Grayson Small Urban Area Study

Carter County

February 2018

FINAL

Engineering Planning

KENTUCKY TRANSPORTATION CABINET

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EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated this transportation-focused Small Urban Area (SUA) Study for the city of Grayson, in Carter County. Grayson is located in the northeastern part of the Commonwealth of Kentucky on Interstate 64 (I-64) about 25 miles south and west of the Ohio and West Virginia borders.

Based on U.S. Census Bureau 2010 data, the population of Grayson was 4,217. Grayson is nicknamed "Heart of the Parks" because of its location near the center of a quadrangle formed by Grayson Lake, Carter Caves, Greenbo Lake, and Yatesville Lake state parks. Downtown Grayson is at the crossroads of US 60 and KY 7. I-64 is along the northern edge of the city, and just north of I-64 is the southern end of KY 9 (AA Highway)[1], which connects Grayson to Cincinnati, Ohio, and provides transportation access that benefits both commerce and tourism.

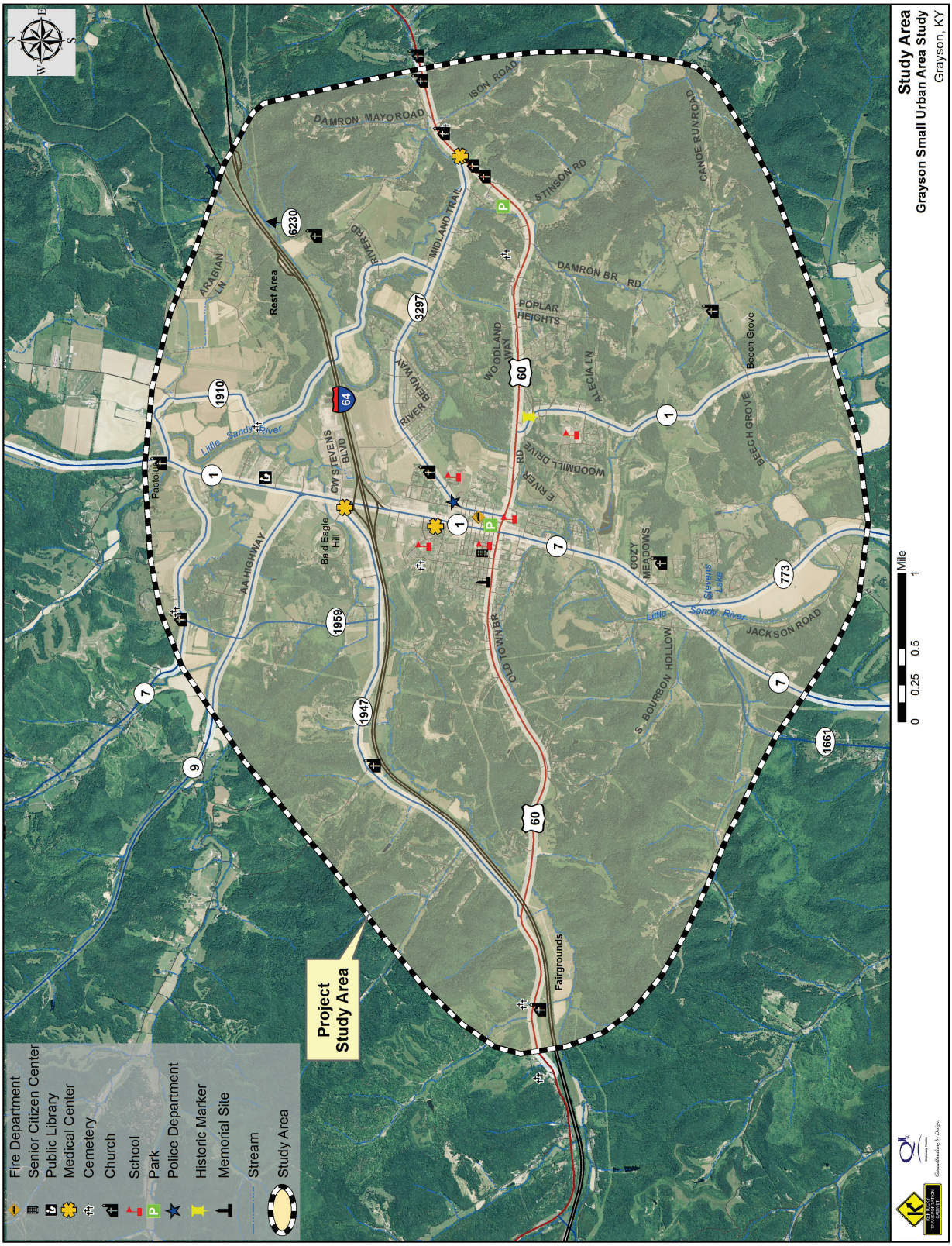
The purpose of this SUA Study is to identify and examine transportation issues on state-maintained routes related to safety operations and congestion in Grayson and its surrounding area. In addition to US 60, KY 7, and KY 9, study area roadways evaluated were KY 1, KY 773, KY 1910, KY 1947, and KY 3297.

