VIII. POTENTIAL IMPROVEMENT ALTERNATIVES AND DEVELOPMENT COSTS

This chapter provides an overview of the range of alternatives under consideration for the development of the I-69 corridor. The first section includes a discussion of corridor options not likely to address the purpose and need for the I-69 project on the national level or the transportation policy at the state level. The second section outlines the potential improvement options identified for the I-69 corridor, including the no-build alternative, as well as the associated development costs. The final section in this chapter provides information related to additional roadside features (welcome centers, rest areas and Commercial Vehicle Monitoring stations) to be considered in the development of any of the improvement options.

A. I-69 Corridor Purpose and Need

The initial concept of I-69 was addressed in the 1995 *Corridor 18 Feasibility Study* mandated by the 1991 Intermodal Surface Transportation and Efficiency Act (ISTEA). This study was prepared for the Federal Highway Administration under the direction of a multi-state task force made up of representatives of the various state transportation agencies, including the Kentucky Transportation Cabinet. In the 1995 study, two alternates were proposed through Kentucky:

- One along the Ford and Breathitt Parkways, I-24, and the Purchase Parkway (which has since been designated as the Julian M. Carroll Parkway), and
- One along a new alignment in Kentucky, west of the Breathitt Parkway, in a northwesterly direction from I-24 at Eddyville to Marion and then to Henderson.

In a follow-up study, the 1997 *Corridor 18 Special Issues Study*, it was assumed that I-69 would follow along the existing Parkways, as discussed in **Chapter I** of this study.

The 1997 study also indicated that the alternate along new alignment was still under consideration as a means of opening up the area between Eddyville, Marion, and Henderson for economic development. However, in recent years, the Transportation Cabinet has a goal to utilize as much of the existing infrastructure as possible. As a result, the KYTC is pursuing another project between Eddyville and Marion which is expected to address the purpose and need for opening up this area for economic development, and that purpose is no longer valid for the routing of I-69.

The national goals for I-69 and Preliminary Project Goals, discussed in **Chapter I**, form the basis for establishing the purpose and need for the I-69 project in Kentucky. This new state policy is reflected in the Preliminary Project Goals set forth in **Chapter I** of this study, since one of the goals for the I-69 project in Kentucky is to: Maximize the use of the existing Parkways.

As a result, the construction of a new I-69 route on new alignment would not maximize the use of the existing Parkway system and would not ultimately meet the purpose and

need for the project. For this reason this alternate has been dismissed from further consideration.

B. Potential Improvements and Development Costs

In this study, the remaining alternatives have been further defined for consideration relative to the development of the Interstate 69 corridor along the existing Parkways between Eddyville and Henderson, Kentucky. Options for I-69 include the following:

- No Build Alternate – KYTC could elect to participate no further in the development of I-69, thus, leaving a gap in the nationally designated I-69 route. While this may cause some concern, there would still be connections to the existing Julian M. Carroll Parkway at the Tennessee border and the Edward T. Breathitt Parkway at the Indiana border. Therefore, the existing Parkways would probably still serve to carry I-69 traffic through the state of Kentucky.
- Minor Upgrades and Spot Safety Improvements to the Parkways – This alternate would address key safety and operational concerns but obtain design exceptions or approval of design flexibility for a number of circumstances where the Parkways do not meet current AASHTO guidelines.
- Partial Reconstruction and Widening of the Parkways – This alternate would enable the Parkways to meet most AASHTO guidelines but attempt to maintain improvements within the right-of-way by making extensive use of median barriers and guardrail along the parkways.
- Full Reconstruction and Widening of the Parkways – This alternate would enable the Parkways to meet full AASHTO guidelines by obtaining additional right-of-way along the Parkways to allow for widening and reconstruction.

These alternatives represent incremental levels of infrastructure investment to implement I-69 between Henderson and Eddyville. The following subsections present further discussion of the alternatives, including a preliminary estimate of the costs for implementation of the three build alternatives.

