VII. KEY FINDINGS OF EXISTING CONDITIONS OVERVIEW

Currently, the Purchase Parkway operates similarly to an interstate highway. As discussed in previous chapters, in some cases the Purchase Parkway lacks geometric compliance with current AASHTO guidelines. These AASHTO minimum guidelines are provided in **Table 7-1**. The Purchase Parkway provides the basic geometric characteristics of an interstate highway, such as full control of access, two travels lanes in each direction, 12 foot lanes, 10 foot outside paved shoulders, 36 foot rural medians, 70 mph rural design speed, and 50 mph urban design speed. However, the Purchase Parkway lacks compliance with the dimensions of other design features. **Figure 7-1** through **7-5** summarizes the deficiency locations for the project corridor. Each deficiency labeled on the figures is described in **Table 7-2** and **Table 7-3** in more detail**.** In addition to those labeled, the inside shoulder for the Purchase Parkway is deficient. The Purchase Parkway has a three foot paved inside shoulder, with the exception of the Mayfield Bypass, which has no inside paved shoulder.

Area Type	Rural			Urban			Urban/Rural		
Design Element	**Mainline**	**Ramps**	**Loops**	**Mainline**	**Ramps**	**Loops**	**Directional**	**Entrance**	**Exit**
Design Speed (MPH) (507,825,826) [2]	70	35	25	50	25	25	40		
Level of Service (504, 838) [3]		C			D				
Driving Lane Width (504,838) [3]	12'	15'	15'	12'	15'	15'			
Inside Shoulder Width (505,510,513,838) [3]									
4-lane freeway & ramps	4'	2'-4'	2'-4'	4'	2'-4'	2'-4'	1'-6'		
6-lane, Truck DDHGV<=250				10'					
6-lane, Truck DDHGV>250				12'					
Outside Shoulder Width (505,838) [3]									
Truck DDHV <= 250	10'	8'-10'	8'-10'	10'	8'-10'	8'-10'	8'-10'		
Truck DDHV > 250	12'			12'					
Median Width (509) [4] [1]	36'			10'					
Over Freeway Vertical Bridge Clearance (506,763)	16'-00"								
Over Freeway Vertical Sign Truss Clearance (507)	17-'00"								
Bridge Width (Horizonatal) ADT>2000	Traveled Lanes + Shoulders (approach raodway width)								
Bridge Width (Horizonatal), Length > 200' [2]	Traveled Lanes + 3.5' each side								
Design ADT (vehicles per day)	> 6,000	750-1,500		> 6,000	750-1,500				
Clear Zone (Fill Slope 1V:4H or flatter) [3]	30'-46'	10'-14'		20'-28'	10'-14'				
Clear Zone (Cut Slope 1V:3H or flatter) [3]	22'-30'	10'-12'		14'-22'	10'-12'				
Superelevation (505) [4]	+/-8%								
Horizontal Curvature Minimum Radius (8% max SE) (170)	1810'	314'	134'	758'	134'	134'	444'		
Minimum Runoff (8% max SE) (181)	240'	155'	137'	192'	137'	137'	166'		
Minimum Runout (8% max SE) (181)	60'	39'	34'	48'	34'	34'	41'		
Maximum Grade (506,829)	4%	5%-7%	5%-7%	5%	5%-7%	5%-7%	4%-6%		
Stopping Sight Distance (112)	730'	250'	155'	425'	155'	155'	305'		
Taper Ratio (845)								50:1	
Divergence Angle (849)									2°-5°

Note: Page number references from AASHTO's *A Policy on Geometric Design of Highways and Streets, 2004* are provided in parenthesis. Page number reference from AASHTO's *A Policy on Design Standards Interstate System, 2005* are provided in brackets.

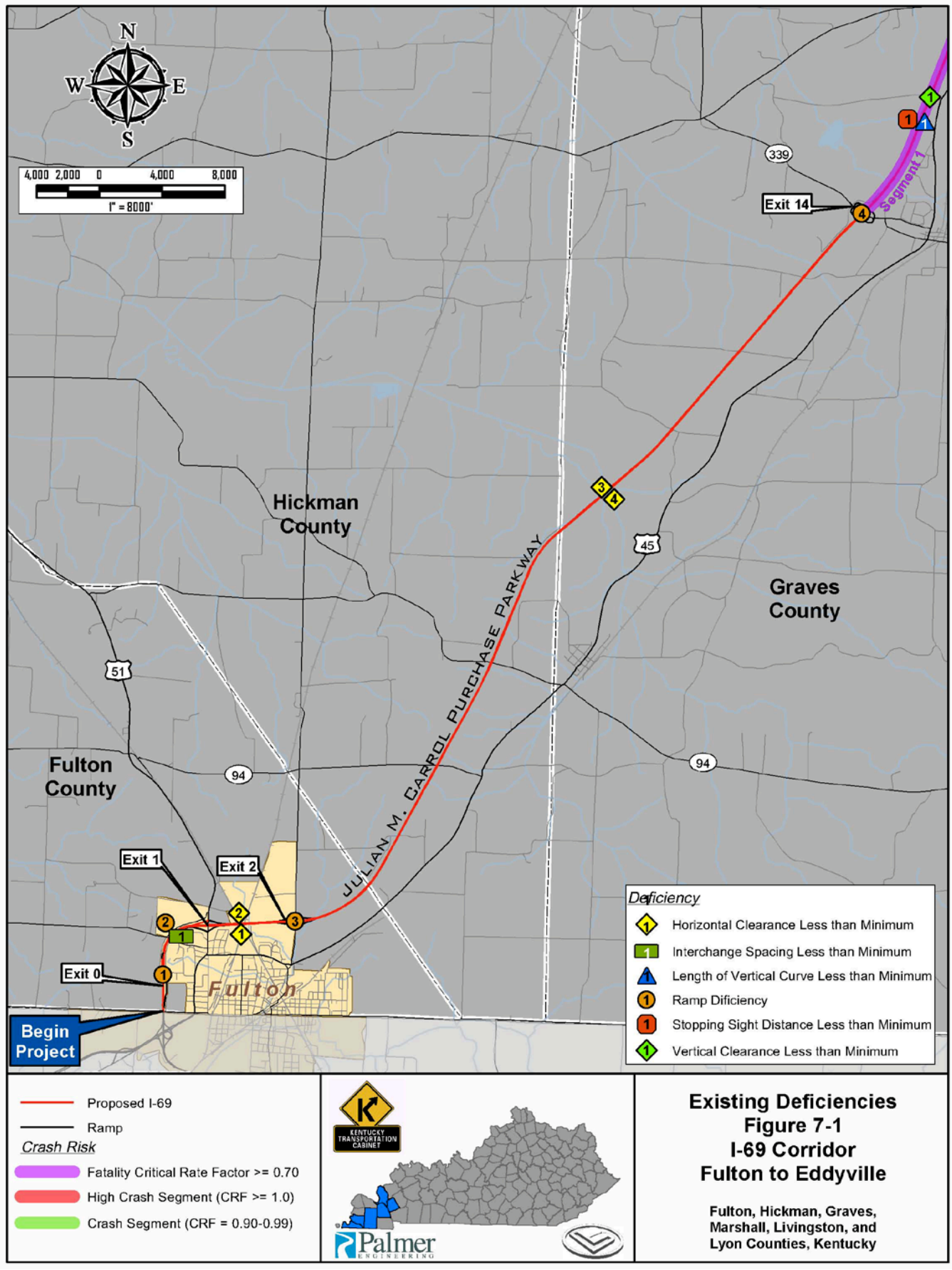
[1] AASHTO's *A Policy on Design Standards Interstate System, 2005* states 36' minimum depressed median in rual areas. AASHTO's *A Policy on Geometric Design of*

