

Executive Summary

The AA Highway Improvements Study was initiated in August of 2019 by the Kentucky Transportation Cabinet (KYTC) to identify and evaluate potential improvement concepts to improve overall safety and operational performance of the AA Highway (KY 9 / KY 10). The study limits encompass KY 9 from the Campbell / Pendleton County line to the city of Grayson (KY 1) and KY 10 from the city of Vanceburg to US 23 in Greenup County for a total of approximately 120 miles.

Illustrated in **Figure ES 1**, the study area encompasses the AA Highway (KY 9 / KY 10) through Pendleton, Bracken, Mason, Lewis, Greenup and Carter Counties. At intersections, the approaches were evaluated as necessary to determine improvement concepts. The mainline AA Highway was evaluated within right-of-way limits unless additional evaluation was deemed necessary for evaluation / refinement of improvement concepts.

During the course of the study, multiple collaborative meetings were held. The meetings with the Project Team were conducted to discuss study progress and next steps. The meetings with local officials / stakeholders (LO/S) were an opportunity to share study information and gather input from various perspectives on identifying areas of concern, developing potential improvements, and providing input on prioritization. The initial meetings with the Project Team (January 2020) and LO/S (February 2020) provided an opportunity to review objectives of the study, present and discuss the existing conditions information, and collect initial input for the improvement concept development process.

Each high crash location (CRF greater than 1.0) and location identified as a concern by the local officials / stakeholders was examined to determine if improvements were appropriate. Values for Excess Expected Crashes (EEC) were calculated and used as a secondary analysis as the transition from CRF to EEC analysis was underway during this study. Information was compiled for each location including:

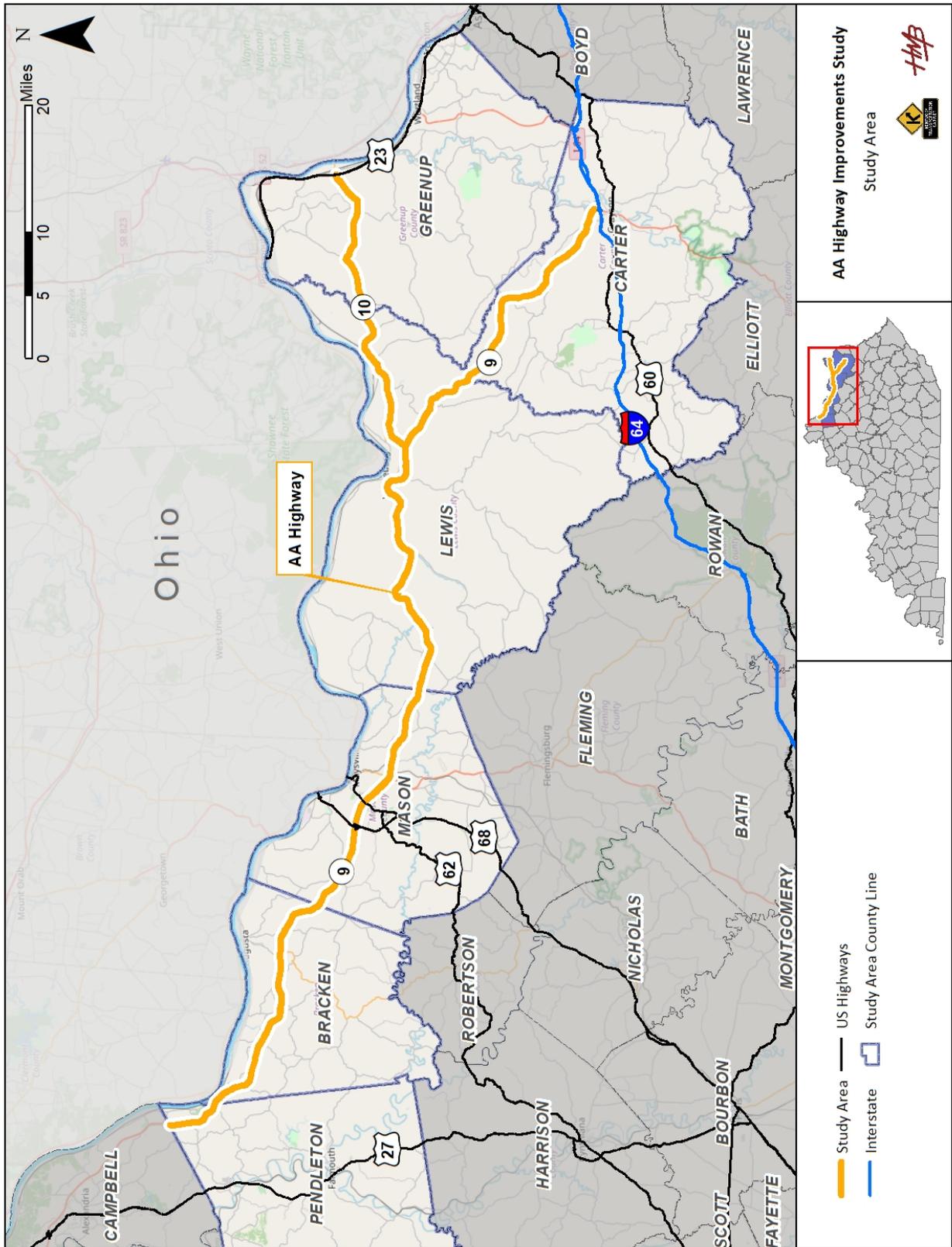
- 2020 AADT
- Truck %
- Speed Limit
- Number of Lanes
- Lane Width
- Shoulder Width
- Lighting
- Median Width
- Presence of Auxiliary Lanes
- Crash Rate (CRF and EEC)
- Existing CHAF
- Number of Local Officials / Stakeholder Responses
- Geometric Issue