For the purpose of this analysis, the following general design criteria are assumed for the various reconstruction scenarios, where appropriate:

Design Assumptions for Cost Estimates [1]			
Design Speed	70 mph	Min. Curve Radius	1820'
Lane Width	12'	Max. Superelevation	0.08
Shoulder Widths		Max. Grade	0.04
Inside:	8'	Avg. R/W Width	300'
Outside:	12'	Control of Access	Full
Number of lanes	4	Avg. Interchange Spacing	5 mi (est.)
Clear Zone	30'	Avg. Rest Area Spacing	50 mi (est.)
Median Width	60'		

[1] All design assumptions shown in the table are not necessarily applicable to all improvement options, and were applied where appropriate to the varying levels of improvement.

1. No-Build Alternate

Under the no-build alternate, the existing Ford and Breathitt Parkways would continue as they are now without I-69 designation. No special funding would be needed to upgrade or construct a new facility in the short or long-term, except as required by any problems that may arise due to increased traffic generated by I-69 traveling between Tennessee and Indiana or from Mexico to Canada.

2. Minor Upgrades and Spot Safety Improvements along the Parkways

As previously noted, the Parkways in their current condition have operational conditions that are similar to those that would be expected if they were to be converted to Interstate 69 and reconstructed to meet current AASHTO guidelines for interstate highways. Given these similarities, this alternate would not upgrade the Parkways to fully meet all guidelines for interstate highways. Instead, design exceptions would be considered where safety and operational conditions would not create an undue risk to motorists. New infrastructure investment along the Ford and Breathitt Parkways would be targeted toward upgrading the design features along the routes that potentially represent the most significant safety and operational issues.

A summary of the preliminary unit costs and design assumptions for implementing the improvements for the alternative to partially reconstruct and upgrade the Parkways is presented in **Table 20**.

Table 20 – Unit Costs (Spot Improvements and Minor Reconstruction)

Item	Unit	2003 Cost ($M)
Install Cable Median Barrier/Improve Median	Mile	$ 0.1
Guardrail and Shoulder Improvements	Mile	$ 0.3
Mainline Structures (Upgrade Guardrail/Approaches)		
Large (> 500'), Medium (200-500') and Small (<200')	Structure	$ 0.1
Other Structures (no improvements)		
Interchanges		
Diamond-Type (Upgrade)	Interchange	$ 4.6
Full Directional (Upgrade)	Interchange	$ 13.3
Partial Directional (Upgrade)	Interchange	$ 9.3
Other Features		
Welcome Centers	Welcome Center	$ 5.8
Rest Area	Rest Area	$ 4.8
Commercial Vehicle Monitoring Station	CV Station	$ 6.9
Design and Environmental	15% of Construction Costs	
Right-of-Way and Utilities	30% of Construction Costs	

A summary of potential improvements that were assumed as a basis for examining this option is as follows:

- Maintain existing mainlines along the Parkways;
- Utilize cabled guardrail within existing median;
- Minimal requirements for new right-of-way acquisition along Parkways;
- Add guardrail on outside edge of pavement where needed to protect against roadside hazards or narrow bridges; and
- Upgrade improvements to some substandard interchanges.

As indicated in **Table 21**, the preliminary cost for implementation of these improvements is estimated at approximately $150 million of new investment at an average rate of $1.9 million per mile. Because most of the improvements are contained within the existing right-of-way, minimal right-of-way costs are anticipated. The largest single cost element would be the improvement of 11 diamond interchanges, where approximately $50 million, or half of the total construction costs, is anticipated. The diamond interchanges include those with elements that do no meet recommended guidelines, as shown in **Chapter 6**, **Figures 15** through **19**: Exits 4, 12, 24, and 38 on the Ford Parkway and Exits 37, 42, 44, 45, 49, 54, 68 and 76 on the Breathitt Parkway. Additionally, most of

the estimated right-of-way costs would also be associated with the interchange construction.

Table 21 – Minor Upgrades and Spot Safety Improvements Preliminary Cost Estimate

Segment	Length (mi.)	Design and Enviro. (million)	ROW and Utilities (million)	Construction Cost (million)				Total Cost (million)
				Road work	Main Line Struc-tures	Inter-changes	Other Features[1]	
Eddyville to Dawson Springs From 1-24 to KY 109	24.4	$2.8	$5.7	$4.4	$0.9	$13.7	-	$27.5
Dawson Springs to Nortonville From KY 109 to Breathitt Pkwy.	13.9	$3.0	$6.0	$5.6	$0.3	$4.6	$9.6	$29.0
Nortonville to Madisonville From Ford Pkwy. to KY 70	8.1	$0.9	$1.8	$1.3	$0.2	$4.6	-	$8.8
Madisonville to Sebree From KY 70 to KY 56	20.2	$4.0	$8.0	$2.1	$1.6	$22.8	-	$38.5
Sebree to Henderson From KY 56 to KY 425	13.7	$5.0	$9.9	$3.1	$1.0	$4.6	$24.4	$48.0
Total:	**80.3**	**$15.7**	**$31.4**	**$16.5**	**$4.1**	**$50.1**	**$34.0**	**$151.7**

