

# KY 163 Alternatives Study

Item No. 3-129.00



## Metcalfe County



October 2007  
**FINAL REPORT**



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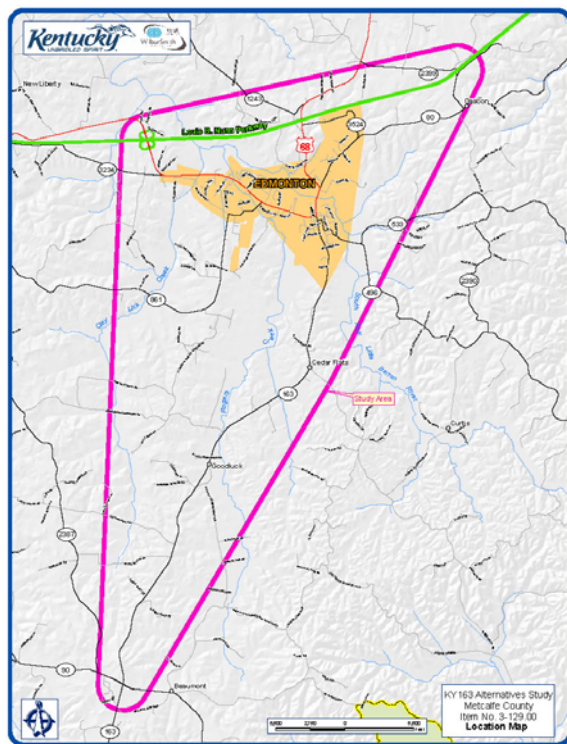
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**KENTUCKY TRANSPORTATION CABINET**  
**KY 163 ALTERNATIVES STUDY, METCALFE COUNTY**  
**Reconstruction/Relocation of KY 163 from KY 90 to the Nunn Parkway**  
**October 2007**

The Kentucky Transportation Cabinet (KYTC) has undertaken this planning study to gather information necessary to develop and evaluate alternatives for the possible reconstruction of a portion of KY 163 in Metcalfe County. The southern terminus for the proposed project is KY 90 and the northern terminus is a potential interchange along the Louie B. Nunn (Cumberland) Parkway at or near the city of Edmonton.

A number of other highway projects are occurring along both KY 90 and KY 163 in adjacent counties. This study provides an opportunity to incorporate Edmonton and Metcalfe County into larger, regional improvements to the transportation network.



*Study Area*

The existing KY 163 corridor is a two lane roadway through rolling terrain with travel lanes ranging between nine feet and 11 feet and two-foot wide shoulders. The posted speed limit ranges from 25 mph in downtown Edmonton to 55 mph in the rural section to the south. There

are few other routes providing north-south connections in the vicinity.

### **Project Purpose and Need**

The primary purpose and need of the project is to improve highway safety and highway systems mobility. As these needs are addressed, a number of secondary goals should provide additional benefits:

- Improve connectivity between KY 90 and the Nunn Parkway;
- Address geometric deficiencies along the existing route;
- Improve accessibility to activity centers within Edmonton;
- Reduce congestion in Edmonton, especially at the KY 163 intersection with US 68-KY 80;
- Improve facilities for truck traffic; and
- Enhance potential for economic development.



*Typical Corridor View along KY 163*

A number of freight trucks use KY 163 northbound to westbound KY 90 as a connection between I-40 and I-65, avoiding increased traffic volumes around Nashville. Also, KY 163 serves to connect the small industrial bases in Edmonton and Tompkinsville to Tennessee. The potential future designation of the Nunn Parkway as I-66 is likely to increase the number of trucks using KY 163.

From a local perspective, the intersection of KY 163 with US 68-KY 80 is one of the primary problems in the area. With no parallel routes,

all north-south and east-west traffic meets at this four-way stop-controlled intersection. Restrictive turning radii and on-street parking facilities make it difficult for trucks to maneuver through this intersection, creating a bottleneck with sizeable queues at peak times.



*Intersection of KY 163 and US 68-KY 80*

### Traffic Characteristics

The existing traffic volumes along KY 163 in the study area range between 2,100 and 4,100 vehicles per day (vpd). Existing truck percentages are approximately 9-12% of the total traffic along the route.

KY 163 currently operates at LOS B or C, with increased delay at key intersections in Edmonton. Typically, a minimum of LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas.

Assuming no transportation improvements, Year 2030 traffic was estimated based on historic traffic growth. Traffic along KY 163 was forecasted with a compounded annual growth rate of 1.9% through Year 2030, resulting in an average daily traffic (ADT) range from 3,300 to 6,500 vpd. The study portion of KY 163 is expected to continue operating at LOS B and C, with a segment just south of downtown Edmonton operating at LOS D. Operations at key intersections deteriorate as traffic volumes increase.

An investigation of the crash history for 2002-2006 showed a number of vehicle crashes along the study corridor. The Critical Rate Factor (CRF) is a measure comparing the frequency of crashes along a route to average crash rates throughout the state; a CRF greater than 1.00 indicates crashes are occurring more often and are not attributable to random circumstances.

In the study area, KY 163 for half a mile south of downtown showed up as a high crash segment (CRF > 1.00). US 68-KY 80 west of downtown also showed a large number of

crashes and multiple spots with a CRF > 1.00. Most high CRF spots appeared at key intersections within Edmonton.

### Environmental Issues

A number of environmental factors and sensitive land uses were identified through the course of this study, including:

- Harvey Cave and other karst features;
- Prime farmland and an established Agricultural District along the existing KY 163 alignment;
- Potential endangered or threatened species habitat;
- Potential water quality issues and impacts to wetlands associated with the large number of streams in the project area;
- Cemeteries and unmarked graves;
- Parks and other community resources;
- Environmental justice issues related to low-income populations; and
- Existing/potential historic structures and archaeological sites.

### Public Involvement

Throughout the study, local citizens, public officials, and interest groups were given the opportunity to provide input. In addition, input was solicited from many local, state, and federal agencies. Survey responses from the second public meeting indicated that approximately 92% of respondents were in support of improving KY 163. Preserving homes and farmlands was the primary concern expressed throughout the study.

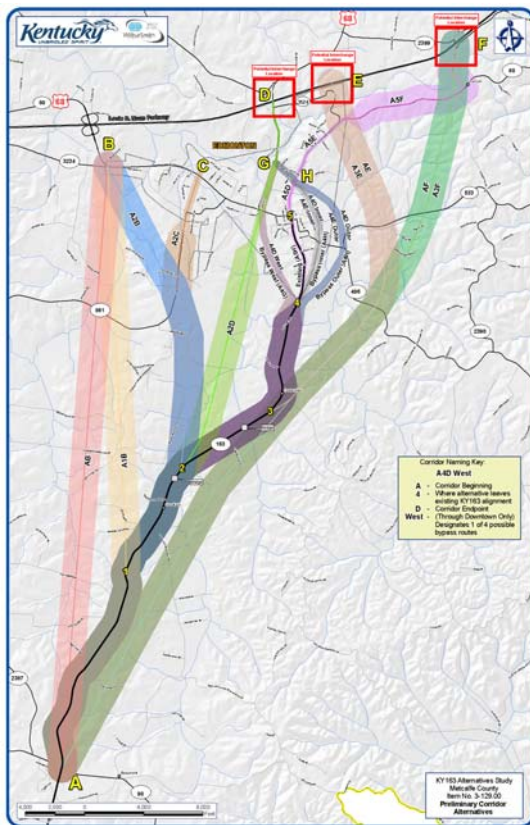


*First Public Meeting*

### Alternatives Evaluation Process

A tiered evaluation process was undertaken to evaluate the proposed alternatives. Initially, 25 alternative corridors were developed, and these were evaluated as part of a Level 1 Screening process. Findings were presented to the project team, and a number of these alternatives were not recommended for further

study because they did not adequately meet the Level 1 criteria.



Level 1 Alternatives

As part of the Level 2 Screening process, environmental and geotechnical assessments were conducted for the remaining seven Alternative Corridors, a Spot Improvements Alternative, and the No Build Alternative. Local citizens, public officials, and representatives of government resource agencies were then given the opportunity to react to the proposed improvement alternatives through a second round of public involvement activities. Results of the Level 2 Screening were summarized and presented to the project team for discussion. The result of this meeting was the recommendation of a preferred build alternative. This alternative was divided into individual construction segments, which were then prioritized.

## Recommendations

The top priority recommendation is a new connecting route within Edmonton, west of the existing alignment (segment 4G above). This link would provide route redundancy within Edmonton, increase access to the southern

Industrial Park, and allow large trucks an alternative route to the parkway without having to negotiate restrictive geometry at the KY 163/US 68-KY 80 intersection. Currently, there is minimal development within the footprint of this alternative. This project should be divided into Priority Segment 1a (north of US 68-KY 80) and Priority Segment 1b (south of US 68-KY 80).

As a second priority, a new interchange on the parkway at US 68 north of Edmonton is recommended. Karst topography and the proximity of both KY 1243 and the northern Industrial Park entrance increase costs for this alternative. Because the Nunn Parkway is designated to become a portion of the future I-66 corridor, an interchange justification study may be required for Federal Highway Administration (FHWA) approval.

Concurrent with the Priorities 1a, 1b, and 2, a number of lower cost, short term spot improvements are also recommended. In priority order, these include:

- Widening the bridges over Rogers Creek and Black Rock Creek, respectively;
- Creating a 3-lane section on US 68 from milepoints 6.120 to 7.000;
- Improving the intersection of US 68 with KY 80;
- Adjusting vertical and horizontal alignments at both Cedar Flats and Missionary Mound Baptist Church;
- Constructing turn lanes into the northern Industrial Park on both US 68 and KY 80; and
- Adding a truck climbing lane on KY 163 north of KY 90.

## Typical Sections

The typical section for new alignments consists of three 12-foot wide lanes with 8-foot wide shoulders and ditches. A partially controlled access facility is recommended. Consideration should be given during design phases to adding sidewalks and/or a multi-use bicycle/pedestrian path.

For spot improvements to the existing route, a two lane cross-section with 11-foot wide lanes and six-foot wide shoulders is recommended.



## Cost Estimates

As shown in the following table, the total combined cost estimate for Priority Segments 1a and 1b is \$11.3 million. The total cost for all the recommended spot improvements is \$15.5 million. No funds are scheduled at this time in the Six-Year Plan for the design or construction of this project.

Cost by Phase for Segments 1a & 1b	Anticipated Project Cost
Design	\$619,000
Right-of-Way	\$1,020,000
Utility Relocation	\$820,000
Construction	\$8,840,000
<b>Total</b>	<b>\$11,299,000</b>

## Construction Considerations

A number of issues were identified through the course of this study that should be considered as part of future design and construction phases, as follows:

- Farmland Impacts: Care should be taken to preserve harvested croplands. One Agricultural District lies in the study area but should not be impacted by the recommended alternatives.
- Erosion and Sedimentation Control: Measures should be utilized to control erosion and sedimentation during and after earth-disturbing activities. The construction of this project may initially increase the amount of erosion. There may also be an increase in non-point source pollution after the construction of this project. Careful consideration should be given to erosion control methods and to decreasing the amount of non-point source pollution that reaches surface and ground water.
- Threatened/Endangered Species: Two endangered species of bats potentially occur within the area. Further investigation may be necessary to identify roosting sites; tree cutting activities should be limited to mid October through late March.

- Air Quality Impacts during Construction: Construction period air quality impacts will need to be evaluated to (1) expose the potential short-term effects of site preparation, demolition, materials storage and construction and (2) determine if any appropriate mitigation commitments are to be incorporated into the project plans.
- Water Quality and Aquatic Habitats: Care should be taken to preserve aquatic habitats. Any impacted wetlands should be delineated. Permits from the KY Division of Water may be necessary.
- Geotechnical Conditions: If deemed necessary, a more detailed study of karst topography within the study area should be undertaken as the project develops.
- Waste Management: Solid wastes should be disposed of at a permitted facility. Underground Storage Tanks (UST) and other contaminants should be properly addressed as they are encountered.
- Traffic Operations: Maintenance of traffic and residential access should be preserved throughout the construction phases.

## Additional Information

Additional information regarding the KY 163 Alternatives Study can be obtained from the following KYTC Division of Planning staff members:

- Daryl Greer, P.E., Director
- Steve Ross, P.E., Branch Manager
- Jimmy Wilson, P.E., Team Leader
- Boday Borres, P.E., Project Manager

The following address and phone number can be used to reach these individuals:

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 Kentucky Transportation Cabinet  
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## I. INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) has undertaken this Alternatives Study to consider the improvement and/or potential realignment of KY 163 from KY 90 to the Louie B. Nunn (Cumberland) Parkway near Edmonton, Kentucky in Metcalfe County.

The purpose of this study is to:

- Identify known issues, concerns, and constraints, including safety, traffic, social, environmental, and geotechnical considerations;
- Develop preliminary “purpose and need” and goals for the proposed project;
- Listen to and share information with local officials, government agencies, other interested parties, and the public;
- Establish logical termini for the proposed project;
- Develop and evaluate project alternatives based on project purpose and need, including a potential new interchange north of Edmonton and spot improvements along the existing route; and
- Make project recommendations.

Through this Alternatives Study, the KYTC ensures that any future project improvements to KY 163 effectively address identified transportation needs, and that project development decisions meet federal requirements as defined in the National Environmental Policy Act (NEPA).

### A. Background

The KY 163 Alternatives Study was identified in the *Kentucky Enacted Six-Year Highway Plan FY 2007-2012* (generally referred to as the Six-Year Plan) as Item No. 3-129.00. This project was described in the latest Six-Year Plan as a “scoping study to determine appropriate corridor for improvements to KY 163 from KY 90 north to the Cumberland Parkway at Edmonton.”

### B. Project Location

The study area, shown in **Figure 1.1**, lies within Metcalfe County, Kentucky.

Metcalfe County is a predominantly rural county with a population of about 10,000. Edmonton is the county seat, located just south of the Louie B. Nunn (Cumberland) Parkway, with a population of approximately 1,600.

Minority populations for both city and county are below 3% while the population of persons over age 65 is above the state average for both city (25%) and county (15%). Income levels are below state and national averages, not uncommon for this portion of the state.

Manufacturing makes up the largest sector of the local economy, employing about 1,300 to 1,400 persons. Nearly half the residents of the county commute beyond its borders to work, primarily in nearby Glasgow, Somerset, or Bowling Green.





Figure 1.1– Study Area Map



Metcalfe County is largely agricultural, but also has some timber. Most of the farmland lies to the west of the existing KY 163 corridor south of Edmonton, while the aggressive terrain to the east better serves the timber industry. A stockyard is located north of downtown Edmonton, just south of the US 68-KY 80 intersection, and generates a significant amount of truck traffic at peak times during the year.

Within Edmonton, in addition to city and county government offices, there are a number of businesses, churches, and parks, similar to other rural towns in southern Kentucky. There are three schools, all located on US 68-KY 80 west of downtown.

Within the study area, there are two industrial parks. One industrial park, located on US 68 north of downtown Edmonton, is an established location with three major industries that are the largest employers in the county. This industrial park is a major traffic generator for trucks and for commuters from both within and outside of Metcalfe County. A new industrial park at the southern city limits of Edmonton is still in development and does not yet have a tenant.

### **C. Programming and Schedule**

This study was funded in the FY 2007 (2007-2012) Six-Year Highway Plan, with committed planning funds of \$250,000.

Subsequent phases of project development, including Design, Right-of-Way Acquisition, Utility Relocation, and Construction, are not scheduled in the most recent legislatively approved Six-Year Highway Plan.

## II. EXISTING CONDITIONS

Since KY 163 ends at US 68-KY 80 in downtown Edmonton, access from KY 163 to the Louie B. Nunn Parkway must continue via US 68-KY 80 to the west. Also, a potential new interchange could be located at or along several other routes. Therefore, existing conditions information was gathered not only for KY 163, but also for US 68, KY 80, and other highways in the study area.

Characteristics of KY 163 and the other state highways in the study area are identified in the following sections. Information is included about highway systems, geometric characteristics, bridges, traffic conditions, crash history, adequacy ratings, and planned highway improvements. Roadway information is summarized from the KYTC Highway Information System (HIS) database 2006.

Project area roadways considered as part of this analysis are presented in **Table 2.1**. These roadways were selected because they were deemed most important to the overall transportation system in the study area. Specifically, they are primary traffic carriers within the project area and serve the inflow and outflow of goods for the area. In addition, portions of these roadways could become part of a route, including KY 163, designed to improve connectivity between the Nunn Parkway and the transportation network to the south. Therefore, in selected cases, maps and tables may include roadway segments that fall outside the segments defined in **Table 2.1**.

Photographs taken throughout the study area can be found in **Appendix A**. Additional information on the existing conditions is presented in **Appendix B**, as discussed below.

**Table 2.1 – Major Study Area Routes**

Route	Begin MP	End MP
US 68	3.855	13.013
KY 80	0.000	3.205
KY 90	1.623	6.468
KY 163	0.000	11.489
Nunn Parkway	24.092	34.402

### A. Highway Systems

Major highway systems information is shown in **Table B.1** in **Appendix B**, including the State Primary Road System, Functional Classification System, National Highway System (NHS), National Truck Network (NN), and Designated Truck Weight Class. Major highway systems summarized for the study area are as follows:

- State-maintained roads in Kentucky are categorized under the State System, ranging from the highest order classification to the lowest as follows: State Primary roads, State Secondary roads, Rural Secondary roads, and Supplemental roads. State Primary routes are those routes which are considered to be long-distance, high-volume intrastate routes that are of statewide significance. Mobility is the prime function of the routes which can be distinguished by high traffic-



carrying capacity. These routes link major urban centers within the state and/or serve as major regional corridors.

KY 163 is classified as a State Secondary Route on the State System. KY 90 and the Nunn Parkway qualify as State Primary Routes. KY 80 and US 68 are also State Secondary Roadways.

- One of 13 functional classification categories is assigned to each state-maintained road in Kentucky, based on the function the road provides and whether the road is an urban or rural road. These are classified from highest to lowest and by geographic designation as: Rural Interstate, Urban Interstate, Other Rural Freeways and Expressways (Principal Arterial), Other Urban Freeways and Expressways (Principal Arterial), Other Rural Principal Arterial, Other Urban Principal Arterial, Rural Minor Arterial, Urban Minor Arterial, Rural Major Collector, Urban Collector, Rural Minor Collector, Rural Local, and Urban Local.

In the study area, KY 163 is classified as a Rural Major Collector. According to Federal criteria, Rural Major Collectors provide service to county seats not located on arterials, forming intra-county travel corridors. These facilities are characterized by shorter trip lengths and lower speeds and compose 20% to 25% of the roadway mileage in rural areas.

- The NHS, first established in 1991 by the Intermodal Surface Transportation Efficiency Act (ISTEA), includes Interstate Highways and other significant Principal Arterials important to the nation's economy, defense, and mobility. The Louie B. Nunn Parkway is the only roadway in the area that is part of the NHS.
- The NN includes roads designated for use by commercial trucks with increased dimensions (102 inches wide; 13 feet, 6 inches high; semi-trailers up to 53 feet long; and trailers up to 28 feet long – not to exceed two trailers per truck). In the study area, the Nunn Parkway is the only route included on the NN. The so-called 102-inch wide trucks may also travel within 5 miles of a NN highway to pick up or deliver goods or commodities or to access essential services, such as fuel, lodging, or food.
- Kentucky Revised Statutes impose weight limits on the state-maintained highway system. There are three weight classification limits: (1) AAA – 80,000 lbs. maximum gross vehicle weight; (2) AA – 62,000 lbs. maximum gross vehicle weight; and (3) A – 44,000 lbs. maximum gross vehicle weight. For special circumstances, occasional exceptions are granted for over-dimensional or overweight vehicles by permits issued by the KYTC, Division of Motor Carriers. In the study area, KY 163 has a weight classification limit of AAA.

## **B. Geometric Characteristics**

Geometric characteristics for major routes in the study area are listed in **Table B.2** in **Appendix B**, including the number of lanes, lane widths, shoulder widths, roadway type, local terrain, route speed limits, percent

passing sight distance requirements, and pavement type. In the study area, KY 163 lies on rolling terrain with an undivided cross-section, two driving lanes ranging from 9 to 11 feet in width, and two-foot shoulders. An average of 28% of the entire route length meets passing sight distance requirements, with 35% in the section south of Edmonton. Posted speed limits are 55 mph south of Edmonton, 45 mph entering the southern city limits, and 25 mph in the downtown area.



*Typical view along KY 163*

Within Edmonton, a sidewalk network is provided in the downtown area and along portions of US 68-KY 80 west of the intersection with KY 163. There are no multimodal/intermodal facilities or services within the study area.

Due to the substandard geometrics of the general roadway, available “as-built” plans were reviewed for key routes in the study area. The documented alignment was compared to the guidelines presented in the 2006 KYTC Highway Design Manual. Based on this analysis, many horizontal and vertical curves on the rural portion of KY 163 did not meet requirements, as follows:

- Of the total 26 horizontal curves, 8 do not meet the minimum radius requirement of 1,205 feet;
- Of the total 86 vertical curves, 64 do not meet the minimum stopping sight distance or headlight sight distance requirements of 570 feet; and
- Of the total 87 grade segments, 14 exceed the maximum grade requirement.

**Figure 2.1** portrays the deficiencies along the existing alignment. Additional information for each deficiency is presented in **Table B.3** in **Appendix B**.