Additionally, if a project had previously been identified in a CHAF, SUA, HSIP, Preventative Maintenance, or Highway Plan, but did not have a high crash rate or was not identified by the local officials / stakeholders, it was still included in the initial list of locations. The review of this initial list helped determine the need for the previously identified project to carry forward to a refined set of locations and improvement concepts.

Reconstruction or widening sections or the entirety of the AA Highway was not included as part of the initial list of locations or corridor needs. Through the technical analysis and discussions with the local officials / stakeholders, it was determined that capacity is not an issue with operations in the study area. Local officials / stakeholders expressed a desire for spot improvements, particularly turn lanes. Reconstruction or widening was not identified as a priority. Therefore, this study focuses on spot improvements and corridor treatments to address identified issues.

With a comprehensive initial list of possible improvement locations, the next step was to refine the list of locations. To do so, additional information was collected including detailed crash records, intersection turning movement counts and existing signal timing. Locations with similar issues were also consolidated into one project if possible. Improvement concept categories considered for spot improvements generally included:

Figure ES 1. Study Area



- Turn Lanes at Intersections
- Modifications to Truck Climbing Lanes
- Signage and / or Striping
- Access Management
- Enforce or Adjust Speed Limits
- Pavement Rehabilitation / Management
- Lighting

For each identified spot, segment, and corridor concept, improvement strategies were further developed and refined. Traffic forecasts were prepared for the future year 2045, planning-level cost estimates were further developed and refined, and a high-level benefit-cost analysis was completed.

A second set of local officials / stakeholder (LO/S) meetings were held virtually in July 2020 to present and collect input on the refined set of project locations and improvement concepts. Attendees were asked to review the project locations and improvement concepts and categorize them based on high, medium, and low priority. From these meetings, an additional location was added to consider improvements – the intersection of the AA Highway and KY 2523 (Lions Lane). The data does not show a history of crashes; however, there is concern regarding the perceived potential for crashes by local officials and stakeholders. This intersection provides access to the Lewis County Middle and High Schools with several young and inexperienced drivers travelling through the intersection.

From this process, a final list of 28 individual spot or segment locations and seven corridor-wide recommendations were developed. The prioritization is broken down by the following categories.

