KY 194 / KY 632
Corridor Planning Study

Pike County | November 2014

KENTUCKY TRANSPORTATION CABINET

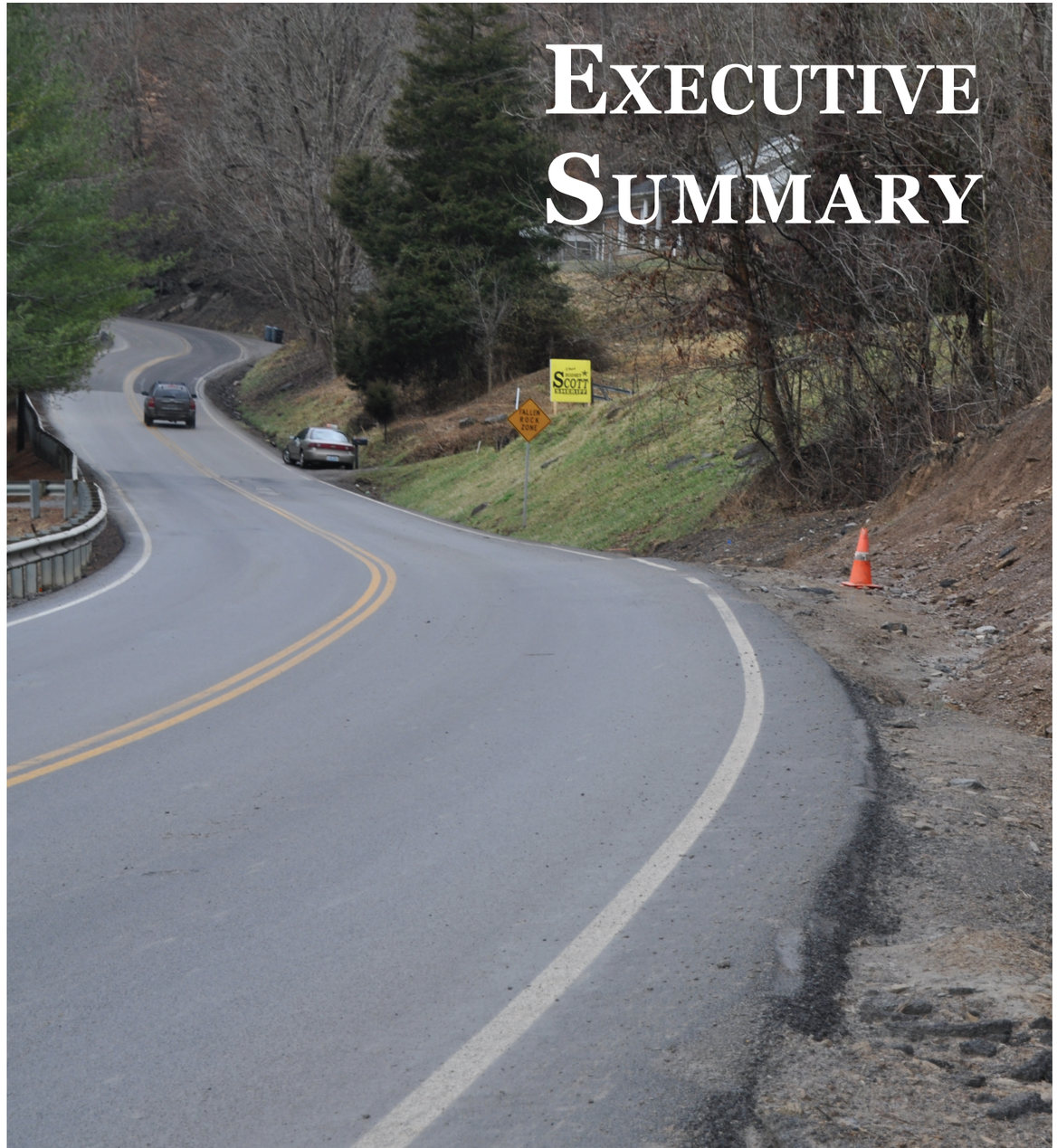
prepared for

Engineering Planning

Groundbreaking by Design.

prepared by

Executive Summary



EXECUTIVE SUMMARY

The purpose of this corridor planning study is to identify and evaluate improvements within the existing corridor on KY 194 from US 119 southeast to KY 632 in Kimper, and on KY 632 from KY 194 in Kimper east to KY 194 in Phelps, in Pike County, Kentucky (see Figure ES1, p. ES4). This study includes an inventory of existing conditions, establishes a preliminary project purpose and need, proposes and analyzes alternative improvement options, develops practical solutions and cost estimates for viable construction sections, includes public involvement activities throughout the study process, prioritizes improvements, and includes a technical report that documents the study process and overall results of the study.

US 119 in Pike County provides major interregional connections to Letcher, Harlan, and Bell counties to the southwest and to West Virginia to the northeast. Near Blackburn Bottom northeast of Pikeville, US 119 provides access to Kimper via KY 194 and to Phelps via KY 632. Several agencies of Pike County government have branch offices in Phelps and it provides access to its 1,000 residents. Nearly half of the traffic volume on US119 enters from or exits to KY194 at their junction.

Study Goals

The overall study goal is to investigate a complete reconstruction with passing opportunities every 5 miles for the proposed project's 22.7-mile-long corridor and identify associated impacts and costs. In addition, the study would identify smaller spot improvements that would fit into an overall reconstruction of the corridor. The ultimate typical section would match the typical section for Item Number 12-281.00, is two 12-foot-wide lanes and 6-foot-wide paved shoulders (adding another lane for passing in sections 1, 3, 4, and 5). For cost estimating purposes, the cut slope will be 1.2H:1V and fill slopes 2H:1V for both the full reconstruction and for the spot improvements development. The desired design speed is 55 miles per hour (mph) for a complete reconstruction alternative and 40 mph for the spot improvements. Due to the overall length of the study corridor, it was divided into five sections, each approximately 5 miles in length, with an initial focus from US 119 to just beyond the Kellogg Pikeville Plant. These sections are identified are illustrated in Figure ES2 (p. ES5).

