

Appendix A

Existing Conditions

Appendix A highlights the existing conditions of the Louie B. Nunn Cumberland Expressway (CE) in southern Kentucky. The existing conditions were compiled and evaluated using American Association of State Highway Transportation Officials (AASHTO) guidelines from *the 2018 Green Book, A Policy on Design Standards* (The Green Book) to compare the CE to Interstate standards. The Green Book provides minimum criteria for Interstate facilities shown throughout this appendix. In addition to the Green Book, the Federal Highway Administration (FHWA) has ten controlling criteria for Interstate facility design. The ten controlling criteria were emphasized in the main report, as well as in this appendix. All of the data were compiled from the Kentucky Transportation Cabinet's (KYTC) Highway Information System (HIS), as-built plans, a field review, and Google Earth review for information not included in HIS or the as-built plans. This appendix is intended to supplement the existing conditions chapter of the report by providing data for the entire CE (where it is not already included in the main report) and not just the locations that do not meet Interstate standards.

1.1 Mainline

The following subsections display the data and features pertaining to the mainline existing conditions. For information on the interchanges and structures, please refer to sections 2.2 and 2.3 respectively.

Terrain

The table below highlights existing terrain classifications of the CE.

Route Unique	Begin Milepoint (BMP)	End Milepoint (EMP)	District	County	Terrain
005-LN-9008 -000	0.000	8.709	3	Barren	Rolling
005-LN-9008 -000	8.709	11.467	3	Barren	Rolling
005-LN-9008 -000	11.467	13.990	3	Barren	Rolling
005-LN-9008 -000	13.990	15.383	3	Barren	Rolling
005-LN-9008 -000	15.383	22.357	3	Barren	Rolling
085-LN-9008 -000	22.357	27.400	3	Metcalfe	Rolling
085-LN-9008 -000	27.400	36.159	3	Metcalfe	Rolling
001-LN-9008 -000	36.159	46.621	8	Adair	Rolling
001-LN-9008 -000	46.621	48.886	8	Adair	Rolling
001-LN-9008 -000	48.886	57.791	8	Adair	Rolling
104-LN-9008 -000	57.791	62.454	8	Russell	Flat
104-LN-9008 -000	62.454	72.087	8	Russell	Flat
100-LN-9008 -000	72.087	78.349	8	Pulaski	Rolling
100-LN-9008 -000	78.349	86.170	8	Pulaski	Rolling
100-LN-9008 -000	86.170	88.266	8	Pulaski	Rolling

Shoulder Widths

The table below highlights existing shoulder widths, paved shoulder widths, and shoulder types of the CE. Shoulders are classified by direction of the road where cardinal (CR) is in the eastern and northern directions and non-cardinal (NR) is in the western and southern directions. The other classification is inside shoulder (I) or outside shoulder (O). Minimum paved shoulder widths are 4 feet for inside shoulders and 10 feet for outside shoulders.

Route Unique	BMP	EMP	Length	County	Side	I/O	Shoulder Type	Shoulder Width (ft)	Paved Width (ft)
005-LN-9008-000	0.000	22.357	22.357	Barren	CR	O	Asphalt	10	10
005-LN-9008-000	0.000	22.357	22.357	Barren	NR	O	Asphalt	10	10
085-LN-9008-000	22.357	36.159	13.802	Metcalfe	CR	O	Asphalt	10	10
085-LN-9008-000	22.357	36.159	13.802	Metcalfe	NR	O	Asphalt	10	10
001-LN-9008-000	36.159	57.791	21.632	Adair	CR	O	Asphalt	10	10
001-LN-9008-000	36.159	57.791	21.632	Adair	NR	O	Asphalt	10	10
104-LN-9008-000	57.791	72.087	14.296	Russell	CR	O	Asphalt	10	10
104-LN-9008-000	57.791	72.087	14.296	Russell	NR	O	Asphalt	10	10
100-LN-9008-000	72.087	84.287	12.200	Pulaski	CR	O	Asphalt	10	10
100-LN-9008-000	72.087	84.287	12.200	Pulaski	NR	O	Asphalt	10	10
100-LN-9008-000	84.612	88.376	3.764	Pulaski	CR	O	Asphalt	10	10
100-LN-9008-000	84.612	88.376	3.764	Pulaski	NR	O	Asphalt	10	10
005-LN-9008-000	0.000	22.357	22.357	Barren	CL	I	Asphalt Combination	6	4
005-LN-9008-000	0.000	22.357	22.357	Barren	NL	I	Asphalt Combination	6	4
085-LN-9008-000	22.357	36.159	13.802	Metcalfe	CL	I	Asphalt Combination	6	4
085-LN-9008-000	22.357	36.159	13.802	Metcalfe	NL	I	Asphalt Combination	6	4
001-LN-9008-000	36.159	57.791	21.632	Adair	CL	I	Asphalt Combination	6	4
001-LN-9008-000	36.159	57.791	21.632	Adair	NL	I	Asphalt Combination	6	4
104-LN-9008-000	57.791	72.087	14.296	Russell	CL	I	Asphalt Combination	6	4
104-LN-9008-000	57.791	72.087	14.296	Russell	NL	I	Asphalt Combination	6	4
100-LN-9008-000	72.087	84.287	12.200	Pulaski	CL	I	Asphalt Combination	5	3
100-LN-9008-000	72.087	84.287	12.200	Pulaski	NL	I	Asphalt Combination	5	3
100-LN-9008-000	84.287	84.647	0.360	Pulaski	CL	I	Curbed	4	4
100-LN-9008-000	84.287	84.612	0.325	Pulaski	CR	O	Curbed	4	4
100-LN-9008-000	84.287	84.647	0.360	Pulaski	NL	I	Curbed	4	4
100-LN-9008-000	84.287	84.612	0.325	Pulaski	NR	O	Curbed	4	4
100-LN-9008-000	84.647	84.757	0.110	Pulaski	CL	I	Asphalt	4	4
100-LN-9008-000	84.647	84.757	0.110	Pulaski	NL	I	Asphalt	4	4
100-LN-9008-000*	84.757	85.346	0.589	Pulaski	CL	I	Asphalt Combination	5	3

Route Unique	BMP	EMP	Length	County	Side	I/O	Shoulder Type	Shoulder Width (ft)	Paved Width (ft)
100-LN-9008 -000*	84.757	85.346	0.589	Pulaski	NL	I	Asphalt Combination	5	3
100-LN-9008 -000**	85.346	85.490	0.144	Pulaski	CL	I	No Shoulders or Curbs Exist	0	0
100-LN-9008 -000**	85.346	85.490	0.144	Pulaski	NL	I	No Shoulders or Curbs Exist	0	0
100-LN-9008 -000	85.490	88.376	2.886	Pulaski	CL	I	Asphalt Combination	5	3
100-LN-9008 -000	85.490	88.376	2.886	Pulaski	NL	I	Asphalt Combination	5	3

*Google Earth review confirmed an inside paved shoulder width of 4 feet.

**This location is on a bridge, therefore bridge clear width standards apply.

Median Widths

The 2011 *Roadside Design Guide* requires a mainline highway with design speed of 70-mph to maintain a median width of between 30 feet and 60 feet, where median barriers remain optional depending on traffic density and safety concerns. Median widths less than 30 feet require median barriers to be installed. Barriers are optional between 30 and 50 feet. *AASHTO A Policy on Design Standards - Interstate System* states that median widths should be at least 50 feet wide as a minimum, with 60 feet in width preferred in rural areas with level or rolling terrain. The table below highlights existing median types, widths, and barrier types of the CE.

Route Unique	BMP	EMP	Length	County	Median Type	Width (ft)	Barrier
005-LN-9008 -000	0.000	22.357	22.357	Barren	Depressed	36	None
085-LN-9008 -000	22.357	36.159	13.802	Metcalfe	Depressed	36	None
001-LN-9008 -000	36.159	57.791	21.632	Adair	Depressed	36	None
104-LN-9008 -000	57.791	72.087	14.296	Russell	Depressed	36	None
100-LN-9008 -000	72.087	84.287	12.200	Pulaski	Depressed	36	None
100-LN-9008 -000	84.287	84.647	0.360	Pulaski	Concrete Barrier	11	Concrete
100-LN-9008 -000	84.647	84.757	0.110	Pulaski	Guardrail Barrier	11	Guardrail
100-LN-9008 -000	84.757	85.346	0.589	Pulaski	Depressed	36	None
100-LN-9008 -000	85.346	85.490	0.144	Pulaski	Flush	60	None
100-LN-9008 -000	85.490	88.376	2.886	Pulaski	Depressed	60	None

Median Turnarounds

The 2018 *Green Book* states that median turnarounds may be provided where interchange spacing exceeds five miles. KYTC also likes to provide median turnarounds at county lines. The table below highlights existing median turnarounds and whether the median turnaround is needed to meet Interstate standards.

Median Mile point	Median Turnaround Needed?	Note
0.316	YES	
3.216	YES	
6.799	YES	
10.787	NO	Snow & Ice Turnaround
15.48	NO	
17.95	YES	
20.691	NO	
22.511	YES	County Line
26.711	NO	
29.086	NO	
31.5	YES	
36.21	YES	County Line
37.715	NO	
38.42	NO	
40.896	YES	
42.65	NO	
44.13	YES	
46.251	NO	Snow & Ice Turnaround
47.336	NO	Snow & Ice Turnaround
48.537	NO	Snow & Ice Turnaround
51	NO	
52.377	YES	
55.102	NO	
57.725	YES	County Line
59.646	NO	
61.66	NO	
62.152	NO	Snow & Ice Turnaround
62.845	NO	Snow & Ice Turnaround
65.333	NO	
67.1	NO	
67.711	YES	
69.5	NO	Snow & Ice Turnaround
71.039	NO	Snow & Ice Turnaround
72.087	NO	County Line
72.909	YES	
73.854	NO	
74.9	NO	
76.771	YES	
79.852	NO	Snow & Ice Turnaround
81.495	YES	
82.718	NO	Snow & Ice Turnaround
85.4	NO	Maintenance Turnaround

Clear Zones

The *2011 Roadside Design Guide* provides a range for the minimum clear zone requirement for an interstate, derived from the design speed, traffic volume, and roadside slope. For a 70-mph roadway, slopes of 1V:6H or flatter require clear zone width of 30 to 34 feet, with steeper slopes requiring 38 to 46 feet. The table below highlights clear zones that may not meet the Interstate standard. Due to the inability to accurately identify the clear zone slope, clear zones were given a score of 1, 2, or 3 upon data compilation. A score of 1 is an obstruction which does not meet any clear zone requirements for an interstate facility and guardrail is required to protect vehicles from the obstruction. A score of 2 is an obstruction which does not meet clear zone requirements for an interstate facility if the clear zone slope is 1:5 or 1:4. A score of 3 is given to rock cuts, which do not require guardrail but were still within clear zone widths. The data compiled in this table was collected through Google Earth and milepoints could not be obtained, although a shapefile is available showing locations of clear zones not meeting Interstate standard. A detailed survey should be completed to get accurate existing clear zones.

ID	Category	Obstruction Type	Length to Obstruction (ft)
1	1	Light Pole	17
2	1	Headwall	28
3	1	Headwall	27
4	1	Headwall	27
5	1	Headwall	27
6	1	Headwall	28
7	1	Headwall	34
8	2	Headwall	34
9	1	Headwall	23
10	1	Headwall	33
11	1	Headwall	33
12	1	Headwall	32
13	1	Headwall	34
14	1	Headwall	32
15	1	Headwall	23
16	1	Headwall	25
17	1	Headwall	25
18	2	Headwall	36
19	1	Tree	20
20	2	Culvert or Headwall	44
21	2	Tree	36
22	1	Headwall	20
23	1	Headwall	20
24	1	Headwall	25
25	1	Headwall	25
26	1	Headwall	24
27	1	Headwall	25
28	1	Headwall	25
29	1	Headwall	27
30	2	Headwall	34
31	1	Headwall	30
32	2	Headwall	40

ID	Category	Obstruction Type	Length to Obstruction (ft)
33	2	Tree	38
34	1	Headwall	20
35	1	Headwall	25
36	1	Headwall	25
37	1	Headwall	25
38	1	Headwall	25
39	1	Headwall	25
40	1	Headwall	25
41	1	Headwall	30
42	1	Headwall	25
43	2	Tree	40
44	1	Headwall	25
45	1	Headwall	22
46	1	Headwall	30
47	1	Headwall	30
48	1	Headwall	28
49	1	Headwall	26
50	1	Headwall	28
51	2	Headwall	34
52	1	Headwall	30
53	1	Headwall	26
54	1	Headwall	28
55	1	Headwall	26
56	1	Headwall	26
57	1	Headwall	25
58	1	Headwall	29
59	1	Culvert	25
60	1	Culvert	26
61	1	Culvert	21
62	2	Culvert	22
63	2	Culvert	40
64	2	Culvert	40
65	2	Culvert	35
66	2	Culvert	40
67	2	Culvert	40
68	2	Culvert	40
69	2	Culvert	34
70	2	Culvert	33
71	2	Culvert	28
72	1	Culvert	28
73	1	Culvert	30
74	2	Culvert	32
75	2	Culvert	35
76	2	Culvert	35
77	2	Culvert	30
78	2	Culvert	30