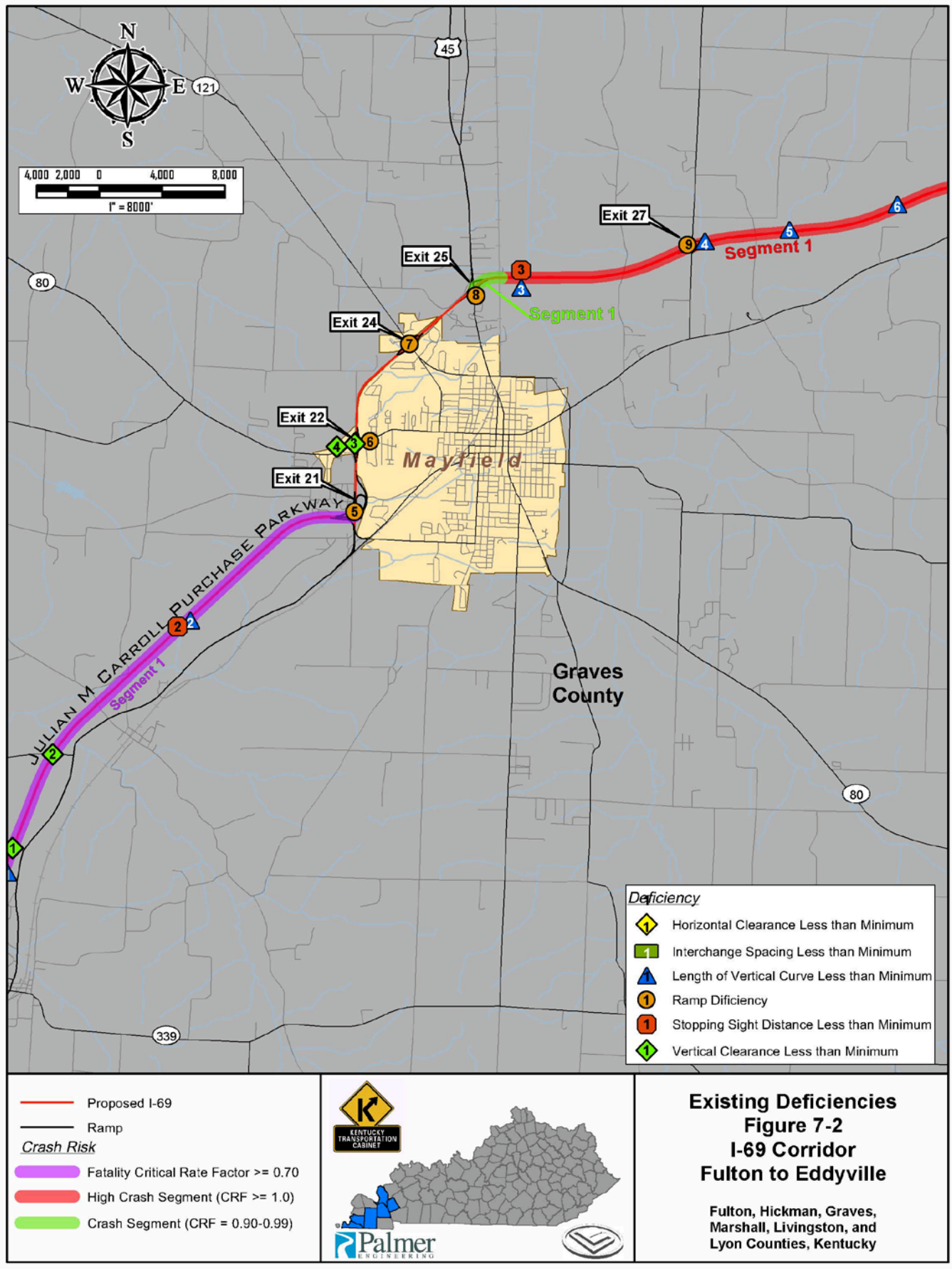
[2]This item is referenced in the AASHTO *A Policy on Design Standards Interstate System, 2005*

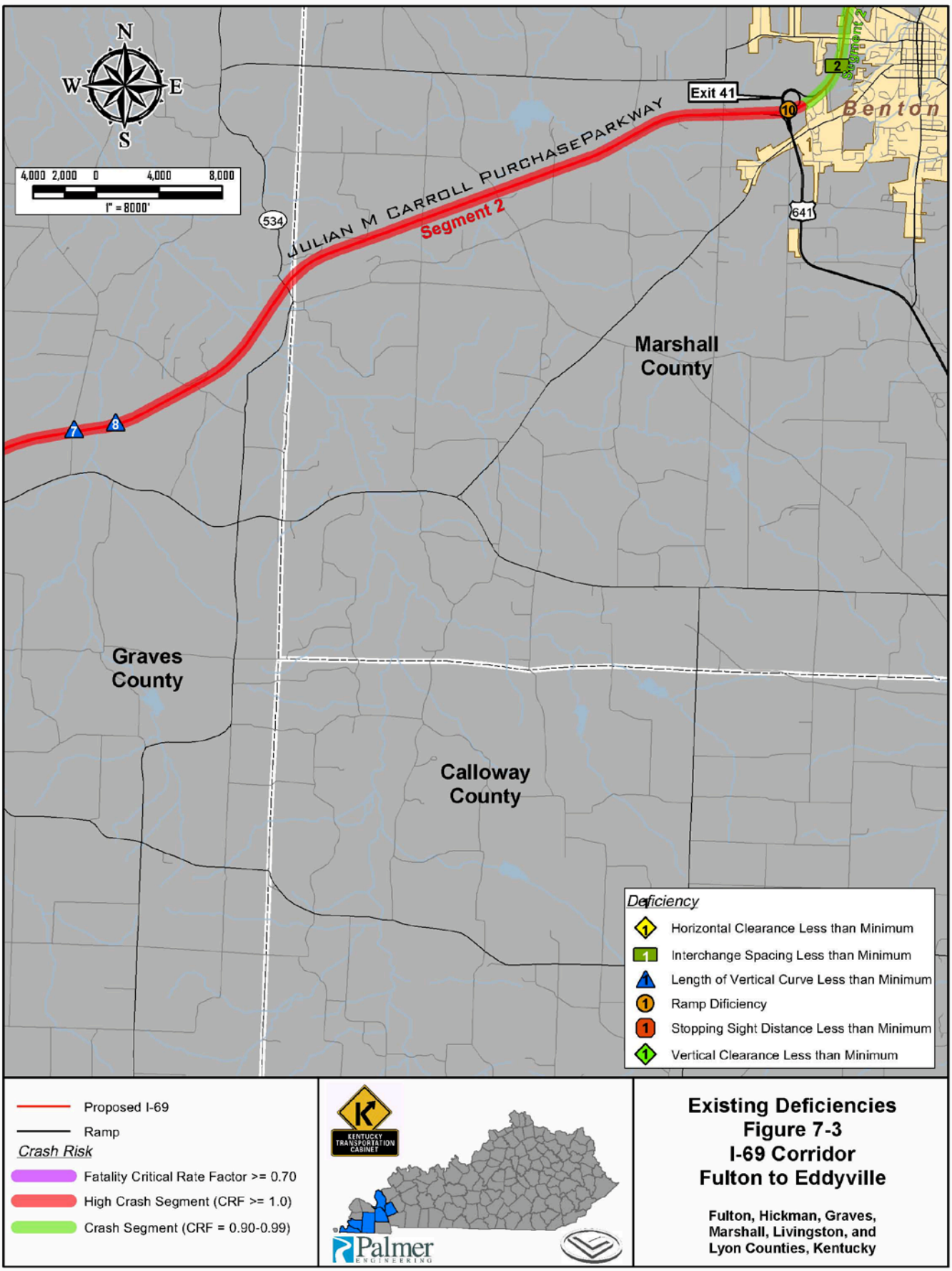
[3] Information on clear zones is provided in AASHTO's *Roadside Design Guide Current Edition* .