Existing Conditions

KY 194 carries 5,800 vehicles per day (vpd) at the western end of the corridor at Bevins Branch Road and decreases to 4,900 vpd approaching Kimper. KY 632 from Kimper to KY 3419 has a low volume of 3,000 vpd. The eastern segment of KY 632 from KY 3419 to KY 194 in Phelps the traffic volume increases to 4,600 vpd. The lane widths range from 10 to 11 feet wide with a varying average shoulder width of one to four feet. In some instances, the shoulder has completely broken away and has required stabilization. The speed limit for the majority of the corridor is 55 mph; the exception is the section on KY 194 from MP 12.611 to MP 14.019, which is 35 mph. The majority of the corridor does not meet 55-mph design speed criteria. The entire corridor has approximately 15 locations that do not meet the current minimum radius criteria for 40 mph and 57 locations that do not meet the current minimum radius criteria for 55 mph. The area for which existing plans were not available had an additional 11 horizontal curves that do not meet 40-mph design speed criteria and 26 that do not meet 55-mph design speed criteria. According to KYTC's Adequacy Ratings (measure of roadway condition, safety and capacity) 91% of the length of the corridor ranks lower than 93 to 96% of similar roadways in Kentucky. There are also 3 bridges along the corridor that are considered functionally obsolete by KYTC with one posted for load restrictions that District 12 staff recommends for replacement.

Crashes

There are 8 0.3 mile spot locations (some overlap) with Critical Crash Rate Factors (CCRF) greater than or equal to 0.95. A CCRF greater than or equal to 1.0 indicates that crashes may not be occurring randomly (see Figure ES3, p.ES6). The cause of those crashes can be summarized by the following:

- Lost control in a curve
- Lost control
- Majority were on wet pavement.

Traffic

The 2013 Average Daily Traffic (ADT) volumes ranged from 5,800 vehicles per day (vpd) on the western end of the corridor decreasing to 3,000 vpd in the middle, and then increasing from KY 3419 to KY 194 in Phelps to 4,600 vpd. The current and future Level of Service (LOS) for the corridor is D due to the high percentage of time spent following by vehicles, although the v/c ratio is well under 0.5 indicating a facility operating well under capacity. Due to the high percent time following, passing lanes were analyzed in each section to provide for motorists to maneuver around slow moving or large vehicles. Although, the Highway Capacity Software does not show improvement in the levels of service or percent time spent following, limited passing results in driver frustration and unnecessary risks taken by impatient drivers. No additional traffic is expected over normal growth because of any proposed improvements. Eight intersection locations were counted to determine necessary improvements. Each intersection operates at LOS B or C in both the current and design year with the exception of the intersection of KY 632 and KY 194 in Phelps which will operate at LOS F in the design year 2040. However, the intersection delay is only 63.3 seconds. Turn lane warrant analyses were conducted for the current (2013) and design year (2040) for 8 intersections. A left turn lane at the Kellogg Plant employee entrance (easternmost entrance) and the entrance at Kimper Elementary were warranted in the current year due to the AM peak design hour. In 2040, the following turn lanes were warranted:

- KY 194/KY 632 intersection at MP 26.70 / MP 0.00 (very close left and right turns)
- KY 632/Phelps Elementary School (right and left)
- KY 632/KY 194 in Phelps (left)

The existing (2013) and 2040 No Build traffic is shown in Figure ES4 (p.ES7).

Environmental Concerns

A literature search of known environmental features and several windshield surveys revealed the following areas of concern:

- For much of its length, KY 194/KY 632 is located parallel to John's Creek and Peter Creek

- Endangered Species
  - Indiana bat (*Myotis sodalis*; federally endangered)
  - Gray bat (*Myotis grisescens*; federally endangered)
- 10 mine portals within or immediately adjacent to the study area providing potential winter roosting habitat for the Indiana and Gray bats.
- Available geologic mapping indicates that the project is underlain by bedrock of the Breathitt Formation. The Breathitt Formation consists of shale, limestone, siltstone, sandstone, coal and clay. The sandstones can be friable and shales highly weatherable. Detailed study of potential structure locations would need to include an evaluation of past mining activities.
- Deep mines encountered during construction likely will contain water. Measures to mitigate project-related impacts to mining areas would likely be required, depending on the nature of the impacts. It is also likely that areas of uncompacted or loosely compacted mine spoil exist in the area. These areas can be problematic for road construction.
- Existing slopes have shown movement in the past and it is likely that many of the existing soil slopes range from marginally stable to unstable. Wet areas could require undercutting and the replacement of soils.
- Several locations were identified through windshield surveys that appeared to have potential Environmental Justice concerns.
  - There are old abandoned gas stations, along with new gas stations that would be a concern for underground storage tanks (UST) leakage. However, no leaking of USTs was observed during a field review. There are also many businesses that appear to be truck, tire and/or car repair shops that could possibly use or store contaminated materials.
  - Five cemeteries and at least 44 buildings were identified during the survey. Some of the buildings identified as residences may also have associated outbuildings.

Purpose and Need

The purpose of this project is to improve safety, mobility, and connectivity for travelers along the 22.7-mile KY 194/KY 632 corridor from US 119 to Phelps in Pike County. Both KY 194 and KY 632 are classified as rural minor arterials. This corridor provides a connection for those travelers from Phelps and areas further east to US 119, which leads to Pikeville.

The need for reconstruction and / or spot improvements for KY 194 and KY 632 is characterized by 10-11 foot driving lanes, narrow or no shoulders in locations, numerous deficient horizontal (approximately 83) and vertical curves (over 36) not designed for 55 mph, and issues with breaks or slides in the pavement along the route. Due to the coal mining operations in the area and on KY 194 and KY 632, large trucks carrying equipment travel the corridor. Drivers of these large trucks often must swerve out of their lane to negotiate a curve, thereby crowding the drivers in the opposite oncoming lane. There are three schools located within the study area and, therefore, full-size buses are frequently on the corridor and the narrow roadways give the drivers little room for error. Within a three-year period between 2010-2012, there were 31 0.3 mile spots (8 critical locations with overlapping 0.3 mile high crash spots) with CCRFs > 0.95, indicating the potential that the crashes may not be occurring at random. Some of these spots had as many as 10 crashes in a single location. Over 70% of the crashes occurred in horizontal curves and 55% in wet pavement conditions.

Early Stakeholders' Meetings

Three early Stakeholders' Meetings with industry along the corridor were conducted as part of this study. Each supported improvements along the corridor and identified their areas of concern. All noted wet pavement was an issue and recent high friction pavement used by KYTC seemed to help to reduce crash occurrences. At each meeting, the westbound segment on KY 632 from MP 2.70 to MP 3.20 was consistently identified as a concern. At this location, a westbound passing lane transitions back to one lane at a sharp horizontal curve.

