VIII. POTENTIAL IMPROVEMENT ALTERNATIVES AND DEVELOPMENT COSTS

This chapter describes a range of alternatives to address the deficiencies identified on the Purchase Parkway. As discussed in **Chapter I,** the use of the existing parkways is a goal for designating as I-69 through Kentucky. Therefore, the development of a new alignment was not among alternatives considered.

A. Potential Improvements and Development Costs

For this study, the range of alternatives under consideration is No Build, Necessary Upgrades and Spot Safety Improvements, and Fully Compliant Reconstruction. These alternatives are discussed further below and represent incremental levels of infrastructure investment needed to implement I-69 along the Purchase Parkway from the Tennessee state line at Fulton to I-24 near Calvert City.

- **No Build** – This alternate would leave a gap in the nationally proposed I-69 route. However, the Purchase Parkway would provide the connectivity for the I-69 traffic to travel from Tennessee to I-24.
- **Necessary Upgrades and Spot Safety Improvements** - Key safety and operational concerns would be addressed. Design exceptions or variances would be obtained for the existing conditions that do not meet current AASHTO or KYTC guidelines that are deemed appropriate by the KYTC and the FHWA.
- **Fully Compliant Reconstruction** – This alternate would involve improvements within existing right of way or with minimum right of way acquisition necessary for making the existing Purchase Parkway meet minimum AASHTO criteria for interstate routes.

Figures are provided at the end of the chapter referencing improved interchanges for the cost estimates.

1. No Build

The Purchase Parkway and I-24 would remain as they are currently without the I-69 designation. This alternate would not require any additional funding for the construction related to upgrading the facilities to current interstate standards.

2. Necessary Upgrades and Spot Safety Improvements

Under this alternate the Purchase Parkway would not be upgraded to meet all current interstate standards. Design exceptions and variances would be necessary for those design features that do not meet current criteria or standards and are deemed appropriate by the KYTC and the FHWA. New infrastructure and improvements along the Purchase Parkway would be proposed to upgrade necessary features and improve safety. **Table 8-1** contains a summary of the preliminary costs and design assumptions for implementing improvements proposed in these alternatives.

Item	Unit	2011 Cost
Correct Vertical / Stopping Sight Distance Deficiencies (MP 25.32)	Total	$30,000
Upgrade Crash Worthy Pier Protection	Location	$30,000
Upgrade Mayfield Bypass Median	Mile	$725,000
Mainline Structures (Upgrade Guardrail/Approaches/Railings)	Foot	$85
Overpass Structures (Upgrade Deficiencies)	Total	$330,000
Interchanges		
Interchange Ramp Improvements	Interchange	Variable
Toll Plaza - Exits 14 and 43 (Upgrade Deficiencies)	Interchange	$21,600,000
Unique Interchanges		
Exit 21 (Upgrade Deficiencies)	Interchange	$25,360,000
I-69 / I-24 (Upgrade Partial Deficiencies)	Interchange	$15,700,000
Design and Environmental	15% of Construction Costs	
Right-of-Way and Utilities	30% of Construction Costs	

Table 8-1 Unit Costs - Necessary Upgrades and Spot Safety Improvements

A summary of the recommended improvements for this option are below:

- Maintain the existing mainline along the Purchase Parkway
- Correct vertical curve and stopping sight distance deficiencies at MP 25.32. This improvement is due to a crash rate greater than the statewide average at this location.
- Upgrade for crash worthy pier protection for existing structures
- Upgrade Mayfield Bypass median and inside shoulder
- Retrofit the bridge railing/barriers that do not meet current minimum standards
- Upgrade overpass structures to meet the minimum 16 foot vertical clearance (driving lanes and shoulders)
- Upgrade improvements to substandard interchanges
- Upgrade the previous toll booth interchanges at Exits 14 and 43 to meet interstate standards
- Upgrade the Exit 21 (US 45) Trumpet interchange (**Figures 8-3, 8-4**) to meet interstate standards
- Upgrade the I-69/I-24 systems interchange. Refer to **Figure 8-1** for recommended configuration.

As shown in **Table 8-2**, the preliminary cost associated with this alternate is $132 million. Almost half of this cost is associated with the upgrading of the Exit 14 (KY 339) and Exit 43 (KY 348) previous toll booth interchanges and upgrading the interchanges at Exits 21 (US 45) and 52 (I-24).