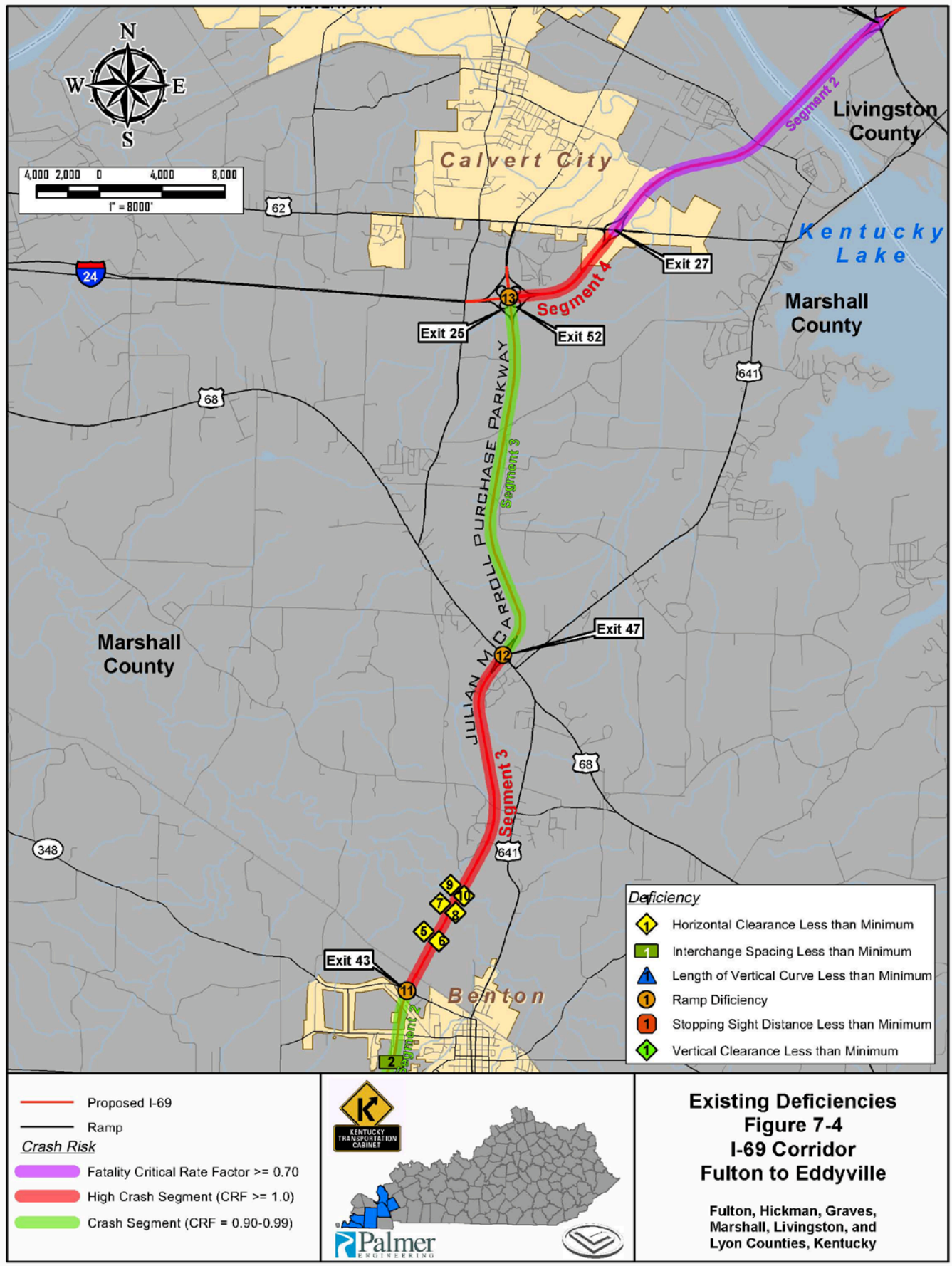
[4] Common KYTC Practice is 8% maximum superelevation. KYTC has used 10% maximum superelevation on past projects including the Purchase Parkway.

Table 7-1 AASHTO Minimum Guidelines


N
W
E
S
4,000 2,000 0 4,000 8,000
1" = 8000'
Hickman County
Graves County
Fulton County
Julian M. Carroll Purchase Parkway
339
45
51
94
94
Exit 14
Segment 1
Exit 1
Exit 2
Exit 0
Fulton
Begin Project
Deficiency
Horizontal Clearance Less than Minimum
Interchange Spacing Less than Minimum
Length of Vertical Curve Less than Minimum
Ramp Dificiency
Stopping Sight Distance Less than Minimum
Vertical Clearance Less than Minimum
Proposed I-69
Ramp
Crash Risk
Fatality Critical Rate Factor >= 0.70
High Crash Segment (CRF >= 1.0)
Crash Segment (CRF = 0.90-0.99)
KENTUCKY TRANSPORTATION CABINET
Palmer ENGINEERING
Existing Deficiencies
Figure 7-1
I-69 Corridor
Fulton to Eddyville
Fulton, Hickman, Graves, Marshall, Livingston, and Lyon Counties, Kentucky


N
W
E
S
4,000 2,000 0 4,000 8,000
1" = 8000'
45
121
80
339
Exit 27
Exit 25
Exit 24
Exit 22
Exit 21
Segment 1
Segment 1
Segment 1
Mayfield
Graves County
JULIAN M CARROLL PURCHASE PARKWAY
Deficiency
Horizontal Clearance Less than Minimum
Interchange Spacing Less than Minimum
Length of Vertical Curve Less than Minimum
Ramp Dificiency
Stopping Sight Distance Less than Minimum
Vertical Clearance Less than Minimum
Proposed I-69
Ramp
Crash Risk
Fatality Critical Rate Factor >= 0.70
High Crash Segment (CRF >= 1.0)
Crash Segment (CRF = 0.90-0.99)
KENTUCKY TRANSPORTATION CABINET
Palmer ENGINEERING
Existing Deficiencies
Figure 7-2
I-69 Corridor
Fulton to Eddyville
Fulton, Hickman, Graves, Marshall, Livingston, and Lyon Counties, Kentucky


