US 460 Improvements Scoping Study
Magoffin County

Kentucky Transportation Cabinet

Final Report
October 2012

Prepared for the Kentucky Transportation Cabinet by
Stantec Consulting Services Inc.

KENTUCKY TRANSPORTATION CABINET

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EXECUTIVE SUMMARY

The US 460 Improvements Scoping Study, initiated by the Kentucky Transportation Cabinet (KYTC) Division of Planning, was undertaken to identify current and anticipated future transportation deficiencies along portions of the route in Magoffin County. The study area includes US 460 from the end of the Bert T. Combs Mountain Parkway (KY 9009) in Salyersville to the KY 114 intersection. The study corridor, which includes the southern commercial district of Salyersville sometimes referred to as “Restaurant Row”, is approximately 2.4 miles in length. This includes 0.3 miles of the Mountain Parkway and 2.1 miles of US 460. The goal of the study was to develop transportation alternatives and strategies to better accommodate future travel demand while improving safety and mobility. There is currently $2.0 Million in federal national highway system (NH) funding for design of the project in 2014. No other phases are included in the Highway Plan.

There have been several recent studies or design projects that evaluated the need for extending the Mountain Parkway and improving existing segments of roadway within the study area, including two design studies performed by Stantec for extending the Mountain Parkway east around Salyersville (KYTC Item No. 12-001.00 and KYTC Item No. 10-124.30). KYTC Item No. 10-140.00 is a current project that includes the widening of the Mountain Parkway to four lanes west of Salyersville. The US 460 Improvement Scoping Study, which is not related to the previous design studies around Salyersville, begins at the eastern end of the 10-140.00 project and includes the bridge over the Burning Fork.

The study section of US 460 currently consists of three lanes (one travel lane per direction with a continuous center left turn lane) and carries between 10,000 and 15,000 vehicles per day. Traffic forecasts developed for the 10-140.00 project on the Mountain Parkway indicate traffic volumes on US 460 will reach 24,000 vehicles per day by 2032. Based on these forecasts, widening US 460 will be necessary to accommodate the future demand for travel and to improve mobility through the US 460 corridor.

Access Management is an important issue addressed in the study. Portions of this section of US 460 have a high crash rate, and many of the crashes may be attributed to the relatively high access density. Between 2007 and 2011, there were 79 crashes reported between the intersection with the Mountain Parkway and the KY 114 intersection, and there are approximately 43 access points per mile along this stretch of the road.

Numerous improvement options were developed over the course of the study, and after discussions with local elected officials and the public, the Project Team ultimately recommended a Hybrid four-lane alternative that includes four 11-foot wide travel lanes and a 14-foot wide raised median. The term Hybrid is used to denote this alternative includes alternating the widening from one side to the other to minimize right-of-way impacts. The recommendation includes an improved, four-lane rural section at the eastern end of the Mountain Parkway (the western limits of the project) to connect to the planned improvements under design as part of the KYTC 10-140.00 project. East of the Mountain Parkway, the proposed improvement includes an urban typical section and a rural typical section with 8-foot-wide paved shoulders at the east end.

The Project Team examined multiple access alternatives in an effort to maximize the distance between full access intersections while still providing safe and efficient access to both businesses and residents. The proposed changes include converting some existing entrances to right-in/right-out only and relocating some access points on US 460 to extended frontage roads or new backage roads. With the construction of a raised median, the frontage/backage roads are proposed to better serve existing businesses while accommodating potential future development. Median openings are located to accommodate access, and the closest spacing is approximately 600 to 700 feet.

The cost estimate, shown in **Table ES-1**, includes the replacement of the Mountain Parkway bridge over the Burning Fork with a four-lane structure with shoulders, to connect to improvements proposed with KYTC Item No. 10-140.00. Further coordination with that project will be required during preliminary design to ensure consistency between proposed typical sections and to determine the most feasible solution to provide a consistent four-lane section through Salyersville.

Table ES-1: Cost Estimate for Recommended Alternative

Phase	Cost
Design	$2,070,000
Right-of-Way	$10,493,000
Utilities	$1,500,000
Construction	$20,733,000
TOTAL	**$34,796,000**

1.0 INTRODUCTION

The US 460 Improvements Scoping Study, initiated by the Kentucky Transportation Cabinet (KYTC), was undertaken to seek improvement strategies for current and anticipated future transportation deficiencies along portions of the route in Magoffin County. The project study area, shown in **Figure 1**, includes the eastern end of the Bert T. Combs Mountain Parkway (KY 9009) from the bridge over Burning Fork to US 460, and US 460 from the end of the parkway in Salyersville to the KY 114 intersection. This section is approximately 2.4 miles in length. The goal of the study was to develop transportation alternatives and strategies to better accommodate the growing travel demand while preserving the safety and mobility in the area.

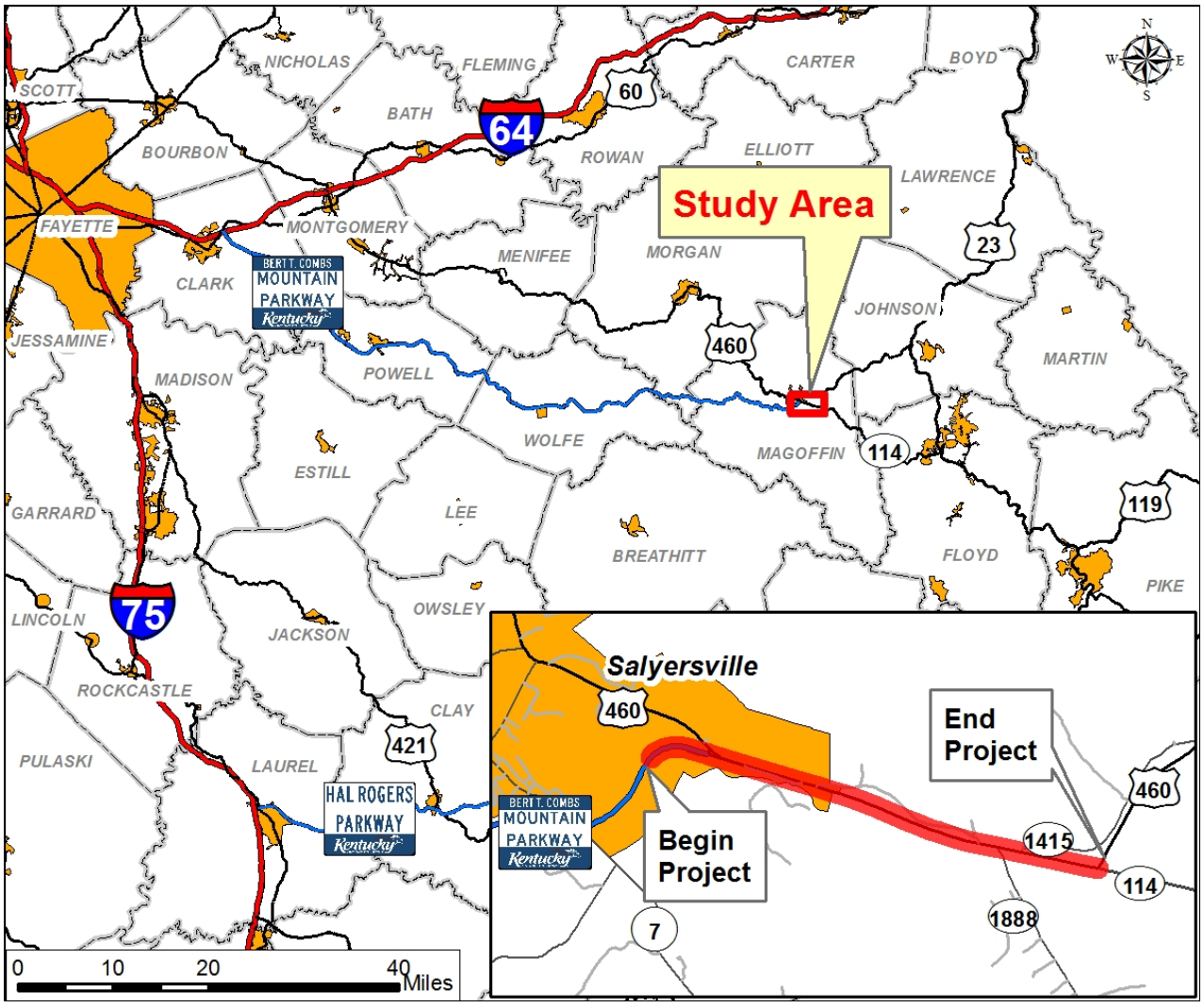

Figure 1: US 460 Study Area

1.1 Draft Purpose and Need Statement

The Purpose and Need Statement for the study and for project recommendations is as follows:

