PRE-DESIGN SCOPING STUDY

US 421/KY 80 FROM HAL ROGERS PARKWAY TO KY 149

MANCHESTER, CLAY COUNTY
ITEM NO. 11-8003.00

KENTUCKY TRANSPORTATION CABINET

FINAL

Prepared by the
KENTUCKY TRANSPORTATION CABINET
DIVISION OF PLANNING

JANUARY 2006

Kentucky
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PRE-DESIGN SCOPING STUDY

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I. INTRODUCTION

A. Study Purpose

The purpose of this Pre-Design Scoping Study was to: (a) develop information for corridor improvements along US 421/KY 80 from the Hal Rogers (formerly Daniel Boone) Parkway to the intersection with KY 149; (b) provide data to be used when and if the project enters the design phase; and (c) provide background information that can be utilized in the National Environmental Policy Act (NEPA) documentation for the project. Tasks undertaken as part of this effort included:

- Identifying project goals and issues
- Defining the need for the project
- Determining project termini and potential alternatives
- Describing the conditions along the existing roadway
- Identifying preliminary environmental concerns
- Estimating the project costs
- Identifying priority segments for future phase activities
- Initiating contact with public officials and agencies

One of the steps in this process was the collection of technical and resource agency input concerning the project. This was accomplished by:

- Compiling information from existing data and reports
- Establishing a project team to provide direction and review for the study
- Coordinating with resource agencies and local officials

Information thus collected was evaluated to accomplish the following:

- Evaluate the project description and logical termini
- Address the geometrics, level of service, vehicle crashes, and other issues that are influencing the project
- Address, in general terms, the project design criteria
- Document known environmental concerns
- Develop a draft statement of project issues and goals

B. Programming and Schedule

The project is described in the 2002 Kentucky Six-Year Highway Plan (FY 2003-2008) as a “Pre-Design Scoping Study to widen US 421/KY 80 to three

lanes from the Daniel Boone Parkway, mile point 15.751, south to KY 149 (Lockards Creek Road), mile point 13.692". This project is state funded and is scheduled for design in 2005.

II. PROJECT LOCATION, EXISTING CONDITIONS, AND TRAFFIC

A. Project Location

The project termini, as originally described in the 2002 Kentucky Six-Year Highway Plan (see previous paragraph), were fairly general and did not logistically coincide with the project's realized intentions. The project team thus determined that the study area for the project would be better defined as follows:

US 421/KY 11/KY 80/KY 2076 intersection at milepoint 16.915 southeast to KY 149 (Lockards Creek Road) at milepoint 13.692.

The project area is shown in Exhibit 1 in Appendix A. The project termini were more specifically redefined as that above. Several photographs of the project area are shown in Appendix B.

B. Existing Highway Features

Data on the existing conditions along US 421 and the nearby road network were taken from the Division of Planning's Highway Information System (HIS) database.

The US 421 corridor is classified as being located in mountainous terrain; however, the section of roadway in the project area is relatively flat with little horizontal curvature. Passing sight distance is minimal, approximately six percent, and the volume of traffic makes passing almost impossible.

US 421 in the study segment is an undivided two-lane highway with ten to twelve-foot wide lanes with two to eight-foot shoulders as shown in Table 1. The driving surface is high flexible with the most recent resurfacing date also shown in Table 1.

TABLE 1
ROADWAY CROSS-SECTION

Beginning MP	Ending MP	Lane Width	Shoulder Width	Year Resurfaced
13.692	15.307	10 Feet	2 Feet	2000
15.307	16.576	11 Feet	2 Feet	1997
16.576	16.680	12 Feet	2 Feet	1997
16.680	16.915	12 Feet	8 Feet	1997

Source: Highway Information System (HIS) Database

US 421 in the study segment contains only two structures. Table 2 depicts detailed information about each of these structures. As noted therein, the structure, B00009, over Horse Creek at the north end of the study segment is listed as functionally obsolete with narrow lanes and deteriorating concrete. It is noted herein for emphasis that functional obsolescence describes a condition wherein the roadway geometrics do not meet current design standards and is separate and distinct from a condition of structural deficiency. Additionally this bridge, which was built in 1933, may have historical significance. The other structure, B00096, built in 1983 is in "better than minimum condition" but may need modification if additional lanes are to be constructed for this project.