Segment	Length (miles)	Design & Environmental (million)	ROW and Utilities (million)	Construction Costs (million)			Total Costs (million)
				Roadwork	Mainline & Overpass Structures	Interchanges	
Fulton MP 0.0 - MP 3.0	3	$0.24	$0.48	$0.00	$0.22	$1.36	$2.30
Fulton to Mayfield MP 3.0 - MP 21.0	18	$3.32	$6.64	$0.00	$0.52	$21.60	$32.08
Mayfield MP 21.0 - MP 25.2	4.2	$4.30	$8.59	$2.18	$0.27	$26.16	$41.50
Mayfield to Benton MP 25.2 - MP 40.0	14.8	$0.11	$0.22	$0.03	$0.25	$0.43	$1.04
Benton MP 40.0 - MP 43.0	3	$3.25	$6.50	$0.00	$0.03	$21.63	$31.41
Benton to Calvert City MP 43.0 - MP 51.4	8.4	$2.45	$4.89	$0.00	$0.21	$16.07	$23.62
Total	51.4	$13.67	$27.32	$2.21	$1.50	$87.25	$131.95

Table 8-2 Necessary Upgrades and Spot Safety Improvement Preliminary Cost Estimate

3. Fully Compliant Reconstruction

The Fully Compliant Reconstruction option would involve improving the Purchase Parkway to meet all the minimum design guidelines for interstate highways. **Table 8-3** contains a summary of the preliminary costs and design assumptions for implementing improvements proposed in this alternate.

Item	Unit	2011 Cost
Correct Vertical / Stopping Sight Distance Deficiencies	Total	$250,000
Upgrade Crashworthy Pier Protections	Location	$30,000
Widen Inside Shoulders to 4 foot paved	Mile	$77,000
Auxiliary Lane (Interchange Spacing - Exit 41/Exit 43)	Mile	$4,233,000
Upgrade Mayfield Bypass Median	Mile	$725,000
Mainline Structures (Widen Deficient Bridges)	Foot	$65
Mainline Structures (Upgrade Guardrail/Approaches/Railings)	Foot	$200
Overpass Structures (Upgrade Deficiencies)	Total	$330,000
Interchange Control of Access	Total	$5,000,000
Interchanges		
Interchange Ramp Improvements	Interchange	Variable
Toll Plaza - Exits 14 and 43 (Upgrade Deficiencies)	Interchange	$21,600,000
Unique Interchanges		
Exit 21 Upgrade Deficiencies	Interchange	$25,360,000
I-69 / I-24 (Replace with fully directional)	Interchange	$65,800,000
Design and Environmental	15% of Construction Costs	
Right-of-Way and Utilities	30% of Construction Costs	

Table 8-3 Unit Costs – Fully Compliant Reconstruction

A summary of the improvements for this option are below:

- Maintain the existing mainline along the Purchase Parkway
- Correct any vertical curve and stopping sight distance deficiencies
- Upgrade crash worthy pier protection
- Widen the inside paved shoulder to 4 foot
- Upgrade Mayfield Bypass median and inside shoulder
- Widen the mainline bridges that are deficient in horizontal lateral clearance to 31 feet. All of these bridges are greater than 200 feet long.
- Replace the bridge railing/barriers that do not meet current minimum standards
- Upgrade overpass structures to the meet minimum 16 foot vertical clearance (driving lanes and shoulders)
- Upgrade the improvements to substandard interchanges (acceleration/decelerations length, divergence angle, shoulder width, curb removal)
- Reconstruct the toll booth interchanges at Exits 14 and 43
- Upgrade Exit 21 (US 45) deficiencies (**Figure 8-6**)
- Upgrade the I-69/I-24 systems interchange Refer to **Figure 8-2** for interchange configuration
- Construct auxiliary lanes between Exit 41 and Exit 43 to comply with interchange spacing.

As indicated in **Table 8-4**, the improvements for this alternate are estimated at $219 million. At an average cost per mile of $4.26 million, the Purchase Parkway can be improved to meet the minimum interstate design standard without any design exceptions. The majority of the cost estimate is associated with the reconstructing interchanges on the Purchase Parkway.