> *The purpose of the US 460 Improvements Scoping Study is to explore needed transportation improvements to increase capacity and improve safety along US 460 east of Salyersville in Magoffin County. The study corridor, from the US 460 intersection with the Mountain Parkway (KY 9009) to the KY 114 intersection, is commonly referred to as the business or commercial district of Salyersville. US 460 provides both a connection from the Mountain Parkway to communities east, as well as direct, local access to numerous businesses and residences.*
>
> *This section of US 460 currently consists of three lanes (one travel lane per direction with a continuous center left turn lane) and carries between 10,000 and 15,000 vehicles per day. Preliminary traffic forecasts developed for the west end of the study corridor indicate traffic volumes will reach 24,000 vehicles per day by 2032. Based on these forecasts, widening US 460 will be necessary to accommodate the future demand for travel and to improve mobility through the US 460 corridor.*
>
> *Portions of this section of US 460 have a high crash rate. Between 2007 and 2011, there were 79 crashes reported within the project area (between the US 460 intersection with the Mountain Parkway and the KY 114 intersection). Critical Rate Factors (CRFs) have been determined as part of this analysis. A CRF greater than 1.0 suggests that conditions may exist that contribute to non-random occurrences and a higher than average crash rate. Within or adjacent to the project area, US 460 has CRF values ranging from 0.3 north/west of the Mountain Parkway to 1.3 for sections east of the Mountain Parkway and north of KY 114. The CRF analyses support the presumption that safety is a concern that will be addressed by the project. As the majority of the reported crashes have been related to access (55 percent were rear end, opposing left turn, or angle crashes), access management concepts will be explored.*

1.2 Study Area

This section of US 460 travels through the southern commercial district of Salyersville, sometimes referred to as “Restaurant Row” because of the multitude of fast food establishments. US 460 provides a critical link in the transportation infrastructure of southeastern Kentucky, effectively serving as an extension of the Mountain Parkway through Salyersville and connecting the Parkway to Paintsville to the north and Prestonsburg and Pikeville to the east. The Mountain Parkway travels for 75 miles from I-64 in Clark County as an access-controlled facility (partial control of access is maintained east of Campton), and the study area portion of US 460 serves as the first significant commercial area encountered as motorists travel between the Bluegrass Region and southeastern Kentucky. As such, many motorists choose to stop in Salyersville before continuing on to their destination.

1.3 Related Projects

There have been several recent studies or design projects that evaluated the need for extending the Mountain Parkway and improving existing segments of roadway within the study area, including two design studies performed by Stantec for extending the Mountain Parkway east around Salyersville. Two different alignments were studied under different item numbers. The first, Item No. 12-001.00, was a preliminary study for District 12. The second, KYTC Item No. 10-124.30, was a modification to the original alignment for District 10. These alignments, shown in **Figure 2**, included four-lane divided sections with full or partial control of access. The proposed study is not related to these previous projects.

Figure 2: Previous Design Studies related to extending the Mountain Parkway around Salyersville

KYTC Item No. 10-140.00, shown in **Figure 3**, is a current project that includes widening the Mountain Parkway to four lanes west of Salyersville. The description from the KYTC Six Year Plan indicates the project limits are between milepost 74.5 and 75.6. However, the currently proposed improvements begin about one mile west of the KY 7 interchange near milepost 73.75 and end at the western end of the bridge over the Burning Fork at approximately milepost 75.25. The KYTC Division of Planning developed a Data Needs Analysis (DNA) Study for the project in 2010 and the project is currently under design by a consultant. The approved 2012 Highway Plan includes state priority project (SPP) funding for right-of-way acquisition and utility relocation in 2012 and construction in 2012. The project will not include widening or replacing the existing bridge over the Burning Fork. The US 460 Improvement Scoping Study begins at the eastern end of the 10-140.00 project and includes the bridge over the Burning Fork.

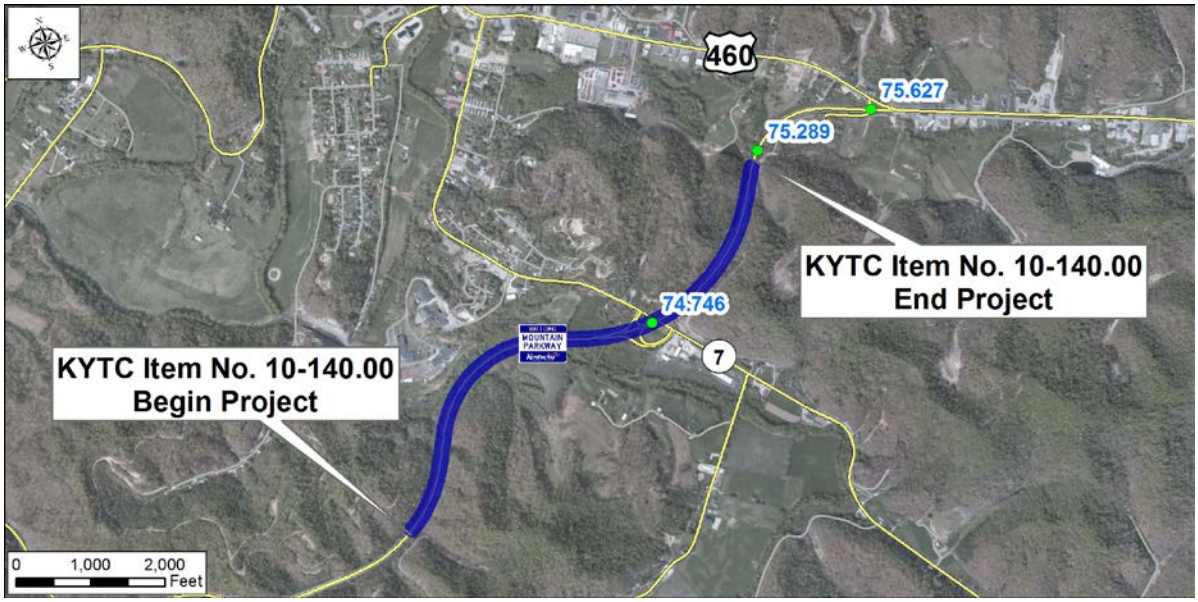

Figure 3: Proposed Limits for KYTC Item No. 10-140.00

The current study was initiated in late 2011 when Magoffin County Judge Executive Charles Hardin and Kentucky State Representative John Short asked the KYTC to consider improvements to the existing US 460 through the commercial district of Salyersville. The KYTC Division of Planning initiated a study with Stantec through the Statewide Planning Contract. Project Team meeting summaries are included in **Appendix A**. The study was to examine the scope of necessary improvements to accommodate future travel demand along US 460. The 2012 Highway Plan includes $2.0 Million in federal national highway system (NH) funding for design of the project in 2014. No other phases are included in the Highway Plan.

2.0 EXISTING CONDITIONS

Conditions of the study area's existing transportation network are examined in the following sections. The information compiled includes roadway facilities and geometrics, crash history, and traffic volumes within the study area. Data for this section were collected from the KYTC's Highway Information System (HIS) database, aerial photography, as-built plans, and field review.

2.1 Roadway Characteristics

Table 1 presents a summary of the HIS data available for US 460 and the Mountain Parkway.

Table 1: Highway Information System (HIS) Database Summary for US 460

Begin MP	End MP	US 460 Segment Description	Segment Length (mi.)	Functional Class	Number of Lanes	Shoulder Type	Posted Speed Limit	Truck Weight Class	Current ADT (VPD)	Truck Percent
11.999	12.43	Allen Dr. to Unnamed Road #3	0.431	Rural Minor Arterial	2 - 11' lanes with continous center left-turn lane	2' curbed	35 MPH	AAA (80,000 pounds)	10,100	4.2%
12.43	12.486	Unnamed Road #3 to KY 9009/KY 3048	0.056							
12.486	12.664	KY 9009/KY 3048 to Old KY 114	0.178	Rural Principal Arterial		8' combination (4' paved)	45 MPH (ends at MP 13.46)		14,200	10.6%
12.664	12.86	Old KY 114 to Pine Point St.	0.196							
12.86	12.967	Pine Point St. to Old KY 114	0.107							
12.967	13.049	Old KY 114 to Old Burning Fork Rd.	0.082						12,800	10.6%
13.049	13.936	Old Burning Fork Rd. to Old Burning Fork Rd.	0.887				55 MPH (begins at MP 13.46)			
13.936	14.041	Old Burning Fork Rd. to KY 1888	0.105							
14.041	14.162	KY 1888 to KY 1415	0.121						9,620	10.6%
14.162	14.566	KY 1415 to KY 114	0.404			10' paved				
14.566		North of KY 114			2 - 12' lanes				4,590	14.0%
Begin MP	**End MP**	**KY 9009 (Mountain Parkway) Segment Description**	**Segment Length (mi.)**	**Functional Class**	**Number of Lanes**	**Shoulder Type**	**Posted Speed Limit**	**Truck Weight Class**	**Current ADT (VPD)**	**Truck Percent**
75.25	75.627	Burning Fork Bridge to US 460/KY 3048	0.377	Rural Principal Arterial	2 - 12' lanes	10' paved	55 MPH	AAA (80,000 pounds)	8,200	19.30%

The portion of US 460 in the study area was widened beginning in the fall of 1992. **Figure 4** shows the typical section from these as-built plans that includes three 12-foot wide lanes (two travel lanes with a continuous center two-way left-turn lane, or TWLTL) and four-foot wide paved shoulders. There are 10-foot wide paved shoulders approaching the KY 114 intersection and north of the intersection. The posted speed limit is 35 miles per hour (MPH) west of the Mountain Parkway, 45 MPH between the Parkway and east of the first Old Burning Fork Road intersection, and 55 MPH to the east. **Figure 5** and **Figure 6** are representative photographs taken along the roadway.