TABLE 2
BRIDGES

MP	Bridge Number	Length	Width	Feature Crossed	Sufficiency Rating	Other Information
15.520	B00096	233'	33.3'	Goose Creek	81.3	Better than Minimum
16.577	B00009	66'	26.8'	Horse Creek	69.5	Functionally Obsolete

Source: Kentucky Bridge Inventory System (KBIS) Database

Significant intersections with crossroads along the study segment of US 421 are shown in Table 3. In addition to those listed therein, there are multiple access points along the corridor in addition to the two railroad crossings. The rail line is operated by CSX Transportation and the segment crossing US 421 is a lightly utilized rail line in Kentucky with a freight traffic density of less than 5 million gross ton-miles per mile annually.

More information about this rail line can be found in the Kentucky Transportation Cabinet's 2002 Kentucky Statewide Rail Plan at this website: http://transportation.ky.gov/Multimodal/railsystems.asp.

TABLE 3
MAJOR CROSSROADS

MP	Description
13.692	KY 179
14.055	Wade Hacker Road
14.281	Sevier-Airport Road (CR 1180)
15.259	Taylor Smith Road
15.307	KY 1999
15.329	CSX Railroad Crossing
15.520	Goose Creek Bridge – B00096
15.751	KY 11
16.451	CSX Railroad Crossing
16.577	Horse Creek Bridge – B00009
16.600	KY 3480
16.723	KY 3481
16.915	KY 80/KY 11/ KY 2076

Source: Highway Information System (HIS) Database

C. Highway Systems

US 421 in the study segment is functionally classified as a Rural Major Collector. This functional classification is used to describe highway segments that:

- Serve trips that are of relatively short distance
- Are of regional, rather than statewide or interstate, significance
- Serves both access and mobility functions
- Provides connections to county seats

For maintenance purposes, it is classified as a state secondary route. US 421 in the study segment has a Truck Weight Class of "AAA" (80,000 pounds gross weight limit) and is part of the Coal Haul and Extended Weight Systems. It is not part of the National Highway System, the National Truck Network, the Forest Highway System, the Appalachian Development Highway System, the Bicycle Route System, or the National or Kentucky Scenic Byway System.

D. Vehicle Crash Analysis

A total of 78 vehicle crashes were recorded with valid reference points on US 421 in the study segment during the three year and eight month period between January 1, 2000 and August 31, 2003. Thirty-three of the crashes produced injuries to at least one person, while there were no crashes resulting in fatalities. More than half of the crashes were "rear-end" collisions with sideswipe and angle crashes accounting for most of the remaining crash types. These crash types are indicative that turning movements are the major factor influencing the crash situation.

Both segment and spot crash analyses for the study segment of US 421 were conducted as depicted in Tables 4 and 5. One of the analysis segments showed a crash critical rate factor (CRF) over 1.0 as shown in Table 4. Six spot locations, both 0.1 mile and 0.3 mile lengths, produced a CRF over 1.0 with two other spots approaching the 1.0 CRF threshold. The Kentucky Transportation Center identified the US 421/KY 11/KY 2076 intersection as having a CRF of 1.50 in their research report, Crash Rates at Intersections, KTC-03-21/SPR258-03-21, dated August 2003.

TABLE 4
SEGMENT CRASH ANALYSIS 2000 - 2003

Begin MP	End MP	Segment Length	Functional Class Rate	Number of Crashes	HMVM	RC	Crash Rate	Critical Rate Factor
13.692	15.751	2.059	244	78	0.3262	314	228	0.73
15.751	16.577	0.826	244	46	0.1625	344	270	0.78
16.577	16.915	0.338	244	43	0.0600	412	683	**1.66**

Source: Highway Information System (HIS) Database, KYTC and Analysis of Traffic Accident Data in Kentucky (2000 – 2003) Kentucky Transportation Center, September 2004