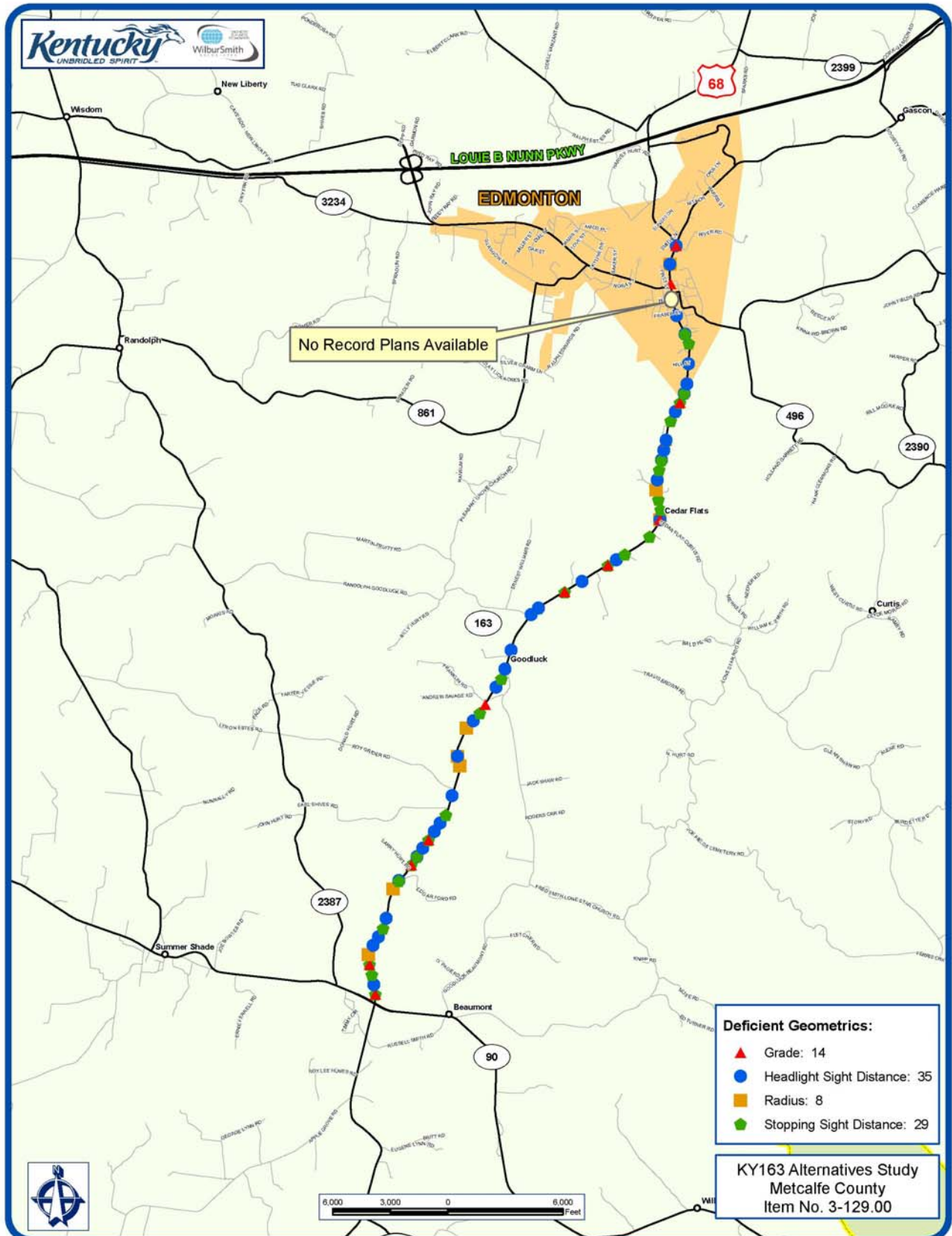
### C. Bridges

Bridge data for the routes considered in this study are listed in **Table 2.2**. A bridge with a sufficiency rating less than 50 is considered to be eligible for replacement with federal funds under the Federal-Aid Highway Bridge Replacement and Rehabilitation Program. Bridges can be rated either structurally deficient or functionally obsolete. Within the project area, all ten bridges along the key study routes have sufficiency rating greater than the 50 threshold; six have been deemed functionally obsolete, but none are currently considered as structurally deficient.



*Narrow bridge over Rogers Creek*

Figure 2.1 – Existing Geometric Deficiencies along KY 163



**Table 2.2 – Information for Bridges along Key Routes**

Route	Milepoint	Bridge	Feature	Length (ft)	Width (ft)	Horiz Clearance	Sufficiency Rating	Functionally Obsolete?	Structurally Deficient?
KY 163	7.280	B00010	Rogers Creek	240	22.0	19.4	76.7	Yes	No
KY 163	8.452	B00009	Black Rock Creek	42	22.0	19.4	70.5	Yes	No
US 68	4.912	B00046	Dry Fork Creek	27	Culvert	46.0	97.0	No	No
US 68	5.421	B00039	Louie B. Nunn Parkway	266	65.6	24.0	96.2	No	No
US 68	6.591	B00016	Clay Lick Creek	159	29.9	26.0	62.9	Yes	No
US 68	7.156	B00015	Rogers Creek	144	30.5	28.0	65.6	Yes	No
US 68	8.822	B00008	Little Barren River, South Fork	192	30.5	26.0	62.9	Yes	No
US 68	9.414	B00001	Douglas Creek	33	22.0	19.0	67.4	Yes	No
US 68	10.107	B00038	Louie B. Nunn Parkway	252	31.8	30.1	81.4	No	No
US 68	12.914	B00002	Sulphur Creek	22	Culvert	18.5	63.0	No	No

## D. Traffic and Operational Measures

Existing (Year 2006) and estimated future (Year 2030) traffic and operational conditions for each major route in the study area are discussed in the following subsections.

### 1. Existing Traffic Volumes (Year 2006)

Existing traffic volumes for segments of the study area routes were summarized based on information provided in the HIS database. Year 2006 traffic characteristics for all major state routes in the study area are shown in **Figure 2.2** and in **Table B.4** in **Appendix B**.

The existing traffic volume along KY 163 in the study area ranges from 2,090 vehicles per day (vpd) in the southern portion of the study area to 4,130 vpd within Edmonton. Existing truck percentages are approximately 12% just north of the intersection with KY 90, decreasing to around 9% of the total traffic in town. For comparison, existing traffic volumes along the Nunn Parkway range between 4,250 vpd and 6,250 vpd, with 27% truck traffic. US 68-KY 80 serves larger traffic volumes, ranging from 3,600 to 10,300 vpd in town, and provides access to the majority of homes, businesses, and activity centers within Edmonton.

### 2. Level of Service (Year 2006)

The Level of Service (LOS) is a qualitative measure of highway traffic conditions, as defined in the *2000 Highway Capacity Manual* (HCM), published by the Transportation Research Board (TRB). Individual levels of service characterize these conditions in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and given letter designations from A to F, with LOS A as the best condition, representing free flow conditions, and ranging to LOS F, the worst condition, representing severe congestion and/or time delays. Typically, a minimum of LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas.

Capacity analysis was performed on the following key intersections within Edmonton: KY 163 with US 68-KY 80, US 68 with KY 80, and US 68 with the existing Nunn interchange ramps. For unsignalized intersections, LOS is measured on each approach road, controlled by the delay time. Using existing turning movement counts and lane configurations,

summary intersection results are presented for the AM and PM peak hours in **Table 2.3**. Intersection LOS does not show capacity problems at present; however, local input indicates significant traffic queuing and delay at the US 68-KY 80 intersection with KY 163. With no parallel routes through Edmonton, all north-south and east-west traffic meets at this four-way-stop-controlled intersection. The stockyard and industrial park to the north contribute a significant volume of truck traffic passing through this intersection, and the tight turning radius at this location compounds delays as turning trucks often infringe into adjacent lanes.

Based on HCM procedures, LOS was also determined for the design hour volume traffic flow on segments of roadways in the study area. Results for this analysis are presented in **Table B.4** and **Figure 2.2**. For rural two-lane segments, limited passing opportunities tend to control the LOS, but capacity for all highway sections is within acceptable levels in 2006.

### **3. Estimated No-Build Future Traffic (Year 2030)**

No-Build future traffic was estimated using historic growth rates and assuming no future improvements along study area roadways. The growth rates were based on KYTC's historic traffic counts for each study area route. The future growth rate used for KY 163 traffic was 1.9 percent, resulting in a 2030 traffic volume ranging from 3,280 north of the junction with KY 90 to 6,490 at the four-way stop in Edmonton. Projected future year traffic volumes are shown in **Figure 2.3** and **Table B.4**.

### **4. Estimated No-Build Future Level of Service (Year 2030)**

Future no-build LOS at the three analyzed intersections indicates a degradation in service, focused on the PM peak hour. Northbound and eastbound movements at the KY 163 intersection with US 68-KY 80 decline to LOS D and F, respectively. The increased traffic volumes in the future, combined with the constrained truck movements, are likely to degrade service more than anticipated by standard traffic analysis; therefore, the intersection may even fall below LOS D or F during high volume periods.

The existing off ramp for the eastbound Nunn Parkway also functions at LOS D during the afternoon peak by 2030. These results are presented in **Table 2.3**.

Despite increases in traffic volumes, most highway segments are still providing adequate capacity for anticipated traffic volumes in 2030. A portion of US 68-KY 80 south of the Nunn interchange and KY 163 within Edmonton would reach LOS D as increased daily traffic volumes further reduce passing opportunities. LOS for projected volumes are presented in **Table B.4** and **Figure 2.3**.



Figure 2.2 – 2006 Average Daily Traffic and Level of Service

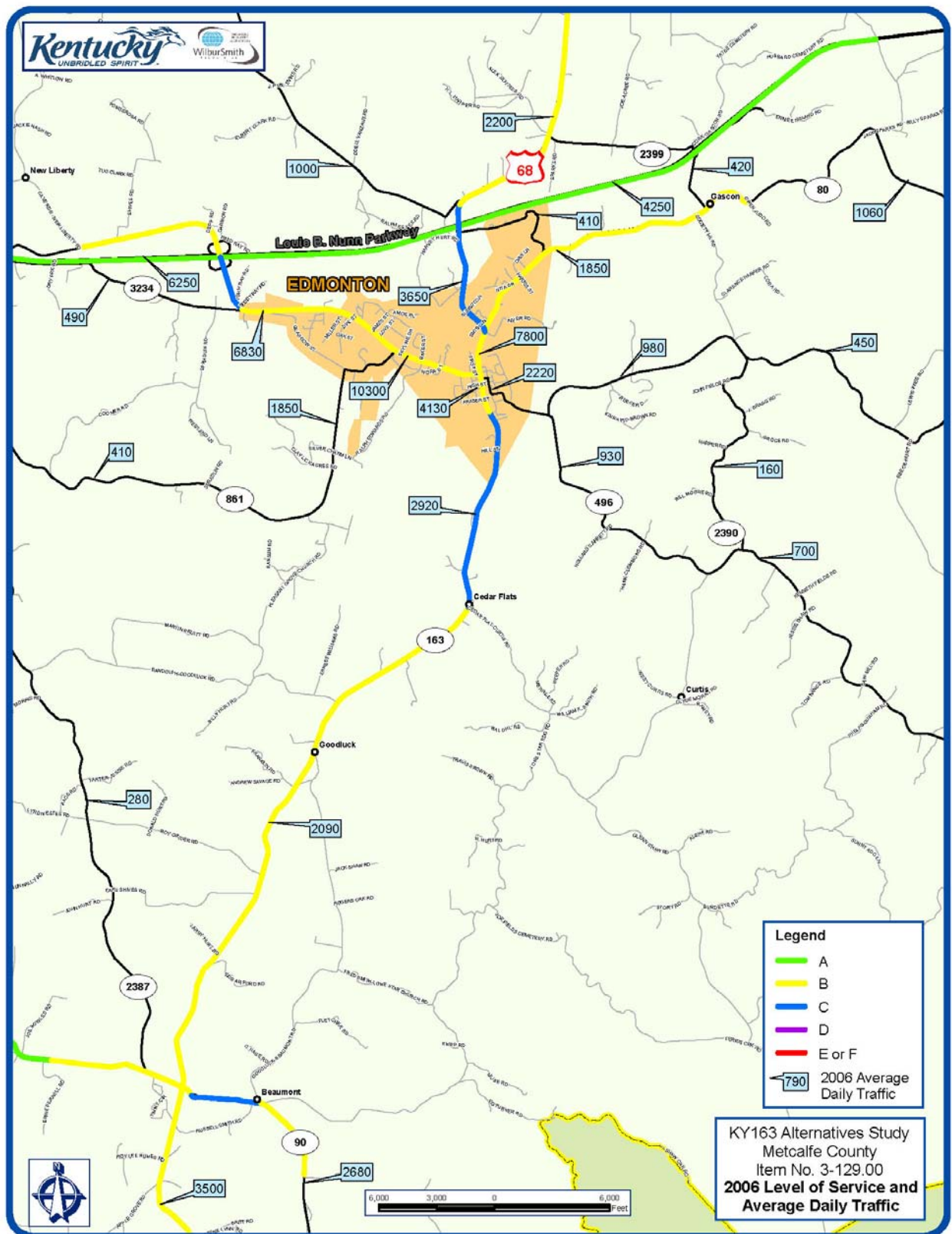
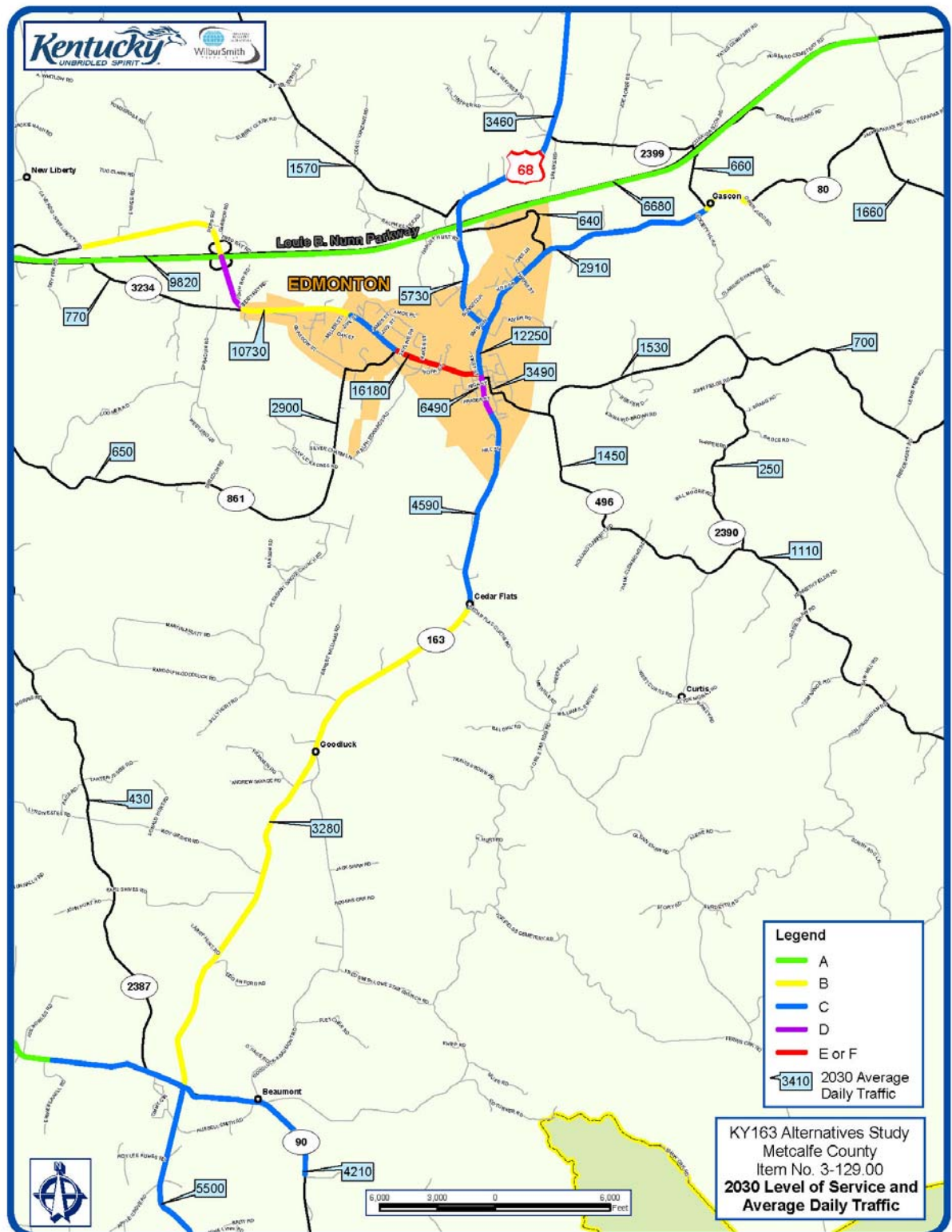


Figure 2.3 – 2030 Average Daily Traffic and Level of Service



**Table 2.3 – Intersection LOS for AM / PM Peak Hour**

Intersection Approach	2006		2030	
	Delay	LOS	Delay	LOS
KY 163 with US 68-KY 80				
Northbound KY 163	12 / 14	B / B	21 / 32	C / D
Southbound US 68-KY 80	11 / 12	B / B	16 / 21	C / C
Eastbound US 68-KY 80	12 / 18	B / C	26 / 111	D / F
Westbound East Stockton St.	10 / 11	B / B	17 / 19	C / C
US 68 with KY 80				
Southbound US 68	10 / 11	B / B	12 / 15	B / B
US 68 at Eastbound Nunn				
Eastbound Nunn Off Ramp	13 / 14	B / B	21 / 27	C / D
US 68 at Westbound Nunn				
Westbound Nunn Off Ramp	9 / 9	A / A	10 / 9	B / A

Note: Delay is measured in Seconds

## E. Crash Analysis

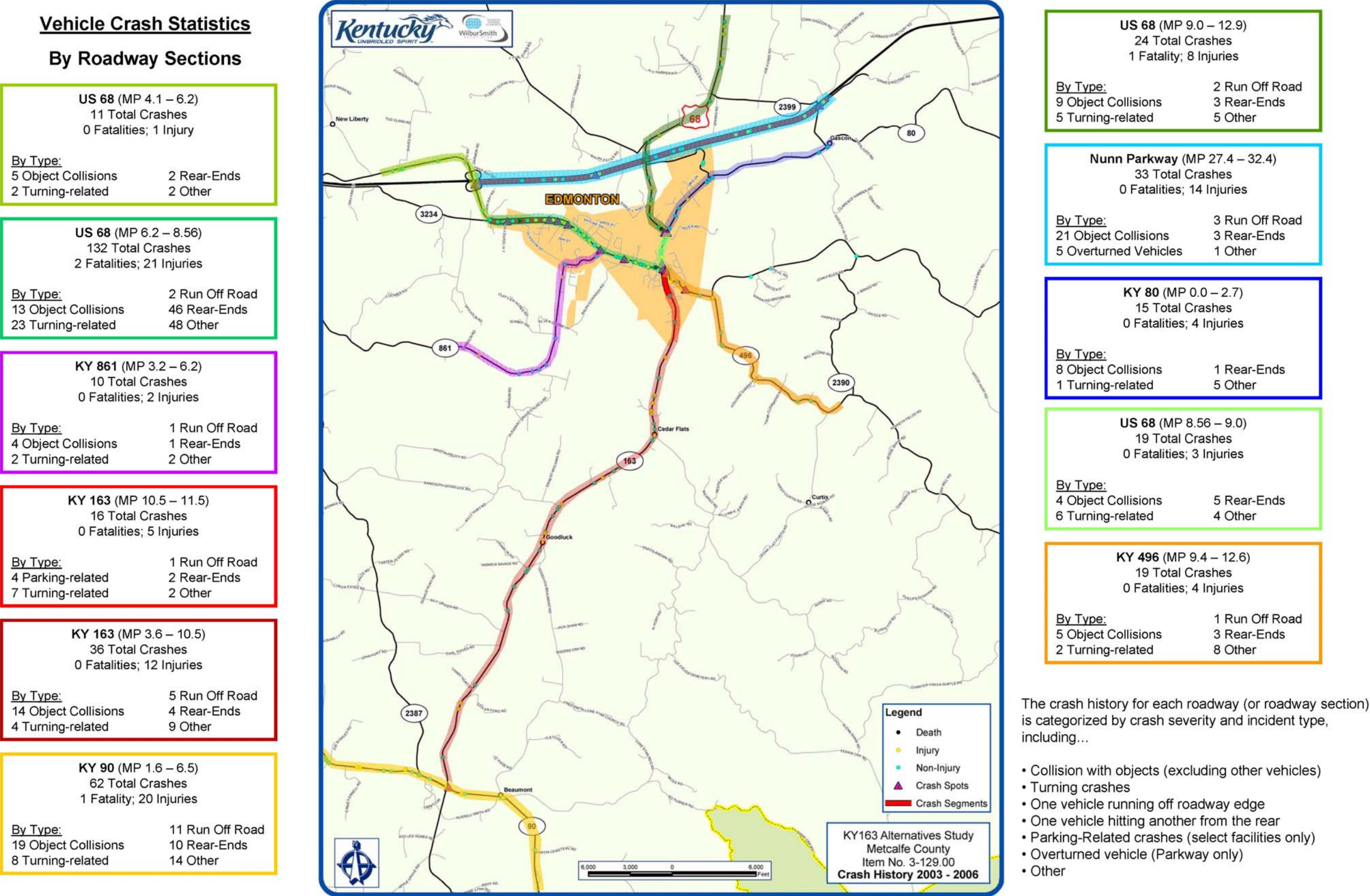
Crash records were collected from KYTC for major state routes in the project area over a four-year period (January 1, 2003 to December 31, 2006). The location of reported crashes with valid milepoint designations were geospatially referenced to help identify incident clusters. Each roadway with a significant crash history was broken into sections, as shown in **Figure 2.4**, based upon its characteristics. The rural portion of KY 163 (Milepoints 3.6 through 10.5) shows 36 total crashes, including 12 injury incidents. There are 14 reported object collision events and five crashes in which a vehicle has run off the road. Along US 68-KY 80 west of downtown Edmonton, there is a marked concentration of crashes between KY 3234 and Shirley Street, corresponding to a commercial area with many driveway entrances plus the transition between a 2-lane and 4-lane facility.

After identifying these incident locations, Wilbur Smith Associates (WSA) used a methodology developed by the Kentucky Transportation Center (KTC) to locate roadway “segments” based upon traffic volumes and geometric characteristics which correspond to high crash concentrations. The procedure was also used to identify the location of 0.1-mile “spots” which demonstrate high crash frequencies. Each segment or spot is assigned a Critical Rate Factor (CRF) based on formulas published by the KTC. The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the study location to the average crash rate for roadways of the same functional classification throughout the state.

If the Critical Rate Factor is 1.00 or greater, it is assumed that crashes are happening due to circumstances that cannot be attributed to random occurrence. Therefore, it should be studied in more detail to ascertain if there are remedial actions that could be taken to improve the overall safety of the facility. Calculations for the segments and spots along the area state routes are summarized in **Tables 2.4** and **2.5**, showing each spot/segment with a CRF greater than 0.50. Spots/segments with a CRF greater than 1.00 are highlighted in red; sites nearing this value (0.90 or greater) are highlighted in gold as potential high crash spots/segments.



Figure 2.4 – Crash Information for Roadway Sections



**Table 2.4 – High Vehicle Crash Segments Analysis in Study Area**

Route	Begin MP	End MP	Length (Miles)	Vehicle Crashes				Critical Rate Factor
				Fatal	Injury	PDO	Total	
KY 80	0.000	2.700	2.700	0	4	11	15	0.51
KY 90	1.600	4.721	3.121	1	17	34	52	0.71
KY 163	11.090	11.489	0.399	0	2	10	12	0.95
KY 496	11.700	12.600	0.900	0	3	10	13	0.90
KY 861	3.200	4.171	0.971	0	1	3	4	0.80
US 68	6.240	7.186	0.946	1	10	36	47	1.20
US 68	7.186	8.562	1.376	1	11	67	79	0.66
US 68	8.562	9.002	0.440	0	3	17	20	0.84
LN 9008	27.400	32.400	5.000	0	14	19	33	1.02

Note: A Critical Rate Factor greater than 1.00 indicates a high crash location, and a Critical Rate Factor greater than 0.90 indicates a potential high crash location. Only segments with CRF > 0.50 are shown in table.

