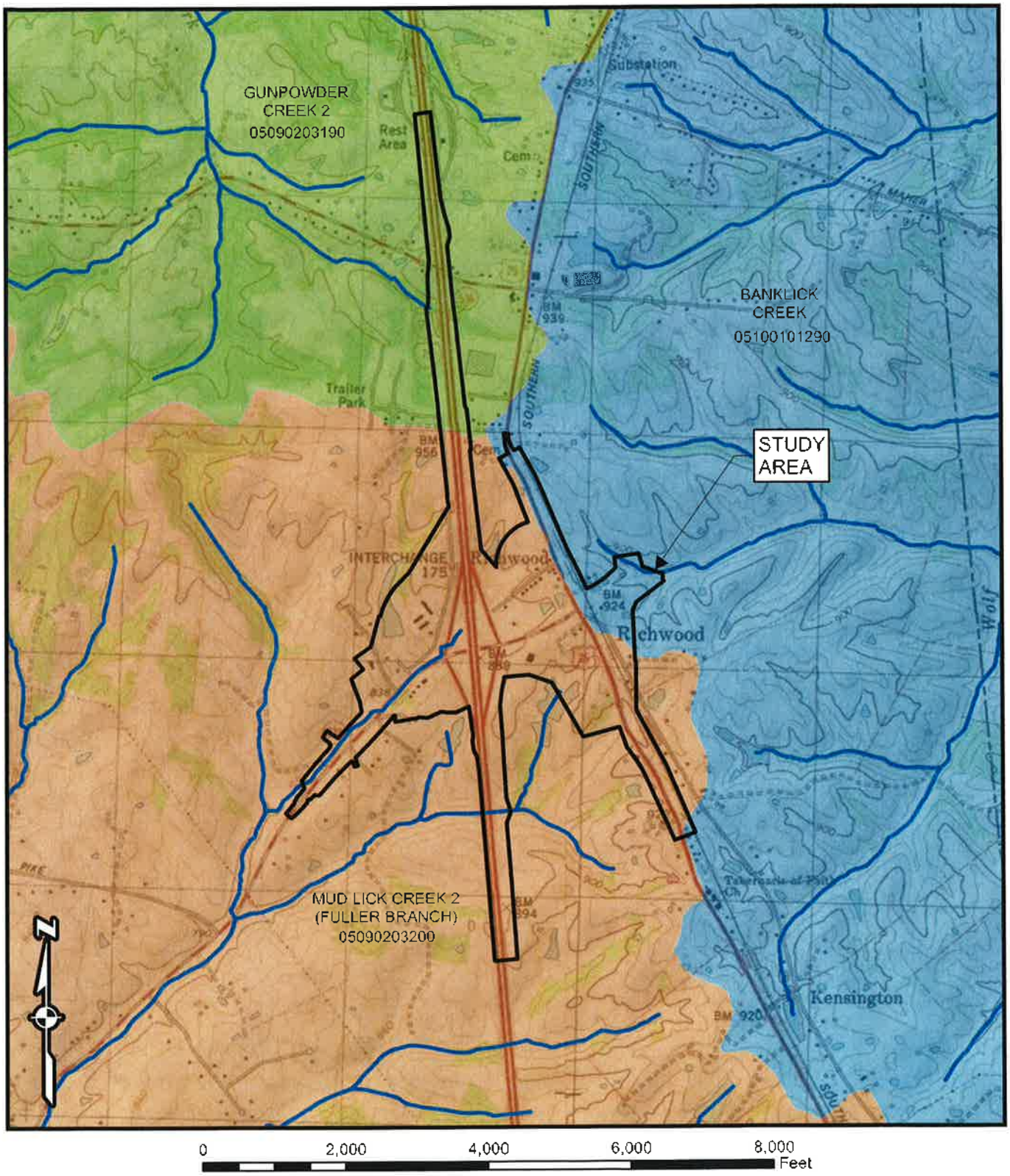
ITEM NO: 6-18.00

FILE: Redwing/10-076-01/Figures/Soils

REVISED DATE 5.04.2012 | DRAWN BY EDB

EXHIBIT 6

Source: USA Topo Maps, Copyright:© 2011 National Geographic Society, i-cubed. USGS 7.5-Minute Topographic Quadrangle Map - Union, Kentucky



REDWING
ECOLOGICAL SERVICES, INC.

KENTUCKY
TRANSPORTATION
CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00

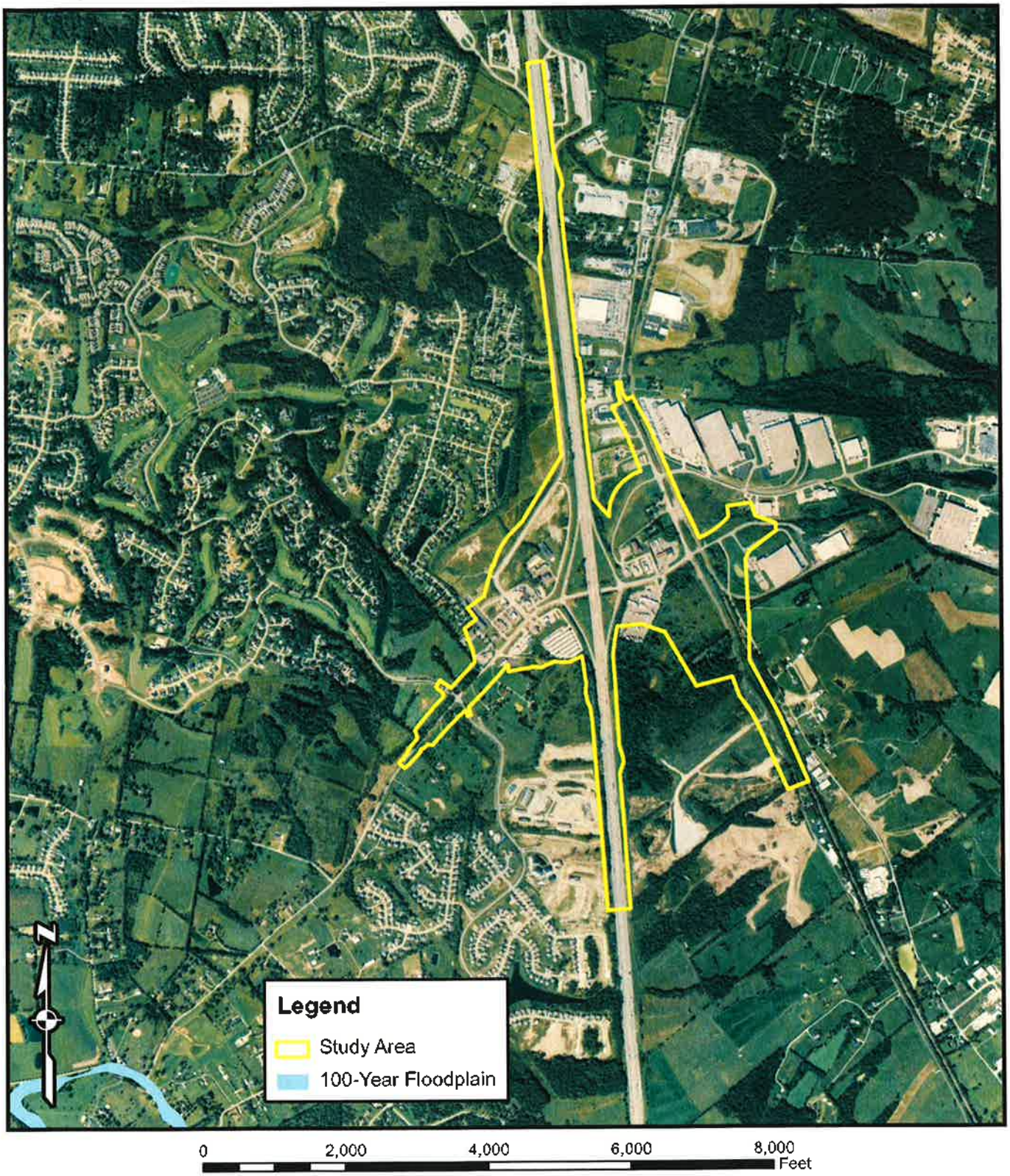
FILE: Redwing/10-076-01/Figures/HUC

REVISED DATE 5.04.2012 | DRAWN BY EDB

ELEVEN-DIGIT HUC AND
NHD STREAMS MAP

EXHIBIT 7

Source: Bing Maps Aerial, (c) 2010 Microsoft Corporation and its data suppliers; Federal Emergency Management Agency, Q3 Flood Data, Boone County, Kentucky, 2007



REDWING ECOLOGICAL SERVICES, INC.

KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00

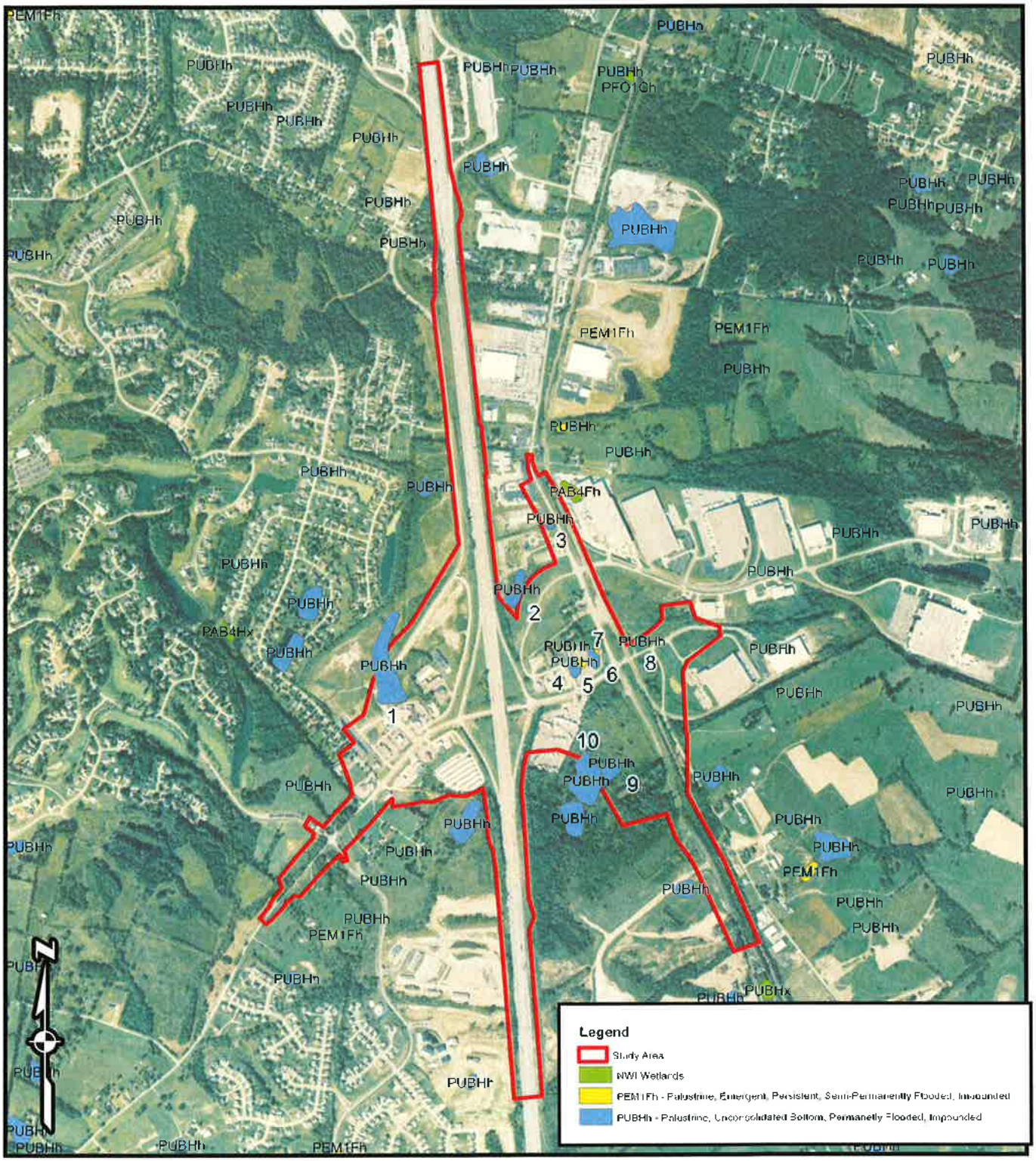
FILE: Redwing/10-076-01/Figures/FEMA

REVISED DATE 5.04.2012 | DRAWN BY EDB

FEMA FLOODPLAIN MAP

EXHIBIT 8

Source: Bing Maps Aerial, (c) 2010 Microsoft Corporation and its data suppliers



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KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00

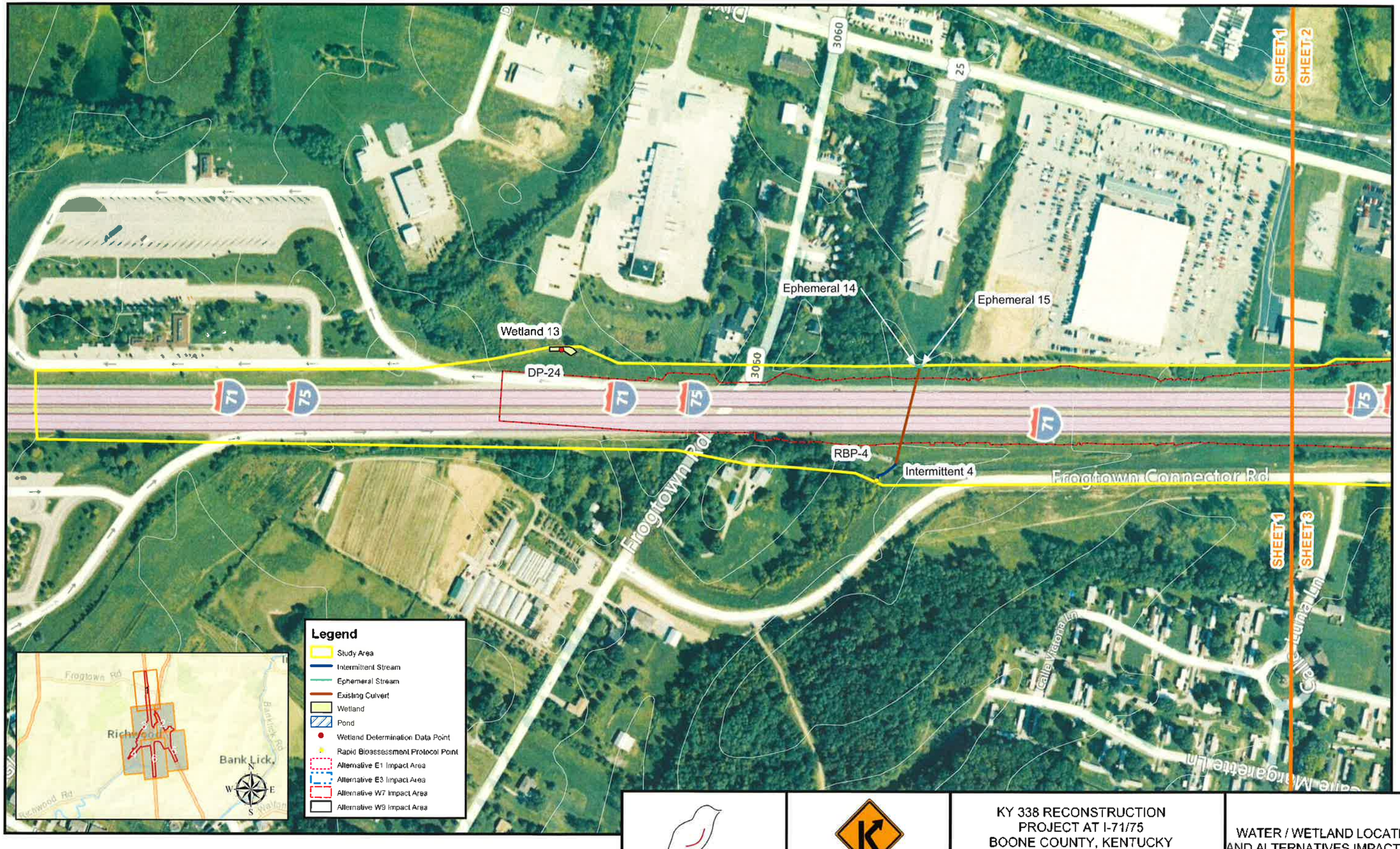
FILE: Redwing/10-076-01/Figures/NWI

REVISED DATE 5.04.2012 | DRAWN BY EDB

NATIONAL WETLANDS INVENTORY MAP

EXHIBIT 9

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



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KENTUCKY TRANSPORTATION CABINET

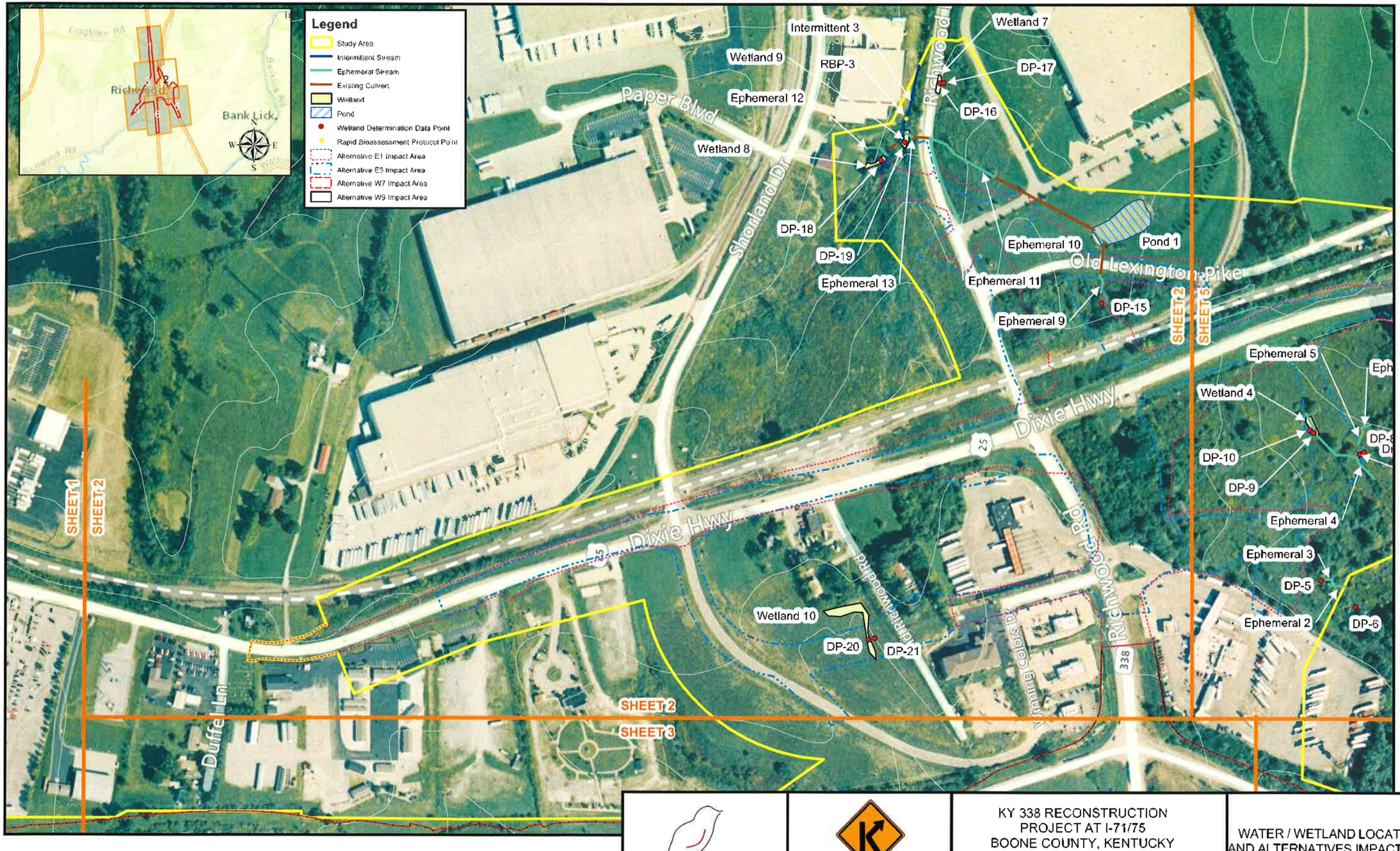
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-18.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 1 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



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KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-18.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 2 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



REDWING ECOLOGICAL SERVICES, INC.

KENTUCKY TRANSPORTATION CABINET

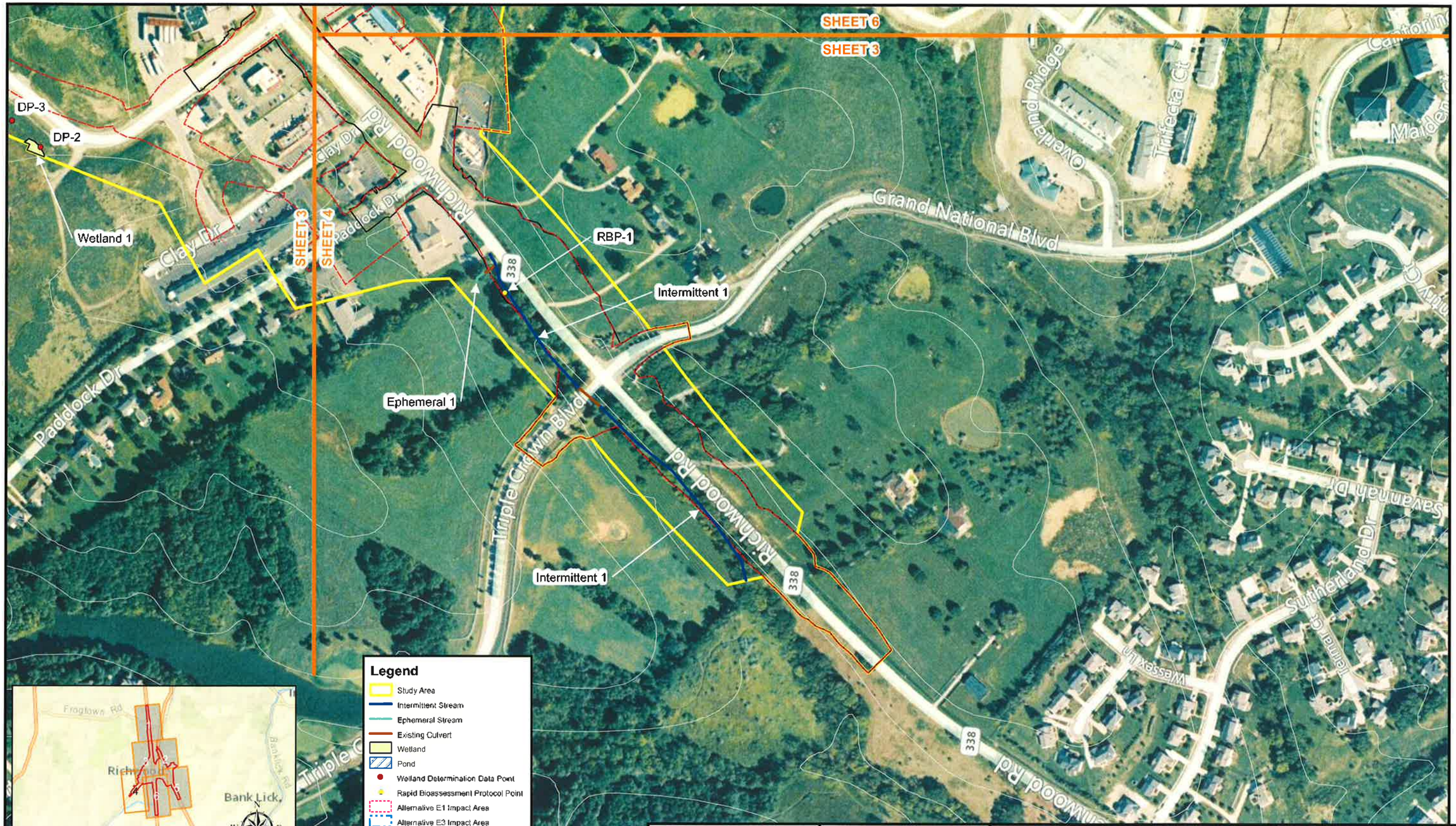
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-18.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 3 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



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KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-16.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 4 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



REDWING ECOLOGICAL SERVICES, INC

KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-18.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 5 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternatives provided by Parsons Corporation.



REDWING ECOLOGICAL SERVICES, INC

KENTUCKY TRANSPORTATION CABINET

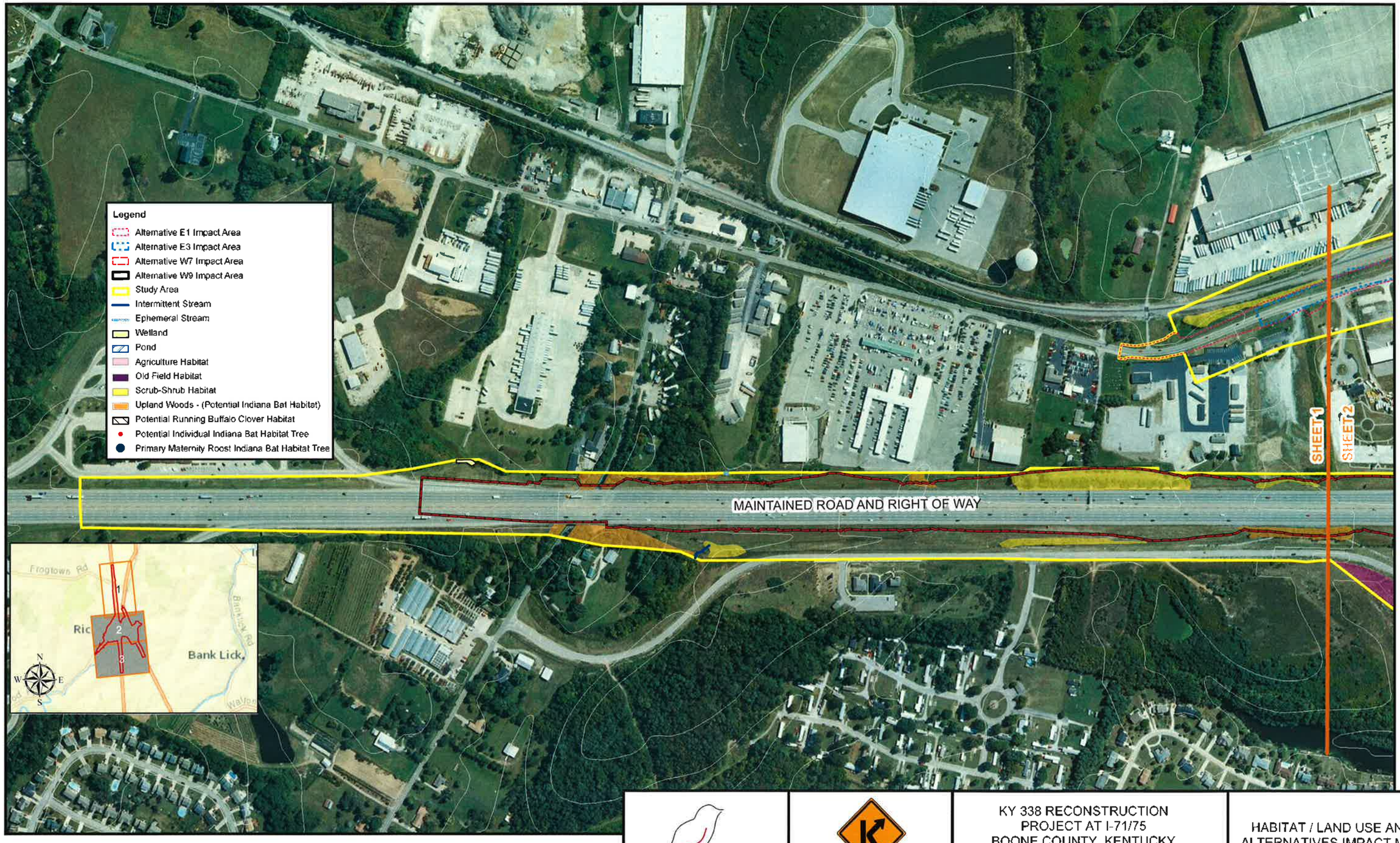
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO:6-18.00
FILE: Redwing/10-076/Figures/WaterWetlandMap
REVISED DATE 6.05.2012 | DRAWN BY EDB

WATER / WETLAND LOCATION AND ALTERNATIVES IMPACT MAP

EXHIBIT 10
SHEET 6 of 6

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternates provided by Parsons Corporation.



REDWING ECOLOGICAL SERVICES, INC.

KENTUCKY TRANSPORTATION CABINET

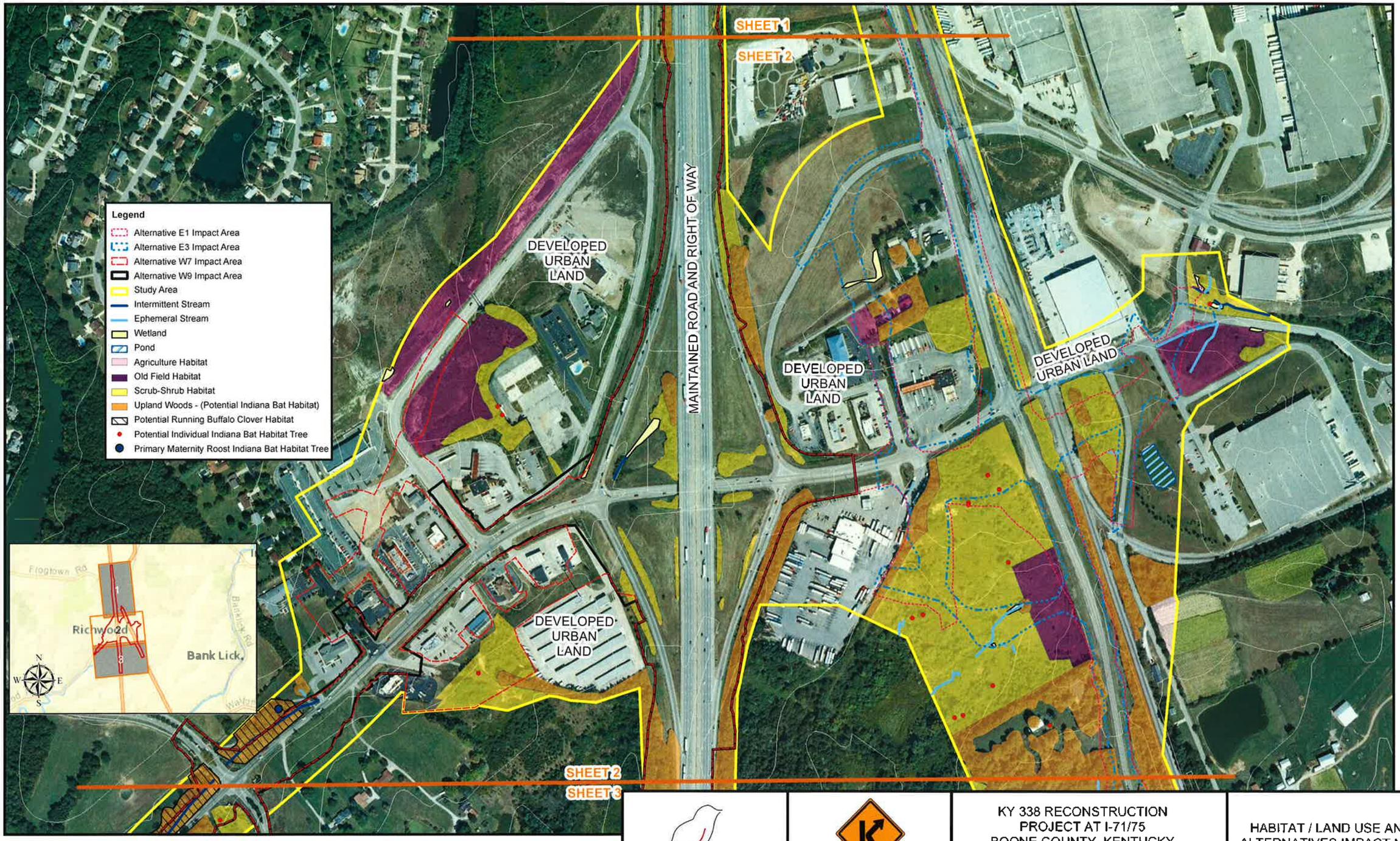
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00
FILE: Redwing/10-076-01/Figures/Habitat Map Impact
REVISED DATE 6.04.2012 | DRAWN BY EDB

HABITAT / LAND USE AND
ALTERNATIVES IMPACT MAP

EXHIBIT 11
SHEET 1 of 3

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternates provided by Parsons Corporation.



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KENTUCKY TRANSPORTATION CABINET

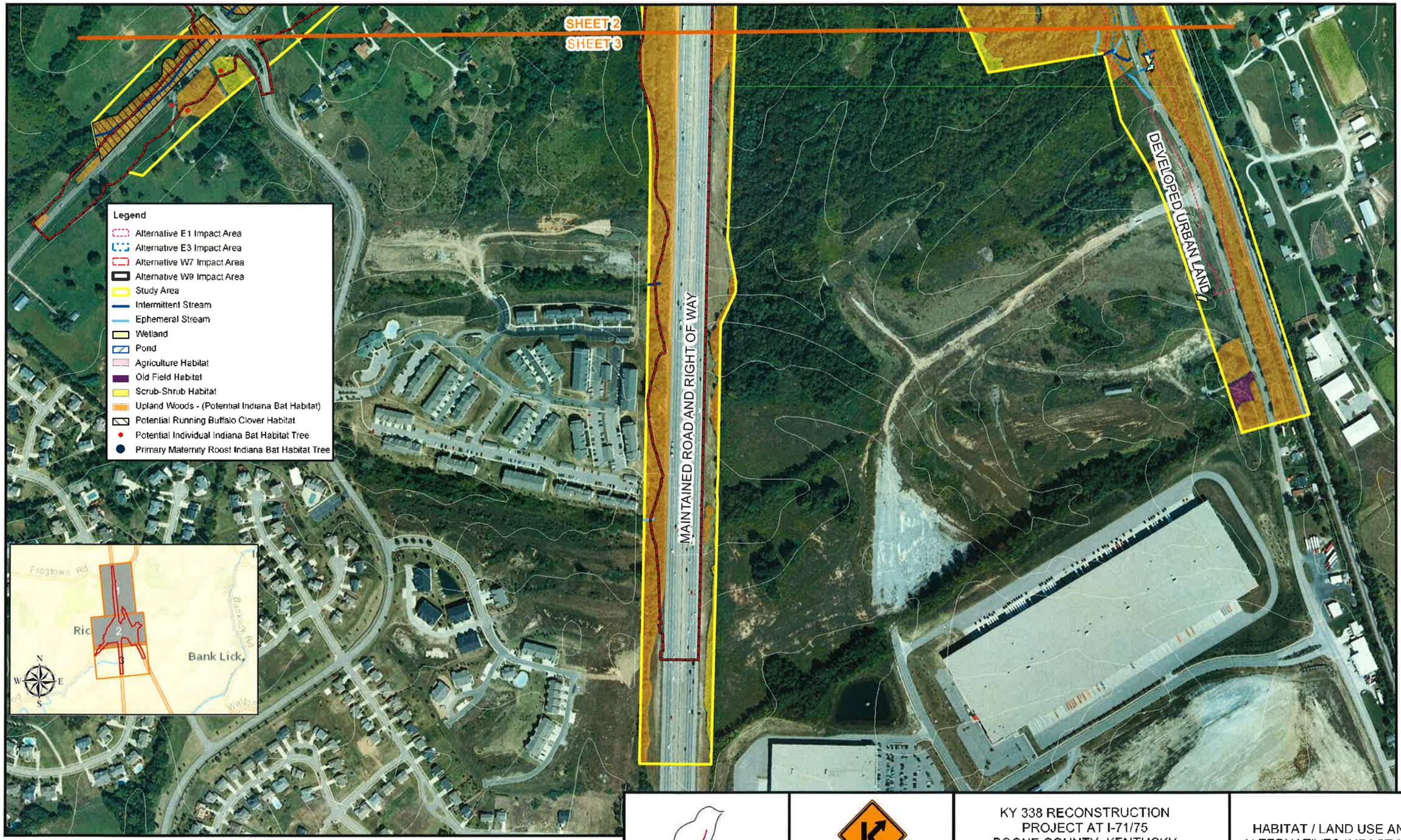
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO. 6-18.00
FILE: Redwing/10-076-01/Figures/Habitat Map Impact
REVISED DATE 6.04.2012 | DRAWN BY EDB

HABITAT / LAND USE AND ALTERNATIVES IMPACT MAP

EXHIBIT 11
SHEET 2 of 3

Source: Bing Maps Hybrid, (c) 2010 Microsoft Corporation and its data suppliers; Alternates provided by Parsons Corporation.



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KENTUCKY TRANSPORTATION CABINET

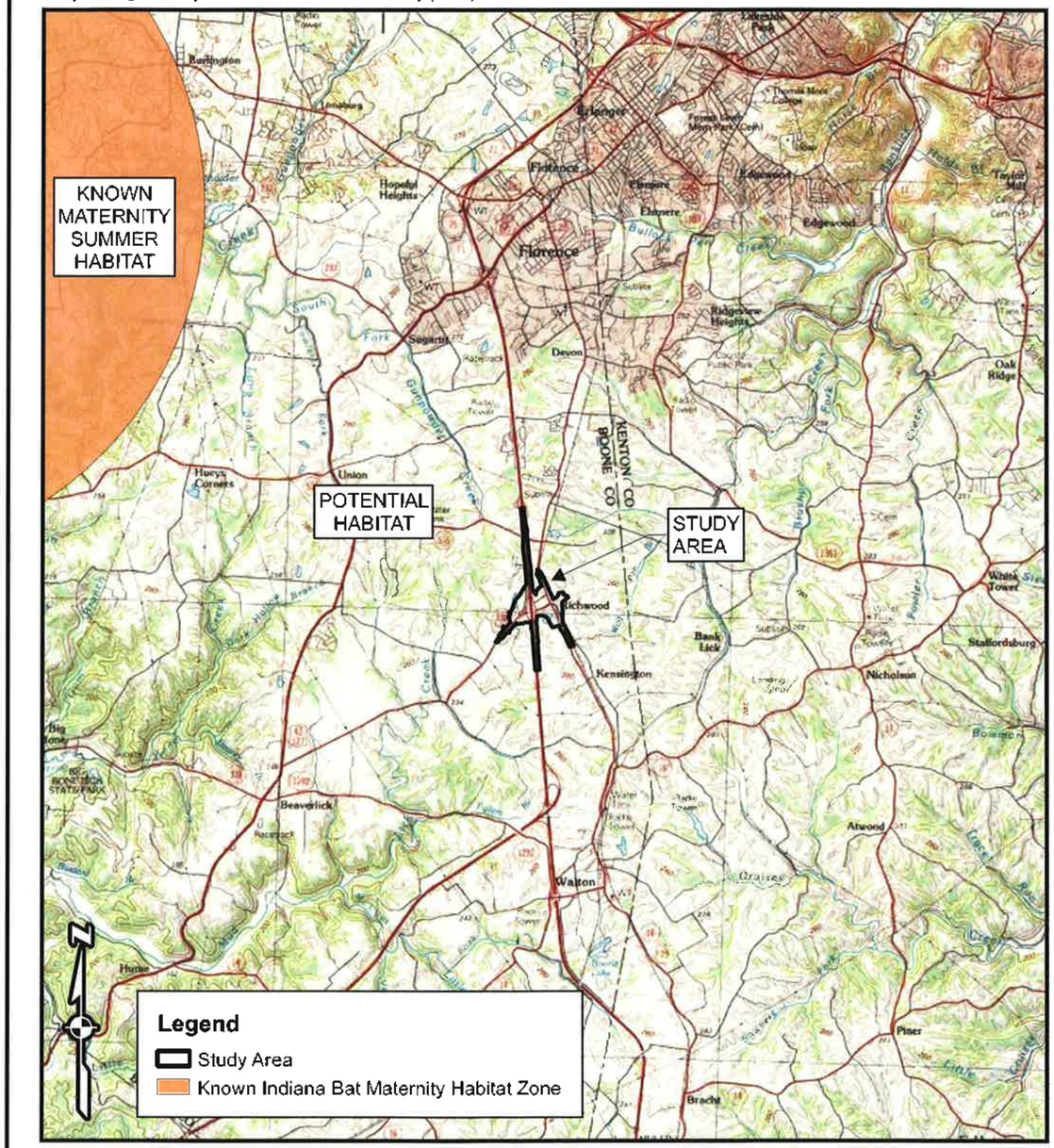
KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00
FILE: Redwing/10-076-01/Figures/Habitat Map Impact
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HABITAT / LAND USE AND
ALTERNATIVES IMPACT MAP

EXHIBIT 11
SHEET 3 of 3

Source: USA Topo Maps, Copyright:© 2011 National Geographic Society, i-cubed. USGS 7.5-Minute Topographic Quadrangle Map - Union, Kentucky.
Kentucky Geologic Survey - Karst Occurrence in Kentucky (2005)



REDWING ECOLOGICAL SERVICES, INC.

KENTUCKY TRANSPORTATION CABINET

KY 338 RECONSTRUCTION
PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY

ITEM NO: 6-18.00
FILE: Redwing/10-076-01/Figures/BatCircle
REVISED DATE 5.07.2012 | DRAWN BY EDB

KNOWN INDIANA BAT HABITAT LOCATION MAP

EXHIBIT 12

PHOTOGRAPHS



Photograph 1: Intermittent Stream 1 on north side of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 2: Intermittent Stream 2 along east side of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 3: Intermittent Stream 3 along west side of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 4: Intermittent Stream 4 flows beneath I-71/75 in the northern portion of the study area. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 5: Intermittent Stream 5 flows beneath I-71/75 in the southern portion of the study area. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 6: Ephemeral Stream 1 which is a tributary to Intermittent Stream 1. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 7: Ephemeral Stream 2 south of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 8: Ephemeral Stream 3 south of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 9: Ephemeral Stream 4 west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 10: Ephemeral Stream 5 which is tributary to Ephemeral Stream 4 located west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 11: Ephemeral Stream 6 located west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 12: Ephemeral Stream 7 which is tributary to Intermittent Stream 2 and west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 13: Ephemeral Stream 8 located along the west side of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 14: Ephemeral Stream 9 flows beneath Old Lexington Pike and into Pond 1. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 15: Ephemeral Stream 10 flows into Intermittent Stream 3. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 16: Ephemeral Stream 11 located along south side of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 17: Ephemeral Stream 14 flows west under I-71/75 and into Intermittent Stream 4. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 18: Ephemeral Stream 15 flows west under I-71/75 and into Intermittent Stream 4. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 19: Ephemeral Stream 16 flows west under I-71/75 in the southern portion of the study area. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 20: General view of Pond 1. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 21: Scrub-shrub habitat. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 22: Scrub-shrub habitat. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 23: Scrub-shrub habitat. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 24: Upland woods habitat. Potential Indiana bat summer maternity habitat. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 25: Upland woods habitat along Intermittent Stream 1. Potential running buffalo clover habitat within this area. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 26: Upland woods habitat along railroad right-of-way. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



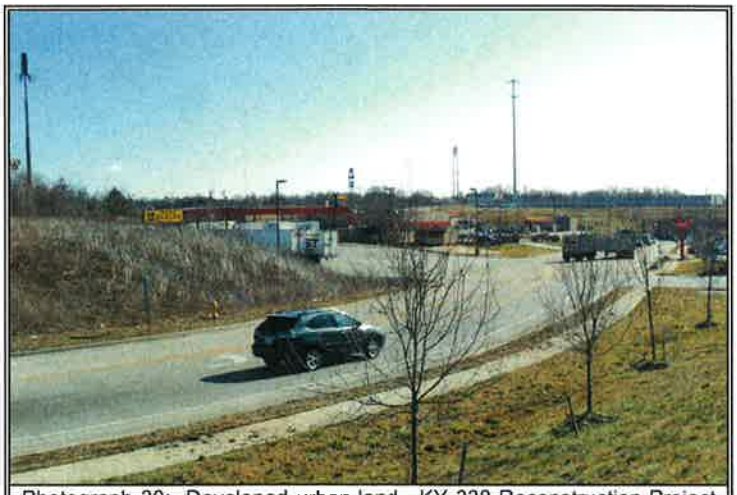
Photograph 27: Old field habitat. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 28: Old field habitat. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 29: Old field habitat. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 30: Developed urban land. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 31: Developed urban land. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 32: Developed urban land. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 33: Emergent Wetland 1 located north of Frogtown Connector Road. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 34: Emergent Wetland 2 located north of Frogtown Connector Road. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 35: Emergent Wetland 3 located west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 36: Emergent Wetland 4 located west of Dixie Highway and along Ephemeral Stream 4. KY 338 Reconstruction Project at I-71/75. February 6, 2012.



Photograph 37: Wooded Wetland 5 located east of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 38: Emergent Wetland 6 located west of Dixie Highway. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 39: Emergent Wetland 7 along south side of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 40: Emergent Wetland 8 along Intermittent Stream 3 and north of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 41: Emergent Wetland 9 along stream Intermittent Stream 3 and north of Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 42: Emergent Wetland 10 north of Old Richwood Road. KY 338 Reconstruction Project at I-71/75. February 7, 2012.



Photograph 43: Emergent Wetland 11 west of southbound I-71/75 off ramp. KY 338 Reconstruction Project at I-71/75. March 8, 2012.



Photograph 44: Emergent Wetland 12 east of I-71/75 southbound off ramp. KY 338 Reconstruction Project at I-71/75. March 8, 2012.



Photograph 45: Emergent Wetland 13 located east I-71/75 near travel stop. KY 338 Reconstruction Project at I-71/75. March 8, 2012.



Photograph 46: Emergent Wetland 13 located east of I-71/75 near travel stop. KY 338 Reconstruction Project at I-71/5. March 8, 2012.

APPENDIX A

AGENCY CORRESPONDENCE

From: Phil_DeGarmo@fws.gov
Sent: Friday, March 23, 2012 2:18 PM
To: Seth Bishop
Subject: Re: KY 338 Reconstruction Project at 1-71/75, Boone Co., KY

Seth,

Thank you for the follow up. Please use the species list as proposed below.

Sincerely,

Phil DeGarmo
USFWS- Frankfort, KY Field Office
330 W. Broadway, Rm 265
Frankfort, KY 40601

502-695-0468 ext. 110 (office)
502-229-8830 (cell)
502-695-1024 (fax)
Phil_DeGarmo@fws.gov
"Seth Bishop" <sbishop@redwingeco.com>

"Seth Bishop" <sbishop@redwingeco.com>
03/19/2012 09:39 AM

To<phil_degarmo@fws.gov>
cc
SubjectKY 338 Reconstruction Project at 1-71/75, Boone Co., KY

Phil,

Redwing is doing the ecological assessment for the KY Transportation Cabinet's KY 338 Reconstruction Project at 1-71/75 in Boone County, Kentucky. As part of the agency coordination portion of this assessment, we submitted a letter (see attachment) to your office on February 6 requesting information on federally-threatened and endangered species and their critical habitat that may occur with the study area for the proposed project. We also obtained a list of the federally-protected species that are known to occur or have the potential to occur in Boone County from your office's website. I wanted to follow up with you and see if the USFWS wants to provide any species lists, comments, or concerns about the project. Or, would you prefer that we use the species list from your website to address federally-protected species that may occur within the project study area?

Please let me know how the USFWS would like to proceed. Feel free to contact me if you have any questions or need additional information.

Thanks,

Seth

Seth Bishop
Staff Ecologist
Redwing Ecological Services, Inc.
1139 South Fourth St.
Louisville, KY 40203

Phone: (502) 625-3009
Fax: (502) 625-3077
Cell: (502) 330-6881

[attachment "USFWS Request.pdf" deleted by Phil DeGarmo/R4/FWS/DOI]

KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES
TOURISM, ARTS, AND HERITAGE CABINET

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
Fax (502) 564-0506
fw.ky.gov

Marcheta Sparrow
Secretary

Dr. Jonathan W. Gassett
Commissioner

13 February 2012

Seth R. Bishop
Staff Ecologist
Redwing Ecological Services, Inc.
1139 South Fourth Street
Louisville, KY 40203

RE: Request for Information
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076
KYTC Item No. 6-18.00

Dear Mr. Bishop:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information regarding the subject project. The Kentucky Fish and Wildlife Information System indicates no federally-threatened/endangered species are known to occur within close proximity to the project site. The state-listed Henslow's Sparrow is known to occur within the project boundary. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

It appears that the proposed project has the potential to impact wetland habitats. The KDFWR recommends that you look at the appropriate US Department of Interior National Wetland Inventory Map (NWI) and the appropriate county soil surveys to determine where the proposed project may impact wetlands. Additionally, field verification may be needed to determine the extent and quality of wetland habitats within the project area. Any planning should include measures designed to eliminate and/or reduce impacts to wetland habitats. If impacts cannot be avoided, mitigation should be properly designed and proposed to offset the losses. KDFWR will recommend, at a minimum, a 2:1 mitigation ratio for any permanent loss or degradation of wetland habitats.

To minimize indirect impacts to aquatic resources, strict erosion control measures should be developed and implemented prior to construction to minimize siltation into streams and storm water drainage systems located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

I hope this information is helpful to you, and if you have questions or require additional information, please call me at (502) 564-7109 extension 4453.

Sincerely,

Dan Stoelb
Wildlife Biologist

Cc: Environmental Section File

Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

Donald S. Dott, Jr.
Director

Commonwealth of Kentucky
Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, Kentucky 40601-1403
502-573-2886 Voice
502-573-2355 Fax

January 30, 2012

Redwing Ecological Services
1139 South Fourth Street
Louisville, KY 40203

Data Request 12-069

Dear Mr. Bishop:

This letter is in response to your data request of January 25, 2012 for the KY 338 Reconstruction Project at I-71/75 project. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Kentucky State Nature Preserves Commission occur near the project area on the Union and Independence USGS Quadrangles, as shown on the map provided. Please see the attached reports for more information, which reflect analysis of the project area with three buffers applied:

1-mile for all records – 2 records
5-mile for aquatic records – 1 record
5-mile for federally listed species – 4 records
10-mile for mammals and birds – 10 records

Trifolium stoloniferum (Running buffalo clover, federally endangered, KSNPC threatened) is known to occur within five miles of the project area. This plant grows in mesic soils that receive filtered light. It is recommended that a thorough search be conducted by a qualified biologist in the months of May through July if suitable habitat will be disturbed. The optimal time to search is in May, during its flowering period. Areas to search include stream banks, bars, and terraces, footpaths, dirt roads, and grazed bottomlands.

Ammodramus henslowii (Henslow's Sparrow, KSNPC special concern, federal species of management concern) is associated with fallow hayfields, ungrazed pastures with scattered small trees and tall weeds, grassland, and brushland.

Passerculus sandwichensis (Savannah Sparrow, KSNPC special concern) can be found in

sparsely vegetated grasslands such as pastures.

Thyromanes bewickii (Bewick's Wren, KSNPC special concern, federal species of management concern) can be found in brushy areas, thickets, scrub in open country, open and riparian woodlands, and in country towns and farms.

Tyto alba (Barn Owl, KSNPC special concern) can be found in hollow trees, old buildings, barns, silos and other abandoned structures. Before demolition of existing structures, it should be determined that these birds are not present.

Myotis sodalis (Indiana myotis, federally listed endangered, KSNPC endangered) has been reported within five miles of the project area. This record is not based on a visual observation but from an Anabat call. A thorough survey for this species should be conducted by a qualified biologist if suitable habitat will be disturbed. The survey should include a search for potential roost and winter sites, and a mistnetting census at numerous points within the proposed corridor, particularly in preferred summer habitat. Summer foraging habitats include upland forests, bottomland forests and riparian corridors. Suitable roost and winter sites include sandstone and limestone caves, rockhouses, clifflines, auger holes, and abandoned mines. In order to avoid impacts to bats, bottomland forests and riparian corridors, particularly near caves, should not be disturbed.

I would like to take this opportunity to remind you of the terms of the data request license, which you agreed upon in order to submit your request. The license agreement states "Data and data products received from the Kentucky State Nature Preserves Commission, including any portion thereof, may not be reproduced in any form or by any means without the express written authorization of the Kentucky State Nature Preserves Commission." The exact location of plants, animals, and natural communities, if released by the Kentucky State Nature Preserves Commission, may not be released in any document or correspondence. These products are provided on a temporary basis for the express project (described above) of the requester, and may not be redistributed, resold or copied without the written permission of the Kentucky State Nature Preserves Commission's Data Manager (801 Schenkel Lane, Frankfort, KY, 40601. Phone: (502) 573-2886).

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.

If you have any questions or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Sara Hines
Data Manager

SLD/SGH

Enclosures: Data Report and Interpretation Key

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

February 14, 2012

Mr. Seth R. Bishop
Redwing Ecological Services, Inc.
1139 South Fourth Street
Louisville, Kentucky 40203

RE: Information Request
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076
KYTC Item No. 6-18.00

Dear Mr. Bishop:

In reviewing the information and map supplied with your letter of January 25, 2012 for this project, there are no OSRWs or special classified surface waters in the area of interest. The nearest assessed stream to your interest area is South Fork Gunpowder Creek. It is not supporting primary contact recreation (PCR) from river mile 4.1 to 6.8 due to fecal coliform (pathogen indicator); this segment extends to the northwest side of the I-71/75 rest area just south of the northern terminus of your outlined project boundary.

I found no groundwater tracer data or groundwater recharge area delineations surrounding this transportation corridor. Additionally, based on the geologic map this area is underlain predominantly by the Bull Fork Formation, which is characterized by moderately-developed karst drainage. The Bull Fork Formation is described as interbedded limestone and shale (Luft, 1969). The geologic map notes the presence of small, shallow sinkholes developed in the Bull Fork Formation and the underlying Bellevue Tongue of the Grant Lake Limestone. The Grant Lake Limestone is present only at the extreme southern tip of the project area. The absence of verified groundwater tracer data does not mean that karst drainage, and its inherent susceptibility to contamination, is not present. Furthermore, based on hydrogeologic factors, this area was designated as having moderate sensitivity to groundwater pollution by Ray and others (1994) on the *Groundwater Sensitivity Regions of Kentucky* map. This area is moderately sensitive to groundwater pollution.

Any activities with the potential to impact surfacewater or groundwater resources should proceed with caution. Proper BMPs associated with required construction permit(s) are necessary to prevent pollutants associated with the construction activities.

If you have any further questions please contact me at (502) 564-3410. Thank you for the opportunity to comment on specific aquatic resources in this project area.

Sincerely,

Randall G. Payne

Randall G. Payne
Environmental Scientist

From: Wright, James (EEC) [James.Wright@ky.gov]
Sent: Monday, March 19, 2012 4:15 PM
To: sbishop@redwingeco.com
Subject: KY 338 Reconstruction Project - Boone Co
Mr. Bishop,

Thank you for inquiring about the forest resources located within the proposed project area in Boone County, KY. We were able to take a quick survey of the area and did not see any significant area of concern on the forest impact of the project. Most woodlots consist of small trees that are of average quality and species. In addition, there are no recorded Big Trees or State Forests within the project area. I hope this helps, and please let me know if we can be of anymore assistance. Thanks.

James R. Wright
District Forester
Bluegrass District
Kentucky Division of Forestry
1-800-866-0876

From: Currens, James C [currens@email.uky.edu]
Sent: Monday, February 20, 2012 2:04 PM
To: sbishop@redwingeco.com
Cc: SGentry177@aol.com
Subject: Your requests to KSS for cave data

Dear Mr. Bishop,

I've finally worked my way down through the pile to your request for cave locations [redacted] and I75 in Boone County. [redacted] In regard to Boone County, the Kentucky Speleological Survey does not have records in the vicinity of the I-75 exchange, further I do not think the KSS has any records of caves in the county.

Cordially,

KGS Representative to KSS

James C. Currens, M.S., Ky RPG
Karst Hydrogeologist
Kentucky Geological Survey, Univ. of Ky.
Rm 228 MMRB, 504 Rose Street
Lexington, KY 40506

Office: 859-323-0526
Personal mobile: 859-533-6000

APPENDIX B

RAPID BIOASSESSMENT PROTOCOL (RBP) FORMS

High Gradient Stream Data Sheet

STREAM NAME: Intermittent Stream 1	LOCATION: KY 338 Reconstruction Project at I-71/75
STATION #: RBP 1 MILE:	BASIN/WATERSHED: Mud Lick Creek
LAT: 38.9144 LONG: 84.6351	COUNTY: Boone USGS 7.5 TOPO: Union
DATE: 02/06/2012 TIME: 1:45 [ ] AM [X] PM	INVESTIGATORS: L. Darnell
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT.	

WEATHER:

Now	Past 24 Hours
Heavy Rain	Heavy Rain
Steady Rain	Steady Rain
Intermittent Showers	Intermittent Showers
Clear/Sunny	Clear/Sunny

Has there been a heavy rain in the last 7 days? [Yes] No

Air Temperature 45 °F _____ °C

Rainfall in the past 24 hours _____ In.

4 % Cloud Cover

P-Chem: Temp (°C) _____ D.O. (mg/l) _____ % Saturation _____ pH (S.U.) _____ Cond. _____ Grab

INSTREAM WATERSHED FEATURES:

Stream Width	4-10	ft
Range of Depth	1-6	in
Average Velocity	~1	ft/s
Discharge		cfs
Est. Reach Length	200	ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

Surface Mining	[Construction]	[Forest]
Deep Mining	[Commercial]	[Pasture/Grazing]
Oil Wells	Industrial	Silviculture
Land Disposal	Row Crops	[Urban Runoff/Storm Sewers]

Hydraulic Structures

Dams Bridge Abutments
Island Waterfalls
Other Culverts

Stream Flow:

Dry Pooled Low [Normal]
High Very Rapid or Torrential

Stream Type:

Perennial [Intermittent]
Ephemeral Seep

Riparian Vegetation

Dominant Type:

[Trees] Shrubs
[Grasses] Herbaceous

Number of strata: 2

Dom. Tree/Shrub Taxa

red oak
sugar maple
white ash

Canopy Cover:

Fully Exposed (0-25%)
Partially Exposed (25-50%)
Partially Shaded (50-75%)
[Fully Shaded (75-100%)]

Channel Alterations:

Dredging
Channelization
(Full Partial)

Substrate Est. P.C	Riffle 30 %	Run 30 %	Pool 40 %
Silt/Clay (<0.06 mm)	X	X	X
Sand (0.06 - 2 mm)			
Gravel (2-64 mm)	X	X	
Cobble (64 - 256 mm)	X	X	X
Boulders (>256 mm)	X	X	X
Bedrock		X	X

Habitat Parameter	Condition Category: Excellent	Good	Fair	Poor
1. **Epifaunal Substrate/ Available Cover** **12**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover. 16 - 20	40-70% mix of stable habitat: well-suited for full colonization potential. 11 - 15	20-40% mix of stable habitat; habitat availability less than desirable. 6 - 10	Less than 20% stable habitat; lack of habitat is obvious. 0 - 5
2. **Embeddedness** **13**	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. 16 - 20	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. 11 - 15	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. 6 - 10	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. 0 - 5
3. **Velocity/Depth Regime** **8**	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/x, deep is >0.5 m). 16 - 20	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). 11 - 15	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low). 6 - 10	Dominated by 1 velocity/depth regime (usually slow-deep). 0 - 5

Project Name: KY 338 Reconstruction Project at I-71/75 Stream Name: Intermittent Stream 1

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of bottom affected by deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 50-80% of the bottom affected. Sediment deposits at obstructions, constrictions, and bends.	Heavy deposits of fine material, increased bar development; more than 80% of bottom changing frequently.
17	16 - 20	11 - 15	6 - 10	0 - 5
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel is exposed.	Water fills 25-50% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
18	16 - 20	11 - 15	6 - 10	0 - 5
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, evidence of past channelization (> past 20 years) may be present.	Channelization may be extensive; shoring structures on both banks and 40-80% stream reach channelized.	Brush shored with gabion or cement; over 80% of reach channelized and disrupted.
15	16 - 20	11 - 15	6 - 10	0 - 5
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
16	16 - 20	11 - 15	6 - 10	0 - 5
8. Bank Stability	Stable; evidence of erosion of bank failure absent or minimal. Little potential for future problem.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank has areas of erosion.	Moderately unstable; 30-60% of bank has areas of erosion; high erosion potential during floods.	Unstable; eroded areas frequent; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB) 8	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 7	9 - 10	6 - 8	3 - 5	0 - 2
9. Vegetative Protection	More than 90% of streambank surfaces and immediate riparian zone covered by native vegetation.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants not well-represented; disruption evident.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil.	Less than 50% of the streambank surfaces covered by vegetation disruption of streambank vegetation is very high.
SCORE (LB) 7	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 7	9 - 10	6 - 8	3 - 5	0 - 2
10. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) 2	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 2	9 - 10	6 - 8	3 - 5	0 - 2

Total Score: 132 **NOTES/COMMENTS:** Poor

Bluegrass Bioregion (High Gradient Assessments) Headwater Streams (<5.0 mi^2)

Fully Supporting	(Excellent)	156-200
Supporting but Threatened and Partially Supporting	(Average)	142-155
Not Supporting	(Poor)	0-141



Reference: Kentucky Division of Water. 2008. Revision 3. "Methods for Assessing Biological Integrity of Surface Waters in Kentucky."

High Gradient Stream Data Sheet

STREAM NAME: Intermittent Stream 2	LOCATION: KY 338 Reconstruction Project at I-71/75
STATION #: RBP 2 MILE:	BASIN/WATERSHED: Mud Lick Creek
LAT: 38.9143 LONG: 84.6351	COUNTY: Boone USGS 7.5 TOPO: Union
DATE: 02/07/2012 TIME: 09:30 X AM PM	INVESTIGATORS: L. Darnell
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT.	

WEATHER:

Now	Past 24 Hours
Heavy Rain	Heavy Rain
Steady Rain	Steady Rain
Intermittent Showers	Intermittent Showers
[Clear/Sunny]	Clear/Sunny

Has there been a heavy rain in the last 7 days? [Yes] No

Air Temperature 40 °F ____ °C

Rainfall in the past 24 hours ____ in.

100 % Cloud Cover

P-Chem: Temp (°C) ____ D.O. (mg/l) ____ % Saturation ____ pH (S.U.) ____ Cond. ____ Grab

INSTREAM WATERSHED FEATURES:

Stream Width	3-5	ft
Range of Depth	1-4	in
Average Velocity	~1	ft/s
Discharge		cfs
Est. Reach Length	120	ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

Surface Mining	[Construction]	[Forest]
Deep Mining	Commercial	[Pasture/Grazing]
Oil Wells	Industrial	Silviculture
Land Disposal	Row Crops	Urban Runoff/Storm Sewers

Hydraulic Structures: Dams, Bridge Abutments, Island, Waterfalls, Other

Stream Flow: Dry, Pooled, Low, [Normal], High, Very Rapid or Torrential

Stream Type: Perennial, [Intermittent], Ephemeral, Seep

Riparian Vegetation

Dominant Type: [Trees] [Shrubs] [Grasses] [Herbaceous]

Number of strata: 3

Dom. Tree/Shrub Taxa: black walnut, sycamore, bush honeysuckle, box elder

Canopy Cover: Fully Exposed (0-25%), Partially Exposed (25-50%), Partially Shaded (50-75%), [Fully Shaded (75-100%)]

Channel Alterations: Dredging, Channelization (Full Partial)

Substrate Est. P.C	Riffle 40 %	Run 20 %	Pool 40 %
Silt/Clay (<0.06 mm)	X	X	X
Sand (0.06 - 2 mm)		X	X
Gravel (2-64 mm)	X		
Cobble (64 - 256 mm)	X	X	X
Boulders (>256 mm)	X	X	X
Bedrock			

Habitat Parameter	Condition Category: Excellent	Good	Fair	Poor
1. **Epifaunal Substrate/ Available Cover** **11**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover. 16 - 20	40-70% mix of stable habitat; well-suited for full colonization potential. 11 - 15	20-40% mix of stable habitat; habitat availability less than desirable. 6 - 10	Less than 20% stable habitat; lack of habitat is obvious. 0 - 5
2. **Embeddedness** **10**	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. 16 - 20	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. 11 - 15	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. 6 - 10	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. 0 - 5
3. **Velocity/Depth Regime** **8**	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/x, deep is >0.5 m). 16 - 20	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). 11 - 15	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low). 6 - 10	Dominated by 1 velocity/depth regime (usually slow-deep). 0 - 5

Project Name: KY 338 Reconstruction Project at I-71/75 Stream Name: Intermittent Stream 2

4. **Sediment Deposition** **12**	Little or no enlargement of islands or point bars and less than <20% of bottom affected by deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 50-80% of the bottom affected. Sediment deposits at obstructions, constrictions, and bends.	Heavy deposits of fine material, increased bar development; more than 80% of bottom changing frequently.
	16 - 20	11 - 15	6 - 10	0 - 5
5. **Channel Flow Status** **18**	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel is exposed.	Water fills 25-50% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	16 - 20	11 - 15	6 - 10	0 - 5
6. **Channel Alteration** **19**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, evidence of past channelization (> past 20 years) may be present.	Channelization may be extensive; shoring structures on both banks and 40-80% stream reach channelized.	Brush shored with gabion or cement; over 80% of reach channelized and disrupted.
	16 - 20	11 - 15	6 - 10	0 - 5
7. **Frequency of Riffles (or bends)** **15**	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	16 - 20	11 - 15	6 - 10	0 - 5
8. **Bank Stability**	Stable; evidence of erosion of bank failure absent or minimal. Little potential for future problem.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank has areas of erosion.	Moderately unstable; 30-60% of bank has areas of erosion; high erosion potential during floods.	Unstable; eroded areas frequent; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB) 7	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 7	9 - 10	6 - 8	3 - 5	0 - 2
9. **Vegetative Protection**	More than 90% of streambank surfaces and immediate riparian zone covered by native vegetation.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants not well-represented; disruption evident.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil.	Less than 50% of the streambank surfaces covered by vegetation disruption of streambank vegetation is very high.
SCORE (LB) 5	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 5	9 - 10	6 - 8	3 - 5	0 - 2
10. **Riparian Vegetative Zone Width**	Width of riparian zone >18 meters; human activities have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) 9	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 9	9 - 10	6 - 8	3 - 5	0 - 2

Total Score: 135 **NOTES/COMMENTS:** Poor

Bluegrass Bioregion (High Gradient Assessments) Headwater Streams (<5.0 mi^2)

Fully Supporting	(Excellent)	156-200
Supporting but Threatened and Partially Supporting	(Average)	142-155
Not Supporting	(Poor)	0-141



Reference: Kentucky Division of Water. 2008. Revision 3. "Methods for Assessing Biological Integrity of Surface Waters in Kentucky."

High Gradient Stream Data Sheet

STREAM NAME: Intermittent Stream 3	LOCATION: KY 338 Reconstruction Project at I-71/75
STATION #: RBP 3 MILE:	BASIN/WATERSHED: Banklick Creek
LAT: 38.9204 LONG: 84.6210	COUNTY: Boone USGS 7.5 TOPO: Union
DATE: 02/07/2012 TIME: 12:45 [ ] AM [X] PM	INVESTIGATORS: L. Darnell
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT.	

WEATHER:

Now	Past 24 Hours
Heavy Rain	Heavy Rain
Steady Rain	Steady Rain
Intermittent Showers	Intermittent Showers
[Clear/Sunny]	Clear/Sunny

Has there been a heavy rain in the last 7 days? [Yes] No

Air Temperature 45 °F _____ °C

Rainfall in the past 24 hours _____ in.

75 % Cloud Cover

P-Chem: Temp (°C) _____ D.O. (mg/l) _____ % Saturation _____ pH (S.U.) _____ Cond. _____ Grab

INSTREAM WATERSHED FEATURES:

Stream Width	2-6	ft
Range of Depth	1-6	in
Average Velocity	~1	ft/s
Discharge		cfs
Est. Reach Length	120	ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

Surface Mining	Construction	[Forest]
Deep Mining	Commercial	Pasture/Grazing
Oil Wells	Industrial	Silviculture
Land Disposal	Row Crops	Urban Runoff/Storm Sewers

Hydraulic Structures

Dams Bridge Abutments
Island Waterfalls
[Other] Culvert

Stream Flow:

Dry Pooled Low [Normal]
High Very Rapid or Torrential

Stream Type:

Perennial [Intermittent]
Ephemeral Seep

Riparian Vegetation

Dominant Type:

Trees [Shrubs]
[Grasses] [Herbaceous]

Number of strata: _____

Dom. Tree/Shrub Taxa

sandbar willow
elderberry

Canopy Cover:

Fully Exposed (0-25%)
[Partially Exposed (25-50%)]
Partially Shaded (50-75%)
Fully Shaded (75-100%)

Channel Alterations:

Dredging
Channelization
(Full Partial)

Substrate Est. P.C	Riffle 25 %	Run 15 %	Pool 60 %
Silt/Clay (<0.06 mm)	X	X	X
Sand (0.06 - 2 mm)			
Gravel (2-64 mm)	X	X	X
Cobble (64 - 256 mm)	X	X	
Boulders (>256 mm)			
Bedrock			

Habitat Parameter	Condition Category			
	Excellent	**Good**	**Fair**	**Poor**
1. Epifaunal Substrate/ Available Cover **12**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover	40-70% mix of stable habitat: well-suited for full colonization potential	20-40% mix of stable habitat; habitat availability less than desirable	Less than 20% stable habitat; lack of habitat is obvious
	16 - 20	11 - 15	6 - 10	0 - 5
2. Embeddedness **11**	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment
	16 - 20	11 - 15	6 - 10	0 - 5
3. Velocity/Depth Regime **9**	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/x, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep)
	16 - 20	11 - 15	6 - 10	0 - 5

Project Name: KY 338 Reconstruction Project at I-71/75 Stream Name: Intermittent Stream 3

4. Sediment Deposition **15**	Little or no enlargement of islands or point bars and less than <20% of bottom affected by deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 50-80% of the bottom affected. Sediment deposits at obstructions, constrictions, and bends.	Heavy deposits of fine material, increased bar development; more than 80% of bottom changing frequently.
	16 - 20	11 - 15	6 - 10	0 - 5
5. Channel Flow Status **18**	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel is exposed.	Water fills 25-50% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	16 - 20	11 - 15	6 - 10	0 - 5
6. Channel Alteration **15**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, evidence of past channelization (> past 20 years) may be present.	Channelization may be extensive; shoring structures on both banks and 40-80% stream reach channelized.	Brush shored with gabion or cement; over 80% of reach channelized and disrupted.
	16 - 20	11 - 15	6 - 10	0 - 5
7. Frequency of Riffles (or bends) **13**	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	16 - 20	11 - 15	6 - 10	0 - 5
8. Bank Stability	Stable; evidence of erosion of bank failure absent or minimal. Little potential for future problem.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank has areas of erosion.	Moderately unstable; 30-60% of bank has areas of erosion; high erosion potential during floods.	Unstable; eroded areas frequent; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB) 7	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 7	9 - 10	6 - 8	3 - 5	0 - 2
9. Vegetative Protection	More than 90% of streambank surfaces and immediate riparian zone covered by native vegetation.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants not well-represented; disruption evident.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil.	Less than 50% of the streambank surfaces covered by vegetation disruption of streambank vegetation is very high.
SCORE (LB) 8	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 8	9 - 10	6 - 8	3 - 5	0 - 2
10. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) 2	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 2	9 - 10	6 - 8	3 - 5	0 - 2

Total Score: 127 **NOTES/COMMENTS:** Poor

Bluegrass Bioregion (High Gradient Assessments) Headwater Streams (<5.0 mi^2)

Fully Supporting	(Excellent)	156-200
Supporting but Threatened and Partially Supporting	(Average)	142-155
Not Supporting	(Poor)	0-141

Reference: Kentucky Division of Water. 2008. Revision 3. "Methods for Assessing Biological Integrity of Surface Waters in Kentucky."



High Gradient Stream Data Sheet

STREAM NAME: Intermittent Stream 4	LOCATION: KY 338 Reconstruction Project at I-71/75
STATION #: RBP 4 MILE:	BASIN/WATERSHED: Gunpowder Creek
LAT: 38.9306 LONG: 84.6317	COUNTY: Boone USGS 7.5 TOPO: Union
DATE: 02/07/2012 TIME: 3:15 [ ] AM [X] PM	INVESTIGATORS: L. Darnell
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT.	

WEATHER:

Now	Past 24 Hours
Heavy Rain	Heavy Rain
Steady Rain	Steady Rain
Intermittent Showers	Intermittent Showers
[Clear/Sunny]	Clear/Sunny

Has there been a heavy rain in the last 7 days? [Yes] No

Air Temperature 45 °F _____ °C

Rainfall in the past 24 hours _____ in.

100 % Cloud Cover

P-Chem: Temp (°C) _____ D.O. (mg/l) _____ % Saturation _____ pH (S.U.) _____ Cond. _____ Grab

INSTREAM WATERSHED FEATURES:

Stream Width	3-7	ft
Range of Depth	1-3	in
Average Velocity	< 1	ft/s
Discharge		cfs
Est. Reach Length	100	ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

Surface Mining	Construction	[Forest]
Deep Mining	Commercial	Pasture/Grazing
Oil Wells	Industrial	Silviculture
Land Disposal	Row Crops	[Urban Runoff/Storm Sewers]

Hydraulic Structures

Dams Bridge Abutments
Island Waterfalls
Other Culvert under interstate

Stream Flow:

Dry Pooled Low [Normal]
High Very Rapid or Torrential

Stream Type:

Perennial [Intermittent]
Ephemeral Seep

Riparian Vegetation

Dominant Type:

[Trees] [Shrubs]
Grasses [Herbaceous]
Number of strata: 4

Dom. Tree/Shrub Taxa

green ash
black walnut
bush honeysuckle
box elder

Canopy Cover:

Fully Exposed (0-25%)
Partially Exposed (25-50%)
[Partially Shaded (50-75%)]
Fully Shaded (75-100%)

Channel Alterations:

Dredging
[Channelization]
(Full [Partial])

Substrate Est. P.C	Riffle 30 %	Run 40 %	Pool 30 %
Silt/Clay (<0.06 mm)	X	X	X
Sand (0.06 - 2 mm)			
Gravel (2-64 mm)	X	X	X
Cobble (64 - 256 mm)	X	X	X
Boulders (>256 mm)			
Bedrock			

Habitat Parameter	Condition Category			
	Excellent	Good	Fair	Poor
1. **Epifaunal Substrate/ Available Cover** **12**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover	40-70% mix of stable habitat: well-suited for full colonization potential	20-40% mix of stable habitat; habitat availability less than desirable	Less than 20% stable habitat; lack of habitat is obvious
	16 - 20	11 - 15	6 - 10	0 - 5
2. **Embeddedness** **13**	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment
	16 - 20	11 - 15	6 - 10	0 - 5
3. **Velocity/Depth Regime** **8**	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/x, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep)
	16 - 20	11 - 15	6 - 10	0 - 5

Project Name: KY 338 Reconstruction Project at I-71/75 Stream Name: Intermittent Stream 4

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of bottom affected by deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 50-80% of the bottom affected. Sediment deposits at obstructions, constrictions, and bends.	Heavy deposits of fine material, increased bar development; more than 80% of bottom changing frequently.
15	16 - 20	11 - 15	6 - 10	0 - 5
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel is exposed.	Water fills 25-50% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
18	16 - 20	11 - 15	6 - 10	0 - 5
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, evidence of past channelization (> past 20 years) may be present.	Channelization may be extensive; shoring structures on both banks and 40-80% stream reach channelized.	Brush shored with gabion or cement; over 80% of reach channelized and disrupted.
18	16 - 20	11 - 15	6 - 10	0 - 5
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
15	16 - 20	11 - 15	6 - 10	0 - 5
8. Bank Stability	Stable; evidence of erosion of bank failure absent or minimal. Little potential for future problem.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank has areas of erosion.	Moderately unstable; 30-60% of bank has areas of erosion; high erosion potential during floods.	Unstable; eroded areas frequent; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB) 5	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 5	9 - 10	6 - 8	3 - 5	0 - 2
9. Vegetative Protection	More than 90% of streambank surfaces and immediate riparian zone covered by native vegetation.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants not well-represented; disruption evident.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil.	Less than 50% of the streambank surfaces covered by vegetation disruption of streambank vegetation is very high.
SCORE (LB) 5	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 5	9 - 10	6 - 8	3 - 5	0 - 2
10. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) 3	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 3	9 - 10	6 - 8	3 - 5	0 - 2

Total Score: 125 **NOTES/COMMENTS:** Poor

Bluegrass Bioregion (High Gradient Assessments) Headwater Streams (<5.0 mi^2)

Fully Supporting	(Excellent)	156-200
Supporting but Threatened and Partially Supporting	(Average)	142-155
Not Supporting	(Poor)	0-141



Reference: Kentucky Division of Water. 2008. Revision 3. "Methods for Assessing Biological Integrity of Surface Waters in Kentucky."

High Gradient Stream Data Sheet

STREAM NAME: Intermittent Stream 5	LOCATION: KY 338 Reconstruction Project at I-71/75
STATION #: RBP 5 MILE:	BASIN/WATERSHED: Mud Lick Creek
LAT: 38.9110 LONG: 84.6289	COUNTY: Boone USGS 7.5 TOPO: Union
DATE: 2/7/12 TIME: 03:45 [ ] AM [X] PM	INVESTIGATORS: L. Darnell
TYPE SAMPLE: P-CHEM Macroinvertebrate FISH BACT.	

WEATHER:

Now	Past 24 Hours
Heavy Rain	Heavy Rain
Steady Rain	Steady Rain
Intermittent Showers	Intermittent Showers
[Clear/Sunny]	Clear/Sunny

Has there been a heavy rain in the last 7 days? [Yes] No

Air Temperature 45 °F _____ °C

Rainfall in the past 24 hours _____ in.

100 % Cloud Cover

P-Chem: Temp (°C) _____ D.O. (mg/l) _____ % Saturation _____ pH (S.U.) _____ Cond. _____ Grab

INSTREAM WATERSHED FEATURES:

Stream Width	4-8	ft
Range of Depth	2-6	in
Average Velocity	~1	ft/s
Discharge		cfs
Est. Reach Length	150	ft

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

Surface Mining	Construction	[Forest]
Deep Mining	Commercial	Pasture/Grazing
Oil Wells	Industrial	Silviculture
Land Disposal	Row Crops	[Urban Runoff/Storm Sewers]

Hydraulic Structures

Dams Bridge Abutments
Island Waterfalls
Other Culvert

Stream Flow:

Dry Pooled Low [Normal]
High Very Rapid or Torrential

Stream Type:

Perennial [Intermittent]
Ephemeral Seep

Riparian Vegetation

Dominant Type:

[Trees] [Shrubs]
[Grasses] [Herbaceous]

Number of strata: _____

Dom. Tree/Shrub Taxa

black walnut
bush honeysuckle
honey locust
pear

Canopy Cover:

Fully Exposed (0-25%)
Partially Exposed (25-50%)
[Partially Shaded (50-75%)]
Fully Shaded (75-100%)

Channel Alterations:

Dredging
[Channelization]
(Full [Partial])

Substrate Est. P.C	Riffle 30 %	Run 30 %	Pool 40 %
Silt/Clay (<0.06 mm)	X	X	X
Sand (0.06 - 2 mm)			
Gravel (2-64 mm)	X	X	X
Cobble (64 - 256 mm)	X	X	X
Boulders (>256 mm)			
Bedrock			

Habitat Parameter	Condition Category: Excellent	Good	Fair	Poor
1. **Epifaunal Substrate/ Available Cover** **15**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover	40-70% mix of stable habitat; well-suited for full colonization potential	20-40% mix of stable habitat; habitat availability less than desirable	Less than 20% stable habitat; lack of habitat is obvious
	16 - 20	11 - 15	6 - 10	0 - 5
2. **Embeddedness** **14**	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment
	16 - 20	11 - 15	6 - 10	0 - 5
3. **Velocity/Depth Regime** **9**	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/x, deep is >0.5 m).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep)
	16 - 20	11 - 15	6 - 10	0 - 5

Project Name: KY 338 Reconstruction Project at I-71/75 Stream Name: Intermittent Stream 5

4. **Sediment Deposition**	Little or no enlargement of islands or point bars and less than <20% of bottom affected by deposition.	Some new increase in bar formation, mostly from gravel, sand, or fine sediment; 20-50% of the bottom affected	Moderate deposition of new gravel, sand, or fine sediment on old and new bars; 50-80% of the bottom affected. Sediment deposits at obstructions, constrictions, and bends.	Heavy deposits of fine material, increased bar development; more than 80% of bottom changing frequently.
15	16 - 20	11 - 15	6 - 10	0 - 5
5. **Channel Flow Status**	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel is exposed.	Water fills 25-50% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
19	16 - 20	11 - 15	6 - 10	0 - 5
6. **Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, evidence of past channelization (> past 20 years) may be present.	Channelization may be extensive; shoring structures on both banks and 40-80% stream reach channelized.	Brush shored with gabion or cement; over 80% of reach channelized and disrupted.
15	16 - 20	11 - 15	6 - 10	0 - 5
7. **Frequency of Riffles (or bends)**	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
15	16 - 20	11 - 15	6 - 10	0 - 5
8. **Bank Stability**	Stable; evidence of erosion of bank failure absent or minimal. Little potential for future problem.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank has areas of erosion.	Moderately unstable; 30-60% of bank has areas of erosion; high erosion potential during floods.	Unstable; eroded areas frequent; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB) 4	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 4	9 - 10	6 - 8	3 - 5	0 - 2
9. **Vegetative Protection**	More than 90% of streambank surfaces and immediate riparian zone covered by native vegetation.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants not well-represented; disruption evident.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil.	Less than 50% of the streambank surfaces covered by vegetation disruption of streambank vegetation is very high.
SCORE (LB) 5	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 5	9 - 10	6 - 8	3 - 5	0 - 2
10. **Riparian Vegetative Zone Width**	Width of riparian zone >18 meters; human activities have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB) 3	9 - 10	6 - 8	3 - 5	0 - 2
SCORE (RB) 3	9 - 10	6 - 8	3 - 5	0 - 2

Total Score: **126** **NOTES/COMMENTS:** Poor

Bluegrass Bioregion (High Gradient Assessments) Headwater Streams (<5.0 mi^2)

Fully Supporting	(Excellent)	156-200
Supporting but Threatened and Partially Supporting	(Average)	142-155
Not Supporting	(Poor)	0-141



Reference: Kentucky Division of Water. 2008. Revision 3. "Methods for Assessing Biological Integrity of Surface Waters in Kentucky."

