Matthew G. Bevin
Governor

COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Greg Thomas
Secretary

October 22, 2019

CALL NO. 203
CONTRACT ID NO. 191064
ADDENDUM # 2

Subject: Lyon-Caldwell-Trigg Counties, 121GR19D064-NHPP IM
Letting October 25, 2019

(1)Revised – Special Note – Page 20 of 493
(2)Revised – General Summary – Page 24 of 493
(3)Revised – General Note – Page 49 of 493
(4)Revised – Material Summary – Pages 432-437 of 493
(5)Revised – Proposal Bid Items – Pages 490-493 of 493
(6)Added – Special Notes – Pages 1-39 of 39

Proposal revisions are available at http://transportation.ky.gov/Construction-Procurement/.

If you have any questions, please contact us at 502-564-3500.

Sincerely,

Rachel Mills, P.E.
Director
Division of Construction Procurement

RM:ws
Enclosures

STANDARD DRAWINGS
I-24 - CALDWELL, LYON, AND TRIGG COUNTY
PAGE 2 OF 2

APPLICABLE KENTUCKY DEPARTMENT OF HIGHWAYS
STANDARD DRAWING SEPIAS (ATTACHED):

005	SHOULDER AND EDGELINE RUMBLE STRIPS
007	SHOULDER RUMBLE STRIP DETAILS TWO LANE ROADWAYS
008	RUMBLE STRIP DETAILS MULTI-LANE ROADWAYS AND RAMPS
013	GUARDRAIL CONNECTOR TO BRIDGE END TYPE A AND A-1 COMPONENTS
015	GUARDRAIL CONNECTOR TO BRIDGE END TYPE A
016	GUARDRAIL CONNECTOR TO BRIDGE END TYPE A-1
018	CONNECTION DETAILS OF CRASH CUSHION TYPE VI TO DOUBLE FACE GUARDRAIL
021	CRASH CUSHION TYPE VI-BT
023	CRASH CUSHION TYPE IX-A
024	TYPICAL GUARDRAIL INSTALLATIONS
025	INSTALLATION OF GUARDRAIL END TREATMENT TYPE 1
027	STEEL BEAM GUARDRAIL "W" BEAM
028	STEEL GUARDRAIL POSTS
029	GUARDRAIL END TREATMENT TYPE 1
030	GUARDRAIL END TREATMENT TYPE 4A
032	DELINEATORS FOR GUARDRAIL
033	GUARDRAIL SYSTEM TRANSITION
038	GUARDRAIL END TREATMENT TYPE 2A
039	TYPICAL ENTRANCE RAMP MARKINGS FOR INTERSTATES AND PARKWAYS
040	TYPICAL EXIT RAMP MARKINGS FOR INTERSTATES AND PARKWAYS
041	TYPICAL EXIT RAMP MARKINGS FOR INTERSTATES AND PARKWAYS
045	TYPICAL MARKINGS FOR GORE AREAS
060	CURB AND GUTTER, CURBS AND VALLEY GUTTER

GENERAL SUMMARY

I-24 - CALDWELL, LYON, AND TRIGG COUNTY

BID CODE	ITEM	UNIT	NOTE	QUANTITIES			
				CALDWELL COUNTY	LYON COUNTY	TRIGG COUNTY	TOTALS
06513	PAVE STRIPING-TEMP PAINT-12 IN	LF		978	0	0	978
06556	PAVE STRIPING - DUR TY - 6 IN W	LF		34,261	44,946	163,502	242,709
06557	PAVE STRIPING - DUR TY - 6 IN Y	LF		27,408	35,957	130,801	194,166
06560	PAVE STRIPING-DUR TY 1-12 IN W	LF		2,297	0	1,288	3,585
06600	REMOVE PAVEMENT MARKER TYPE V	EACH	12	173	320	1,169	1,662
08903	CRASH CUSHION TY VI CLASS BT TL3	EACH		0	4	4	8
10020NS	FUEL ADJUSTMENT	DOLL		24,821	31,361	63,602	119,784
10030NS	ASPHALT ADJUSTMENT	DOLL		13,203	21,096	29,920	64,219
20362ES403	SHOULDER RUMBLE STRIPS-SAWED	LF	20	26,639	31,279	74,701	132,619
20366NN	REPLACE GRATE	EACH		2	1	2	5
20412ED	REMOVE ASPHALT SHOULDER	SY	10	9,169	0	41,590	50,759
20432ES112	REMOVE CRASH CUSHION	EACH		0	2	6	8
21173EC	SAW-CLEAN-RESEAL RANDOM CRACKS	LF		2,000	2,000	6,000	10,000
22883EN	CONCRETE WEDGE CURB	LF		0	0	2,198	2,198
23032EN	BRIDGE BARRIER RETROFIT	LF		0	0	785	785
23147EN	HIGH TENSION CABLE-ROPE	LF	11	301	416	395	1,112
23148EN	END ANCHORS	EACH	11	4	2	2	8
23949EC	BRIDGE CLEANING AND PREVENTATIVE MAINTENANCE	LS	18	-	1	-	1
23949EC	BRIDGE CLEANING AND PREVENTATIVE MAINTENANCE	LS	19	-	-	1	1
24255EC	REMOVE CABLE GUARDRAIL BARRIER SYSTEM	LF	11	301	416	395	1,112
24489EC	INLAID PAVEMENT MARKERS	EACH		447	449	1,635	2,531
24640ED	OBJECT MARKER TYPE 1	EACH		0	6	10	16
24969ED	LONGITUDINAL SAW CUT	LF		9,282	0	37,351	46,633
24997EC	PARTIAL DEPTH PATCHING - POLYMER MOD	CUFT		216	49	1,991	2,256
25050ED	GEOTEXTILE BOND BREAKER	SY		45,373	52,130	124,503	222,006

NOTES:

1. Quantities from all other summary sheets have been carried over and included in this General Summary Sheet.
2. For eastbound concrete pavement removal MP 51.886 to MP 64.500.
3. Required for slab replacements.
4. For guardrail at bridges. See Standard Drawing RBB-002.
5. Total includes 2,060 LF for slab replacements.
6. Total includes 2,220 LF for slab replacements.
7. Total includes 75 headwalls for slab replacements.
8. For Diamond Grinding areas.
9. Total includes 11,660 LF for MOT impacts.
10. Total includes 4290 square yards for MOT impacts from potential deterioration of shoulders from MP 55.668 to MP 64.7 during phase 1 of construction.
11. For High Tension Cable-Rope Barrier for crossovers.
12. For Diamond Grinding areas. Estimated every 80'.
13. For Maintenance of Traffic.
14. For erosion control of temporary crossovers.
15. For Diamond Grinding areas. Estimated every 20 feet.
16. For removal of concrete for slab replacements.
17. Total includes 293 tons for perforated pipe headwalls, and 551 tons for erosion repairs.
18. For bridges 072B00048L&R in Lyon County.
19. For bridges 111B00044L&R in Trigg County.
20. For eastbound shoulders from MP 51.886 to MP 64.500.

GENERAL NOTES
I-24 – CALDWELL, LYON, AND TRIGG
PAGE 4 OF 4

B. The Contractor is advised that locations of low wires crossing the roadway exist. If any utility is impacted, it will be the Contractor's responsibility to contact the affected utility and cover any costs associated with the impact.

C. Guardrail, End Treatments, and Terminal Sections to be replaced are listed by mileposts. Exact placement to be approved by the Engineer on construction.

D. Any signs and any light poles that are damaged during Construction are to be replaced at the Contractor's expense.

E. The existing edge drain system that is not being replaced is to be preserved. Care should be taken when pavement is removed and replaced, any edge drains damaged during these activities will be replaced at the Contractor's expense.

F. Pavement rideability requirements in accordance with Section 501 Category A of the standard specifications shall apply on this project.

G. The Department will accept the compaction of asphalt mixtures furnished for the shoulders at one inch or greater on this project by Option B according to subsections 402 and 403 of the Standard Specifications.

H. The Contractor shall be responsible for the repair of any pavement in the travelled lanes that becomes detrimental or hazardous to the travelling public during construction. Areas needing repair will be at the discretion of the Engineer. Repair or reconstruction of shoulder pavement due to maintenance of traffic will paid for with the pavement construction bid items in the contract.

I. No tree cutting is allowed nor should it be necessary.

J. Depth of existing base material of existing pavement is not reflected on the cross sections.

K. Delineators shall meet the requirements of Section 830 and 838 of the Standard Specifications. Delineators shall be placed in accordance with Section 3F of the M.U.T.C.D., current edition and Kentucky Standard Drawings, current edition.

L. Quantities have been included in the General Summary for pavement repairs. The Engineer will determine the actual locations that will be repaired based upon the condition of the pavement at the time the repairs are accomplished. The Engineer shall determine the extent of the repairs.

M. Locations of pavement subsurface drainage outlets are listed. These locations may be adjusted by the Engineer. Engineer may elect to add or reduce the number of outlets.

N. Allowing traffic to travel on milled shoulder surface is not allowed unless approved by the Engineer.

O. PVC pipe shall be used for all 4-inch non-perforated pipe (minimum schedule 40). The unit bid price for construction of the PVC pipe shall include all fittings, connections, etc.

P. A vacuum truck shall be required during all milling operations.

Q. The old rest areas (eastbound and westbound) near MP 54.5 may be used by the Contractor for staging. A staging plan shall be submitted to the Engineer for approval. Upon completion of use of these areas the Contractor shall restore them to original condition as approved by the Engineer. Payment for restoration will not be allowed.

R. Cement Stabilized Roadbed– Stabilize the top 12 inches of the finished roadbed with Portland cement in accordance with section 208 of the standard specifications. Use selected soils, with a minimum CBR value of 3, for this purpose. The Portland cement content is 6.0 percent by weight, and the estimated plan quantity uses an average dry density of 120 lbs/cubic feet. However, adjust the quantity after constructing the roadbed and submitting the samples for testing. This takes approximately two weeks.

S. Contrary to Standard Drawing Sepia 8 use 8" rumble length and 1' offset from the edge line on both shoulders.

T. Special Note For Dowel Bar and Tie Placement in JPC Pavement shall apply to this project.

MATERIAL SUMMARY

CONTRACT ID: 191064 **121GR19D064 - NHPP IM** **DE01700241964**

I-24 ADDRESS PCC PAVEMENT CONDITIONS ON I-24 FROM MP 55.6 TO MP 57.1 IN CALDWELL COUNTY JPC PAVEMENT REPAIRS, A DISTANCE OF 1.5 MILES.