ID	Category	Obstruction Type	Length to Obstruction (ft)
79	2	Tree Line	35
80	1	Tree Line	28
81	2	Tree Line	36
82	2	Tree Line	38
83	2	Tree Line	45
84	3	Rock Cut	30
85	3	Rock Cut	28
86	3	Rock Cut	28
87	3	Rock Cut	28
88	3	Rock Cut	28
89	2	Tree Line	36
90	2	Tree Line	40
91	2	Tree Line	40
92	2	Tree Line	40
93	2	Tree Line	40
94	2	Tree Line	40
95	2	Tree Line	40
96	2	Tree Line	40
97	2	Tree Line	40
98	2	Tree Line	40
99	3	Rock Cut	34
100	3	Rock Cut	30
101	2	Tree Line	40
102	2	Tree Line	40
103	2	Tree Line	40
104	2	Tree Line	40
105	2	Tree Line	40
106	3	Rock Cut	40
107	3	Rock Cut	40
108	3	Rock Cut	40
109	3	Rock Cut	34
110	2	Tree Line	40
111	1	Tree Line	40
112	2	Tree Line	40
113	3	Rock Cut	34
114	3	Rock Cut	34
115	3	Rock Cut	34
116	3	Rock Cut	34
117	3	Rock Cut	34
118	3	Rock Cut	34
119	3	Rock Cut	34
120	3	Rock Cut	34
121	3	Rock Cut	34
122	3	Rock Cut	34
123	3	Rock Cut	34
124	3	Rock Cut	34

ID	Category	Obstruction Type	Length to Obstruction (ft)
125	3	Rock Cut	34
126	3	Rock Cut	34
127	1	Culvert	25
128	1	Culvert	20
129	2	Tree Line	34
130	1	Culvert	20
131	3	Rock Cut	45
132	3	Rock Cut	34
133	3	Rock Cut	34
134	3	Rock Cut	34
135	3	Rock Cut	34
136	3	Rock Cut	34
137	2	Culvert	30
138	3	Rock Cut	34
139	2	Culvert	30
140	3	Grade/Rock Cut	34
141	3	Rock Cut	34
142	1	Culvert	29
143	3	Rock Cut	34
144	3	Rock Cut	34
145	3	Rock Cut	34
146	3	Rock Cut	34
147	3	Rock Cut	25
148	3	Rock Cut	25
149	3	Rock Cut	25
150	2	Tree Line	36
151	2	Tree Line	30
152	3	Rock Cut	25
153	2	Tree Line	35
154	3	Rock Cut	25
155	3	Rock Cut	25
156	3	Rock Cut	25
157	3	Rock Cut	25
158	3	Rock Cut	25
159	3	Rock Cut	25
160	3	Rock Cut	25
161	3	Rock Cut	25
162	3	Rock Cut	25
163	3	Rock Cut	25
164	2	Tree Line	34
165	3	Rock Cut	25
166	3	Rock Cut	25
167	3	Rock Cut	25
168	3	Rock Cut	25
169	3	Rock Cut	25
170	3	Rock Cut	25

ID	Category	Obstruction Type	Length to Obstruction (ft)
171	3	Rock Cut	25
172	3	Rock Cut	25
173	3	Rock Cut	25
174	3	Rock Cut	25
175	3	Rock Cut	25
176	3	Rock Cut	25
177	3	Rock Cut	25
178	3	Rock Cut	25
179	3	Rock Cut	25
180	3	Rock Cut	25
181	3	Rock Cut	25
182	3	Rock Cut	25
183	3	Rock Cut	25
184	3	Rock Cut	25
185	3	Rock Cut	25
186	3	Rock Cut	25
187	3	Rock Cut	25
188	3	Rock Cut	25
189	3	Rock Cut	25
190	3	Rock Cut	25
191	3	Rock Cut	25
192	3	Rock Cut	25
193	3	Rock Cut	25
194	3	Rock Cut	25
195	3	Rock Cut	25
196	3	Rock Cut	25
197	3	Rock Cut	25
198	3	Rock Cut	25
199	3	Rock Cut	25
200	3	Rock Cut	25
201	3	Rock Cut	25
202	3	Rock Cut	25
203	3	Rock Cut	25
204	3	Rock Cut	25
205	3	Rock Cut	25
206	3	Rock Cut	25
207	3	Rock Cut	25
208	3	Rock Cut	35
209	3	Rock Cut	25
210	3	Rock Cut	25
211	3	Rock Cut	25
212	3	Rock Cut	25
213	3	Rock Cut	25
214	3	Rock Cut	25
215	3	Rock Cut	25
216	3	Rock Cut	25

ID	Category	Obstruction Type	Length to Obstruction (ft)
217	3	Rock Cut	25
218	3	Rock Cut	25
219	3	Rock Cut	25
220	3	Rock Cut	25
221	3	Rock Cut	25
222	3	Rock Cut	25
223	3	Rock Cut	25
224	3	Rock Cut	25
225	3	Rock Cut	25
226	3	Rock Cut	25
227	2	Tree Line	30
228	3	Rock Cut	25
229	2	Tree Line	30
230	1	Tree Line	29
231	2	Tree Line	36

Horizontal Alignment

The 2018 *Green Book* identifies the minimum radii for superelevation rates based on design speeds. The table below highlights the existing horizontal alignment along the CE, and the required superelevation based on the radius of the curve. In some instances, curves have a radius over 14,500 feet and thus require a normal crown (NC). Curve radii between 11,000 feet and 14,500 feet are required to have a reverse crown (RC). KYTC's HIS provided curve length and superelevation. Upon further review, there was a discrepancy between the HIS data and what exists in the field. A comparison between the superelevation from HIS is shown to what is in the record plans. Record plans were considered to be the most accurate for determining locations that do not meet Interstate standards. The side friction factor was also calculated for each curve. A detailed survey should be completed to collect the most accurate existing superelevation data.

Route Unique	BMP	EMP	Curve Length (mi)	Curve Degree	Superelevation (HIS)	Superelevation (Record Plan)	Superelevation Required by Standard	Radius (ft)	Friction Factor Cardinal	Friction Factor Non Cardinal
005-LN-9008 -000	0.032	0.086	0.054	2.4	5.5	8.0	7.4	2387	0.08	0.14
085-LN-9008 -000	22.357	23.635	1.278	0.1	0.0	RC	RC	57296	0.01	0.01
085-LN-9008 -000	23.635	24.352	0.717	0.3	0.0	RC	RC	19099	0.02	0.02
085-LN-9008 -000	25.499	25.810	0.311	0.5	0.0	RC	RC	11459	0.03	0.03
085-LN-9008 -000	28.410	29.238	0.828	0.4	0.0	RC	RC	14324	0.02	0.02
085-LN-9008 -000	30.029	30.045	0.016	0.1	0.0	NC	NC	57296	0.01	0.01
085-LN-9008 -000	31.838	32.133	0.295	1.5	-5.7	5.8	5.7	3820	0.03	0.09
085-LN-9008 -010	31.852	32.122	0.270	1.5	4.7	5.8	5.2	3820	0.09	0.04
085-LN-9008 -010	33.714	34.067	0.353	1.5	-5.8	5.8	5.8	3820	0.09	0.03
085-LN-9008 -000	33.721	34.046	0.325	1.5	4.4	5.8	5.2	3820	0.04	0.09
001-LN-9008 -010	39.541	39.584	0.043	1.3	3.6	3.9	4.2	4407	0.07	0.04
001-LN-9008 -010	39.913	39.974	0.061	1.2	3.6	3.9	4.4	4775	0.07	0.03
001-LN-9008 -000	40.301	40.330	0.029	1.3	3.6	3.9	4.2	4407	0.04	0.07
001-LN-9008 -000	40.330	40.703	0.373	1.0	0.0	3.9	3.9	5730	0.06	0.06
001-LN-9008 -000	41.164	41.545	0.381	0.7	0.0	2.9	2.9	8185	0.04	0.04
001-LN-9008 -000	41.545	41.827	0.282	0.6	0.0	2.9	2.9	9549	0.03	0.03
001-LN-9008 -000	42.366	42.848	0.482	1.0	0.0	3.9	3.9	5730	0.06	0.06
001-LN-9008 -000	42.848	43.290	0.442	1.0	0.0	3.9	3.9	5730	0.06	0.06
001-LN-9008 -000	46.384	47.166	0.782	0.9	0.0	3.9	3.9	6366	0.05	0.05
001-LN-9008 -000	47.874	48.532	0.658	0.1	0.0	NC	NC	57296	0.01	0.01
001-LN-9008 -000	48.810	49.000	0.190	0.2	0.0	NC	NC	28648	0.01	0.01
001-LN-9008 -000	49.000	49.630	0.630	1.0	0.0	3.9	3.9	5730	0.06	0.06
001-LN-9008 -000	50.172	50.699	0.527	0.2	0.0	3.9	3.9	28648	0.01	0.01
001-LN-9008 -000	54.984	55.565	0.581	0.1	0.0	NC	NC	57296	0.01	0.01
001-LN-9008 -000	55.565	55.863	0.298	0.1	0.0	NC	NC	57296	0.01	0.01
001-LN-9008 -000	55.863	56.211	0.348	0.5	0.0	NC	NC	11459	0.03	0.03
001-LN-9008 -000	57.133	57.473	0.340	0.4	0.0	RC	RC	14324	0.02	0.02
001-LN-9008 -000	57.473	57.791	0.318	0.1	0.0	RC	RC	57296	0.01	0.01

Route Unique	BMP	EMP	Curve Length (mi)	Curve Degree	Superelevation (HIS)	Superelevation (Record Plan)	Superelevation Required by Standard	Radius (ft)	Friction Factor Cardinal	Friction Factor Non Cardinal
104-LN-9008 -000	57.791	58.044	0.253	0.2	0.0	RC	RC	28648	0.01	0.01
104-LN-9008 -000	58.044	58.301	0.257	0.5	0.0	RC	RC	11459	0.03	0.03
104-LN-9008 -000	58.301	58.772	0.471	0.5	0.0	RC	RC	11459	0.03	0.03
104-LN-9008 -000	60.488	60.896	0.408	1.0	0.0	5.8	5.8	5730	0.06	0.06
104-LN-9008 -000	62.332	62.542	0.210	1.0	0.0	2.9	2.9	5730	0.06	0.06
104-LN-9008 -000	62.542	62.849	0.307	0.7	0.0	2.9	3.6	8185	0.04	0.04
104-LN-9008 -000	62.849	63.188	0.339	0.7	0.0	2.9	2.9	8185	0.04	0.04
104-LN-9008 -000	63.188	63.510	0.322	0.1	0.0	NC	NC	57296	0.01	0.01
104-LN-9008 -000	63.510	64.106	0.596	0.5	0.0	RC	RC	11459	0.03	0.03
104-LN-9008 -000	64.106	64.991	0.885	0.5	0.0	NC	NC	11459	0.03	0.03
104-LN-9008 -000	66.486	67.112	0.626	0.2	0.0	NC	NC	28648	0.01	0.01
104-LN-9008 -000	68.385	68.972	0.587	1.0	0.0	3.9	3.9	5730	0.06	0.06
104-LN-9008 -000	69.899	70.470	0.571	0.5	0.0	RC	RC	11459	0.03	0.03
104-LN-9008 -000	71.577	71.845	0.268	1.4	0.0	5.8	5.8	4093	0.08	0.08
100-LN-9008 -000	72.757	73.058	0.301	1.3	0.0	5.8	5.8	4407	0.07	0.07
100-LN-9008 -000	73.058	73.418	0.360	1.4	0.0	5.8	5.8	4093	0.08	0.08
100-LN-9008 -000	74.327	74.830	0.503	0.8	0.0	2.9	2.9	7162	0.05	0.05
100-LN-9008 -000	74.830	75.173	0.343	0.7	0.0	2.9	2.9	8185	0.04	0.04
100-LN-9008 -000	75.173	75.540	0.367	0.8	0.0	2.9	2.9	7162	0.05	0.05
100-LN-9008 -000	76.425	76.879	0.454	0.5	0.0	RC	RC	11459	0.03	0.03
100-LN-9008 -000	77.264	77.756	0.492	0.8	0.0	2.9	2.9	7162	0.05	0.05
100-LN-9008 -000	77.756	78.172	0.416	0.8	0.0	2.9	2.9	7162	0.05	0.05
100-LN-9008 -000	79.971	80.506	0.535	0.7	0.0	2.9	2.9	8185	0.04	0.04
100-LN-9008 -000	81.079	81.547	0.468	0.5	0.0	RC	RC	11459	0.03	0.03
100-LN-9008 -000	82.292	82.706	0.414	0.9	0.0	3.9	3.9	6366	0.05	0.05
100-LN-9008 -000	82.706	83.157	0.451	0.4	0.0	NC	NC	14324	0.02	0.02
100-LN-9008 -000	83.157	83.876	0.719	0.5	0.0	RC	RC	11459	0.03	0.03
100-LN-9008 -000	85.426	86.402	0.976	1.0	0.0	3.4	3.6	5730	0.06	0.06

Route Unique	BMP	EMP	Curve Length (ft)	Curve Degree	Superelevation (HIS)	Superelevation (Record Plan)	Superelevation Required by Standard	Radius (ft)	Friction Factor Cardinal	Friction Factor Non Cardinal
100-LN-9008 -000	86.858	87.744	0.886	0.7	0.0	3.4	3.4	8185	0.04	0.04
100-LN-9008 -000	87.744	88.376	0.632	0.3	0.0	2.6	2.6	19099	0.02	0.02

Vertical Alignment

Vertical Grade

AASHTO A Policy on Design Standards – Interstate System states that vertical grade should be less than 4.0% at 70-mph for rolling terrain. HIS data indicated a vertical grade greater than 4.0% at 93 locations, therefore the record plans were reviewed and found that 4.0% was the maximum grade utilized. The record plans showed more vertical grades along the corridor than HIS, and the milepoints of the beginning and end of the grades did not match up between the two sources. Record plans were considered to be the most accurate for determining locations that do not meet Interstate standards. The table below shows grade percentage along the CE.