APPENDIX C

FLORA SPECIES LIST

Appendix C - Table 1: All Flora Species List
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076

Scientific Name	Common Name	Indicator
Acer negundo	Box Elder	FAC
Acer rubrum	Red Maple	FAC
Acer saccharum	Sugar Maple	FACU
Agrimonia parviflora	Small-Flower Groovebur	FAC
Agrostis sp.	Bentgrass	
Agrostis stolonifera	Spreading Bentgrass	FACW
Alliaria petiolata	Garlic Mustard	FACU
Allium vineale	Field Garlic	FACU
Ambrosia artemisiifolia	Annual Ragweed	FACU
Aster sp.	Aster	
Barbarea vulgaris	Yellow Rocket	FACU
Bidens coronata	Large-Fruit Beggar-Ticks	OBL
Bidens frondosa	Devil's Beggar-Ticks	FACW
Carex frankii	Frank's Sedge	OBL
Carex scoparia	Pointed Broomsedge	FACW
Carex vulpinoidea	Fox Sedge	OBL
Carya laciniosa	Shellbark Hickory	FAC
Catalpa speciosa	Northern Catalpa	FAC
Celtis occidentalis	Common Hackberry	FACU
Cirsium vulgare	Bull Thistle	FACU
Conium maculatum	Poison Hemlock	FACW
Coronilla varia	Crown-Vetch	UPL
Daucus carota	Queen Anne's Lace	UPL
Dipsacus sylvestris	Teasel	NI
Echinochloa muricata	Rough Barnyard Grass	FACW
Eleocharis obtusa	Blunt Spikerush	OBL
Epilobium coloratum	Purple-Leaf Willow-Herb	OBL
Erigeron annuus	Annual Fleabane	FACU
Eupatorium perfoliatum	Common Boneset	FACW
Euthamia graminifolia	Flat-top Fragrant-Golden-rod	FAC
Festuca arundinacea	Tall Fescue	FACU
Fraxinus americana	White Ash	FACU
Fraxinus pennsylvanica	Green Ash	FACW
Gleditsia triacanthos	Honey Locust	FAC
Juglans nigra	Black Walnut	FACU

Scientific Name	Common Name	Indicator
Juncus effusus	Soft Rush	FACW
Juncus scirpoides	Needle-Pod Rush	FACW
Juncus secundus	Secund Rush	FACU
Juniperus virginiana	Eastern Red Cedar	FACU
Lamium purpureum	Purple Deadnettle	UPL
Leersia oryzoides	Rice Cutgrass	OBL
Lespedeza cuneata	Chinese Bushclover	NI
Lonicera japonica	Japanese Honeysuckle	FAC
Lonicera mackii	Bush Honeysuckle	UPL
Lysimachia nummularia	Creeping Jenny	OBL
Phalaris arundinacea	Reed Canary Grass	FACW
Pinus strobus	Eastern White Pine	FACU
Platanus occidentalis	Sycamore	FACW
Poa palustris	Fowl Bluegrass	FACW
Poa pratensis	Kentucky Bluegrass	FACU
Polygonum hydropiperoides	Swamp Smartweed	OBL
Pyrus calleryiana	Bradford Pear	UPL
Quercus rubra	Northern Red Oak	FACU
Rhus sp.	Sumac	
Robinia pseudo-acacia	Black Locust	FACU
Rosa multiflora	Multiflora Rose	FACU
Rubus sp.	Blackberry	
Rubus sp.	Raspberry	
Salix exigua	Sandbar Willow	OBL
Salix nigra	Black Willow	FACW
Sambucus canadensis	Elderberry	FACW
Scirpus atrovirens	Green Bulrush	OBL
Scirpus validus	Soft-Stem Bulrush	OBL
Solidago altissima	Tall Golden-rod	FACU
Solidago canadensis	Canada Golden-rod	FACU
Stellaria media	Common Chickweed	UPL
Trifolium repens	White Clover	FACU
Typha latifolia	Broad-Leaf Cattail	OBL
Vitis sp.	Grape	

Prepared By: SRB 2/23/12
Checked By: NAG 5/2/12

Appendix C - Table 2: Scrub/Shrub Flora Species List
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076

Scientific Name	Common Name	Indicator
Acer negundo	Box Elder	FAC
Acer rubrum	Red Maple	FAC
Agrimonia parviflora	Small-Flower Groovebur	FAC
Allium vineale	Field Garlic	FACU
Aster sp.	Aster	
Carex vulpinoidea	Fox Sedge	OBL
Catalpa speciosa	Northern Catalpa	FAC
Celtis occidentalis	Common Hackberry	FACU
Daucus carota	Queen Anne's Lace	UPL
Dipsacus sylvestris	Teasel	NI
Eupatorium perfoliatum	Common Boneset	FACW
Festuca arundinacea	Tall Fescue	FACU
Fraxinus pennsylvanica	Green Ash	FACW
Gleditsia triacanthos	Honey Locust	FAC
Juglans nigra	Black Walnut	FACU
Juncus effusus	Soft Rush	FACW

Scientific Name	Common Name	Indicator
Juniperus virginiana	Eastern Red Cedar	FACU
Lespedeza cuneata	Chinese Bushclover	NI
Lonicera japonica	Japanese Honeysuckle	FAC
Lonicera mackii	Bush Honeysuckle	UPL
Lysimachia nummularia	Creeping Jenny	OBL
Poa palustris	Fowl Bluegrass	FACW
Poa pratensis	Kentucky Bluegrass	FACU
Pyrus calleryiana	Bradford Pear	UPL
Rhus sp.	Sumac	
Robinia pseudo-acacia	Black Locust	FACU
Rosa multiflora	Multiflora Rose	FACU
Salix exigua	Sandbar Willow	OBL
Sambucus canadensis	Elderberry	FACW
Solidago altissima	Tall Golden-rod	FACU
Typha latifolia	Broad-Leaf Cattail	OBL

Prepared By: SRB 2/23/12
Checked By: NAG 5/2/12

Appendix C - Table 3: Old Field Flora Species List
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076

Scientific Name	Common Name	Indicator
Agrostis sp.	Bentgrass	
Allium vineale	Field Garlic	FACU
Ambrosia artemisiifolia	Annual Ragweed	FACU
Aster sp.	Aster	
Barbarea vulgaris	Yellow Rocket	FACU
Carex scoparia	Pointed Broomsedge	FACW
Carex vulpinoidea	Fox Sedge	OBL
Cirsium vulgare	Bull Thistle	FACU
Conium maculatum	Poison Hemlock	FACW
Coronilla varia	Crown-Vetch	UPL
Dipsacus sylvestris	Teasel	NI

Scientific Name	Common Name	Indicator
Erigeron annuus	Annual Fleabane	FACU
Festuca arundinacea	Tall Fescue	FACU
Juncus secundus	Secund Rush	FACU
Juniperus virginiana	Eastern Red Cedar	FACU
Poa pratensis	Kentucky Bluegrass	FACU
Pyrus calleryiana	Bradford Pear	UPL
Rubus sp.	Blackberry	
Solidago altissima	Tall Golden-rod	FACU
Solidago canadensis	Canada Golden-rod	FACU
Trifolium repens	White Clover	FACU
Typha latifolia	Broad-Leaf Cattail	OBL

Prepared By: SRB 2/23/12
Checked By: NAG 5/2/12

Appendix C - Table 4: Upland Woods Flora Species List
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076

Scientific Name	Common Name	Indicator
Acer negundo	Box Elder	FAC
Acer saccharum	Sugar Maple	FACU
Alliaria petiolata	Garlic Mustard	FACU
Allium vineale	Field Garlic	FACU
Carya laciniosa	Shellbark Hickory	FAC
Celtis occidentalis	Common Hackberry	FACU
Fraxinus americana	White Ash	FACU
Gleditsia triacanthos	Honey Locust	FAC
Juglans nigra	Black Walnut	FACU
Lamium purpureum	Purple Deadnettle	UPL

Scientific Name	Common Name	Indicator
Lonicera mackii	Bush Honeysuckle	UPL
Phalaris arundinacea	Reed Canary Grass	FACW
Pinus strobus	Eastern White Pine	FACU
Platanus occidentalis	Sycamore	FACW
Pyrus calleryiana	Bradford Pear	UPL
Quercus rubra	Northern Red Oak	FACU
Robinia pseudo-acacia	Black Locust	FACU
Rubus sp.	Raspberry	
Stellaria media	Common Chickweed	UPL
Vitis sp.	Grape	

Prepared By: SRB 2/23/12
Checked By: NAG 5/2/12

APPENDIX D

FAUNA SPECIES LIST

Appendix D - All Faunal Species List
KY 338 Reconstruction Project at I-71/75
Boone County, Kentucky
Redwing Project 10-076

Group	Scientific Name	Common Name
Bird	*Agelaius phoeniceus*	Red-winged Blackbird
	Baeolophus bicolor	Tufted Titmouse
	Branta canadensis	Canada Goose
	Buteo jamaicensis	Red-Tailed Hawk
	Charadrius vociferus	Killdeer
	Corvus brachyrhynchos	American Crow
	Cyanocitta cristata	Blue Jay
	Melospiza melodia	Song Sparrow
	Mimus polyglottos	Northern Mockingbird
	Picoides pubescens	Downy Woodpecker
	Poecile carolinensis	Carolina Chickadee
	Sturnus vulgaris	European Starling
	Thryothorus ludovicianus	Carolina Wren
	Zenaida macroura	Mourning Dove

Group	Scientific Name	Common Name
Crayfish	*Cambarus sp.*	Burrowing Crayfish
	Orconectes sp.	Crayfish
Mammal	*Didelphis virginiana*	Virginia Opossum
	Marmota monax	Groundhog
	Microtus sp.	Vole
	Odocoileus virginianus	White-Tailed Deer
	Procyon lotor	Common Raccoon
	Sylvilagus floridanus	Eastern Coltontail
Mussel	*Pyganodon grandis*	Giant Floater

Prepared By: SRB 2/23/12
Checked By: NAG 5/2/12

APPENDIX E

WETLAND DETERMINATION DATA FORMS

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 2/6/12
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP1
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Flat upland Local relief (concave, convex, none): concave Slope (%): 1-2
Subregion (LRR or MLRA) LRR N Lat.: 38.9206°N Long.: 84.6307°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?** No
Hydric soil present?	No	
Wetland hydrology present?	Yes	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	1
Water table present?	Yes	X	No	___	Depth (inches):	10
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP1

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Argostis* cf. *hyemalis*	30	Yes	FAC
2	*Typha latifolia*	25	Yes	OBL
3	*Aster sp.*	10	No	
4	*Juncus secundus*	8	No	FACU
5	*Festuca arundinacea*	2	No	FACU
6	*Trifolium repens*	0.5	No	FACU
7				
8				
9				
10				
11				
12				
13				
14				
15				
		75.5 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	2.5Y 5/3	90	10YR 4/4	10	C	M	Clay	
8-10	2.5Y 5/3	92	10YR 4/6	8	C	PL	Clay	
10+								Refusal

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP2
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression on hill Local relief (concave, convex, none): Concave Slope (%): < 1
Subregion (LRR or MLRA) LRR N Lat.: 38.9185°N Long.: 84.6340°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: PUBHh
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation _____, soil _____, or hydrology _____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 1

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (Inches):	3
Water table present?	Yes	X	No	___	Depth (Inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (Inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP2

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix nigra*		3	No	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		3 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Echinochloa muricata*		35	Yes	FACW
2 *Typha latifolia*		25	Yes	OBL
3 *Bidens coronata*		10	No	OBL
4 *Eleocharis obtusa*		3	No	OBL
5				
6				
7				
8				
9				
10				
		73 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		0 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	2.5Y 6/1	95	2.5Y 6/4	5	C	M	Clay	
8+								Refusal

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP3

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hilltop Local relief (concave, convex, none): Flat Slope (%): < 1

Subregion (LRR or MLRA) LRR N Lat.: 38.9186°N Long.: 84.6338°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: PUBHh

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation _____, soil _____, or hydrology _____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	No		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes ___	No X	Depth (inches):	NA	
Water table present?	Yes ___	No X	Depth (inches):	NA	**Wetland hydrology present?** No
Saturation present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	NA	

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP3

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Dipsacus sylvestris*	65	Yes	NI
2	*Aster sp.*	10	No	
3	*Erigeron annuus*	3	No	FACU
4	*Cirsium vulgare*	2	No	FACU
5	*Coronilla vulgaris*	1	No	
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		81 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 0 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	2.5Y 5/4	100					Clay	
8+								Refusal

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP4
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Small depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA) LRR N Lat.: 38.9195°N Long.: 84.6332°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: PUBhL
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Wetland hydrology present? Yes

Is the Sampled Area within a Wetland? Yes

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 2

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP4

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Carex frankii*	25	Yes	OBL
2	*Eleocharis obtusa*	20	Yes	OBL
3	*Festuca arundinacea*	10	No	FACU
4	*Carex vulpinoidea*	10	No	OBL
5	*Bidens frondosa*	5	No	FACW
6	*Typha latifolia*	3	No	OBL
7	*Dipsacus sylvestris*	2	No	NI
8				
9				
10				
11				
12				
13				
14				
15				
		75 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

_X_ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-14	2.5Y 5/3	87	10YR 5/6	10	C	M	Silty Clay Loam	
			10YR 6/1	3	D	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP5
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Depression/Swale Local relief (concave, convex, none): Concave Slope (%): 1-2
Subregion (LRR or MLRA) LRR N Lat.: 38.9163°N Long.: 84.6257°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: PUBhL
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	Yes		

Remarks. (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (Includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP5

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Fraxinus pennsylvanica*	5	Yes	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		5 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Poa palustris*	75	Yes	FACW
2	*Eupatorium perfoliatum*	10	No	FACW
3	*Lysimachia nummularia*	5	No	OBL
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		90 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

_X_ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 3/4	95	10YR 5/6	5	C	M	Silty Loam	
6-14	10YR 4/3	85	10YR 5/2	10	D	M	Silty Clay Loam	
			10YR 5/6	5	C	PL/M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP6

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toe of slope Local relief (concave, convex, none): Concave Slope (%): 1-2

Subregion (LRR or MLRA) LRR N Lat.: 38.9159°N Long.: 84.6259°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: PUBhL

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes ___	No X	Depth (inches):	NA	
Water table present?	Yes X	No ___	Depth (inches):	0	**Wetland hydrology present?** Yes
Saturation present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	0	

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP6

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Acer rubrum*	2	No	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		2 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Juncus effusus*	30	Yes	FACW
2	*Carex triangularis*	25	Yes	OBL
3	*Lysimachia nummularia*	5	No	OBL
4	*Aster sp.*	5	No	
5	*Dipsacus sylvestris*	1	No	NI
6	*Typha latifolia*	1	No	OBL
7	*Agrimonia sp.*	1	No	
8				
9				
10				
11				
12				
13				
14				
15				
		68 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	2.5Y 5/3	95	2.5Y 4/4	5	C	M	Silty Loam	
5-12	2.5Y 4/3	88	10YR 4/4	10	C	M	Silty Clay Loam	
			10YR 4/6	2	C	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
___ Sandy Gley Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) (**MLRA 147, 148)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
___ Umbric Surface (F13) (**MLRA 136, 122)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP7

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): < 1

Subregion (LRR or MLRA) LRR N Lat.: 38.9161°N Long.: 84.6242°W Datum:

Soil Map Unit Name: Faywood Silty Clay loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 3

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	____	No	X	Depth (inches):	NA
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants **Sampling Point:** DP7

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Juncus effusus*	25	Yes	FACW
2	*Scirpus validus*	20	Yes	OBL
3	*Typha latifolia*	15	Yes	OBL
4	*Juncus scirpoides*	5	No	FACW
5	*Aster sp.*	3	No	
6	*Epilobium sp.*	3	No	
7	*Agrimonia parviflora*	2	No	FAC
8				
9				
10				
11				
12				
13				
14				
15				
		73 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

_X_ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 4/4	60	2.5Y 4/1	40	D	M	Silty Clay Loam	
5-14	2.5Y 4/1	95	2.5Y 4/6	5	C	M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP8

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Flat upland Local relief (concave, convex, none): Concave Slope (%): < 1

Subregion (LRR or MLRA) LRR N Lat.: 38.9160°N Long.: 84.6242°W Datum:

Soil Map Unit Name: Faywood Silty Clay loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	No		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	____	No	X	Depth (inches):	NA
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches):	NA

Wetland hydrology present? No

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP8

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Carex vulpinoidea*	35	Yes	OBL
2	*Festuca arundinacea*	15	No	FACU
3	*Juncus effusus*	10	No	FACW
4	*Aster sp.*	10	No	
5	*Agrimonia parviflora*	5	No	FAC
6	*Lespedeza cuneata*	2	No	NI
7	*Daucus carota*	1	No	UPL
8				
9				
10				
11				
12				
13				
14				
15				
		78 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

X 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separale sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	10YR 5/4	90	10YR 5/8	5	C	M	Silty Clay Loam	
			10YR 5/2	5	D	M		
6-12	10YR 5/3	90	7.5YR 4/6	10	C	PL/M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (If observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP9

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): <1

Subregion (LRR or MLRA) LRR N Lat.: 38.9165°N Long.: 84.6240°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 4

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	3
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP9

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Typha latifolia*	70	Yes	OBL
2	*Juncus effusus*	5	No	FACW
3	*Agrostis sp.*	5	No	
4	*Epilobium coloratum*	2	No	OBL
5	*Dipsacus sylvestris*	2	No	NI
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		84 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	x 1 =	0
FACW species	x 2 =	0
FAC species	x 3 =	0
FACU species	x 4 =	0
UPL species	x 5 =	0
Column totals	(A)	0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	2.5Y 5/2	85	10YR 4/4	15	C	M	Silty Loam	
6-12	2.5Y 5/2	95	10YR 4/6	5	C	PL/M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/06/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP10

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): ~5

Subregion (LRR or MLRA) LRR N Lat.: 38.9165°N Long.: 84.6240°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? No

Hydric soil present? No

Wetland hydrology present? No

Is the Sampled Area within a Wetland? No

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present? Yes ____ No X Depth (inches): NA

Water table present? Yes ____ No X Depth (inches): NA

Saturation present? Yes ____ No X Depth (inches): NA

(includes capillary fringe)

Wetland hydrology present? No

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP10

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Poa pratensis*	60	Yes	FACU
2	*Solidago altissima*	35	Yes	FACU
3	*Typha latifolia*	10	No	OBL
4	*Aster sp.*	5	No	
5	*Dipsacus sylvestris*	5	No	NI
6	*Allium vineale*	5	No	FACU
7				
8				
9				
10				
11				
12				
13				
14				
15				
		120 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

___ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 4/3	100					Silty Loam	
4-14	2.5Y 5/3	75	2.5Y 4/2	5	D	M	Clay	
			10YR 5/4	20	C	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP11
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Low area Local relief (concave, convex, none): Flat Slope (%): 0
Subregion (LRR or MLRA) LRR N Lat.: 38.9143°N Long.: 84.6215°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 5

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	1
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP11

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Phalaris arundinacea*	15	Yes	FACW
2	*Polygonum hydropiperoides*	1	No	OBL
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		16 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

_X_ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 4/2	100					Silt Loam	
4-6	2.5Y 5/3	85	2.5Y 7/1	10	D	M	Silty Clay Loam	
			10YR 4/6	5	C	PL/M		
6-14	2.5Y 4/2	85	10YR 4/6	15	C	PL/M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP12

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): _____ Slope (%): 20

Subregion (LRR or MLRA) LRR N Lat.: 38.9143°N Long.: 84.6215°W Datum: _____

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation _____, soil _____, or hydrology _____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	No		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	_____	No	X	Depth (inches):	NA
Water table present?	Yes	_____	No	X	Depth (inches):	> 14
Saturation present? (includes capillary fringe)	Yes	_____	No	X	Depth (inches):	> 14

Wetland hydrology present? No

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP12

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Juglans nigra*	3	No	FACU
2				
3				
4				
5				
6				
7				
8				
9				
10				
		3 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Phalaris arundinacea*	80	Yes	FACW
2	*Lamium purpureum*	3	No	UPL
3	*Stellaria media*	2	No	UPL
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		85 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- X 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 4/3	100					Silty Loam	
7-14	10YR 4/4	75	10YR 4/3	10	D	M	Silty Clay	
			10YR 5/4	15	C	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (Inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP13
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 1-2
Subregion (LRR or MLRA) LRR N Lat.: 38.9115°N Long.: 84.6203°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Wetland hydrology present? Yes

Is the Sampled Area within a Wetland? Yes

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 6

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	12
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP13

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Juncus effusus*	60	Yes	FACW
2	*Scirpus atrovirens*	25	Yes	OBL
3	*Eupatorium perfoliatum*	10	No	FACW
4	*Dipsacus sylvestris*	5	No	NI
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separale sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 4/2	90	10YR 4/4	10	C	M	Silty Loam	
7-14	10YR 4/2	90	10YR 3/6	10	C	PL/M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP14

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 2-5

Subregion (LRR or MLRA) LRR N Lat.: 38.9115°N Long.: 84.6203°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	Yes		
Wetland hydrology present?	No		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	____	No	X	Depth (inches):	NA
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches):	NA

Wetland hydrology present? No

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP14

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Solidago altissima*	25	Yes	FACU
2	*Dipsacus sylvestris*	25	Yes	NI
3	*Conium maculatum*	20	Yes	FACW
4	*Barbarea vulgaris*	5	No	FACU
5	*Allium vineale*	3	No	FACU
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		78 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

___ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 In. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 4/2	70	10YR 4/4	30	C	M	Silty Clay Loam	
5-14	10YR 4/2	97	10YR 4/6	3	C	PL	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP15
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Broad swale Local relief (concave, convex, none): Concave Slope (%): ~1
Subregion (LRR or MLRA) LRR N Lat.: 38.9185°N Long.: 84.6228°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	____	Depth (inches):	2
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	0

Wetland hydrology present? Yes

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP15

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix exigua*		10	Yes	OBL
2				
3				
4				
5				
6				
7				
8				
9				
10				
		10 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Salix exigua*		50	Yes	OBL
2 *Lonicera maackii*		5	No	UPL
3				
4				
5				
6				
7				
8				
9				
10				
		55 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Poa pratensis*		25	Yes	FACU
2 *Barbarea vulgaris*		15	Yes	FACU
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		40 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1 *Lonicera japonica*		15	Yes	FAC
2				
3				
4				
5				
		15 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 5 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 60.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	2.5Y 4/2	100					Silty Loam	
4-12	2.5Y 4/2	97					Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP16
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): wet seepy area on hill Local relief (concave, convex, none): Slightly concave Slope (%): 2
Subregion (LRR or MLRA) LRR N Lat.: 38.9202°N Long.: 84.6206°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 7

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	____	Depth (inches):	12
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP16

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Leersia oryzoides*	45	Yes	OBL
2	*Typha latifolia*	35	Yes	OBL
3	*Juncus effusus*	15	No	FACW
4	*Poa palustris*	3	No	FACW
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		98 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-3	10YR 4/3	95	10YR 5/6	5	C	M	Silty Loam	
3-5	2.5Y 5/2	90	2.5Y 5/6	10	C	M	Silty Clay Loam	
5-14	10YR 4/1	95	10YR 4/6	5	C	PL/M	Silty Clay	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains M=Matrix

**Location: PL=Pore Lining,

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP17

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): 3-4

Subregion (LRR or MLRA) LRR N Lat.: 38.9201°N Long.: 84.6206°W Datum:

Soil Map Unit Name: Faywood Silty Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	____	No	X	Depth (inches):	> 14
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP17

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Festuca arundinacea*	70	Yes	FACU
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		70 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

___ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 5/3	80	10YR 5/4	10	C	M	Silty Clay Loam	
			10YR 5/2	10	D	M		
7+								Refusal

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain In Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP18
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Drainage ditch Local relief (concave, convex, none): concave Slope (%): <1
Subregion (LRR or MLRA) LRR N Lat.: 38.9206°N Long.: 84.6215°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 8

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Descrive recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP18

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Carex vulpinoidea*	50	Yes	OBL
2	*Leersia oryzoides*	20	Yes	OBL
3	*Juncus effusus*	15	No	FACW
4	*Scirpus atrovirens*	5	No	OBL
5	*Dipsacus sylvestris*	3	No	NI
6	*Poa palustris*	3	No	FACW
7				
8				
9				
10				
11				
12				
13				
14				
15				
		96 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 4/2	100					Silty Clay Loam	
4-8	2.5Y 5/1	90	2.5Y 5/6	10	C	M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP19
Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Drainage ditch Local relief (concave, convex, none): Concave Slope (%): <1
Subregion (LRR or MLRA) LRR N Lat.: 38.9204°N Long.: 84.6213°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Wetland hydrology present? Yes

Is the Sampled Area within a Wetland? Yes

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 9

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	10
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP19

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Typha latifolia*	75	Yes	OBL
2	*Aster sp.*	5	No	
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		80 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	x 1 =	0
FACW species	x 2 =	0
FAC species	x 3 =	0
FACU species	x 4 =	0
UPL species	x 5 =	0
Column totals	0 (A)	0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

X 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	2.5Y 5/3	90	10YR 5/4	10	C	M	Silty Clay Loam	
5-14	2.5Y 5/2	65	2.5Y 5/3	30	C	M	Silty Clay Loam	
			10YR 4/6	5	C	M		

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain In Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 02/07/2012

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP20

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Toe of slope Local relief (concave, convex, none): Concave Slope (%): 2-3

Subregion (LRR or MLRA) LRR N Lat.: 38.9292°N Long.: 84.6269°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 10

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	____	Depth (inches):	6
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP20

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Agrostis stolonifera*	60	Yes	FACW
2	*Typha latifolia*	50	Yes	OBL
3	*Juncus effusus*	40	Yes	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		150 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-2	10YR 4/2	100					Silty Loam	
2-7	10YR 4/2	85	10YR 5/4	10	C	M	Silty Clay Loam	
			10YR 4/6	5	C	PL/M		
7-14	10YR 5/6	80	2.5Y 7/1	20	D	M	Clay	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 2/7/12

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP21

Investigator(s): L. Darnell, S. Bishop Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Upland Local relief (concave, convex, none): Convex Slope (%): <1

Subregion (LRR or MLRA) LRR N Lat.: 38.9202°N Long.: 84.6269°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	No	**Is the Sampled Area within a Wetland?**	No
Hydric soil present?	No		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	NA
Water table present?	Yes	X	No	___	Depth (inches):	10
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	9

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP21

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Festuca arundinacea*	35	Yes	FACU
2	*Dipsacus sylvestris*	25	Yes	NI
3	*Carex vulpinoidea*	15	No	OBL
4	*Carex scoparia*	10	No	FACW
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		85 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

___ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? No

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 4/3	98	10YR 5/6	2	C	M	Silty Loam	
5-14	10YR 4/3	90	10YR 5/8	10	C	M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? No

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 3/8/12
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP22
Investigator(s): N. Guthals, L. Darnell Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): ~1
Subregion (LRR or MLRA) LRR N Lat.: 38.9177°N Long.: 84.6309°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 11

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	1-2
Water table present?	Yes	___	No	X	Depth (inches):	NA
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Delineation visit occurred during a rain event.

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP22

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Juncus effusus*	50	Yes	FACW
2	*Typha latifolia*	35	Yes	OBL
3	*Leersia oryzoides*	10	No	OBL
4	*Carex frankii*	10	No	OBL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		105 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

X 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-5	10YR 5/2	100					Silty Clay Loam	
5-11	2.5Y 5/2	95	10YR 5/6	5	C	M	Silty Clay Loam	
11-14	2.5Y 5/2	90	10YR 5/6	10	C	M	Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
___ Sandy Gley Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) (**MLRA 147, 148)**
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
___ Umbric Surface (F13) (**MLRA 136, 122)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 3/8/12

Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP23

Investigator(s): N. Guthals, L. Darnell Section, Township, Range: NA

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): ~2

Subregion (LRR or MLRA) LRR N Lat.: 38.9800°N Long.: 84.6279°W Datum:

Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes	**Is the Sampled Area within a Wetland?**	Yes
Hydric soil present?	Yes		
Wetland hydrology present?	Yes		

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 12

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	1
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Delineation visit occurred during a rain event

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP23

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Typha latifolia*	100	Yes	OBL
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0	
FACW species		x 2 =	0	
FAC species		x 3 =	0	
FACU species		x 4 =	0	
UPL species		x 5 =	0	
Column totals	0	(A)	0	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid test for hydrophytic vegetation
- X 2 - Dominance test is >50%
- ___ 3 - Prevalence index is ≤3.0*
- ___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 5/2	95	10YR 5/6	5	C	M	Silty Loam	
4-14	Gley2 4/10GB	100					Silty Clay Loam	

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: KY 338 Reconstruction Project at I-71/75 City/County: Boone Sampling Date: 3/8/12
Applicant/Owner: Kentucky Transportation Cabinet State: KY Sampling Point: DP24
Investigator(s): N. Guthals, L. Darnell Section, Township, Range: NA
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): ~1
Subregion (LRR or MLRA) LRR N Lat.: 38.9337°N Long.: 84.6307°W Datum:
Soil Map Unit Name: Faywood Silty Clay Loam NWI Classification: None
Are climatic/hydrologic conditions of the site typical for this time of the year? Yes (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Yes
Hydric soil present? Yes
Wetland hydrology present? Yes

Is the Sampled Area within a Wetland? Yes

Remarks: (Explain alternative procedures here or in a separate report.)
Wetland 13

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	1
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Yes

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Delineation visit occurred during a rain event.

VEGETATION (Four Strata) -- Use scientific names of plants

Sampling Point: DP24

Tree Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Sapling/Shurb Stratum	Plot Size (15')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0 =	Total Cover	

Herb Stratum	Plot Size (5')	Absolute % Cover	Dominant Species	Indicator Staus
1	*Typha latifolia*	80	Yes	OBL
2	*Euthamia graminifolia*	15	No	FAC
3	*Bidens frondosa*	10	No	FACW
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		105 =	Total Cover	

Woody Vine Stratum	Plot Size (30')	Absolute % Cover	Dominant Species	Indicator Staus
1				
2				
3				
4				
5				
		0 =	Total Cover	

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column totals	0 (A)		0 (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid test for hydrophytic vegetation

_X_ 2 - Dominance test is >50%

___ 3 - Prevalence index is ≤3.0*

___ 4 - Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** DP24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 4/1	90	5YR 4/6	10	C	M	Silt Loam	
8+							Refusal	Concrete

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains **Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1) **(LRR,N MLRA 147, 148)**
- ___ Sandy Gley Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S9) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) (**MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N MLRA 136)**
- ___ Umbric Surface (F13) (**MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain In Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Yes

Remarks:

	Kentucky Transportation Cabinet **Federal Highway Administration** **NO EFFECT FINDING**		U.S.Department of Transportation Federal Highway Administration
KYTC Item No:	**6 - 18**	**Route:**	**Ky – 338**
Quadrangle(s):	**Walton**	**County(ies):**	**Boone**

Project Description: (Type of improvement, areas to be impacted, crossroad improvements, easements, etc.)

KYTC Proposes to reconstruct the KY-338, Richwood Wood, interchange.

COUNTY LISTED SPP:

Bald Eagle Haliaeetus leucocephalus (801) BE KSNPC
Diamond Darter Crystallaria cincotta (507) CRCI KSNPC
Indiana Bat Myotis sodalis (903) IB KSNPC, USFWS
Catspaw Epioblasma obliquata obliquata (407) EPM KSNPC
Clubshell Pleurobema clava (416) CM KSNPC, USFWS
Fanshell Cyprogenia stegaria (403) FSM KSNPC, USFWS
Northern Riffleshell Epioblasma torulosa rangiana (408) NRM KSNPC
Orangefoot Pimpleback Plethobasus cooperianus (414) OFPM KSNPC, USFWS
Pink Mucket Lampsilis abrupta (409) PMM KDFWR, KSNPC, USFWS
Rayed Bean Villosa fabalis (420) RBM KSNPC
Ring Pink Obovaria retusa (412) RPM KDFWR, KSNPC, USFWS
Rough Pigtoe Pleurobema plenum (417) RPTM KSNPC, USFWS
Scaleshell Leptodea leptodon (410) SSM KSNPC
Sheepnose Plethobasus cyphyus (415) SNM KDFWR, KSNPC, USFWS
Spectaclecase Cumberlandia monodonta (402) SCM KDFWR, KSNPC
Running Buffalo Clover Trifolium stoloniferum (112) RBC KSNPC, USFWS

Methodologies: (Methods of assessment, who, what, when, resources, etc.)

KYTC Biologists performed an in office analysis using ArcMap layers: Rivers/Streams, topography, aerials, hillshade, and models from our in-house database of Indiana Bat polygons and mussels.

Results: (Compare habitat used by listed species with available habitat)

Bald Eagles usually nest and forage around large bodies of water. This particular project is several miles from the Ohio River. If Bald Eagles are found nesting in the area then KYTC will comply with the Bald and Golden Eagle Act.

The **mussels** listed for Boone County are typically of 2nd order or larger streams, typically rivers. All streams within the project area are 1st order streams. In addition, the project area is very urbanized, and streams would likely to be a low quality to provide suitable habitat for mussels.

Indiana Bats use trees to roost in during the summer and caves to hibernate in the winter. The project area is not located in a karst-type geological formation area, and is unlikely to have winter habitat.

Determinations:

Bald Eagle No Effect

Mussels No habitat No effect all species

Indiana Bat No effect winter habitat only.

The project has been assessed in accordance with the provisions of Section 7 of the Endangered Species Act. As a designated representative of the FHWA, the KYTC has determined that the project will have No Effect on any listed species or their critical habitat, and further Section 7(a)(2) consultation with the Service is not required.

KYTC Signature

2/12/14
Date

Ian Horn
Print Name

E.A.T.S. Milestones updated

Ian Horn
Name

2/12/14
Date

Appendix D2 -- ACOE & DOW Permits

6-14.00 ACOE & DOW Permits

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Army Corps of Engineers and Division of Water permits are not necessary for this project.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE KY 40201-0059
FAX: (502) 315-6677
http://www.lrl.usace.army.mil/

February 6, 2019

Regulatory Division
South Branch (RDS)
ID No. LRL-2018-1027-ncc

Mr. Adam Michels
Kentucky Transportation Cabinet, DEA
200 Mero Street
Frankfort, Kentucky 40622

Dear Mr. Michels:

This is in regard to your application for a Department of the Army (DA) permit concerning a proposal to reconstruct the KY 338 interchange, associated side roads and a small portion of I-75/I-71 at the Richwood, Kentucky exit (Exit 175). The project would involve the construction of a new Double Crossover Diamond Interchange (DCD) along with widening and lengthening the existing ramps. KY 338 would be reconstructed to include a roundabout at Triple Crown Boulevard, a grade separation at US 25 using a single point urban interchange (SPUI), and a grade separation at the railroad crossing east of US 25. US 25 would be reconstructed north and south of KY 338 to accommodate the new proposed SPUI configuration and improve access for businesses and residents along the corridor. The proposed project is located in Richwood, Boone County, Kentucky. We have reviewed your application and have made the following determinations: the work is minor in nature, will not have a significant impact on the environment, and should encounter no opposition.

Based on these determinations, your proposed work satisfies the Letter of Permission criteria, as specified in our regulations. Therefore, you are authorized, in accordance with 33 USC 403, to place fill material into approximately 1,245 linear feet of intermittent stream, 484 linear feet of ephemeral stream, 0.29 acre of wetland and 0.365 acre of an open water pond. This permission is granted with the following Special Conditions:

a. The project shall be constructed in accordance with the plans included in the November 26, 2018 application for Kentucky Transportation Cabinet (KYTC) Item No. 6-18.00 and all subsequent information received regarding changes to the original submittal.

b. To compensate for the removal of 5.59 acres of potential habitat for the Indiana bat and northern long-eared bat, the permittee shall avoid tree clearing from June 1 to July 31 and

shall comply with the processes identified in the 2016 Revised Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky between the Federal Highway Administration (FHWA), KYTC, and the U.S. Fish and Wildlife Service (USFWS) Kentucky Field Office.

c. To compensate for stream and wetland impacts, the permittee shall provide a receipt from the Kentucky Department of Fish and Wildlife Resources (KDFWR) In-Lieu Fee Program for the purchase of 950 stream Adjusted Mitigation Units (AMUs) and for 0.4 wetland AMUs. AMUs must be purchased prior to the discharge of fill into "waters of the U.S." The Corps ID number LRL-2018-1027-ncc must accompany the payment. Inquiries regarding credit purchase may be made directly to KDFWR by calling Mr. Clifford Scott (502) 564-5101, by email at Clifford.scott@ky.gov, or in writing at Kentucky Department of Fish and Wildlife Resources, Division of Fisheries, #1 Sportsman's Lane, Frankfort, Kentucky 40601.

d. The time limit for completing the work authorized ends on **February 6, 2024**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.

e. Upon completion of construction you are to notify the District Engineer. The enclosed Completion Report form must be completed and returned to this office.

f. You must agree to comply with the enclosed General Conditions.

This authorization will be effective as soon as we receive your signed acceptance of these conditions. Please sign and date the duplicate copy of this letter in the space provided and return the signed copy in the enclosed envelope. Note that we also perform periodic inspections to ensure compliance with our permit conditions and appropriate Federal laws.

Copies of this letter will be sent to the appropriate coordinating agencies (see enclosure for addresses).

FOR THE DISTRICT ENGINEER:

David Baldridge
Chief, South Branch
Regulatory Division

Enclosures

(I accept the conditions of this authorization):

Kentucky Transportation Cabinet

2-07-2019
Date

COORDINATING AGENCIES

Mr. Duncan Powell
USEPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

Mr. Lee Andrews
U.S. Fish & Wildlife Service
JC Watts Federal Building
330 West Broadway, Room 265
Frankfort, KY 40601

Ms. Stephanie Hayes
Kentucky Energy & Environment Cabinet
Division of Water
300 Sower Boulevard, 3rd Floor
Frankfort, KY 40601

Mr. Craig Potts
Executive Director
State Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601

Mr. Gregory Johnson, Commissioner
Kentucky Department of Fish and Wildlife Resources
#1 Sportsman's Lane
Frankfort, KY 40601

GENERAL CONDITIONS:

1. Discharges of dredged or fill material into “waters of the U.S.” must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site). In determining the minimal impact threshold, the Districts will consider the direct, secondary, and cumulative impacts of the fill or work and any mitigation measures.

2. The permittee shall provide a mitigation/monitoring plan for impacts resulting from the placement of fill into “waters of the U.S.” in excess of 300 linear feet of intermittent or perennial stream; the filling of greater than 0.10 acre (4,356 sq. feet) of waters of the U.S; or work causing more than minimal effects, to compensate for impacts to the “waters of the U.S.” These impact thresholds are applied for each crossing. When mitigation is required, the permittee will develop the mitigation site concurrently with, or in advance of, the site construction unless the Corps determines on a project specific basis that it is not practical to do so. This will ensure that aquatic functions are not lost for long periods of time (e.g. temporal loss) which could adversely affect water quality and wildlife. The requirement for conservation easements or deed restrictions will be determined on a project specific basis.

3. The permittee shall ensure that sedimentation and soil erosion control measures are in place prior to commencement of construction activities. These measures will remain in place and be properly maintained throughout construction. Sedimentation and soil control measures shall include the installation of straw bale barriers, silt fencing and/or other approved methods to control sedimentation and erosion. Sedimentation and erosion controls will not be placed in “waters of the U.S.” except if specifically approved by the District.

4. The permittee shall ensure that areas disturbed by any construction activity, including channel and stream banks, are immediately stabilized and revegetated with a combination of non-invasive plants (grasses, legumes and shrubs) which are compatible with the affected area and will not compete with native vegetation.

5. The permittee shall ensure that no in-stream construction activity is performed during periods of high stream flow or during the fish spawning season (April 1 through June 30) without first contacting the Kentucky Department of Fish and Wildlife Resources (KDFWR) for their expertise on impacts to the fishery resource. Additionally, the discharge of dredged and/or fill material in known waterfowl breeding and wintering areas must be avoided to the maximum extent practicable.

6. The permittee will ensure that the activity authorized will not disrupt movement of those aquatic species indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's specific purpose is to impound water.

7. The permittee shall ensure that all construction equipment is refueled and maintained on an upland site away from existing streams, drainageways and wetland areas. Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

8. The permittee must comply with any case specific special conditions added by the Corps or by the State Section 401 Water Quality Certification (WQC). The conditions imposed in the State Section 401 WQC are also conditions of this LOP.

9. The permittee shall ensure that no activity authorized by the LOP may cause more than a minimal adverse effect on navigation.

10. The permittee shall ensure proper maintenance of any structure or fill authorized by the LOP, in good condition and in conformance with the terms and conditions of the LOP, including maintenance to ensure public safety. The permittee is not relieved of this requirement if the permitted activity is abandoned, although the permittee may make a good faith transfer to a third party. Should the permittee wish to cease to maintain the authorized activity or desire to abandon it without a good faith transfer, the permittee must obtain a modification to the LOP from the Corps, which may require restoration of the area.

11. The permittee shall not perform any work within any Wild and Scenic Rivers or in any river officially designated as a "study river" for possible inclusion in the system, unless the appropriate Federal agency, with direct management responsibility for such river, has determined in writing that the proposed activity authorized by the LOP will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal Land Management agency in the area (e.g. U.S. Forest Service, Bureau of Land Management, the National Parks Service, or the U.S. Fish and Wildlife Service).

12. The permittee shall not perform any work under the LOP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. The permittee shall notify the Corps and coordinate the proposed action with the USFWS to determine if any listed species or critical habitat might be affected and/or adversely modified by the proposed work. No activity is authorized under the LOP which “may affect” a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed. At the direction of the Corps, the permittee shall complete the necessary consultation with the USFWS, satisfying the requirements of Section 7(a)(2) of the Endangered Species Act. The permittee shall not begin work until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. Authorization of an activity under the LOP does not authorize the "take" of a threatened or endangered species as defined under the Federal Endangered Species Act. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. Fish and Wildlife Service, both lethal and non-lethal "takes" of protected species are in violation of the Endangered Species Act.

Obligations under Section 7 of the Act must be reconsidered by the Corps Districts if (1) new information reveals impacts of the proposed action may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during consultation, or (3) new species are listed or critical habitat designated that might be affected

by the proposed action.

13. The permittee shall not perform any activity under the LOP which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places until the District Engineer has complied with the provisions of 33 CFR Part 325, Appendix C. The permittee must notify the District Engineer if the activity authorized by the LOP may affect any historic properties listed, determined to be eligible or which the permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin construction until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the Kentucky Heritage Council.

If the permittee discovers any previously unknown historic or archaeological remains while accomplishing the activity authorized by the LOP, work must be immediately stopped and this office immediately notified regarding the discovery. The District will initiate the Federal, Tribal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

14. The permittee shall not perform any work under the LOP where the discharge of dredged and/or fill material will occur in the proximity of a public water supply intake.

15. No activity, including structures or work in “waters of the U.S.” or discharges of dredged or fill material may consist of unsuitable materials (e.g. trash, debris, car bodies, asphalt, etc.) and that materials used for construction or discharge must be free from toxic pollutants in toxic amounts.

16. The permittee shall, to the maximum extent practicable, design the project to maintain pre-construction downstream flow conditions. Furthermore, the work must not permanently restrict or impede the passage of normal or expected high flows and the structure or discharge of fill must withstand expected high flows. The project must provide, to the maximum extent practicable, for retaining excess flows from the site and for establishing flow rates from the site similar to pre-construction conditions.

17. The permittee shall ensure that all temporary fills, authorized under the LOP, be removed in their entirety and the affected areas returned to pre-construction elevation.

18. Representatives from the Corps of Engineers and/or the State of Kentucky may inspect any authorized activity or mitigation site at any time deemed necessary to ensure compliance with the terms and conditions of the LOP, Section 401 WQC, and applicable laws.

19. All work authorized by this LOP must be completed within five years after the date of the Corps authorization letter. If you find you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least three months before the expiration date.

20. The permittee, after completion of work under the LOP, shall submit a signed certification letter regarding the completed work and required mitigation, if applicable. The certification letter will include a statement that the work was done in accordance with the LOP authorization including compliance with all general and special conditions and completion of mitigation work.

21. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of the LOP.

22. For Section 10 waters, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

Appendix E – RIGHT OF WAY

Appendix E1 -- Right of Way Project Reports (Form TC 62-75)

PROJECT STATUS REPORT

ITEM NUMBER:	06-0014.00	**COUNTY:**	Boone	**FEDERAL NO.**	NHPP IM0757 (139)	**STATE**	12FO FD52 008 8022201R
ROAD NAME:	KY 536 Mt. Zion Road Reconstruction Project	**FHWA APPROVAL**		**CLEARANCE DATE:**	7/1/2018	**OFFICIAL ORDER NO:**	110422
ACCOUNT NO:		**TITLE ATTORNEY:**	Jeffrey Arnzen	**LETTING DATE:**	2018		
APPRAISER :	Matt Chapman - C	**BUYERS:**	Tim Flynn - T, Julie Boggess - J	**REVIEWER:**	Dale Crump / Brian Davis		

5/1/2019

P. NO.	FIRST NAME	LAST NAME	TITLE REC.	APPR. ASSIGN		APPR. REC.	DIST. REVIEW	C.O. APPR.	RELOC. COMPU.	BUYER ASSIGN		FMV OFFER	RELOC. OFFER	PARCEL BGT.	CHECK DELV.	SUIT INFO	SUIT FILED	ROE	90 DAY EXPIRED	IMPROV VACATE	IMPROV REMOVE	REMARKS
103	St. Elizabeth Medical Ctr.			C	7/5/18	8/3/18	8/16/18	8/22/18	XX/XX/XX	T	11/15/17	9/18/18	xx/xx/xx	11/16/18	2/4/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 585
104	Wayne & Phyli	Sandlin		C	2/7/17	6/20/17	8/15/17	9/8/17	12/5/17	J	6/21/17	12/7/17	12/7/17	1/4/18	3/2/18	xx/xx/xx	xx/xx/xx	xx/xx/xx				Hwy DB 22 Pg 426
105	Steak N Shake			C	7/5/18	8/3/18	9/10/18	9/17/18	XX/XX/XX	T	11/15/17	1/8/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	2/12/19						**SUIT**
106	Toebben, Ltd.			C	7/5/18	8/3/18	8/10/18	8/20/18	XX/XX/XX	T	11/15/17	1/9/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	3/7/19						**SUIT**
107	Speedway LLC			C	2/7/17	6/21/17	8/24/18	9/14/18	XX/XX/XX	T	11/15/17	9/28/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	12/5/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
108	Toebben, Ltd.			C	7/5/18	8/3/18	8/20/18	8/28/18	XX/XX/XX	T	11/15/17	1/9/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	3/7/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
109	NDJ Properties, LLC			C	7/5/18	8/3/18	8/10/18	8/20/18	XX/XX/XX	T	11/15/17	9/17/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	1/29/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
110	Fleet Development Co. LLC			C	2/7/17	6/19/17	6/20/17	6/21/17	XX/XX/XX	J	6/21/17	6/26/18	xx/xx/xx	8/4/17	9/8/17	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 261
110	Richwood Auto -**Tenant**				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	J	6/21/17	xx/xx/xx	6/26/17	xx/xx/xx	9/8/17	xx/xx/xx	xx/xx/xx	xx/xx/xx	9/26/17	8/8/17		**Relo closed**
111	Transit Authority of Northern KY			C	7/5/18	8/3/18	8/13/18	8/20/18	XX/XX/XX	T	11/15/17	9/19/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	11/13/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
112	BB&T			C	7/5/18	8/3/18	8/14/18	8/20/18	XX/XX/XX	T	11/15/17	10/3/18	xx/xx/xx	2/25/19	3/28/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	HWY DB 22 Pg 687
113	Fifth Third Bank of Northern KY			C	2/7/17	7/12/17	7/26/17	8/8/17	XX/XX/XX	T	11/15/17	2/15/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	6/29/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
114	Ayaan LLC			C	2/7/17	7/24/17	8/30/17	9/13/17	XX/XX/XX	T	11/15/17	1/25/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	4/12/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
115	Mt. Zion Properties LLC			C	7/5/18	8/3/18	9/7/18	9/14/18	XX/XX/XX	T	11/15/17	10/4/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	1/10/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
116	Toll Road Properties, LLC			C	7/5/18	8/3/18	9/7/18	9/14/18	XX/XX/XX	T	11/15/17	10/16/18	xx/xx/xx	2/27/19	3/28/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	HWY DB 22 Pg 705
117	Halls Investment, LLC				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	1/31/18	xx/xx/xx	5/21/18	6/21/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 150
118	Greenlawn White Pines, LLC			C	2/7/17	8/15/17	8/30/17	9/13/17	XX/XX/XX	T	11/15/17	1/25/18	xx/xx/xx	5/30/18	7/11/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 528
119	WD Florence Portfolio, L.P.			C	7/5/18	8/3/18	8/16/18	8/22/18	XX/XX/XX	T	11/15/17	10/30/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	2/19/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
120	Sousa Realty Group LLC			C	7/5/18	8/3/18	8/14/18	8/20/18	XX/XX/XX	T	11/15/17	10/8/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	1/22/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
121	Autozone Development Corp.			C	7/5/18	8/3/18	8/23/18	8/30/18	XX/XX/XX	T	11/15/17	10/12/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	1/24/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
123	Robert	Reynolds		C	2/7/17	8/9/17	8/21/18	8/30/18	XX/XX/XX	T	11/15/17	10/11/18	xx/xx/xx	2/7/19	3/21/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 657
124	John	Lang			xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	3/6/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	6/26/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
125	Carolyn	Doolin		C	2/7/17	7/5/17	9/8/17	9/8/17	2/7/18	J	1/1/18	2/8/18	2/8/18	xx/xx/xx	xx/xx/xx	5/2/18						**SUIT**
126	Midwest Leasing/Properties			C	7/5/18	8/20/18	8/20/18	8/30/18	XX/XX/XX	T	11/15/17	11/15/18	xx/xx/xx	12/18/18	3/26/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	**EA 81 Pg 827**
127	Thomas E. & Li	Kohlhepp			xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	2/16/18	xx/xx/xx	2/23/18	4/18/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	HWY DB 22 Pg 502
128	120 Mt. Zion Rd., LLC				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	2/26/18	xx/xx/xx	6/7/18	7/31/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	HWY DB 22 Pg 550
129	Arrm Properties, LLC			C	7/5/18	9/17/18	9/18/18	9/24/18	XX/XX/XX	T	11/10/17	10/15/18	xx/xx/xx	12/19/18	3/12/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 775

PROJECT STATUS REPORT

ITEM NUMBER:	06-0014.00	**COUNTY:**	Boone	**FEDERAL NO.**	NHPP IM0757 (139)	**STATE**	12FO FD52 008 8022201R
ROAD NAME:	KY 536 Mt. Zion Road Reconstruction Project	**FHWA APPROVAL**		**CLEARANCE DATE:**	7/1/2018	**OFFICIAL ORDER NO:**	110422
ACCOUNT NO:		**TITLE ATTORNEY:**	Jeffrey Arnzen	**LETTING DATE:**	2018		
APPRAISER :	Matt Chapman - C	**BUYERS:**	Tim Flynn - T, Julie Boggess - J	**REVIEWER:**	Dale Crump / Brian Davis		

5/1/2019

P. NO.	FIRST NAME	LAST NAME	TITLE REC.	APPR. ASSIGN		APPR. REC.	DIST. REVIEW	C.O. APPR.	RELOC. COMPU.		BUYER ASSIGN	FMV OFFER	RELOC. OFFER	PARCEL BGT.	CHECK DELV.	SUIT INFO	SUIT FILED	ROE	90 DAY EXPIRED	IMPROV VACATE	IMPROV REMOVE	REMARKS
130	Fay & Wm Shehan			C	2/7/17	11/28/17	12/1/17	12/18/17	XX/XX/XX		1/1/18	1/12/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	4/5/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
131	Walter	Hayes, LLC		C	2/7/17	9/27/17	10/2/17	10/9/17	XX/XX/XX	T	11/15/17	1/11/18	xx/xx/xx	2/9/18	4/24/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	HWY DB 22 Pg 510
132	United Dairy Farmers, Inc..			C	7/5/18	8/20/18	8/20/18	8/30/18	XX/XX/XX		11/15/17	10/15/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	12/4/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
137	Welding Alloys (USA), Inc.			C	2/7/17	12/15/17	8/29/18	8/30/18	XX/XX/XX		11/15/17	10/26/18	xx/xx/xx	12/19/18	3/22/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 662
138	Bill C. & Faye	Shehan		C	2/7/17	9/27/17	10/10/17	11/14/17	XX/XX/XX		1/1/18	1/12/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	4/5/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
139	Toebben, Ltd.			C	2/7/17	9/27/17	8/23/18	8/30/18	XX/XX/XX	T	11/15/17	1/9/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	3/1/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
200	Arrm Properties, LLC				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	3/1/18	xx/xx/xx	12/19/18	3/12/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 769
201	Theresa L. & Lu	Gentry			xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	2/22/18	xx/xx/xx	4/13/18	5/4/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 47
202	Duke Energy KY, Inc.				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	2/22/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	**Eliminated**
204	Bodies by Mike, LLC				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	2/23/18	2/23/18	5/3/18	6/1/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 94
205	Carter Lumber Co.				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	XX/XX/XX	T	11/10/17	3/8/18	xx/xx/xx	3/26/18	4/16/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 23
302	Sherwood Lakes Development, LLC			C	2/7/17	7/31/17	9/7/17	9/13/17	XX/XX/XX	T	11/15/17	2/23/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	7/9/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
303	Elite Wellness, LLC			C	2/7/17	9/27/17	10/5/17	10/17/17	XX/XX/XX	T	11/15/17	2/24/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	7/11/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
304	Boom, Inc.			C	7/5/18	8/3/18	8/16/18	8/20/18	XX/XX/XX	T	11/15/17	10/29/18	xx/xx/xx	3/19/19		xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Check to att 4/10
305	St. Elizabeth Medical Ctr.			C	2/7/17	7/31/17	8/7/17	8/14/17	XX/XX/XX	T	11/15/17	9/18/18	xx/xx/xx	11/16/18	2/4/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	EA 81 Pg 533
306	Toebben, Ltd.			C	7/5/18	9/24/18	9/28/18	10/8/18	XX/XX/XX	T	7/5/18	1/9/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	3/7/19			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
307	Castle Bluff Estates, LLC				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	T	11/10/17	3/13/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	**Eliminated**
308	Bill C. & Faye Shehan				xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx/	T	11/10/17	1/12/18	xx/xx/xx	xx/xx/xx	xx/xx/xx	4/5/18			xx/xx/xx	xx/xx/xx	xx/xx/xx	**SUIT**
309	STPC, LLC			C	7/5/18	8/29/18	9/18/18	9/24/18	XX/XX/XX	T	7/5/18	10/17/18	xx/xx/xx	12/12/18	1/30/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 593
310	Welding Alloys (USA), Inc.			C	7/5/18	8/3/18	8/27/18	9/14/18	XX/XX/XX	T	7/5/18	10/26/18	xx/xx/xx	12/19/18	3/22/19	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	xx/xx/xx	Hwy DB 22 Pg 667
311	Welding Alloys (USA), Inc.			C	7/5/18	8/3/18	8/27/18	9/14/18	12/12/18	T	7/5/18	10/26/18	12/12/18	12/19/18	3/22/19	xx/xx/xx	xx/xx/xx	xx/xx/xx				Hwy DB 22 Pg 671
48	**<TOTAL>**		**0**		**36**	**36**	**36**	**36**	**3**		**48**	**47**	**5**	**23**	**23**	**22**	**0**	**0**	**1**	**1**	**0**	

Right of Way Status Report

Item No:	6-18.00	**County:**	Boone	**Letting Date:**		**Federal No:**	2342	**eMars No:**	2147	**Print Date: 04/25/2019**
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Project Description:	RECONSTRUCT THE KY-338 (RICHWOOD ROAD) INTERCHANGE. (FUNDING FOR IMR SHOWN UNDER 6-14.01) (10CCR)(12CCR)(14CCR)(16CCR) (DESIGN BUILD)					**Title Attorney:**	Jeff Shipp			
Appraiser(s):	Dale J Crump ,Kevin Johnson ,Matt Chapman ,Matt K Crump			**KYTC Project Manager:**	KYTC\CAROL.CALLAN-RAMLER	**Buyers:**	Angela Auter ,Chelsea DeWitt ,Francisco Dimas ,Jodi Griffel ,Kevin Cleary ,MaryBeth Johnson			
Reviewer(s):	ROGER CREW ,SCOTT CLARKE			**ROW Project Manager:**	Brian Cox ,LEIGH KARR, SR/WA	**Relocation Agent(s):**	Mary Beth ,Mary Beth Johnson			

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0101	N	Triple Crown Developers, LLC	10/1/18	7/9/18	DJC	1/16/19	1/23/19	1/28/19	11/12/18	MJ	2/7/19	4/3/19							N				
0102	N	Miracle, John	7/26/18	7/9/18	DJC	1/8/19	2/4/19		11/12/18	MJ	2/25/19								N				
0103	N	EM-A-NON Acres Partnership	8/27/18	7/9/18	MC	12/21/18	1/4/19	1/14/19	1/15/19	MJ	1/21/19	3/27/19							N				
0104	N	Triple Crown Developers, LLC, a Kentucky Limited Liability Company	10/12/18	7/9/18	DJC	1/16/19	1/23/19	1/28/19	11/12/18	MJ	2/7/19	4/3/19							N				
0105	N	Davis, RichardL	8/1/18	7/9/18	MC	12/21/18	1/4/19	1/14/19	1/15/19	MJ	1/21/19	3/27/19							Y	MBJ			
0106	N	Davis, Don	7/13/18	7/9/18	MC	12/21/18	12/28/18	1/14/19	1/15/19	MJ	1/21/19	3/27/19							Y	MBJ			
0107	N	Davis, DennisG	7/26/18	7/9/18	MC	12/21/18	12/28/18	1/14/19	1/15/19	MJ	1/21/19	3/27/19							N				
0108	N	Fifth Third Bank, Northern Kentucky, Inc.	7/26/18	7/9/18	MC	1/30/19	1/30/19	2/4/19	1/24/19	FD,JG	2/13/09								N				
0109	N	The Huntington National Bank	7/26/18						9/17/18	MJ	12/17/18	1/22/19	3/29/19						N				
0111	Y	Richwood Shops, LLC	7/26/18	7/9/18	MC				1/18/19	CD	1/30/19								N				
0112	N	The Bank of Kentucky, Inc	7/26/18	7/9/18	MC	1/30/19	1/31/19		1/24/19	FD,JG,KC	2/13/19								N				
0113	N	One Holland Properties of Richwood LLC	7/13/18	7/9/18	KJ	4/8/19	11/2/18	4/11/19	11/12/18	MJ	1/21/19								N				
0114	N	The Deters Company	7/26/18	7/9/18	KJ	12/20/18	12/21/18	2/8/19	1/18/19	AA	2/15/19	4/16/19							Y	MBJ			
0115	N	Deters Company	7/26/18	7/9/18	KJ	1/17/19	1/23/19	1/24/19	1/18/19	AA	2/15/19	4/16/19							Y	MBJ			
0116	N	McDonalds Corporation	7/26/18	7/9/18	KJ	1/17/19	11/8/18	1/28/19	1/18/19	AA	2/13/19								N				
0117	N	Lydia Real Estate, LLC	7/26/18	7/9/18	KJ	1/17/19	11/2/18	3/25/19	1/18/19	CD	2/5/19								N				
0120	N	K K C Investors	7/26/18	7/9/18	MC	11/9/18	11/20/18	12/3/18	11/12/18	MJ	12/17/18	2/11/19	3/29/19						Y	MBJ			
0123	N	Pilot Travel Center	7/26/18	7/9/18	KJ	1/4/19	12/21/18	1/14/19	1/24/19	FD,JG,KC	2/8/19								N				

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Appraiser(s):	Dale J Crump ,Kevin Johnson ,Matt Chapman ,Matt K Crump			**KYTC Project Manager:**	KYTC\CAROL.CALLAN-RAMLER	**Buyers:**	Angela Auter ,Chelsea DeWitt ,Francisco Dimas ,Jodi Griffel ,Kevin Cleary ,MaryBeth Johnson			
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0124	N	Garrard Street Enterprises, LLC	7/26/18	7/9/18	KJ	1/11/19	1/8/19	1/23/19	1/2/19	MJ	2/7/19	3/1/19							Y	MBJ			
0127	N	SSTI 281 Richwood Rd, LLC	6/28/18	7/9/18	KJ	1/10/19	11/27/18	1/17/19	1/2/19	MJ	2/5/19								Y	MBJ			
0133	N	Saint Elizabeth Medical Center, Inc	7/26/18						9/17/18	MJ	2/5/19	2/22/19							N				
0134	N	EM-A-NON Acres Limited Partnership	8/11/18	7/9/18	MC	12/21/18	12/28/18	1/14/19	1/15/19	MJ	1/21/19	3/27/19							N				
0135	N	Bischoff, ThomasE	8/1/18						1/18/19	CD	2/5/19								N				
0303	N	Mason, JeffA	7/13/18	7/9/18	DJC	10/19/18	12/8/18	2/8/19	11/12/18	MJ	2/11/19	3/16/19							N				
0304	N	Mason, Jeffrey A	7/13/18	7/9/18	DJC	12/18/18	12/20/18	1/23/19	11/12/18	MJ	2/11/19	3/16/19							Y	MBJ			
0305	N	Miller, Kara	7/26/18	7/9/18	DJC	10/24/18	12/11/18	12/14/18	1/9/19	CD	1/30/19	4/8/19							N				
0306	N	Fiorelli, Bernard	8/27/18	7/9/18	DJC	1/10/19	1/24/19	2/4/19	11/12/18	MJ	2/14/19								Y	MB			
0307	N	ILPT KYIN LLC	8/27/18	7/9/18	DJC	1/14/19	1/14/19	1/22/19	1/24/19	FD,JG	2/8/19								N				
0308	N	Park South H, LLC	8/27/18	7/9/18	DJC	1/28/19	1/24/19	2/4/19	2/13/19	KC	2/15/19								N				
0310	N	BOTR, LLC;Bowers Richwood, LLC;Grever Richwood, LLC;Hemberger Richwood LLC;Hyden Richwood, LLC;Ricke Richwood, LLC	7/26/18	7/9/18	DJC	2/7/19	2/7/19	2/12/19	1/18/19	AA	2/15/19								N				
0311	N	Caldwell, RebeccaS;Haren, CynthiaC;Kim, Janice Clare;Kim, KathleenA	7/26/18	7/9/18	DJC	10/23/18	10/26/18	11/1/18	11/5/18	MJ	11/7/18	12/21/18	3/15/19						Y	MBJ			
0312	N	Stag Industrial Holdings, LLC	8/7/18	7/9/18	MC	1/22/19	2/12/19	2/13/19	1/23/19	JG	2/15/19								N				
0315	N	HPT TA Properties Trust	7/26/18	7/9/18	KJ	1/24/19	1/24/19	1/28/19	2/15/19	JG,MJ	2/8/19								Y	MBJ			
0316	N	Richwood Development Company II, LLC	8/1/18	7/9/18	KJ	1/17/19	10/23/18	1/18/19	11/27/18	AA	2/5/19								N				
0317	N	Richwood Development Company II, LLC	8/1/18	7/9/18	KJ	1/14/19	10/23/18	1/18/19	11/27/18	AA	2/5/19								N				
0318	N	Richwood Development Company II, LLC	8/1/18	7/9/18	KJ	1/17/19	11/2/18	1/28/19	11/27/18	AA	2/5/19								Y	MBJ			

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0319	N	Pilot Travel Center	8/1/19	7/9/18	KJ	1/11/19	1/11/19	1/14/19	2/8/19	FD,JG,KC	2/8/19								N				
0320	N	FRS RE, LLC	8/1/18						1/8/19	AA	2/5/19	2/26/19							N				
0321	N	Hotel, LLC, Bluebird	8/27/18	7/9/18	KJ	1/17/19	1/18/19	1/28/19	1/18/19	AA	2/7/19								N				
0322	N	R.C. Durr Foundation, INC.	8/27/18	7/9/18	DJC	1/9/19	2/11/19	2/13/19	1/18/19	AA	2/20/19	3/15/19							N				
0323	N	Egan, Shawn	7/26/18	7/9/18	DJC	1/10/19	2/12/19	2/13/19	2/15/19	JG	2/18/19								Y	MBJ			
0324	N	Griggs, Claude	7/25/18	7/9/18	DJC	1/10/19	2/12/19	2/13/19	1/18/19	CD						3/20/19			N				
0325	N	Johnson, Timothy	7/26/18	10/19/18	DJC	1/14/19	1/14/19	1/22/19	1/18/19	AA	2/7/19								N				
0326	N	J O Properties	8/7/18						9/17/18	MJ	11/7/18					4/17/19			N				
0327	N	K & S Realty, LLC	8/27/18	7/9/18	MC	1/3/19	1/3/19	1/10/19	1/24/19	JG,KC	2/7/19								N				
0328	N	Clean Energy	8/27/18	7/9/18	MC	1/3/19	12/11/18	1/25/19	1/24/19	JG	2/14/19								N				
0329	N	Walton Fire Protection District	8/27/18	7/9/18	MC	11/27/18	11/28/18	12/3/18	1/3/19	MJ	1/10/19	3/1/19							N				
0333	N	Mahoney, TimothyL	8/27/18	7/9/18	DJC	10/30/18	12/11/18	12/14/18	11/12/18	MJ	1/21/19					4/25/19			N				
0334	N	WFF Investments LLC	8/27/18						11/27/18	AA	2/20/19								N				
0335	N	C.C.W. Realty Company	7/26/18	7/9/18	MC	1/3/19	1/4/19	1/10/19	1/18/19	MJ	2/8/19	4/10/19							N				
0336	N	Skyline Development, LLC	12/11/18						1/18/19	CD,MJ	2/11/19								N				
0337	N	B & Z Development, Inc	8/27/18						9/17/18	MJ	2/7/19	2/12/19	3/14/19						N				
0339	N	CMH of KY, Inc.	8/1/18						9/17/18	MJ	1/11/19	1/25/19							N				

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0340	N	Johnson, Timothy	7/26/18	10/19/18	DJC	1/14/19	1/17/19	4/18/19	1/18/19	AA	2/7/19								N				
0341	N	Robinsons Express LLC	7/26/18						11/27/18	AA	1/23/19								N				
0347	N	Legends of Steeplechase	8/27/18						9/17/18	MJ	11/7/18								N				
0348	N	Lyons-Magnus East Inc.	8/27/18	1/15/19	MKC	1/18/19	1/22/19	1/28/19	1/18/19	CD	2/11/19	3/26/19							N				
0349	N	Norfolk Southern Railroad	6/28/18	12/13/18	KJ	1/2/19	1/4/19	2/20/19	2/25/19	MJ									N				
0350	N	The Drees Company, a Kentucky Corporation	10/2/18						9/25/18	MJ	10/15/18	12/29/18							N				
0351	N	Park South I, LLC	8/27/18	1/3/19	DJC	1/17/19	1/24/19	1/28/19	2/13/19	JG,KC	2/15/19								N				
0352	N	GWR Group, LLC	7/26/18	1/15/19	MKC	1/25/19	2/8/19	2/11/19	1/18/19	MJ	2/16/19	4/18/19							Y	MBJ			
61	**1**	**TOTALS**	**61**	**49**		**48**	**48**	**46**	**61**		**59**	**26**	**4**	**0**		**3**	**0**	**0**	**14**		**0**	**0**	

Appendix E2 -- Right of Way Requirements for an Approved ATC

APPENDIX E2: RIGHT OF WAY REQUIREMENTS FOR AN APPROVED ATC

RIGHT-OF-WAY (ROW)

All elements of the Right of Way Process shall be performed with discretion and confidentiality. The acquisition of private property for public use is a serious matter. Those in government charged with managing and implementing property acquisition programs have the responsibility to the government body and to the public to ensure that such right of way programs are executed professionally and fairly

All right of way documents, including the appraisal report, offer letter, and relocation assistance shall not be shown to, read to, permitted to be read by, or lent to a person other than those DBT Right of Way Team in discharge of the official business of the Division of Right of Way & Utilities. The DBT shall not disclosure or discuss confidential information about any parcel or owner(s) of a parcel. The DBT Right of Way Team shall be the only people to discuss confidential information and then shall only discuss with KYTC Division of Right of Way Personnel.

PROCUREMENT OF RIGHT-OF-WAY and the ATC PROCESS

The DBT shall be required to submit an ATC when the DBT determines that additional Right-of-Way or easements beyond what is shown in the Project Construction plans is required. If the DBT does not submit an ATC and it is determined by KYTC during final design and/or construction that additional Right-of-Way and/or easements are required to perform the work, the DBT shall be responsible for <u>all services and costs necessary to properly obtain the Right-of-Way and/or easements needed to complete the project.</u>

This Section sets forth the Right-of-Way activities and applicable requirements to perform the work assigned to the DBT as well as pre-acquisition and acquisition activities to be performed by KYTC as part of the ATC process. Upon acceptance of an ATC by KYTC, the DBT shall provide all services necessary to acquire title to the Project Right-of-Way and/or easements beyond the limits shown in Project construction plans in form and substance acceptable to KYTC. This shall include coordination of relocation of displacees and clearance/demolition of the improvements from the Project Right-of-Way, as more fully described in the following sub-sections. Details regarding the DBT's approach for acquisition of Right-of-Way for an ATC shall be addressed by an ATC Right-of-Way Acquisition Plan prepared by the DBT.

Except as otherwise set forth in the Agreement, the DBT's Project Right-of-Way staff and/or Contractors shall function as independent contractors while acquiring Project Right-of-Way, and not as an agent, representative, or employees of KYTC. The DBT shall be responsible for all services and costs necessary to properly obtain the Right-of-Way and/or easements needed to complete the roadway project and utility relocations due to an approved ATC. The services for right of way acquisition described herein are to be included in the lump sum bid as part of the price proposal. In addition, the DBT shall provide a separate estimate for the right of way acquisition and relocation costs due to an approved ATC.

The DBT shall provide all services necessary to acquire title to the Project Right-of-Way and/or easements, in form and substance acceptable to KYTC, in the name of the

Commonwealth of Kentucky. This shall include coordination of relocation of displaces and clearance/demolition of the improvements from the Project Right-of-Way, as more fully described in the following sub-sections.

STANDARDS FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT shall acquire Project Right-of-Way in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act, otherwise referenced as the UNIFORM Act, as well as applicable state and federal Law and the practices, guidelines, procedures, and methods contained in the following as it pertains to Right-of-Way:

A. KYTC Right of Way Manual and Relocation Assistance Manual (Kentucky properties)

Pursuant to the applicable federal regulations, the DBT shall (i) acquire Right-of-Way parcels for the Project on behalf of KYTC, but without the direct participation of KYTC, subject to KYTC rights of review, approval, and audit; (ii) certify acceptance of the KYTC Policies and Procedures; (iii) provide adequate access to all occupied properties; and (iv) maintain utility service to occupied properties until relocation is complete.

SOFTWARE REQUIREMENTS FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT shall employ software that is compatible with the software in use by KYTC, or fully transferable to the KYTC system. The DBT must supply and maintain a web-based, parcel-by-parcel database that incorporates the fields and information required by KYTC. The DBT must maintain and participate in the KYTC Right-of-Way and Utilities Management System (RWUMS) for appraisal, appraisal review and acquisitions, and any other required Right-of-Way tracking system required by KYTC or otherwise agreed to by the parties. The database shall be fully accessible to persons authorized by KYTC.

DBT'S ATC RIGHT-OF-WAY ACQUISITION PLAN

The ATC Right-of-Way Acquisition Plan shall clearly present the DBT's methodology to be used to secure the ATC Right-of-Way needed to construct the Project as prescribed in the approved ATC. The Right-of-Way Acquisition Plan shall set forth DBT's organization, including names, titles and qualifications of Project Right-of-Way personnel, integration of the Project Right-of-Way schedule into the Project Schedule, interface between design and Project Right-of-Way activities, documentation and reporting, quality control procedures, and quality review standards.

The ATC Right-of-Way Acquisition Plan shall contain, at a minimum, the following:

A. The name of KYTC approved title attorneys to be used for title services.
B. The name and qualifications of the proposed Right-of-Way Acquisition Manager (AM).
C. The resumes and qualifications for appraisers, appraisal reviewers, relocation agents, negotiators, real estate attorneys, property management

agents, approved condemnation attorneys, and Right-of-Way personnel who shall have the minimum qualifications and experience specified in the KYTC Right-of-Way Manual.

D. A completed Project Report (form TC 62-75) provided in Appendix E.

The ATC Right-of-Way Acquisition Plan shall establish the specific means by which the DBT shall:

A. Provide sufficient personnel to achieve, in accordance with the Project Schedule, the goals and milestones established for Project Right-of-Way acquisition, relocation assistance, appraisals and appraisal review, and clearance/demolition of the improvements from the Project Right-of-Way.

B. Provide administrative support.

C. Provide for non-English speaking, visually impaired, or hearing impaired translation, as necessary.

D. Provide documentation and reports.

E. Produce and distribute acquisition and relocation brochures as approved by KYTC.

F. Establish, implement, and maintain quality control procedures and quality review standards for the acquisition for Project Right-of-Way.

G. Prevent fraud, waste, and mismanagement.

H. Provide methods for dispute resolution.

I. Provide for expeditious navigation through condemnation proceedings.

SCHEDULE AND REVIEW PROCEDURES FOR THE ATC RIGHT-OF-WAY ACQUISITION PLAN

The Project Schedule shall indicate the date to begin the acquisition of the Project Right-of-Way for the approved ATC and the anticipated completion date of acquisition activities for each parcel. KYTC shall be advised of all properties and temporary rights or interests in real property to be acquired by the DBT. In developing the Project Schedule, the DBT shall give priority to the acquisition of parcels that have significant impact on the Project Schedule and/or affect the Critical Path as so indicated. The monthly status reports shall provide updated projections for the acquisition date of each parcel.

Prior to beginning acquisition of a parcel, the DBT shall submit a complete Acquisition Package for said parcel. The Acquisition Package shall be prepared in accordance with the UNIFORM ACT as well as the KYTC Right-of-Way Manuals. Also, any unusual issues with the parcel shall be denoted. The submittal shall be made to the Project Manager for KYTC or their designee. Upon approval of the parcel Acquisition Package by KYTC, the DBT is released to acquire the parcel. KYTC shall retain all submittals as reference documents only. Submittal of the Acquisition Package to KYTC does not release the DBT from any responsibilities regarding the lawful performance of the acquisition of the Right-of-Way as defined by the ITP and other applicable laws and regulations. No adjustments to the Project Schedule shall be allowed due to this requirement.

The DBT is advised that for scheduling purposes, KYTC will be allowed up to 30 Calendar Days to process payments to respective property owners once the acquisition process has been completed and submitted to KYTC for execution.

PROJECT SCOPE OF SERVICES FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT shall complete all administrative activities and prepare all documentation sufficient for the DBT to acquire the Project Right-of-Way. The DBT shall provide all Project Right-of-Way maps and surveys, appraisals, legal descriptions, acquisition documentation, requests to acquire Project Right-of-Way, condemnation-related activities, and funding/closing procedures. The DBT shall use only those attorneys that are on KYTC's Office of Legal Services statewide contract list for title reports, closings, and condemnation. Except as otherwise authorized by applicable State and federal policy and regulations for early acquisition and approved by KYTC, the DBT shall not proceed with acquisition of the Project Right-of-Way until Right-of-Way maps and legal descriptions for the applicable constructible segment as established by the logical termini of the Project have been prepared and approved by KYTC. KYTC shall provide a separate release for each approved segment. Further, the DBT shall not commence any negotiations with landowners nor shall eminent domain procedures begin until the Acquisition Package from the Right-of-Way AM for that particular parcel has been submitted and approved by KYTC.

If the DBT and the landowner cannot negotiate an agreed-upon purchase price, the DBT shall advise KYTC that the DBT has elected to commence acquisition of the property through eminent domain procedures. The DBT shall not be permitted to commence any condemnation action through the statutory procedure without the express written consent of KYTC. Consent may be withheld by KYTC at their sole and absolute discretion. In the event KYTC withholds consent and delays are caused to the controlling item of the critical path schedule, the department will consider an extension of Contract time according to section 108.07 of the Standard Specifications.

The DBT shall not begin construction on any parcel of real estate unless property rights for the parcel have been conveyed and recorded in favor of KYTC, possession has been obtained through eminent domain procedures or a Consent and Release Agreement has been validly executed and delivered by all necessary parties to KYTC.

ACQUISITION PROCESS SUMMARY FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT's major activities with respect to the acquisition of the Project Right-of-Way for an approved ATC are:

A. Project Right-of-Way surveying and mapping
B. Title services
C. Appraisal services
D. Appraisal review
E. Negotiations
F. Closing services

G. Relocation assistance
H. Performance of Condemnation services
I. Clearance and demolition of Project Right-of-Way
J. Environmental due diligence
K. Documentation and document control
L. Progress reports
M. Project Right-of-Way administration and management
N. Project Right-of-Way quality management
O. Preparation of the acquisition packet for approval
P. Obtaining rights of entry, as necessary

RIGHT-OF-WAY PERSONNEL QUALIFICATIONS

DBT Right-of-Way personnel qualifications shall meet minimum standards set out in KYTC Right-of-Way Manuals.

DOCUMENTATION, REPORTING, AND LEGAL RESPONSIBILITIES FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT is responsible for preparing all specific reports and supporting documentation for review and approval during the acquisition process required by the UNIFORM ACT, all applicable laws and regulations, and the Policies and Procedures for KYTC, as required. At the sole discretion of KYTC, should evidence be presented, or it is suspected that the DBT is not following all laws and regulations in regards to the procurement of Right-of-Way for the Project, KYTC reserves the right to audit the DBT's Project documentation to verify contract requirements are being met. No adjustments to the Project schedule shall be allowed due to performance of an audit. If evidence is found that the DBT has failed to conform with all applicable laws and requirements established for the procurement of Right-of-Way as detailed in the ITP for this Project, the DBT may be subject to litigation and penalties as determined by a Court of Law in Kentucky. By submittal of a Proposal for this Project, the DBT acknowledges and agrees that the sole responsibility for the lawful procurement of Right-of-Way for this Project is the DBT's. Further, any delays, work stoppages, or financial penalties resulting from a failure to comply with all applicable laws and requirements for the lawful procurement of Right-of-Way for this Project are the responsibility of the DBT and the DBT agrees to hold harmless KYTC and FHWA.

All correspondence with KYTC and property owners relating to acquisition of real property shall include a heading with the following information (at a minimum):

A. County/State
B. Project – Item Number Highway Designation
C. Parcel number
D. Name of record owner(s)

In administering and managing its Project Right-of-Way activities for an approved ATC, the DBT shall:

A. Maintain parcel records on file of all aspects of the acquisition process in accordance with KYTC requirements and applicable Law. Each parcel file

shall include all documents required by the KYTC Right-of-Way Manuals as applicable and the UNIFORM ACT.

B. Provide monthly summaries for the cost of Project Right-of-Way acquisition and related relocation assistance including amounts authorized and amounts paid on a parcel-by-parcel basis as requested by KYTC.

C. Maintain and electronically transmit to KYTC, in a format acceptable to KYTC, bi-monthly status reports including appraisal, acquisition, and relocation status of all parcels and activities related to Project Right-of-Way.

D. Input and update parcel status in KYTC approved web-based tracking system or as directed by KYTC.

RESPONSIBILITIES OF THE DBT FOR ATC RIGHT-OF-WAY ACQUISITION BY THE DBT

The DBT shall be responsible for the costs of all services and preparation of all documentation for all Project Right-of-Way acquisition, easement acquisition, permitting, and related relocation assistance for the Project for an approved ATC. The work related to ATC Project Right-of-Way acquisition includes mapping, surveying, environmental assessment, testing and remediation, appraisal, appraisal review, negotiation, acquisition, clearing of title, closing of acquisitions, and condemnation support, including expert witnesses as required by KYTC's Office of Legal Services for all condemnation proceedings. The DBT shall also be responsible for all exhibits, transcripts, and photos associated with condemnation services and proceedings required by KYTC's Office of Legal Services, including but not limited to jury trials, all pre-trial motions, discovery, appeals, relocation assistance, and clearance/demolition of improvements, as required.

DBT shall be responsible for the costs of acquisition and documentation for the acquisition of any temporary right or interest in real property not necessary for the Project but that the DBT deems advisable to acquire for work space, contractor lay-down areas, material storage areas, borrow/waste sites, or any other convenience of the DBT. Except as otherwise authorized by Law for temporary areas necessary for construction of the Project, KYTC shall not be obligated to exercise power of eminent domain in connection with the DBT's acquisition of any such temporary right or interest, and KYTC shall have no obligations or responsibilities with respect to the acquisition, maintenance, or disposition of such temporary rights or interests.

REVIEW RESPONSIBILITIES OF KYTC FOR ATC ACQUSITION PACKAGES

KYTC shall have the following responsibilities with acquisition of Project Right-of-Way:

A. Upon receipt of a complete Acquisition Package prepared by the DBT's Right-of-Way AM, KYTC will review the package for completeness. KYTC will complete this review and approval in no longer than five (5) business days.

B. KYTC will provide the DBT with a maximum amount that can be used as an administrative settlement for each parcel. Any increase to the approved amount shall require additional documentation.

RESPONSIBILITIES OF THE DBT AND KYTC OFFICE OF LEGAL SERVICES FOR USE OF CONDEMNATION FOR EMINENT DOMAIN FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

KYTC and KYTC Office of Legal Services, shall have the following responsibilities in connection with acquisition of Project Right-of-Way for an approved ATC in regard to use of State's right for condemnation for eminent domain

A. Upon receipt of a complete condemnation package from the DBT, KYTC shall coordinate with the KYTC Office of Legal Services to review the condemnation package. KYTC shall deliver the complete condemnation package to the KYTC Office of Legal Services within five business days after receipt from the DBT.

B. Upon receipt of the condemnation package by the KYTC Office of Legal Services the respective legal authority shall have 20 business days to approve the condemnation package and determine if is acceptable to move forward with filing of the condemnation suit. If condemnation package is acceptable, the respective legal authority shall issue an executive order authorizing the DBT to file the condemnation suit on behalf of the respective State. The KYTC Office of Legal Services reserves the right to request that the DBT revise the condemnation package as required prior to approval in order to meet all legal requirements for the filing of condemnation suits for eminent domain in the respective State for which the suit is to be filed. All re-submittals required from the DBT by the respective legal authority shall be approved in 20 business days.

C. KYTC will return the approved condemnation package and executive order authorizing the DBT to file suit on behalf of the State to the DBT within five business days after receipt of the approved condemnation package from the respective legal authority. The DBT shall be responsible for filing the condemnation suit for eminent domain on behalf of the State upon receipt of the approved condemnation package and executive order at their earliest convenience.

The DBT shall be responsible for filing and concluding the condemnation suit for eminent domain on behalf of the State upon receipt of the approved condemnation package and executive order. The responsibilities of the DBT in connection with acquisition of Project Right-of-Way in regards to use of State's right for condemnation for eminent domain shall include but not be limited to:

A. Provide records that the DBT has negotiated in good faith, in accordance with the UNIFORM ACT and the Right-of-Way Manual for KYTC. Document the reason(s) for condemnation including recommendations for property closure.

B. Conduct all eminent domain-condemnation activities in accordance with the policies and procedures as described in the Right-of-Way Manual for KYTC, and all other applicable laws and regulations.

C. After non-response or upon receipt of a copy of the rejected final offer from a property owner or other property right holder entitled to compensation,

request an updated title report from the title attorney issuing the original title commitment.

D. Use the information from the title report to join all parties having a property interest. Spouses of property holders with compensable rights must also be joined.

E. Prepare a condemnation packet containing two copies each of the following documents: Report Form indicating all joined parties in the suit, negotiation logs, the updated title report not more than 90 days old, appraisal receipt acknowledgment, pre-appraisal contact sheet, signed and sealed field notes, parcel sketch, bisection clause and access clause exhibits (if necessary), final offer letter reflecting latest appraisal, any correspondence sent by the DBT or from the owner of the compensable interest or representatives, one copy of the appraisal report not more than 90 days old, and proof of good faith negotiations. Submit two complete condemnation packets to the KYTC Right-of-Way Administrator.

F. Send a copy of the complete petition to the title attorney and confirm with the title attorney that the appropriate parties were joined in the case and that no changes in title have occurred since the original litigation guaranty was issued.

G. Upon approval of the Condemnation Package by the KYTC Office of Legal Services, file the petition for condemnation with the appropriate court clerk after a determination that a timely settlement is not feasible.

H. Be responsible for the all services and other duties required for the successful prosecution of the suit, including attendance in court and filing necessary documents to complete all eminent domain proceedings. This may include appearances at pre-commissioner's hearing preparations, special commissioner's hearings, and subsequent proceedings including jury trials and related proceedings.

I. Provide written monthly updates as to the parcel status to the KYTC Right-of-Way Administrator throughout the process.

J. Serve in person a "Notice of Hearing or Trial" at least 11 days prior to the date of the special commissioners' hearing, trial, or other hearings and notice requirements as directed or authorized by the court.

K. Call and send reminder letters two to three weeks in advance of any hearing to the KYTC Right-of-Way Administrator such that KYTC is kept appraised of the progress of the court case.

L. Make payment to all commissioners involved in the hearing and include payment for commissioners as part of general Project Right-of-Way services.

M. Schedule and pay for all court related expenses including, but not limited to, court reporter services, transcription costs, mediation fees, expert witness fees, exhibits, and exhibit workbooks as required for the successful prosecution of the case. All documents and exhibits used in the special commissioner’s hearings shall be retained as part of the Project records.

N. File in a timely manner and provide proper service of objections after completion of the special commissioner's hearing as required. Within three days after objections have been filed, the DBT, at its cost, shall order transcripts of such hearing and provide said documents to the KYTC Right-of-Way Administrator.

KYTC and KYTC's Office of Legal Services shall have the following responsibilities in connection with acquisition of Project Right-of-Way in regards to use of State's right for condemnation for eminent domain:

A. Upon receipt of a complete condemnation package from the DBT, KYTC shall coordinate with the KYTC Office of Legal Services to review the condemnation package. KYTC shall deliver the complete condemnation package to the KYTC Office of Legal Services within two business days after receipt from the DBT.

B. Upon receipt of the condemnation package by the KYTC Office of Legal Services, the office shall have 20 business days to approve the condemnation package and determine if is acceptable to move forward with filing of the condemnation suit. If condemnation package is acceptable, the KYTC Office of Legal Services shall issue an executive order authorizing the DBT to file the condemnation suit on behalf of the State. The KYTC Office of Legal Services reserves the right to request that the DBT revise the condemnation package as required prior to approval in order to meet all legal requirements for the filing of condemnation suits for eminent domain. All re-submittals required from the DBT shall be approved in 10 business days.

C. KYTC will return the approved condemnation package and executive order authorizing the DBT to file suit on behalf of the State to the DBT within two business days after receipt of the approved condemnation package from KYTC's Office of Legal Services.

ADDITIONAL REPORTING REQUIREMENTS FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

In addition, the DBT shall provide the following reports and electronic files:

A. Monthly Parcel Report: DBT shall provide a report, prior to the first of the month, listing all parcel deletions, parcel additions, and parcel splits.

B. Monthly Progress Report: DBT shall provide a report of all survey activity that occurred over the previous month, including a two-week look ahead of anticipated survey activity.

C. CAD Files: The DBT shall provide digital CAD files in MicroStation format which include: property lines and/or existing Right-of-Way lines, as surveyed; proposed Right-of-Way lines; parcel numbers; resource files; level assignments; and plot files. DBT shall submit CAD files prior to submitting the first Acquisition Package and provide updates as needed.

TITLE SERVICES FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

With respect to title services, and in compliance with KYTC Policies and Procedures, the DBT shall:

A. Complete titles as directed by Right-of-Way manuals and legal services in KY.

B. Select and contract with one or more title attorneys that are on KYTC's Office of Legal Services statewide contract list. The DBT shall be responsible for obtaining a five-year sales history, a preliminary title commitment or preliminary title report, and, if necessary or appropriate, copies of all underlying documents and a plot of all easements, including existing Utility property interests, referenced therein for each parcel (including fee acquisitions, slope easements, other drainage and roadway Right-of-Way or easements and abandonment of Utility easements) to be acquired by KYTC for the Project. Each title report shall be dated not more than 30 days prior to the date of submittal to KYTC of the Acquisition Package for such parcel. The DBT shall, at its own cost, review each title report to ensure that it complies with the format required by the Right-of-Way Manual for KYTC. The DBT shall, at its own cost, retain the services of a real estate attorney, licensed and approved by KYTC, to be available for title support and acquisition assistance. All title reports must be in the following required format (format as required by KYTC's Office of Legal Services): clearly indicate which exclusions and exceptions shall be deleted upon acquisition of the subject parcel, and clearly indicate any required deliverables to the title attorney to clear identified exclusions and exceptions. Title reports shall be in accordance with KYTC's Right-of-Way Manual. The DBT shall notify the title attorney, by letter, which exceptions may be removed, including easements that: (a) are appurtenant to and/or of benefit to the parcel but not included in the parcel to be acquired, and (b) are a burden on the parcel and not acceptable.

C. Review the preliminary title commitment or report to ensure that all current owners of record title are contacted and that negotiations or condemnation actions are conducted with all appropriate parties.

D. Work with the current owners of record title to each parcel or interest in a parcel or their designee and all other appropriate parties to clear any title exceptions or exclusions not acceptable to KYTC.

E. Ensure that all Project Right-of-Way shall be acquired in fee simple absolute or easement interest as appropriate, free and clear of any and all liens and encumbrances. Title to the Project Right-of-Way shall be in the name of the Commonwealth of Kentucky.

APPRAISALS FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

As part of an ATC, should the DBT wish to make changes to the Right-of-Way for a particular parcel that effects the determination of the fair market value as

presented in the current appraisal, the DBT shall be responsible for performing a new appraisal. If necessary, the DBT shall provide KYTC with fair market value appraisals prepared by appraisers meeting the minimum qualifications established herein. All appraisals shall be prepared in conformance with applicable law (including the UNIFORM Act), and in accordance with professional appraisal methods and applicable KYTC standards for all parcels to be acquired. The DBT shall select appraisers from KYTC list of approved fee appraisers.

Appraisal review for ATC Right-of-Way Acquisitions by the DBT
All necessary review appraisals shall be prepared in conformance with applicable law (including the UNIFORM Act), and in accordance with professional appraisal methods and KYTC standards for all parcels to be acquired. The DBT shall select review appraisers from KYTC's list of approved fee appraisers. KYTC will evaluate the review appraisal and issue approval or denial within 5 business days.

PROJECT RIGHT-OF-WAY ACQUISITION PACKAGE APPROVAL for ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

Acquisition Packages for an approved ATC submitted by the DBT to KYTC will include the following items, prepared for each parcel in accordance with the requirements of this section or Right-of-Way manual:

A. A cover sheet setting forth the following information for each parcel.
   1. County/State Project item number
   2. Parcel number and number of parts
   3. Name of owner
   4. Extent of acquisition (partial or whole acquisition)
   5. Type of conveyance (fee, easement, etc.)

B. A complete legal description of the parcel adequate to effect the desired acquisition of the parcel, signed and sealed by a Registered Land Surveyor. A legal description and parcel plat is required for each parcel. Control of access shall be addressed in all legal descriptions. All descriptions shall be in recordable form and shall be prepared in a form and manner acceptable to KYTC in all respects.

C. A title report, current within 180 Days, including copies of all documents identified in the exceptions listed therein and a plot of all easements identified therein. The Acquisition Package shall include the DBT's analysis of each preliminary title report or title commitment to determine potential problems and proposed methods to cure title deficiencies. The DBT shall perform title curative work. The DBT shall include copies of all curative documents in the Acquisition Package.

D. A copy of the appraisal report; review appraisal report; and all supporting documentation, review, and supporting documents.

E. A real/personal property report detailing what items making up each parcel are classified as real estate, tenant-owned improvements, or personal property. Particular attention shall be paid to items that have questionable classifications.

F. Replacement Housing Calculations, notification of business eligibility, completed displacee interviews, all comparables used in estimating the Replacement Housing Calculations, and letter to displacee(s) explaining Replacement Housing Calculations. Calculations and replacement housing benefit package shall be prepared and reviewed by a qualified consultant, in conformance with KYTC standard relocation procedures and State and federal laws and regulations.

G. The proposed initial offer letter, MOU, deed, and any other documents, which shall be prepared by the DBT as required.

Upon approval of the Acquisition Package from the DBT Right-of-Way AM by KYTC, the DBT may proceed with the offer to the property owner.

RIGHT-OF-WAY NEGOTIATIONS FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT shall conduct all negotiations in accordance with the KYTC Right-of-Way Manual.

RELOCATION ASSISTANCE FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

The DBT shall coordinate and perform the administrative requirements necessary to relocate any occupants from Project Right-of-Way. All work prepared by the DBT with respect to relocation assistance shall be performed in accordance with the KYTC Right-of-Way Manual.

KYTC will be responsible for the payment of all appropriate relocation costs for the respective parcel.

10.3.1 CLOSING SERVICES FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

For purposes of closing services, the DBT shall:

A. Prepare the escrow agreement and closing documents, including a closing memorandum identifying all parties involved in the closing, and listing all documents to be executed and/or delivered in connection with the closing.

B. Select and contract with one or more attorneys that are on KYTC's Office of Legal Services statewide contract list to perform closings. Attend closings; provide curative documents and exhibits as required and in conjunction with the applicable title attorney. Confirm that all conditions to closing are satisfied.

C. Coordinate with the applicable title attorney to obtain an updated title commitment within 24 hours prior to closing and provide an approved updated title commitment within 30 Days following closing and transmit the same to KYTC.

D. Obtain and deliver to KYTC one certified copy of each instrument of conveyance immediately after closing to KYTC within five business days

after receipt. Cause to be delivered to KYTC a copy of the recorded deed within 10 business days after the attorney receives the recorded deed.

10.3.2 CONDEMNATION FOR ATC RIGHT-OF-WAY ACQUISITIONS BY THE DBT

When it has become apparent that the condemnation process must be utilized in order to obtain possession of a parcel the DBT shall not condemn any parcel without prior approval of the KYTC's Office of Legal Services. The DBT shall submit to the parcel owner (s) a 10-day letter notifying the property owners of the pending condemnation process.

The DBT shall be responsible for all aspects for the filing and execution of condemnation suits for the acquisition of Right-of-Way as part of an approved ATC, including the preparation of all documentation required, and attorneys' expenses needed for obtaining clear title to each parcel authorized for condemnation of the Project. The DBT shall use only those attorneys that are on KYTC's Office of Legal Services statewide contract list to perform condemnation services. The KYTC Office of Legal Services reserves the right to review and approve the condemnation package prepared by the DBT prior to the filing of a condemnation suit for eminent domain. In order to expedite review by the KYTC Office of Legal Services, the DBT shall provide the following information in the condemnation package:

A. **Approved** Condemnation Pay Statement (RWUMS)
B. Record of Contacts (RWUMS) **and Correspondence** (10 Day Letter, Notice of Condemnation Letter, Etc.)
C. Notice of Proposed Acquisition Letter (Rev. 5/2017)
D. FMV Offer to Purchase Letter (RWUMS)
E. **Approved** Parcel Summary **(Include all encumbrances-Item 3)** (RWUMS)
F. Appraisal Report or **Approved** MAR (RWUMS – not more than 90 days old) with **Approved** MAR Range of Values and Color Photos
G. Finalized Deed of Conveyance/Deed of Easement/Grant of Easement to KYTC prepared by Staff/Closing Attorney. (Include and attach Microsoft Word Version of Deed of Conveyance/Deed of Easement/Grant of Easement separately for OLS.)
H. Title report (not more than 90 days old - cover sheets only - **Source deeds not needed)**
(TC-11-18 Version 6/2014)
I. Colored plan sheet(s) indicating the property to be acquired
J. Report Form indicating all joined parties in the suit,
K. Negotiation logs
L. Appraisal receipt acknowledgment
M. Pre-appraisal contact sheet
N. Signed and sealed field notes
O. Bisection clause and access clause exhibits (if necessary)
P. Final offer letter reflecting latest appraisal
Q. Proof of good faith negotiations. Submit two complete condemnation packets to the KYTC Right-of-Way Administrator.

Contract time shall not be extended due to the length of time required for acquisition of the property necessary to complete the project. The contractor shall be aware that it is possible that condemnation through eminent domain may be required and contract time will not be extended to account for condemnation suits. The only possibilities for extension of contract time due to R/W acquisitions shall be if:

A. KYTC withholds consent to file suit against a property owner and delays are caused to the controlling item of the critical path schedule, or
B. A condemnation suit escalates into a "Right to Take" challenge and delays are caused to the controlling item of the critical path schedule.

In the event either of these circumstances occurs the department will consider an extension of Contract time according to section 108.07 of the Standard Specifications. Those considerations will be made based upon the date when KYTC withheld consent, or the date when a property owner files a "Right to Take" challenge.

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY AND UTILITIES

PROJECT REPORT

SECTION 1: PROJECT INFORMATION

COUNTY	ITEM NO.	PROJECT NO.	FEDERAL NO.

PROJECT NAME

LENGTH OF PROJECT	# OF PARCELS	CROSS SECTIONS AVAILABLE AND USED?
		☐ Yes ☐ No

COMPILED BY	DATE COMPILED

SECTION 2: PROJECT SUMMARY

# OF ENTIRE ACQUISITIONS	# OF PARTIAL ACQUISITIONS		RELOCATIONS	
		W/1 Remainder		Residential
Vacant	Vacant	W/2 Remainder		Non-Residential
Improved	Improved	W/3 or more		Misc. Move
		W/LL Remainder		Outdoor Ads

 # OF PARCELS IN "MAJOR" CATEGORY _____

 # OF PARCELS IN "MINOR" CATEGORY _____

 # OF PARCELS IN MAR CATEGORY _____

SECTION 3: PROJECT DESCRIPTION (*overall complexity of project, special problems that may be encountered, estimated availability of data, recommended studies and analysis) Text limited for accurate printing. Use attachment if needed.*

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY AND UTILITIES

PROJECT REPORT

SECTION 4: PARCEL INFORMATION

COUNTY	ITEM NO.	PROJECT NO.	FEDERAL NO.

PROJECT NAME

INSTRUCTIONS: *After entering information in the last available field below, click 'tab' to access additional fields.*

Parcel No.	Type Property	No Tr	No Rem	V/I[1]	P/T[2]	Size Tract AC/SF	R/W To be Acquired AC/SF	Type and Size of Easements SF	REMARKS *Number and type of improvements before acquisition, present use of property, current zoning, improvements acquired, physical changes such as grade, access, right of way proximity, physical effects of easements, SLI affected, etc.*	Complexity Rating[3]	Recommended Format 62-20 Narrative	Appraisers Proposed Fee

[1] ***V****=Vacant* ***I****=Improved* [2] ***P****=Partial* ***T****=Total* [3] ***BV****=Before Value* ***BAV****=Before & After Value* ***MAR****=Minor Acquisition Rev.*

PROJECT REPORT

SECTION 5: RELOCATION INFORMATION

COUNTY	ITEM NO.	PROJECT NO.	FEDERAL NO.

PROJECT NAME

INSTRUCTIONS: *After entering information in the last available field below, click 'tab' to access additional fields.*

Parcel No.	Relo Type[4]	REMARKS **DETAILED SUMMARY:** *(Text is unlimited. Additional space will be added as needed.)* *Type of Relocation, Type of improvements acquired, present use of property, type of move, anticipated problems, etc.*

[4]***RHP****=Replacement Housing Payment* ***B****=Business* ***M****=Miscellaneous Move* ***S****=Sign/Billboard*

Appendix F - UTILITIES

Appendix F1 -- Utility Impact Notes

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
NHPPIM 00757 (144)
FD52 008 80222 02U
Mile point: 177.659 TO 178.345
IMPROVE THE I-71/I-75 INTERCHANGE AT KY-536 (MT. ZION ROAD) (DESIGN BUILD)
ITEM NUMBER: 06-14.00

PROJECT SAFETY AND PROTECTION NOTES ON UTILITIES

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

SPECIAL WORKER PROTECTION NOTE

There is extensive high voltage electric transmission lines throughout this project. The contractor is use extreme caution when operating equipment beneath these lines. Since these transmission lines are high voltage, there is a greater potential of arching if equipment gets too close. Transmission lines on this project are located parallel to Mt. Zion Road left of centerline from the interchange area to Norfolk Southern Railroad, and right of US-25 centerline the full length of the improvements along US-25. These transmission lines are currently located on wood poles; but, are to be relocated to new steel poles. Wherever transmission lines exist, whether on wood poles or steel, the contractor shall limit the height of equipment operating under transmission lines and within 25 feet of the center of transmission lines to 12 feet. No equipment shall be greater in height than 12 feet or shall extend to a height greater than 12 feet within 25 feet of a transmission line.

There is also normal electric distribution lines located on the project. The contractor shall take normal cautionary measures when working under these lines.

Protection of Underground Utilities

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work a significant amount of existing facilities will require relocation. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Kentucky Transportation Cabinet (KYTC) Section Engineer. KYTC maintains the right to remove or alter portions of this contract if a utility conflict occurs. The utility facilities as noted in the following sections have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor shall submit Excavation Locate

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
NHPPIM 00757 (144)
FD52 008 80222 02U
Mile point: 177.659 TO 178.345
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ITEM NUMBER: 06-14.00

Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-KY 811 member facility owners. Non-KY 811 member owners are to be directly contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

Damage to Utilities

Any intentional or accidental disruption of service due to damage to gas, sewer or water mains caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for the Cabinet to charge liquidated damages in the amount of five thousand dollars per day ($5,000/day) per occurrence against the contractor until such time as the utility main is restored.

Any intentional or accidental disruption of any individual gas, water or sewer service caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for the Cabinet to charge liquidated damages in the amount of five hundred dollars per day ($500/day) per occurrence against the contractor until such time as service is restored.
In the case of a main disruption, liquidated damages shall be charged at the main disruption rate only. Liquidated damages shall not be charged in addition for service disruptions when a main disruption is involved.

Flowable Fill Requirement

The road contractor MUST use flowable fill as the backfill media any place gas, water and sewer lines cross under existing or proposed roadway surfaces. It should also be noted that the cost of the flowable fill shall be incidental to the cost of the gas, water or sewer line being installed.

External Utility Permits

Kentucky Division of Water permits for water and sanitary sewer relocation construction may not be available before bidding. These items will be distributed at the preconstruction meeting.

Abandoned Utilities

The contractor shall safeload the entire length of all abandoned pipes 6 inches in diameter and larger under proposed pavement and under any existing pavement that is to remain. The contractor shall safeload the entire length of all abandoned pipes 15 inches and larger which will be located outside of proposed pavement but within project limits. Appropriate bid items have been included in the road contract. The safeloading criteria above shall be observed unless otherwise directed by the KYTC Section Engineer or his representative.

Utility Phasing

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
NHPPIM 00757 (144)
FD52 008 80222 02U
Mile point: 177.659 TO 178.345
IMPROVE THE I-71/I-75 INTERCHANGE AT KY-536 (MT. ZION ROAD) (DESIGN BUILD)
ITEM NUMBER: 06-14.00

The contractor should be aware that some utilities will need to be relocated first to accommodate the relocation of others. The contractor should review the plans and draw his own conclusions as to the phasing of the work of various utilities. The contractor should pay close attention to the proximity of construction of new facilities when working in the vicinity of existing water mains to prevent blow-outs.

Road Construction Field Adjustments to Accommodate Utilities

Some minor adjustments to road work may be required in the field to work around some poles and other utility infrastructure. The road contractor should discuss any adjustments with the KYTC Section Engineer or his inspector as they arise. The adjustments anticipated are to ditches and other such minor items so that poles and such are not in the center bottom of ditches where debris may collect.

NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

The overwhelming majority of utilities within the project limits require relocation. Some will be relocated by the road contractor and others by the utility owners.
The Contractor is fully responsible for protection of all utilities until relocated.

THE FOLLOWING FACILITY OWNERS ARE RELOCATING/ADJUSTING THEIR FACILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

No overhead or underground utility will have completed relocation prior to road construction.

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE OWNER OR THEIR SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT

Duke Energy (Electric), Cincinnati Bell Telephone, Spectrum (CATV), Windstream (fiber) and CenturyLink (fiber) have substantial existing overhead and limited underground facilities throughout the project. All overhead utility owner will relocate their own facilities to new poles to be installed by Duke or to duct to be installed by the road contractor, excluding that of CenturyLink discussed in the next paragraph. Duke Energy will have started some overhead relocation; however, removal of all overhead facilities and abandonment of underground facilities is dependent on a fall 2019 electric transmission line outage and the timely installation of utility duct by the road contractor. Given the amount of overhead and underground utility work by and for these utilities, it is estimated all these existing overhead facilities and the existing associated underground facilities will take until December 2020 to

completely clear the project of these utilities. The contractor is to coordinate and cooperate with these utility owners until they have completed their work.

CenturyLink has an existing underground fiber cable in a small duct in the area right (south side) of Mt. Zion Road centerline from the SE corner of the US-25 intersection heading east to the Norfolk Southern railroad tracks. This fiber cable is to remain in place and protected from damage by the road contractor while roadway fill widening in this area is completed. The road contractor is expected to build the fill over the existing fiber cable. Once the fill is completed and the slope is dressed to near-final grade, CenturyLink shall be allowed to come on the site with their contractor to directionally bore a new fiber cable across the face of the new fill slope, tie in the new cable and abandon the existing cable. The road contractor will be responsible to notify CenturyLink at least four weeks in advance of when the area will be available for fiber cable installation. The road contractor is to coordinate and cooperate with CenturyLink and their contractor for this installation and allow sufficient reasonable time for CenturyLink to complete their work. CenturyLink estimates their work will take approximately four weeks to complete once they arrive on the site. The road contractor may have to do some minor redress in some areas disturbed by the fiber cable relocation installation.
NOTE: CenturyLink is being allowed to install this cable in the new fill slope due to limited available R/W. CenturyLink is not being allowed to open cut the fill slope for installation of this cable due to the potential that trenching in the slope could lead to future slope failures. CenturyLink is only being allowed to directional bore in the fill slope area.

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

There is extensive joint duct installation included in the road contract to be constructed by the road contractor. This duct is being installed mainly to facilitate relocations of facilities owned by overhead utility owners Duke Energy (Electric), Cincinnati Bell Telephone, Spectrum (CATV), Windstream (fiber) and CenturyLink (fiber). Some duct in joint duct installations is for future use also. Duct is to be installed by the road contractor in three areas. Those areas are generally as follows:

- Through the I-71/I-75 interchange area under ramps and mainline along the north side of Mt. Zion Road.
- In the roundabout area where Biltmore Connector and Sherwood Lakes Drive cross.
- Along the east side of Berberich Drive from Biltmore Drive to Mt. Zion Road

Timely installation of duct in these three locations is integral to facilitating relocation of existing overhead facilities on the project. The road contractor will be expected to coordinate with all these utility owners to expedite duct installation to accomplish overhead utility relocations. Plans for duct

UTILITIES AND RAIL CERTIFICATION NOTE

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ITEM NUMBER: 06-14.00

installation are included in the road plans. Specifications are included in the project proposal. Bid items are included in the road contract.