**Table 2.5 – High Vehicle Crash Spots Analysis in Study Area**

Route	Begin MP	End MP	Vehicle Crashes				Critical Rate Factor
			Fatal	Injury	PDO	Total	
KY 80	0.000	0.100	0	2	2	4	1.24
KY 90	1.875	1.975	0	1	3	4	0.72
KY 90	2.200	2.300	0	0	7	7	1.25
KY 90	2.300	2.400	0	2	2	4	0.72
KY 90	2.505	2.605	0	1	4	5	0.90
KY 90	2.950	3.050	0	0	4	4	0.72
KY 90	4.700	4.800	0	5	8	13	2.93
KY 163	11.400	11.500	0	4	10	14	2.64
KY 496	12.050	12.150	0	0	4	4	1.13
KY 496	12.500	12.600	0	0	4	4	1.13
LN 9008	27.400	27.500	0	1	4	5	1.90
LN 9008	29.000	29.100	0	4	0	4	1.52
LN 9008	32.200	32.300	0	3	4	7	2.66
US 68	5.420	5.520	0	1	5	6	0.96
US 68	6.200	6.300	0	0	5	5	0.75
US 68	6.400	6.500	0	2	7	9	1.24
US 68	6.500	6.600	1	0	4	5	0.69
US 68	6.691	6.791	0	1	4	5	0.69
US 68	6.898	6.998	0	3	5	8	1.10
US 68	7.002	7.102	0	2	5	7	0.97
US 68	7.130	7.230	0	2	6	8	0.97
US 68	7.400	7.500	0	2	6	8	0.58
US 68	7.620	7.720	0	3	10	13	0.95
US 68	7.970	8.070	0	3	12	15	1.09
US 68	8.150	8.250	0	1	7	8	0.58
US 68	8.440	8.540	1	0	9	10	0.73
US 68	8.550	8.650	0	1	8	9	1.14
US 68	8.900	9.000	0	0	5	5	0.63
US 68	9.000	9.100	0	1	8	9	1.83

Note: a CRF greater than 1.00 indicates a high crash location, and a CRF greater than 0.90 indicates a potential high crash location. Only spots with a CRF > 0.50 are shown in table.

This procedure was used to identify multiple high crash spots and segments. As shown in **Figure 2.5**, data for these locations were further analyzed, detailing severity and crash type for each. Findings are as follows:

A segment with a CRF of 0.95 appears in the urban portion of KY 163 (Milepoints 11.090 through 11.489). Incidents at this location relate to the on-street parking facilities and turning movements at cross streets.

Several high crash spots occur at the intersection of US 68-KY 80 with KY 163, indicating crash concentrations occur at three of the four approaches.

The high crash segment appearing on US 68-KY 80 west of downtown should be partially addressed by a reconstruction project already scheduled for implementation.

There are two spots near the existing Nunn interchange, which currently has a toll booth style ramp configuration.

## **F. Adequacy Ratings**

The KYTC HIS database provides an adequacy rating percentile for state-maintained arterials and most major collectors. The composite rating is based on the condition, safety, and service component scores of the route, as described below:

- The Condition Index considers only the condition of the road's pavement.
- The Safety Index is evaluated based on lane width, shoulder width, median widths, alignment, and critical Crash Rate Factors.
- The Service Index considers the route's Volume-to-Capacity (V/C) ratio and access control.

**Table B.5** depicts the adequacy ratings assigned to various study area routes.

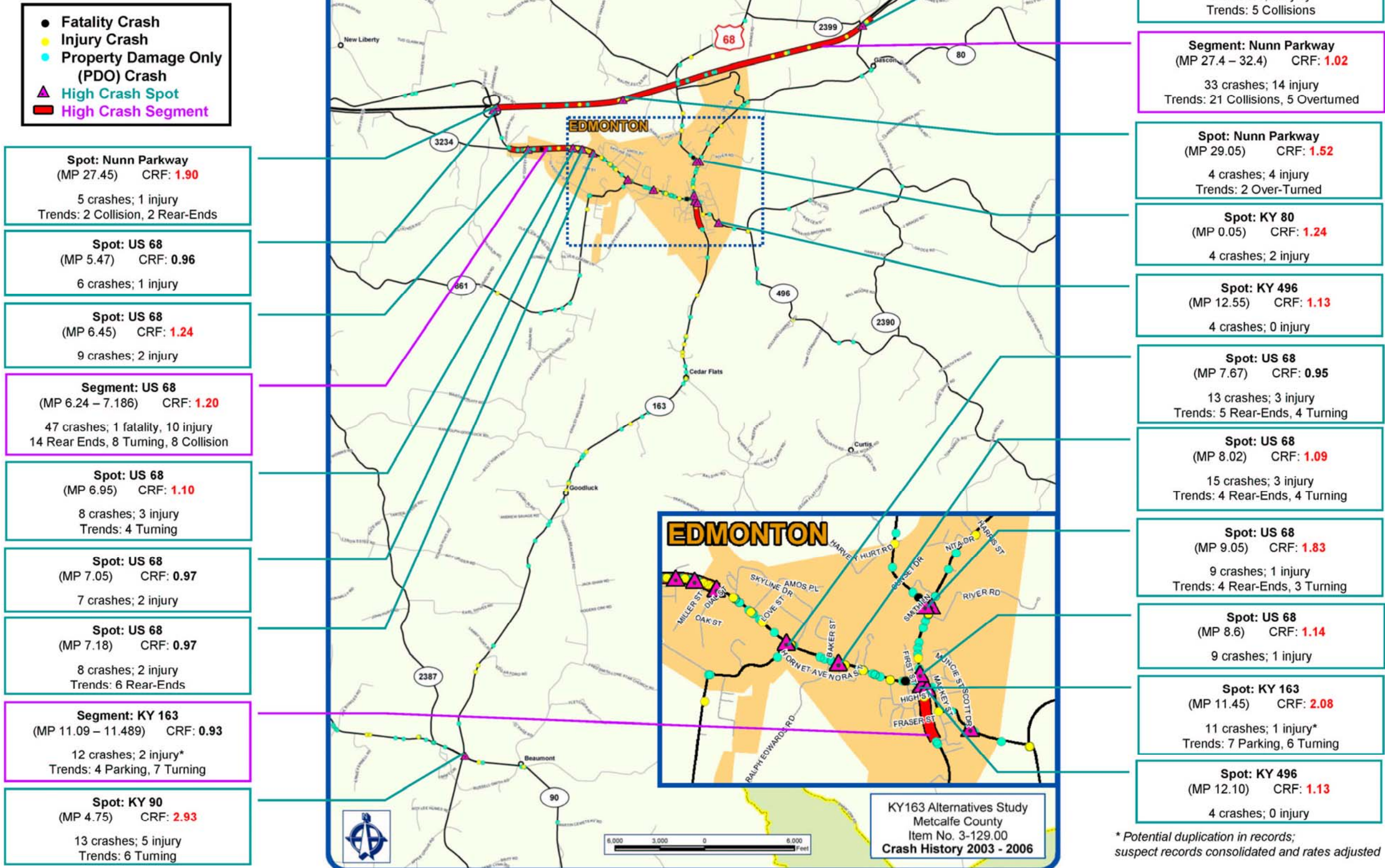
Portions of US 68 and KY 90 fall into the lowest quartile for composite rankings, primarily due to safety issues. KY 163 generally is in the highest quartile, with a degradation approaching Edmonton from the south.

Safety is the primary category affecting ratings, followed by the pavement condition.



Figure 2.5 – High Crash Spots and Segments

**Vehicle Crash Statistics**  
**High Crash Spots and Segments**



### **G. Programmed Highway Improvements**

In addition to the KY 163 Alternatives Study in Metcalfe County, several other projects are planned and programmed for project area routes in the KYTC's *FY 2007-FY 2012 Enacted Six-Year Highway Plan*. A summary of these projects is provided below.

- Right-of-way, utility, and construction activities for a project on US 68, Milepoints 7.0 – 7.7, including installation of a two-way left turn lane and raised pavement markers (Item No. 3-900.00);
- Design and construction activities for spot improvements along KY 90 from the Barren/Metcalfe County line to Burkesville (Item Nos. 8-136.00, 8-136.01, and 8-136.02);
- Construction activities in Monroe County along KY 163 from Tompkinsville to KY 90 in Metcalfe County (Item Nos. 3-276.10, 3-276.11, 3-276.17, 3-276.50, and 3-276.57); and
- Another Alternative Study for the section of KY 163 in Monroe County from Tompkinsville to the Tennessee state line (Item No. 3-8310.00).

### III. ENVIRONMENTAL OVERVIEW

This chapter provides a summary of environmental issues located in the KY 163 study area. Throughout November and December of 2006, teams of specialists performed data analysis and field surveys of the project area to identify key natural, cultural, and noise-related environmental features associated with the KY 163 study. The following sections present the findings of these investigations. **Figure 3.1**, a map detailing the discussed features, is presented at the end of this chapter.

#### Environmental Components

Natural Environment  
Cultural Resources  
Noise Impacts

#### A. Natural Environment

This section presents the summary findings of the field review completed by Third Rock Consultants, LLC. Air Quality, Aquatic and Terrestrial Resources, Threatened and Endangered Species, Socioeconomic Data, and Underground Storage Tank/Hazardous Materials components were reviewed and documented in an Environmental Overview technical report, presented in its entirety in **Appendix C**.

Metcalf County is located in the South Central Kentucky Air Quality Control Region. Due to its rural nature, the county is within attainment levels for all transportation-related air pollutants and is anticipated to remain within the National Ambient Air Quality Standards (NAAQS) through the design year. Emissions arising from any potential alternative of this study are not expected to have a negative impact on air quality.

Four perennial bedrock streams lie within the project area. Three of these bodies demonstrate evidence of excessive nutrients, with South Fork Little Barren River being the most degraded and a likely candidate for remediation. Construction on or near streams may create temporary impacts and require additional permits. Other ephemeral and intermittent streams traverse the study area. There are also a multitude of springs and wells.



*Little Barren River near stockyard*

There are few natural jurisdictional wetlands in Metcalf County. Farm ponds are common but typically do not connect to flowing streams. If any wetlands are impacted by the proposed project, they should be delineated.

The study area lies within a significant karst region, as seen in the undulating terrain, and a known cave is located near the southern terminus. Harvey Cave is located in the study area and is reported to contain petroglyphs. There are several documented sinkholes within the project boundaries and a high likelihood to encounter additional karst features at both the northern and southern ends of the study area. A policy paper, published by the KYTC Division of Environmental Analysis, provides best management practices for



karst areas to improve long term water quality and protect endangered species. This document is included in the full text of the Environmental Report in **Appendix C**.

Two endangered species potentially occur in the region: the gray bat and the Indiana bat. Their habitats include mature hardwood forests and dry caves or sinkholes, both of which occur in the study area.

There are three parks within Edmonton which are protected under Section 4(f) regulations. Details for other land uses are depicted in the full text of the Environmental Overview Report.

Agriculture is a significant component of the economy and lifestyle of Metcalfe County. A 473 acre Agricultural District exists on either side of the existing KY 163 alignment, just south of Black Rock Creek. Impacts to prime soils and farmlands should be taken into consideration as this project develops.

Nineteen documented underground storage tanks (UST) and hazardous materials generators exist in the project area, primarily along existing major collector routes. Three inactive landfills are recorded near Edmonton and will require additional site investigations if any future alignment lies nearby. Many oil and gas wells also occur within the project area.

## **B. Cultural Environment**

This section presents an overview of key cultural resources within the project area. A copy of the Cultural Resources Overview technical report is presented in **Appendix D**. Previously identified sites and structures are shown on the map included as part of the appendix.

Based on a review of the Kentucky Heritage Council and the Kentucky Office of State Archaeologist files, there are three structures within the project area listed on the National Register of Historic Places (NRHP). These are the Metcalfe County Court House and Metcalfe County Jail, located near the northern terminus of KY 163, and the Stockton-Ray House, located southeast of the existing US 68-KY 80 interchange with the Nunn Parkway.



*Historic Metcalfe County Court House*

There are 11 previously surveyed archaeological sites in the study area. Additional archaeological sites are likely to be identified, especially concentrated near waterways and along ridge tops. Harvey Cave is reported to contain petroglyphs, making it a potential cultural resource as well.

Research efforts also identified 59 cultural historic sites which have been previously surveyed. Field review identified numerous other structures older

than 50 years. NRHP eligibility for these sites is undetermined. Should any of these locations fall within the boundary of any future corridor alternative, additional investigation will be necessary.

#### **C. Noise Environment**

Potential noise-sensitive receptor sites were identified during a field visit to the project area. The intersection of KY 163 with KY 90 and the City of Edmonton were classified as potential receptor sites, due to the presence of historic structures, churches, cemeteries, schools, parks, and/or residential clusters. No significant noise-related impacts are anticipated to result from this project. A Noise Overview technical report documents this review and can be found in **Appendix E**.



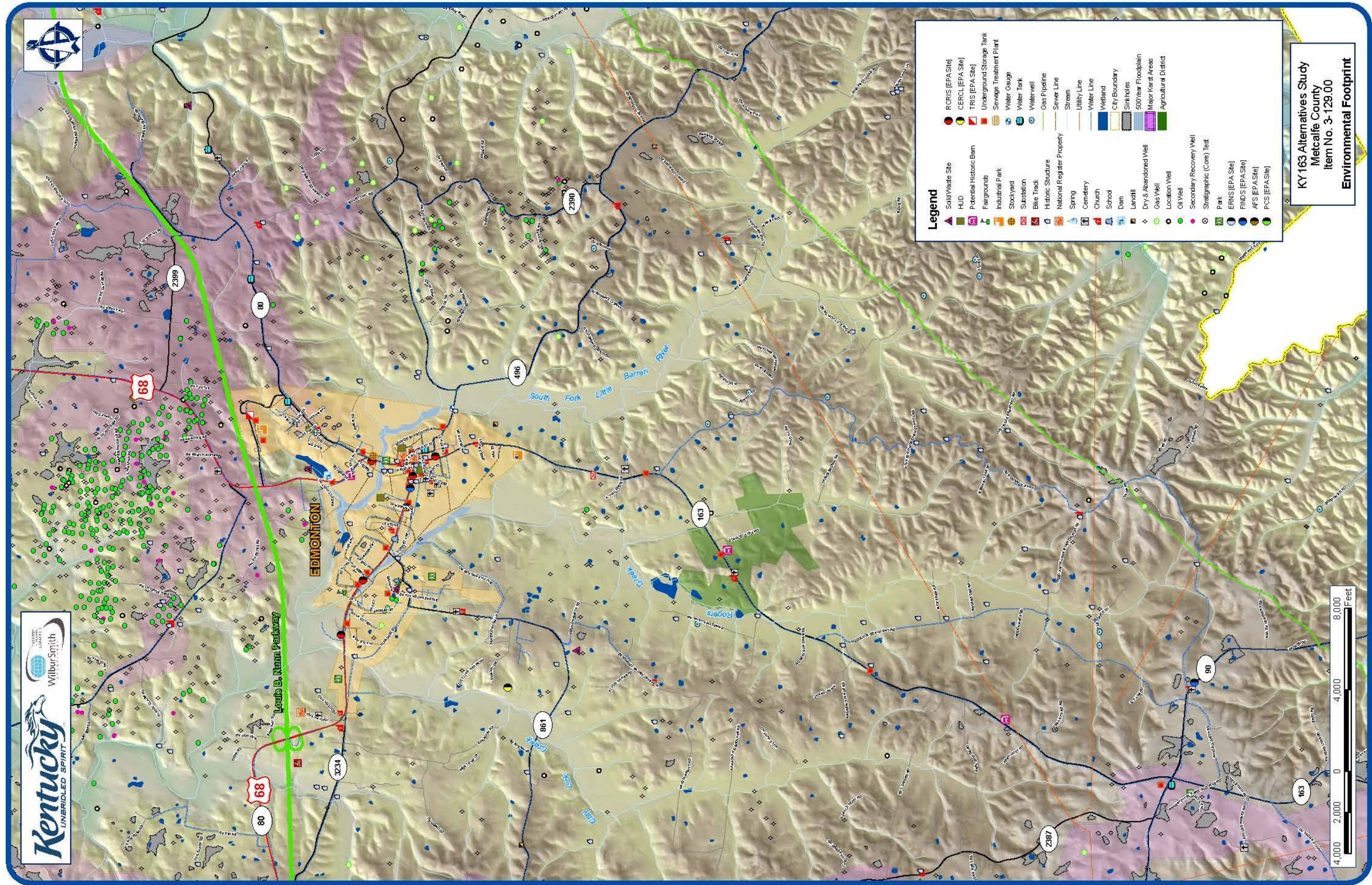


Figure 3.1 – Environmental Map



## **IV. GEOTECHNICAL OVERVIEW**

This chapter presents a summary of the findings of the geotechnical data analysis and the field review completed December 2006. A copy of the full Geotechnical Overview technical report is included in **Appendix F**.

The project area lies on gently rolling terrain common to this portion of Kentucky, predominated by farmlands and numerous farm ponds. According to the United States Geological Survey (USGS), KY 163 is located on the Mississippian Plateau province, dominated by thick deposits of horizontal limestone bedrock. The maximum difference in elevation between any two points in the project area is 350 feet.

Karst topographic features will be a concern due to the underlying limestones: sinkholes, sinking streams, streamless valleys, springs, and caverns. The area near the KY 2399 crossing of the Nunn Parkway and a large sinkhole at the sharp bend in KY 861 south of US 68-KY 80 are identified as sensitive areas due to their karst potential. It is also recommended that any potential new alignments limit east-west shifting at the southern project area, keeping near the existing KY 90 intersection with KY 163.

Observations of several shale and limestone outcroppings demonstrated a shallow depth of bedrock, estimated at two feet. This depth could adversely affect cut/fill quantities, increase excavation costs, and result in additional engineering design and inspection regulations.

There is no evidence of mining activity in the project area.

Numerous oil and gas wells appear within the study limits. There are fewer than 10 active oil wells reported south of the Nunn Parkway, but there are many abandoned wells.

## **V. ENVIRONMENTAL JUSTICE OVERVIEW**

This chapter presents a summary of the findings of an Environmental Justice Overview technical report, prepared by the Barren River Area Development District (BRADD). The Environmental Justice Overview was prepared to provide the community characteristics compiled from a number of sources. A copy of the full report is included in **Appendix G**.

There are two census Tracts and seven Block Groups within the study area. Statistics were compiled for key environmental justice issues – Race, Poverty Level, and Age Group – and are summarized in the following sections.

### **A. Population by Race**

All Tracts and Block Groups demonstrate minority concentrations below national (24.9%) and state (10.0%) averages. Metcalfe County has a black population of 1.12%; Block Group 2 in Tract 9602 has a black concentration of 2.27% and Block Group 2 in Tract 9603 has a concentration of 1.95%.

It is anticipated that the implementation of this project will not have a disproportionate effect on minorities residing in the study area.

### **B. Population by Poverty Level**

The county average percentage of persons below poverty level (23.26%) is significantly above both state (15.37%) and national (12.05%) levels. Each Block Group in the project area exceeds both state and national poverty levels, with poverty rates ranging from 18.51% to 26.39%.

The poverty percentages within Metcalfe County are comparable with other counties nearby. These counties are identified as economically distressed due to high unemployment rates and the unavailability of quality employment opportunities. It is very likely that the KY 163 project will impact a portion of this population group. However, because low-income populations are common throughout Metcalfe County, it is anticipated that the proposed project will not have a disproportionate effect on any populations of persons below the poverty level residing in the study area.

In fact, discussions with local officials and community members indicate that the KY 163 Alternatives Study is viewed by many as a potential means to enhance economic growth and development in the area, which could improve income levels and reduce poverty for Metcalfe County.

### **C. Population by Age Group**

The percentage of the population 65 years and older within Tract 9602 is consistent with state (12.1%) and national (12.4%) levels. Tract 9603 has a higher level at 17.02%, compared to a county average of 14.98%. Block Groups 3 and 4 in Tract 9603 have slightly lower concentrations, both around 13%.

No significant concentrations of specific age groups were identified within the study area; therefore, there are no anticipated disproportionate effects on the aging populace.

## VI. INITIAL CABINET, PUBLIC, AND AGENCY INPUT

Throughout the course of the KY 163 Alternatives Study, the local citizens, public officials and representatives of government resource agencies were given the opportunity to provide input for the study. This chapter describes the first KYTC project team meeting and the first round of public and agency involvement. It also presents the comments and input received as a result of those efforts. Other KYTC Project Team meetings and activities during the second round of local, public, and agency involvement are summarized in **Chapter X** as they relate to the development and evaluation of alternatives. Meeting minutes are presented in **Appendix H** for each meeting discussed in this chapter. Materials related to public meetings are included in Public Meeting Notebooks on file with KYTC.

### Public and Agency Involvement

- Project Team Meetings
- Local Elected Officials Meetings
- Stakeholder Meetings
- Public Information Meetings
- Public Comment Surveys
- Resource Agency Coordination

### A. Project Team Meeting (November 30, 2006)

The first Project Team Meeting was held on November 30, 2006, at the KYTC District 3 Office building in Bowling Green, Kentucky. The project team convened to discuss the purpose, goals and objectives of the proposed project; review preliminary existing conditions data for the study corridor; and identify study needs. The meeting minutes are included in **Appendix H**.

The project was originally recommended by the Barren River ADD, conceptually calling for an investigation of possible alternatives which would improve travel time and safety along KY 163 between the KY 90 intersection and the southern border of Edmonton. The study area was since expanded to continue north to an interchange with the Nunn Parkway. Consideration of a potential bypass around Edmonton was also discussed.

### B. Local Officials and Stakeholders Meetings

As part of the initial public involvement, a meeting was held with local officials and another with stakeholders in November 2006. The purpose of these meetings was to inform these groups about the project, discuss potential project issues and concerns, and solicit input. The meeting minutes are included in **Appendix H**.

#### 1. Local Officials Meeting

On November 30, 2006, the project team invited local elected officials from Metcalfe and surrounding counties to attend a meeting to discuss the KY 163 planning study. The discussion focused largely on regional improvements along KY 163 that could improve connectivity between I-40 in Tennessee and the future I-66 Corridor, currently anticipated to follow the Nunn Parkway.