Highway Information System (HIS)					Record Plans			
Route Unique	BMP	EMP	Direction	Grade	BMP	EMP	Grade	Direction
005-LN-9008 -000	0.000	0.032	UPHILL	0.803	0.000	0.000	2.2	UPHILL
005-LN-9008 -000	0.158	0.232	DOWNHILL	1.636	0.002	0.116	1.4	DOWNHILL
005-LN-9008 -000	0.471	0.565	UPHILL	3.318	0.248	0.438	2.1	UPHILL
005-LN-9008 -000	0.837	1.539	DOWNHILL	1.013	0.646	1.006	0.5	DOWNHILL
005-LN-9008 -000	1.749	1.880	UPHILL	2.803	1.120	1.441	0.5	DOWNHILL
005-LN-9008 -000	2.333	2.558	DOWNHILL	1.024	2.029	2.322	0.6	DOWNHILL
005-LN-9008 -000	2.786	2.894	UPHILL	2.060	2.474	2.625	1.7	UPHILL
005-LN-9008 -000	3.138	3.518	DOWNHILL	0.999	2.834	3.250	0.7	DOWNHILL
005-LN-9008 -000	3.724	4.064	UPHILL	1.273	3.402	3.780	1.0	UPHILL
005-LN-9008 -000	4.252	4.533	DOWNHILL	0.817	3.913	4.273	0.5	DOWNHILL
005-LN-9008 -000	4.725	4.901	UPHILL	1.295	4.424	4.633	1.0	UPHILL
005-LN-9008 -000	5.501	5.901	DOWNHILL	0.418	5.012	5.485	0.5	DOWNHILL
005-LN-9008 -000	6.046	6.260	DOWNHILL	1.676	5.900	6.146	1.0	DOWNHILL
005-LN-9008 -000	6.482	6.646	UPHILL	3.372	6.336	6.563	3.0	UPHILL
005-LN-9008 -000	6.886	7.194	UPHILL	1.098	6.733	7.074	1.0	UPHILL
005-LN-9008 -000	7.590	8.106	DOWNHILL	4.056	7.453	7.983	4.0	DOWNHILL
005-LN-9008 -000	8.326	8.908	UPHILL	1.135	9.877	10.521	0.7	UPHILL
005-LN-9008 -000	9.135	9.329	UPHILL	3.270	10.673	10.938	3.0	UPHILL
005-LN-9008 -000	9.819	9.909	DOWNHILL	3.660	11.392	11.525	3.0	DOWNHILL
005-LN-9008 -000	10.111	10.299	UPHILL	1.920	11.677	11.904	1.1	UPHILL
005-LN-9008 -000	10.461	11.149	DOWNHILL	0.686	12.093	12.415	0.6	DOWNHILL
005-LN-9008 -000	11.314	11.857	UPHILL	0.980	12.529	12.756	0.6	UPHILL
005-LN-9008 -000	12.027	12.174	UPHILL	2.961	12.908	13.106	2.5	UPHILL
005-LN-9008 -000	12.544	12.604	DOWNHILL	1.470	13.391	13.514	1.1	DOWNHILL
005-LN-9008 -000	12.832	13.134	UPHILL	4.107	13.665	13.665	3.0	UPHILL
005-LN-9008 -000	13.560	14.686	DOWNHILL	1.904	13.987	15.209	1.1	DOWNHILL
005-LN-9008 -000	14.840	15.499	UPHILL	1.860	15.322	16.175	1.4	UPHILL
005-LN-9008 -000	15.627	15.892	UPHILL	3.119	16.288	16.425	2.4	UPHILL
005-LN-9008 -000	16.385	16.547	DOWNHILL	2.905	16.803	17.040	2.4	DOWNHILL
005-LN-9008 -000	16.855	17.116	UPHILL	2.635	17.305	17.542	2.4	UPHILL
005-LN-9008 -000	17.259	17.281	UPHILL	0.336	17.940	18.195	1.8	DOWNHILL
005-LN-9008 -000	17.489	17.894	DOWNHILL	2.034	18.328	18.442	3.4	DOWNHILL
005-LN-9008 -000	18.076	18.133	DOWNHILL	4.287	18.707	18.896	4.0	UPHILL
005-LN-9008 -000	18.461	18.614	UPHILL	4.795	19.389	19.663	1.4	DOWNHILL
005-LN-9008 -000	19.148	19.658	DOWNHILL	1.780	19.777	19.976	0.5	DOWNHILL

Highway Information System (HIS)					Record Plans			
Route Unique	BMP	EMP	Direction	Grade	BMP	EMP	Grade	Direction
005-LN-9008 -000	19.913	20.053	DOWNHILL	2.708	20.146	20.345	2.4	DOWNHILL
005-LN-9008 -000	20.271	21.829	UPHILL	2.475	20.534	21.093	2.1	UPHILL
005-LN-9008 -000	22.342	22.357	UPHILL	0.400	21.283	21.794	1.3	UPHILL
085-LN-9008 -000	22.357	22.873	UPHILL	1.705	21.908	22.182	1.1	UPHILL
085-LN-9008 -000	23.265	23.416	DOWNHILL	2.067	22.409	22.514	1.7	DOWNHILL
085-LN-9008 -000	23.670	24.335	UPHILL	1.365	22.703	23.214	1.4	UPHILL
085-LN-9008 -000	24.545	24.611	UPHILL	3.341	23.555	23.735	1.9	DOWNHILL
085-LN-9008 -000	25.048	25.547	DOWNHILL	2.325	23.963	24.114	1.2	UPHILL
085-LN-9008 -000	25.718	26.041	DOWNHILL	0.476	24.228	24.493	0.5	UPHILL
085-LN-9008 -000	26.291	26.886	DOWNHILL	3.959	24.644	24.758	3.0	UPHILL
085-LN-9008 -000	27.104	27.490	UPHILL	1.914	25.156	25.705	2.0	DOWNHILL
085-LN-9008 -000	28.311	28.852	UPHILL	3.403	25.819	26.169	0.5	DOWNHILL
085-LN-9008 -000	29.027	29.188	UPHILL	1.200	26.396	27.040	3.2	DOWNHILL
085-LN-9008 -000	29.770	30.166	DOWNHILL	1.536	27.211	27.665	1.2	UPHILL
085-LN-9008 -000	30.358	30.580	UPHILL	3.815	28.063	28.167	3.7	DOWNHILL
085-LN-9008 -000	30.865	30.993	UPHILL	0.876	28.394	28.981	2.6	UPHILL
085-LN-9008 -000	31.199	31.344	DOWNHILL	1.632	29.133	29.322	1.3	UPHILL
085-LN-9008 -000	31.528	31.627	UPHILL	2.853	29.436	29.559	2.9	UPHILL
085-LN-9008 -000	32.284	32.541	UPHILL	0.967	29.881	30.298	1.1	DOWNHILL
085-LN-9008 -000	32.935	33.329	DOWNHILL	4.248	30.468	30.733	3.4	UPHILL
085-LN-9008 -000	33.482	33.544	DOWNHILL	2.591	30.961	31.141	0.6	UPHILL
085-LN-9008 -000	33.752	34.036	DOWNHILL	5.202	31.292	31.481	1.3	DOWNHILL
085-LN-9008 -000	34.335	34.608	UPHILL	0.812	31.633	31.784	2.4	UPHILL
085-LN-9008 -000	34.819	34.991	UPHILL	2.830	32.163	32.201	1.4	DOWNHILL
085-LN-9008 -000	35.435	35.549	DOWNHILL	2.430	32.391	32.694	0.5	UPHILL
085-LN-9008 -000	35.761	36.159	UPHILL	1.391	33.034	33.489	4.0	DOWNHILL
001-LN-9008 -000	36.159	36.525	UPHILL	1.274	33.603	33.688	2.5	DOWNHILL
001-LN-9008 -000	36.659	38.017	UPHILL	2.774	33.877	34.237	4.0	DOWNHILL
001-LN-9008 -000	38.628	39.082	DOWNHILL	4.465	34.427	34.957	0.7	UPHILL
001-LN-9008 -000	39.262	39.403	DOWNHILL	1.157	35.108	35.317	2.7	UPHILL
001-LN-9008 -000	39.950	40.262	DOWNHILL	0.550	35.695	35.904	1.9	DOWNHILL
001-LN-9008 -000	40.512	40.871	DOWNHILL	1.714	36.055	36.822	1.3	UPHILL
001-LN-9008 -000	41.088	41.259	UPHILL	1.225	36.974	37.750	2.3	UPHILL
001-LN-9008 -000	41.741	41.929	DOWNHILL	0.290	37.826	38.082	3.0	UPHILL
001-LN-9008 -000	42.041	42.464	UPHILL	3.535	38.612	39.142	4.0	DOWNHILL
001-LN-9008 -000	42.953	57.791	DOWNHILL	2.031	39.294	39.398	1.2	DOWNHILL
104-LN-9008 -000	57.791	57.797	DOWNHILL	0.585	39.701	39.805	3.2	DOWNHILL
104-LN-9008 -000	57.925	57.993	DOWNHILL	2.236	39.957	40.298	0.5	DOWNHILL
104-LN-9008 -000	58.140	58.222	UPHILL	2.047	40.449	40.961	1.3	DOWNHILL
104-LN-9008 -000	59.173	59.334	DOWNHILL	2.658	41.112	41.273	1.2	UPHILL
104-LN-9008 -000	59.548	59.877	UPHILL	1.373	41.425	41.425	3.0	UPHILL
104-LN-9008 -000	60.006	60.461	UPHILL	2.336	41.728	41.841	0.5	DOWNHILL
104-LN-9008 -000	60.596	60.935	UPHILL	0.981	41.993	42.457	3.0	UPHILL

Highway Information System (HIS)					Record Plans			
Route Unique	BMP	EMP	Direction	Grade	BMP	EMP	Grade	Direction
104-LN-9008 -000	61.118	61.170	DOWNHILL	2.073	42.836	43.205	1.2	DOWNHILL
104-LN-9008 -000	61.405	61.717	UPHILL	1.515	43.432	44.142	2.0	DOWNHILL
104-LN-9008 -000	62.030	62.195	DOWNHILL	3.089	44.370	44.578	3.0	UPHILL
104-LN-9008 -000	62.393	62.484	UPHILL	1.746	44.957	45.127	1.5	DOWNHILL
104-LN-9008 -000	62.644	62.781	UPHILL	2.285	45.279	45.563	2.6	UPHILL
104-LN-9008 -000	64.278	64.406	DOWNHILL	1.087	45.866	46.226	0.8	DOWNHILL
104-LN-9008 -000	64.595	64.858	UPHILL	1.536	46.377	46.548	1.9	DOWNHILL
104-LN-9008 -000	65.175	65.512	DOWNHILL	2.581	46.661	47.438	0.5	DOWNHILL
104-LN-9008 -000	65.737	65.903	UPHILL	2.207	47.665	47.930	3.3	UPHILL
104-LN-9008 -000	66.285	66.542	DOWNHILL	2.810	48.158	48.233	3.0	UPHILL
104-LN-9008 -000	66.714	66.756	UPHILL	1.617	48.347	48.631	3.5	UPHILL
104-LN-9008 -000	66.989	67.457	DOWNHILL	1.667	49.086	49.199	2.5	DOWNHILL
104-LN-9008 -000	67.618	67.973	UPHILL	1.056	49.313	49.597	0.5	DOWNHILL
104-LN-9008 -000	68.290	68.489	DOWNHILL	2.435	49.824	49.995	3.1	DOWNHILL
104-LN-9008 -000	68.720	69.102	UPHILL	3.322	50.222	50.686	3.3	UPHILL
104-LN-9008 -000	69.366	69.671	DOWNHILL	1.465	51.027	51.264	0.9	DOWNHILL
104-LN-9008 -000	69.871	70.210	UPHILL	1.393	51.415	51.605	1.4	UPHILL
104-LN-9008 -000	70.396	70.451	DOWNHILL	0.785	51.908	52.059	1.7	DOWNHILL
104-LN-9008 -000	70.636	70.774	UPHILL	2.975	52.173	52.324	1.0	UPHILL
104-LN-9008 -000	71.029	71.145	UPHILL	0.500	52.476	52.608	2.2	UPHILL
104-LN-9008 -000	71.366	71.511	DOWNHILL	1.166	52.760	52.959	1.5	UPHILL
104-LN-9008 -000	71.701	71.795	UPHILL	1.303	53.224	53.385	1.8	DOWNHILL
104-LN-9008 -000	72.066	72.087	DOWNHILL	0.200	53.555	53.726	2.8	UPHILL
100-LN-9008 -000	72.087	72.181	DOWNHILL	0.100	53.915	54.114	0.7	UPHILL
100-LN-9008 -000	72.561	72.952	DOWNHILL	5.148	54.417	54.569	3.0	DOWNHILL
100-LN-9008 -000	73.317	73.653	UPHILL	4.161	54.682	54.985	1.0	DOWNHILL
100-LN-9008 -000	73.877	73.889	UPHILL	1.447	55.137	55.307	2.6	UPHILL
100-LN-9008 -000	74.044	74.526	DOWNHILL	1.180	55.819	55.942	4.0	DOWNHILL
100-LN-9008 -000	74.710	74.803	UPHILL	1.341	56.226	56.491	4.0	UPHILL
100-LN-9008 -000	75.766	75.931	UPHILL	4.987	56.794	56.993	0.5	UPHILL
100-LN-9008 -000	76.464	76.735	UPHILL	1.256	57.144	57.372	2.2	UPHILL
100-LN-9008 -000	76.964	77.088	UPHILL	3.983	57.694	57.807	1.8	DOWNHILL
100-LN-9008 -000	77.718	78.086	DOWNHILL	3.960	57.921	58.053	1.6	UPHILL
100-LN-9008 -000	78.315	78.707	UPHILL	1.939	58.394	58.461	2.0	DOWNHILL
100-LN-9008 -000	78.971	79.885	DOWNHILL	1.857	58.631	58.716	1.5	UPHILL
100-LN-9008 -000	80.060	80.298	UPHILL	2.117	59.057	59.228	1.7	DOWNHILL
100-LN-9008 -000	80.499	80.509	DOWNHILL	0.596	59.341	59.720	1.0	UPHILL
100-LN-9008 -000	80.697	81.641	DOWNHILL	2.817	59.834	60.307	2.2	UPHILL
100-LN-9008 -000	82.231	82.278	DOWNHILL	2.501	60.421	60.743	1.0	UPHILL
100-LN-9008 -000	82.480	82.703	UPHILL	2.026	60.932	61.074	1.2	DOWNHILL
100-LN-9008 -000	83.325	84.107	DOWNHILL	4.515	61.188	61.557	1.0	UPHILL
100-LN-9008 -000	84.339	84.573	UPHILL	1.672	61.822	62.069	2.2	DOWNHILL
100-LN-9008 -000	84.774	85.408	UPHILL	4.584	62.182	62.343	1.0	UPHILL