Improvement Options

Utilizing the existing corridor (see Figure ES5, p. ES8), each of the five sections has one Total Reconstruction alternative with passing lanes in Sections 1, 3, 4, and 5. Section 2 has long tangent opportunities for passing without the addition of lanes. The Total Corridor Reconstruction alternative from MP 18.6 on KY 194 to Phelps is estimated to cost $256M (see Table ES1, p. ES9). In today's economy rarely are major corridors of this length slated for overall improvement. Therefore, spot improvements totaling $48.5M were identified that could be implemented as funding becomes available or designated for the corridor. The spot improvements are shown on Figure ES6 (p. ES10). Additionally, safety improvements totaling approximately $3,051,000 were identified. These include guardrail ($380,000), high friction pavement at 7 locations ($1,130,000), and replacement of 3 bridges ($1,541,000).

LOS calculations show even with the proposed improvements, the LOS for the corridor is still D; however, there is an improvement of the average travel speed (ATS) that ranges from 1 mph to 5 mph (see Figure ES7, p. ES11). Using general Crash Modification Factors for Rural, 2-Lane Roads in the Highway Safety Manual and from the Crash Modification Factor Clearinghouse, increasing roadway width from an average of 10.5 feet to 12 feet can be expected to reduce single vehicle run-off-the-road and multiple vehicle head-on, and same and opposite direction sideswipe crashes by 17%. Increasing shoulder width from an average of 3 feet to 6 feet is expected to reduce all crashes by 25%. Thus, overall crashes could be expected to be reduced by at least 25%.

Additional Stakeholders' Meetings

Two Local Officials/Stakeholders' Meetings were held as a part of this project. The first meeting consisted of representatives from Kellogg, KYTC, the Pike County Government, Fiscal Court, Emergency Management, KY Berwind Land, the Ross Harris Group, and BSADD. The meeting was held to solicit concerns along the project corridor, and to present the existing conditions inventory to the group. The items of discussion or concerns are listed below:

- Advocated the use of "coal to roads to fund construction"
- Entrances
- Blind curves
- Deep ditches

- Flooding
- Lack of shoulders
- Slow moving trucks causing congestion
- Issues with trucks entering and exiting the roadway
- The need for three-lane passing opportunities, turn lanes at Kellogg's
- Possible high friction surface
- The potential to utilize coal seams and leave the existing road in place
- The need for jobs
- The "community is due" because of the large amount of coal that has been removed from this area, and issues with utilities
- Location of water lines is critical
- Bypass existing KY 194 beginning at US 119, and then proceed along a new alignment either north or south of the existing roadway, connecting back to existing KY 194 near the Kellogg's Plant. This option was previously discussed with the District 12 staff, and it was dismissed from consideration due to the impacts on the operation of the existing interchange, the potential for a new interchange construction, impacts to mining operations, and increased project costs due to additional excavation required.

The second meeting, presented improvement options and cost estimates. Again, proceeding with new alignment and working with coal companies to use part of their roads was voiced since improving the existing road only improved the speeds up to 5 mph and did not improve the LOS.

Project Team Meetings

Two project meetings were held on the same day prior to the aforementioned stakeholders' meetings. The following were significant discussion items.

For Section 1

- Increase the estimated bridge cost/square foot from $80 to $120.
- Increase the earthwork cost/cubic yard from $5 to $6 on the Total Reconstruction alternative due to the manner that material must be handled, and the proximity of the work to the existing road.
- Increase the Maintenance of Traffic cost from $43,000 to $150,000.
- Add a line in the estimate specifically for in-lieu fees.

For the remaining corridor

- District 12 staff requested to add the bridge replacement in Kimper to the spot improvements. This bridge continually presents issues for District 12.
- Document the number of miles of road that would be abandoned by the reconstruction of each section.
- In-lieu fee rates were recently raised to $600–$650 per linear foot; therefore, it was suggested using a placeholder for in-lieu fees for waste areas (perhaps $500,000–$750,000); or a cost/lineal foot for a small, medium, and large project in District 12, and perhaps for each Section 1 through 5 use a ratio for the in-lieu fees based on the cubic yards of excavation and add that cost as a footnote in the cost estimate summaries.
- In future phases, a lesser typical section for the spot improvements would potentially save at least 15%.

Prioritization and Recommendations

Various factors were considered in developing recommendations for the priority of the Total Reconstruction alternatives, including: current and future traffic volumes (including truck percentages), horizontal and vertical curve deficiencies, cost, and the estimated increase in average travel speed resulting from improvements, environmental concerns, utility issues, and the number of right-of-way parcels affected. The top priority is Section 1. During this study, Section 1 was included in the approved Final April 2014 Highway Plan (FY 2014-2020) as Item Number 12- 198.00. Because the Highway Plan is only funded for the first two years, it is recommended that this project continue funding through to construction before other Reconstruction alternatives commence.

Due to the overall economy and other transportation needs across the Commonwealth, Section 1 is the only Total Reconstruction alternative recommended at this time.

However, several spot improvements are recommended for implementation as funding becomes available. Spots considered for geometric improvements were identified based on crash history and stakeholder input. The following priorities were recommended:

- Installing high friction pavement at high crash locations
- Upgrading existing guardrail (locations provided to District 12 staff) end treatments
- Replacement of functionally obsolete structures
- Spot 8 in Section 3 identified by all stakeholders as a problem area

These recommendations were developed in concert with the project team and District 12 maintenance staff. However, as the projects move forward, that coordination should continue.

If funding became available for the entire corridor, improvements should continue from west to east (Section 2, 3, 4, and 5).

The recommended corridor priorities are shown in Figure ES8 (p. ES12).