Duke Energy (Gas) and Boone County Water District facilities are being relocated by the road contractor. Plans for relocation of these utilities are included in the road plans. Specifications are included in the project proposal. Bid items are included in the road contract. The road contractor will do water tie-ins. Duke (Gas) will do gas tie-ins. The road contractor shall work closely with Duke to schedule timely tie-ins.

Sanitation District No. 1 facilities on the project only require the adjustment of manhole frames and covers. The road contractor will perform this work as a part of the road contract. No plans are being provided for this minor work. Manholes needing adjustment are located as follows:

- Near centerline of Biltmore Connector at approximately station 22+80.
- Near curb line left of Investment Way at approximately station 196+60.
- Left of Biltmore Blvd at approximately station 311+85.
- Right of US-25 centerline at approximately stations 502+35, 506+25 and 507+75.

Specifications for manhole adjustments is included in the project proposal. A bid item for sanitary manhole adjustment is included in the road contract.

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

☒**No Rail Involvement** ☐**Rail Involved** ☐**Rail Adjacent**

FACILITY OWNER CONTACT LIST

Boone County Water District	Keith Feldhaus	(859) 586-7270
Duke Energy (Gas)	Gerry Helm	(859) 534-4405
Duke Energy (Electric Transmission)	Josh Waldroff	(513) 287-1330
Duke Energy (Electric Distribution)	Aaron Wright	(513) 479-1886
Windstream (Fiber)	Mark Ware	(606) 329-6195
CenturyLink (Fiber)	Bruce Miller	(513) 644-8943
Spectrum (CATV)	Chuck McCarty	+1 (859) 687-7045
Cincinnati Bell Telephone	Dan Springelmeyer	(513) 397-7165

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
IMSTP 00757 144
FD52 008 84338 01U
Mile point: 175.217 TO 175.622
RECONSTRUCT THE I-71/I-75 AT KY-338 (RICHWOOD ROAD) INTERCHANGE. (DESIGN BUILD)
ITEM NUMBER: 06-18.00

PROJECT NOTES ON UTILITIES

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work a significant amount of existing facilities will require relocation. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Kentucky Transportation Cabinet (KYTC) Section Engineer. KYTC maintains the right to remove or alter portions of this contract if a utility conflict occurs. The utility facilities as noted in the following sections have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-KY 811 member facility owners. Non-KY 811 member owners are to be directly contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

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Any intentional or accidental disruption of service due to damage to gas, sewer or water mains caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for the Cabinet to charge liquidated damages in the amount of five thousand dollars per day ($5,000/day) per occurrence against the contractor until such time as the utility main is restored.

Any intentional or accidental disruption of any individual gas, water or sewer service caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for

the Cabinet to charge liquidated damages in the amount of five hundred dollars per day ($500/day) per occurrence against the contractor until such time as service is restored.

In the case of a main disruption, liquidated damages shall be charged at the main disruption rate only. Liquidated damages shall not be charged in addition for service disruptions when a main disruption is involved.

Flowable Fill Requirement

The road contractor MUST use flowable fill as the backfill media any place gas, water and sewer lines cross under existing or proposed roadway surfaces. It should also be noted that the cost of the flowable fill shall be incidental to the cost of the gas, water or sewer line being installed.

External Utility Permits

Kentucky Division of Water permits for water and sanitary sewer relocation construction may not be available before bidding. These items will be distributed at the preconstruction meeting.

Abandoned Utilities

The contractor shall safeload the entire length of all abandoned pipes 6 inches in diameter and larger under proposed pavement and under any existing pavement that is to remain. The contractor shall safeload the entire length of all abandoned pipes 15 inches and larger which will be located outside of proposed pavement but within project limits. Appropriate bid items have been included in the road contract. The safeloading criteria above shall be observed unless otherwise directed by the Section Engineer or his representative.

Utility Phasing

The contractor should be aware that some utilities will need to be relocated first to accommodate the relocation of others. The contractor should review the plans and draw his own conclusions as to the phasing of the work of various utilities. The contractor should pay close attention to the proximity of construction of new facilities when working in the vicinity of existing water mains to prevent blow-outs.

Road Construction Field Adjustments to Accommodate Utilities

Some minor adjustments to road work may be required in the field to work around some poles and other utility infrastructure. The road contractor should discuss any adjustments with the Section Engineer or his inspector as they arise. The adjustments anticipated are to ditches and other such minor items so that poles and such are not in the center bottom of ditches where debris may collect.

UTILITIES AND RAIL CERTIFICATION NOTE

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NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

The overwhelming majority of utilities within the project limits require relocation. Some will be relocated by the road contractor and others by the utility owners.
The Contractor is fully responsible for protection of all utilities until relocated.

THE FOLLOWING FACILITY OWNERS ARE RELOCATING/ADJUSTING THEIR FACILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

Duke Energy (Electric Transmission) has a transmission line running north and south parallel to the east side of I-71/I-75. Duke should have relocation of this transmission line completed before road construction begins.

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE OWNER OR THEIR SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT

Duke Energy (Electric Distribution), Owen Electric Cooperative, Cincinnati Bell Telephone, Spectrum (CATV) and Windstream (fiber) have substantial existing overhead and some underground facilities throughout the project. All these utility owners will relocate their own facilities to new poles to be installed by Duke or to duct to be installed by the road contractor. Duke and Owen Electric will have started some overhead relocation before road construction; however, removal of all overhead and underground facilities and abandonment of underground facilities owned by these companies is dependent on the timely installation of utility duct by the road contractor. Given the amount of overhead and underground utility work by and for these utilities, it is estimated all these existing facilities will take until December 2020 to completely clear the project. The contractor is to coordinate and cooperate with these utility owners until they have completed their work.

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

There is extensive joint duct installation included in the road contract to be constructed by the road contractor. This duct is being installed mainly to facilitate relocations of facilities owned by Duke Energy (Electric), Owen Electric Cooperative, Cincinnati Bell Telephone, Spectrum (CATV) and Windstream (fiber). Some duct in joint duct installations is for future use also. Duct is to be installed by the road contractor in two areas. Those areas are generally as follows:

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
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ITEM NUMBER: 06-18.00

- Through the I-71/I-75 interchange area under ramps and mainline along the north side of KY-338 (Richwood Road)
- Along the west side of Grand National Blvd and Triple Crown Blvd from the beginning of construction on Grand National Blvd to the end of construction on Triple Crown Blvd.

Timely installation of duct in these two locations is integral to facilitating relocation of existing facilities owned by these companies on the project. The road contractor will be expected to coordinate with all these utility owners to expedite duct installation to accomplish their relocations. Plans for duct installation are included in the road plans. Specifications are included in the project proposal. Bid items are included in the road contract.

Duke Energy (Gas), Sanitation District No. 1 and Boone County Water District facilities are being relocated by the road contractor. Plans for relocation of these utilities are included in the road plans. Specifications are included in the project proposal. Bid items are included in the road contract. The road contractor will do sanitary sewer and water tie-ins. Duke (Gas) will do gas tie-ins. The road contractor shall work closely with Duke to schedule timely tie-ins.

Sanitation District No. 1 has two segments of existing sanitary sewer that are to be lined concurrently with the road project. The pipe lining will be performed by a Sanitation District No. 1 (SD1) continuing contractor. The two existing segments to be lined are as follows:

- Under Ramp A between sanitary sewer Line A manholes at stations 15+96.14 and 17+83.42.
- Left of WB KY-338 centerline between sanitary sewer Line A manholes at stations 19+83.34 and 21+85.25.

Existing pipe cannot be lined until after adjoining manholes and sanitary sewer segments are installed and completed. The final manholes must be present at each end of lining segments to perform the lining operation. The road contractor will coordinate and cooperate with SD1 and their contractor to accomplish this work during road construction.

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

☐ **No Rail Involvement** ☒ **Rail Involved** ☐ **Rail Adjacent**

UTILITIES AND RAIL CERTIFICATION NOTE

Boone County
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UTILITY OWNER CONTACT LIST

Boone County Water District	Keith Feldhaus	(859) 586-7270
Duke Energy (Gas)	Gerry Helm	(859) 534-4405
Duke Energy (Electric Transmission)	Josh Waldroff	(513) 287-1330
Duke Energy (Electric Distribution)	Aaron Wright	(513) 479-1886
Owen Electric Cooperative	Lucas McNally	(502) 563-3494
Windstream (Fiber)	Mark Ware	(606) 329-6195
Spectrum (CATV)	Chuck McCarty	+1 (859) 687-7045
Cincinnati Bell Telephone	Dan Springelmeyer	(513) 397-7165

Appendix F2 -- Overhead Utility Plans (for information only)

(Pending)

Appendix F3 -- Utility Reference Plans (for information only)

(Pending)

Appendix F4 -- Duke Gas Specifications
(Pending)

Appendix F5 -- Water Specifications

(Pending)

Appendix F6 -- SD1 Sanitary Sewer Specifications

(Pending)

Appendix F7 -- Utility Agreements
(Pending)

Appendix G - RAILROAD

Appendix G1 -- Railroad Construction Agreement

(Pending)

Appendix G2 -- Railroad Right of Entry
(Pending)

Appendix H - GEOTECHNICAL

Appendix H1 -- KY 536 (Item No. 6-14) Geotechnical Reports (Roadway)
(Pending)

Appendix H2 -- KY 536 (Item No. 6-14) Geotechnical Reports (Structures)
(Pending)

Appendix H3 -- KY 338 (Item No. 6-18) Geotechnical Reports (Roadway)
(Pending)

Appendix H4 -- KY 338 (Item No. 6-18) Geotechnical Reports (Structures)
(Pending)

Appendix H5 -- KY 338 (Item No. 6-18) Geotechnical Reports (Railroad)
(Pending)

Appendix I - Construction

Appendix I1 -- Overall Notes (all 3 Projects)

List of Special Notes
FOR REFERENCE ONLY

Appendix		SPECIAL NOTES	6-14 Mt. Zion Road	6-18 Richwood Road	6-20002 I-75 Rehab	Comments
I1	1-125	National Highway	x	x	x	
I1	1-126	Significant Project	x	x	x	
I1	1-132	Asphalt Mixtures	x	x	x	
I1	1-134	DGA Base	x	x	x	
I1	1-126	DGA Base for shoulders	x	x	x	
I1	1-160	Compaction Option A	x	x	x	
I5	1-175	Critical Path Method (CPM)	Use alt note	Use alt note	Use alt note	
I1	1-296	Waste and Borrow Sites	x	x	x	
F5	1-732	Standard Gas Bid item descriptions	see utilities	see utilities	see utilities	
F6	1-734	Standard Water Bid item descriptions	see utilities	see utilities	see utilities	
F7	1-736	Standard Sewer Bid item descriptions	see utilities	see utilities	see utilities	
I1	1-943	BMP-KPDES Special Note-Draft NOI	x	x	x	
I1	1-943a	Special Note for Erosion Control	x	x	x	
I1	1-3050	Pipeline Inspection	x	x	x	
I1	1-3060	Intelligent Compaction of Asphalt Mixtures	x	x	x	
I1	1-3061	Intelligent Compaction of Aggregate Bases & Soils	x	x	x	
I1	1-3062	Paver Mounted Temperature Profiles	x	x	x	
I1	1-98312	Guardrail Delivery Verification Sheet	x	x	x	
B2	4-100	Insurance (included in Appendix B2)	x	x	x	
I1	1I	Portable Changeable Message Signs	x	x	x	
I1	11C	Drilled Shafts	x	x	x	
I1	11F	Turf Reinforcing Mat	x	x	x	
I1	11N	Longitudinal Pavement Joint Adhesive	x	x	x	
I1		Barcodes on Permanent Signs	x	x	x	
I1		SN FOR DOWEL BAR AND TIE BAR PLACEMENT IN JPC PAVEMENT	x	x	x	
I4		SN for Non-tracking Tack Cost	x	x	x	
I1		Special Provision 69 Embankment at Bridge End Structures	x	x	x	
I1		Before You Dig	x	x	x	
I4		Asphalt Milling & Texturing			x	

List of Special Notes
FOR REFERENCE ONLY

Appendix		SPECIAL NOTES	6-14 Mt. Zion Road	6-18 Richwood Road	6-20002 I-75 Rehab	Comments
I1		Inlaid Pavement Markers	x	x	x	
I4		Fine Milling			x	
I1		HMA Electronic Delivery Management System	x	x	x	
I4		Typical Sections Dimensions			x	
I3		Building Removal	in plans	x		
I3		Railroad Construction (aggregate note)		x		
I3		Repairs for I-71/I-75 Bridge		x		From PTG
I3		Traffic Data Station Relocation		x		From Tomlinson
I3		Sound Barrier Walls	x	x		
I3		Centrifugally Cast Concrete Pipe Liner		x		Includes specs
I3		Construction for Fire Station		x		Consent & Release
I3		Lighting and Temporary Lighting		x		
I1		No Blasting	x	x	x	
I3		Stormwater Basins		x		
F5		Gasline Relocations		see utilities		
F6		Waterline Relocations		see utilities		
F7		Sewer Relocations		see utilities		
I3		Accelerated Cement Subgrade Stabilization	x	x		
I3		Cellular Concrete Fill		x		
I3		Colored Concrete		x		Finalize locations
I3		EPS Foam Block Embankment		x		
I3		MSE Retaining Walls		x		
I3		Soil Nail Wall QC Inspection		x		
I3		Spot Subgrade Stabilization	x	x		

NATIONAL HIGHWAY

Be advised this project is on the *NATIONAL HIGHWAY SYSTEM*.

PROJECT TRAFFIC COORDINATOR (PTC)

Be advised this project is a significant project pursuant to section 112.03.12.

ASPHALT MIXTURE

Unless otherwise noted, the Department estimates the rate of application for all asphalt mixtures to be 110 lbs/sy per inch of depth.

DGA BASE

Unless otherwise noted, the Department estimates the rate of application for DGA Base to be 115 lbs/sy per inch of depth.

DGA BASE FOR SHOULDERS

Unless otherwise noted, the Department estimates the rate of application for DGA Base for Shoulders to be 115 lbs/sy per inch of depth. The Department will not measure necessary grading and/or shaping of existing shoulders prior to placing of DGA Base, but shall be incidental to the Contract unit price per ton for DGA Base.

Accept payment at the Contract unit price per ton as full compensation for all labor, materials, equipment, and incidentals for grading and/or shaping of existing shoulders and furnishing, placing, and compacting the DGA Base.

OPTION A

Be advised that the Department will accept compaction of asphalt mixtures furnished for driving lanes and ramps, at 1 inch (25mm) or greater, on this project according to OPTION A in accordance with Section 402 and Section 403 of the *current Standard Specifications.* The Department will require joint cores as described in Section 402.03.02 for surface mixtures only. The Department will accept compaction of all other asphalt mixtures according to OPTION B.

SPECIAL PROVISION FOR WASTE AND BORROW SITES

Obtain U.S. Army Corps of Engineer's approval before utilizing a waste or borrow site that involves "Waters of the United States". The Corps of Engineers defines "Waters of the United States" as perennial or intermittent streams, ponds or wetlands. The Corps of Engineers also considers ephemeral streams, typically dry except during rainfall but having a defined drainage channel, to be jurisdictional waters. Direct questions concerning any potential impacts to "Waters of the United States" to the attention of the appropriate District Office for the Corps of Engineers for a determination prior to disturbance. Be responsible for any fees associated with obtaining approval for waste and borrow sites from the U.S. Army Corps of Engineer or other appropriate regulatory agencies.

Kentucky Transportation Cabinet

Highway District 10

And

_____(2), Construction

Kentucky Pollutant Discharge Elimination System Permit KYR10 Best Management Practices (BMP) plan

Groundwater protection plan

For Highway Construction Activities

For

Widening of the Mountain Parkway

Project 10-126.40

Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – **Kentucky Transportation Cabinet, District 10** (1)

2. Resident Engineer: (2)

3. Contractor name: (2)
   Address: (2)

   Phone number: (2)
   Contact: (2)
   Contractors agent responsible for compliance with the KPDES permit requirements (3):

4. Project Control Number (2)

5. Route (Address) **Mountain Parkway (KY 9009)** (1)

6. Latitude/Longitude (project mid-point) **37°45'01"N, 83°10'19"W** (1)

7. County (project mid-point) **MAGOFFIN COUNTY** (1)

8. Project start date (date work will begin): (2)

9. Projected completion date: (2)

A. Site description:

1. Nature of Construction Activity (from letting project description) (1)
   MAJOR WIDENING/RECONSTRUCTION

2. Order of major soil disturbing activities (2) and (3)

3. Projected volume of material to be moved (1)
   5,591,850 CU. YDS.

4. Estimate of total project area (acres) (1)
   199 ACRES

5. Estimate of area to be disturbed (acres) (1)
   199 ACRES

6. Post construction runoff coefficient will be included in the project drainage folder. Persons needing information pertaining to the runoff coefficient will contact the resident engineer to request this information. (1)

7. Data describing existing soil condition (1) & (2)

8. Data describing existing discharge water quality (if any) (1) & (2)

9. Receiving water name (1)
   JOHNSON CREEK, COW CREEK, AND PATTON BRANCH

10. TMDLs and Pollutants of Concern in Receiving Waters: (1 DEA)

11. Site map – Project layout sheet plus the erosion control sheets in the project plans that depict Disturbed Drainage Areas (DDAs) and related information. These sheets depict the existing project conditions with areas delineated by DDA (drainage area bounded by watershed breaks and right of way limits), the storm water discharge locations (either as a point discharge or as overland flow) and the areas that drain to each discharge point. These plans define the limits of areas to be disturbed and the location of control measures. Controls will be either site specific as designated by the designer or will be annotated by the contractor and resident engineer before disturbance commences. The project layout sheet shows the surface waters and wetlands.

12. Potential sources of pollutants:

    The primary source of pollutants is solids that are mobilized during storm events. Other sources of pollutants include oil/fuel/grease from servicing and operating construction equipment, concrete washout water, sanitary wastes and trash/debris. (3)

B. Sediment and Erosion Control Measures:

1. Plans for highway construction projects will include erosion control sheets that depict Disturbed Drainage Areas (DDAs) and related information. These plan sheets will show the existing project conditions with areas delineated by DDA within the right of way limits, the discharge points and the areas that drain to each discharge point. Project managers and

designers will analyze the DDAs and identify Best Management Practices (BMPs) that are site specific. The balance of the BMPs for the project will be listed in the bid documents for selection and use by the contractor on the project with approval by the resident engineer.

Projects that do not have DDAs annotated on the erosion control sheets will employ the same concepts for development and managing BMP plans.

2. Following award of the contract, the contractor and resident engineer will annotate the erosion control sheets showing location and type of BMPs for each of the DDAs that will be disturbed at the outset of the project. This annotation will be accompanied by an order of work that reflects the order or sequence of major soil moving activities. The remaining DDAs are to be designated as "Do Not Disturb" until the contractor and resident engineer prepare the plan for BMPs to be employed. The initial BMP's shall be for the first phase (generally Clearing and Grubbing) and shall be modified as needed as the project changes phases. The BMP Plan will be modified to reflect disturbance in additional DDA's as the work progresses. <u>All DDA's will have adequate BMP's in place before being disturbed.</u>

3. As DDAs are prepared for construction, the following will be addressed for the project as a whole or for each DDA as appropriate:

   - Construction Access – This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary mulch and/or vegetation.
   - At the beginning of the project, all DDAs for the project will be inspected for areas that are a source of storm water pollutants. Areas that are a source of pollutants will receive appropriate cover or BMPs to arrest the introduction of pollutants into storm water. Areas that have not been opened by the contractor will be inspected periodically (once per month) to determine if there is a need to employ BMPs to keep pollutants from entering storm water.
   - Clearing and Grubbing – The following BMP's will be considered and used where appropriate.
     - Leaving areas undisturbed when possible.
     - Silt basins to provide silt volume for large areas.
     - Silt Traps Type A for small areas.
     - Silt Traps Type C in front of existing and drop inlets which are to be saved
     - Diversion ditches to catch sheet runoff and carry it to basins or traps or to divert it around areas to be disturbed.

- Brush and/or other barriers to slow and/or divert runoff.
- Silt fences to catch sheet runoff on short slopes. For longer slopes, multiple rows of silt fence may be considered.
- Temporary Mulch for areas which are not feasible for the fore mentioned types of protections.
- Non-standard or innovative methods.

➢ Cut & Fill and placement of drainage structures - The BMP Plan will be modified to show additional BMP's such as:

- Silt Traps Type B in ditches and/or drainways as they are completed
- Silt Traps Type C in front of pipes after they are placed
- Channel Lining
- Erosion Control Blanket
- Temporary mulch and/or seeding for areas where construction activities will be ceased for 21 days or more.
- Non-standard or innovative methods

➢ Profile and X-Section in place – The BMP Plan will be modified to show elimination of BMP's which had to be removed and the addition of new BMP's as the roadway was shaped. Probably changes include:

- Silt Trap Type A, Brush and/or other barriers, Temporary Mulch, and any other BMP which had to be removed for final grading to take place.
- Additional Silt Traps Type B and Type C to be placed as final drainage patterns are put in place.
- Additional Channel Lining and/or Erosion Control Blanket.
- Temporary Mulch for areas where Permanent Seeding and Protection cannot be done within 21 days.
- Special BMP's such as Karst Policy

➢ Finish Work (Paving, Seeding, Protect, etc.) – A final BMP Plan will result from modifications during this phase of construction. Probably changes include:

- Removal of Silt Traps Type B from ditches and drainways if they are protected with other BMP's which are sufficient to control erosion, i.e. Erosion Control Blanket or Permanent Seeding and Protection on moderate grades.
- Permanent Seeding and Protection
- Placing Sod
- Planting trees and/or shrubs where they are included in the project

➢ BMP's including Storm Water Management Devices such as velocity dissipation devices and Karst policy BMP's to be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed are: (1)

C. Other Control Measures

1. No solid materials, including building materials, shall be discharged to waters of the commonwealth, except as authorized by a Section 404 permit.

2. Waste Materials

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease containers, liquids of any kind, soluble materials, etc.) will be collected and stored in appropriate covered waste containers. Waste containers shall be removed from the project site on a sufficiently frequent basis as to not allow wastes to become a source of pollution. All personnel will be instructed regarding the correct procedure for waste disposal. Wastes will be disposed in accordance with appropriate regulations. Notices stating these practices will be posted in the office.

3. Hazardous Waste

All hazardous waste materials will be managed and disposed of in the manner specified by local or state regulation. The contractor shall notify the Resident Engineer if there any hazardous wastes being generated at the project site and how these wastes are being managed. Site personnel will be instructed with regard to proper storage and handling of hazardous wastes when required. The Transportation Cabinet will file for generator, registration when appropriate, with the Division of Waste Management and advise the contractor regarding waste management requirements.

4. Spill Prevention

The following material management practices will be used to reduce the risk of spills or other exposure of materials and substances to the weather and/or runoff.

- **Good Housekeeping:**

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer’s label

- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite

➢ **Hazardous Products:**

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable.
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- Contractor will follow procedures recommended by the manufacturer when handling hazardous materials
- If surplus product must be disposed of, manufacturers' or state/local recommended methods for proper disposal will be followed

The following product-specific practices will be followed onsite:

➢ **Petroleum Products:**

Vehicles and equipment that are fueled and maintained on site will be monitored for leaks, and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products onsite will be stored in tightly sealed containers, which are clearly labeled and will be protected from exposure to weather.

The contractor shall prepare an Oil Pollution Spill Prevention Control and Countermeasure plan when the project that involves the storage of petroleum products in 55 gallon or larger containers with a total combined storage capacity of 1,320 gallons. This is a requirement of 40 CFR 112.

This project (will / will not) (3) have over 1,320 gallons of petroleum products with a total capacity, sum of all containers 55-gallon capacity and larger.

➢ **Fertilizers:**

Fertilizers will be applied at rates prescribed by the contract, standard specifications or as directed by the resident engineer. Once applied, fertilizer will be covered with mulch or blankets or worked into the soil to limit exposure to

storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

- **Paints:**

All containers will be tightly sealed and stored indoors or under roof when not being used. Excess paint or paint wash water will not be discharged to the drainage or storm sewer system but will be properly disposed of according to manufacturers' instructions or state and local regulations.

- **Concrete Truck Washout:**

Concrete truck mixers and chutes will not be washed on pavement, near storm drain inlets, or within 75 feet of any ditch, stream, wetland, lake, or sinkhole. Where possible, excess concrete and wash water will be discharged to areas prepared for pouring new concrete, flat areas to be paved that are away from ditches or drainage system features, or other locations that will not drain off site. Where this approach is not possible, a shallow earthen wash basin will be excavated away from ditches to receive the wash water

- **Spill Control Practices**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup**:**

- Manufacturers' recommended methods for spill cleanup will be clearly posted. All personnel will be made aware of procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area. Equipment and materials will include as appropriate, brooms, dust pans, mops, rags, gloves, oil absorbents, sand, sawdust, and plastic and metal trash containers.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contract with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state/local agency as required by KRS 224 and applicable federal law.
- The spill prevention plan will be adjusted as needed to prevent spills from reoccurring and improve spill response and cleanup.
- Spills of products will be cleaned up promptly. Wastes from spill clean-up will be disposed in accordance with appropriate regulations.

D. Other State and Local Plans

This BMP plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials. Upon submittal of the NOI, other requirements for surface water protection are incorporated by reference into and are enforceable under this permit (even if they are not specifically included in this BMP plan). This provision does not apply to master or comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit issued for the construction site by state or local officials. (1)

E. Maintenance

1. The BMP plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.

- Maintenance of BMPs during construction shall be a result of weekly and post rain event inspections with action being taken by the contractor to correct deficiencies.

- Post Construction maintenance will be a function of normal highway maintenance operations. Following final project acceptance by the cabinet, district highway crews will be responsible for identification and correction of deficiencies regarding ground cover and cleaning of storm water BMPs. The project manager shall identify any BMPs that will be for the purpose of post construction storm water management with specific guidance for any non-routine maintenance. (1)

F. Inspections

Inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- Inspections will be conducted by individuals that have received KyTC Grade Level II training or other qualification as prescribed by the cabinet that includes instruction concerning sediment and erosion control.
- Inspection reports will be written, signed, dated, and kept on file.

- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 70 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

G. Non – Storm Water discharges

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

- Water from water line flushings.
- Water form cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

H. Groundwater Protection Plan (3)

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

_____ 2. (e) land treatment or land disposal of a pollutant;

_____ 2. (f) Storing, …, or related handling of hazardous waste, solid waste or special waste, …, in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

_____ 2. (g) …. Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

_____ 2. (j) Storing or related handling of road oils, dust suppressants, …., at a central location;

_____ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

_____ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

Or, check the following only if there are no qualifying activities

_____ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

The contractor is responsible for the preparation of a plan that addresses the

401 KAR 5:037 Section 3. (3) Elements of site specific groundwater protection plan:

(a) General information about this project is covered in the Project information;

(b) Activities that require a groundwater protection plan have been identified above;
(c) Practices that will protect groundwater from pollution are addressed in section C. Other control measures.
(d) Implementation schedule – all practices required to prevent pollution of groundwater are to be in place prior to conducting the activity;
(e) Training is required as a part of the ground water protection plan. All employees of the contractor, sub-contractor and resident engineer personnel will be trained to understand the nature and requirements of this plan as they pertain to their job function(s). Training will be accomplished within one week of employment and annually thereafter. A record of training will be maintained by the contractor with a copy provide to the resident engineer.
(f) Areas of the project and groundwater plan activities will be inspected as part of the weekly sediment and erosion control inspections
(g) Certification (see signature page.)

Contractor and Resident Engineer Plan certification

The contractor that is responsible for implementing this BMP plan is identified in the Project Information section of this plan.

The following certification applies to all parties that are signatory to this BMP plan:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Further, this plan complies with the requirements of 401 KAR 5:037. By this certification, the undersigned state that the individuals signing the plan have reviewed the terms of the plan and will implement its provisions as they pertain to ground water protection.

Resident Engineer and Contractor Certification:

(2) Resident Engineer signature

Signed _____title_____, _____
Typed or printed name[2] signature

(3) Signed _____title_____, _____
Typed or printed name[1] signature

1. Contractors Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

2. KyTC note: to be signed by the Chief District Engineer or a person designated to have the authority to sign reports by such a person (usually the resident engineer) in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601 Reference the Project Control Number (PCN) and KPDES number when one has been issued.

Sub-Contractor Certification

The following sub-contractor shall be made aware of the BMP plan and responsible for implementation of BMPs identified in this plan as follows:

Subcontractor

Name:
Address:
Address:

Phone:

The part of BMP plan this subcontractor is responsible to implement is:

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System permit that authorizes the storm water discharges, the BMP plan that has been developed to manage the quality of water to be discharged as a result of storm events associated with the construction site activity and management of non-storm water pollutant sources identified as part of this certification.

Signed _____title_____, _____
Typed or printed name[1] signature

1. Sub Contractor Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

SPECIAL NOTE

Filing of eNOI for KPDES Construction Stormwater Permit

County: Magoffin **Route: KY 9009**
Mountain Parkway

Item No.: 10-126.40
CID No.: 181019 **KDOW ID: 123262**

Project Description: WIDEN THE MOUNTAIN PARKWAY TO FOUR LANES FROM 0.3 MI W OF KY 3047 TO 0.7 MI W OF MIDDLE FORK LICKING RIVER BRIDGE

A Notice of Intent for obtaining coverage under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Stormwater Discharges Associated with Construction Activities (KYR10) has been drafted, copy of which is attached. Upon award, the Contractor will be identified in Section III of the form as the "Building Contractor" and it will be submitted for approval to the Kentucky Division of Water. The Contractor shall be responsible for advancing the work in a manner that is compliant with all applicable and appropriate KYTC specifications for sediment and erosion control as well as meeting the requirements of the KYR10 permit and the KDOW.

If there are any questions regarding this note, please contact the Division of Environmental Analysis, TCOB, 200 Mero Street, Frankfort, KY 40622, Phone: (502) 564-7250.

KPDES FORM NOI-SW

Kentucky Pollutant Discharge Elimination System (KPDES)
Notice of Intent (NOI)
for Storm Water Discharges Associated with Industrial Activity Under the KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for storm water discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name:	KyTC District 10, Jackson Office	**Phone:**	(606) 666-8841
Address:	P.O. Box 621, 473 Highway 15 South	**Status of Owner/Operator:**	State Government
City, State, Zip Code:	Jackson, KY 41339		

II. Facility/Site Location Information

Name:	KyTC CID 181019		
Address:	KY 9009 Bert T Combs Mountain Parkway		
City, State, Zip Code:	USPS, 330 E. Maple St., Salyersville, KY 41465		
County:	Magoffin County		
Site Latitude: (degrees/minutes/seconds)	37° 45' 01" North	**Site Longitude: (degrees/minutes/seconds)**	83° 10' 19" West

III. Site Activity Information

MS4 Operator Name:							
Receiving Water Body:	Johnson Creek Cow Creek Patton Branch						
Are there existing quantitative data?	Yes ☐ **If Yes, submit with this form.** No ☒						
SIC or Designated Activity Code Primary	1611	**2nd**	1622	**3rd**		**4th**	
If this facility is a member of a Group Application, enter Group Application Number:							
If you have other existing KPDES Permits, enter Permit Numbers:							

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date:	8/1/2018	**Completion Date:**	10/1/2021
Estimated Area to be disturbed (in acres):		199	
Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans?		Yes ☒ No ☐	

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed or Typed Name:	**Marshall Carrier**

Revised June 1999

Signature:	Date: 5/17/18	

Kentucky Pollutant Discharge Elimination System (KPDES)
Instructions
Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity
To Be Covered Under The KPDES General Permit

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the Storm Water Contact, Industrial Section, Kentucky Division of Water at (502) 564-3410.

WHERE TO FILE NOI FORM

NOIs must be sent to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

COMPLETING THE FORM

Type or print legibly in the appropriate areas only. If you have any questions regarding the completion of this form call the Storm Water Contact, Industrial Section, at (502) 564-3410.

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility.

F = Federal M = Public (other than federal or state)
S = State P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and complete street address, including city, state, and ZIP code.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges. If data is available submit with this form.

List, in descending order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other KPDES permits presently issued for the facility or site listed in Section II, list the permit numbers.

SECTION IV - ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION ACTIVITIES ONLY

Construction activities must complete Section IV in addition of Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION V - CERTIFICATION

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authroity to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

AARON B. KEATLEY
COMMISSIONER

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

April 4, 2018

Marshall Carrier
Kentucky Transportation Cabinet (KYTC)
200 Mero St
Frankfort, KY 40622

Re: KYR10 Coverage Acknowledgment
KPDES No.: KYR10M399
10-126.40 Mountain Parkway Widening
Permit Type: Construction
AI ID: 123262
Magoffin County, Kentucky

Dear Marshall Carrier

The discharges associated with the Notice of Intent you submitted have been approved for coverage under the "Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Storm Water Discharges Associated with Construction Activities (KYR100000)" master general permit. Your coverage becomes effective on the date of this letter, and will automatically terminate two years from the effective date of your coverage unless an extension is requested prior to the termination date, until the KYR100000 master general permit expires on November 30, 2019, or the Division of Water revokes coverage, whichever comes first. During this period of coverage all discharges shall comply with the conditions of the KYR100000 master general permit. This permit and links to the eNOI (and permit coverage extension) and eNOT forms can be found on our website:

http://dep.ky.gov/formslibrary/Documents/KYR10PermitPage.pdf.

Any questions concerning the general permit and its requirements should be directed to me at 502-782-7048 or email me at Justina.Bascombe@ky.gov

Construction Site GPS Coordinates: 37.750278 , -83.171944
Receiving Water: Cow Creek

Sincerely,

Justina Bascombe
Surface Water Permits Branch
Division of Water

Special Note for Erosion Control

SPECIAL NOTE FOR EROSION CONTROL

The Contractor shall be responsible for filing the Kentucky Pollution Discharge Elimination System (KPDES) KYR10 permit Notice of Intent (NOI) with the Kentucky Division of Water (DOW) and any KPDES local Municipal Separate Storm Sewer System (MS4) program that has jurisdiction. The NOI shall name the contractor as the Facility Operator and include the KYTC Contract ID Number (CID) for reference.

The Contractor shall perform all temporary erosion/sediment control functions including: providing a Best Management Practice (BMP) Plan, conducting required inspections, modifying the BMP plan documents as construction progresses and documenting the installation and maintenance of BMPs in conformance with the KPDES KYR10 permit effective on December 1, 2014 or a permit re-issued to replace that KYR10 permit. This work shall be conducted in conformance with the requirements of Section 213 of KYTC 2012 Department of Highways, Standard Specifications for Road and Bridge Construction.

Contrary to Section 213.03.03, paragraph 2, the Engineer shall conduct inspections as needed to verify compliance with Section 213 of KYTC 2012 Department of Highways, Standard Specifications for Road and Bridge Construction. The Engineer's inspections shall be performed a minimum of once per month and within seven days after a storm of ½ inch or greater. Copies of the Engineer's inspections shall not be provided to the contractor unless improvements to the BMP's are required. The contractor shall initiate corrective action within 24 hours of any reported deficiency and complete the work within 5 days. The Engineer shall use Form TC 63-61 A for this report. Inspections performed by the Engineer do not relieve the Contractor of any responsibility for compliance with the KPDES permit.

Contrary to Section 213.05, bid items for temporary BMPs will not be listed and all work will instead be included in the lump sum contract cost. The schedule of values for the project should may utilize a lump sum item for "Temporary Erosion Control" to address all items included in section 213 of the Standard Specifications.

The contractor shall be responsible for applying "good engineering practices" as required by the KPDES permit. The contractor may use any temporary BMPs with the approval of the KYTC Engineer.

The contractor shall provide the Engineer copies of all documents required by the KPDES permit at the time they are prepared.

The contractor shall be responsible for the examination of the soils to be encountered and make his own independent determination of the temporary BMPs that will be required to accomplish effective erosion prevention and sediment control.

The Contractor shall be responsible for filing the KPDES permit Notice of Termination (NOT) with the Kentucky DOW and any local MS4 program that has jurisdiction. The NOT shall be filed after the Engineer agrees that the project is stabilized or the project has been formally accepted.

SPECIAL NOTE FOR PIPELINE INSPECTION

1.0 DESCRIPTION. The Department will perform visual inspections on all pipe on the project. A video inspection will be required on projects having more than 250 linear feet of storm sewer and/or culvert pipe and on routes with an ADT of greater than 1,000 vehicles. Conduct video inspections on all pipe located under the roadway and 50 percent of the remaining pipe not under the roadway. Storm sewer runs and outfall pipes not under the roadway take precedence over rural entrance pipes. Contractors performing this item of work must be prequalified with the Department in the work type J51 (Video Pipe Inspection and Cleaning). Deflection testing shall be completed using a mandrel in accordance with the procedure outlined below or by physical measurement for pipes greater than 36inches in diameter. Mandrel testing for deflection must be completed prior to the video inspection testing. Unless otherwise noted, Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

2.0 VIDEO INSPECTION. Ensure pipe is clear of water, debris or obstructions. Complete the video inspection and any necessary measurement prior to placing the final surface over any pipe. When paving will not be delayed, take measurements 30 days or more after the completion of earthwork to within 1 foot of the finished subgrade. Notify the Engineer a minimum of 24 hours in advance of inspection and notify the Engineer immediately if distresses or locations of improper installation are logged.

2.1 INSPECTION FOR DEFECTS AND DISTRESSES

A) Begin at the outlet end and proceed through to the inlet at a speed less than or equal to 30 ft/minute. Remove blockages that will prohibit a continuous operation.

B) Document locations of all observed defects and distresses including but not limited to: cracking, spalling, slabbing, exposed reinforcing steel, sags, joint offsets, joint separations, deflections, improper joints/connections, blockages, leaks, rips, tears, buckling, deviation from line and grade, damaged coatings/paved inverts, and other anomalies not consistent with a properly installed pipe.

C) During the video inspection provide a continuous 360 degree pan of every pipe joint.

D) Identify and measure all cracks greater than 0.1" and joint separations greater than 0.5".

E) Video Inspections are conducted from junction to junction which defines a pipe run. A junction is defined as a headwall, drop box inlet, curb box inlet, manhole, buried junction, or other structure that disturbs the continuity of the pipe. Multiple pipe inspections may be conducted from a single set up location, but each pipe run must be on a separate video file and all locations are to be referenced from nearest junction relative to that pipe run.

F) Record and submit all data on the TC 64-765 and TC 64-766 forms.

3.0 MANDREL TESTING. Mandrel testing will be used for deflection testing. For use on Corrugated Metal Pipe, High Density Polyethylene Pipe, and Polyvinyl Chloride Pipe,

use a mandrel device with an odd number of legs (9 minimum) having a length not less than the outside diameter of the mandrel. The diameter of the mandrel at any point shall not be less than the diameter specified in Section 3.6. Mandrels can be a fixed size or a variable size.

3.1 Use a proving ring or other method recommended by the mandrel manufacturer to verify mandrel diameter prior to inspection. Provide verification documentation for each size mandrel to the Engineer.

3.2 All deflection measurements are to be based off of the AASHTO Nominal Diameters. Refer to the chart in section 3.6.

3.3 Begin by using a mandrel set to the 5.0% deflection limit. Place the mandrel in the inlet end of the pipe and pull through to the outlet end. If resistance is met prior to completing the entire run, record the maximum distance achieved from the inlet side, then remove the mandrel and continue the inspection from the outlet end of the pipe toward the inlet end. Record the maximum distance achieved from the outlet side.

3.4 If no resistance is met at 5.0% then the inspection is complete. If resistance occurred at 5.0% then repeat 3.1 and 3.2 with the mandrel set to the 10.0% deflection limit. If the deflection of entire pipe run cannot be verified with the mandrel then immediately notify the Engineer.

3.5 Care must be taken when using a mandrel in all pipe material types and lining/coating scenarios. Pipe damaged during the mandrel inspection will be video inspected to determine the extent of the damage. If the damaged pipe was video inspected prior to mandrel inspection then a new video inspection is warranted and supersedes the first video inspection. Immediately notify the Engineer of any damages incurred during the mandrel inspection and submit a revised video inspection report.

3.6 AASHTO Nominal Diameters and Maximum Deflection Limits.

Base Pipe Diameter	AASHTO Nominal Diameter	Max. Deflection Limit	
		5.0%	10.0%
(inches)	(inches)	(inches)	
15	14.76	14.02	13.28
18	17.72	16.83	15.95
24	23.62	22.44	21.26
30	29.53	28.05	26.58
36	35.43	33.66	31.89
42	41.34	39.27	37.21
48	47.24	44.88	42.52
54	53.15	50.49	47.84
60	59.06	56.11	53.15

4.0 PHYSICAL MEASUREMENT OF PIPE DEFLECTION. Alternate method for deflection testing when there is available access or the pipe is greater than 36 inches in diameter, as per 4.1. Use a contact or non-contact distance instrument. A leveling device is recommended for establishing or verifying vertical and horizontal control.

4.1 Physical measurements may be taken after installation and compared to the AASHTO Nominal Diameter of the pipe as per Section 3.6. When this method is used, determine the smallest interior diameter of the pipe as measured through the center point of the pipe (D2). All measurements are to be taken from the inside crest of the corrugation. Take the D2 measurements at the most deflected portion of the pipe run in question and at intervals no greater than ten (10) feet through the run. Calculate the deflection as follows:

% Deflection = [(AASHTO Nominal Diameter - D2) / AASHTO Nominal Diameter] x 100%

Note: The Engineer may require that preset monitoring points be established in the culvert prior to backfilling. For these points the pre-installation measured diameter (D1) is measured and recorded. Deflection may then be calculated from the following formula:

$$\% \text{ Deflection} = [(D1 - D2) / D1] (100\%)$$

4.2 Record and submit all data.

5.0 DEDUCTION SCHEDULE. All pipe deductions shall be handled in accordance with the tables shown below.

FLEXIBLE PIPE DEFLECTION	
Amount of Deflection (%)	Payment
0.0 to 5.0	100% of the Unit Bid Price
5.1 to 9.9	50% of the Unit Bid Price [(1)]
10 or greater	Remove and Replace [(2)]

[(1)] Provide Structural Analysis for HDPE and metal pipe. Based on the structural analysis, pipe may be allowed to remain in place at the reduced unit price. [(2)] The Department may allow the pipe to remain in place with no pay to the Contractor in instances where it is in the best interest to the public and where the structural analysis demonstrates that the pipe should function adequately.

RIGID PIPE REMEDIATION TABLE PIPE	
Crack Width (inches)	Payment
• 0.1	100% of the Unit Bid Price
Greater than 0.1	Remediate or Replace [(1)]

[(1)] Provide the Department in writing a method for repairing the observed cracking. Do not begin work until the method has been approved.

6.0 PAYMENT. The Department will measure the quantity in linear feet of pipe to inspect. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24814EC	Pipeline Inspection	Linear Foot
10065NS	Pipe Deflection Deduction	Dollars

SPECIAL NOTE FOR INTELLIGENT COMPACTION OF ASPHALT MIXTURES

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction current edition.

1.0 DESCRIPTION. Provide and use Intelligent Compaction (IC) Rollers for compaction of all asphalt mixtures.

2.0 MATERIALS AND EQUIPMENT. In addition to the equipment specified in Subsection 403.02, a minimum of one (1) IC roller is to be used on the project at all times, two (2) IC rollers will be required when the paving train consists of three (3) or more rollers. The Contractor is to only use the IC roller(s) for compaction as the breakdown and/or intermediate roller(s). All IC rollers will meet the following minimum characteristics:

1. Are self propelled double-drum vibratory rollers equipped with accelerometers mounted in or about the drum to measure the interactions between the rollers and compacted materials in order to evaluate the applied compactive effort. The IC rollers must have the approval of the Engineer prior to use. Examples of rollers equipped with IC technology can be found at www.IntelligentCompaction.com.
2. Are equipped with non-contact temperature sensors for measuring pavement surface temperatures.
3. The output from the roller is designated as the IC-MV which represents the stiffness of the materials based on the vibration of the roller drums and the resulting response from the underlying materials.
4. Are equipped with integrated on-board documentation systems that are capable of displaying real-time color-coded maps of IC measurement values including the stiffness response values, location of the roller, number of roller passes, machine settings, together with the material temperature, speed and the frequency and amplitude of roller drums. Ensure the display unit is capable of transferring the data by means of a cloud based system.
5. Are equipped with a mounted Global Positioning System GPS radio and receiver either a Real Time Kinematic (RTK-GPS) or Global Navigational Satellite System (GNSS) units that monitor the location and track the number of passes of the rollers. Accuracy of the positioning system is to be a minimum of 12 inches. Data is to be transferred to the Cabinet via a cloud based system within 30 minutes of collection.

3.0 WORK PLAN. Submit to the Engineer an IC Work Plan at the Preconstruction Conference and at least 2 weeks prior to beginning construction. Describe in the work plan the following:

1. Compaction equipment to be used including:
    - Vendor(s)
    - Roller model(s),
    - Roller dimensions and weights,
    - Description of IC measurement system,
    - GPS capabilities,
    - Documentation system,
    - Temperature measurement system, and
    - Software.

2. Roller data collection methods including sampling rates and intervals and data file types.
3. Transfer of data to the Engineer including method, timing, and personnel responsible. At the preconstruction meeting, provide the Cabinet with rights to allow for web access to the data file location. Access to the data is not to be hindered in any way. The Contractor will provide the Cabinet with any vendor specific software, user id, passwords, etc. needed to access the data through this service, cost of this access is incidental to the thermal profile bid item. The Cabinet is to have access to all data as it is being collected. If a third party is used for collecting and distributing the data the Cabinet is to have the same access rights and time as the Contractor.
4. Training plan and schedule for roller operators, project foreman, project surveyors, and Cabinet personnel; including both classroom and field training. Training should be conducted at least 1 week before beginning IC construction. The training is to be performed by a qualified representative(s) from the IC Roller manufacture(s) to be used on the project. This training shall include how to access and use the data from the cloud data source.

4.0 CONSTRUCTION. Do not begin work until the Engineer has approved the IC submittals and the IC equipment.

Follow requirements established in Section 400 for production and placement, materials, equipment, acceptance plans and adjustments except as noted or modified in this Specification. Provide the Engineer at least one day's notice prior to beginning construction or prior to resuming production if operations have been temporarily suspended. Ensure paving equipment complies with all requirements specified in Section 400. The IC roller temperatures will be evaluated by the Department with the data from a Paver Mounted Infrared Temperature Gauge.

A. Pre-Construction Test Section(s) Requirements.

Three to five days prior to the start of production, ensure the proper setup of the GPS, IC roller(s) and the rover(s) by conducting joint GPS correlation and verification testing between the Contractor, GPS representative and IC roller manufacturer using the same datum.

1. Ensure GPS correlation and verification testing includes the following minimum processes:

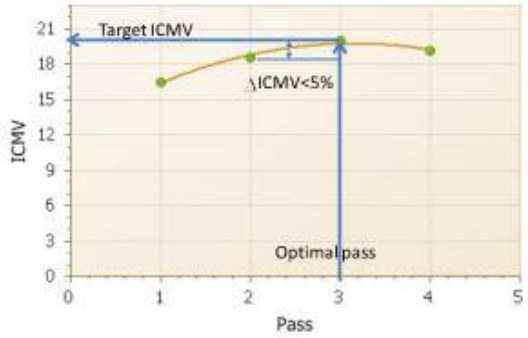
    a. Establish the GPS system to be used either one with a base station or one with mobile receivers only. Ensure all components in the system are set to the correct coordinate system; then,
    b. Verify that the roller and rover are working properly and that there is a connection with the base station; then,
    c. Record the coordinates of the two edges where the front drum of the roller is in contact with the ground from the on-board, color-coded display; then,
    d. Mark the locations of the roller drum edges and move the roller, and place the mobile receiver at each mark and record the readings; then,

2. Compare coordinates between the roller and rover receivers. If the coordinates are within 12.0 in. of each other, the comparison is acceptable. If the coordinates are not within 12.0 in., diagnose and perform necessary corrections and repeat the above steps until verification is acceptable.
3. Do not begin work until acceptable GPS correlation and verification has been obtained.
4. The Contractor and the Department should conduct random GPS verification testing during production to ensure data locations are accurate. The recommended rate is once per day with a requirement of at least once per week.
5. All acceptance testing shall be as outlined in Standard Specifications section 400.

B. Construction Test Section(s) Requirements.

Construct test section(s) at location(s) agreed on by the Contractor and the Engineer within the project limits. The test section is required to determine a compaction curve of the asphalt mixtures in relationship to number of roller passes and to the stiffness of mixture while meeting the Department in-place compaction requirements. All rollers and the respective number of passes for each is to be determined via control strip each time a material change, equipment change or when the Engineer deems necessary.

Conduct test section(s) on every lift and every asphalt mixture. Ensure test section quantities of 500 to 1,000 tons of mainline mixtures. Operate IC rollers in the low to medium amplitude range and at the same settings (speed, frequency) throughout the section while minimizing overlapping of the roller, **the settings are to be used throughout the project with no changes.** After each roller pass, the qualified technician from the contractor observed by the Department will use a nondestructive nuclear gauge that has been calibrated to the mixture to estimate the density of the asphalt at 10 locations uniformly spaced throughout the test section within the width of a single roller pass. The density readings and the number of roller passes needed to achieve the specified compaction will be recorded. The estimated target density will be the peak of the average of the nondestructive readings within the desired compaction temperature range for the mixture. The IC roller data in conjunction with the Veda software will create an IC compaction curve for the mixture. The target IC-MV is the point when the increase in the IC-MV of the material between passes is less than 5 percent on the compaction curve. The IC compaction curve is defined as the relationship between the IC-MV and the roller passes. A compaction curve example is as follows:



Subsequent to the determination of the target IC-MV, compact an adjoining > 250 < 500 tons section using same roller settings and the number of estimated roller passes and allow the Department to verify the compaction with the same calibrated nondestructive nuclear gauge following the final roller pass. **The Department will obtain cores at 10 locations (No cores for calibration are to be taken in the surface layer, use non-destructive density results only!!)** uniformly spaced throughout the test section within the width of the single roller. Obtain GPS measurement of the core locations with a GPS rover. Use the Veda software to perform least square linear regression between the core data and IC-MV in order to correlate the production IC-MV values to the Department specified in-place air voids. A sample linear regression curve example is as follows.



C. Construction Requirements.

Use the IC roller on all lifts and types of asphalt within the limits of the project.

Ensure the optimal number of roller passes determined from the test sections has been applied to a minimum coverage of 80% of the individual IC Construction area. Ensure a minimum of 75% of the individual IC Construction area meets the target IC-MV values determined from the test sections.

Do not continue paving operations if IC Construction areas not meeting the IC criteria are produced until they have been investigated by the Department. Obtain the Engineer's approval to resume paving operations. Non-IC rollers are allowed to be used as the third roller on the project; one of the breakdown or the finish rollers is to be equipped with IC technology.

IC Construction areas are defined as subsections of the project being worked continuously by the Contractor. The magnitude of the IC Construction areas may vary with production but must be at least 750 tons per mixture for evaluation. Partial IC Construction areas of < 750 tons will be included in the previous area evaluation. IC Construction areas may extend over multiple days depending on the operations.

The IC Construction Operations Criteria does not affect the Department's acceptance processes for the materials or construction operations

5.0 MEASUREMENT. The Department will measure the total tons of asphalt mixtures compacted using the IC roller(s). Compaction is to be performed by a minimum of one (1) IC roller for a two (2) roller operation and a minimum of two (2) IC rollers when three (3) or more rollers are used for compaction. Material compacted by rollers not equipped with properly functioning IC equipment will not be accepted for payment of the bid item asphalt mixtures IC rolled. Use of

non-IC rollers can be accepted on small areas due to equipment malfunctions at the written approval of the Engineer. Paving operations should be suspended for equipment malfunctions that will extend over three days of operation.

Data is to be transferred to the cabinet in usable form no later than 30 minutes after collection. Data is to be transferred via a cloud based system.

6.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

1. Payment is full compensation for all work associated with providing IC equipped rollers, laptop computer, transmission of electronic data files, two copies of IC roller manufacturer software, and training.
2. Delays due to GPS satellite reception of signals to operate the IC equipment or IC roller breakdowns will not be considered justification for contract modifications or contract extensions.
3. Delays in data transfer will result in a reduction payment. Delays over 1 hour after collection are 75% pay, over 90 minutes are 50% pay, over 2 hours are 25% pay.

Code	Pay Item	Pay Unit
24781EC	Intelligent Compaction for Asphalt	Ton

March 14, 2019

SPECIAL NOTE FOR INTELLIGENT COMPACTION OF AGGREGATE BASES AND SOILS

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's current edition of the Standard Specifications for Road and Bridge Construction.

1.0 DESCRIPTION. Provide and use Intelligent Compaction (IC) Rollers for compaction of Aggregate bases, stabilized subgrades, soil, and soil rock mixtures.

2.0 MATERIALS AND EQUIPMENT. The Contractor shall supply sufficient numbers of rollers and other associated equipment necessary to complete the compaction requirements for the specific materials. The Contractor will determine the number of IC rollers to use depending on the scope of the project. The IC roller(s) may be utilized during production with other standard compaction equipment and shall be used for the evaluation of the compaction operations. Provide at least one (1) roller to be used on the project with the following minimum characteristics:

1. Are self propelled vibratory rollers equipped with machine drive power and/or accelerometers mounted in or about the drum to measure the interactions between the rollers and compacted materials in order to evaluate the applied Compactive effort. www.IntelligentCompaction.com contains a list of acceptable rollers equipped with IC technology.
2. IC rollers can be either smooth drums or pad footed drums based on the type needed for the aggregate base or soil types to compact.
3. The output from the roller is designated as the IC-MV which represents the stiffness of the materials based on the vibration of the roller drums and the resulting response from the underlying materials, or the machine drive power value.
4. Are equipped with integrated on-board documentation systems that are capable of displaying real-time color-coded maps of IC measurement values including the stiffness response values, location of the roller, number of roller passes, machine settings, together with the speed, the frequency and amplitude of roller drums. Ensure the display unit is capable of transferring the data by means of a cloud based near real time system with a USB port backup data transfer.
5. Are equipped with a mounted Global Positioning System GPS radio and receiver either a Real Time Kinematic (RTK-GPS) or Global Navigational Satellite System (GNSS) units that monitor the location and track the number of passes of the rollers. Accuracy of the positioning system must be within 12 inches.

3.0 WORK PLAN. Submit to the Engineer an IC Work Plan at the Preconstruction Conference and/or at least 2 weeks prior to beginning the corresponding construction activates. Describe in the work plan the following:

1. Compaction equipment to be used including:
    - Vendor(s)
    - Roller model(s),
    - Roller dimensions and weights,
    - Description of IC measurement system,
    - GPS capabilities,
    - Documentation system,
    - Software.
2. Roller data collection methods including sampling rates and intervals and data file types.
3. Transfer of data to the Engineer including method, timing, and personnel responsible. **Data transfer shall be provided by a real time cloud data collecting and distribution system (ex. Visionlink). The Contractor will provide the Cabinet with any vendor specific software, user id, passwords, etc. needed to access the data through this service, cost of this access is incidental to the IC bid item(s).**
4. Training plan and schedule for roller operators, project foreman, project surveyors, and Cabinet personnel; including both classroom and field training from the equipment manufacturer. Training should be conducted at least 1 week before beginning IC construction. The training is to be performed by a qualified representative(s) from the IC Roller manufacture(s) to be used on the project.

4.0 CONSTRUCTION. Prior to the start of production, ensure the proper setup of the GPS, IC roller(s) and the rover(s) by conducting joint GPS correlation and verification testing between the Contractor, GPS representative

and IC roller manufacturer using the same datum. Use the project datum system (Northing, Easting and Elevation) when applicable.

1. Ensure GPS correlation and verification testing includes the following minimum processes:

    a. Establish the GPS system to be used either one with a base station or one with mobile receivers only. Ensure all components in the system are set to the correct coordinate system; then,
    b. Verify that the roller and rover are working properly and that there is a connection with the base station; then,
    c. Record the coordinates of the two edges where the front drum of the roller is in contact with the ground from the on-board, color-coded display; then,
    d. Mark the locations of the roller drum edges and move the roller, and place the mobile receiver at each mark and record the readings; then; then,

2. Compare coordinates between the roller and rover receivers. If the coordinates are within12.0 in. of each other, the comparison is acceptable. If the coordinates are not within 12.0 in., diagnose and perform necessary corrections and repeat the above steps until verification is acceptable.
3. Do not begin work until acceptable GPS correlation and verification has been obtained. The Contractor and the Department should conduct random GPS verification testing during production to ensure data locations are accurate. The recommended rate is once per day with a requirement of at least once per week.
4. A test strip is to be used for all materials (DGA, CSB, subgrade and soil) as outlined and sized in section 302.03.04 to determine optimum rolling pattern, for all materials, and the target density for aggregate bases. A new test strip will be required anytime the material changes, equipment changes, or proper compaction has not been obtained for two (2) consecutive test locations.
5. All acceptance testing shall be as outlined in Standard Specifications sections 200 and 300.
6. Any areas a minimum of 50 square feet in area not achieving the 80% of the stiffness value determined by the latest control strip shall be tested by other means approved by the Engineer. If the material doesn't pass the testing it shall be repaired based on current standards to the satisfaction of the Engineer.

5.0 MEASUREMENT. The Department will measure the total tons of aggregate base (DGA and/or CSB), total square yards of stabilized subgrade, and total cubic yards of soil compacted using the IC roller(s). The use of non-IC rollers is allowed on this project, but an IC roller must be used as well.

6.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

1. All areas with a minimum of 80% pass coverage and 75% required stiffness readings.
2. Payment is full compensation for all work associated with providing IC equipped rollers, transmission of electronic data files, two copies of IC roller manufacturer software, and training.
3. Delays due to GPS satellite reception of signals to operate the IC equipment or IC roller breakdowns will not be considered justification for contract modifications or contract extensions.

Code	Pay Item	Pay Unit
24779EC	Intelligent Compaction for Soil	Cubic Yard
24780EC	Intelligent Compaction for Aggregate	Ton
24990EC	Intelligent Comp Subgrade Stabilization	Square Yard

March 14, 2019

SPECIAL NOTE FOR PAVER MOUNTED TEMPERATURE PROFILES

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction current edition.

1.0 DESCRIPTION. Provide a paver mounted infrared temperature equipment to continually monitor the temperature of the asphalt mat immediately behind all paver(s) during the placement operations for all mainline pavements (including ramps for Interstates and Parkways) within the project limits. Provide thermal profiles that include material temperature and measurement locations.

2.0 MATERIALS AND EQUIPMENT. In addition to the equipment specified in Subsection 403.02 Utilize a thermal equipment supplier that can provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verification, and data management and processing as needed during the Project to maintain equipment within specifications and requirements.

Provide operator settings, user manuals, required viewing/export software for analysis. Ensure the temperature equipment will meet the following:

A. A device with one or more infrared sensors that is capable of measuring in at least 1 foot intervals across the paving width, with a minimum width of 12 feet, or extending to the recording limits of the equipment, whichever is greater. A **Maximum of two (2)** brackets are allowed in the influence area under the sensors. A temperature profile must be made on at least 1 foot intervals longitudinally down the road:
B. Infrared sensor(s):
    1. Measuring from 32°F to 400°F with an accuracy of ± 2.0% of the sensor reading.
C. Ability to measure the following:
    1. The placement distance using a Global Positioning System (GPS) or a Distance Measuring Instrument (DMI) and a Global Positioning System (GPS).
    2. Stationing
D. GPS: Accuracy ± 4 feet in the X and Y Direction
E. Latest version of software to collect, display, retain and analyze the mat temperature readings during placement. The software must have the ability to create and analyze:
    1. Full collected width of the thermal profiles,
    2. Paver speed and
    3. Paver stops and duration for the entire Project.
F. Ability to export data automatically to a remote data server ("the cloud").
    At the preconstruction meeting, provide the Cabinet with rights to allow for web access to the data file location. Access to the data is not to be hindered in any way. The Contractor will provide the Cabinet with any vendor specific software, user id, passwords, etc. needed to access the data through this service, cost of this access is incidental to the thermal profile bid item. The Cabinet is to have access to all data as it is being collected. If a third party is used for collecting and distributing the data the Cabinet is to have the same access rights and time as the Contractor.
    This web-based software must also provide the Department with the ability to download the raw files and software and to convert them into the correct format.
G. The thermal profile data files must provide the following data in a neat easy to read table format.
    1. Project information including Road Name and Number, PCN, Beginning and Ending MPs.
    2. IR Bar Manufacturer and Model number
    3. Number of Temperature Sensors (N)
    4. Spacing between sensors and height of sensors above the asphalt mat
    5. Total number of individual records taken each day (DATA BLOCK)
        a. Date and Time reading taken
        b. Latitude and Longitude
        c. Distance paver has moved from last test location
        d. Direction and speed of the paver
        e. Surface temperature of each of the sensors

3.0 CONSTRUCTION. Provide the Engineer with all required documentation at the pre-construction conference.

A. Install and operate equipment in accordance with the manufacturer's specifications.
B. Verify that the temperature sensors are within ± 2.0% using an independent temperature device on a material of known temperature. Collect and compare the GPS coordinates from the equipment with an independent measuring device.
    1. Ensure the independent survey grade GPS measurement device is calibrated to the correct coordinate system (using a control point), prior to using these coordinates to validate the equipment GPS.
    2. The comparison is considered acceptable if the coordinates are within 4 feet of each other in the X and Y direction.
C. Collect thermal profiles on all mainline pavements during the paving operation and transfer the data to the "cloud" network or if automatic data transmission is not available, transfer the data to the Engineer at the end of daily paving.
D. Contact the Department immediately when System Failure occurs. Daily Percent Coverage will be considered zero when the repairs are not completed within two (2) working days of System Failure. The start of this two (2) working day period begins the next working day after System Failure.
E. Evaluate thermal profile segments, every 150 feet, and summarize the segregation of temperature results. Results are to be labeled as Minimal 0°-25°F, Moderate 25.1°-50°F and Severe >50°. Severe readings over 3 consecutive segments or over 4 or more segments in a day warrant investigation on the cause of the differential temperature distribution.

4.0 MEASUREMENT. The Department will measure the total area of the pavement lanes mapped by the infrared scanners. Full payment will be provided for all lanes with greater than 85% coverage. Partial payment will be made for all areas covered from 50% coverage to 85% coverage at the following rate Coverage area percentage X Total bid amount. And area with less than 50% coverage will not be measured for payment.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

1. Payment is full compensation for all work associated with providing all required equipment, training, and documentation.
2. Delays due to GPS satellite reception of signals or equipment breakdowns will not be considered justification for contract modifications or contract extensions.

Code	Pay Item	Pay Unit
24891EC	Pave Mount Infrared Temp Equipment	Square Foot

March 14, 2019

GUARDRAIL DELIVERY VERIFICATION SHEET

DESCRIPTION	UNIT	QUANTITIES FIELD VERIFIED	QUANTITIES DELIVERED
GUARDRAIL STEEL W BEAM	LF		
GUARDRAIL STEEL THRIE BEAM	LF		
GUARDRAIL THRIE BEAM-W BEAM CONNECTOR	EA		
GUARDRAIL TERMINAL SECTION No. 1	EA		
GUARDRAIL TERMINAL SECTION No. 2	EA		
GUARDRAIL TERMINAL SECTION No. 3	EA		
GUARDRAIL THRIE BEAM TERMINAL SECTION	EA		
CRASH CUSHION TYPE VI	EA		
CRASH CUSHION TYPE VII	EA		
CRASH CUSHION TYPE IX/IX-A	EA		
GUARDRAIL END TREATMENT TYPE 1	EA		
GUARDRAIL END TREATMENT TYPE 2A	EA		
GUARDRAIL END TREATMENT TYPE 3	EA		
GUARDRAIL END TREATMENT TYPE 4A	EA		
GUARDRAIL END TREATMENT TYPE 7	EA		
GUARDRAIL CONNECTOR TO BRIDGE END TYPE A/A-1	EA		
GUARDRAIL CONNECTOR TO BRIDGE END TYPE E/E-1	EA		
GUARDRAIL CONNECTOR TO BRIDGE END TYPE C	EA		
GUARDRAIL CONNECTOR TO BRIDGE END TYPE D	EA		
GUARDRAIL CONNECTOR TO CONC MED PIER	EA		
GUARDRAIL CONNECTOR TO CONC SHLDR PIER	EA		
GUARDRAIL POSTS-STEEL	EA		
GUARDRAIL OFFSET BLOCK TYPE 4	EA		
GUARDRAIL OFFSET BLOCK STEEL	EA		
GUARDRAIL OFFSET BLOCK THRIE BEAM	EA		
GUARDRAIL BACK-UP PLATE W BEAM	EA		
GUARDRAIL BACK-UP PLATE THRIE BEAM	EA		
GUARDRAIL NUTS, BOLTS, & WASHERS	BAG		

NOTES:
1. Dispose of concrete foundations and timber posts off the Right-of-Way at sites obtained by the Contractor at no additional cost to the Department.
2. Deliver salvageable removed guardrail system components, other than concrete foundations and timber posts, to the Department's Letcher County Maintenance HQ. Dispose of components the Engineer deems unsalvageable.
3. Prior to removing the materials from the project site, obtain the Contractor's and Engineer's representativ's signatures.
4. Upon delivery, obtain the Letcher County Maintenance HQ representative's signature and submit this completed form to the Engineer.
5. The Department will not measure removed guardrail components for payment without completed delivery verification sheet(s).

	PRINTED NAME	SIGNATURE	DATE
RESIDENT ENGINEER'S REPRESENTATIVE	_____	_____	_____
CONTRACTOR'S REPRESENTATIVE	_____	_____	_____
LETCHER COUNTY MAINTENANCE HQ REPRESENTATIVE	_____	_____	_____

SPECIAL NOTE FOR BEFORE YOU DIG

INFRA PROJECTS
BOONE CO.
ITEM NO. 6-14, 6-18, 6-20002

Call 1-800-752-6007 toll free a minimum of two and no more than ten business days prior to excavation for information on the location of existing under-ground utilities which subscribe to the before-u-dig (BUD) service. Coordinate excavation with all utility owners, including those who do not subscribe to BUD.

SPECIAL NOTE FOR INLAID PAVEMENT MARKERS

I. DESCRIPTION

Except as provided herein, perform all work in accordance with the Department's Standard and Supplemental Specifications and applicable Standard and Sepia Drawings, current editions. Article references are to the Standard Specifications. This work shall consist of:

(1) Maintain and Control Traffic; and (2) Furnish and install Inlaid Pavement Markers (IPMs) in recessed grooves; and (3) Any other work as specified by these notes and the Contract.

II. MATERIALS

The Department will sample all materials in accordance with the Department's Sampling Manual. Make the materials available for sampling a sufficient time in advance of the use of the materials to allow for the necessary time for testing unless otherwise specified in these Notes.

A. Maintain and Control Traffic. See Traffic Control Plan.

B. Markers. Provide reflective lenses with depth control breakaway positioning tabs. Before furnishing the markers, provide to the Engineer the manufacturer's current recommendations for adhesives and installation procedures. Use one brand and design throughout the project. Use markers meeting the specifications in the table below.

SPECIFICATIONS FOR HOUSING AND REFLECTOR	
Material:	Polycarbonate Plastic
Weight:	Housing 2.00 oz.
	Reflector 2.00 oz.
Housing Size:	5.00" x 3.00" x 0.70" high
Specific Intensity of Reflectivity at 0.2° Observation Angle	
White:	3.0 at 0° entrance angle
	1.2 at 20° entrance angle
Yellow:	60% of white values
Red:	25% of white values

C. Adhesives. Use adhesives that conform to the manufacturer's recommendations.

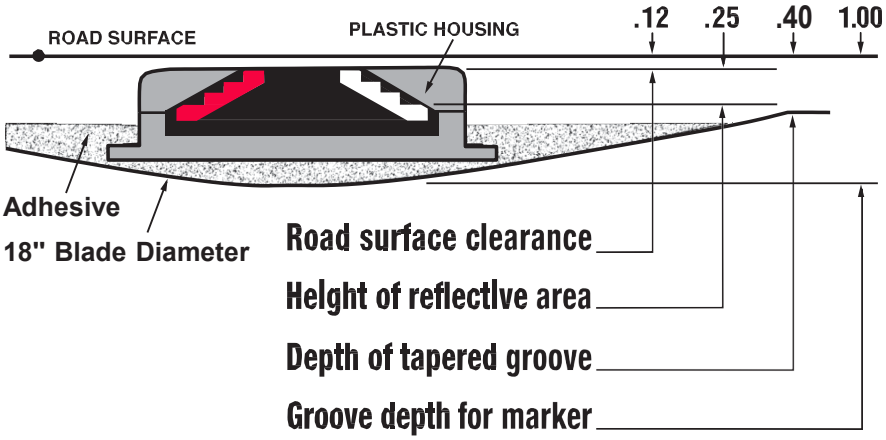
III. CONSTRUCTION

A. Experimental Evaluation. The University of Kentucky Transportation Center will be evaluating this installation of IPMs. Notify the Engineer a minimum of 14 calendar days prior to beginning work. The Engineer will coordinate the University's activities with the Contractor's work.

B. Maintain and Control Traffic. See Traffic Control Plan.

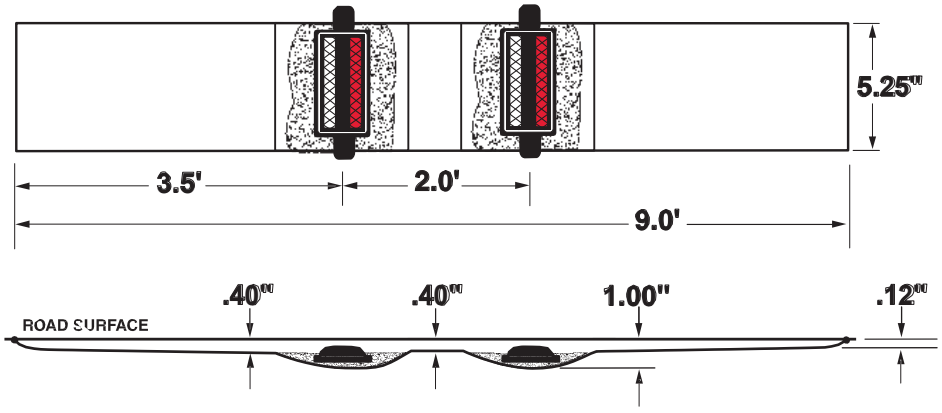
C. Installation. Install IPMs in recessed grooves cut into the final course of asphalt pavement according to the manufacturer's recommendations. Do not cut the grooves until the pavement has cured sufficiently to prevent tearing or raveling. Cut installation grooves using diamond blades on saws that accurately control groove dimensions. Remove all dirt, grease, oil, loose or unsound layers, and any other material from the marker area which would reduce the bond of the adhesive. Maintain pavement surfaces in a clean condition until placing markers.

Prepare the pavement surfaces, and install the markers in the recessed groove according to the drawing below. Use an approved snowplowable epoxy adhesive. Ensure that the adhesive bed area is equal to the bottom area of the marker, and apply adhesive in sufficient quantity to force excess out around the entire perimeter of the marker. Use materials, equipment, and construction procedures that ensure proper adhesion of the markers to the pavement surface according to the manufacturer's recommendations. Remove all excess adhesive from in front of the reflective faces. If any adhesive or foreign matter cannot be removed from the reflective faces, or if any marker fails to properly adhere to the pavement surface, remove and replace the marker at no additional cost to the Department.



D. Location and Spacing. Install the markers in the pattern for high reflectivity with two (2) IPMs per groove. Locate and space markers as shown in the current standard drawings or sepias (note: use Inlaid Pavement Markers wherever Type V Pavement Markers are called for). Do not install markers on bridge decks. Do not install a marker on top of a pavement joint or crack. Offset the recessed groove a minimum of 2

inches from any longitudinal pavement joint or crack and at least one inch from the painted stripe, ensuring that the finished line of markers is straight with minimal lateral deviation. Give preference to maintaining the 2-inch offset between recessed groove and joint as opposed to keeping the line of markers straight.



Place inlaid markers as much in line with existing pavement striping as possible. Place markers installed along an edge line or channelizing line so that the near edge of the plastic housing is no more than one inch from the near edge of the line. Place markers installed along a lane line between and in line with the dashes. Do not place markers over the lines except where the lines deviate visibly from their correct alignment, and then only after obtaining the Engineer's prior approval of the location.

If conflicts between recessed groove placement in relation to pavement joint and striping cannot be resolved, obtain the Engineer's approval to eliminate the marker or revise the alignment.

E. Disposal of Waste. Dispose of all removed asphalt pavement, debris, and other waste at sites off the right of way obtained by the Contractor at no additional cost to the Department. See Special Note for waste and Borrow.

F. Restoration. Be responsible for all damage to public and/or private property resulting from the work. Restore all damaged features in like kind materials and design at no additional cost to the Department.

G. On-Site Inspection. Make a thorough inspection of the site prior to submitting a bid and be thoroughly familiar with existing conditions so that the work can be expeditiously performed after a contract is awarded. The Department will consider submission of a bid as evidence of this inspection having been made and will not honor any claims for money or grant Contract time extensions resulting from site conditions.

H. Caution. Do not take information shown on the drawings and in this proposal and the types and quantities of work listed as an accurate or complete evaluation of the material and conditions to be encountered during construction, but consider the types and

quantities of work listed as approximate only. The bidder must draw his own conclusion as to the conditions encountered. The Department does not give any guarantee as to the accuracy of the data and no claim will be considered for additional compensation or extension of Contract time if the conditions encountered are not in accordance with the information shown.

IV. MEASUREMENT

A. Maintain and Control Traffic. See Traffic Control Plan.

B. "INLAID PAYMENT MARKER" shall be measured as each. One (1) installation of "INLAID PAVEMENT MARKER" will consist of grooving the pavement, removing asphalt cuttings and debris, preheating pavement to remove moisture, adhesives, and installation of two (2) markers with all lenses in accordance with this note.

Note: Each pay item of Inlaid Pavement Marker will require two markers.

V. PAYMENT

A. Maintain and Control Traffic. See Traffic Control Plan.

B. Inlaid Pavement Markers. The Department will make payment for the completed and accepted quantity of completely installed "INLAID PAVEMENT MARKERS" at the Contract unit price, each. Accept payment as full compensation for all labor, equipment, materials, and incidentals to accomplish this work to the satisfaction of the Engineer. A system of one (1) groove and two (2) markers shall be paid as one "INLAID PAVEMENT MARKER". The bid item "INLAID PAVEMENT MARKER" shall be used regardless of the color and type of lenses required.

SPECIAL NOTE FOR DOWEL BAR AND TIE BAR PLACEMENT IN JPC PAVEMENT

This Special Note will apply where indicated on the plans or in the proposal. Section references herein are to the Department's current Standard Specifications for Road and Bridge Construction.

1.0 DESCRIPTION. This Special Note applies when new JPC pavement is placed on a project. Allowable tolerances are outlined for both dowel bar and tie bar placement in driving lanes and shoulders. Concrete patches will not be tested under this special note unless they are required as corrective work under subsection 3.1. Testing applies to all joints except that transverse joints in the shoulders will not be tested. *Working with concrete requires at least seven days or more of curing time. The concrete should be dry for at least 24 hrs prior to testing.*

This Special Note specifies the allowable tolerances for placement of dowel bars and tie bars in JPC pavement.

2.0 MATERIALS. Conform to Subsection 501 or 502 of the current Standard Specifications. Consistent with Standard Drawing RPS-020-13, dowel baskets will be manufactured with the mid-point of the dowel bar at T/2.

3.0 CONSTRUCTION.

3.1 Dowel Bars. Transverse dowel bars, which are generally in baskets, should be located in the center of the slab vertically. They should not be skewed or rotated. Contrary to Section 501 of the Standard Specification and Standard Drawing RPS-020-13, place dowel bars to the tolerances shown in the table below.

Dimension	Tolerance
Horizontal offset	± 1 inch
Longitudinal translation	± 3 inches
Horizontal skew	½ inch, max
Vertical skew	½ inch, max
Vertical depth	The minimum distance below the concrete pavement surface must be: DB=T/3 + ½ inch Where: DB = vertical distance in inches, measured from the concrete pavement surface to any point along the top of dowel bar; and T = actual concrete pavement thickness at joint location, in inches. The maximum distance below the surface to any point along the dowel bar should be 2T/3.

Dowel bars determined to be out of tolerance are to be marked in the field with marking paint. Corrective work will be required for the following circumstances:

- if 3 or more bars are higher than T/3 + ½ inch from the top of the slab or lower than 2T/3 (as measured from the top) for the bottom of the slab
- if 3 or more bars are translated longitudinally 3 inches or more
- if more than two consecutive joints have any bars that are skewed vertically or horizontally

Any corrective work shall be completed in accordance with the current special note 11J – Special Note for Full Depth Concrete Pavement Repair. Contrary to Special Note 11J, all joint repairs completed due to corrective work shall be sealed with silicone rubber unless approved by the Engineer.

3.2 Tie Bars. Install tire bars at a depth equal to ½ of the slab thickness. Tie bars shall be perpendicular to the longitudinal joint and parallel with the concrete pavement surface. Installation shall be to the tolerances outlined below.

- Not less than ½ inch below the saw cut depth of the joints
- 2" clearance from the tie bar and bottom of pavement

Corrective action will be required for the following circumstances:

- 2 consecutive tie bars are missing or outside of the tolerance listed above
- 4 or more bars in a slab are missing or outside of the tolerances listed (does not have to be consecutive)

The correction shall be made by cross stitching to place the new tie bars accordingly.

4.0 MEASUREMENT

4.1 Testing Limits. All driving lanes requiring load transfer assemblies will be tested with Ground Penetrating Radar (GPR) equipment. All longitudinal joints will be tested. The Kentucky Transportation Center (KTC) will perform all testing.

4.2 Validation. A minimum of one location per lane mile will be cored to verify GPR testing. Two 4 inch cores shall be obtained at each location. One core will be taken on each dowel bar end to expose both ends and allow physical measurements. KTC will conduct coring while the contractor shall patch all core holes.

November 5, 2014

SPECIAL NOTE

NO BLASTING

Blasting for excavation will not be permitted occur on the project.

SPECIAL NOTE FOR PORTABLE CHANGEABLE MESSAGE SIGNS

This Special Note will apply when indicated on the plans or in the proposal.

1.0 DESCRIPTION. Furnish, install, operate, and maintain variable message signs at the locations shown on the plans or designated by the Engineer. Remove and retain possession of variable message signs when they are no longer needed on the project.

2.0 MATERIALS.

2.1 General. Use LED Variable Message Signs Class I, II, or III, as appropriate, from the Department's List of Approved Materials.

Unclassified signs may be submitted for approval by the Engineer. The Engineer may require a daytime and nighttime demonstration. The Engineer will make a final decision within 30 days after all required information is received.

2.2 Sign and Controls. All signs must:

1) Provide 3-line messages with each line being 8 characters long and at least 18 inches tall. Each character comprises 35 pixels.
2) Provide at least 40 preprogrammed messages available for use at any time. Provide for quick and easy change of the displayed message; editing of the message; and additions of new messages.
3) Provide a controller consisting of:
   a) Keyboard or keypad.
   b) Readout that mimics the actual sign display. (When LCD or LCD type readout is used, include backlighting and heating or otherwise arrange for viewing in cold temperatures.)
   c) Non-volatile memory or suitable memory with battery backup for storing pre-programmed messages.
   d) Logic circuitry to control the sequence of messages and flash rate.
4) Provide a serial interface that is capable of supporting complete remote control ability through land line and cellular telephone operation. Include communication software capable of immediately updating the message, providing complete sign status, and allowing message library queries and updates.
5) Allow a single person easily to raise the sign to a satisfactory height above the pavement during use, and lower the sign during travel.
6) Be Highway Orange on all exterior surfaces of the trailer, supports, and controller cabinet.
7) Provide operation in ambient temperatures from -30 to + 120 degrees Fahrenheit during snow, rain and other inclement weather.
8) Provide the driver board as part of a module. All modules are interchangeable, and have plug and socket arrangements for disconnection and reconnection. Printed circuit boards associated with driver boards have a conformable coating to protect against moisture.
9) Provide a sign case sealed against rain, snow, dust, insects, etc. The lens is UV stabilized clear plastic (polycarbonate, acrylic, or other approved material) angled to prevent glare.
10) Provide a flat black UV protected coating on the sign hardware, character PCB, and appropriate lens areas.
11) Provide a photocell control to provide automatic dimming.

12) Allow an on-off flashing sequence at an adjustable rate.
13) Provide a sight to aim the message.
14) Provide a LED display color of approximately 590 nm amber.
15) Provide a controller that is password protected.
16) Provide a security device that prevents unauthorized individuals from accessing the controller.
17) Provide the following 3-line messages preprogrammed and available for use when the sign unit begins operation:

/KEEP/RIGHT/⇒⇒⇒/
/KEEP/LEFT/⇐⇐⇐/
/LOOSE/GRAVEL/AHEAD/
/RD WORK/NEXT/**MILES/
/TWO WAY/TRAFFIC/AHEAD/
/PAINT/CREW/AHEAD/
/REDUCE/SPEED/**MPH/
/BRIDGE/WORK/***0 FT/
/MAX/SPEED/**MPH/
/SURVEY/PARTY/AHEAD/
/MIN/SPEED/**MPH/
/ICY/BRIDGE/AHEAD/ /ONE LANE/BRIDGE/AHEAD/
/ROUGH/ROAD/AHEAD/
/MERGING/TRAFFIC/AHEAD/
/NEXT/***/MILES/
/HEAVY/TRAFFIC/AHEAD/
/SPEED/LIMIT/**MPH/
/BUMP/AHEAD/
/TWO/WAY/TRAFFIC/

*Insert numerals as directed by the Engineer.
Add other messages during the project when required by the Engineer.

2.3 Power.

1) Design solar panels to yield 10 percent or greater additional charge than sign consumption. Provide direct wiring for operation of the sign or arrow board from an external power source to provide energy backup for 21 days without sunlight and an on-board system charger with the ability to recharge completely discharged batteries in 24 hours.

3.0 CONSTRUCTION. Furnish and operate the variable message signs as designated on the plans or by the Engineer. Ensure the bottom of the message panel is a minimum of 7 feet above the roadway in urban areas and 5 feet above in rural areas when operating. Use Class I, II, or III signs on roads with a speed limit less than 55 mph. Use Class I or II signs on roads with speed limits 55 mph or greater.

Maintain the sign in proper working order, including repair of any damage done by others, until completion of the project. When the sign becomes inoperative, immediately repair or replace the sign. Repetitive problems with the same unit will be cause for rejection and replacement.

Use only project related messages and messages directed by the Engineer, unnecessary messages lessen the impact of the sign. Ensure the message is displayed in either one or 2 phases with each phase having no more than 3 lines of text. When no message is needed, but it is necessary to know if the sign is operable, flash only a pixel.

When the sign is not needed, move it outside the clear zone or where the Engineer directs. Variable Message Signs are the property of the Contractor and shall be removed from the project when no longer needed. The Department will not assume ownership of these signs.

4.0 MEASUREMENT. The final quantity of Variable Message Sign will be

the actual number of individual signs acceptably furnished and operated during the project. The Department will not measure signs replaced due to damage or rejection.

5.0 PAYMENT. The Department will pay for the Variable Message Signs at the unit price each. The Department will not pay for signs replaced due to damage or rejection. Payment is full compensation for furnishing all materials, labor, equipment, and service necessary to, operate, move, repair, and maintain or replace the variable message signs. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
02671	Portable Changeable Message Sign	Each

Effective June 15, 2012

SPECIAL NOTE FOR DRILLED SHAFTS

1.0 DESCRIPTION. Furnish all equipment, materials and labor necessary for constructing reinforced concrete drilled shafts in cylindrically excavated holes according to the details shown on the plans or as the Engineer directs. Construct the shaft to the lines and dimensions shown on the plans, or as the Engineer directs. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

2.0 MATERIALS.

2.1 Concrete. Use Class A Modified concrete unless otherwise shown on the plans. The slump at the time of placement shall be 6.5 to 9.5 inches, the coarse aggregate shall be size 67, 68, 78, 8 or 9M, and the water/cementitious material ratio shall not exceed 0.45. Include water reducing and retarding admixtures. Type F high range water reducers used in combination with retarding admixtures or Type G high range water reducers fully meeting trial batch requirements are permitted and Class F fly ash is permitted in conformance with Section 601. Design the mix such that the concrete slump exceeds 4 inches at 4 hours after batching. If the estimated concrete transport, plus time to complete placement, exceeds 4 hours, design the concrete to have a slump that exceeds 4 inches or more for the greater time after batching and demonstrate that the slump requirement can be achieved after the extended time period using a trial batch.

Perform trial batches prior to beginning drilled shaft construction in order to demonstrate the adequacy of the proposed concrete mix. Demonstrate that the mix to be used will meet the requirements for temperature, slump, air content, water/cementitious material ratio, and compressive strength. Use the ingredients, proportions and equipment (including batching, mixing, and delivery) to be used on the project. Make at least 2 independent consecutive trial batches of 3 cubic yards each using the same mix proportions and meeting all specification requirements for mix design approval. Submit a report containing these results for slump, air content, water/cement ratio, temperature, and compressive strength and mix proportions for each trial batch to the Engineer for review and approval. Failure to demonstrate the adequacy of the concrete mix, methods, or equipment to the Engineer is cause for the Engineer to require appropriate alterations in concrete mix, equipment, and/or method by the Contractor to eliminate unsatisfactory results. Perform additional trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment.

2.2 Steel Reinforcement. Provide Grade 60 deformed bars conforming to Section 811 of the Standard Specifications. Rail steel is permitted for straight bars only. Place according to Section 602 of the Standard Specifications, this Special Note, and the plans. Use non-corrosive centering devices and feet to maintain the specified reinforcement clearances.

2.3 Casings. Provide casing meeting the requirements of ASTM A 252 Grade 2 or better unless otherwise specified. Ensure casing is smooth, clean, watertight, true and straight, and of ample strength to withstand handling, installation, and extraction stresses and the pressure of both concrete and the surrounding earth materials. Ensure the outside diameter of casing is not less than the specified diameter of shaft.

Use only continuous casings. Cut off the casing at the prescribed elevation and trim to within tolerances prior to acceptance. Extend casing into bedrock a sufficient distance to stabilize the shaft excavation against collapse, excessive deformation, and/or flow of water if required and/or shown on the plans.

Install from the work platform continuous casing meeting the design thickness requirements, but not less than 3/8 inch, to the elevations shown on the plans. When drilled

shafts are located in open water areas, extend casings above the water elevation to the plan tip elevation to protect the shaft concrete from water action during concrete placement and curing. All casing is permanent unless temporary casing is specified in the contract drawings or documents. Permanent casing is incidental to the applicable drilled shaft unit bid price unless noted otherwise in the contract. Temporary casing may be required for drilled shafts not socketed into bedrock. If temporary surface casings are used, extend each casing up to the work platform. Remove all temporary surface casing prior to final acceptance unless otherwise permitted by the Central Office Construction Engineer.

Ensure casing splices have full penetration butt welds conforming to the current edition of AWS D1.1 with no exterior or interior splice plates and produce true and straight casing.

2.4 Slurry. When slurry is to be used for installation of the Drilled Shaft, submit a detailed plan for its use and disposal. The plan should include, but not be limited to the following:

1) Material properties
2) Mixing requirements and procedures
3) Testing requirements
4) Placement procedures
5) Disposal techniques

Obtain the Central Office Division of Construction's approval for the slurry use and disposal plan before installing drilled shafts.

2.5 Tremies. Provide tremies of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. Ensure the tremie diameter is least 6 times the maximum size coarse aggregate to be used in the concrete mix and no less than 10 inches. Provide adequate wall thickness to prevent crimping or sharp bends that restrict concrete placement. Support tremies used for depositing concrete in a dry drilled shaft excavation so that the free fall of the concrete does not cause the shaft excavation to cave or slough. Maintain a clean and smooth tremie surface to permit both flow of concrete and unimpeded withdrawal during concrete placement. Do not allow any aluminum parts to contact the concrete. Construct tremies used to deposit concrete for wet excavations so that they are watertight and will readily discharge concrete.

2.6 Concrete Pumps. Provide pump lines with a minimum diameter of 5 inches and watertight joints.

2.7 Drop Chutes. Do not use aluminum drop chutes.

3.0 CONSTRUCTION.

3.1 Preconstruction.

3.1.1 Prequalification. The Department will require prequalification by the Division of Construction Procurement before accepting a bid for the construction of Drilled Shafts.

3.1.2 Pre-Bid Inspection. Inspect both the project site and all subsurface information, including any soil or rock samples, prior to submitting a bid. Contact the Geotechnical Branch (502-564-2374) to schedule a viewing of the subsurface information. Failure to inspect the project site and view the

subsurface information will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project.

3.1.3 Drilled Shaft Installation Plan. Upon request, the Department will review a Drilled Shaft Installation Plan. Submit the plan no later than 45 calendar days prior to constructing drilled shafts. Items covered in this plan should include, but not be limited to the following:

1) Name and experience record of jobsite drilled shaft superintendent and foremen in charge of drilled shaft operations for each shift.
2) List and size of proposed equipment including cranes, drills, augers, bailing buckets, final cleaning equipment, de-sanding equipment, slurry pumps, core sampling equipment, tremies or concrete pumps, casings, etc.
3) Details of overall construction operation sequence and the sequence of shaft construction in the bents or groups.
4) Details of shaft excavation methods including methods to over-ream or roughen shaft walls, if necessary.
5) Details of slurry when the use of slurry is anticipated. Include methods to mix, circulate, and de-sand the proposed slurry. Provide details of proposed testing, test methods, sampling methods, and test equipment.
6) Details of proposed methods to clean shaft and inside of casing after initial excavation.
7) Details of reinforcement handling, lifting, and placement including support and method to center in shaft. Also include rebar cage support during concrete placement and temporary casing removal.
8) Details of concrete placement including procedures for concrete tremie or pump. Include initial placement, raising during placement, and overfilling of the shaft to expel contaminated concrete.
9) Required submittals including shop drawings and concrete design mixes.
10) Other information shown in the plans or requested by the Engineer.
11) Special considerations for wet construction.
12) Details of environmental control procedures to protect the environment from discharge of excavation spoil, slurry (natural and mineral), and concrete over-pour.

The Division of Construction will review the submitted procedure and provide comments and recommendations. The Contractor is responsible for satisfactory construction and ultimate performance of the Drilled Shaft.

3.2 General Construction. Construct drilled shafts as indicated in the plans or described in this Special Note by either the dry or wet method. When the plans describe a particular method of construction, use this method unless the Engineer permits otherwise. When the plans do not describe a particular method, propose a method on the basis of its suitability to the site conditions. Approval of this proposed method is contingent upon the satisfactory results of the technique shaft.

The construction of the first drilled shaft or technique shaft will be used to determine if the methods and equipment used by the contractor are sufficient to produce a completed shaft meeting the requirements of the plans and specifications. Ability to control dimensions and alignment of excavations within tolerances; to seal the casing into impervious materials; to prevent caving or deterioration of subsurface materials by the use of slurry or other means; to

properly clean the completed shaft excavation; to construct excavations in open water areas when required by the plans; to establish methods for belling or over-reaming when required by the plans; to determine the elevation of ground water; to satisfactorily handle, lift, place, and support the reinforcement cage; to satisfactorily place concrete meeting the specifications within the prescribed time frame; and to satisfactorily execute any other necessary construction operations will be evaluated during construction of the first shaft(s). Revise the methods and equipment as necessary at any time during the construction of the first shaft when unable to satisfactorily carry out any of the necessary operations described above or unable to control the dimensions and alignment of the shaft excavation within tolerances. Accurately locate technique so they may be used in the finished structure unless directed otherwise in the contract document or by the Engineer.

If at any time the Contractor fails to satisfactorily demonstrate, to the satisfaction of the Engineer, the adequacy of methods or equipment and alterations are required, additional technique shafts will be required at no additional cost to the Department and with no extension of contract time. Additional technique shafts shall be located as near as possible to the proposed production shafts but in a location as not to interfere with other construction activities. Once approval has been given to construct production shafts, no changes will be permitted in the methods or equipment used to construct the satisfactory shaft without written approval of the Engineer.

Do not make a claim against the Department for costs of construction delays, or any materials, labor, or equipment that may be necessary due to the Contractor's failure to furnish drilled shafts of a length sufficient to obtain the required bearing values, or for variations in length due to subsurface conditions that may be encountered. Soundings, boring logs, soil profiles, or other subsurface data included in the Contract documents are used by the Department for design and making preliminary estimates of quantities and should be used only at the risk of the Contractor for determining equipment, materials, or labor necessary for drilling shafts as required by the contract.

When necessary, set temporary removable surface casing. Use surface casing of sufficient length to prevent caving of the surface soils and to aid in maintaining shaft position and alignment. Pre-drilling with slurry and/or over-reaming to the outside diameter of the casing may be required to install the surface casing at some sites.

Provide equipment capable of constructing shafts to the deepest shaft depth shown in the plans plus 15 feet, 20 percent greater than the longest shaft (measured from the ground or water surface to the tip of the shaft), or 3 times the shaft diameter, whichever is greater. Blasting excavation methods are not permitted.

Use permanent casing unless otherwise noted in the Contract. Place casing as shown on the plans before beginning excavation. If full penetration cannot be attained, the Engineer may direct that excavation through the casing be accomplished and the casing advanced until reaching the plan tip elevation. In some cases, over-reaming to the outside diameter of the casing may be required before placing the casing. Cut off the casing at the prescribed elevation and leave the remainder of the casing in place. Do not use vibratory hammers for casing installation within 50 feet of shafts that have been completed less than 24 hours.

3.2.1 Dry Construction Method. Use the dry construction method only at sites where the ground water table and soil conditions (generally stiff to hard clays or rock above the water table) make it feasible to construct the shaft in a relatively dry excavation and where the sides and bottom of the shaft are stable and may be visually inspected by the Engineer prior to placing the concrete. The dry construction method consists of drilling the shaft excavation, removing accumulated seepage water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation.

3.2.2 Wet Construction Method. Use the wet construction method at all sites where it is impractical to excavate by the dry method. The wet construction method consists of drilling the shaft excavation below the water table, keeping the shaft filled with water (including natural slurry formed during the drilling process) or slurry as defined in part 2.4 of this Special Note, desanding and cleaning the slurry as required, final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other approved devices and placing the shaft concrete (with a tremie or concrete pump beginning at the shaft bottom) which displaces the water or slurry as concrete is placed.