Highway Information System (HIS)					Record Plans			
Route Unique	BMP	EMP	Direction	Grade	BMP	EMP	Grade	Direction
100-LN-9008 -000	85.986	86.510	DOWNHILL	0.788	62.457	62.618	2.0	UPHILL
100-LN-9008 -000	86.767	87.107	UPHILL	1.243	63.091	63.224	3.9	DOWNHILL
100-LN-9008 -000	87.481	87.514	UPHILL	1.283	63.489	63.579	3.5	UPHILL
100-LN-9008 -000	87.741	88.266	UPHILL	0.085	63.693	63.749	2.3	UPHILL
100-LN-9008 -000	88.266	88.376	DOWNHILL	0.000	64.052	64.251	0.9	DOWNHILL
					64.365	64.737	0.9	UPHILL
					64.983	65.390	1.6	DOWNHILL
					65.542	65.740	2.0	UPHILL
					66.081	66.346	2.4	DOWNHILL
					66.479	66.574	1.1	UPHILL
					66.763	66.820	0.8	DOWNHILL
					66.934	67.085	1.3	DOWNHILL
					67.199	67.445	1.0	UPHILL
					67.672	67.937	1.7	DOWNHILL
					68.089	68.543	2.4	UPHILL
					68.771	69.112	1.2	DOWNHILL
					69.263	69.642	1.0	UPHILL
					69.793	69.888	0.5	DOWNHILL
					70.040	70.210	2.7	UPHILL
					70.437	70.504	0.5	UPHILL
					70.693	70.816	1.0	DOWNHILL
					71.006	71.214	0.8	UPHILL
					73.108	73.240	0.5	DOWNHILL
					73.581	74.036	4.0	DOWNHILL
					74.339	74.708	4.0	UPHILL
					75.011	75.286	0.5	UPHILL
					75.494	75.598	1.0	DOWNHILL
					75.731	75.949	0.7	UPHILL
					76.365	76.479	4.0	DOWNHILL
					76.782	77.009	4.0	UPHILL
					77.369	77.388	0.5	DOWNHILL
					77.502	77.615	1.2	UPHILL
					77.767	77.947	3.6	UPHILL
					78.477	78.960	3.1	DOWNHILL
					79.150	79.566	1.6	UPHILL
					79.793	80.418	0.5	DOWNHILL
					80.532	80.778	1.05	DOWNHILL
					80.892	81.176	1.78	UPHILL
					81.498	81.650	2.3	DOWNHILL
					81.763	82.521	1.59	DOWNHILL
					82.672	82.767	1.86	UPHILL
					83.070	83.146	1.94	DOWNHILL
					83.297	83.657	1.44	UPHILL

	Record Plans			
	BMP	EMP	Grade	Direction
	84.074	84.992	3.995	DOWNHILL
	85.182	85.182	1	UPHILL
	85.295	86.138	3.95	UPHILL
	86.612	87.180	0.52	DOWNHILL
	87.947	87.947	2	UPHILL

Stopping Sight Distance on Crest Vertical Curves

The 2018 Green Book provides criteria for stopping sight distance (SSD) based on design speed. For a 70-mph facility, the minimum SSD (S) for a crest vertical curve is 730 feet. SSD is calculated using the length of the curve (L) in feet, and the difference in grade (A) as a percent. The following equations are used to calculate the SSD in feet.

When $S < L$

$$L = \frac{AS^2}{2158}$$

When $S > L$

$$L = 2S - \frac{2158}{A}$$

The table below highlights the existing SSD for crest vertical curves along the CE. The original data was collected from KYTC’s HIS, which indicated that all crest curves meet the Interstate standard. Because of the discrepancy between HIS data and record plans, a detailed survey should be completed to collect the most accurate existing vertical curve data.

Route Unique	BMP	EMP	L (ft)	A	Required SSD (ft)	Actual SSD (ft)
005-LN-9008 -010	0.014	0.157	755	2.593	730	794
005-LN-9008 -000	0.032	0.158	665	2.108	730	844
005-LN-9008 -010	0.560	0.852	1542	3.42	730	986
005-LN-9008 -000	0.565	0.837	1436	3.401	730	955
005-LN-9008 -000	1.880	2.333	2392	3.361	730	1239
005-LN-9008 -010	1.966	2.324	1890	2.88	730	1190
005-LN-9008 -010	2.883	3.133	1320	2.989	730	976
005-LN-9008 -000	2.894	3.138	1288	2.932	730	974
005-LN-9008 -000	4.064	4.252	993	1.741	730	1116
005-LN-9008 -010	4.070	4.245	924	1.762	730	1074
005-LN-9008 -010	4.889	5.201	1647	3.452	730	1015
005-LN-9008 -000	4.901	5.172	1431	3.131	730	993
005-LN-9008 -000	5.901	6.046	766	1.258	730	1241
005-LN-9008 -010	6.644	6.882	1257	2.434	730	1056
005-LN-9008 -000	6.646	6.886	1267	2.453	730	1056
005-LN-9008 -010	7.180	7.612	2281	5.705	730	929
005-LN-9008 -000	7.194	7.590	2091	5.14	730	937
005-LN-9008 -010	9.327	9.755	2260	6.054	730	898
005-LN-9008 -000	9.329	9.819	2587	6.429	730	932
005-LN-9008 -010	10.238	10.517	1473	2.224	730	1196
005-LN-9008 -000	10.299	10.461	855	1.88	730	1002
005-LN-9008 -000	12.174	12.544	1954	4.413	730	977
005-LN-9008 -010	12.185	12.569	2028	4.545	730	981

Route Unique	BMP	EMP	L (ft)	A	Required SSD (ft)	Actual SSD (ft)
005-LN-9008 -000	13.134	13.560	2249	5.177	730	968
005-LN-9008 -010	13.137	13.487	1848	4.253	730	968
005-LN-9008 -000	15.892	16.385	2603	5.999	730	968
005-LN-9008 -010	15.929	16.364	2297	5.499	730	949
005-LN-9008 -000	17.116	17.259	755	1.804	730	976
005-LN-9008 -010	17.178	17.496	1679	3.339	730	1042
005-LN-9008 -000	17.281	17.489	1098	2.29	730	1017
005-LN-9008 -010	17.891	18.103	1119	2.295	730	1026
005-LN-9008 -000	17.894	18.076	961	2.159	730	980
005-LN-9008 -010	18.578	19.142	2978	6.109	730	1026
005-LN-9008 -000	18.614	19.148	2820	5.864	730	1019
005-LN-9008 -000	19.658	19.913	1346	2.497	730	1079
005-LN-9008 -010	19.682	19.874	1014	1.893	730	1077
005-LN-9008 -010	21.821	22.176	1874	0	730	N/A
005-LN-9008 -000	21.829	22.159	1742	3.662	730	1013
085-LN-9008 -000	22.873	23.265	2070	3.772	730	1088
085-LN-9008 -010	22.873	23.268	2086	3.745	730	1096
085-LN-9008 -000	24.611	25.048	2307	5.501	730	951
085-LN-9008 -010	24.630	25.076	2355	5.521	730	959
085-LN-9008 -010	25.997	26.288	1536	3.29	730	1004
085-LN-9008 -000	26.041	26.291	1320	2.881	730	994
085-LN-9008 -000	27.490	27.983	2603	6.19	730	953
085-LN-9008 -010	27.492	27.984	2598	5.94	730	971
085-LN-9008 -010	28.793	29.029	1246	1.582	730	1305
085-LN-9008 -000	28.852	29.027	924	1.364	730	1253
085-LN-9008 -000	29.352	29.770	2207	5.065	730	970
085-LN-9008 -010	29.425	29.762	1779	4.075	730	971
085-LN-9008 -000	30.580	30.865	1505	3.407	730	976
085-LN-9008 -010	30.606	30.855	1315	2.746	730	1016
085-LN-9008 -010	30.984	31.198	1130	2.647	730	960
085-LN-9008 -000	30.993	31.199	1088	2.508	730	967
085-LN-9008 -000	31.627	32.056	2265	4.432	730	1050
085-LN-9008 -010	31.645	31.863	1151	2.755	730	950
085-LN-9008 -010	31.878	32.064	982	1.785	730	1096
085-LN-9008 -010	32.536	32.962	2249	5.487	730	941
085-LN-9008 -000	32.541	32.935	2080	5.216	730	928
085-LN-9008 -000	33.544	33.752	1098	2.167	730	1046
085-LN-9008 -010	33.565	33.764	1051	1.37	730	1313
085-LN-9008 -000	34.991	35.435	2344	5.207	730	986
085-LN-9008 -010	35.004	35.402	2101	4.834	730	969
001-LN-9008 -010	38.004	38.292	1521	3.779	730	932
001-LN-9008 -000	38.017	38.628	3226	7.875	730	940
001-LN-9008 -010	38.307	38.570	1389	3.712	730	898
001-LN-9008 -000	39.403	39.664	1378	2.072	730	1198

Route Unique	BMP	EMP	L (ft)	A	Required SSD (ft)	Actual SSD (ft)
001-LN-9008 -010	39.465	39.593	676	1.211	730	1229
001-LN-9008 -000	40.262	40.512	1320	1.064	730	1674
001-LN-9008 -000	41.419	41.741	1700	3.839	730	978
001-LN-9008 -010	41.430	41.780	1848	3.641	730	1047
001-LN-9008 -010	42.449	42.875	2249	4.637	730	1023
001-LN-9008 -000	42.464	42.953	2582	5.372	730	1018
104-LN-9008 -000	57.797	57.925	676	1.461	730	1076
104-LN-9008 -000	58.222	58.629	2149	4.16	730	1056
104-LN-9008 -010	58.226	58.647	2223	4.462	730	1037
104-LN-9008 -000	58.879	59.173	1552	2.7	730	1114
104-LN-9008 -010	58.904	59.373	2476	3.781	730	1189
104-LN-9008 -010	60.457	60.659	1067	1.539	730	1234
104-LN-9008 -000	60.461	60.596	713	1.354	730	1153
104-LN-9008 -010	60.888	61.141	1336	2.902	730	997
104-LN-9008 -000	60.935	61.118	966	2.275	730	957
104-LN-9008 -010	61.713	62.008	1558	3.351	730	1002
104-LN-9008 -000	61.717	62.030	1653	3.792	730	970
104-LN-9008 -010	62.757	63.151	2080	5.061	730	942
104-LN-9008 -000	62.781	63.333	2915	6.917	730	954
104-LN-9008 -010	63.169	63.267	517	1.644	730	915
104-LN-9008 -000	63.690	64.278	3105	5.182	730	1137
104-LN-9008 -010	63.739	64.277	2841	4.768	730	1134
104-LN-9008 -010	64.853	65.171	1679	2.728	730	1152
104-LN-9008 -000	64.858	65.175	1674	3.123	730	1075
104-LN-9008 -010	65.900	66.285	2033	5.019	730	935
104-LN-9008 -000	65.903	66.285	2017	4.956	730	937
104-LN-9008 -000	66.756	66.989	1230	2.26	730	1084
104-LN-9008 -010	66.767	66.997	1214	2.146	730	1105
104-LN-9008 -000	67.973	68.290	1674	2.957	730	1105
104-LN-9008 -010	67.978	68.275	1568	2.707	730	1118
104-LN-9008 -010	69.076	69.361	1505	4.225	730	877
104-LN-9008 -000	69.102	69.366	1394	4.07	730	860
104-LN-9008 -010	70.208	70.433	1188	1.846	730	1178
104-LN-9008 -000	70.210	70.396	982	1.786	730	1095
104-LN-9008 -010	70.765	71.039	1447	2.58	730	1100
104-LN-9008 -000	70.774	71.029	1346	2.585	730	1060
104-LN-9008 -000	71.145	71.366	1167	1.633	730	1244
104-LN-9008 -010	71.152	71.365	1125	1.664	730	1211
104-LN-9008 -000	71.795	72.066	1431	1.503	730	1433
104-LN-9008 -010	71.881	72.068	987	1.231	730	1370
100-LN-9008 -000	72.181	72.561	2006	4.006	730	1040
100-LN-9008 -010	72.183	72.584	2117	3.852	730	1089
100-LN-9008 -000	73.653	73.877	1183	2.714	730	970
100-LN-9008 -010	73.657	73.996	1790	4.238	730	955

Route Unique	BMP	EMP	L (ft)	A	Required SSD (ft)	Actual SSD (ft)
100-LN-9008 -000	73.889	74.044	818	1.143	730	1353
100-LN-9008 -010	74.226	74.429	1072	1.681	730	1178
100-LN-9008 -000	74.803	75.364	2962	6.081	730	1025
100-LN-9008 -010	74.843	75.315	2492	5.233	730	1014
100-LN-9008 -010	75.928	76.321	2075	4.898	730	956
100-LN-9008 -000	75.931	76.330	2107	5.019	730	952
100-LN-9008 -010	77.087	77.637	2904	7.134	730	937
100-LN-9008 -000	77.088	77.718	3326	7.522	730	977
100-LN-9008 -000	78.707	78.971	1394	2.374	730	1126
100-LN-9008 -010	78.709	78.954	1294	2.427	730	1072
100-LN-9008 -000	80.298	80.499	1061	2.672	730	926
100-LN-9008 -010	80.309	80.699	2059	4.765	730	966
100-LN-9008 -000	80.509	80.697	993	2.222	730	982
100-LN-9008 -000	81.853	82.231	1996	4.756	730	952
100-LN-9008 -010	81.898	82.244	1827	4.309	730	957
100-LN-9008 -010	82.608	82.953	1822	2.612	730	1227
100-LN-9008 -000	82.703	83.325	3284	4.915	730	1201
100-LN-9008 -010	82.962	83.337	1980	3.247	730	1147
100-LN-9008 -000	85.408	85.986	3052	5.22	730	1123
100-LN-9008 -010	85.471	85.981	2693	5.063	730	1071
100-LN-9008 -010	87.298	87.476	940	1.487	730	1196
100-LN-9008 -000	87.301	87.481	950	1.47	730	1209
100-LN-9008 -000	87.514	87.741	1199	1.198	730	1500
100-LN-9008 -010	87.514	87.793	1473	1.241	730	1606

Headlight Sight Distance on Sag Vertical Curves

The sight distance (S) for sag vertical curves is known as headlight sight distance (HLSD) and is 730 feet according to the 2018 Green Book. Similar to SSD for crest curves, HLSD for sag curves is calculated based on the length (L) of the curve in feet, and the difference in grade (A) as a percent. The following equations are used to calculate the HLSD in feet.