TABLE 5
SPOT CRASH ANALYSIS 2000 – 2003

Begin MP	End MP	Spot Length	Functional Class Rate	Number of Crashes	MVM	RC	Crash Rate	Critical Rate Factor
13.7	14.0	0.3	0.73	16	15.84	1.31	1.01	0.77
14.0	14.3	0.3	0.73	20	15.84	1.31	1.26	**0.96**
15.0	15.3	0.3	0.73	21	15.84	1.31	1.33	**1.01**
13.9	14.0	0.1	0.24	12	15.84	0.59	0.76	**1.29**
15.0	15.1	0.1	0.24	12	15.84	0.59	0.76	**1.29**
15.3	15.4	0.1	0.24	10	15.84	0.59	0.63	**1.07**
15.5	15.6	0.1	0.24	10	15.84	0.59	0.63	**1.07**
15.6	15.7	0.1	0.24	10	15.84	0.59	0.63	**1.07**

Source: Highway Information System (HIS) Database, KYTC and Analysis of Traffic Accident Data in Kentucky (2000 – 2003) Kentucky Transportation Center, September 2004

E. Traffic and Level of Service

The average daily traffic volume (ADT) in the year 2002 varied from about 12,400 vehicles at the southern most section of the project to around 14,000 vehicles at the US 421/ KY 11/ KY 2076 intersection (Table 6 and, in Appendix A, Exhibit 2). Projected future year (2030) average daily traffic volumes, based on an annual growth rate of three percent, range from about 20,000 vehicles at the southern most section to 23,000 vehicles at the northern termini (Table 7 and, in Appendix A, Exhibit 3). Current and projected future year truck volumes are approximately twelve percent of total vehicular traffic.

TABLE 6
CURRENT (2002) AND PROJECTED FUTURE YEAR (2030)
AVERAGE DAILY TRAFFIC VOLUMES

Route	Begin Point	Begin MP	End Point	End MP	2002 ADT	2030 ADT
US 421	KY 149	13.692	KY 11	15.751	12,400	20,100
US 421	KY 11	15.751	Horse Creek Bridge	16.577	15,400	24,900
US 421	Horse Creek Bridge	16.577	KY 11, KY 80, & KY 2076	16.915	13,900	22,500

Source: Highway Information System (HIS) Database, KYTC

For purposes of Level of Service (LOS) determination, the study segment of US 421 is considered to be a Class I highway. As shown in Table 7, the LOS is defined in terms of the percent of time spent by one vehicle following another.

TABLE 7
LOS CRITERIA FOR TWO-LANE HIGHWAYS IN CLASS I

Level of Service	Percent Time-Spent-Following
A	< 35
B	>35 but <50
C	>50 but <65
D	>65 but <80
E	>80
F	Flow rate exceeds the segment capacity

Given the high traffic volumes along the study segment of US 421, one would expect a relatively poor LOS and that indeed is the case. Tables 8 and 9 indicate the current year (2002) and future year (2030) LOS for US 421.

TABLE 8
EXISTING LEVEL OF SERVICE (2002)

Section	Begin MP	End MP	Segment Length	Average Travel Speed*	Percent Time Spent Following*	V/ C	LOS
1	13.692	15.751	2.059	33.2	72.1	0.45	E
2	15.751	16.577	0.826	28.1	79.4	0.55	E
3	16.577	16.915	0.338	29.4	76.0	0.50	E

Source: Highway Capacity Manual 2000 Chapter 20 (See LOS Criteria in Table 7)
* Based on BFFS of 50 mph and 20 access points per mile (Section 1 = 10 access points per mile)

TABLE 9
FUTURE LEVEL OF SERVICE (2030)**

Section	Begin MP	End MP	Segment Length	Average Travel Speed*	Percent Time Spent Following*	V/ C	LOS
1	13.692	15.751	2.059	26.4	87.1	0.72	E
2	15.751	16.577	0.826	19.6	92.0	0.90	F
3	16.577	16.915	0.338	21.8	89.7	0.81	E

Source: Highway Capacity Manual 2000 Chapter 20 (See LOS Criteria in Table 9)
* Based on BFFS of 50 mph and 20 access points per mile (Section 1 = 10 access points per mile)
** Without corridor improvements

