

KY 59/KY 344/KY 377 Planning Study

Executive Summary

January 2018

Prepared For



Lewis and Rowan Counties

Item No. 9-231.00

KY 9 (AA Highway) in Vanceburg to KY 799

(Big Perry Road) in Triplett

Prepared by



KY 377



KY 377 Lewis/Rowan County Line



KY 344



KY 59



KY 59 on Vanceburg Hill

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Executive Summary

Introduction

The purpose of this planning study is to examine alternative concepts to improve safety, travel time, and regional connectivity from Vanceburg to Morehead, Kentucky, for access to medical, educational, and shopping destinations and to I-64. The KY 59/KY 344/KY 377 corridor (approximately 26 miles) is the only direct highway connection between these two cities. The project study area is shown in **Figure ES 1**. The study area varied in width from approximately 1,500 feet along KY 377 to 3,500 feet near the KY 377/KY 344 and KY 344/KY 59 intersections. Due to terrain along KY 59 and possible connections to KY 9 in Vanceburg, the study area was widened to approximately 2.80 miles at the north end of the project. KY 377 in Rowan County, between KY 32 north of Morehead, and KY 799 at Triplett, is already programmed as a two-lane improvement (Item Number 9-8406.00).

Project Purpose and Need

Given the existing conditions and early public and local officials input, the project purpose and need was refined. The purpose of the project is to:

... improve safety and travel time and provide reliable system connectivity from Vanceburg to Morehead for access to medical (St. Claire Regional Medical Center), educational [Morehead State University, Rowan County Branch of Maysville Community & Technical College (CTC)] and shopping destinations (Kroger, Lowe's, Wal-Mart, etc.) and to enhance connectivity between I-64 in Rowan County and KY 9, the AA-Highway in Lewis County. The travel routes from Vanceburg to Morehead consist of KY 59, KY 344, KY 377, and KY 32 which collectively serve as the most direct route between the cities of Vanceburg and Morehead. KY 9, the John Y. Brown AA Highway (KY 9), and I-64 provide major 4-lane east-west corridors in northeastern Kentucky. However, there is no modern north-south connection, built to current design standards, linking KY 9 in or near Vanceburg (or all of Lewis County), with I-64. The current network of roads is substandard and includes areas that frequently flood, and others with poor drainage, failing shoulders, poor sight distance, limited passing opportunities, narrow bridges, and substandard intersections and horizontal and vertical curves. Providing a route addressing these conditions would improve travel time and provide reliable system connectivity between KY 9/Vanceburg and Morehead.

The need derives from narrow lanes (nine to 11 feet) and shoulders (90% are two feet or less), as well as numerous horizontal (75) and vertical (69) curves that do not meet today's highway design standards for 55 mph. Travel speeds average less than 55 mph (46 mph), and passing opportunities are infrequent (no passing 50% in Rowan County and 95% in Lewis County). Crash clusters occur near the northern and southern ends of the corridor. The corridor has flooding and slope stability issues along with shoulder drop offs.

The shortest route between Morehead and Vanceburg uses 26 miles of the study corridor. The 2040 forecasted average travel time is 36.40 minutes between the northern and southern termini. If the entire roadway is built to current design standards with passing lanes at strategic locations, it is estimated that overall travel time would be reduced by approximately 6 minutes, to 30.41 minutes. This is a substantial savings in time, especially for emergency service vehicles, school buses, and other public services. Additionally, a rebuilt corridor would improve safety by reducing crashes, and improve travel time and mobility by addressing flooding and maintenance issues.