When $S < L$

$$L = \frac{AS^2}{400+3.5S}$$

When $S > L$

$$L = 2S - \frac{400+3.5S}{A}$$

The table below highlights the existing HLSD for sag vertical curves along the CE. The original data was collected from KYTC’s HIS. For locations where HIS data showed that HLSD does not meet Interstate standards, record plans were used to perform a second check. Record plans were considered to be the most accurate for determining locations that do not meet Interstate standards. A detailed survey should be completed to collect the most accurate existing vertical curve data.

Route Unique	BMP	EMP	L (ft)	A	Required HLSD (ft)	Actual HLSD - HIS (ft)	Actual HLSD - Record Plans (ft)
005-LN-9008 -000	0.232	0.471	1262	4.955	730	994	
005-LN-9008 -010	0.233	0.416	966	4.539	730	846	
005-LN-9008 -010	1.112	1.279	882	1.37	730	INFINITE	
005-LN-9008 -000	1.539	1.749	1109	2.797	730	1672	

Route Unique	BMP	EMP	L (ft)	A	Required HLSD (ft)	Actual HLSD - HIS (ft)	Actual HLSD - Record Plans (ft)
005-LN-9008 -010	1.571	1.756	977	2.73	730	1565	
005-LN-9008 -000	2.558	2.786	1204	2.752	730	1853	
005-LN-9008 -010	2.594	2.804	1109	2.891	730	1580	
005-LN-9008 -000	3.518	3.724	1088	2.271	730	2754	
005-LN-9008 -010	3.550	3.722	908	1.99	730	4598	
005-LN-9008 -010	4.510	4.755	1294	1.986	730	6290	
005-LN-9008 -000	4.533	4.725	1014	1.793	730	25787	
005-LN-9008 -000	5.172	5.501	1737	1.844	730	19166	
005-LN-9008 -010	5.245	5.475	1214	1.409	730	INFINITE	
005-LN-9008 -010	6.248	6.493	1294	5.927	730	865	
005-LN-9008 -000	6.260	6.482	1172	4.857	730	947	
005-LN-9008 -010	8.081	8.394	1653	6.509	730	991	
005-LN-9008 -000	8.106	8.326	1162	5.19	730	885	
005-LN-9008 -010	8.890	9.106	1140	3.011	730	1520	
005-LN-9008 -000	8.908	9.135	1199	2.857	730	1727	
005-LN-9008 -010	9.895	10.112	1146	5.358	730	849	
005-LN-9008 -000	9.909	10.111	1067	5.58	730	768	
005-LN-9008 -010	11.116	11.340	1183	1.946	730	6892	
005-LN-9008 -000	11.149	11.314	871	1.666	730	INFINITE	
005-LN-9008 -010	11.852	12.032	950	2.173	730	2914	
005-LN-9008 -000	11.857	12.027	898	2.184	730	2719	
005-LN-9008 -010	12.569	12.792	1177	5.095	730	910	
005-LN-9008 -000	12.604	12.832	1204	5.577	730	856	
005-LN-9008 -010	14.674	14.867	1019	3.221	730	1252	
005-LN-9008 -000	14.686	14.840	813	3.392	730	962	
005-LN-9008 -000	15.499	15.627	676	1.14	730	INFINITE	
005-LN-9008 -010	16.543	16.859	1668	5.288	730	1209	
005-LN-9008 -000	16.547	16.855	1626	5.541	730	1131	
005-LN-9008 -010	18.103	18.464	1906	9.614	730	794	
005-LN-9008 -000	18.133	18.461	1732	9.082	730	767	
005-LN-9008 -010	20.030	20.321	1536	6.117	730	982	
005-LN-9008 -000	20.053	20.271	1151	5.145	730	884	
005-LN-9008 -000	22.159	22.342	966	2.695	730	1589	
005-LN-9008 -010	22.176	22.349	913	2.469	730	1847	
085-LN-9008 -010	23.387	23.702	1663	4.088	730	1530	
085-LN-9008 -000	23.416	23.670	1341	3.43	730	1488	
085-LN-9008 -000	24.335	24.545	1109	3.318	730	1301	
085-LN-9008 -010	24.352	24.550	1045	3.239	730	1271	
085-LN-9008 -000	25.547	25.718	903	2.062	730	3625	
085-LN-9008 -010	25.571	25.748	935	2.042	730	3953	
085-LN-9008 -000	26.886	27.104	1151	5.523	730	830	
085-LN-9008 -010	26.888	27.149	1378	5.907	730	918	
085-LN-9008 -000	27.983	28.311	1732	8.506	730	813	
085-LN-9008 -010	28.039	28.294	1346	6.86	730	787	

Route Unique	BMP	EMP	L (ft)	A	Required HLSD (ft)	Actual HLSD - HIS (ft)	Actual HLSD - Record Plans (ft)
085-LN-9008 -000	29.188	29.352	866	2.15	730	2827	
085-LN-9008 -010	29.190	29.356	876	2.204	730	2568	
085-LN-9008 -010	30.123	30.392	1420	6.107	730	916	
085-LN-9008 -000	30.166	30.358	1014	5.336	730	764	
085-LN-9008 -000	31.344	31.528	972	4.251	730	901	
085-LN-9008 -010	31.351	31.589	1257	4.53	730	1074	
085-LN-9008 -000	32.056	32.284	1204	2.567	730	2136	
085-LN-9008 -010	32.064	32.167	544	1.502	730	INFINITE	
085-LN-9008 -000	33.329	33.482	808	1.576	730	INFINITE	
085-LN-9008 -010	33.338	33.510	908	2.301	730	2259	
085-LN-9008 -000	34.036	34.335	1579	6.014	730	1022	
085-LN-9008 -010	34.103	34.343	1267	5.876	730	856	
085-LN-9008 -010	34.587	34.842	1346	2.524	730	2454	
085-LN-9008 -000	34.608	34.819	1114	2.587	730	1961	
085-LN-9008 -000	35.549	35.761	1119	3.66	730	1177	
085-LN-9008 -010	35.584	35.768	972	3.939	730	965	
001-LN-9008 -000	36.525	36.659	708	1.18	730	INFINITE	
001-LN-9008 -010	36.530	36.682	803	1.088	730	INFINITE	
001-LN-9008 -000	39.082	39.262	950	3.096	730	1242	
001-LN-9008 -010	39.087	39.264	935	3.53	730	1039	
001-LN-9008 -000	39.664	39.950	1510	3.419	730	1667	
001-LN-9008 -010	39.739	40.017	1468	3.475	730	1594	
001-LN-9008 -000	40.871	41.088	1146	3.195	730	1405	
001-LN-9008 -010	40.881	41.100	1156	3.351	730	1335	
001-LN-9008 -000	41.259	41.419	845	2.108	730	3046	
001-LN-9008 -010	41.263	41.430	882	2.054	730	3637	
001-LN-9008 -010	41.851	42.037	982	4.367	730	888	
001-LN-9008 -000	41.929	42.041	591	3.559	730	692	679
104-LN-9008 -000	57.993	58.140	776	4.064	730	768	
104-LN-9008 -010	57.995	58.145	792	4.429	730	725	1215
104-LN-9008 -000	58.629	58.879	1320	4.562	730	1116	
104-LN-9008 -010	58.647	58.846	1051	4.302	730	957	
104-LN-9008 -000	59.334	59.548	1130	4.031	730	1084	
104-LN-9008 -010	59.373	59.538	871	3.856	730	893	
104-LN-9008 -000	59.877	60.006	681	1.319	730	INFINITE	
104-LN-9008 -000	61.170	61.405	1241	3.588	730	1320	
104-LN-9008 -010	61.223	61.406	966	3.016	730	1309	
104-LN-9008 -010	62.173	62.394	1167	4.985	730	921	
104-LN-9008 -000	62.195	62.393	1045	4.835	730	858	
104-LN-9008 -000	62.484	62.644	845	1.212	730	INFINITE	
104-LN-9008 -010	62.516	62.636	634	1.224	730	INFINITE	
104-LN-9008 -000	63.333	63.690	1885	9.388	730	803	
104-LN-9008 -010	63.371	63.681	1637	8.51	730	773	
104-LN-9008 -010	64.399	64.551	803	2.431	730	1726	

Route Unique	BMP	EMP	L (ft)	A	Required HLSD (ft)	Actual HLSD - HIS (ft)	Actual HLSD - Record Plans (ft)
104-LN-9008 -000	64.406	64.595	998	2.423	730	2094	
104-LN-9008 -010	65.501	65.737	1246	4.788	730	1014	
104-LN-9008 -000	65.512	65.737	1188	4.788	730	971	
104-LN-9008 -000	66.542	66.714	908	4.427	730	818	
104-LN-9008 -010	66.545	66.719	919	4.416	730	829	
104-LN-9008 -000	67.457	67.618	850	2.325	730	2066	
104-LN-9008 -010	67.461	67.620	840	2.394	730	1871	
104-LN-9008 -000	68.489	68.720	1220	5.757	730	842	
104-LN-9008 -010	68.514	68.707	1019	4.932	730	824	
104-LN-9008 -010	69.667	69.854	987	2.543	730	1835	
104-LN-9008 -000	69.671	69.871	1056	2.587	730	1871	
104-LN-9008 -010	70.433	70.644	1114	4.601	730	949	
104-LN-9008 -000	70.451	70.636	977	3.76	730	1013	
104-LN-9008 -010	71.419	71.694	1452	2.024	730	6093	
104-LN-9008 -000	71.511	71.701	1003	2.346	730	2310	
100-LN-9008 -000	72.952	73.317	1927	9.176	730	836	
100-LN-9008 -010	72.978	73.351	1969	9.823	730	802	
100-LN-9008 -000	74.526	74.710	972	2.308	730	2368	
100-LN-9008 -010	74.529	74.687	834	2.108	730	3015	
100-LN-9008 -000	75.364	75.766	2123	10.552	730	804	
100-LN-9008 -010	75.411	75.751	1795	8.981	730	800	
100-LN-9008 -010	76.321	76.475	813	2.086	730	3119	
100-LN-9008 -000	76.330	76.464	708	2.139	730	2459	
100-LN-9008 -000	76.735	76.964	1209	3.186	730	1481	
100-LN-9008 -010	76.773	76.954	956	2.389	730	2099	
100-LN-9008 -010	78.027	78.314	1515	6.731	730	889	
100-LN-9008 -000	78.086	78.315	1209	5.863	730	822	
100-LN-9008 -000	79.885	80.060	924	3.921	730	927	
100-LN-9008 -010	79.918	80.066	781	3.391	730	929	
100-LN-9008 -000	81.641	81.853	1119	4.862	730	907	
100-LN-9008 -010	81.644	81.846	1067	4.448	730	941	
100-LN-9008 -010	82.244	82.510	1404	5.257	730	1038	
100-LN-9008 -000	82.278	82.480	1067	4.527	730	926	
100-LN-9008 -000	84.107	84.339	1225	6.187	730	793	
100-LN-9008 -010	84.108	84.330	1172	5.943	730	790	
100-LN-9008 -000	84.573	84.774	1061	4.18	730	991	
100-LN-9008 -010	84.599	84.775	929	3.752	730	971	
100-LN-9008 -010	86.507	86.767	1373	2.026	730	5763	
100-LN-9008 -000	86.510	86.767	1357	2.03	730	5633	
100-LN-9008 -010	87.081	87.298	1146	1.184	730	INFINITE	
100-LN-9008 -000	87.107	87.301	1024	1.373	730	INFINITE	

1.2 Bridges and Overpasses

Bridge data was obtained from a combination of bridge inspection reports, Google Earth & Streetview, and field visit verification. Structures along the CE comprised of both bridges and box culverts. Box culverts not only were located at stream crossings but also provided a vehicular underpass crossing at many locations.

Bridge Width

A review of the bridge inspection reports yielded information on the clear width measured across each bridge. The table below shows the clear width (curb-to-curb) width and the approach road width across each bridge on the CE. Widths of the bridges that cross over the Expressway are not included in this table.

The *AASHTO A Policy on Design Standards - Interstate System* provides minimum clear widths across bridges for existing structures on the mainline on routes to be incorporated into the Interstate System. These widths are dependent on the length of the bridge and are classified into two categories: bridges less than or equal to 200 feet in length and bridges longer than 200 feet in length.

- Bridges that are less than or equal to 200 feet in length, the bridge cross section shall consist of at least 12-foot lanes, 10-foot right side shoulder, and 3.5-foot left side shoulder. With two lanes in a direction on the Expressway this equates to a minimum clear width of 37.5 feet.
- Bridges longer than 200 feet in length, the bridge cross section shall have shoulders on both the left and right sides that are at least 3.5 feet in width. With two lanes in each direction on the Expressway this equated to a minimum clear width of 31 feet.