The study focused on (1) short-term improvements—projects quickly and effectively implemented at both an individual intersection level and at an area-wide level; and (2) long-term future improvement projects requiring more significant resources to implement. The initial focus of the study was to examine state-maintained roads; however, as the study progressed, it became important to study several local roads as well **(ES Figure 1)**.

Basic project activities performed for this SUA Study included:

- Evaluating existing conditions, crash history, and geometric deficiencies to identify possible safety issues.
- Evaluating capacity needs of state-maintained routes and several routes of local significance.
- Working with Local Officials/Stakeholders (LO/S) and the Project Team to identify trouble spots and potential projects to address congestion and safety.
- Developing a list of short- and long-term recommendations the KYTC, Grayson, Carter County, and/or private developers could advance for further project development and implementation.
- Prioritizing local, short-term, and long-term improvement recommendations.
- Documenting the study process and recommendations.

[1] A section of AA Highway (meant to connect Alexandria and Ashland), KY 9 is referred to hereafter by its state designation, only.



ES Figure 1: Study Area

The first Project Team meeting was held the morning of July 8, 2016, at the FIVCO Area Development District (FIVCO ADD) office in Grayson. The Project Team was composed of KYTC District 9 and Central Office staff from various disciplines. The purpose of the meeting was to review existing conditions data including high crash locations, current levels of service (LOS), traffic volumes, and an environmental overview. Issues discussed included:

- KY 1 between KY 1947 south and US 60 carries 13,620 vehicles per day (vpd). Five intersections or their approaches (i.e., westbound or eastbound) operate at LOS E or F in either/both the AM or PM peak hour. Four of the five are along KY 1 at Interstate Drive/Everman Street, Love's North and South entrances, and Super Eight Lane.
- A crash analysis yielded 13 high crash 0.1-mile spots, five of which are between CW Stevens Boulevard and KY 1/KY 7.
- One segment of US 60 between KY 1/KY 7 intersection and KY 1 (South) operates at LOS E is currently operating at LOS E. This segment also has a v/c ratio greater than 1.0.
- New or improved sidewalks can reduce congestion and serve as improvement options.
- KY 1910 has narrow lane and shoulder widths, substandard curves, slope stability issues, flooding problems, and a less-than-desirable grade near the intersection with KY 3297.

The first LO/S meeting was held July 8, 2016, following the first Project Team meeting. Attendees were divided into four groups and participated in an exercise to identify transportation issues related to safety, congestion, and growth in the study area. Attendees identified 16 congestion-related trouble spots, 28 locations with safety issues, and four areas of growth. Among the transportation issues discussed were the following:

- School congestion along KY 1, US 60, and KY 3297 (Midland Trail).
- Safety concerns at East Carter High School due to sight distance issues.
- Drainage/flooding issues on KY 1, Rupert Street, and South Hord Street.
- Most of the city's employment (nearly 600 employees at Smithfield Foods) is along CW Stevens Boulevard. The city widened and striped the roadway midway through this study; however, LO/S felt additional improvements were necessary.
- Carol Malone Boulevard (KY 1) should be widened to five lanes from Academic Parkway south to just north of the Little Sandy River (KYTC Item Number: 09-144.00).
- Other suggestions regarded lighting, signing, and turn lanes.