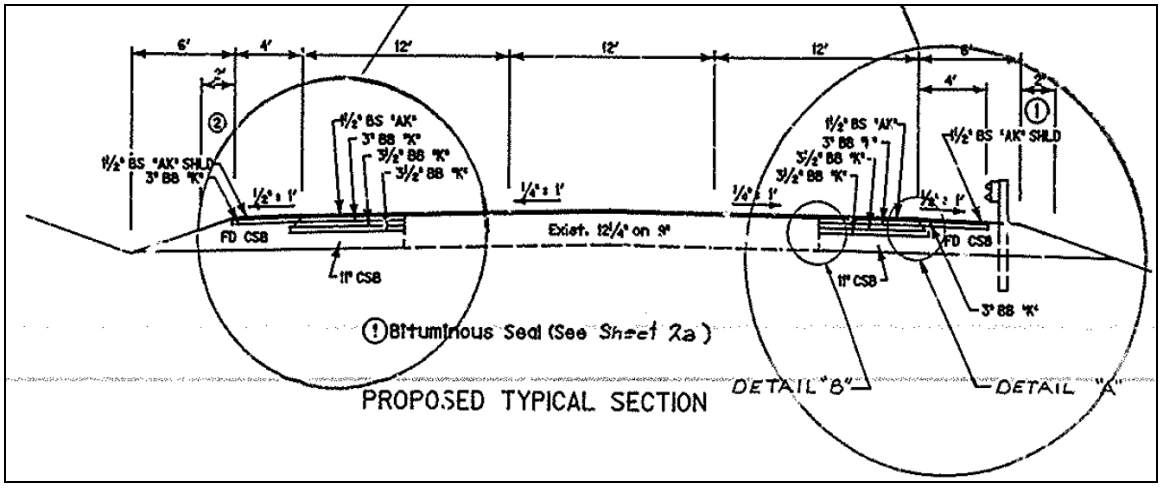

Figure 4: US 460 Typical Section from the As-Built Plans

Figure 5: Westbound US 460

Figure 6: Eastbound US 460 at Intersection with Mountain Parkway

Figure 7 shows the functional classification of all roadways within the study area.

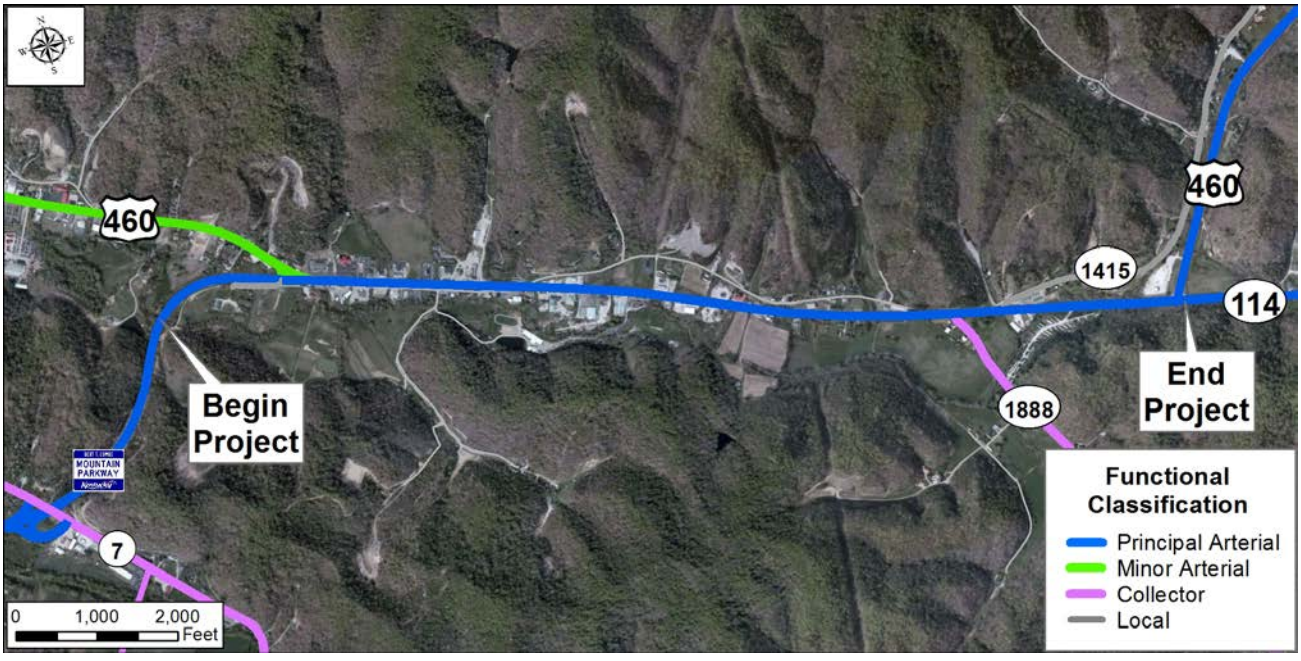

Figure 7: Functional Classification for Study Area Roadways

Functional classification is the grouping of roads, streets and highways into integrated systems ranked by the level of mobility for through movements and access to adjoining land. This grouping acknowledges that roads serve multiple functions and it provides a basis for comparing roads fairly. Functional classification can be used for, but is not limited to, the following purposes:

- Provide a framework for highways serving mobility and connecting regions and cities within a state.
- Provide a basis for assigning jurisdictional responsibility according to the roadway's importance.
- Provide a basis for development of minimum design standards according to function.
- Provide a basis for evaluating present and future needs.
- Provide a basis for allocation of limited financial resources

West of the Mountain Parkway, US 460 is classified as a minor arterial. The remainder of the route is classified as a principal arterial, as is the Mountain Parkway and KY 114.

2.2 Existing Access

Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. It also involves roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing of traffic signals. The purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system.

Roads are an important public resource and are costly to build, improve or replace. By allowing closely spaced curb cuts, median openings, driveways near major intersections, and poorly coordinated traffic signals, many areas are placing a heavy burden on the roadway, which in turn leads to unsafe and congested conditions. By managing access, it is possible to extend the life of these roads, improve traffic safety, decrease congestion, improve traffic flow, and improve air quality. Effective access management has been shown to reduce crashes as much as 50 percent, increase roadway capacity by as much as 45 percent, and reduce travel time and delay as much as 40 to 60 percent.[1]

The existing access points along US 460 were located and quantified using aerial photography, as shown in **Figure 8**. Between the Mountain Parkway and KY 114, there are approximately 48 access points on the south side of US 460 and 41 on the north side. This results in an access density of approximately 43 points per mile. Studies have shown that access density greater than 10 points per mile contribute to decreased safety and traffic operations. [1]

[1] Access Management Manual, Transportation Research Board of the National Academies, Washington, D.C., 2003.

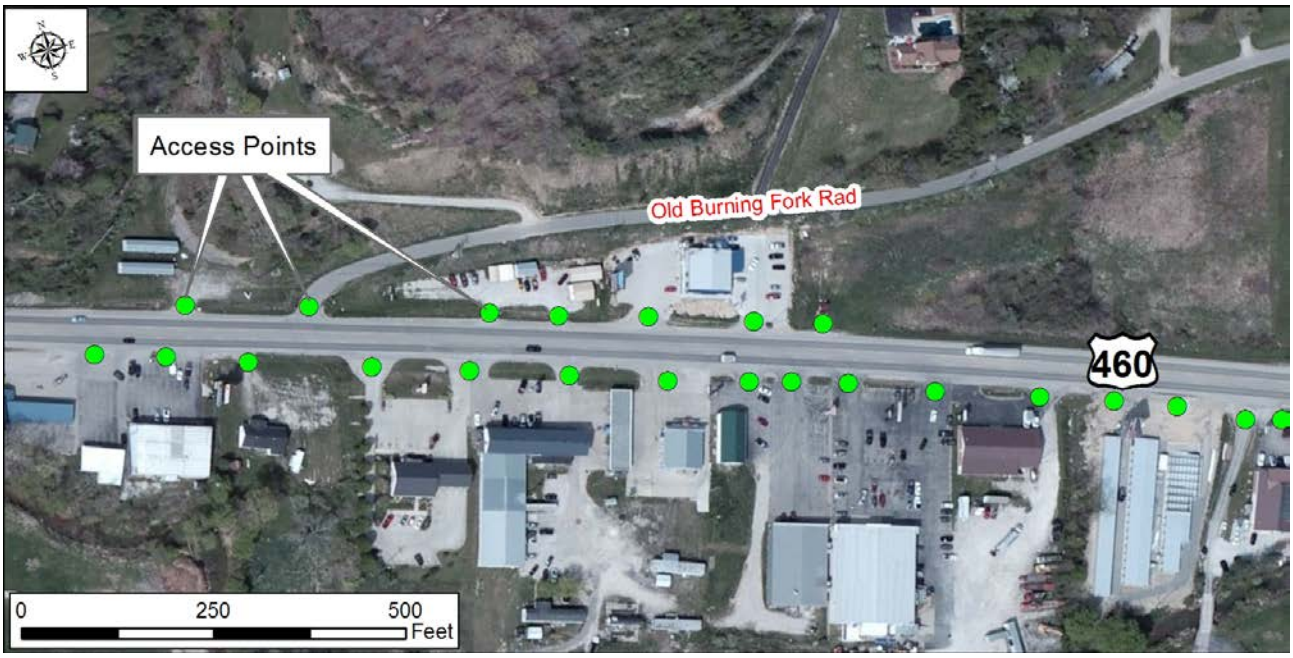

Figure 8: Example Access Points along US 460

2.3 Existing Traffic Volumes

Existing average daily traffic (ADT) volumes (in vehicles per day, or VPD) were obtained for roadway segments within the study area using the KYTC HIS database. **Figure 9** shows the current ADTs as provided in the KYTC HIS database along each of the state-maintained roadways within the study area.