- **Short-Term** projects included those that are either relatively low-cost or can be implemented relatively quickly using KYTC resources such as maintenance activities. These projects would not need to go through the SHIFT process to be constructed. There were 12 total Short-Term projects. **Table ES 1** lists the project location and improvement concepts for this category. Also included is the additional concept location at Lions Lane (KY 2523) and the AA Highway (KY 9). It was not included in the prioritization process but should be included in this category given the additional nearby development and roadway modifications / development for the school complex.
- **High Priority** projects included those that were overall in a higher tier of ratings based on crash history, benefits-cost analysis, and local official / stakeholder input. There were 7 total High-Priority projects. **Table ES 2** lists the project location and improvement concepts for this category.
- **Medium Priority** projects included those that were overall in the middle tier of ratings based on crash history, benefits-cost analysis, and local official / stakeholder input. There were 5 total Medium-Priority projects. **Table ES 3** lists the project location and improvement concepts for this category.
- **Low Priority** projects included those that were overall in the lowest tier of ratings based on crash history, benefits-cost analysis, and local official / stakeholder input. There were 3 total Low-Priority projects. **Table ES 4** lists the project location and improvement concepts for this category.
- **Other** projects included those that are broader in nature (i.e. corridor-wide or a longer segment), consolidated projects, or policy-based. There were 7 total Other projects. **Table ES 5** lists the project location and improvement concepts for this category.

Table ES 1. Short-Term Projects

|  | Improvement Description |  Cost (2020 Dollars Including DRUC) |
|---|---|---|
| D Bracken KY 875 | <ul style="list-style-type: none"> Add advanced intersection warning signage. Add advance bridge warning and "Bridge Ices Before Road" signage. Add Drains to Bridge | \$12,500 |
| G Mason KY 435 | <ul style="list-style-type: none"> Add wet roadway condition warning signs. Evaluate drainage further at this intersection. Surveying will be required to determine areas that need to be addressed further. Add open graded high skid-resistance overlay. | \$85,000 |
| H Mason Downing Dr | <ul style="list-style-type: none"> Evaluate and improve signal timing and phasing. Add advance intersection signage. This intersection is included in concept AB which lowers the speed limit to 45 mph just west of this intersection. | \$10,000 |
| L Mason KY 1448 | <ul style="list-style-type: none"> The widening improvement for concept K extends through this intersection. Add advanced intersection warning signage. Add dual red signal heads. | \$20,000 |
| S Lewis Garrard Rd | <ul style="list-style-type: none"> Modify striping to double yellow to restrict passing EB from MP 30.700 to MP 30.075 and westbound from MP 29.900 to Garrard Road. Install "No Passing" signage. Add advanced intersection warning signage. | \$10,000 |
| T Lewis KY 57 | <ul style="list-style-type: none"> Add flashing yellow arrow for KY 9 left turn movements. Add advanced intersection warning signage for KY 57 vehicles. Adjust signal timing. | \$25,000 |
| U Lewis KY 59 | <ul style="list-style-type: none"> Add advanced warning signage. Add Intersection Collision Warning System (ICWS) "Traffic Entering When Flashing" signs on KY 9 to alert drivers there is traffic present. | \$35,000 |
| W Greenup KY 7 | <ul style="list-style-type: none"> Add advanced intersection warning signage. Add Intersection Collision Warning System (ICWS) "Traffic Entering When Flashing" signs on KY 10 to alert drivers there is traffic present. Consider addition overhead lighting. | \$40,000 |
| X Greenup US 23 | <ul style="list-style-type: none"> Add backplates to signals. Add dual red signal heads. Improve signal timing. Add fog warning signage. | \$30,000 |
| Y Carter KY 7 (North) | <ul style="list-style-type: none"> Add stop bar on KY 7. Add advance intersection warning signage. Stripe a No Passing Zone through the intersection. Install "No Passing" signage. Consider addition of overhead lighting. | \$10,000 |

Table ES 1. Short-Term Projects (cont.)

|  | Improvement Description |  Cost (2020 Dollars Including DRUC) |
|---|--|--|
| <p>Z Carter KY 7 (South)</p> | <ul style="list-style-type: none"> Begin the EB truck climbing lane after the intersection and convert the existing climbing lane to EB left turn lane. | \$10,000 |
| <p>AA Carter KY 1959</p> | <ul style="list-style-type: none"> Add advanced warning signage for the WB truck climbing lane drop. Enhance median striping to help clarify the westbound truck climbing lane has ended and the WB left turn lane begins. | \$10,000 |
| <p>AI Lewis Lions Ln</p> | <ul style="list-style-type: none"> Add a second SB lane on Lions Lane Add "Do Not Block Intersection" signage | \$65,000 |