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0935	00001	DGA BASE	3,655.00	TON
0940	00008	CEMENT STABILIZED ROADBED	45,373.00	SQYD
0945	00078	CRUSHED AGGREGATE SIZE NO 2	58.00	TON
0950	00080	CRUSHED AGGREGATE SIZE NO 23	60.00	TON
0955	00100	ASPHALT SEAL AGGREGATE	286.00	TON
0960	00103	ASPHALT SEAL COAT	34.00	TON
0965	00190	LEVELING & WEDGING PG64-22	182.00	TON
0970	00214	CL3 ASPH BASE 1.00D PG64-22	1,587.00	TON
0975	00312	CL3 ASPH SURF 0.50D PG64-22	1,609.00	TON
0980	00356	ASPHALT MATERIAL FOR TACK	6.00	TON
0985	00358	ASPHALT CURING SEAL	91.00	TON
0990	01005	PERFORATED PIPE EDGE DRAIN-4 IN	22,820.00	LF
0995	01015	INSPECT & CERTIFY EDGE DRAIN SYSTEM - CALDWELL	1.00	LS
1000	01028	PERF PIPE HEADWALL TY 3-4 IN	9.00	EACH
1005	01032	PERF PIPE HEADWALL TY 4-4 IN	49.00	EACH
1010	01740	CORED HOLE DRAINAGE BOX CON-4 IN	1.00	EACH
1015	01986	DELINEATOR FOR BARRIER WALL-B/Y	681.00	EACH
1020	02058	REMOVE PCC PAVEMENT	45,802.00	SQYD
1025	02060	PCC PAVEMENT DIAMOND GRINDING	40,470.00	SQYD
1030	02069	JPC PAVEMENT-10 IN	650.00	SQYD
1035	02071	JPC PAVEMENT-11 IN	45,373.00	SQYD
1040	02091	REMOVE PAVEMENT	650.00	SQYD
1045	02115	SAW-CLEAN-RESEAL TVERSE JOINT	16,556.00	LF
1050	02116	SAW-CLEAN-RESEAL LONGIT JOINT	13,797.00	LF
1055	02542	CEMENT - (REVISED: 10-8-19)	1,470.00	TON
1060	02562	TEMPORARY SIGNS	600.00	SQFT
1065	02575	DITCHING AND SHOULDERING	13,797.00	LF
1070	02604	FABRIC-GEOTEXTILE CLASS 1A	650.00	SQYD
1075	02650	MAINTAIN & CONTROL TRAFFIC - CALDWELL	1.00	LS
1080	02655	CROSSOVER - #2- CALDWELL	1.00	LS
1085	02655	CROSSOVER - #3- CALDWELL	1.00	LS
1090	02671	PORTABLE CHANGEABLE MESSAGE SIGN	4.00	EACH
1095	02676	MOBILIZATION FOR MILL & TEXT - CALDWELL	1.00	LS
1100	02677	ASPHALT PAVE MILLING & TEXTURING	498.00	TON
1105	02701	TEMP SILT FENCE	1,350.00	LF
1110	02702	SAND FOR BLOTTER	113.00	TON
1115	02705	SILT TRAP TYPE C	2.00	EACH
1120	02726	STAKING - CALDWELL	1.00	LS
1125	03171	CONCRETE BARRIER WALL TYPE 9T	13,612.00	LF
1130	03383	PVC PIPE-4 IN	2,625.00	LF
1135	05950	EROSION CONTROL BLANKET	10,000.00	SQYD
1140	05953	TEMP SEEDING AND PROTECTION	717.00	SQYD

MATERIAL SUMMARY

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
1145	05963	INITIAL FERTILIZER	.20	TON
1150	05964	MAINTENANCE FERTILIZER	.20	TON
1155	05985	SEEDING AND PROTECTION	2,323.00	SQYD
1160	05992	AGRICULTURAL LIMESTONE	1.44	TON
1165	06401	FLEXIBLE DELINEATOR POST-M/W	231.00	EACH
1170	06404	FLEXIBLE DELINEATOR POST-M/Y	64.00	EACH
1175	06511	PAVE STRIPING-TEMP PAINT-6 IN	54,447.00	LF
1180	06513	PAVE STRIPING-TEMP PAINT-12 IN	978.00	LF
1185	06556	PAVE STRIPING-DUR TY 1-6 IN W	34,261.00	LF
1190	06557	PAVE STRIPING-DUR TY 1-6 IN Y	27,408.00	LF
1195	06560	PAVE STRIPING-DUR TY 1-12 IN W	2,297.00	LF
1200	06600	REMOVE PAVEMENT MARKER TYPE V	173.00	EACH
1205	10020NS	FUEL ADJUSTMENT	24,821.00	DOLL
1210	10030NS	ASPHALT ADJUSTMENT	13,203.00	DOLL
1215	20366NN	REPLACE GRATE	2.00	EACH
1220	20412ED	REMOVE ASPHALT SHOULDER	9,169.00	SQYD
1225	21173EC	SAW-CLEAN-RESEAL RANDOM CRACKS	2,000.00	LF
1230	23147EN	HIGH TENSION CABLE-ROPE BARRIER	301.00	LF
1235	23148EN	END ANCHORS	4.00	EACH
1240	24255EC	REMOVE CABLE GUARDRAIL BARRIER SYSTEM	301.00	LF
1245	24489EC	INLAID PAVEMENT MARKER	447.00	EACH
1250	24969ED	LONGITUDINAL SAW CUT	9,282.00	LF
1255	24997EC	PARTIAL DEPTH PATCHING-POLYMER MOD	216.00	CUFT
1260	25050ED	GEOTEXTILE BOND BREAKER INTERLAYER	45,373.00	SQYD
1265	02568	MOBILIZATION	1.00	LS
1270	02569	DEMOBILIZATION	1.00	LS
1275	20362ES403	SHOULDER RUMBLE STRIPS-SAWED - (ADDED: 10-22-19)	26,639.00	LF

CONTRACT ID: 191064 **121GR19D064 - NHPP IM** **DE07200241964**

I-24 ADDRESS PCC PAVEMENT CONDITIONS ON I-24 IN BOTH DIRECTIONS FROM MP 51.7 TO MP 53.9 IN LYON COUNTY JPC PAVEMENT REPAIRS, A DISTANCE OF 2.2 MILES.

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0005	00001	DGA BASE	6,921.00	TON
0010	00008	CEMENT STABILIZED ROADBED	52,130.00	SQYD
0015	00078	CRUSHED AGGREGATE SIZE NO 2	72.00	TON
0020	00080	CRUSHED AGGREGATE SIZE NO 23	100.00	TON
0025	00100	ASPHALT SEAL AGGREGATE	278.00	TON
0030	00103	ASPHALT SEAL COAT	33.00	TON
0035	00214	CL3 ASPH BASE 1.00D PG64-22	3,932.00	TON
0040	00312	CL3 ASPH SURF 0.50D PG64-22	1,464.00	TON
0045	00356	ASPHALT MATERIAL FOR TACK	7.00	TON
0050	00358	ASPHALT CURING SEAL	104.00	TON
0055	01005	PERFORATED PIPE EDGE DRAIN-4 IN	32,548.00	LF
0060	01015	INSPECT & CERTIFY EDGE DRAIN SYSTEM - LYON	1.00	LS

MATERIAL SUMMARY

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0065	01020	PERF PIPE HEADWALL TY 1-4 IN	2.00	EACH
0070	01024	PERF PIPE HEADWALL TY 2-4 IN	1.00	EACH
0075	01028	PERF PIPE HEADWALL TY 3-4 IN	26.00	EACH
0080	01032	PERF PIPE HEADWALL TY 4-4 IN	43.00	EACH
0085	01740	CORED HOLE DRAINAGE BOX CON-4 IN	1.00	EACH
0090	01890	ISLAND HEADER CURB TYPE 1	100.00	LF
0095	01891	ISLAND HEADER CURB TYPE 2	100.00	LF
0100	01982	DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL WHITE	8.00	EACH
0105	01983	DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL YELLOW	7.00	EACH
0110	01986	DELINEATOR FOR BARRIER WALL-B/Y	782.00	EACH
0115	02058	REMOVE PCC PAVEMENT	69,507.00	SQYD
0120	02060	PCC PAVEMENT DIAMOND GRINDING	59,598.00	SQYD
0125	02069	JPC PAVEMENT-10 IN	950.00	SQYD
0130	02071	JPC PAVEMENT-11 IN	52,130.00	SQYD
0135	02091	REMOVE PAVEMENT	950.00	SQYD
0140	02115	SAW-CLEAN-RESEAL TVERSE JOINT	30,717.00	LF
0145	02116	SAW-CLEAN-RESEAL LONGIT JOINT	25,597.00	LF
0150	02351	GUARDRAIL-STEEL W BEAM-S FACE	796.00	LF
0155	02352	GUARDRAIL-STEEL W BEAM-D FACE	245.00	LF
0160	02360	GUARDRAIL TERMINAL SECTION NO 1	2.00	EACH
0165	02363	GUARDRAIL CONNECTOR TO BRIDGE END TY A	5.00	EACH
0170	02365	CRASH CUSHION TYPE IX-A	2.00	EACH
0175	02367	GUARDRAIL END TREATMENT TYPE 1	4.00	EACH
0180	02369	GUARDRAIL END TREATMENT TYPE 2A	2.00	EACH
0185	02381	REMOVE GUARDRAIL	1,241.00	LF
0190	02387	GUARDRAIL CONNECTOR TO BRIDGE END TY A-1	4.00	EACH
0195	02542	CEMENT - (REVISED: 10-8-19)	1,689.00	TON
0200	02562	TEMPORARY SIGNS	700.00	SQFT
0205	02565	OBJECT MARKER TYPE 2	2.00	EACH
0210	02575	DITCHING AND SHOULDERING	20,317.00	LF
0215	02604	FABRIC-GEOTEXTILE CLASS 1A	950.00	SQYD
0220	02650	MAINTAIN & CONTROL TRAFFIC - LYON	1.00	LS
0225	02655	CROSSOVER - #1 LYON	1.00	LS
0230	02671	PORTABLE CHANGEABLE MESSAGE SIGN	2.00	EACH
0235	02701	TEMP SILT FENCE	1,390.00	LF
0240	02702	SAND FOR BLOTTER	130.00	TON
0245	02705	SILT TRAP TYPE C	2.00	EACH
0250	02726	STAKING - LYON	1.00	LS
0255	02775	ARROW PANEL	1.00	EACH
0260	03171	CONCRETE BARRIER WALL TYPE 9T	15,639.00	LF
0265	03383	PVC PIPE-4 IN	3,602.00	LF
0270	05950	EROSION CONTROL BLANKET	13,000.00	SQYD
0275	05953	TEMP SEEDING AND PROTECTION	613.00	SQYD
0280	05963	INITIAL FERTILIZER	.10	TON
0285	05964	MAINTENANCE FERTILIZER	.10	TON
0290	05985	SEEDING AND PROTECTION	1,162.00	SQYD
0295	05992	AGRICULTURAL LIMESTONE	.72	TON
0300	06401	FLEXIBLE DELINEATOR POST-M/W	38.00	EACH
0305	06511	PAVE STRIPING-TEMP PAINT-6 IN	65,541.00	LF

MATERIAL SUMMARY

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0310	06556	PAVE STRIPING-DUR TY 1-6 IN W	44,946.00	LF
0315	06557	PAVE STRIPING-DUR TY 1-6 IN Y	35,957.00	LF
0320	06600	REMOVE PAVEMENT MARKER TYPE V	320.00	EACH
0325	08903	CRASH CUSHION TY VI CLASS BT TL3	4.00	EACH
0330	10020NS	FUEL ADJUSTMENT	31,361.00	DOLL
0335	10030NS	ASPHALT ADJUSTMENT	21,096.00	DOLL
0340	20366NN	REPLACE GRATE	1.00	EACH
0345	20432ES112	REMOVE CRASH CUSHION	2.00	EACH
0350	21173EC	SAW-CLEAN-RESEAL RANDOM CRACKS	2,000.00	LF
0355	23147EN	HIGH TENSION CABLE-ROPE BARRIER	416.00	LF
0360	23148EN	END ANCHORS	2.00	EACH
0365	23949EC	BRIDGE CLEANING & PREVENTIVE MAINTENANCE - BRIDGES 072B00048L&R-LYON	1.00	LS
0370	24255EC	REMOVE CABLE GUARDRAIL BARRIER SYSTEM	416.00	LF
0375	24489EC	INLAID PAVEMENT MARKER	449.00	EACH
0380	24640ED	OBJECT MARKER TYPE 1	6.00	EACH
0385	24997EC	PARTIAL DEPTH PATCHING-POLYMER MOD	49.00	CUFT
0390	25050ED	GEOTEXTILE BOND BREAKER INTERLAYER	52,130.00	SQYD
0395	02568	MOBILIZATION	1.00	LS
0400	02569	DEMOBILIZATION	1.00	LS
0405	20362ES403	SHOULDER RUMBLE STRIPS-SAWED - (ADDED: 10-22-19)	31,279.00	LF

CONTRACT ID: 191064 **121GR19D064 - NHPP IM** **DE11100241964**

I-24 ADDRESS PCC PAVEMENT CONDITION ON I-24 FROM MP 59.2 TO MP 67.1 IN TRIGG COUNTY JPC PAVEMENT REPAIRS, A DISTANCE OF 7.9 MILES.