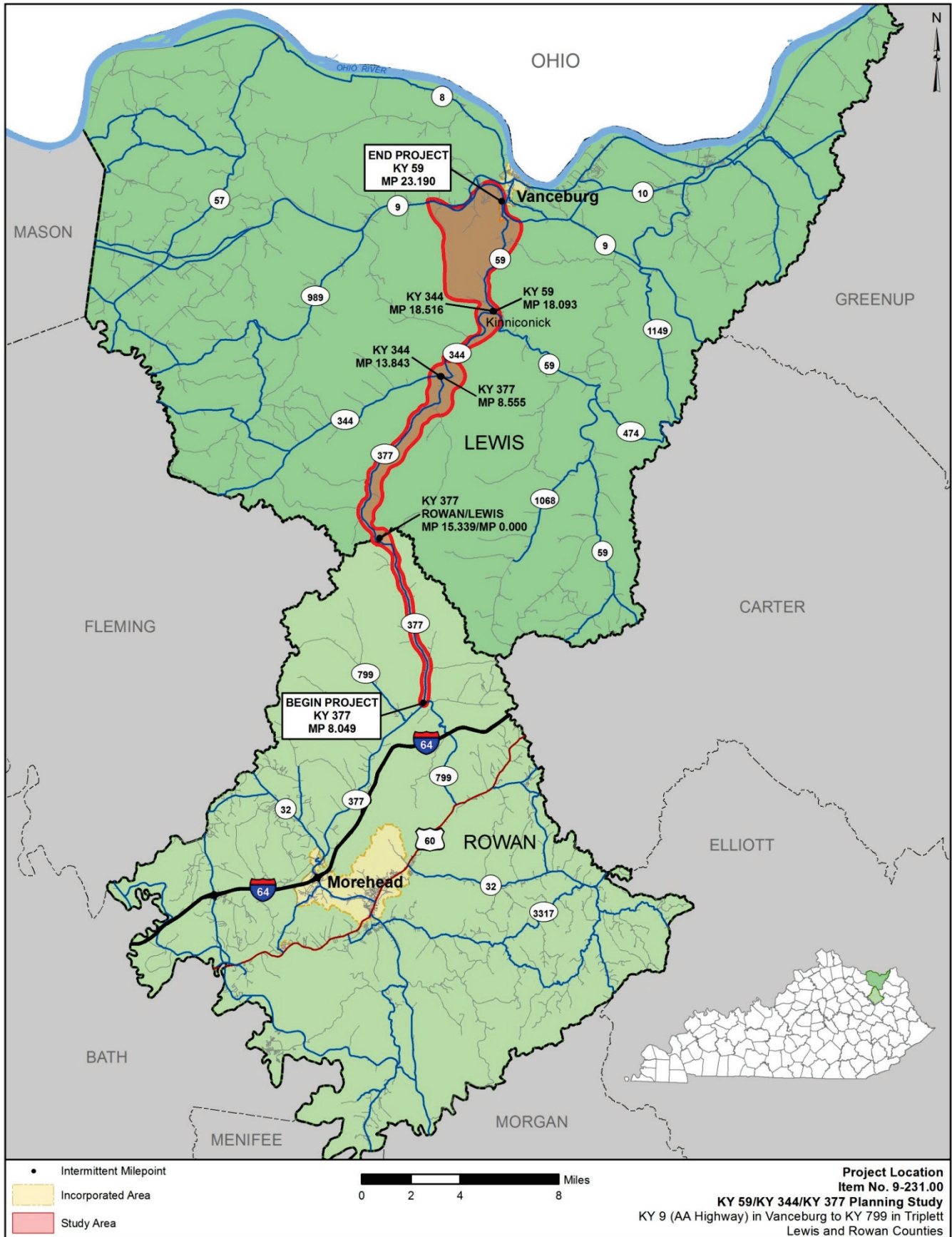


Figure ES 1: Study Area

Project Goals

The Project Team identified the following goals for this project:

- Reconstruct the corridor to current design standards for rural context, similar to other planned or recently constructed road projects in the area.
- Provide a continuous corridor by improving and realigning the KY 377/KY 344 and KY 344/KY 59 intersections.
- Avoid and/or minimize environmental impacts.

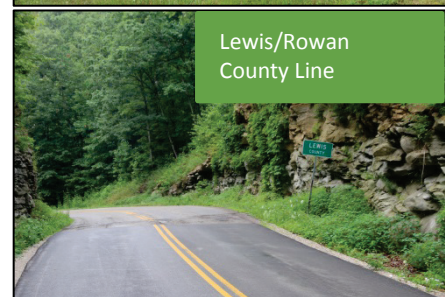
Existing Conditions and Future Traffic

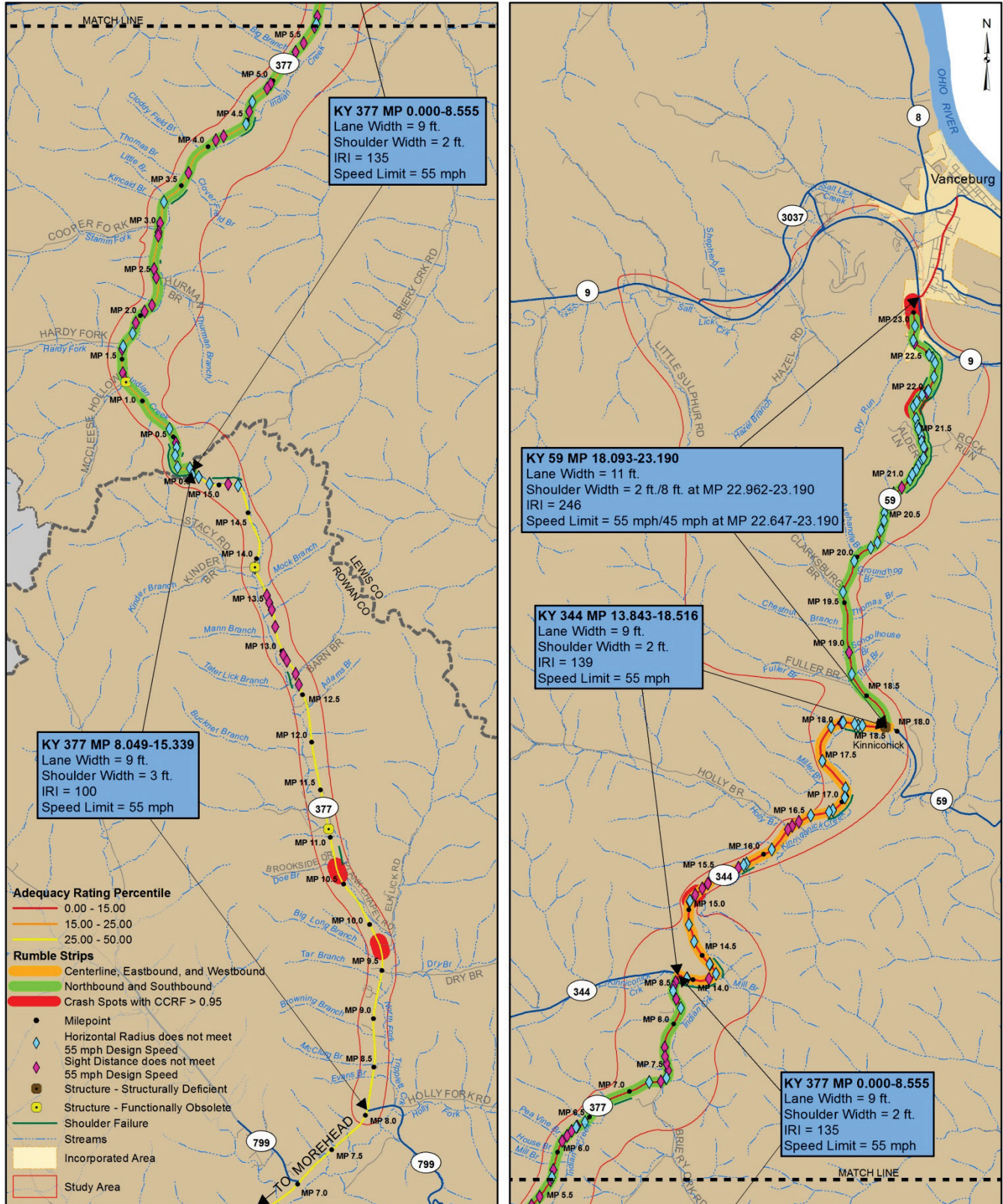
KY 377, KY 344, and KY 59 have rolling terrain, are functionally classified as Rural Major Collectors and State Secondary Routes for maintenance purposes, and are characterized by travel lanes between nine- and 11-foot-wide with two- to three-foot-wide shoulders. Existing conditions are described as follows and illustrated in **Figure ES 2**.