III. CABINET, PUBLIC, AND AGENCY INPUT

A. Project Team Meeting

A pre-design scoping study project team meeting was conducted on April 6, 2004. The purpose of this meeting was to discuss the project and to assist in determining issues and concerns to be addressed in the study. A copy of the meeting minutes is included in Appendix C. Issues and concerns discussed by the team with observations and conclusions are as follows:

- The consensus of the team was that the general project area should be expanded to include the section between the Hal Rogers Parkway overpass to the US 421/ KY 11/KY 2076 intersection.

- The primary goals are to address safety and traffic flow problems created by unlimited access points and dangerous intersections. The short sight distances, narrow cross section, and increasing congestion problems of the roadway increase these problems.

- Potential benefits of the project include:

  - Improved safety resulting from increased sight distance, increased stopping sight distance, and a wider roadway cross section.
  - Improved safety by limiting access and the construction of turning lanes throughout the corridor.
  - Better access from Barbourville via KY 11 to the Hal Rogers Parkway.
  - Potentially improved access to areas of economic growth if the US 421 corridor were improved.

- KYTC will solicit the assistance of the Cumberland Valley Area Development District in obtaining information pertaining to Environmental Justice.

- No previous reports have been found, and improvements are needed even though the bypass project has been deauthorized and other projects impacting this corridor have been put on hold.

- The Environmental Footprint Area will be an approximate 1000-foot band around the corridor as agreed on by the team. There seems to be limited historical and cultural impacts within this boundary.

- After discussion relating to probable design criteria within the corridor, the team agreed to recommend design criteria as follows:

  - The functional classification of US 421 in Clay county is currently a rural major collector. The project team does not expect this to change as a result of improvements to the roadway.
  - The design year for this study will be 2030. The maximum traffic in 2030 is estimated to be in the range from 20,000 to 25,000 ADT and 740 to 920 DHV.
  - The expected design speed will be 45 mph to match the posted speed limit.
  - The typical cross-section for rural collector roads with an ADT of 2000 or greater is 12-foot lanes with 8-foot shoulders. The team agreed that due to the unlimited access characteristic

of the current traffic on US 421, a curb and gutter cross section with sidewalks would be recommended to control the access.

  - The restricting points in this corridor are the two bridges and the Hal Rogers Parkway overpass; however this bridge overpass will likely have to be retrofitted to accommodate any future lane configurations. The other two bridges will need reconstruction also.

- The team did not identify an applicable ITS solution for this project.

- The team agreed that any needs for bicycle/pedestrian traffic would be provided for by the cross sections of 10 foot paved shoulders and/or the sidewalks in the school areas.

B. Local Officials and Stakeholder Meetings

No public meetings were held during the course of this study until further project development phases are funded. Communication through the local officials and stakeholders was obtained through the resource agency mailings.

C. Resource Agency Coordination

Early agency coordination letters were sent to various resource agencies, interested organizations, local officials, and internal Cabinet offices to obtain input and comments regarding the potential impacts associated with this project. Copies of request letters, mailing list, and the responses are included in Appendix D. Issues identified and concerns raised as a result of this process include:

- Geotechnical Engineering Branch, KYTC Division of Structural Design (formerly under Division of Materials): underground mining has occurred along the existing US 421/KY 80 route; widening of cut sections should be held to a minimum to avoid existing mines and adits; backfilling of any mine adits encountered during construction; special construction techniques in the cut areas such as lined limestone ditches and detention basins will likely be necessary if existing mines and/or adits are encountered; embankment benching may be required in existing fill sections if new fill material is placed over existing embankments.

- Kentucky State Nature Preserves Commission, Natural Resources and Environmental Protection Cabinet: the potential presence of Appalachian rosinweed (Siliphium wasiotense) listed as a KSNPC-monitored plant.

- Natural Resources Conservation Service, U.S. Department of Agriculture: expressed a general concern about potential impacts on prime farmland soils and farmlands of statewide importance.