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0410	00001	DGA BASE	7,593.00	TON
0415	00008	CEMENT STABILIZED ROADBED	124,503.00	SQYD
0420	00078	CRUSHED AGGREGATE SIZE NO 2	714.00	TON
0425	00080	CRUSHED AGGREGATE SIZE NO 23	240.00	TON
0430	00100	ASPHALT SEAL AGGREGATE	744.00	TON
0435	00103	ASPHALT SEAL COAT	89.00	TON
0440	00190	LEVELING & WEDGING PG64-22	730.00	TON
0445	00214	CL3 ASPH BASE 1.00D PG64-22	2,495.00	TON
0450	00312	CL3 ASPH SURF 0.50D PG64-22	4,428.00	TON
0455	00356	ASPHALT MATERIAL FOR TACK	17.00	TON
0460	00358	ASPHALT CURING SEAL	249.00	TON
0465	01005	PERFORATED PIPE EDGE DRAIN-4 IN	60,372.00	LF
0470	01015	INSPECT & CERTIFY EDGE DRAIN SYSTEM - TRIGG	1.00	LS
0475	01020	PERF PIPE HEADWALL TY 1-4 IN	3.00	EACH
0480	01024	PERF PIPE HEADWALL TY 2-4 IN	1.00	EACH
0485	01028	PERF PIPE HEADWALL TY 3-4 IN	4.00	EACH
0490	01032	PERF PIPE HEADWALL TY 4-4 IN	155.00	EACH
0495	01690	FLUME INLET TYPE 1	2.00	EACH

MATERIAL SUMMARY

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0500	01691	FLUME INLET TYPE 2	2.00	EACH
0505	01740	CORED HOLE DRAINAGE BOX CON-4 IN	3.00	EACH
0510	01890	ISLAND HEADER CURB TYPE 1	75.00	LF
0515	01891	ISLAND HEADER CURB TYPE 2	50.00	LF
0520	01982	DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL WHITE	157.00	EACH
0525	01983	DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL YELLOW	20.00	EACH
0530	01986	DELINEATOR FOR BARRIER WALL-B/Y	1,868.00	EACH
0535	02058	REMOVE PCC PAVEMENT	99,603.00	SQYD
0540	02060	PCC PAVEMENT DIAMOND GRINDING	274,122.00	SQYD
0545	02069	JPC PAVEMENT-10 IN	2,500.00	SQYD
0550	02071	JPC PAVEMENT-11 IN	124,503.00	SQYD
0555	02091	REMOVE PAVEMENT	2,500.00	SQYD
0560	02115	SAW-CLEAN-RESEAL TVERSE JOINT	112,141.00	LF
0565	02116	SAW-CLEAN-RESEAL LONGIT JOINT	93,451.00	LF
0570	02165	REMOVE PAVED DITCH	8,097.00	SQYD
0575	02351	GUARDRAIL-STEEL W BEAM-S FACE	10,354.00	LF
0580	02352	GUARDRAIL-STEEL W BEAM-D FACE	685.00	LF
0585	02360	GUARDRAIL TERMINAL SECTION NO 1	6.00	EACH
0590	02363	GUARDRAIL CONNECTOR TO BRIDGE END TY A	11.00	EACH
0595	02365	CRASH CUSHION TYPE IX-A	6.00	EACH
0600	02367	GUARDRAIL END TREATMENT TYPE 1	10.00	EACH
0605	02369	GUARDRAIL END TREATMENT TYPE 2A	15.00	EACH
0610	02381	REMOVE GUARDRAIL	11,978.00	LF
0615	02387	GUARDRAIL CONNECTOR TO BRIDGE END TY A-1	12.00	EACH
0620	02391	GUARDRAIL END TREATMENT TYPE 4A	1.00	EACH
0625	02483	CHANNEL LINING CLASS II	1,575.00	TON
0630	02542	CEMENT - (REVISED: 10-8-19)	4,034.00	TON
0635	02562	TEMPORARY SIGNS	1,800.00	SQFT
0640	02565	OBJECT MARKER TYPE 2	6.00	EACH
0645	02575	DITCHING AND SHOULDERING	65,308.00	LF
0650	02575	DITCHING AND SHOULDERING - SPECIAL	2,198.00	LF
0655	02604	FABRIC-GEOTEXTILE CLASS 1A	2,500.00	SQYD
0660	02650	MAINTAIN & CONTROL TRAFFIC - TRIGG	1.00	LS
0665	02655	CROSSOVER - #4 TRIGG	1.00	LS
0670	02671	PORTABLE CHANGEABLE MESSAGE SIGN	4.00	EACH
0675	02676	MOBILIZATION FOR MILL & TEXT - TRIGG	1.00	LS
0680	02677	ASPHALT PAVE MILLING & TEXTURING	1,096.00	TON
0685	02701	TEMP SILT FENCE	1,200.00	LF
0690	02702	SAND FOR BLOTTER	311.00	TON
0695	02705	SILT TRAP TYPE C	2.00	EACH
0700	02726	STAKING - TRIGG	1.00	LS
0705	02775	ARROW PANEL	1.00	EACH
0710	03171	CONCRETE BARRIER WALL TYPE 9T	37,351.00	LF
0715	03383	PVC PIPE-4 IN	9,782.00	LF
0720	05950	EROSION CONTROL BLANKET	42,000.00	SQYD
0725	05953	TEMP SEEDING AND PROTECTION	237.00	SQYD
0730	05963	INITIAL FERTILIZER	.10	TON
0735	05964	MAINTENANCE FERTILIZER	.10	TON
0740	05985	SEEDING AND PROTECTION	1,162.00	SQYD

MATERIAL SUMMARY

Project Line No	Bid Code	DESCRIPTION	Quantity	Unit
0745	05992	AGRICULTURAL LIMESTONE	.72	TON
0750	06401	FLEXIBLE DELINEATOR POST-M/W	465.00	EACH
0755	06404	FLEXIBLE DELINEATOR POST-M/Y	71.00	EACH
0760	06511	PAVE STRIPING-TEMP PAINT-6 IN	151,259.00	LF
0765	06556	PAVE STRIPING-DUR TY 1-6 IN W	163,502.00	LF
0770	06557	PAVE STRIPING-DUR TY 1-6 IN Y	130,801.00	LF
0775	06560	PAVE STRIPING-DUR TY 1-12 IN W	1,288.00	LF
0780	06600	REMOVE PAVEMENT MARKER TYPE V	1,169.00	EACH
0785	08903	CRASH CUSHION TY VI CLASS BT TL3	4.00	EACH
0790	10020NS	FUEL ADJUSTMENT	63,602.00	DOLL
0795	10030NS	ASPHALT ADJUSTMENT	29,920.00	DOLL
0800	20366NN	REPLACE GRATE	2.00	EACH
0805	20412ED	REMOVE ASPHALT SHOULDER	41,590.00	SQYD
0810	20432ES112	REMOVE CRASH CUSHION	6.00	EACH
0815	21173EC	SAW-CLEAN-RESEAL RANDOM CRACKS	6,000.00	LF
0820	22883EN	CONCRETE WEDGE CURB	2,198.00	LF
0825	23032EN	BRIDGE BARRIER RETROFIT	785.00	LF
0830	23147EN	HIGH TENSION CABLE-ROPE BARRIER	395.00	LF
0835	23148EN	END ANCHORS	2.00	EACH
0840	23949EC	BRIDGE CLEANING & PREVENTIVE MAINTENANCE - BRIDGES 111B00044L&R-TRIGG	1.00	LS
0845	24255EC	REMOVE CABLE GUARDRAIL BARRIER SYSTEM	395.00	LF
0850	24489EC	INLAID PAVEMENT MARKER	1,635.00	EACH
0855	24640ED	OBJECT MARKER TYPE 1	10.00	EACH
0860	24969ED	LONGITUDINAL SAW CUT	37,351.00	LF
0865	24997EC	PARTIAL DEPTH PATCHING-POLYMER MOD	1,991.00	CUFT
0870	25050ED	GEOTEXTILE BOND BREAKER INTERLAYER	124,503.00	SQYD
0875	04793	CONDUIT-1 1/4 IN	120.00	LF
0880	04795	CONDUIT-2 IN	40.00	LF
0885	04820	TRENCHING AND BACKFILLING	140.00	LF
0890	04829	PIEZOELECTRIC SENSOR	8.00	EACH
0895	04830	LOOP WIRE	3,000.00	LF
0900	04895	LOOP SAW SLOT AND FILL	760.00	LF
0905	20359NN	GALVANIZED STEEL CABINET	4.00	EACH
0910	20360ES818	WOOD POST	8.00	EACH
0915	20391NS835	ELECTRICAL JUNCTION BOX TYPE A	4.00	EACH
0920	02568	MOBILIZATION	1.00	LS
0925	02569	DEMOBILIZATION	1.00	LS
0930	20362ES403	SHOULDER RUMBLE STRIPS-SAWED - (ADDED: 10-22-19)	74,701.00	LF