KYTC District 9 staff identified nine locations along the corridor having recurring maintenance issues. There are also a significant number of locations where shoulder failures have occurred. Railroad steel (T-rail) retaining walls (using steel posts), varying in length and height, are along existing KY 377, KY 344 and KY 59. These types of walls were installed as a mitigation measure to help stabilize the roadway embankment adjacent to waterways. These walls may need to be replaced with cast-in-place concrete walls, mechanically stabilized earth walls, or other retaining structures if any build alternatives or spot improvements are advanced to future project development phases. In areas where stream bank stabilization appears to be a problem (e.g. outside bends), stream stabilization techniques may be employed to reduce stream bank erosion and scour.

KY 377

KY 377 in Rowan and Lewis counties is 15.8 miles in length, carries a range of 380 to 1,300 vehicles per day (vpd) and operates at LOS D (see **right**). It is projected to carry 480-1,500 vpd in the design year 2040 and is expected to operate at LOS E due to narrow lanes and shoulders and a low average travel speed (ATS). Along its length; there are multiple shoulder drop-offs and 68 horizontal and vertical curves that do not meet 55 mph design criteria. Most are between Cooper Fork and KY 344 in Lewis County. Three structures are considered functionally obsolete, all having a sufficiency rating exceeding 60. There are two 0.1 mile high-crash spot locations in Rowan County, one just south of Brookside Drive (MP 9.7–9.8) and another just north of Dry Branch Road near Elk Lick Road (MP 10.6–10.7). The Daniel Boone National Forest (DBNF) lies on either side of KY 377; the Sheltowee Trace National Trail skirts the Rowan/Lewis county line where the corridor





Existing Conditions

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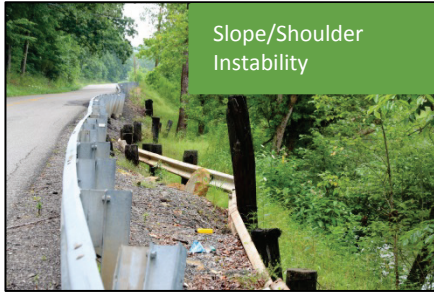
KY 59/KY 344/KY 377 Planning Study
KY 9 (AA Highway) in Vanceburg (MP 23.190 on KY 59)
to KY 799 in Triplett (MP 8.049 on KY 377)
Lewis and Rowan Counties



Figure ES 2: Existing Conditions



Bridge Rail (struck multiple times by trucks)



Slope/Shoulder Instability



Lewis County Park

terrain becomes rugged with multiple substandard curves. In addition, the Sheltoewe Trace has a trailhead on KY 377. Potentially historic structures dot the corridor and a major pipeline parallels KY 377 in the south. Also at MP 1.3 in Lewis County, there are three natural gas line crossings.

KY 344

KY 344 is 4.67 miles in length, carries 700 vpd, and operates at LOS C. In 2040, KY 344 is projected to carry 900 vpd and operate at LOS C. It has 34 horizontal and vertical curves that do not meet 55 mph design criteria. There is one 0.1 mile high-crash spot location between MP 15.1 and MP 15.2 (2 crashes). One structure over Grassy Branch at the KY 59/KY 344 intersection (MP 18.481) in Lewis County is structurally deficient with a sufficiency rating of 49.4. Tractor trailers traveling south on KY 59 turning west onto KY 344 have hit the narrow bridge railing numerous times because of the bridge proximity to the intersection (see **left**).

Indian Creek runs north along KY 344 until its intersection with KY 59 where it meets Kinniconick Creek (designated as an Outstanding State Resource Waters (OSRW), Exceptional Waters, and Reference Reach Waters). Any impacts to this stream may require permits from the U.S. Army Corps of Engineers (USACE) and the

Kentucky Division of Water (KDOW).

A protected five-mile stream mitigation site (Kinniconick and Indian Creeks) is located at the KY 377/KY 344 intersection. This site is permanently protected through the implementation of a conservation easement which places permanent restrictions on its use. The Lewis County Park is also along KY 344. This park received Land and Water Conservation Funds which may require avoidance or mitigation measures.