Where drilled shafts are located in open water areas, construct the shafts by the wet method using casings extending from above water elevation to the plan casing tip elevation to protect the shaft concrete from water action during placement and curing. Install the casing in a manner that will produce a positive seal at the bottom of the casing.

3.3 Slurry. When the Contractor elects to use slurry, adjust construction operations so that the slurry is in contact with the bottom 5 feet of the shaft for less than 4 hours unless the Engineer approves otherwise. If the 4-hour limit is exceeded, over-ream the bottom 5 feet of shaft.

3.4 Cleaning. Over-reaming, cleaning, or wire brushing the sidewalls of the shaft excavation and permanent casings may be necessary to remove the depth of softening or to remove excessive slurry cake buildup as indicated by sidewall samples or other test methods employed by the Engineer. Over-ream around the perimeter of the excavation a minimum depth of 1/2 inch and maximum depth of 3 inches.

3.5 Subsurface Exploration. Take subsurface exploration borings when shown on the plans or as the Engineer directs to determine the character of the material that the shaft extends through and the material directly below the shaft excavation. Complete subsurface exploration borings prior to beginning excavation for any drilled shaft in a group. Unless directed otherwise, extend subsurface exploration borings a minimum depth of 3 shaft diameters but not less than 10 feet below the bottom of the anticipated tip of drilled shaft excavation as shown on the plans. For subsurface exploration borings where soil sampling is required use thin-wall tube samples and perform standard penetration tests according to the Department’s current Geotechnical Manual. When shafts extend into bedrock, soil samples are not required unless otherwise specified. Perform rock core drilling according to the Department’s Geotechnical Manual. When the Engineer directs, perform additional subsurface exploration borings prior to drilled shaft construction. Measure soil samples and/or rock cores and visually identify and describe them on the subsurface log according to the Department’s current Geotechnical Manual. Subsurface exploration borings must be performed by contractors/consultants prequalified by the Department’s Division of Professional Services for Geotechnical Drilling Services at the time that field work begins.

The Engineer or geotechnical branch representative may be on-site during the subsurface exploration process to evaluate the soil and/or rock core samples. The Engineer or geotechnical branch representative will determine the need to extend the borings to depths greater than the depths previously specified. Handle, label, identify, and store soil and/or rock samples according to the Department's current Geotechnical Manual and deliver them with the subsurface logs to the geotechnical branch’s rock core lab in Frankfort within 24-hours of completing the borings, unless directed otherwise.

The Engineer will inspect the soil samples and/or cores and determine the final depth of required excavation (final drilled shaft tip elevation) based on evaluation of the material's suitability. The Engineer will establish the final tip elevations for shaft locations, other than

those for which subsurface exploration borings have been performed, based on the results of the subsurface exploration. Within 15 calendar days after completion of the subsurface exploration borings, the Engineer will notify the contractor of the final tip elevations for shaft locations.

3.6 Excavations. The plans indicate the expected depths, the top of shaft elevations, and the estimated bottom of shaft elevations between which the drilled shaft are to be constructed. Drilled shafts may be extended deeper when the Engineer determines that the material encountered while drilling the shaft excavation is unsuitable and/or is not the same as anticipated in the design of the drilled shaft. Drilled shafts may be shortened when the Engineer determines the material encountered is better than that anticipated.

Begin drilled shaft excavation the excavation, excavation inspection, reinforcement placement, and concrete placement can be completed as one continuous operation. Do not construct new shafts within 24 hours adjacent to recently completed shafts if the center-to-center spacing is less than 3 shaft diameters.

Dispose of excavated material removed from the shaft according to the Standard Specifications or the contract documents.

Do not allow workmen to enter the shaft excavation for any reason unless both a suitable casing has been installed and adequate safety equipment and procedures have been provided to the workmen entering the excavation. Recommended Procedures for the Entry of Drilled Shaft Foundation Excavations, prepared by ADSC: The International Association of Foundation Drilling provides guideline recommendations for down-hole entry of drilled excavations.

3.7 Obstructions. Remove subsurface obstructions at drilled shaft locations. Such obstructions may include man-made materials such as old concrete foundations or natural materials such as boulders. Blasting is not permitted.

3.8 Inspections of Excavations. Provide equipment for checking the dimensions and alignment of each shaft excavation. Determine the dimensions and alignment of the shaft excavation under the observation and direction of the Engineer. Provide equipment necessary to verify shaft cleanliness for the method of inspection selected by the Engineer.

Measure final shaft depths with a weighted tape or other approved methods after final cleaning. Ensure the base of each shaft has less than ½ inch of sediment at the time of concrete placement. For dry excavations, do not allow the depth of water to exceed 3 inches for tremie or pump methods of concrete placement. Verify shaft cleanliness to the Engineer using direct visual inspection or other method the Engineers determines acceptable. Video camera or underwater inspection procedures may be used if specified in the plans. Inspect the side surfaces of rock sockets to ensure they are rough and of such condition to ensure bond between the shaft concrete and the rock. Calipers, bent rods, or other devices may be used to inspect the diameter and roughness of rock sockets. When the Engineer directs, mechanically roughen surfaces found to be smooth.

3.9 Reinforcing Steel Cage Fabrication and Placement. Assemble the reinforcing steel cage, consisting of longitudinal bars, ties, spirals, cage stiffener bars, spacers, centering devices, and other necessary appurtenances and place as a prefabricated unit immediately after the shaft excavation is inspected and accepted, and just prior to concrete placement.

Tie the reinforcing steel with 100 percent double-wire ties and provide support so that it will remain within allowable tolerances for position. Locate splices as shown on the plans. Splice no more than 50 percent of the longitudinal reinforcing within 2-lap splice lengths of any location or within 3 feet of the splice location if approved mechanical connectors are used. All splices are to be in accordance with plan details. Use bands, temporary cross ties,

etc. as required to provide a reinforcement cage of sufficient rigidity to prevent racking, permanent deformations, etc. during installation.

Use concrete centering devices or other approved non-corrosive centering devices at sufficient intervals along the length of the reinforcement cage to ensure concentric spacing for the entire cage length. As a minimum, provide a set of non-corrosive centering devices at intervals not exceeding 5 feet throughout the length of the shaft. When the size of the longitudinal reinforcement exceeds one inch in diameter the minimum spacing may be increased to 10 feet. As a minimum, provide a set of centering devices within 2 feet of the top and 2 feet of the bottom of the shaft. In addition provide one set of centering devices 2 feet above and 2 feet below each change in shaft diameter. Provide feet (bottom supports) at the bottom of the shaft on vertical bars. As a minimum, provide non-corrosive centering devices at 60 degree intervals around the circumference of the shaft to maintain the required reinforcement clearances. Ensure the centering devices maintain the specified annular clearance between the outside of the reinforcing cage and the side of the excavated hole or casing.

Concrete centering devices and feet will be constructed of concrete equal in quality and durability to the concrete specified for the shaft. Use epoxy coated centering devices fabricated from reinforcing steel. Use feet (bottom supports) of adequate size and number to assure the rebar cage is the proper distance above the bottom as determined by part 3.11 3) of this Special Note. The feet are not intended to support the weight of the cage. In the event that the shaft has been excavated below the anticipated tip elevation, extend the reinforcing cage at the tip (low) end by lap splices, mechanical connectors, or welded splices conforming to the Standard Specifications. In this instance, splices need not be staggered and 100 percent of the reinforcing bars may be spliced at a given location. The bottom 12 inches of the shaft may not be reinforced when below plan tip elevation.

During concrete placement, support the reinforcing cage at or near the top of shaft such that the concrete feet are positioned approximately one inch above the bottom of shaft excavation. Not sooner than 24 hours after the completion of concrete placement, remove temporary supports. Provide the needed equipment, including extra cranes if necessary, to provide this cage support.

Prior to placing the reinforcement cage, demonstrate to the satisfaction of the Engineer that the fabrication and handling methods to be used will result in a reinforcing cage placed in the proper position, with the proper clearances, and without permanent bending, squashing, or racking of the reinforcement cage. During this demonstration bring the cage to an upright position, lower into a shaft excavation, and support as if for concrete placement.

Check the elevation of the top of the reinforcing cage before and after the concrete is placed. If the reinforcing cage is not maintained within the specified tolerances, correct to the satisfaction of the Engineer. Do not construct additional shafts until the contractor has modified his reinforcing cage support to obtain the required tolerances.

3.10 Concrete Placement. Place concrete according to the applicable portions of the Standard Specifications and with the requirements set forth herein. Do not apply the provisions of the Special Note 6U for Structural Mass Concrete.

Place concrete as soon as practical after reinforcing steel placement but no later than 4 hours after completion of the shaft excavation. Place concrete continuously from the bottom to above the top elevation of the shaft. For shafts that extend above ground or water surface, place concrete continuously after the shaft is full until good quality concrete is evident at the top of the shaft. Form any portion of the shaft above ground with a removable form or other approved method to the dimensions shown on the plans.

For shafts constructed in the wet with the top of the shaft below the water surface and below top of casing, place concrete to approximately one shaft diameter but no less than 2 feet above the top of shaft elevation. Remove contaminated concrete and deleterious material, as

determined by the Engineer, accumulated above the top of shaft elevation immediately after completing concrete placement. Deleterious material and contaminated concrete may be airlifted under a head of water or slurry provided that the head is maintained at or near the exterior water surface elevation. Carefully remove any concrete remaining above plan top of shaft after curing and excess casing removal.

Place concrete either by free fall, through a tremie, or concrete pump. Use the free fall placement method in dry holes only. The maximum height of free fall placement is 20 feet. Do not allow concrete placed by free fall to contact either the reinforcing cage or hole sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Place concrete in the shaft in one continuous operation. Maintain a minimum slump of 4 inches or more throughout the placement for 4 hours after batching. Adjust approved admixtures in the concrete mix for the conditions encountered on the job so that the concrete remains in a workable plastic state throughout the placement. Perform slump loss tests to demonstrate that the concrete will maintain a 4-inch or greater slump for a period of time equal to the estimated transport plus the 2-hour placement time, but not less than 4 hours.

When the Engineer determines the concrete placement methods and/or equipment during construction of any technique and/or production shafts to be inadequate, make appropriate alterations to eliminate unsatisfactory results.

Drilled shafts not meeting the concrete placement requirements of this Special Note or contract plans are unacceptable. Correct all unacceptable completed shafts to the satisfaction of the Engineer.

3.10.1 Tremie Placement. Tremies may be used for concrete placement in either wet or dry holes. Extend the tremie to the shaft base elevation before starting underwater placement. Valves, bottom plates, or plugs may be used only if concrete discharge can begin approximately 2 inches above the excavation bottom. Remove plugs from the excavation unless otherwise approved by the Engineer. Maintain tremie discharge at or near the bottom of excavation as long as practical during concrete placement. Immerse tremie discharge end as deep as practical in the concrete but not less than 10 feet.

If at any time during the concrete pour the tremie line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete surface, the entire drilled shaft is considered defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as directed by the Engineer, and repour the shaft.

3.10.2 Pumped Concrete. Concrete pumps and lines may be used for concrete placement in either wet or dry excavations. Do not begin concrete placement until the pump line discharge orifice is at the shaft base elevation.

For wet excavations, use a plug or similar device to separate the concrete from the fluid in the hole until pumping begins. Remove the plug unless otherwise approved by the engineer.

Ensure the discharge orifice remains at least 10 feet below the surface of the fluid concrete. When lifting the pump line during concrete placement, reduce the line pressure until the orifice has been repositioned at a higher level in the excavation.

If at any time during the concrete pour the pump line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the Department will consider the shaft defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as the Engineer directs, and repour the shaft.

3.10.3 Drop Chutes. Drop chutes may be used to direct placement of free fall concrete in excavations where the maximum depth of water does not exceed one inch. Do not use the free fall method of placement in wet excavations. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. Reduce the height of free fall and/or reduce the rate of concrete flow into the excavation if the concrete placement causes the shaft excavation to cave or slough, or if the concrete strikes the reinforcing cage or sidewall. When the Engineer determines free fall placement cannot be accomplished satisfactorily, use either tremie or pumping to accomplish the pour.

3.11 Construction Tolerances. The following construction tolerances apply to drilled shafts unless otherwise stated in the contract document:

1) Construct drilled shaft within 3 inches of plan position in the horizontal plane at the top of the shaft.
2) Do not vary the vertical alignment of a shaft excavation from the plan alignment by more than 1/4 inch per foot of depth or 6 inches total.
3) Maintain the top of the reinforcing steel cage no more than 6 inches above and no more than 3 inches below plan position.
4) All casing diameters shown on the plans refer to O.D. (outside diameter) dimensions. The casing dimensions are subject to American Pipe Institute tolerances applicable to regular steel pipe. A casing larger in diameter than shown in the plans may be used, at no additional cost, with prior approval by the Department.
5) Maintain the top of shaft concrete within ± 3 inches from the plan top of shaft elevation, measured after excess shaft concrete has been removed.
6) Design excavation equipment and methods so that the completed shaft excavation will have a planar bottom. Maintain the cutting edges of excavation equipment normal to the vertical axis of the equipment within a tolerance of ± 3/8 inch per foot of diameter. The tip elevation of the shaft has a tolerance of ± 6 inches from final shaft tip elevation unless otherwise specified in the plans.

Drilled shaft excavations and completed shafts not constructed within the required tolerances are unacceptable. Correct all unacceptable shaft excavations and completed shafts to the satisfaction of the Engineer. When a shaft excavation is completed with unacceptable tolerances, present corrective measures designed by a registered Professional Engineer for approval.

4.0 MEASUREMENT.

4.1 Drilled Shafts. The Department will not measure for payment any trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment; concrete required to fill an oversized casing or oversized excavation; obstruction removal; over-reaming or sidewall cleaning; inspection work or inspection equipment; materials or work necessary, including engineering analyses and redesign, to alter unacceptable work methods or to complete corrections for unacceptable work; and will consider them incidental to the Drilled Shaft. Unless noted otherwise in the contract documents, casing is incidental to the drilled shaft.

4.1.1 Drilled Shaft, Common. The Department will measure the length, in linear feet, of drilled shaft above the top of rock elevation shown on the plans. The

Department will consider this quantity Drilled Shaft, Common regardless of the character of material actually encountered.

4.1.2 Drilled Shafts, Solid Rock. The Department will measure the length, in linear feet, of drilled shaft below the top of rock elevation shown on plans. The Department will consider this quantity Drilled Shafts, Solid Rock regardless of the character of material actually encountered during excavation.

4.2 Technique Shaft. The Department will pay for technique shaft at the contract unit price per each as detailed on the plans or as directed by the Engineer. This will constitute full compensation for all costs incurred during installation as described herein for 'Drilled Shaft' or in the contract documents. No additional compensation beyond the number of technique shafts allowed for in the plans will be permitted for additional technique shafts required because of failure to demonstrate adequacy of methods.

4.3 Rock Coring and Rock Sounding. The Department will measure Rock Sounding and Rock Coring shown on the plans, as specified in part 3.5 of this Special Note, and as the Engineer directs, in linear feet to the nearest 0.1-foot. If soil samples are specified in the contract documents they will be incidental to the unit price bid for Rock Sounding. The Department will not measure or pay for subsurface exploration performed deeper than the elevations indicated on the plans and/or in this Special Note, unless directed by the Engineer, and will consider it incidental to these items of work. Additionally, the Department will consider all mobilization, equipment, labor, incidental items, and operations necessary to complete the boring operations incidental to these items of work.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
-----	Drilled Shaft, Diameter*, Common	Linear Foot
-----	Drilled Shaft, Diameter*, Solid Rock	Linear Foot
-----	Technique Shaft	Each
20745ED	Rock Sounding	Linear Foot
20746ED	Rock Coring	Linear Foot

* *See Plan Sheets for sizes of shafts*.

The Department will consider payment as full compensation for all work required in this note.

June 15, 2012

SPECIAL NOTE FOR TURF REINFORCING MAT

1.0 DESCRIPTION. Install turf reinforcement mat at locations specified in the Contract or as the Engineer directs. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

2.0 MATERIALS.

2.1 Turf Reinforcement Mat (TRM). Use a Turf Reinforcement Mat defined as permanent rolled erosion control product composed of non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a three-dimensional matrix of sufficient thickness and from the Department's List of Approved Materials. Mats must be 100% UV stabilized materials. For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting exclusively. Ensure product labels clearly show the manufacturer or supplier name, style name, and roll number. Ensure labeling, shipment and storage follows ASTM D-4873. The Department will require manufacturer to provide TRMs that are machine constructed web of mechanically or melt bonded nondegradable fibers entangled to form a three dimensional matrix. The Department will require all long term performance property values in table below to be based on non degradable portion of the matting alone. Approved methods include polymer welding, thermal or polymer fusion, or placement of fibers between two high strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. Ensure that mats designated in the plans as Type 4 mats, are not to be manufactured from discontinuous or loosely held together by stitching or glued netting or composites. Type 4 mats shall be composed of geosynthetic matrix that exhibits a very high interlock and reinforcement capacities with both soil and root systems and with high tensile modulus. The Department will require manufacturer to use materials chemically and biologically inert to the natural soil environments conditions. Ensure the blanket is smolder resistant without the use of chemical additives. When stored, maintain the protective wrapping and elevate the mats off the ground to protect them from damage. The Department will not specify these materials for use in heavily acidic coal seam areas or other areas with soil problems that would severally limit vegetation growth.

A) Dimensions. Ensure TRMs are furnished in strips with a minimum width of 4 feet and length of 50 feet.
B) Weight. Ensure that all mat types have a minimum mass per unit area of 7 ounces per square yard according to ASTM D 6566.
C) Performance Testing: The Department will require AASHTO's NTPEP index testing. The Department will also require the manufacturer to perform internal MARV testing at a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory for tensile strength, tensile elongation, mass per unit area, and thickness once every 24,000 yds of production or whatever rate is required to ensure 97.7% confidence under ASTM D4439& 4354. The Department will require Full scale testing for slope and channel applications shear stress shall be done under ASTM D 6459, ASTM D 6460-07 procedures.

2.2 Classifications

The basis for selection of the type of mat required will be based on the long term shear stress level of the mat of the channel in question or the degree of slope to protect and will be designated in the contract. The Type 4 mats are to be used at structural backfills protecting critical

structures, utility cuts, areas where vehicles may be expected to traverse the mat, channels with large heavy drift, and where higher factors of safety, very steep slopes and/or durability concerns are needed as determined by project team and designer and will be specified in the plans by designer.

Turf Reinforcement Matting					
Properties[1]	Type 1	Type 2	Type 3	Type 4	Test Method
Minimum tensile Strength lbs/ft	125	150	175	3000 by 1500	ASTM D6818[2]
UV stability (minimum % tensile retention)	80	80	80	90	ASTM D4355[3] (1000-hr exposure)
Minimum thickness (inches)	0.25	0.25	0.25	0.40	ASTM D6525
Slopes applications	2H:1V or flatter	1.5H:1V or flatter	1H:1V or flatter	1 H: 1V or greater	
Shear stress lbs/ft^2 Channel applications	6.0[4]	8.0[4]	10.0[4]	12.0[4]	ASTM D6459 ASTM D6460-07

[1] For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting alone.
[2]Minimum Average Roll Values for tensile strength of sample material machine direction.
[3]Tensile Strength percentage retained after stated 1000 hr duration of exposure under ASTM D4355 testing. Based on nondegradable components exclusively.
[4]Maximum permissible shear design values based on short-term (0.5 hr) vegetated data obtained by full scale flume testing ASTM D6459, D6460-07. Based on nondegradable components exclusively. Testing will be done at Independent Hydraulics Facility such as Colorado State University hydraulics laboratory, Utah State University hydraulics laboratory, Texas Transportation Institute (TTI) hydraulics and erosion control laboratory.

2.3 Quality Assurance Sampling, Testing, and Acceptance

A) Provide TRM listed on the Department's List of Approved Materials. Prior to inclusion on the LAM, the manufacturer of TRM must meet the physical and performance criteria as outlined in the specification and submit a Letter Certifying compliance of the product under the above ASTM testing procedures and including a copy of report from Full Scale Independent Hydraulics Facility that Fully Vegetated Shear Stress meets shear stress requirements tested under D6459 and D6460-07.

B) Contractors will provide a Letter of Certification from Manufacturer stating the product name, manufacturer, and that the product MARV product unit testing results meets Department criteria. Provide Letters once per project and for each product.

C) Acceptance shall be in accordance with ASTM D-4759 based on testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory using Procedure A of ASTM D-4354.

Current mats meeting the above criteria are shown on the Department's List of Approved Materials.

2.4 Fasteners. When the mat manufacturer does not specify a specific fastener, use steel wire U-shaped staples with a minimum diameter of 0.09 inches (11 gauge), a minimum width of one inch and a minimum length of 12 inches. Use a heavier gauge when working in rocky or clay soils and longer lengths in sandy soils as directed by Engineer or Manufacturer's Representative. Provide staples with colored tops when requested by the Engineer.

3.0 CONSTRUCTION. When requested by the Engineer, provide a Manufacturer's Representative on-site to oversee and approve the initial installation of the mat. When requested by the Engineer, provide a letter from the Manufacturer approving the installation. When there is a conflict between the Department's criteria and the Manufacturer's criteria, construct using the more restrictive. The Engineer and Manufacturer's Representative must approve all alternate installation methods prior to execution. Construct according to the Manufacturer's recommendations and the following as minimum installation technique:

3.1 Site Preparation. Grade areas to be treated with matting and compact. Remove large rocks, soil clods, vegetation, roots, and other sharp objects that could keep the mat from intimate contact with subgrade. Prepare seedbed by loosening the top 2 to 3 inch of soil.

3.2 Installation. Install mats according to Standard Drawing Sepias "Turf Mat Channel Installation" and "Turf Mat Slope Installation." Install mats at the specified elevation and alignment. Anchor the mats with staples with a minimum length of 12 inches. Use longer anchors for installations in sandy, loose, or wet soils as directed by the Engineer or Manufacturer's Representative. The mat should be in direct contact with the soil surface.

4.0 MEASUREMENT. The Department will measure the quantity of Turf Reinforcement Mat by the square yard of surface covered. The Department will not measure preparation of the bed, providing a Manufacturer's Representative, topsoil, or seeding for payment and will consider them incidental to the Turf Reinforcement Mat. The Department will not measure any reworking of slopes or channels for payment as it is considered corrective work and incidental to the Turf Reinforcement Mat. Seeding and protection will be an incidental item.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
23274EN11F	Turf Reinforcement Mat 1	Square Yard
23275EN11F	Turf Reinforcement Mat 2	Square Yard
23276EN11F	Turf Reinforcement Mat 3	Square Yard
23277EN11F	Turf Reinforcement Mat 4	Square Yard

SPECIAL NOTE FOR LONGITUDINAL PAVEMENT JOINT ADHESIVE

1. DESCRIPTION. This specification covers the requirements and practices for applying an asphalt adhesive material to the longitudinal joint of the surface course of an asphalt pavement. Apply the adhesive to the face of longitudinal joint between driving lanes for the first lane paved. Then, place and compact the adjacent lane against the treated face to produce a strong, durable, waterproof longitudinal joint.

2. MATERIALS, EQUIPMENT, AND PERSONNEL.

2.1 Joint Adhesive. Provide material conforming to Subsection 2.1.1.

2.1.1 Provide an adhesive conforming to the following requirements:

Property	Specification	Test Procedure
Viscosity, 400 ° F (Pa·s)	4.0 – 10.0	ASTM D 4402
Cone Penetration, 77 ° F	60 – 100	ASTM D 5329
Flow, 140 ° F (mm)	5.0 max.	ASTM D 5329
Resilience, 77 ° F (%)	30 min.	ASTM D 5329
Ductility, 77 ° F (cm)	30.0 min.	ASTM D 113
Ductility, 39 ° F (cm)	30.0 min.	ASTM D 113
Tensile Adhesion, 77 ° F (%)	500 min.	ASTM D 5329, Type II
Softening Point, ° F	171 min.	AASHTO T 53
Asphalt Compatibility	Pass	ASTM D 5329

Ensure the temperature of the pavement joint adhesive is between 380 and 410 °F when the material is extruded in a 0.125-inch-thick band over the entire face of the longitudinal joint.

2.2. Equipment.

2.2.1 Melter Kettle. Provide an oil-jacketed, double-boiler, melter kettle equipped with any needed agitation and recirculating systems.

2.2.2 Applicator System. Provide a pressure-feed-wand applicator system with an applicator shoe attached.

2.3 Personnel. Ensure a technical representative from the manufacturer of the pavement joint adhesive is present during the initial construction activities and available upon the request of the Engineer.

3. CONSTRUCTION.

3.1 Surface Preparation. Prior to the application of the pavement joint adhesive, ensure the face of the longitudinal joint is thoroughly dry and free from dust or any other debris that would inhibit adhesion. Clean the joint face by the use of compressed air.

Ensure this preparation process occurs shortly before application to prevent the return of debris on the joint face.

3.2 Pavement Joint Adhesive Application. Ensure the ambient temperature is a minimum of 40 ^{o} F during the application of the pavement joint adhesive. Prior to applying the adhesive, demonstrate competence in applying the adhesive according to this note to the satisfaction of the Engineer. Heat the adhesive in the melter kettle to the specified temperature range. Pump the adhesive from the melter kettle through the wand onto the vertical face of the cold joint. Apply the adhesive in a continuous band over the entire face of the longitudinal joint. Do not use excessive material in either thickness or location. Ensure the edge of the extruded adhesive material is flush with the surface of the pavement. Then, place and compact the adjacent lane against the joint face. Remove any excessive material extruded from the joint after compaction (a small line of material may remain).

3.3 Pavement Joint Adhesive Certification. Furnish the joint adhesive's certification to the Engineer stating the material conforms to all requirements herein prior to use.

3.4 Sampling and Testing. The Department will require a random sample of pavement joint adhesive from each manufacturer's lot of material. Extrude two 5 lb. samples of the heated material and forward the sample to the Division of Materials for testing. Reynolds oven bags, turkey size, placed inside small cardboard boxes or cement cylinder molds have been found suitable. Ensure the product temperature is 400°F or below at the time of sampling.

4. MEASUREMENT. The Department will measure the quantity of Pavement Joint Adhesive in linear feet. The Department will not measure for payment any extra materials, labor, methods, equipment, or construction techniques used to satisfy the requirements of this note. The Department will not measure for payment any trial applications of Pavement Joint Adhesive, the cleaning of the joint face, or furnishing and placing the adhesive. The Department will consider all such items incidental to the Pavement Joint Adhesive.

5. PAYMENT. The Department will pay for the Pavement Joint Adhesive at the Contract unit bid price and apply an adjustment for each manufacturer's lot of material based on the degree of compliance as defined in the following schedule. When a sample fails on two or more tests, the Department may add the deductions, but the total deduction will not exceed 100 percent.

Pavement Joint Adhesive Price Adjustment Schedule						
Test	Specification	100% Pay	90% Pay	80% Pay	50% Pay	0% Pay
Joint Adhesive Referenced in Subsection 2.1.1						
Viscosity, 400 º F (Pa•s)			3.0-3.4	2.5-2.9	2.0-2.4	≤1.9
ASTM D 3236	4.0-10.0	3.5-10.5	10.6-11.0	11.1-11.5	11.6-12.0	≥ 12.1
Cone Penetration, 77 º F			54-56	51-53	48-50	≤ 47
ASTM D 5329	60-100	57-103	104-106	107-109	110-112	≥ 113
Flow, 140 º F (mm) ASTM D 5329	≤ 5.0	≤ 5.5	5.6-6.0	6.1-6.5	6.6-7.0	≥ 7.1
Resilience, 77 º F (%) ASTM D 5329	≥ 30	≥ 28	26-27	24-25	22-23	≤ 21
Tensile Adhesion, 77 º F (%) ASTM D 5329	≥ 500	≥ 490	480-489	470-479	460-469	≤ 459
Softening Point, º F AASHTO T 53	≥ 171	≥ 169	166-168	163-165	160-162	≤ 159
Ductility, 77 º F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9
Ductility, 39 º F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9

Code	Pay Item	Pay Unit
20071EC	Joint Adhesive	Linear Foot

May 7, 2014

SPECIAL NOTE FOR BARCODE LABEL ON PERMANENT SIGNS

1.0 DESCRIPTION. Install barcode label on sheeting signs. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

2.0 MATERIALS. The Department will provide the Contractor with a 2 inch x 1 inch foil barcode label for each permanent sheeting sign. A unique number will be assigned to each barcode label.

The Contractor shall contact the Operations and Pavement Management Branch in the Division of Maintenance at (502) 564-4556 to obtain the barcode labels.

3.0 CONSTRUCTION. Apply foil barcode label in the lower right quadrant of the sign back. Signs where the bottom edge is not parallel to the ground, the lowest corner of the sign shall serve as the location to place the barcode label. The barcode label shall be placed no less than one-inch and no more than three inches from any edge of the sign. The barcode must be placed so that the sign post does not cover the barcode label.

Barcodes shall be applied in an indoor setting with a minimum air temperature of 50°F or higher. Prior to application of the barcode label, the back of the sign must be clean and free of dust, oil, etc. If the sign is not clean, an alcohol swab shall be used to clean the area. The area must be allowed to dry prior to placement of the barcode label.

Data for each sign shall include the barcode number, MUTCD reference number, sheeting manufacturer, sheeting type, manufacture date, color of primary reflective surface, installation date, latitude and longitude using the North American Datum of 1983 (NAD83) or the State Plane Coordinates using an x and y ordinate of the installed location.

Data should be provided electronically on the TC 71-229 Sign Details Information and TC 71-230 Sign Assembly Information forms. The Contractor may choose to present the data in a different format provided that the information submitted to the Department is equivalent to the information required on the Department TC forms. The forms must be submitted in electronic format regardless of which type of form is used. The Department will not accept PDF or handwritten forms. These completed forms must be submitted to the Department prior to final inspection of the signs. The Department will not issue formal acceptance for the project until the TC 71-229 and TC-230 electronic forms are completed for all signs and sign assemblies on the project.

4.0 MEASUREMENT. The Department will measure all work required for the installation of the barcode label and all work associated with completion and submission of the sign inventory data (TC 71-229 and TC 71-230).

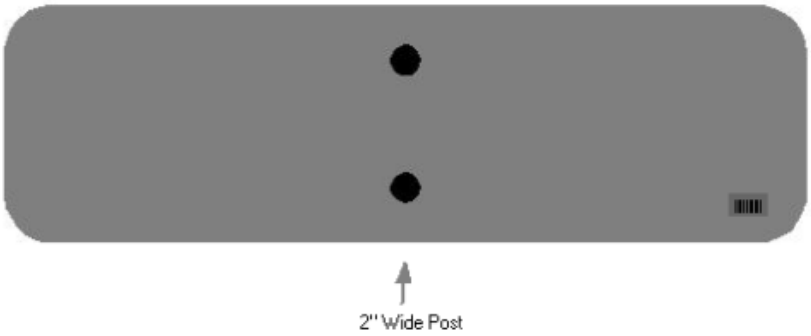
The installation of the permanent sign will be measured in accordance to Section 715.

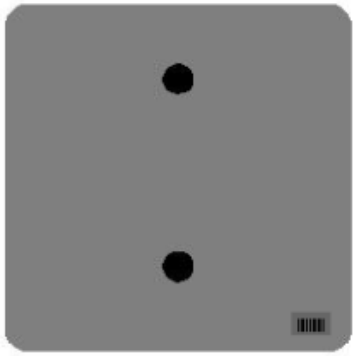
5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24631EC	Barcode Sign Inventory	Each

The Department will not make payment for this item until all barcodes are installed and sign inventory is complete on every permanent sign installed on the project. The Department will make payment for installation of the permanent sign in accordance to Section 715. The Department will consider payment as full compensation for all work required under this special note.

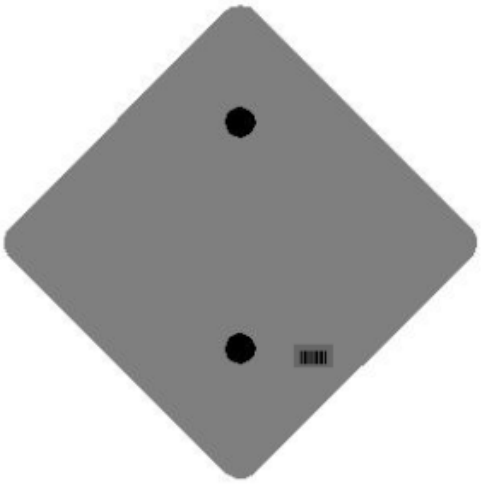
One Sign Post

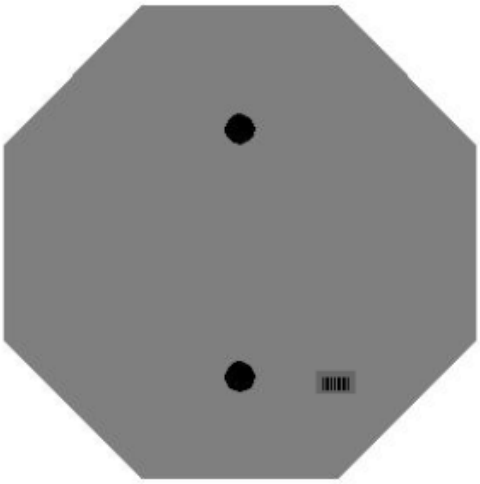


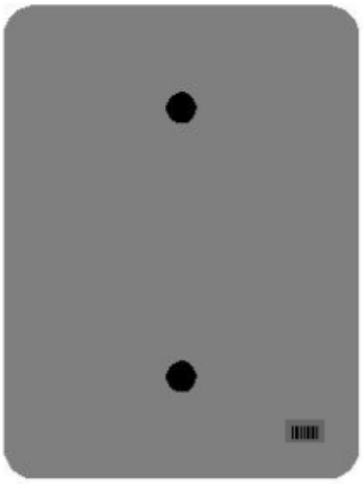


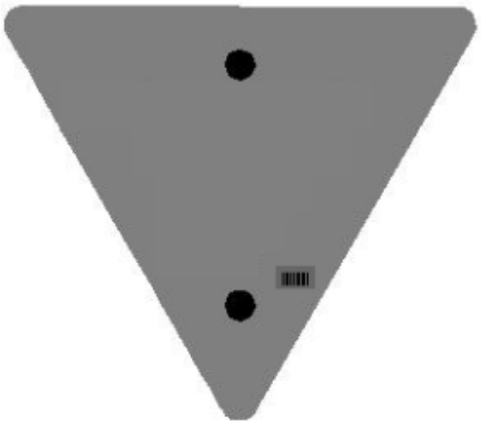


One Sign Post

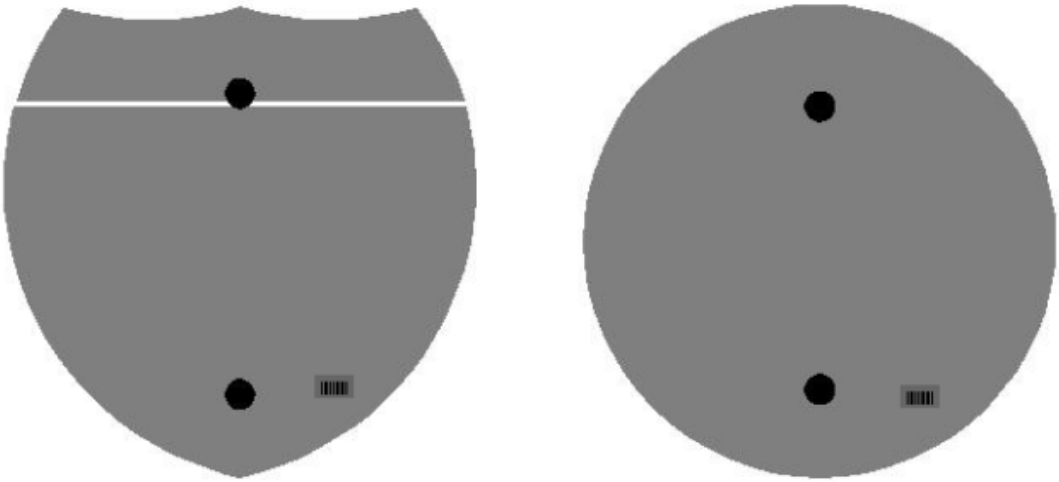


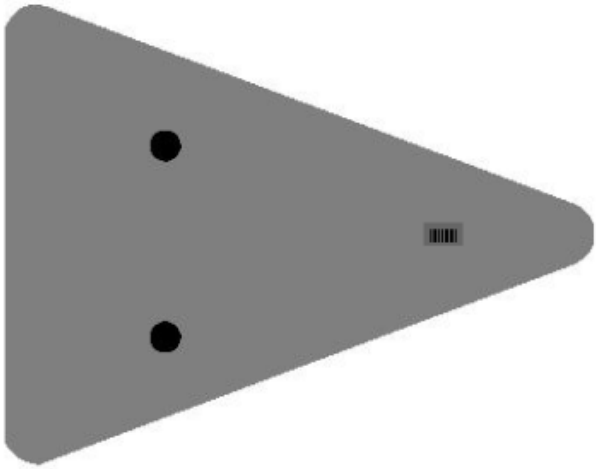




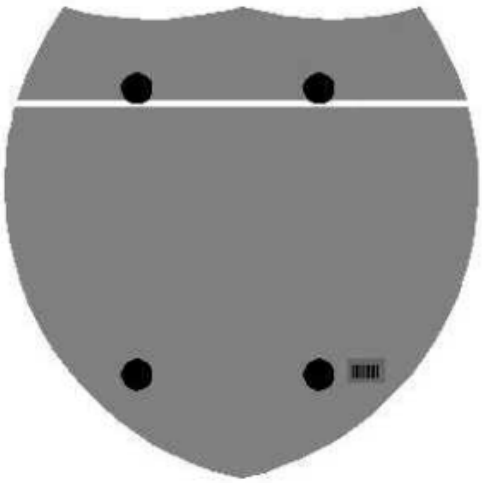


One Sign Post

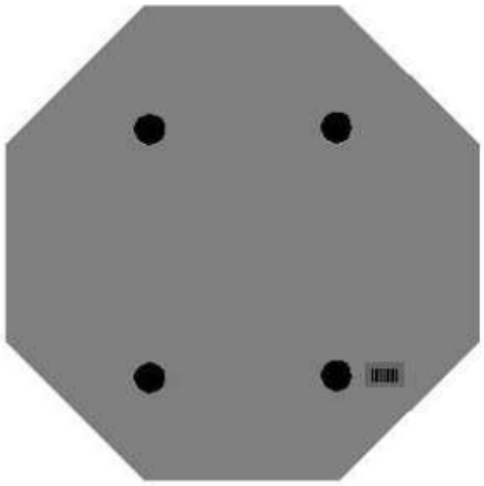




Double Sign Post



Interstate
Shield

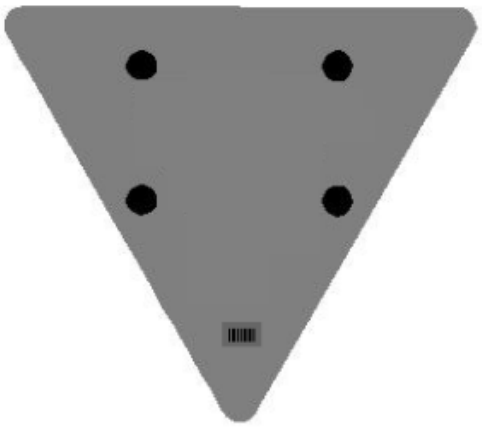


48" Stop

2 Post Signs







SPECIAL NOTE FOR HMA ELECTRONIC DELIVERY MANAGEMENT SYSTEM
(HMA e-Ticketing)

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction current edition.

1.0 DESCRIPTION. Incorporate a GPS Fleet Management System for all HMA delivered to the project in order to monitor, track, and report loads of HMA during the construction processes from the point of measurement and loading to the point of incorporation to the project.

2.0 MATERIALS AND EQUIPMENT. Submit to the Engineer for approval, no fewer than 30 days prior to HMA placement activities, a GPS fleet management system supplier that can provide a qualified representative for on-site technical assistance during the initial setup, pre-construction verifications, and data management and processing as needed during the Project to maintain equipment.

Provide operator settings, user manuals, training videos, and required viewing/export software for review. Provide equipment that will meet the following:

1. A wireless fleet management or GPS device that is capable of tracking all delivery trucks (both company-owned and third-party) must be installed on all trucks and equipment (dump trucks, belly dumps, side-load dumps, transfer vehicles, pavers, or any other trucks/vehicles) used to transfer and incorporate HMA into the project. KYTC personnel shall have the ability to access Real Time monitoring through the use of a mobile device such as an iPad, smartphone, etc.

2. The fleet management system shall be fully integrated with the Contractor's Load Read-Out scale system at the HMA plant site.

3. The fleet management system shall have the ability to measure and track vehicles and their contents (weights and material types) continuously from the plant site to the project site. The system shall have internal battery backup capabilities due to loss of power, and have the ability to store data if GPS connectivity is lost and transmit that same data when unit re-establishes connectivity. To be considered continuous, no two data points shall be more than 60 seconds apart unless the vehicle is stopped. Duration of stop time for any reason shall be recorded.

3.0 CONSTRUCTION. Provide the Engineer with the manufacturer's specifications and all required documentation for data access at the pre-construction conference.

A. Construction Requirements

1. Install and operate equipment in accordance with the manufacturer's specifications.

2. Verify the GPS is working within the requirements of this Special Note.

B. Data Deliverables

Provide to the Engineer a means in which to gather report summaries by way of iOS apps, web pages, or any other method at the disposal of the Engineer. The Engineer may request data at any time during paving operations.

1. Real-time Continuous Data Items

Provide the Engineer access to a GIS map-based data viewer which displays the following information in real-time with a web-based system compatible with iOS and Windows environments.

- Each Truck
  - UniqueTruck ID
  - Truck status
    - Time At Source

        - Time At Destination
        - Time At Paver
        - Time At Scale
        - Time to and from plant/job
        - Time Stopped with Engine Running
    - Time of last transmission
    - Location (Latitude and Longitude in decimal degrees to nearest 0.0000001) every 60 seconds
    - Description of Material being transported (i.e. asphalt base, asphalt surface)
    - Mix Description (i.e. CL2 ASPH BASE 1.00D PG64-22, etc.)
    - Mix Identification Number (Project Specific)
    - Net Weight of material being transported to the nearest 0.01 ton
    - Running Daily Total of Net Weight of material being transported to nearest 0.01 ton.
    - Project Number

- Scale Location
- Project Location
- Point of Delivery (i.e. paver)

2. Daily Summary

The following summary information shall be provided to the Engineer electronically within 4 hours of beginning operations on the next working day

- For each Material
    - List of Individual Loads
        - Contractor Name
        - Project Number
        - Unique Truck ID
        - Net Weight For Payment (nearest 0.01 tons)
        - Date
        - Mix Temperature at Time of Loading, Fahrenheit (to be key entered by plant)
        - Time Loaded
        - Time Unloaded
        - Delivery Location (Latitude/Longitude in decimal degrees to nearest 0.0000001)
- For each Bid Item
        - Total Quantity for Payment (nearest 0.01 tons)

SPECIAL NOTE FOR NON-TRACKING TACK COAT

1. DESCRIPTION AND USEAGE. This specification covers the requirements and practices for applying a non-tracking tack asphalt coating. Place this material on the existing pavement course, prior to placement of a new asphalt pavement layer. Use when expedited paving is necessary or when asphalt tracking would negatively impact the surrounding area. This material is not suitable for other uses. Ensure material can "break" within 15 minutes under conditions listed in 3.2.

2. MATERIALS, EQUIPMENT, AND PERSONNEL.

2.1 Non-Tracking Tack. Provide material conforming to Subsection 2.1.1.

2.1.1 Provide a tack conforming to the following material requirements:

Property	Specification	Test Procedure
Viscosity, SFS, 77 ˚ F	20 – 100	AASHTO T 72
Sieve, %	0.3 max.	AASHTO T 59
Asphalt Residue[1], %	50 min.	AASHTO T 59
Oil Distillate, %	1.0 max.	AASHTO T 59
Residue Penetration, 77 ˚ F	20 max.	AASHTO T 49
Original Dynamic Shear (G*/sin δ), 82 ˚ C	1.0 min.	AASHTO T 315
Softening Point, ˚ F	149 min.	AASHTO T 53
Solubility, %	97.5 min.	AASHTO T 44

[1] Bring sample to 212 ˚F over a 10-15 minute period. Maintain 212 ˚F for 15-20 minutes or until 30-40 mL of water has distilled. Continue distillation as specified in T59.

2.2. Equipment. Provide a distributor truck capable of heating, circulating, and spraying the tack between 170 ˚F and 180 ˚F. Do not exceed 180 ˚F. Circulate the material while heating. As required by the manufacturer, ensure the spray bar is equipped with #1 or #2 ¼" V-slot Etnyre nozzles. Other nozzles are not acceptable. Arrange the nozzles in the following patterns from left to right:

Nozzle number(s)	Activity	Orientation
1	On	Vertical
2	Off	-
3	On	Horizontal
4 & 5	Off	-
6	On	Horizontal
Continue 2 off and 1 on pattern through rest of spray bar system.		

Ensure the bar can be raised to between 14 and 18" from the roadway.

2.3 Personnel. Ensure the tack supplier has provided training to the contractor on the installation procedures for this product. Make a technical representative from the supplier available at the request of the Engineer.

3. CONSTRUCTION.

3.1 Surface Preparation. Prior to the application of the non-tracking tack, ensure the pavement surface is thoroughly dry and free from dust or any other debris that would inhibit adhesion. Clean the surface by scraping, sweeping, and the use of compressed air. Ensure this preparation process occurs shortly before application to prevent the return of debris pavement. If rain is expected within one hour after application, do not apply material. Apply material only when the surface is dry, and no precipitation is expected.

3.2 Non-tracking Tack Application. Ensure the roadway temperature is a minimum of 40 ˚F and rising during the application of the tack. This material is not suitable for use in colder temperatures. Prior to applying the tack, demonstrate competence in applying the tack according to this note to the satisfaction of the Engineer. Heat the tack in the distributor to between 170 – 180 ˚F. After initial heating to between 170 – 180 ˚F, the material may be sprayed between 165 ˚F and 180 ˚F. Do not apply outside this temperature range. Apply material at a rate of 0.50 pounds (0.06 gallons) per square yard. Ensure full coverage of the material on the pavement surface. Full coverage of this material is critical. If full coverage is not achieved, material application rate may be increased to ensure full coverage. Do not heat material more than twice in one day.

3.3 Non-tracking Tack Certification. Furnish the tacks certification to the Engineer stating the material conforms to all requirements herein prior to use.

3.4 Sampling and Testing. The Department will require a sample of non-tracking tack be taken from the distributor at a rate of one sample per 15,000 tons of mix. Take two 1 gallon samples of the heated material and forward the sample to the Division of Materials for testing within 7 days. Ensure the product temperature is between 170 and 180 °F at the time of sampling.

4. MEASUREMENT. The Department will measure the quantity of non-tracking tack in tons. The Department will not measure for payment any extra materials, labor, methods, equipment, or construction techniques used to satisfy the requirements of this note. The Department will not measure for payment any trial applications of non-tracking tack, the cleaning of the pavement surface, or furnishing and placing the adhesive. The Department will consider all such items incidental to the non-tracking tack.

5. PAYMENT. The Department will pay for the non-tracking tack at the Contract unit bid price and apply an adjustment for each manufacturer's lot of material based on the degree of compliance as defined in the following schedule. When a sample fails on two or more tests, the Department may add the deductions, but the total deduction will not exceed 100 percent.

Non-Tracking Tack Price Adjustment Schedule						
Test	Specification	100% Pay	90% Pay	80% Pay	50% Pay	0% Pay
Viscosity, SFS, 77 ˚ F	20 – 100	19 - 102	17 - 18 103 - 105	15 - 16 106 - 107	14 108 - 109	≤13 ≥ 110
Sieve, %	0.30 max.	≤ 0.40	0.41 - 0.50	0.51 - 0.60	0.61 - 0.70	≥ 0.71
Asphalt Residue, %	50 min.	≥49.0	48.5 – 48.9	48.0 – 48.4	47.5-47.9	≤ 47.4
Oil Distillate, %	1.0 max.	≤1.0	1.1-1.5	1.6 - 1.7	1.8-1.9	>2.0
Residue Penetration, 77 ° F	20 max.	≤ 21	22 - 23	24 - 25	26 - 27	≥ 28
Original Dynamic Shear (G*/sin δ), 82 ˚ C	1.0 min.	≥0.95	0.92 – 0.94	0.90 – 0.91	0.85 - 0.89	≤ 0.84
Softening Point, º F	149 min.	≥145	142 - 144	140 - 141	138 - 139	≤ 137
Solubility, %	97.5 min.	≥ 97.0	96.8 – 96.9	96.6 – 96.7	96.4 – 96.5	≤ 96.3

Code	Pay Item	Pay Unit
24970EC	Asphalt Material for Tack Non-Tracking	Ton

April 30, 2018

SPECIAL PROVISION FOR EMBANKMENT AT BRIDGE END BENT STRUCTURES

This Special Provision will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, Current Edition.

1.0 DESCRIPTION. Construct a soil, granular, or rock embankment with soil, granular or cohesive pile core and place structure granular backfill, as the Plans require. Construct the embankment according to the requirements of this Special Provision, the Plans, Standard Drawing RGX 100 and 105, and the Standard Specifications, Current Edition.

2.0 MATERIALS.

2.1 Granular Embankment. Conform to Subsection 805.10. When Granular Embankment materials are erodible or unstable according to Subsection 805.03.04, use the Special Construction Methods found in 3.2 of the Special Provision.

2.2 Rock Embankment. Provide durable rock from roadway excavation that consists principally of Unweathered Limestone, Durable Shale (SDI equal to or greater than 95 according to KM 64-513), or Durable Sandstone.

2.3 Pile Core. Provide a pile core in the area of the embankments where deep foundations are to be installed unless otherwise specified. The Pile Core is the zone indicated on Standard Drawings RGX 100 and 105 designated as Pile Core. Material control of the pile core area during embankment construction is always required. Proper Pile Core construction is required for installation of foundation elements such as drilled or driven piles or drilled shafts. The type of material used to construct the pile core is as directed in the plans or below. Typically, the pile core area will be constructed from the same material used to construct the surrounding embankment. Pile Core can be classified as one of three types:

A) Pile Core - Conform to Section 206 of the Standard Specifications. Provide pile core material consisting of the same material as the adjacent embankment except the material in the pile core area shall be free of boulders or particle sizes larger than 4 inches in any dimension or any other obstructions that may hinder pile driving operations. If the pile core material hinders pile driving operations, take the appropriate means necessary to reach the required pile tip elevation, at no expense to the Department.

B) Granular Pile Core. Granular pile core is required only when specified in the plans. Select a gradation of durable rock to facilitate pile driving that conforms to Subsection 805.11. If granular pile core material hinders pile driving operations, take appropriate means necessary to reach the required pile tip elevation, at no expense to the Department.

C) Cohesive Pile Core. Cohesive Pile Core is required only when specified in the plans. Conform to Section 206 of the Standard Specifications and use soil with at least 50 percent passing a No. 4 sieve having a minimum Plasticity Index (PI) of 10. In addition, keep the cohesive pile core free of boulders, larger than 4 inches in any dimension, or any other obstructions, which would interfere with drilling operations. If cohesive pile core material interferes with drilling operations, take appropriate means necessary to maintain

excavation stability, at no expense to the Department.

2.4 Structure Granular Backfill. Conform to Subsection 805.11

2.5 Geotextile Fabric. Conform to Type I or Type IV in Section 214 and 843.

3.0 CONSTRUCTION.

3.1 General. Construct roadway embankments at end bents according to Section 206 and in accordance with the Special Provision, the Plans, and Standard Drawings for the full embankment section. In some instances, granular or rock embankment will be required for embankment construction for stability purposes, but this special provision does not prevent the use of soil when appropriate. Refer to the plans for specific details regarding material requirements for embankment construction.

Place and compact the pile core and structure granular backfill according to the applicable density requirements for the project. If the embankment and pile core are dissimilar materials (i.e., a granular pile core is used with a soil embankment or a cohesive pile core is used with a granular embankment), a Geotextile Fabric, Type IV, will be required between the pile core and embankment in accordance with Sections 214 and 843 of the Standard Specifications.

When granular or rock embankment is required for embankment construction, conform to the general requirements of Subsection 206.03.02 B. In addition, place the material in no greater than 2-foot loose lifts and compact with a vibrating smooth wheel roller capable of producing a minimum centrifugal force of 15 tons. Apply these requirements to the full width of the embankment for a distance of half the embankment height or 50 feet, whichever is greater, as shown on Standard Drawing RGX-105.

When using granular pile core, install 8-inch perforated underdrain pipe at or near the elevation of the original ground in the approximate locations depicted on the standard drawing, and as the Engineer directs, to ensure positive drainage of the embankment. Wrap the perforated pipe with a fabric of a type recommended by the pipe manufacturer.

After constructing the embankment, excavate for the end bent cap, drive piling, install shafts or other foundation elements, place the mortar bed, construct the end bent, and complete the embankment to finish grade according to the construction sequence shown on the Plans or Standard Drawings and as specified hereinafter.

Certain projects may require widening of existing embankments and the removal of substructures. Construct embankment according to the plans. Substructure removal shall be completed according to the plans and Section 203. Excavation may be required at the existing embankment in order to place the structure granular backfill as shown in the Standard Drawings.

After piles are driven or shafts installed (see design drawings), slope the bottom of the excavation towards the ends of the trench as noted on the plans for drainage. Using a separate pour, place concrete mortar, or any class concrete, to provide a base for forming and placing the cap. Place side forms for the end bent after the mortar has set sufficiently to support workmen and forms without being disturbed.

Install 4-inch perforated pipe in accordance with the plans and Standard Drawings. In the event slope protection extends above the elevation of the perforated pipe, extend the pipe through the slope protection.

After placing the end bent cap and achieving required concrete cylinder strengths, remove adjacent forms and fill the excavation with compacted structure granular backfill material (maximum 1’ loose lifts) to the level of the berm prior to placing beams for the bridge. Place Type IV geotextile fabric between embankment material and structure granular backfill. After completing the end bent backwall, or after completing the span end

wall, place the compacted structure granular backfill (maximum 1' loose lifts) to subgrade elevation. If the original excavation is enlarged, fill the entire volume with compacted structure granular backfill (maximum 1' loose lifts) at no expense to the Department. Do not place backfill before removing adjacent form work. Place structure granular backfill material in trench ditches at the ends of the excavation. Place Geotextile Fabric, Type IV over the surface of the compacted structure granular backfill prior to placing aggregate base course.

Tamp the backfill with hand tampers, pneumatic tampers, or other means approved by the Engineer. Thoroughly compact the backfill under the overhanging portions of the structure to ensure that the backfill is in intimate contact with the sides of the structure.

Do not apply seeding, sodding, or other vegetation to the exposed granular embankment.

3.2 Special Construction Methods. Erodible or unstable materials may erode even when protected by riprap or channel lining; use the special construction method described below when using these materials.

Use fine aggregates or friable sandstone granular embankment at "dry land" structures only. Do not use them at stream crossings or locations subject to flood waters.

For erodible or unstable materials having 50 percent or more passing the No. 4 sieve, protect with geotextile fabric. Extend the fabric from the original ground to the top of slope over the entire area of the embankment slopes on each side of, and in front of, the end bent. Cover the fabric with at least 12 inches of non-erodible material.

For erodible or unstable materials having less than 50 percent passing a No. 4 sieve, cover with at least 12 inches of non-erodible material.

Where erodible or unstable granular embankment will be protected by riprap or channel lining, place Type IV geotextile fabric between the embankment and the specified slope protection.

4.0 MEASUREMENT.

4.1 Granular Embankment. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure for payment any Granular Embankment that is not called for in the plans.

The Department will not measure for payment any special construction caused by using erodible or unstable materials and will consider it incidental to the Granular Embankment regardless of whether the erodible or unstable material was specified or permitted.

4.2 Rock Embankment. The Department will not measure for payment any rock embankment and will consider it incidental to roadway excavation or embankment in place, as applicable. Rock embankments will be constructed using granular embankment on projects where there is no available rock present within the excavation limits of the project.

4.3 Pile Core. Pile core will be measured and paid under roadway excavation or embankment in place, as applicable. The Department will not measure the pile core for separate payment. The Department will not measure for payment the 8-inch perforated underdrain pipe and will consider it incidental to the Pile Core.

4.4 Structure Granular Backfill. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure any additional material required for backfill outside the limits shown on the Plans and Standard Drawings for payment and will

consider it incidental to the work.

The Department will not measure for payment the 4-inch perforated underdrain pipe and will consider it incidental to the Structure Granular Backfill.

4.5 Geotextile Fabric. The Department will not measure the quantity of fabric used for separating dissimilar materials when constructing the embankment and pile core and will consider it incidental to embankment construction.

The Department will not measure for payment the Geotextile Fabric used to separate the Structure Granular Backfill from the embankment and aggregate base course and will consider it incidental to Structure Granular Backfill.

The Department will not measure for payment the Geotextile Fabric required for construction with erodible or unstable materials and will consider it incidental to embankment construction.

4.6 End Bent. The Department will measure the quantities according to the Contract. The Department will not measure furnishing and placing the 2-inch mortar or concrete bed for payment and will consider it incidental to the end bent construction.

4.7 Structure Excavation. The Department will not measure structure excavation on new embankments for payment and will consider it incidental to the Structure Granular Backfill or Concrete as applicable.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
02223	Granular Embankment	Cubic Yards
02231	Structure Granular Backfill	Cubic Yards

The Department will consider payment as full compensation for all work required in this provision.

September 16, 2016

Appendix I2 -- KY 536 Notes

SPECIAL NOTE FOR SOUND BARRIER WALLS

I. DESCRIPTION

All work shall be performed in accordance with the Department's latest Standard and Supplemental Specifications and applicable Special Provisions and Standard and Sepia Drawings, except as specified in these notes or elsewhere in this proposal. Section references are to the Standard Specifications. This work shall consist of the sound barrier wall and foundation design, construction plans for the foundation, shop drawing preparation, and construction of precast concrete sound barrier walls, including construction of the drilled shaft foundations, in reasonably close conformity with the lines and grades shown on the contract plans and the Contractor's approved plans.

All references to AASHTO are to the AASHTO Standard Specifications for Highway Bridges, Current Edition with Interims.

All references to the Guide Specifications are to the AASHTO Guide Specifications for Structural Design of Barriers Current Edition with Interims.

The **"Appendix"** to this Special Note contains the project specific requirements.

II. DESIGN

A. General

Furnish plans for sound barrier walls and drilled shaft foundations (see attached geotechnical report) designed by a Registered Professional engineer licensed to practice in the Commonwealth of Kentucky. Design according to the Guide Specifications, AASHTO, and the Contract plans and documents. Design for an 84-mph wind velocity. Design for exposure category in accordance with the Guide Specifications (see the **"Appendix"**). Design for wind pressure based on the Exposure Category and the height to the centroid (mid- height) of the loaded area. Apply the wind pressure as a uniform load.

The Contractor's design shall comply with all restrictions imposed by the site conditions and the proposal notes and plan sheets such as drainage, accommodation of existing and proposed utilities, limitations on dimensions or sound barrier wall location, fire hydrant access, and other conditions noted or found in the field. The top and bottom of the sound barrier wall elevation throughout shall be as shown on the contract plans.

Design a free standing sound barrier wall finished on both sides. The maximum precast panel length shall be 40 feet. Design all sound barrier walls for the same appearance and materials. Design drilled shafts for foundations; spread footings or other type foundation designs will not be accepted.

Geotechnical work to determine the soil conditions and for the design of the drilled shaft foundation has been performed by the Department (See **"Geotechnical Notes"**).

B. Site Conditions

Be advised that Section 102.06 of the Specifications applies to this project. It shall be distinctly understood that any references in the contract plans and other contract documents to rock, rock disintegration zone, earth, or any other subsurface material whether in numbers, words, letters, or lines is solely for the Department's information. The Bidder draws his own conclusions as to the field conditions to be encountered.

Tops of drilled shafts are to be a minimum of 6 inches below finished grade, and the bottoms of sound barrier walls are to be a minimum of two feet below finished grade unless otherwise shown on the contract plans or **"Appendix"**.

C. Utilities

Take into consideration existing and proposed utilities and the Department's electrical service for interchange lighting in the vicinity of the sound barrier walls when developing sound barrier wall details. Show on the Contractor's plans and shop drawings additional work or materials necessary to construct the sound barrier wall without disturbing the utilities. Repair or replace features damaged during construction in like kind materials and design at no additional cost to the Department.

D. Contractor Submittals

Submit design calculations and plans to the Engineer for review within thirty calendar days of the 'Notice to Begin Work'. Submit adequate documentation of proprietary designs and/or products to the Engineer for review.

Submit three complete sets of the design calculations and five complete sets of the plans for the sound barrier wall to the Engineer for approval. Design calculations shall include the design for each component of the wall and the wall as a unit. Include the design for the horizontal connection (dowels, etc.) between panels. Include drilled shaft foundation design for axial and lateral loading. Show on the plans the drilled shaft foundations. One set of design calculations and plans, with

any corrections noted will be returned to the Contractor. Each time corrections are made, three copies of the revised calculation sheets and/or five copies of the revised plan sheets shall be submitted.

The Department will review the design calculations and plans for general conformance with the Guide Specifications, AASHTO, this Special Note, and the Contract Documents. The design calculations, plans, details and dimensions may not be completely checked. The Contractor shall be responsible for the accuracy of his design calculations and for compatibility with the contract plans. The Department's review will not relieve the Contractor of responsibility for the accuracy and completeness of the design calculations and plans.

Upon final approval by the Department, furnish drawings of the Contractor's approved plans to the Engineer in a .pdf format in accordance with KYTC requirements. The Department will provide copies of the approved plans to the Contractor.

Do not produce shop drawings before the Department's approval of the design calculations and Contractor's plans are completed. The Contractor's wall design engineer providing the design calculations and plans shall be responsible for shop drawing review. The Contractor's wall design engineer shall provide the Engineer ten sets of reviewed and approved shop drawings for the wall and provide the Department with a statement of assurance that the shop drawings are accurate and that they satisfy the project requirements. Each sheet of two copies of the shop drawings shall be dated, sealed, and signed by the wall design engineer providing the Contractor's design for the wall. Place the Drawing Number on the lower right hand side of all shop drawings.

Do not order materials or begin fabrication or construction before the Department's review of the shop drawings is completed. The Contractor may request permission from the Engineer to begin foundation construction at his own risk. Written permission from the Engineer is required.

After acceptance by the Department, submit requests for changes to the design calculations, Contractor's approved plans and shop drawings to the Engineer. Obtain written acceptance from the Engineer before incorporating any of the requested changes into the work.

Allow thirty working days for the Department's review of each submission of the design calculations, Contractor's plans, and shop drawings for the sound barrier wall. The thirty-day period begins when the design calculations, Contractor's plans, or shop drawings are received by the Engineer. Additional time required by the Department to review re-submissions shall not be cause for extending the specified completion date. Provide additional re-submissions as requested at no additional cost to the Department and with no extension of the specified completion date.

III. SOUND BARRIER WALLS

See the Appendix for permitted wall type and architectural treatment.

Precast Concrete panels may be pilaster, (post), and panel design or connected panels.

Precast concrete panels, pilasters, and other precast elements shall comply with Section 605 of the Standard Specifications. Precast concrete shall be Class D with a minimum 28-day compressive strength of 5000 p.s.i. All materials and reinforcement shall conform to the Department's Standard Specifications.

Precast panels, pilasters, and other precast elements may be prestressed. Prestress fabrication shall be in accordance with Section 605 of the Standard Specifications. Prestressing tendons may be either bar or strand. Prestressing bars shall conform to ASTM A722 'Uncoated Steel Bars for Prestressed Concrete'. Prestressing strands shall be seven wire strands conforming to ASTM A4l6, 'Uncoated Seven-wire Stress-Relieved Strand for Prestressed Concrete'.

Use drilled shafts for the foundation. The Contractor's design shall be in accordance to the Special Note for Drilled Shafts (11C) of the Standard Specifications. The Contractor's plans shall indicate whether or not permanent casings will be required. Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring will be incidental to the Sound Barrier Wall and will not be measured for separate payment. The Contractor will not be required to conduct a subsurface exploration as outlined in Section 3.5 of the Special Note for Drilled Shafts since the exploration is provided by KYTC (see **"Geotechnical Notes"**).

Use preformed joint filler complying with AASHTO M153 for Types I, II, or III or AASHTO M213.

Use epoxy coated steel dowels to provide positive horizontal alignment of panels coated in accordance with Section 811.10.

Provide positive means of alignment between panels. Use tongue and groove joints or steel dowels. If steel dowels are used at horizontal joints between panels, install no less than one dowel at the mid-point for panels up to 20 feet long and no less than two dowels at the third points for panels over 20 feet long.

Seal all joints between panels and between pilasters and panels to prevent sound leaks. Obtain the Engineer's approval of the sealant before use.

Step elevation changes at the top of the sound barrier wall except for end panels. Construct the top of sound barrier level between steps. Make steps only at the pilasters. Construct the

top of the sound barrier wall at or above the elevation of the top of the sound barrier shown on the contract plans.

Construct reinforced concrete pilasters. Cast using metal forms. Construct pilasters that protrude a maximum of twelve inches from the front face of the precast panels for sound barrier walls located more than 30 feet from the edge of the traveled way. Construct pilasters that protrude no more than one inch from the front face of the precast panels for sound barrier walls located within 30 feet from the edge of the traveled way. Connect pilasters to drilled shaft foundations above the finish grade. Use bolted galvanized steel for the connections; the Engineer will not allow or permit field welding.

Obtain the Engineer's approval of joint materials and details before use.

IV. MATERIALS APPROVAL

All materials shall be sampled and tested in accordance with the Department's Sampling Manual and the materials shall be available for sampling a sufficient time in advance of the use of the materials to allow for the necessary time for testing. Unless otherwise specified in these Notes, obtain acceptance of materials from the Engineer before use.

V. CONSTRUCTION

Perform site preparation necessary to construct the sound barrier wall in accordance with the Standard Specifications, contract plans, Contractor's approved plans, and notes in the proposal. Clear and grub the minimum area required to construct the wall. Sound standing trees and shrubs within the construction limits shall be trimmed or removed only as directed or approved by the Engineer. The Engineer may direct minor alignment changes to avoid damage to existing trees or shrubs.

Construct sound barrier walls in accordance with the contract plans, the Contractor's approved plans, and the approved shop drawings. Construct vertical and horizontal joints so that the sound barrier wall is structurally sound and with no sound leaks. Construct the face of the completed sound barrier wall without deviation from the vertical of more than ½ inch in ten feet and with horizontal alignment conforming to the neat line shown on the contract plans.

Transport, store, handle, and erect precast units in accordance with Section 605 of the Standard Specifications.

Protect all masonry materials from the weather from the time of manufacture until they are in the finished sound barrier walls.

Construction of the ditches shown on the plans will not be measured for payment but shall be incidental to Site Preparation.

After constructing the wall, clean all sound barrier wall surfaces. Clean from the top of the wall to twelve inches below finished grade on both sides. Use a cleaner selected by the Contractor and approved by the Engineer.

VI. MEASUREMENT

SOUND BARRIER WALL

Sound Barrier Walls will be measured in square feet of surface area in a vertical plane between the vertical and horizontal limits, top of wall elevations, and lateral limits shown on the Contractor's approved plans or approved changes; however, tops of footings may be above the minimum depth of burial with no reduction in area to be measured.

Any area of the sound barrier wall outside the approved vertical and horizontal plan limits as shown on the approved plans or changes approved or directed by the Engineer will not be measured for payment. Approved adjustments in the area will be measured in square feet and the final quantity will be increased or decreased as applicable.

The Department will not measure caps, copings, joint sealants, void fill material, weep holes, connectors, trim, surface finish, concrete stain, cleaning, sample panels, and incidental items that are a normal part of the sound barrier wall construction but shall be incidental to **Sound Barrier Wall**.

FOUNDATION PREPARATION

Contrary to Section 603.04.03, **Foundation Preparation** will be measured as lump sum. Structure Excavation Common, Structure Excavation Solid Rock, Structure Excavation Unclassified, Foundation Undercut for removal of unsuitable foundation materials, and refill will not be measured for separate payment but shall be incidental to Foundation Preparation. Removal and resetting of guardrail if needed for access will not be measured for separate payment and shall be incidental to **Foundation Preparation**.

VII. PAYMENT

Payment at the contract unit price per square foot shall be full complete compensation for all labor, materials, equipment, and incidentals to design and construct the sound barrier walls, including construction of the drilled shaft foundations.

Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring will be incidental to the Sound Barrier Wall.

CODE	PAY ITEM	PAY UNIT
21590EN	Sound Barrier Wall	Square Feet
08003	Foundation Preparation	Lump Sum

APPENDIX

Standard Specifications: Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, latest Edition.

AASHTO: AASHTO Standard Specifications for Highway Bridges, latest Edition with Current Interims.

Guide Specifications: AASHTO Guide Specifications for Structural Design of Barriers, latest Edition with Interims.

The Exposure Category is C.

The permitted Wall Type is precast concrete panels mounted on reinforced concrete pilasters, with drilled shaft foundation (no alternate).

Finish Requirements:

Precast Panels — Provide an architectural formed finish using pattern #1214 Minnesota Ashlar Form Liner, as manufactured by "Custom Rock Formliner", 2020 West 7th Street, St. Paul, Minnesota 55116, (800) 637-2447, www.customrock.com, or an approved equivalent. Formliner shall be used on all exposed concrete on the front face (face toward the roadway) and rear face of precast panels. Place form lining to assure that the grooves, lines, and striations are normal to joints and aligned with adjacent panels with no pattern offset.

Pilasters — Pilasters shall be concrete and shall be cast using metal forms. Provide smooth finish on all exposed surfaces.

Color — All concrete surfaces of the precast panels and pilasters shall be stained and sealed as approved by the Resident Engineer, using exterior grade coloring agents applied according to the manufacturer's instructions. Apply the stain and sealer to all exposed faces of the entire structure after the sound barrier wall has been erected, extending from the top of the wall to twelve inches below finish grade on both sides. Provide uniform color in each continuous sound barrier.

Anti-Graffiti coating shall be applied to all surfaces once sealer has cured in accordance with the manufacturer's recommendations. Anti-Graffiti coating shall extend from the top of wall to twelve (12) inches below finish grade on both sides. Anti-Graffiti coating shall be Tex-Cote Graffiti Gard S Non-Sacrificial Coating, as manufactured by "Textured Coatings of America", 2422 East 15th Street, Panama City, Florida 32405, (800) 454-0340, www.texcote.com, or an approved equivalent.

If required by the Resident Engineer, provide two samples of the precast concrete panels, a minimum of four feet by eight feet, cast using the same form liners as proposed for

production for the Department's approval. Retain one sample at the casting yard for a standard of comparison for the production panels. Deliver the second sample to the project site.

Casting and delivering the samples to the job site will not be measured for separate payment but shall be incidental to **Sound Barrier Wall**.

Special Note for Accelerated Cement Subgrade Stabilization

DESCRIPTION

The subgrade of this project is to be chemically stabilized. In areas where a faster cure is desired, cement should be applied at a rate of 56.7 pounds per square yard. Contrary to Section 208 of the Standard Specifications, the curing time and testing of the subgrade may be constructed with an expedited schedule, and the depth is increased to 12 inches. Otherwise, the subgrade is to be prepared and mixed per the Standard Specifications. The curing time is allowed to be lowered to 48 hours per the following items in this note (Curing time may be reduced to 12 hours when stabilization must occur in an area designated for weekend closure or in other areas at the discretion of the Engineer.).

A. The subgrade is to be tested with a nuclear density meter to ensure that the required maximum dry density and optimum moisture content have been achieved.

B. The subgrade is to be coated with an asphalt curing seal within 12 hours of final mixing. This is to ensure that the proper moisture content is maintained during the shortened curing period.

C. After curing period the Contractor can begin constructing the aggregate base layer. If any rutting of the treated subgrade layer is detected, it must be repaired immediately. Rutting is to be checked by driving a grader over the subgrade 5 times. If the depth of the ruts is 3/8 of an inch or greater, construction of the aggregate layer is to be halted for an additional 24 hour curing period. (Additional curing time may be reduced to 12 hours when stabilization must occur in an area designated for weekend closure or in other areas at the discretion of the Engineer.) Repair of the subgrade is defined as refilling any ruts and cutting any bulges to ensure the depth of stabilized material is 12 inches and the subgrade is at proper grade. The asphalt curing seal must be replied over disturbed areas so that it completely covers the stabilized area.

D. If after 4 days of curing the subgrade is continuing to rut in excess of 1/2 inch it can be tested using a Dynamic Cone Penetrometer (DCP) by an approved tester. If the DCP tests result show that the subgrade has achieved 80 psi of bearing strength, or has increased in strength by at least 15 psi the Contractor will be allowed to continue aggregate layer construction. The Geotechnical Branch will conduct DCP readings at the start of construction to determine a baseline bearing strength.

E. If DCP results do not show the required strength the Contractor can attempt checking the rutting depth or wait the full 7 day curing period.

F. The Geotechnical Branch will coordinate with District Construction personnel with the Department to ensure that core samples of the subgrade are taken. The rate of the core sampling will be determined during subgrade construction to ensure enough are taken to be representative of the entire subgrade. These cores will be tested for verification of the subgrade strength by either the KYTC District Materials Office, the KYTC Geotechnical Branch, or a Geotechnical Consultant prequalified with the KYTC Division of Professional Services.

SPECIAL NOTE FOR SPOT SUBGRADE STABILIZATION

This Special Note will apply when indicated on the plans or in the proposal. When this note is used a primary subgrade stabilization method will be as outlined in the project plans. This note will only apply for areas of the project where the primary subgrade selected is not feasible due to Maintenance of Traffic, entrances, narrow part-width sections, or other constraints. The locations for the use of this note and the selected alternate are subject to approval of the Engineer. Section references herein are to the current edition of the Department's Standard Specifications for Road and Bridge Construction, including Supplemental Specifications.

1.0 DESCRIPTION. Use one of the following five (5) alternates for the subgrade stabilization.

A. Eight inches of chemical stabilization using lime or cement
B. Eight inches of chemical stabilization using stockpiled, lime-stabilized soil (**Alternate "B" only allowed when lime stabilization** is the primary subgrade for the project.)
C. High-Strength Geotextile Fabric with six (6) additional inches of aggregate base
D. Geogrid reinforcement and geotextile fabric with eight (8) additional inches of aggregate base
E. Fifteen (15) inches of rock (#2's, #3's or #23's) wrapped in geotextile fabric. **Do NOT use Alternate "E" under concrete pavements**.

Stabilization should be applied from shoulder break to shoulder break.

2.0 MATERIALS

2.1 Cement, Lime, Asphalt Curing Seal, Water and Sand: Conform to Section 208.02.

2.2 Aggregate: Conform to Section 805.

2.3 Geogrid: Furnish geogrid according to Section 304.

2.4 Type IV Geotextile Fabric: Conform to Section 843.

2.5 High-Strength Geotextile Fabric: Furnish a woven or non-woven fabric meeting the AASHTO M 288 Class 1 strength requirements corresponding to <50% elongation. The fabric shall also comply with table 5 (Stabilization Geotextiles) in AASHTO M 288, with the exception of the minimum permittivity value being 0.1 sec^{-1}.

Packing, Shipment, Storage of Geogrid or Geotextile. Ensure that each roll is labeled with the Manufacturer's name, product type, lot number, roll number, manufactured date, and roll dimension. Protect the fabric or grid from direct sunlight, UV rays, and temperatures greater than 120 ^{o}F, mud, dirt, and debris during all periods of shipment and storage.

3.0 CONSTRUCTION

Surface Preparation. Prepare the surface according to Section 207 and Section 208.

3.1 Alternate A - Chemical Stabilization: Construct a minimum 8-inch thick, chemically stabilized roadbed according to Section 208. See the geotechnical notes to determine the type of chemical used for the stabilization (lime or cement) and additional requirements.

3.2 Alternate B - Chemical Stabilization w/ Stockpiled Lime-Stabilized Soil: Construct an 8-inch thick, chemically stabilized Roadbed according to section 208 using stockpiled lime stabilized soil. The lime shall be stockpiled offsite from the subgrade area being stabilized. The stockpiled soil shall consist of either:

1) Lime stabilized subgrade constructed in an approved borrow area, or approved area outside the typical section but within right-of-way.

2) Lime stabilized soil left over from cutting the chemically stabilized roadbed to final grade. The cuttings shall then be stored in a separate area until needed. The cuttings shall be stored in a minimum thickness of three (3) feet, and the stockpile lightly tamped when completed. The stockpile shall be covered until needed with an asphalt curing seal, or other approved method.

Follow all construction requirements of Section 208 unless otherwise noted herein. The stabilized material shall be maintained at or above optimum moisture content, which may require the addition of water prior to placement of the asphalt seal. Heavy construction traffic shall not be permitted on the pre-mixed material. Compaction requirements of Section 208 will not apply during initial placement with Option 1 (typical lime-stabilized soil from borrow area).

After sealing with an asphalt curing seal, the stabilized soil shall be left in place until needed. If ambient air temperature will drop below 32 degrees Fahrenheit for more than 2 hours, take appropriate measures to cover and protect the stabilized soils, subject to approval of the Engineer.

When ready for subgrade stabilization within the roadbed, excavate pre-stabilized soils and transport to the area to be stabilized. Place pre-stabilized material in 4 to 6-inch loose lifts at the locations determined by the Engineer. Mixing may be performed by disking or other lightweight equipment approved by the Engineer. At the time of reusing the stockpiled soil, additional water may need to be added to increase the moisture content to optimum, or slightly above.

Compaction may be performed with a vibratory sheepsfoot compactor or other approved equipment. Use caution to ensure the selected compactor and other construction equipment will not overload nearby subsurface utilities or produce excessive vibration. Test moisture content with a nuclear or Speedy Moisture gage and add water if needed to maintain a moisture content at or slightly above optimum. Place an asphalt curing seal on the constructed subgrade. Construction traffic shall not be permitted until the subgrade can support traffic without rutting.

3.3 Alternate C - High-Strength Geotextile Fabric: Place High-Strength Fabric at the proper elevation and locations in continuous strips to minimize the amount of joints and wrinkles during placement. All seams shall be sewn according the Manufacturer's recommendations, **lapping of seams is NOT permitted**. High-Strength Fabric shall be temporarily secured in place to maintain tension during aggregate placement. This may be done with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions as the Engineer directs. Make sure there are no buckles or folds in the fabric.

Ensure that a **Representative** of the High-Strength Fabric Manufacturer is on the project when work begins, **and at least the first 3 days of fabric construction**. The representative shall remain on call as the project progresses, to advise the Engineer.

High-Strength Fabric should not be completely placed before placing aggregate, but should be placed at the front of a "paving train" consisting of the fabric laydown **equipment followed no further than 50 feet by the aggregate placement equipment**. In curves and intersections, cut and seam the fabric to prevent development of buckles and folds.

Place aggregate over the fabric according to the Contract. Place, spread, and compact the aggregate in such a manner that minimizes the development of wrinkles and movement in the fabric. The Department will require a minimum loose thickness of 6 inches prior to operation of tracked vehicles over the fabric. Keep the turning of tracked vehicles to a minimum to prevent displacement of the fill and damage to the fabric. Rubber tired equipment may pass over the fabric at slow speeds (less than 10

mph). Avoid sudden braking and sharp turning movements. Repair any damage caused during placement or by vehicles.

If the total aggregate base thickness is less than 12 inches, the aggregate base will be placed in one lift. If greater than 12 inches, place the aggregate in 6 inch to 12 inch lifts.

3.3.1 Sampling/Testing of High-Strength Fabric:
The Department will sample the High-Strength Fabric at the project site according to KM 64-113 at a frequency determined by the Engineer. The Department will test the fabric for all properties possible given the testing equipment availability. When the Department determines that an individual samples fails to meet any specification requirement, the Department will reject that roll and sample 2 additional rolls from the same lot. When the Department determines that either of these 2 additional samples fails to comply with any part of the specification, the Department will reject the entire quantity of rolls represented by that sample.

3.4 Alternate D – Geogrid and Fabric: Place geogrid in accordance with Sections 304 and 302 of the current Standard Specifications and in accordance with the contract documents. Place the geotextile fabric first, then place the geogrid on top of the geotextile fabric so that they are at the bottom of the aggregate layer.

Ensure that a **Geogrid Representative** of the geogrid Manufacturer is on the project when work begins, **and at least the first 3 days of geogrid construction**. The representative shall remain on call as the project progresses, to advise the Engineer.

Geogrid shall be temporarily secured in place to maintain tension during aggregate placement. This may be done with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions as the Engineer directs. Make sure there are no buckles or folds in the geogrid.

Geogrid should not be completely placed before placing aggregate, but should be placed at the front of a "paving train" consisting of the geogrid laydown equipment **followed no further than 50 feet by the aggregate placement equipment**. In curves and intersections, cut and overlap the geogrid. Place the geogrid and aggregate according to Sections 304 and 302, and in accordance with the contract documents.

Contrary to Section 302.03.03, if the total aggregate base thickness is less than 12 inches, the aggregate base will be placed in one lift. If greater than 12 inches, place

the aggregate in 6 inch to 12 inch lifts. All other construction and density requirements of Section 302 will apply.

3.5 Alternate E - Fifteen (15) Inches of Rock and Fabric: Do ***NOT*** use this alternate for concrete pavements. Use fifteen (15) inches of Coarse Aggregate #2's, #3's or #23's wrapped in Type IV Geotextile Fabric. This will require excavating the subgrade by fifteen (15) inches more than shown on the plans. This alternate also requires positive drainage of the rock roadbed – perforated pipe discharged into weep holes in drainage boxes or headwalls or by daylighting the rock. The drainage solution and the additional 15-inch excavation are incidental to Subgrade Stabilization.

4.0 MEASUREMENT. The Department will measure the quantity of Subgrade Stabilization in square yards. The square yard price will include the additional aggregate (6 or 8 inches), the Type IV Geotextile Fabric and the geogrid, Lime, Cement, Lime Stabilized Roadbed, Cement Stabilized Roadbed, Asphalt Curing Seal, or Sand for Blotter, Coarse Aggregate #2's, #3's or #23's, High-Strength Geotextile Fabric and drainage items. No separate payment will be made for the above items. The Department will not make payment for providing a Geogrid or High-Strength Fabric Manufacturer's representative and will consider it incidental to the bid item for Subgrade Stabilization. The Department will not measure excavation (for 15 inches of rock and fabric or an additional 6 to 8 inches of aggregate) or adjusting subgrade differences between the alternates, and will consider such excavation or adjustments as incidental to Subgrade Stabilization. The Department will not measure hauling, extra handling, or placement of stockpiled lime stabilization soil for payment and will consider these incidental to Subgrade Stabilization. Fuel Price Adjustment does not apply to the Subgrade Stabilization bid item.

5.0 PAYMENT. The Cabinet will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24790EC	Subgrade Stabilization	Square Yard

The Cabinet will consider payment as full compensation for all work required in this note. If the Department determines a thicker chemical or rock stabilization section is needed once construction begins, the unit price for subgrade stabilization will be adjusted as follows:

Adjusted Unit Price = Original Unit Bid Price * (New Thickness/Original Thickness of Alternate)

Appendix I3 -- KY 338 Notes

SPECIAL NOTE

Boone County
Item 6-18.00

SPECIAL NOTE FOR BUILDING REMOVAL

Building Removal

Limited building removal is required as part of the project. The contractor shall follow 40 CFR 61 Subpart M Demolition Regulations (NESHAP) and KYTC – Division of Right of Way & Utilities Specifications for removal of improvements (TC62-16). The contractor shall contact the Division of Air Quality Florence Regional Office located at 8020 Veterans Memorial Drive, Suite 110, Florence, Kentucky 41042 (Phone Number 859-525-4923) for proper notification requirements prior to demolition.

The following parcels have improvements that need to be removed:

Parcel 110 – Commercial Bank Building – Sheet R11

Parcel 352 – Residential House – Sheet R87

SPECIAL NOTE

Boone County
Item 6-18.00

RAILROAD CONSTRUCTION

General

Reference is made to the railroad construction plans contained within the plan set. The plans identify the work that will be performed by the KYTC contractor and the work performed by Norfolk Southern outside of the KYTC contract, and the necessary coordination requirements.

Subballast Information

Norfolk Southern Specification:

B. Category B material shall meet the following specification:
   1. Dense graded aggregate shall comply with the NS gradation as shown in Table 2 below. This gradation may be modified at the discretion of the ENGINEER to accommodate locally produced dense graded aggregate (aggregate base) that complies with local State Department of Transportation specifications or as shown on plans.

Table 2: NS's Type B:

1 inch	¾ inch	½ inch	3/8 inch	No. 4	No. 8	No. 10	No. 30	No. 40	No. 200
90-100			50-84			26-50		12-30	5-12

KYTC DGA Gradation and Specifications:

1 inch	¾ inch	½ inch	3/8 inch	No. 4	No. 8	No. 10	No. 30	No. 40	No. 200
100	70-100		50-80	30-65			10-40		4-13

Locally produced material should pass both gradation ranges without too much difficulty. The rest of the aggregate quality properties (found in Section 805 of the KYTC spec book) are similar and KYTC does not allow any recycled materials in our DGA.

805.03 GENERAL REQUIREMENTS. Provide coarse aggregates that are free of objectionable amounts of clay lumps, dirt coatings, and foreign material. The Department will reject contaminated aggregate when the Engineer deems it could be detrimental to the finished product.

Maximum 2.0% Shale

805.03.02 Physical Properties. Conform to the following:
Wear (Except Slag and Sandstone) 40% (maximum)
Wear (Sandstone) 50% (maximum)
Wear (Slag) 60% (maximum)
Friable Particles 1.0% (maximum)
Unit Weight (Slag) 70 lbs/ft3 (minimum)

805.06 DENSE GRADED AGGREGATE (DGA) AND CRUSHED STONE BASE (CSB). Provide crushed stone having a sand equivalent value of 30 or greater with mineral filler as needed to meet gradation requirements. The Department may waive the sand equivalent requirement when the portion passing the No. 40 sieve has a plasticity index of 4 or less according to AASHTO T 90.

SPECIAL NOTE

Boone County
Item 6-18.00

SPECIAL NOTE FOR REPAIRS TO THE I-71/I-75 BRIDGE OVER KY338

General

The following work will be performed as part of the KYTC contract.

PENDING

SPECIAL NOTE

Boone County
Item 6-18.00

SPECIAL NOTE - TRAFFIC DATA STATION RELOCATION

General

The project will involve the relocation of two traffic data stations on I-75. The following identified work will be performed as part of the KYTC contract.

BOONE I-75 NB m.p. 176.04
~LAT/LONG N 38.927062, W 84.630213
STATION P63

SITE LOCATION IS APPROXIMATE AND WILL BE DETERMINED IN THE FIELD AND APPROVED BY DIVISION OF PLANNING PERSONNEL PRIOR TO ANY CONSTRUCTION.

ALL LOOPS SHALL BE 6'X6' SQUARE AND SHALL BE INSTALLED 16' FROM LEADING EDGE TO LEADING EDGE AS SHOWN. PIEZOELECTRIC SENSORS (PIEZOS) SHALL BE INSTALLED 5' FROM THE EDGE OF LOOPS WITH THE EDGE OF EACH PIEZO FLUSH WITH THE EDGE OF THE CORRESPONDING DRIVING LANE. LOOPS AND PIEZOS SHALL BE INSTALLED SPLICE-FREE TO THE CABINET. A MINIMUM OF 2' OF WIRE FOR EACH SENSOR SHALL BE COILED AND LABELED INSIDE EACH JUNCTION BOX. A MINIMUM OF 3' OF WIRE FOR EACH SENSOR SHALL BE COILED AND LABELED INSIDE THE CABINET. DIVISION OF PLANNING PERSONNEL WILL CONNECT THE LOOPS AND PIEZOS INSIDE THE CABINET.

INSTALL ONE (1) 35' WOOD POLE AND ONE (1) ELECTRICAL SERVICE.

INSTALL ONE (1) MODEL 336 CABINET ON PROP. POLE.

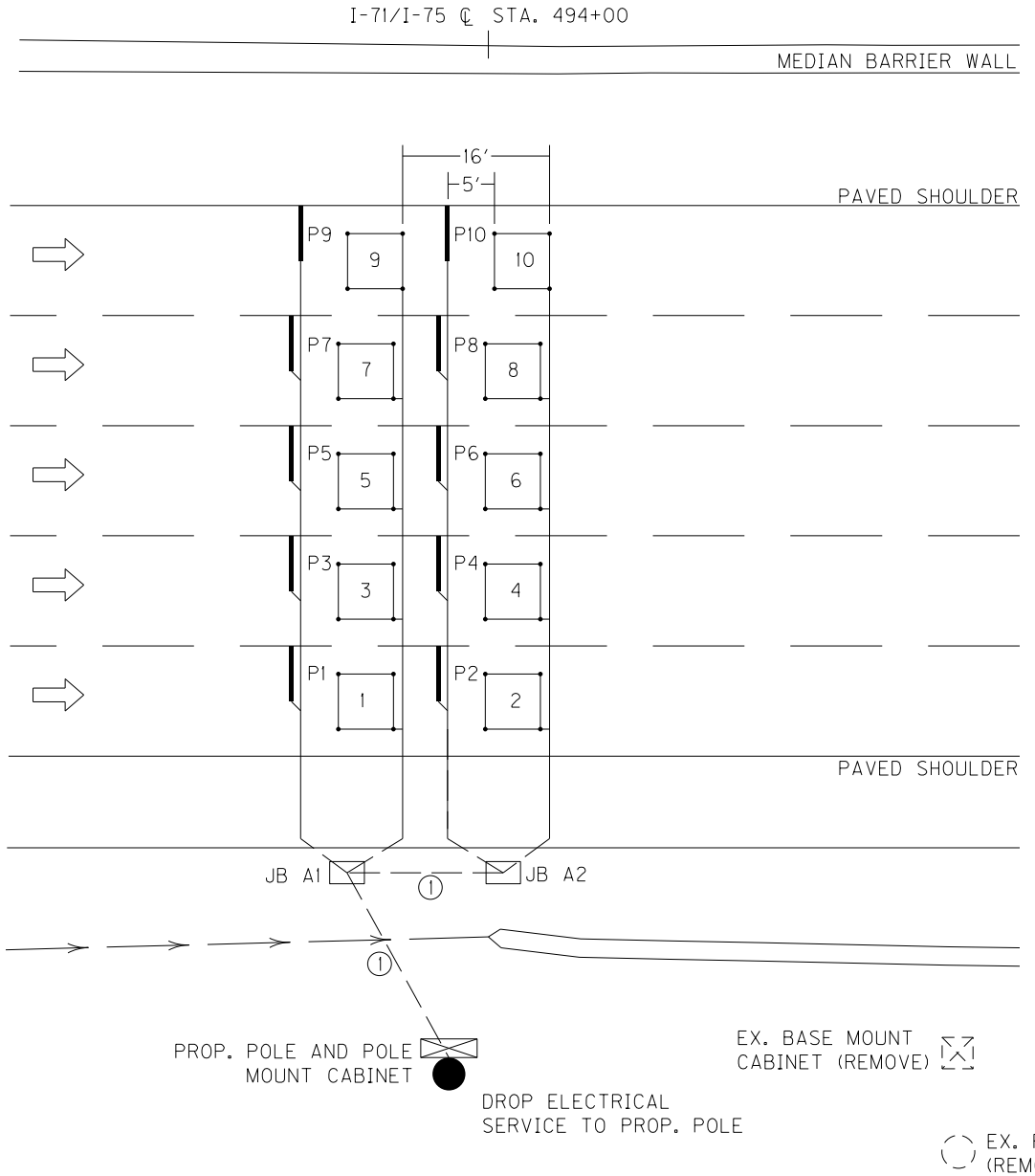
INSTALL TWO (2) TYPE A JUNCTION BOXES (JB A1 AND A2).

INSTALL ONE (1) 1¼" CONDUIT FROM EACH SAW SLOT TO NEAREST JUNCTION BOX.

REMOVE ALL EX. TRAFFIC DATA COLLECTION EQUIPMENT (CABINET, CONCRETE BASE, JUNCTION BOXES, WIRE, CONDUIT, ETC.) AND DISPOSE OF OFF THE PROJECT.

CODED NOTE:

① INSTALL ONE (1) 2" CONDUIT



BOONE I-75 SB m.p. 175.89
~LAT/LONG N 38.925097, W 84.630357
STATION P64

SITE LOCATION IS APPROXIMATE AND WILL BE DETERMINED IN THE FIELD AND APPROVED BY DIVISION OF PLANNING PERSONNEL PRIOR TO ANY CONSTRUCTION.

ALL LOOPS SHALL BE 6'X6' SQUARE AND SHALL BE INSTALLED 16' FROM LEADING EDGE TO LEADING EDGE AS SHOWN. PIEZOELECTRIC SENSORS (PIEZOS) SHALL BE INSTALLED 5' FROM THE EDGE OF LOOPS WITH THE EDGE OF EACH PIEZO FLUSH WITH THE EDGE OF THE CORRESPONDING DRIVING LANE. LOOPS AND PIEZOS SHALL BE INSTALLED SPLICE-FREE TO THE CABINET. A MINIMUM OF 2' OF WIRE FOR EACH SENSOR SHALL BE COILED AND LABELED INSIDE EACH JUNCTION BOX. A MINIMUM OF 3' OF WIRE FOR EACH SENSOR SHALL BE COILED AND LABELED INSIDE THE CABINET. DIVISION OF PLANNING PERSONNEL WILL CONNECT THE LOOPS AND PIEZOS INSIDE THE CABINET.

INSTALL ONE (1) 35' WOOD POLE AND ONE (1) ELECTRICAL SERVICE.

INSTALL ONE (1) MODEL 336 CABINET ON PROP. POLE.