Bridge clear widths across bridges that is less than the AASHTO standard are shown in red text. It should be noted that these minimum widths are only applicable to mainline, ramp widths are shown with an asterisk. The below table also doesn't contain box culvert crossings since the same mainline typical section is carried across each of these culvert locations resulting in no change in width.

Bridge ID	Milepoint	County	Crossing Feature	Approach Road Width (ft)	Bridge Clear Width (ft)	Bridge Length (ft)
005B00067L	0.031	Barren	I-65	36.50	35.00*	277.00
005B00067R	0.031	Barren	I-65	36.50	26.33*	277.00
005B00068R	8.188	Barren	Beaver Creek	40.03	30.30	282.00
005B00068L	8.199	Barren	Beaver Creek	40.00	30.30	282.00
005B00109L	9.042	Barren	KY1297	44.00	44.00	175.00
005B00109R	9.043	Barren	KY1297	53.50	53.50	175.00
005B00071R	11.467	Barren	US31E	30.00	30.00	203.00
005B00073N	11.497	Barren	South Fork- Beaver Creek	34.00	31.00*	161.00
005B00071L	11.498	Barren	US31E	30.00	30.00	203.00
005B00072R	11.541	Barren	South Fork- Beaver Creek	30.00	30.00	191.00
005B00072L	11.576	Barren	South Fork- Beaver Creek	37.07	30.00	191.00
005B00074N	11.586	Barren	South Fork- Beaver Creek	25.92	25.00*	131.00
005B00075R	18.259	Barren	Mt. Pisgah Rd.	37.07	30.00	213.00
005B00075L	18.26	Barren	Mt. Pisgah Rd.	37.07	30.00	213.00
085B00040L	24.132	Metcalfe	KY640	40.03	39.00	128.00
085B00040R	24.135	Metcalfe	KY640	40.00	39.00	128.00
085B00042L	28.114	Metcalfe	S. Fork Little Barren River	39.04	30.00	298.30
085B00042R	28.125	Metcalfe	S. Fork Little Barren River	39.00	30.00	298.30

Bridge ID	Milepoint	County	Crossing Feature	Approach Road Width (ft)	Bridge Clear Width (ft)	Bridge Length (ft)
085B00043R	34.226	Metcalfe	East Fork Little Barren River	37.00	30.00	210.00
085B00043L	34.227	Metcalfe	East Fork Little Barren River	37.00	30.00	210.00
001B00062R	48.131	Adair	Pettys Fork	30.00	30.00	208.70
001B00062L	48.136	Adair	Pettys Fork	30.00	30.00	208.70
001B00063R	50.069	Adair	Russell Creek	84.00	30.00	291.30
001B00063L	50.103	Adair	Russell Creek	84.00	30.00	291.30
001B00069R	56.243	Adair	Russell Creek	84.00	30.00	265.40
001B00069L	56.249	Adair	Russell Creek	84.00	30.00	265.40
100B00074L	84.466	Pulaski	Fishing Creek	84.00	30.00	1746.00
100B00074R	84.471	Pulaski	Fishing Creek	84.00	30.00	1746.00
100B00120L	88.241	Pulaski	US27	58.00	58.00	278.60
100B00120R	88.241	Pulaski	US27	60.00	60.00	278.60

* Bridge is located on ramp.

Vertical Clearance at Overpasses

With the CE being a rural facility, the AASHTO A Policy on Design Standards – Interstate System May 2016 requires the vertical clearance between the Expressway, including the entire roadway width, any auxiliary lanes, shoulders, ramps, and collector-distributor facilities, and any structure overpass to be a minimum of 16-feet. Vertical clearance requirement is not only needed for normal roadway operations but is also needed for the Strategic Highway Network (STRAHNET) and a critical need for Department of Defense’s domestic operations.

Bridge inspection reports were reviewed for any locations with a reported vertical clearance of less than 16.50 feet. Locations with less than 16.50 feet were flagged for further data collection at a field review. Google Earth and bridge inspection photos were reviewed to determine which overpass bridges had haunched beams. These types of beams have a cross-sectional area that thickens near the supports. This can often result in vertical clearance less over the shoulders than at the driving lanes. Additional vertical clearance measurements were taken at the inside and outside shoulder locations and are shown in the following table.

Bridge ID	Milepoint	County	Vertical Clearance over Driving Lanes*	Vertical Clearance at Edge of Shoulder (ft)**			
				EB Outside	EB Inside	WB Outside	WB Inside
005B00078N	3.300	Barren	17.84	17.16	18.00	17.91	17.00
005B00077N	5.253	Barren	18.01	16.75	18.16	18.83	18.75
005B00062N	5.919	Barren	17.62	17.16	18.08	17.00	17.58
005B00081N	10.175	Barren	17.5	17.00	17.50	18.00	17.25
005B00065N	12.949	Barren	17.42	17.83	17.41	17.91	16.50
005B00064N	13.631	Barren	17.42	16.42	17.00	16.83	16.42
005B00063N	14.068	Barren	17.25	19.41	18.66	17.83	16.58
005B00086N	15.027	Barren	17.45	16.83	17.25	18.16	16.66
005B00083N	16.108	Barren	16.72	16.41	16.50	16.50	16.75
005B00082N	17.276	Barren	16.60	17.91	16.66	16.41	16.25
085B00047N	32.302	Metcalfe	16.67	16.41	17.00	17.16	17.50
001B00055N	38.423	Adair	16.42	16.50	17.41	18.16	19.08
001B00068N	53.972	Adair	17.00	16.83	17.66	17.66	17.50
001B00070N	57.162	Adair	17.00	16.83	18.08	17.91	17.50

Bridge ID	Milepoint	County	Vertical Clearance over Driving Lanes*	Vertical Clearance at Edge of Shoulder (ft)**			
				EB Outside	EB Inside	WB Outside	WB Inside
104B00027N	58.248	Russell	17.50	17.00	18.16	17.50	16.50
104B00028N	59.211	Russell	17.33	16.50	18.25	18.91	19.50
104B00020N	61.709	Russell	17.58	16.75	17.91	18.08	17.83
104B00025N	62.926	Russell	17.58	16.58	18.66	18.83	18.58
104B00023N	65.331	Russell	17.17	17.25	17.58	17.41	16.41
104B00026N	67.223	Russell	17.00	16.66	17.75	17.50	17.00
104B00029N	69.486	Russell	17.42	16.91	17.75	17.58	16.58
104B00024N	70.806	Russell	17.00	18.08	18.33	17.75	16.58
100B00069N	72.189	Pulaski	16.50	16.41	16.33	16.75	16.08
100B00070N	73.846	Pulaski	16.25	16.25	16.50	16.83	16.75
100B00068N	74.891	Pulaski	16.83	17.08	17.08	17.41	16.25
100B00067R	78.386	Pulaski	16.25	16.33	17.75	18.25	17.83
100B00067L^	78.386	Pulaski					
100B00072N	79.935	Pulaski	16.75	16.33	17.00	17.25	16.75
100B00073N	82.725	Pulaski	17.17	17.91	18.00	18.16	16.58

*From bridge inspection reports

**From field measurements

^Both 67R and 67L bridges carry KY 80 over the CE. 67R with haunched beams has less vertical clearance than 67L, therefore no measurements shown for 67L.

Bridge Railing

The AASHTO A Policy on Design Standards – Interstate System May 2016 stipulates that mainline bridges on routes to be incorporated into the Interstate System may remain in place if the railing across the bridge meets or will be upgraded to the current standards. A review of the bridge inspection reports, and field verification resulted in the structures shown in the table below having substandard railing. This substandard railing usually consisted of metal railing on top of concrete barrier wall and in some locations included a small curb at the edge of the bridge deck. Any railing should be replaced with MASH Test Level IV compliant bridge railing.

Also shown in the table is a listing from the bridge inspection report showing if the transitions from guardrail to bridge rail meets current standard.

Bridge ID	Milepoint	County	Crossing Feature	Bridge Railing	Transition to Railing
005B00067L	0.031	Barren	I-65	Substandard	Substandard
005B00067R	0.031	Barren	I-65	Substandard	Substandard
005B00068R	8.188	Barren	Beaver Creek	Substandard	Substandard
005B00068L	8.199	Barren	Beaver Creek	Substandard	Meets
005B00071R	11.467	Barren	US31E	Substandard	Substandard
005B00073N	11.497	Barren	South Fork- Beaver Creek	Substandard*	Meets
005B00071L	11.498	Barren	US31E	Substandard	Substandard
005B00072R	11.541	Barren	South Fork- Beaver Creek	Substandard	Meets
005B00072L	11.576	Barren	South Fork- Beaver Creek	Substandard	Meets
005B00074N	11.586	Barren	South Fork- Beaver Creek	Substandard*	Substandard
005B00075R	18.259	Barren	Mt. Pisgah Rd.	Substandard	Meets

Bridge ID	Milepoint	County	Crossing Feature	Bridge Railing	Transition to Railing
005B00075L	18.26	Barren	Mt. Pisgah Rd.	Substandard	Meets
085B00040L	24.132	Metcalfe	KY640	Substandard	Substandard
085B00040R	24.135	Metcalfe	KY640	Substandard	Substandard
085B00042L	28.114	Metcalfe	S. Fork Little Barren River	Substandard	Substandard
085B00042R	28.125	Metcalfe	S. Fork Little Barren River	Substandard	Substandard
085B00043R	34.226	Metcalfe	East Fork Little Barren River	Substandard	Substandard
085B00043L	34.227	Metcalfe	East Fork Little Barren River	Substandard	Substandard
001B00062R	48.131	Adair	Pettys Fork	Substandard	Meets
001B00062L	48.136	Adair	Pettys Fork	Substandard	Meets
001B00063R	50.069	Adair	Russell Creek	Substandard	Meets
001B00063L	50.103	Adair	Russell Creek	Substandard	Meets
001B00069R	56.243	Adair	Russell Creek	Substandard	Meets
001B00069L	56.249	Adair	Russell Creek	Substandard	Meets
100B00074L	84.466	Pulaski	Fishing Creek	Substandard	Meets
100B00074R	84.471	Pulaski	Fishing Creek	Substandard	Substandard

* Bridge is located on ramp.

Bridge Sufficiency Ratings

There are 74 bridges along the CE, 30 of which carry the facility over another roadway or stream. The other 44 bridges cross over the CE carrying state and county routes. The majority of these bridges were constructed in the early 1970's with some new bridges being reconstructed in the 2000's. The table below provides the locations of the bridges and the condition from a review of the most current inspection reports.

The condition shown in the table below comes from the National Bridge Inventory (NBI) rating as provided in bridge inspection reports. Ratings are assigned for the bridge deck, superstructure and substructure. The condition given for the overall structure is based off of the lowest rated element. Bridge condition ratings are classified as such: **Poor** – rating less than or equal to 4, **Fair** – rating between 5 and 6, **Good** – rating greater than or equal to 7.

Bridge ID	Milepoint	County	Crossing Feature	Condition	Health Index	Year Built	Posting/Notes
005B00067L	0.031	Barren	I-65	Fair	93.14	1973	None
005B00067R	0.031	Barren	I-65	Fair	91.32	1973	None
005B00078N	3.248	Barren	KY255	Fair	95.23	1973	Posed for Loads
005B00077N	5.192	Barren	US68	Fair	92.93	1973	None
005B00062N	5.873	Barren	KY685	Fair	98.58	1973	None
005B00068R	8.188	Barren	Beaver Creek	Fair	86.50	1973	Posted for Loads
005B00068L	8.199	Barren	Beaver Creek	Fair	84.85	1973	Posted for Loads
005B00111N	8.709	Barren	KY3600	Good	99.62	2014	None
005B00109L	9.042	Barren	KY1297	Fair	99.41	2015	None
005B00109R	9.043	Barren	KY1297	Fair	98.81	2015	None
005B00081N	10.13	Barren	Glen Garry Rd.	Fair	93.90	1973	None
005B00071R	11.467	Barren	US31E	Good	99.24	1973	None
005B00073N	11.497	Barren	South Fork-Beaver Creek	Fair	88.97	1972	Ramp - None
005B00071L	11.498	Barren	US31E	Good	98.47	1973	None
005B00072R	11.541	Barren	South Fork-Beaver Creek	Fair	99.10	1973	None