- Division of Air Quality, Department for Environmental Protection: noted general concerns about Fugitive Emissions, open burning, and air quality conformity. (Note: Clay County is not currently listed as a non-attainment area).

- Division of Conservation, Environmental and Public Protection Cabinet: expressed a general concern about loss of farmland and control of erosion and sedimentation, recommend use of best management practices (BMPs).

- Kentucky Geological Survey, University of Kentucky: general comments, similar to those of the Geotechnical Engineering Branch of the KYTC Division of Materials.

- Permits Branch, KYTC Division of Traffic Operations: urges that if roadway is significantly reconstructed it be as a partially controlled access facility and discusses procedural requirements if this happens; recommends that design speed used in subsequent project development phases be the same as anticipated posted speed; recommends construction of access control fence; recommends early notification if proposed roadway is to be on the National Highway System (N.H.S.).

- KYTC Department of Vehicle Enforcement: support concept of project and accommodation for large commercial vehicles.

- Kentucky Department of Travel: preserve all historical and natural assets to ensure that such properties of interest are not negatively impacted.

- United States Fish and Wildlife Service: information on internet site identifies the Indiana Bat, *Myotis sodalis*, as an endangered species candidate.

- Kentucky Airport Zoning Commission: requires a permit if any construction exceeds 200 feet in height.

- Centers for Disease Control and Prevention, Public Health Service, U. S. Department of Health and Human Services: outlined issues that they want considered as a part of future project development phases, including air quality, water quality and quantity; wetlands and floodplains, hazardous materials and wastes, non-hazardous solid wastes and other materials, noise, occupational health and safety, land use and housing, and environmental justice.

- Clay County Fiscal Court: supported concept of project to improve overall transportation system, outlined potential economic benefits

for the area, concerned with safety issues with nearby schools and potential for additional accidents without improvements.

- The following agencies responded to KYTC's solicitation for comments, but indicated that they had none at this time:

  - Department for Surface Mining Reclamation and Enforcement
  - United States Coast Guard
  - Department of Fish & Wildlife Resources
  - Department of Agriculture
  - Department of Natural Resources
  - Department for Workforce Investment
  - Department of Parks
  - Kentucky State Police

IV. ENVIRONMENTAL AND SOCIOECONOMIC OVERVIEW

A. Environmental Footprint

The Division of Planning developed an Environmental Footprint as shown on Exhibit 5 in Appendix E. The Division of Environmental Analysis has not completed their review of identifying issues possibly requiring particular consideration in subsequent project development phases. Once that information becomes available, it will be added to this report as a supplemental document.

B. Environmental Justice

The Cumberland Valley Area Development District (CVADD) conducted a review of the 2000 Census data for the purpose of identifying environmental justice and community impact issues. The purpose of this review was to assist the Kentucky Transportation Cabinet in meeting the requirements of Federal Executive Order (EO) 12898, which states that "….each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" and hence to ensure equal environmental protection to all groups potentially impacted by the US 421 project. Although EO 12898 does not specifically address consideration of the elderly population, the U. S. Department of Transportation encourages the consideration of this demographic subset in Environmental Justice discussions. A copy of CVADD's Environmental Justice and Community Impact Report is included in Appendix F.

The CVADD study concludes that the potential for disproportionately high and/or adverse affects on minority populations impacted by the US 421 project is very small. A significant concentration of minority persons exists in Census Tract 9503 which is attributed to those individuals incarcerated in the Federal Correctional Institute of Manchester. An additional concentration of minority population was discovered in Census Tract 9503, Block Group 5,

however, it is anticipated that the area will not be impacted by the proposed project.

The population below poverty level for Clay County and all Census Tracts and Block Groups in and around the study area significantly exceeds national and state averages. No areas with a potential concentration of persons age 62 and over along the US 421 corridor were identified.

Economic distress is the most important issue affecting Clay County today. The county continues to experience significant unemployment, low income levels and high poverty rates. While the population below poverty level in surrounding southeastern Kentucky counties also exceeds state and national averages, a comparison of the data shows that Clay County is an extreme case.