#### 2. Stakeholders Meeting

Later that same day, members of the project team met with local stakeholders to review project information and discuss issues relating to the corridor. Improved accessibility for the existing and developing

industrial parks, route redundancy for emergency services, congestion relief during the afternoon peak hour, and safety improvements were identified as local concerns to address. Attendees strongly supported a second interchange with the Nunn Parkway near Edmonton and believed a bypass around Edmonton would be seen as a positive development.

### C. Public Information Meeting - Round I

A public meeting was held during the first round of public involvement for this project. The meeting was held at Metcalfe County High School on December 14, 2006. The meeting was designed to inform the public and solicit questions and comments regarding local issues and potential locations for the possible reconstruction of KY 163. In addition to the information presented in this chapter, material related to the first round of public involvement meetings is included in a separate Public Meeting Notebook on file with the KYTC Division of Highway Design and Division of Planning.

Minutes of this public meeting may be found in **Appendix H**.

General project information displays, such as project location, traffic volumes, crash information and preliminary environmental maps, were presented for review and comment. Potential corridor alternatives for KY 163 had not yet been identified, and therefore were not included in the meeting materials.

Members of the project team gave a short slide presentation explaining the overall project development process, a proposed typical timeline, the current status of the project, next steps, and the preliminary project goals and issues, which ran on a continuous loop for the duration of the meeting for those who were not present for the presentation.

Attendees were given the opportunity to identify areas to avoid and potential corridors for an improved KY 163 alignment. In this forum, attendees were also able to ask questions and provide comments one-on-one with KYTC, ADD, and consultant staff.

#### 1. General Comments

Attendees were invited to discuss any questions or concerns with KYTC and consultant staff. General comments included the following:



- Several attendees mentioned a congestion problem at the four-way stop (intersection of KY 163 and US 68-KY 80) downtown during the afternoon peak hour.
- Various safety problems were repeatedly identified and discussed (these were noted for future investigation).
- Truck traffic is a problem, especially at the four-way stop. The geometry of this intersection makes it difficult for trucks to make turns.
- Multiple participants expressed concern that farmlands and homes would be taken if a new route were chosen.

## **2. Map Exercise**

Two tables were set up with study area maps of both county and city for attendees to draw on. Participants were asked to identify specific impact areas, existing problems with KY 163, and potential alignments for a new route. The points identified included the following.

- Impact Areas:
  - Homes and farmlands along KY 163, US 68-KY 80, and KY 861
  - Various cemeteries near principal routes
  - Gas wells south of the existing Nunn interchange with US 68
  - The industrial park along KY 3524 and a proposed industrial park off KY 163 at the south city limits of Edmonton
- Existing problems:
  - Various sharp curves and steep hills
  - Narrow bridges over Rogers Creek and Black Rock Creek
  - A high crash location at Cedar Flats
  - High volumes of pull-out traffic along KY 80 north of the junction with US 68
- Potential Alignments:
  - A link between the KY 90/KY 163 intersection and a new interchange with the Nunn Parkway at KY 2399
  - A connection from KY 163 at Hill Street north to a new interchange east of the Industrial Park
  - A bypass to the east around Edmonton from Hill Street to the junction between KY 80 and US 68
  - A bypass to the west from Hill Street to US 68-KY 80 near Baker Street
  - A connection from south of the city limits that travels north through town, west of KY 163 and US 68 to tie into a new interchange at US 68

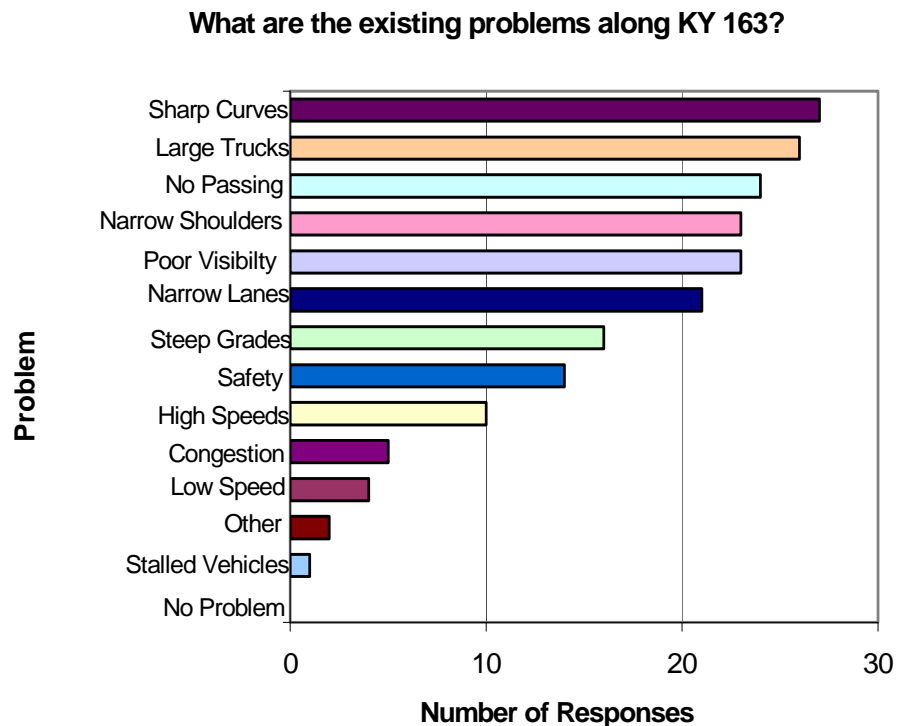
- A connection from the existing KY 163 alignment somewhere north of Goodluck which travels up a county road north to tie into KY 861

### 3. Public Comment Survey Responses

As part of the public meeting handout, the KYTC supplied a survey form so that citizens of the area could provide input on the project. The results from all surveys received as part of the initial public involvement process are summarized in the following paragraphs.

Of the 37 surveys received, 28 respondents live in the city of Edmonton, with 6 respondents from Summershade and 2 from Tompkinsville. One survey did not list an address.

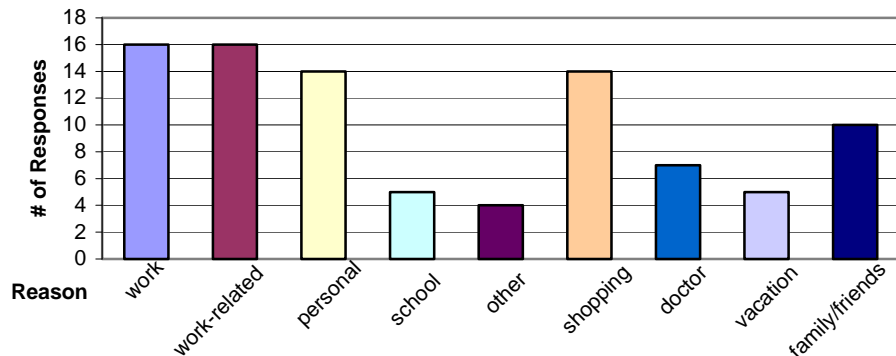
The first question asked what transportation problems exist on KY 163 that the proposed project should address. Respondents were invited to check all that apply from a list of options, with results shown below.



Question two addressed how often attendees traveled along KY 163. Sixty-one percent (61%) reported traveling the corridor on a daily basis. Twenty-one percent (21%) use the corridor 3 to 4 times per week; nine percent (9%) each use the corridor once or twice per week or use the corridor 3 to 4 times per month.

The next question investigated primary trip purpose. As shown in the following chart, there is a wide variety of purposes for trips on KY 163.

### Why do you primarily use KY 163?



The final question asked survey respondents to identify sensitive areas that should be considered. Homes and farmlands were the most frequently identified sensitive areas to avoid, with 17 and 13 responses, respectively. Natural/wildlife habitats and historic sites were identified second-most with 8 and 6 responses, while each other category – businesses, recreational areas, hazardous waste sites, and scenic areas – were identified twice as areas to be considered. Specific locations are identified below, based upon received responses.

- Spradlin Road
- Franklin Road
- Springs and waters
- Howard Coffey's woods, with hills, bluffs, and hollows
- Missionary Mound Church and Cemetery

#### D. Resource Agency Coordination - Round I (January 2007)

Many local, state and federal resource agencies, with diverse areas of public responsibility, were included in this planning process. Input was solicited through written requests by letter on two occasions. For the first round of resource agency coordination, each agency was sent a copy of the study area map, maps showing traffic and volume/service flow data for 2006 and 2030, a crash information map highlighting critical rate factors, and an environmental footprint map. This section describes the input received from these organizations during the first round. The remainder of recipients did not provide a response. Copies of the response letters from the various resource agencies are located in **Appendix I** and are summarized below.

##### Resource Agencies

- Local Agencies
- Local Interest Groups
- KYTC Division Offices
- Other State Agencies
- Federal Agencies

The following 15 agencies responded by offering comments or concerns regarding the project:



- Kentucky Airport Zoning Commission – The project will have no adverse effects on air navigation, but any construction equipment standing above 200 feet tall will require a permit.
- Kentucky Commerce Cabinet, Department of Parks – The Department of Parks does not own facilities in the project area; no adverse impacts are anticipated for this project.
- Kentucky Economic Development Cabinet – There are two industrial parks in Edmonton. Improving KY 163 will improve the entrance to the southern park and will positively affect transportation within the community.
- Kentucky Department of Agriculture – The proposed project creates no issues for this department.
- Kentucky Department of Education – Metcalfe County School System does not anticipate any impacts as a result of this project.
- Kentucky Department for Environmental Protection – This agency serves as a clearinghouse the review of environmental documents, forwarding them to other state agencies. Through this department, responses were received from the Divisions of Air Quality, Conservation, and Waste Management. Specific concerns raised by these agencies are presented in the following points.
- Kentucky Division for Air Quality – Precautions should be taken to prevent particulate matter from becoming airborne, including covering open bodied trucks and avoiding depositing earth onto paved roadways. Open burning is prohibited for all but the express purposes detailed in the Open Burning Fact Sheet. The project must meet the conformity requirements of the Clean Air Act and the transportation planning provisions of Titles 23 and 49 of the US Code. The division suggests investigating local government requirements as well.
- Kentucky Division of Conservation – There is one agricultural district (085-01) in the project area; state agencies are required to mitigate any impact their programs may have on this district. Additionally, prime farmlands and farmlands of statewide importance could be impacted by the project. Best management practices are also recommended to control erosion and sedimentation.
- Kentucky Division of Waste Management – Solid wastes generated should be disposed of at a permitted facility. If underground storage tanks, asbestos, lead paint, or other contaminants are encountered, they should be properly addressed.
- Kentucky State Police – Shoulders on a new facility should be wider to allow traffic to be diverted around vehicle crash sites. The narrowness of the bridge between Randolph-Goodluck Road and Beaumont-Goodluck Road is also a concern.
- Kentucky Transportation Cabinet, Division of Construction – Maintenance of traffic and sustaining residential access create

difficulties for reconstruction along the existing alignment. An alignment west of the existing route would be easier to construct, following the ridge system north to Pleasant Grove Church and connecting to US 68-KY 80 near KY 3234.

- Kentucky Transportation Cabinet, Permits Branch – The facility should be classified as a partially controlled access facility with access control fencing installed and potential access points marked on plans according to 603 KAR 5:120. The design speed for the route should be set to match the anticipated posted speed limit. If this route is incorporated into the National Highway System, further coordination with this office is necessary.
- United States Coast Guard – A Coast Guard bridge permit is not required for this project, as it does not cross waterways over which the Coast Guard exercises jurisdiction for bridge administration purposes.
- United States Department of Agriculture, Natural Resources Conservation Service – This agency is concerned with potential impacts that the proposed highway project may have on prime farmland soils and other farmlands of statewide importance. Form NRCS-CPA-106 must be submitted to NRCS if federal dollars are to be used to convert important farmlands from agricultural uses to non-agricultural uses.
- University of Kentucky, Kentucky Geological Survey – The project area is in the Mississippian Plateau, underlain by limestone. There is a probability to encounter karst features such as sinkholes and caves as well as unconsolidated sediments like clay, silt, sand, gravel, and chert rubble. Landslide hazards are unlikely based on landscape features. There are two limestone types in the area: the St Louis stone may contain layers unsuitable for construction stone while the Salem and Warsaw stone has been quarried for construction previously. There are no faults in the area and a minimal potential for slope failure in unconsolidated sediments due to any earthquake movement of the bedrock.

## VII. PROJECT PURPOSE AND NEED

The general scope of the KY 163 Alternatives Study is to consider the improvement and/or potential realignment/relocation of KY 163 from KY 90 to the Louie B. Nunn (Cumberland) Parkway at or near Edmonton in Metcalfe County, Kentucky.

The purpose of the proposed project is to improve highway safety and highway systems mobility in the KY 163 corridor.

Improving highway safety and mobility in this corridor will also provide the following benefits:

- Improve highway systems linkage/connectivity between KY 90 and the Louie B. Nunn (Cumberland) Parkway;
- Address geometric deficiencies.
- Improve highway accessibility to the major activity centers in Edmonton;
- Reduce congestion within Edmonton, especially at the intersection of KY 163 and US 68-KY 80 in downtown Edmonton;
- Facilitate the movement of truck traffic; and
- Enhance potential economic development by improving freight truck movements and highway accessibility.

### Project Purpose and Need

- Improve Safety and Mobility
- Improve Connectivity
- Address geometry
- Improve accessibility
- Reduce congestion
- Facilitate truck traffic
- Enhance economic development opportunities

Following is further discussion on the purpose and need for this project.

### A. Improve Safety

The existing KY 163 corridor is a two-lane, undivided highway with narrow lanes and minimal shoulders. There are multiple horizontal and vertical curves which restrict sight distances and create potential safety problems.

To access the Nunn Parkway from KY 163, autos and trucks must now travel along US 68-KY 80 west of downtown Edmonton to the interchange with the parkway. An approximately one-mile section of US 68-KY 80 from KY 3234 to Miller Street has been identified as having a Critical Rate Factor (CRF) greater than 1.00, which indicates that vehicle crashes are occurring at a higher frequency than on similar roadways throughout Kentucky. A Hazard Elimination/Safety (HES) project is now programmed for part of this section to help remedy this problem. Some of the problems in this section may be due to the mixture of local traffic and through vehicles, exacerbated by numerous access points which provide many opportunities for turning movements, and vehicular conflicts, at local streets and businesses in this commercial strip area. Where this route intersects KY 163 in downtown Edmonton, more crash concentrations appear; both the US 68-KY 80 and KY 163 approaches have been identified as high crash spot locations with Critical Rate Factors of 1.14 and 2.65 respectively. Over half the crashes reported on the KY 163 approach at this location are directly tied to the angle parking facilities on the

street. The junction of US 68 and KY 80 north of the downtown area is another high crash location, according to available crash data.

This proposed project will provide an opportunity to address these issues, thereby reducing the potential for vehicle crashes along the corridor.

## **B. Improve Mobility**

At present, KY 163 is the only north-south route which provides continuous access from southern Metcalfe County and points south of KY 90, as well as east and west along KY 90, to and through the City of Edmonton.

Due to geometric deficiencies on the rural portion of KY 163, drivers must travel at relatively low speeds which, in turn, results in increased travel times. There is also a reported congestion problem in downtown Edmonton.

Of special importance, KY 163 provides limited mobility since it does not provide direct access to the Nunn Parkway, an east-west route that is the only Principal Arterial passing through Metcalfe County and, thus, the main highway connection with other parts of the state and the nation. Instead, access from KY 163 to the Parkway can only be reached via US 68-KY 80 west of downtown Edmonton. US 68-KY 80 is the only major east-west route providing direct connections and access to streets and properties in Edmonton, and all north-south traffic must ultimately mingle with east-west traffic in downtown Edmonton.

The heart of downtown Edmonton is centered around the intersection of KY 163 with US 68-KY 80, an intersection with tight turning radii that also has on-street parking on two legs of the intersection, which further limits maneuvering space. As indicated previously, there are no other major parallel east-west or north-south routes through the city. With no route redundancy, the US 68-KY 80/KY 163 intersection becomes the primary intersection point for practically all north-south and east-west travel within the city and all traffic – passenger cars and freight trucks – is routed through this point. During the afternoon peak period, anecdotal input from the public indicates that traffic backs up at this four-way-stop-controlled intersection, leading to congestion and delays.



*Intersection of KY 163 with US 68-KY 80*

These mobility problems limit access opportunities for services and economic growth to Edmonton and Metcalfe County. Therefore, this proposed highway improvement project should address the problems of travel delays along the route and congestion in downtown Edmonton.

## **C. Other Desirable Goals**

### **1. Improve Highway System Linkage/Connectivity**

From the intersection with KY 90, travel along the existing alignment of KY 163 requires approximately 16 minutes to reach the Nunn Parkway at the US 68 interchange west of Edmonton, due to low travel speeds. Rerouting the KY 163 corridor has the potential to reduce travel times from KY 90 to the US 68 interchange at Edmonton by as much as 45%, thus, reducing required travel time to as little as 9 minutes.

### **2. Address Geometric Deficiencies**

Existing KY 163 has many geometric deficiencies. As indicated previously, KY 163 is a two-lane, undivided highway with lane widths ranging from 9 to 11 feet and two foot wide shoulders. Multiple curves on the existing alignment slow traffic and cause less than ideal safety conditions. Eight of the 27 horizontal curves do not meet minimum radius requirements; 64 of 86 vertical curves do not meet sight distance requirements and 24 of the 86 vertical curves exceed the 7% maximum grade limitation. Design speeds vary from 21 to over 80 mph along the route based upon the existing alignment. In addition, improvements are needed to narrow bridges along the route, as well as to a few intersections with limited sight distance for traffic exiting and/or entering the intersecting roadways.

### **3. Facilitate the Movement of Truck Traffic**

Based on anecdotal input from the public, it is thought that a relatively large volume of freight trucks travel from I-40 and other locations east of Nashville along KY 163 through Monroe County, Kentucky, then north to KY 90 in Metcalfe County, Kentucky, and then west to access I-65 at Glasgow in Barren County, Kentucky. Traffic volumes along KY 163 decrease by forty percent north of the intersection with KY 90. By improving the KY 163 corridor in Metcalfe County (coupled with simultaneous improvements in Monroe County), a more direct connection would be established from Tompkinsville, Kentucky, and from I-40 in Tennessee to the future I-66 corridor in Kentucky.

In addition, two major attractors/generators of truck traffic are located on the northeast side of Edmonton: the stockyard at the US 68/KY 80 split and the Metcalfe County Industrial Park on US 68 just south of the Nunn Parkway. Also, a significant number of trucks hauling logs and lumber travel through Edmonton to and from lumber yards located on KY 496 and KY 533 east of Edmonton. To reach these locations from the Nunn Parkway, trucks must exit at the US 68-KY 80/Nunn Parkway interchange west of Edmonton and travel through downtown Edmonton through the US 68-KY 80 intersection with KY 163. Geometric deficiencies, coupled with traffic queues, at this intersection in downtown Edmonton complicate truck turning movements. On at least two legs of the intersection, large trucks must swing out of the driving lane into the path of oncoming vehicles to make the turn. When this occurs, other vehicles must stop well short of the intersection to avoid collisions and allow the trucks to complete their turns.



Low-cost improvements to the US 68-KY 80/KY 163 intersection are difficult to implement due to the narrowness of the streets and the restricted right-of-way, caused by close proximity of structures to the edge of the street, on the western and northern legs of this four-way intersection. Therefore, improvement alternatives should be developed and evaluated to address this problem.

#### **4. Improve Highway Accessibility within Edmonton**

As discussed previously, there is a public perception that traffic congestion often occurs at the US 68-KY 80/KY 163 intersection in downtown Edmonton. Truck turning movements at this intersection further inhibit operations, increasing delay times and queue lengths as trucks attempt to navigate through downtown. Bottlenecks at this location also inhibit emergency response operations; in the event of an incident, emergency response personnel are sometimes delayed several critical minutes before being able to provide necessary care.

Based on HCS analysis for the 2006 peak hour traffic operations, this intersection functions at a level of service (LOS) B for the a.m. and p.m. peak hours; turn movements from the eastbound approach on US 68-KY 80 function at LOS C during the afternoon. Without improvements at this intersection, movements from the eastbound approach are projected to degrade to LOS D by 2015, assuming a modest 1.9% annual growth rate based on historic traffic data and development patterns. The entire intersection can be expected to reach LOS D by 2020.

As the level of service deteriorates in the future, more significant delays to trucks and autos would occur at that location and restrict access to locations from one side of town to the other.

Of special importance, improvements to the US 68-KY 80/KY 163 intersection and to existing KY 163 would improve access to city and county government offices in downtown Edmonton, downtown businesses, the existing industrial park, the stockyard, and a new industrial park that is being developed on KY 163 at the southern city limits of Edmonton.

#### **5. Enhance Economic Development Opportunities**

According to U.S. Bureau of Census Journey-to-Work data, almost 46% of the Metcalfe County workforce commutes outside the county for jobs; however, approximately 850 persons commute into Metcalfe County for work.

Edmonton is home to a developed industrial park, located in the northeastern quadrant of the city, currently employing around 750 people. A second 38-acre industrial park is being developed at the southern edge of town, with access directly from KY 163. Any improvements to KY 163 and/or other parts of the city's highway



*Entrance to northern Industrial Park*

network would provide better access to these locations for both commuters and trucks, which would help to improve Edmonton's competitiveness and help to draw industrial tenants to these two industrial parks.

In addition, improvements to KY 163 from KY 90 to the Nunn Parkway would provide the opportunity for an improved connection to and from Monroe County, Kentucky and locations in Tennessee, including I-40 and Dale Hollow Lake, a major tourist attraction southeast of Metcalfe County. Since the Nunn Parkway has been designated as the Future I-66 corridor, it is anticipated that additional economic opportunities will occur along the Parkway. The KY 163 corridor improvement could be an important factor in providing future economic development opportunities for Edmonton and Metcalfe County by providing better access to the area for trucks, commuters, and other business interests.

## **VIII. ALTERNATIVES DEVELOPMENT PROCESS**

Following the existing conditions review and first round of public involvement, preliminary improvement alternatives were developed on and off the existing KY 163 alignment. This chapter presents the development and refinement of the preliminary improvement alternatives, a detailed Level 1 Screening, and input from the project team.

### **A. Corridor Alternatives Definition**

The existing conditions analysis and the first round of public, local official, and agency input were used to identify 25 potential “build” corridors for KY 163. These initial corridors are presented in **Figure 8.1**. Each alternative is identified by an alphanumeric identification “name” that indicates the beginning point, ending point, and, in some cases, intermediate points along the corridor.

Each corridor alternative “name” begins with the letter A, which represents the beginning point. Location A corresponds to the reconstructed intersection of KY 90 and KY 163; all corridor alternatives begin at this point.