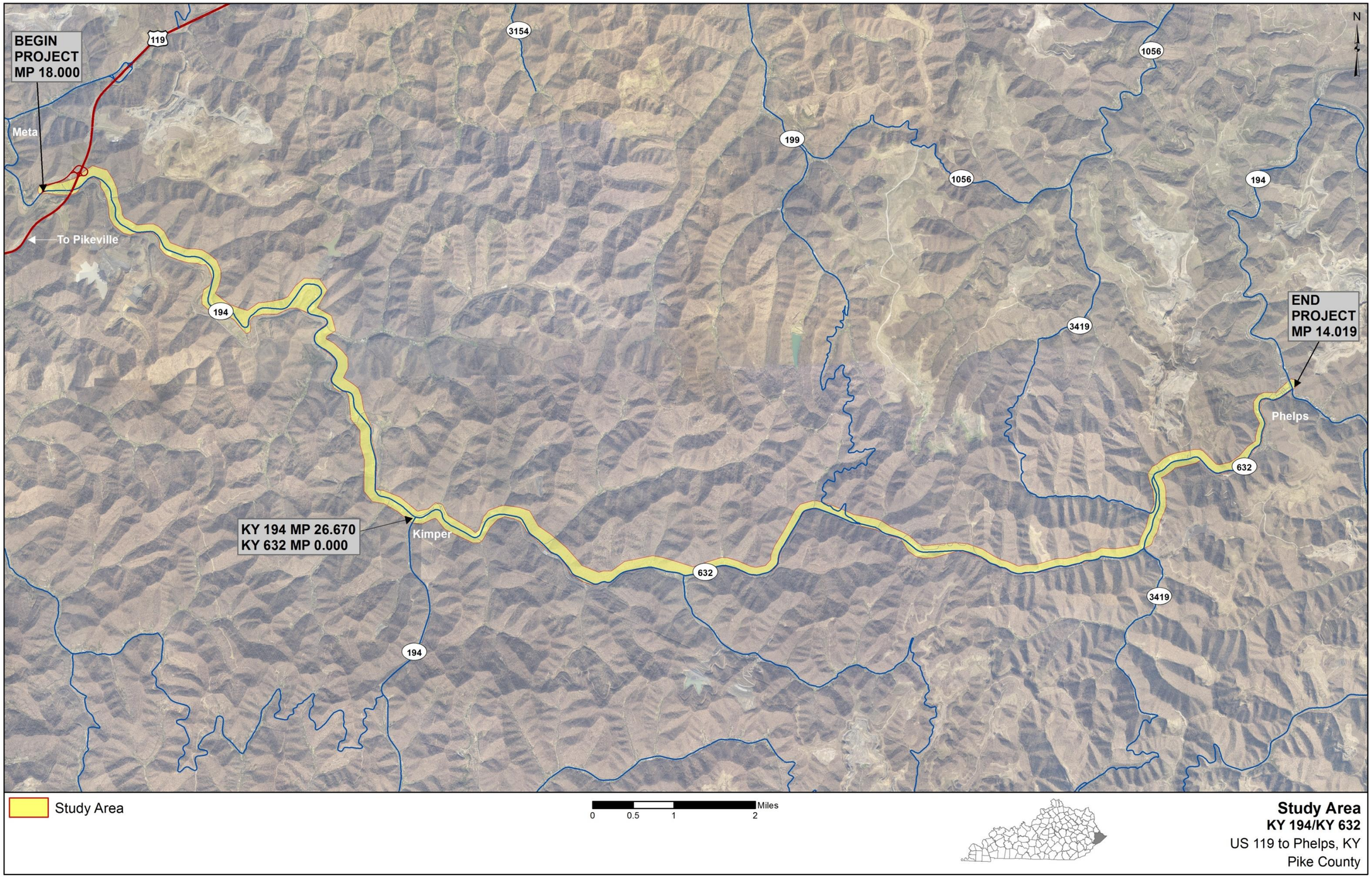


Figure ES 1: Study Area

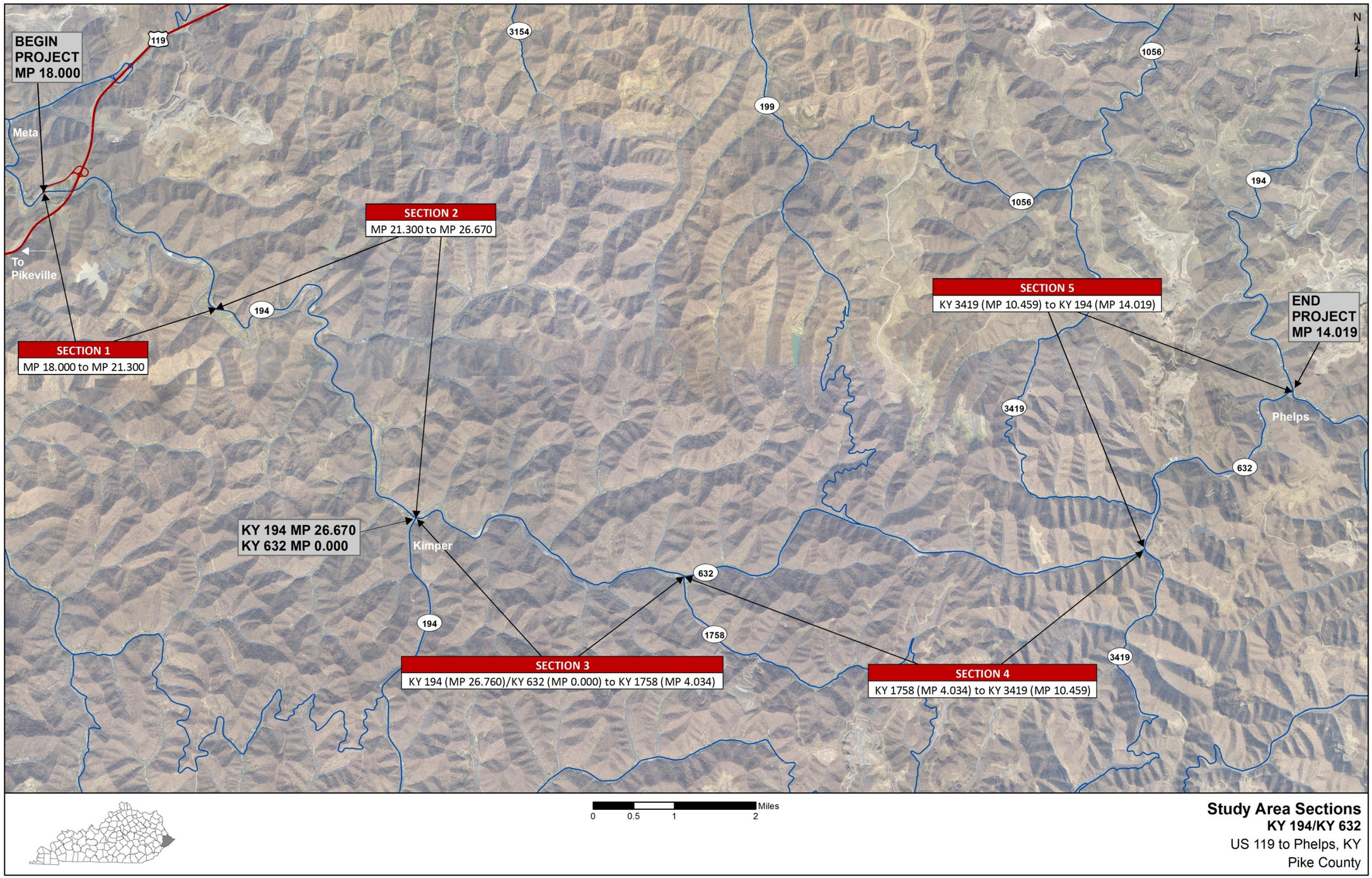


Figure ES 2: Study Area Sections

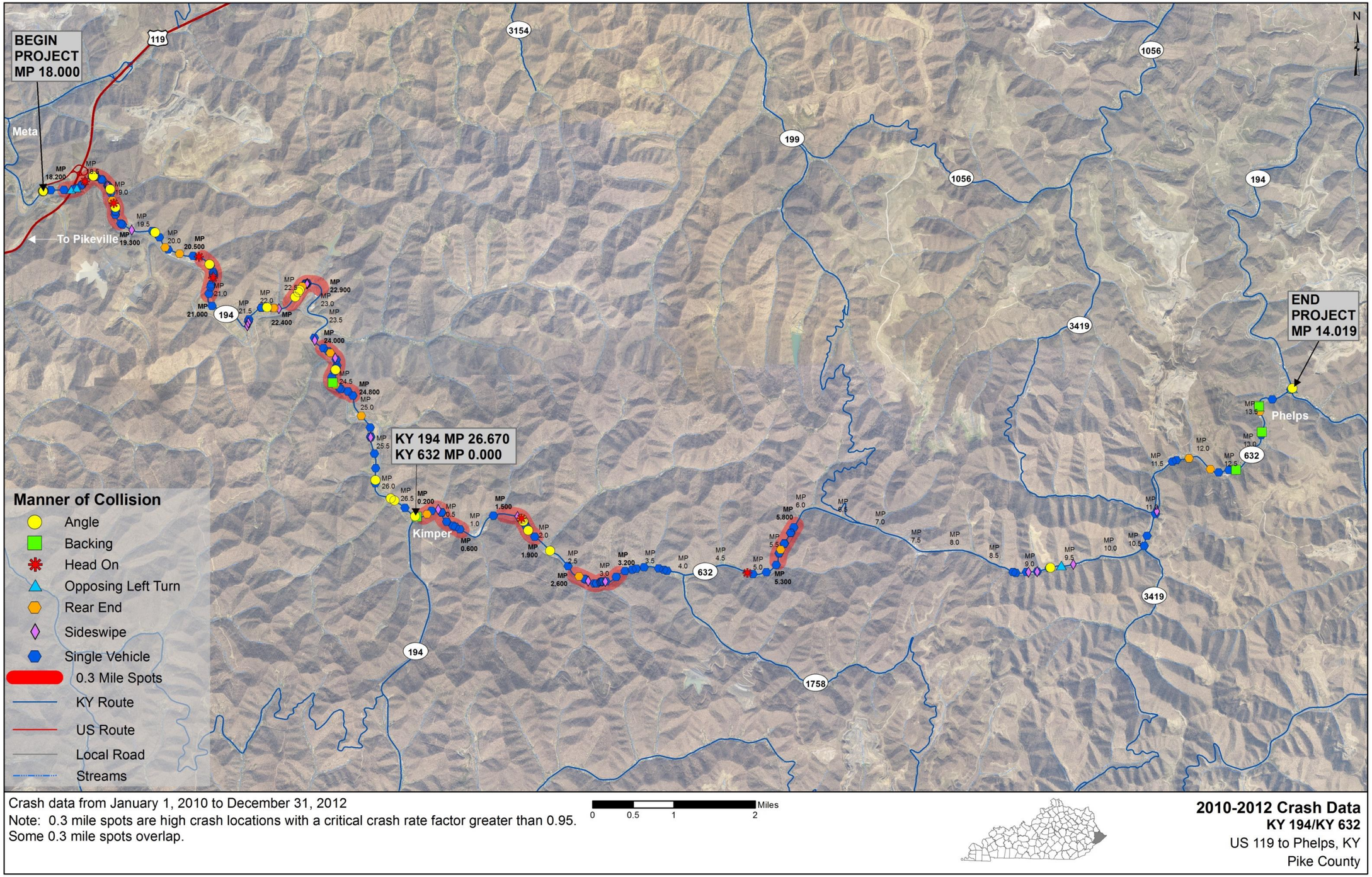


Figure ES 3: 2010-2012 Crash Data

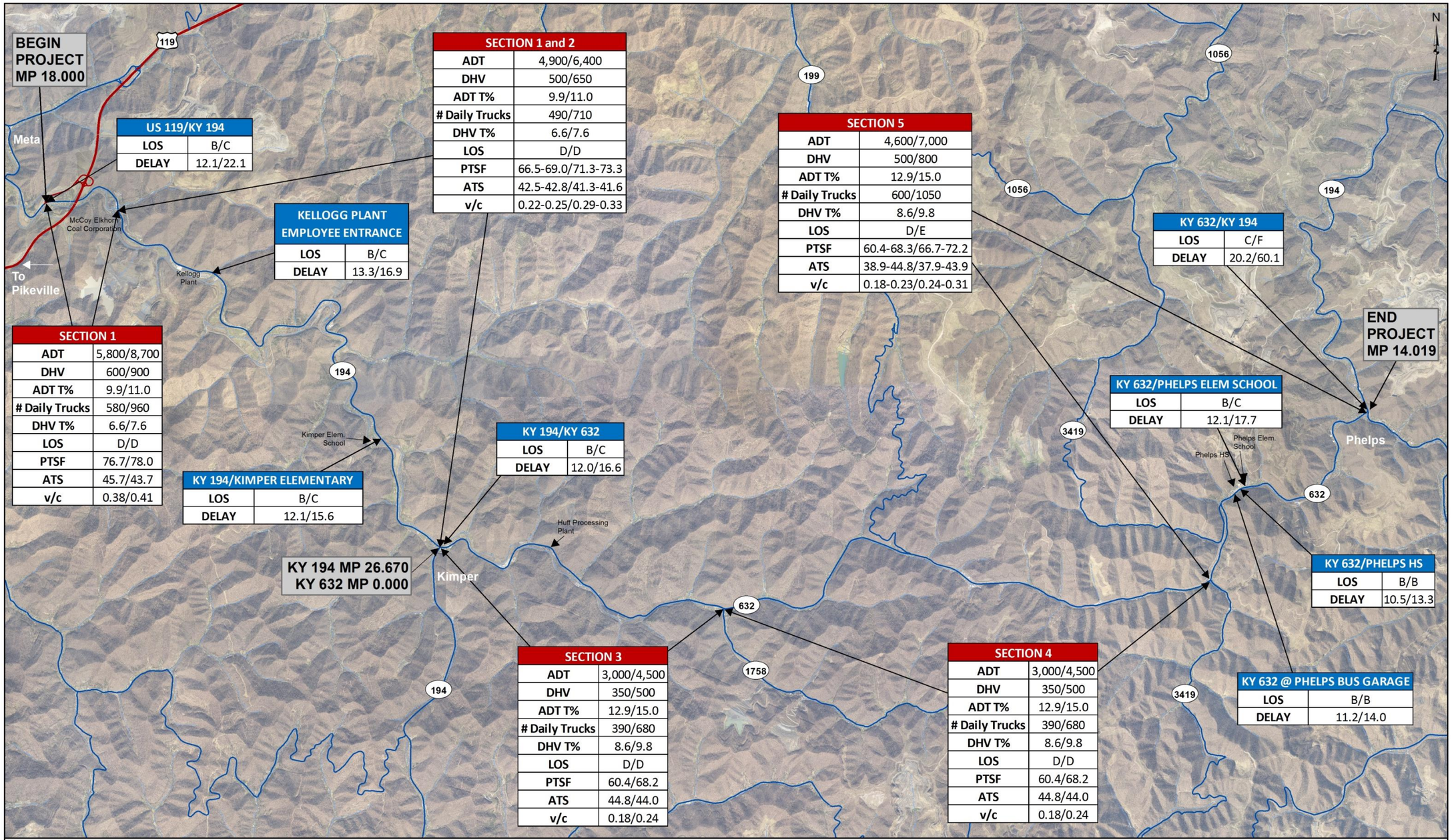


Figure ES 4: 2013 (Existing) and 2040 No Build Traffic Characteristics

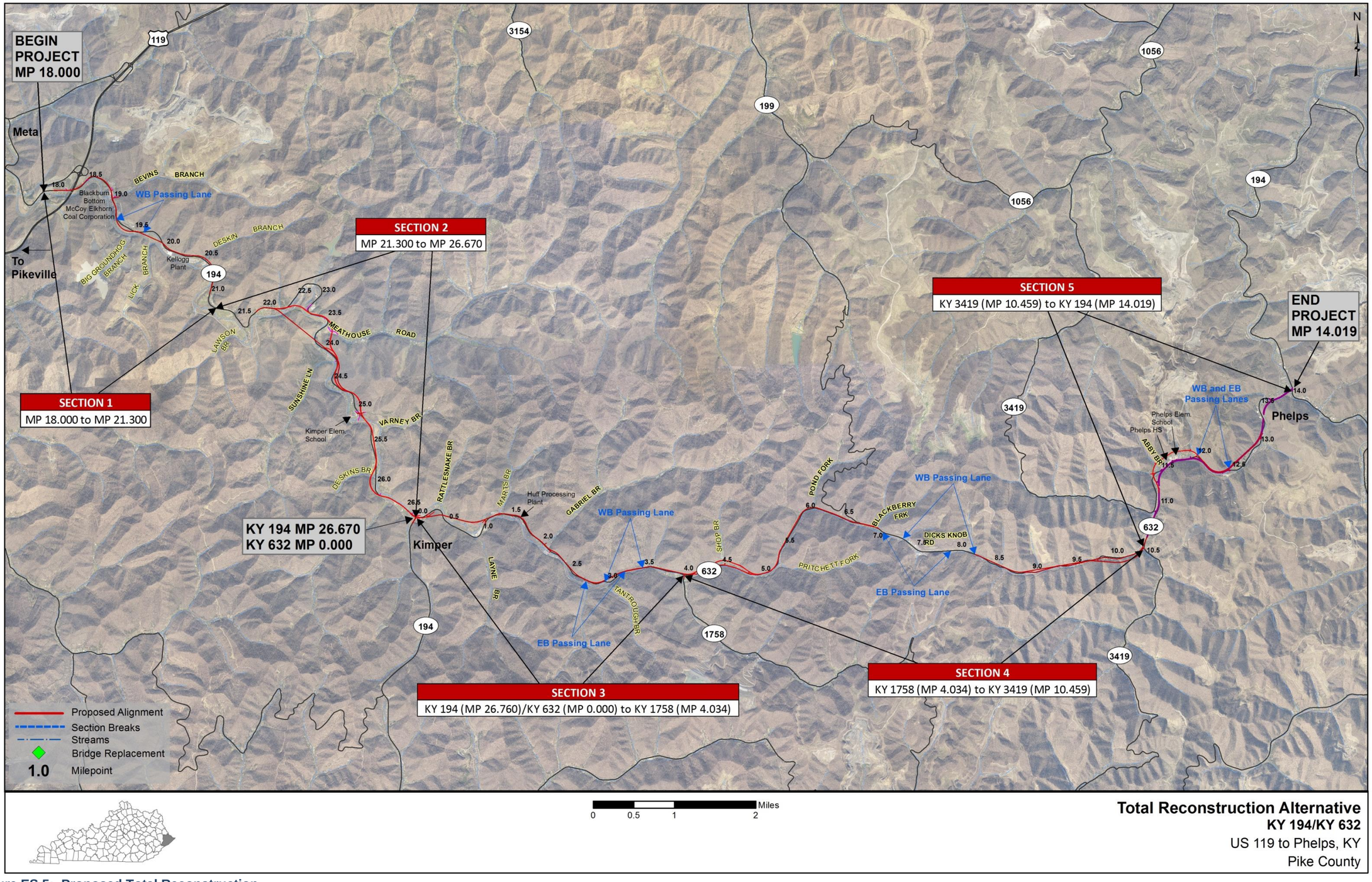


Figure ES 5: Proposed Total Reconstruction

Table ES 1: Total Reconstruction Sections Cost Estimate Summary

		Total Reconstruction Sections Cost Estimate Summary				