V. TERMINI AND LENGTH

As indicated above, the project termini were defined to be the intersection of US 421, KY 11, KY 80, and KY 2076 on the north and the intersection of US 421 and KY 149 on the south, a distance of 3.2 miles along the existing route.

VI. DRAFT PROJECT GOALS

The existing and projected future traffic volumes along the study segment of US 421 indicate systemic congestion problems, and it does appear that additional lanes of travel are needed. Currently, the LOS for the study segment is E. Traffic flow conditions are congested with frequent platooning of vehicles and added interruptions from the existing minimal access restrictions throughout the study corridor. This has resulted in a high number of crashes with 70% of those being rear end or angle type collisions.

The somewhat unique mixture of vehicular traffic composition traveling on the existing unrestricted access and narrow lanes creates a roadway environment of less than optimal safety conditions. Therefore, improving safety for all roadway users and improving congestion are the principal project goals.

VII. RECOMMENDATIONS

A. Geometric Design Features

Probable design criteria were discussed by the US 421 project team, which agreed to the following recommendations:

- The functional classification of US 421 in Clay County is currently rural major collector. The project team does not expect this to change as a result of improvements to the roadway.

- The design year for this study will be 2030. The average projected daily vehicular traffic in 2030 ranges from about 20,000 vehicles just north of KY 149 to about 25,000 vehicles near the main intersections of US 421, KY 80, KY 11, and KY 2076 (Table 6 and, in Appendix A, Exhibit 3) with design hour volumes (DHV) of approximately 740 to 920, respectively.

- The expected design speed will be 45 mph to match the posted speed limit.

- The typical cross-section for rural collector roads with an ADT of 2000 or greater is 12-foot lanes with 8-foot shoulders. The US 421 project team agreed that, due to the unique character of the traffic on US 421, a curb and gutter section similar to a section north of town towards McKee would be recommended. A 3-lane section would continue south throughout the project study area until you reached the Save-A-Lot store in the vicinity of the airport. It would then be tapered to a 2-lane section with paved shoulders and a turn lane constructed at the KY 149 intersection. Also, 4 and 5-lane sections would be analyzed for constructability and cost.

B. Priority Segments

The US 421 project team recommended that the priority segments should begin at the intersection of US 421, KY 80, KY11, and KY 2076 and extend to the south. This coincides with the termini of the proposed Manchester Bypass. There are two options for the first segment. Cost estimates for these segments and alternatives are depicted in Table 10.

C. Cost Estimates

For study purposes, three alternative cost estimates for the priority section (Segment 1) were considered. One of these estimates is for a 3-lane section with a continuous left turn option with paved shoulders. As shown in Table 10, the phase cost estimates for this alternative are as follows:

Segment 1, 3-Lane Option

Design:	$1,000,000
Right-of-Way:	$4,500,000
Utilities:	$1,000,000
Construction:	$8,000,000
Total:	$14,500,000

For the 4-lane option construction cost estimate for segment 1, no decision was made at this stage regarding the retrofitting of the 2 bridges on this segment. This decision would be made during the Design phase. The study cost estimate, however, assumes that these 2 bridges would be rebuilt to current design standards. Further, since no public meetings or hearings were conducted as a part

TABLE 10
COST ESTIMATES BY SEGMENT

Segment Number	SEGMENT DESCRIPTION		TYPE OF IMPROVEMENT	APPROXIMATE LENGTH (MILES)	PHASE COST ESTIMATES (Millions)				Total Cost Estimate (Millions)	Estimated Cost per Mile (Millions)
	NORTHERN TERMINUS	SOUTHERN TERMINUS			Phase II Design	R/W	Utilities	Construction		
1	KY 11 / KY 2076	US 421 - MP 14.79	Widen to 3-Lane section with continuous turning lane	2.1	$1.00	$4.50	$1.00	$8.00	$14.50	$6.81
1	KY 11 / KY 2076	US 421 MP - 14.79	4-Lane Section Reconstruction	2.1	$1.00	$5.00	$1.00	$9.00	$16.00	$7.51
1	KY 11 / KY 2076	US 421 MP - 14.79	5-Lane Section Reconstruction	2.1	$1.00	$6.00	$1.00	$10.00	$18.00	$8.45
2	US 421 MP - 14.79	KY 149	Widen to 3-Lane section with continuous turning lane	1.1	$0.50	$2.00	$0.50	$3.00	$6.00	$5.45
2	US 421 MP - 14.79	KY 149	2-Lane with full paved shoulders with turning lane at KY 149	1.1	$0.50	$1.50	$0.50	$2.50	$5.00	$4.55