Table ES 2. High Priority Projects

|  | Improvement Description |  Cost (2020 Dollars Including DRUC) |
|---|--|--|
| <p>J Mason US 62</p> | <ul style="list-style-type: none"> Narrow lane widths and add an extra lane in the EB, WB, and SB approaches so the signal phasing can be optimized for traffic. This includes a dedicated WB right turn and left turn for the EB and SB approaches. The NB did not warrant an extra lane. Continue to monitor access control issues after intersection improvement, or consider converting entrances as right-in, right-out only. | \$2,575,000 |
| <p>V Lewis KY 1306</p> | <ul style="list-style-type: none"> Add advanced warning signage. Add dual stop signs on KY 1306 approaches. Evaluate clear zone along the northern side of KY 10 between MP 11.800 and MP 11.900 and clear trees or add guardrail. Add EB and WB left turn lanes to improve safety. Consider addition of lighting. | \$670,000 |
| <p>M Mason KY 11</p> | <ul style="list-style-type: none"> Construct dedicated EB right turn lane to improve safety and meet vehicular traffic (warranted for 2020 volumes). Consider addition of a second NB left turn lane to improve operations and meet vehicular demand. Improve signal timing / Add advanced warning signage. This intersection is included in concept AB. | \$995,000 |
| <p>I Mason Kenton Station Dr</p> | <ul style="list-style-type: none"> Construct WB right turn lane (warranted for 2020 volumes). Evaluate and improve signal timing. Widening the roadway and the reconstruction of the roadside ditch could result in significant impacts. This would need to be evaluated further with surveying. Consider addition of overhead lighting. | \$645,000 |
| <p>N Mason Knoweshaw Rd</p> | <ul style="list-style-type: none"> Construct EB right turn lane to improve safety. Improve intersection signage. Add stop bars on side street. Consider addition of lighting. | \$450,000 |
| <p>F Bracken KY 19</p> | <ul style="list-style-type: none"> Add advanced intersection warning signage. Add oversized dual stop signs. Offset KY 9 left turn lanes in the positive direction. | \$320,000 |
| <p>P Mason KY 1449</p> | <ul style="list-style-type: none"> Add advanced intersection warning signage. Construct right turn lanes and positive offsets for left turn lanes to improve safety. | \$490,000 |

Table ES 3. Medium Priority Projects

|  | Improvement Description |  Cost (2020 Dollars Including DRUC) |
|---|--|---|
| K Mason Walmart | <ul style="list-style-type: none"> Widen KY 9 to allow for a landscaped median as an access management and traffic calming measure. Construct right-in / right-out at Tucker Dr. and Walmart Way. Construct dual left turn lanes at Walmart Way. Eliminate two field entrances, evaluate signal timing, and consider lighting. | \$7,385,000 |
| Q Mason Marathon | <ul style="list-style-type: none"> Construct an EB left turn lane to improve safety. Add stop bars to approaches. | \$550,000 |
| C Bracken KY 1019 | <ul style="list-style-type: none"> Add advanced intersection warning signage. Offset KY 9 left turn lanes in the positive direction. | \$540,000 |
| B Bracken Iler Rd | <ul style="list-style-type: none"> Add EB left turn lane (warranted based on 2045 volumes) and WB right turn lane to improve safety. Add advanced intersection warning signage. | \$945,000 |
| O Mason Clarkson Sherman Rd | <ul style="list-style-type: none"> Construct EB right turn lane and WB left turn lane to improve safety. Add stop bars on approaches. | \$525,000 |

Table ES 4. Low Priority Projects

|  | Improvement Description |  Cost (2020 Dollars Including DRUC) |
|---|---|---|
| R Mason KY 1234 | <ul style="list-style-type: none"> Concept 1 – Add hatch striping to clarify that there is no turn lane. Concept 2 – Construct a WB left turn lane to improve safety. Add advanced intersection warning signage. | Concept 1 - \$15,000 Concept 2 - \$315,000 |
| E Bracken KY 875 | <ul style="list-style-type: none"> Improve SB approach guardrail radius. Re-stripe EB truck climbing lane as EB and WB left turn lanes to improve safety. Add advanced intersection warning signage. | \$225,000 |
| A Pendleton KY 159 | <ul style="list-style-type: none"> Concept 1 – Extend truck climbing lane to the west. Concept 2 – End the truck climbing lane before the intersection and use the extra width as a WB left turn lane. | Concept 1 - \$540,000 Concept 2 - \$15,000 |