KY 59

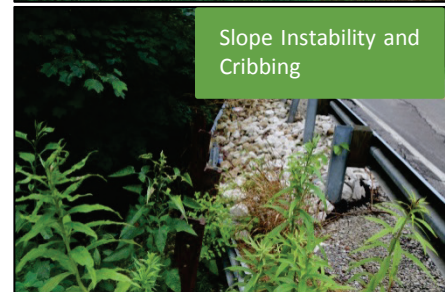
KY 59 is 5.10 miles in length, carries between 1,180 and 2,200 vpd, and operates at LOS C except at Vanceburg Hill, where it operates at LOS D. In 2040, KY 59 is projected to carry 1,515-2,700 vpd and will continue to operate at LOS C but drops to LOS E over Vanceburg Hill. It has 42 horizontal and vertical curves that do not meet 55 mph design criteria (see **right**). The terrain becomes rugged from Vanceburg Hill near Clarksburg Branch (MP 19.704) to approximately Leslie Street (MP 22.488). On Vanceburg Hill the vertical grade exceeds nine percent. A segment crash analysis shows four 0.1-mile high-crash spot locations between MP 21.8 and 23.1. Along this corridor, Vanceburg Hill is the number one



Slope Instability along Vanceburg Hill



Stream near KY 59 and 344 Intersection



Slope Instability and Cribbing

priority with local officials and KYTC District 9 staff. No structures are considered functionally obsolete or structurally deficient.

In 2040, the KY 377/KY 799, KY 377/KY 344, and KY 344/KY 59 intersections are projected to operate at LOS A or B. The KY 9/KY 59 intersection northbound left would operate at LOS F and the northbound through/right would operate at LOS D due to left turns from KY 59. However, the queue length is only four vehicles.

Crashes

During a five-year period (January 1, 2009 to December 31, 2013), there were 91 crashes on the KY 59/KY 344/KY 377 corridor between KY 799 in Rowan County and KY 9 in Lewis County; 26 (29%) resulted in one or more injuries. Sixty-three of the study corridor crashes (nearly 70%) involved only one vehicle with 29 of those indicated as “Ran Off Roadway,” 22% of which occurred in a curve. Using Kentucky Transportation Center (KTC) methodology for crash analysis, statistical calculations resulting in a Critical Crash Rate Factor greater than or near 1.0 indicates a potential crash concern. Those 0.1-mile high-crash locations are shown in **Figure ES 2 (p. ES4)**.

Environmental Concerns and Resource Agency Coordination

An environmental overview was conducted for this study. A host of environmental resources were studied, but the ones that provide project- and alignment-specific concerns are summarized in this section along with resource agency comments. More information about each resource studied, other agency comments, and accompanying exhibits can be found in Section 7.0 Environmental Overview of the Full Report.

Daniel Boone National Forest (DBNF)

The DBNF straddles KY 377 in Rowan and Lewis counties and will necessitate special considerations.

Kinniconick Creek and Indian Creek

Kinniconick Creek flows northeastward in the northern portion of the study area and has the following designations: Outstanding State Resource Waters (OSRW), Exceptional Waters, and Reference Reach Waters. Stream impacts would require permits from the U.S. Army Corps of Engineers (USACE) and the Kentucky Division of Water (KDOW).

A 5.2-mile stream mitigation site of Kinniconick and Indian Creeks is located near the KY 377/KY 344 intersection that includes a conservation easement. A stream mitigation site is a stream that has been restored, established, enhanced or preserved for the purpose of providing compensation for unavoidable impacts to resources permitted under Section 404 of the Clean Water Act. Impacts to this area should be avoided.

Portions of KY 344 south of the Kinniconick community lie within the 100-year floodplain of Kinniconick Creek. Members of the public identified two areas along KY 344 (MP 17.2 and MP 17.5) that are noted for continual flooding.

During agency coordination, the U.S. Army Corps of Engineers requested an early planning meeting concerning the impacts to Kinniconick Indian Creek mitigation site. The Kentucky Division of Water (KDOW) noted the status of Kinniconick Creek as an Outstanding State Resource Waters (OSRW) and advised that habitat and water quality should not be degraded. KDOW stated the need to avoid or

minimize impacts to Kinniconick Creek and a Kentucky Division of Fish and Wildlife Resources (KDFWR) stream restoration project (located around the KY 377/KY 344 intersection) as alternatives are developed.

Lewis County Park

Lewis County Park, adjacent to KY 344 near MP 15.7, is a Section 4(f) site, and has received Section 6(f) funds (Land and Water Conservation Funds). During the Design phase, this site should be avoided if possible; if not, efforts to minimize impacts to the park must be considered. Due to possible Section 4(f) impacts, the County must put in writing that any use to the park will not have an adverse effect. Due to Section 6(f) concerns, any taking of 6(f) land must be replaced with adjacent property from the same area.

Sheltowee Trace

The Sheltowee Trace begins on KY 377 at the trailhead and follows the Rowan/Lewis County line. The Sheltowee Trace is also a designated recreation area and will be afforded some level of protection under Section 4(f).

Geotechnical Concerns

Due to mountainous terrain, geotechnical concerns will be a major factor during the design phase. Ohio and Sunbury shales are present and are known acidic stratum in the northern part of the corridor along KY 59. Particular attention should be given to the design of cut slopes and embankments near existing formations. Several landslides have been noted along the existing alignments of KY 59 and KY 344. Additional costs will be associated with design and mitigation of these slide areas if disturbed. Numerous railroad retaining walls exist along KY 59, KY 344, and KY 377. These walls should be surveyed and evaluated. Depending on the selected alignment, the affected walls will likely require repairs and/or replacement. Additional costs could be incurred for repair/replacement of these walls. Oil and gas wells have been drilled near/along the study corridor.