November 1, 2016, a second Project Team meeting was held in Flemingsburg at the KYTC's District 9 office. The purpose of the meeting was to review proposed projects to address safety and congestion, traffic growth of 0.58% annually, LO/S input, the KYTC's FY 2016–FY 2022 Highway Plan projects underway with either funds not authorized or not progressing, and previously identified Project Identification Forms (PIF). PIF projects are unfunded identified needs not in the Highway Plan. Preliminary construction costs were also estimated for each project.

Thirty-nine improvement projects are shown in **ES Figure 2**. One project was not ranked by LO/S (Project H). These recommended projects were categorized as follows:

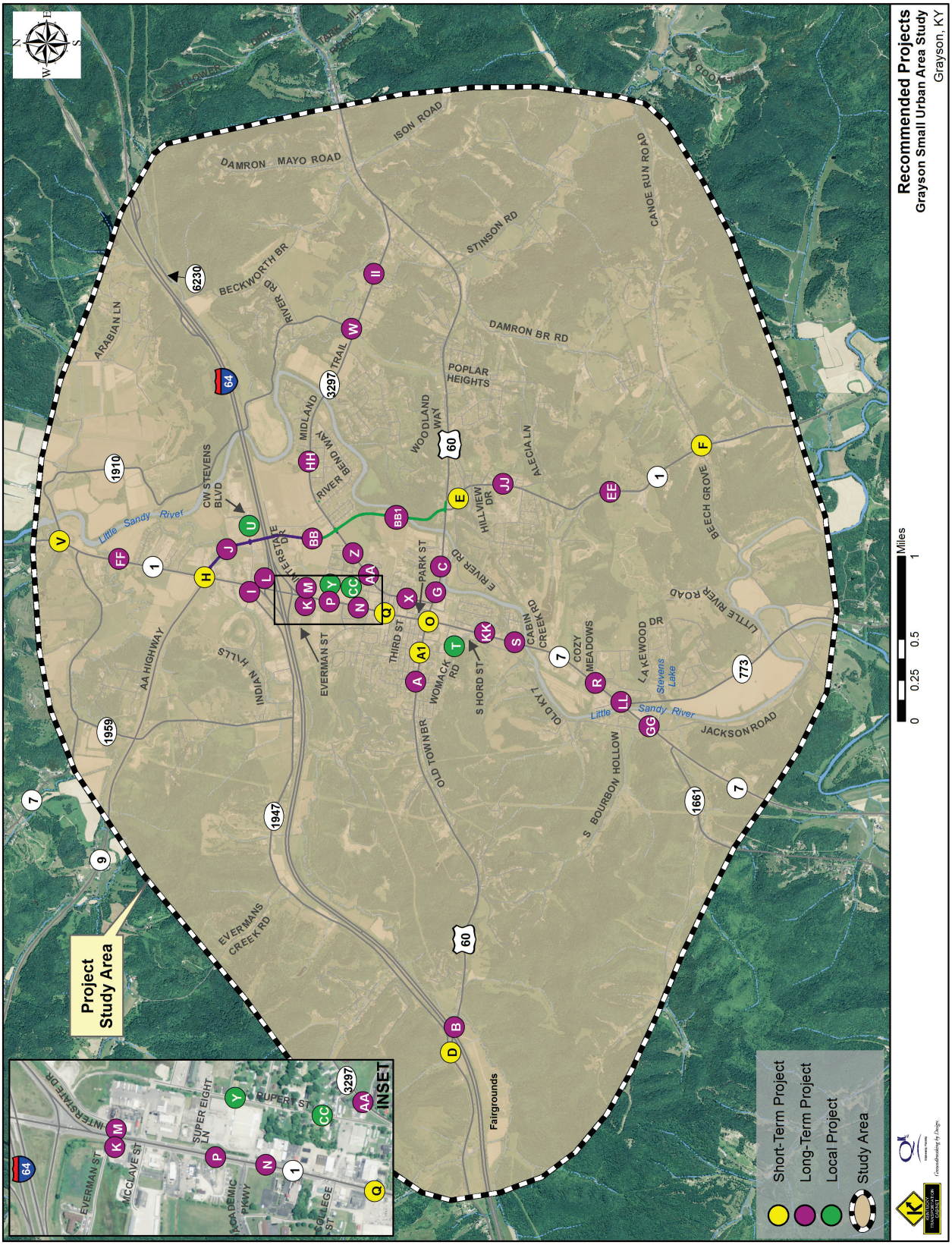
- **Local:** Local projects are not located on the state-maintained system and would likely need to be funded by the City of Grayson or Carter County. A private developer could also assume this responsibility.
- **Short-Term:** Short-term projects are typically lower-cost implemented in the near term. These projects require little or no right-of-way to construct and in some cases may be implemented by the KYTC Divisions of Maintenance or Traffic Operations.
- **Long-Term:** Long-term projects are higher-cost that would require more significant resources to implement. These project types would require additional right-of-way to construct, and would likely need to be funded through the KYTC Highway Plan process.