[1] Other Features include welcome centers, rest areas and CVM stations. These cost estimates are based on recommendations for additional roadside features, included in Section C of this Chapter. These include welcome centers and/or rest areas south of Henderson and between Princeton and Dawson Springs, as well as a CVM station and/or truck parking area in the Henderson area.

NOTE:
Cost estimates are based upon planning-level unit cost assumptions that were derived from development costs on comparable projects, from comparable project elements, or from similar corridor studies in Kentucky (such as the Interstate 66 Southern Kentucky Corridor Study).

3. Partial Reconstruction of the Parkways

The next incremental level of infrastructure investment to convert the two Parkways to Interstate 69 would involve partial reconstruction of the Parkways to allow them to meet most, if not all, design guidelines for interstate highways. Wherever possible, reconstruction would be done within the existing right-of-way. The center median would be reconstructed with a permanent barrier, allowing the existing two lanes to be shifted to the center, thereby increasing clear zones on the outside edges of the roadways.

A summary of potential improvements that were assumed as a basis for examining this option is as follows:

- Partial reconstruction of mainlines to increase clear zone distance and enable installation of concrete median barrier;
- Limited need for new right-of-way acquisition along Parkways;
- Use of median guardrail or concrete median barrier;
- Partial widening of narrow bridges and partial reconstruction of low overpasses; and
- Partial reconstruction of 16 interchanges.

A summary of the preliminary unit costs and design assumptions for implementing the improvements for the alternative to partially reconstruct and upgrade the Parkways is shown in **Table 22**.

Table 22 – Unit Costs (Partial Reconstruction)

Item	Unit	2003 Cost ($M)
Road and Earthwork (Upgrade, Add Barrier)	Mile	$ 1.5
Mainline Structures (Upgrade, Avg. Width = 44')		
Large (> 500')	Structure	$ 0.8
Medium (200 – 500')	Structure	$ 0.3
Small (<200')	Structure	$ 0.1
Other Structures		
RR Bridge (Mainline Overpass, Upgrade)	Structure	$ 1.4
RR Bridge (RR Overpass, Upgrade	Structure	$ 1.3
Overpass (2-Ln, Upgrade)	Structure	$ 1.4
Overpass (4-Ln, Upgrade)	Structure	$ 2.9
Interchanges		
Diamond-Type (Upgrade)	Interchange	$ 4.6
Full Directional (Upgrade)	Interchange	$ 13.3
Partial Directional (Upgrade)	Interchange	$ 9.3
Other Features		
Welcome Centers	Welcome Center	$ 5.8
Rest Area	Rest Area	$ 4.8
Commercial Vehicle Monitoring Station	CV Station	$ 6.9
Design and Environmental	15% of Construction Costs	
Right-of-Way and Utilities	20% of Construction Costs	

As indicated in the **Table 23**, the preliminary cost for implementation of these improvements is estimated at approximately $380 million of new investment at an average rate of $4.7 million per mile. As with the spot improvements scenario, minimal right-of-way costs are anticipated for this option as most of the improvements associated with the partial reconstruction and widening of the Parkways to meet interstate guidelines are contained within the existing right-of-way.