N
W
E
S
4,000 2,000 0 4,000 8,000
1" = 8000'
534
JULIAN M CARROLL PURCHASEPARKWAY
Segment 2
Exit 41
10
2
Segment 2
Benton
1
641
Marshall County
7
8
Graves County
Calloway County
Deficiency
Horizontal Clearance Less than Minimum
Interchange Spacing Less than Minimum
Length of Vertical Curve Less than Minimum
Ramp Dificiency
Stopping Sight Distance Less than Minimum
Vertical Clearance Less than Minimum
Proposed I-69
Ramp
Crash Risk
Fatality Critical Rate Factor >= 0.70
High Crash Segment (CRF >= 1.0)
Crash Segment (CRF = 0.90-0.99)
KENTUCKY TRANSPORTATION CABINET
Palmer ENGINEERING
Existing Deficiencies
Figure 7-3
I-69 Corridor
Fulton to Eddyville
Fulton, Hickman, Graves, Marshall, Livingston, and Lyon Counties, Kentucky


N
W
E
S
4,000 2,000 0 4,000 8,000
1" = 8000'
Calvert City
Livingston County
Kentucky Lake
Marshall County
Marshall County
Segment 2
Segment 4
Segment 3
Segment 3
Segment 2
Exit 27
Exit 25
Exit 52
Exit 47
Exit 43
JULIAN M CARROLL PURCHASE PARKWAY
Benton
62
24
68
641
68
348
641
Deficiency
Horizontal Clearance Less than Minimum
Interchange Spacing Less than Minimum
Length of Vertical Curve Less than Minimum
Ramp Dificiency
Stopping Sight Distance Less than Minimum
Vertical Clearance Less than Minimum
Proposed I-69
Ramp
Crash Risk
Fatality Critical Rate Factor >= 0.70
High Crash Segment (CRF >= 1.0)
Crash Segment (CRF = 0.90-0.99)
KENTUCKY TRANSPORTATION CABINET
Palmer ENGINEERING
Existing Deficiencies
Figure 7-4
I-69 Corridor
Fulton to Eddyville
Fulton, Hickman, Graves, Marshall, Livingston, and Lyon Counties, Kentucky

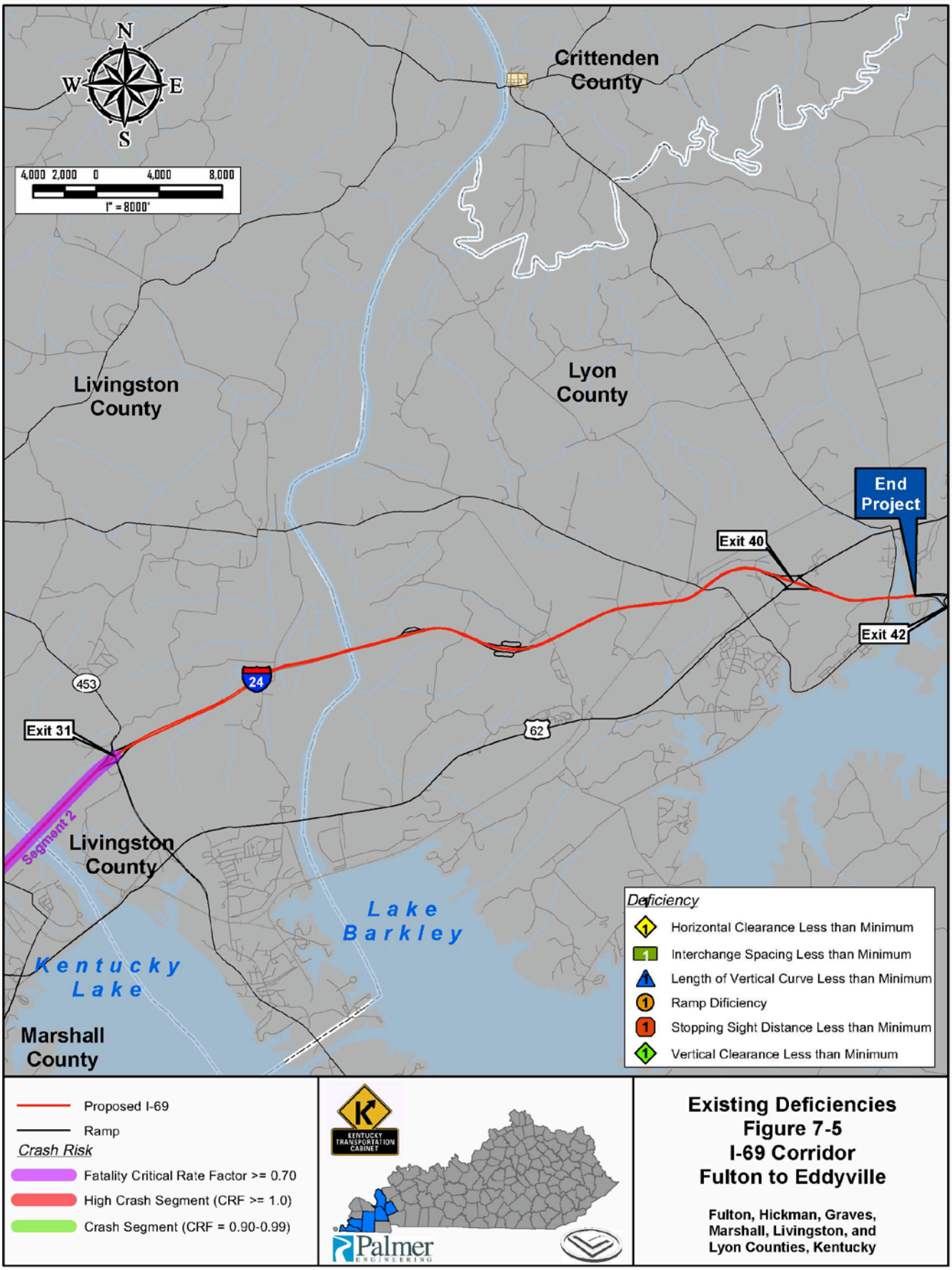

N
W
E
S
4,000 2,000 0 4,000 8,000
1" = 8000'
Crittenden County
Livingston County
Lyon County
End Project
Exit 40
Exit 42
Exit 31
453
24
62
Segment 2
Livingston County
Lake Barkley
Kentucky Lake
Marshall County
Deficiency
Horizontal Clearance Less than Minimum
Interchange Spacing Less than Minimum
Length of Vertical Curve Less than Minimum
Ramp Dificiency
Stopping Sight Distance Less than Minimum
Vertical Clearance Less than Minimum
Proposed I-69
Ramp
Crash Risk
Fatality Critical Rate Factor >= 0.70
High Crash Segment (CRF >= 1.0)
Crash Segment (CRF = 0.90-0.99)
KENTUCKY TRANSPORTATION CABINET
Palmer ENGINEERING
Existing Deficiencies
Figure 7-5
I-69 Corridor
Fulton to Eddyville
Fulton, Hickman, Graves, Marshall, Livingston, and Lyon Counties, Kentucky