PROPOSAL BID ITEMS

Report Date 10/22/19

Section: 0001 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00001		DGA BASE	18,169.00	TON		$	
0020	00008		CEMENT STABILIZED ROADBED	222,006.00	SQYD		$	
0030	00078		CRUSHED AGGREGATE SIZE NO 2	844.00	TON		$	
0040	00080		CRUSHED AGGREGATE SIZE NO 23	400.00	TON		$	
0050	00100		ASPHALT SEAL AGGREGATE	1,308.00	TON		$	
0060	00103		ASPHALT SEAL COAT	156.00	TON		$	
0070	00190		LEVELING & WEDGING PG64-22	912.00	TON		$	
0080	00214		CL3 ASPH BASE 1.00D PG64-22	8,014.00	TON		$	
0090	00312		CL3 ASPH SURF 0.50D PG64-22	7,501.00	TON		$	
0100	00356		ASPHALT MATERIAL FOR TACK	30.00	TON		$	
0110	00358		ASPHALT CURING SEAL	444.00	TON		$	
0120	01005		PERFORATED PIPE EDGE DRAIN-4 IN	115,740.00	LF		$	
0130	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM CALDWELL	1.00	LS		$	
0140	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM LYON	1.00	LS		$	
0150	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM TRIGG	1.00	LS		$	
0160	01020		PERF PIPE HEADWALL TY 1-4 IN	5.00	EACH		$	
0170	01024		PERF PIPE HEADWALL TY 2-4 IN	2.00	EACH		$	
0180	01028		PERF PIPE HEADWALL TY 3-4 IN	39.00	EACH		$	
0190	01032		PERF PIPE HEADWALL TY 4-4 IN	247.00	EACH		$	
0200	01690		FLUME INLET TYPE 1	2.00	EACH		$	
0210	01691		FLUME INLET TYPE 2	2.00	EACH		$	
0220	01740		CORED HOLE DRAINAGE BOX CON-4 IN	5.00	EACH		$	
0230	01890		ISLAND HEADER CURB TYPE 1	175.00	LF		$	
0240	01891		ISLAND HEADER CURB TYPE 2	150.00	LF		$	
0250	01982		DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL WHITE	165.00	EACH		$	
0260	01983		DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL YELLOW	27.00	EACH		$	
0270	01986		DELINEATOR FOR BARRIER WALL-B/Y	3,331.00	EACH		$	
0280	02058		REMOVE PCC PAVEMENT	214,912.00	SQYD		$	
0290	02060		PCC PAVEMENT DIAMOND GRINDING	374,190.00	SQYD		$	
0300	02069		JPC PAVEMENT-10 IN	4,100.00	SQYD		$	
0310	02071		JPC PAVEMENT-11 IN	222,006.00	SQYD		$	
0320	02091		REMOVE PAVEMENT	4,100.00	SQYD		$	
0330	02115		SAW-CLEAN-RESEAL TVERSE JOINT	159,414.00	LF		$	
0340	02116		SAW-CLEAN-RESEAL LONGIT JOINT	132,845.00	LF		$	
0350	02165		REMOVE PAVED DITCH	8,097.00	SQYD		$	
0360	02351		GUARDRAIL-STEEL W BEAM-S FACE	11,150.00	LF		$	
0370	02352		GUARDRAIL-STEEL W BEAM-D FACE	930.00	LF		$	
0380	02360		GUARDRAIL TERMINAL SECTION NO 1	8.00	EACH		$	
0390	02363		GUARDRAIL CONNECTOR TO BRIDGE END TY A	16.00	EACH		$	
0400	02365		CRASH CUSHION TYPE IX-A	8.00	EACH		$	
0410	02367		GUARDRAIL END TREATMENT TYPE 1	14.00	EACH		$	
0420	02369		GUARDRAIL END TREATMENT TYPE 2A	17.00	EACH		$	
0430	02381		REMOVE GUARDRAIL	13,219.00	LF		$	

PROPOSAL BID ITEMS

Report Date 10/22/19

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0440	02387		GUARDRAIL CONNECTOR TO BRIDGE END TY A-1	16.00	EACH		$	
0450	02391		GUARDRAIL END TREATMENT TYPE 4A	1.00	EACH		$	
0460	02483		CHANNEL LINING CLASS II	1,575.00	TON		$	
0470	02542		CEMENT (REVISED: 10-8-19)	7,193.00	TON		$	
0480	02562		TEMPORARY SIGNS	3,100.00	SQFT		$	
0490	02565		OBJECT MARKER TYPE 2	8.00	EACH		$	
0500	02575		DITCHING AND SHOULDERING	99,422.00	LF		$	
0510	02575		DITCHING AND SHOULDERING SPECIAL	2,198.00	LF		$	
0520	02604		FABRIC-GEOTEXTILE CLASS 1A	4,100.00	SQYD		$	
0530	02650		MAINTAIN & CONTROL TRAFFIC CALDWELL	1.00	LS		$	
0540	02650		MAINTAIN & CONTROL TRAFFIC LYON	1.00	LS		$	
0550	02650		MAINTAIN & CONTROL TRAFFIC TRIGG	1.00	LS		$	
0560	02655		CROSSOVER #1 LYON	1.00	LS		$	
0570	02655		CROSSOVER #2- CALDWELL	1.00	LS		$	
0580	02655		CROSSOVER #3- CALDWELL	1.00	LS		$	
0590	02655		CROSSOVER #4 TRIGG	1.00	LS		$	
0600	02671		PORTABLE CHANGEABLE MESSAGE SIGN	10.00	EACH		$	
0610	02676		MOBILIZATION FOR MILL & TEXT CALDWELL	1.00	LS		$	
0620	02676		MOBILIZATION FOR MILL & TEXT TRIGG	1.00	LS		$	
0630	02677		ASPHALT PAVE MILLING & TEXTURING	1,594.00	TON		$	
0660	02701		TEMP SILT FENCE	3,940.00	LF		$	
0670	02702		SAND FOR BLOTTER	554.00	TON		$	
0680	02705		SILT TRAP TYPE C	6.00	EACH		$	
0690	02726		STAKING CALDWELL	1.00	LS		$	
0700	02726		STAKING LYON	1.00	LS		$	
0710	02726		STAKING TRIGG	1.00	LS		$	
0720	02775		ARROW PANEL	2.00	EACH		$	
0730	03171		CONCRETE BARRIER WALL TYPE 9T	66,602.00	LF		$	
0740	03383		PVC PIPE-4 IN	16,009.00	LF		$	
0750	05950		EROSION CONTROL BLANKET	65,000.00	SQYD		$	
0760	05953		TEMP SEEDING AND PROTECTION	1,567.00	SQYD		$	
0770	05963		INITIAL FERTILIZER	.40	TON		$	
0780	05964		MAINTENANCE FERTILIZER	.40	TON		$	
0790	05985		SEEDING AND PROTECTION	4,647.00	SQYD		$	
0800	05992		AGRICULTURAL LIMESTONE	2.88	TON		$	
0810	06401		FLEXIBLE DELINEATOR POST-M/W	734.00	EACH		$	
0820	06404		FLEXIBLE DELINEATOR POST-M/Y	135.00	EACH		$	
0830	06511		PAVE STRIPING-TEMP PAINT-6 IN	271,247.00	LF		$	

PROPOSAL BID ITEMS

Report Date 10/22/19

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0840	06513		PAVE STRIPING-TEMP PAINT-12 IN	978.00	LF		$	
0850	06556		PAVE STRIPING-DUR TY 1-6 IN W	242,709.00	LF		$	
0860	06557		PAVE STRIPING-DUR TY 1-6 IN Y	194,166.00	LF		$	
0870	06560		PAVE STRIPING-DUR TY 1-12 IN W	3,585.00	LF		$	
0880	06600		REMOVE PAVEMENT MARKER TYPE V	1,662.00	EACH		$	
0890	08903		CRASH CUSHION TY VI CLASS BT TL3	8.00	EACH		$	
0900	10020NS		FUEL ADJUSTMENT	119,784.00	DOLL	$1.00	$	$119,784.00
0910	10030NS		ASPHALT ADJUSTMENT	64,219.00	DOLL	$1.00	$	$64,219.00
0915	20362ES403		SHOULDER RUMBLE STRIPS-SAWED (ADDED: 10-22-19)	132,619.00	LF		$	
0920	20366NN		REPLACE GRATE	5.00	EACH		$	
0930	20412ED		REMOVE ASPHALT SHOULDER	50,759.00	SQYD		$	
0940	20432ES112		REMOVE CRASH CUSHION	8.00	EACH		$	
0950	21173EC		SAW-CLEAN-RESEAL RANDOM CRACKS	10,000.00	LF		$	
0960	22883EN		CONCRETE WEDGE CURB	2,198.00	LF		$	
0970	23032EN		BRIDGE BARRIER RETROFIT	785.00	LF		$	
0980	23147EN		HIGH TENSION CABLE-ROPE BARRIER	1,112.00	LF		$	
0990	23148EN		END ANCHORS	8.00	EACH		$	
1000	23949EC		BRIDGE CLEANING & PREVENTIVE MAINTENANCE BRIDGES 072B00048L&R-LYON	1.00	LS		$	
1010	23949EC		BRIDGE CLEANING & PREVENTIVE MAINTENANCE BRIDGES 111B00044L&R-TRIGG	1.00	LS		$	
1020	24255EC		REMOVE CABLE GUARDRAIL BARRIER SYSTEM	1,112.00	LF		$	
1030	24489EC		INLAID PAVEMENT MARKER	2,531.00	EACH		$	
1040	24640ED		OBJECT MARKER TYPE 1	16.00	EACH		$	
1050	24969ED		LONGITUDINAL SAW CUT	46,633.00	LF		$	
1060	24997EC		PARTIAL DEPTH PATCHING-POLYMER MOD	2,256.00	CUFT		$	
1070	25050ED		GEOTEXTILE BOND BREAKER INTERLAYER	222,006.00	SQYD		$	

Section: 0002 - TRAFFIC LOOPS

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1080	04793		CONDUIT-1 1/4 IN	120.00	LF		$	
1090	04795		CONDUIT-2 IN	40.00	LF		$	
1100	04820		TRENCHING AND BACKFILLING	140.00	LF		$	
1110	04829		PIEZOELECTRIC SENSOR	8.00	EACH		$	
1120	04830		LOOP WIRE	3,000.00	LF		$	
1130	04895		LOOP SAW SLOT AND FILL	760.00	LF		$	
1140	20359NN		GALVANIZED STEEL CABINET	4.00	EACH		$	
1150	20360ES818		WOOD POST	8.00	EACH		$	
1160	20391NS835		ELECTRICAL JUNCTION BOX TYPE A	4.00	EACH		$	

Section: 0003 - DEMOBILIZATION &/OR MOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1170	02568		MOBILIZATION	1.00	LS		$	

PROPOSAL BID ITEMS

Report Date 10/22/19

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1180	**02569**		**DEMOBILIZATION**	**1.00**	**LS**		**$**	

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

TRIGG CO. I-24 m.p. ~59.5
~LAT/LONG N 36.93304, W 86.81697
STATION 046

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 AND A MINIMUM OF 2' OF WIRE FOR EACH SENSOR SHALL BE COILED INSIDE EACH JUNCTION BOX AND CABINET. ALL LOOPS AND PIEZOS SHALL BE LABELED IN ALL JUNCTION BOXES AND CABINETS. DIVISION OF PLANNING PERSONNEL WILL CONNECT THE LOOPS AND PIEZOS INSIDE THE CABINETS.

INSTALL ONE (1) 1¼" CONDUIT FROM EACH SAW SLOT TO NEAREST JUNCTION BOX.