Table ES 5. Other Projects

|  Improvement Description |  Cost (2020 Dollars Including DRUC) |
|--|---|
| <p>AB Mason</p> <ul style="list-style-type: none"> Reduce existing 55 mph speed limit to 45 mph along KY 9 between just east of KY 11 and just west of Downing Drive. Increase law enforcement or add traffic calming measures such as "Your Speed" signs, transverse rumble strips, painted warnings, speed tables, or other measures. | \$15,000 |
| <p>AC All Counties</p> <ul style="list-style-type: none"> Additional locations that had crashes potentially related to truck climbing lane issues and were not included in the intersection analysis are included in this corridor-wide improvement concept. | TBD |
| <p>AD All Counties</p> <ul style="list-style-type: none"> Identify, evaluate and prioritize routes needing pavement reconstruction or rehabilitation. Replace 4" striping with 6" spray thermo striping in conjunction with pavement reconstruction or rehabilitation projects or as needed. | Re-paving: \$630,000 average per mile Re-striping: \$ 7,500 average per mile |
| <p>AE Lewis / Greenup</p> <ul style="list-style-type: none"> Evaluate side streets and install stop signs and stop bars. Add advanced intersection warning signs. For intersections with identified crashes or in curves, consider addition of flashing warning beacon. Consider addition of street name to intersection warning signs. | \$20,000 |
| <p>AF Carter</p> <ul style="list-style-type: none"> Evaluate routes leading to / from KY 9 and Carter Caves State Resort Park. Provide recommendations to navigation guidance for any proposed modifications. | TBD |
| <p>AG Pendleton / Bracken / Mason</p> <ul style="list-style-type: none"> Targeted enforcement of speeding with increased presence of police. Increased use of portable speed monitors to reinforce speed limit. | TBD |
| <p>AH Lewis</p> <ul style="list-style-type: none"> Mitigate surface drainage issues throughout segment. Improve friction surface issue by implementing high skid resistance surface or improve superelevation with milling / paving. Add curve warning signage. | High Friction Surface Option: \$330,000 Superelevation Correction Option: \$530,000 |

The ranking system used to score the projects included ranking the CRF, Benefit-Cost Analysis, local officials / stakeholder prioritization, then combining the score to determine which projects rated the highest. This list was then compared against existing CHAF projects to determine if any priorities needed to be adjusted. **Figure ES 2** shows the priority scoring. An overview of locations is provided in **Figure ES 3**.