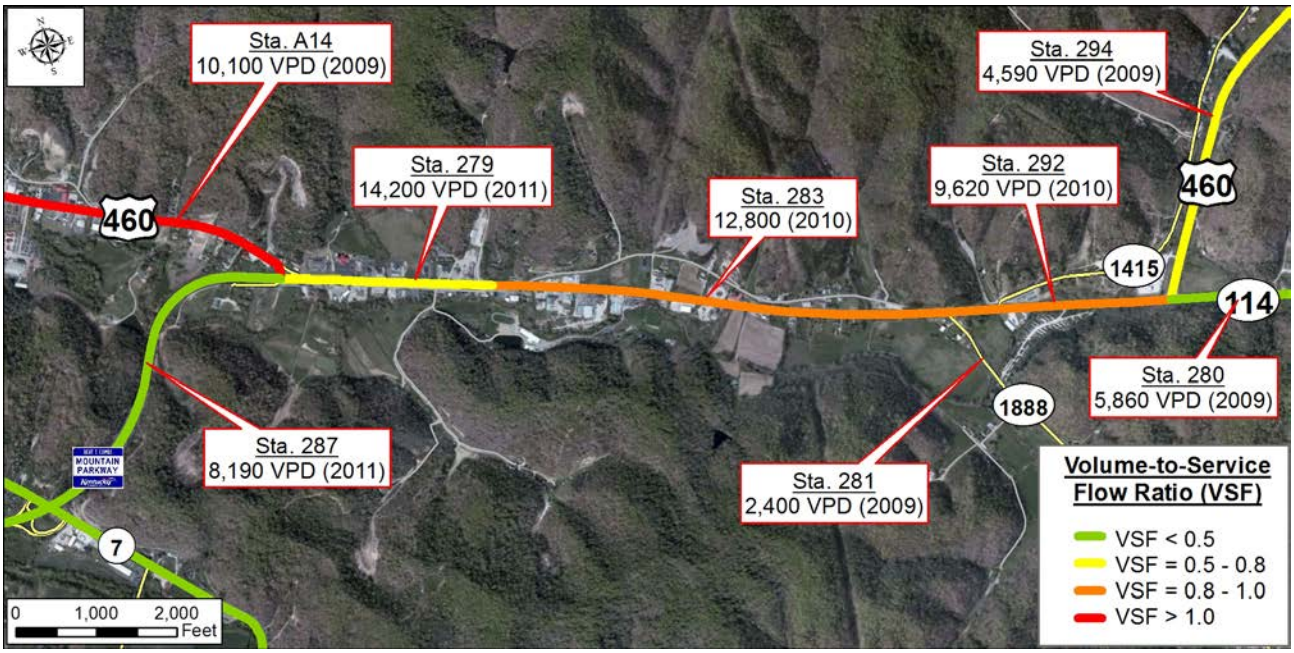

Figure 9: Existing Average Daily Traffic (ADT) Counts

Traffic volumes along US 460 range from a low of about 4,600 vehicles per day at the east end (north of KY 114) to 14,200 vehicles per day just east of the Mountain Parkway. Truck percentages range from 4.2 percent west of the Parkway to over 14 percent north of KY 114. The study portion of the Mountain Parkway carries 8,200 vehicles per day with 19.3 percent trucks.

The volume-to-service flow (VSF) ratio is a basic measure of congestion, comparing the traffic demand to the roadway's capability. The VSF is calculated by dividing the peak hour traffic flow by the calculated or theoretical capacity of the roadway segment. Areas of concern are where the VSF values approach or exceed 1.0, in which limited capacity leads to congestion. As illustrated on Figure 9, much of US 460 has a VSF ratio between 0.8 and 1.0. The only roadway segment within the study area with a VSF greater than 1.0 is on US 460 west of the Mountain Parkway intersection.

Figure 10 shows the historical traffic counts for count stations within the project area since 2000. Generally speaking, traffic growth has been relatively flat along US 460.

Figure 11 shows the peak hour traffic volumes for selected count stations in the study area. The highest peak hour counts are around 1,150 vehicles per hour (total of both directions) between the Mountain Parkway and KY 1888 (Burning Fork Road). The KYTC provided peak hour turning movement counts for the US 460 intersection with the Mountain Parkway, also shown on Figure 11. The counts show little traffic traveling through the intersection between the Parkway and downtown Salyersville (i.e. turning left off the Mountain Parkway onto US 460 or right from US 460 onto the Mountain Parkway). The highest turning movement volumes are the through movements along US 460.