Table 7-2 Deficiencies Summary for the Purchase Parkway

Deficiency Type	Milepoint	Deficiency Description
Purchase Parkway - Fulton/Hickman County		
1	Exit 0	Taper Length < Min; Rolled Curb
1	MP 1.0	Interchange Spacing less than 3 mile minimum
2	Exit 1	Taper Length < Min; Rolled Curb
3	Exit 2	Taper Length < Min; Divergence Angle > Max; Rolled Curb
1	1.781	Horizontal Clearance = 30' (Note bridge is over 200' long)
2	1.781	Horizontal Clearance = 30' (Note bridge is over 200' long)
Purchase Parkway - Graves County		
3	9.082	Horizontal Clearance = 30' (Note bridge is over 200' long)
4	9.082	Horizontal Clearance = 30' (Note bridge is over 200' long)
1	13.645 - 21.305	Fatality CRF = 0.75 (CRF >=0.70)
4	Exit 14 MP 13.653	Taper Length < Min; Degree of Curve > Max; Ramp Entrance/Exit Deficient; Rolled Curb; Interchange control of access less than 300' minimum
1	14.965	Length of Vertical Curve = 500' (696' calcuated minimum)
1	14.965	Stopping Sight Distance = 554' (730' minimum)
1	15.302	Vertical clearance = 15.88' (16' minimum)
2	16.526	Vertical clearance = 15.94' (16' minimum)
2	18.727	Length of Vertical = 600' (624' calculated minimum)
2	18.727	Stopping Sight Distance = 727' (730' minimum)
5	Exit 21 MP 21.285	Taper Length < Min; Divergence Angle > Max; Rolled Curb
6	Exit 22 MP 22.267	Taper Length < Min; Interchange control of access less than 100' minimum
3	22.267	Vertical clearance = 15.30' (16' minimum)
4	22.267	Vertical clearance = 15.12' (16' minimum)
7	Exit 24 MP 23.701	Taper Length < Min
8	Exit 25 MP 24.726	Taper Length < Min; Rolled Curb

Table 7-2 (Continued) Deficiencies Summary for the Purchase Parkway

Deficiency Type	Milepoint	Deficiency Description
1	24.747 - 25.100	Crash Segment CRF = 0.9 (CRF 0.90-0.99)
1	25.100 - 27.452	High Crash Segment - CRF= 1.33 (CRF >=1.0)
	27.452 - 34.487	High Crash Segment - CRF = 1.05 (CRF >=1.0)
3	25.32	Length of Vertical Curve = 536' (584' calcuated minimum)
3	25.32	Stopping Sight Distance = 721' (730' minimum)
9	Exit 27 MP 27.461	Taper Length < Min; Ramp Entrance/Exit Deficient; Divergence Angle > Max; Rolled Curb; Interchange control of access less than 300' minimum
4	27.517	Length of Vertical Curve = 536' (584' calculated minimum)
5	28.625	Length of Vertical Curve = 400' (438' calculated minimum)
6	29.970	Length of Vertical Curve = 400' (416' calculated minimum)
7	31.144	Length of Vertical Curve = 400' (467' calcuated minimum)
8	31.646	Length of Vertical Curve = 600' (608' calculated minimum)
Purchase Parkway - Marshall County		
2	34.487 - 41.035	High Crash Segment - CRF = 1.05 (CRF >=1.0)
10	Exit 41 MP 40.809	Taper Length < Min; Divergence Angle > Max
2	MP 41.682	Interchange spacing less than 3 mile minimum
2	41.035 - 42.555	Crash Segment -CRF = 0.99 (CRF 0.90-0.99)
3	42.555 - 46.942	High Crash Segment CRF =1.0 (CRF >=1.0)
11	Exit 43 MP 42.555	Taper Length < Min; Degree of Curve > Max; Ramp Entrance/Exit Deficient; Rolled Curb
5	43.277	Horizontal Clearance = 30' (Note bridge is over 200' long)
6	43.277	Horizontal Clearance = 30' (Note bridge is over 200' long)
7	43.614	Horizontal Clearance =30' (Note bridge is over 200' long)
8	43.614	Horizontal Clearance =30' (Note bridge is over 200' long)
9	43.872	Horizontal Clearance =30' (Note bridge is over 200' long)
10	43.872	Horizontal Clearance = 30' (Note bridge is over 200' long)
12	Exit 47 MP 46.942	Taper Length < Min; Rolled Curb; Interchange control of access less than 300' minimum
3	46.942 - 51.398	Crash Segment - CRF = 0.91 (CRF 0.90-0.99)
13	Exit 52 MP 51.398	Taper Length < Min; Degree of Curve > Max

Table 7-3 Deficiencies Summary of I-24

Deficiency Type	Milpoint	Deficiency Description
Interstate 24 - Marshall County		
4	24.941 - 26.558	High Crash Segment - CRF =1.10 (CRF >=1.0)
2	26.558 - 29.352	Fatality CRF = 0.71 (CRF >=0.70)
Interstate 24 - Livingston/Lyon County		
2	29.352 - 30.742	Fatality CRF = 0.71 (CRF >=0.70)

A. Operational Considerations and Safety

The following is a summary of the key findings related to the operational considerations and the safety of the Purchase Parkway and I-24:

- Crash Analysis: For the crash analysis, a high crash segment was defined as having a critical crash rate factor greater than or equal to one. Crash segments with a critical crash rate factor between 0.9 and 0.99 are identified in the report.
- Crash Analysis – Purchase Parkway: When compared to other Kentucky parkways, there is one high crash segment in Graves County (MP 25.1 – MP 27.452) where the crash rate exceeds the statewide average for all parkways. There is one segment in Graves and Marshall Counties (MP 27.452 – MP 41.035) with a critical crash rater factor between 0.9 and 0.99.
- Crash Analysis – I-24: When compared to other interstates within Kentucky, there is one high crash segment located near the Purchase Parkway interchange in Marshall County (MP 24.941-MP 26.558) where the crash rate exceeds the statewide average for all interstates.
- Crash Analysis – Purchase Parkway as an Interstate: When compared to Kentucky interstates, rather than state parkways, two additional high crash segments were identified along the Purchase Parkway located in Graves and Marshall Counties (MP 27.452 – MP 41.035 and MP 42.555 – MP 46.942).
- Crash Segment – Purchase Parkway as an Interstate: There are three segments with a critical crash rate factor between 0.9 and 0.99. These segments are: MP 24.747 – MP 25.1, MP 41.035 – MP 42.555, and MP 46.942 – MP 51.398.
- Additional Findings Related to Crash Analysis: There were only six crashes coded as *median cross-over* or *head-on* collisions for the Purchase Parkway and I-24 during the study period (2005-2009). Two crashes occurred on the Purchase Parkway and the remaining four happened on I-24. There were seven fatal crashes on the Purchase Parkway and six fatal crashes on I-24 during the study period (2005-2009).
- Current Traffic (2010): The current Purchase Parkway traffic volumes range from 7,060 vehicles per day (vpd) in Fulton County to 19,200 vpd near I-24 interchange in Marshall County. The current I-24 traffic volumes range from 21,900 vpd near the Purchase Parkway interchange to 28,200 vpd near Calvert City in Marshall County.
- Truck Percentages (2010): The existing truck percentages on the Purchase Parkway range from 24.9% at Mayfield, Kentucky in Graves County to 34.5% near Benton, Kentucky in Marshall County. On I-24, the truck percentage is 24.9%.
- Future Traffic (2040) without I-69: The projected annual growth rate along the Purchase Parkway and I-24 is 2%. This rate results in traffic volumes ranging from 12,800 vpd to 34,800 vpd on the Purchase Parkway and from 39,700 vpd to 51,100 vpd on I-24.
- Future Traffic (2040) with I-69: The projected annual growth rate along the Purchase Parkway and I-24 is 2.5%. This rate results in traffic volumes ranging from 14,800 vpd to 40,300 vpd on the Purchase Parkway and from 45,900 vpd to 53,900 vpd on I-24.
- Truck Percentages (2040): Future truck volumes were not forecasted for this project. However, truck traffic is expected to increase if the national goals of I-69 are met.
- Level of Service (2010): The Purchase Parkway and I-69 currently operate at a LOS C or better, which is acceptable to the AASHTO guidelines.