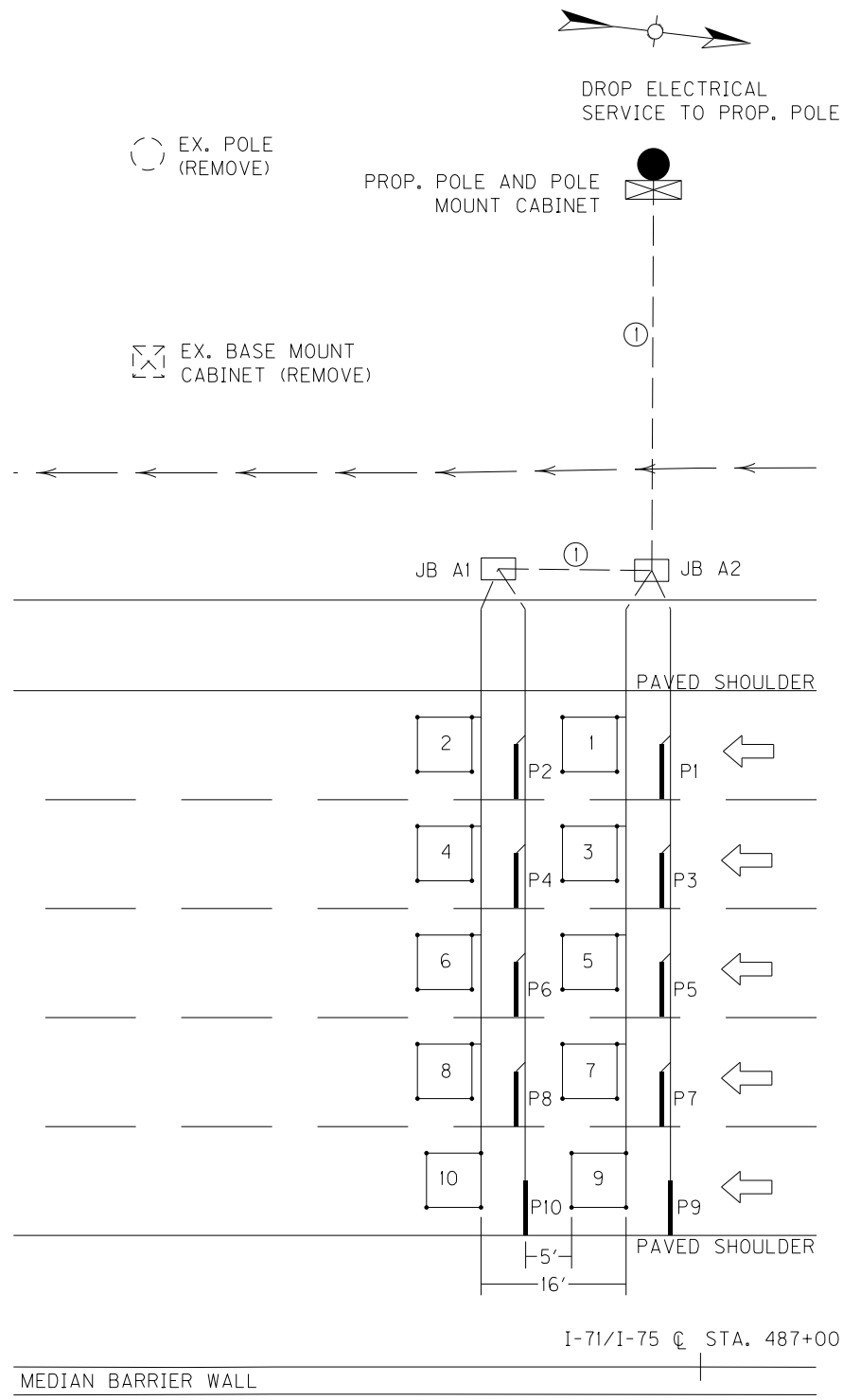
INSTALL TWO (2) TYPE A JUNCTION BOXES (JB A1 AND A2).

INSTALL ONE (1) 1¼" CONDUIT FROM EACH SAW SLOT TO NEAREST JUNCTION BOX.

REMOVE ALL EX. TRAFFIC DATA COLLECTION EQUIPMENT (CABINET, CONCRETE BASE, JUNCTION BOXES, WIRE, CONDUIT, ETC.) AND DISPOSE OF OFF THE PROJECT.

CODED NOTE:

① INSTALL ONE (1) 2" CONDUIT



PERMANENT TRAFFIC DATA ACQUISITION STATIONS
ESTIMATE OF QUANTITIES

Bid Item Code	Description	Unit	Quantity
4793	CONDUIT 1 ¼ INCH	LIN FT	80
4795	CONDUIT 2 INCH	LIN FT	120
4811	ELECTRICAL JUNCTION BOX TYPE B	EACH	
4820	TRENCHING AND BACKFILLING	LIN FT	110
4821	OPEN CUT ROADWAY	LIN FT	
4829	PIEZOELECTRIC SENSOR	EACH	20
4830	LOOP WIRE	LIN FT	6650
4850	CABLE NO. 14/1 PAIR	LIN FT	
4871	POLE – 35’ WOODEN	EACH	2
4895	LOOP SAW SLOT AND FILL	LIN FT	1100
4899	ELECTRICAL SERVICE	EACH	2
20213EC	INSTALL PAD MOUNT ENCLOSURE	EACH	
20359NN	GALVANIZED STEEL CABINET	EACH	
20360ES818	WOOD POST	EACH	
20391NS835	ELECTRICAL JUNCTION BOX TYPE A	EACH	4
20392NS835	ELECTRICAL JUNCTION BOX TYPE C	EACH	
20468EC	ELECTRICAL JUNCTION BOX 10x8x4	EACH	
21543EN	BORE AND JACK CONDUIT	LIN FT	
23206EC	INSTALL CONTROLLER CABINET	EACH	2

MATERIAL, INSTALLATION, AND BID ITEM NOTES FOR PERMANENT TRAFFIC DATA ACQUISITION STATIONS

1. DESCRIPTION

Except as specified in these notes, all work shall consist of furnishing and installing all materials necessary for permanent data acquisition station equipment installation(s) and shall be performed in accordance with the current editions of:

- The Contract
- Division of Planning Standard Detail Sheets
- Kentucky Transportation Cabinet, Department of Highways, *Standard Specifications for Road and Bridge Construction*
- Kentucky Transportation Cabinet, Department of Highways, Standard Drawings
- National Fire Protection Association *(NFPA) 70: National Electrical Code*
- Institute of Electrical and Electronic Engineers (IEEE), *National Electrical Safety Code*
- Federal Highway Administration, *Manual on Uniform Traffic Control Devices*
- American Association of State Highway and Transportation Officials (AASHTO), *Roadside Design Guide*.
- Standards of the utility company serving the installation, if applicable

The permanent traffic data acquisition station layout(s) indicate the extent and general arrangement of the proposed installation and are for general guidance. Any omission or commission shown or implied shall not be cause for deviation from the intent of the plans and specifications. Information shown on the plans and in this proposal and the types and quantities of work listed are not to be taken as an accurate or complete evaluation of the material and conditions to be encountered during construction. The bidder must draw his own conclusion as to the conditions encountered. The Department of Highways (Department) does not give any guarantee as to the accuracy of the data and no claim will be considered for additional compensation if the conditions encountered are not in accordance with the information shown. If any modifications of the plans or specifications are considered necessary by the Contractor, details of such modifications and the reasons, therefore, shall be submitted in writing to the Engineer for written approval prior to beginning such modified work.

The Contractor shall contact all utility companies and the district utility agent prior to beginning construction to insure proper clearance and shielding from existing and proposed utilities. The Contractor shall use all possible care in excavating on this project so as not to disturb any existing utilities whether shown on the plans or not shown on the plans. Any utilities disturbed or damaged by the Contractor during construction shall be replaced or repaired to original condition by the Contractor at no cost to the department. If necessary, to avoid existing utilities, the Contractor shall hand dig areas where poles or conduit cross utilities.

The Contractor shall be responsible for all damage to public and/or private property resulting from his work.

The Contractor shall inspect the project site prior to submitting a bid and shall be thoroughly familiarized with existing conditions. Submission of a bid will be considered an affirmation of this inspection having been completed. The Department will not honor any claims resulting from site conditions.

2. MATERIALS

All proposed materials shall be approved prior to being utilized. The Contractor shall submit for material approval an electronic file of descriptive literature, drawings and any requested design data for the proposed materials. After approval, no substitutions of any approved materials may be made without the written approval of the Engineer.

Materials requiring sampling shall be made available a sufficient time in advance of their use to allow for necessary testing.

2.1. Anchoring

2.1.1. Anchor and Anchor Rod

Anchor, except rock anchor, shall be expanding type, with a minimum area of 135 square inches.

Anchor rod shall be galvanized steel, double-eye, have a minimum diameter of 5/8 inches, and a minimum length of 84 inches. Minimum holding capacity shall be 15,400 lbs.

Rock anchor shall be galvanized steel, triple-eye, expanding type, with a minimum diameter of ¾ inch, a minimum 53 inches long, and a minimum tensile strength of 23,000 lb.

2.1.2. Guy Wire and Guy Guard

Guy wire shall be Class A, Zinc-coated, 3/8 inch diameter, high strength grade steel (minimum 10,800 lb.) and galvanized per ASTM A475. Guy guard shall be 8' long, fully-rounded, yellow, and able to be securely attached to the guy wire.

2.1.3. Strandvise for Guy Wire

Strandvise for guy wire shall be 3/8 inch and rated to hold a minimum of 90% of the rated breaking strength (RBS) of the strand used.

2.2. Asphalt

Asphalt shall be a minimum CL2 Asph Surf 0.38C PG64-22 and conform to the *Standard Specifications for Road and Bridge Construction.*

2.3. Backer Rod

Backer rod shall be ½ inch diameter, closed cell polyethylene foam and shall meet or exceed the following physical properties:

- Density (average): 2.0 lbs/cu.ft. (minimum): ASTM D 1622 test method
- Tensile Strength: 50 PSI (minimum): ASTM D 1623 test method
- Compression Recovery: 90% (minimum): ASTM D 5249 test method
- Water Absorption: 0.03 gm/cc (maximum): ASTM C 1016 test method

2.4. Cabinets

2.4.1. Galvanized Steel Cabinet

Galvanized Steel Cabinet shall be constructed of 16 or 14 gauge galvanized steel and shall meet or exceed the industry standards set forth by UL 50 and NEMA 3R. The finish shall be an ANSI 61 gray polyester powder finish inside and out over the galvanized steel. Cabinet shall have minimum inside dimensions of 20 inches high by 20 inches wide by 8 inches deep.

The cabinet shall be equipped with the following:

- Drip shield top
- Seam-free sides, front, and back, to provide protection in outdoor installations against rain, sleet, and snow
- Hinged cover with 16 gauge galvanized steel continuous stainless steel pin.
- Cover fastened with captive plated steel screws, knob or latch
- Hasp and staple for padlocking
- No gaskets or knockouts
- Back panel for terminal block installation
- Post mounting hardware
- Terminal Blocks

2.4.2. Anchor Bolt for Pad Mounted Cabinet

Anchor bolt for pad mounted cabinet shall be galvanized steel with minimum dimensions of 3/8 inch by 6 inches.

2.5. Concrete

Concrete shall be Class A and conform to the *Standard Specifications for Road and Bridge Construction.*

2.6. Conduit and Conduit Fittings

Conduit and conduit fittings shall be rigid steel unless otherwise specified.

Conduit shall be zinc galvanized inside and out and conform to the NEC, UL Standard 6, and ANSI C-80.1.

Rigid Steel Conduit Fittings shall be galvanized inside and out and conform to the NEC, UL Standard 514B, and ANSI C-80.4. Intermediate Metal Conduit (IMC) will not be approved as an acceptable alternative to rigid steel conduit.

2.7. Conduit sealant

Conduit sealant shall be weather-, mold-, and mildew-resistant and chemically resistant to gasoline, oil, dilute acids and bases. Conduit sealant shall be closed cell type and shall meet or exceed the following properties:

- Cure Time — 20 minutes max.
- Density — 64.4 kg/m3; 6 lbs/ft3
- Compressive Strength (ASTM 1691) — 13.8 MPa; 330 or 300 psi

- Tensile Strength (ASTM 1623) 15.9 MPa; 270 or 250 psi
- Flexural Strength (ASTM D790) 14.5 MPa; 460 or 450 psi
- Service Temperature -20 to 200 F

2.8. Electrical Service Meter Base

Electrical service meter base shall meet or exceed all requirements of the National Electrical Code and the local utility providing the electrical service.

2.9. Electrical Service Disconnect

Electrical service disconnect shall meet or exceed all requirements of the National Electrical Code and the local utility providing the electrical service.

2.10. Flashing Arrow

Flashing Arrow shall conform to the *Standard Specifications for Road and Bridge Construction.*

2.11. Ground Fault Circuit Interrupter (GFCI) Receptacle

Ground Fault Circuit Interrupter Receptacle shall be 2-pole, 3-wire, 20 Amp, 125 Volt, 60 Hz, NEMA 5-20R configuration and meet or exceed the following standards and certifications:

- NEMA WD-1 and WD-6
- UL 498 and 943
- NOM 057
- ANSI C-73

This item shall include a UL listed, 4 inch x4 inch x $2^1/_8$ inch box with ¾ inch side and end knockouts and a 1½ inches deep, single-receptacle cover to house the GFCI receptacle. Box and cover shall be hot rolled, galvanized steel with a minimum thickness of 0.62 inches.

2.12. Grounding

2.12.1. Ground Rod

Ground Rod shall be composite shaft consisting of a pure copper exterior (5 mil minimum) that has been inseparably molten welded to a steel core. Ground Rod shall have a minimum diameter of 5/8 inch, a minimum length of 8 feet and shall be manufactured for the sole purpose of providing electrical grounding.

2.12.2. Ground Rod Clamp

Ground rod shall be equipped with a one piece cast copper or bronze body with a non-ferrous hexagonal head set screw and designed to accommodate a 10 AWG solid through 2 AWG stranded grounding conductor.

2.13. Grout

2.13.1. Grout for Inductive Loop Installation

Grout for inductive loop installation shall be non-shrink, shall meet the requirements of the *Standard Specifications for Road and Bridge Construction*,

and shall be included on the KYTC Division of Materials, *List of Approved Materials*.

2.13.2. Grout for Piezoelectric Sensor Installation

Grout for piezoelectric sensor installation shall be per the piezoelectric sensor manufacturer's recommendation. Grout shall be suitable for installation in both asphalt and Portland cement pavements. Grout shall have a short curing time (tack free in ten minutes; open to traffic in forty minutes; and fully cured within sixty minutes) to prevent unnecessary lane closure time and should be of sufficient consistency to prevent running when applied on road surfaces with a drainage cross slope. Particulate matter within the grout shall not separate or settle and the grout shall not shrink during the curing process.

2.14. Hardware

Except where specified otherwise, all hardware such as nuts, bolts, washers, threaded ends of fastening devices, etc. with a diameter less than 5/8 inch shall be passivated stainless steel, alloy type 316 or type 304. Stainless steel hardware shall meet ASTM F593 and F594 for corrosion resistance. All other nuts and bolts shall meet ASTM A307 and shall be galvanized.

2.14.1. Conduit Strap

Conduit strap shall be double-hole, stainless steel, and sized to support specified conduit. Conduit strap shall attach to wood pole or post with two 2 ¼ inch wood screws.

2.14.2. Mounting Strap for Pole Mount Cabinet

Mounting strap for pole mount cabinet shall be ¾ inch x 0.03 inch stainless steel; equipped with clips or buckles to securely hold strap.

2.14.3. Metal Framing Channel and Fittings

Metal framing channel shall be 1 5/8 inches wide galvanized steel that conforms to ASTM A1011 and ASTM A653. One side of the channel shall have a continuous slot with in-turned edges to accommodate toothed fittings.

Fittings shall be punch pressed from steel plates and conform to ASTM A575 and the physical requirements of ASTM A1011.

2.15. Junction Box

2.15.1. Junction Box Type A, B, or C

Junction Box Type A, B, or C shall meet or exceed ANSI/SCTE 77-2007, Tier 15. Box shall have an open bottom. A removable, non-slip cover marked "PLANNING" shall be equipped with a lifting slot and attached with a minimum of two 3/8 inch stainless steel hex bolts and washers. Type A Box shall have nominal inside dimensions of 13 inches wide by 24 inches long by 18 inches deep. Type B Box shall have nominal inside dimensions of 11 inches wide by 18 inches long by 12

inches deep. Type C Box shall have nominal inside dimensions of 24 inches wide by 36 inches long by 30 inches deep.

2.15.2. Aggregate for Junction Box Type A, B, or C

Aggregate for junction box type A, B, or C shall be gradation size no. 57 and conform to the *Standard Specifications for Road and Bridge Construction*.

2.15.3. Junction Box 10x8x4

Junction Box Type 10x8x4 shall be constructed of a UV-stabilized, nonmetallic material or non-rusting metal and be weatherproof in accordance with NEMA 4X. Box shall be equipped with an overhanging door with a continuous durable weatherproof gasket between the body and door. Door shall be hinged with screws, hinge(s) and pin(s) and shall be equipped with a padlockable latch on the side opposite the hinge(s). Junction Box 10x8x4 shall have minimum inside dimensions of 10 inches high by 8 inches wide by 4 inches deep.

2.16. Maintain and Control Traffic

Materials for the bid item Maintain and Control Traffic shall conform to the *Standard Specifications for Road and Bridge Construction,* and the KYTC Department of Highways *Standard Drawings*.

2.17. Piezoelectric Sensor

Piezoelectric sensor (piezo) shall provide a consistent level voltage output signal when a vehicle axle passes over it, shall have a shielded transmission cable attached, and shall meet the following requirements:

- Dimensions: such that sensor will fit in a ¾ inch wide by 1 inch deep saw cut. Total length shall be 6 feet unless specified otherwise.
- Output uniformity: ± 7% (maximum)
- Typical output level range: 250mV (minimum) from a wheel load of 400 lbs.
- Working temperature range: -40° to 160° F.
- Sensor life: 30 million Equivalent Single Axle Loadings (minimum)

Shielded transmission cable shall be coaxial and shall meet the following requirements:

- RG 58C/U with a high density polyethylene outer jacket rated for direct burial
- Length shall be a minimum of 100 feet. Installations may exceed 100 feet so the piezo shall be supplied with a lead-in of appropriate length so that the cable can be installed splice-free from the piezo to the cabinet.
- Soldered, water resistant connection to the sensor.

One installation bracket for every 6 inches of sensor length shall also be supplied. Piezo shall be a RoadTrax BL Class I or approved equal.

2.18. Saw Slot Sealant

Saw Slot Sealant shall be non-shrink, non-stringing, moisture cure, polyurethane

encapsulant suitable for use in both asphalt and concrete pavements. It shall provide a void-free encapsulation for detector loop cables and adequate compressive yield strength and flexibility to withstand heavy vehicular traffic and normal pavement movement.

The cured encapsulant shall meet or exceed the following:

- Hardness (Indentation): 35-65 Shore A, ASTM D2240
- Tensile Strength: 150 psi minimum, ASTM D412
- Elongation: 125% minimum 2 inch/minute pull, ASTM D412
- Tack-free Drying Time: 24 hours maximum, ASTM C679
- Complete Drying Time: 30 hours maximum, KM 64-447
- Chemical Interactions (seven day cure at room temperature, 24-hour immersion, KM 64-446):
  - Motor Oil: No effect
  - Deicing Chemicals: No effect
  - Gasoline: Slight swell
  - Hydraulic Brake Fluid: No effect
  - Calcium Chloride (5%): No effect

2.19. Seeding and Protection

Material for Seeding and Protection shall be Seed Mixture Type I and conform to the *Standard Specifications for Road and Bridge Construction*.

2.20. Signs

Materials for signs shall conform to the *Standard Specifications for Road and Bridge Construction.*

2.21. Splicing Materials

2.21.1. Electrical Tape

Electrical tape shall be a premium grade, UL-listed, all-weather, vinyl-insulating tape with a minimum thickness of 7 mil. Tape shall be flame retardant and resistant to abrasion, moisture, alkalis, acids, corrosion, and weather (including ultraviolet exposure).

2.21.2. Splice Kit

Splice kit shall be inline resin-type and rated for a minimum of 600V. Resin shall be electrical insulating-type and shall provide complete moisture and insulation resistance.

2.22. Steel Reinforcing Bar

Steel reinforcing bar shall be #5 and shall conform to the *Standard Specifications for Road and Bridge Construction.*

2.23. Terminal Block

Terminal block shall be rated for a minimum of 300 V and have a minimum of six

terminal pairs with 9/16-inch nominal spacing (center to center) for connecting loop and piezoelectric sensor wires to cable assemblies. Terminal block shall have screw type terminal strips to accommodate wire with spade-tongue ends.

2.24. Warning Tape

Warning tape shall be acid and alkali resistant formulated for direct burial. Tape shall be a minimum of 3 inches wide by 4.0 mils (nominal) thick, and shall be permanently imprinted with a minimum 1 inch black legend on a red background warning of an electric line. Tape shall meet or exceed the following industry specifications:

- American Gas Association (AGA) 72-D-56
- American Petroleum Institute (API) RP 1109
- American Public Works Association (APWA) Uniform Color Code
- Department of Transportation (DOT) Office of Pipeline Safety USAS B31.8
- Federal Gas Safety Regulations S 192-321 (e)
- General Services Administration (GSA) Public Buildings Service Guide: PBS 4-1501, Amendment 2
- National Transportation Safety Board (NTSB) PSS 73-1
- Occupational Safety and Health Administration (OSHA) 1926.956 (c) (1)

2.25. Wire and Cable

All cable and wire shall be plainly marked in accordance with the National Electrical Code (NEC).

2.25.1. Loop Wire

Loop wire shall be 14 AWG, stranded, copper, single conductor, and shall conform to the International Municipal Signal Association (IMSA) Specification No. 51-7.

2.25.2. Cable No. 14/1 Pair

Cable No. 14/1 pair loop lead-in cable shall be 14 AWG, stranded, copper paired, electrically shielded conductors, and shall conform to IMSA 19-2.

2.25.3. Grounding conductor

Grounding conductor and bonding jumper shall be solid or stranded, 4 AWG bare copper.

2.25.4. Service Entrance Conductor

Service entrance conductor shall be stranded, copper, Type USE-2, sized as required to comply with the NEC.

2.25.5. Terminal for electrical wire or cable

Terminal for electrical wires or cables shall be insulated, solderless, spade tongue terminals of correct wire and stud size. Terminal for electrical wires or cables shall be incidental to the wire or cable (including piezoelectric sensor transmission cable) to be connected to terminal strips.

2.26. Wood Post

Wood post shall be Southern Pine pretreated to conform to the American Wood Preservers' Association (AWPA) C-14 or UC4B and shall have minimum dimensions of 4 inches by 4 inches by 8 feet long (for Galvanized Steel Cabinet) or 4 feet long (for Junction Box 10x8x4), sawed on all four sides with both ends square.

2.27. Wooden Pole

Wooden pole shall be a Class IV wood pole of the length specified and shall conform to the *Standard Specifications for Road and Bridge Construction* except the pole shall be treated in accordance with AWPA P9 Type A.

3. CONSTRUCTION METHODS

The plans indicate the extent and general arrangement of the installation and are for guidance. When the Contractor deems any modifications to the plans or specifications necessary, details of such changes and the reasons shall be submitted in writing to the engineer for written approval prior to beginning the modified work.

After the project has been let and awarded, the Division of Construction shall notify the Division of Planning of the scheduled date for a Pre-Construction meeting so that prior arrangements can be made to attend. This will allow the Division of Planning an opportunity to address any concerns and answer any questions that the Contractor may have before beginning the work.

The Division of Planning Equipment Management Team (502-564-7183) shall be notified a minimum of seven days before any work pertaining to these specifications begins to allow their personnel the option to be present during installation.

Unless otherwise specified, installed materials shall be new.

Construction involving the installation of loops or piezoelectric sensors shall not be performed when the temperature of the pavement is less than 38ºF.

A final inspection will be performed by a member of the Central Office Division of Planning equipment staff after the installation is complete to verify that the installation is in compliance with the plans and specifications.

Any required corrective work shall be performed per the *Standard Specifications for Road and Bridge Construction.*

3.1. Anchoring

Furnish: Anchor, anchor rod, guy wire, strand vise, guy guard.

Anchor shall be installed in relatively dry and solid soil. Rock anchor shall be installed in solid rock. Excavate the hole at a 45° to 60° angle in line with the guy (hole size shall be slightly larger than the expanded anchor – see manufacturer's recommendation). Attach rod to anchor, install assembly into hole, and expand anchor. Backfill and tamp entire disturbed area. The effectiveness of the anchor is dependent upon the thoroughness of backfill tamping. Attach guy to strand vise on pole and anchor rod and tighten to required tension. Install guy guard on guy.

3.2. Bore and Jack Pipe – 2"

Furnish: Steel Encasement Pipe, 2"

Bore and jack pipe – 2" shall conform to the Section 706 of the *Standard Specifications for Road and Bridge Construction*.

3.3. Cleanup and Restoration

Furnish: Seed Mix Type 1 (as required); fertilizer (as required); agricultural limestone (as required); mulch or hydromulch (as required); tackifier (as required).

The Contractor shall be responsible for repairing any damage to public and/or private property resulting from his work. Upon completion of the work, restore all disturbed highway features in like kind design and materials. This shall include filling any ruts and leveling ground appropriately. Contractor shall dispose of all waste and debris off the project. Sow all disturbed earthen areas with Seed Mix Type 1 per Section 212 of the *Standard Specifications for Road and Bridge Construction*. All materials and labor necessary for cleanup and restoration shall be considered incidental to other bid items.

3.4. Conduit

Furnish: Conduit; conduit fittings; bushings (grounding where required); LB condulets (as required); weatherheads (as required); conduit straps; hardware; conduit sealant.

Conduit that may be subject to regular pressure from traffic shall be laid to a minimum depth of 24 inches below grade. Conduit that will not be subject to regular pressure from traffic shall be laid to a minimum depth of 18 inches below grade.

Conduit ends shall be reamed to remove burrs and sharp edges. Cuts shall be square and true so that the ends will butt together for the full circumference of the conduit. Tighten couplings until the ends of the conduit are brought together. Do not leave exposed threads. Damaged portions of the galvanized surfaces and untreated threads resulting from field cuts shall be painted with an Engineer-approved, rust inhibitive paint. Conduit bends shall have a radius of no less than 12 times the nominal diameter of the conduit, unless otherwise shown on the plans.

Contractor shall install a bushing (grounding bushing where required) on both ends of all conduits. Cap spare conduits on both ends with caps or conduit sealant.

Conduit openings in junction boxes and cabinets shall be waterproofed with a flexible, removable conduit sealant, working it around the wires, and extending it a minimum 1 inch into the end of the conduit.

After the conduit has been installed and prior to backfilling, the conduit installation shall be inspected and approved by the Engineer.

3.5. Electrical Service

Furnish: Meter base, service disconnect, wire, GFCI AC duplex receptacle with box and cover; conduit, conduit fittings, bushings (grounding where required); LB condulets (as required); weatherhead; conduit straps; hardware; conduit sealant; ground rod with clamp; grounding conductor.

Prior to any construction, the Contractor shall initiate a work order with the local power

company for the installation of electrical service to the site. A representative from the Division of Planning and the local power company shall be consulted prior to choosing an exact location for the pole. The Contractor shall clear the right-of-way for the electrical service drop.

Contractor shall obtain electrical inspections, memberships, meter base, service disconnect and any other requirements by the utility serving the installation and pay all fees as required.

Install meter-base and disconnect panel with a 30-ampere, fused, circuit breaker inside. Install a manufactured weatherproof hub connectors to connect the conduit to the top of the meter base and service disconnect.

Install a rigid ¾ inch conduit with three 8 AWG service conductors from the cabinet, through the service disconnect to the meter base and a 1¼" conduit with three 8 AWG service conductors from the meter base to a weatherhead two feet from the top of the electrical service pole. Install conduit straps 30 inches on center and provide a drip loop where the wire enters the weatherhead. Splice electric drop with service entrance conductors at the top of the pole.

The limit of conduit incidental to "Install Electrical Service" for a pad mounted cabinet is 24 inches beyond face of service pole.

Install a 120-volt, 20-amp GFCI AC duplex receptacle with box and cover in the automatic data recorder (ADR) cabinet.

Install a ground rod with clamp. Install a grounding conductor wire from the meter base, through the disconnect panel, to the ground rod clamp. Install grounding conductor in 1-¾" conduit from service disconnect to ground rod.

After completing the installation and before the electrical service is connected, obtain a certificate of compliance from the Kentucky Department of Housing, Buildings and Construction, Electrical Inspection Division.

3.6. Flashing Arrow

Furnish: Arrow Panel

Construction of Flashing Arrow shall conform to the *Standard Specifications for Road and Bridge Construction.*

3.7. Galvanized Steel Cabinet

Furnish: Cabinet; wood posts; concrete; conduit fittings; metal framing channel; pipe clamp; terminal block(s); spade tongue wire terminals; wire labels; hardware.

Where right-of-way allows, locate the cabinet such that it is outside the clear zone in accordance with the *Roadside Design Guide*. Install Cabinet such that the door of the

cabinet faces the roadway.

Excavate as required and install wood posts to a depth of 36 inches and place concrete around posts as shown on the standard detail sheets. Install metal framing channel with pipe clamp between posts.

Install Cabinet on wood posts 38 inches above the finished grade as shown on the standard detail sheets. Install a unistrut between posts when two posts are specified.

Install the required number of terminal blocks on the cabinet back plate. Install a spade tongue terminal on each loop and piezo sensor wire entering the cabinet and connect wires to terminal block(s). Wiring shall be neat and orderly. Label all wires and cables inside cabinet.

Install conduit from ground to cabinet and attach to pipe clamp. Install locknuts to attach conduit to cabinet and install a conduit bushing as shown on the standard detail sheets.

3.8. Grounding

Furnish: Ground rod with clamp; grounding conductor.

At sites with electrical or solar service, all conduits, poles, and cabinets shall be bonded to ground rods and the electrical system ground to form a complete grounded system.

Install such that top of ground rod is a minimum of 3 inches below finished grade.

Grounding systems shall have a maximum 25 ohms resistance to ground. If the resistance to ground is greater than 25 ohms, two or more ground rods connected in parallel shall be installed. Adjacent ground rods shall be separated by a minimum of 6 feet.

3.9. Install Pad Mount Enclosure

Furnish: Concrete; anchor bolts with washers and nuts; conduit; conduit fittings; conduit grounding bushings; ground rod with clamp; grounding conductor; conduit sealant; wooden stakes (where required); wire labels; hardware.

The Contractor shall be responsible for securing the enclosure from the Central Office Division of Planning Warehouse in Frankfort and transporting it to the installation site.

Where right-of-way allows, locate the enclosure such that it is outside the clear zone in accordance with the *Roadside Design Guide*.

Excavate as required, and place concrete to construct the enclosure foundation as specified on the standard detail sheets. Install enclosure on the concrete base such that the door(s) of the enclosure opens away from traffic (hinges away from traffic). Install anchor bolts, washers, and nuts to secure the enclosure to the foundation.

Install ground rod with clamp and install one ¾ inch rigid conduit from enclosure base to

ground rod. Install a grounding conductor from ground rod to enclosure base and bond to each conduit bushing in the base.

Install one ¾ inch rigid steel conduit for electrical service from the base of the enclosure to 24 inches beyond the concrete base. Make all field wiring connections to the electrical service, as applicable.

If electrical service is not provided as a bid item in the contract, plug conduit on both ends with a cap, conduit sealant, or electrical tape. Mark the location of the buried conduit end with a wooden stake labeled "3/4 in. conduit."

Install specified rigid steel conduit(s) into the base of the enclosure for sensor wire entry. Install one spare 2 inch conduit from the enclosure base to 2 feet beyond the concrete base. Plug spare conduit on both ends with a cap, conduit sealant or electrical tape.

The limit of all conduits incidental to "Install Pad Mount Enclosure" is 24 inches beyond the edge of the concrete base.

Wiring in enclosure shall be neat and orderly. Label all wires and cables inside enclosure. KYTC personnel will furnish and install terminal blocks and connect sensors to terminal blocks.

3.10. Install Controller Cabinet

Furnish: Mounting brackets; mounting straps; conduit; LB condulets; conduit fittings; conduit grounding bushings; ground rod with clamp; grounding conductor; cable staples; conduit sealant; wooden stakes (where required); wire labels; hardware.

The Contractor shall be responsible for securing the cabinet from the Central Office Division of Planning Warehouse in Frankfort and transporting it to the installation site. Any existing holes in the cabinet not to be reused shall be covered or plugged to meet NEC requirements.

Install mounting brackets and secure cabinet to pole with mounting straps.

Install a ground rod with clamp. Install grounding conductor in 1-¾" conduit form cabinet to ground rod.

Install one ¾ inch rigid steel conduit with two lb condulets from cabinet to electrical service disconnect box. Make all field wiring connections to the electrical service, as applicable.

If electrical service is not provided as a bid item in the contract, plug conduit on both ends with cap, plumbers putty, conduit sealant, or electrical tape. Mark the location of the buried conduit end with a wooden stake labeled "3/4 in. conduit".

Install specified rigid steel conduit(s) and type LB condulet(s) into the bottom of the

cabinet for sensor wire entry. The limit of conduits incidental to "Install Controller Cabinet" is 24 inches beyond the face of the pole.

Wiring in cabinet shall be neat and orderly. Label all wires and cables inside cabinet. KYTC personnel will furnish and install terminal blocks and connect sensors to terminal blocks.

3.11. Junction Box Type 10x8x4

Furnish: Junction box; wood post; conduit fittings; wire labels; hardware.

Where right-of-way allows, locate the junction box such that it is outside the clear zone in accordance with the Roadside Design Guide.

Excavate as required and install wood post(s) to a depth of 18 inches. Install junction box on wood post such that the bottom of the box is 18 inches above the finished grade as shown on the standard detail sheets. Box shall be installed with four (4) 2½ inch wood screws and washers.

Install locknuts to attach conduit to junction box and install a conduit bushing as shown on the standard detail sheets.

Wiring inside box shall be neat and orderly. Label all wires and cables inside box.

3.12. Junction Box Type A, B, or C

Furnish: Junction box, No. 57 aggregate; grounding conductor

Excavate as required and place approximately 12 inches of No. 57 aggregate beneath the proposed junction box to allow for drainage. Install specified junction box type A, B, or C near the edge of pavement, flush with finished grade per the detail sheets. Where required, orient the box so that the dimensions comply with the National Electrical Code. Stub conduits with grounding bushings into junction box at its base to accommodate wires and connect grounding conductor to all grounding bushings. Backfill to existing grade, and restore disturbed area to the satisfaction of the Engineer.

Wiring inside box shall be neat and orderly. Label all wires and cables inside box.

3.13. Loops - Proposed

Furnish: Wire; saw slot sealant; backer rod; grout; conduit sealant.

The plans and notes specify the approximate location for loop installations. Prior to sawing slots or drilling cores, the Contractor shall meet with a representative of the Division of Planning to verify the precise layout locations on site. Avoid expansion joints and pavement sections where potholes, cracks, or other roadway flaws exist.

Upon completion of this meeting, the Contractor shall measure out and mark the proposed loop locations with spray paint or chalk such that the saw slots will be parallel

and perpendicular to the direction of traffic. Marked lines shall be straight and exact to the locations determined and sized as shown on the plans. Unless indicated otherwise, loops shall be 6 feet by 6 feet square and loops in the same lane shall be spaced 16 feet from leading edge to leading edge.

On resurfacing, rehabilitation, and new construction projects that include new asphalt pavement, the Contractor shall install loops prior to laying the final surface course. On projects with milling and texturing, the Contractor may install the loops prior to or after the milling operation; however, if installed prior to milling, the Contractor shall be responsible for ensuring that the loops are installed at a depth such that the milling operation will not disturb the newly installed loops. The Contractor shall correct damage caused by the milling operations to newly installed loops prior to placement of the final surface course at no additional cost to the Cabinet.

For projects that include the installation of new asphalt and piezoelectric sensors, the Contractor shall mark or otherwise reference all loops installed prior to the final surface course such that the loops can be accurately located when the piezoelectric sensors are installed after placement of the final surface course.

For projects that do not have asphalt surfacing, the Contractor shall install the loops in the surface of the pavement.

The Prime Contractor shall coordinate the installation of loops with the electrical sub-Contractor and the Engineer to ensure correct operation of the completed installation.

The following is a typical step by step procedure for the installation of a loop.

- Carefully mark the slot to be cut, perpendicular to the flow of traffic and centered in the lane.
- Make each saw-cut 3/8-inch wide and at a depth such that the top of the backer rod is a minimum of 2 inches below the surface of rigid (PCC/Concrete) pavement or 4 inches below the surface of asphalt pavement.
- Drill a 1½ inch core hole at each corner and use a chisel to smooth corners to prevent sharp bends in the wire.
- Clean ALL foreign and loose matter out of the slots and drilled cores and within 1 foot on all sides of the slots using a high pressure washer.
- Completely dry the slots and drilled cores and within 1 foot on all sides of the slots using oil-free forced air, torpedo heaters, electric heaters, or natural evaporation, depending on weather conditions. Be very careful not to burn the asphalt if heat is used.
- Measure 9-12 inches from the edge of the paved surface (shoulder break or face of curb) and drill a 1½ inch hole on a 45º angle to the conduit adjacent to the roadway.
- Closely inspect all cuts, cores, and slots for jagged edges or protrusions prior to the placement of the wire. All jagged edges and protrusions shall be ground or re-cut and cleaned again.

- Place the loop wire splice-free from the termination point (cabinet or junction box) to the loop, continue around the loop for four turns, and return to the termination point.
- Push the wire into the saw slot with a blunt object such as a wooden stick. Make sure that the loop wire is pushed fully to the bottom of the saw slot.
- Install conduit sealant to a minimum of 1" deep into the cored 1½ inch hole.
- Apply loop sealant from the bottom up and fully encapsulate the loop wires in the saw slot. The wire should not be able to move when the sealant has set.
- Cover the encapsulated loop wire with a continuous layer of backer rod along the entire loop and home run saw slots such that no voids are present between the loop sealant and backer rod.
- Finish filling the saw cut with non-shrinkable grout per manufacturer's instructions. Alleviate all air pockets and refill low spaces. There shall be no concave portion to the grout in the saw slot. Any excess grout shall be cleaned from the roadway to alleviate tracking.
- Clean up the site and dispose of all waste off the project.
- Ensure that the grout has completely cured prior to subjecting the loop to traffic. Curing time varies with temperature and humidity.

Exceptions to installing loop wire splice-free to the junction box or cabinet may be considered on a case-by-case basis and must be pre-approved by the Engineer. If splices are allowed, they shall be located in a junction box and shall conform to the construction note for Splicing.

If loop lead-in cable (Cable No. 14/1 Pair) is specified, cable shall be installed splice free to the cabinet ensuring that extra cable is left in each junction box or cabinet. All wires and cables shall be labeled in each junction box and cabinet.

Loop inductance readings shall be between 100 and 300 microhenries. The difference of the loop inductance between two loops in the same lane shall be ±20 microhenries. Inductance loop conductors shall test free of shorts and grounds. Upon completion of the project, all loops must pass an insulation resistance test of a minimum of 100 million ohms to ground when tested with a 500 Volt direct current potential in a reasonably dry atmosphere between conductors and ground.

3.14. Loops – Existing

When noted on a data collection station layout sheet that there are existing inductive loops within the limits of the project, notify the Engineer in writing, a minimum of 14 calendar days prior to beginning milling operations. After milling and prior to placing asphalt inlay, conduct an operating test on the existing inductance loops at the control cabinet in the presence of the Engineer to determine if the inductance loop conductors have an insulating resistance of a minimum of 100 megohms when tested with a 500 volt direct current potential in a reasonably dry atmosphere between conductors and ground. The Department may also conduct its own tests with its own equipment.

If the tests indicate the loop resistances are above the specified limit and the Engineer determines the system is operable, proceed with the asphalt inlay. If the test indicates the loop resistance is not within the specified limits or if the Engineer determines the system is otherwise not operable, prior to placing the asphalt inlay install and test new loop detectors according to the station layout, notes, and Detail Drawings.

The Engineer will contact and maintain liaison with the District Planning Engineer and the Division of Planning in order to coordinate any necessary work.

3.15. Maintain and Control Traffic

Furnish (all as required): Drums, traffic cones, barricades used for channelization purposes, delineators, and object markers.

Maintain and Control Traffic shall conform to the plans, the Standard Specifications for Road and Bridge Construction, and the KYTC Department of Highways Standard Drawings.

3.16. Open Cut Roadway

Furnish: Concrete, reinforcing bars.

Excavate trench by sawing and chipping away roadway to dimensions as indicated on the detail sheets. After placing conduit, install concrete and steel reinforcing bars per the *Standard Specifications for Road and Bridge Construction*. Restore any disturbed sidewalk to its original condition.

3.17. Piezoelectric Sensor

Furnish: Piezoelectric sensor and cable; sensor support brackets; saw slot sealant; backer rod; grout; conduit sealant.

The plans and notes specify the approximate location for piezoelectric sensor (piezo) installations. Prior to sawing slots or drilling cores, the Contractor shall meet with a representative of the Division of Planning to verify the final layout on site. Avoid expansion joints and pavement sections where potholes, cracks, or other roadway flaws exist. Roadway ruts at the proposed piezo location shall not be in excess of ½ inch under a 4-foot straight edge.

Install the piezo perpendicular to traffic in the final surface course of the pavement. Locate the sensor in the lane as shown on the site layout drawing. Eleven-foot length sensors shall be centered in the lane.

The following is a typical step by step procedure for the installation of a piezo. Refer specifically to the manufacturer's instructions provided with the sensor prior to installation.

- Carefully mark the slot to be cut, perpendicular to the flow of traffic and properly positioned in the lane.

- It is strongly recommended that a ¾ inch wide diamond blade be used for cutting the slot, or that blades be ganged together to provide a single ¾ inch wide cut. The slot shall be wet cut to minimize damage to the pavement.
- Cut a slot ¾ inch wide (±1/16 inch) by 1 inch minimum deep. The slot should be a minimum of 2 inches longer than the sensor (including the lead attachment). Drop the saw blade an extra ½ inch down on both ends of the sensor. The lead out of the passive cable should be centered on the slot.
- Cut the slot for the passive cable ¼ inch wide and at a depth so that the top of the backer rod is a minimum of 2 inches below the road surface.
- Clean ALL foreign and loose matter out of the slot and within 1 foot on all sides of the slot using a high pressure washer.
- Completely dry the slot and within 1 foot on all sides of the slot using oil-free forced air, torpedo heaters, electric heaters, or natural evaporation, depending on weather conditions. Be very careful not to burn the asphalt if heat is used.
- Measure 9-12 inches from the edge of the paved surface (shoulder break or face of curb) and drill a 1½ inch hole on a 45º angle to the conduit adjacent to the roadway.
- Place strips of 2-4 inch wide tape strips on the pavement along the lengths of both sides of the sensor slot, 1/8 inch away from the slot.
- Wear clean, protective latex (or equivalent) gloves at all times when handling sensors. Visually inspect sensor to ensure it is straight. Check lead attachment and passive cable for cuts, gaps, cracks and/or bare wire. Verify that the correct sensor type and length is being installed by checking the data sheet. Verify there is sufficient cable to reach the cabinet. Piezo lead-in cable shall not be spliced.
- Test the sensor for capacitance, dissipation factor and resistance, according to the directions enclosed with the sensor. Capacitance and dissipation should be within ±20% of the piezo data sheet. Resistance (using the 20M setting) should be infinite. Record the sensor serial number and the test results and label "pre-installation." This information should be stored in the counter cabinet and/or returned to Department Planning personnel.
- Lay the sensor next to the slot and ensure that it is straight and flat.
- Clean the sensor with steel wool or an emery pad and wipe with alcohol and a clean, lint-free cloth.
- Place the installation bracket clips every 6 inches along the length of the sensor.
- Bend the tip of the sensor downward at a 30° angle. Bend the lead attachment end down at a 15° angle and then 15° back up until level (forming a lazy Z).
- Place the sensor in the slot, with the brass element 3/8 inch below the road surface along the entire length. The tip of the sensor should be a minimum of 2 inches from the end of the slot and should not touch the bottom of the slot. The top of the plastic installation bracket clips should be 1/8 inch below the surface of the road. The lead attachment should not touch the bottom or sides of the slot. Ensure the sensor ends are pushed down per the manufacturer's instructions.
- Visually inspect the length of the sensor to ensure it is at uniform depth along its length and it is level (not twisted, canted or bent).

- On the passive cable end, block the end of the slot approximately 3-5 inches beyond the end of the lead attachment area creating an adequate "dam" so that the sensor grout does not flow out.
- Use one bucket of sensor grout per piezo installation. Overfill the slot with sensor grout and allow to cure for a minimum of 10 minutes before continuing with the installation. Ensure that sensor grout fills around and beneath the sensor completely and that there is not a trough on top.
- Remove the tape along the sides of the saw slot when the adhesive starts to cure.
- Carefully remove the dam from the end of the sensor.
- Route the lead-in cable through the saw slot
- Install conduit sealant to a minimum of 1" deep into the cored 1½ inch hole.
- Cover the lead-in cable with encapsulant, backer rod, and grout.
- If necessary, after the grout has hardened, grind with an angle grinder until the profile is a 1/16 inch mound. There shall be no concave portion to the mound.
- Clean up the site and dispose of all waste off the project.
- Ensure that the sensor grout has completely cured prior to subjecting the sensor to traffic. Curing time will vary with temperature and humidity.

Upon installation, test the sensor for capacitance, dissipation factor and resistance, according to the directions enclosed with the sensor. Capacitance and dissipation should be within ±20% of the piezo data sheet. Resistance (using the 20M setting) should be infinite. Perform a functional test of the piezo with an oscilloscope to ensure that the sensor is generating a proper response to the passage of vehicles.

Record the sensor serial number and the test results and label "post-installation." This information should be stored in the counter cabinet and/or returned to Department Planning personnel.

3.18. Pole – Wooden

Furnish: Pole; anchoring equipment (as required); hardware (as required).

Excavate and install wood pole to a minimum depth of one-sixth the total pole height. Place backfill material in hole and compact until flush with existing grade. Install guy wire, guy guard, anchor, anchor rod, and strand vise, if necessary. Anchor shall be a minimum of one-third the pole height from the face of the pole. Provide temporary erosion control, seeding, protection and restoration of disturbed areas to the satisfaction of the Engineer.

3.19. Removal of Existing Equipment

The Contractor shall remove existing materials (including but not limited to: poles, anchors, cabinets, junction boxes, conduit and wire) not to be reused. Contractor shall dispose of all removed materials off the project. All materials and labor necessary for the removal of existing equipment shall be considered incidental to other bid items.

3.20. Signs

Furnish: Signs; sign standards; hardware.

Construction of **s**igns shall conform to the *Standard Specifications for Road and Bridge Construction.*

3.21. Splicing

Furnish: Splice kit; solder.

These notes describe the splicing process (if permitted) and are not intended to grant permission to splice. Permission to splice shall be determined by the Division of Planning and the locations shall be shown on the layout sheet. If splicing is needed but not shown on the layout sheet, the Contractor shall receive prior written approval from the Division of Planning.

All splices shall conform to the provisions of the NEC.

Splices for loop and loop lead-in wire shall be twisted and soldered. Abrade the outer jacket of both wires to promote good adhesion and prevent capillary leak paths. Seal the splice with an electrical sealing resin. Spliced loop conductors shall test free of shorts and unauthorized grounds and shall have an insulating resistance of at least 100 megohms when tested with a 500 volt direct current potential in a reasonably dry atmosphere between conductors and ground.

For piezos, the same type coax cable, supplied by the manufacturer, shall be used to splice to the sensor's lead-in cable. Cables shall be soldered. Abrade the outer jacket of both cables to promote good adhesion and prevent capillary leak paths. Seal the splice with an electrical sealing resin. Spliced piezo cables shall be tested and have a minimum resistance of 20 megohms, a maximum dissipation factor of 0.03, a capacitance within the manufacturer's recommended range based upon the length of additional cable. A functional test of the piezo shall be performed to ensure that the sensor is generating a proper response to the passage of vehicles.

3.22. Trenching and Backfilling

Furnish: Warning tape; seed mix type I; cereal rye or German foxtail-millet; mulch; concrete (as required); asphalt (as required).

Excavate trench and provide required cover as shown on the standard detail sheets. After placing conduit, backfill material shall be placed and compacted in lifts of 9 inches or less. Install warning tape as shown on the detail sheet. Provide temporary erosion control, seeding, protection and restoration of disturbed areas to the satisfaction of the Engineer. This item shall include concrete, asphalt or approved replacement material for sidewalks, curbs, roadways, etc. (if required).

3.23. Wiring

Furnish: Wire; wire labels; spade tongue wire terminals (as required).

Installation of all wiring shall conform to the NEC. Permanent identification numbers shall be affixed to all wires in all junction boxes and cabinets (see Layout(s) for loop and piezo numbers).

Additional lengths of each loop and piezo sensor wire shall be neatly coiled in all cabinets and junction boxes as follows:

Enclosure Type	Additional length of each wire
Galvanized Steel Cabinet	2' – 3'
Pad Mount Cabinet (332)	6' - 8'
Pole Mount Cabinet (336)	3' - 4'
Junction Box Type 10x8x4	2' – 3'
Junction Box Type A, B, or C	2' – 3'

3.24. Wood Post

Furnish: Wood post; concrete (as required); seed mix type I; cereal rye or German foxtail-millet; mulch.

Excavate hole to specified depth and place concrete, if required. Install post, backfill to existing grade, and tamp backfill. Provide temporary erosion control, seeding, protection and restoration of disturbed areas to the satisfaction of the Engineer.

4. BID ITEM NOTES AND METHOD OF MEASUREMENT FOR PAYMENT

Only the bid items listed will be measured for payment. All other items required to complete the vehicle detection installation shall be incidental to other items of work. Payment at the contract unit price shall be full compensation for all materials, labor, equipment and incidentals to furnish and install these items.

4.1. Bore and Jack Pipe – 2”

Bore and jack pipe – 2” shall be furnished, installed, and measured for payment per the *Standard Specifications for Road and Bridge Construction*.

4.2. Conduit

Conduit shall include furnishing and installing specified conduit in accordance with the specifications. This item shall include conduit fittings, bodies, boxes, weatherheads, expansion joints, couplings, caps, conduit sealant, electrical tape, clamps, bonding straps and any other necessary hardware. Conduit will be measured in linear feet.

4.3. Electrical Service

Electrical Service shall include furnishing and installing all necessary materials and payment of all fees toward the complete installation of an electrical service which has passed all required inspections. Incidental to this item shall be furnishing and installing:

- Meter-base per utility company’s specifications
- Service disconnect panel per utility company’s specifications
- Meter base and service disconnect entrance hubs, waterproof
- Service entrance conductors
- Rigid steel conduit
- Rigid steel conduit fittings
- Conduit straps
- Weatherhead
- Duplex GFCI receptacle, 120-volt, 20-amp
- Ground rod with clamp
- Grounding conductor

Also incidental to this item shall be any necessary clearing of right of way for the electrical service drop.

Electrical service will be measured in individual units each.

4.4. Flashing Arrow

Flashing Arrow shall be furnished, installed, and measured for payment per the *Standard Specifications for Road and Bridge Construction.*

4.5. Galvanized Steel Cabinet

Galvanized Steel Cabinet shall include furnishing and installing galvanized steel cabinet on post as specified. Incidental to this item shall be furnishing and installing grounding hardware, and any necessary post/pole mounting hardware. Also incidental to this item shall be furnishing and installing the required number of terminal blocks and connection of all

sensors to the terminal blocks. Galvanized Steel Cabinet will be measured in individual units each.

4.6. Install Pad Mount Enclosure

Install Pad Mount Enclosure shall include installing a Department-furnished enclosure as specified on the detail sheets.

This item shall include obtaining the enclosure from KYTC and transporting it to the installation site and furnishing and installing the following:

- Concrete foundation (including any excavation necessary)
- Anchor bolts, lock washers, and nuts
- Conduit
- Conduit fittings (including grounding bushings)
- Weatherhead
- Terminal Strip(s)
- Ground rod with clamp
- Grounding conductor

Install Pad Mount Enclosure will be measured in individual units each.

4.7. Install Controller Cabinet

Install Controller Cabinet shall include installing a Department-furnished cabinet as specified on the detail sheets.

This item shall include obtaining the cabinet from KYTC and transporting it to the installation site and furnishing and installing the following:

- Conduit
- Conduit Fittings
- Terminal Strip(s)
- Ground rod with clamp
- Grounding conductor

Install Controller Cabinet will be measured in individual units each.

4.8. Junction Box Type 10" x 8" x 4"

Junction Box Type 10”x8”x4” shall include furnishing and installing specified junction box in accordance with the specifications. This item shall include connectors, splice sleeves, conduit fittings, mounting materials and any other items required to complete the installation. Incidental to this item shall be furnishing and installing specified post (wood, channel, metal, etc.) as required for the installation. Junction Box Type 10”x8”x4” will be measured in individual units each.

4.9. Junction Box Type A, B, or C

Junction Box Type A, B, or C shall include furnishing and installing specified junction box in accordance with the specifications. This item shall include excavation, furnishing and installing #57 aggregate, backfilling around the box, and restoration of disturbed areas to the satisfaction of the Engineer. Incidental to this item shall be furnishing and installing a

grounding conductor bonding all conduit grounding bushings in the box. Junction Box Type A, B, or C will be measured in individual units each.

4.10. Loop Saw Slot and Fill

Loop Saw Slot and Fill shall include sawing and cleaning saw slots and furnishing and installing conduit sealant, loop sealant, backer rod, grout, or other specified material. Loop Saw Slot and Fill will be measured in linear feet of sawed slot.

4.11. Maintain and Control Traffic

Maintain and Control Traffic shall be measured for payment per the *Standard Specifications for Road and Bridge Construction.*

4.12. Open Cut Roadway

Open Cut Roadway shall include excavating trench (sawing and chipping roadway) to dimensions as indicated on the detail sheets and furnishing and placing concrete, steel reinforcing bars, and asphalt. This item also includes restoring any disturbed sidewalk to its original condition. Open Cut Roadway will be measured in linear feet.

4.13. Piezoelectric Sensor

Piezoelectric sensor (piezo) shall include sawing and cleaning saw slots and furnishing and installing piezo in accordance with the specifications. This item shall include furnishing and installing lead-in wire, conduit sealant, encapsulation material, backer rod, grout, testing, and accessories. Piezo will be measured in individual units each.

4.14. Pole – 35' Wooden

Pole – 35' Wooden shall include excavation, furnishing and installing specified wood pole, backfilling and restoring disturbed areas to the satisfaction of the Engineer. Incidental to this item shall be furnishing and installing guy wire, anchor and anchor rod, strand vise, and guy guard, if specified.

Pole – 35' Wooden will be measured in individual units each.

4.15. Signs

Signs shall be furnished, installed, and measured for payment per the *Standard Specifications for Road and Bridge Construction.*

4.16. Trenching and Backfilling

Trenching and Backfilling shall include excavation, warning tape, backfilling, temporary erosion control, seeding, protection and restoration of disturbed areas to original condition. This item shall include concrete, asphalt or approved replacement material for sidewalks, curbs, roadways, etc. (if required). Trenching and backfilling will be measured in linear feet.

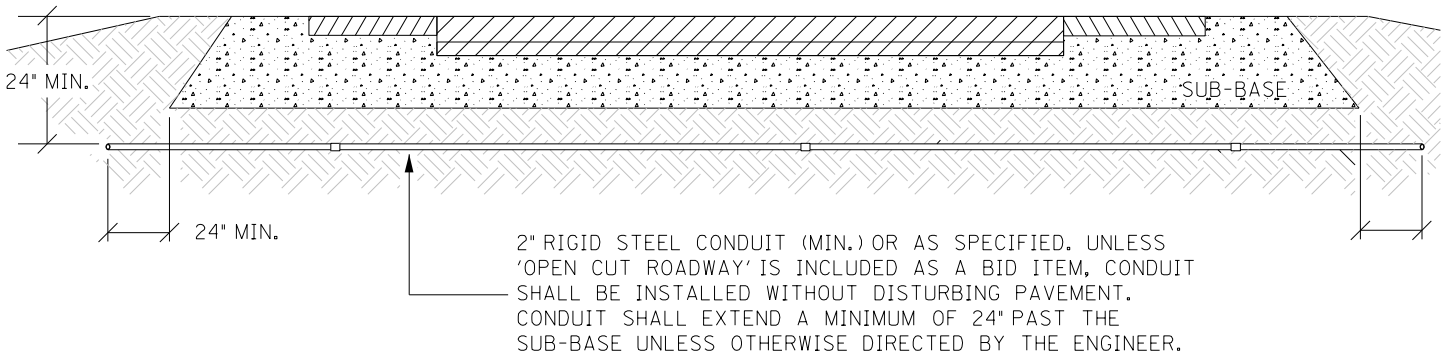
4.17. Wire or Cable

Wire or cable shall include furnishing and installing specified wire or cable within saw slot, conduit, junction box, cabinet, or overhead as indicated on the detail sheets. Incidental to this item shall be the labeling of all wires and cables in each junction box, cabinet and splice

box, and furnishing and installing other hardware required for installing cable. Wire or Cable will be measured in linear feet.

4.18. Wood Post

Wood Post shall include furnishing and installing wood post as specified. This item shall include excavation, furnishing and placing concrete (if required), backfilling around the post, and restoration of disturbed areas to the satisfaction of the engineer. Wood Post will be measured in individual units each.

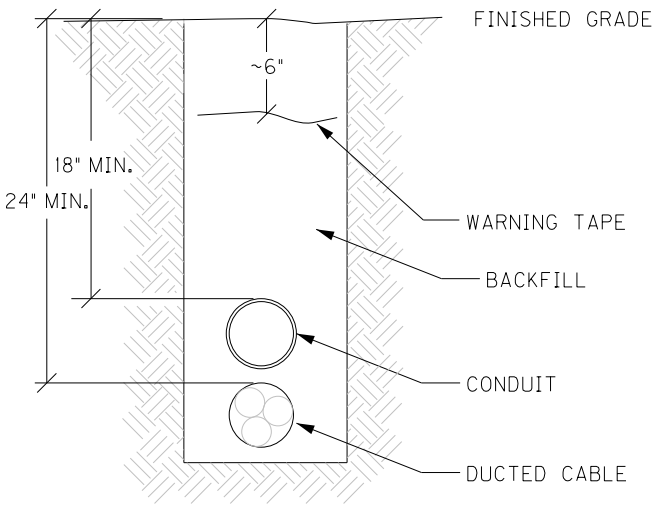


CONDUIT UNDER PAVEMENT

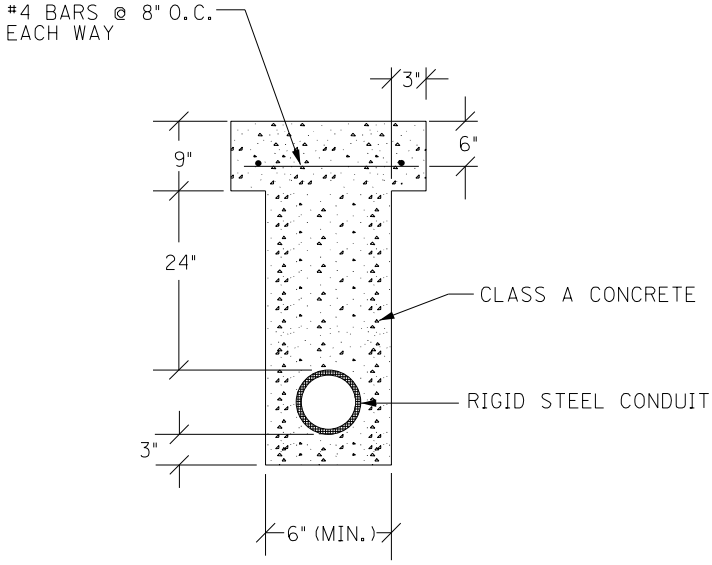
TOTAL TRENCH WIDTH SHALL BE 3" (NOM.) WIDER THAN THE SUM OF THE OUTSIDE DIAMETER(S) OF THE CONDUIT(S) INSTALLED. CONDUIT(S) SHALL BE CENTERED IN TRENCH.

CONTRACTOR SHALL PLACE BACKFILL IN LIFTS (9" MAX.) COMPACT BACKFILL, AND RESTORE DISTURBED AREA TO THE SATISFACTION OF THE ENGINEER

CONTRACTOR SHALL INSTALL UNDERGROUND UTILITY WARNING TAPE ABOVE CONDUIT AS SHOWN.



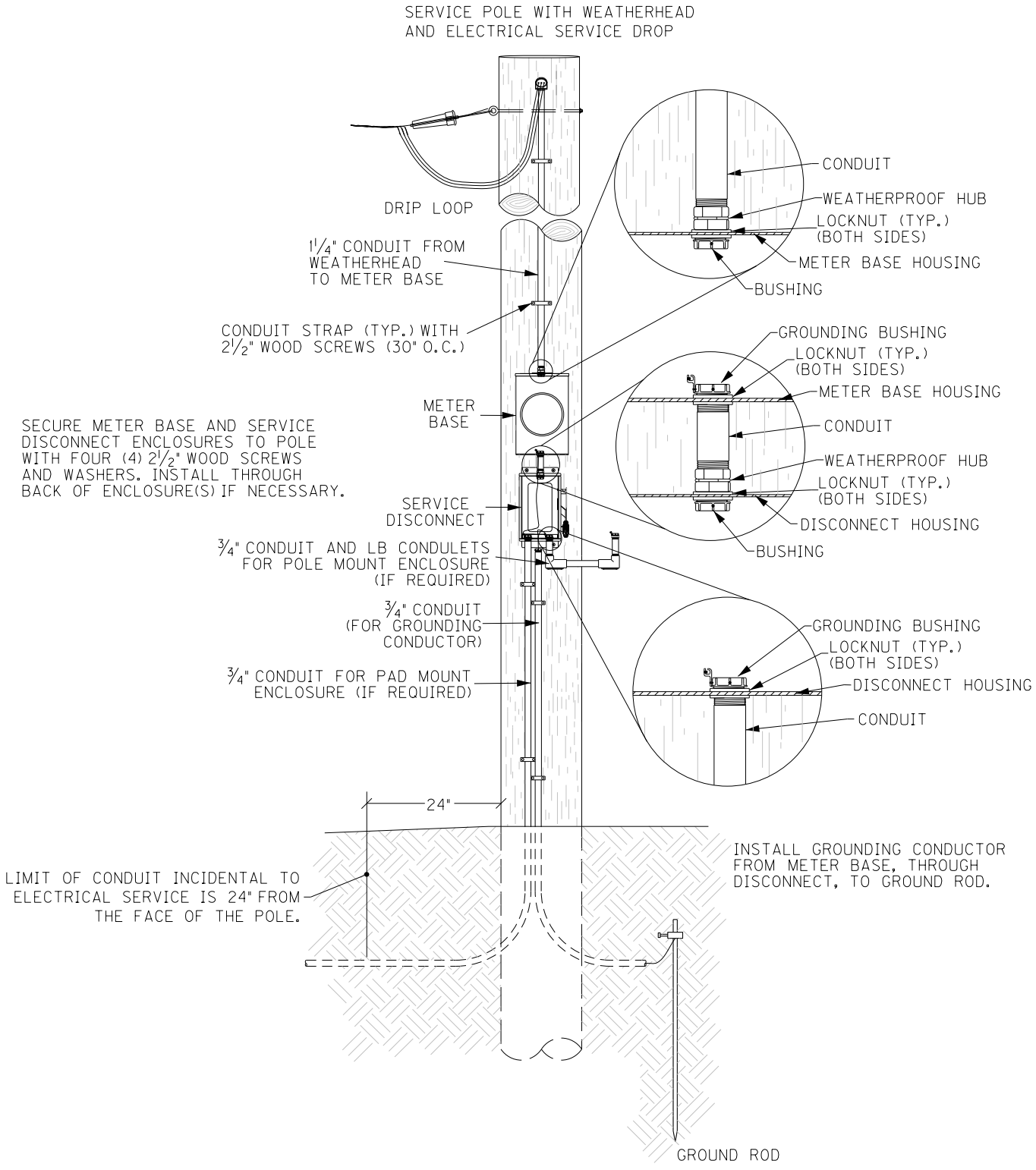
CONDUIT TRENCH



OPEN CUT PAVEMENT DETAIL

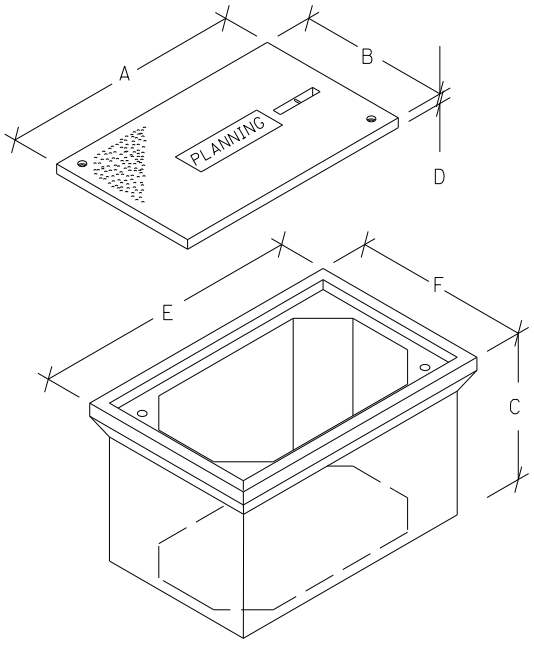
CONDUIT INSTALLATION

NOT TO SCALE



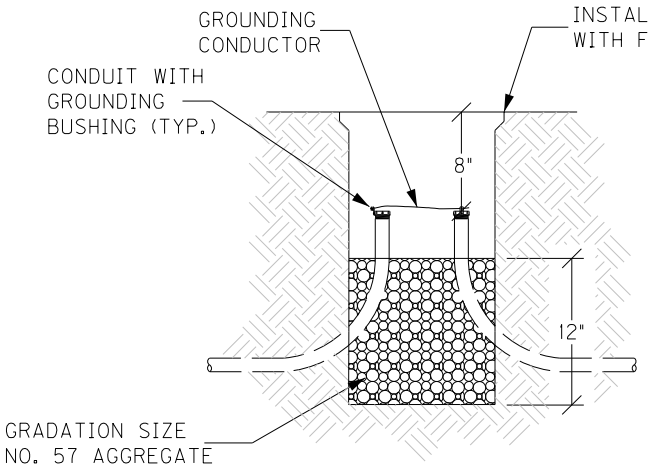
ELECTRICAL SERVICE

NOT TO SCALE



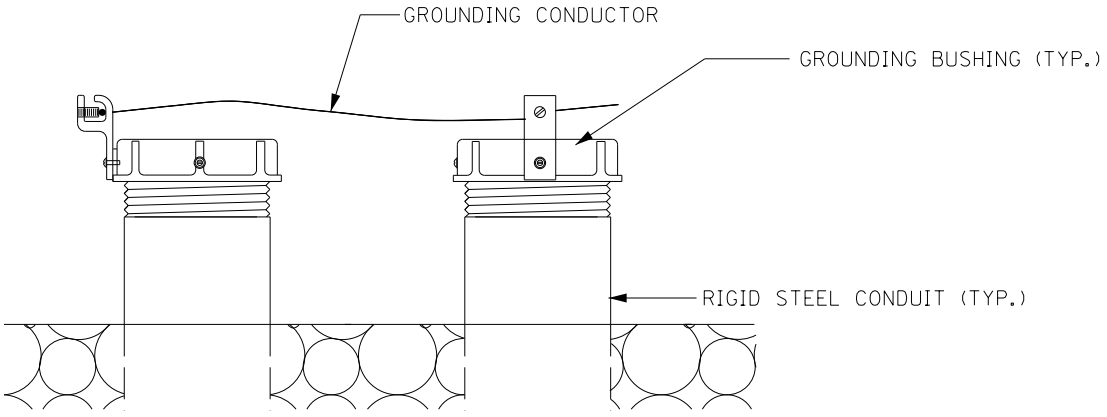
JUNCTION BOX DIMENSIONS (NOMINAL)						
	A	B	C	D*	E	F
TYPE A	23"	14"	18"	2"	25"	16"
TYPE B	18"	11"	12"	1¾"	20"	13"
TYPE C	36"	24"	30"	3"	38"	26"

* MINIMUM
STACKABLE BOXES ARE PERMITTED



WHERE REQUIRED, JUNCTION BOX SHALL BE ORIENTED SUCH THAT THE DIMENSIONS COMPLY WITH THE NATIONAL ELECTRICAL CODE.

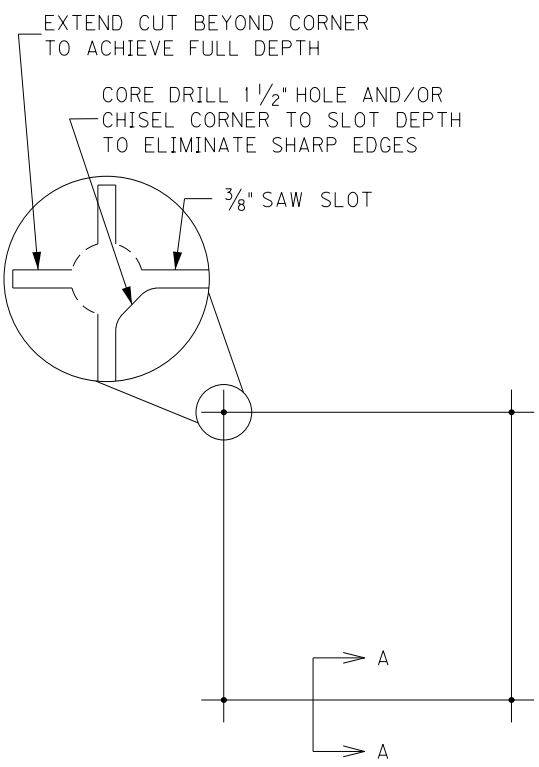
ELEVATION



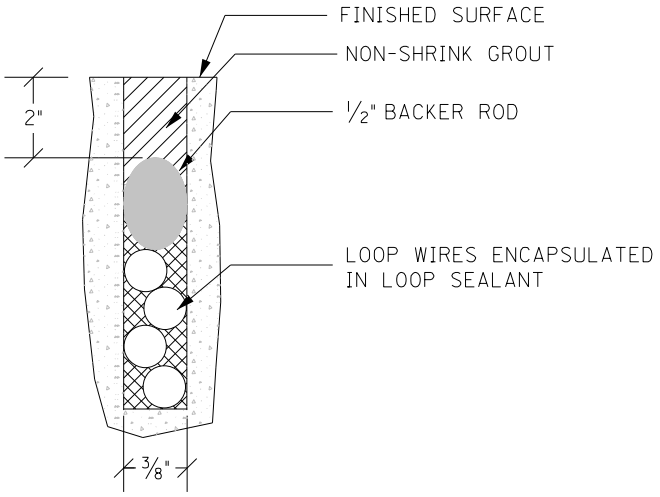
GROUNDING DETAIL

JUNCTION BOX - TYPE A, TYPE B, TYPE C

NOT TO SCALE



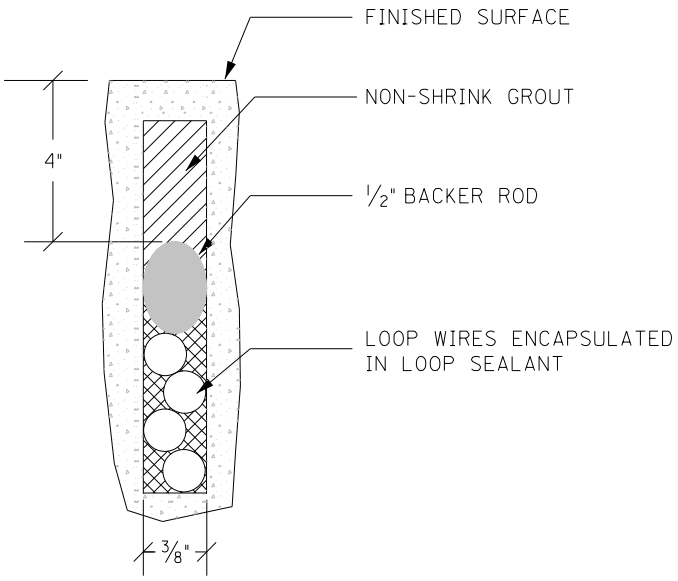
SAW CUT PLAN



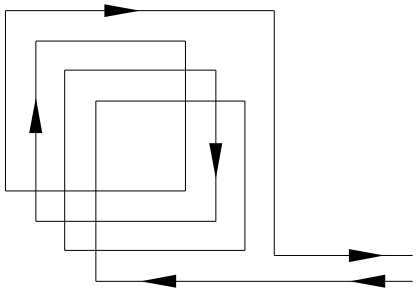
SECTION A-A (CONCRETE)

UNLESS SPECIFIED OTHERWISE, ALL LOOPS SHALL BE 6' x 6' SQUARE, CENTERED IN EACH LANE, WITH FOUR TURNS OF 14 AWG LOOP WIRE.

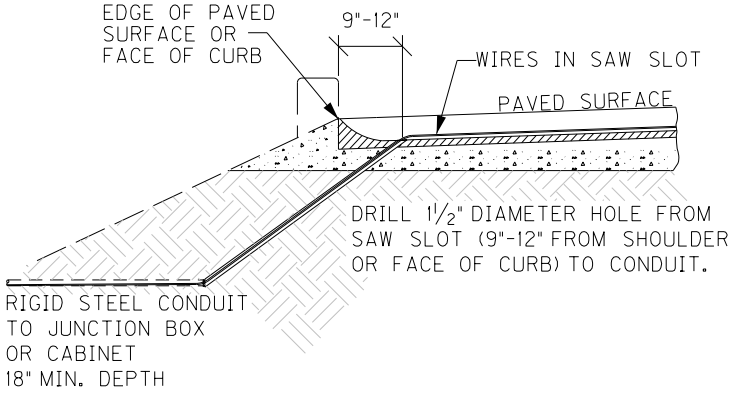
ADJACENT SAW SLOTS SHALL BE A MINIMUM OF 12" APART.



SECTION A-A (ASPHALT)



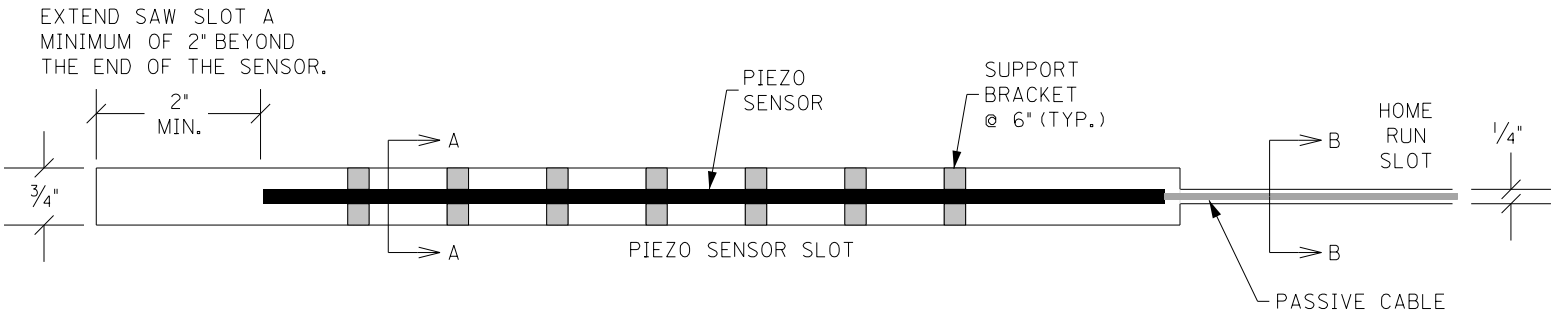
WIRING PLAN



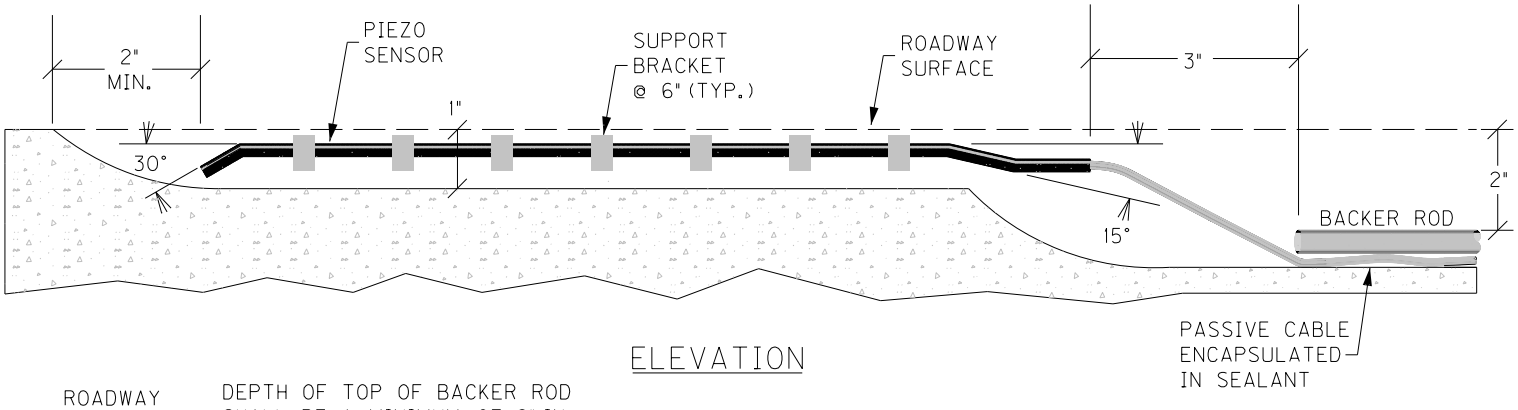
SAW SLOT EDGE OF PAVEMENT TRANSITION

INDUCTIVE LOOP DETECTOR

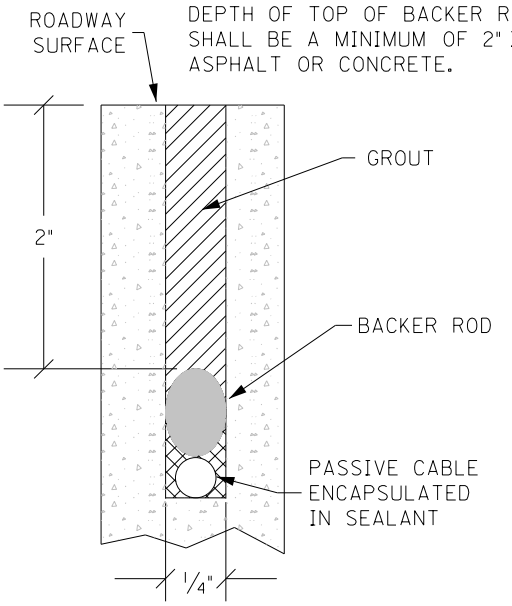
NOT TO SCALE



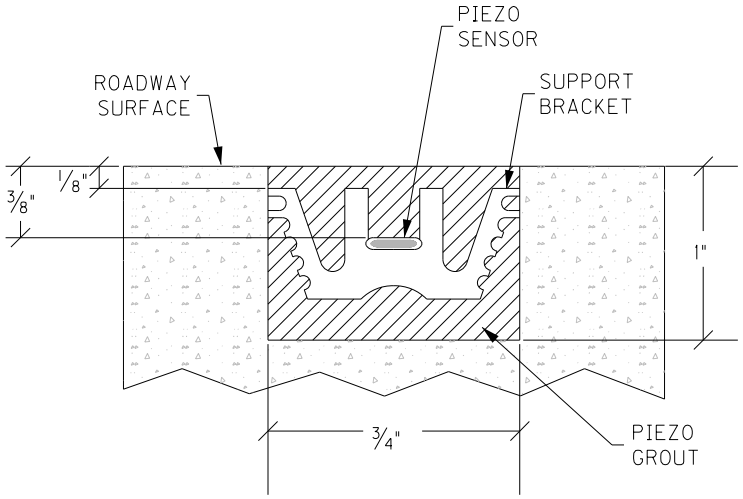
PLAN



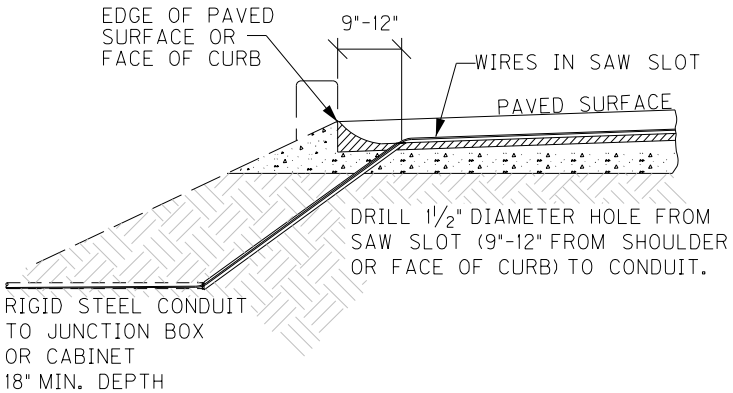
ELEVATION



SECTION B-B



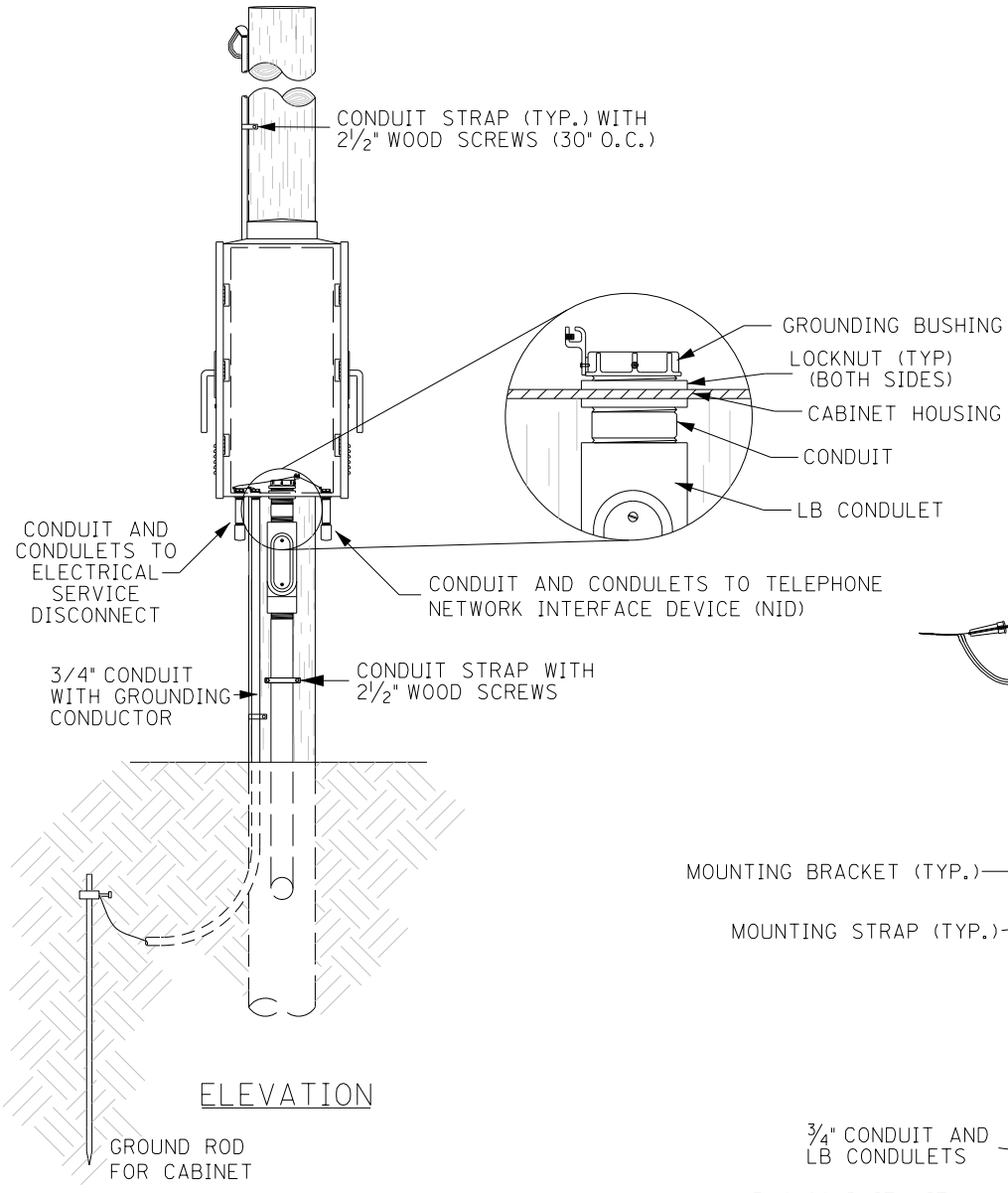
SECTION A-A



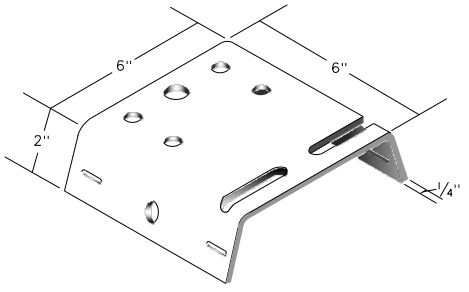
SAW SLOT EDGE OF PAVEMENT TRANSITION

PIEZOELECTRIC SENSOR INSTALLATION

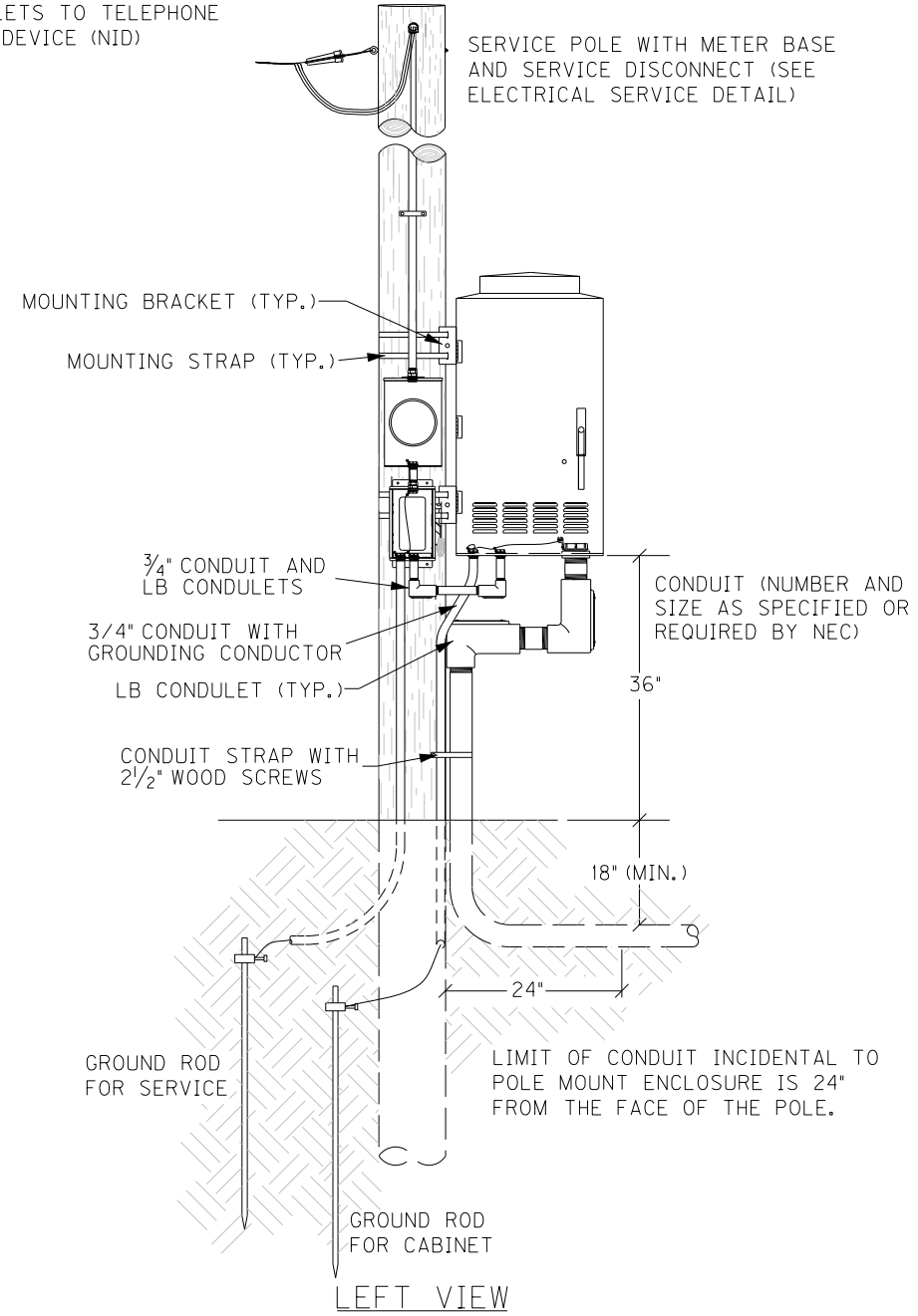
NOT TO SCALE



ELEVATION



MOUNTING BRACKET (TYPICAL)
SIZE AND NUMBER/POSITIONS
OF OPENINGS MAY DIFFER



LEFT VIEW

WOOD POLE MOUNT ENCLOSURE

NOT TO SCALE

SPECIAL NOTE FOR SOUND BARRIER WALLS

KY338
Boone County
Item No. 6-18.00

I. DESCRIPTION

All work shall be performed in accordance with the Department's latest Standard and Supplemental Specifications and applicable Special Provisions and Standard and Sepia Drawings, except as specified in these notes or elsewhere in this proposal. Section references are to the Standard Specifications. This work shall consist of the sound barrier wall and foundation design, construction plans for the foundation, shop drawing preparation, and construction of precast concrete sound barrier walls, including construction of the drilled shaft foundations, in reasonably close conformity with the lines and grades shown on the contract plans and the Contractor's approved plans.

All references to AASHTO are to the AASHTO Standard Specifications for Highway Bridges, Current Edition with Interims.

All references to the Guide Specifications are to the AASHTO Guide Specifications for Structural Design of Barriers Current Edition with Interims.

The **"Appendix"** to this Special Note contains the project specific requirements.

II. DESIGN

A. General

Furnish plans for sound barrier walls and drilled shaft foundations (see attached geotechnical report) designed by a Registered Professional engineer licensed to practice in the Commonwealth of Kentucky. Design according to the Guide Specifications, AASHTO, and the Contract plans and documents. Design for an 84-mph wind velocity. Design for exposure category in accordance with the Guide Specifications (see the **"Appendix"**). Design for wind pressure based on the Exposure Category and the height to the centroid (mid- height) of the loaded area. Apply the wind pressure as a uniform load.

The Contractor's design shall comply with all restrictions imposed by the site conditions and the proposal notes and plan sheets such as drainage, accommodation of existing and proposed utilities, limitations on dimensions or sound barrier wall location, fire hydrant access, and other conditions noted or found in the field. The top and bottom of the sound barrier wall elevation throughout shall be as shown on the contract plans.

Design a free standing sound barrier wall finished on both sides. The maximum precast panel length shall be 40 feet. Design all sound barrier walls for the same appearance and materials. Design drilled shafts for foundations; spread footings or other type foundation designs will not be accepted.

Geotechnical work to determine the soil conditions and for the design of the drilled shaft foundation has been performed by the Department (See **"Geotechnical Notes"**).

B. Site Conditions

Be advised that Section 102.06 of the Specifications applies to this project. It shall be distinctly understood that any references in the contract plans and other contract documents to rock, rock disintegration zone, earth, or any other subsurface material whether in numbers, words, letters, or lines is solely for the Department's information. The Bidder draws his own conclusions as to the field conditions to be encountered.

Tops of drilled shafts are to be a minimum of 6 inches below finished grade, and the bottoms of sound barrier walls are to be a minimum of two feet below finished grade unless otherwise shown on the contract plans or **"Appendix"**.

C. Utilities

Take into consideration existing and proposed utilities and the Department's electrical service for interchange lighting in the vicinity of the sound barrier walls when developing sound barrier wall details. Show on the Contractor's plans and shop drawings additional work or materials necessary to construct the sound barrier wall without disturbing the utilities. Repair or replace features damaged during construction in like kind materials and design at no additional cost to the Department.

D. Contractor Submittals

Submit design calculations and plans to the Engineer for review within thirty calendar days of the 'Notice to Begin Work'. Submit adequate documentation of proprietary designs and/or products to the Engineer for review.

Submit three complete sets of the design calculations and five complete sets of the plans for the sound barrier wall to the Engineer for approval. Design calculations shall include the design for each component of the wall and the wall as a unit. Include the design for the horizontal connection (dowels, etc.) between panels. Include drilled shaft foundation design for axial and lateral loading. Show on the plans the drilled shaft foundations. One set of design calculations and plans, with

any corrections noted will be returned to the Contractor. Each time corrections are made, three copies of the revised calculation sheets and/or five copies of the revised plan sheets shall be submitted.

The Department will review the design calculations and plans for general conformance with the Guide Specifications, AASHTO, this Special Note, and the Contract Documents. The design calculations, plans, details and dimensions may not be completely checked. The Contractor shall be responsible for the accuracy of his design calculations and for compatibility with the contract plans. The Department's review will not relieve the Contractor of responsibility for the accuracy and completeness of the design calculations and plans.

Upon final approval by the Department, furnish drawings of the Contractor's approved plans to the Engineer in a .pdf format in accordance with KYTC requirements. The Department will provide copies of the approved plans to the Contractor.

Do not produce shop drawings before the Department's approval of the design calculations and Contractor's plans are completed. The Contractor's wall design engineer providing the design calculations and plans shall be responsible for shop drawing review. The Contractor's wall design engineer shall provide the Engineer ten sets of reviewed and approved shop drawings for the wall and provide the Department with a statement of assurance that the shop drawings are accurate and that they satisfy the project requirements. Each sheet of two copies of the shop drawings shall be dated, sealed, and signed by the wall design engineer providing the Contractor's design for the wall. Place the Drawing Number on the lower right hand side of all shop drawings.

Do not order materials or begin fabrication or construction before the Department's review of the shop drawings is completed. The Contractor may request permission from the Engineer to begin foundation construction at his own risk. Written permission from the Engineer is required.

After acceptance by the Department, submit requests for changes to the design calculations, Contractor's approved plans and shop drawings to the Engineer. Obtain written acceptance from the Engineer before incorporating any of the requested changes into the work.

Allow thirty working days for the Department's review of each submission of the design calculations, Contractor's plans, and shop drawings for the sound barrier wall. The thirty-day period begins when the design calculations, Contractor's plans, or shop drawings are received by the Engineer. Additional time required by the Department to review re-submissions shall not be cause for extending the specified completion date. Provide additional re-submissions as requested at no additional cost to the Department and with no extension of the specified completion date.

III. SOUND BARRIER WALLS

See the Appendix for permitted wall type and architectural treatment.

Precast Concrete panels may be pilaster, (post), and panel design or connected panels.

Precast concrete panels, pilasters, and other precast elements shall comply with Section 605 of the Standard Specifications. Precast concrete shall be Class D with a minimum 28-day compressive strength of 5000 p.s.i. All materials and reinforcement shall conform to the Department's Standard Specifications.

Precast panels, pilasters, and other precast elements may be prestressed. Prestress fabrication shall be in accordance with Section 605 of the Standard Specifications. Prestressing tendons may be either bar or strand. Prestressing bars shall conform to ASTM A722 'Uncoated Steel Bars for Prestressed Concrete'. Prestressing strands shall be seven wire strands conforming to ASTM A4l6, 'Uncoated Seven-wire Stress-Relieved Strand for Prestressed Concrete'.