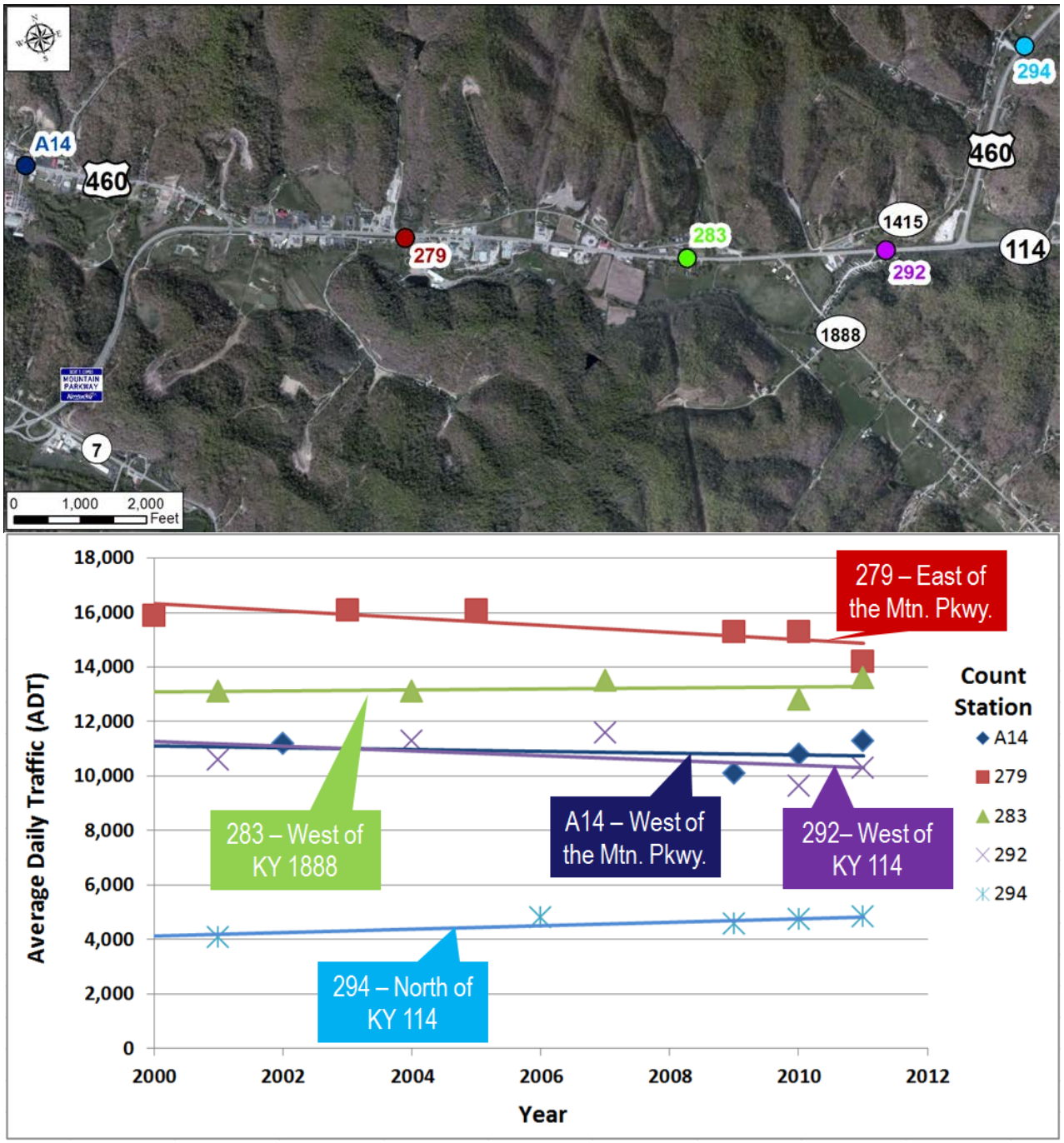

Figure 10: Historic Average Daily Traffic (ADT) Volumes

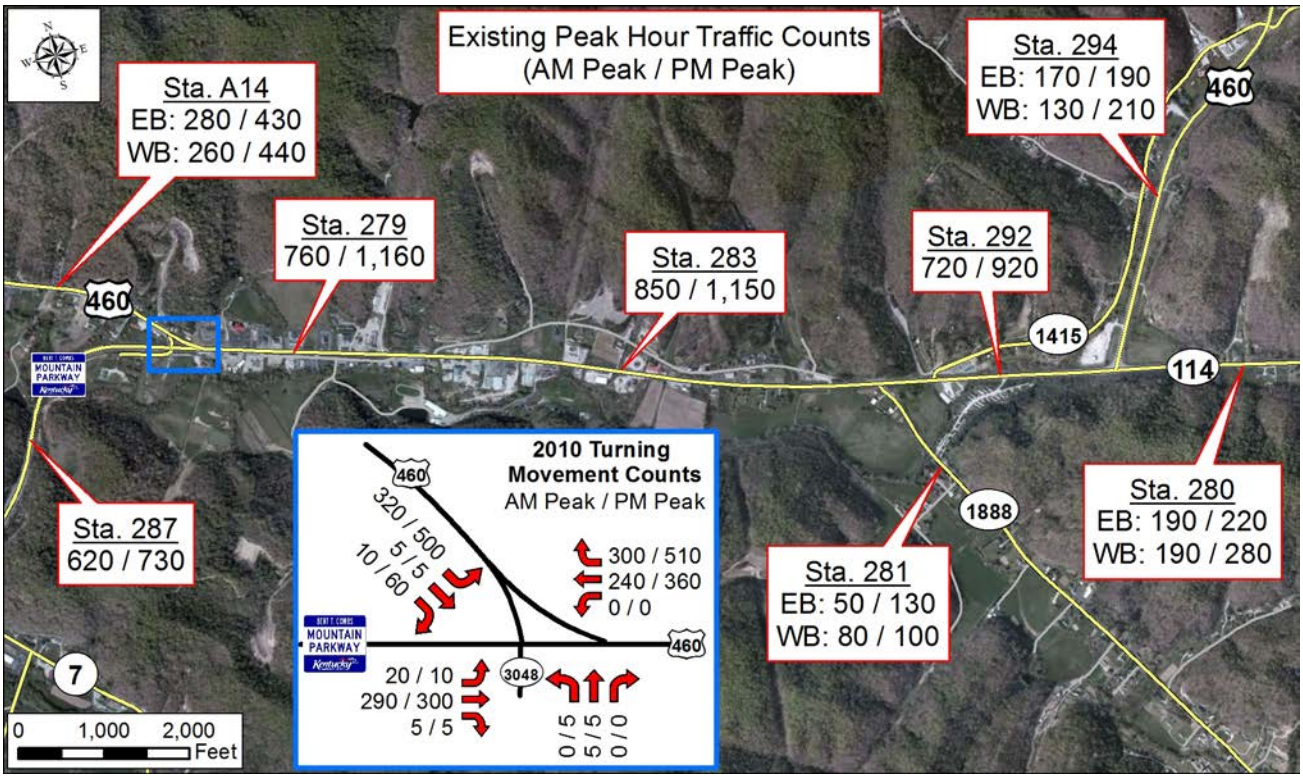

Figure 11: Existing Peak Hour Traffic Counts

2.4 Crash Analysis

Crash data was collected within the study area for a five-year period between January 1, 2007 and December 31, 2011. During the period, there were 79 reported crashes on US 460 between the intersection with the Mountain Parkway and KY 114 with 26 (33 percent) injury crashes. The crash types are shown on **Figure 12**. The predominant crash type were rear end crashes (24 crashes, 30 percent) followed by single vehicle crashes and angle crashes (each with 15 crashes, 19 percent). Typically speaking, rear end crashes and angle crashes can be attributed to access.

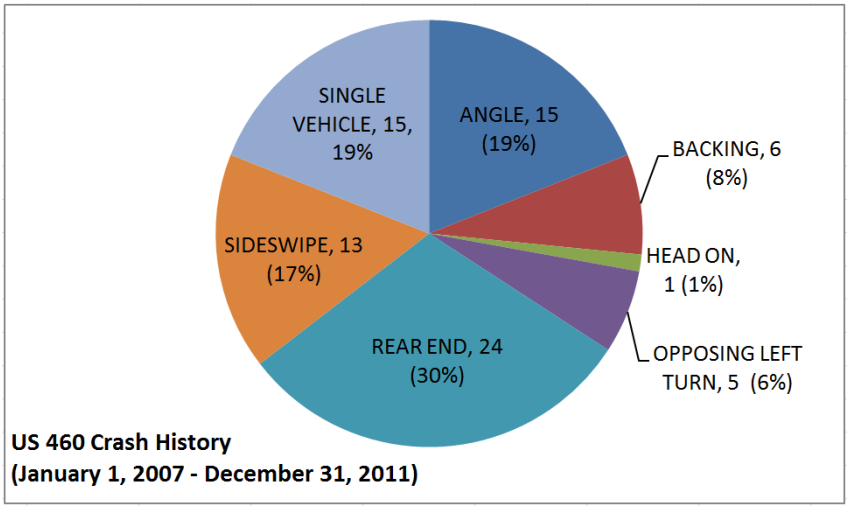

Figure 12: US 460 Crash Types

Critical Rate Factors (CRFs) were also determined as part of this analysis. The CRF value is calculated by dividing the actual crash rate along a particular roadway segment by the critical rate, which is the maximum accident rate for which it can be said that crashes are most likely occurring randomly based on roadway characteristics and traffic. A CRF greater than 1.0 suggests that conditions may exist that contribute to non-random occurrences. Both roadway segments (in this case, stretches between significant intersections) and spots were analyzed. In this case, spots are defined as 0.2 mile segments centered on intersections to encompass the influence area of each intersection. **Table 2** summarizes the segments and **Table 3** summarizes the spots. Both are shown on **Figure 13**.

Table 2: Segment Crash Analysis Results

Route	Begin Segment	Begin Milepoint	End Segment	End Milepoint	Number of Crashes	Avg. ADT	CRF
US 460	Allen Dr.	12.000	KY 9009/KY 3048	12.486	11	11,700	0.32
US 460	KY 9009/KY 3048	12.487	Old KY 114	12.664	18	14,200	0.97
US 460	Old KY 114	12.665	Old KY 114	12.967	32	12,800	1.26
US 460	Old KY 114	12.968	Old Burning Fork Rd.	13.936	19	13,525	0.28
US 460	Old Burning Fork Rd.	13.937	KY 1415	14.162	3	13,500	0.14
US 460	KY 1415	14.163	KY 114	14.566	7	13,700	0.21
US 460	KY 114	14.567		15.000	20	1,600	2.61
KY 9009	MP 75.0	75.000	US 460	75.627	9	6,700	0.78
KY 114	US 460	0.000	1.0 miles east of US 460	1.000	15	5,700	0.43

Table 3: Spot Crash Analysis Results

Route	Intersection	Begin Milepoint	End Milepoint	Number of Crashes	Avg. ADT	CRF
US 460	KY 9009 (Mountain Parkway)	12.386	12.586	9	15,400	0.62
US 460	KY 1888	13.941	14.141	5	13,500	0.38
US 460	KY 114	14.466	14.666	17	5,500	2.39

There are two roadway segments of US 460 with a CRF greater than 1.0. The first is east of the Mountain Parkway intersection and the second is north of KY 114; both segments have CRF's of 1.3. The only spot with a CRF greater than 1.0 is located at the intersection of KY 114 with a CRF of 2.4.