- Level of Service (2040): The Purchase Parkway and I-69 are expected to operate at a LOS C or better with or without the I-69 designation.

B. Mainline Geometry/Typical Section

The following is a summary of the key findings related to the Purchase Parkway geometry and typical section:

- Design Speed: The Purchase Parkway meets or exceeds the minimum design speed guidelines for interstate highways in rural and urban areas.
- Lane Width: The lane width on the Purchase Parkway meets the minimum AASHTO guidelines for interstate design.
- Outside Shoulder Width: The Purchase Parkway meets the AASHTO minimum outside shoulder width based on the current truck DDHV.
- Inside Shoulder Width: The Purchase Parkway does not comply with the minimum AASHTO design guidelines for inside paved shoulder widths. The AASHTO minimum inside paved shoulder width is four feet. The Purchase Parkway has a three foot inside paved shoulder with the exception of the Mayfield Bypass where no inside paved shoulder exists.
- Median Width: The Purchase Parkway meets the rural 36 foot AASHTO minimum median width in rural areas and the 10 foot AASHTO minimum median width in urban areas.
- Clear Zones: Based on the provided information and limited field reviews, it is not possible to evaluate the applicability of the current design standards for clear zone on the Purchase Parkway. The fill and cut slopes provided in the typical sections vary from 1V:2H to 1V:4H, the median ditch slope is 1V:4H, and the outside ditch slope is between 1V:3H and 1V:4H.
- Guardrail Placement and Condition: The guardrail end treatments on the Purchase Parkway meet the current standards. An evaluation of guardrail placement is not possible based on the insufficient information provided on the as-built plans.
- Superelevation: From the review of as-built plans, horizontal curves along the Purchase Parkway appear to comply with the AASHTO criteria of 10% maximum superelevation.
- Horizontal Alignment: The horizontal curvature for the Purchase Parkway is acceptable and in compliance with the current AASHTO design guidelines.
- Vertical Alignment: The majority of the vertical curves along the Purchase Parkway meet the current AASHTO guidelines. Eight vertical curves do not meet the guideline for the minimum length of vertical curves.
- Stopping Sight Distance: The minimum stopping sight distance guideline is not met for three vertical curves: MP 14.965, MP 18.727, and MP 25.320.

C. Bridges and Overpasses

The following is a summary of the key findings related to the bridges and overpasses on the Purchase Parkway and I-24:

- Lateral Clearance – Purchase Parkway: Of the 46 mainline bridges, 10 do not meet the minimum lateral clearance requirement.
- Vertical Clearance – Purchase Parkway and I-24: Of the 35 overpass bridges on the Purchase Parkway, 4 do not meet the minimum 16 foot vertical clearance requirement. The five overpass bridges on I-24 meet the minimum vertical clearance regulation.
- Functional Adequacy: One bridge (MP 21.285) is identified as functionally obsolete.
- Sufficiency Rating: All Purchase Parkway mainline and overpass bridges have a sufficiency rating greater than 60.0.

D. Interchanges and Ramps

The following is a summary of the key findings related to the interchanges and ramps on the Purchase Parkway:

- Design Speed: Design speed for ramps were not provided on the as-built plans.

- Lane Width: Lane widths for the interchange ramps range from 15 feet to 18 feet, which is compliant with AASHTO guidelines.
- Shoulder Width: A majority of the interchange ramps on the Purchase Parkway do not meet the AASHTO guidelines for shoulder width. 10 of the 13 interchanges have ramp shoulder widths that do not meet criteria.
- Horizontal Alignment: One loop ramp at Exit 14 (MP 13.653) does not meet the minimum radius for 25 mph design speed. This ramp has a 130 foot radius within the ramp and the minimum loop ramp radius is 134 feet for 25 mph design speed.
- Vertical Alignment-Vertical Grade: The minimum vertical grade is met on all interchange ramps that were provided on the as-built plans.
- Vertical Alignment-Vertical Length of Curve: Three vertical curve ramps did not meet the requirement for minimum length of curve that were calculated based on the minimum ramp design speed. These ramps are located at the US 51 interchange (Exit 1) and KY 80 interchange (Exit 22).
- Vertical Alignment-Stopping Sight Distance: Two vertical curve ramps did not meet the minimum stopping sight distance requirement that were calculated based on the minimum ramp design speed. These ramps are located at the US 51 interchange (Exit 1) and KY 80 interchange (Exit 22).
- Superelevation: Based on review of as-built plans, existing ramps appear to satisfy the AASHTO criteria for 10% maximum superelevation.
- Speed-Change Lanes: Many of the existing ramps on the Purchase Parkway do not meet the minimum criteria for acceleration and deceleration lengths.
- Weaving Characteristics: The one location with an existing weaving situation between interchanges will operate at a LOS B with future I-69 traffic projections. The interchanges at Exits 14, 43, and 52 are cloverleaf interchanges with weaving within the interchange.
- Interchange Spacing: On the Purchase Parkway, there are two locations where the minimum interchange spacing requirements are not met. The three interchanges (Exits 0, 1, 2) in Fulton are within three miles of each other. The two interchanges (Exit 41 and Exit 43) in Benton are within three miles of each other.
- Interchange Control of Access: The Purchase Parkway has four interchanges that do not meet the minimum interchange control of access requirements.
- Interchange Configuration: Currently, the Purchase Parkway has four service interchanges that do not meet the recommended interstate interchange configuration. They are located at Exit 0, Exit 14, Exit 21, and Exit 43. The interchange configurations at I-24 and the Purchase Parkway is not recommended for a systems interchange.

E. Design Feature Deficiency and Crash History Analysis

To further evaluate the impact of the roadway feature deficiencies on safety, a crash analysis was conducted to verify the deficiency has an impact on safety.

1. Mainline Geometry/Typical Section

a. Median Type – Mayfield Bypass

On the section of the Purchase Parkway that has a 16 foot non mountable median, there were not any 'cross-over', 'head-on' or fatal collisions. The highest critical rate factor when analyzed as an interstate for segments with this median is 0.55.

b. Vertical Alignment – Minimum Vertical Curves, Minimum Stopping Sight Distance

A rolling crash analysis was conducted for vertical alignment deficiencies. The crashes were analyzed in 0.3 mile segments with reference given to each vertical alignment deficiency. **Table 7-4** below illustrates the findings of analysis.