Figure ES 2. Prioritization Scoring

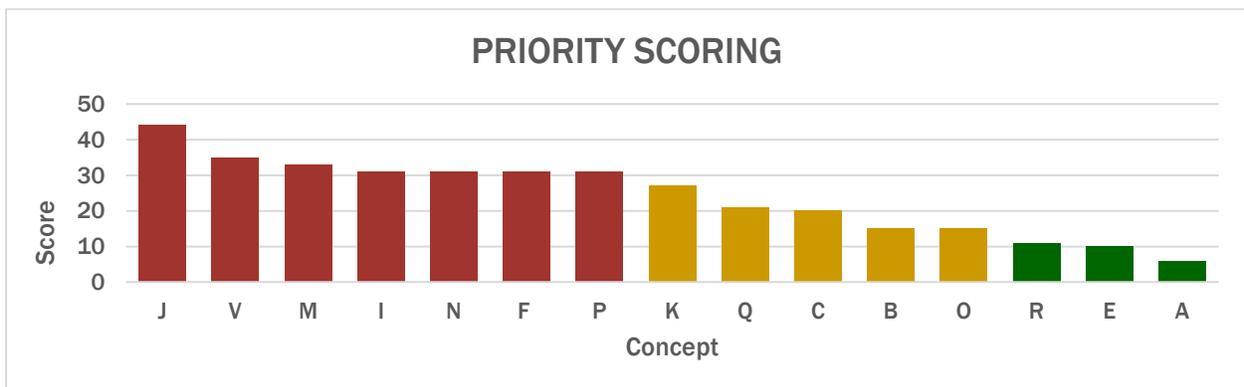
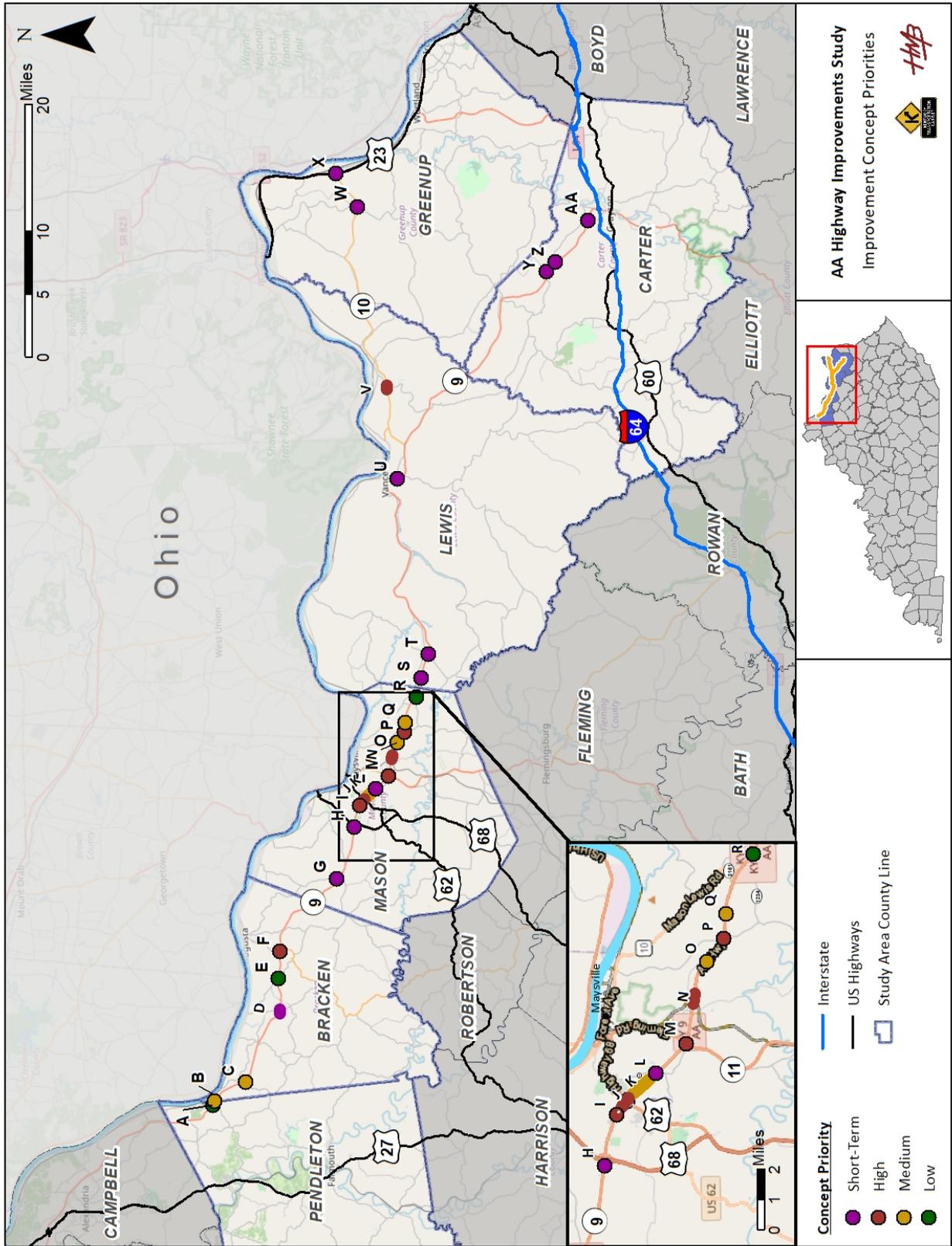


Figure ES 3. Improvement Concept Priorities



The next phase in the project development process is Preliminary Engineering. If federal funds are used or permits will be required, additional environmental analyses will be required to satisfy the National Environmental Policy Act (NEPA). All identified high, medium, and low priority projects would need to be integrated into Kentucky's Strategic Highway Investment Formula for Tomorrow (SHIFT). Through this mechanism they may be programmed in the Highway Plan. Short-Term projects may be initiated through the District's routine maintenance and traffic programs or become part of systematic programs such as Pavement Rehabilitation or Highway Safety Improvement Program (HSIP). Corridor projects may be implemented through a combination of these mechanisms or considered for additional study. City and county governments, along with ADDs, should collaborate with KYTC on project funding and implementation.