A number in the corridor “name” description represents an intermediate point along the existing route where the alternative diverts from the existing KY 163 alignment. Lower numbers are farther south; a corridor without a number in its name does not lie along the existing alignment at all.

The final letter in each name represents where the corridor terminates. There are eight distinct endpoints which have been given letter designations, ranging alphabetically from A to H.

For options passing through downtown Edmonton, an additional descriptor specifies the location of the path: west, inner, or outer.

Four of the 25 alternatives included an additional interchange added at one of three locations north and east of Edmonton, with each alternative “name” represented only by a single letter (end points D, E, and F). These alternatives did not include any additional roadway improvements: only the new interchange and connecting links tie it into the existing network.

These 25 alternatives were coupled with a No-Build Alternative and a Spot Improvements Alternative to form all of the alternatives subjected to an initial (Level 1) screening.

### **B. Traffic Analysis**

Traffic volumes for representative “build” alternatives were predicted using the Kentucky Statewide Travel Demand Model and the Manual Gravity Model. A model run was completed for a far western route (AB), a western route near Edmonton with a second interchange (A2D), an eastern route with an additional interchange (AF), an additional interchange only (D), and for both an eastern and western bypass within Edmonton. It was assumed that other alternatives in close proximity to each would have similar traffic impacts. The results of this analysis are presented in **Figure 8.2**.

Findings showed that the alternatives located nearer the existing alignment would divert more trips from existing KY 163. Western alternatives provided the most relief at the intersection of KY 163 and US 68-KY 80.



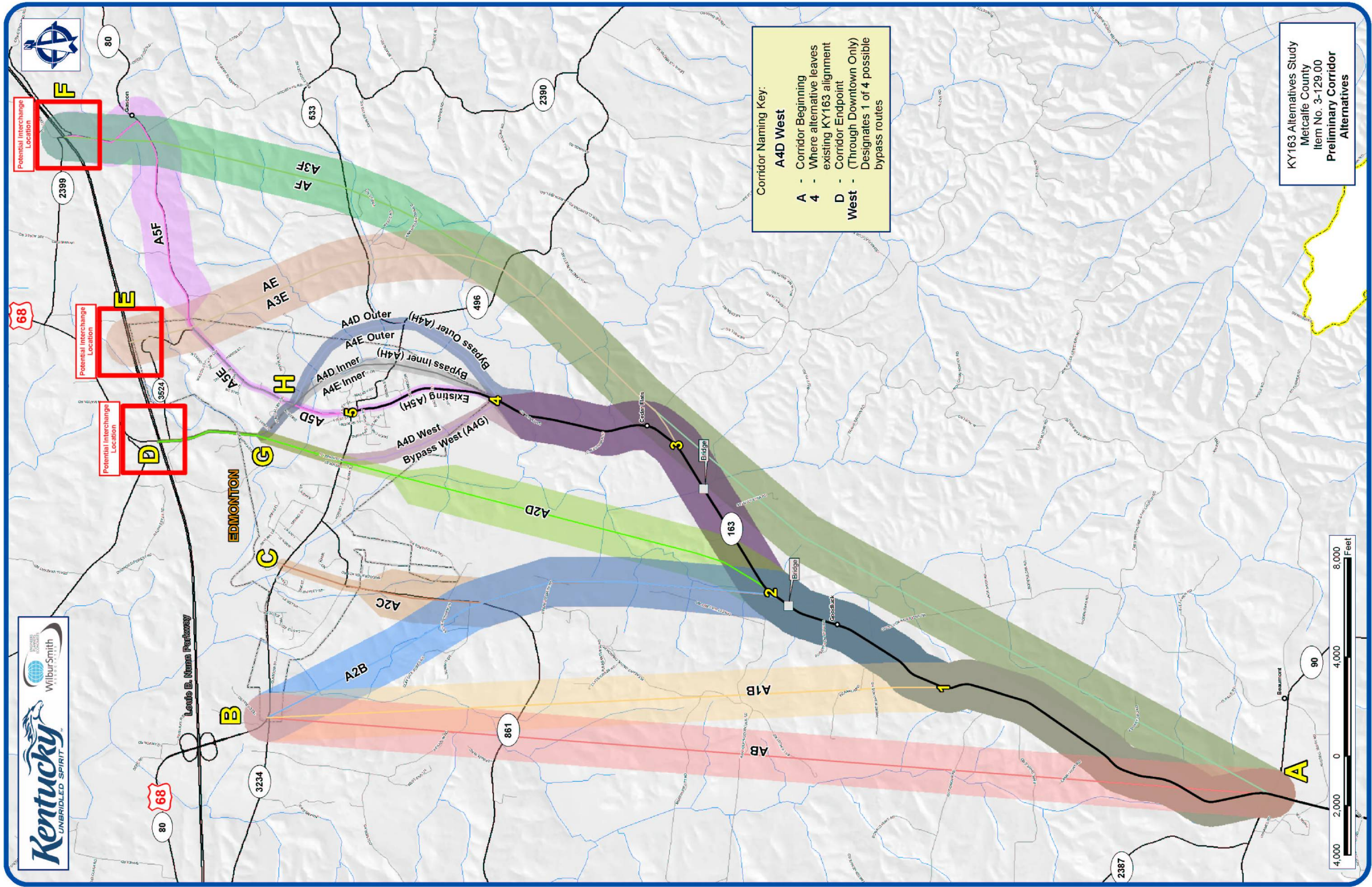


Figure 8.1 – Level 1 Corridor Alternatives





### Figure 8.2 – Level 1 Traffic Projections



### C. Level 1 Screening

The goal of the Level 1 Screening process was to eliminate alternatives that did not warrant further consideration, leaving a reduced number of worthier alternatives for a more detailed analysis.

For the Level 1 Screening of these 27 corridors, criteria were developed based on how well each alternative:

- Satisfied the project purpose and need and/or additional project goals;
- Appeared to have fewer potential environmental and community impacts; and
- Compared with regard to constructability and planning level cost estimates.

The alternatives were given a comparative review using quantitative and qualitative evaluations. Based on these comparisons, each alternative was assigned a High, Medium, or Low rank for each category, as shown in **Table 8.1**.

The results of the Level 1 Screening were presented to the project team on March 15, 2007, as discussed below.

### D. Second Project Team Meeting (March 15, 2007)

The Second Project Team Meeting was conducted on March 15, 2007, at the KYTC District 3 Office in Bowling Green, Kentucky. At this meeting, the KY 163 preliminary alternatives were further discussed primarily using the results of the Level 1 Screening. A copy of the meeting minutes is included in **Appendix J**.

The project team agreed to the following recommendations for each alternative corridor:

- An interchange at location D (US 68 north of Edmonton) was recommended to be carried forward in the screening process because it addresses the project purpose and need with minor environmental and community impacts. Of the alternatives including additional interchanges, location D provides the most direct access for the majority of traffic.
- Neither configuration of interchange at location E (north of KY 3524) was recommended for further study due to a potential to find karst features, more circuitous routing than site D that increases state mileage for maintenance while reducing traffic volumes using the interchange, and right-of-way impacts for portions of the Industrial Park.
- An interchange at location F (KY 2399) was not recommended for further study because it has a high potential to encounter karst topography, less direct access than either other interchange option, and would require several small roads parallel to the parkway to be relocated.

Table 8.1 – Level 1 Evaluation Matrix

Corridor	Distance (mi)	Travel Time (min)	Addressing Purpose and Need				Other Project Goals				Construction Cost (\$ millions)
			Safety		Movement		Existing Geometry	Truck Movement	Economic Development		
			Local	Regional	Local	Regional					
No Build	11.41	15.3	Low	Low	Low	Low	Low	Low	Low	None	
Spot Improvements	11.41	14.3	High	Medium	High	Low	Medium	Medium	Low	Undetermined	
AB	7.71	8.6	Low	High	Low	High	Low	Medium	Low	\$23.8	
A1B	7.94	9.1	Low	High	Low	High	Low	Medium	Low	\$24.5	
A2B	8.43	9.9	Low	High	Low	High	Medium	Medium	Low	\$26.9	
A2C	8.13	10.5	Low	Medium	Low	Medium	Medium	Medium	Low	\$27.0	
A2D	9.20	11.5	Medium	Medium	Low	Medium	Medium	High	High	\$44.0	
A4D west	9.80	13.1	High	Medium	Medium	Medium	High	High	High	\$45.4	
A5D	9.86	13.2	High	Medium	Medium	Medium	High	High	Medium	\$45.6	
A5E	10.20	13.4	High	Medium	Medium	Medium	High	High	Medium	\$45.7	
A5F	12.01	15.6	High	Low	Medium	Medium	High	High	Medium	\$56.4	
A4D inner	9.94	13.2	High	Medium	High	Medium	High	High	High	\$48.6	
A4E inner	10.28	13.4	High	Medium	High	Medium	High	High	High	\$48.7	
A4D outer	10.33	13.5	High	Medium	High	Medium	High	High	High	\$47.0	
A4E outer	10.67	13.7	High	Medium	High	Medium	High	High	High	\$47.1	
Bypass West (A4G)	9.03	12.0	Medium	Medium	High	Medium	High	Low	Medium	\$30.6	
Existing (A5H)	8.71	11.6	Medium	Low	Low	Low	High	Low	Low	\$29.4	
Bypass Inner (A4H)	8.79	11.5	Low	Low	Low	Low	High	Low	Low	\$32.4	
Bypass Outer (A4H)	9.18	11.8	Low	Low	Low	Low	High	Low	Low	\$30.8	
A3E	10.53	12.4	Low	Medium	Low	High	Medium	High	Medium	\$47.9	
AE	10.16	11.3	Low	High	Low	High	Low	High	Medium	\$46.7	
A3F	11.09	13.1	Low	Medium	Low	High	Medium	Medium	Medium	\$57.4	
AF	10.73	11.9	Low	High	Low	High	Low	Medium	Medium	\$56.3	
Interchange D*	1.10	1.7	Medium	Medium	High	Low	Low	Medium	Medium	\$13.0	
Interchange E Flyover*	1.49	1.9	Medium	Medium	High	Low	Low	Medium	Medium	\$12.7	
Interchange E Typical*	1.49	1.9	Medium	Medium	High	Low	Low	Medium	Medium	\$12.5	
Interchange F*	3.32	4.0	Medium	Low	Medium	Low	Low	Medium	Low	\$15.6	

\* Travel Times/Distances measured from interchange to US 68-KY 80 split  
For comparison, times and distances from corresponding point on parkway to US 68-KY 80 split: D (6.0 miles / 7.6 minutes); E (6.8 miles / 8.4 minutes); F (8.4 miles / 9.8 minutes)

Table 8.1 – Level 1 Evaluation Matrix (continued)

	Community Impacts						Environmental Impacts				
	ROW Impacts		Schools	Parks	Churches	Cemetery	Affected Farmlands	Historic Property	Archaeology Sites	UST Sites	Karst
	Homes	Businesses									
Corridor	As is	As is	As is	As is	As is	As is	As is	As is	As is	As is	As is
No Build	Some	Some	Few/None	Few/None	Few/None	Few/None	Some	Few/None	Low Likelihood	As is	Low Likelihood
Spot Improvements	Few/None	Few/None	Few/None	Few/None	Some	Some	Many	Few/None	Medium Likelihood	Few/None	Medium Likelihood
AB	Few/None	Few/None	Few/None	Few/None	Some	Many	Many	Some	Low Likelihood	Few/None	Medium Likelihood
A1B	Some	Few/None	Few/None	Few/None	Some	Few/None	Many	Some	Low Likelihood	Few/None	High Likelihood
A2B	Some	Few/None	Few/None	Few/None	Some	Some	Many	Some	Low Likelihood	Few/None	High Likelihood
A2C	Some	Some	Many	Few/None	Some	Some	Many	Some	Low Likelihood	Few/None	High Likelihood
A2D	Some	Many	Some	Few/None	Few/None	Few/None	Many	Some	Medium Likelihood	Some	Low Likelihood
A4D west	Some	Many	Few/None	Few/None	Few/None	Few/None	Some	Some	Low Likelihood	Many	Low Likelihood
A5D	Many	Many	Few/None	Some	Some	Some	Some	Few/None	Low Likelihood	Many	Medium Likelihood
A5E	Many	Many	Few/None	Some	Some	Some	Some	Few/None	Low Likelihood	Many	Medium Likelihood
A5F	Many	Many	Few/None	Some	Some	Some	Some	Few/None	Low Likelihood	Many	High Likelihood
A4D inner	Many	Some	Few/None	Few/None	Some	Some	Some	Some	High Likelihood	Many	Low Likelihood
A4E inner	Many	Some	Few/None	Few/None	Some	Some	Some	Some	High Likelihood	Many	Medium Likelihood
A4D outer	Few/None	Some	Few/None	Few/None	Some	Some	Some	Few/None	Medium Likelihood	Some	Low Likelihood
A4E outer	Few/None	Some	Few/None	Few/None	Some	Some	Some	Few/None	Medium Likelihood	Many	Medium Likelihood
Bypass West (A4G)	Some	Many	Few/None	Few/None	Some	Some	Some	Some	Low Likelihood	Many	Low Likelihood
Existing (A5H)	Many	Some	Few/None	Few/None	Some	Some	Some	Few/None	High Likelihood	Many	Low Likelihood
Bypass Inner (A4H)	Many	Some	Few/None	Few/None	Some	Some	Some	Few/None	High Likelihood	Many	Low Likelihood
Bypass Outer (A4H)	Few/None	Some	Few/None	Few/None	Some	Some	Some	Few/None	Medium Likelihood	Many	Low Likelihood
A3E	Some	Few/None	Few/None	Few/None	Some	Some	Some	Few/None	Medium Likelihood	Some	Low Likelihood
AE	Some	Few/None	Few/None	Few/None	Few/None	Some	Some	Some	Low Likelihood	Some	Medium Likelihood
A3F	Some	Few/None	Few/None	Few/None	Some	Few/None	Many	Many	Low Likelihood	Few/None	Medium Likelihood
AF	Some	Few/None	Few/None	Few/None	Some	Few/None	Many	Many	Low Likelihood	Few/None	High Likelihood
Interchange D	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Low Likelihood	Few/None	Low Likelihood
Interchange E Flyover	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Low Likelihood	Few/None	Medium Likelihood
Interchange E Typical	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Low Likelihood	Few/None	Medium Likelihood
Interchange F	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Few/None	Low Likelihood	Few/None	High Likelihood



- Alternative corridors passing east of Edmonton and terminating at E or F were not recommended for further analysis due to the same reasons as discussed above. They do not adequately address the project purpose because they have only minor impacts on local traffic and would consume significant portions of farmlands. This includes Alternatives AE, AF, A3E, and A3F.
- Corridors AB and A1B were not recommended for further evaluation because they do not impact the project purpose locally and they are associated with major impacts to area farmlands, a sensitive area frequently identified as a concern at the first public meeting.
- Corridor A2B was selected for the Level 2 Screening because it addresses the project purpose, providing access to the existing interchange for trips to and from the south without traveling through Edmonton. Because it lies mostly on existing roadbeds, right-of-way impacts to homes and farmlands would be lesser than other western alternatives.
- Corridor A2C addresses the purpose and need, but travels near Metcalfe County High School, making it a less favorable alternative than Corridor A2B. It is not recommended for further evaluation.
- Corridors bypassing downtown Edmonton to the immediate east (A4D inner, A4E inner, Bypass Inner, A4D Outer, A4E Outer, and Bypass Outer) were not recommended for additional evaluation. The footprint of these alternatives lies near multiple historic properties and archaeological sites, creating potential 4(f) concerns. These alternatives also terminate near the stockyards, which creates additional right-of-way, environmental, and stream issues.
- Corridor A2D was selected for the Level 2 Screening because it addressed the project purpose and additional goals. A relatively high volume of traffic is anticipated to use this route, thereby removing a significant portion from the existing KY 163 intersection with US 68-KY 80 and addressing congestion concerns within Edmonton. This alternative will be considered both with and without an interchange at D.
- Corridor A4D west was selected for additional evaluation because it addresses the project purpose and need. With this alternative, truck access to the industrial parks and stockyard is improved, congestion is addressed, and route redundancy within Edmonton is provided. This alternative will be considered both with and without an interchange at D.
- Alternatives along the existing alignment would create significant right-of-way impacts to homes and businesses within Edmonton. It is recommended that one of the three alternatives along the existing alignment – A5D – be further evaluated in the Level 2 Screening process. Because A5E and A5F provide less direct access with increased environmental and community impacts, they are not recommended for additional analysis.

In summary, the Project Team decided that Corridors AB, A1B, A2C, A5E, A5F, all inner or outer bypass options, A3E, AE, A3F, AF, and interchanges at E and F would not move forward.

The Project team also agreed that Corridors A2B, A2G, A2D, A4G, A4D, A5D, interchange at D, No Build, and the Spot Improvements scenario would be advanced for further consideration in the study process.

#### **E. Spot Improvements**

Ten locations along the existing routes were identified for potential spot improvements. These were identified based on existing deficiencies, safety concerns, and community attractions. The Project Team concurred that these 10 spot improvement locations should be considered further.

**Table 8.2** provides summary information for each of the potential spot improvements, and **Figure 8.3** depicts the locations on a map.

Table 8.2 - Spot Improvement Information

Spot	Roadway	Milepoint	Length (ft)	Description	Problem	Crashes*	Existing Geometry	Improvement	Construction Cost
1	KY 163	3.223	1,600	Add truck climbing lane for northbound traffic.	Slow moving trucks and no passing lanes	None reported	7.8% grade	Add a truck climbing lane	\$410,000
2	KY 163	7.900	1,450	Adjust vertical alignment at Missionary Mound Baptist Church	Stopping sight distance	1 injury, 1 PDO	The church is on a 700' vertical curve that has 184' of stopping sight distance and a 7.0% grade.	495' stopping sight distance	\$660,000
3	KY 163	9.084	1,075	Adjust vertical alignment at Cedar Flats	Stopping sight distance	1 injury, 3 PDO	The intersection is on a 300' vertical curve that has 300' of stopping sight distance and a 8% grade.	495' stopping sight distance	\$380,000
4	KY 163	7.310	1,500	Replace Bridge over Roger's Creek	Bridge width	1 injury, 3 PDO	19.4' horizontal clearance	30' wide bridge	\$2,600,000
5	KY 163	8.470	1,000	Replace Bridge over Black Rock Creek	Bridge width	2 PDO	19.4' horizontal clearance	34' wide bridge	\$1,100,000
6	US 68	9.002	2,500	US 68/KY 80 Intersection	Rear end collisions	1 fatal, 1 injury, 18 PDO	Traffic on KY 80 has the through movement. Traffic on US 68 has to yield or stop.	Center turn lanes	\$260,000
7	US 68	10.000	553	Add right turn lane on US 68 at Industrial Park	Truck turning movements	None reported	Two 12' lanes	553' right turn lane	\$53,000
8	KY 80	0.967	585	Add left turn lane on KY 80 at Industrial Park	Truck turning movements	1 PDO	Two 9' lanes	585' left turn lane	\$51,000
9	US 68	5.930	4,500	Add a turn lane and construct a 3 lane roadway section along US 68 at Bowling Park	Rear end collisions	1 fatal, 3 injury, 23 PDO	Two 11' lanes	3 lane roadway section	\$3,000,000
10	US 68 / PKWY	5.540	N/A	Reconstruct Existing Interchange at Exit 27	Deficient ramps	2 injury, 9 PDO	Toll booth interchange	Conventional diamond (Keep existing bridge)	\$9,000,000 <sup>1</sup>

\* Crash statistics reported for 2003 - 2006

<sup>1</sup> Estimate from BG Pkwy & US 27 interchange actual construction cost.



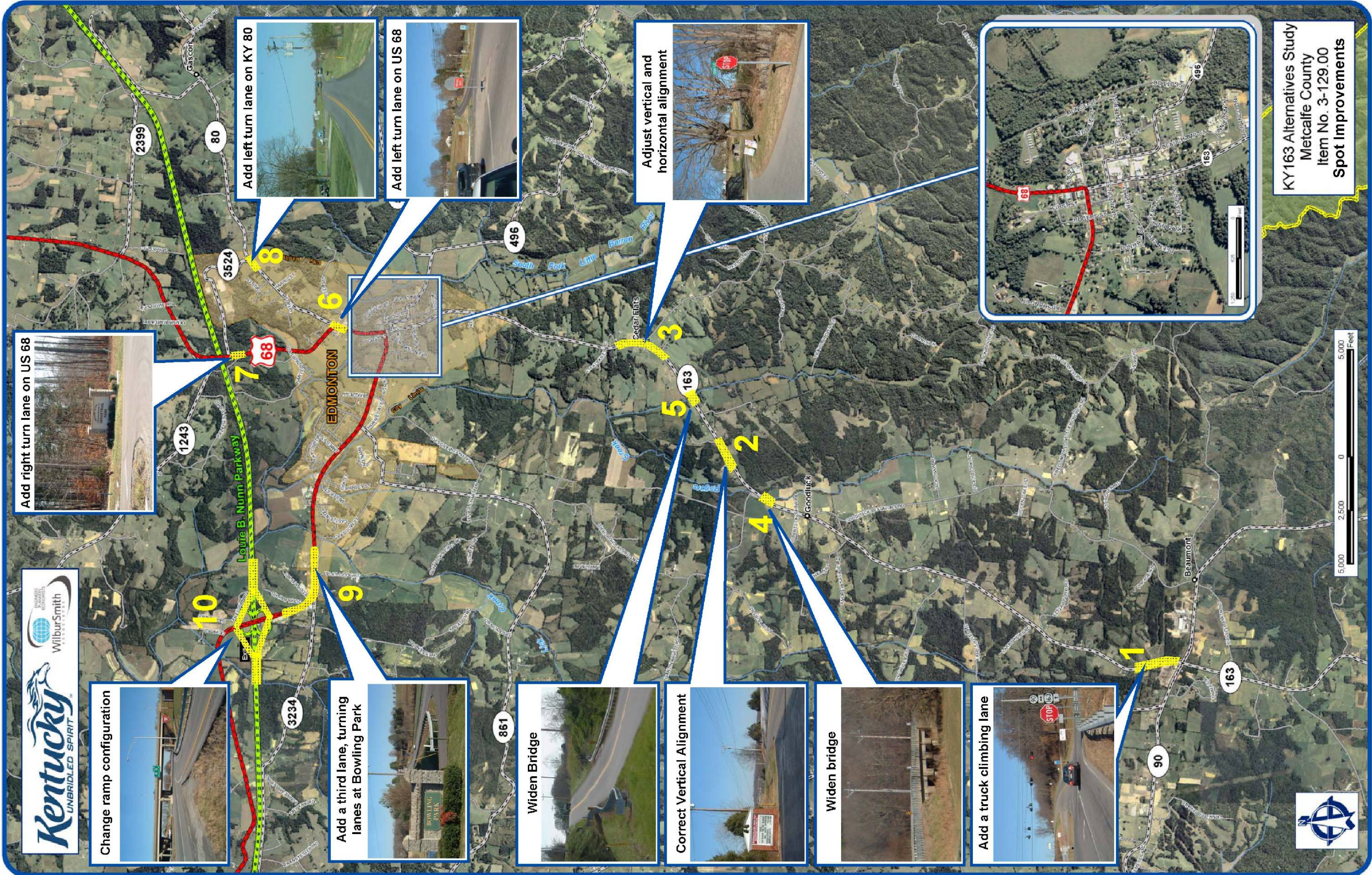


Figure 8.3 – Spot Improvements



## **IX. FINAL ALTERNATIVES EVALUATION PROCESS**

This chapter presents an overview of the alternatives screening process for the final corridor alternatives selected by the project team for a more detailed (Level 2) evaluation. These corridors are shown in **Figure 9.1**, including Alternatives A2B, A2D, A2G, A4G, A4D, A5D, and Interchange D. The No-Build and Spot Improvements Scenarios were also included in the Level 2 evaluation.