Alternatives Development

Numerous meetings were held involving the Project Team, local officials/stakeholders, and the public. Input received at these meetings guided the development and screening of alternatives.

Design criteria used to develop alternatives in the project corridor, with the exception of improvements to Vanceburg Hill, are consistent with the proposed section for Item 9-8406.00 [KY 377 reconstruction from KY 32 (Flemingsburg Road) to KY 799 (Big Perry Road)]. The typical section used is shown in **Figure ES 3**.

No-Build Alternative

The purpose of this project is to improve safety, travel time, and regional connectivity from Vanceburg to Morehead for access to medical, educational, and shopping destinations and to I-64. The No-Build or Do-Nothing Alternative does not satisfy the purpose and need as only regular maintenance of KY 59, KY 344, and KY 377 would take place. The No-Build Alternative would not improve substandard conditions or travel time, nor result in a road facility build to current design standards that are appropriate for the rural setting.

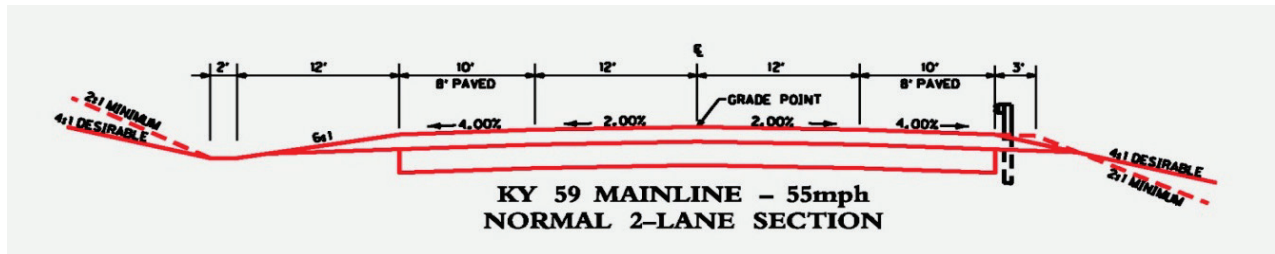


Figure ES 3: Typical Section

The corridor was divided into five manageable sections to examine two total reconstruction alternatives and 45 mph spot improvements. An early screening process eliminated many alternatives further from the existing corridor and the following concepts were carried forward.

- Sections 1 and 2—two reconstruction alternatives along or near KY 377 were examined for widening existing KY 377.
- Section 3—due to horizontal and vertical curves not meeting current design criteria near the Rowan/Lewis county line, DBNF, Sheltoewe Trace and trailhead, multiple alternative corridors were studied both on and off the existing alignment.

KYTC District 9 staff met with representatives of the Sheltoewe Trace Association on September 20, 2017 to provide a project update and discuss impacts this study, in particular Section 3, could have on the Trace. Representatives agreed Alt 3D-1 would be the most favorable due to its compatibility with the Trace’s long-term plans to extend the trail toward Jenny Wiley Trail in South Portsmouth Kentucky. In addition, the remaining Section 3 Alts would be acceptable if impacts to the trail are properly mitigated to allow the trailhead to function as it currently does. KYTC agreed to mitigate impacts to the trailhead. If Alt 3A-1 is preferred, KYTC agreed a section of KY 377 would remain in place to provide access to the existing trailhead or some other form of mitigation considered.

- Section 4 (KY 377 and a portion of KY 344)—two alternative corridors and spot improvements were examined to minimize flooding and impacts to Lewis County Park. Due to the desire to have a continuous corridor, the KY 377/KY 344 intersection was also modified to eliminate the stop condition and minimize or eliminate impacts to the KDFWR mitigation site.
- Section 5, south of the KY 344/KY 59 intersection north to KY 9—two alternatives were examined to again provide for a continuous corridor. Near MP 16.5, multiple alternative corridors for reconstruction were examined both on and off existing KY 59.

For each of these five sections, a screening process was performed that included numerous section and alternative combinations as discussed in the Full Report and illustrated on **Figure ES 4**. The report also addresses the No-Build/Do-Nothing Alternative, which was used as a means of comparison for future conditions with and without reconstructing the roadway corridor, and is summarized in the following sections.