Phases	No-Build Alternative	1	2	3	4*	5
Length (miles)**		2.30	3.99	3.79	5.22	3.11
Milepoints *(approximate project limits)**		MP 18.68 to MP 20.98	MP 22.00 to MP 27.00	MP 0.21 to MP 4.00	MP 4.20 to MP 10.50*	MP 10.50 to MP 14.00
Design	$0	$2,000,000	$5,700,000	$3,200,000	$2,300,000	$3,000,000
Right-of-Way	$0	$2,000,000	$3,500,000	$3,300,000	$4,500,000	$2,700,000
Utilities	$0	$1,500,000	$2,600,000	$2,500,000	$3,400,000	$2,100,000
Construction	$0	$14,139,000	$78,720,000	$44,300,000	$32,100,000	$42,100,000
Total	$0	$19,639,000	$90,520,000	$53,300,000	$42,300,000	$49,900,000
Waste Area In Lieu Fee****	$0	$910,000	$910,000	$4,095,000	$1,040,000	$1,560,000

Note:

*Section 4 ties into an existing WB and EB passing lane that is approximately 1.2 miles in length.
**The length represents the length of the improvement.
***Milepoints represent the approximate termini of each reconstructed section given today's MPs. They will not match the project length.
**** Waste Area in lieu fees are not included in the total above and are estimated at $650.00/LF.