Bridge ID	Milepoint	County	Crossing Feature	Condition	Health Index	Year Built	Posting/Notes
005B00072L	11.576	Barren	South Fork-Beaver Creek	Fair	99.32	1973	None
005B00074N	11.586	Barren	South Fork-Beaver Creek	Fair	96.96	1972	Ramp - None
005B00065N	12.905	Barren	KY249	Fair	98.09	1973	None
005B00064N	13.602	Barren	KY63	Fair	84.86	1973	None
005B00063N	14.021	Barren	KY90	Fair	98.53	1973	Posed for Loads
005B00086N	14.981	Barren	KY1307	Fair	95.48	1973	Posted for Loads
005B00101N	15.383	Barren	KY1519	Good	99.53	2011	None
005B00083N	16.064	Barren	Lecta Salem Rd.	Fair	94.29	1973	None
005B00082N	17.214	Barren	Lecta Kino Rd.	Fair	94.03	1973	None
005B00075R	18.259	Barren	Mt. Pisgah Rd.	Good	98.36	1973	None
005B00075L	18.26	Barren	Mt. Pisgah Rd.	Good	99.29	1973	None
085B00040L	24.132	Metcalfe	KY640	Fair	96.98	1973	None
085B00040R	24.135	Metcalfe	KY640	Fair	93.92	1973	None
085B00039N	27.422	Metcalfe	US68	Fair	99.20	1973	None
085B00042L	28.114	Metcalfe	S. Fork Little Barren River	Good	99.75	1973	None
085B00042R	28.125	Metcalfe	S. Fork Little Barren River	Good	99.81	1973	None
085B00060N	29.796	Metcalfe	US68	Good	98.97	2014	None
085B00047N	32.253	Metcalfe	KY2399	Fair	97.10	1973	Posted for Loads
085B00043R	34.226	Metcalfe	East Fork Little Barren River	Fair	97.55	1972	None
085B00043L	34.227	Metcalfe	East Fork Little Barren River	Fair	95.84	1972	None
001B00055N	38.378	Adair	KY80	Fair	97.60	1971	None
001B00053N	42.616	Adair	KY2982	Fair	97.91	1972	None
001B00083N	46.625	Adair	KY61	Good	98.78	2007	None
001B00062R	48.131	Adair	Pettys Fork	Good	99.68	1972	None
001B00062L	48.136	Adair	Pettys Fork	Good	99.40	1972	None
001B00085N	48.348	Adair	KY55	Good	99.51	2008	None
001B00059N	48.917	Adair	KY55X	Fair	94.31	1972	None
001B00063R	50.069	Adair	Russell Creek	Fair	86.61	1972	None
001B00063L	50.103	Adair	Russell Creek	Fair	88.58	1972	None
001B00065N	51.018	Adair	Sawmill Rd.	Fair	95.66	1972	None
001B00068N	53.929	Adair	KY2968	Fair	95.91	1972	None
001B00069R	56.243	Adair	Russell Creek	Fair	96.08	1972	None
001B00069L	56.249	Adair	Russell Creek	Fair	88.58	1972	None
001B00070N	57.119	Adair	Providence Church Rd.	Fair	98.48	1972	None
104B00027N	58.198	Russell	North Grider Rd.	Good	96.71	1972	None
104B00028N	59.166	Russell	Miller Cemetary Rd.	Fair	96.38	1972	None
104B00021N	60.753	Russell	KY379	Fair	91.07	1973	None
104B00020N	61.665	Russell	KY430	Fair	89.02	1973	None
104B00022N	62.452	Russell	US127	Fair	73.32	1973	None
104B00025N	62.877	Russell	KY619	Fair	92.11	1973	None
104B00023N	65.288	Russell	KY910	Fair	92.58	1973	None
104B00026N	67.175	Russell	KY76	Fair	92.70	1973	None
104B00029N	69.443	Russell	J.W. Harris Rd.	Good	97.06	1973	None
104B00024N	70.757	Russell	KY910	Fair	84.20	1973	None
100B00069N	72.146	Pulaski	Brown Ridge Rd.	Good	98.48	1973	None
100B00070N	73.803	Pulaski	Finley Owens Rd.	Fair	97.78	1973	Posed for Loads

Bridge ID	Milepoint	County	Crossing Feature	Condition	Health Index	Year Built	Posting/Notes
100B00068N	74.849	Pulaski	KY837	Fair	92.96	1972	None
100B00067R	78.334	Pulaski	KY80	Good	88.91	1972	None
100B00067L	78.338	Pulaski	KY80	Fair	81.11	1979	None
100B00072N	79.891	Pulaski	KY2993	Fair	93.55	1972	None
100B00073N	82.68	Pulaski	Piney Grove Rd.	Fair	92.78	1972	None
100B00074L	84.466	Pulaski	Fishing Creek	Fair	95.31	1973	Posted for Loads
100B00074R	84.471	Pulaski	Fishing Creek	Fair	95.77	1973	Posted for Loads
100B00123R	86.164	Pulaski	KY914	Good	99.21	2008	None
100B00123L	86.175	Pulaski	KY914	Good	99.44	2008	None
100B00122N	86.74	Pulaski	KY3263	Fair	97.89	2008	None
100B00121N	88.044	Pulaski	KY3091	Fair	97.79	2008	None
100B00120L	88.241	Pulaski	US27	Good	99.56	2008	New - Not Yet Open
100B00120R	88.241	Pulaski	US27	Good	99.24	2008	None

Box Culverts

Twenty-one reinforced box culverts with span lengths in excess of 20-foot are located along the CE. These culverts were built in the early 1970s with 9 locations accommodating the crossing of streams and 12 locations providing the crossing of local roads. The table below provides the locations of these culverts and the culvert conditions.

Bridge ID	Milepoint	County	Crossing Feature	Condition	Health Index	Year Built	Posting/Notes
005B00079N	1.866	Barren	Millstown Rd	Fair	76.17	1973	RCBC - None
005B00080N	7.262	Barren	Bishop Rd	Fair	77.56	1973	RCBC - None
005B00070N	10.015	Barren	Huggins Branch	Fair	95.28	1972	RCBC - None
005B00084N	19.702	Barren	Slick Rock Rd	Fair	64.05	1973	RCBC - None
005B00076N	20.188	Barren	Beaver Creek	Fair	86.44	1973	RCBC - None
005B00085N	20.346	Barren	Beaver Creek Rd	Fair	66.08	1973	RCBC - None
085B00046N	23.221	Metcalfe	Dripping Springs Rd	Fair	57.12	1973	RCBC - None
085B00041N	27.005	Metcalfe	Dry Fork Creek	Fair	89.89	1973	RCBC - None
085B00044N	34.422	Metcalfe	Jack Sparks Rd	Fair	88.43	1973	RCBC - None
085B00045N	35.121	Metcalfe	E. Fork-Adair Co Line Rd	Fair	61.73	1973	RCBC - None
001B00057N	40.956	Adair	Richards Branch	Fair	85.88	1971	RCBC - None
001B00056N	41.293	Adair	Middle Prong Creek	Fair	76.14	1971	RCBC - None
001B00058N	41.352	Adair	Gradyville Country Club Rd	Fair	91.50	1971	RCBC - None
001B00060N	44.444	Adair	Butlers Fork	Good	93.30	1972	RCBC - None
001B00061N	45.268	Adair	Bliss Rd	Fair	81.94	1972	RCBC - Posted for Load
001B00064N	50.328	Adair	Conover Ln	Fair	63.86	1971	RCBC - None
001B00066N	52.58	Adair	Keen Wilson Rd	Fair	64.58	1971	RCBC - None
001B00067N	53.174	Adair	Reeves Rd	Fair	65.41	1972	RCBC - None
104B00030N	68.616	Russell	Irvin Branch	Fair	87.22	1973	RCBC - None
100B00076N	73.157	Pulaski	House Fork Creek	Fair	64.68	1974	RCBC - None
100B00071N	75.62	Pulaski	Wolf Creek	Fair	60.69	1973	RCBC - None

Overhead Signing

The AASHTO A Policy on Design Standards – Interstate System May 2016 requires the vertical clearance under sign trusses and pedestrian overpasses to not be less than 17 ft. This vertical clearance applies to all travel lanes, auxiliary lanes, shoulders, and collector-distributor roads. Four overhead truss signs are present along the CE.

Field measurements were obtained for all four of these locations and all overhead signs met the 17-foot minimum vertical clearance. The table below shows the locations of these sign trusses.

Milepoint	County	Description
0.30	Barren	Truss-mounted sign over WB lanes
0.65	Barren	Truss-mounted sign over WB lanes
1.16	Barren	Truss-mounted sign over WB lanes
87.98	Pulaski	Truss-mounted sign over EB lanes

1.3 Interchanges and Ramps

This section shows data for interchanges and ramps along the CE. Data was collected from KYTC's HIS, record plans, Google Earth, and a field review for confirmation of data. It should be noted that a full survey should be conducted to up-to-date and accurate data within this study area.

Interchange Type and Interchange Lighting Presence

The following table shows the interchange locations along the CE, interchange type, and presence/absence of interchange lighting. Exit 70 is a new interchange and existing data was limited. A Google Earth review and field visit confirmation were used.

County	Exit Number	BMP	EMP	Intersecting Route	Interchange Type	Lighting
Barren	0	0	0.316	I-65	Trumpet	Yes
Barren	8	8.333	9.014	Glasgow Outerloop	Diamond	Yes
Barren	11	11.176	11.781	Scottsville Rd	Diamond	Yes
Barren	14	13.684	14.35	Burkesville Rd	Diamond	Yes
Barren	15	15.004	15.72	KY 1519	Diamond	Yes
Metcalfe	27	27.419	29.086	Glasgow Rd	Loop/Cloverleaf	Yes
Metcalfe	29	29.463	30.046	Greensburg Rd	Diamond	No
Adair	46	46.302	46.942	South Burkesville Rd	Diamond	Yes
Adair	49	48.537	49.183	KY 55	Diamond	Yes
Russell	62	62.152	62.776	US 127	Diamond	Yes
Russell	70	70.366	71.039	KY 910	Diamond	Yes
Pulaski	78	78.063	78.831	KY 80	Diamond	No
Pulaski	86	85.982	86.404	Southwestern Bypass	Trumpet	Yes
Pulaski	88	87.969	88.266	US 27	Partial Cloverleaf	Yes

Design Speed, Posted Auxiliary Speed, and Weaving Sections

The *Green Book* provides values for ramp design speed as related to highway design speed. These design speeds apply to the sharpest ramp curve. For standard ramps, the design speed may range from 35-mph to 60-mph, and for loop ramps the design speed should not be less than 20-mph. The following table shows the posted auxiliary speeds (mph) and weaving sections for the CE ramps.

County	Exit Number	Intersecting Route	EB Entrance	EB Exit	WB Entrance	WB Exit	Weave (Y/N)
Barren	0	I-65	40	NA	50	50	No
Barren	8	Glasgow Outerloop	35	NA	40	NA	No
Barren	11	Scottsville Rd	NA	NA	NA	50	No
Barren	14	Burkesville Rd	NA	NA	NA	NA	No
Barren	15	KY 1519	NA	NA	NA	NA	No
Metcalfe	27	Glasgow Rd	25	25	25	25	Yes
Metcalfe	29	Greensburg Rd	NA	NA	NA	NA	No
Adair	46	South Burkesville Rd	NA	NA	NA	NA	No
Adair	49	KY 55	NA	NA	NA	50	No
Russell	62	US 127	30	50	30	50	No
Russell	70	KY 910	NA	NA	NA	NA	No
Pulaski	78	KY 80	NA	NA	NA	NA	No
Pulaski	86	Southwestern Bypass	45	40	25	45	No
Pulaski	88	US 27	45	25	40	NA	No

Ramp Lane Width

The following table shows the lane widths for the CE ramps. The 2018 Green Book requires lane widths to be 14 feet wide for a standard ramp and 15 feet wide for loop ramps.

County	Exit Number	Intersecting Route	Lane Width (ft)			
			EB Entrance	EB Exit	WB Entrance	WB Exit
Barren	0	I-65	15	14	14	14
Barren	8	Glasgow Outerloop	14	14	14	14
Barren	11	Scottsville Rd	14	14	14	14
Barren	14	Burkesville Rd	14	14	14	14
Barren	15	KY 1519	14	14	14	14
Metcalfe	27	Glasgow Rd	15	15	15	15
Metcalfe	29	Greensburg Rd	14	14	14	14
Adair	46	South Burkesville Rd	14	14	14	14
Adair	49	KY 55	14	14	14	14
Russell	62	US 127	14	14	14	14
Russell	70	KY 910	14	14	14	14
Pulaski	78	KY 80	14	14	14	14
Pulaski	86	Southwestern Bypass	14	14	14	14
Pulaski	88	US 27	14	14	14	NA

Ramp Shoulder Width

The following table shows the shoulder widths for the CE ramps. The 2018 Green Book requires inside shoulder widths to be at least 2 feet wide and outside shoulders to be at least 6 feet wide.

County	Exit Number	Intersecting Route	EB Entrance Inside/ Outside Width (ft)	EB Exit Inside/ Outside Width (ft)	WB Entrance Inside/ Outside Width (ft)	WB Exit Inside/ Outside Width (ft)
Barren	0	I-65	4'/6'	4'/6'	4'/6'	4'/6'
Barren	8	Glasgow Outerloop	4'/6'	4'/6'	4'/6'	4'/6'
Barren	11	Scottsville Rd	4'/6'	4'/6'	4'/6'	4'/6'
Barren	14	Burkesville Rd	4'/6'	4'/6'	4'/6'	4'/6'
Barren	15	KY 1519	4'/6'	4'/6'	4'/6'	4'/6'
Metcalfe	27	Glasgow Rd	4'/6'	4'/6'	4'/6'	4'/6'
Metcalfe	29	Greensburg Rd	4'/6'	4'/6'	4'/6'	4'/6'
Adair	46	South Burkesville Rd	4'/6'	4'/6'	4'/6'	4'/6'
Adair	49	KY 55	4'/6'	4'/6'	4'/6'	4'/6'
Russell	62	US 127	4'/6'	4'/6'	4'/6'	4'/6'
Russell	70	KY 910	4'/6'	4'/6'	4'/6'	4'/6'
Pulaski	78	KY 80	4'/6'	4'/6'	4'/6'	4'/6'
Pulaski	86	Southwestern Bypass	4'/6'	4'/6'	4'/6'	4'/6'
Pulaski	88	US 27	6'/8'	6'/8'	6'/8'	NA

Ramp Horizontal Alignment

The 2018 *Green Book* requires that the superelevation for interstate ramps be less than 10%, which is what some of the CE interchanges were designed to, however it is KYTC common practice to keep superelevation below 8%. Locations with superelevation greater than 8% but less than equal to 10% are typically allowed since that does meet the 2018 *Green Book* requirement even though it is greater than KYTC common practice. Record plans were used to determine the superelevation of interchange ramps. Ramp radius is contingent on the superelevation of the ramp and the ramp speed. The existing radius was found in the record plans while the radius required was found in the superelevation table in the 2018 *Green Book*. During the original design of the CE, ramps were designed at an $e_{\max} = 10\%$. Any ramp with a superelevation over 8% in the table below adheres to the $e_{\max} = 10\%$ table in the 2018 *Green Book*. All others adhere to the $e_{\max} = 8\%$ table. The divergence angle for an interstate must be between two and five percent. The divergence angle was found by measuring the two legs of the off-ramp divergence and solving for the tangent degree. The table below highlights the superelevation and radius of most ramps, but there was missing record plan data for some interchanges. The divergence angle was calculated for all off-ramps using Google Earth.