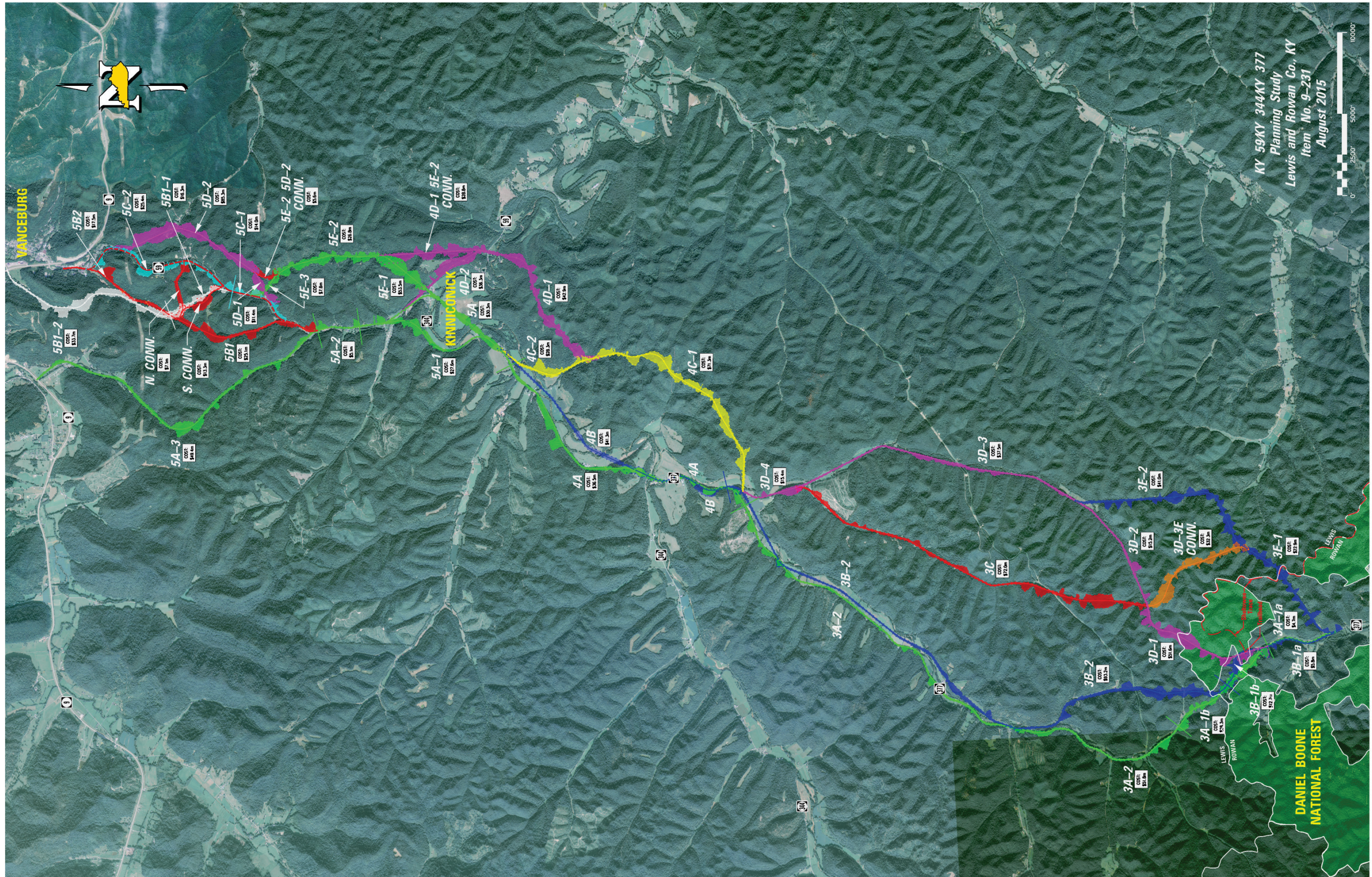


Figure ES 4: Initial Screening Alternatives

Comparing the 2040 No-Build versus 2040 Build Alternatives (**Table ES 1**), corridor travel time, average travel speeds, and percent time spent following (KY 59 and Vanceburg Hill only) improve with a Build Alternative. According to the travel demand model, improvements will not generate more traffic in the corridor; and therefore, there would not be any anticipated adverse impacts from induced traffic volumes.

Table ES 1: No-Build (Do-Nothing) vs. Build Alternatives

Alternative	2040 Improved Average Travel Speed (mph)	2040 Improved Percent Time Spent Following	2040 Improved LOS No-Build vs. Build	2040 Improved Total Corridor Travel Time (minutes/vehicle)
Entire Corridor	4–10	KY 377/KY 344–0% KY 59–11.1%	E vs. C–KY 377 C vs. B–KY 344 C vs. C–KY 59	6.0
Vanceburg Hill Only	7–10	4.7%	E vs. C–Vanceburg Hill	1.6

Regarding safety, proposed improvements with the Build Alternatives are anticipated to reduce traffic crashes by 15% to 50% depending on the improvements (i.e., wider shoulders, better sight distances, etc.). These safety improvement benefits would not be realized with the No-Build Alternative.

Safety is also a major component of the purpose and need for the project. Wider lanes and shoulders, improved ditches, and improved geometry (whether 45 or 55 mph) will enhance safety for the traveling public.

Spot Improvements

Given horizontal and vertical curves not meeting current design standards, recurring maintenance issues, high-crash locations, shoulder failures, local official and public input, and the major investment of total reconstruction, spot improvements were also identified along the corridor. Spot improvements were given an associated name known to the communities along the corridor and are shown on **Figure ES 5**.

Cost Estimates

Total reconstruction and spot improvement cost estimates and impacts were quantified, compared, and discussed at Project Team Meetings and presented to the public at the last round of public involvement. All spot improvements meet 45 mph design criteria and total \$99.4 million. The total reconstruction cost to improve the entire corridor to 55 mph design criteria, except along Vanceburg Hill, ranges from \$226 to \$284 million.