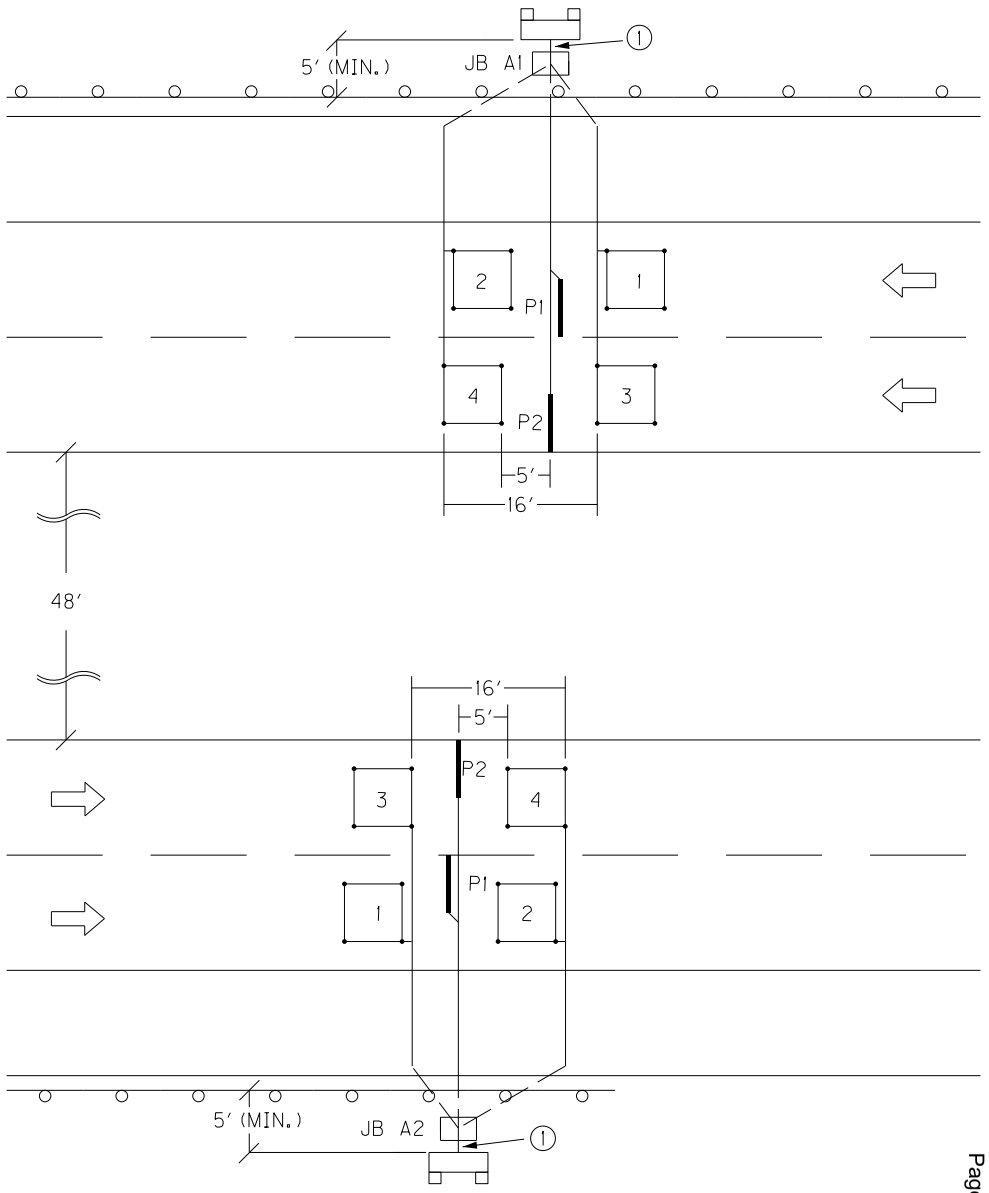
INSTALL TWO (2) TYPE A JUNCTION BOXES (JB A1, JB A2).

INSTALL TWO (2) 20"X20"X8" CABINETS MOUNTED TO TWO (2) WOOD POSTS EACH.

REMOVE EXISTING CABINETS, POSTS, WIRE, CONDUIT AND JUNCTION BOXES AND DISPOSE OF OFF THE PROJECT.

CODED NOTE:

(1) INSTALL ONE (1) 2" CONDUIT.



SCALE: NONE

TRIGG CO. I-24 m.p. ~66.58
~LAT/LONG N 36.87151, W 87.71689
STATION 043

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 AND A MINIMUM OF 2' OF WIRE FOR EACH SENSOR SHALL BE COILED INSIDE EACH JUNCTION BOX AND CABINET. ALL LOOPS AND PIEZOS SHALL BE LABELED IN ALL JUNCTION BOXES AND CABINETS. DIVISION OF PLANNING PERSONNEL WILL CONNECT THE LOOPS AND PIEZOS INSIDE THE CABINETS.

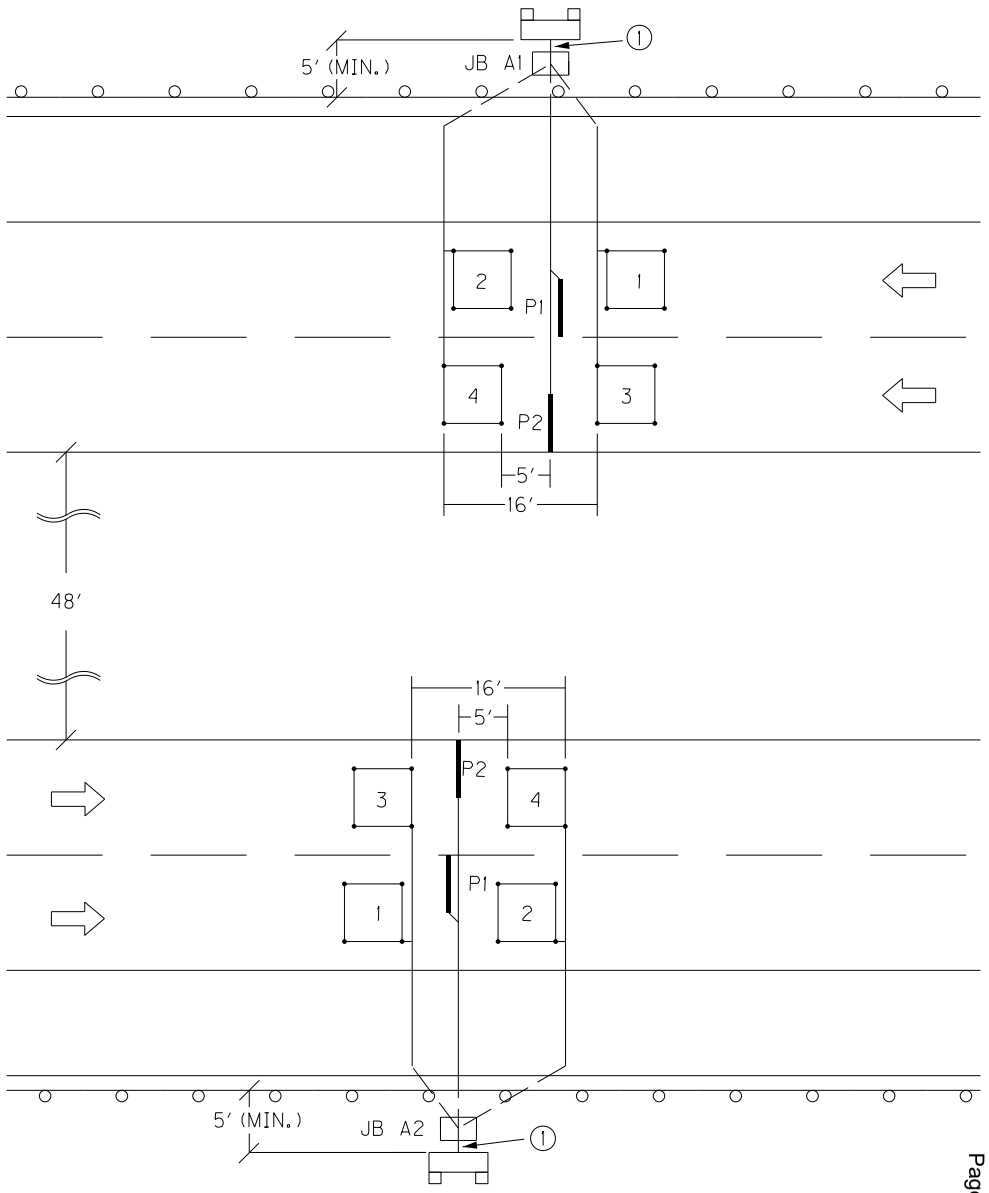
INSTALL ONE (1) 1¼" CONDUIT FROM EACH SAW SLOT TO NEAREST JUNCTION BOX.

INSTALL TWO (2) TYPE A JUNCTION BOXES (JB A1, JB A2).

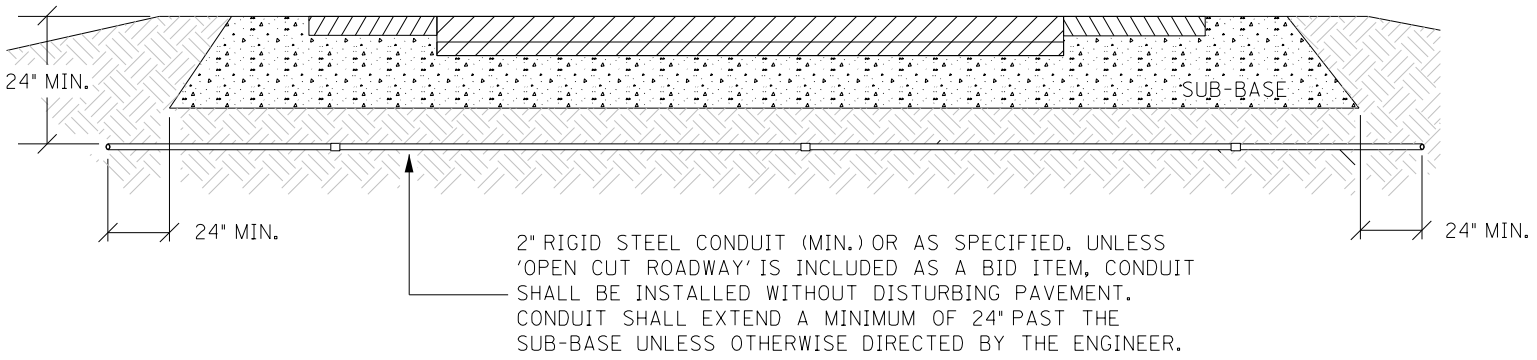
INSTALL TWO (2) 20"X20"X8" CABINETS MOUNTED TO TWO (2) WOOD POSTS EACH.

CODED NOTE:

① INSTALL ONE (1) 2" CONDUIT.



SCALE 1" = 20'

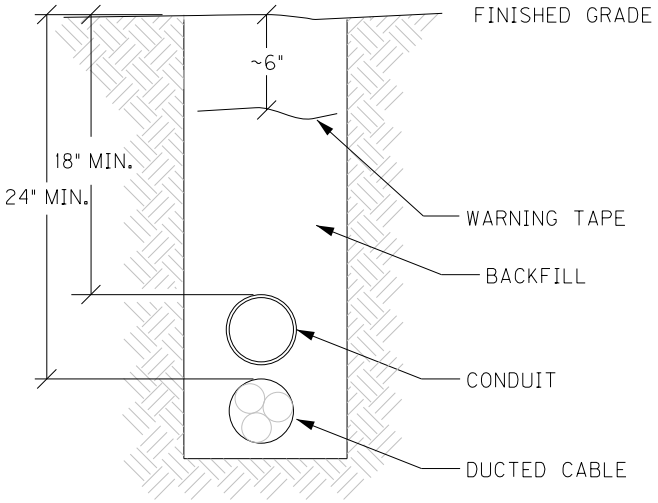


CONDUIT UNDER PAVEMENT

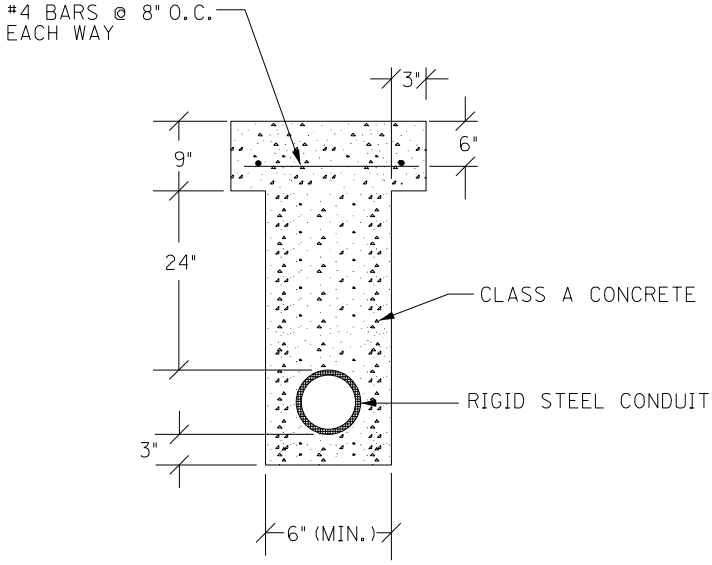
TOTAL TRENCH WIDTH SHALL BE 3" (NOM.) WIDER THAN THE SUM OF THE OUTSIDE DIAMETER(S) OF THE CONDUIT(S) INSTALLED. CONDUIT(S) SHALL BE CENTERED IN TRENCH.