Table 23 – Partial Reconstruction Preliminary Cost Estimate

Segment	Length (mi)	Design and Enviro. (million)	ROW and Utilities (million)	Construction Costs (million)					Total Cost (million)
					Structures				
				Road work	Main line	Other[1]	Inter-changes	Other Fea-tures[2]	
Eddyville to Dawson Springs From 1-24 to KY 109	24.4	$11.2	$15.0	$35.9	$1.9	$14.0	$22.9	-	$100.9
Dawson Springs to Nortonville From KY 109 to Breathitt Pkwy.	13.9	$ 7.9	$10.6	$20.4	$0.8	$4.2	$17.8	$9.6	$71.3
Nortonville to Madisonville From Ford Pkwy. to KY 70	8.1	$4.1	$5.4	$12.0	$0.5	$5.5	$9.1	-	$36.5
Madisonville to Sebree From KY 70 to KY 56	20.2	$ 8.9	$11.8	$29.7	$5.2	$1.4	$22.8	-	$79.7
Sebree to Henderson From KY 56 to KY 425	13.7	$9.9	$13.2	$20.1	$3.4	$1.4	$18.4	$24.4	$89.4
Total:	**80.3**	**$42.0**	**$56.0**	**$118.1**	**$11.6**	**$26.5**	**$91.0**	**$34.0**	**$379.7**

[1] Other Structures include railroad and roadway overpasses along the Parkways.
[2] Other Features include welcome centers, rest areas and CVM stations. These cost estimates are based on recommendations for additional roadside features, included in Section C of this Chapter. These include welcome centers and/or rest areas south of Henderson and between Princeton and Dawson Springs, as well as a CVM station and/or truck parking area in the Henderson area.

NOTE:
Cost estimates are based upon planning-level unit cost assumptions that were derived from development costs on comparable projects, from comparable project elements, or from similar corridor studies in Kentucky (such as the Interstate 66 Southern Kentucky Corridor Study).

4. Full Reconstruction and Widening of the Parkways

The highest level of infrastructure investment for converting the Parkways to Interstate 69 would involve full reconstruction and widening of Parkways as new interstate highways including all 16 interchanges. While reconstruction would be able to make use of the existing right-of-way, it would also generally require obtaining a significant amount of new right-of-way to allow for a full four-lane interstate cross-section to be constructed.

A summary of the preliminary unit costs and design assumptions for the alternative to fully reconstruct the Parkways as new interstate highways is shown in **Table 24**.

Table 24 – Unit Costs (Full Reconstruction)

Item	Unit	2003 Cost ($M)
Road and Earthwork (Reconstruction)	Mile	$ 4.2
Mainline Structures (Reconstruction, Avg. Width = 44')		
Large (> 500')	Structure	$ 2.3
Medium (200 - 500')	Structure	$ 1.0
Small (<200')	Structure	$ 0.2
Other Structures		
RR Bridge (Mainline Overpass, Reconstr.)	Structure	$ 2.3
RR Bridge (RR Overpass, Replacement)	Structure	$ 2.2
Overpass (2-Ln, Replacement)	Structure	$ 2.3
Overpass (4-Ln, Replacement)	Structure	$ 4.8
Interchanges		
Diamond-Type (Reconstruction)	Interchange	$ 9.1
Full Directional (Replacement)	Interchange	$ 26.5
Partial Directional (Replacement)	Interchange	$ 18.6
Other Features		
Welcome Centers	Welcome Center	$ 5.8
Rest Area	Rest Area	$ 4.8
Commercial Vehicle Monitoring Station	CV Station	$ 6.9
Design and Environmental	15% of Construction Costs	
Right-of-Way and Utilities	20% of Construction Costs	

The cost for these improvements could potentially require approximately $850 million of new investment at a cost of $10.6 million per mile. The preliminary cost estimate is presented in **Table 25**.

Table 25 – Full Reconstruction and Widening Preliminary Cost Estimate

Segment	Length (mi)	Design and Enviro. (million)	ROW And Utilities (million)	Construction Cost (million)					Total Cost (million)
					Structures				
				Road work	Main line	Other[1]	Inter-changes	Other Fea-tures[2]	
Eddyville to Dawson Springs From 1-24 to KY 109	24.4	$26.6	$35.5	$102.7	$5.3	$23.3	$45.9	-	$239.3
Dawson Springs to Nortonville From KY 109 to Breathitt Pkwy.	13.9	$16.9	$22.6	$58.4	$2.3	$7.0	$35.6	$9.6	$152.3
Nortonville to Madisonville From Ford Pkwy. to KY 70	8.1	$9.4	$12.6	$34.2	$1.3	$9.1	$18.2	-	$84.9
Madisonville to Sebree From KY 70 to KY 56	20.2	$22.1	$29.5	$85.0	$14.8	$2.3	$45.5	-	$199.3
Sebree to Henderson From KY 56 to KY 425	13.6	$19.6	$26.1	$57.2	$9.6	$2.3	$36.8	$24.4	$176.0
Total:	**80.3**	**$94.6**	**$126.2**	**$337.5**	**$33.3**	**$44.1**	**$ 182.0**	**$34.0**	**$851.8**

[1] Other Structures include railroad and roadway overpasses along the Parkways.
[2]Other Features include welcome centers, rest areas and CVM stations. These cost estimates are based on recommendations for additional roadside features, included in Section C of this Chapter. These include welcome centers and/or rest areas south of Henderson and between Princeton and Dawson Springs, as well as a CVM station and/or truck parking area in the Henderson area.