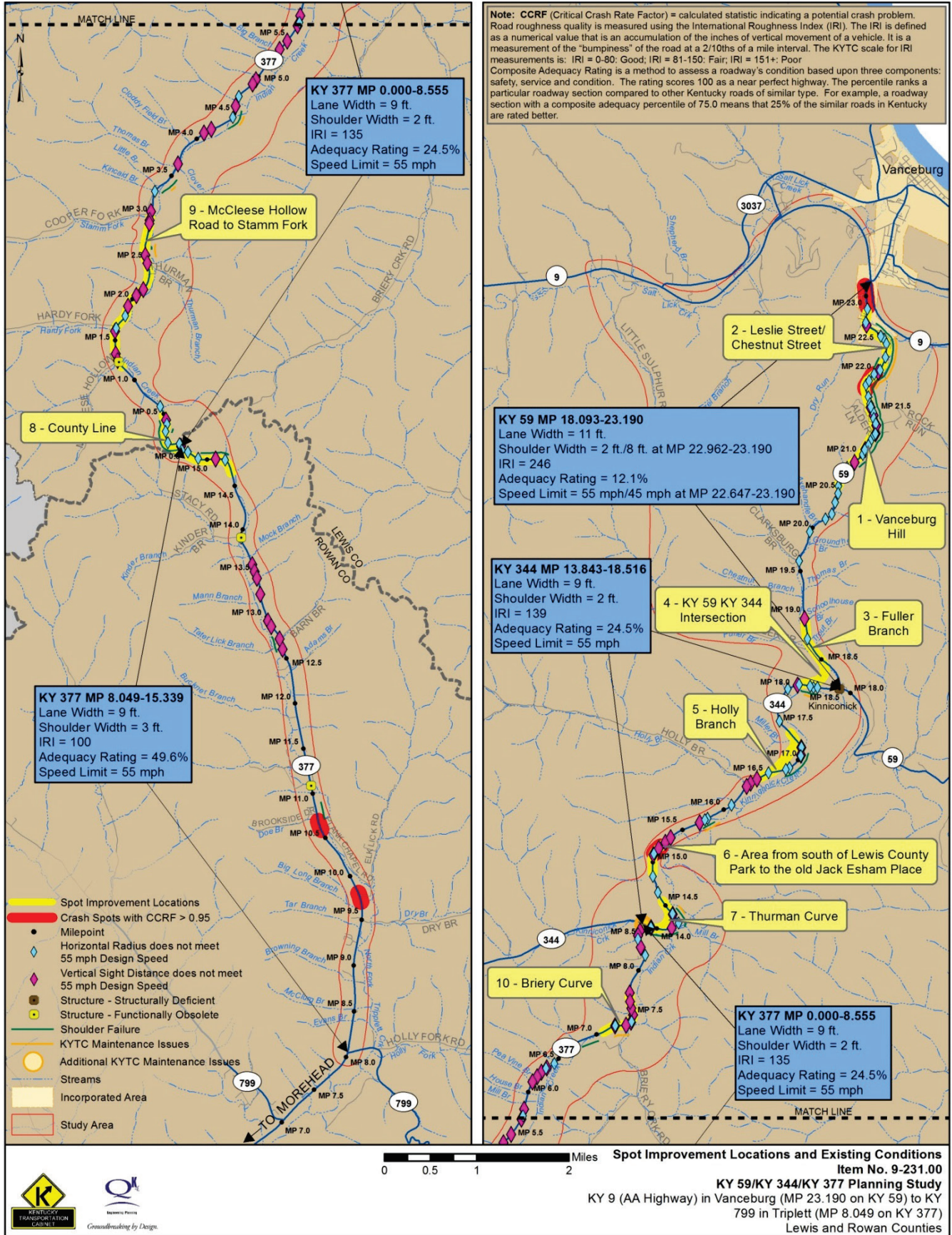


Figure ES 5: Spot Improvement Locations

Recommendations

Priorities for alternatives to be advanced to the next project development phase were agreed to by the Project Team and should be based on available funding and design considerations. Each priority has options with at least one total reconstruction alternative and one spot improvement. The Alternatives to be considered are shown in **Figure ES 6**. The No-Build (Do-Nothing) Alternative should be a consideration with each priority.

Priority 1—Vanceburg Hill (near MP 19.5 to KY 9 AA Highway) – Section 5

As a section of independent utility with logical termini, conduct Phase I design and NEPA documentation from KY 344 to KY 9 (AA Highway). The benefits for total reconstruction include improved safety and travel time, reduced KYTC maintenance costs, and a truck climbing lane in both directions to help with speed differential.

At this stage there is not enough information to make a recommendation for a preferred alternative, as each has benefits and impacts that should be analyzed in more detail in design. Given the project's rough terrain, it is expected geotechnical findings will significantly impact all alternatives and associated costs. The estimated cost of alternatives/spot improvements for Priority 1 range from \$6.3 million to \$64.0 million.

- 1) From MP 19.5 to MP 23.0
 - ALTS 5C-1, 5B1-1, AND 5B1-2 (\$64.0 million)
 - ALTS 5C-1 AND 5C-2 (\$39.4 million)
 - ALTS 5B1, 5B2 and North Connector (\$49.7 million)
 - ALTS 5C-1, 5B1-1, AND 5B2 (\$47.8 million)
 - ALTS 5B1 AND 5B2 (\$42.6 million)
- 2) From MP 20.7 to MP 23.0
 - ALTS 5B1-1 and 5B1-2 (\$50.0 million)
 - ALT 5C-2 (\$25.4 million)
 - ALTS 5B1-1 and 5B2 (\$33.8 million)
- 3) Spot improvements within Priority 1
 - Spot Improvement 1—Vanceburg Hill (\$21.6 million)
 - Spot Improvement 2—Leslie Street/Chestnut Street (\$6.3 million)

Priority 2—KY 59/KY 344 Intersection—Section 5

This priority replaces a structurally deficient bridge and realigns the intersection of KY 344 and KY 59 to meet one of the project goals for a continuous corridor between Vanceburg and Morehead. There are considerable slope/shoulder stability issues on KY 344 between MP 18.1 and MP 18.2. This section of roadway is adjacent to Kinniconick Creek and fronts the “Kinniconick Hotel.” There are also numerous substandard horizontal and vertical curves along with flooding that each improvement would correct. The estimated costs for Priority 2 range from \$2.5 million to \$30.3 million.