For evaluating impacts, the following corridor widths were established:

- Existing KY 163 in rural areas: 2,000 feet
- New routes in rural areas: 2,000 feet
- Existing KY 163 in urban areas: 150 feet
- New routes in urban areas: 500 feet

Secondary field and data reviews were conducted for each of the final corridor alternatives, focusing on environmental issues, geotechnical concerns, cultural resources, and environmental justice impacts. The results of these studies are presented in the following sections. Reported impacts are recorded for the total corridor width; actual impacts will be less severe.

### **A. Environmental/Community Issues**

Each of the final alternatives would have an impact on farmlands. Alternative A2B has the greatest area impact on farmlands: the corridor footprint covers 2,000 acres of farmlands and 76 acres of the Agricultural District. Alternatives A2D and A2G have the greatest impact on the Agricultural District, covering 135 acres each, and 1,800 acres of additional farmlands. The No Build, Spot Improvements, and Interchange D Alternatives have the least impact on farmlands.

Each alternative is associated with residential relocations, ranging from minor (0-5) to major (135-170). Business impacts range from one relocation to as many as 15 relocations. Alternatives passing nearer Edmonton (A4D, A4G, A5D) have higher impacts than others.

Alternatives A4D and A4G are associated with community resource implications. Three churches and at least seven cemeteries lie within the corridors. There is also a Section 8 housing development on Bushong Lane, creating a potential environmental justice concern for these two alternatives.

Alternative A5D contains 17 historic properties within the corridor, far more than any other alternative. Pedigo Park also lies near the existing alignment and has the potential to be impacted by a reconstruction along this route.

Corridors off the existing alignment (A2B, A2G, and A2D) would have greater impacts on streams and wetlands resources.

Oil and gas wells are common throughout the project area, but have a greater concentration near Edmonton. Alternatives A4D, A4G, and A5D are associated with greater impacts to wells, underground storage tanks, and utilities.



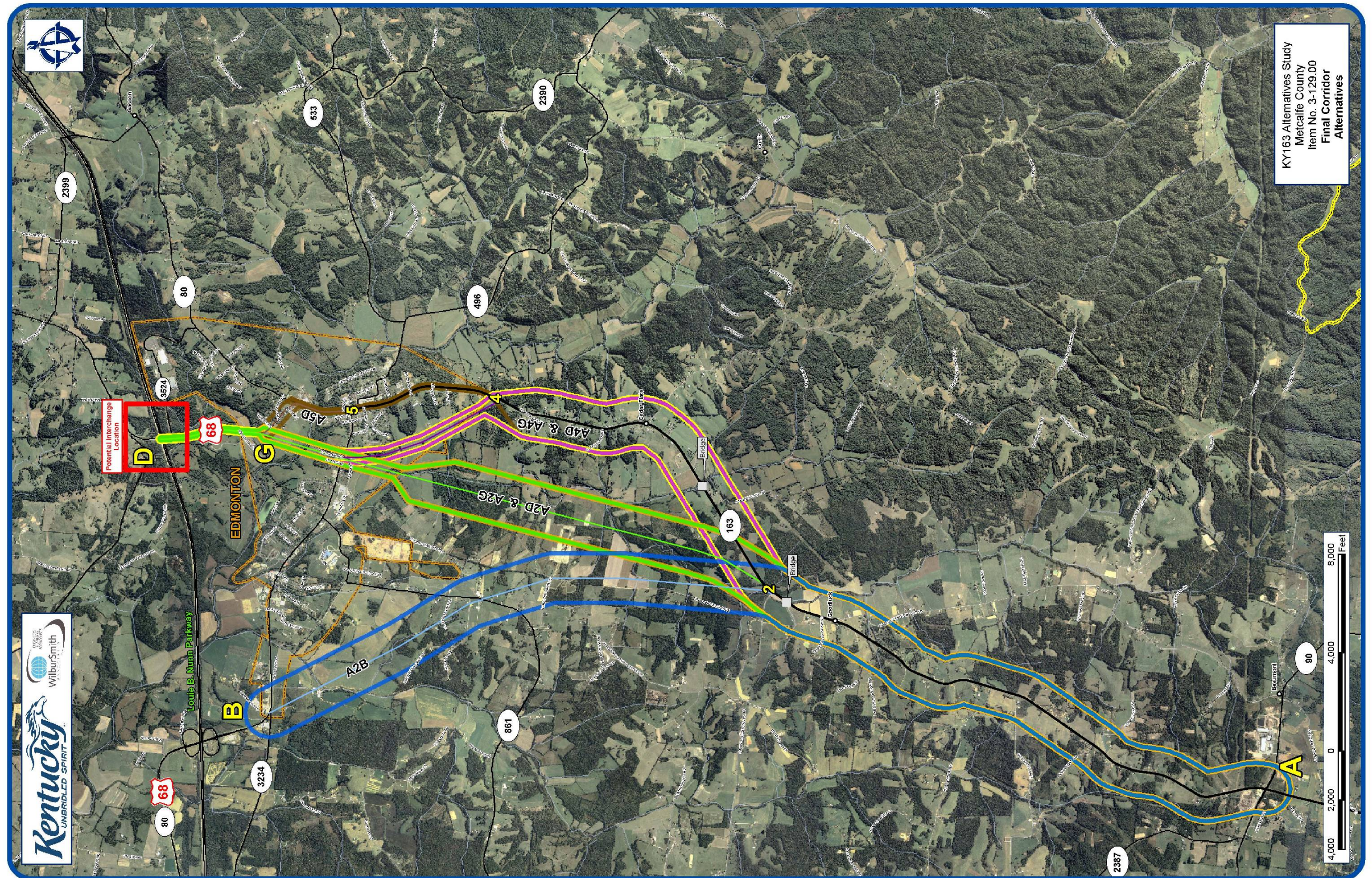


Figure 9.1 – Level 2 Corridor Alternatives



## **B. Geotechnical Concerns**

Karst terrain is the primary geotechnical issue within the study area. Each of the six build corridors passes near 2 to 3 sinkholes. The potential interchange location at D and the KY 90-KY 163 intersection to the south are both noted karst areas.

Each build corridor is also associated with alluvial deposits from Rogers Creek, Clay Lick Creek, and/or Little Barren River.

Wetlands impacts from multiple farmlands are also likely. Alternatives lying on the existing alignment will require fewer alluvial and wetlands mitigations.

From a geotechnical perspective, Alternatives A4G, A4D, and A2B are preferred.

## **C. Cultural Resources**

Along the existing KY 163 alignment, there are more than 100 potential historic structures that are 50 years of age or older which would require review and documentation. Therefore, highway improvements along the existing alignment are likely to affect more structures

Within Edmonton, there are three historic properties of concern. The Metcalfe County Courthouse and Metcalfe County Jail are both listed on the National Register of Historic Places. The Beauchamp House has been determined eligible for listing. None of these sites are likely to be impacted by any of the Level 2 Build Alternatives.

Based on an official preliminary assessment of historic significance, three barns lying along the existing alignment of KY 163 are considered as likely historic structures for listing. These rack-sided barns exhibit inward-sloping sides and are unique to Western Kentucky and areas around Sevierville, Tennessee.

No known archaeological sites occur within the final corridors. It is more likely to discover sites on new alignments (A2B, A2G, and A2D) where the ground has not yet been disturbed.

## **D. Environmental Justice Impacts**

Census data was collected and analyzed by the Barren River ADD to identify environmental justice (EJ) populations within each of the alternative corridors. Analysis groups included minority, elderly, and low income populations. The minority population data showed several of the block groups as having an identified concentration of one or more EJ populations. Some were significant, some were only minor.

The conclusion was made that no concentration of minority groups will be disproportionately affected by these alternatives.

There appear to be few small concentrations of populations by age within the KY 163 proposed alternatives. Age analysis indicates that the distribution of elderly residents in Block Group 2 of Census Tract 9603 has a significant concentration of elderly persons. The remaining Block Groups that may be impacted by the proposed alternatives closely resemble the national, state and county averages.

Block Group 2 of Census Tract 9603 has a percentage of persons below the poverty level of 26.23%, which is slightly higher than the county average of 23.26%. Proposed factors have been identified, it was noted that a minor concentration is present in Block Group 2. The high percentage of the population below poverty level is not uncommon for this type of rural distressed county in Kentucky.

The conclusion was made that concentrations of individuals below the poverty level in Block Group 2 may be disproportionately affected by this project.

However, improved access into the county may have a positive impact on economic development, which could bring more jobs and/or higher incomes, thus, helping to reduce the poverty level in the county.

After reviewing environmental justice data, Interchange D and Alternative A2B appear to be the best options based on this analysis.

## **E. Traffic Analysis**

For each of the final “build” corridor alternatives, traffic volumes were projected using the Kentucky Statewide Travel Demand Model. The results of this analysis are presented in **Figure 9.2**. Major findings are as follows:

- Corridor A2B carries the least traffic on the newly aligned segment;
- A2G and A4G carry approximately the same traffic volumes, ranging from 1,800 to 2,700 vehicles per day.
- Alternatives combining the connection with an interchange (A2D and A4D) carry higher traffic volumes on the connection link north of Stockton Street (US 68-KY 80), serving approximately 3,600 daily trips.
- Each alternative off the existing alignment diverts traffic from the intersection of KY 163 with US 68-KY 80.
- The addition of an interchange at D is expected to improve traffic flow at this intersection by removing the need for large trucks to make tight turns to reach a parkway interchange.

These volumes were projected to 2030 using a 1.9% annual growth factor, as shown in **Figure 9.3**. For comparison, the 2030 no-build volumes were presented in **Figure 2.3** using the same growth rate.

Based on typical cross sections and projected traffic volumes, newly constructed segments for each alternative are anticipated to function at a LOS B. The three primary approaches to the KY 163/US 68-KY 80 intersection also appear to function at a LOS B based on this analysis.

Alternatives providing an interchange at D (A2D, A4D, and A5D) eliminate the necessity for large trucks to negotiate tight turns at the KY 163/US 68-KY 80 intersection.

Alternatives including a connecting route from US 68 north of Edmonton to US 68-KY 80 (Stockton Street) west of downtown

Edmonton (A2G, A2D, A4G, and A4D) would provide an alternate route with less restrictive geometry for large trucks trying to reach the industrial park, the stockyard, or other points north or east of Edmonton. These features would make a notable improvement to operations at the primary intersection in downtown Edmonton.

## **F. Level 2 Screening**

Based on more detailed data analysis, the project purpose and need, and further reviews of environmental and community impacts, an evaluation matrix was developed that summarizes the potential impacts for each of the Final Corridor Alternatives, as shown in **Figure 9.4**.

Impacts shown in this matrix are estimated for each alternative, indicating the total potential impacts in the corridor based on the widths discussed previously. However, actual impacts associated with a final alignment will ultimately be less severe since the improvement right-of-way footprint will not require the full corridor width.

Findings from the Level 2 Screening were used in further discussions with the Project Team and were then presented at meetings with local officials, stakeholders, and the public to get input on the proposed alternatives, as discussed in **Chapter X**.

These findings, along with project team and public input, were then used to help formulate the final recommendations discussed in **Chapter XI**.



**Alternative 1: (Interchange D)**  
Adding an interchange on US  
68 is an option by itself.

Traffic volumes match A5D.

2006 Build Traffic Volumes

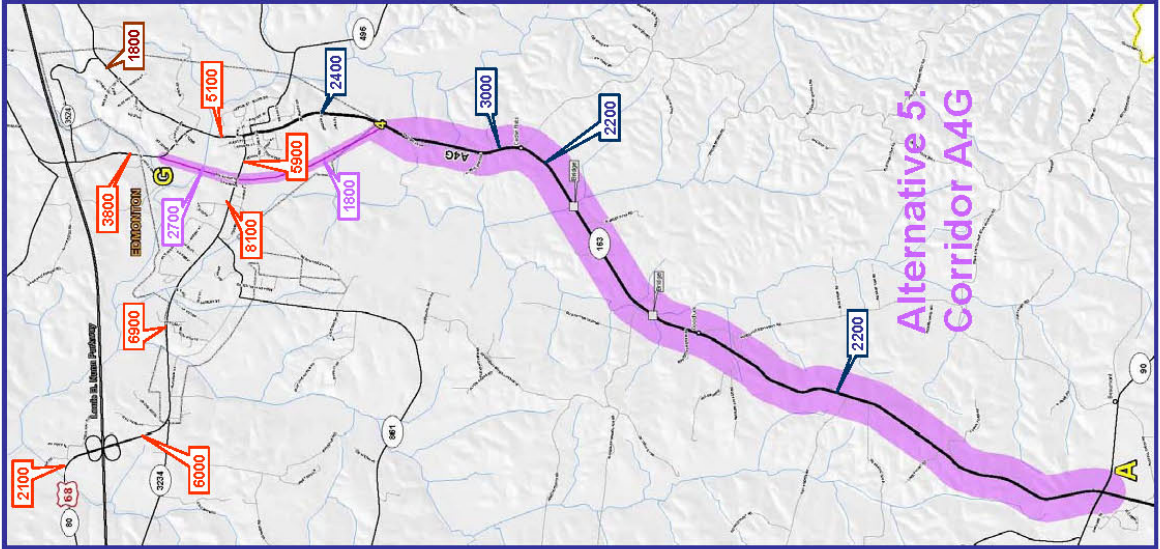
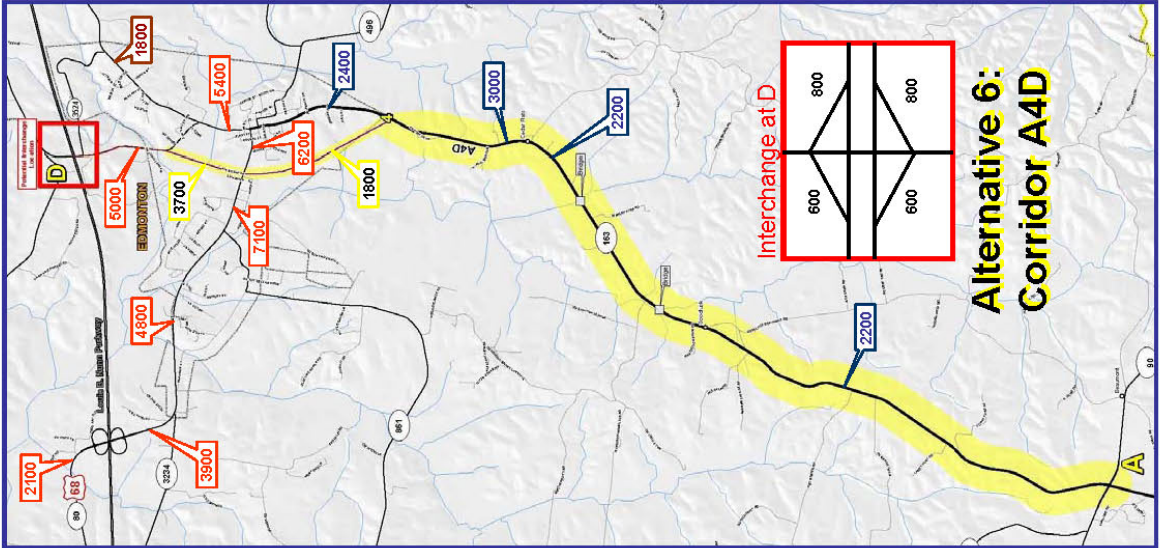
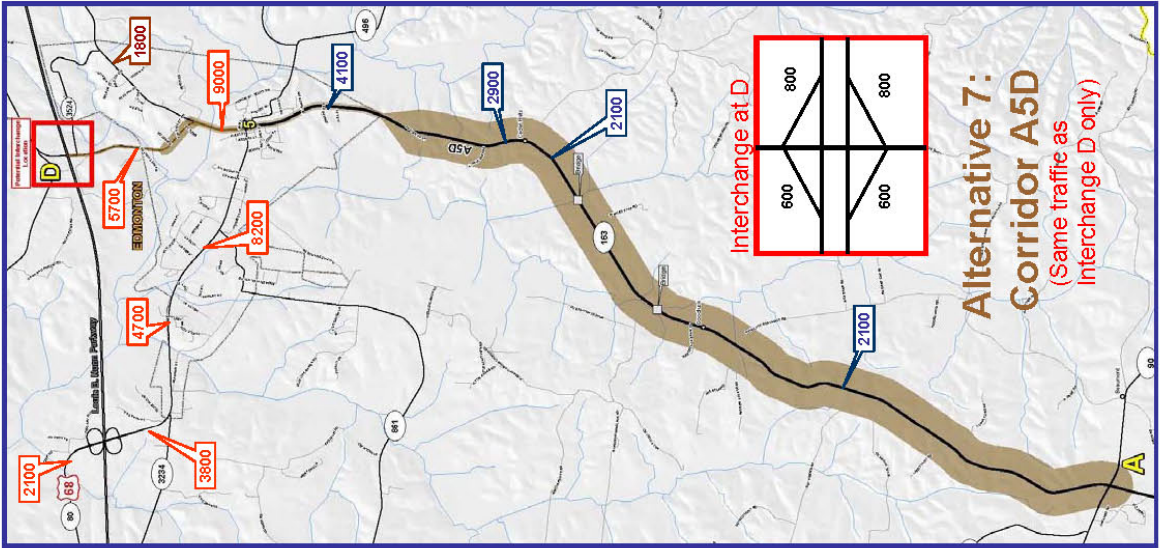
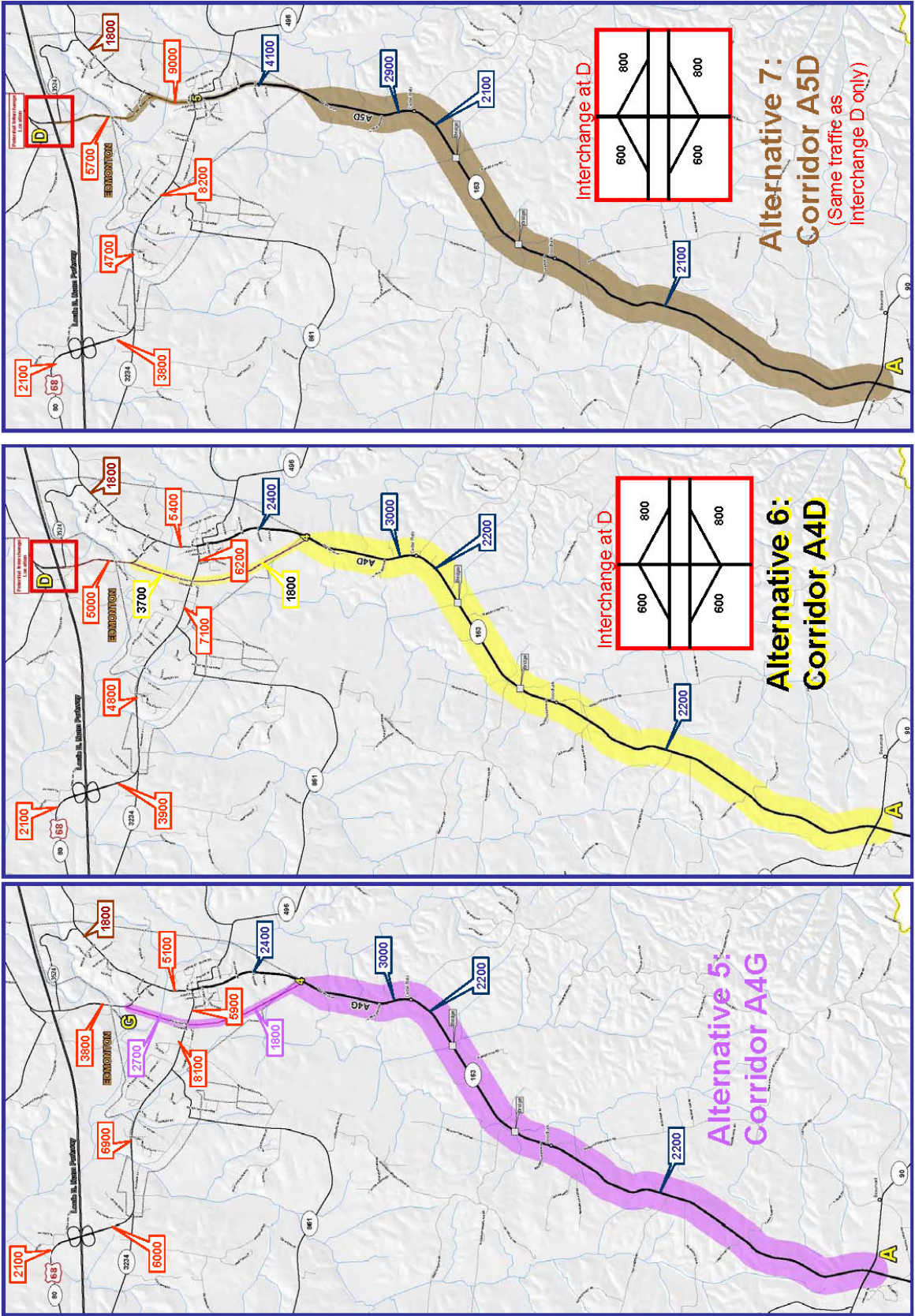
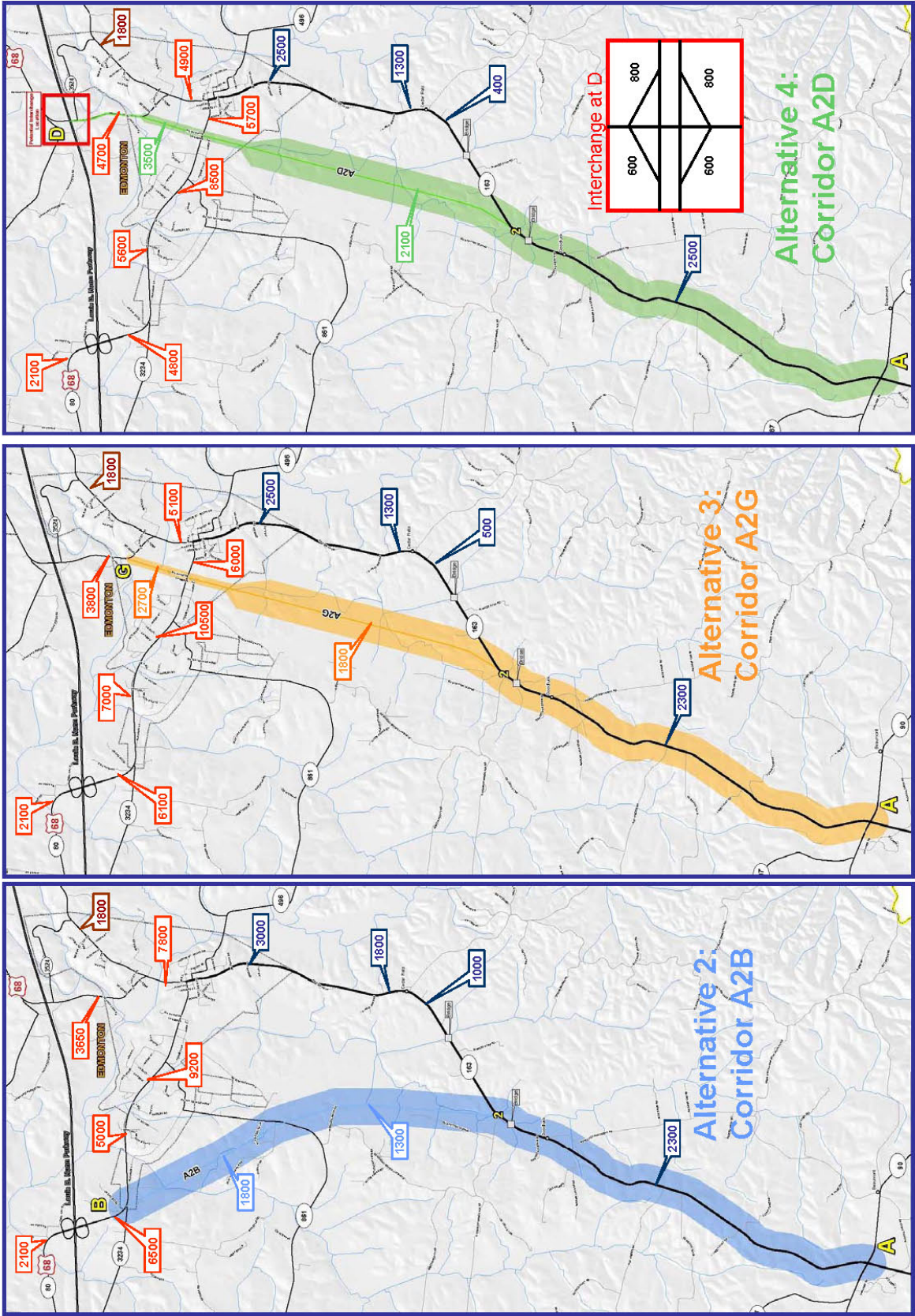