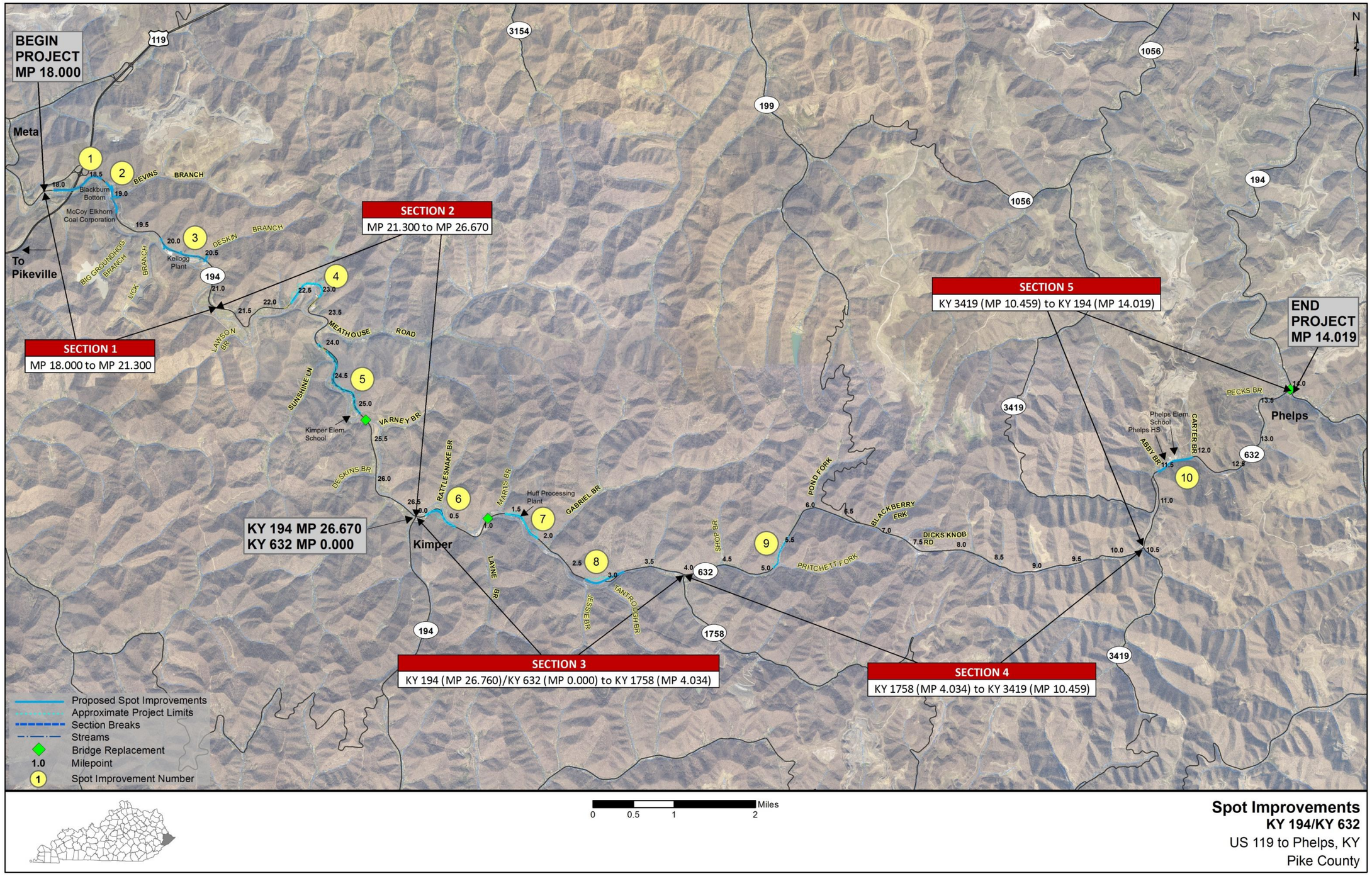


Figure ES 6: Proposed Spot Improvements

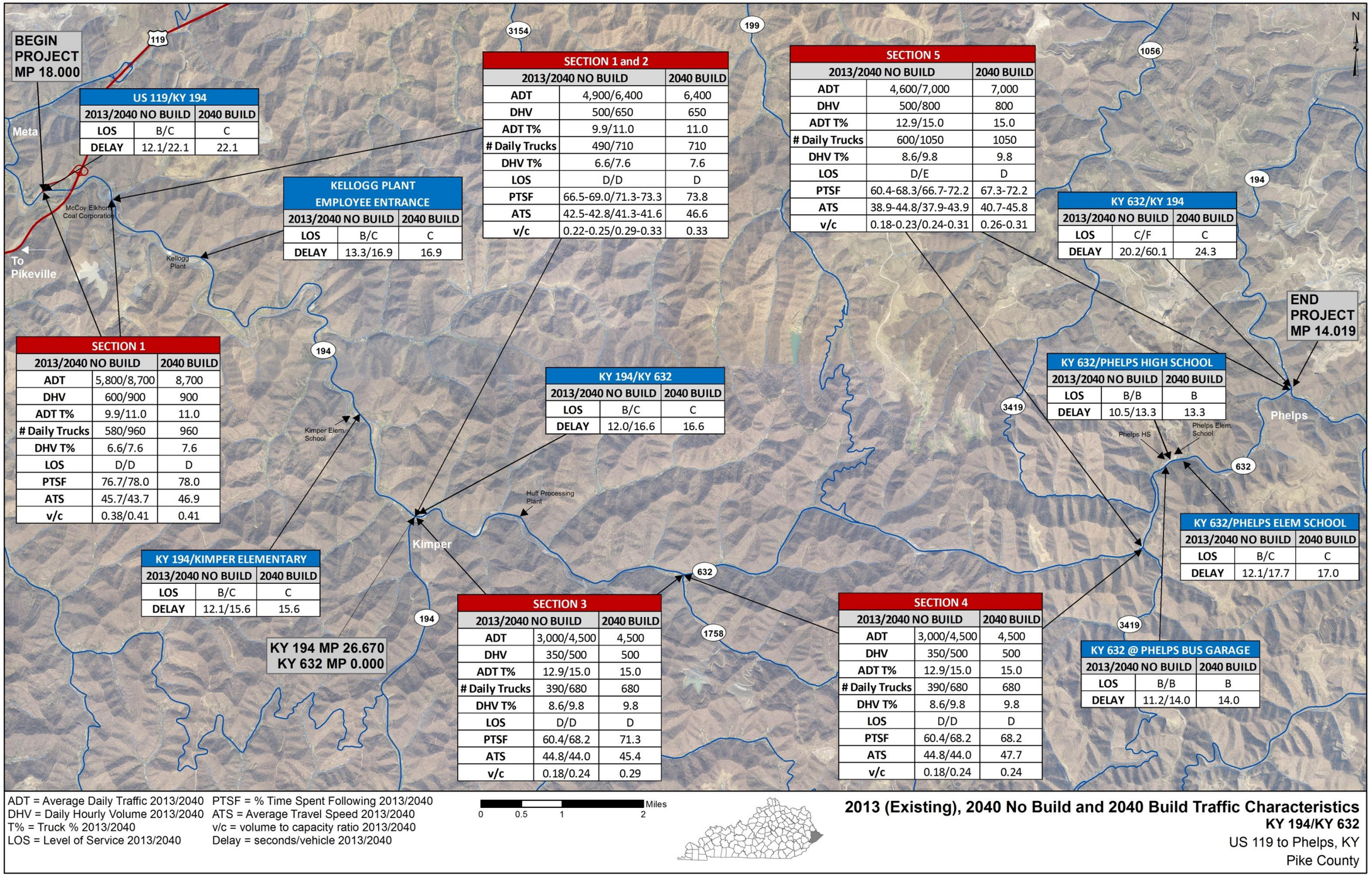


Figure ES 7: 2013 (Existing), 2040 No