Use drilled shafts for the foundation. The Contractor's design shall be in accordance to the Special Note for Drilled Shafts (11C) of the Standard Specifications. The Contractor's plans shall indicate whether or not permanent casings will be required. Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring will be incidental to the Sound Barrier Wall and will not be measured for separate payment. The Contractor will not be required to conduct a subsurface exploration as outlined in Section 3.5 of the Special Note for Drilled Shafts since the exploration is provided by KYTC (see **"Geotechnical Notes"**).

Use preformed joint filler complying with AASHTO M153 for Types I, II, or III or AASHTO M213.

Use epoxy coated steel dowels to provide positive horizontal alignment of panels coated in accordance with Section 811.10.

Provide positive means of alignment between panels. Use tongue and groove joints or steel dowels. If steel dowels are used at horizontal joints between panels, install no less than one dowel at the mid-point for panels up to 20 feet long and no less than two dowels at the third points for panels over 20 feet long.

Seal all joints between panels and between pilasters and panels to prevent sound leaks. Obtain the Engineer's approval of the sealant before use.

Step elevation changes at the top of the sound barrier wall except for end panels. Construct the top of sound barrier level between steps. Make steps only at the pilasters. Construct the

top of the sound barrier wall at or above the elevation of the top of the sound barrier shown on the contract plans.

Construct reinforced concrete pilasters. Cast using metal forms. Construct pilasters that protrude a maximum of twelve inches from the front face of the precast panels for sound barrier walls located more than 30 feet from the edge of the traveled way. Construct pilasters that protrude no more than one inch from the front face of the precast panels for sound barrier walls located within 30 feet from the edge of the traveled way. Connect pilasters to drilled shaft foundations above the finish grade. Use bolted galvanized steel for the connections; the Engineer will not allow or permit field welding.

Obtain the Engineer's approval of joint materials and details before use.

IV. MATERIALS APPROVAL

All materials shall be sampled and tested in accordance with the Department's Sampling Manual and the materials shall be available for sampling a sufficient time in advance of the use of the materials to allow for the necessary time for testing. Unless otherwise specified in these Notes, obtain acceptance of materials from the Engineer before use.

V. CONSTRUCTION

Perform site preparation necessary to construct the sound barrier wall in accordance with the Standard Specifications, contract plans, Contractor's approved plans, and notes in the proposal. Clear and grub the minimum area required to construct the wall. Sound standing trees and shrubs within the construction limits shall be trimmed or removed only as directed or approved by the Engineer. The Engineer may direct minor alignment changes to avoid damage to existing trees or shrubs.

Construct sound barrier walls in accordance with the contract plans, the Contractor's approved plans, and the approved shop drawings. Construct vertical and horizontal joints so that the sound barrier wall is structurally sound and with no sound leaks. Construct the face of the completed sound barrier wall without deviation from the vertical of more than ½ inch in ten feet and with horizontal alignment conforming to the neat line shown on the contract plans.

Transport, store, handle, and erect precast units in accordance with Section 605 of the Standard Specifications.

Protect all masonry materials from the weather from the time of manufacture until they are in the finished sound barrier walls.

Construction of the ditches shown on the plans will not be measured for payment but shall be incidental to Site Preparation.

After constructing the wall, clean all sound barrier wall surfaces. Clean from the top of the wall to twelve inches below finished grade on both sides. Use a cleaner selected by the Contractor and approved by the Engineer.

VI. MEASUREMENT

SOUND BARRIER WALL

Sound Barrier Walls will be measured in square feet of surface area in a vertical plane between the vertical and horizontal limits, top of wall elevations, and lateral limits shown on the Contractor's approved plans or approved changes; however, tops of footings may be above the minimum depth of burial with no reduction in area to be measured.

Any area of the sound barrier wall outside the approved vertical and horizontal plan limits as shown on the approved plans or changes approved or directed by the Engineer will not be measured for payment. Approved adjustments in the area will be measured in square feet and the final quantity will be increased or decreased as applicable.

The Department will not measure caps, copings, joint sealants, void fill material, weep holes, connectors, trim, surface finish, concrete stain, cleaning, sample panels, and incidental items that are a normal part of the sound barrier wall construction but shall be incidental to **Sound Barrier Wall**.

FOUNDATION PREPARATION

Contrary to Section 603.04.03, **Foundation Preparation** will be measured as lump sum. Structure Excavation Common, Structure Excavation Solid Rock, Structure Excavation Unclassified, Foundation Undercut for removal of unsuitable foundation materials, and refill will not be measured for separate payment but shall be incidental to Foundation Preparation. Removal and resetting of guardrail if needed for access will not be measured for separate payment and shall be incidental to **Foundation Preparation**.

VII. PAYMENT

Payment at the contract unit price per square foot shall be full complete compensation for all labor, materials, equipment, and incidentals to design and construct the sound barrier walls, including construction of the drilled shaft foundations.

Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring will be incidental to the Sound Barrier Wall.

CODE	PAY ITEM	PAY UNIT
21590EN	Sound Barrier Wall	Square Feet
08003	Foundation Preparation	Lump Sum

APPENDIX

Standard Specifications: Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, latest Edition.

AASHTO: AASHTO Standard Specifications for Highway Bridges, latest Edition with Current Interims.

Guide Specifications: AASHTO Guide Specifications for Structural Design of Barriers, latest Edition with Interims.

The Exposure Category is C.

The permitted Wall Type is precast concrete panels mounted on reinforced concrete pilasters, with drilled shaft foundation (no alternate).

Finish Requirements:

Precast Panels — Provide an architectural formed finish using pattern #1214 Minnesota Ashlar Form Liner, as manufactured by "Custom Rock Formliner", 2020 West 7th Street, St. Paul, Minnesota 55116, (800) 637-2447, www.customrock.com, or an approved equivalent. Formliner shall be used on all exposed concrete on the front face (face toward the roadway) and rear face of precast panels. Place form lining to assure that the grooves, lines, and striations are normal to joints and aligned with adjacent panels with no pattern offset.

Pilasters — Pilasters shall be concrete and shall be cast using metal forms. Provide smooth finish on all exposed surfaces.

Color — All concrete surfaces of the precast panels and pilasters shall be stained and sealed as approved by the Resident Engineer, using exterior grade coloring agents applied according to the manufacturer's instructions. Apply the stain and sealer to all exposed faces of the entire structure after the sound barrier wall has been erected, extending from the top of the wall to twelve inches below finish grade on both sides. Provide uniform color in each continuous sound barrier.

Anti-Graffiti coating shall be applied to all surfaces once sealer has cured in accordance with the manufacturer's recommendations. Anti-Graffiti coating shall extend from the top of wall to twelve (12) inches below finish grade on both sides. Anti-Graffiti coating shall be Tex-Cote Graffiti Gard S Non-Sacrificial Coating, as manufactured by "Textured Coatings of America", 2422 East 15th Street, Panama City, Florida 32405, (800) 454-0340, www.texcote.com, or an approved equivalent.

If required by the Resident Engineer, provide two samples of the precast concrete panels, a minimum of four feet by eight feet, cast using the same form liners as proposed for

production for the Department's approval. Retain one sample at the casting yard for a standard of comparison for the production panels. Deliver the second sample to the project site.

Casting and delivering the samples to the job site will not be measured for separate payment but shall be incidental to **Sound Barrier Wall**.

SPECIAL NOTE

Boone County
Item 6-18.00

KY338 INTERCHANGE IMPROVEMENTS

Centrifugally Cast Concrete Pipe Liner

The existing 84” Equivalent Reinforced Concrete storm sewer pipe, downstream of station 119+75 KY338, will be salvaged and relined in accordance with the attached Ecocast™ Technical Specification. As equal products will be allowed, but will require advance approval from the KYTC.



EcoCast Specification

STORM and SANITARY SEWER PIPE REHABILITATION BY THE *ECOCAST™* METHOD
STRUCTURAL GEOPOLYMER LINING REHABILITATION SYSTEM

OUTLINE

PART 1 GENERAL

1.1 Description of Work
1.2 Intent
1.3 Objective
1.4 Work and Components Included
1.5 Applicable ASTM Standards and Specifications
1.6 Safety Equipment and Procedures

PART 2 QUALIFICATIONS

2.1 General
2.2 Acceptable Geopolymer Liner Manufacturers
2.3 Manufacturer and Installer Experience
2.4 Qualifying Superintendent and Crew

PART 3 GENERAL REQUIREMENTS OF THE STRUCTURAL GEOPOLYMER LINER

3.1 Reference Specifications
3.2 Materials: GeoSpray Geopolymer Liner
3.3 Materials: Anti-Microbial System (AMS)
3.4 Materials: Packaging and Storage
3.5 Materials: Receipt Procedure

PART 4 PIPE DESIGN

4.1 Liner Thickness
4.2 Liner Physical Characteristics
4.3 Minimum Acceptable Liner Thickness (Selected Diameters)

PART 5 EQUIPMENT

5.1 Description of Major Equipment
5.2 Equipment Maintenance Schedules

PART 6 EXECUTION

6.1 Pipe Cleaning and Preparation
6.2 Sealing Active Leaks
6.3 Invert Repair
6.4 Inspections (Pre and Post)
6.5 Identification and Pre-Measurement of Lateral Connections
6.6 Bypass of Flow
6.7 Mixing the Geopolymer Lining Material
6.8 Spray Application of Geopolymer Lining Material
6.9 Curing of the Geopolymer Lining Material
6.10 Termination and Sealing at Manhole Outlets
6.11 Internal Reconnection of Lateral Services
6.12 End of Shift Clean Up Procedures

PART 7 QUALITY ASSURANCE AND QUALITY CONTROL

7.1 Quality Control Statement
7.2 Quality Assurance Reports to Management
7.3 Daily Activity Logs
7.4 Equipment Calibration Reports
7.5 Final Inspection
7.6 Sample Preparation and Testing of Geopolymer Liner

PART 8 SUBMITTALS

PART 9 GUARANTEE AND WARRANTY

STORM and SANITARY SEWER PIPE REHABILITATION BY THE *ECOCAST™* METHOD
STRUCTURAL GEOPOLYMER LINING REHABILITATION SYSTEM

PART 1 GENERAL

1.1 Description of Work

Provide all labor, material and equipment to provide for the structural reconstruction of existing sanitary or storm pipes using an approved structural geopolymer lining system by forming a new pipe within an existing structurally deteriorated pipe, which has generally maintained its original shape. This Specification covers the general requirements for the referenced specifications, geopolymer manufacturer and installer qualifications, submittal and guaranty guidelines, materials, pre-installation and installation procedures, and testing. The geopolymer liner may be spin cast or hand sprayed to various pipe surfaces including: brick, concrete, corrugated metal, clay tile, and various other materials.

1.2 Intent

The EcoCast System is used to install a geopolymer liner inside storm and sanitary sewer pipes resulting in a structural liner that stops further water infiltration, rebuilds the structure surface and protects it from chemical attack. The pipe surface is cleaned and a geopolymer liner is spin cast applied to the interior surfaces. This specification describes all the work, materials, and equipment required for the purpose of structurally rehabilitating the pipe, stopping water infiltration and providing protection from chemical attack in storm and sewer pipes and other underground structures. A uniform geopolymer liner shall be spin cast applied, in a prescribed thickness, to all cleaned interior surfaces. The pipe liner shall extend the full length of the original pipe and shall provide a structurally sound, joint-less, new structural pipe within the original pipe.

1.3 Objective

The primary objective of this section is to structurally reinforce the existing pipe while stopping any excessive infiltration and inflow of extraneous water into the storm or sewer system and thereby reduce sewer overflows and the unnecessary treatment and transport costs associated with inflow/infiltration. It is critical that both the Product and the Installer have the ability to meet or exceed all requirements of the Owner. The secondary objective of this contract is to rehabilitate those sewers on which failure could be very disruptive, hazardous to public health, and/or be very expensive to repair after failure.

1.4 Work and Components Included

1. Pre-Installation Cleaning and TV Inspection of Storm or Sewer Pipes
2. Bypass Pumping
3. Pipe Cleaning and Preparation
4. Application of Geopolymer Liner
5. Quality Control Measures
6. Post Rehabilitation Video Taping of Storm or Sewer Pipes

1.5 Applicable ASTM and ACI Standards and Specifications

Unless revised herein, the Contractor shall follow the latest revision of the practices and standards of the following American Society for Testing and Materials (ASTM) Standards, which are made part of this specification:

ASTM Standards:

C 39/39M-10 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C 469-02e1 Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression
C 496/C496-04e1 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
C 882-05 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete by Slant Shear
C 1140-03A Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels
F 2414 Practice for Sealing Sewer Manholes Using Chemical Grouting

ACI Standards:

ACI 305R-99 Hot Weather Concreting
ACI 306R-88 Cold Weather Concreting
ACI Certified Concrete Field Testing Technician, Level 1

1.6 Safety Equipment and Procedures

1. Because pipes of various sizes and configurations will be encountered, each one must be evaluated as to its status as a confined space, on a case by case basis. The OSHA Regulation Document, CFR 29, Part 1910.146 considers storm and sewer pipes as confined spaces.

2. Employees must have been provided adequate training as either a confined space entrant or attendant. Personnel records showing the date, location and test results of confined space training are available.

3. It is required that employees use a relevant 4-gas detection meter to monitor the air quality of the storm or sewer pipe before entry and are familiar with its operation.

4. Proper Personal Protective Equipment (PPE) will be worn by the field technicians at all times. Proper PPE consists of a hard hat, eye protection (safety glasses, goggles, or a face shield) steel toed boots, and a reflective vest that shall be worn at all times while at the work site.

5. Personnel involved in mixing operations must have on long sleeve shirts, gloves and appropriate dust masks while mixing the powder materials.

6. Personnel that work near the spin cast head must wear eye protection that includes safety glasses as a minimum and a face shield for employees that wear glasses.

7. When working in manholes they must be treated as permit required confined spaces.

8. When working in permit required confined spaces the permit must be fully and properly filled out before any operations begin.

9. The minimum equipment required for Permit Required Confined space entry consists of a fully functional 4-gas monitor with a hose of proper length to sample all levels within the confined space (this includes the lowest level, breathing/work zone, above breathing zone and below the ceiling), a tripod in good working condition having the chains required to

stabilize the legs in place, a suitable retraction device in good working order, and harnesses that fits the entrant comfortably.

10. Every effort will be made to minimize the amount of product released into the air during mixing operations.

11. Employees shall treat all waste matter and material removed from a sewer pipe as a contaminated material. All contaminated substances from sanitary sewers such as fallen brick, sand debris, sludge and organic matter must be disposed of in a proper manner.

PART 2 QUALIFICATIONS

2.1 General

It is the intention of this Specification to set a standard of quality and design for the application of all geopolymer materials used in the rehabilitation of Storm and Sanitary Sewer Pipes.

2.2 Acceptable Geopolymer Liner Manufacturers

In order to establish product quality and installation standards, the approved structural EcoCast GeoSpray geopolymer liner shall be applied using the EcoCast lining system and installed by IPR, LLC or equal. Any currently approved process or subsequent approved equal shall strictly adhere to this specification with regard to all standards and requirements. Where discrepancies exist between this specification and the established manufacturer's product and process specifications, THIS SPECIFICATION SHALL GOVERN.

2.3 Manufacturer and Installer Experience

1. The installing Contractor must certify that the geopolymer liner to be used is the EXACT system for which ALL SUBMITTALS AND CERTIFICATIONS were made. No substitutions will be allowed, and misrepresentations or omissions will be grounds for contract termination with the Contractor waiving any and all claims against the Owner for work performed or costs incurred.

2. The structural geopolymer lining rehabilitation system and installing contractor must have a minimum two years proven performance record, using the exact name brand product must have been installed.

3. The Contractor must have installed a minimum of 5000 linear feet of 54 inch diameter pipe or greater of the exact name brand product bid.

4. The Contractor must have been actively involved in the direct field installation of the exact name-brand product bid.

5. The Contractor's office and/or domicile from which the work for THIS CONTRACT will be executed shall provide a list of qualifying experience within 14 days prior to submitting. At a minimum, the Contractor shall provide the following: project name, owner, and contact person, phone number, diameter and length of pipe. ALL PAST REFERENCES PRIOR TO THE BID MUST BE SUBMITTED. Omission of any references may be grounds for disqualification or termination.

2.4 Qualifying Superintendent and Crew

1. The contractor is required to have at least one Qualifying Superintendent on the job during construction activities. The Qualifying Superintendent and crew that will be undertaking the work must meet the experience requirements.

2. The Qualifying Superintendent must have a minimum of two years field experience and been trained by the pump manufacturers and have received a certificate of completion. This factory certification of completion of the required training is kept on file. The Qualifying Superintendent must be thoroughly familiar with all aspects of the operation including safety and quality control measures.

4. The Qualifying Superintendent shall provide a list of qualifying experience within 14 days prior to contract. All required information, including: project name, owner, and contact person, phone number, diameter and length of pipe and date completed shall be furnished for each project completed.

5. The work crew will have been thoroughly trained in the specific aspects of their jobs. This training includes training received from equipment manufacturers and in-field training. A fully trained field technician shall apply the geopolymer liner. Moreover, the field technician is required to have a good understanding of the work and product usage. Field technicians must demonstrate their ability to improve their skills and be capable of properly cleaning the sanitary storm or sewer pipe, developing a repair strategy for stopping any minor water infiltration, and spray applying the geopolymer liner to fully rehabilitate the pipe. The trained field technician is required to follow the manufacturer's guidelines and keep in good standing with the product manufacturer. All of the work including the cleaning course of action, furnishing the materials, preparation of the materials and repair area, providing the installation of the materials and the testing method will be accomplished according to the manufacturer's specific recommendations. The field technicians are given their approval and recognition upon successfully completing the appropriate training.

PART 3 GENERAL REQUIREMENTS OF THE STRUCTURAL GEOPOLYMER LINER

The finished pipe must be such that when the geopolymer liner sets, the total wall thickness will be homogeneous and monolithic. This structural liner is designed and installed to meet fully deteriorated pipe conditions.

3.1 Reference Specifications

Installation and material tests of geopolymer liners must meet the minimum requirements demonstrated in the following **ASTM** standards:

3.1.1 Specifications: Centrifugally Cast or Sprayed Geopolymer Liner

3.1.2 Physical Properties

All geopolymer lining material shall conform to the following 28-day minimum physical properties.

A. Compressive Strength (ASTM C39)
Min. 8,000 psi @ 28days

B. Modulus of Elasticity (ASTM C469)
Min. 5,000,000 psi @ 28 days

C. Flexural Strength (ASTM C293)
Min. 800 psi @ 28days

D. Bond Strength (ASTM C882)

	Min. 1400 psi	
E. Density	Dry	Wet
	127.7 pcf.	139.3 pcf.

3.2 Materials: GeoSpray Geopolymer Liner

1. The EcoCast GeoSpray geopolymer lining material shall be a micro-fiber reinforced ultra-dense geopolymer. This material provides a high strength fiber reinforced mortar specifically designed for ease of mechanical pumping, spraying and spin casting.

2. The EcoCast GeoSpray nano-ceramic geopolymer liner shall not clog spinner heads or spray equipment. The GeoSpray geopolymer liner can also be used to repair, resurface, or rebuild pits, sumps, trenches, tunnels, bridges, piers or any concrete structure that has experienced deterioration.

3. The EcoCast GeoSpray geopolymer liner shall be designed to produce a liner with improved compressive and flexural strength, high adhesion to damp surfaces, lower permeability and increased resistance to aggressive chemical attack.

4. This fiber reinforced formula shall be engineered to improve hydraulic abrasion resistance, provide dimensional stability and protect against penetration by substances such as fats, oils, gases, chloride ions found in marine applications, and where high corrosion exists within a sewer manhole environment.

3.3 Materials: Anti-Microbial System (AMS)

1. Application of Antimicrobial Liquid to prevent Microbiologically Induced Corrosion (MIC). The work consists of rolling, spraying or centrifugally applying GeoTree Technologies' AMS Liquid to the inside of the newly cast pipe. The AMS Biokill mechanism uses static electricity to destroy bacteria and other microorganisms creating an environment that does not allow MIC to occur. Equipment required for application can include centrifugal spray mechanisms, pneumatic spray pumps, hand pumps or paint style roller.

2. The AMS Liquid shall be used full strength as received from the manufacturer and shall not be diluted.

3. The AMS Liquid may be applied during the application of the GeoSpray liner or anytime thereafter.

4. The AMS Liquid shall be applied adequately to achieve surface saturation.

5. The AMS Liquid must be allowed to cure for 12 hours prior to releasing bypass or opening to any traffic.

6. The Owner may perform additional analysis to insure geopolymer quality and consistency throughout the project.

3.4 Material: Packaging and Storage

Material shall be delivered in packaged and sealed condition and free of moisture. Do not use materials that have been exposed to moisture or there is visible damage to the packaging. The GeoSpray Geopolymer is provided in 50 pound bags and 2,000 pound supersacks.

3.5 Material Receipt Process

All materials must be inspected upon receipt and properly documented as to the amount of material, the identification of the material by lot numbers, and inspected by the receiving employee. Dates and times along with the shipping company delivering the material should be recorded for possible future reference. See daily log.

PART 4 PIPE DESIGN

4.1 Liner Thickness

The Contractor shall submit liner thickness calculations to the Engineer for review. These calculations will be performed by a third party registered professional engineer. The structural geopolymer lining rehabilitation system is designed in accordance with a "fully deteriorated gravity pipe condition".

4.2 Liner Physical Characteristics

The geopolymer liner material shall also conform to the minimum requirements demonstrated in the following table:

Physical Properties	ASTM Reference	Requirements
Compressive Strength	ASTM C-39	Minimum 8,000 psi @ 28 days
Modulus of Elasticity	ASTM C-469/469M-10	Min. 5,000,000 psi @ 28 days
Flexural Strength	ASTM C-293	Minimum 800 psi @ 28 days

The contractor shall submit his price proposal based on the appropriate length, size, and existing pipe parameters designated in the Proposal Section. The deterioration of sanitary and storm sewers is an on-going process. Should pre-construction inspections reveal the sewers to be in substantially different conditions than those in the design considerations, the contractor shall request such changes in reconstruction liner thickness, supporting such requests with design data. The deviation, if approved, shall be reflected by the appropriate addition or reduction in the unit cost for that size as agreed to by the Owner.

4.3 Minimum Acceptable Pipe Liner Thickness

The minimum installed geopolymer liner thickness shall be one and a half inch (1.5). The design calculations provided by a registered professional engineer will determine thicknesses if they are over the one and a half (1.5) inch minimum, as required.

The Contractor shall submit his proposed plan for ensuring that the installed geopolymer liner meets the engineer's minimum thickness requirements. The plan shall include the proposed geopolymer liner thickness to be installed.

PART 5 EQUIPMENT

5.1 Description of Equipment

Major equipment components consist of a generator, an air compressor, a high pressure washer, a high shear mixer and pump assembly as a single unit, a reciprocating high speed spin cast delivery assembly, an electric chain drive retraction system capable of +/- 5% repeatability, and high pressure hoses and couplings.

1. Application equipment should have material feed, high shear mixer and pump as a single

operating unit. These three functions should operate as a single synchronized unit. In addition, the application equipment is required to have sensors that maintain uniform operation of all three functions and have the ability to shut down the equipment in the event of interruption of any of the functions. This will ensure consistent delivery of materials over time and distance.

2. Application equipment needs to have visible display for the rate of water addition. This will ensure water/material ratios are known and controlled. Water/material ratio must be monitored and recorded throughout the application process.

3. Application equipment should measure the back pressure on the discharge side of the pump. The change in pressure will alert the operator to any potential changes in flow rates. Do not exceed 25 bars of back pressure.

4. Spinner head needs to be capable of spraying in a both a clock wise and a counter clock wise direction. The change in spin direction achieves superior application by applying the materials at multiple angles, when making multiple applications passes.

5. Spinner head needs to be attached to a reciprocating mechanism to layer the materials. The reciprocating mechanism needs to oscillate the spinner head by a minimum of 6 inches. The multiple layering allows for a more uniform application of the product and achieves higher thickness levels, in a single pass.

6. Retraction system needs to be capable of pulling the spinner head at a minimum rate of 4 inches per minute with no more than +/-5% tolerance. This 5 percent tolerance validation should be performed on a daily basis and be recorded in the daily log.

7. Retraction system needs to have a visible display that monitors the rate of retraction. The rate of retraction and the volume of material discharged are necessary to calculate the thickness of the sprayed materials.

8. The rate of retraction, material discharge volume, dry material usage and length of pipe covered should be monitored and recorded on a daily basis. This is a critical to measure the thickness of material applied.

9. Thickness design calculations must be provided by a registered Professional Engineer.

5.2 Equipment Maintenance Schedules

1. All equipment should be in clean and good working condition.

2. Maintenance and service should be performed on the equipment to manufacturer's standards.

3. Inspect the dry material hopper in the mixer to ensure that there is no blockage or debris in the dry material feed point. Remove any debris prior to feeding dry powder.

4. Inspect the pre-mix chamber to ensure it that there is no blockage or debris. Remove any debris prior to mixing.

5. Inspect the mixing chamber to ensure there is no blockage on debris. Remove any debris or dry materials prior to application.

6. Inspect the rotor/stator pump to ensure there is no debris or blockage in the pump. Remove any debris prior to application.

7. Spare parts or extra equipment should be kept on site to ensure rapid redeployment in the event of equipment failure.

PART 6 EXECUTION

1. All structural rehabilitation of existing storm or sewer pipe will follow the procedures listed below.

2. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.

3. The Owner will be responsible for locating and accessing all manholes, as required, and provide free access to water hydrants for cleaning and other work items requiring water.

4. All surfaces, which have been damaged by the Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations. Suitable materials and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period. Compensation for this work will be included in the rehabilitation item to which it pertains.

6.1 Pipe Cleaning and Preparation

1. The floor and interior walls of the pipe shall be thoroughly cleaned and made free of all foreign materials including dirt, grit, roots, grease, sludge and all debris or material that may be attached to the wall or bottom of the pipe.

2. High pressure water blasting with a minimum of 3,500 psi shall be used to clean and free all foreign material within the pipe.

3. When grease and oil are present within the pipe, water may be heated to 200 degrees, or an approved detergent may be added to the water or a dilute solution of muriatic acid may be used integrally with the high pressure cleaning water.

4. All materials resulting from the cleaning of the pipe shall be removed prior to application of the geopolymer lining material.

5. All loose or defective concrete, brick, or grout, shall be removed to provide an even surface prior to application of the geopolymer lining material.

6.2 Sealing Active Leaks

The work consists of hand applying a dry quick-setting cementitious mix designed to instantly stop running water or seepage in all types of concrete and masonry structures. The contractor shall apply an approved quick-setting mortar in accordance with manufacturer's recommendations. The use of chemical grouts is also an approved method for stopping leaks.

6.3 Invert Repair

The work consists of mixing and applying GeoSpray™ or a suitable mortar, to fill all large voids and repair inverts prior to spraying or centrifugally casting the pipe. For invert repairs, flow must be restricted.

1. The area to be repaired must be cleaned and free of all debris.

2. Once mixed to proper consistency, the geopolymer lining material shall be shot or hand troweled for invert repairs. Care shall be taken to not apply excessive material in the channel, which could restrict flow. Once applied, the geopolymer lining material shall be smoothed either by hand or trowel in order to facilitate flow.

3. Spray or centrifugal application of the geopolymer lining material may proceed immediately after invert repairs are completed.

4. In severe conditions, reinforcing wire mesh or rebar may be required in addition to the geopolymer liner.

5. Suitable flowable fill may be used to fill voids or stabilize soils outside of the pipe or in the invert of the pipe.

6.4 Inspections

The Contractor's experienced personnel trained in location breaks and obstacles by CCTV inspection shall perform inspection of the sewer pipe. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded on CD or DVD and two (2) copies produced. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the geopolymer liner, and it shall be noted so that these conditions can be corrected. A CD or DVD and suitable log shall be submitted to the Owner.

1. Sewers service connections shall also be TV inspected, which shall identify all service connections, openings, and condition of service connections to main.

2. Utilizing high-pressure jet cleaning equipment, several passes shall be completed to assure that all debris is removed from the pipe. If roots are present, root cutters or mechanical brushes are attached to the jet nozzle and sent through the line to remove all root intrusions. Should equipment other than high-pressure jetting apparatus be needed to remove debris or roots, additional payment will be authorized by the Owner.

6.5 Identification and Pre-Measurement of Lateral Connections

A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe traveling upstream. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection. If there remains a doubt as to whether or not the connection is live, additional "dye and flush" tests shall be performed. It will be the responsibility of the Owner's representatives to review this process live or review the video tapes to verify and approve which lateral connections are to be reinstated. The Owner shall be responsible for determining if connection is active or inactive. For each existing service connection determined by the Owner to be active, the Contractor shall determine the condition of the service connection to the main, make his recommendation for lateral connection repair, and record both items in his log. All lateral locations will be measured from the back wall (opposing wall) of the basis manhole, typically the downstream manhole.

6.6 Bypass of Flow

As required for acceptable completion of the work and/or to avoid damages due to sewer spills or overflows, the Contractor shall provide for sewer flow maintenance around the section or sections of pipe designated for rehabilitation. The bypass shall typically be made by plugging the line at an existing upstream structure and pumping the flow into a downstream structure or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow.

Bypassing of sanitary sewerage into the storm water system will not be allowed. For all bypass pumping, pump noise shall be kept to a minimum.

6.7 Mixing the Geopolymer Lining Material

1. Contractor shall add the geopolymer material to the batch water not to exceed a 0.20 water/material ratio. For example, add 100 lbs of geopolymer powder to 18-20 lbs batch water. Precision metering of water in a continuous mixing chamber is required to maintain the strict water to material ratio. It is important to maintain the specified water to polymer ratio throughout the application process. Uniform water to polymer ratio equates to consistent strength. The ability to closely adjust and monitor the addition of water through the use of a sight tube system is required.

2. Mixing water temperatures must be determined before blending operations begin. The mixing water temperature must be recorded in the daily operation log at multiple times throughout the day during the installation process. If water temperatures exceed 80 degrees F, then the water should be chilled to 80 degrees F or lower. The ability to provide mixing water at a consistent temperature is a critical aspect of the mixing and installation process. Industrial electronic chillers are available and should be of a suitable capacity to provide the proper amount of water and at the required temperature. High temperature applications, those greater than 80 degrees F, require the use of water chillers to maintain the water at the proper temperature.

3. The geopolymer lining material shall be mixed in a high shear mixer. This ensures thorough and uniform mix of water with the material prior to pumping. Begin pumping through an adjustable rotor stator pump for continuous delivery to the appropriate application device.

4. The mixing operations must be performed so that the minimum of dust is released into the surrounding environment.

5. This process requires the use of continuous automated mixing and pumping, which eliminates human error and mechanical issues associated with maintaining consistent water/material ratio, mix time, mix speed and dwell time prior to pumping. The automation of dry material feed rate, precise metering of water and pump rate eliminates wet/dry and thick/thin variations resulting in a uniform structure regardless of the pumping distance.

6. Pumps must be equipped with multiple sensors that stop the pump if material either runs out or is overflowing.

7. Multiple pumps shall be onsite at all times in the event one pump has mechanical difficulties.

8. Multiple spin casting units should be onsite to address any application issues that arise during the lining process.

9. Multiple spin cast nozzles should be onsite at all times to address any application issues or failure of the nozzle. Multiple nozzles may be required to produce the required depth or finish of the liner surface.

6.8 Spray Application of Geopolymer Lining Material

1. The geopolymer lining material delivery hose shall be coupled to a medium-velocity spray application nozzle. Pumping of the material shall commence and the material shall be atomized by the introduction of air at the nozzle, creating a medium-

velocity spray pattern for material application.

2. The spin cast nozzle must be cable of bidirectional operation.

3. The bidirectional nozzle shall have the capability to be adjusted to match the angle or gauge of the corrugations when lining corrugated metal pipe.

4. A reciprocating head that has a speed adjustment for making multiple position changes per minute is required. The reciprocating head allows the spin cast mechanism and the associated selected nozzle to make multiple passes on the pipe wall in a single pass of the sled assembly.

5. Spraying shall be performed by starting at the pipe end-project location and progressing towards the entrance of the pipe.

6. Begin at downstream side of the pipe, and retract the spin cast assembly at a monitored uniform rate. Just as important as knowing that a consistent amount of water is being added to the mix, the retrieval rate of the spin head must be measureable and constant. At the beginning of each pipe segment the retraction device should be calibrated. The calibration process includes setting the digital readout to the desired retrieval rate (in inches per minute). Then the retrieval chain is laid out and marked to show the distance traveled in two minutes. The rate obtained must be within 5% of the expected speed and can be verified by this process.

7. The EcoCast GeoSpray geopolymer liner shall be applied to a specified uniform minimum thickness no less than 1/4 inch.

8. The geopolymer delivery hose shall be coupled to a high speed rotating applicator device. The rotating casting applicator shall then be positioned within the center, or positioned higher inside the pipe, as required by the diameter the pipe.

9. The high speed rotating applicator shall then be initialized, and pumping of the material shall commence. As the material begins to be centrifugally cast evenly around the interior of the cavity, the rotating applicator head shall uniformly travel back and forth at or near the center point of the pipe at a controlled frequency conducive to providing a uniform material thickness to the pipe walls.

10. Controlled multiple passes shall then be made until the specified minimum finished thickness is attained. If the procedure is interrupted for any reason, the operator shall arrest the retrieval of the applicator head until flows are recommenced.

11. Material thickness may be verified at any point with a depth gauge and shall be no less than a uniform 1/4-inch. If additional material is required at any level, the rotating applicator head shall be placed at the location and application shall recommence until that area meets the required thickness.

12. The geopolymer lining material shall be applied to a damp surface, with no free water.

13. The medium-velocity spray nozzle and the centrifugal spin casting head may be used in conjunction to facilitate uniform application of the material to irregularities in the contour of the pipe walls.

14. If desired, the geopolymer liner may be troweled following the spray application. Initial troweling shall be in an upward motion, to compress the material and solidify the pipe wall. Precautions shall be taken not to over-trowel.

15. Proper steps shall be taken to ensure the material is cured in a moist and moderate climate. General underground conditions are usually adequate to meet this curing requirement. However, when situations of dry and/or hot conditions are present, the use of a wind barrier and fogging spray may be required.

16. The geopolymer liner should not be placed when the ambient temperature is 37 degrees Fahrenheit and falling or when the temperature is anticipated to fall below 32 degrees Fahrenheit during the next 24 hours, unless specific precautions are employed.

17. During extreme hot weather conditions, chilled water must be used to mix the geopolymer. The geopolymer material should be maintained at a temperature lower than 90 degrees F.

6.9 Curing of the Geopolymer Lining Material

1. Follow manufacturer's recommended cure schedule in curing of EcoCast liner.

2. Refer to ACI 305R-99 Hot Weather Concreting. Do not apply EcoCast liner material when ambient and surface temperatures are 100°F or 35°C and above. Shade the material and prepare the surface to keep it cool. To extend working time, mix the material with cool water or ice-cooled water. Be certain the substrate is saturated surface dry (SSD) before application begins. Proper curing is always required and is particularly important in hot weather. Follow ACI 305R-99 guidelines for the proper use of curing agents.

3. Refer to ACI 306R-88 Cold Weather Concreting. Low-substrate and ambient temperatures slow down the rate of set and strength development. At temperatures below 45°F or 7°C, warm the material and monitor substrate temperatures. Properly ventilate the area when heating. Protect the new liner from freezing.

6.1.10 Termination and Sealing at Manhole Outlets

Termination of the geopolymer liner at the end of a pipe or manhole shall be completed by hand applying the geopolymer liner to the outer surface of the pipe or into the interior of the manhole.

6.11 Internal Reconnection of Lateral Services

The Contractor shall reopen the existing active connections after the final geopolymer lining pass. Restored openings shall be neatly and smoothly open and without rough edges. Care must be exercised not to damage the geopolymer lining while reinstating the lateral.

6.12 End of Shift Equipment Clean Up Procedures

Employees will properly clean and store all equipment used during the days operations. All hoses, fittings, pumps, mixers, spray head equipment, retraction equipment well be cleaned both inside and out. The chain for the retraction device will be pressure washed and then treated with a non hydrocarbon based lubricant. All mixed geopolymer materials will be captured and disposed of properly.

PART 7 QUALITY ASSURANCE AND QUALITY CONTROL

7.1 Quality Control Statement

It is hereby the stated policy that all services will be performed by the protocol specified including ACI, ASTM, OSHA or other appropriate guidelines. The final results will be of the highest quality possible, delivered on the date promised. All equipment and supplies shall be obtained and maintained in order to produce results of the highest quality while meeting OSHA, ASTM, ACI or

other appropriate guidelines. Personnel shall be fully qualified to perform the tasks assigned to them. Continuing education and monitoring of the performance of personnel and equipment will be reviewed by management. Corrective action will be taken immediately if a problem is identified. Quality assurance and quality control objectives are to produce rehabilitated structures of the highest quality.

7.2 Quality Assurance Reports to Management

As management is directly involved in daily operation, the QA/QC plan must be strictly followed. This plan calls for the strict adherence of field protocol and the continuing training and monitoring of all field personnel. All rehabilitated structures are inspected and verified at the end of the installation. All pipe inspection reports, including all photographs and video tapes of the completed structure, are returned to the field superintendent and kept in the project file.

7.3 Daily Activity Logs

An EcoCast Daily Activity Log will be filled out completely anytime a work crew is on site. This log includes listing the personnel present at the site, when they arrived and when they left the site. Important spray data includes the times material was applied and under which atmospheric conditions. The ambient air temperature, the dry powder temperature, the mixing water temperature, and the temperature inside the pipe are all recorded on the daily activity report. The operating conditions are also recorded. These measurements include the water addition rate taken at the meter tube, the retrieval speed of the retraction system and the pump motor speed recorded at the pump. Any special conditions are to be noted in the daily log.

7.4 Equipment Calibration Reports

Equipment calibration reports are to be kept in the truck at all times.

7.5 Final Inspection

At the completion of the rehabilitation of the sewer mains, a video inspection CD or DVD and log (1 copy of both) of the completed line segments shall be given to the Owner by the Contractor. This inspection shall be performed by a color video inspection system. The finished geopolymer shall be continuous over the entire length of all runs and be free of dry spots. No infiltration of groundwater shall be observed. All service entrances shall be accounted for and shall be unobstructed including all rehabilitated lateral connection repair(s).

7.6 Sample Preparation and Testing of Geopolymer Liner

Submit the following information to the engineer: Product data, including manufacturer and brand name along with laboratory tests results to verify 28-day compressive strength in accordance with ASTM C 39. The project superintendent will require that samples of the applied material will be taken on a daily basis. The samples may be taken from the pump immediately before discharge into the hose or at the spin caster, if feasible. A minimum of four samples will be obtained and formed into cylinders as required by ASTM C 39. The samples must be undisturbed for a period of at least 24 hours before they can be transported. The material thickness may be determined by using depth gauges during the spraying process. Another process to determine thickness is to drill into the lined corrugated metal pipes to determine the amount of materials applied to the pipe walls. The depth measurements should be made at three clock positions around the pipe and near both ends and the middle of the pipe. These measurements must be written down in a log book which will be submitted to the client at the end of the project, along with digital photos of the completed pipe. The client or project engineer may request additional testing to be performed. These additional tests should be addressed in writing before the project begins. In some instances clients may request several cores be taken of the pipe into or through the original pipe to determine the thickness applied. Approved geophysical laboratories are available to perform this

type of test on a routine basis. The Contractor shall furnish all equipment and personnel necessary to conduct all required sample preparations.

PART 8 SUBMITTALS

8.1. Before any field work by the Contractor, the Contractor shall submit to the Owner for his review the following:

1. A fully detailed engineers report submitted by a third party, registered professional engineer.

2. Detailed installation procedures and specific procedures for rehabilitation of sewer mains, storm pipe and various other underground structures.

3. Certified copies of all third party laboratory test reports on materials referred to within this Section in accordance with ASTM or Federal Specification requirements that support the physical characteristics required from the materials.

8.2. After cleaning and TV inspection by the Contractor of all of the proposed mains to be rehabilitated and before beginning any lining of mains, the Contractor shall submit to the Owner for his review the following:

1. DVD or CD and log (1 copy of both) of the Contractor's TV inspection of the pipes to be rehabilitated.

2. Detailed minimum design thickness calculations for the geopolymer liner based on Contractor's TV inspection results.

8.3. After rehabilitation of the pipe, the Contractor shall submit to the Owner/Engineer for his records the following:

1. DVD or CD and log (1 copy of both) of the Contractor's TV inspection of the Completed Work.

2. Test results of samples of geopolymer liner as specified in the contract documents.

PART 9 GUARANTEE AND WARRANTY

1. The material shall be unconditionally guaranteed to meet or exceed the design criteria detailed in Part 4 of this Specification Section.

2. The finished EcoCast ™ liner shall be continuous over the entire length of a run and be as free as commercially practicable from visual defects. It shall also meet the test requirements specified in this Section. During the guarantee period, any defects which will affect the integrity or strength of the EcoCast™ liner, shall be repaired at the Contractor's expense.

END OF SECTION

SPECIAL NOTE

Boone County
Item 6-18.00

Construction at Fire Station – Parcel #329

The proposed concrete entrance pad identified for this parcel will be constructed under a consent and release arrangement. Quantities are included in the roadway totals.

SPECIAL NOTE

Boone County
Item 6-18.00

KY338 INTERCHANGE IMPROVEMENTS

Maintain Lighting and Temporary Lighting

Maintain Lighting

This bid item addresses maintaining the lighting for mainline I-75 traffic during construction. The contractor is to maintain interstate lighting at all times.

The project provides for High-Mast lighting. Reference is made to the Lighting plans for information regarding the existing I-71/I-75 median pole locations that will be removed once the High-Mast lighting is operational.

Temporary Lighting

The bid item for "Temporary Lighting" addresses providing temporary lighting specific to the following locations:

- KY338 Roundabout - Temporary lighting is required during the construction MOT phasing as portions of the roundabout are opened. The final lighting is covered by separate bid items.
- The two horizontal curves for US25 Diversion #2.

See the Lighting plans for additional language on this requirement. The contractor will provide location specific plans that will require prior approval by the KYTC. The average maintained illuminance will be 0.6 -.08 footcandles

With respect to the permanent lighting at the Roundabout, it needs to be fully operational before opening to the final configuration.

SPECIAL NOTE

Boone County
Item 6-18.00

NO BLASTING

Blasting for excavation will not be permitted occur on the project.

SPECIAL NOTE FOR STORMWATER BASINS

KY338 INTERCHANGE IMPROVEMENTS
Boone County
Item No. 6-18.00

I. OVERVIEW

This work shall consist of the construction of a new stormwater detention basin, and a reconstruction of an existing retention basin. The new stormwater detention basin is located on the west side of I-75 and is known as the "West Basin". The reconstructed retention basin is located on the east side of I-75 and is known as the "East Basin". This work shall consist of shop drawing preparation, construction of precast concrete outlet structures (2), paved channel, pipe, seeding, erosion control items and earthwork conformity with the lines and grades shown on the contract plans. All work shall be performed in accordance with the Department's latest Standard and Supplemental Specifications and applicable Special Provisions and Standard and Sepia Drawings, except as specified in these notes or elsewhere in this proposal.

II. PAYMENT

All bid items associated with construction of the basins are shown on the Basin Plan Sheets and included in the Roadway General Summary Sheets. Any dewatering activities needed throughout the construction duration will be incidental to the Earthwork quantity.

Special Note for Accelerated Cement Subgrade Stabilization

DESCRIPTION

The subgrade of this project is to be chemically stabilized. In areas where a faster cure is desired, cement should be applied at a rate of 56.7 pounds per square yard. Contrary to Section 208 of the Standard Specifications, the curing time and testing of the subgrade may be constructed with an expedited schedule, and the depth is increased to 12 inches. Otherwise, the subgrade is to be prepared and mixed per the Standard Specifications. The curing time is allowed to be lowered to 48 hours per the following items in this note (Curing time may be reduced to 12 hours when stabilization must occur in an area designated for weekend closure or in other areas at the discretion of the Engineer.).

A. The subgrade is to be tested with a nuclear density meter to ensure that the required maximum dry density and optimum moisture content have been achieved.

B. The subgrade is to be coated with an asphalt curing seal within 12 hours of final mixing. This is to ensure that the proper moisture content is maintained during the shortened curing period.

C. After curing period the Contractor can begin constructing the aggregate base layer. If any rutting of the treated subgrade layer is detected, it must be repaired immediately. Rutting is to be checked by driving a grader over the subgrade 5 times. If the depth of the ruts is 3/8 of an inch or greater, construction of the aggregate layer is to be halted for an additional 24 hour curing period. (Additional curing time may be reduced to 12 hours when stabilization must occur in an area designated for weekend closure or in other areas at the discretion of the Engineer.) Repair of the subgrade is defined as refilling any ruts and cutting any bulges to ensure the depth of stabilized material is 12 inches and the subgrade is at proper grade. The asphalt curing seal must be replied over disturbed areas so that it completely covers the stabilized area.

D. If after 4 days of curing the subgrade is continuing to rut in excess of 1/2 inch it can be tested using a Dynamic Cone Penetrometer (DCP) by an approved tester. If the DCP tests result show that the subgrade has achieved 80 psi of bearing strength, or has increased in strength by at least 15 psi the Contractor will be allowed to continue aggregate layer construction. The Geotechnical Branch will conduct DCP readings at the start of construction to determine a baseline bearing strength.

E. If DCP results do not show the required strength the Contractor can attempt checking the rutting depth or wait the full 7 day curing period.

F. The Geotechnical Branch will coordinate with District Construction personnel with the Department to ensure that core samples of the subgrade are taken. The rate of the core sampling will be determined during subgrade construction to ensure enough are taken to be representative of the entire subgrade. These cores will be tested for verification of the subgrade strength by either the KYTC District Materials Office, the KYTC Geotechnical Branch, or a Geotechnical Consultant prequalified with the KYTC Division of Professional Services.

SPECIAL NOTE FOR CELLULAR CONCRETE FILL

REFERENCES:

All references to the Standard Specifications are to the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, Current Edition.

All references to AASHTO and ASTM are to the current edition.

The requirements in the Standard Specifications, AASHTO, or ASTM shall be used for information not provided. Where there are conflicts between the Standard Specifications, AASHTO, or ASTM the Standard Specifications shall govern.

DEFINITIONS:

Manufacturer – Company that produces lightweight fill materials and provides formulation and methodology for installation.

Applicator – Company subcontracted by the Contractor that mixes fill materials into a slurry per Manufacturer recommendations and places cellular concrete on the project site. (Applicator may be the same as the Manufacturer.)

PART ONE - GENERAL

1.1 DESCRIPTION

1.1.1 Provide and install Cellular Concrete Fill material as specified herein and in the contract documents.

1.2 MANUFACTURER AND APPLICATOR QUALIFICATIONS

1.2.1 The Manufacturer must certify the foaming agent utilized conforms to requirements of ASTM C869 and the cellular concrete produced must meet all properties of Section 2 of this note.

1.2.2 The cellular concrete Applicator shall be approved by the Engineer and certified by the Manufacturer of the cellular concrete prior to ordering materials or beginning work on excavating for placement of cellular concrete. Use skilled workmen who are trained, experienced and familiar with the requirements and the methods for proper performance of this work.

1.2.3 Any specialized batching, mixing, and placing equipment shall be automated with bulk handling equipment approved by the Manufacturer. Transit mixes are not acceptable for these applications.

1.2.4 The certified Applicator shall have successfully applied cellular concrete on at least ten projects, which have performed satisfactorily for at least ten years.

1.3 SUBMITTALS

1.3.1 Details of the cellular concrete shown in the contract plans on the Cellular Concrete Fill Detail Sheet are based on the stated maximum allowable unit weight. If the Contractor proposes to use the unit weight and configuration specified in the plans, a material data sheet will be sufficient for verification of the proposed material. No additional calculations will be required unless requested by the Engineer.

If the Contractor elects to use a different unit weight or configuration, design calculations and construction plans are required clearly showing conformance with the Standard Specifications, ASTM and applicable sections of the contract plans. These calculations and plans shall be submitted to the Engineer for review 30 calendar days prior to ordering material or beginning excavation for placement of lightweight fill. Electronic submission of these documents is acceptable, unless otherwise indicated in the contract documents or requested by the Engineer. Lightweight fill designs and construction plans shall be dated, sealed, and signed by a registered professional engineer licensed to practice in Kentucky. The Contractor shall allow 30 calendar days for the Department to review the first complete submission. Additional time required by the Department to

review resubmissions shall not be cause for increasing the number of contract working days. The additional work required by the Contractor to provide resubmissions shall be at no cost to the Department.

Details need to be enclosed in the submittal about the construction methods proposed. These could include, but are not limited to: procedure for applying waterproofing membrane, a description of any temperature restrictions on placement of the material, etc.

Embankment benching, excavation stabilization, final installation and protection details necessary to construct the lightweight fill and produce a stable final embankment integrated with the remainder of the roadway embankment shall be the responsibility of the Contractor. Design of sheeting, shoring or other earth retention systems necessary to stabilize excavations shall be part of the construction submittal. The Engineer may request that construction plans be supplied prior to any construction.

The format for the construction plans shall be in accordance with the Division of Structural Design's Guidance Manual. The first sheet shall be a title sheet. All final tracings shall be submitted on 22" X 36" paper. Refer to Subsection SD-206-2 of the manual for additional requirements. For additional information contact the Division of Structural Design.

1.3.2 The bid shall be based on work being performed by an experienced Applicator, and the material being provided by a Manufacturer of cellular concrete conforming to the properties of Section 2.2.

1.3.3 Other documentation including concrete mix designs, material certifications, etc. shall be submitted in accordance with this Special Note.

1.3.4 Refer to the proposal for additional details regarding submittals.

PART TWO - PRODUCTS

2.1 MATERIALS

2.1.1 The cellular concrete Manufacturer must produce cellular concrete meeting all requirements of Section 2 of this Special Note. Materials from Manufacturers that have not previously supplied cellular concrete to KYTC projects may submit their product information to the Kentucky Product Evaluation List (KYPEL) for consideration at least 30 calendar days prior to beginning work. For additional information on KYPEL, contact the Division of Materials, Structural Materials Branch.

2.1.2 Foaming Agent: The foaming agent shall be in accordance with the cellular concrete Manufacturer recommendations and ASTM C 869, and shall produce cellular concrete meeting the properties of Section 2.2 of this Special Note.

2.1.3 Cementitious Material: Portland cement shall comply with Section 801 and pozzolans comply with Section 844 of the Standard Specifications. The cellular concrete Manufacturer shall design the mix.

2.1.4 Water: Use potable water.

2.1.5 Admixtures: Admixtures may be used when specifically approved by the Manufacturer of the cellular concrete.

2.1.6 Water-proofing layer: Provide an asphaltic material meeting the properties for Asphalt Mop Coat in Section 808 of the Standard Specifications or an equivalent product in accordance with the lightweight cellular concrete Manufacturer’s recommendations. The product shall meet the approval of the Engineer. The coverage rate shall be as recommended by the Manufacturer for protection of the installation from water infiltration.

2.1.7 Drainage Blanket: The drainage blanket shall meet the requirements for “Coarse Aggregate for Rock Drainage Blanket” in Section 805 of the Standard Specifications, unless otherwise stated in the Cellular Concrete Fill Detail Sheet. The cost of the drainage blanket will be incidental to the cost of Cellular Concrete Fill.

2.1.8 Geotextile Fabric: Type IV Geotextile Fabric shall be in accordance with Sections 214 and 843 of the Standard Specifications. Contrary to Section 214 of the Standard Specifications, the cost of geotextile fabric will be incidental to the cost of Cellular Concrete Fill.

2.2 PROPERTIES

2.2.1 The cellular concrete shall meet the following:

	Class A	Class B	Class C
Cast Unit Weight	26-30 pcf	31-36 pcf	37-42 pcf
Minimum Compressive * Strength@ 28 days (ASTM C 495)	40 psi	80 psi	120 psi
Long-Term Water Absorption (% Cast Unit Weight) (ASTM C 796)	20%	16%	14%
Coefficient of Permeability (cm/sec) (@ 2.0 psi) (ASTM D 2434)	10^{-4}	10^{-4}	10^{-4}

* If fly ash is used for cement replacement in percentages of 40% or greater, the compressive strength shall be tested @ 56 days.

2.3 GEOTECHNICAL DESIGN PARAMETERS

2.3.1 Unit Weight:

	Class A	Class B	Class C
Maximum unit weight for design above the water table*	30 pcf	36 pcf	42 pcf
Maximum unit weight for design below the water table	36 pcf	42 pcf	48 pcf

*Maximum unit weight value for use in design above water table is assumed to be cast unit weight.

2.3.2 Uplift Forces
Where the cellular concrete will be designed for use below the water table, uplift forces shall be calculated. The unit weight of cellular concrete used for these calculations shall be the minimum value from Section 2.2.1 of this note for the applicable Class of material. The thickness of rip-rap, soil, or other material required as a cap to offset the uplift forces shall be determined.

2.3.3 Global Stability Analyses
Global stability calculations for the critical embankment section with lightweight cellular concrete will be the responsibility of the Department. If the Contractor decides to use a different unit weight, as discussed in Section 1.3.1, or a different configuration from the lightweight fill detail sheet, the stability calculations for the new lightweight fill section will be the responsibility of the Contractor.

PART THREE - EXECUTION

3.1 SITE CONDITIONS: Examine the areas for work of this Section so that conditions detrimental to timely and proper completion of the work are corrected.

3.2 PREPARATION: The installation of the cellular concrete shall be in accordance with procedures provided by the cellular concrete Manufacturer. The area to be filled shall be prepared in accordance with the contract documents and plans, and shall not have any standing water in it prior to fill placement. Items encased in the fill shall be set and stable prior to installing the cellular concrete.

3.3 INSTALLATION: Use automated job site batching, mixing, and placing equipment certified by the cellular concrete Manufacturer. The Contractor is responsible for maintaining a stable slope during construction.

3.3.1 A drainage blanket shall be constructed in accordance with requirements of the Cellular Concrete Fill Detail Sheet. The drainage blanket beneath the cellular concrete shall be wrapped with Type IV Geotextile Fabric, unless the plans state otherwise.

3.3.2 Mix the materials and convey promptly to the point of placement. Cast the cellular concrete in lifts in such a manner to prevent segregation. The maximum lift thickness shall be 4 feet. Allow a minimum 12-hour curing time between lifts, unless otherwise directed by the Engineer and Manufacturer.

3.3.3 The final surface finish shall be within 6 inches of plan elevation. After all lifts have been constructed, the final surface of the lightweight fill shall be coated with a waterproofing material in accordance with Section 2.1.6 of this Special Note. Coat the top and sides of the final lightweight fill configuration. Apply the product by mop and allow to dry prior to backfilling. Avoid direct contact with construction equipment to prevent damage to the water-proofing layer. Repair any areas damaged during construction prior to backfilling.

3.3.4 A minimum of 2 feet of soil cover, compacted in accordance with the Standard Specifications, will be required above the cellular concrete.

3.4 SAMPLING (to be completed by the Applicator in accordance with this Special Note):

Mold four (4) 3" x 6" cylinder test specimens for each 300 cubic yards of lightweight fill placed or for each four (4) hours of placing. Take samples in accordance with ASTM C 495. **Do not rod the samples**. The samples molds shall be provided by the Applicator, and the cost of the sample molds is incidental to the placement of Cellular Concrete Fill.

3.5 CURING:

Mark the cylinders and place in a location that will not be disturbed or subjected to temperature extremes. Avoid excessive or early handling of test cylinders. After 2-3 days, deliver the cylinders to the Department's Division of Materials. Care should be taken during delivery to prevent damage of the specimens. Maintain the curing environment for the molded specimens as specified in ASTM C 495, for cellular concrete using preformed foam. Do not oven dry the specimens. Cure as follows:

Day 1: 70 ± 10ºF
Days 2-25: 73.4 ± 3ºF moist cure
Days 26-28: Dry for 3 days at a temperature of 70 ± 10ºF and relative humidity 50 ± 10%.

3.6 TESTING:

3.6.1 The Applicator shall perform the field unit weight measurement in accordance with ASTM C 796, Section 8. Field unit weight shall be measured using a machined-steel container with a volume of 0.5 cubic feet and a flat smooth rim. The scale used for the weight measurement shall be accurate to within 0.1% of the measured weight. Fill the tared weighing container with a representative sample of the cellular concrete (tap the sides of the container with a rubber hammer during filling). Overfill the container, then strike off excess concrete by holding the strike-off plate in a horizontal position and moving it across the top of the container with a sawing motion. Wipe the outside surface of the container free of spilled concrete with a cloth. Record the weight of the container and concrete. Calculate the unit weight of the cellular concrete. Adjust the mix as required to obtain the specified cast unit weight at the point of placement.

3.6.2 Compressive Strength: The Department, Division of Materials shall test compressive strength in accordance with ASTM C 495. Specimens may be tested at any age to monitor the compressive strength. Note: The maximum load required to break the sample should not be less than 10% of the maximum load range of the testing equipment being used. A testing machine with a load range of 5,000 pounds is appropriate to use when testing cellular concrete.

3.6.3 Absorption: Water absorption must be certified by the Manufacturer to meet the requirements of Section 2.2 prior to use. The procedure shall be as specified in ASTM C 796, Section 8.

3.6.4 Permeability: Permeability must be certified by the Manufacturer to meet the requirements of Section 2.2 prior to use. The procedure shall be as specified in ASTM D 2434.

PART FOUR - METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 METHOD OF MEASUREMENT:

4.1.1 No separate measurement shall be made for Cellular Concrete Fill. Lightweight fill shall be paid for based on the volume of cellular concrete shown on the plans. Changing the limits or character of the installation due to the Contractor's construction methods or the Contractor's choice of a lightweight fill material of different unit weight as outlined in Section 1.3.1 of this Special Note shall not be cause for changing the plan pay quantities including plan roadway pay quantities.

4.1.2 The Contractor's selected construction methods may require additional excavation, fill or lightweight fill volume, or incidental items to satisfy the plan requirements. The Contractor will be responsible for maintaining a stable slope during construction. Sheeting, shoring, temporary walls or other earth retention systems necessary to stabilize excavations during lightweight fill construction will not be paid separately. All designs, labor, materials, etc. required to complete this work shall be incidental to Cellular Concrete Fill.

4.2 PAYMENT: Work specified in this section will be paid for at the contract unit price. The quantities shall be as shown in the contract documents and plans for Cellular Concrete Fill.

Code	**Item**	**Pay Unit**
23930EC	Cellular Concrete Fill	Cubic Yard

~~Jefferson~~ Boone County
~~COOPER CHAPEL ROAD~~KY338
Item No. 6-18.00~~5 403.00~~

Special Note for Colored Concrete

Colored concrete will be used at the Roundabout at the Truck Apron ~~and Splitter Islands~~ locations.

Payment will be made per the following bid items:

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Truck Apron
9" JPC Pavement (Colored) – Sq. Yard

~~**Splitter Islands**~~
~~____" JPC Pavement (Colored) Sq. Yard~~

The intent is to utilize a redish tone. The contractor will submit a color sample for approval prior to the construction.

1.0 Materials
1.1 Concrete –
- Integrally color concrete using non-fading pigments conforming to ASTM C979 as follows:
- For red: use non-fading synthetic iron oxides at a loading of 6 percent or more by weight of total cementitious material in the mix. Match the concrete color in reasonably close conformance with Federal Standard 595 Color Server, FS color 31136.
- Maintain mix characteristics for colored concrete requiring a matching finish. Use the same source, brand, type, and color of Portland cement, supplementary cemetitious materials, aggregates, and admixtures for colored concrete

throughout the project. Use constant cement content, supplementary cementitious material content, and water/cementitious material ratio to maintain consistent color.

1.2 Curing Compound –

- Furnish a liquid membrane-forming clear curing compound conforming to ASTM C 1315, type 1.

1.3 Admixtures –

- Furnish admixtures designed for use with and compatible with colored concrete pigments. Do not use calcium chloride or other admixtures containing chlorides.

1.4 Colored Concrete Mix Approval

1.4.1 General – Obtain engineer approval for colored concrete mixes before placing colored concrete. The engineer will base approval either on successful performance history or on trial batches. Upon engineer approval, the submitted sample panel will be the visual quality standard for finished work under the contract.

2.0 <u>Construction</u>

- Construct work incorporating colored concrete conforming to contract specifications under the associate bid items except cure with clear curing compound and use only non-chloride admixtures.
- Produce consistently colored concrete in full cubic yard increments. The engineer will not allow variations in the amounts, types, or source of materials with them exception on minor adjustments of water and air entraining agent. Other changes require mix re-approval.
- Schedule placement to minimize exposure to rapid drying conditions, wind and full sun, before applying curing compound. Do not place colored concrete if rain, snow, or freezing temperatures are forecast within 24 hours.
- Cover or otherwise protect adjacent concrete work from discoloration and spillage while placing and curing colored concrete. Remove and replace discolored concrete as the engineer directs.
- Perform finishing operations consistently to avoid color variation. Do not begin finishing while bleed water is present. The engineer will order removal and replacement of colored concrete if the contractor adds water to the surface to aid in finishing. Apply strokes in the same direction during the final finishing and texturing.

- Protect colored concrete from premature drying and excessive cold or hot temperatures by promptly applying curing compound. Do not allow plastic sheeting to come in contact with the colored concrete.
- Protect the colored concrete from damage. Do not permit construction traffic or material storage on colored concrete. Exclude foot traffic from colored concrete for at least 24 hours after placement.

3.0 Measurement

- The department will measure the Colored~~ing~~ Concrete bid items by the square yard.

4.0 Payment

- Payment for bid items under this section is full compensation for developing mix designs and providing sample panels for furnishing pigments; for special construction procedures required; restoring the site, and disposing of waste material; and for other costs not included in associated contract bid items.

Payment will be made per the following bid items:

Truck Apron
9" JPC Pavement (Colored) – Sq. Yard

~~**Splitter Islands**~~
~~4" JPC Pavement (Colored) – Sq. Yard~~

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SPECIAL NOTE FOR EPS FOAM BLOCK EMBANKMENTS

This Special Note will apply when indicated on the plans or in the proposal.

REFERENCES:

All references to the Standard Specifications are to the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, Current Edition.

All references to ASTM are to the current edition.

The requirements in the Standard Specifications, NCHRP Publications, or ASTM shall be used for information not provided. Where there are conflicts between the Standard Specifications or ASTM, the Standard Specifications shall govern.

DEFINITIONS:

Manufacturer – Company that produces EPS geofoam blocks to meet the desired specifications and provides formulation and methodology for installation.

Supplier – Subcontracted by the Contractor. Provides EPS geofoam blocks to the Contractor. Responsible for design of lightweight fill as specified in this note, but may hire a subconsultant to perform the design, subject to approval by the Engineer.

1.0 DESCRIPTION.

This work consists of furnishing and installing Expanded Polystyrene (EPS) foam blocks for use as a lightweight fill material. The terms "EPS foam" and "geofoam" are considered synonymous in this Special Note.

1.1 Manufacturer Qualifications

1.1.1 The Manufacturer must have their EPS geofoam product listed in the Kentucky Product Evaluation List (KYPEL) with a status of Phase IV or Phase X and the lightweight fill and associated materials must meet all properties of Section 2 of this note. For additional information on KYPEL, contact the Department's Division of Materials, Structural Materials Branch.

1.2 Submittals

1.2.1 Details on the EPS foam block fill detail sheet shown in the contract plans are based on the stated maximum allowable unit weight. If the Contractor uses the given unit weight and configuration specified in the plans, then only a material data sheet must be supplied for verification of the proposed material. No additional calculations will be required unless requested by the Engineer.

If the Contractor elects to use a different unit weight or configuration, design calculations and construction plans are required clearly showing conformance with the Standard Specifications, ASTM and applicable sections of the contract plans. These calculations and plans shall be submitted to the Engineer for review 30 calendar days prior to ordering material or beginning excavation for placement of lightweight fill. Electronic submission of these documents is acceptable, unless otherwise indicated in the contract documents or requested by the Engineer. Lightweight fill designs and construction plans shall be dated, sealed, and signed by a registered professional engineer licensed to practice in Kentucky. The Contractor shall allow 30 calendar days for the Department to review the first complete submission. Additional time required by the Department to

review resubmissions shall not be cause for increasing the number of contract working days. The additional work required by the Contractor to provide resubmissions shall be at no cost to the Department.

Embankment benching, excavation stabilization, final installation and protection details necessary to construct the lightweight fill and produce a stable final embankment integrated with the remainder of the roadway embankment shall be the responsibility of the Contractor. Design of sheeting, shoring or other earth retention systems necessary to stabilize excavations shall be part of the construction submittal. The Engineer may request that construction plans for the sheeting/shoring be supplied prior to any construction.

The format for the construction plans for the EPS geofoam embankment shall be in accordance with the Division of Structural Design's Guidance Manual. The first sheet shall be a title sheet. Refer to Subsection SD-206-2 of the manual for additional requirements. Submittals shall be electronic unless otherwise noted. For additional information contact the Division of Structural Design.

1.2.2 The bid shall be based on the Supplier utilizing a Manufacturer that is listed in KYPEL as status of Phase IV or Phase X to supply EPS Geofoam Blocks.

1.2.3 Submit an installation plan for the geomembrane spill protection layer, as outlined in Section 6.4.4 of this special note. See Section 2.4 of this special note for additional requirements for the geomembrane.

1.2.4 Other documentation including material certifications, etc. shall be submitted in accordance with this special note.

1.2.5 Refer to the proposal for additional details regarding submittals.

1.3 Supplier's Representative

1.3.1 A representative of the EPS block Supplier is required to be on site during the first full day of geofoam fill construction to provide training and assistance to the Contractor's personnel and project inspectors.

1.3.2 A one-day minimum follow-up visit by the Supplier's representative will be required within two weeks of the initial visit, or as approved by the Engineer, in order to monitor progress.

1.3.3 After each on-site visit, the Contractor is required to submit a letter to the Section Engineer written by the Supplier's representative documenting the observations of each visit with documentation that the licensed professional engineer responsible for the design has reviewed the letter.

2.0 MATERIALS.

2.1 EPS Foam Blocks. Use EPS foam blocks meeting the requirements of ASTM D6817. The EPS blocks cannot contain chloro-fluorocarbon, hydro-chloro-fluorocarbon, or hydro-fluorocarbon compounds and shall be resistant to biological degradation including insect infestation.

The EPS foam block must be listed in KYPEL as Phase IX or Phase X and the block, and other materials associated with its installation, must meet all material requirements of this note. Materials from other Manufacturers of EPS blocks not listed in KYPEL may submit their product information to KYPEL for consideration at least 30 calendar days prior to beginning work.

For most applications, use EPS Blocks with standard dimensions approximately 2 to 3.5 feet tall by 4 feet wide by 8 to 16 feet long. Other proposed dimensions may be acceptable, and will be evaluated on a case-by-case basis.

The EPS block Manufacturer is responsible for maintaining a quality control program to ensure compliance with this section.

2.1.1 Block Properties

*Type	EPS 22	EPS 29	EPS 39	EPS 46
Density (ASTM C1622)	1.35 pcf	1.80 pcf	2.40 pcf	2.85 pcf
Minimum Compressive Strength @ 1% Strain (ASTM D1621)	7.3 psi	10.9 psi	15.0 psi	18.6 psi
Minimum Flexural Strength (ASTM C203)	35 psi	50 psi	60 psi	75 psi
Minimum Oxygen Index (Volume %) (ASTM D2863)	24.0%	24.0%	24.0%	24.0%

*ASTM D6817, Table 1.

2.2 Block-to-Block Connectors. When horizontal forces cannot be resisted by the friction between blocks or when seismic loads are to be resisted, take appropriate measures to permanently secure the blocks and prevent horizontal block-on-block sliding. Secure the blocks as needed during construction to prevent movement and separation. At a minimum, connect the blocks using small sections of epoxy-coated steel reinforcing bars as needed. Bars should conform to Section 602 of the current Standard Specifications. Bars should not prevent the adjacent block surfaces from being in intimate contact. Other equivalent measures may be used if approved by the Engineer.

If required based on Manufacturer recommendations or geotechnical plan notes, use gripper plates to restrain EPS blocks from moving laterally in layer over layer applications. If required, gripper plate material properties and installation shall be in accordance with Manufacturer specifications.

2.3 Leveling Pad. Use sand meeting the requirements of Section 804 under the subsections pertaining to pipe bedding. Ensure that material is free of coal, shale, roots, organic matter, frozen material, and other deleterious materials.

2.4 Spill Protection Layer. The exposed surfaces of the final block configuration should be protected against chemical spill, particularly petroleum products. In order to provide this protection, a geomembrane liner will be required unless otherwise specified in the contract documents. The geomembrane should be resistant to petroleum products and manufactured of High Density Polyethylene (HDPE) or Linear Low Density Polyethylene (LLDPE). Place the geomembrane as described on the EPS Geofoam Embankment Detail Sheet. The geomembrane should also be UV resistant. Use a **textured (both sides)** geomembrane meeting the minimum specifications below.

Contractor may propose other comparable alternates for the spill protection layer for review by the Engineer.

2.4.1 Geomembrane Properties

Dimensional Properties

Special order roll dimensions are preferred to minimize the amount of seams.

Thickness (ASTM D5994) 30 mil (0.75 mm)

Tensile Properties (ASTM D6693)

Tensile Strength @ Break 50 lb/in width

Minimum Elongation @ Break 100%

Puncture Resistance (ASTM D4833)	35 lbs.
Tear Resistance (ASTM D1004)	15 lbs.

2.5 Soil Cap. A minimum 2-foot soil cap is required over the top surface of the geomembrane. The first one (1) foot of material above the geomembrane shall have a top size of 0.5 inch.

2.6 Concrete Load Distributor. A concrete load distributor will be required when geofoam is placed beneath the paved roadway and there is less than 5 feet of soil between the pavement base material and the top layer of geofoam. Where a concrete load distributor is included in the design, use Class B concrete conforming to Subsections 601.02 and 601.03, and use epoxy-coated No. 4 steel bars as reinforcement. The steel reinforcement and epoxy coating shall conform to Section 602 of the Standard Specifications.

3.0 GEOTECHNICAL DESIGN PARAMETERS.

Use the geotechnical parameters below for the design of EPS foam block configurations.

3.1 Coefficient of Friction (for internal, block-on-block calculations). An appropriate coefficient of friction should be used to check for horizontal sliding between block layers. A value of 0.6 is typical for most block types. The selected coefficient of friction will be evaluated by the Department during review of the Lightweight Fill plans (if submission of plans is required based on Section 1.2.1). The Manufacturer should provide a coefficient of friction by certification, for use in the design calculations.

3.2 Unit Weight

3.2.1 **Lightweight fill above the groundwater elevation**. Where EPS foam blocks will be above the groundwater elevation the entire design life, a density of 3.2 lb/ft^3 should be used in settlement and stability analyses to account for long-term water absorption.

3.2.2 **Lightweight fill periodically submerged.** Where EPS foam blocks will be submerged periodically due to groundwater fluctuation, a density of 4.7 lb/ft^3 should be used in settlement and stability analyses to account for long-term water absorption.

3.2.3 **Lightweight fill continually below groundwater elevation.** Where EPS foam blocks will be continually below the groundwater table, a density of 6.3 lb/ft^3 should be used in settlement and stability analyses to account for long-term water absorption due to submersion.

3.3 Design for uplift forces. Conditions where blocks will be submerged shall be accounted for by considering uplift forces in design. The uplift forces must be counteracted with overburden or suitable restraint devices with geogrids or geomembranes. The minimum density for the specified block shall be used for these calculations. A minimum factor of safety against uplift of 1.3 should be provided.

3.4 Maximum Design Stress in Blocks. The maximum design stress in the geofoam blocks should not exceed 30% of the compressive strength developed at approximately 1% strain.

3.5 Global, Seismic and Internal Stability Analyses

Global stability calculations for geofoam embankment will be the responsibility of the Department. If the Contractor elects to use a different unit weight, as discussed in Section 1.2.1, these stability calculations for the new EPS block weights will be the responsibility of the Contractor. Analyses should conform to Transportation Research Board (TRB) recommendations as outlined in NCHRP Web Document 65, Chapter 5 (global and seismic stability) and Chapter 6 (internal stability).

4.0 DELIVERY, STORAGE, AND HANDLING.

4.1 Delivery. Deliver materials in Manufacturer's original, undamaged condition with identification markings and labels intact.

4.2 Storage and Handling. Store EPS blocks so as to prevent them from being damaged. Ballast and/or secure blocks during storage and placement. Cover blocks with light-colored opaque tarps if stored outdoors for more than two weeks.

EPS blocks are combustible. Do not expose them to flame, cigarette smoking, or other ignition sources.

Do not operate any equipment directly on the EPS Blocks. If necessary, light weight rubber-tired equipment (with a contact pressure less than 15 psi may be allowed if a sufficient amount of plywood or other sheathing material is used on top of the blocks to allow the equipment to operate without damaging the blocks and if approved by the Engineer.

Do not expose the EPS Blocks to hydrocarbons, or petroleum-based solvents such as gasoline, diesel fuel, concrete curing compound, tar, and asphalt/mastic compounds.

Allow a minimum of seven days between the Manufacturer molding and the Contractor placing EPS blocks to allow adequate out-gassing of the blowing agent. A longer time period may be required by the Manufacturer.

5.0 SAMPLING AND TESTING.

5.1 Sampling. The Supplier shall obtain samples for testing by the Department, Division of Materials. Samples shall be obtained at a frequency of one set of samples per 500 cubic yards. One set of samples consists of ten (10) cubes, 2 inches on each side. Projects with less than 500 cubic yards of material will not require testing, and strength properties will be accepted based on EPS type and certification by the Manufacturer. The Supplier or Contractor may elect to obtain additional samples for independent testing.

5.2 Testing.

5.2.1 **Density.** The Department will perform 1 test per 500 cubic yards as outlined in Section 2.1 of this note. (The samples for compressive strength testing may also be used for density testing, if done before strength testing. Three (3) cube samples shall be individually measured and the average reported.)

5.2.2 **Compressive Strength.** Each individual sample obtained will be tested by the Department for compressive strength as outlined in Section 2.1 of this Special Note. Acceptance will be based on strength at 1% strain.

6.0 CONSTRUCTION. Place EPS Blocks in accordance with the Manufacturer's recommendations, in tight groups without gaps in the horizontal or vertical directions. The Contractor will be responsible for maintaining a stable slope during construction.

6.1 Surface Preparation. Smooth and level the surface and remove obstructions, debris or sharp objects that may damage the blocks. Conform to Standard Specifications Sections 202 and 207 when preparing the surface to be reinforced.

6.2 Leveling Pad. Construct a leveling pad to the lines, grades, and cross-sections as shown in the plans. Complete all leveling pad fill with a tolerance of ± 0.4 % (1/2 inch per 10 feet). There should be no debris or large pieces of vegetation protruding from the subgrade before placement of the leveling pad. Soil particles at the subgrade surface should be no larger than coarse sand to fine gravel (0.08 to 0.8 inch). Leveling pad materials and placement for EPS block construction will incidental to EPS Foam Block, unless otherwise stated in the plans.

6.3 EPS Block Placement. Place EPS block such that blocks in successive courses are placed at 90^{o} to the previous layer and offset so that joints between block layers are not continuous. Each horizontal joint between courses of block will be secured with a gripper plate or other connection device approved by the Engineer and the Manufacturer. The surface of the blocks must remain level within the ± 0.4% tolerance. Field cut the EPS Blocks for a tight fit at any cross-drain pipe or other similar obstruction as directed by the Engineer. Sand placement may be allowed by the Engineer between the block and obstruction if deemed necessary.

6.4 Spill Protection Layer.

6.4.1 The surface beneath geomembrane shall be uniform and free of all sharp or angular objects prior to geomembrane placement. No objects larger than 0.5 inch should be protruding above the prepared subgrade. Any rebar used to connect blocks should be driven beneath the block surfaces. Gripper plates (if used) should be padded such to avoid puncturing the geomembrane with the sharp edges.

6.4.2 Seaming shall be performed in the field using a welding system and quality control testing in strict accordance with the Manufacturer's specifications. The weld seam shall provide the same physical and chemical resistance properties as the HDPE sheet.

6.4.3 The geomembrane should be installed according to the Manufacturer's recommendations, and as directed by the Engineer.

6.4.4 The Geomembrane Supplier or Installer is required to provide the layout plan for the installation of the geosynthetic material. Include a brief overview of the Installer's previous geomembrane installation experience with this submittal. This information may be submitted electronically. Allow 30 days for the Department to review this submittal.

6.4.5 Construction details for geomembrane/geofoam penetrations and adjacent structures should be provided by the Geomembrane Supplier or Installer. Construction for these situations should be conducted carefully to provide a seal that is capable of preventing leakage around the penetration or structure.

6.4.6 The selected geomembrane material should be stored onsite in accordance with the Manufacturer's instructions, and should not be exposed to sunlight any longer than permitted by the Manufacturer's instructions.

6.5 Soil Cap. Two (2) feet of soil cover is required over the geomembrane. The first one (1) foot of fill placed above the geomembrane shall be a controlled fill with a top size of 0.5 inch. The material shall be placed in a single lift. This reduces the chance of puncturing the geomembrane.

6.6 Concrete Load Distributor. When a concrete load distributor is required (see Section 2.5 of this note), use a cap of reinforced, cast-in-place concrete with a minimum 4-inch thickness. Reinforce the concrete with epoxy-coated No. 4 bars placed on two foot centers in both directions, and provide one inch of clear cover from the bottom surface of the concrete.

7.0 ACCEPTANCE.

Obtain the Department's approval for all material before incorporating it into the project.

7.1 Certification. Ensure that each EPS block shipment is accompanied by a Manufacturer's certification that the material satisfies the above specifications and any applicable test data for the specified physical properties for each lot number.

8.0 MEASUREMENT.

No separate measurement shall be made for EPS Foam Block. "EPS Foam Block" fill shall be paid for based on the volume of lightweight fill shown on the plans. Changing the limits or character of the lightweight fill installation to

conform to the lightweight fill Manufacturer's design and construction plans or the Contractor's selected construction methods shall not be cause for changing the plan pay quantities including plan roadway pay quantities.

If required, the Concrete Load Distributor and all associated materials will be incidental to EPS Foam Block.

The EPS Foam Block fill Manufacturer's design may require additional excavation, fill or lightweight fill volume, or incidental items to satisfy the lightweight fill design requirements. The Contractor will be responsible for maintaining a stable slope during construction. Sheeting, shoring, temporary walls or other earth retention systems necessary to stabilize any excavation required during lightweight fill construction will not be paid separately. All designs, labor, materials, etc. required to complete this work shall be incidental to EPS Foam Block.

Connection devices and sand Leveling Pad are incidental to EPS Foam Block construction and will not be paid for separately by the Department.

9.0 PAYMENT. Payment includes all equipment, labor, and materials necessary to furnish and install the EPS blocks according to the plans and specifications. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
23931EC	**EPS Foam Block**	**Cubic Foot**

SPECIAL NOTE FOR MECHANICALLY STABILIZED EARTH RETAINING WALLS

Item 6-18
KY338

1.0 DESCRIPTION

1.01 General and Experience Requirements:

The work under this section consists of designing, furnishing all materials and constructing Mechanically Stabilized Earth (MSE) retaining walls in accordance with the current Standard Specifications, this Special Note, in compliance with the lines and grades, dimensions and details shown on the project plans, and as directed by the Engineer.

The Contractor shall provide the MSE wall designer with a complete set of project plans and specifications and shall ensure that the wall design is compatible with all other project features that can impact the design and construction of the wall. The following terms are used in this specification for identification of various entities for which the Contractor shall be fully responsible:

Term	Entity
Wall Manufacturer	The entity contractually retained by the contractor to provide materials and construction services for an accepted MSE wall system as identified in Subsection 1.02.
Wall Designer	The entity contractually retained by the contractor to provide design of an accepted MSE wall system as identified in Subsection 1.02. The wall designer may be a representative of the wall manufacturer.
Department / Engineer	Refers to the Kentucky Transportation Cabinet representative and/or a designated consultant acting on behalf of KYTC.

1.02 Accepted Systems:

The contractor shall provide an MSE Wall System that uses inextensible reinforcement and reinforced concrete panels or modular block and is one of the pre-approved systems below. Inclusion of a system on this list does not relieve the Contractor and/or wall manufacturer of the contractual responsibility to satisfy all specific requirements herein and/or elsewhere in the contract documents.

- Reinforced Earth (Reinforced Earth and Retained Earth)
- Hilfiker RSE
- Tricon Retained Soil Wall System
- ISOGRID Retaining Wall System
- Keystone Keysystem I
- Sine Wall MSE Panel System
- Sanders Pre-Cast Concrete Systems

Heights and lengths of earth retaining walls may vary from, but shall not be less than, those shown on the plans. The height and length to be used for any system shall be the minimum for that system that will effectively retain the earth behind the wall for the loading conditions and the contours, profile, or slope lines shown on the plans, or on the approved working drawings, and in accordance with all relevant

internal and external stability design criteria, but not more than the pre-approved height for the particular MSE wall system selected.

1.03 MSE Wall Design Engineer:

Requirements for the Wall Designer's **MSE Wall Design Engineer** (who may be employed by the wall manufacturer or may be a consultant) are:

- Licensed Professional Engineer in the Commonwealth of Kentucky with a minimum of 5 years of geotechnical and/or structural engineering experience.
- Design and/or construction experience on at least five (5) MSE Walls and a minimum of 50,000 square feet of MSE Wall completed in the past five (5) years. Experience on a Reinforced Soil Slope may be substituted for one wall and up to 10,000 square feet.
- Design experience on at least three (3) MSE Walls and a minimum of 30,000 square feet of MSE Wall on highway infrastructure projects using the wall system that will be used on this project completed in the past five (5) years.
- Completion of at least 15 Professional Development Hours related to the design and/or construction of MSE Walls in the past five (5) years. This training may consist of attendance at a related short course, conference, seminar, workshop, or college course. Include documentation of this training with the submittal of the Design Engineer's credentials.

1.04 Wall Aesthetics:

Wall aesthetics shall be as specified in the project documents and request for proposals.

1.05 Certifications:

(A)	Certification of Design Parameters:	See Subsection 2.01 herein specified.
(B)	Certification of Materials:	See Subsections 3.04, 3.07, 3.09 & 3.10 herein specified.

1.5 QUALITY CONTROL:

The Department will perform construction inspection for the MSE Walls. However, the Contractor will be required to proactively implement the quality control procedures described herein. All costs associated with MSE Wall Quality Control will be incidental to the cost of the wall.

1.51 MSE Wall Quality Coordinator:

The Contractor shall designate a MSE Wall Quality Coordinator who shall:

- have a minimum of 3 years of construction field experience,
- be responsible for ensuring that the Contractor's quality control procedures are implemented including maintaining and submitting the checklists required in Section 1.57, (but may have other duties and/or responsibilities),
- have sufficient authority to carry out quality coordinator responsibilities, and
- be in the field during MSE Wall construction.

1.52 Mandatory MSE Wall Construction Training:

The MSE Wall Designer or an approved appointee will provide training related to proper MSE Wall construction for Contractor and Department personnel. This training should occur after the contractor has selected the MSE Wall system and the Department has confirmed that the MSE Wall Design Engineer and Manufacturer's Technical Field Representative meet the specified requirements. The training will be

conducted in the District by the Manufacturer's Technical Field Representative or an outside consultant meeting the experience requirements of the Manufacturer's Technical Field Representative. The MSE Wall Construction Training is expected to last one full day. Department personnel who will attend will include project inspection personnel and may include other district and central office personnel. The following contractor personnel are required to attend:

- On-Site Supervisor in charge of MSE Wall construction
- MSE Wall Quality Coordinator
- At least one office management level person representing the MSE Wall contractor
- If the MSE Wall is to be constructed by a subcontractor, at least one management level representative (field or office) of the Prime Contractor
- Manufacturer's Technical Field Representative referenced in Section 1.55 herein

At least one week before the training begins, the Contractor shall submit a list of specific persons who plan to attend.

1.53 Quality Control Plan:

The contractor shall submit a Quality Control Plan to the Engineer for review and acceptance which details measurements and documentation (including daily documentation checklists) that will be maintained by the Contractor during construction to assure consistency in meeting specification requirements. The Contractor shall coordinate the development of the Quality Control Plan with the MSE Wall System Manufacturer and the MSE Wall Design Engineer. The Quality Control Plan shall be submitted to the Engineer for acceptance at least four weeks before beginning MSE wall construction.

1.54 MSE Pre-Activity Meeting:

A pre-activity meeting will be scheduled and shall occur after the Quality Control Plan has been submitted and accepted by the Engineer and no later than two (2) weeks prior to commencement of MSE wall construction activity. As a minimum, this meeting shall be attended by representatives of the Contractor and MSE Wall Sub-Contractor (including wall construction crew chiefs and MSE Wall Quality Coordinator), MSE Wall Manufacturer's Technical Field Representative, Department District personnel as designated by the Branch Manager for Project Delivery and Preservation, Central Office Construction, and Geotechnical Branch. No wall construction activity shall be performed until the contractor's final submittals have been approved as having satisfactorily resolved all review comments and the pre-activity meeting has been held.

1.55 Manufacturer's Technical Field Representative:

The MSE Wall System Manufacturer shall provide a technical field representative to provide assistance to the MSE Wall Contractor. The requirements for the **Manufacturer's Technical Field Representative** are:

- At minimum, an associate's or bachelor's degree with a major in a technical or scientific field such as engineering, engineering or construction technology, geology, physics, mathematics, etc.
- A minimum of five (5) years of technical experience related to engineering and/or construction.
- Construction experience on at least five (5) MSE Walls and a minimum of 50,000 square feet of MSE Wall completed in the past five (5) years. Experience on a Reinforced Soil Slope may be substituted for one wall and up to 10,000 square feet.

- Construction experience on at least three (3) MSE Walls and a minimum of 30,000 square feet of MSE Wall on highway infrastructure projects using the wall system that will be used on this project completed in the past five (5) years.
- Completion of at least ten (10) Professional Development Hours related to the design and/or construction of MSE Walls in the past five (5) years. This training may consist of attendance at a related short course, conference, seminar, workshop, or college course. Include documentation of this training with the submittal of the Technical Field Representative's credentials.

At least four weeks before beginning MSE wall construction, the Contractor shall submit documentation that the Technical Field Representative meets the above requirements.

The minimum required duties of the Manufacturer's Technical Field Representative are:

- Participate in the mandatory training referenced in Section 1.52 herein.
- Participate in the preparation of the Quality Control Plan referenced in Section 1.53 herein.
- Attend the MSE Pre-Activity Meeting referenced in Section 1.54 herein.
- Ensure that the contractor obtains all "Certificates of Analysis" required in Section 3.0 (Materials Requirements) of this Special Note.
- Review all "Certificates of Analysis" and supporting documentation and provide written documentation to the Contractor and Engineer that the reviews have been completed and that all materials meet the specified requirements.
- Review all Supervisor Checklists described in Section 1.57 herein.
- Be present at a minimum, during construction of the initial 10-foot height of the full length of wall for each wall system. Additionally the representative shall be present for the initial 10-foot height of the full length of wall for each wall system as constructed by each additional contractor, and as called upon thereafter by the Engineer, to assist the contractor and Engineer at no additional cost to the Agency.
- After each on-site visit, the Contractor is required to submit a letter to the Engineer written by the Manufacturer's Technical Field Representative documenting the observations of each visit with documentation that the MSE Wall Design Engineer has reviewed the letter.
- The manufacturer's technical field representative may recommend field changes subject to the approval of the MSE Wall Design Engineer and the Department. Any such changes shall be documented in writing within 24 hours of the approved changes. This written document shall be sealed by the MSE Wall Design Engineer prior to implementation of the changes.
- The Department reserves the right to discuss matters pertaining to this project directly with the technical field representative and to require the Contractor to call the technical field representative to the site for assistance at no additional cost to the Department if, in the opinion of the Engineer, the Contractor is not satisfactorily complying with the plans and specifications.

1.56 Certificates of Analysis:

The Contractor will be responsible for performing and/or subcontracting all testing required to produce the Certificates of Analysis required in Section 3.0 (Materials Requirements) of this Special Note and for submitting the Certificates to the Engineer as required.

1.57 Checklists:

The Contractor's MSE Wall On-Site Supervisor and MSE Wall Quality Coordinator shall complete and both sign the checklists below and submit them to the Engineer with copies to the Manufacturer's Technical Field Representative. The first three of these checklists can be found in FHWA Publication No. FHWA-NHI-10-025 *"Design and Construction of Mechanically Stabilized Earth Walls and Reinforced*

Soil Slopes – Volume II", dated November 2009 (these tables are located in the appendix of this document).

Checklists	
Checklist Title	**Submittal Requirements**
Checklist for Drawing Review (FHWA Table 11-2)	At least two weeks before starting MSE wall construction
Checklist for Specification Compliance (FHWA Table 11-3)	Weekly
Checklist for Construction (FHWA Table 11-5)	Weekly
Quality Control Documentation (Quality Control Plan)	Daily

1.58 MSE Wall Design Engineer:

The MSE Wall Design Engineer will be required to play an active role in the construction of the MSE walls and to be available to answer any questions that may arise during construction. Specifically, the MSE Wall Design Engineer is required to:

- Assist the Contractor and Manufacturer's Technical Field Representative with preparing the Quality Control Plan referenced in Section 1.53 herein.
- Make at least one site visit (4 hour minimum) while the Contractor is installing panels and reinforced fill material during the first 10 working days of panel and reinforced fill installation
- Review documentation of the Manufacturer's Technical Field Representative's site visits.

Additionally, the Design Engineer is required to attend the MSE Wall Construction Training and MSE Pre-Activity Meeting.

2.0 DESIGN SUBMITTALS (WORKING DRAWINGS AND DESIGN CALCULATIONS):

2.01 Submittals:

(A) General:

Design calculations and working drawings clearly showing conformance with the current Standard Specifications; AASHTO LRFD Bridge Design Specifications, current edition; KYTC Geotechnical Manual and project requirements shall be submitted for review. The format for the working drawings shall be in accordance with the Division of Structural Design's Guidance Manual. The first sheet shall be a title sheet.

Working drawings and design calculations shall be sealed by a licensed Professional Engineer in the Commonwealth of Kentucky. The MSE wall designer/supplier shall document on the working drawings all assumptions made in the design. The following statement shall be included near the P.E. seal on the first sheet of the working drawings: "All design assumptions are validated through notes or details on these drawings."

The Department assumes no responsibility for errors or omissions in the working drawings. Acceptance of the final working drawings submitted by the contractor shall not relieve the contractor of any responsibility under the contract for the successful completion of the work. Construction of the wall shall

not commence until the contractor receives a written Notification to Begin MSE Wall Construction from the Engineer which will be issued once the complete wall package (drawings, calculations and construction procedures) is accepted. Fabrication of any of the wall components before the written Notification to Begin MSE Wall Construction shall be at the sole risk of the Contractor.

A Certificate of Analysis for the Reinforced Fill Material (See Sections 3.05 and 3.07 herein) may be required prior to final acceptance of the MSE Wall design.

(B) Review Submittals:

All review submittals shall be submitted electronically in pdf format through the Contractor to the Project Resident Engineer. The Project Resident Engineer shall forward the plans, calculations, and working drawings to the Department. Submittals may be directly emailed to applicable reviewers with the permission of the Contractor and Resident Engineer provided that the Contractor and Resident Engineer receive email copies of the submittals. Contact the Department before beginning any work on the wall designs and construction plans.

The submittals required shall include working drawings, the Contractor's and MSE Wall supplier's construction procedures, supporting design calculations, verification of experience, and a transmittal letter. The transmittal letter shall only list the documents included in the submittal. No technical information shall be included in the transmittal letter.

Working drawings, design calculations and MSE supplier's construction procedures modified as necessary by the contractor and Wall Designer for site-specific conditions shall be submitted to the Engineer for review. The Engineer shall have 30 calendar days after receiving the six complete sets to finish a review. The revised package shall be resubmitted to the Engineer for review. The Engineer shall have 15 calendar days to complete this review. This review process shall be repeated until the entire submittal is accepted by the Engineer. Additional time required by the Department to review resubmissions shall not be cause for increasing the number of contract working days. The additional work required by the contractor to provide resubmissions shall be at no cost to the Department.

The Department reserves the right to require the contractor to verify that the Reinforced Wall Fill Material meets all applicable requirement before final acceptance of the design.

(C) Final Submittals:

All final wall tracings, with drawing number, shall be submitted on 3 mil, or thicker, 22" X 36" mylar film. The final mylar tracings of the accepted working drawings submitted to the Division of Structural Design shall be dated, sealed, and signed on Sheet 1 by the licensed Professional Engineer performing the work. Nine copies of the accepted working drawings shall be submitted.

2.02 Working Drawings:

The contractor shall submit complete working drawings and specifications for each installation of the system. Working drawings shall include the following at a minimum:

(1) Layout of the wall including plan and elevation views;
(2) All design parameters and assumptions including design life;
(3) Existing ground elevations and utilities impacted by the wall, and those that should be field verified by the contractor, for each location;
(4) Complete details of all elements and component parts required for the proper construction of the system at each location and any required accommodations for drainage systems, foundation subgrades or other facilities shown on the contract documents;

(5) The working drawing submittal shall clearly detail any special design requirements, if applicable. These special design requirements may include, but are not limited to: structural frames to place reinforcements around obstructions such as deep foundations and storm drain crossings, drainage systems, placement sequence of drainage and unit core fill with respect to reinforced (structure) fill behind a wall face using modular block facing units, guardrail post installation, scour protection, foundation subgrade modification, all corner details (acute, obtuse and 90 degrees), slip joints, joint details of MSE walls with other cast-in-place structures, wedges, shims and other devices such as clamps and bracing to establish and maintain vertical and horizontal wall facing alignments;

(6) A complete listing of components and materials specifications; and

(7) Other site-specific or project specific information required by the contract.

2.03 MSE Wall Design:

(A) General:

The working drawings shall be supplemented with all design calculations for the particular installation as required herein. Installations that deviate from the accepted design (by the Contractor's MSE Wall Design Engineer) shall be accompanied by supporting stability (internal; external; and global/overall and/or compound if required in the project documents) calculations of the proposed structure as well as supporting calculations for all special details not contained in the accepted design. The MSE wall designer/supplier shall note all deviations of the proposed wall design from the accepted design.

The proposed design shall satisfy the design parameters shown on the project plans and listed in this Special Note, and comply with the design requirements of AASHTO LRFD Bridge Design Specifications, current edition and the KYTC Geotechnical and Bridge Design Guidance Manuals. Unless otherwise specified in the contract, all structures shall be designed to conform to the requirements shown in Table 1 and other requirements specified herein.