NOTE:
Cost estimates are based upon planning-level unit cost assumptions that were derived from development costs on comparable projects, from comparable project elements, or from similar corridor studies in Kentucky (such as the Interstate 66 Southern Kentucky Corridor Study).

5. Summary

Table 26 provides a cost comparison of each of the potential alternatives. To provide a basis for comparison, cost estimates related to building a new alignment parallel to the parkways are included. However, the option to construct I-69 along a new corridor has been dismissed from further consideration by the KYTC.

Table 26 – Comparison of Preliminary Costs

Alternative	Meet Current Standards	Future Expansion w/o Additional ROW[2]	Impact on Environment	Cost (million)	Cost per Mile (million)
1. No Build	No	n/a	Least	$0.0[3]	$0.0
2. Minor Upgrade	Yes[1]	No	Least	$151.7	$1.9
3. Partial Reconstruction	Yes	No	Minimal	$379.7	$4.7
4. Total Reconstruction	Yes	Yes	Minimal	$851.8	$10.6
5. New Alignment	Yes	n/a	Substantial	$1,364.0	$22.0

[1] Improvements under this alternate would be targeted toward upgrading the design features along the routes that potentially represent the most significant safety and operational issues. Design exceptions would be considered where safety and operational conditions would not create an undue risk to motorists.

[2] This column answers the question: If additional travel lanes are required to meet future capacity after I-69 improvements are made, could the lanes be added within the right-of-way provided under each alternative?

[3] Funding for routine maintenance activities would still be needed.

It can generally be concluded that the sections of the Breathitt and Ford Parkways under consideration for designation as I-69 are currently providing efficient and safe travel routes through the Western Kentucky region. In the short-term, designating these roadways as I-69 would not substantially alter their operating characteristics in a manner that would be different than the conditions currently experienced along the two Parkways today. In addition, these Parkways are not alone in having design features that do not meet all of the current standards for interstate highways. Other interstate highways across Kentucky and throughout the United States have varying degrees of design characteristics that do not meet current interstate standards. Therefore, signing the Ford and Breathitt Parkways as I-69 today may not be an unrealistic option and should merit further investigation.

As I-69 develops across the country from Texas to Michigan, additional traffic (especially trucks) will be induced to the corridor. As traffic volumes grow and the percentages of trucks increase, congestion along the main lanes and at system-to-system and system-to-service interchanges will increase. In addition, crash rates and causes should be regularly monitored to insure that, as traffic changes occur, safety problems do not develop that are not currently known to exist.

Independent of the decision of when the Parkways should be officially designated as I-69, it will be necessary to provide for a systematic program of highway improvements along the Parkways that will serve to maintain acceptable operational levels of service and safety and will address the areas along the Parkways that do not meet interstate design criteria.

C. Additional Roadside Features

Additional features that should be considered as part of an upgrade to the Parkways include welcome centers/rest areas/other roadside amenities, commercial vehicle monitoring stations and intelligent transportation systems. Each is briefly discussed here.

1. Welcome Centers, Rest Areas, and Other Roadside Amenities

If the Ford and Breathitt Parkways are designated as part of I-69, there will be a need to provide additional amenities along the routes to accommodate automobile and truck travel and to assist visitors entering the state.

Welcome Centers and Rest Areas will be needed to serve interstate travelers along the proposed I-69 and I-66 corridors, as well as visitors entering the state.

Consideration should also be given to the proposed extension of the I-66 corridor along the Ford Parkway from its junction with the Breathitt Parkway to the junction with the William H. Natcher (Green River) Parkway.