Exit Number	Intersecting Route	Ramp	Speed (mph)	Actual Superelevation	Superelevation Required	Actual Radius (ft)	Radius Req. (ft)	Divergence Angle (deg)
0	I-65	EB On	25	8.4%	5.6%	402	234	
		EB On	40	9.8%	5.4%	1206	798	
		WB Off	50	10.0%	10.0%	716	694	5.3
		WB Off	50	10.0%	7.2%	1145	694	5.3
8	Glasgow Outerloop	EB Off	NA	NA	NA	NA	NA	4.3
		EB On	NA	NA	NA	NA	NA	
		WB Off	NA	NA	NA	NA	NA	5.4
		WB On	NA	NA	NA	NA	NA	
11	Scottsville Rd	EB Off	50	8.4%	8.4%	1145	1130	6.4
		EB On	35	5.1%	2.8%	2292	960	
		WB Off	45	9.9%	9.9%	764	746	5.7
		WB On	40	9.9%	9.9%	764	746	
14	Burkesville Rd	EB Off	50	NC	NC	Straight	Straight	9.0
		EB On	50	9.9%	9.9%	764	746	
		WB Off	50	5.1%	4.6%	2291	1985	9.2
		WB On	50	9.9%	9.9%	768	746	
15	KY 1519	EB Off	NA	NA	NA	NA	NA	4.6
		EB On	NA	NA	NA	NA	NA	
		WB Off	NA	NA	NA	NA	NA	4.8
		WB On	NA	NA	NA	NA	NA	
27	Glasgow Rd	EB Off	25	8.0%	4.2%	716	134	12.3
		EB On	25	8.0%	5.8%	328	134	
		WB Off	25	8.0%	6.2%	360	134	11.6
		WB On	25	8.0%	6.2%	329	134	
29	Greensburg Rd	EB Off	50	7.0%	7.0%	1200	1190	4.0
		EB On	50	7.0%	7.0%	1200	1190	
		WB Off	50	7.0%	7.0%	1200	1190	4.0
		WB On	50	7.0%	7.0%	1200	1190	
46	South Burkesville Rd	EB Off	35	2.8%	2.6%	2500	2130	4.1
		EB On	35	6.3%	5.8%	800	649	
		WB Off	35	4.0%	3.6%	1600	1370	4.8
		WB On	35	6.3%	5.8%	800	649	
49	KY 55	EB Off	50	5.9%	5.4%	1909	1605	6.7
		EB On	50	9.2%	9.2%	955	948	
		WB Off	50	9.2%	9.2%	955	948	7.2
		WB On	50	7.3%	6.4%	1432	1090	
62	US 127	EB Off	NA	NA	NA	NA	NA	4.5
		EB On	NA	NA	NA	NA	NA	
		WB Off	NA	NA	NA	NA	NA	3.6
		WB On	NA	NA	NA	NA	NA	
70	KY 910	EB Off	50	4.8%	4.8%	2200	2160	3.4
		EB On	50	6.4%	6.4%	1400	1400	
		WB Off	50	7.0%	7.0%	1200	1190	3.9
		WB On	50	6.4%	6.4%	1400	1400	

Exit Number	Intersecting Route	Ramp	Speed (mph)	Actual Superelevation	Superelevation Required	Actual Radius (ft)	Radius Req. (ft)	Divergence Angle (deg)
78	KY 80	EB Off	35	10.0%	10.3%	240	292	5.9
		EB On	50	NC	NC	Straight	Straight	
		WB Off	35	10.0%	10.3%	240	292	5.0
		WB On	45	9.8%	9.8%	818	798	
86	Southwestern Bypass	EB Off	40	8.0%	6.8%	800	444	3.8
		EB On	45	6.8%	9.8%	800	990	
		WB Off	45	8.0%	8.0%	600	587	5.2
		WB On	25	8.0%	3.8%	800	134	
88	US 27	EB Off	25	6.2%	2.4%	1500	308	3.0
		EB On	40	8.0%	8.0%	450	444	
		WB On	40	8.0%	8.0%	500	444	

Ramp Vertical Grades

The 2018 Green Book requires that the vertical grade for interstate ramps much be between 4% and 8% based on the design speed of the ramp. The required SSD for crest curves and HLSD for sag curves are determined by the ramp speed, and actual SSD and HLSD are calculated using the same equations as shown for the mainline. There are three locations where the HLSD is less than what is required, however these locations are at interchanges where lighting is present, which mitigates the issue. The following table shows the vertical grades and the associated HLSD and SSD for the CE ramps. Data was not available for all ramps.

Exit	Ramp	Curve Length (ft)	Grade 1	Grade 2	A	Actual SSD / HLSD (ft)	Required SSD / HLSD (ft)	Design Speed (mph)
0	EB On	900	-2.2	0.5	3.2	1131	155	25
0	EB On	450	0.5	2.3	1.8	12100	305	40
0	WB Off	450	-2.1	0.6	2.7	850	425	50
0	WB Off	800	-0.9	2.2	2.7	1347	425	50
8	EB Off	NA	NA	NA	NA	NA	NA	NA
8	EB On	NA	NA	NA	NA	NA	NA	NA
8	WB Off	NA	NA	NA	NA	NA	NA	NA
8	WB On	NA	NA	NA	NA	NA	NA	NA
11	EB Off	300	-2.5	0.7	3.2	469	425	50
11	EB On	550	4	1.1	2.9	647	250	35
11	WB Off	350	1.9	-3	4.9	395	360	45
11	WB On	200	-1.1	0.7	1.8	7600	305	40
14	EB Off	600	-1.5	2.9	4.4	573	425	50
14	EB On	400	-3.8	-0.5	3.3	555	425	50
14	WB Off	400	0.9	3.1	2.2	1422	425	50
14	WB On	400	-0.7	1.6	2.3	1200	425	50
15	EB Off	NA	NA	NA	NA	NA	NA	NA
15	EB On	NA	NA	NA	NA	NA	NA	NA
15	WB Off	NA	NA	NA	NA	NA	NA	NA
15	WB On	NA	NA	NA	NA	NA	NA	NA
27	EB Off	300	3.1	3	0.1	10940	155	25
27	EB On	500	-3.1	0.9	4	533	155	25
27	WB Off	300	-1	3.7	4.7	307	155	25

Exit	Ramp	Curve Length (ft)	Grade 1	Grade 2	A	Actual SSD / HLSD (ft)	Required SSD / HLSD (ft)	Design Speed (mph)
27	WB On	300	-0.6	-2.2	2.8	535	155	25
29	EB Off	300	1.4	-1.3	2.7	550	425	50
29	EB On	500	2.2	-3.1	5.3	451	425	50
29	WB Off	400	0.8	5	4.2	424	425	50
29	WB On	400	-4	-1.25	2.75	750	425	50
46	EB Off	400	0.5	-3.4	3.9	477	250	35
46	EB On	400	-5	-0.5	4.5	400	250	35
46	WB Off	300	-4.14	-0.5	3.64	395	250	35
46	WB On	562	-3.67	3	6.67	383	250	35
49	EB Off	200	3.16	5	1.84	4267	425	50
49	EB On	250	-5	-1.56	3.44	373	425	50
49	WB Off	250	1.8	3.6	1.8	8500	425	50
49	WB On	200	-5	-2.8	2.2	933	425	50
62	EB Off	NA	NA	NA	NA	NA	NA	NA
62	EB On	NA	NA	NA	NA	NA	NA	NA
62	WB Off	NA	NA	NA	NA	NA	NA	NA
62	WB On	NA	NA	NA	NA	NA	NA	NA
70	EB Off	580	-0.5	4.5	5	499	425	50
70	EB On	450	-1	1.24	2.24	1437	425	50
70	WB Off	420	-1.2	3.4	4.6	409	425	50
70	WB On	500	-5	-0.84	4.16	515	425	50
78	EB Off	600	-1.97	3.1	5.07	507	250	35
78	EB On	550	-3.1	2.52	5.62	433	425	50
78	WB Off	400	-1.9	1.5	3.4	533	250	35
78	WB On	600	-3.25	3.7	6.95	391	360	45
86	EB Off	450	0.5	4	3.5	564	305	40
86	EB On	500	1	-3.5	2.5	682	360	45
86	WB Off	400	-0.5	2.3	2.8	724	360	45
86	WB On	500	-2.3	1.1	3.4	636	155	25
88	EB Off	400	-0.8	-4.6	3.8	484	155	25
88	EB On	300	-1.5	-3.7	2.2	640	305	40
88	WB On	150	1.3	1.2	0.1	10865	305	40

Acceleration and Deceleration Lane Lengths

Acceleration and deceleration lanes allow vehicles time and space to increase their speed when entering a freeway or decrease their speed when exiting a freeway. The required acceleration and deceleration lane lengths from *2018 Green Book* vary based on the design speed of the ramp. The table below shows the minimum length based on auxiliary speed.

Auxiliary Speed (MPH)	Minimum Acceleration Lane Length (ft)	Minimum Deceleration Lane Length (ft)
25	1,420	550
30	1,350	520
35	1,230	490
40	1,000	440
45	820	390
50	580	340

The following table shows the acceleration and deceleration lane lengths for the CE ramps.

County	Exit Number	Intersecting Route	Acceleration / Deceleration Lane Length (ft)					
			EB Entrance	EB Exit	WB Entrance	WB Exit	EB Exit 2	WB Exit 2
Barren	0	I-65	Continuous	Continuous	Continuous	610	NA	NA
Barren	8	Glasgow Outerloop	1100	800	1110	545	NA	NA
Barren	11	Scottsville Rd	670	700	680	755	NA	NA
Barren	14	Burkesville Rd	500	750	650	750	NA	NA
Barren	15	KY 1519	1155	775	1100	800	NA	NA
Metcalfe	27	Glasgow Rd	315	315	315	315	NA	NA
Metcalfe	29	Greensburg Rd	1150	815	1000	830	NA	NA
Adair	46	South Burkesville Rd	1080	560	830	760	NA	NA
Adair	49	KY 55	610	540	510	610	NA	NA
Russell	62	US 127	1120	720	1200	730	NA	NA
Russell*	70	KY 910	NA	NA	NA	NA	NA	NA
Pulaski	78	KY 80	570	775	450	660	280	280
Pulaski	86	Southwestern Bypass	1000	715	610	800	NA	NA
Pulaski	88	US 27	850	1000	1150	NA	NA	NA

* This is a new interchange and aerial imagery/HIS data is not available

Control of Access

The following table shows the control of access for the CE. Access points should be greater than 300 feet away from ramp terminals in rural areas and 100 feet in urban areas. Interchanges located in urban areas are shown in italics.

County	Exit Number	Intersecting Route	EB Entrance	EB Exit	WB Entrance	WB Exit
Barren	0	I-65	300+ feet	300+ feet	300+ feet	300+ feet
Barren	8	Glasgow Outerloop	300+ feet	300+ feet	300+ feet	300+ feet
<i>Barren</i>	<i>11</i>	<i>Scottsville Rd</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>240 feet</i>	<i>230 feet</i>
<i>Barren</i>	<i>14</i>	<i>Burkesville Rd</i>	<i>230 feet</i>	<i>300+ feet</i>	<i>230 feet</i>	<i>300+ feet</i>
Barren	15	KY 1519	300+ feet	300+ feet	300+ feet	300+ feet
Metcalfe	27	Glasgow Rd	300+ feet	300+ feet	300+ feet	300+ feet
Metcalfe	29	Greensburg Rd	300+ feet	300+ feet	300+ feet	300+ feet
Adair	46	South Burkesville Rd	300+ feet	300+ feet	300+ feet	300+ feet
<i>Adair</i>	<i>49</i>	<i>KY 55</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>250 feet</i>	<i>300+ feet</i>
<i>Russell</i>	<i>62</i>	<i>US 127</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>
Russell	70	KY 910	300+ feet	300+ feet	300+ feet	300+ feet
Pulaski	78	KY 80	300+ feet	300+ feet	300+ feet	300+ feet
<i>Pulaski</i>	<i>86</i>	<i>Southwestern Bypass</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>
<i>Pulaski</i>	<i>88</i>	<i>US 27</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>	<i>300+ feet</i>

Interchange Spacing

Interchange spacing is shown in the following table for the CE. Interstate requirements for interchange spacing are one mile in urban areas and two miles in rural areas. Interchanges located in urban areas are shown in italics. Exit 14 and 15 are less than two miles apart, with one interchange being rural and the other urban. Because spacing is greater than one mile, this location meets the spacing requirement.

County	Exit Number	Intersecting Route	Interchange Spacing From Last (mi)	Interchange Spacing To Next (mi)
Barren	0	I-65	0	8.5155
Barren	8	Glasgow Outerloop	8.5155	2.805
<i>Barren</i>	<i>11</i>	<i>Scottsville Rd</i>	<i>2.805</i>	<i>2.5385</i>
<i>Barren</i>	<i>14</i>	<i>Burkesville Rd</i>	<i>2.5385</i>	<i>1.345</i>
Barren	15	KY 1519	1.345	12.8905
Metcalfe	27	Glasgow Rd	12.8905	2.360
Metcalfe	29	Greensburg Rd	2.360	16.8675
Adair	46	South Burkesville Rd	16.8675	2.238
<i>Adair</i>	<i>49</i>	<i>KY 55</i>	<i>2.238</i>	<i>13.604</i>
<i>Russell</i>	<i>62</i>	<i>US 127</i>	<i>13.604</i>	<i>8.2385</i>
Russell	70	KY 910	8.2385	7.7445
Pulaski	78	KY 80	7.7445	7.746
<i>Pulaski</i>	<i>86</i>	<i>Southwestern Bypass</i>	<i>7.746</i>	<i>1.9245</i>
<i>Pulaski</i>	<i>88</i>	<i>US 27</i>	<i>1.9245</i>	<i>0</i>