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.



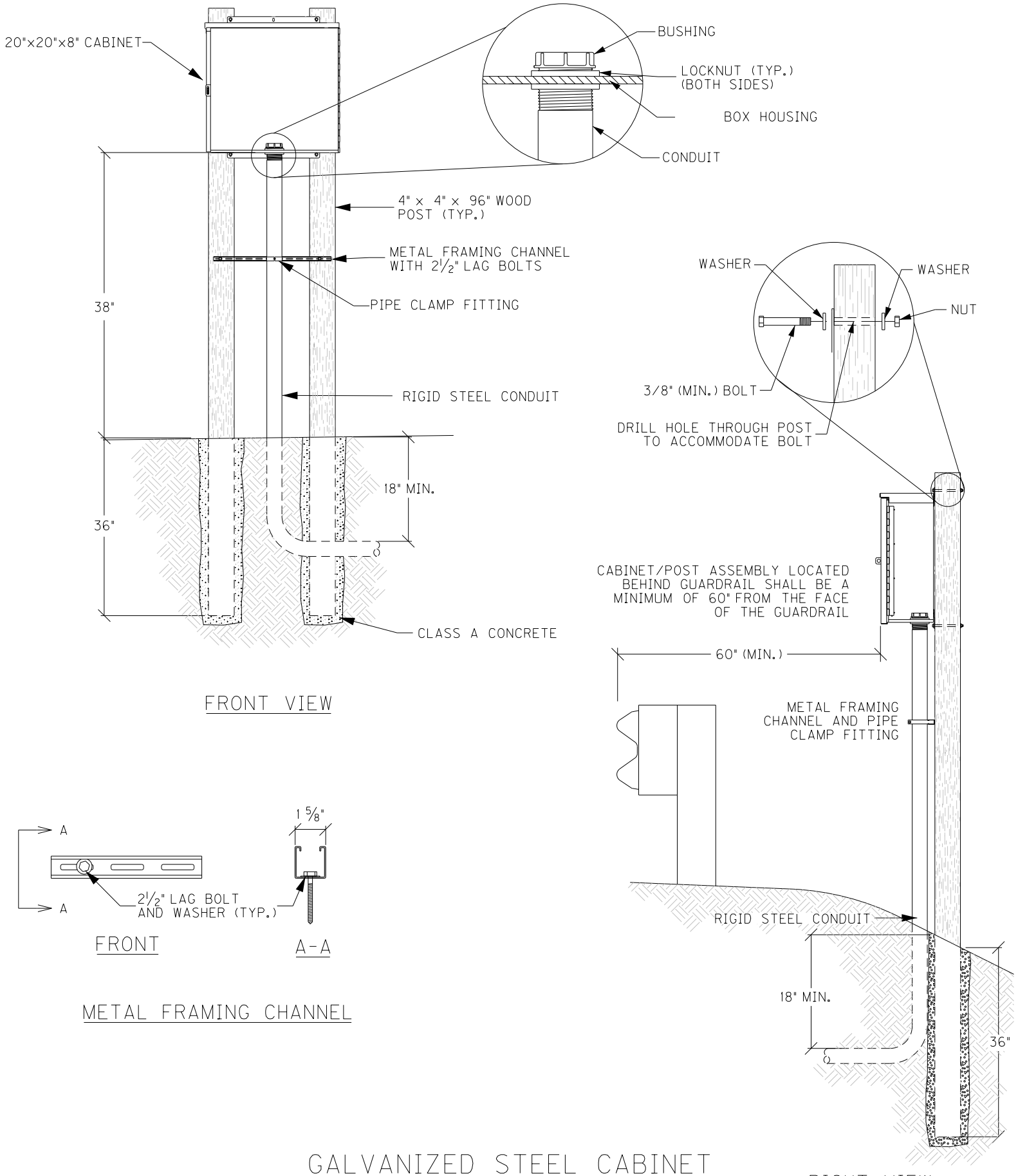
CONDUIT TRENCH



OPEN CUT PAVEMENT DETAIL

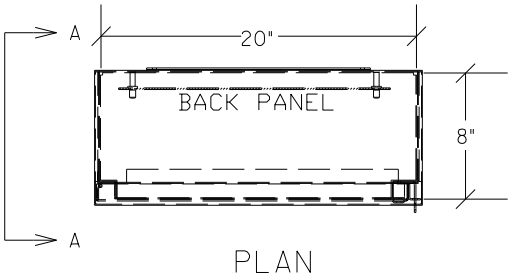
CONDUIT INSTALLATION

NOT TO SCALE

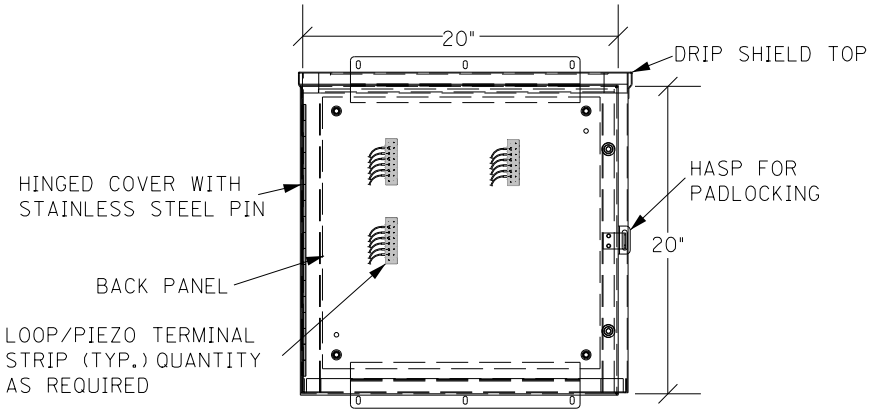


GALVANIZED STEEL CABINET
DOUBLE POST ASSEMBLY

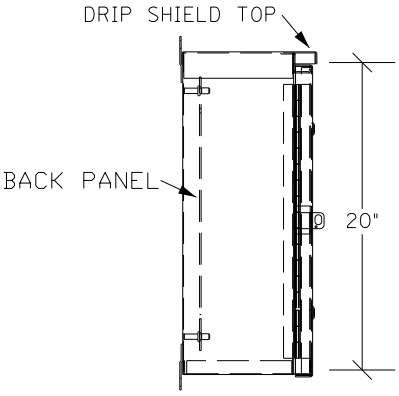
NOT TO SCALE



PLAN

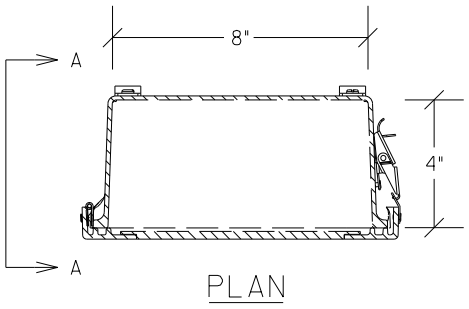


ELEVATION

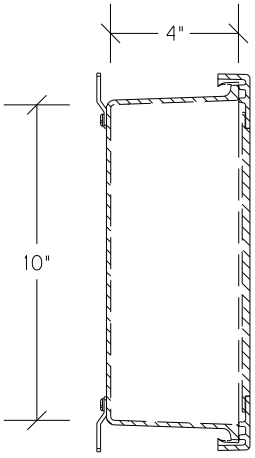


SECTION A-A

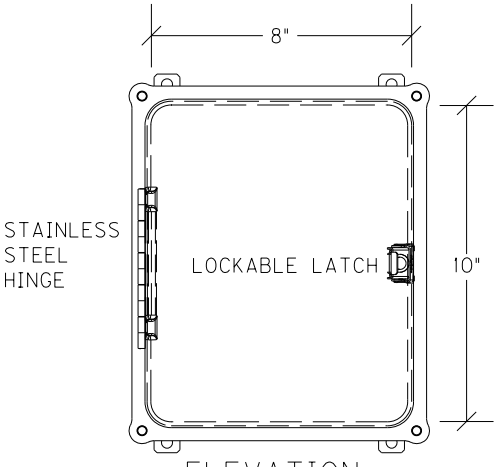
GALVANIZED STEEL CABINET



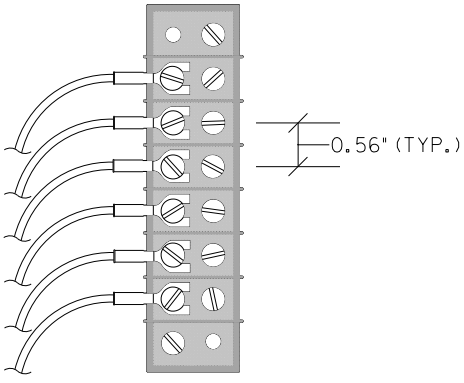
PLAN



SECTION A-A



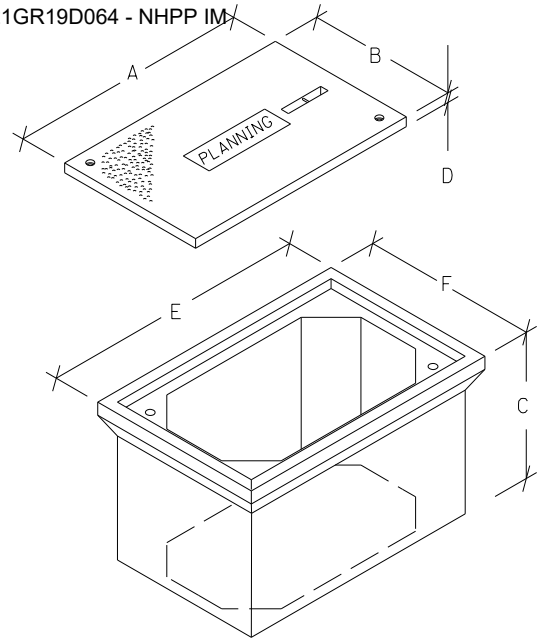
ELEVATION



TERMINAL STRIP (TYP.)