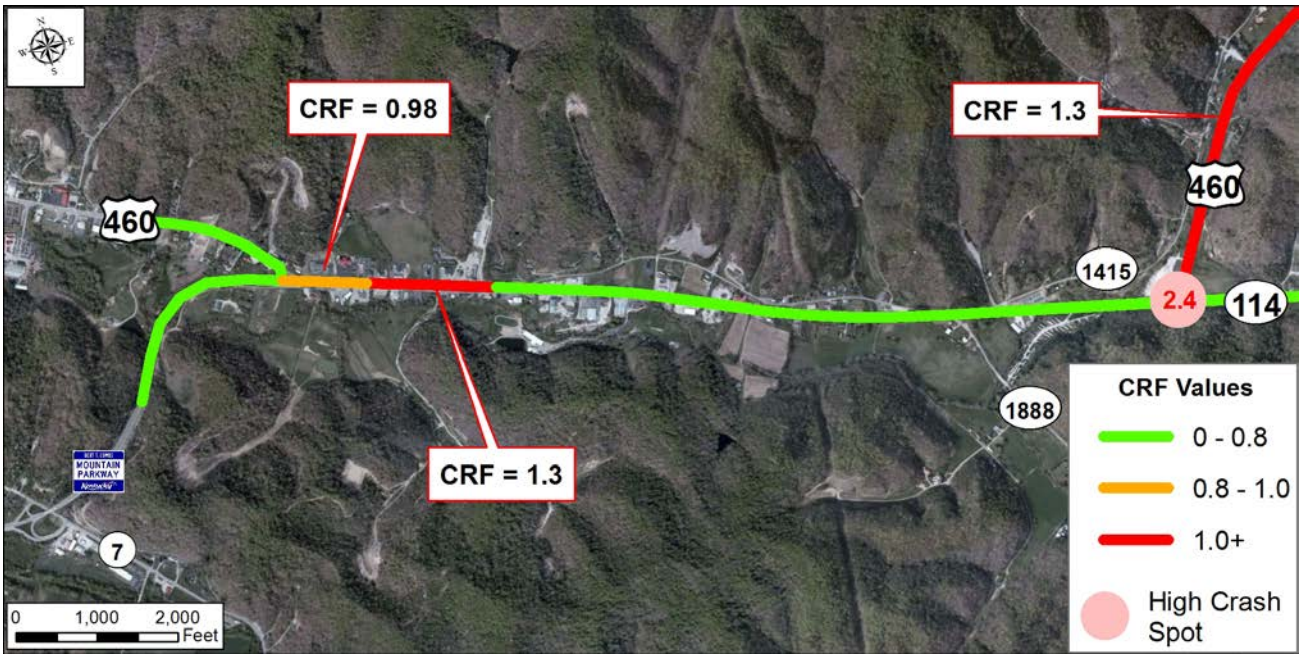

Figure 13: Critical Crash Rate Factors for Segments and Spots (2007-2011)

3.0 ENVIRONMENTAL OVERVIEW

The environmental overview provides a general summary of the social, economic, and environmental composition of the study area. These findings were used to evaluate the impact that improvement options might have on the environmental resources in the study area. The environmental review area generally includes 200 feet each side of the existing centerline of US 460 or the Mountain Parkway (400 feet total width), beginning at the Burning Fork bridge and ending at the KY 114 intersection. A detailed Environmental Overview Report dated April 2012 has been prepared and submitted to the KYTC under separate cover. **Table 4** provides a summary of the natural resources found within the study area and **Table 5** provides a summary of the man-made resources. The Environmental Overview map is included in **Appendix B**.

Table 4: Environmental Considerations – Natural Environment

Environmental Category	Resource/Feature	Source/Information
Floodplain	Federal Emergency Management Agency (FEMA) 100-Year floodplain occurs within the 400' study area south of US 460 along Burning Fork (ranging from approximately 150 to 1,000 feet in width).	Source: FEMA Flood Insurance Rate Map (March 16, 2005)
Floodway	FEMA floodway occurs within the 400' study area south of US 460 along Burning Fork (ranging from approximately 100 to 300 feet in width).	Source: FEMA Flood Insurance Rate Map (March 16, 2005)
United States Geological Survey (USGS) Streams	7 USGS streams (approximately 3,400 linear feet of channel) are located within the 400' study area, including Burning Fork, Rockhouse Fork, Prater Branch. Burning Fork is listed by USEPA/KDOW as an impaired stream (not supporting designated uses).	Source: KY 114 EA/FONSI, USGS map, USEPA Enviromapper, KDOW 305b report (2010), aerial photo review
Other Streams	7 non-USGS streams (approximately 1,300 linear feet of channel) are located within the 400' study area	Source: KY 114 EA/FONSI, USGS map, aerial photo review
Wetlands	No NWI wetlands or other potential wetland areas (based on USGS/aerial photo review) are located within the 400' study area.	Source: KY 114 EA/FONSI, NWI map, USGS map, aerial photo review
Groundwater	No Source Water Protection Areas (SWPA) are located in the 400' study area.	Source: KDOW Source Water Protection Areas GIS map
United States Fish and Wildlife Service (USFWS) Endangered Species List	Indiana bat is listed as endangered by USFWS and known to Magoffin County. Some potential summer roost and foraging habitat for Indiana bat (mature woodlands) is found within the 400' study area; no Priority Swarming or Maternity Sites occur in the project vicinity.	Source: USFWS Kentucky Field Office - Federal Species List for Magoffin County, Indiana bat priority areas map, aerial photo review
Kentucky Department of Fish and Wildlife Resources (KDFWR) Endangered Species List	State endangered spotted sandpiper and federal endangered Indiana bat are listed by KDFWR as known to Magoffin County. Spotted sandpiper habitat (shorelines and along lakes, rivers, large creeks, wetlands) is not found within the 400' study area; some potential summer roost and foraging habitat for Indiana bat (mature woodlands) is found within the 400' study area.	Source: KDFWR - Species List for Magoffin County, aerial photo review
Kentucky State Nature Preserves (KSNPC) Endangered Species Database	Rafinesque's big-eared bat (federal species of management concern), Eastern small-footed bat (federal species of management concern), Indiana bat (federal endangered) are known to occur within ten miles of the 400' study area (no occurrences in the immediate project vicinity). American brook lamprey (state threatened) is known to occur within one mile of the 400' study area (Licking River).	Source: KSNPC Natural Heritage Database

Table 5: Environmental Considerations – Human Environment

Environmental Category	Resource/Feature	Source/Information
Cultural - Archaeology	Cain Farmstead (15MG33) prehistoric and historic archaeology site is located south of US 460 near the US 460/KY 1888 intersection (exact location/boundary not available); potentially eligible for the National Register of Historic Places (NRHP) and potentially located within the 400' study area. Short Fork (15MG38) prehistoric site is located north of KY 114 and east of US 460 at the east project terminus; potentially NRHP eligible, but not located within the 400' study area. KOSA database search identified seven previously recorded archaeology sites within the 400' study area (locations and site numbers not specifically provided) and an additional six previously recorded archaeology sites are located within a 2.0 kilometer radius. Six of the archaeology sites within the study area have been determined to be not eligible for inclusion on the NRHP. The remaining (unidentified) site has not had its NRHP eligibility assessed. Of the archaeology sites outside of the study area but within a 2.0 kilometer radius, three have been determined to be not NRHP eligible and three have not had their NRHP eligibility assessed. Approximately 25 percent of the 400' study area has been surveyed for archaeology resources, and given the location of the study area, additional resources are likely to be present.	Source: KY 114 EA/FONSI; Kentucky Office of State Archaeology (KOSA) database
Cultural - Historic	The Cain House is located adjacent to the 400' study area (south of US 460 and west of KY 1888 near the US 460/KY 1888 intersection) and has been previously determined to be not NRHP eligible; KHC database search identified no NRHP listed or eligible properties within the 400' study area.	Source: KY 114 EA/FONSI; Kentucky Heritage Council (KHC) database
Section 4(f)	No National Register of Historic Places (NRHP) listed or eligible historic sites or publicly- owned recreational properties are known to occur within the 400' study area.	Source: KY 114 EA/FONSI, Magoffin County property maps, aerial photo review
Section 6(f)	No publicly-owned recreational properties are known to occur within the 400' study area.	Source: KY 114 EA/FONSI, Magoffin County property maps, aerial photo review
Air Quality	No project level concerns expected for PM 2.5, MSATs, or carbon monoxide; no USEPA air emissions facilities are located within the 400' study area.	Source: KYTC/FHWA, USEPA Enviromapper
Noise	Seven noise sensitive land use areas are located within or immediately adjacent to the 400' study area (Activity Category "B" and "C" land uses – consisting of residences, churches/schools, cemeteries).	Source: Magoffin County property maps, aerial photo review, KYTC Noise Policy (2011)
Environmental Justice (EJ)	Approximately 36% of the population in census block groups on the north side of US 460 in the project area are low income (equivalent to county average). Less than 1% of the population in census block groups throughout project area are minority (below county average).	Source: USEPA EJ Viewer
Churches	Three churches (Saint Luke's Catholic Church, Mount Carmel Church, Faith Freewill Baptist) are located in the immediate project vicinity; only Mount Carmel Church is located within the 400' study area.	Source: KY 114 EA/FONSI, Magoffin County property maps, USEPA Enviromapper, aerial photo review

Table 5 (continued): Environmental Considerations – Human Environment

Environmental Category	Resource/Feature	Source/Information
Schools	One school (Mount Carmel School) is located within the 400' wide study area.	Source: KY 114 EA/FONSI, Magoffin County property maps, USEPA Enviromapper, aerial photo review
Cemeteries	Six cemeteries are known to exist in the immediate project vicinity; only two are within the 400' study area.	Source: KY 114 EA/FONSI, Magoffin County property maps, USGS map, aerial photo review
Residences/Businesses	Approximately 26 residences and 36 businesses are located within the 400' study area; 2 county facilities also located within the 400' study area.	Source: Magoffin County property maps, aerial photo review
Hazardous Materials	FirstSearch database review: two Underground Storage Tank/Leaking Underground Storage Tank (UST/LUST) sites are located within the 400' study area ("Salyersville Gas and Go" - 442 East Mountain Parkway, Salyersville, Kentucky and "Fuel Station 3" – 300 East Mountain Parkway, Salyersville, Kentucky); seven other sites likely with UST's are located within the 400' study area (based on aerial photo review). USEPA Envirofacts database review (Facilities Reporting to USEPA): no RCRA generators occur in the project vicinity; no toxic releases, brownfields, or superfund sites occur in the project vicinity; no air emissions facilities occur in the project vicinity.	Source: FirstSearch Technology Corp., USEPA Envirofacts, aerial photo review

4.0 DEVELOPMENT OF ALTERNATIVES

Through a collaborative effort between the KYTC Division of Planning, KYTC Division of Highway Design, KYTC District 10 and KYTC District 12, improvement alternatives were developed for consideration in the US 460 Improvements Scoping Study. This chapter discusses these conceptual improvement alternatives.