Currently, KYTC provides rest areas at approximately 60-mile intervals along interstate highways and should provide service in both directions. Therefore, welcome centers and rest areas along the proposed I-69 corridor are recommended. Where appropriate, these should be located so as to serve interstate travel along both I-66 and I-69. The following locations are recommended for consideration as welcome centers and/or rest areas:

- South of Henderson (Southbound Welcome Center and Northbound Rest Area)
- Between Princeton and Dawson Springs (Dual Rest Areas)

Currently, a Travel Information Center is located in Henderson along US 41, just south of the Ohio River Bridges. With the implementation of I-69, and assuming that proposed alternatives for I-69 through and around the Henderson/Evansville

metropolitan area will bypass this location, a new official Kentucky Welcome Center and interstate rest area is recommended along I-69 near Henderson to serve southbound traffic. An adjacent northbound rest area is also recommended near the vicinity of this welcome center.

Along the Ford Parkway, an additional pair of rest areas may be needed at a point between I-24 and the Breathitt Parkway interchange. It is recommended that these rest areas be considered at a location between Princeton and Dawson Springs. If a central location for the rest areas is assumed midway between Exit 12 (Princeton) and Exit 24 (Dawson Springs), the rest areas would be located near milepoint (MP) 18. This location would be about 53 miles east of the Paducah Welcome Center near MP 7 on I-24. This location would also be about 58 miles west of the existing service area near MP 76 on the Ford Parkway (future I-66) corridor.

In the planning of future welcome center/rest areas along the I-69 corridor, the KYTC may want to give consideration to the inclusion of state-of-the-art amenities and traveler resources that are being adopted in new interstate travel service facilities around the nation. These amenities include:

- Exhibit areas
- Improved handicap accessibility
- Indoor vending machines with seating
- Updated restrooms
- Special-use family restrooms
- Space for future technological attractions such as an interactive kiosk
- Children's outside play area
- Outdoor space for pets to exercise
- State police field office
- Improved lighting
- 24-hour surveillance cameras

Beyond welcome centers/rest areas, the KYTC may also consider opportunities for public/private partnerships to develop other roadside amenities and commercial service areas.

2. Commercial Vehicle Monitoring Stations

Commercial vehicle monitoring (CVM) stations serve to monitor commercial trucks that are entering and operating within the state relative to legal weights and permitting. CVM stations are located at key points of entry into the state or at other locations where it could be anticipated that there may be a large number of trucks that have not been intercepted through existing monitoring stations. Currently a CVM station is located north of the Ohio River Bridge along US 41. Proposed alternatives for I-69 through and around the Henderson/Evansville metropolitan area will bypass this CVM station. If so,

the construction of a new station is recommended in the Henderson area to capture truck traffic that is inbound to Kentucky. Since increased truck traffic is expected along I-69, a separate truck parking/rest area should also be considered at this location.

No other monitoring stations are anticipated along the study corridors. On the southeastern end of the corridor, inbound commercial vehicles will be captured at CVM stations located near the state line along I-24 near Paducah and along the Julian M. Carroll (Purchase) Parkway near Fulton. An ongoing study being sponsored by the KYTC and the Kentucky Transportation Center at the University of Kentucky is evaluating proposed locations for mid-state CVM stations. This study may yield further recommendations relative to the need for locating CVM stations along the proposed I-69 corridor to capture mid-state truck trips.

3. Intelligent Transportation Systems

Intelligent Transportation Systems, or ITS, refers to any application of advanced technology for the purpose of improving surface transportation. Use of ITS technologies along the I-69 corridor could offer benefits to motorists through incident detection and advance motorist information.

The KYTC's *Intelligent Transportation Systems Strategic Plan (June 2000)* includes a summary of existing ITS programs in Kentucky and initiatives for expanding ITS applications throughout Kentucky. Goals established through the *ITS Strategic Plan* may provide direction for future ITS implementation along I-69 and within the study area:

Message Signs Improve Driver Awareness

- Surveillance technologies can be used to monitor traffic flow, detect incidents and notify emergency response teams.
- Travel information through dynamic message signs, highway advisory radio and the Internet can be used to improve driver awareness and reduce traffic congestion related to construction activities, adverse weather conditions and roadway hazards.

According to the KYTC *ITS Strategic Plan*, no ITS programs have been implemented along the Ford or Breathitt Parkways. Consideration should be given to planning for and/or implementing ITS technologies as part of future activities related to I-69.