If the designer uses software other than MSEW, a minimum of one analysis corresponding to the most critical design case for each MSE wall shall be submitted using MSEW software. Sample hand calculations containing a sketch, all external analysis for the design case, and internal analyses for a minimum of three reinforcement levels shall also be submitted for the most critical design case for each MSE wall.

Table 1 - MSE Wall Design Criteria and Parameters	
Design Life	100 years
Friction angle of granular retained backfill (where required)	36°
Friction angle of MSE reinforced fill material	34° *
Total Unit weight of granular retained backfill	120 pcf
Total Unit weight of MSE reinforced fill material	120 pcf **
Minimum reinforcement length	Greater of 8 ft. or 0.7 times effective height
Friction angle for sliding calculation (through reinforced fill)	34° *
Resistance factor for sliding	As specified in AASHTO LRFD Bridge Design Specifications
Wall Eccentricity	Verify as specified in AASHTO LRFD Bridge Design Specifications, current edition
Bearing Resistance Factor	As specified in AASHTO LRFD Bridge Design Specifications
Surcharge Loading (due to vehicle loading behind the walls)	As specified in AASHTO LRFD Bridge Design Specifications
Minimum top of leveling pad embedment	2 ft. below final grade or as specified by the Geotechnical Report

* For internally reinforced fill material, a minimum friction angle of 34 degrees shall be substantiated by laboratory tests discussed in Subsection 3.05(D). If the measured friction angle in laboratory tests as per Subsection 3.05(D) is greater than 34 degrees and the fill material is well-graded according to the Unified Soil Classification System (USCS), then the design friction angle may be increased up to a maximum of 38 degrees. See Table 5.

** The Total Unit Weight of the reinforced fill material shall be substantiated by laboratory tests discussed in Subsection 3.05(F). If the Total Unit Weight (i.e. SSD Bulk Density) obtained from laboratory tests as per Subsection 3.05(F) varies by more than +/- 5.0 pcf from the design value, then the design must be adjusted accordingly or reinforced fill material falling within this range must be used. See Table 5.

"H" is the design height of the wall and is defined as the difference in elevation from the finished grade at the top of wall and the top of leveling pad. The length of reinforcement, "L", is measured from the backface of the wall facing unit. If applicable, the length of grid type reinforcement is measured from the backface of the wall to the last full transverse member. "H' " is the effective height of the wall and is defined as: the design height "H" + (strap length "L" – distance from the wall face to the toe of slope) * tan (slope angle of backfill). In the case of horizontal backfill design height "H" equals effective height "H' ".The top of the leveling pad shall always be below the minimum embedment reference line as indicated on the plans for that location. If applicable, the total base length for modular block facing units, BT, as measured from the front face of the wall is the length L as defined above plus the width of the modular block unit (the horizontal dimension of the block unit measured perpendicular to the wall face).

(B) Subsurface Drainage Systems:

Walls shall be provided with subsurface drainage measures as shown on the project plans and specifications. As a minimum, an underdrain system shall be provided for leading subsurface and surface water away from the reinforced fill material and outside the limits of the wall. Geocomposite drains, if used for subsurface drainage, shall be in accordance with Section 845 of the current Standard Specifications.

(C) Obstructions in Reinforced Fill:

(1) General:

Where obstructions, such as deep foundations or storm drains crossings, are located in the reinforced fill material zone, cutting of reinforcements to avoid obstructions shall not be permitted. A minimum offset of one diameter but not less than three (3) feet shall be maintained between the face of any pipe crossings and the back face of retaining wall panels. A minimum clearance of three (3) feet shall be maintained between the face of any other obstruction and the back face of retaining wall panels.

(2) Horizontal Deflection of Reinforcements:

In the horizontal plane at a reinforcing level, a deviation up to fifteen (15) degrees from the normal to the face of the wall may be allowed for strip reinforcement and bolted connection. This deviation is herein referred to as the splay angle. Grid reinforcements may not be splayed, unless connection has been specifically fabricated to accommodate a splay and connection detail has been approved by the Department. If used, the splay in grid reinforcement is limited to fifteen (15) degrees. For obstructions that cannot be accommodated with splayed reinforcement, structural frames and connections shall be required, and shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications, current edition. The structural frame design shall be such that bending moments are not generated in the fill reinforcement or the connection at the wall face. The design, along with supporting calculations, shall be included in the working drawings.

(3) Vertical Deflection of Reinforcements:

Vertical deflection of the reinforcement to avoid obstructions such as utilities along the wall face shall be limited to a maximum of 15 degrees from normal to face of wall. Bends in the reinforcement shall be smooth and gradual to ensure that galvanization remains intact.

(D) Hydrostatic Pressures:

As determined by the Designer and/or as noted on the plans, for walls potentially subject to inundation, such as those located adjacent to rivers, canals, detention basins or retention basins. Effective unit weights shall be used in the calculations for internal and external stability beginning at levels just below the equivalent surface of the pressure head line. Where the wall is influenced by water fluctuations, the wall shall be designed for rapid drawdown conditions which could result in differential hydrostatic pressure.

(E) Acute Angle Corners:

Wall corners with an included angle of less than 70 degrees shall be designed for bin-type lateral pressures

for the extent of the wall where the full length of the reinforcement cannot be installed without encountering a wall face. Acute angle corner structures shall not be stand-alone separate structures. Computations shall be provided that demonstrate deformation compatibility between the acute angle corner structure and the rest of the MSE wall. Full-height vertical slip joints shall be provided at the acute angle corner and after the last column of panels where full length of the reinforcements can be placed. The soil reinforcement attached to the slip joints shall be oriented perpendicular to the slip joint panels and shall be the full design length. Special connection and compaction details shall be provided on the working drawings.

(F) Spacing of Metallic Reinforcement for Flexible Face Wall Systems:
Permanent Flexible Face Wall Systems are not allowed.

(G) Fill Reinforcement for Modular Block Wall Systems:
The reinforcement lengths and percent coverage at a given reinforcement level shall be in accordance with the plans. All reinforcement shall be positively connected to the modular block facing units that is capable of resisting 100% of the maximum tension in the reinforcements at any level within the wall. Detailed documentation for connection strength shall be submitted as noted in Subsection 3.10. The vertical spacing of the reinforcement for walls with modular block facing units shall be as follows:

1. The first (bottom) layer of reinforcement shall be no further than 16 inches above the top of the leveling pad.

2. The last (top) layer of reinforcement shall be no further than 20 inches on the average below the top of the uppermost MBW unit.

3. The maximum vertical spacing between layers of adjacent reinforcement shall not exceed 32 inches. For walls deriving any part of their connection capacity by friction the maximum vertical spacing of the reinforcement should be limited to two times the block depth (front face to back face) to assure construction and long-term stability. The top row of reinforcement should be one-half the vertical spacing.

(H) Initial Batter of Wall:
The initial batter of the wall, both during construction and upon completion, shall be within the vertical and horizontal alignment tolerances included in this Special Note. The initial batter of the wall panels at the start of construction and the means and methods necessary to achieve the batter shall be provided on the working drawings. Subject to Engineer's approval, the initial batter of the wall panels may be modified at the start of construction by the manufacturer's field representative based on the evaluation of the reinforced fill material selected by the contractor. Any such changes shall be documented in writing within 24 hours of the approved changes. This written document shall be sealed by the manufacturer's design engineer who is a licensed Professional Engineer in the Commonwealth of Kentucky. Details of the wedges or shims or other devices, such as clamps and external bracing used to achieve or maintain the wall batter, and the details for removal of temporary wedges or shims shall be as shown on the working drawings and/or accompanying construction manual. Permanent shims shall comply with the design life criteria, and shall maintain the design stress levels required for the walls.

(I) Bridge Abutment Design Considerations:
Shallow Bridge Foundations supported by MSE wall systems are not allowed. All bridge loads must be supported by deep foundations.

3.0 MATERIAL REQUIREMENTS:

The contractor shall furnish the Engineer with Certificates of Analysis documenting that all materials meet the requirements herein.

3.01 Precast Concrete Elements:

Precast concrete shall attain a minimum 28-day compressive strength of 4,000 psi unless a higher strength is specified by the wall supplier. The concrete shall be air entrained containing 5.5 ± 1.5% entrained air at the time the concrete is placed in the forms. A proposed mix design shall be submitted.
Prior to casting, all embedded components shall be set in place to the dimensions and tolerances designated in the plans and specifications. Wall aesthetics shall be in accordance with project plans, special notes, and/or other applicable contract documents.

(A) Concrete Testing and Inspection:

Precast concrete elements shall be subjected to compressive strength testing and inspected for dimensional tolerances and surface conditions. Panels delivered to the site without Department approval will be rejected.

(B) Casting:

Precast concrete face panels shall be cast on a horizontal surface with the front face of the panel at the bottom of the form. Connection hardware shall be set in the rear face. The concrete in each precast concrete panel shall be placed without interruption and shall be consolidated by deploying an approved vibrator, supplemented by such hand tamping as may be necessary to force the concrete into the corner of the forms, and to eliminate the formation of stone pockets or cleavage planes. Form release agents shall be used on all form faces for all casting operations.
The contractor shall advise the Engineer of the starting date for concrete panel casting at least 14 calendar days prior to beginning the operation if the casting operation is within the State, or 21 calendar days if the casting operation is outside the State.

(C) Finish:

(1) Non-Exposed Surfaces:

Rear faces of precast concrete panels shall be a face floated surface finish and screeded to eliminate open pockets of aggregate and surface distortions in excess of ¼ inch.

(2) Exposed Surfaces:

The type of finish required on exposed surfaces shall be as shown in the plans.

(a) Exposed Aggregate Finish:

(1) Prior to placing concrete, a set retardant shall be applied to the casting forms in accordance with the manufacturer's instructions.

(2) After removal from the forms and after the concrete has set sufficiently to prevent its dislodging, the aggregate shall be exposed by a combination of brushing and washing with clear water. The depth of exposure shall be between 3/8 inch and ½ inch.

(3) An acrylic resin sealer consisting of 80 percent thinner and 20 percent acrylic solids by weight shall be applied to the exposed aggregate surface at a rate of one (1) gallon per 250 square feet.

(b) Concrete Panel Finish:

Concrete panel finish shall be in accordance with the plans and specifications. A sample of the proposed finish consisting of four full-sized panels shall be fabricated for inspection by the Engineer. Fabrication of the remaining panels is not authorized until the Engineer has inspected the sample panels an approved the finish as acceptable.

(D) Tolerances:

Connection device placement shall be within ± 1 inch of the dimensions shown on the drawings. Panel squareness as determined by the difference between the two diagonals shall not exceed ½ inch.

(E) Identification and Markings:

The date of manufacture, the production lot number, and the piece mark shall be inscribed on a non-exposed surface of each element.

(F) Handling, Storage and Shipping:

All panels shall be handled, stored, and shipped in such a manner to eliminate the dangers of chipping, discoloration, cracks, fractures, and excessive bending stresses. Panels in storage shall be supported in firm blocking to protect panel connection devices and the exposed exterior finish. Storing and shipping shall be in accordance with the manufacturer's recommendations.

(G) Compressive Strength:

Precast concrete elements shall not be shipped or placed in the wall until a compressive strength of 3,400 pounds per square inch has been attained. The facing elements shall be cast on a flat and level area and shall be fully supported until a compressive strength of 1,000 pounds per square inch has been attained.

(H) Precast Concrete Panel Joints:

(1) General:

Where the wall wraps around an inside corner, a corner block panel shall be provided with flange extensions that will allow for differential movement without exposing the panel joints. The back face of vertical and horizontal joints shall be covered with geotextile filter. Joint filler, bearing pads, and geotextile filter shall be as recommended by the wall manufacturer and shall meet the requirements shown on the approved working drawings.

If required, as indicated on the plans, flexible open-cell polyurethane foam strips shall be used for filler for vertical joints between panels, and in horizontal joints where pads are used.

All joints between panels on the back side of the wall shall be covered with a Type IV geotextile fabric meeting the requirements of Section 843 of the current Standard Specifications. The minimum width shall be one (1) foot.

(2) Bearing Pads:

All horizontal and diagonal joints between panels shall include bearing pads. Bearing pads shall meet or exceed the following material requirements:

- Preformed EPDM (Ethylene Propylene Diene Monomer) rubber pads conforming to ASTM D 2000 Grade 2, Type A, Class A with a Durometer Hardness of 70.
- Preformed HDPE (High Density Polyethylene) pads with a minimum density of 0.946 grams per cubic centimeter in accordance with ASTM D 1505.

The stiffness (axial and lateral), size, and number of bearing pads shall be determined such that the final joint opening shall be ¾ ± ⅛ inch unless otherwise shown on the plans. The MSE wall designer shall submit substantiating calculations verifying the stiffness (axial and lateral), size, and number of bearing pads assuming, as a minimum, a vertical loading at a given joint equal to 2 times the weight of facing panels directly above that level. As part of the substantiating calculations, the MSE wall designer shall submit results of certified laboratory tests in the form of vertical load-vertical strain and vertical load-lateral strain curves for the specific bearing pads proposed by the MSE wall designer. The vertical load-vertical strain curve should extend beyond the first yield point of the proposed bearing pad.

3.02 Steel Components:

(A) Galvanization:

Fill reinforcement steel shall be hot-dip galvanized in accordance with AASHTO M 111 (ASTM A123). Connection hardware steel can be galvanized by hot-dipping or other means, provided the method satisfies the requirements of AASHTO M 111 (ASTM A123). A minimum galvanization coating of 2.0 oz/ft^2 (605 g/m^2) or 3.4 mils (85 μm) thickness is required. Fill reinforcement steel shall be adequately supported while lifting and placing such that the galvanization remains intact. Steel members with damaged (peeled) galvanization shall be repaired according to ASTM A780 and as specified in approved working drawings, at no additional cost to the Department.

(B) Metallic Reinforcing Strips and Tie Strips:

Reinforcing strips shall be hot-rolled from bars to the required shape and dimensions. The strips' physical and mechanical properties shall conform to the requirements of ASTM A572, Grade 65 minimum.

Tie strips shall be shop fabricated of hot-rolled steel conforming to the requirements of ASTM A1101, Grade 50 minimum. The minimum bending radius of the tie strips shall be ⅜ inch. Galvanization shall be applied after the strips are fabricated, inclusive of punch holes for bolts as shown on approved drawings.

(C) Metallic Reinforcing Mesh:

Reinforcing mesh shall be shop fabricated of cold-drawn steel wire conforming to the requirements of AASHTO M 32, and shall be welded into the finished mesh fabric in accordance with AASHTO M 55. Galvanization shall be applied after the mesh is fabricated. A minimum galvanization coating of 2.0 oz/ft^2 (605 g/m^2) or 3.4 mils (85 μm) thickness is required.

(D) Connector Pins:

Connector pins and mat bars shall be fabricated and connected to the fill reinforcement mats as shown in the approved working drawings. Connector bars shall be fabricated of cold drawn steel wire conforming to the requirements of AASHTO M 32.

(E) Welded Wire Fabric:
All welded wire fabric shall conform to the requirements of AASHTO M 32, AASHTO M 55, and the approved working drawings. Welded wire fabric shall be galvanized in conformance with the requirements of ASTM A123.

(F) Fasteners:
Connection hardware shall conform to the requirements shown in the approved working drawings. Connection hardware shall be cast in the precast concrete panels such that all connectors are in alignment and able to transfer full and even load to the fill reinforcement. Once the reinforcement is connected to the panel, the amount of slack shall not exceed ⅛ inch between the connector and the reinforcement during field installation. (If wedges are to be used to remove slack, the size, shape, and installation procedure with illustrations shall be included on the drawings and in the construction procedures.) Fasteners shall be galvanized and conform to the requirements of AASHTO M 164 or equivalent.

3.03 Geosynthetic Reinforcement:
Geosynthetic fill reinforcement is not allowed.

3.04 Certificate of Analysis for Fill Reinforcements:
For metallic wall reinforcement, a mill test report containing the ultimate tensile strength for the fill reinforcement shall be included in the certification. For metallic wall reinforcement, a mill test report containing the galvanization coverage shall be included in the certification. For metallic mesh wall reinforcement, a mill test report containing the ultimate weld strength for the fill reinforcement shall be included in the certification.

3.05 Reinforced Wall Fill Material:
Provide internally reinforced wall fill material consisting of quarry-processed limestone from a Department-approved quarry meeting all applicable general requirements of Section 805 of the Standard Specifications, current edition, and requirements herein. Provide material meeting the specific requirements for "Reinforced Fill Material" in Section 805 of the Standard Specifications, current edition, defined as "Non-Erodible" according to Section 805, and meeting all other requirements herein. Approval of the material source by the Department is required prior to beginning MSE wall construction.

(A) General:
Reinforced wall fill material shall be free of shale, organic matter, mica, gypsum, smectite, montmorillonite, or other soft poor durability particles. No salvaged material, such as asphaltic concrete millings or Portland Cement Concrete rubble, etc., will be allowed.

(B) Soundness and Shale:
The reinforced fill material shall have a soundness loss of 30 percent or less when tested in accordance with AASHTO T104 using a magnesium sulfate solution with a test duration of four cycles. Alternatively, the material shall have a soundness loss of 15 percent or less when tested in accordance with AASHTO T104 using a sodium sulfate solution with a test duration of five cycles. A maximum of 2.0% shale is permitted as determined by KM 64-604.

(C) Gradation:
Gradations will be determined per AASTHO T27 and shall be in accordance with Table 2, unless

otherwise specified.

Table 2 REINFORCED FILL GRADATION REQUIREMENTS	
Sieve Size	**Percent Passing**
4 inch	100
2 inch	40 – 90
No. 4	0 - 10
No. 200	0 – 5
This is the same gradation as required in Section 805.11 of the Standard Specifications except the requirement for the 2 inch sieve has been added. Size # 23 in the Standard Specifications falls within these gradation limits.	

(D) Internal Friction Angle Requirement:

The reinforced wall fill material shall exhibit an effective (drained) angle of internal friction of not less than 34 degrees, as determined by performing a Direct Shear Test in accordance with AASHTO T236 or ASTM D3080 A minimum of three (3) points (i.e. three normal stresses) is required to constitute a complete test.

The direct shear test shall be performed on the portion finer than the 1-inch sieve. In order to comply with the test method, a minimum 12-inch diameter circular box or minimum 12-inch square box is required. The sample shall be compacted directly in the shear device at the saturated surface dry (SSD) condition and in general accordance with the rodding procedure in AASHTO T-19.

(E) Electrochemical Requirements:

The reinforced wall fill material shall meet the electrochemical requirements of Table 3.

Table 3 ELECTROCHEMICAL REQUIREMENTS FOR METALLIC REINFORCEMENTS		
Characteristic	**Requirement**	**Test Method**
Resistivity	> 3,000 ohm-cm	AASHTO T-288
pH	5.0 to 10.0	AASHTO T-289
Chlorides	< 200 ppm	ASTM D4327
Sulfates	< 1000 ppm	ASTM D4327
Organic Content	< 1.0 %	AASHTO T-267
* If the resistivity is greater or equal to 5,000 ohm-cm, the chloride and sulfate requirements may be waived.		

Table 4 – VACANT

(F) Saturated Surface Dry (SSD) Bulk Density:

The Bulk Density of the Reinforced Fill Material shall be obtained in accordance with AASHTO T19. The Bulk Density at the oven-dry condition shall then be corrected using the Absorption determined according to AASHTO T-85 to determine the SSD Bulk Density, which shall be within +/- 5.0 pcf of the design total unit weight of MSE reinforced fill material or the design shall be adjusted. (See Table 1.)

(G) Limits of Reinforced Wall Fill Material:

The reinforced fill material shall extend to at least one (1) foot beyond the free end of the reinforcement. If applicable, back-to-back walls wherein the free ends of the reinforcement of the two walls are spaced apart less than or equal to one-half the design height of the taller wall, reinforced wall fill material shall be used for the space between the free ends of the reinforcements as well. The design height of the wall is defined as the difference in elevation between finished grade at top of wall and the top of leveling pad. The top of the leveling pad shall always be below the minimum embedment reference line as indicated on the plans for the location under consideration.

3.06 Granular Embankment for Foundation and Retained Backfill:

Provide granular foundation material and granular external retained backfill consisting of "Granular Embankment" meeting the material requirements of Section 805 in the current edition of the Standard Specifications and defined as "Non-Erodible" according to Section 805. If required by design, the extent of the granular foundation material and granular external retained backfill shall be shown in the Geotechnical Notes. Contrary to the Standard Specifications, no natural sand is permitted. Also contrary to the Standard Specifications, the maximum size limit for "Granular Embankment" is 4 inches where shown in the Geotechnical Sheets. Approval of the material source by the Department is required prior to beginning placement of this material.

3.07 Sampling & Testing of Reinforced Wall Fill and Granular Embankment Materials

(A) Reinforced Wall Fill:

To obtain source approval, the contractor shall furnish the Engineer with an 80-pound representative sample of the reinforced wall fill material and a Certificate of Analysis containing results of all tests referenced in Table 5 at least four weeks prior to beginning construction of the MSE wall.

During construction, the reinforced fill material shall be sampled and tested by the Engineer for acceptance and quality control testing. A new sample and Certificate of Analysis shall be provided any time the material and/or source changes.

Table 5 - Sampling Frequency for Reinforced Wall Fill Material

Function	Tests	Frequency
Source Approval Testing by Contractor and/or its Consultant(s)	Soundness (AASHTO T104)* % Shale (KM 64-604)* Gradation (AASHTO T27)* Direct Shear (AASHTO T236 or ASTM D3080)* Organic Content (AASHTO T267)* SSD Bulk Density (AASHTO T19 & T85)* Resistivity (AASHTO T288)** pH (AASHTO T289)** Chlorides and Sulfates (ASTM D4327)**	At least four (4) weeks prior to beginning MSE wall construction and once per material change and/or change in source. Except for Direct Shear, one test is valid for up to 10,000 ft^2 of MSE wall area if there is no material change or change in source. **** Generally, only one Direct Shear test is required unless there is a change in material, source, or gradation.
Acceptance and Quality Control Testing by Department	Gradation (AASHTO T27) % Shale (KM 64-304) At the discretion of the Engineer.	One per 2,000 cubic yards at job site. (A change of more than +/- 5.0 percent passing any sieve size will require additional SSD Bulk Density testing and may require additional Direct Shear testing, both by the Contractor.)
	Any other applicable requirements of Section 805 of the current Standard Specifications	As required by the current Materials Field Sampling and Testing Manual, Standard Specifications, and/or other Department policy.

* The laboratory performing these tests must be accredited by the AASHTO Materials Reference Laboratory (AMRL) for the tests they perform. AMRL accreditation for AASHTO T104 & T27 is required to perform KM 64-604.

** Although accreditation for the specific test methods may not be available, the laboratory performing these tests must be accredited or certified by one of the organizations below. A laboratory's accreditation or certification status does not relieve the laboratory of its responsibility to perform the tests in accordance with the specified methods.

- AMRL - Soil and/or Aggregate (Resistivity and pH only)
- American Association for Laboratory Accreditation (A2LA) - Chemical and/or Environmental
- Kentucky Division of Water - Drinking Water Chemical Analyses

The Contractor may consult the Geotechnical Branch to ensure that a lab is accredited or certified.

**** e.g. 1 to 10,000 ft^2 of wall requires 1 test, 10,001 to 20,000 ft^2 requires 2 tests, etc.

(B) Granular Embankment Material for Foundation and Retained Backfill:

To obtain source approval, the contractor shall furnish the Engineer with an 80-pound representative sample of the Granular Embankment material and a Certificate of Analysis at least four weeks prior to beginning Granular Embankment construction.

Table 6
Sampling Frequency for Granular Embankment for Foundation and Retained Backfill

Function	Frequency
Source Approval	At least four weeks prior to beginning granular embankment construction and once per material change and/or change in source.
Acceptance and Quality Control	In accordance with standard procedures for "Granular Embankment".

3.08 Cast-in-Place Concrete:

Cast-in-place concrete shall be Class A, except that the leveling pads shall be Class B, both in accordance with the current Standard Specifications.

3.09 Modular Block (Segmental) Facing Units:

This section covers dry-cast hollow and solid concrete masonry structural retaining wall units, machine made from Portland cement, water, and suitable mineral aggregates. The units are intended for use as facing units in the construction of mortarless, modular block walls (MBW) also known as segmental retaining walls (SRW). Metallic reinforcement specified in Section 3.02 shall be used as reinforcement in the reinforced (structure) wall fill zone.

(A) Casting:

Cementitious material in the modular block facing unit shall be Portland cement conforming to the requirements of ASTM C 150. If fly ash is used it shall not exceed 20% by weight of the total cement content and shall conform to ASTM C 618. Aggregates used in concrete blocks shall conform to ASTM C 33 for normal weight concrete aggregate. Efflorescence control agent shall be used in concrete mix design to prevent efflorescence on the block.

The contractor shall advise the Engineer of the starting date for concrete panel casting at least 14 calendar days prior to beginning the operation if the casting operation is within the State, or 21 calendar days if the casting operation is outside the State.

(B) Physical Requirements:

At the time of delivery to the work site, the modular block facing units shall conform to the following physical requirements:

1) Minimum required compressive strength of 4,000 psi (average 3 coupons)
2) Minimum required compressive strength of 3,500 psi (individual coupon)
3) Minimum oven dry unit weight of 125 pcf
4) Maximum water absorption of 5 % after 24 hours
5) Maximum number of blocks per lot of 2,000. Tests on blocks shall be submitted at the frequency of one set per lot.

Acceptance of the concrete block, with respect to compressive strength, water absorption and unit weight, will be determined on a lot basis. The lot shall be randomly sampled and tested in accordance with ASTM C140. As no additional expense to the Department, the manufacturer shall perform the tests at a Department approved laboratory and submit the results to the Engineer for approval. Compressive strength test specimens shall be cored or shall conform to the saw-cut coupon provisions of ASTM C 140. Block lots represented by test coupons that do not reach an average compressive strength of 4,000 psi will be rejected.

(C) Freeze-Thaw Durability:

In areas where repeated freezing and thawing under saturated conditions occur, the units shall be tested to demonstrate freeze-thaw durability in accordance with Test Method ASTM C1262. Freeze thaw durability shall be based on tests from five specimens made with the same materials, concrete mix design, manufacturing process, and curing method, conducted not more than 18 months prior to delivery. Specimens used for absorption testing shall not subsequently be used for freeze-thaw testing. Specimens shall comply with either or both of the following acceptance criteria depending on the severity of the project location as determined by the Department:

1) The weight loss of four out of five specimens at the conclusion of 150 cycles shall not exceed

1% of its initial weight when tested in water.

2) The weight loss of each of four out of the five test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial mass when tested in a saline (3% sodium chloride by weight) solution.

(D) Tolerances for Modular Block Dimensions:

Modular blocks shall be manufactured within the following tolerances:

1) The length and width of each individual block shall be within ± 1/8 inch of the specified dimension. Hollow units shall have a minimum wall thickness of 1¼ inches.
2) The height of each individual block shall be within ± 1/16 inch of the specified dimension.
3) When a broken (split) face finish is required, the dimension of the front face shall be within ± 1.0 inch of the theoretical dimension of the unit.

(E) Finish and Appearance:

Units that indicate imperfect molding, honeycomb or open texture concrete and color variation on front face of block due to excess form oil or other reasons shall be rejected. All units shall be visually efflorescence free. All units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the construction. Minor cracks (e.g. no greater than 1/50 inch in width and no longer than 25% of the unit height) incidental to the usual method of manufacture or minor chipping resulting from shipment and delivery, are not grounds for rejection.

The exposed faces shall be free of chips, cracks or other imperfections when viewed from a distance of 30 feet under diffused lighting. Up to five (5) percent of a shipment may contain slight cracks or small chips not larger than 1.0 inch.

Color and finish shall be as shown on the plans and shall be erected with a running bond configuration.

(F) Pins:

If pins are required to align modular block facing units, they shall consist of a non-degrading polymer or hot-dipped galvanized steel and be made for the express use with the modular block units supplied. Connecting pins supporting the reinforcement shall be hot-dipped galvanized steel and be capable of holding the reinforcement in the proper design position during backfilling.

(G) Cap Units and Adhesive:

The cap unit connection to the block unit immediately under it shall be of a positive interlocking type and not frictional. Cap units shall be cast to or attached to the top of modular block facing units in strict accordance with the requirements of the manufacturer of the blocks and the adhesive. The surface of the block units under the cap units shall be clear of all debris and standing water before the approved adhesive is placed. Contractor shall provide a written 10-year warranty, acceptable to Owner, that the integrity of the materials used to attach the cap blocks will preclude separation and displacement of the cap blocks for the warranty period.

(H) Unit (Core) Fill:

Unit (core) fill is defined as free-draining, coarse grained material that is placed within the empty cores of the modular block facing units. Unit (core) fill shall be a well graded crushed stone or granular fill meeting the gradation shown in Table 7. Gradation for unit fill shall be tested at the frequency of 1 test per 50 yd^3 at the job site and for every change in the material source.

Table 7
Gradation for Unit (Core) Fill

U.S. Sieve Size	Percent Passing
1½-inch	100
1-inch	75-100
¾-inch	50-75
No. 4	0-60
No. 40	0-50
No. 200	0-5

3.10 Certificate of Analysis for Modular Block Connection:

For modular block facing units, a certification shall be provided with detailed calculations according to AASHTO and the results of laboratory test results performed in accordance with Section C.3 in Appendix B of FHWA NHI-10-025, dated 2009 ("Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume II"). Such certification shall demonstrate that all connections, including block-to-reinforcement and block-to-block connections, and all related components meet or exceed the current AASHTO 100 year design life requirements and are capable of resisting 100% of the maximum tension in the soil reinforcements at any level within the wall. Long-term connection testing for extensible reinforcements is also required. The effect of wall batter and normal pressures representative of the full range of wall configurations and heights shall be incorporated in the tests.

4.0 CONSTRUCTION REQUIREMENTS:

Construction of MSE walls may be subject to special requirements as specified in the Geotechnical Report and Geotechnical MSE Wall Note Sheets developed by the Design Build Team. These requirements may include but are not limited to: monitoring devices (refer to section 4.5), phased panel and reinforced fill construction, waiting period intervals and foundation modification.

4.01 Excavation:

The contractor shall ensure that temporary slopes are safe during the period of wall construction, and shall adhere to all applicable local, state and federal regulations. During construction of the MSE walls, the contractor shall design, construct, maintain and, when called for, remove temporary excavation support systems (shoring). Temporary excavation support systems may be left in place if approved by the Engineer. The back slope of the excavation shall be benched. Where shoring is required, the contractor shall submit the shoring design, and a plan outlining construction and removal procedures, to the Engineer for review and approval prior to proceeding with the work. Shoring plans shall be prepared and submitted as part of the working drawings and shall bear the seal and signature of a licensed Professional Engineer in the Commonwealth of Kentucky. All shoring design shall include appropriate input and review by a geotechnical engineer.

4.02 Foundation Preparation:

(A) General:

If required, specific ground improvement requirements shall be outlined in the Geotechnical Report and the Geotechnical Note Sheets.

In general the following applies:

The foundation for the reinforced wall fill and retained backfill shall be graded level for the entire area of the base of such backfills, plus an additional 12 inches on all sides, or to the limits shown in the plans. If soil reinforcement components are to be positioned on native soil, the top one (1) foot of native soil shall meet the requirements of the reinforced backfill material specified in Subsection 3.05.

Foundation replacement material shall consist of "Granular Embankment" meeting the requirements of Section 3.06 herein. The material shall be compacted in accordance with Section 206 of the current Standard Specifications except that the maximum loose lift thickness (prior to compaction) is 12 inches. Type IV Geotextile Fabric shall be placed between the existing embankment material and the proposed "Granular Embankment" in accordance with Sections 214 and 843 of the Standard Specifications.

(B) Proof-Rolling:

The contractor shall perform proof-rolling to evaluate the stability and uniformity of the subgrades on which the MSE structure will be constructed. Proof rolling shall be performed on the entire areas at the following locations:

1) At the bottom of the overexcavation and recompaction zones.
2) At the bottom of the overexcavation and replacement zones.
3) At the base of all walls.
4) At the top of native soil layers and/or existing fill material that has been scarified, moisture-conditioned, and recompacted (if different from the bottom of the overexcavation and recompaction zones, or overexcavation and replacement zones).

Proof-rolling shall be done immediately after subgrade compaction while the moisture content of the subgrade soil is near optimum, or at the moisture content that was used to achieve the required compaction. Proof-rolling shall be performed again within one day prior to beginning MSE Wall construction.

If proof-rolling is performed after installation of pipe underdrains, the proof-roller shall not be used within 1½ feet of the underdrains.

Proof-rolling shall be performed with a pneumatic-tired tandem axle roller with at least three wheels on each axle, a gross weight of 25 tons (50,000 pounds), a minimum tire pressure of 75 pounds per square inch, and a minimum rolling width of 75 inches. A Caterpillar PS-300B (or PF-300B), Ingersoll-Rand PT-240R, BOMAG BW24R, Dynapac CP271, or equipment with equivalent capabilities shall be used for proof-rolling.

Proof-rolling equipment shall be operated at a speed between 1.5 and 3 miles per hour, or slower as required by the Engineer to permit measurements and/or observations of the deformations, ruts and/or pumping.

Proof-rolling shall be carried out in two directions at right angles to each other with no more than 24 inches between tire tracks of adjacent passes. The contractor shall operate the proof-roller in a pattern that readily allows for the recording of deformation data and complete coverage of the subgrade.

The following actions shall be taken based on the results of the proof-rolling activity:

1) Rutting (i.e. deformation that does not rebound) less than ¼-inch – The grade is acceptable.
2) Rutting greater than ¼-inch and less than 1½ inches – The grade shall be scarified and re-compacted.
3) Rutting greater than 1½ inches – The compacted area shall be removed and reconstructed.
4) Pumping (i.e. deformation that rebounds, or materials that are squeezed out of a wheel's path) greater than one (1) inch – The area shall be remediated as directed by the Engineer.

The contractor shall be responsible for maintaining the condition of the approved proof-rolled soils throughout the duration of the retaining wall construction. Wall construction shall not commence until

the foundation subgrade has been approved by the Engineer.

4.03 Concrete Leveling Pad:

Leveling pads shall be constructed of unreinforced Class B concrete meeting the requirements of Section 601 of the current Standard Specifications as shown on the working drawings. Gravel leveling pads shall not be allowed. The elevation of the top of leveling pad shall be within ⅛ inch from the design elevation when measured by a straightedge over any 10-foot run of the leveling pad.

The minimum width of the leveling pad shall be the width of the facing unit plus 8-inches. The centerline of the leveling pad shall be within 1 inch from design location. When the facing units are centered on the leveling pad, the leveling pad shall extend approximately 4-inches beyond the limits of the facing unit as measured in the direction perpendicular to the face of the wall.

Cast-in-place leveling pads shall be cured for a minimum of 48 hours before placement of wall facing units. A geotextile shall be applied over the back of the area of any openings greater than ¼ inch between the facing units and leveling pad steps. The geotextile shall extend a minimum of six (6) inches beyond the edges of the opening. The opening shall be filled with Class B concrete, or shall be concurrently backfilled on both sides with soil.

4.04 Subsurface Drainage:

Prior to wall erection, the contractor shall install a subsurface drainage system as shown on the working drawings.

4.05 Wall Erection:

(A) General:

Walls shall be erected in accordance with the approved manufacturer's written construction procedures. The contractor shall be responsible for ensuring that a field representative from the manufacturer is available at the site during construction of the **initial 10-foot height of the full length of wall for each wall system. Additionally the representative shall be present for the initial 10-foot height of the full length of wall for each wall system as constructed by each additional contractor,** and as called upon thereafter by the Engineer, to assist the contractor and Engineer at no additional cost to the Department. All temporary construction aids (e.g., wedges, clamps, etc.) shall be in accordance with the manufacturer's recommendations.

(B) Placement Tolerances for Walls with Precast Facing:

For walls with rigid facing, such as precast concrete panels, the panels shall be placed such that their final position is vertical or battered as shown on the working drawings. As wall fill material is placed, the panels shall be maintained in the correct vertical alignment by means of temporary wedges, clamps, or bracing as recommended by the manufacturer. A minimum of two, but not more than three, rows of panel wedges shall remain in place at all times during wall erection. Wedges shall be removed from lower rows as panel erection progresses, so as to prevent chipping or cracking of concrete panels. The contractor shall repair any damage to erected concrete panels as directed by the Engineer and to the Engineer's satisfaction. No external wedges in front of the wall shall remain in place when the wall is complete.

Erection of walls with panel facing shall be in accordance with the following tolerances:

- Vertical and horizontal alignment of the wall face shall not vary by more than ¾ inch when measured along a 10-foot straightedge.
- The overall vertical tolerance (plumbness) of the finished wall shall not exceed ½ inch per 10 feet of wall height. Negative (outward leaning) batter is not acceptable.
- The maximum permissible out of plane offset at any panel joint shall not exceed 3/8 inch.

- The final horizontal and vertical joint gaps between adjacent facing panel units shall be within 1/8 inch and ¼ inch, respectively, of the design final joint opening per the approved calculations required in Subsection 3.01(H).

Wall sections not conforming to these tolerances shall be reconstructed at no additional cost to the Department.

(C) Placement Tolerances for Permanent Walls with Flexible Facing:
Permanent Flexible Facing is not allowed.

(D) Placement Tolerances for Modular Block Units:
Erection of walls with Modular Block Units shall be as per the following requirements:

- Vertical and horizontal alignment of the wall face shall not vary by more than ¾-inch when measured along a 10-feet straightedge.
- Overall vertical tolerance (plumbness) of the wall shall not exceed 1¼-inch per 10-ft of wall height from the final wall batter. Negative (outward leaning) batter is not acceptable.
- The first row of units shall be level from unit-to-unit and from front-to-back. Use the tail of the units for alignment and measurement.
- All units shall be laid snugly together and parallel to the straight or curved line of the wall face.
- Unless otherwise noted, all blocks shall be dry-stacked and placed with each block evenly spanning the joint in the row below (running bond). Shimming or grinding shall control the elevations of any two adjacent blocks within 1/16 inch.
- The top of blocks shall be checked with a minimum length of 3-feet long straight edge bubble level. Any high points identified by the straight edge shall be ground flat. Block front to back tilting shall be checked frequently, however correction by shimming shall be done no later than 3 completed courses.
- Wall sections not conforming to these tolerances shall be reconstructed at no additional cost to the Department.

(E) Placement of Metallic Reinforcement Elements:
Metallic reinforcement elements shall be placed normal (perpendicular) to the face of the wall, unless otherwise shown on the approved plans. All reinforcement shall be structurally connected to the wall face.

At each level of the reinforcement, the reinforced wall fill material shall be roughly leveled and compacted before placing the next layer of reinforcement. The reinforcement shall bear uniformly on the compacted reinforced fill from the connection to the wall to the free end of the reinforcing elements. The reinforcement placement elevation shall be at the connection elevation to two (2) inches higher than the connection elevation.

Where overlapping of reinforcing may occur, such as at corners, reinforcing connections to panels shall be adjusted to maintain at least three (3) inches of vertical separation between overlapping reinforcement.

(F) Placement of Geotextile:
All joints between precast concrete panels shall be covered with geotextile on the backside of the wall. Adhesive shall be applied to panels only. Adhesive shall not be applied to geotextile fabric or within two

(2) inches of a joint. The contractor shall provide geotextile having a minimum width of 12 inches, and shall overlap fabric a minimum of four (4) inches. If applicable, the placement of the geotextile fabric for modular block walls shall be in accordance with the plans.

(G) Joint Pads and Fillers:
The contractor shall install joint pads and fillers as shown on the working drawings.

(H) Placement of Geosynthetic Reinforcement:
Geosynthetic reinforcement is not allowed.

4.06 Reinforced Wall Fill Placement:

(A) General:
Reinforced wall fill material shall be compacted using a static-weighted or vibratory roller. Sheeps-foot or grid-type rollers shall not be used for compacting material within the limits of the fill reinforcement. Compaction within three (3) feet of the wall facing shall be achieved by a lightweight mechanical tamper or roller system.

Reinforced wall fill placement shall closely follow erection of each course of facing panels. Reinforced fill material shall be placed in such a manner to avoid damage or disturbance of the wall materials, misalignment of facing panels, or damage to fill reinforcement or facing members. The contractor shall place fill material to the level of the connection and in such a manner as to ensure that no voids exist directly beneath reinforcing elements.

If applicable, the fill material for walls with modular block facing units shall not be advanced more than the height of a modular block unit until the drainage fill, core fill and all fill in all openings within the blocks at that level have been placed. The filled units shall be swept clean of all debris before installing the next level of units and/or placing the geogrid materials
.
The maximum compacted lift thickness shall not exceed eight (8) inches. The contractor shall decrease this lift thickness, if necessary, to obtain the specified density.

For metallic reinforcements, the fill shall be spread by moving the machinery parallel to or away from the wall facing and in such a manner that the steel reinforcement remains normal to the face of the wall. Construction equipment shall not operate directly on the steel reinforcement. A minimum fill thickness of three (3) inches over the steel reinforcement shall be required prior to operation of vehicles. Sudden braking and sharp turning shall be avoided.

Wall materials which are damaged during reinforced fill material placement shall be removed and replaced by the contractor, at no additional cost to the Department. The contractor may submit alternative corrective procedures to the Engineer for consideration. Proposed alternative corrective procedures shall have the concurrence of the MSE wall supplier and designer, in writing, prior to submission to the Engineer for consideration. All corrective actions shall be at no additional cost to the Department.

(B) Compaction Criteria:
Trial fill sections shall be constructed with Department personnel present to determine appropriate criteria to achieve adequate compaction. The trial fill sections shall be performed as follows:

- One trial fill section is valid for up to 10,000 ft^2 of MSE wall area (e.g. 1 to 10,000 ft^2 of wall requires 1 trial fill section, 10,001 to 20,000 ft^2 requires 2, etc.) and for no more than one individual MSE wall.
- The minimum dimensions of the test pad shall be 15 ft. wide by 50 ft. long.
- The lift thickness shall not exceed eight (8) inches after compaction.
- Compaction shall be determined by using a level to measure the settlement of the trial section at a number of points after each pass (e.g., a minimum of 5 points measured at the center of a 1 ft square metal plate or other method approved by the Engineer).
- A thickness of approximately 2.5 feet shall be constructed to determine the appropriate number of passes, which will maximize compaction without excessively crushing the rock at the surface.
- The number of passes to achieve at least 80 percent of the maximum settlement will be required for production work.
- Only those methods used to establish compaction compliance in the trial fill section shall be used for production work.
- A material change, change in source, a difference of more than +/- 5.0 percent passing any sieve size, and/or change in the approved equipment shall require the contractor to conduct a new trial fill section and obtain re-approval by the Engineer of the minimum number of passes and rolling pattern.
- The Department reserves the right to use other test methods to evaluate the adequacy of the compaction criteria.
- The trial fill sections are incidental to the bid price for Retaining Wall.

Within three (3) feet of the wall facing, compaction criteria shall be determined using test pad sections with Department personnel present to determine appropriate criteria to achieve adequate compaction. The test pad sections shall be performed as follows:

- The minimum dimensions of the test pad shall be 5 ft. wide by 15 ft. long.
- The lift thickness shall not exceed eight (8) inches after compaction.
- Compaction shall be determined by using a level to measure the settlement of the test pad section at a number of points after each pass (e.g., a minimum of 3 points measured at the center of a 1 ft square plate or other method approved by the Engineer).
- A thickness of approximately 2.5 feet shall be constructed to determine the minimum number of passes of a lightweight mechanical tamper or roller system.
- The number of passes to achieve at least 80 percent of the maximum settlement will be required for production work.
- Only those methods used to establish compaction compliance in the test pad section shall be used for production work.
- A material change, change in source, a difference of more than +/- 5.0 percent passing any sieve size, and/or change in the approved equipment shall require the contractor to conduct a new test pad section.
- The test pad sections are incidental to the bid price for Retaining Wall.

(C) Moisture Control:

The free moisture content of the reinforced fill material, as determined by KM 64-306, shall not exceed 2.0% during compaction.

(D) Protection of the Work:

The contractor shall not allow surface runoff from adjacent areas to enter the wall construction site at any time during construction operations. In addition, at the end of each day's operation, the contractor shall

slope the last lift of fill material away from the wall facing so that runoff is directed away from the structure. If the subgrade is damaged due to water or otherwise, such that it does not meet the requirements of Subsection 4.02, then as directed by the Engineer, the contractor shall rework and repair the damaged subgrade at no additional expense to the Department. The criteria in Subsection 4.02 shall be used to judge the adequacy of the repair. Rework and repair shall extend to a depth where undamaged work is encountered.

4.07 Retained Backfill Placement:

As required by the Geotechnical Report and plan notes the retained backfill (i.e. external backfill outside of the reinforced volume) may consist of either soil or "Granular Embankment" meeting the requirements of Section 3.06 herein. The material shall be compacted in accordance with Section 206 of the current Standard Specifications except that the maximum loose lift thickness (prior to compaction) is 12 inches. Type IV Geotextile Fabric shall be placed between the existing embankment material and the proposed "Granular Embankment" in accordance with Sections 214 and 843 of the Standard Specifications.

4.5 MONITORING:

4.51 Monitoring Devices:

The Geotechnical Report may require devices to monitor vertical and horizontal displacement both during and after construction. The Contractor will be responsible for providing labor and materials and for cooperating with, and providing, any required assistance to Department personnel with implementation of monitoring activities. The cost of all labor and materials required to support the monitoring program will be incidental to the cost of the.

The approximate locations of any monitoring devices shall be shown in the Working Drawings prepared by the MSE Wall Designer.

4.52 Monitoring Schedule:

The monitoring schedule for any required monitoring device shall be as agreed upon in the Geotechnical Report for the structure.

5.0 METHOD OF MEASUREMENT:

5.01 MSE Retaining Wall:

Mechanically Stabilized Earth (MSE) retaining walls will be measured by the square foot of Retaining Wall. The vertical height will be taken as the difference in elevation measured from the top of wall to the top of the leveling pad. No field measurement will be made. The final quantity will be the contract plan quantity increased or decreased by authorized changes.

The MSE Wall supplier's design may require additional excavation and MSE Wall materials to satisfy their design. The design MSE earth reinforcement lengths shall be equal to or greater than the length shown on the plans or as required by the AASHTO Specifications for the height of the wall plus live load surcharge. The lengths of the MSE Reinforcement shall be constant from the bottom to the top of the section. Extension of the plan limits to accommodate the wall design, configuration of pre-fabricated concrete units, or lengths of earth reinforcement for MSE Walls shall not be cause for changing the plan pay quantities. Additional quantities of excavation, MSE Reinforcement, MSE volume, excavation for

foundation replacement, granular embankment, and labor necessary to satisfy the MSE Wall supplier's design shall be incidental to the Retaining Wall.
The MSE volume that extends twelve inches, minimum, beyond the ends of the reinforced volume for MSE Walls shall be incidental to the Retaining Wall.
All work associated with providing the design, details and construction for the coping, moment slab, barrier and pre-cast aesthetic panel shall be incidental to the Retaining Wall.
All materials, equipment, and labor necessary to provide and install the geotextile fabric immediately surrounding the reinforced fill volume shall be incidental to the Retaining Wall.

5.02 Embankment:
The quantity of embankment for external retained backfill behind the MSE Walls and, if required, granular foundation beneath the walls shall be measured according to Section 206 of the current Standard Specifications. The final quantities shall be based on field measurements.

5.03 Geotextile Fabric:
All materials, equipment, and labor necessary to provide and install the geotextile fabric placed between existing fill material and Granular Embankment shall be measured according to Section 214 of the current Standard Specifications. The final quantities shall be based on field measurements.

Appendix:

Special Note for Soil Nail Wall
Quality Control Inspection

Boone County
EB KY 338, Wall #14
Item No. 6-18.00

This Special Note is in addition to the requirements set forth in Section 113 of the Standard Specifications for Road and Bridge Construction, current edition.

The Federal Highway Administration's **GEC 007, Soil Nail Walls Reference Manual** (FHWA-NHI-14-007) presents state-of-the-practice information on soil nails for highway applications. Ensure that Quality Control field and office personnel have access to and are familiar with this document.

1.0 DESCRIPTION

This work consists of developing, furnishing, executing, and maintaining a Quality Control Plan (QCP) for the inspection of the retaining wall(s). QC personnel will answer directly to the Department's Resident Engineer. The work includes but is not limited to inspecting, testing, and ensuring conformance to the contract. The Contractor is responsible for executing the QCP, which includes checking and tracking material shipments, construction inspection, and on-site materials testing pertaining to drilling, installation and testing of soil nails and instrumentation. This includes ensuring conformance with all sections and Appendices of the Special Note for Soil Nail Walls.

The Department will be responsible for quality assurance, any off-site material testing, and inspection of all other items in the contract.

2.0 QUALITY CONTROL PLAN (QCP) PERSONNEL

In addition to conforming to Subsection 113.03 of the Standard Specifications for Road and Bridge Construction, conform to the following requirements.

The QCP personnel's sole duty on the project will be implementing the QCP. Provide a QCP organization to be on the site at all times during the progress of work on the specified bid items, with complete authority to take any action necessary to ensure compliance with the Contract. These individuals must not be responsible for the production of the project and may not be employed by the general contractor, specialty subcontractor, or any other subcontractor responsible for any construction activities on the project.

Soil Nail testing is considered production work performed by the Specialty Contractor's production personnel (verification and proof testing). However, the QCP personnel will be responsible for monitoring the tests, independently recording data, and reviewing the Contractor's test reports.

The size and composition of the QCP organization may vary as the job progresses but at all times must be compatible with the level of effort and capability required by the Contract requirements.

Any engineering firm that performed engineering analyses and/or design for this project will not be permitted to perform QC Inspection, due to the potential for conflict of interest.

2.1 QCP Personnel

As part of the QCP organization, provide a QCP Manager and specialized inspection personnel to assist and be responsible to the QCP Manager and to be physically present at the construction site during all activities covered by the QCP. Provide a QCP organization with a minimum of the persons listed below:

- 1 QCP Manager and 1 Alternate QCP Manager
- 1 Lead Inspector and 1 Alternate Lead Inspector
- Assistant Inspector(s) - if necessary

The actual number of personnel required may be less than the persons listed above and will be dictated by the project size, complexity, and schedule, and is subject to Department approval. However, the persons above must be available.

Provide personnel with the experience and credentials below. For lead and assistant inspectors, education may be substituted for experience as follows:

- A Bachelors Degree in Engineering, Engineering Technology, Surveying, Construction Management, Geology, or other related technical field (at the discretion of the Department), will count for two (2) years of experience.
- An Associates Degree in Engineering Technology, Surveying, Construction Management or other related technical field (at the discretion of the Department), will count for one (1) year of experience.

2.1.1 QCP Manager and Alternate QCP Manager(s)

- Licensed Professional Engineer with a minimum of five (5) years of engineering experience in one or more of the following areas: construction, materials, geotechnical, or structure design. A Master's Degree in Engineering will count for one (1) year of experience.
- Experience on a minimum of three (3) projects involving the interpretation of pullout test results for drilled and grouted anchors such as soil and/or rock anchors, soil nails, rock bolts, etc.; or experience on a minimum of one (1) project involving the interpretation of pullout test results for drilled and grouted

anchors such as soil and/or rock anchors, soil nails, rock bolts, etc. supplemented by design-related experience on a minimum of one (1) soil nail or tieback ground anchor retaining wall project and other experience with interpretation of geotechnical-related field test results (e.g. deep foundation load testing, geotechnical instrumentation, etc.)

- Field construction engineering and/or inspection experience on a minimum of three (3) geotechnical-related projects.

2.1.2 Lead Inspector and Alternate Lead Inspector(s)

- A minimum of six (6) years of construction and/or materials inspection experience showing evidence of supervisory experience on geotechnical-related projects.
- Construction inspection experience on a minimum of two (2) projects involving inspection of installation and pullout testing of drilled and grouted anchors such as soil and/or rock anchors, soil nails, rock bolts, etc.; or experience on a minimum of one (1) project involving inspection of installation and pullout testing of drilled and grouted anchors such as soil and/or rock anchors, soil nails, rock bolts, etc., supplemented by related experience such as post-tensioned concrete inspection, deep foundation load testing, etc.
- ACI Level I Concrete Field Testing Technician, supplemented by a minimum of one (1) other construction-related technician certification (NICET, KYTC, etc.).

2.1.3 Assistant Inspectors

- A minimum of four (4) years of construction and/or materials inspection experience on geotechnical-related projects.
- Construction inspection experience on a minimum of one (1) project involving inspection of installation and pullout testing of drilled and grouted anchors such as soil and/or rock anchors, soil nails, rock bolts, etc. or one (1) project involving drilled deep foundations (drilled shafts, auger cast piles, drilled-in soldier piles, etc.) or other drilling-related experience (geotechnical exploration drilling, etc.).

2.2 QCP Personnel Duties Duties for the QCP personnel include, but are not limited to the duties described below.

2.2.1 QCP Manager and Alternate QCP Manager(s)

The QCP Manager must be available during construction activities as indicated on the QCP Plan. The QCP Manager may be removed from the project for noncompliance of quality products. Identify an Alternate QCP Manager in the QCP Plan to manage the QCP effort during the QCP Manager's absence. In no instance may the QCP Manager be absent and the Alternate QCP Manager serve for more than a 2 week period without written permission from the Engineer.

The QCP Manager must visit the project site at least one time during the first two (2) weeks of activities covered by the QCP. The QCP Manager and/or Alternate QCP Manager must review all QCP reports and documentation and submit letters to the Resident Engineer documenting that they have done such.

2.2.2 Lead Inspector

The Lead Inspector or Alternate Lead Inspector must be present during all activities covered by the QCP. The Lead Inspector or Alternate Lead Inspector may request prior verbal approval for short absences from the Resident Engineer or authorized representative. Approval will be subject to the experience and competency of the Assistant Inspector(s) on the project.

The Lead Inspector or Alternate Lead Inspector must review and sign all QCP reports and documentation prior to submittal to the Department.

3.0 QCP Organization and Procedures

The QCP must include the following:

3.1 A description of the quality control organization, including an organizational chart showing lines of authority and acknowledgment that the QCP staff shall implement at least a 3-phase control system for all aspects of work as specified herein. Phase I Preparatory Phase prior to beginning work; Phase II Construction Phase during execution of work; and Phase III Acceptance of Work.

3.2 The name, qualifications in resume format, duties responsibilities and authorities and certifications of the QCP Manager, Alternate QCP Manager, Lead Inspector and Alternate Lead Inspector and all other personnel.

3.3 A copy of the letter to the QCP Manager, signed by an authorized official of the Contractor which describes the responsibilities and delegates sufficient authority to adequately perform the functions of the QCP Manager, including authority to stop work which is not in compliance with the Contract. The QCP Manager must issue a letter of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Include copies of these letters in the QCP.

3.4 Procedures for managing submittals and approvals, including but not limited to, source of materials, shop drawings and subletting requests.

3.5 Procedures for tracking construction deficiencies from identification through acceptable corrective action shall be on the QCP. These procedures will establish verifications that identified deficiencies have been corrected. A Non-Conformance Report (NCR) with each item numbered consecutively will be prepared and signed by the QCP Manager at least weekly with recommended action, action taken and date corrected and filed separately.

3.6 The scope of the project, including a list of definable work activities. A definable work activity is separate and distinct from other tasks, requires specific crews or Subcontractors, has different specifications, and has separate control

requirements. It could be identified by different crews or Subcontractors, or it could be work performed by the same trade in a different environment. Each activity must have construction tolerances and workmanship standards identified for use by construction crews and sampling/testing frequencies identified for the QCP personnel. This list will be agreed upon during the coordination meeting.

4.0 CONTROL

QCP is the means by which the Contractor ensures the quality and construction, to include subcontractors and suppliers, and complies with the requirements of the Contract. At least 3 phases of control must be conducted by the QCP Manager for each definable work activity as follows:

4.1 Preparatory Phase Perform this phase prior to beginning work in an activity and include:

4.1.1 Review all the Contractor's Construction and Materials Submittals (including those required by the Special Note for Soil Nail Walls, steel mill test reports, nail QC reports, shop drawings, etc.) and provide written comments signed by the QCP Manager and Lead Inspector, to the Department within 14 calendar days; include specific recommendations for acceptance, acceptance with revisions, or non-acceptance of each submittal.

4.1.2 Prior to the start of each work activity, the Contractor and QCP Manager are encouraged to conduct a meeting with each crew to discuss in detail with each crew member the quality standards and workmanship identified in the Preparatory Phase. The importance and role of each crew member in achieving quality should be stressed.

4.1.2 A review of each paragraph of applicable specifications.

4.1.3 A review of Contract and Construction Drawings.

4.1.4 A check to assure that all materials and equipment and subletting requests have been submitted, tested and approved.

4.1.5 A review of control inspection and testing requirement has been completed.

4.1.6 Examination of the work area to assure that all required preliminary work has been completed and complies with the Contract.

4.1.7 A physical examination to assure all required materials and equipment are on hand, and conform to approved shop drawings, or submitted data and are properly stored.

4.1.8 Notify the Department at least 24 hours prior to beginning aggregate or concrete work.

4.1.9 Preparation and approval of QCP staffing plan which corresponds to the working schedule.

4.1.10 Discussion of procedures for controlling quality of work, including repetitive deficiencies, with all contractor managers. Assure availability of appropriate documentation.

4.2 Construction Phase This phase includes the control measures from start to completion of a work activity.

4.2.1 Once the work zone has been established, check it to ensure conformance with the Contract requirements.

4.2.2 Monitor the producers' QC testing to ensure specifications are being met.

4.2.3 Inspect, test and document in accordance with the Contract requirements to ensure quality standards are being identified, corrective actions taken and documented using the NCR. The Lead Inspector will be responsible for completing a Daily Work Report (DWR) to document each day's activities on the retaining wall work. Submit the DWR to the Resident Engineer or representative no later than the close of the next workday. Verify quality standards as work progresses and make adjustments to the QCP.

4.3 Acceptance Phase

4.3.1 Pre-final Inspection At the completion of any work activity or any increment thereof, the QCP Manger, Contractor, and Resident Engineer (or representative) must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Include such a list of deficiencies in the QCP documentation as required herein and include the estimated date by which the deficiencies will be corrected. The Contractor must ensure all items on this list have been corrected when the Final Inspection is scheduled.

4.3.2 Final Acceptance Inspection Final acceptance and any corrective work will be in accordance with the requirements of Section 105.12 of the Standard Specifications.

5.0 QCP SUBMITTAL

5.1 Original Submittal for Approval Submit the QCP to the Engineer no later than sixty (60) calendar days after receiving Notice to Begin Work and at least thirty (30) calendar days before beginning a specific work activity. The Department will return the QCP to the Contractor within twenty-one (21) calendar days after submittal with requests for changes, if applicable. The Contractor will then have seven (7) calendar days to correct and make changes and resubmit the QCP to the Engineer. Work cannot begin on an activity until after the QCP for that activity has been approved by the Engineer.

5.2 Subsequent Approvals Once the Contractor begins work under the approved QCP, continuously prosecute the work in accordance with the QCP. Changes must be approved by the Engineer prior to implementation.

6.0 DOCUMENTATION

The Contractor and QCP personnel are advised that any deliberate action to the detriment of the QCP will be grounds for defaulting the Contract. This includes but is not limited to any deliberate omissions, deliberate cover-ups, or attempts by the Contractor to withhold information from the Department. Allow direct communication between QCP personnel and the Department. The Contractor and any Subcontractor involved in such detrimental action will not be considered for future bids until requalified.

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include the work of subcontractors and suppliers. Document verification and proof tests in accordance with the Special Note for Soil Nail Walls. Generate and update a soil nail test summary. Forms for these records must be approved by the Department. Submit all records with the last pay estimate, including but not limited to sketch books, and as-built plans. The Department will make the final payment only after all documentation has been submitted.

7.0 PAYMENT

The Department will pay for Quality Control at the contract Lump Sum amount. The Department considers payment as full compensation for all labor and costs associated with performing Quality Control. In addition to conforming to Subsection 113.09 of the Standard Specifications for Road and Bridge Construction, there are the following requirements. The Department will include payment for 20 percent Lump Sum for the QCP in the first estimate. The Department will pay the remaining 80 percent based on the percentage of work completed.

Additional payment for the QCP will be made when time or extra work is added according to Subsection 104.03 for the bid items included in the QCP. Additional work added to other parts of the contract will not permit additional payment for the QCP.

Code	**Pay Item**	**Pay Unit**
2572	Quality Control	Lump Sum

Special Note for Soil Nail Walls

Boone County
EB KY 338 Wall #14
Item No. 6-18.00

1.0 DESCRIPTION

1.1 This work is for the design and construction of permanent “Soil Nail Walls". Use an approved Soil Nail Wall Contractor that has the expertise and capability to complete the work required by this Special Note. Only Contractors pre-qualified by the Kentucky Department of Highways (the Department) and that meet any specific requirements for this project may perform soil nail wall design and construction for this project.

1.2 Subsurface data from the geotechnical exploration is included in the Contract Plans. Rock cores (if applicable) are available for viewing at the Geotechnical Branch in Frankfort, 502-564-2374. Contractors may view rock cores (if applicable); call a minimum of two (2) days in advance to schedule a viewing. A link to the Geotechnical Report can be provided under Project Related Information for the letting if requested.

2.0 SCOPE OF WORK

2.1 The contract item "Soil Nail Wall" includes furnishing the design calculations and construction plans, materials, labor, tools, equipment, and other incidental items required for the design, construction, and testing of permanent soil nail walls as described herein. See the contract plans for an overview of the soil nail wall(s).

2.2 Soil nail wall construction includes excavating in staged lifts; drilling soil nail drillholes; providing, placing and grouting the encapsulated and/or epoxy coated nail bar tendons into the drillholes; placing drainage elements; placing shotcrete reinforcement; applying shotcrete facing over the reinforcement; attaching bearing plates and nuts; performing nail testing; and installing permanent facing. Refer to the FHWA GEC 007 "Soil Nail Walls Reference Manual" for the components of a soil nail wall.

2.3 Soil nail wall construction requires excavation in staged lifts***. Excavation in the vicinity of the wall face requires special care and effort compared to general earthwork excavation and close coordination between the earthwork contractor and the Soil Nail Wall Contractor.*** The Prime Contractor should take this into account during bidding and should consult the Excavation Section of this Special Note and the Contract Plans for details.

2.4 Subject to the requirements in the Contract Plans and this Special Note, select the method of excavation, drilling method and equipment, final drillhole diameter(s), and grouting procedures to meet the performance requirements specified herein.

2.5 In design and construction of the wall, consider the potential risks involved due to slope failure. Excavation stability, slope stability, wall alignment, and wall stability are the Contractor's responsibilities from the beginning of work until final acceptance. Damage to property (public or private) or to the wall itself during construction is the responsibility of the Contractor. Analyze the soil nail wall system in order to ensure that the wall system will function as intended.

2.6 The main body of this Special Note is general for permanent soil nail walls. Refer to the Appendix or Appendices for any project specific requirements.

2.7 Contract Plans are defined as plans prepared by the Department and/or authorized representative containing the Soil Nail Wall Profile and Layout, Soil Nail Wall Details, Subsurface Data, etc., to be used by the Soil Nail Specialty Contractor to design the soil nail wall. These plans are included in the Bid Proposal.

2.8 Construction Plans are defined as plans prepared by or for the Soil Nail Wall Contractor under the direction of the Wall Design Engineer and accepted by the Engineer for construction of the soil nail wall.

3.0 REFERENCES

The documents below apply to this work. Unless noted otherwise, use the current edition as of the letting date of this project.

3.1 Contract Plans and Plan Notes

3.2 The "Kentucky Standard Specifications for Road and Bridge Construction", Current Edition with supplements. This document may be referred to as "Specifications" or "Standard Specifications" elsewhere in this Special Note.

3.3 The Department Manuals "Kentucky Methods", "List of Approved Materials", and "Field Sampling and Testing Practices".

3.4 American Society for Testing and Materials (ASTM) Standards, Current Edition.

3.5 American Association of State Highway and Transportation Officials (AASHTO) Standards, Current Edition.

3.6 FHWA Publication FHWA-NHI-14-007, "GEC 007: Soil Nail Walls Reference Manual", February 2015.

3.7 AASHTO LRFD Bridge Design Specifications, Current Edition, with all interims.

3.8 AISC Steel Construction Manual for the design of structural hardware applies if the design is not covered in the AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.

4.0 EXPERIENCE REQUIREMENTS AND SUBMITTALS

Requirements for personnel experience and pre-construction submittals, **including submittal deadlines**, are in this section. Do not begin construction on any soil nail wall, other than stockpiling of wall materials, until the Engineer receives and accepts all submittals required in this section. Additional submittals and records required during and after construction may be included in other sections of this Special Note. The use of electronic submittals (preferably in .pdf format) will expedite the approval process.

4.1 Experience Requirements The Department considers a satisfactory record of experience in soil nail wall design and construction important to successfully complete this work. Use personnel meeting the requirements below on this project and submit electronically in PDF format all information necessary to verify that they meet the requirements. **Submit this information no later than thirty (30) calendar days after receiving Notice to Begin Work.** As a minimum, include the following for each project necessary to satisfy the requirements:

1. The names and current phone numbers of the owner's representative(s) who can verify that the Contractor meets the requirements.
2. The dates of construction.
3. The type (temporary/permanent) of structure.
4. The number of nails.
5. The maximum wall design height.

The Department will review the experience requirements and respond to the Contractor within twenty-one (21) calendar days. Review and acceptance by the Engineer is for evidence of the required experience and does not in any way relieve the Contractor of full responsibility for the successful and satisfactory completion of the work.

4.2 Contractor Experience Requirements The requirements for the Soil Nail Wall Contractor are:

a. A minimum of five (5) years experience constructing temporary and/or permanent soil nail retaining walls, with a minimum of three (3) projects and at least 600 soil nails or 15,000 ft^2 of wall face completed in the past five (5) years.
b. A minimum of three (3) soil nail retaining wall projects with permanent soil nail retaining walls at least 15 ft high completed in the past five (5) years, and at least 400 permanent soil nails or 10,000 ft^2 of wall face completed in the past five (5) years.

Only drilled and grouted soil nails will satisfy these requirements. Some projects may be used to satisfy more than one requirement.

4.3 Personnel Experience Requirements

4.3.1 Wall Design Engineer Experience Requirements

Use a Wall Design Engineer meeting the requirements below to assume full responsibility for soil nail wall design on this project. One or more other Engineers may assist with the design and plan preparation under the supervision of the Wall Design Engineer, who may be an employee of the Soil Nail Wall Contractor or a Consultant. However, manufacturers' representatives may not be used to satisfy these requirements. The requirements for the Wall Design Engineer are:

a. Licensed Professional Engineer (Civil and/or Structural) in Kentucky.
b. A minimum of five (5) years design and/or construction experience on temporary and/or permanent soil nail retaining walls, with experience on a

minimum of three (3) projects and at least 400 soil nails or 10,000 ft^2 of wall face, constructed in the past five (5) years.

4.3.1 Project Engineer Experience Requirements

Use an engineer meeting the requirements below to have overall technical responsibility for soil nail wall construction on this project. It is not necessary for the Project Engineer to be on site on a daily basis. Consultants or manufacturers' representatives may not be used to satisfy these requirements. The requirements for the Project Engineer are:

a. Licensed Professional Engineer in the U.S.
b. A minimum of five (5) years design and/or construction experience on temporary and/or permanent soil nail retaining walls, with experience on a minimum of three (3) projects and at least 400 soil nails or 10,000 ft^2 of wall face, constructed in the past five (5) years.
c. An employee of the Soil Nail Wall Contractor.

The Project Engineer and the Wall Design Engineer may be the same person if that person meets all the stated requirements.

4.3.3 On-Site Supervisor Experience Requirements

Use an on-site supervisor (project manager, superintendent, etc.) meeting the requirements below to be responsible for the daily soil nail wall construction activities on this project. Consultants or manufacturers' representatives may not be used to satisfy the requirements of this section. The requirements for the On-Site Supervisor are:

a. A minimum of five (5) years construction experience on temporary and/or permanent soil nail retaining walls, with experience on a minimum of three (3) projects and at least 400 soil nails or 10,000 ft^2 of wall face, constructed in the past five (5) years.
b. An employee of the Soil Nail Wall Contractor.

The On-Site Supervisor and the Project Engineer may be the same person if that person meets all the stated requirements. The Department will consider allowing a team of more than one supervisor to satisfy these requirements and perform the associated functions, subject to certain conditions at the discretion of the Engineer. The Department may consider related experience with other similar types of specialty construction.

4.3.4 Shotcrete Nozzlemen and Finishers Experience Requirements

Use shotcrete nozzlemen and finishers meeting the requirements below:

a. Certification in accordance with the ACI CP-60 "Craftsman Workbook for ACI Certification of Shotcrete Nozzleman" by an ACI recognized shotcrete testing lab and/or recognized shotcreting consultant and covering the type of shotcrete to be used (plain wet-mix, plain dry-mix or steel fiber reinforced). Provide proof of ACI certification.

b. Experience with similar shotcrete application on at least three (3) projects constructed in the past five (5) years, with work totaling at least 5,000 square feet of area.

4.3.5 The Engineer may suspend work on the wall if the Contractor substitutes unqualified and/or unapproved personnel or if the personnel are not performing the required duties. If work is suspended due to substitution of unqualified and/or unapproved personnel, the Contractor is fully liable for all costs resulting from the suspension of work. No adjustment in contract time resulting from this suspension of work will be allowed.

4.4 Design Calculations and Construction Plans For each wall, submit electronically in PDF format for review Construction Plans and Design Calculations prepared by or under the supervision of the Wall Design Engineer and signed by the Wall Design Engineer. Submit in the same format revisions to construction plans and design calculations each time corrections are required. In the design calculations and construction plans, show explicit details sufficient to allow an expeditious review of the proposed design and construction procedures. Hard copies of the reviewed and accepted plans and calculations will required as noted in Section 4.4.2. **Submit this information no later than sixty (60) calendar days after receiving Notice to Begin Work.**

Submit any changes or deviations from the Construction Plans for additional review and acceptance. No adjustments in contract time will be allowed due to incomplete submittals. Revise the drawings when plan dimensions are revised due to field conditions, evaluation of verification or proof test results, or for other reasons. Provide revised design calculations signed by the Wall Design Engineer for all design changes made during construction of the wall.

4.4.1 Design Calculations As a minimum, include the following items:

1. A written summary report that describes the overall soil nail wall design.
2. Applicable code requirements and design references.
3. Nail wall critical design cross sections geometry including soil/rock strata and location, magnitude, and direction of the design slope or external surcharge loads and piezometric levels.
4. Design criteria including, soil/rock shear strengths (friction angle and cohesion), unit weights, and ground-grout pullout resistances and nail drillhole diameter assumptions for each soil/rock strata.
5. Partial safety factors/strength factors (for Service Load Design) used in the design on the pullout resistance, surcharges, soil/rock unit weights, nail head strengths, and steel, shotcrete, and concrete materials. Minimum required global stability soil factor of safety for SLD design.
6. Seismic design acceleration coefficient.
7. Design calculation sheets with the project number, wall location, designation, date of preparation, initials of designer and checker, and page

number at the top of each page. Provide an index page with the design calculations.

8. Design notes including an explanation of any symbols and computer programs used in the design.
9. Nail wall final design cross-sections geometry including soil/rock strata and location, magnitude, and direction of slope or external surcharge loads and piezometric levels with critical slip surface shown along with minimum calculated Global stability soil factor of safety of SLD design and required nail lengths and strengths (nail bar sizes and grades) for each nail row.
10. Structural design calculations for wall facings and nail head/facing connections including consideration of facing flexural and punching shear strength, headed studs tensile strength, upper cantilever, minimum reinforcement ratio, cover and splice requirements.
11. Any other necessary design calculations.

4.4.2 Construction Plans As a minimum, include the following items:

1. A natural scale plan view of the wall identifying:
   a. A reference baseline and north arrow.
   b. The offset and offset from the construction centerline or baseline to the face of the wall at its base at all changes in horizontal alignment.
   c. Beginning and end of wall stations and offsets.
   d. Right-of-way and permanent or temporary construction easement limits, location of all known active and abandoned existing utilities, adjacent structures or other potential interferences. The centerline of any drainage structure or drainage pipe behind, passing through or passing under the wall.
   e. Limits of longest nails.
   f. Subsurface exploration locations shown on a plan view of the proposed wall alignment with appropriate references base lines to fix the locations of the explorations relative to the wall.

2. A natural scale elevation view of the wall identifying:
   a. The elevation at the top of the wall, at all horizontal and vertical break points, and at least every 25 ft. along the wall.
   b. Elevations at the wall base and the top of leveling pads for casting CIP facing (if applicable).
   c. Beginning and end of wall stations and stations of alignment breaks.
   d. The distance along the face of the wall to all steps in the wall base.
   e. Wall elevation view showing nail locations and elevations; vertical and horizontal nail spacing; and the location of wall drainage elements and permanent facing expansion/contraction joints (if applicable) along the wall length.
   f. Existing and finish grade profiles both behind and in front of the wall.
   g. Elevation Datum

3. Design parameters, including ultimate and allowable nail pullout resistance.

4. General notes for constructing the wall including construction sequencing or other special construction requirements.
5. Horizontal and vertical curve data affecting the wall and wall control points. Match lines or other details to relate wall station to centerline stationing.
6. A summary of quantities of each wall showing estimated square feet of wall face.
7. Nail wall typical section including staged excavation lifts, wall and excavation face batter, nail spacing and inclination, nail bar sizes, and corrosion protection details.
8. A typical detail of production and test nails defining the nail length, minimum drillhole diameter, inclination, test nail bonded and unbonded test lengths and Design Test Loads (DTL's).
9. A soil nail schedule including:
    a. Soil nail numbers
    b. Soil nail design loads
    c. Type, size, and number of bars
    d. Total nail lengths
    e. Nail hole diameters
    f. Angle of nail inclination
    g. Nail locations and spacing
10. Details, dimensions, and schedules for all nails, reinforcing steel, wire mesh, bearing plates, headed studs, etc. and/or attachment devices for shotcrete, cast-in-place or prefabricated facings.
11. Dimensions and schedules of all reinforcing steel including reinforcing bar bending details.
12. Details and dimensions for wall appurtenances such as barriers, coping, drainage gutters, fences, etc.
13. Details for constructing wall around drainage facilities.
14. Details for terminating wall and adjacent slope construction.
15. Facing finishes, color and architectural treatment requirements (if applicable) for permanent wall facing details.

The Department will complete the review within thirty (30) calendar days of each submittal; the Department will not suspend charging working days for this review period. Insufficient design and/or plan details, as judged by the Engineer, will be cause for withholding acceptance. The Contractor is fully liable for all costs resulting from acceptance being withheld; the Department will not suspend charging working days as the result of not accepting the design, details, or plans. Review and acceptance of the plans by the Engineer is for evidence of work to be performed and does not in any way relieve the Contractor of full responsibility for the design and for successful and satisfactory completion of the work.

After the review is completed and the Engineer accepts the Design Calculations and Construction Plans, furnish the Section Engineer one full set of accepted Final Construction Plans in Microstation format (.dgn) using a 36 x 22 inch sheet size, four (4) full sets of accepted Final Construction Plans for the Department's use.

Provide a set of the above information plus the accepted Final Design Calculations, stamped and signed by the Soil Nail Wall Design Engineer, electronically in PDF format.

4.5 Construction and Materials Submittals Submit electronically in PDF format the following. **Submit this information no later than one hundred twenty (120) calendar days after receiving Notice to Begin Work and sixty (60) calendar days prior to beginning wall construction.**

1. The proposed start date and proposed wall construction sequence and schedule including:
   a. Plan describing how surface water will be diverted, controlled and disposed of.
   b. Proposed methods and equipment for excavating the soil and/or rock to the staged excavation lifts, including the proposed grade elevations for each excavation lift.
   c. Measures to ensure wall and slope stability during various stages of wall construction and excavation where discontinuous rows of nails will be installed (if applicable); information on space requirements for installation equipment; temporary shoring plans (if applicable); information on provisions for working in the proximity of underground facilities or utilities (if applicable).
   d. Proposed nail drilling and grouting methods and equipment including drillhole diameter proposed to achieve the required pullout resistance values and any variation of these along the wall alignment.
2. Grout submittal including:
   a. type of mixer;
   b. water/cement ratio;
   c. type of additives;
   d. design grout pressure;
   e. type of cement;
   f. quantity of flyash;
   g. mix design;
   h. design strength of grout; and
   i. mix verification testing;
3. Certified mill test results for nail bars and couplers from each heat specifying the ultimate strength, yield strength, elongation and composition.
4. Certificates of Compliance for the following materials, if used. Provide certificates stating that the material or assemblies to be provided will fully comply with the contract requirements:
   a. Nail Centralizers
   b. Nail Encapsulation
   c. Bearing Plates
   c. Nuts
   d. Portland Cement
   e. Documentation to support any other requirements in the Materials Section of this Special Note.

5. Shotcrete and Drainage submittals including:
    a. Proposed methods of shotcrete placement and of controlling and maintaining facing alignment and location and shotcrete thickness.
    b. Shotcrete mix design performed by a certified ACI Level II or KRMCA Level II technician including:
        - Type of Portland cement.
        - Aggregate source and gradation.
        - Proportions of mix by weight and water-cement ratio.
        - Proposed admixtures, manufacturer, dosage, technical literature.
        - If prepackaged shotcrete is used, previous strength test results for the same shotcrete mix from the same manufacturer completed within one year of the start of shotcreting may be submitted for initial verification of the required compressive strengths at start of production work.
    c. Certificates of Compliance, manufacturers' engineering data and installation instructions for the PVC drain piping, drainage geotextile, geocomposite drain strip, drain grate and accessories.
6. Proposed nail testing methods and equipment setup including:
    a. Details of the jacking frame and appurtenant bracing.
    b. Details showing methods of isolating test nails during shotcrete application (i.e., methods to prevent bonding of the soil nail bar and the shotcrete facing during testing).
    c. Details showing methods of providing the temporary unbonded length and of grouting the temporary unbonded length of test nails after completion of testing.
    d. Specific test nail locations including stations and elevations.
    e. Equipment list.
    f. Identification number and certified calibration records for each test jack and pressure gauge (calibrated as a unit no more than 12 months prior to use) and load cell to be used.

7. Instrumentation submittals, if required.
8. Any other documentation required to verify that proposed construction procedures and materials fully comply with all requirements in the contract documents.

The Department will complete the review within fourteen (14) calendar days after accepting the Design Calculations and Construction plans or within fourteen (14) calendar days after receiving each submittal; the Department will not suspend charging working days for this review period. Unacceptable methods or documentation, as judged by the Engineer, will be cause for withholding acceptance. The Contractor is fully liable for all costs resulting from acceptance being withheld; the Department will not suspend charging working days as the result of not accepting the design, details, or plans. Review and acceptance by the Engineer is for evidence of work to be performed and does not in any way relieve the Contractor of full responsibility for the successful and satisfactory completion of the work.

4.6 Soil Nail Wall Pre-Construction Meeting A Pre-Construction Meeting to discuss soil nail wall construction will be required. This meeting will be held after all soil nail submittals in Sections 4.1, 4.2, 4.3, and 4.4 have been received, reviewed, and accepted by the Department, after the submittals in Section 4.5 have been received by the Department, and at least ten (10) working days prior to the beginning of soil nail construction. The purpose of the meeting is to discuss construction procedures, personnel, and equipment to be used. The following will be expected to attend:

- Representing the Contractor and Subcontractors - Prime Contractor Representative, Soil Nail Wall Design Engineer, Soil Nail Wall Project Engineer, and Soil Nail Wall On-Site Supervisor. Also, representatives of the Excavation Contractor, Shotcreting Contractor, and Surveyor, if different than the Prime or Soil Nail Wall Contractor.
- Representing the Quality Control Team - QCP Manager and Lead Inspector.
- Representing the Department - Section Engineer, Central Office Construction Engineer, Geotechnical Branch Representative and others as deemed appropriate by the Section Engineer.

If the Contractor's key personnel change or if the Contractor proposes a significant revision to soil nail construction procedures, additional Soil Nail Pre-Construction meetings may be required at the discretion of the Engineer.

5.0 DESIGN

Design the soil nail wall using the design method outlined in FHWA Publication FHWA-NHI-14-007, "GEC 007, Soil Nail Walls Reference Manual", February 2015. Use required partial safety factors, allowable strength factors, and minimum global stability soil factors

of safety in accordance with the FHWA GEC 007, unless specified otherwise; critical structure requirements apply. Perform structural design of any individual wall elements not covered in FHWA GEC 007 by the LRFD methods in conformance with appropriate articles of the AASHTO Specifications. Estimated soil/rock design shear strength parameters, slope and external surcharge loads, type of wall facing and facing architectural requirements, soil nail corrosion protection requirements, known utility locations, easements, and right-of-ways will be as shown in the Contract Plans or specified elsewhere in this Special Note.

Refer to the Contract Plans for additional information to be used for the design of the soil nail wall, including: Wall Plan and Elevation Views, Soil Nail Wall Details, and Subsurface Data.

5.1 Soil Nail Capacity Determine the allowable pullout resistance necessary to develop the required design loads using theoretical and empirical methods, and based on evaluation of the subsurface data in the Contract Plans and/or inspection of the site. Verify the desired soil nail capacities in accordance with the Soil Nail Testing and Acceptance Section of this Special Note.

5.2 Soil Nail Geometry

- Unless specified in the Contract Plans or elsewhere in this Special Note, provide a minimum soil nail length of 10 ft.
- Provide a minimum nail hole diameter of 6 inches.
- Provide a nail inclination of at least 10^{o} but no more than 20^{o}, unless otherwise specified in the Contract Plans or elsewhere in the Special Note.
- Do not extend the nails beyond the right-of-way or easement limits shown in the Contract Plans.

5.3 Corrosion Protection Provide design and details for Epoxy Coating meeting ASTM A775/A775M in addition to Class A Protection (Encapsulation) in accordance with FHWA GEC 007.

5.4 Structural Hardware Design structural hardware in accordance with the current edition of the AISC Steel Construction Manual and the current edition of the AASHTO Standard Specifications for Highway Bridges with interims. Where these conflict, AASHTO Specifications with interims govern.

5.5 Temporary Shotcrete and Wall Drainage Design a temporary shotcrete and permanent wall drainage system as shown in the Contract Plans and/or specified elsewhere in this Special Note. The Wall Design Engineer is responsible for providing all necessary details required to successfully construct the temporary shotcrete facing and wall drainage system (including weep drains and/or toe drains as applicable) to satisfy the design intent of the wall. Comply with AASHTO Specifications or the FHWA GEC 007 for any specific items that may not be addressed herein or elsewhere in the Contract Documents.

5.6 Wall Alignment Ensure that the wall is compatible with the horizontal and vertical alignment indicated in the Contract Plans. Survey control is the front face of the wall.

5.7 Permanent Concrete Facing When permanent concrete facing is required, provide cast-in-place concrete facing unless otherwise specified in the plans.

Refer to the plans for detail concerning formliners or other architectural treatments that may be required. Design concrete facing for full loads at final condition (in-place facing and complete construction). Provide a minimum facing thickness according to the following:

Cast-in-Place Concrete with 1 Mat of Reinforcement	10 inches
Cast-in-Place Concrete with 2 Mats of Reinforcement	12 inches

The minimum concrete cover over reinforcement is 3 inches against temporary shotcrete and 2 inches on the front face. Provide joints and joint materials as shown in the Contract Plans.

Protrusions beyond the face of the wall are not allowed. Completely fill any voids between the permanent facing and the construction facing with grout.

Include details for formwork connections to the shotcrete facing and/or nails (if applicable), proposed concrete placement method and placement rates, and accompanying structural calculations verifying the structural adequacy of the formwork, connections, and shotcrete facing and/or nails to support the loading induced by the fluid CIP concrete. When anchors embedded into the shotcrete facing will be used to support the 1-sided CIP face form, include calculations illustrating the anchor design load (calculated as the design concrete fluid pressure times the anchor tributary area).

5.8 Surface Drainage Coordinate design of surface drainage above the walls with the wall design.

6.0 MATERIALS

Provide materials conforming to the requirements below when the materials are required by the Contract Plans, this Special Note, the Construction Plans, or elsewhere in the Contract Documents.

6.1 Soil Nails

6.1.1 Solid Bar Nails AASHTO M31/ASTM A615, Grade 60 or 75, ASTM A722 for Grade 150. Deformed bar, continuous without splices or welds, new, straight, undamaged, and encapsulated. Threaded a minimum of 6 inches on the wall anchorage end to allow proper attachment of bearing plate and nut. Threading may be continuous spiral deformed ribbing provided by the bar deformations (e.g. continuous threadbars) or may be cut into a reinforcing bar. If threads are cut into a reinforcing bar, provide the effective area used for design, at no additional cost. Use mechanical splicers only for nails greater than 40 ft. in length.

6.1.2 Bar Couplers Bar couplers that develop the full ultimate tensile strength of the bar as certified by the manufacturer.

6.1.3 Fusion Bonded Epoxy Coating ASTM A 775, 7-12 mil thickness electrostatically applied. Bend test requirements are waived. Coating at the wall anchorage end of epoxy-coated bars may be omitted over the length provided for threading the nut against the bearing plate.

6.1.4 Encapsulation Minimum 40 mils thick corrugated HDPE tube conforming to AASHTO M252 or corrugated PVC tube conforming to ASTM D1784, Class 13464-B.

6.2 Soil Nail Appurtenances

6.2.1 Centralizers Manufactured from Schedule 40 PVC pipe or tube, steel or other material not detrimental to the nail steel (do not use wood); securely attached to the nail bar; sized to position the nail bar within 1 inch of the center of the drillhole; sized to allow tremie pipe insertion to the bottom of the drillhole; and sized to allow grout to freely flow up the drillhole.

6.2.2 Nail Grout Provide Type I or III Portland Cement conforming to ASTM C 150 and Section 801 of the Standard Specifications. Provide fresh cement that does not contain any lumps or other indication of hydration or "pack set." Provide water in the grout that is potable, clean and free of injurious substances, and meets the requirements of Section 803 of the Standard Specifications, except that the chloride content of the water does not exceed 100 ppm.

Provide grout consisting of a pumpable neat mixture of cement and water and is stable (bleed less than 2 percent), fluid, with a minimum 28-day compressive strength of 2000 psi and 1000 psi at 3 days, measured in accordance with ASTM C 109. No later than thirty days prior to beginning grouting operations, submit to the Engineer results of tests performed by an approved laboratory which demonstrate that the proposed grout mixture meets the requirements of this note. Include a graph with this information relating compressive strength of the grout to age covering a range of ages from 24 hours to 28 days.

Add water to the mixer first followed by cement and the admixtures. Mix the grout in mechanical mixing equipment of a type capable of continuous mixing which produce a grout free of lumps and undispersed cement. Auger mixing of the grout is not permitted. Retempering to the grout is not permitted.

Required Grout Physical Properties		
Property	**Test Value**	**Test Method**
Water-Cement Ratio	Max. 0.45	----------
28 Day Compressive Strength (Average of 3 cubes)	Min. 2000 psi	ASTM C109
3 Day Compressive Strength (Average of 3 cubes)	Min. 1000 psi	ASTM C109
Expansion	0.5% min 2% max	ASTM C1090

6.2.3 Admixtures Section 802 of the Standard Specifications. Admixtures which control bleed, improve flowability, reduce water content and use retard set in the grout, subject to review and acceptance by the Engineer. Accelerators are not permitted. Expansive admixtures may only be used in grout used for filling sealed encapsulations. Use admixtures compatible with the grout and mixed in accordance with the manufacturer's recommendations.

6.2.4 Film Protection Polyethylene film per AASHTO M171.

6.3 Bearing Plates, Nuts, and Welded Stud Shear Connectors

6.3.1 Bearing Plates ASTM A36

6.3.2 Nuts AASHTO M291, Class B, hexagonal, fitted with beveled washer or spherical seat to provide uniform bearing.

6.3.3 Shear Connectors AASHTO Construction Specifications, Section 11.3.3.1

6.4 Temporary Shotcrete and Wall Drainage Materials

Deliver, store and handle materials to prevent contamination, segregation, corrosion or damage. Store liquid admixtures to prevent evaporation and freezing.

Provide drainage geotextile and geocomposite drain strips in rolls wrapped with a protective covering and stored in a manner which protects the fabric from mud, dirt, dust, debris, and shotcrete rebound. Do not remove protective wrapping until immediately before the geotextile or drain strip is installed. Avoid extended exposure to ultra-violet light. Label each roll of geotextile or drain strip in the shipment to identify the production run.

Cement	Section 801, Type I, II, III or IV
Fine Aggregate	Section 804, Concrete Sand
Coarse Aggregate	Section 805, No. 11
Water	Section 803
Chemical Admixtures:	
Accelerator	Section 802, Fluid type, applied at nozzle
Water-reducer and Superplastisizer	Section 802
Retarders	Section 802
Mineral Admixtures:	
Fly Ash	Section 844, Cement replacement up to 35% by weight of cement
Silica Fume	Section 844, 90% minimum silicon dioxide solids content, not to exceed 12% by weight of cement
Welded Steel Wire Fabric	Section 811/AASHTO M55
Reinforcing Bars for Shotcrete Facing	Section 811, Grade 60, deformed
Bearing Plates	ASTM A36
Nuts	AASHTO M291, Class B, hexagonal, fitted with beveled washer or spherical seat to provide uniform bearing
Prepackaged Shotcrete	ASTM C928
Toe Drain Geotextile	Section 843, Type II
Drainage Aggregate	Section 805.08, with no more than 2% passing the No. 200 sieve
Geocomposite Drain Strip	Amerdrain 500 or approved equal
Film Protection	Polyethylene films per AASHTO M-171
PVC Connector and Drain Pipes:	
Pipe	ASTM 1785 Schedule 40 PVC, solid and perforated wall, cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric gasket joints
Fittings	ASTM D3034, cell classification 12454-B or 12454-C, wall thickness SDR35, with solvent weld or elastomeric gasket joints
Solvent Cement	ASTM D2564
Primer	ASTM F656
Section References are in the Kentucky Standard Specifications, Current Edition	

6.4.1 Shotcrete Mix Design Use shotcrete complying with the requirements of ACI 506.2, "Specifications for Materials, Proportioning and Application of Shotcrete", except as otherwise specified. The Contractor must receive notification from the Engineer that the proposed mix design and method of placement are acceptable before shotcrete placement can begin.

6.4.1.1 Proportioning and Use of Admixtures Proportion the shotcrete to be pumpable with the concrete pump furnished for the work, with a cementing materials content of at least 650 lb/cy and water/cement ratio not greater than 0.50. Do not use admixtures unless approved by the Engineer. Thoroughly mix admixtures into the shotcrete at the rate specified by the manufacturer. Use only accelerators compatible with the cement used, non-corrosive to steel, and not promoting other detrimental effects such as cracking or excessive shrinkage. The maximum allowable chloride ion content of all ingredients is 0.10% when tested to AASHTO T260.

6.4.1.2 Air Entrainment Air entrainment is not required for temporary shotcrete construction facings.

6.4.1.3 Strength Requirements Provide shotcrete with a compressive strength of 2000 psi in 3 days and 4000 psi in 28 days. The average compressive strength of each set of three test cores extracted from test panels or wall face must equal or exceed 85 percent of the specified compressive strength, with no individual core less than 75 percent of the specified compressive strength, in accordance with ACI 506.2.

6.4.1.4 Mixing and Batching Batch aggregate and cement by weight or by volume in accordance with the requirements of ASTM C94 or AASHTO M241/ASTM C685. Use mixing equipment that thoroughly blends the materials in sufficient quantity to maintain placing continuity. Produce ready mix shotcrete complying with AASHTO M157. Batch, deliver, and place shotcrete within 90 minutes of mixing. The use of retarding admixtures may extend application time beyond 90 minutes if approved by the Engineer.

Premixed and packaged shotcrete mix may be provided for on-site mixing. Use packages containing materials conforming to the Materials Section. Placing time limit after mixing is per the manufacturers' recommendations.

6.4.2 Field Quality Control Production test panels or test cores from the wall facing are required. Perform shotcreting and coring of test panels using qualified personnel in the presence of the Engineer. Provide equipment, materials, and personnel as necessary to obtain shotcrete cores for testing including construction of test panel boxes, field curing requirements and coring.. Shotcrete final acceptance will be based on the 28-day strength.

Begin shotcrete production work only upon initial approval of the design mix and nozzlemen and continue if the specified strengths are obtained. The shotcrete work by a crew will be suspended if the test results for their work do not satisfy the strength requirements. Change all or some of the following: the mix, the crew, the equipment, or the procedures. Before resuming work, the crew must shoot additional test panels and demonstrate that the shotcrete in the panels satisfies

the specified strength requirements. Provide all work required to obtain satisfactory strength tests at no additional cost to the Department.

6.4.2.1 Production Test Panels Furnish at least one production test panel or, in lieu of production test panels, six 3 inch diameter cores taken from the shotcrete facing, during the first production application of shotcrete and henceforth for every 5000 ft^2 of shotcrete placed. Construct the production test panels simultaneously with the shotcrete facing installation at times designated by the Engineer. Make production test panels with minimum dimensions of 18x18inches square and at least 4 inches thick.

6.4.2.2 Test Panel Curing, Test Specimen Extraction and Testing
Immediately after shooting, field moist cure the test panels by covering and tightly wrapping with a sheet of material meeting the requirements of ASTM C171 until they are delivered to the testing lab or test specimens are extracted. Do not immerse the test panels in water. Do not further disturb test panels for the first 24 hours after shooting. Provide at least six 3 inch diameter core samples cut from each preconstruction test panel and production test panel. Contractor has the option of extracting test specimens from test panels in the field or transporting to another location for extraction. Keep panels in their forms when transported. Do not take cores from the outer 6 inches of test panels measured in from the top outside edges of the panel form. Trim the ends of the cores to provide test cylinders at least 3 inches long. If the Contractor chooses to take cores from the wall face in lieu of making production test panels, the Engineer will designate locations. Clearly mark the cores and container to identify the core locations and whether they are for preconstruction or production testing. If for production testing, mark the section of the wall represented by the cores on the cores and container. Immediately wrap cores in wet burlap or material meeting requirements of ASTM C171 and seal in a plastic bag. Deliver cores to the testing lab within 48 hours of shooting the panels. The remainder of the panels will become the property of the Contractor. Upon delivery to the testing lab, place the samples in the moist room until the time of test. When the test length of a core is less than twice the diameter, apply the correction factors given in AASHTO T24/ASTM C42 to obtain the compressive strength of individual cores. Test three cores at 3 days and three cores at 28 days in accordance with AASHTO T24/ASTM C42.

Fill core holes in the wall by dry-packing with non-shrink patching mortar after the holes are cleaned and dampened. Do not fill core holes with shotcrete.