4.1 Widening Alternatives

Do Nothing/ No-Build Alternative

A Do Nothing/ No-Build alternative was briefly discussed in the preliminary stages of the study. This alternative would not satisfy the Purpose and Need for the study as it would not increase capacity or improve safety along US 460.

Build Alternatives

Future year (2032) forecasts were developed along the east end of the Mountain Parkway for the KYTC Item No. 10-140.00 DNA Study. A 1.75 percent per year growth rate was applied to traffic counts collected in 2010. The resulting forecasts are approximately 12,000 vehicles per day on the east end of the Mountain Parkway and 24,000 vehicles per day on US 460 immediately east of the Parkway; forecasts for other portions of US 460 were not developed for the study, but could be inferred using the 1.75 percent annual growth rate. The forecasts on US 460 warrant four travel lanes.

Four conceptual improvement alternatives were developed over the course of the study. These include the following:

a. Five Lane alternative (two travel lanes with a continuous center left-turn lane)
b. Four Lane alternatives (with raised median and turn lanes at intersections)
    i. Widening to the north
    ii. Widening to the south
    iii. Hybrid alternative widening to alternating sides to minimize impacts

These preliminary concepts were developed prior to and presented at the first Project Team meeting. Given the access-related issues along the corridor, the Project Team felt the five-lane option would not address the existing safety concerns and could increase some types of crashes. Therefore, the five-lane alternative was dismissed from further consideration.

In an effort to minimize right-of-way impacts, each of the four lane alternatives were initially developed using an urban typical section with curb and gutter. This typical section, shown in **Figure 14**, includes four 11-foot wide travel lanes and a 14-foot wide raised median. According to KYTC's proposed guidelines for Access Management, the use of a non-traversable median for roadways with a projected ADT greater than 24,000 vehicles per day is recommended. With US 460 anticipated to carry 24,000 vehicles per day by 2032, construction of a non-traversable median is warranted. Given the width required to accommodate a depressed median (minimum 40 feet in width), the Project Team elected to use a raised median. The raised median requires the addition of frontage roads to accommodate access to existing developments. Therefore, each of the three alternatives include new or expanded frontage/backage roads and the elimination of direct left-turn access to and from US 460 except at median openings.

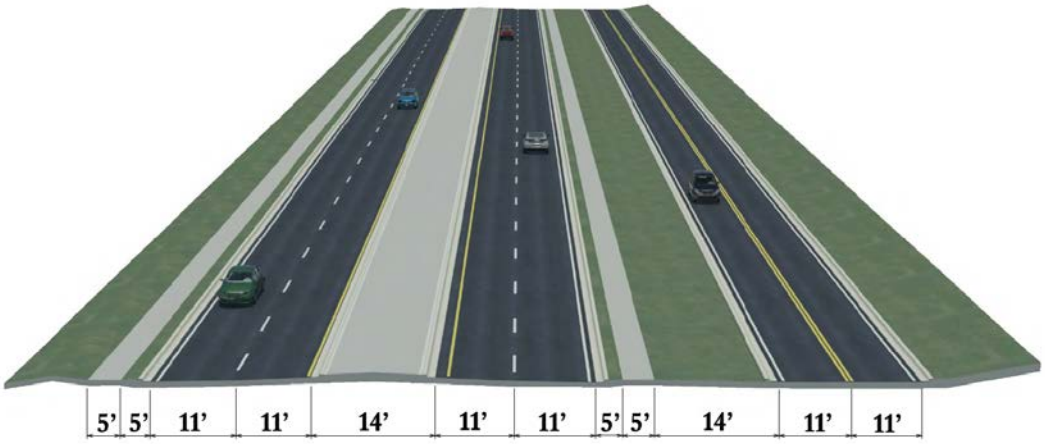

Figure 14: Four Lane "Urban" Typical Section

An example of the proposed access management is shown in **Figure 15**, just east of the Mountain Parkway intersection. The Project Team examined multiple access alternatives in an effort to maximize the distance between full access intersections while still providing safe and efficient access to both businesses and residents. Median openings are located to accommodate access, and the closest spacing is approximately 600 to 700 feet. In some cases, existing county road intersections are proposed to be relocated to improve access spacing and to eliminate badly skewed intersections that limit sight distance. Examples include both of the Old Burning Fork Road intersections on the north side of US 460.

Figure 15: Example of Proposed Access Management

Each of the four-lane alternatives results in different right-of-way impacts. Widening only to the north or to the south would require relocation of numerous businesses and residences on the affected side of the roadway, leaving the other side largely untouched. The Hybrid alternative was therefore developed in an effort to minimize the number of relocations by alternating the widening from one side to the other. Two variations of the Hybrid alternative were explored. The first included an urban section with curb and gutter for the limits of the project. The second included an urban typical section at the west end of the project and a "rural" typical section with 8-foot-wide paved shoulders at the east end, shown in **Figure 16**. The transition occurs near where the speed limit currently changes from 45 MPH to 55 MPH, east of the western Old Burning Fork Road intersection.

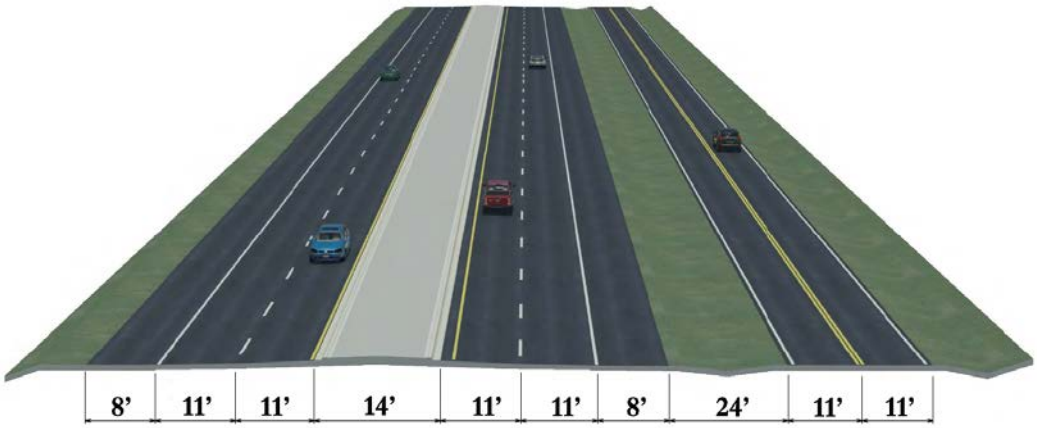

Figure 16: Four Lane "Rural" Typical Section

4.2 Intersection Alternatives

Three alternatives were considered for improving the intersection between US 460 and the Mountain Parkway. The existing intersection lacks adequate turning movement storage and has less than desirable sight distance, particularly from southbound US 460. Currently, US 460 tee's into the Mountain Parkway but a free-flow movement is provided on westbound US 460 for traffic traveling towards downtown Salyersville. The following options, shown in **Appendix C**, were discussed at the first Project Team meeting:

a. Option 1 – Realign the Mountain Parkway to tee into US 460, making US 460 the "through" route for both directions. A continuous movement is maintained for the eastbound Mountain Parkway to eastbound US 460.
b. Option 2 – Relocate the existing intersection west of the current location to improve sight distance and add dual left-turn lanes on southbound US 460.
c. Option 3 – Similar to Option 1, but eastbound Mountain Parkway is not maintained as a continuous movement and dual rights are instead provided.

The Project Team felt maintaining a "through" route between the Mountain Parkway and US 460 was important, and ultimately elected to proceed with refinements to Option 2. This option is shown in **Figure 17**.

Figure 17: Existing and Proposed US 460 Intersection with the Mountain Parkway

The US 460 intersection with KY 114 was noted as having a high crash rate, with the highest number of crashes occurring on the northern leg of the intersection, shown in **Figure 18**. Discussions with stakeholders suggest many of these crashes occur because of driver inattention or due to fog conditions which are common. However, the KYTC has implemented several countermeasures to help alleviate the issue, including the addition of advance warning signage, a flashing caution light, and rumble strips to alert drivers of the upcoming intersection. As traffic turning movement counts were not available for consideration in the study, the intersection should be evaluated further in the preliminary design phase. The existing and proposed intersection configurations are shown in **Figure 19**.