2. Bridges/Overpasses

a. Bridge Width – Mainline Bridges

A crash analysis was conducted for narrow mainline bridge deficiencies. The crashes were analyzed in 0.3 mile segments with reference given to each vertical alignment deficiency. **Table 7-5** below illustrates the findings of analysis.

F. Superelevation Crash Analysis

As part of this study, a crash analysis was conducted on horizontal curves with a superelevation greater than 8%. **Table 7-6** below illustrates the findings of these analyses. The horizontal curve at MP 47.417 has a critical crash rate factor greater than 1.0. This curve has a radius of 1910 feet and superelevation of 8.3%. From MP 47.117 to 47.717, there were 26 crashes from 2005-2009. Of these crashes, 54% occurred when the roadway condition was either icy, wet, or snow/slush. Five of these crashes (20%) were coded *COLLISION WITH ANIMAL and five* crashes were coded *1 VEHICLE PARKED POSITION (NOT PARKING LOT/DRIVEWAY).* Based on the analysis, it is not apparent that the crash history is directly related to superelevation. Therefore, it is not recommended for improvement.

G. Mayfield Bypass

The City of Mayfield, KY has a population of 10,024 and has 4,739 housing units, according to the U.S. Census Bureau. The total area of Mayfield is 6.2 square miles and its population density per square mile of land area is 1,455. Mayfield is the county seat of Graves County. The population of Graves County is 37,121. There are 16,777 housing units within Graves County.

According to KYTC, the functional classification of the Mayfield Bypass is Urban Freeways & Expressways. The Mayfield Bypass traverses approximately for three miles along the west and north borders of the city limits.

The Mayfield Bypass was designed with the intention to serve the City of Mayfield as an urban expressway. The interchanges are spaced at 1 mile or farther. The traffic volumes are approximately 170% higher along the Mayfield Bypass than the rural sections of the Purchase Parkway to the north and south of Mayfield. The 16 foot non mountable median was constructed as an urban expressway. Based on the crash analysis, the Mayfield Bypass operates safer than most of the Purchase Parkway. For this study, the Mayfield Bypass is classified as an urban expressway and was analyzed based on the urban geometric criterion.

DEFICIENCY		MP	Begin MP	End MP	ADT	Avg Crash Rate	Critical Crash Rate	Avg Fatality Rate	Critical Fatality Rate	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
Min Length of Vertical Curve (Actual, Minimum)	Min SSD (Actual, Minimum)									Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
500' , 696'	554' , 730'	14.965	14.665	14.965	8,590	52	148.29	0.8	22.06	0	0	2	2	0.05	0.00	0.00	42.53	42.53	0.29	0.00
			14.765	15.065	8,590	52	148.29	0.8	22.06	0	0	2	2	0.05	0.00	0.00	42.53	42.53	0.29	0.00
			14.865	15.165	8,590	52	148.29	0.8	22.06	0	0	2	2	0.05	0.00	0.00	42.53	42.53	0.29	0.00
			14.965	15.265	8,590	52	148.29	0.8	22.06	0	0	1	1	0.05	0.00	0.00	21.26	21.26	0.14	0.00
600' , 624'	727' , 730'	18.727	18.427	18.727	8,590	52	148.29	0.8	22.06	0	0	1	1	0.05	0.00	0.00	21.26	21.26	0.14	0.00
			18.527	18.827	8,590	52	148.29	0.8	22.06	0	0	3	3	0.05	0.00	0.00	63.79	63.79	0.43	0.00
			18.627	18.927	8,590	52	148.29	0.8	22.06	0	0	4	4	0.05	0.00	0.00	85.05	85.05	0.57	0.00
			18.727	19.027	8,590	52	148.29	0.8	22.06	1	0	5	6	0.05	21.26	0.00	106.31	127.58	0.86	0.96
536' , 584'	721' , 730'	25.320	25.020	25.320	7,790	52	153.67	0.8	23.68	1	1	7	9	0.04	23.45	23.45	164.13	211.02	1.37	0.99
			25.120	25.420	7,790	52	153.67	0.8	23.68	1	1	6	8	0.04	23.45	23.45	140.68	187.57	1.22	0.99
			25.220	25.520	7,790	52	153.67	0.8	23.68	0	2	6	8	0.04	0.00	46.89	140.68	187.57	1.22	0.00
			25.320	25.620	7,790	52	153.67	0.8	23.68	0	1	3	4	0.04	0.00	23.45	70.34	93.79	0.61	0.00
500' , 543'	-	27.517	27.217	27.517	7,320	52	157.27	0.8	24.79	0	1	3	4	0.04	0.00	24.95	74.86	99.81	0.63	0.00
			27.317	27.617	7,320	52	157.27	0.8	24.79	0	1	2	3	0.04	0.00	24.95	49.90	74.86	0.48	0.00
			27.417	27.717	7,320	52	157.27	0.8	24.79	0	1	0	1	0.04	0.00	24.95	0.00	24.95	0.16	0.00
			27.517	27.817	7,320	52	157.27	0.8	24.79	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
400' , 438'	-	28.625	28.325	28.625	7,320	52	157.27	0.8	24.79	0	2	1	3	0.04	0.00	49.90	24.95	74.86	0.48	0.00
			28.425	28.725	7,320	52	157.27	0.8	24.79	0	2	1	3	0.04	0.00	49.90	24.95	74.86	0.48	0.00
			28.525	28.825	7,320	52	157.27	0.8	24.79	0	1	1	2	0.04	0.00	24.95	24.95	49.90	0.32	0.00
			28.625	28.925	7,320	52	157.27	0.8	24.79	0	0	1	1	0.04	0.00	0.00	24.95	24.95	0.16	0.00
400' , 416'	-	29.970	29.670	29.970	7,320	52	157.27	0.8	24.79	0	3	1	4	0.04	0.00	74.86	24.95	99.81	0.63	0.00
			29.770	30.070	7,320	52	157.27	0.8	24.79	0	3	1	4	0.04	0.00	74.86	24.95	99.81	0.63	0.00
			29.870	30.170	7,320	52	157.27	0.8	24.79	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
			29.970	30.270	7,320	52	157.27	0.8	24.79	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
400' , 467'	-	31.144	30.844	31.144	7,320	52	157.27	0.8	24.79	0	2	2	4	0.04	0.00	49.90	49.90	99.81	0.63	0.00
			30.944	31.244	7,320	52	157.27	0.8	24.79	0	2	4	6	0.04	0.00	49.90	99.81	149.71	0.95	0.00
			31.044	31.344	7,320	52	157.27	0.8	24.79	0	0	3	3	0.04	0.00	0.00	74.86	74.86	0.48	0.00
			31.144	31.444	7,320	52	157.27	0.8	24.79	0	0	2	2	0.04	0.00	0.00	49.90	49.90	0.32	0.00
600' , 608'	-	31.646	30.844	31.144	7,320	52	157.27	0.8	24.79	0	1	1	2	0.04	0.00	24.95	24.95	49.90	0.32	0.00
			30.944	31.244	7,320	52	157.27	0.8	24.79	0	2	1	3	0.04	0.00	49.90	24.95	74.86	0.48	0.00
			31.044	31.344	7,320	52	157.27	0.8	24.79	0	3	2	5	0.04	0.00	74.86	49.90	124.76	0.79	0.00
			31.144	31.444	7,320	52	157.27	0.8	24.79	0	2	6	8	0.04	0.00	49.90	149.71	199.62	1.27	0.00