- ALT 5A (\$30.3 million)
- Spot improvements within Priority 2
 - Spot Improvement 3—Fuller Branch (\$2.5 million)
 - Spot Improvement 4—KY 59/KY 344 intersection (\$17.7 million)

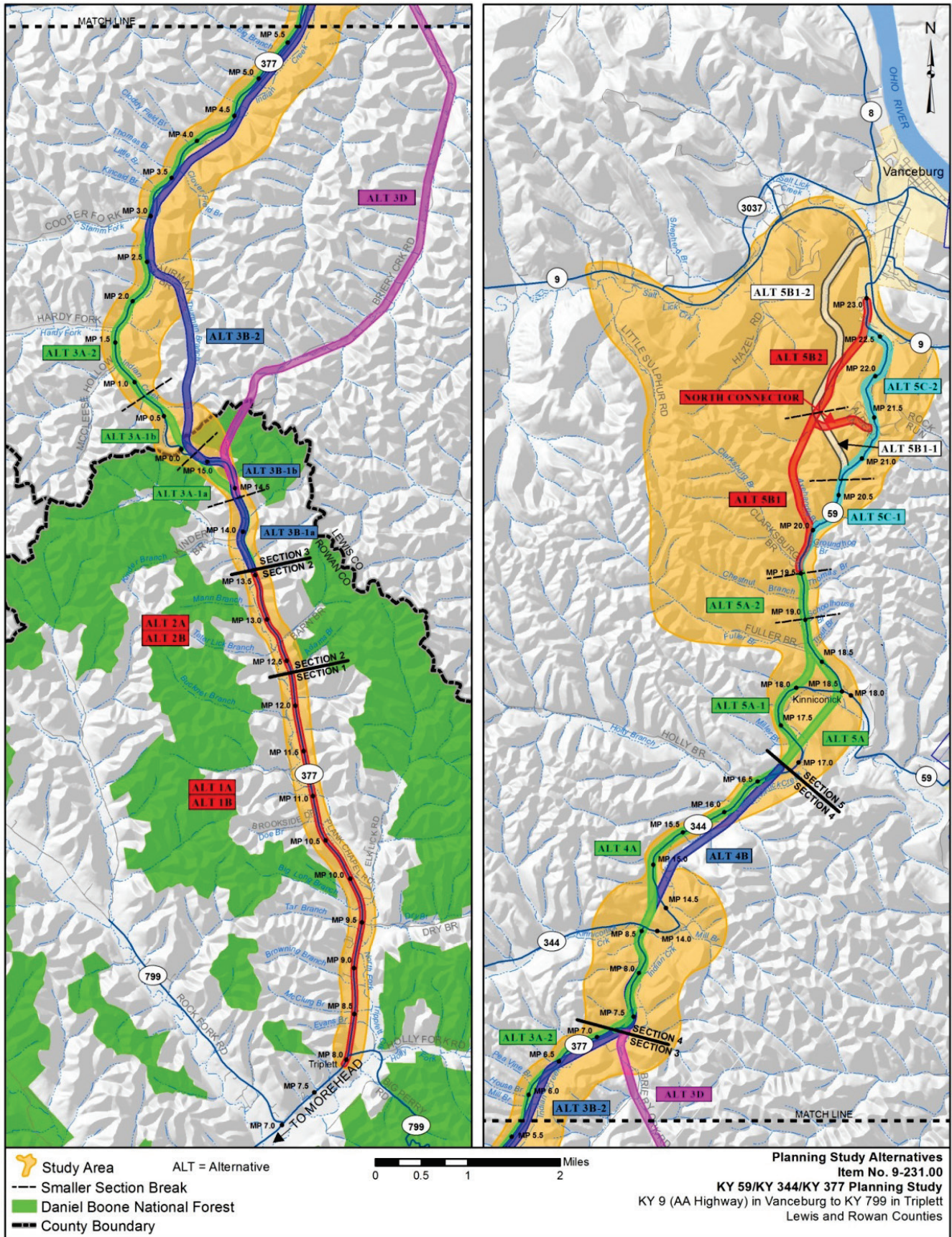


Figure ES 6: Recommended Alternatives

Priority 3–5A-2–Section 5

ALT 5A-2 would complete Section 5, from south of KY 344 (approximately MP 16.5) to KY 9/AA Highway. ALT 5A-2 is along existing KY 59 just north of the KY 344/KY 59 intersection. This section currently has 11-foot-wide lanes, generally 2-foot-wide shoulders, and one sag vertical curve that does not meet sight distance for 55 mph design criteria. The estimated cost for Priority 3 is \$5.1 million.

- ALT 5A-2 (\$5.1 million)

Priority 4–KY 344–Section 4

This section was chosen due to recurring slope/shoulder stability maintenance issues (between MPs 14.3–14.4 and MPs 15.7–15.9), a high crash spot location (MP 15.1–15.2), a flooding issue, and substandard horizontal and vertical curves. The estimated cost of alternatives/spot improvements for Priority 4 range from \$2.6 million to \$41.3 million.

- ALT 4A (\$36.5 million)
- ALT 4B (\$41.3 million)
- Spot improvements within Priority 4
 - Spot Improvement 5–Holly Branch (\$11.0 million)
 - Spot Improvement 6–Area from south of Lewis County Park to the old Jack Esham Place (\$2.6 million)
 - Spot Improvement 7–Thurman Curve (\$7.7 million)
 - Spot Improvement 10–Briery Curve (could be in Section 3 or 4) (\$4.6 million)

Sections 1, 2, and 3 are beyond foreseeable funding and therefore are considered long-term projects.