Figure 9.2 – 2006 Level 2 Traffic Projections



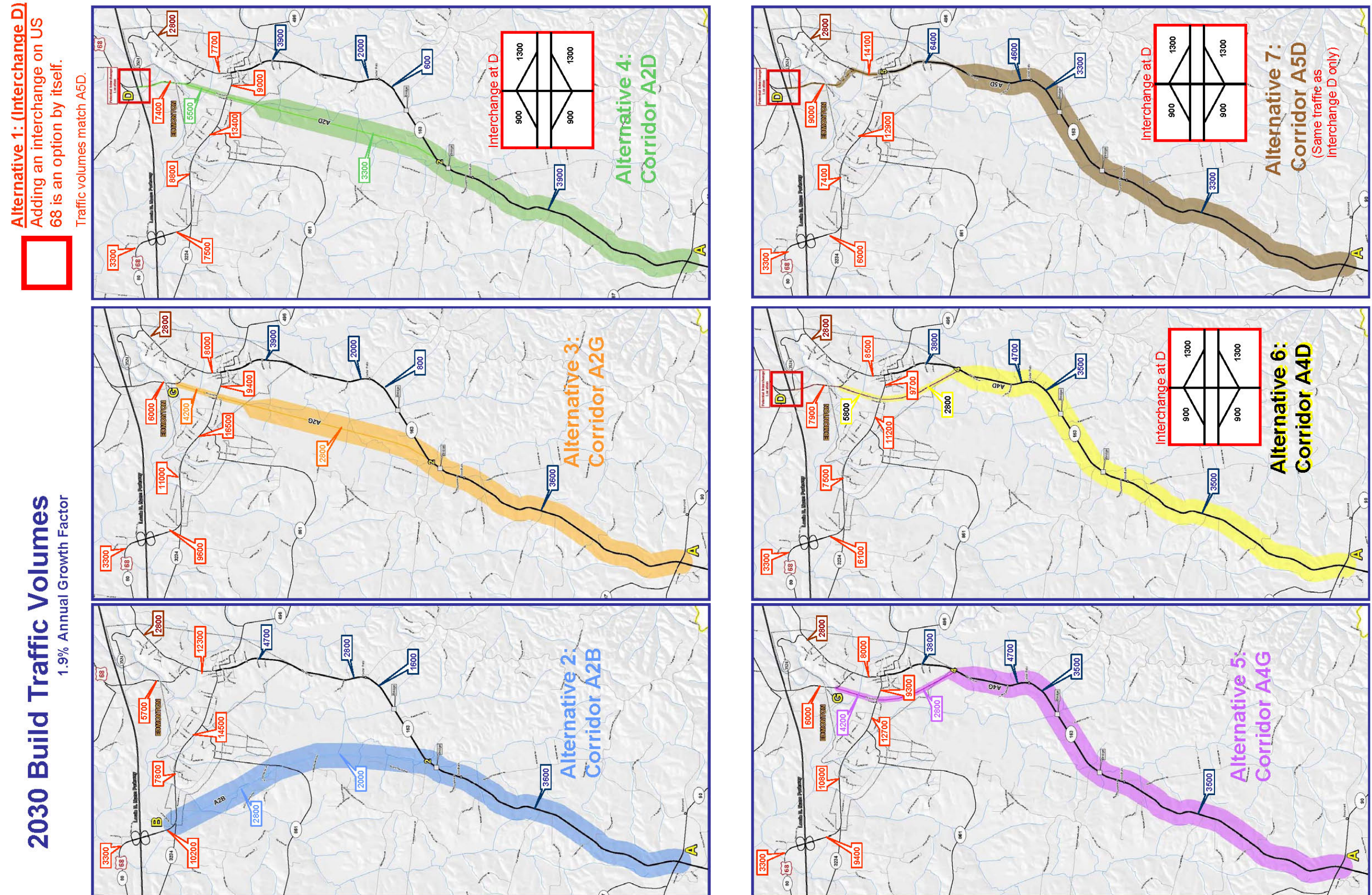




Figure 9.4 – Level 2 Evaluation Matrices

Level 2 Summary			
Alternative	Evaluation for Project Goals	Evaluation for Environmental	Construction Cost (\$ millions)
No Build	Lowest	Highest	None
Interchange D	Medium	High	\$13.0
A2B	Medium Low	Medium	\$26.9
A2D	Medium High	Medium	\$44.0
A2G	Medium Low	Medium	\$28.5
A4D	Highest	Low	\$45.4
A4G	Medium	Low	\$30.6
A5D	Medium	Lowest	\$45.6
Spot Improvements	Medium	High	Undetermined

Project Goals												
Alternative	Build Distance (mi)	Addressing Purpose and Need				Other Project Goals			Travel Time (min)			Overall Evaluation for Project Goals
		Safety		Movement		Address Existing Geometry	Truck Movement	Economic Development	North Ind Park to Nunn	South Ind Park to Nunn	KY 90 to Nunn	
		Local	Regional	Local	Regional							
No Build	11.41	Low	Low	Low	Low	Low	Low	Low	7.2	6.3	15.1	Lowest
Interchange D	1.10	Medium	Medium	High	Low	Low	Medium	Medium	0.2	4.5	13.3	Medium
A2B	8.43	Low	High	Low	High	Medium	Medium	Low	7.2	6.3	10.8	Medium Low
A2D	9.20	Medium	Medium	Medium	Medium	Medium	High	High	0.2	4.5	11.5	Medium High
A2G	8.43	Medium	Medium	Medium	Medium	Medium	Medium	Medium	6.2	6.3	12.9	Medium Low
A4D	9.80	High	Medium	High	Medium	High	High	High	0.2	4.4	13.1	Highest
A4G	9.03	Medium	Medium	High	Medium	High	Low	Medium	6.2	5.7	14.6	Medium
A5D	9.86	High	Medium	Medium	Medium	High	High	Medium	7.2	6.3	14.9	Medium
Spot Improvements	2.2	High	Medium	High	Low	Medium	Medium	Low	7.0	6.1	14.9	Medium

Environmental Impacts*																			
Alternative	Farmlands		Relocation Impacts			Community Resources				Natural Resources		Engineering Concerns							Overall Evaluation for Environmental
	Agricultural District	Corridor Area through Farmlands	Homes	Env Justice Concerns	Business	Parks	Churches	Historic Properties	Cemeteries	Stream Crossings	Wetlands	Mapped Sinkholes	Karst Likelihood	Excavation Required	Geotech Preference	Abandoned Wells	Utilities	UST Sites	
No Build	None	None	None	None	None	None	None	None	None	None	None	None	None	None	High	None	None	None	Highest
Interchange D	None	None	0-5	None	1	None	None	None	None	1	None	None	High	Minor	Medium	2	Few	None	High
A2B	76 acres	2,000 acres	45-60	None	3	None	1	5	3	10	30	3	Minor	High	Medium	18	Minor	2	Medium
A2D	135 acres	1,800 acres	80-110	Moderate	5	None	1	5	3	12	15	3	High	Minor	Low	18	Moderate	5	Medium
A2G	135 acres	1,800 acres	80-105	Moderate	4	None	1	5	3	10	15	3	Moderate	Minor	Low	18	Moderate	5	Medium
A4D	9 acres	1,810 acres	120-160	High	8	None	3	6	7	9	14	2	High	Moderate	Medium	23	High	7	Low
A4G	9 acres	1,810 acres	120-155	High	7	None	3	6	7	7	14	2	Moderate	Moderate	High	23	High	7	Low
A5D	9 acres	1,650 acres	135-170	Moderate	>15	1	2	17**	5	7	10	2	Major	Moderate	Low	21	High	9	Lowest
Spot Improvements	Minor	Few/None	0-5	None	1	None	None	None	None	2	Few	None	Minor	Minor	Medium	None	Minor	None	High

\* All features falling within corridor footprint are listed though final alignment will not necessarily impact all resources shown here

\*\* Includes one structure listed on National Register of Historic Places

Most desirable alternative for this measure

Least desirable alternative for this measure

## **X. ADDITIONAL CABINET, PUBLIC, AND AGENCY INPUT**

As part of the public involvement portion of this study, meetings were held in April and May of 2007 with the project team, local officials, stakeholders, the public, and resource agencies. The purpose of these meetings was to update participants about what took place after the first round of community involvement activities. Summary information was provided on the existing conditions, all technical analyses, the alternatives development process, and the corridor evaluation process. Copies of the meeting minutes are included in **Appendix J**.

### **Public and Agency Involvement**

- Project Team Meetings
- Local Elected Officials Meetings
- Stakeholder Meetings
- Public Involvement Meetings
- Public Comment Surveys
- Resource Agency Coordination

### **A. Project Team Meeting (April 17, 2007)**

The third Project Team Meeting was held on April 17, 2007, at the KYTC District 3 Office building in Bowling Green, Kentucky. The project team convened to preview the Level 2 Screening results on the remaining corridors and prepare for the upcoming local officials, stakeholders, and public meetings. The Project Team concurred with the final corridor alternatives, the findings of the Level 2 Screening, and the proposed spot improvements and approved the presentation of this information to the public.

### **B. Local Officials and Stakeholders Meetings**

Meetings with local elected officials and stakeholders were conducted April 26, 2007, at the Metcalfe County Justice Center to present study information to interested attendees. Existing conditions data, public input from the initial involvement meetings and surveys, and corridor alternatives screening data were presented.

#### **1. Local Officials Meeting**

After the project team presented the assembled exhibits, discussion among local officials focused on the proposed alternatives. General consensus affirmed that a second interchange on US 68 would provide multiple benefits to the community including increased access to the Industrial Park, congestion relief at the KY 163/US 68-KY 80 intersection, and additional benefits for truck traffic. Alternative A2B is anticipated to meet with the strongest public opposition due to the impacts to farmlands.

#### **2. Stakeholders Meeting**

Based on the presented data, stakeholders discussed the role of public input in the corridor selection process. Interchange D was again supported as a top priority for the area.

### **C. Public Information Meeting - Round 2**

A second public meeting was held at the Metcalfe County High School on May 17, 2007. The meeting was designed to communicate the study process and findings to the public and solicit input on the developed build alternatives.

The meeting was set up to facilitate one-on-one discussions between staff and attendees, with areas for viewing a slideshow presentation, examining exhibit boards, completing a survey, and providing feedback on alternative maps. The details of the meeting are included in a second Public Meeting Summary Notebook on file with KYTC's Division of Highway Design and Division of Planning.



### **1. General Comments**

Attendees were invited to ask questions or discuss concerns with KYTC and consultant staff. General comments and concerns received during the feedback process included:

- Several people expressed concerns about losing homes and farmlands if a road is constructed;
- A safety problems does exist on KY 163;
- Improving the existing route is better for the community members than constructing a new alignment; and
- Trucks are causing most of the roadway issues:
  - The large volume of trucks using the road,
  - High speeds,
  - Limited passing opportunities,
  - Turning movements downtown.

### **2. Map Exercise**

Three tables were set up with study area maps showing the six build corridors. Participants were asked to write and/or draw on the maps to identify specific impact areas and any additional problems with KY 163 that should be addressed. Points identified included the following.

- Additional environmentally sensitive areas were identified:
  - A cemetery along KY 163 south of Robert Shaw Road
  - Several new wells south of the intersection of US 68 with KY 3234
- Modifications to the recommended spot improvements were suggested, including:
  - Clearing trees and brush at Rogers Creek to improve sight distance
  - Improving the grade near Missionary Mound Baptist Church
  - Extending the spot improvement near Cedar Flats to include Faulkner Road



- Realigning the US 68/KY 80 intersection to make traffic on KY 80 stop

### 3. Public Comment Survey Responses

As part of the public meeting handout, the KYTC supplied a survey form so that citizens of the area could provide input on the project. The results from all surveys received as part of the second phase of the public involvement process are summarized in the following paragraphs.

Surveys were distributed at the public meeting, as well as during the local officials and stakeholders meetings held the previous month. Surveys were also distributed from the courthouse following the public meeting to provide an opportunity for other residents of Metcalfe County to provide feedback. From the distributed surveys, 30 were returned. Results are summarized below.

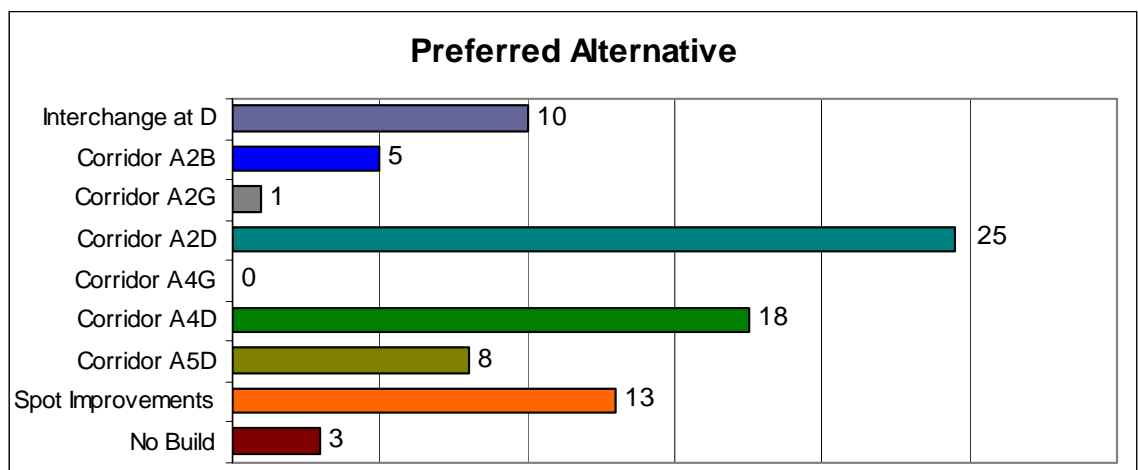


Meeting participants completing surveys

When asked whether KY 163 should be improved, 23 respondents indicated that it should; 2 respondents were opposed to improvements; and 5 respondents did not answer the question.

The second question asked citizens to rank their top two preferred alternatives. Each build corridor was included with a brief description, plus the Spot Improvements and No Build scenarios. Maps depicting the alternatives were provided with the surveys.

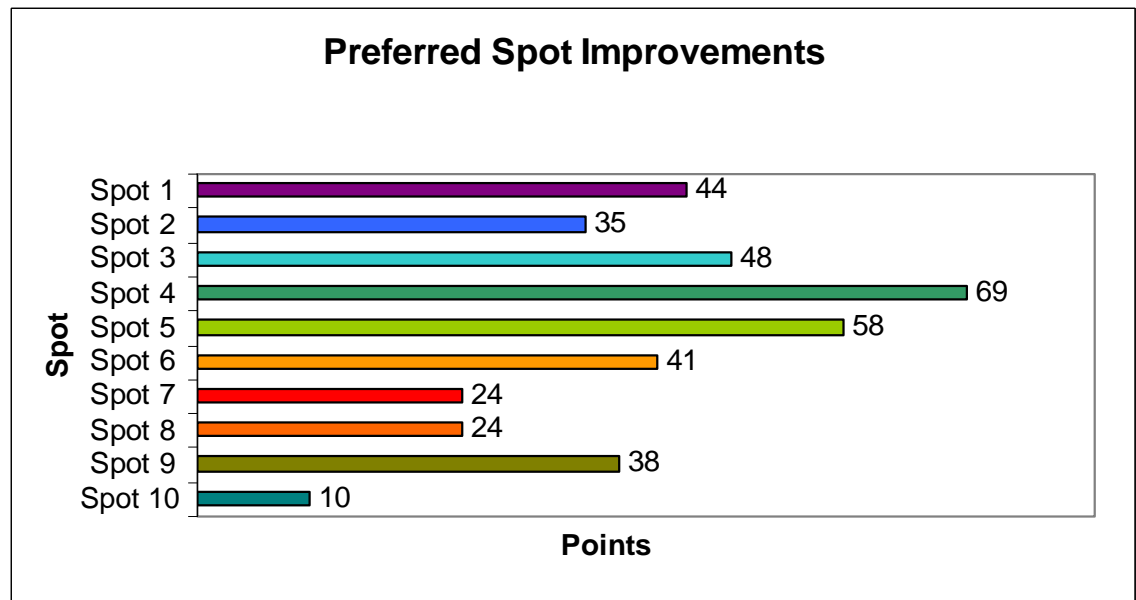
To accurately reflect the results, points were assigned for each response: two points for a first choice preference and one point for a second choice. In cases where the order of preference was not indicated, each selected alternative received 1.5 points. The following graph illustrates the tallied points from the received survey.



*Note: Chart shows points received based on order of preference*

As demonstrated in the previous graph, Corridor A2D was favored above others, followed by Corridor A4D. Based on the favored alternatives, 73% (61 points of 83 total points for preferred alternatives, as described above) were in favor of a second interchange on US 68 north of Edmonton. 53% (44 points of 83 total points) were in favor of a connection within Edmonton between US 68 north of Edmonton and Stockton Street (US 68-KY 80) west of downtown Edmonton.

Meeting participants were also asked to select and rank the 5 most needed spot improvements. Points were awarded in a similar fashion – 5 points for a first choice spot, 4 points for a second choice, etc. – to the preceding question. The results for this question are presented in the following graph.



*Note: Chart shows points received based on order of preference*

Spot 4 (Widening the bridge over Rogers Creek) and Spot 5 (Widening the bridge over Black Rock Creek) received the most votes. Other suggested spot improvements included the following:

- Keep the right-of-way cleaned and trimmed;
- Include Faulkner Road in the Cedar Flats realignment;
- At the US 68-KY 80 intersection, make KY 80 stop. Clarify boundaries, turning areas, and off-street parking;
- Fix the curve south of Roger's Creek and various S-curves nearby; and
- Widen Stockton Street in town and/or add lanes. Consider a caution light at McDonald's and the CB Food Store.

**D. Resource Agency Coordination - Round 2 (April 2007)**

Many local, state and federal resource agencies, with diverse areas of public responsibility, were included in this planning process. Input was solicited through written requests on two occasions. For this second round of coordination, agencies received a map depicting the seven build alternatives and were requested to comment on this set of alternatives. A copy of the informational letter distributed by the KYTC and response letters from the various resource agencies are located in **Appendix K** and are summarized below.

**Resource Agencies**

- Local Agencies
- Local Interest Groups
- KYTC Division Offices
- Other State Agencies
- Federal Agencies

The following 12 agencies responded by offering comments or concerns regarding the project:

- Kentucky Department of Agriculture – The agency has no specific concerns or issues with the project.
- Kentucky Department for Natural Resources – The Department found no mining impacts for the area: current, historic, or pending permits; they have no preference between alternatives. Several oil and gas wells are in the area; a map is provided showing the locations of these wells.
- Kentucky Department of Parks – The Department has no preference between alternative corridors.
- Kentucky Division for Air Quality – The Division has no additional comments for this project.
- Kentucky Division of Conservation – The division prefers Alternatives A4D and A4G because these follow the existing alignment of KY 163 through the Agricultural District, minimizing impacts to this area which was developed to protect farmland. The other alternatives require new construction which would result in the loss of farmlands.
- Kentucky Department for Environmental Protection – This organization has no additional comments or preference between the alternatives.
- Kentucky Geological Survey – The study area is in the Mississippian Plateau, underlain by limestone, some argillaceous. There is a potential for karst features like sinkholes and caves but not for landslide hazards. There is also a potential to encounter unconsolidated sediments like clay, silt, sand, gravel, and chert rubble in streams.
- Kentucky Transportation Cabinet, Construction Division – The Division has no additional comments for this project.
- Kentucky Transportation Cabinet, Geotechnical Branch – All corridors are acceptable, but A2B is least preferred. Other alternatives better



avoid seepage from groundwater flow because they run relatively parallel to the dip of the bedrock.