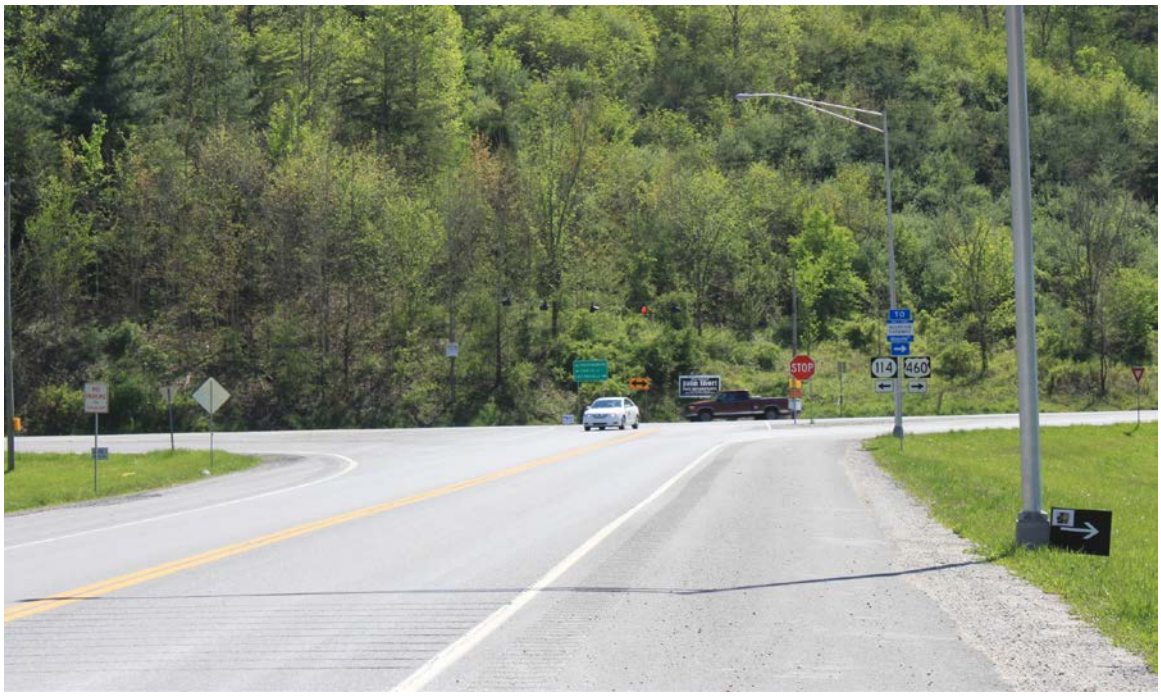

Figure 18: US 460 Intersection with KY 114 (looking south)

Figure 19: Existing and Proposed US 460 Intersection with KY 114

4.3 Local Official and Public Input

The Project Team met with local elected officials in May 2012 to discuss the preliminary improvement concept under consideration. The local officials expressed approval for the Hybrid concept as it was presented, and noted the urban typical section proposed for the west end was preferred as it would likely serve to slow traffic entering the commercial area of Salyersville from the Mountain Parkway. As a result of the meeting, the concept was carried forward and would be presented at a public meeting.

A public informational meeting was held on May 24, 2012 at the Magoffin County Courthouse in Salyersville. Approximately 75 individuals attended. The Project Team provided handouts and exhibited displays depicting the Hybrid widening concept with access management. A comment form was also provided to allow for a mechanism to collect and document public feedback; 17 completed comment forms were received. Of those, all (100 percent) indicated the project is needed and 94 percent strongly agreed with the proposed improvements to US 460. More results from the surveys are found in the public meeting summary in **Appendix A**.

5.0 FINAL RECOMMENDATION

A final Project Team meeting was held in June 2012. At the meeting, the alternatives were discussed, comments returned during and after the Public Meeting were summarized, and a recommended alternative was selected by the Project Team.

The Hybrid alternative, a detailed depiction of which is included in **Appendix D**, was chosen by the Project Team for final recommendation. The general concept is shown in **Figure 20**. A desire to limit right of way impacts and minimize costs while providing ample capacity and improving safety for the future has led to the decision to apply a mix of components from the presented alternatives.

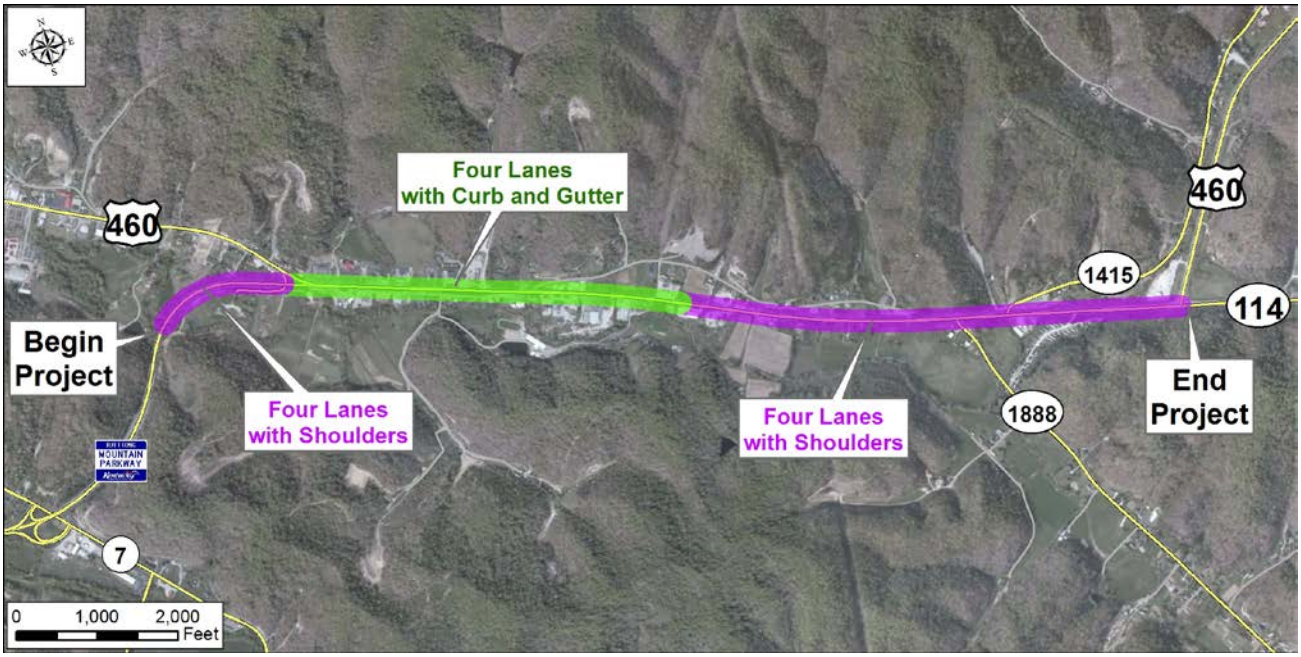

Figure 20: Study Recommendations

This alternative should help eliminate some of the contributing factors of crashes along US 460 by improving sight distance and providing more usable shoulder, thereby enhancing the overall safety of the roadway. It may be determined during the design process that some other intersection improvements and turn lanes may be added to further improve the quality and efficiency of the roadway for the projected increase of traffic. Working with local officials and the public, the Project Team has developed conceptual access management improvements that should accommodate all interests. The proposed changes include converting some existing entrances to right-in/right-out only and replacing some access points on US 460 with access provided on extended frontage roads or new backage roads. With the construction of a raised median, the frontage/backage roads are proposed to better serve existing businesses while accommodating potential future development. As the project progresses, additional coordination with project stakeholders will be necessary, particularly related to individual access concerns.

Table 6 includes a cost estimate for the recommended alternative, by project phase.

Table 6: Cost Estimate for Recommended Alternative

Phase	Cost
Design	$2,070,000
Right-of-Way	$10,493,000
Utilities	$1,500,000
Construction	$20,733,000
TOTAL	**$34,796,000**

The right-of-way and utility relocation estimates were provided by KYTC District 10. Right-of-way assumptions include 90 affected parcels with the acquisition of 25 buildings. Utilities affected by the project include overhead power and telephone lines, approximately 9,000 linear feet of water line, 5,000 feet of sewer line, and 5,000 feet of gas line.

The construction cost estimate includes the replacement of the Mountain Parkway bridge over the Burning Fork with a four-lane structure with shoulders, to connect to improvements proposed with KYTC Item No. 10-140.00. Further coordination with that project will be required during preliminary design to ensure consistency between proposed typical sections and to determine the most feasible solution to provide a consistent four-lane section through Salyersville. It may be determined that other options are more feasible beyond replacement of the structure. The cost estimate also assumes full-depth replacement of pavement within areas to be widened. That assumption will require further consideration during preliminary design.