Build and 2040 Build Traffic Characteristics for Total Reconstruction

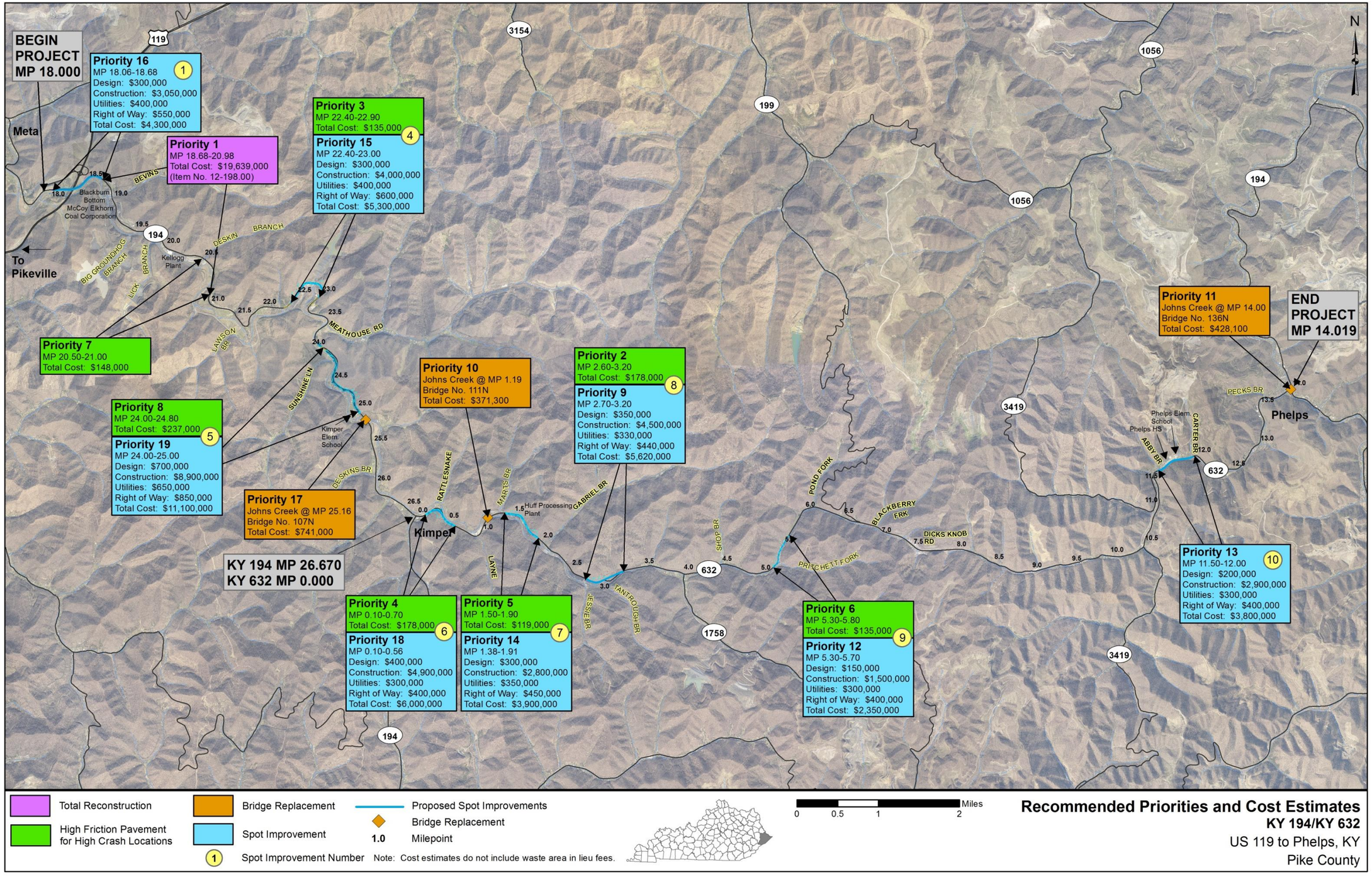


Figure ES 8: Recommended Priorities and Cost Estimates