Segment	Length (miles)	Design & Environmental (million)	ROW and Utilities (million)	Construction Costs (million)			Total Costs (million)
				Roadwork	Mainline & Overpass Structures	Interchanges	
Fulton MP 0.0 - MP 3.0	3	$0.32	$0.63	$0.24	$0.49	$1.36	$3.04
Fulton to Mayfield MP 3.0 - MP 21.0	18	$3.58	$7.16	$1.67	$0.51	$21.68	$34.60
Mayfield MP 21.0 - MP 25.2	4.2	$4.31	$8.62	$2.27	$0.24	$26.22	$41.66
Mayfield to Benton MP 25.2 - MP 40.0	14.8	$0.35	$0.69	$1.26	$0.53	$0.50	$3.33
Benton MP 40.0 - MP 43.0	3	$3.98	$7.96	$4.47	$0.10	$21.94	$38.45
Benton to Calvert City MP 43.0 - MP 51.4	8.4	$10.13	$20.25	$0.65	$0.66	$66.17	$97.86
Total	51.4	$22.67	$45.31	$10.56	$2.53	$137.87	$218.94 [1]

[1] Cost estimate does not include cost associated with connecting to Segments of Independent Utility (SIU) 5 (I-24 at Western Kentucky Parkway) or SIU 7 (Exits 0,1,2 at Fulton, KY).

Table 8-4 Fully Compliant Reconstruction Preliminary Cost Estimate

4. Summary

The following table provides a cost comparison of the potential alternates provided in this study. The cost per mile estimate is based on the 51.4 miles of the Purchase Parkway. The Necessary Upgrades / Spot Safety Improvements alternative cost is approximately two-thirds the cost of the Fully Compliant Reconstruction alternative. The difference in cost results from inside shoulder improvement, bridge widening, auxiliary lanes, and reconstructing the Purchase Parkway and I-24 interchange to meet full compliance for a systems interchange.

Alternative	Meet Current Standards	Impact on Environment	Cost (million)	Cost per Mile [1] (million)
1. No Build	No	Least	$0.00 [2]	$0.00
2. Necessary Upgrades / Spot Safety Improvements	Yes [3]	Minimal	$131.95	$2.57
3. Fully Compliant Reconstruction	Yes	More Significant	$218.94 [4]	$4.26

Table 8-5 Cost Comparison of Potential Alternatives

[1] Cost per mile based on 51.4 miles of Purchase Parkway.

[2] Cost for routine maintenance is not depicted in alternatives.

[3] This alternative would include upgrading the design features along the Purchase Parkway that potentially represents the most significant safety and operational issues. This alternative requires design exceptions and variances where safety and operational conditions would not create undue risk to the motorist.

[4] Cost estimate does not include cost associated with connecting to Segments of Independent Utility (SIU) 5 (I-24 at Western Kentucky Parkway) or SIU 7 (Exits 0,1,2 at Fulton, KY).