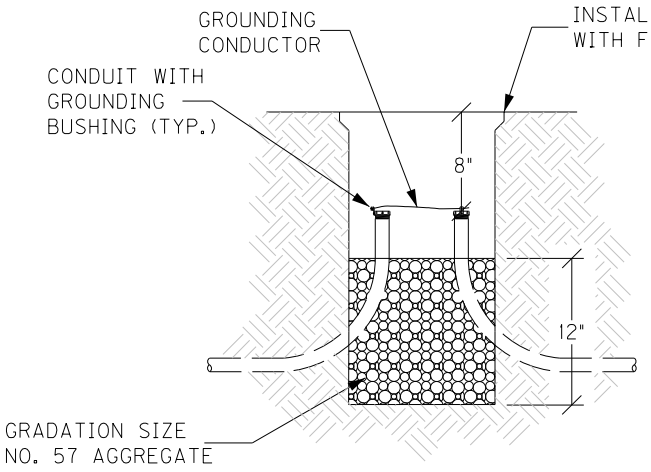
JUNCTION BOX 10"x8"X4"

NOT TO SCALE



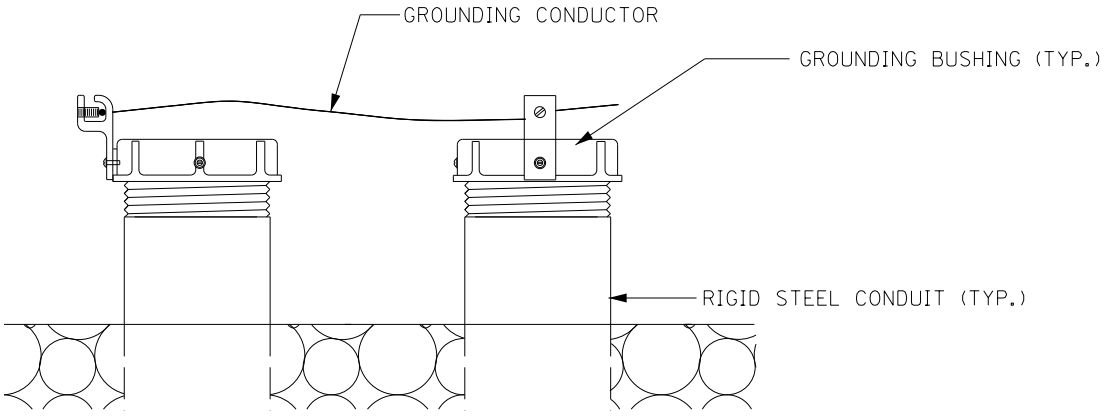
JUNCTION BOX DIMENSIONS (NOMINAL)						
	A	B	C	D*	E	F
TYPE A	23"	14"	18"	2"	25"	16"
TYPE B	18"	11"	12"	1¾"	20"	13"
TYPE C	36"	24"	30"	3"	38"	26"

* MINIMUM
STACKABLE BOXES ARE PERMITTED



WHERE REQUIRED, JUNCTION BOX SHALL BE ORIENTED SUCH THAT THE DIMENSIONS COMPLY WITH THE NATIONAL ELECTRICAL CODE.

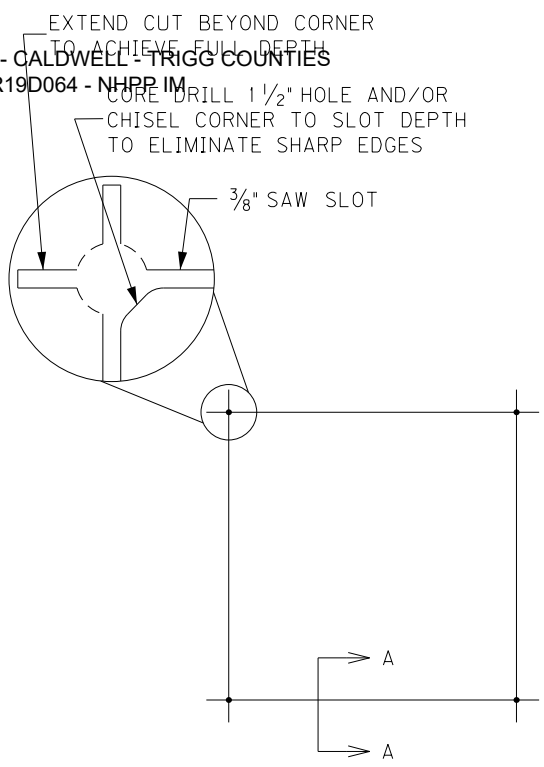
ELEVATION



GROUNDING DETAIL

JUNCTION BOX - TYPE A, TYPE B, TYPE C

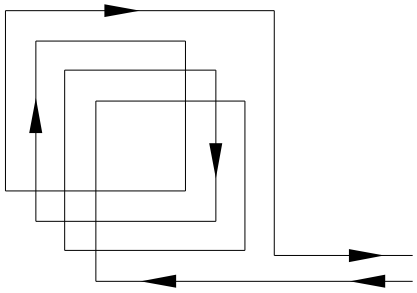
NOT TO SCALE



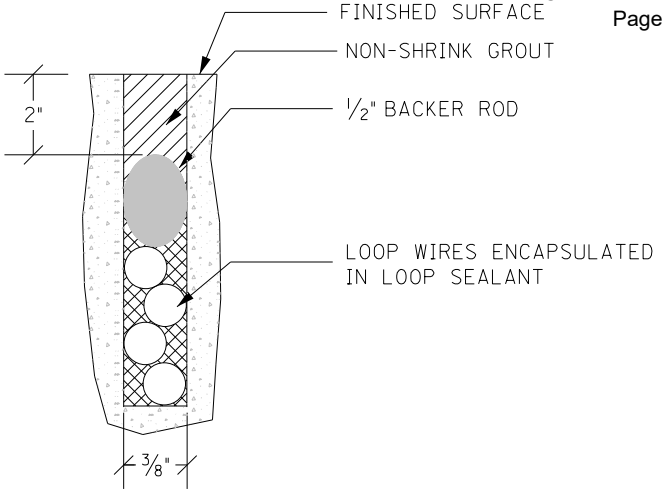
SAW CUT PLAN

UNLESS SPECIFIED OTHERWISE, ALL LOOPS SHALL BE 6' x 6' SQUARE, CENTERED IN EACH LANE, WITH FOUR TURNS OF 14 AWG LOOP WIRE.

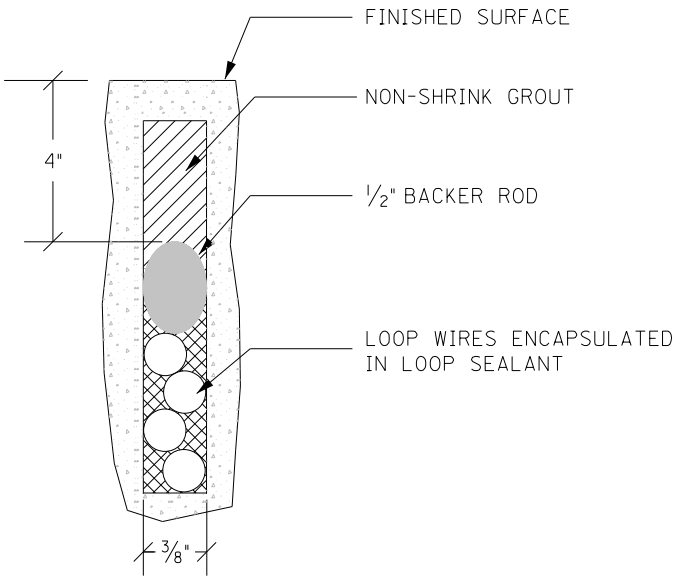
ADJACENT SAW SLOTS SHALL BE A MINIMUM OF 12" APART.



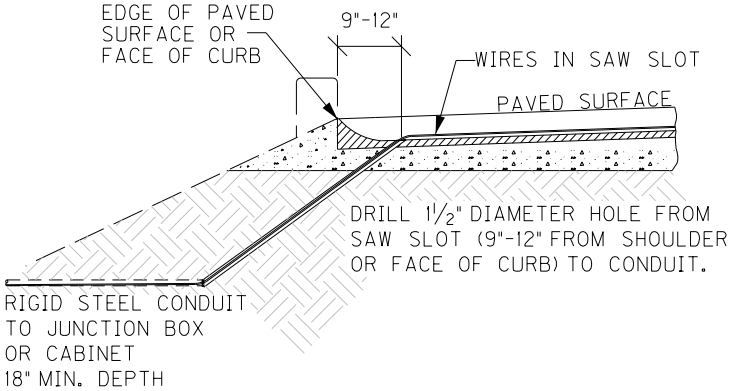
WIRING PLAN



SECTION A-A (CONCRETE)



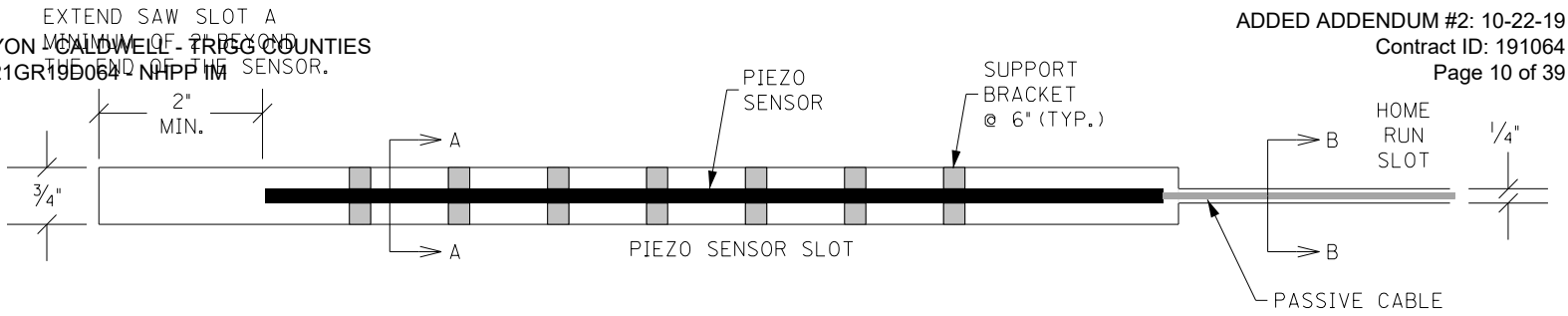
SECTION A-A (ASPHALT)