Table 7-4 Vertical Curve Deficiency Crash Analysis

MP	Begin MP	End MP	ADT	Avg Crash Rate	Critical Crash Rate	Avg Fatality Rate	Critical Fatality Rate	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
								Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
1.781	1.481	1.781	7,060	52	159.42	0.8	25.45	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	1.581	1.881	7,060	52	159.42	0.8	25.45	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	1.681	1.981	7,060	52	159.42	0.8	25.45	0	1	2	3	0.04	0.00	25.87	51.74	77.61	0.49	0.00
	1.781	2.081	7,060	52	159.42	0.8	25.45	0	1	2	3	0.04	0.00	25.87	51.74	77.61	0.49	0.00
9.082	8.782	9.082	7,290	52	157.51	0.8	24.86	0	1	1	2	0.04	0.00	25.05	25.05	50.11	0.32	0.00
	8.882	9.182	7,290	52	157.51	0.8	24.86	0	1	1	2	0.04	0.00	25.05	25.05	50.11	0.32	0.00
	8.982	9.282	7,290	52	157.51	0.8	24.86	0	0	1	1	0.04	0.00	0.00	25.05	25.05	0.16	0.00
	9.082	9.382	7,290	52	157.51	0.8	24.86	0	2	0	2	0.04	0.00	50.11	0.00	50.11	0.32	0.00
21.285	20.985	21.285	8,590	97 [1]	224.62	0.5	19.53	0	1	5	6	0.05	0.00	21.26	106.31	127.58	0.57	0.00
	21.085	21.385	8,590	97 [1]	224.62	0.5	19.53	1	2	5	8	0.05	21.26	42.53	106.31	170.10	0.76	1.09
	21.185	21.485	8,590	97 [1]	224.62	0.5	19.53	1	1	5	7	0.05	21.26	21.26	106.31	148.84	0.66	1.09
	21.285	21.585	8,590	97 [1]	224.62	0.5	19.53	1	1	6	8	0.05	21.26	21.26	127.58	170.10	0.76	1.09
43.277	42.977	43.277	18,800	52	114.76	0.8	12.84	0	2	12	14	0.10	0.00	19.43	116.58	136.01	1.19	0.00
	43.077	43.377	18,800	52	114.76	0.8	12.84	0	3	7	10	0.10	0.00	29.15	68.01	97.15	0.85	0.00
	43.177	43.477	18,800	52	114.76	0.8	12.84	0	2	4	6	0.10	0.00	19.43	38.86	58.29	0.51	0.00
	43.277	43.577	18,800	52	114.76	0.8	12.84	0	2	4	6	0.10	0.00	19.43	38.86	58.29	0.51	0.00
43.614	43.314	43.614	18,800	52	114.76	0.8	12.84	0	2	5	7	0.10	0.00	19.43	48.58	68.01	0.59	0.00
	43.414	43.714	18,800	52	114.76	0.8	12.84	0	0	5	5	0.10	0.00	0.00	48.58	48.58	0.42	0.00
	43.514	43.814	18,800	52	114.76	0.8	12.84	0	0	6	6	0.10	0.00	0.00	58.29	58.29	0.51	0.00
	43.614	43.914	18,800	52	114.76	0.8	12.84	0	1	10	11	0.10	0.00	9.72	97.15	106.87	0.93	0.00
43.872	43.572	43.872	18,800	52	114.76	0.8	12.84	0	0	6	6	0.10	0.00	0.00	58.29	58.29	0.51	0.00
	43.672	43.972	18,800	52	114.76	0.8	12.84	0	1	9	10	0.10	0.00	9.72	87.44	97.15	0.85	0.00
	43.772	44.072	18,800	52	114.76	0.8	12.84	0	1	9	10	0.10	0.00	9.72	87.44	97.15	0.85	0.00
	43.872	44.172	18,800	52	114.76	0.8	12.84	0	1	9	10	0.10	0.00	9.72	87.44	97.15	0.85	0.00

[1] Average statewide crash rate for interstates in an urban area

Table 7-5 Narrow Bridge Crash Analysis

Super-elevation	MP	BEGIN MP	END MP	ADT	Avg Crash Rate	Critical Crash Rate	Avg Fatality Rate	Critical Fatality Rate	Crashes				HMVM	Rates per HMVM				Critical Crash Rate Factor	Critical Fatality Rate Factor
									Fatal	Injury	PDO	Total		Fatal	Injury	PDO	Total		
e = 0.088	1.022	0.722	1.022	7,570	52	155.31	0.8	24.18	0	0	1	1	0.04	0.00	0.00	24.13	24.13	0.16	0.00
		0.822	1.122	7,570	52	155.31	0.8	24.18	0	0	1	1	0.04	0.00	0.00	24.13	24.13	0.16	0.00
		0.922	1.222	7,570	52	155.31	0.8	24.18	0	0	1	1	0.04	0.00	0.00	24.13	24.13	0.16	0.00
		1.022	1.322	7,570	52	155.31	0.8	24.18	0	0	0	0	0.04	0.00	0.00	0.00	0.00	0.00	0.00
e = 0.083	22.881	22.581	22.881	13,100	97 [1]	198.70	0.5	14.27	0	0	3	3	0.07	0.00	0.00	41.83	41.83	0.21	0.00
		22.681	22.981	13,100	97 [1]	198.70	0.5	14.27	0	0	2	2	0.07	0.00	0.00	27.89	27.89	0.14	0.00
		22.781	23.081	13,100	97 [1]	198.70	0.5	14.27	0	1	2	3	0.07	0.00	13.94	27.89	41.83	0.21	0.00
		22.881	23.181	13,100	97 [1]	198.70	0.5	14.27	0	3	6	9	0.07	0.00	41.83	83.66	125.48	0.63	0.00
e = 0.083	24.917	24.617	24.917	7,790	97 [1]	231.57	0.5	21.04	0	1	4	5	0.04	0.00	23.45	93.79	117.23	0.51	0.00
		24.717	25.017	7,790	97 [1]	231.57	0.5	21.04	0	2	6	8	0.04	0.00	46.89	140.68	187.57	0.81	0.00
		24.817	25.117	7,790	97 [1]	231.57	0.5	21.04	0	2	6	8	0.04	0.00	46.89	140.68	187.57	0.81	0.00
		24.917	25.217	7,790	97 [1]	231.57	0.5	21.04	1	1	6	8	0.04	23.45	23.45	140.68	187.57	0.81	1.11
e = 0.083	47.417	47.117	47.417	19,200	52	114.05	0.8	12.66	0	3	9	12	0.11	0.00	28.54	85.62	114.16	1.00	0.00
		47.217	47.517	19,200	52	114.05	0.8	12.66	0	4	11	15	0.11	0.00	38.05	104.64	142.69	1.25	0.00
		47.317	47.617	19,200	52	114.05	0.8	12.66	0	4	15	19	0.11	0.00	38.05	142.69	180.75	1.58	0.00
		47.417	47.717	19,200	52	114.05	0.8	12.66	0	2	12	14	0.11	0.00	19.03	114.16	133.18	1.17	0.00

[1] Average statewide crash rate for interstates in an urban area

Table 7-6 Superelevation Crash Analysis