5. Potential Interchange Improvements/Reconstruction

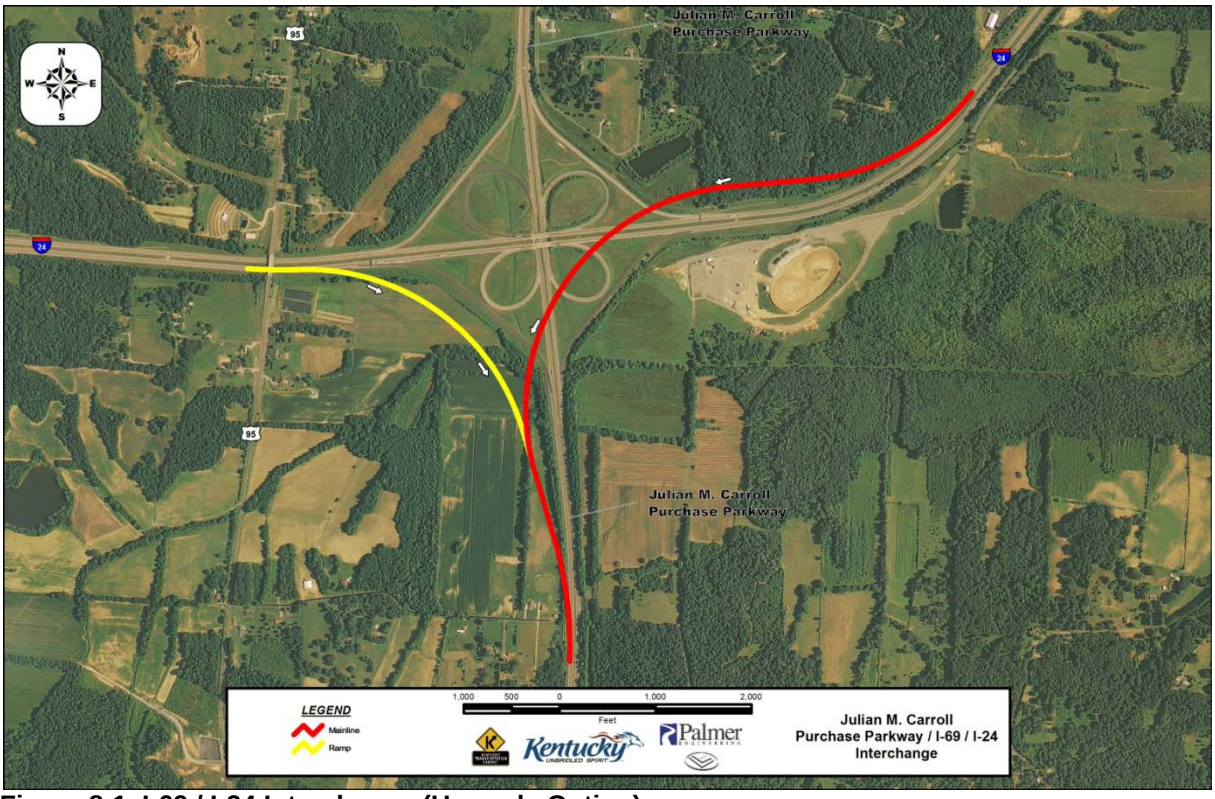

Figure 8-1 I-69 / I-24 Interchange (Upgrade Option)

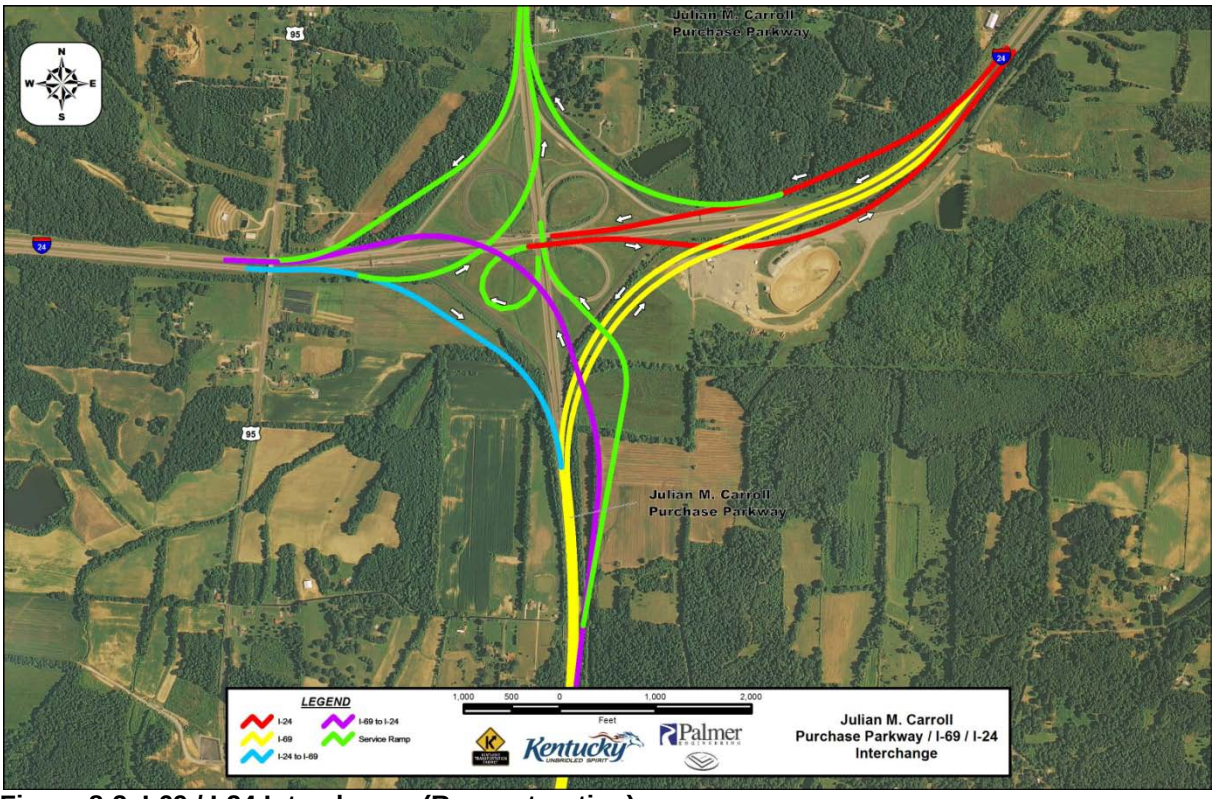

Figure 8-2 I-69 / I-24 Interchange (Reconstruction)

Figure 8-3 I-69 / US 45 Interchange (Upgrade Option 1)

Figure 8-4 I-69 / US 45 Interchange (Upgrade Option 2)

Figure 8-5 I-69 / US 45 Interchange (Reconstruction)