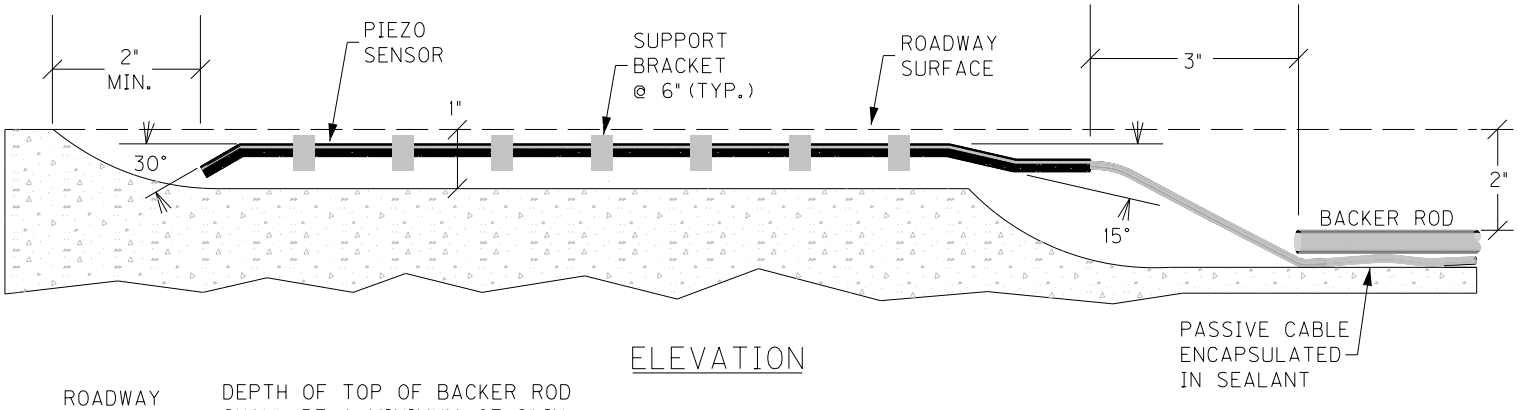
SAW SLOT EDGE OF PAVEMENT TRANSITION

INDUCTIVE LOOP DETECTOR

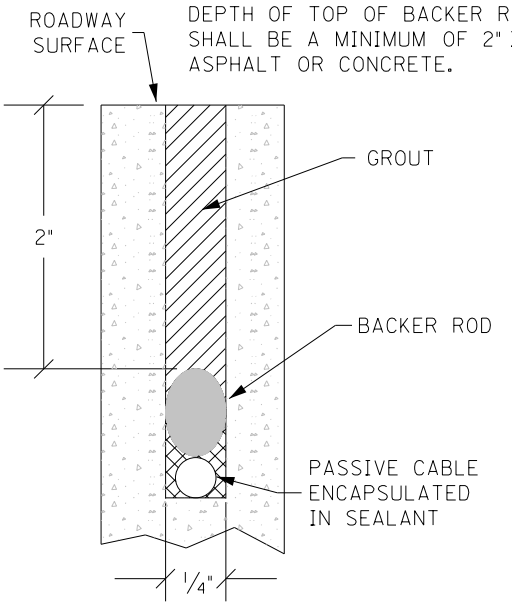
NOT TO SCALE



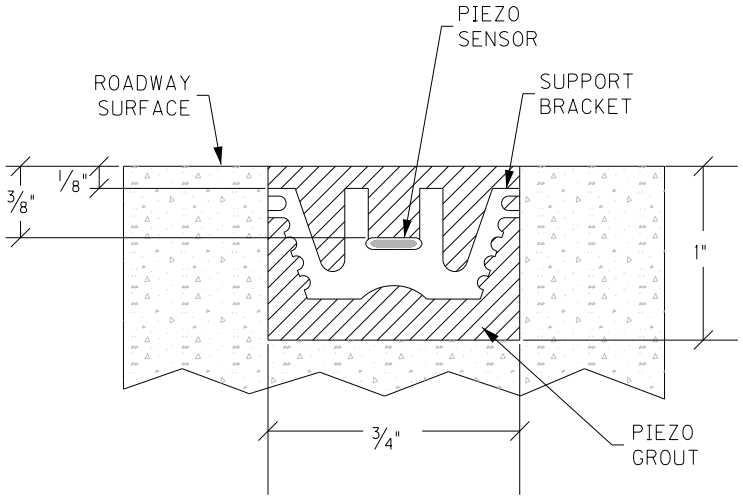
PLAN



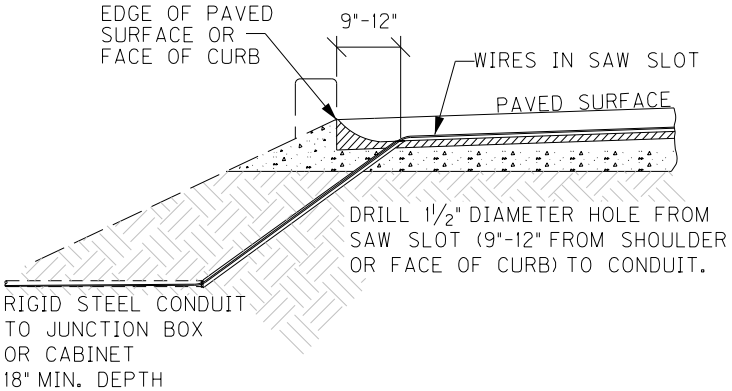
ELEVATION



SECTION B-B



SECTION A-A



SAW SLOT EDGE OF PAVEMENT TRANSITION

PIEZOELECTRIC SENSOR INSTALLATION

NOT TO SCALE

PERMANENT TRAFFIC DATA ACQUISITION STATIONS
ESTIMATE OF QUANTITIES

Bid Item Code	Description	Unit	Quantity
4793	CONDUIT 1 ¼ INCH	LIN FT	120
4795	CONDUIT 2 INCH	LIN FT	40
4811	ELECTRICAL JUNCTION BOX TYPE B	EACH	
4820	TRENCHING AND BACKFILLING	LIN FT	140
4821	OPEN CUT ROADWAY	LIN FT	
4829	PIEZOELECTRIC SENSOR	EACH	8
4830	LOOP WIRE	LIN FT	3000
4850	CABLE NO. 14/1 PAIR	LIN FT	
4871	POLE – 35’ WOODEN	EACH	
4895	LOOP SAW SLOT AND FILL	LIN FT	760
4899	ELECTRICAL SERVICE	EACH	
20213EC	INSTALL PAD MOUNT ENCLOSURE	EACH	
20359NN	GALVANIZED STEEL CABINET	EACH	4
20360ES818	WOOD POST	EACH	8
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	

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

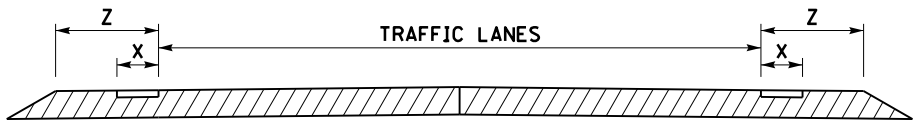
Wire or cable shall include furnishing and installing specified wire or cable within saw slot, conduit, junction box, cabinet, or overhead as indicated on the detail sheets. Incidental to this item shall be the labeling of all wires and cables in each junction box, cabinet and splice

box, and furnishing and installing other hardware required for installing cable. Wire or Cable will be measured in linear feet.

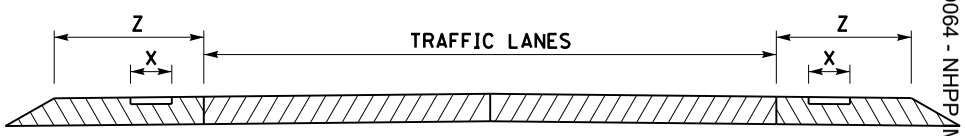
4.18. Wood Post

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.

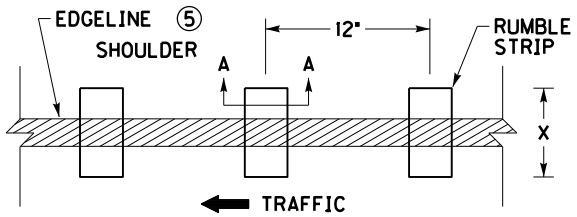
COUNTY OF	ITEM NO.	SHEET NO.



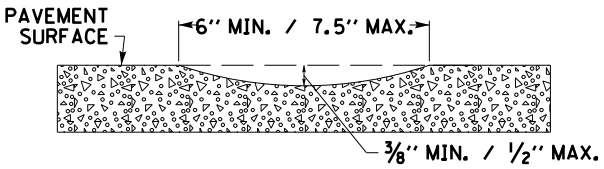
PAVEMENT CROSS-SECTION
(WHEN ELRS ARE SPECIFIED)



PAVEMENT CROSS-SECTION
(WHEN SRS ARE SPECIFIED)

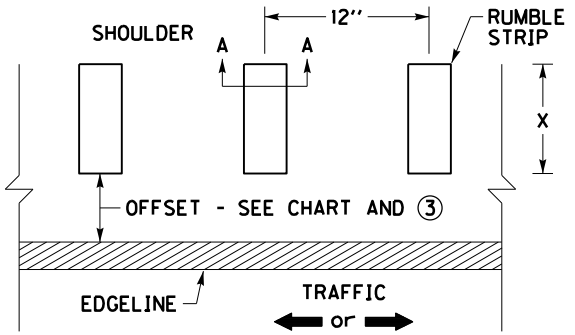


ELRS DETAILS

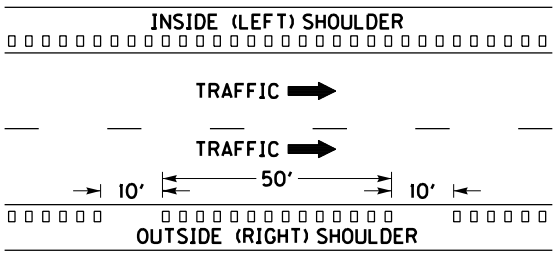


SECTION A-A

SHOULDER WIDTH (Z) ②	RUMBLE TYPE ①	RUMBLE LENGTH (X) ③	OFFSET ③
>=1'	ELRS	8"	N/A
2'	ELRS or SRS	8"	ELRS-N/A SRS-6"
3'	ELRS or SRS	8"	ELRS-N/A SRS-6"
4'	ELRS or SRS	8"	ELRS-N/A SRS-6"
5'	SRS ⑥	8"	6"
6'	SRS ⑥	8"	6"
7'	SRS ⑥	12"	12"
>=8'	SRS ⑥	16"	12"



SRS DETAILS



BICYCLE GAPS ⑥

~ NOTES ~

① FOR MULTI-LANE ROADWAYS, THE RUMBLE TYPE TO BE INSTALLED IS BASED ON SHOULER WIDTH (Z). FOR SHOULDER WIDTHS OF 2', 3', AND 4' THE RUMBLE TYPE MAY BE SPECIFIED AS EITHER EDGELINE RUMBLE STRIPS (ELRS) OR SHOULDER RUMBLE STRIPS (SRS). IN THESE SITUATIONS, THE RUMBLE TYPE TO BE INSTALLED WILL BE SPECIFIED IN THE PLANS, PROPOSAL, AND/OR BID ITEMS, OR AS DIRECTED BY THE ENGINEER.

② WHEN ELRS ARE SPECIFIED, SHOULDER WIDTH (Z) IS FROM LANE SIDE EDGE OF RUMBLE STRIP TO OUTSIDE EDGE OF TRAVERSABLE PAVEMENT. WHEN SRS ARE SPECIFIED, SHOULDER WIDTH (Z) IS FROM CENTER OF EDGELINE STRIPE TO OUTSIDE EDGE OF TRAVERSABLE PAVEMENT.

③ RUMBLE LENGTH (X) AND/OR OFFSET DISTANCE MAY BE MODIFIED AS THE ENGINEER DIRECTS, IF THE SHOULDER WIDTH (Z) IS EQUAL TO OR LESS THAN THE COMBINED WIDTH OF THE PROPOSED RUMBLE LENGTH (X) AND OFFSET DISTANCE.

4. DISTANCES SHOWN ARE APPROXIMATE. MAINTAIN RUMBLE STRIP DIMENSIONS AND SPACING AS MUCH AS POSSIBLE.

⑤ WHEN ELRS ARE SPECIFIED, THE EDGELINE MARKING SHALL BE PLACED IN THE CENTER OF THE RUMBLE STRIP.

⑥ SHOULDER RUMBLE STRIPS (SRS) ALONG OUTSIDE (RIGHT) SHOULDERS THAT ARE 5' OR WIDER SHOULD INCLUDE BICYCLE GAPS AS DETAILED. BICYCLE GAPS ARE NOT REQUIRED ON INSIDE (LEFT) SHOULDERS. BICYCLE GAPS SHALL NOT BE USED ON INTERSTATES AND PARKWAYS.

7. RUMBLE STRIPS SHOULD BE OMITTED WHERE THE POSTED SPEED LIMIT IS 45 MPH OR LESS, OR WHEN THE SHOULDER WIDTH IS LESS THAN 1 FT.

BID ITEMS AND UNIT TO BID

SHOULDER RUMBLE STRIPS	LF
EDGELINE RUMBLE STRIPS	LF

DRAWING NOT TO SCALE

USE WITH SEPIA 005

KENTUCKY
DEPARTMENT OF HIGHWAYS

RUMBLE STRIP DETAILS
MULTI-LANE ROADWAYS
AND RAMPS

SUBMITTED R. Jeffrey Wolfe 11-23-16
DATE

008

I-24 -CALDWELL, LYON, AND TRIGG CO.
KYTC STANDARD DRAWING SEPIA SHEETS