6.5 Permanent Concrete Facing

6.5.1 Cast-in-Place Concrete Conform to the Standard Specifications for Class A concrete.

6.5.2 Precast Concrete Panels Conform to the Standard Specifications for Class D or Class D Modified concrete. Obtain panels from an approved Precast Concrete Producer on the KYTC List of Approved Materials.

6.5.3 Reinforcing Steel Conform to the Standard Specifications. Epoxy coating is not required.

6.6 Materials Handling and Storage Comply with the Standard Specifications and the items below:

1. Do not move or transport encapsulated nails until the encapsulation grout has reached sufficient strength to resist damage during handling.
2. Handle encapsulated nails in a manner that will prevent large deflections, distortions or damage.
3. Repair encapsulated nails that are damaged or defective in accordance with the manufacturer's recommendations or remove them from the site.

7.0 MATERIALS TESTING AND ACCEPTANCE

7.1 Materials Sampling and Testing will be in accordance with Section 106 of the Standard Specifications, the Department's current "Kentucky Methods", the current "Manual of Field Sampling and Testing Practices", and other referenced documents.

7.2 Use only materials accepted by the Department before use. The Engineer may suspend work on the wall if the Contractor does not have acceptance of materials to be used and there is no other work on the wall that may be done. If work is suspended due to lack of material acceptance, the Contractor is fully liable for additional cost from the suspension of work. No additional contract time resulting from the suspension of work will be allowed.

8.0 CONSTRUCTION

Construct the wall(s) according to the Contract Plans, Construction Plans, the Standard Specifications, and the requirements below. In all cases, provide materials conforming to the Materials Section of this Special Note.

8.1 Excavation ***Coordinate the work and the excavation so the soil nail wall is safely constructed.*** Perform the wall construction and excavation sequence in accordance with the Construction Plans. Proceed with excavation in stages exposing the minimum amount of soil or rock face that will allow the practical and expeditious application of the shotcrete and the installation of soil nails while assuring stability of the excavated face and minimizing ground movements. Excavate a neatline face to facilitate application of temporary shotcrete and limit excavation in front of walls to 2 ft. below any soil nail until that nail has been completed and tested (if applicable). Leave temporary excavation lifts open no more than 24 hours without the temporary shotcrete facing or nails installed. After temporary shotcrete has been applied, excavate the next lift only after the shotcrete strength reaches 2000 psi.

Excavation for the next lowest row of soil nails shall not be conducted until the row of soil nails immediately above that row has been installed, tested, and temporary facing constructed.

8.2 Drilling Drill holes for soil nails at the locations shown in the Construction Plans. Use drilling methods and soil nail lengths necessary to develop adequate load capacity to satisfy testing acceptance criteria for the design load required, but not less than the lengths and diameters shown on the Construction Plans. It is the Contractor's responsibility to choose drilling methods that will maintain open drill holes and that do not promote mining or loosening of the soil at the perimeter of the drill hole or fracture soil with weak stratification planes by use of high flush volumes and pressures. At the ground surface, locate the drill hole within 6 inches of the location shown on the Construction Plans. At the point of entry, angle the nail within plus or minus 3^{o} of that shown on the Construction Plans. Do not extend the nails beyond the right-of-way or easement limits shown in the Contract Plans provided in the contract documents.

8.3 Nail Installation Place centralizers as shown in the Construction Plans as necessary for corrosion protection.

8.4 Grouting Provide grouting equipment capable of continuous mixing and producing a grout free of lumps. Place nails in each drilled hole either prior to grouting or within 15 minutes of the grout injection. Grout until the hole is completely filled with grout and clean grout is seen to run from the top of the hole. Accomplish mortar packing and secondary grouting to the wall face as soon as practical after nail installation. Provide secondary grouting to the small ungrouted zone at the face and place a bearing plate over the bar and dry pack with cement or a cement mortar to provide even bearing against the shotcrete face.

Test grout according to AASHTO T106/ASTM C109 at a frequency of no less than one test every 50 CY of grout placed. Provide grout cube test results to the Engineer within 24 hours of testing.

8.5 Temporary Shotcrete and Wall Drainage Shotcrete facing and wall drainage work consists of furnishing all materials and labor required for placing and securing geocomposite drainage material, connection pipes, weepholes and horizontal drains (if required), drainage gutter, reinforcing steel and shotcrete for the temporary shotcrete construction facing and nail head bearing plates and nuts for the soil nail walls. The Work includes any preparatory trimming and cleaning of soil/rock surfaces and shotcrete cold joints to receive new shotcrete.

Use shotcrete complying with the requirements of ACI 506.2, "Specifications for Materials, Proportioning and Application of Shotcrete", except as otherwise specified. Shotcreting consists applying of one or more layers of concrete conveyed through a hose pneumatically projected at a high velocity against a prepared surface.

Produce shotcrete by either a wet-mix or dry-mix process. The wet-mix process consists of thoroughly mixing all the ingredients except accelerating admixtures, but including the mixing water, introducing the mixture into the delivery equipment

and delivering it, by positive displacement, to the nozzle. Air jet the wet-mix shotcrete from the nozzle at high velocity onto the surface. The dry-mix process consists of shotcrete without mixing water that is conveyed through the hose pneumatically with the mixing water introduced at the nozzle. For additional descriptive information, refer to the American Concrete Institute ACI 506R "Guide to Shotcrete."

All temporary shotcrete and wall drainage construction is incidental to the Contract Unit Bid Price for “Soil Nail Wall” per “Square Foot”.

8.6 Wall Drainage Network Install and secure all elements of the wall drainage network as shown in the Construction Plans, specified herein, or as required to suit the site conditions. Install geocomposite drain strips and PVC connection pipes as shown on the Construction Plans. Install all elements of the drainage network prior to shotcreting. Capture unanticipated subsurface drainage features exposed in the excavation cut face independently of the wall drainage network and mitigate prior to shotcrete application.

8.6.1 Geocomposite Drain Strips Install geocomposite drain strips centered between offset nail columns as shown in the Construction Plans. The maximum horizontal spacing between drain strips is 5 feet. Use drain strips at least 12 inches wide and place the geotextile side against the ground. Secure the strips to the excavation face and prevent shotcrete from contaminating the ground side of the geotextile. Install vertically continuous drain strips. Make splices with a 12 inch minimum overlap such that the flow of water is not impeded. Repair damage to the geocomposite drain strip, which may interrupt the flow of water.

8.6.2 Toe Drains If required, install toe drains at the bottom of each wall. Wrap the drainage geotextile around the toe drain aggregate and pipe and conform to the dimensions of the trench. Conform to Section 214 of the Standard Specifiations for Geotextile Construction. Overlap the drainage geotextile on top of the drainage aggregate as shown in the Construction Plans. Replace or repair damaged or defective drainage geotextile.

8.6.3 Connection Pipes and Weepholes Install connection pipes as shown in the Construction Plans. Connection pipes are lengths of solid PVC pipe installed to direct water from the geocomposite drain strips to the exposed face of the wall. Connect the connection pipes to the drain strips using either prefabricated drain grates as shown in the Construction Plans or using the alternate connection method described below. Install the drain grate per the manufacturer's recommendations. Seal the joint between the drain grate and the drain strip and the discharge end of the connector pipe to prevent shotcrete intrusion.

The alternative acceptable method for connection of the connector pipe to the drain strip involves cutting a hole slightly larger than the diameter of the pipe into the strip plastic core but not through the geotextile. Wrap both ends of the connection pipe in geotextile in a manner that prevents migration of fines through the pipe. Tape or seal the inlet end of the pipe where it penetrates the drain strip and the discharge end of the connector pipe in a manner that prevents penetration of

shotcrete into the drain strip or pipe. To assure passage of groundwater from the drain strip into the connector pipe, slot the inlet end of the connector pipe at every 45 degrees around the perimeter of the pipe to a depth of ¼ inch.

Provide weepholes, if required, through the construction facing to drain water from behind the facing. Install as shown in the Construction Plans. Use PVC pipe to form the weephole through the shotcrete. Cover the end of the pipe contacting the soil with a drainage geotextile. Prevent shotcrete intrusion into the discharge end of the pipe.

8.7 Temporary Shotcrete Construction Facing

8.7.1 Shotcrete Alignment and Thickness Control Ensure that the minimum thickness of shotcrete that shown in the Construction Plans, using shooting wires, thickness control pins, or other devices acceptable to the Engineer. Install thickness control devices normal to the surface such that they protrude the required shotcrete thickness outside the surface. Ensure that the front face of the shotcrete does not extend beyond the limits shown in the Construction Plans.

8.7.2 Surface Preparation Clean the face of the excavation and other surfaces to be shotcreted of loose materials, mud, rebound, overspray or other foreign matter that could prevent or reduce shotcrete bond. Protect adjacent surfaces from overspray during shooting. Avoid loosening, cracking, or shattering the ground during excavation and cleaning. Remove any surface material that is so loosened or damaged, to a sufficient depth to provide a base that is suitable to receive the shotcrete. Remove material that loosens as the shotcrete is applied. The cost of additional shotcrete is incidental to the work. Divert water flow and remove standing water so that shotcrete placement will not be detrimentally affected by standing water. Do not place shotcrete on frozen surfaces.

8.7.3 Delivery and Application Maintain a clean, dry, oil-free supply of compressed air sufficient for maintaining adequate nozzle velocity at all times. Use equipment capable of delivering the premixed material accurately, uniformly, and continuously through the delivery hose. Control shotcrete application thickness, nozzle technique, air pressure, and rate of shotcrete placement to prevent sagging or sloughing of freshly-applied shotcrete.

Apply the shotcrete from the lower part of the area upward to prevent accumulation of rebound. Orient nozzle at a distance and approximately perpendicular to the working face so that rebound will be minimal and compaction will be maximized. Pay special attention to encapsulating reinforcement. Do not work rebound back into the construction. Where shotcrete is used to complete the top ungrouted zone of the nail drill hole near the face, position the nozzle into the mouth of the drillhole to completely fill the void.

A clearly defined pattern of continuous horizontal or vertical ridges or depressions at the reinforcing elements after they are covered with shotcrete will be considered an indication of insufficient reinforcement cover or poor nozzle techniques. In this

case immediately suspend the application of shotcrete and implement corrective measures before resuming the shotcrete operations. Correct the shotcreting procedure by adjusting the nozzle distance and orientation, by insuring adequate cover over the reinforcement, by adjusting the water content of the shotcrete mix or other means. Adjustment in water content of wet-mix will require requalifying the shotcrete mix.

8.7.4 Defective Shotcrete Repair shotcrete surface defects as soon as possible after placement. Remove and replace shotcrete that exhibits segregation, honeycombing, lamination, voids, or sand pockets. In-place shotcrete not meeting the specified strength requirement will be subject to remediation. Possible remediation options include placement of additional shotcrete thickness or removal and replacement, at no additional cost to the Department.

8.7.5 Construction Joints Taper construction joints uniformly toward the excavation face over a minimum distance equal to the thickness of the shotcrete layer. Provide a minimum reinforcement overlap at reinforcement splice joints as shown in the Construction Plans. Clean and wet the surface of a joint before adjacent shotcrete is applied. Where shotcrete is used to complete the top ungrouted zone of the nail drill hole near the face, to the maximum extent practical, clean and dampen the upper grout surface to receive shotcrete, similar to a construction joint.

8.7.6 Finish Use either an undisturbed gun finish as applied from the nozzle or a rough screeded finish. Remove shotcrete extending into the CIP finish face section beyond the tolerances specified herein.

8.7.7 Attachment of Nail Head Bearing Plate and Nut Attach a bearing plate and nut to each nail head as shown on the Construction Plans. While the shotcrete is still plastic and before its initial set, uniformly seat the plate on the shotcrete by hand wrench tightening the nut. Where uniform contact between the plate and the shotcrete cannot be provided, set the plate in a bed of grout. After grout has set for 24 hours, tighten the nut using a hand wrench. Ensure bearing plates with headed studs are in intimate contact with the construction facing and the studs are located within the tolerances shown in the Construction Plans or specified herein.

8.7.8 Weather Limitations Protect the shotcrete if it must be placed when the ambient temperature is below 32^{o}F and falling or when it is likely to be subjected to freezing temperatures before gaining sufficient strength. Maintain cold weather protection until the in-place compressive strength of the shotcrete is greater than 700 psi. Cold weather protection includes blankets, heating under tents, or other means acceptable to the Engineer. Deposit the shotcrete mix at a temperature of not less than 50^{o}F or more than 95^{o}F.

Suspend shotcrete application during high winds and heavy rains unless suitable protective covers, enclosures or wind breaks are installed. Remove and replace newly placed shotcrete exposed to rain that washes out cement or otherwise makes the shotcrete unacceptable. Provide a polyethylene film or equivalent to protect the work from exposure to adverse weather.

8.7.9 Curing Curing is not required for temporary construction facings to be covered by a CIP facing or whose service life is less than 36 months.

8.7.10 Construction Facing Tolerances

Construction Tolerances for Temporary Shotcrete Construction Facing	
Horizontal Location of Wire Mesh; Rebar; Headed Studs on Bearing Plates, from Plan location	+/- 0.6 inch
Headed studs location on bearing plate, from plan location	0.25 inch
Spacing between reinforcing bars, from plan dimension	1 inch
Reinforcing lap, from specified dimension	1 inch
Thickness of shotcrete	0.4 inch
Nail head bearing plate, deviation from parallel to wall face	10 degrees

8.7.11 Safety Requirements Equip nozzlemen and helpers with gloves, eye protection, and adequate protective clothing during the application of shotcrete. The Contractor is responsible for meeting all federal, state and local safety code requirements.

8.8 Backfilling Behind Wall Facing Upper Cantilever If possible, compact backfill within 3 ft. behind the wall facing upper cantilever using light mechanical tampers.

8.9 CIP Concrete Form or PC Panel Connection to Shotcrete Facing

When mechanical, grouted, or epoxied anchors embedded into the shotcrete facing are used to support a one-sided CIP face form or PC Panel, perform pullout testing of the embedded anchors in accordance with ASTM C900 and as modified herein. Perform pullout testing of installed anchors prior to attachment of the face form. Select test anchor locations to be representative of the full wall surface area to be covered.

For facing areas up to 5000 ft^2, perform a minimum of three flexure/shear pullout tests with the anchor located approximately mid-span between two adjacent nail heads and with the nail heads or other reaction points located approximately one-half the nail spacing from the anchor. For facing areas in excess of 5000 ft^2, perform one additional flexure/shear pullout test for each additional 2500 ft^2 of face area. Test these anchors to 1.5 times their required design load (calculated as the design concrete fluid pressure times the anchor tributary area).

Perform local punching shear pullout testing on 2 percent of the installed anchors. Place the load reaction support no closer to the edge of the anchor than the embedment depth of the anchor into the construction facing. Test these anchors to 2.0 times their required design load.

Modify the anchor and/or face form support system if the tested anchors do not meet the above test acceptance criteria. Modified anchor installation will require

re-testing in accordance with the above testing criteria. Cost of anchor pullout testing is incidental to the work.

8.10 Wall Alignment and Permanent Facing Ensure that the wall is compatible with the horizontal and vertical alignment indicated in the Contract Plans. Survey control is the front face of the wall. Construct the exposed face of the wall to be straight and smooth with no discontinuities. Protrusions beyond the face of the walls are not allowed. Completely fill any voids between the temporary and permanent facing with shotcrete or grout. Provide architectural treatment for concrete facing if shown in the Contract Plans.

8.11 Site Drainage Control Provide positive control and discharge of all surface water that will affect construction of the soil nail retaining wall. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the wall, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place, may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

If water is used in the drilling operation, dispose of the water in such a manner that erosion in the vicinity of the wall is minimized. The Contractor is cautioned against the indiscriminate use of water that could create unstable slopes above and/or below the wall. Immediately repair any damage to the site by water or erosion at no cost to the Department.

9.0 SOIL NAIL TESTING AND ACCEPTANCE REQUIREMENTS

9.1 General Perform both verification and proof testing on designated test nails and record required nail test data. Perform nail testing after the nail grout and shotcrete facing have cured for at least 72 hours and attained at least their specified 3-day compressive strength. Perform testing in less than 72 hours only if compressive strength test results, for tests performed verifies that the nail grout and shotcrete mixes being used will provide the specified 3-day compressive strengths in less time.

Specified test nail locations and/or testing frequencies are provided in an Appendix to this Special Note.

Test each production nail designated for testing within 21 calendar days of installation and provide a written summary of the test results to the Engineer within 7 calendar days after each test; include the following:

1. bonded and unbonded lengths
2. jacking length

3. bar size and area

Failure to begin testing within the specified time and/or failure to meet the submittal deadlines for nail test results may result in the Engineer suspending soil nail installation.

The Department will not make separate payment for the testing required in this section. All testing required in this section is included in the price of the wall(s).

9.2 Testing Equipment Testing equipment includes 2 dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The load cell is required only for the creep test portion of the verification test. Provide a description of test setup and jack, pressure gauge and load cell calibration curves in accordance with the submittals section of this Special Note.

Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. If the reaction frame will bear directly on the shotcrete facing, design it to prevent cracking of the shotcrete. Independently support and center the jack over the nail bar so that the bar does not carry the weight of the testing equipment. Align the jack, bearing plates, and stressing anchorage with the bar such that unloading and repositioning of the equipment will not be required during the test.

Apply and measure the test load with a hydraulic jack and pressure gauge. Use a pressure gauge graduated in 75 psi increments or less. Use a jack and pressure gauge with a pressure range not exceeding twice the anticipated maximum test pressure. Use a jack with a ram travel no less than 125% of the anticipated maximum movement and sufficient travel to allow the test to be done without resetting the equipment. Monitor the nail load during verification tests with both the pressure gauge and the load cell. Use the load cell to maintain constant load hold during the creep test load hold increment of the verification test.

Measure the nail head movement with a minimum of 2 dial gauges capable of measuring to 0.001 inch. Use a dial gauge with a travel no less than 125% of the anticipated maximum movement and travel sufficient to allow the test to be done without having to reset the gauge. Visually align the gauge to be parallel with the axis of the nail and support the gauge independently from the jack, wall or reaction frame. Use two dial gauges when the test setup requires reaction against a soil cut face.

9.3 Verification Testing of Sacrificial Test Nails Perform verification testing of sacrificial test nails to verify the installation methods and design nail pullout resistance. Sacrificial test nails will not be incorporated as production nails. Perform verification tests to failure, or no less than 3.0 times the allowable pullout resistance. Bare bars can be used for the sacrificial verification test nails.

Develop and submit the details of the verification testing arrangement including the method of distributing test load pressures to the excavation surface (reaction frame), test nail bar size, grouted drillhole diameter and reaction frame dimensioning to the Engineer for approval in accordance with the Construction Submittals section. Construct verification test nails using the same equipment, installation methods, nail inclination, and drillhole diameter as planned for the production nails. Changes in the drilling or installation method may require additional verification testing as determined by the Engineer at no additional cost to the Department.

Use test nails with both bonded and temporary unbonded lengths. Prior to testing, grout only the bonded length of the test nail. Use a temporary unbonded length of at least 3 ft. Determine the bonded length of the test nail based on the production nail bar grade and size such that the allowable bar structural load is not exceeded during testing; use a bonded length not less than 10 ft. The maximum allowable bar structural load during testing is 90% of the yield strength for Grade 60 and Grade 75 bars, or 80% of the ultimate strength for Grade 150 bars. Provide larger verification test bar sizes, if required to safely accommodate the 10 ft. minimum test bond length and test to failure, at no additional cost to the Department.

Use the following equation for determining the verification test nail maximum bonded length to be used to avoid structurally overstressing the verification test nail bar size:

L_{BV} = $(C\ f_Y\ A_S) / (3\ Q_d)$, or 10 ft., whichever is greater.

L_{BV} = Maximum Verification Test Nail Bonded Length (ft.)
C = 0.9 for Grade 60 and 75 bars and 0.8 for Grade 150 bars
f_Y = Bar Yield or Ultimate Stress (ksi)
(f_Y = 60, 75, and 150 ksi, respectively, for Grade 60, 75 and 150 bars)
A_S = Bar Steel Area (in^2)
3 = Factor of Safety against tensile failure during a Verification Test
Q_d = Allowable pullout resistance (kips/ft., kips per linear foot of grouted nail lengths specified in the Construction Plans)

Determine the Design Test Load (DTL) during verification testing by the following equation:

DTL = Design Test Load (kips) = $L_{BV} \times Q_d$

L_{BV} = As-built bonded test length (ft.)
Q_d = Allowable pullout resistance (kips/ft., kips per linear foot of grouted nail length specified in the Construction Plans)

MTL= 3.0 x DTL = Maximum Test Load (kips)

Incrementally load verification test nails to failure or a maximum test load of 300 percent of the Design Test Load (DTL) in accordance with the following loading schedule. Record the soil nail movements at each load increment.

Verification Test of Sacrificial Nails
Loading Schedule

Step	Load	Hold Time
1	AL (0.05 DTL max.)	1 minute
2	0.25 DTL	10 minutes
3	0.50 DTL	10 minutes
4	0.75 DTL	10 minutes
5	1.00 DTL (Creep Test)	30 minutes
6	1.25 DTL (Creep Test)	60 minutes
7	1.50 DTL (Creep Test)	300 minutes
8	1.75 DTL	10 minutes
9	2.00 DTL	10 minutes
10	2.50 DTL or Failure	10 minutes max.
11	3.00 DTL or Failure	10 minutes max.
12	AL (0.05 DTL max.)	1 minute (record permanent set)
AL – Alignment Load, DTL – Design Test Load		

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the Design Test Load (DTL). Dial gauges should be set to "zero" after the alignment load has been applied. Following application of the maximum test load (3.0 DTL) reduce the load to the alignment load (0.05 DTL maximum) and record the permanent set.

Hold each load increment for at least 10 minutes. Monitor the verification test nail for creep at the 1.00 DTL, 1.25 DTL, and 1.50 DTL load increments. Measure and record nail movements during the creep portion of the test (as applicable) at 1 minute, 2, 3, 5, 6, 10, 15, 20, 25, 30, 45, 60, 75, 90, 100, 150, 180, 210, 240, 270, and 300 minutes. Maintain the load during the creep test within 2 percent of the intended load by use of the load cell.

9.4 Verification Testing of Production Nails Perform verification testing of production nails using the same procedures as for verification testing of sacrificial nails with the following exceptions:

1. The specified corrosion protection is required (bare bars are not allowed).
2. The Maximum Test Load is 2.00 DTL.

3. Creep testing is required only at a load of 1.50 DTL and the creep portion of the test is 60 minutes.

Verification Test of Production Nails Loading Schedule		
Step	**Load**	**Hold Time**
1	AL (0.05 DTL max.)	1 minute
2	0.25 DTL	10 minutes
3	0.50 DTL	10 minutes
4	0.75 DTL	10 minutes
5	1.00 DTL	10 minutes
6	1.25 DTL	10 minutes
7	1.50 DTL (Creep Test)	60 minutes
8	1.75 DTL	10 minutes
9	2.00 DTL	10 minutes
10	AL (0.05 DTL max.)	1 minute (record permanent set)
AL – Alignment Load, DTL – Design Test Load		

Hold each load increment for at least 10 minutes. Monitor the verification test nail for creep at the 1.50 DTL load increment. Measure and record nail movements during the creep portion of the test at 1 minute, 2, 3, 5, 6, 10, 20, 30, 50, and 60 minutes. Maintain the load during the creep test within 2 percent of the intended load by use of the load cell.

9.5 Proof Testing of Production Nails Provide temporary unbonded lengths for each test nail. Isolate the test nail bar from the shotcrete facing and/or the reaction frame used during testing. Isolation of a test nail through the shotcrete facing will not affect the location of the reinforcing steel under the bearing plate. Submit the proposed test nail isolation methods, methods for providing an unbonded test length and methods for grouting the unbonded length subsequent to testing to the Engineer in accordance with the Construction Submittals section. Where temporary casing of the unbonded length of test nails is provided, install the casing in a way that prevents any reaction between the casing and the grouted bond length of the nail and/or the stressing apparatus.

Use production proof test nails with both bonded and temporary unbonded lengths. Prior to testing grout only the bonded length of the test nail. The minimum temporary unbonded length of the test nail is 3 ft. Determine the bonded length of the test nail based on the production nail bar grade and size such that the allowable bar structural load is not exceeded during testing. The maximum allowable bar structural load during testing is 90 percent of the yield strength for Grade 60 and Grade 75 bars, or 80 percent of the ultimate strength for Grade 150 bars.

Use the following equation for sizing the proof test nail bonded length to avoid overstressing the production nail bar size:

$L_{BP} = (C\ f_Y\ A_S) / (1.5\ Q_d)$, or 10 ft., whichever is greater. *

L_{BP} = Maximum Proof Test Nail Bonded Length (ft.)
C = 0.9 for Grade 60 and 75 bars and 0.8 for Grade 150 bars
f_Y = Bar Yield or Ultimate Stress (ksi)
(f_Y = 60, 75, and 150 ksi, respectively, for Grade 60, 75 and 150 bars)
A_S = Bar Steel Area (in^2)
1.5 = Factor of Safety against tensile failure during a Proof Test
Q_d = Allowable pullout resistance (kips/ft., kips per linear foot of grouted nail length specified in the Construction Plans)

* Production proof test nails shorter than 12 ft. in length may be constructed with less than the minimum 10 ft. bond length; however the unbonded length is limited to 3 ft.

Determine the Design Test Load (DTL) during verification testing by the following equation:

DTL = Design Test Load (kips) = L_{BP} x Q_d

L_{BP} = As-built bonded test length (ft.)
Q_d = Allowable pullout resistance (kips/ft., kips per linear foot of grouted nail length specified in the Construction Plans)
MTL = 1.5 x DTL = Maximum Test Load (kips)

Perform proof tests by incrementally loading the proof test nail to a maximum test load of 150 percent of the Design Test Load (DTL). Measure and record the nail movement at each load in the same manner as for verification tests. Monitor the test load by a jack pressure gauge with a sensitivity and range meeting the requirements of pressure gauges used for verification test nails. At load increments other than maximum test load, hold the load long enough to obtain a stable reading. Apply incrementally loads in accordance with the following loading schedule. Record the soil nail movements at each load increment.

Proof Test Loading Schedule		
Step	**Load**	**Hold Time**
1	AL (0.05 DTL max.)	Until Stable
2	0.25 DTL	Until Stable
3	0.50 DTL	Until Stable
4	0.75 DTL	Until Stable
5	1.00 DTL	Until Stable
6	1.25 DTL	Until Stable
7	1.50 DTL (Max Test Load)	Creep Test (See Below)
AL – Alignment Load, DTL – Design Test Load		

The alignment load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the Design Test Load (DTL). Dial gauges should be set to "zero" after the alignment load has been applied.

Start the creep tests as soon as the maximum test load (1.50 DTL) is applied. Depending on performance, perform either 10 minute or 60 minute creep tests at the maximum test load (1.50 DTL). Start the creep period as soon as the maximum test load is applied and measure and record the nail movement at 1 minute, 2, 3, 5, 6, and 10 minutes. Where the nail movement between 1 minute and 10 minutes exceeds 0.04 inches, maintain the maximum test load an additional 50 minutes and record movements at 20 minutes, 30, 50, and 60 minutes. Maintain all load increments within 5 percent of the intended load.

9.6 Test Nail Acceptance Criteria A test nail is considered acceptable when all of the following criteria are met:

1. For verification tests on sacrificial nails, a total creep movement of less than 0.08 inches per log cycle of time over the final log cycle of time of each load increment (between 3 and 30 minutes for 1.00 DTL, 6 and 60 minutes for 1.25 DTL, 30 and 300 minutes for 1.50 DTL) and the creep rate is linear or decreasing throughout the creep test load hold period.
2. For verification tests on production nails, a total creep movement of less than 0.08 inches between the 6 and 60 minute readings is measured during creep testing and the creep rate is linear or decreasing throughout the creep test load hold period.
3. For proof tests, a total creep movement of less than 0.04 inches is measured between the 1 and 10 minute readings, or a total creep movement of less than 0.08 inches is measured between the 6 and 60 minute readings and the creep rate is linear or decreasing throughout the creep test load hold period.
4. For verification tests, the total measured movement at 2.0 x DTL exceeds 80% of the theoretical elastic elongation of the test nail unbonded length.
5. For proof tests, the total measured movement at 1.5 x DTL exceeds 80% of the theoretical elastic elongation of the test nail unbonded length.

6. A pullout failure does not occur prior to or at 2.0 x DTL during verification testing of sacrificial or production nails or 1.5 x DTL during proof testing. Pullout failure is defined as the load at which attempts to further increase the test load simply result in continued pullout movement of the test nail. Record the pullout failure load as part of the test data.

   Successful verification or proof tested production nails meeting the above test acceptance criteria may be incorporated as production nails, provided that (1) the unbonded length of the test nail drillhole has not collapsed during testing, (2) the minimum required drillhole diameter has been maintained, (3) the specified corrosion protection is provided, and (4) the test nail length is equal to or greater than the scheduled production nail length. Complete test nails meeting these requirements by satisfactorily grouting up the unbonded test length. Maintain the temporary unbonded test length for subsequent grouting. If the unbonded test length of production proof test nails cannot be satisfactorily grouted subsequent to testing, replace with an additional production nail installed at no additional cost.

9.7 Test Nail Rejection If a test nail does not satisfy the acceptance criterion, the Engineer will implement the procedures below.

1. For Verification Tests on Sacrificial Nails, the Engineer will evaluate the results of each verification test and will reject installation methods that do not satisfy the nail testing requirements. Propose alternative methods and install replacement verification test nails. Install and test replacement test nails at no additional cost to the Department and with no extension of contract time. The Engineer may require the Contractor to replace some or all of any production nails installed prior to acceptance of Sacrificial Nails; alternatively, the Engineer may require additional verification or proof tests on these production nails.
2. For Verification or Proof Tests on Production Nails, the Engineer may require the Contractor to replace some or all of the installed production nails between a failed test nail and the adjacent passing test nail. Alternatively, the Engineer may require the installation and testing of additional test nails to verify that adjacent previously installed production nails have sufficient load carrying capacity. Contractor modifications may include, but are not limited to: the installation of additional test nails; increasing the drillhole diameter to provide increased capacity; modifying the installation or grouting methods; reducing the production nail spacing from that shown on the Construction Plans and installing more production nails at a reduced capacity; or installing longer production nails if sufficient right-of way is available and the pullout capacity behind the failure surface controls the allowable nail design capacity. The nails may not be lengthened beyond the right-of-way or easement. Installation and testing of additional test nails or installation of additional or modified nails as a result of test nail failure(s) will be at no additional cost to the Department.

10.0 RECORDS

Provide the Engineer with the following final records:

1. As-built drawings showing:
   a. The actual location and orientation of the soil nails, including deviation from specified tolerances.
   b. Nail capacity, nail type, installed drillhole and bar diameter, designed and installed nail length.
   c. The type of testing performed for each soil nail and test results.
   d. The locations of any instrumentation installed and any required instrumentation records.
   e. Finished ground line elevations behind the wall and finished grade elevations in front of the wall.
2. Other records as required by Section 106 of the Standard Specifications.
3. Structural Steel records required by Section 607 of the Standard Specifications.
4. Record plans conforming to Section 105.03 of the Standard Specifications.
5. Construction Records including:
   a. Contractor's name
   b. Drill rig operator's name
   c. Date and time of start and finish of drilling
   d. Drilling difficulties
   e. Caving or sloughing of excavation or drillhole
   f. Groundwater conditions
   g. Drill casing requirements
   h. Grouting records including:
      date, time and method grout was placed
      cement type
      volume of grout placed
      grout pressure

11.0 MEASUREMENT AND PAYMENT

11.1 The Department will pay for the accepted quantities of "Soil Nail Wall" at the contract unit bid price per "Square Foot" and will measure quantities as shown in the Contract Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for designing, constructing, and performing nail testing for the permanent soil nail wall(s) as described herein. This may include but is not limited to the following items: installing sacrificial and production soil nails, providing corrosion protection, shotcrete, concrete facing (if required), wall drainage, toe drainage, surface drainage, anchorage hardware, verification tests, proof tests, all required submittals and records, and other incidental items necessary to provide a complete permanent soil nail wall. Earth moving, backfilling, drainage, any temporary

shoring due to phased construction, and any other earthwork necessary to complete these walls and not included in other bid items, is included as an incidental part of this work.

11.2 Additional areas of wall, required due to unforeseen foundation conditions or other reasons and approved in writing by the Engineer will be paid at the contract unit prices. In the event a decrease in the area of a wall is required, subject to acceptance by the Department, payment will be reduced due to the decrease in the wall area or length.

11.3 All measurement will be based on plan dimensions or dimensions as ordered in writing.

11.4 Refer to an Appendix to this Special Note for Project Specific Measurement and Payment information.

Code	**Pay Item**	**Pay Unit**
20603ED	Soil Nail Wall	Square Foot

Special Note for Soil Nail Walls
Appendix A - Project Specific Requirements

Boone County
EB KY 338, Wall #14
Item No. 6-18.00

A1.0 VALUE ENGINEERING

The Department will not consider any Value Engineering Proposals that would result in changes in wall location and/or elevations.

A2.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered at test boring locations are presented on the Subsurface Data Sheets in the Contract Plans. Subsurface Conditions may vary between boring locations. Rock fragments and boulders were encountered during exploratory drilling, and it is possible they may be encountered during soil nail installation.

A3.0 LOCATIONS OF EXISTING STRUCTURE UNITS

Approximate locations and elevations of the existing substructure and superstructure units are provided in the Contract Plans. These locations are based on plans in the Department's archives. However, the Department does not guarantee the accuracy of these locations. Although no specific scale is provided, the existing structure locations were drawn approximately to scale. Field verify the locations of existing structure units, including footing and/or pile cap elevations, prior to excavating and installing soil nails. The contractor is to exercise caution not to damage the existing substructure and superstructure units.

The existing bridge plans are Drawing No. 21652. Plans for information only are available from archive records. Contact the Division of Structural Design at 502-564-4560.

A4.0 GROUNDWATER CONTROL

The bottom elevation of the wall ranges from 863 to 867 ft. Temporary sheeting, shoring, or dewatering methods may be needed for groundwater control during construction. Appropriate drainage systems behind the wall and weep holes shall also be provided. The drainage system shall be outlet at one end of the wall to prevent seepage onto the road pavement. A bid item for "horizontal drains" is included in the contract for groundwater control. The need for horizontal drains and the specific details

of incorporating them into the design can be discussed during the design review process. The Department will consider alternative methods of permanent groundwater control if proposed by the Contractor. Horizontal drain requirements are addressed in Appendix D.

A5.0 SITE INSPECTIONS

During construction, observe the conditions behind the soil nail wall on a daily basis for signs of ground movement in the vicinity of the wall. Notify the Engineer immediately if signs of movements such as new cracks or increased size of old cracks are observed. If the Engineer determines that the movements exceed those anticipated for typical soil nail wall construction and requires corrective action, immediately take corrective actions necessary to stop the movement or perform repairs at no additional cost to the Department.

A6.0 FIELD ADJUSTMENTS AND CONSTRUCTION TOLERANCES

Field adjustments of nail locations may be necessary due to the existing structure units or other considerations. Redesign and/or additional analyses will be required for field adjustments exceeding the specified tolerances.

A7.0 PERMANENT FACING

Provide permanent facing consisting of cast-in-place concrete or sculpted shotcrete matching the project specific form liner. Conform to applicable sections of FHWA GEC 007 for any items not addressed in the contract proposal or plans. Construct the permanent facing within 3 months of nail installation.

A8.0 SACRIFICIAL TEST NAILS

Prior to installing any production nails, install a minimum of one non-production sacrificial test nail.

Submit the proposed locations and sacrificial test nail design with the wall design and construction plans. Install the sacrificial test nails using the drilling and grouting procedures to be used on the production nails. Conduct Verification Tests on the sacrificial nails as described in Section 9.3 of this Special Note within five (5) calendar days after completing the installation and submit the test results within two (2) calendar days after completing the test. Acceptance criteria and rejection procedures are in Sections 9.6 and 9.7.

If a sacrificial test nail is loaded to 2.5 x DTL or higher during a verification test and meets all acceptance criteria, the Contractor may reduce the diameter of production nails in the adjacent wall based on the ultimate bond stress measured during the

verification test. The Contractor assumes all responsibility for providing production nails meeting the acceptance criteria. All minimum cover and/or any other design requirements are applicable for the reduced diameter nails. The Engineer may require revisions to the Construction Plans. Any modifications proposed by the Contractor other than the drill hole diameter will require a detailed review by the Department.

The Contractor may, at its own risk, install production nails before the Engineer receives the Verification Test results and accepts the non-production sacrificial nails. Production nails may not be installed until after verification testing on the sacrificial nail has been performed. The Engineer may suspend production nail installation if the Contractor has not submitted the verification test results on the sacrificial nail within two (2) calendar days after completion of the test.

A9.0 PRODUCTION NAIL VERIFICATION TESTING

Perform a minimum of six (6) verification tests on production nails according to Section 9.4 and the test schedule below.

Production Nail Verification Test Schedule	
Top Row	Approximate Stations*108+25, 108+70 & 109+15
2nd Row	Approximate Stations* 108+45 & 108+95
3rd Row & Subsequent Rows (If Needed)	Approximate Station* 108+70
	*stations are referenced from EB KY 338 CL

A10.0 PRODUCTION NAIL PROOF TESTING

Perform proof tests according to Section 9.5 on a minimum of 5% of nails installed, including the first nail installed in each row. A verification test of a production nail will be considered equivalent to a proof test nail and will be accounted for in determining the number of proof tests required. If problems occur during nail installation that, in the opinion of the Engineer, may adversely affect the capacity of one or more nails, the Engineer may specify nails for proof testing or may require additional proof testing.

A11.0 SUMMARY OF LABORATORY TEST DATA

Summary of SPT "N" Values and Soil Index Laboratory Test Results											
Hole No.	Sample Depth (ft)	Sample Type	SPT "N" Value	w (%)	LL	PL	PI	LI	Soil Classification		% Silt + Clay
									AASHTO	Unified	
1087	0.0	ST	-	27	46	24	22	0.14	A-7-6(20)	CL	85
	1.4	SS	16	13	47	22	25	-0.38	A-7-6(21)	CL	83
	2.9	ST	-	14	42	21	21	-0.32	A-7-6(18)	CL	83
	3.2	SS	29	20	41	21	20	-0.05	A-7-6(12)	CL	69
	4.7	SS	8	20	41	21	20	-0.05	A-7-6(12)	CL	69
	6.2	ST	-	17	40	22	18	-0.28	A-6(18)	CL	93
	8.2	SS	13	7	41	21	20	-0.68	A-7-6(9)	CL	58
	9.7	SS	50/0.3*	7	41	21	20	-0.68	A-7-6(9)	CL	58
1088	0.0	ST	-	4	25	17	8	-1.63	A-2-4(0)	SC	33
	1.5	SS	8	19	40	22	18	-0.18	A-6(12)	CL	71
	3.0	ST	-	19	45	23	22	-0.17	A-7-6(18)	CL	80
	5.0	ST	-	21	42	22	20	-0.06	A-7-6(15)	CL	78
	5.4	SS	4	**	**	**	**	**	**	**	**
	6.9	ST	-	19	43	22	21	-0.14	A-7-6(19)	CL	87
	8.9	ST	-	25	46	22	24	0.11	A-7-6(24)	CL	91
	10.9	ST	-	25	45	23	22	0.07	A-7-6(21)	CL	89
	12.9	ST	-	21	42	22	20	-0.04	A-7-6(18)	CL	85
	14.9	ST	-	20	41	22	19	-0.13	A-7-6(17)	CL	86
	16.3	SS	11	**	**	**	**	**	**	**	**
	17.8	ST	-	20	50	24	26	-0.16	A-7-6(16)	CH	66
	19.8	ST	-	22	46	23	23	-0.05	A-7-6(19)	CL	81
	20.8	SS	14	8	40	19	21	-0.51	A-6(7)	CL	50
	22.3	ST	-	14	36	19	17	-0.32	A-6(5)	GC	49
	23.1	SS	8	23	39	20	19	0.16	A-6(8)	CL	56
	24.6	ST	-	11	42	20	22	-0.40	A-7-6(8)	CL	51
	25.1	SS	8	**	**	**	**	**	**	**	**
	26.6	ST	-	13	37	19	18	-0.31	A-6(4)	GC	44
	28	SS	75/0.6*	9	36	22	14	-0.95	A-6(5)	CL	54
	29.5	ST	-	**	**	**	**	**	**	**	**
	29.8	SS	50/0.5	**	**	**	**	**	**	**	**
1089 off	2.5	ST	-	20	44	21	23	-0.05	A-7-6(12)	CL	63
	4.5	ST	-	18	42	23	19	-0.29	A-7-6(17)	CL	84
	6.5	ST	-	16	42	22	20	-0.31	A-7-6(14)	CL	74
	8.5	SS	11	20	39	22	17	-0.11	A-6(3)	GC	41
	10	ST	-	10	46	23	23	-0.58	A-7-6(17)	CL	76
	12	SS	15	13	41	21	20	-0.41	A-7-6(8)	CL	55
	13.5	ST	-	13	44	23	21	-0.47	A-7-6(12)	CL	66

	Summary of SPT "N" Values and Soil Index Laboratory Test Results (cont.)										
1089 off	14.6	SS	15	16	44	22	22	-0.27	A-7-6(4)	GC	40
	16.1	ST	-	18	45	22	23	-0.16	A-7-6(10)	CL	55
	18.1	SS	15	16	50	25	25	-0.38	A-7-6(16)	CH	67
	19.6	ST	-	17	43	22	21	-0.25	A-7-6(6)	GC	47
	21.6	SS	15	21	49	25	24	-0.18	A-7-6(12)	CL	58
	23.1	ST	-	24	44	22	22	0.09	A-7-6(16)	CL	76
	25.1	ST	-	21	43	21	22	-0.01	A-7-6(20)	CL	88
	27.1	ST	-	26	37	23	14	0.19	A-6(14)	CL	93
	29.1	ST	-	22	61	29	32	-0.23	A-7-6(33)	CH	90
	31.1	ST	-	28	60	26	34	0.05	A-7-6(37)	CH	94
	33.1	ST	-	26	62	29	33	-0.08	A-7-6(36)	CH	94
	33.6	SS	50/0.2	18	38	19	19	-0.05	A-6(10)	CL	65

*Blow counts were likely influenced by a rock fragment or boulder.
**Insufficient sample retrieved to classify material.

Summary of Unconfined Compression Test Data							
Hole #	**EB KY 338 Station**	**Offset (ft)**	**Depth (ft)**	**Unified Classification**	**Plasticity Index, PI**	**Unconfined Compressive Strength, Q_u (psf)**	**Undrained Shear Strength, S_u or c_u (psf)**
1087	107+38	6.0 Lt.	6.2-8.2	CL	18	2940	1470
1089 off	108+62.40	49.3 Lt.	2.5-4.5	CL	23	3195	1597
			23.1-25.1	CL	22	2660	1330

Summary of CU Triaxial Test Results						
Hole #	**EB KY 338 Station**	**Offset (ft)**	**Depth (ft)**	**Unified Classification**	**c' (psf)**	**Φ' (deg)**
1088	109+55	47.0 Lt.	6.9-8.9	CL	72	26.7
			8.9-10.9	CL		
			14.9-16.3	CL		
1089 off	108+62.4	49.3 Lt.	25.1-27.1	CL	907.2	19.1
			27.1-29.1	CL		
			29.1-31.1	CH		

A12.0 SOIL PARAMETERS AND FACTORS OF SAFETY

Design the wall using the soil strength parameters and external factors of safety in the tables below. The Designer shall verify wall stability based on final wall design dimensions. These requirements are based on the Department's judgment and interpretation of the geotechnical data and are provided to ensure that bidders' designs will be comparable relative to the integrity and performance of the walls. Any modifications proposed by the Contractor, if accepted by the Department, will be subject to price adjustment.

Design Soil Strength Parameters	
Total Unit Weight (pcf)	125
Effective Angle of Internal Friction, Φ' (deg)	20
Effective Cohesion, c' (psf)	200
Undrained Shear Strength, S_u or c_u (psf)	1400

Minimum Required Factors of Safety for External Failure Modes			
Case No.	**Design Case**	**Temporary/ Short Term**	**Permanent/ Long Term**
1	Excavation Stability[1]	1.3	N/A
2	Global Stability[2]	1.3	1.5
3	External Stability[3]	1.3	1.6
4	Sliding	1.3	1.5

[1]Excavation Stability analyses consider excavation lifts left unsupported for up to 24 hours before nails are installed.
[2]In Global Stability analyses, failure surfaces intersect some or all nails.
[3]In External Stability analyses, failure surfaces do not intersect the nails.

A13.0 DESIGN CONSTRAINTS

Design the walls according to the design constraints provided below. Items 7 – 12 are specifically to limit wall deformation. These constraints are based on the Department's judgment and interpretation of the geotechnical data and are provided to ensure that bidders' designs will be comparable relative to the integrity and performance of the walls. Any modifications proposed by the Contractor, if accepted by the Department, will be subject to price adjustment.

1. Neglect any resistance from the bridge in wall analysis and design.
2. Perform analyses with the groundwater table no lower than 2 feet above final grade of adjacent road.
3. Design for a traffic surcharge loading in accordance with AASHTO LRFD Bridge Design Specifications, current edition.
4. Perform Soil Nail Wall analyses using either GOLDNAIL, SNAIL, or SNAP2; the use of other computer programs requires prior approval from the Department.
5. Perform analyses for the temporary condition assuming the excavation will be at least 1 ft. below the subgrade elevation or to the elevation the contractor will need to excavate, if lower.
6. The nominal (i.e. ultimate) soil nail bond stress is 6 psi.
7. A minimum of four (4) rows of nails in the critical section, as defined as the tallest section of the soil nail wall under the bridge, is required.
8. The maximum vertical and horizontal nail spacing is 5 feet.
9. The maximum distance from the top of the wall to the top row of nails is 3 feet and the maximum distance from the bottom of permanent facing to bottom row of nails is 5 feet, unless prohibited by obstructions in the field; exceptions require prior approval from the Department.
10. The maximum nail inclination is 15°.
11. The minimum nail length is 25 feet and the nail length of any row may not be shorter than the row below it.
12. In the top and second rows, limit the maximum bar stress to 40% of the yield strength at the service limit state.
13. Design all components not addressed in the contract proposal and/or plans in accordance with FHWA GEC 007 and applicable sections of the AASHTO LRFD Bridge Design Specifications, current edition.

A14.0 MEASUREMENT AND PAYMENT

A14.1 The Department will measure and pay for the accepted quantity of "Soil Nail Wall" as described in the Contract Plans, Section 11 of this Special Note, and below, at the Contract Unit Bid Price per Square Foot. As shown in the Contract Plans, the soil nail wall quantities are based on a vertical projection of the wall surface rather than along the actual battered surface. The following are incidental to the Soil Nail Wall: any temporary and/or permanent facing (at the Contractor's option) below the defined bottom of wall provided in the contract

plans; all components of the wall drainage system (except horizontal drains); the cost of all materials, labor, and equipment needed to texture the retaining wall.

A14.2 If drilling into solid rock is necessary to install soil nails, the cost of solid rock drilling is included in the unit price for "Soil Nail Wall" and there will be no additional compensation for rock drilling.

A14.3 The Department will measure and pay for the accepted quantity of "Foundation Preparation" according to Section 603 of the Standard Specifications at the Contract Lump Sum Bid Price. This includes the following:

- all common excavation required behind the front face of the wall;
- construction and removal of any working platform if necessary to construct the soil nail wall;
- any incidental grading required behind the wall;
- other incidental excavation and additional effort beyond what is necessary for normal roadway excavation; and
- all materials and labor described in Appendix B of this Special Note.

A14.4 All excavation in front of the front face of the wall, common and solid rock, will be paid as "Roadway Excavation" and quantities are included in the roadway plans.

Code	**Pay Item**	**Pay Unit**
20603ED	Soil Nail Wall	Square Foot
8003	Foundation Preparation	Lump Sum

Special Note for Soil Nail Walls
Appendix B - Monitoring

Boone County
EB KY 338, Wall #14
Item No. 6-18.00

The work described in this Appendix is incidental to the Lump Sum bid price for "Foundation Preparation".

B1.0 DESCRIPTION

B1.1 This work consists of furnishing all instruments, tools, materials, and labor necessary to install and monitor survey monuments.

B1.2 During the course of construction, the Contractor will be responsible for monitoring survey points. Cooperate as necessary with the Department in facilitating these readings. Any monitoring data that indicates excessive structure deflections, the potential for unstable conditions, or damage to adjacent facilities, as determined by the Engineer, is cause for preventative measures to be taken in the affected area until the causes are identified and resolved to the satisfaction of the Engineer. At completion of the soil nail walls, the Department will take post construction readings.

B2.0 MATERIALS

Provide the materials described below.

B2.1 Survey Points Provide permanent survey points necessary to monitor bridge end bent movements.

B3.0 SURVEY POINTS

Install two survey points at approximately the left and right sides of the bridge end bent. Install the survey points to measure end bent movement during excavation and construction of the soil nail wall.

B4.0 MONITORING

B4.1 Monitor the survey points weekly during excavation and until the permanent facing has been completed.

B4.2 Perform all necessary surveying using qualified technicians with a minimum of one (1) year of field surveying experience and working under the general

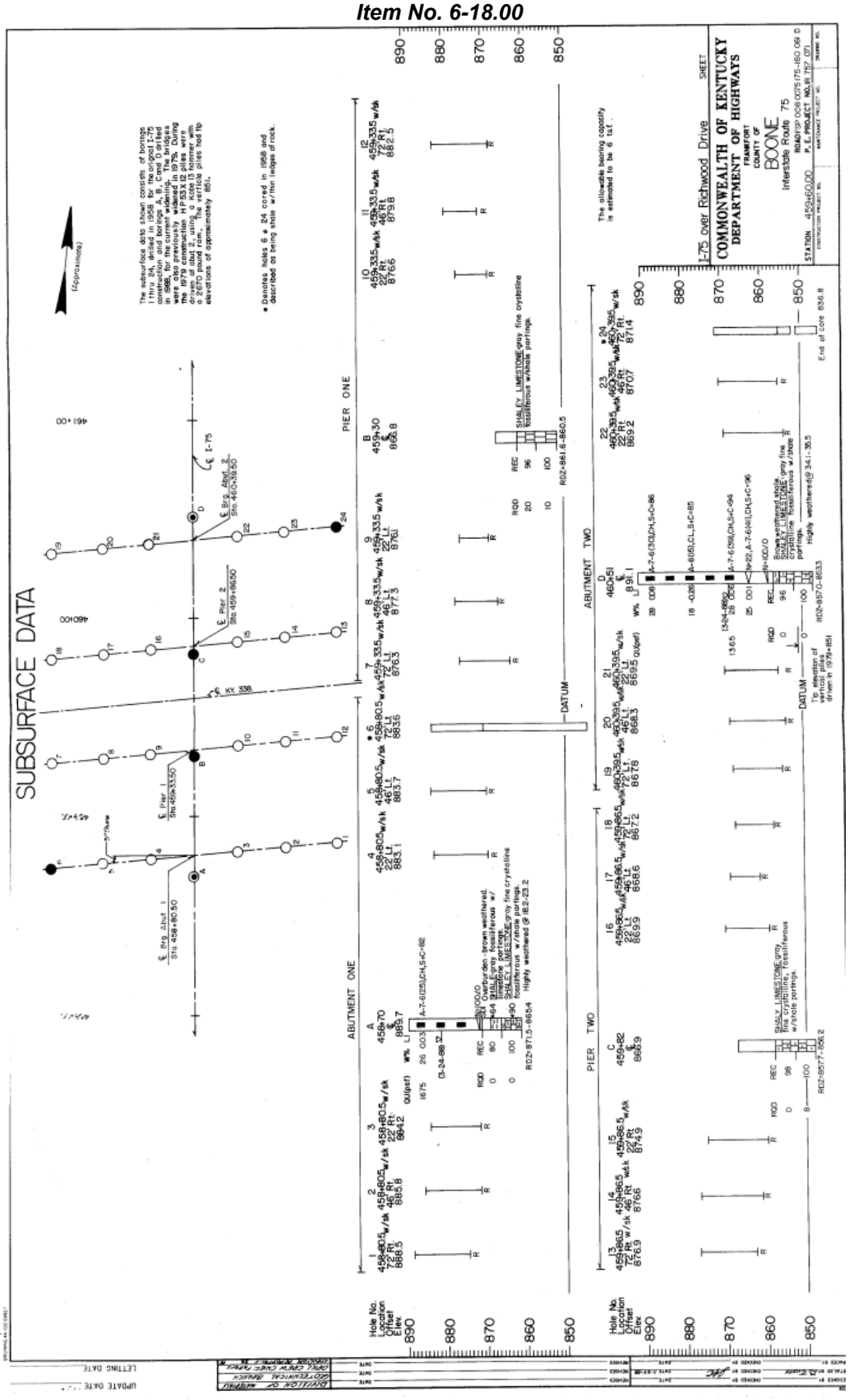
supervision of a licensed Professional Engineer or Professional Land Surveyor. Read the survey point movements to the nearest 0.01 ft.

B5.3 Provide monitoring data electronically to the Department within one day.

B6.0 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

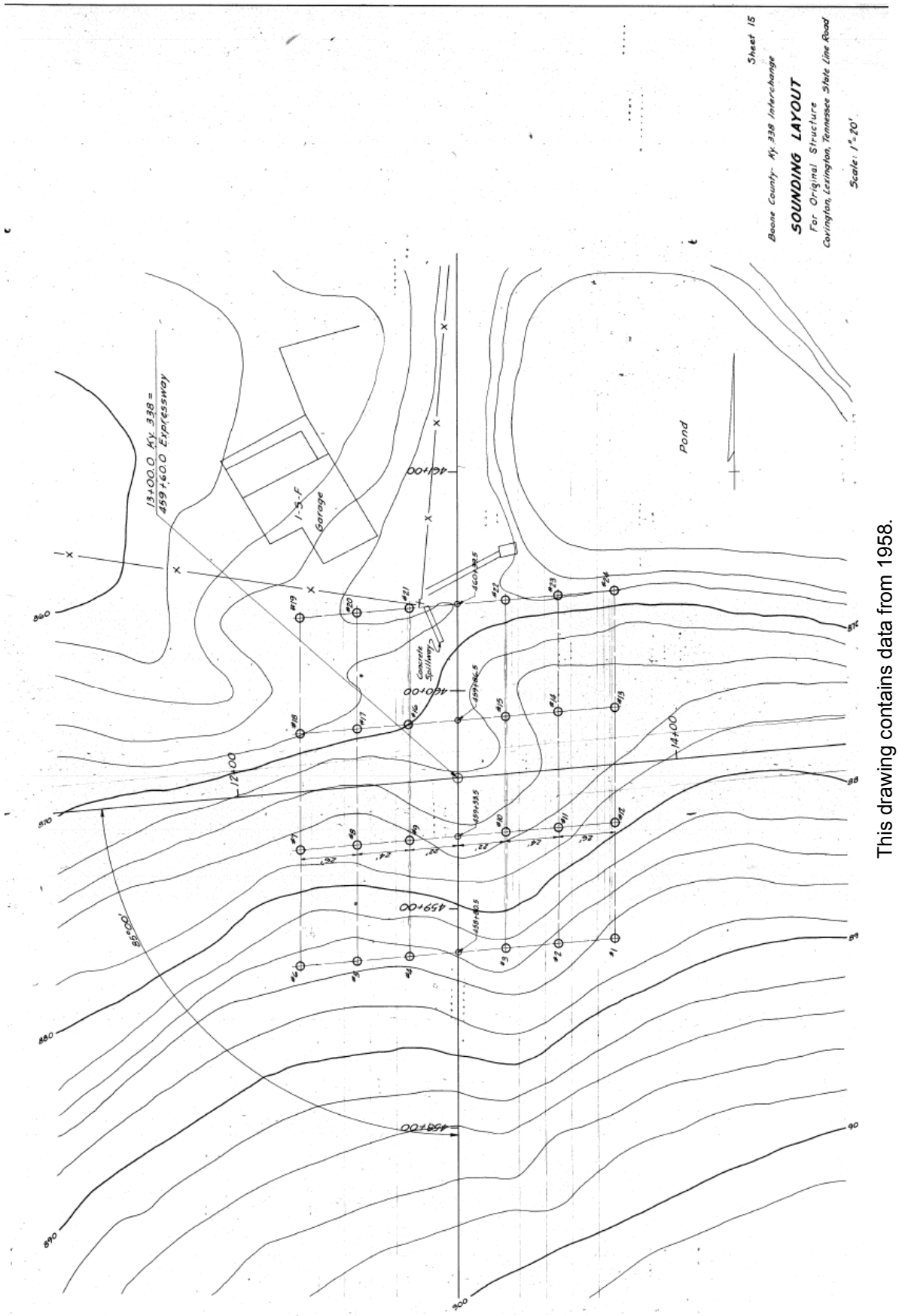
The labor and materials described in this Appendix are incidental to the Lump Sum Bid Price for "Foundation Preparation".

Special Note for Soil Nail Walls
Appendix C - Data from Previous Subsurface Explorations
Boone County
EB KY 338, Wall #14
Item No. 6-18.00



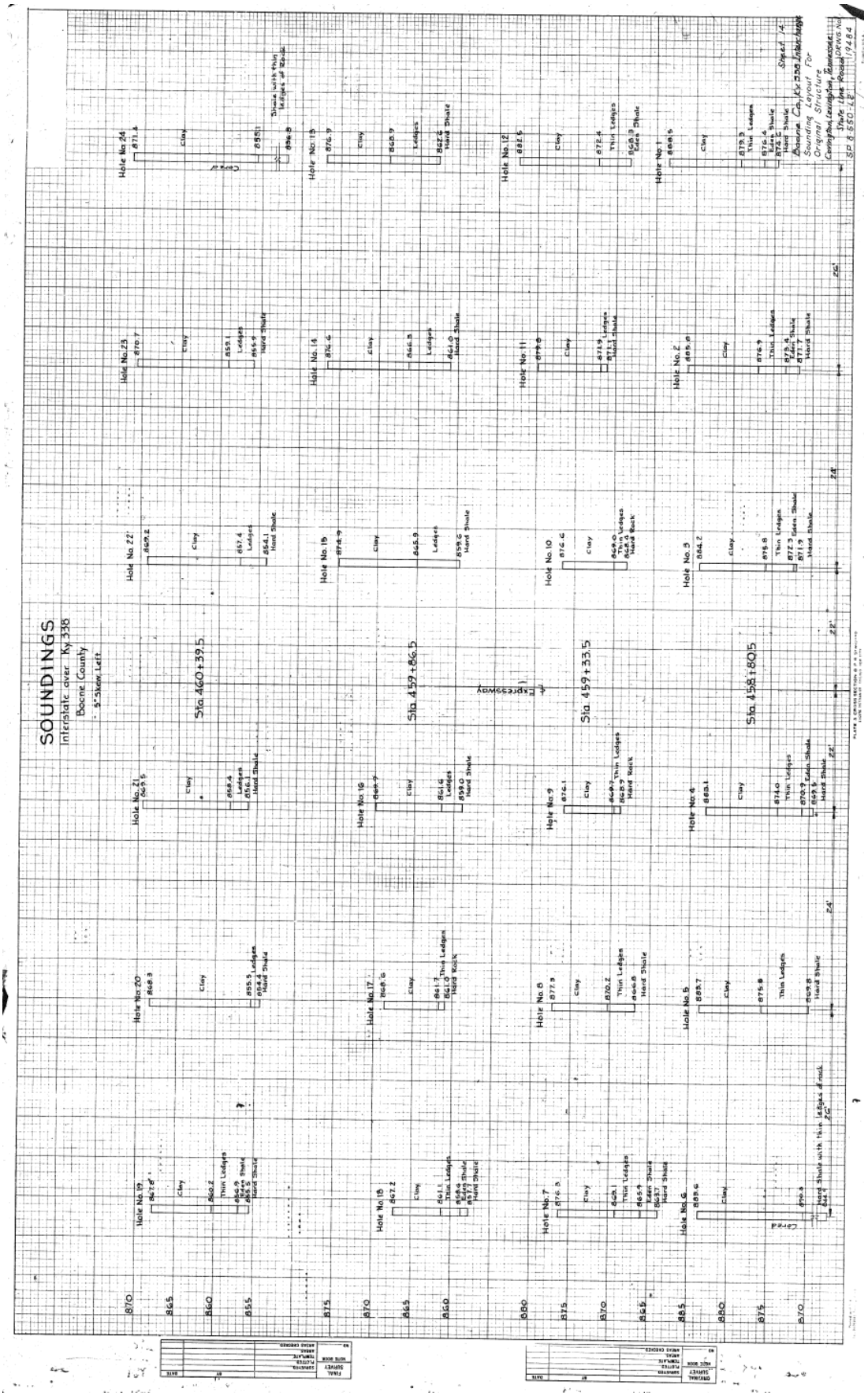
This drawing contains data from 1965.

NOT TO SCALE



This drawing contains data from 1958.

NOT TO SCALE



This drawing contains data from 1958.

NOT TO SCALE

Special Note for Soil Nail Walls
Appendix D - Horizontal Drains

Boone County
EB KY 338, Wall #14
Item No. 6-18.00

I. DESCRIPTION

Install horizontal drains in accordance with the plans and requirements herein.

II. MATERIALS

Use only acceptable materials as specified in this note or contract.

A. Horizontal Drains. Use 1½ inch slotted plastic pipe. Polyvinyl chloride, Schedule 80, Type II, PVC 2110 conforming to ASTM D 1785 with two (2) rows of slots cut circumferentially in the pipe on two (2) of the three points (120 degrees apart). For each row the average number of slots must be 42 per foot plus or minus one slot per row, using 0.020 inch slots with a minimum of 1.10 in^2 of opening per linear foot of slotted pipe.

B. Fittings. Use Type I high impact solvent weld type fittings made of rigid polyvinyl chloride having higher bursting pressure than the pipe.

C. Outlets. Use non-slotted PVC plastic pipe meeting the same requirements as the slotted pipe.

III. PRE-BID REQUIREMENTS

A. On-Site Inspection. Make a thorough inspection of the site prior to submitting a bid to become familiar with existing conditions so that the work can be expeditiously performed after a contract is awarded. The Department will consider submission of a bid as being evidence of the inspection and will not honor claims resulting from this.

B. Preconstruction Submittals. Either the soil nail wall contractor or another contractor other than the General Contractor shall be permitted to install the horizontal drains. If a contractor other than the soil nail wall contractor is to install the horizontal drains, submit a list containing at least five (5) projects on which the horizontal drain contractor has installed horizontal drains similar to those shown on the plans and proposal. List names and phone numbers of owner's representatives who can verify the contractor's performance on those projects. Submit information documenting the experience of personnel in

construction horizontal drains. Submit the name of the person in charge having satisfactory experience.

IV. CONSTRUCTION REQUIREMENTS

A. Installation of Horizontal Drains. Drill and install horizontal drains as shown on the plans. Drains should be sloped to ensure positive drainage. Make adjustments as necessary due to outlet elevation, drill setup, and projected rock line intersection as approved or required by the Engineer. Locations and sequence of placement may be changed at the direction of the Engineer. Drill holes with rotary equipment capable of drilling 3 to 6 inch diameter holes up to 600 feet in length to designated lines and grades through soil and rock formation. Use drill rod with an inside diameter large enough to allow the 1½ inch diameter pipe to be installed through it.

Dispose of water used for drilling and water developed during drilling operations to insure no damage results to the work, roadway embankments, other highway features, or adjacent private property off the right of way. Conform to Sections 212 and 213 of the Standard Specifications.

During the drilling operations, determine the elevation of the upper end of the completed drain hole. Furnish all labor, materials, tools, equipment, and incidentals necessary for determining the elevations. Provide record of drain elevations to the Engineer.

Install plastic pipe by inserting it inside the drill rod and then retracting the drill rod so that the drilled hole is cased for the full length. Seal the entrance end of the plastic pipe. Solvent weld each joint of pipe when installed to form a continuous tube; telescoping will not be allowed. Plug the space between the drilled hole and the pipe tightly with earth for a length of at least 2 feet at the outlet of the hole.

Install 3 to 20 feet of non-slotted PVC plastic pipe meeting the same requirements as the slotted pipe at the outlet of the drain. Extend drain outlets a minimum of 3 feet beyond the soil face. The Engineer will determine the exact length.

B. Right-of-Way Limits. Limit activities to Right-of-Way, Permanent or Temporary Easements, and work areas secured by the Department through consent and release of adjacent property owners and be responsible for all encroachments onto private lands.

C. Property Damage. Accept responsibility for all damage to public and/or private property resulting from work performed.

V. METHOD OF MEASUREMENT

The Engineer will measure the quantity of PVC pipe in linear feet acceptably installed.

VI. BASIS OF PAYMENT

The accepted quantity of 1½ inch slotted and non-slotted PVC pipe, excluding non-slotted material used in outlet drain pipe will be paid for at the contract unit price per linear foot. This will be full compensation for all labor, equipment, materials, and incidentals necessary to furnish and install the pipe as detailed on the plans, including all connections and fittings. Re-drill horizontal drain if not acceptable for payment due to the failure to meet specified tolerances.

The Department will pay for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
22410EN	Horizontal Drains	Linear Foot

SPECIAL NOTE FOR SPOT SUBGRADE STABILIZATION

This Special Note will apply when indicated on the plans or in the proposal. When this note is used a primary subgrade stabilization method will be as outlined in the project plans. This note will only apply for areas of the project where the primary subgrade selected is not feasible due to Maintenance of Traffic, entrances, narrow part-width sections, or other constraints. The locations for the use of this note and the selected alternate are subject to approval of the Engineer. Section references herein are to the current edition of the Department's Standard Specifications for Road and Bridge Construction, including Supplemental Specifications.

1.0 DESCRIPTION. Use one of the following five (5) alternates for the subgrade stabilization.

A. Eight inches of chemical stabilization using lime or cement
B. Eight inches of chemical stabilization using stockpiled, lime-stabilized soil (**Alternate "B" only allowed when lime stabilization** is the primary subgrade for the project.)
C. High-Strength Geotextile Fabric with six (6) additional inches of aggregate base
D. Geogrid reinforcement and geotextile fabric with eight (8) additional inches of aggregate base
E. Fifteen (15) inches of rock (#2's, #3's or #23's) wrapped in geotextile fabric. **Do NOT use Alternate "E" under concrete pavements**.

Stabilization should be applied from shoulder break to shoulder break.

2.0 MATERIALS

2.1 Cement, Lime, Asphalt Curing Seal, Water and Sand: Conform to Section 208.02.

2.2 Aggregate: Conform to Section 805.

2.3 Geogrid: Furnish geogrid according to Section 304.

2.4 Type IV Geotextile Fabric: Conform to Section 843.

2.5 High-Strength Geotextile Fabric: Furnish a woven or non-woven fabric meeting the AASHTO M 288 Class 1 strength requirements corresponding to <50% elongation. The fabric shall also comply with table 5 (Stabilization Geotextiles) in AASHTO M 288, with the exception of the minimum permittivity value being 0.1 sec^{-1}.

Packing, Shipment, Storage of Geogrid or Geotextile. Ensure that each roll is labeled with the Manufacturer's name, product type, lot number, roll number, manufactured date, and roll dimension. Protect the fabric or grid from direct sunlight, UV rays, and temperatures greater than 120 ^{o}F, mud, dirt, and debris during all periods of shipment and storage.

3.0 CONSTRUCTION

Surface Preparation. Prepare the surface according to Section 207 and Section 208.

3.1 Alternate A - Chemical Stabilization: Construct a minimum 8-inch thick, chemically stabilized roadbed according to Section 208. See the geotechnical notes to determine the type of chemical used for the stabilization (lime or cement) and additional requirements.

3.2 Alternate B - Chemical Stabilization w/ Stockpiled Lime-Stabilized Soil: Construct an 8-inch thick, chemically stabilized Roadbed according to section 208 using stockpiled lime stabilized soil. The lime shall be stockpiled offsite from the subgrade area being stabilized. The stockpiled soil shall consist of either:

1) Lime stabilized subgrade constructed in an approved borrow area, or approved area outside the typical section but within right-of-way.

2) Lime stabilized soil left over from cutting the chemically stabilized roadbed to final grade. The cuttings shall then be stored in a separate area until needed. The cuttings shall be stored in a minimum thickness of three (3) feet, and the stockpile lightly tamped when completed. The stockpile shall be covered until needed with an asphalt curing seal, or other approved method.

Follow all construction requirements of Section 208 unless otherwise noted herein. The stabilized material shall be maintained at or above optimum moisture content, which may require the addition of water prior to placement of the asphalt seal. Heavy construction traffic shall not be permitted on the pre-mixed material. Compaction requirements of Section 208 will not apply during initial placement with Option 1 (typical lime-stabilized soil from borrow area).

After sealing with an asphalt curing seal, the stabilized soil shall be left in place until needed. If ambient air temperature will drop below 32 degrees Fahrenheit for more than 2 hours, take appropriate measures to cover and protect the stabilized soils, subject to approval of the Engineer.

When ready for subgrade stabilization within the roadbed, excavate pre-stabilized soils and transport to the area to be stabilized. Place pre-stabilized material in 4 to 6-inch loose lifts at the locations determined by the Engineer. Mixing may be performed by disking or other lightweight equipment approved by the Engineer. At the time of reusing the stockpiled soil, additional water may need to be added to increase the moisture content to optimum, or slightly above.

Compaction may be performed with a vibratory sheepsfoot compactor or other approved equipment. Use caution to ensure the selected compactor and other construction equipment will not overload nearby subsurface utilities or produce excessive vibration. Test moisture content with a nuclear or Speedy Moisture gage and add water if needed to maintain a moisture content at or slightly above optimum. Place an asphalt curing seal on the constructed subgrade. Construction traffic shall not be permitted until the subgrade can support traffic without rutting.

3.3 Alternate C - High-Strength Geotextile Fabric: Place High-Strength Fabric at the proper elevation and locations in continuous strips to minimize the amount of joints and wrinkles during placement. All seams shall be sewn according the Manufacturer's recommendations, **lapping of seams is NOT permitted**. High-Strength Fabric shall be temporarily secured in place to maintain tension during aggregate placement. This may be done with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions as the Engineer directs. Make sure there are no buckles or folds in the fabric.

Ensure that a **Representative** of the High-Strength Fabric Manufacturer is on the project when work begins, **and at least the first 3 days of fabric construction**. The representative shall remain on call as the project progresses, to advise the Engineer.

High-Strength Fabric should not be completely placed before placing aggregate, but should be placed at the front of a "paving train" consisting of the fabric laydown **equipment followed no further than 50 feet by the aggregate placement equipment**. In curves and intersections, cut and seam the fabric to prevent development of buckles and folds.

Place aggregate over the fabric according to the Contract. Place, spread, and compact the aggregate in such a manner that minimizes the development of wrinkles and movement in the fabric. The Department will require a minimum loose thickness of 6 inches prior to operation of tracked vehicles over the fabric. Keep the turning of tracked vehicles to a minimum to prevent displacement of the fill and damage to the fabric. Rubber tired equipment may pass over the fabric at slow speeds (less than 10

mph). Avoid sudden braking and sharp turning movements. Repair any damage caused during placement or by vehicles.

If the total aggregate base thickness is less than 12 inches, the aggregate base will be placed in one lift. If greater than 12 inches, place the aggregate in 6 inch to 12 inch lifts.

3.3.1 Sampling/Testing of High-Strength Fabric:
The Department will sample the High-Strength Fabric at the project site according to KM 64-113 at a frequency determined by the Engineer. The Department will test the fabric for all properties possible given the testing equipment availability. When the Department determines that an individual samples fails to meet any specification requirement, the Department will reject that roll and sample 2 additional rolls from the same lot. When the Department determines that either of these 2 additional samples fails to comply with any part of the specification, the Department will reject the entire quantity of rolls represented by that sample.

3.4 Alternate D – Geogrid and Fabric: Place geogrid in accordance with Sections 304 and 302 of the current Standard Specifications and in accordance with the contract documents. Place the geotextile fabric first, then place the geogrid on top of the geotextile fabric so that they are at the bottom of the aggregate layer.

Ensure that a **Geogrid Representative** of the geogrid Manufacturer is on the project when work begins, **and at least the first 3 days of geogrid construction**. The representative shall remain on call as the project progresses, to advise the Engineer.

Geogrid shall be temporarily secured in place to maintain tension during aggregate placement. This may be done with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions as the Engineer directs. Make sure there are no buckles or folds in the geogrid.

Geogrid should not be completely placed before placing aggregate, but should be placed at the front of a "paving train" consisting of the geogrid laydown equipment **followed no further than 50 feet by the aggregate placement equipment**. In curves and intersections, cut and overlap the geogrid. Place the geogrid and aggregate according to Sections 304 and 302, and in accordance with the contract documents.

Contrary to Section 302.03.03, if the total aggregate base thickness is less than 12 inches, the aggregate base will be placed in one lift. If greater than 12 inches, place

the aggregate in 6 inch to 12 inch lifts. All other construction and density requirements of Section 302 will apply.

3.5 Alternate E - Fifteen (15) Inches of Rock and Fabric: Do ***NOT*** use this alternate for concrete pavements. Use fifteen (15) inches of Coarse Aggregate #2's, #3's or #23's wrapped in Type IV Geotextile Fabric. This will require excavating the subgrade by fifteen (15) inches more than shown on the plans. This alternate also requires positive drainage of the rock roadbed – perforated pipe discharged into weep holes in drainage boxes or headwalls or by daylighting the rock. The drainage solution and the additional 15-inch excavation are incidental to Subgrade Stabilization.

4.0 MEASUREMENT. The Department will measure the quantity of Subgrade Stabilization in square yards. The square yard price will include the additional aggregate (6 or 8 inches), the Type IV Geotextile Fabric and the geogrid, Lime, Cement, Lime Stabilized Roadbed, Cement Stabilized Roadbed, Asphalt Curing Seal, or Sand for Blotter, Coarse Aggregate #2's, #3's or #23's, High-Strength Geotextile Fabric and drainage items. No separate payment will be made for the above items. The Department will not make payment for providing a Geogrid or High-Strength Fabric Manufacturer's representative and will consider it incidental to the bid item for Subgrade Stabilization. The Department will not measure excavation (for 15 inches of rock and fabric or an additional 6 to 8 inches of aggregate) or adjusting subgrade differences between the alternates, and will consider such excavation or adjustments as incidental to Subgrade Stabilization. The Department will not measure hauling, extra handling, or placement of stockpiled lime stabilization soil for payment and will consider these incidental to Subgrade Stabilization. Fuel Price Adjustment does not apply to the Subgrade Stabilization bid item.

5.0 PAYMENT. The Cabinet will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24790EC	Subgrade Stabilization	Square Yard

The Cabinet will consider payment as full compensation for all work required in this note. If the Department determines a thicker chemical or rock stabilization section is needed once construction begins, the unit price for subgrade stabilization will be adjusted as follows:

Adjusted Unit Price = Original Unit Bid Price * (New Thickness/Original Thickness of Alternate)

Appendix I4 -- I-75 Rehab Notes

SPECIAL NOTE FOR
ASPHALT MILLING AND TEXTURING
I-75
BOONE CO.
ITEM NO. 6-20002

Do not allow public traffic to drive on the milled surface except in phases designated in the Maintenance of Traffic Plan. "Fine Milling" will be required only in areas in which traffic will be placed on the milled surface. See Special Note for Fine Milling for requirements. The contractor will be required to manage production rates of both asphalt milling and asphalt placement in phases required to restore traffic to the required minimum number of lanes per direction by the daily times required in the Maintenance of Traffic Plan. Failure to restore traffic to a minimum lanes required per direction by the required times will result in liquidated damages.

The Contractor shall take possession of the millings and recycle the millings or dispose of the millings off the Right-of-Way at sites obtained by the Contractor at no additional cost to the Department.

SPECIAL NOTE FOR FINE MILLING

Perform Fine Milling at areas outlined in the Typical Sections and as directed by the Engineer.

A). Equipment Provide a cold milling machine with a fine tooth milling drum and an electronic grade control system. The tool spacing of the drum shall not exceed 3/8 inch. The machine shall be equipped with a grade control system capable of determining a mean value from a minimum of three grade sensors. The sensors shall span a minimum length of 20 ft longitudinally. The drum must be capable of producing a macrotexture measurement greater than or equal to 9.5 inches as described in C) Testing.

B). Construction The milling machine shall be operated at a speed and drum revolution per minute such that the macrotexture measurement is greater than or equal to 9.5 inches as described in C) Testing and the milled pavement profile does not vary longitudinally more than ¼ inch from a 16' straightedge. Maintain the milling drum such that the cross–slope does not vary more than 1/8 inch from a 10 foot straightedge. Milling shall be performed so that the cross-slope breaks between driving lanes and shoulders remain at their existing locations. Depth of milling shall be set so as to remove rutting and profile errors. The milled surface shall be swept clean of all loose material after milling and prior to resurfacing.

C). Testing Testing shall be performed to determine the macrotexture of the milled pavement surface at a random location chosen in accordance with Kentucky Method KM 64-113- 14. Test area shall be cleaned with a stiff wire and or soft bristle brush and protected with a wind screen as necessary. Pour 200 ml of Type 1 glass beads (meeting AASHTO M 247) from a height of 4 inches or less onto the milled pavement surface. Using a round plexiglass disk (8 inches in diameter x ½ inch thick) with a round handle, place gently on pile of beads and spread in a slow circular motion to disperse the beads in a circular area and create a defined crest around the perimeter. Continue spreading until the beads are well dispersed and the disk rides on top of the high points of the milled pavement surface. Measure the diameter of the pile in inches at 0 degrees, 45 degrees, 90 degrees and 135 degrees. Determine the macrotexture measurement in inches by adding the four measurements and dividing by four. Frequency of testing shall be a minimum of once daily and additional testing will be performed as determined necessary by the project engineer.

D). Measurement The Department will measure Fine Milling in Square Yards of surface milled.

E). Payment Payment at the contract unit price per Square Yard of Fine Milling shall be full compensation for all equipment, work, and material necessary to complete the operations described herein.

Code	Pay Item	Pay Unit
24964EC	FINE MILLING	SQ YD

SPECIAL NOTE FOR TYPICAL SECTION DIMENSIONS
I-75
BOONE CO.
ITEM NO. 6-20002

The dimensions shown on the typical sections for pavement and shoulder widths are nominal or typical dimensions. The actual dimensions to be constructed may be varied to fit existing conditions as directed or approved by the Engineer. It is not intended that existing pavement or shoulders be widened or narrowed **EXCEPT** where specified elsewhere in the Proposal.

Appendix I5 -- CPM

CPM Note

SPECIAL NOTE FOR CPM SCHEDULE

I. General

The Progress Schedule required for this Project is the CPM schedule. The DBT shall designate a Schedule Representative who shall be responsible for coordinating with the Engineer during the preparation and maintenance of the schedule. The DBT shall submit an interim schedule followed by a baseline schedule, or only a baseline schedule, depending on when the DBT starts work as described below.

II. Interim Schedule

If the DBT starts work within 60 days of execution of the contract, they shall submit an interim schedule. The interim schedule shall be in CPM schedule format. The interim schedule shall include detailed activities for the work to be accomplished during the first 90 days of the Contract, and a summary of activities for the balance of the work.

III. Baseline Schedule

The DBT shall submit a baseline schedule within 60 days of the execution of the Contract. The baseline schedule shall be in CPM schedule format and as described below. The Engineer will review the baseline schedule and will either "approve", "approve as noted", or "reject" the schedule within 21 days of receipt. If the Engineer does not provide written notification regarding the disposition of the baseline schedule within 21 days, the submission will be considered approved.

For baseline schedules that are "approved as noted," the DBT shall make the necessary revisions and resubmit the revised schedule within 14 days. The Engineer will only reject baseline schedules that are not in compliance with Contract requirements.

For baseline schedules that are "rejected," the Engineer will indicate in writing all portions of the schedule that are not in compliance with the contract requirements. The Project Engineer will conduct a mandatory meeting with the DBT and the DBT's Schedule Representative within 14 days of the Engineer's written notice. The purpose of this meeting is to resolve all issues with the baseline schedule. At this meeting, the DBT shall provide clarification and all additional information necessary for the Engineer to "approve" the baseline schedule.

In the event the baseline schedule is not "approved" within 120 days of execution of the Contract, all work shall cease on the Project and no progress payments shall be made until the baseline schedule is "approved." Approval of the baseline schedule does not revise the Contract Documents. The baseline schedule must be "approved" or "approved as noted" by the Engineer prior to the Engineer evaluating any DBT claims associated with time impacts.

A. Schedule Requirements

Generate the baseline schedule using Primavera P6 Project Management by Oracle Corporation, Redwood Shores, CA 94065, or an equivalent program approved by the Engineer. The DBT shall provide any necessary training and license needed for KYTC to use the software. Submit the Primavera P6 XER file in the Version required by KYTC.

The DBT shall provide a working day schedule that shows the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the Original Contract Completion Date. Show the order and interdependence of activities and the sequence for accomplishing the work. Describe all activities in sufficient detail so that the Engineer can readily identify the work and measure the progress of each activity. The baseline schedule must reflect the scope of work, required phasing, maintenance of traffic requirements, interim completion dates, the Completion Date, and other Project milestones established in the Contract Documents. Include activities for design processes, mobilization, inspection, testing, submittals, working drawings, shop drawing preparation, submittal review time for KYTC shop drawings, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities. Design reviews shall be numbered and include "KYTC".

The DBT shall be responsible for assuring all work, including all Subcontractor work, is included in the schedule. The DBT shall be responsible for assuring that all work sequences are logical and that the schedule indicates a coordinated plan. Failure by the DBT to include any element of work required for performance of the Contract shall not excuse the DBT from completing all work within the required time. The Engineer's review of the baseline schedule will be for compliance with the Specifications and Contract requirements. Approval by the Engineer shall not relieve the DBT of any of their responsibilities for the accuracy or feasibility of the schedule. Omissions and errors shall be corrected as described in Section VI or VIII in this note and shall not affect Contract time, the Completion Date, or total Contract payment.

1. **Administrative Identifier Information**
    a. Project Number
    b. County
    c. Route Number
    d. FHWA Number
    e. PID Number
    f. Contract Signed Date
    g. Completion Date
    h. DB Design Manager and DBT Name
    i. DB Design Manager and DBT Dated Signature
    j. KYTC's Dated Approval Signature

2. **Project Activities**
    a. Activity Identification (ID)
    Assign each activity a unique identification number. Activity ID length shall not exceed 10 characters. Once accepted, the Activity ID shall be used for the duration of the Project.
    b. Activity Name
    Each activity shall have a narrative name (description) consisting of a verb or work function (e.g., form, pour, excavate) and an object (e.g., slab, footing, underdrain).
    c. Activity Original Duration
    Assign a planned duration in working days for each activity. Do not exceed a duration of 20 working days for any construction activity unless approved by the Engineer. Do not represent the

maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.

d. Activity Relationships:
    i. All activities, except the first activity, shall have a predecessor(s). All activities, except the final activity, shall have a successor(s).
    ii. Use only finish-to-start relationships with no leads or lags to link activities, or use start-to-start relationships with lags no greater than the predecessor duration to link activities.
    iii. Use of finish-to-finish relationship is permitted when both activities are already linked with a start-to-start relationship.

3. <u>Project Milestones</u>

The DBT shall adhere the following milestones:

a. Start Project
   The DBT shall include as the first milestone in the schedule, a milestone named “Start Project”. The date used for this milestone is the date the Contract is executed and signed by KYTC.
b. End Project Milestone
   The DBT shall include as the last activity in the Project schedule, a milestone named “End Project”. The date used for this milestone is considered the Project Completion Date.
c. Start Phase Milestone
   The DBT shall include as the first activity for a Project phase, an activity named "Start Phase X," where "X" identifies the phase of work. The DBT may include additional milestones but, as a minimum, must include all contractual milestones.
d. End Phase Milestone
   The DBT shall include as the last activity in a Project phase, an activity named "End Phase X," where "X" identifies the phase of work. The DBT may include additional milestones, but at a minimum contractual milestones.

4. <u>Level of Effort Activities (Hammocks)</u>

Level of Effort (hammock) activities are summary activities used for graphical display only. Use hammocks to show the duration of specified Contract work periods, phases and road closures. The hammock activity type is allowed to have a start-to-start relationship with the first activity in a series of activities and a finish-to-finish relationship with the last activity in a series of activities.

5. <u>Constraints</u>

Use constraints sparingly in the schedule. If constraints are used, use only early constraints or late constraints. Do not use As Late As Possible, Finish On, Mandatory Finish, Mandatory Start, or Start On constraints.

6. **Seasonal Weather Conditions**

The winter shutdown periods shall be shown using non-work calendars. The activity can be assigned to a calendar indicating time periods of non-work. These custom calendars can be created to show days, weeks, or months of non-work. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work.

7. **Linking Projects**

Independent projects shall not be linked.

8. **Activity Codes**

The DBT shall include the following codes for each activity:

a. Area
b. Phase
c. Responsibility for each task, DBT and Subcontractors
d. Worktypes for each task, as identified by KYTC
e. DBE and non-DBE DBT/designer tasks
f. Funding code

9. **Schedule Options**

The schedule may only be calculated using retained logic. Show open ends as noncritical. Schedule durations are to be contiguous (no suspend or resume dates). Total float shall be calculated as finish float.

10. **Cost Loading**

a. Cost Loading Activities

Costs for incremental design preparation will be assigned to the respective design phase submittal milestone(s). Equipment costs will be assigned to their respective Procurement Activities (i.e., the delivery milestone activity). Costs for installation of the material/equipment (labor, construction equipment, mobilization, and temporary materials) will be assigned to their respective construction activities. Evenly disperse overhead and profit to each activity over the duration of the Project. The total of all cost loaded activities, including costs for material and equipment delivered for installation on the Project, and labor and construction equipment loaded construction activities, shall total to 100 percent of the value of the Contract.

b. Quantities and Units of Measure

Cost loaded activities, as applicable, will have a detailed breakdown of the quantities for each of the various kinds of work and the unit of measure for material testing frequency calculation and planning purposes. These entries are informational only and are non-calculating. Quantities and Units of Measure shall be entered as “Notebook Topic P3 Activity Log Info” for each activity. Begin each Notebook entry with "Quantities and Units of Measure”.

B. Submission Requirements

Submit all schedules within the time frames specified. Submit the schedule and information in electronic file format. Submit the information detailed below along with the electronic baseline schedule.

1. **Baseline Schedule in Bar Chart Format**
   This baseline schedule shall include the Administrative Identifier Information discussed in Section III.A.1 on the first page of the schedule. For each activity on the chart, indicate the Activity ID, Activity Name, Original Duration, Remaining Duration, Total Float, Early Start Date, Early Finish Date, and Calendar ID. Use arrows to show the relationships among activities.

2. **Baseline Schedule in Bar Chart Format, on Paper**
   Identify the critical path of the Project on the bar chart in red. The critical path is defined as the longest path of activities in the Project that determines the Project Completion Date. The activities that make up the critical path of activities are the "Critical Activities."

3. **Three Week Look Ahead and a Six Week Look Ahead Schedule in Bar Chart Format**
   This schedule shall have all the requirements of the baseline schedule in bar chart format except that it shall be limited to those activities that have an early start or early finish within a three-week and a six-week period of the data date.

4. **Scheduling Statistics Report**
   Submit a report of baseline schedule statistics, including number of activities, number of activities on the longest path, number of started activities, number of completed activities, number of relationships, percent complete, and number and type of constraints.

5. **Logic Diagram (if Requested by the Engineer)**
   Submit a diagram in PERT chart format showing the logic of the baseline schedule.

6. **Activity ID Sort**
   Submit a listing of all activities included in the baseline schedule sorted by ascending Activity Identification Number.

7. **Total Float Sort**
   Submit a listing of all activities included in the baseline schedule sorted by increasing total float and by early start date.

8. **Detailed Predecessor/Successor Sort**
   Submit a listing of all activities included in the baseline schedule indicating the activities that immediately precede and immediately succeed that activity in the schedule logic.

9. **Earned Value Report**
   Submit an Earned Value Report listing all activities having a budget amount and cost. A compilation of total earnings on the Project from the

notice to proceed to the most recent monthly progress payment request and the difference between the previous request amount and the current payment request amount. Sort report first by resource and then by activity.

10. **Graphical Representation of Actual Work Completed**
    Submit a graphical representation of actual work completed versus planned work.

11. **Structural Schedule for Main Viaduct**
    Submit a structural schedule for the main viaduct with milestone dates (planned versus actual) for the major elements of work (e.g., footers, piers, abutments, deck, parapets).

IV. Float

Use of float suppression techniques, such as preferential sequencing (arranging critical path through activities more susceptible to Department caused delay), lag logic restraints, zero total or free float constraints, extending activity times, or imposing constraint dates other than as required by the Contract, shall be cause for rejection of the Project schedule or its updates.

A. Definitions of Float

Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the Project Completion Date. Project Float is the length of time between the End Project Milestone and the Contract Completion Date.

B. Ownership of Float

Float available in the schedule at any time shall not be considered for the exclusive use of either KYTC or the DBT. During the course of Contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained as a result of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, shall also contribute to the Project Float. A schedule showing work completing in less time than the Contract time, and accepted by KYTC, shall be considered to have Project Float. Project Float shall be a resource available to both KYTC and the DBT. If a delay occurs which impacts the Project's critical path, consumes all available float, and extends the work beyond the Contract Completion Date, KYTC will consider a time extension.

C. Negative Float

Negative float shall not be a basis for requesting time extensions. Any extension of time shall be addressed in accordance with the Section VII. Scheduled completion date(s) that extend beyond the Contract (or phase) completion date(s) may be used in computations for assessment of liquidated damages. The use of this computation is not to be construed as an order by KYTC to accelerate the Project.

V. Monthly Update Schedule

A monthly update schedule is a schedule in which only progress is updated from the prior data date to the current data date. Work added and/or excusable delays encountered since

the prior data date must be represented as a schedule revision as described in Section VI. Omissions and errors shall be corrected as described in Section VI or VIII in this note and shall not affect the Completion Date, the Contract time, or total Contract payment.

A. Update Requirements

On the tenth day of the current month, during the life of the Project, submit an updated schedule and all required information with a data date of the last day of the preceding month. The date for submission and data date may be adjusted to accommodate regularly scheduled progress meetings. Submit the monthly updated bar chart on paper and a copy of the updated schedule in electronic format in Section III.B. The Engineer will "approve" or "reject" the schedule update within 14 days of receipt of the updated CPM schedule. The Engineer may withhold estimates if the updated schedule is not submitted as required by this section. For each updated schedule, identify the actual start and finish dates for all completed activities and the actual start date and remaining duration for all activities in progress. Provide a written narrative that identifies any changes or shifts in the critical path and submit reasons for the changes or shifts in the critical path. Correct out-of-sequence progress listings generated by the Scheduling Statistics Report on the critical path. Minor logic revisions to correct out of sequence progress to critical or non-critical path activities may be made as part of the monthly schedule update. Submit proposed significant changes and/or changes to the critical path in accordance with Section VI. The Project schedule shall be reviewed at each monthly progress meeting. Any corrections shall be made prior to the next monthly progress meeting.

Submit the following with each updated schedule:

1. CPM Schedule in Bar Chart Format
2. Three Week and Six Week Look Ahead CPM Schedule in Bar Chart Format
3. Logic Diagram (if requested by the Engineer)
4. Activity ID Sort (if requested by the Engineer)
5. Total Float Sort (if requested by the Engineer)
6. Detailed Predecessor/Successor Sort (if requested by the Engineer)
7. Schedule Statistics Report
8. Electronic files (formatted as described above)
9. Earned Value Report

The DBT may submit a statement that there were no changes in the schedule logic, activity durations, or calendars since the previous update in lieu of submission of Items 3, 4, 5, and 6 above.

B. Early Completion Monthly Update Schedule

An Early Completion Monthly Update Schedule is defined as a monthly update schedule submitted by the DBT in which the Finish Date precedes the Contract Completion Date.

C. Late Completion Monthly Update Schedule

A Late Completion Monthly Update Schedule is defined as a monthly update schedule submitted by the DBT in which the Finish Date exceeds the Contract Completion Date. In the event the Finish Date is more than 14 days beyond the current contract completion date and a schedule revision is not warranted, the DBT must proceed in accordance with Section VIII.

VI. Revisions

The work may require and/or the DBT may make revisions to the CPM schedule. Addition of new activities or new calendars or changes to existing activities, calendars, or logic constitute a revision. All revisions must be reported in narrative form on a cover sheet accompanying the monthly update schedule. Any revision that modifies the critical path or impacts an interim date or Project Completion Date must be represented on a companion schedule submitted with the monthly update schedule or as a fragnet within the monthly update schedule. A fragnet is defined as the sequence of new activities that are proposed to be added to the existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. If submitted as a fragnet, the DBT shall compute two finish dates. The first finish date shall be computed without consideration of any impact by the fragnet. The second finish date shall be computed with consideration of any impact by the fragnet. The DBT shall also submit a written narrative stating the reason for the proposed revisions. The Engineer will "approve" or "reject" proposed revisions within 10 days of receipt of appropriate schedules and narrative.

Any revision that modifies an activity's costs shall be submitted with a written narrative stating the reason for the proposed revision. The Engineer will review and "approve" or "reject" proposed cost revisions.

All approved revisions shall be incorporated into the Monthly Update Schedule.

VII. Time Extensions for Delays in Accordance with 108.06

The work may require and/or the DBT may request an extension of the Completion Date. Perform the following analysis to compute the duration of the time extension. Submit two paper copies and two electronic copies of each analysis performed.

A. Determine Project progress prior to circumstance(s) necessitating the time extension. The previous accepted monthly update, updated to the date of the circumstance alleging to have caused delay, shall be used to display the prior progress of the Project. This schedule is referred to as the Un-impacted Schedule.
B. Prepare a fragmentary network (fragnet) depicting the circumstance that is believed to have delayed the Project.
C. Insert the fragnet into the Un-impacted Schedule, run the schedule calculations and determine the finish date. This schedule is referred to as the Impacted Schedule.
D. Compare the Impacted Schedule finish date with the Un-impacted Schedule finish date in order to determine the duration of any warranted time extension.

Submit the impacted schedule with the request for time extension. Include a narrative report describing the effects of new activities and relationships to interim and Contract Completion Dates. All approved time extensions shall be incorporated into the monthly update with the fragnet used to determine impacts incorporated into the schedule. Omissions and errors shall be corrected as described in Section VI or VIII in this note and shall not affect Completion Date, Contract time, or total Contract payment.

VIII. Recovery Schedule

If the Monthly Update Schedule or Revised Monthly Update Schedule projects a finish date for the Project more than 14 Calendar Days later than the current Completion Date, submit a recovery schedule showing a plan to finish by the current Completion Date if requested by the Engineer. KYTC will withhold Estimates until the Engineer approves

the recovery schedule. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the DBT.