of this limited analysis, an assumption is made that US 421 would be reconstructed along the existing alignment. This, too, is a decision that would be made during the Project Planning/Location Approval phase of any subsequent project development activities. The cost estimate is as follows:

Segment 1, 4-Lane Option

Design:	$1,000,000
Right-of-Way:	$5,000,000
Utilities:	$1,000,000
Construction:	$9,000,000
Total:	$16,000,000

The 5-lane section would pose various issues in constructability under the Hal Rogers Parkway and increased construction cost for the two existing bridges. The configuration would also require a substantial amount of right-of-way and encroach on numerous businesses and property owners. The cost estimate for this alternative is as follows:

Segment 1, 5-Lane Option

Design:	$1,000,000
Right-of-Way:	$6,000,000
Utilities:	$1,000,000
Construction:	$10,000,000
Total:	$18,000,000

One of the alternatives for priority segment 2 is similar to the first alternative on segment 1, which is based on a 3-lane section with a continuous left turn option. This segment is approximately 1 mile in length. As shown in Table 10, the phase cost estimates for this alternative are as follows:

Segment 2, Full 3-Lane Option

Design:	$500,000
Right-of-Way:	$2,000,000
Utilities:	$500,000
Construction:	$3,000,000
Total:	$6,000,000

The other priority segment 2 estimate is based on a 2-lane section with paved shoulders and a left turn lane at the KY 149 intersection. As shown in Table 10, the phase cost estimates for this alternative are as follows:

Segment 2, Full 2-Lane Option

Design:	$500,000
Right-of-Way:	$1,500,000
Utilities:	$500,000
Construction:	$2,500,000
Total:	$5,000,000

D. Recommendation

The original project length was 2.1 miles; however, the project team decided to extend the northern termini to a more logical location at the intersection with KY 11/KY 2076 for a total length of 3.1 miles. The project team agreed that the typical section for priority segment 1 should be a 3-lane curb and gutter configuration with sidewalks. The continuous turning lane should accommodate those making turning movements throughout the highly congested developed area thus possibly reducing the high number of crashes that are occurring. Additionally, right turn lanes would be constructed at the KY 11 intersection. Table 10 shows the estimated cost of this section to be $14,500,000, including reconstruction of the 2 existing bridges. Priority segment 2 would be a 2-lane section with full paved shoulders and construction of turn lanes at the KY 149 intersection. Table 10 shows the estimated cost of this section to be $5,000,000.

The 3-lane recommendation should enhance the existing facility, avoid extensive relocations, and minimize additional right of way acquisition. Restricting access with the curb and gutter sections will reduce the entrance points throughout the corridor. This configuration is expected to significantly reduce the number of crashes and conflict opportunities. The center turn lane should also help to alleviate the potential for congestion and improve service flow into the design year. The LOS for a 3-lane section can not be determined empirically, however, providing for turning lanes and storage capacity should be beneficial in reducing congestion and providing an improvement in safety.

VIII. ACKNOWLEDGEMENTS

Appreciation is herewith expressed to Greene Keith, Joel Holcomb, Quentin Smith, Arthur Smallwood, Adam Knuckles, Dean Croft, Michael West, and Sandy Rudder of District 11, to Clay McKnight of the Cumberland Valley Area Development District, to Charlie Spalding with the Division of Planning, and the Division of Environmental Analysis for their participation in the Project Team meeting and field inspection, providing cost estimates, preparation of graphics for this report, environmental footprint, and for development and reporting of environmental justice and community impact information.

IX. CONTACTS

The following persons may be contacted if additional information is needed concerning the project or the pre-design scoping study process:

- Daryl J. Greer, P.E., Director, Division of Planning
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