- Kentucky Transportation Cabinet, Permits Branch – The Division has no additional comments for this project.
- Kentucky Vehicle Enforcement – This department feels alternatives A2G or A2D would be best for emergency personnel since they would not have to travel through the city limits of Edmonton.
- United States Coast Guard – The Coast Guard does not exercise jurisdiction over waterways in the project area; no bridge permits are required.

## **XI. RECOMMENDATIONS**

This chapter provides recommendations for improvements to KY 163 from KY 90 to the Louie B. Nunn (Cumberland) Parkway in Metcalfe County, Kentucky. The recommendations made in this chapter are the result of the Alternatives Study process for the KY 163 corridor.

### **A. Project Purpose and Need**

To summarize before presenting a discussion of the study recommendations, the project purpose and need was defined as improving safety and mobility in Metcalfe County. Additional project goals included the following items:

- Improving highway systems connectivity;
- Addressing geometric deficiencies;
- Improving accessibility to activity centers in Edmonton;
- Reducing congestion within Edmonton;
- Facilitating truck traffic; and
- Enhancing potential economic development.

A more detailed discussion of the Project Purpose and Need can be found in **Chapter VII**.

### **B. Final Project Team Meeting (July 13, 2007)**

#### **1. Project Team Discussion**

A final project team meeting was held on July 13, 2007, at the KYTC District 3 Conference Room in Bowling Green, Kentucky. Attendees at the meeting included staff from KYTC District 3, KYTC Division of Planning, the Barren River ADD, and the project consultant. The purpose of the meeting was to discuss the project information identified through the course of the KY 163 Alternatives Study and to finalize the recommendations for improvements along the route. The meeting minutes are included in **Appendix J**.

A concise review of the study process provided a framework to discuss build recommendations. The consultant team reviewed the project purpose and need, traffic conditions, crash history information, the Level 1 Alternatives, environmental highlights, and the Final (Level 2) Alternatives. Public input surveys from the second round of meetings and resource agency responses were reviewed.

As discussed in **Chapter IX**, the final proposed alternates presented for consideration by the project team include:

- Alternative 1, Interchange at D, with no reconstruction to KY 163;
- Alternative 2, Corridor A2B, reconstructing KY 163 from Goodluck to the existing interchange west of the existing alignment;
- Alternative 3, Corridor A2G, reconstructing KY 163 from Goodluck to US 68 north of Edmonton;

- Alternative 4, Corridor A2D, reconstructing KY 163 from Goodluck to US 68 with an interchange at D;
- Alternative 5, Corridor A4G, constructing a western connection from south Edmonton to US 68 north of town;
- Alternative 6, Corridor A4D, constructing a western connection from south Edmonton to a new interchange on US 68 north of town;
- Alternative 7, Corridor A5D, improving KY 163 along the existing alignment and adding a second interchange north of Edmonton;
- Alternative 8, a combination of the proposed Spot Improvements; and
- Alternative 9, No Build, no improvements made to the corridor.

A review of the public input from the second round of survey questionnaires indicated that Corridor A2D was preferred, followed by Corridor A4D. The majority of respondents (73%) preferred an alternative including a new interchange at Location D; over half (53%) preferred an alternative including the western connection within Edmonton (point 4 to point G).

## **2. Project Team Recommendations**

Based upon consideration of project purpose and need, transportation issues, access needs, potential environmental and community impacts, and public/agency input, the project team agreed on the following:

- Corridors A2B, A2G, and A2D should be eliminated from future consideration because of potential major impacts on prime farmland, streams, and wetlands;
- Corridor A5D should not be selected as the preferred alternative because of potential major impacts on homes, businesses, and other cultural community resources within the Edmonton city limits;
- Corridor A4D and A4G would be the preferred alternatives if a full corridor improvement were made; however, major reconstruction/relocation improvements to the rural section of the study corridor from KY 90 (Point A) to the city limits of Edmonton (Point 4) are not warranted at this time, based on the traffic/LOS analysis, crash analysis, and potential negative impacts on homes, farmland, historic structures, and other community resources. Spot improvements are needed on KY 163 to help alleviate problems at a few specific locations. This is consistent with public input received at public meetings and through public surveys.
- Although a full corridor improvement is not needed, an improvement is needed in Edmonton to alleviate traffic problems in the downtown area. This improvement would provide:
  - A new connector, from the southern city limits to US 68-KY 80 west of downtown Edmonton;



- A continuation of this connector to US 68 north of Edmonton near the industrial park (Point G);
- A new US 68 interchange with the Nunn Parkway (Point D), including relocation of KY 1243 north of the Parkway and the industrial access road south of the Parkway; and
- Improvement of US 68 to a new parkway interchange.

### **Preferred Alternative**

The proposed connector in Edmonton (Corridor Segment 4GD) was broken into construction sections/projects, which were prioritized by the Project Team as follows:

Priorities 1a and 1b are the northern and southern connectors (Corridor Segment 4G) within Edmonton, respectively, divided at the intersection with US 68-KY 80 (Stockton Street). These would be partial access control facilities. Once constructed, consideration should be given to re-routing US 68 along the northern connector, with existing US 68 re-designated as US 68 Business. Also, the southern connector should be re-designated as KY 163 and the existing route re-designated as another route or as KY 163 Business.

This new connector (Corridor Segment 4G) will provide route redundancy within Edmonton, increase access to the southern Industrial Park, and allow trucks an alternative route to the Parkway without having to negotiate the tight turns at the KY 163/US 68-KY 80 intersection. Development patterns along US 68-KY 80 appear to have preserved a gap for the connection to be placed in town with minimal relocation impacts; this gap may not remain undeveloped, so priority should be given while it is available.

Priority 2 is a new interchange on US 68 north of Edmonton (Point D), which would include improvements to US 68 from Point G to D. However, the proximity of KY 1243 and the northern Industrial Park entrance require route relocations which increase costs beyond a standard diamond interchange. An interchange justification study may be required for FHWA approval, since the Nunn Parkway is designated as part of I-66, so it may be advisable to defer this improvement for consideration as part of an I-66 improvement study.

The rural sections of KY 163 south of Edmonton (Corridor Segment A4) are not recommended for reconstruction at this time; however, construction segments were established and cost estimates were prepared for use by KYTC if conditions change in the future.

### **Spot Improvements**

To provide low-cost, short-term improvements while funding is secured for larger projects, spot improvement recommendations were developed to be completed in conjunction with Priorities 1a, 1b, and 2. The purpose of each of these proposed projects is to improve safety and mobility along the existing route.

The two bridge widening projects received the highest preference based on public input surveys, and they are also recommended as the

top priority spot improvements. Bridge replacement funding may be available for these projects.

The spot improvement recommendations are summarized in priority order, below.

- Priority 1: Widening a narrow bridge over Rogers Creek.
- Priority 2: Widening a narrow bridge over Black Rock Creek.
- Priority 3: Creating a 3-lane section to provide turning lanes, where needed, and/or a center turn lane on US 68 from mileposts 6.12 to 7.00. This will include the widening of a bridge over Clay Lick Creek. This spot improvement will extend to the project limits of a similar safety/widening project already scheduled on US 68 from milepoints 7.0 to 7.7.
- Priority 4: Improving the intersection of US 68 with KY 80 north of Edmonton. This improvement should consider adding an extra lane on each approach to accommodate turning bays, striping for a turn lane on US 68-KY 80 eastbound, and better defining adjacent parking area access points.
- Priority 5: Adjusting vertical and horizontal alignment at Cedar Flats. Based on public input, the project team agreed to extend this spot north to milepoint 9.58 to include the intersection with C. Faulkner Road.
- Priority 6: Adjusting alignment at Missionary Mound Baptist Church to improve sight distance and address safety concerns.
- Priority 7: Constructing a right turn lane on US 68 into the northern Industrial Park.
- Priority 8: Constructing a left turn lane on KY 80 into the northern Industrial Park.
- Priority 9: Adding a truck climbing lane on KY 163 coming north from the intersection with KY 90.

The final spot improvement, converting the existing interchange into a diamond-style configuration is not recommended at this time. Current traffic volumes and public reception do not justify this effort. However, further study is recommended as part of any future I-66 study.

### **C. Phase Costs**

As shown in **Figure 11.1**, costs for each spot improvement and corridor segment are broken down for design, right-of-way, utilities, and construction. The connection within Edmonton (Priority 1a and 1b) has a combined total cost estimate of \$11.3 million. The new interchange is anticipated to cost approximately \$19.4 million. **Tables 11.1** and **11.2** show detailed cost estimates for each corridor length (including rural portions not recommended for construction at this time) and for each spot improvement, respectively.



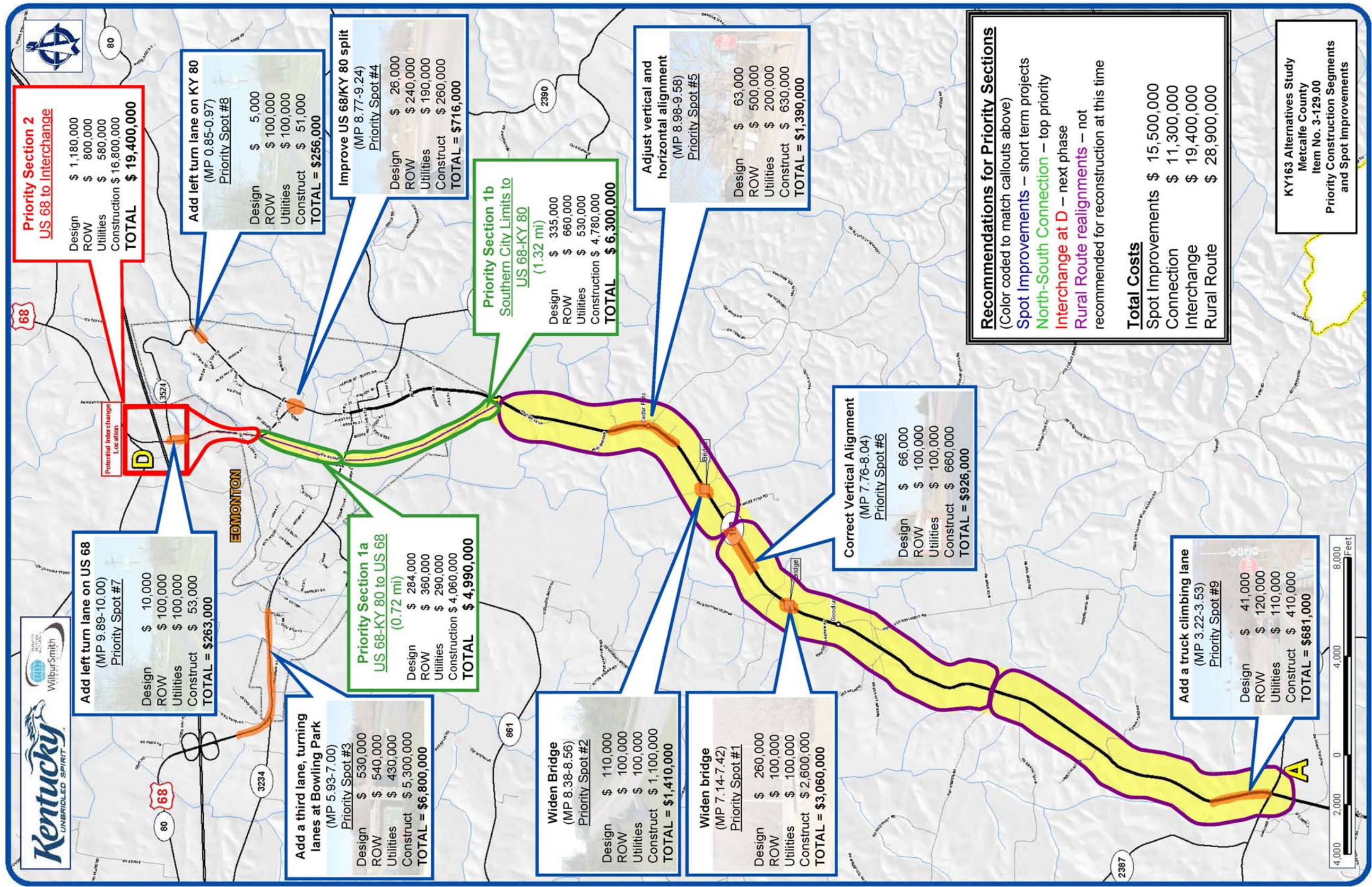


Figure 11.1 – Priority Construction Sections and Spot Improvements



Table 11.1 - Cost Estimates for Build Corridor Segments along KY 163 and New Alignments

Beginning Location on KY 163 Location	KY 163 MP	Ending Location on KY 163 Location	KY 163 MP	ROW Cost Segment Cost	Utility Cost Segment Cost	Construction Cost			Design Cost Segment Cost	TOTAL COST
						Roadway Segment Cost	Structures Segment Cost	Total Construction Cost		
KY 90	3.223	Roy Grider Rd	5.561	\$940,000	\$820,000	\$7,540,000	\$0	\$7,540,000	\$527,800	\$9,830,000
Roy Grider Rd	5.561	Radford Martin Rd	7.984	\$730,000	\$730,000	\$7,100,000	\$400,000	\$7,500,000	\$525,000	\$9,490,000
Radford Martin Rd	7.984	Proposed Connector Road	10.300	\$1,160,000	\$930,000	\$6,790,000	\$180,000	\$6,950,000	\$486,500	\$9,530,000
Proposed Connector Road	10.300	Stockton Street	N/A	\$660,000	\$530,000	\$4,780,000	\$0	\$4,780,000	\$334,600	\$6,300,000
Stockton Street	N/A	Existing US 68	9.400	\$360,000	\$290,000	\$2,610,000	\$1,460,000	\$4,060,000	\$284,200	\$4,990,000
Existing US 68	9.400	Through Interchange D	N/A	\$800,000	\$580,000		\$16,800,000		\$1,176,000	\$19,400,000

**Notes on Corridor Cost Estimate Assumptions**

Costs estimated at \$2.93 million per mile for 2-lane roadway & \$3.62 million per mile for 3-lane

Structures were estimated at \$100 per square foot for all new construction and to replace all existing structures

A 3-lane cross section was applied for the connector within Edmonton and 1 mile north of KY 90; all other lengths are 2-lane facilities

Table 11.2 - Cost Estimates for Spot Improvements

Priority	Roadway	BMP	EMP	Length (ft)	Description	Crashes*	Construction Cost Dollars	ROW Costs Dollars	Utility Costs Dollars	Design Cost Dollars	TOTAL Cost Dollars
9	KY 163	3.22	3.53	1,600	1. Add truck climbing lane for northbound traffic.	None reported	\$410,000	\$120,000	\$110,000	\$41,000	\$681,000
6	KY 163	7.76	8.04	1,450	2. Adjust vertical alignment at Missionary Mound Baptist Church	1 injury, 1 PDO	\$660,000	\$100,000	\$100,000	\$66,000	\$926,000
5	KY 163	8.98	9.58	3,150	3. Adjust vertical alignment at Cedar Flats and C. Faulkner	4 injury, 5 PDO	\$630,000	\$500,000	\$200,000	\$63,000	\$1,393,000
1	KY 163	7.14	7.42	1,500	4. Replace Bridge over Roger's Creek	1 injury, 3 PDO	\$2,600,000	\$100,000	\$100,000	\$260,000	\$3,060,000
2	KY 163	8.38	8.56	1,000	5. Replace Bridge over Black Rock Creek	2 PDO	\$1,100,000	\$100,000	\$100,000	\$110,000	\$1,410,000
4	US 68	8.77	9.24	2,500	6. US 68/KY 80 Intersection	1 fatal, 1 injury, 18 PDO	\$260,000	\$240,000	\$130,000	\$26,000	\$716,000
7	US 68	9.89	10.00	600	7. Add right turn lane on US 68 at Industrial Park	None reported	\$53,000	\$100,000	\$100,000	\$10,000	\$263,000
8	KY 80	0.85	0.97	600	8. Add left turn lane on KY 80 at Industrial Park	1 PDO	\$51,000	\$100,000	\$100,000	\$5,000	\$256,000
3	US 68	5.93	7.00	5,650	9. Along US 68 construct a 3 lane section between the existing interchange and the planned 3-laning project	1 fatal, 6 injury, 30 PDO	\$5,300,000	\$540,000	\$430,000	\$530,000	\$6,800,000
I-66 <sup>2</sup>	US 68 / PKWY	5.54	5.54	N/A	10. Reconstruct Existing Interchange at Exit 27	2 injury, 9 PDO	\$3,000,000 <sup>1</sup>	\$800,000	\$130,000	\$900,000	\$10,890,000

<sup>1</sup> Estimate from BG Pkwy & US 27 interchange actual construction cost.

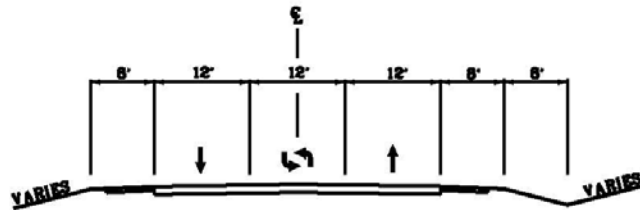
<sup>2</sup> Reconfiguration of existing interchange recommended for further study within future I-66 Study



## D. Potential Design Criteria and Considerations

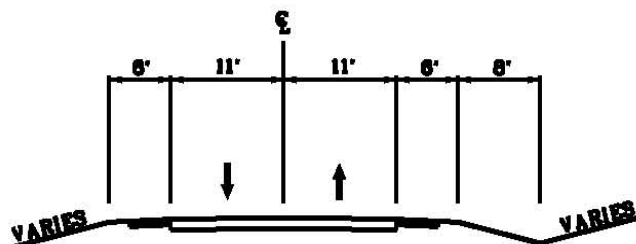
Potential design criteria and considerations for the proposed KY 163 Corridor in Metcalfe County, including typical cross-sections, are included in this section for planning purposes only. These criteria were used in preparing the planning level cost estimates. Therefore, the criteria are general recommendations based upon information gathered through this planning phase of study. Specific geometric parameters should be defined during future design phases of the project, as more detailed information is available.

The recommended cross section for the sections of new alignment consists of three 12-foot wide lanes, 8-foot wide shoulders (with 6-foot paved), and 8-foot wide ditches as shown in **Figure 11.2**. This cross section, applied to the connector between KY 163 at the city limits, through Stockton Street (US 68-KY 80), to US 68 north of Edmonton, allows for any future widening which may be warranted as traffic volumes increase. This portion of the route should be partial access controlled. A rural section is proposed at this time, but consideration should be given in the Preliminary Design phase to providing sidewalks or a multi-use bicycle/pedestrian path, if warranted.



**Figure 11.2 - Cross Section for Edmonton Connector**

The typical section for reconstruction at spot improvement locations is shown in **Figure 11.3**. To better tie into the existing rural alignment, it features two 11-foot wide lanes, 6-foot wide shoulders (4-foot paved), plus ditches. A third 11-foot wide lane is added as a truck climbing lane north of KY 90. A rural section is proposed for most spot improvements, but sidewalks should be considered in some locations as warranted.



**Figure 11.3 - Cross Section for Rural Spot Improvements**

## E. Summary of Environmental Issues for Future Phases

A number of issues related to environmental factors and sensitive land uses identified through this study should be considered as this project moves into future phases. These issues have been discussed in greater detail in previous chapters. Important issues include:

- *Farmland Impacts* – Preservation of existing farmlands was the predominant concern expressed during the public involvement process. The Agricultural District along KY 163 in Metcalfe County was established in 1996 to conserve, protect, develop and improve agricultural land for the production of food, fiber, and other agricultural products. State agencies must mitigate any impacts to this area. Loss of other farmlands in the project area is also an issue; documents to help identify these are available from the Kentucky Division of Conservation Office. The US Department of Agriculture, Natural Resource Conservation Service expressed concern with potential impacts upon prime farmland soils and additional farmlands of statewide importance. If federal funds are used to convert these lands to non-agricultural uses, Form NRCS-CPA-106 should be completed, and a public hearing may be required.
- *Threatened and Endangered Species* – Two endangered species potentially occur within the study area (the gray bat and the Indiana bat). To address impacts to these species and their habitats, tree cutting should be limited to between mid October and late March. Further investigation may be necessary to identify additional roosting/hibernating sites.
- *Water Quality/Aquatic Habitats* – Consideration should be given to potential water quality issues in the numerous streams, springs, and wetlands within the area. Any affected wetlands should be delineated; impacts may require permits from the US Corps of Engineers and/or the Kentucky Division of Water.
- *Cemeteries and Unmarked Graves* – There are a number of cemeteries documented or observed in the project area. Other cemeteries may be unmarked and are likely to be encountered during construction in this area.
- *Cultural Resources* – Special consideration should be given to the numerous historic structures located within the project area. There is a potential to encounter unrecorded historic structures and archaeological sites eligible for listing on the National Register of Historic Places.
- *Environmental Justice* – Environmental justice issues related to low-income populations should be closely monitored during future phases of this project due to concentrations of this demographic in the region.

## F. Construction Considerations

Construction-related issues were also identified throughout this study. Discussed in more detail in previous chapters, potential issues related to construction of the proposed alternative include:

- *Erosion and Sediment Control* – Measures should be utilized to control erosion and sedimentation during and after the commencement of earth-disturbing activities. Careful consideration should be given to erosion control methods; a *Best Management Practices for Construction Activities* guide is available from the Kentucky Division of Conservation.
- *Air Quality* – According to the Kentucky Environmental and Public Protection Cabinet, Division of Air Quality, the following Kentucky Administrative Regulations apply to the proposed project: (1) 401 KAR 63:010 Fugitive Emissions; (2) 401 KAR 63:005 Open Burning; (3) the Clean Air Act; and (4) Title 23 and Title 49 of the United States Code. Applicable regulations in the local government should also be considered.
- *Waste Management* – Solid wastes occurring as part of the construction process should be disposed of at a permitted facility. Underground Storage Tanks and other contaminants should be properly addressed as they are encountered.
- *Traffic Operations* – Maintenance of traffic and residential access should be preserved throughout the construction process.
- *Geotechnical Considerations* – There is a probability to encounter karst topography and unconsolidated sediments in the project area. A more detailed study of karst within the study area should be considered as the project develops. The Salem and Warsaw limestone in the area has been previously quarried as suitable for construction stone.