Cost estimates were developed based on pavement, structures, and an estimate of earthwork quantities utilizing the KYTC's District 9 unit bid prices. The estimates were revised throughout the SUA Study process to account for the addition of detail items such as curb and gutter, culverts, signal heads, retaining walls, etc. District 9 staff provided right-of-way and utility estimates for each new project. The PIF projects' previous construction cost estimates were updated to 2016 dollars.

A second LO/S meeting was held the morning of December 7, 2016, at the FIVCO ADD office in Grayson. A brief overview and presentation of the study's purpose, goals, and proposed projects for Grayson were provided. The LO/S received an exhibit identifying potential project locations, and individual Project Evaluation Worksheets to garner their level of support for each project.

Considering input from the LO/S evaluations, the Project Team prioritized local, short-term, and long-term projects as high, medium, or low. Highway Plan and PIF projects were a part of this process. **ES Tables 1, 2 (p. ES 7) and 3 (p. ES 8)** present the projects according to their prioritization. Regarding three projects listed on the tables, the following should be noted:

- Project H—KYTC has made numerous safety improvements to mitigate crashes at the KY 9/KY 1 intersection, and the reported three-year crash history does not indicate a crash safety issue. The Project Team agreed additional intersection improvements were not necessary. Project H now consists of a District 9 review of signage/striping for KY 9 in advance of KY 1.
- Project DD—Damron Branch Road, near the intersection of Beech Grove Road, is adjacent to a creek. Due to the large drainage area, proximity of the channel to the roadway, and flood zone location, alleviating drainage problems would require major road reconstruction/relocation, additional right-of-way acquisitions, and utility relocations. Therefore, a concept was not developed and improvements are not recommended at this time. Project DD is not shown on either **ES Figure 2** or **ES Tables 1, 2, or 3**.
- Project V—This project was implemented during the final stage of this study in response to the interest shown in the project by the LO/S and its high priority ranking.



ES Figure 2: Recommended Projects

ES Table 1: High Priority Projects

Project ID	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
U	Widen CW Stevens Boulevard; add curb and gutter, sidewalks; and improve turning radii at KY 1.	Local	$2,120,000	**High**
D	Provide lighting at the intersection of US 60 and KY 1947 and remove hill (along south side of KY 1947) to improve sight distance.*	Short-Term	$70,000	**High**
O	Close the Park Street entrance from US 60, and provide curb and sidewalk across the entrance.	Short-Term	$5,000	**High**
H	District 9 will review signage/striping for KY 9 in advance of the intersection with KY 1, but no improvement project is recommended.	Long-Term	$0	**High**
V	Install a "No Through Trucks" sign at the KY 1/KY 1910 intersection.	Short-Term	$1,000	**High Completed**
I	Provide a right-turn lane on KY 1947 at KY 1.	Long-Term	$470,000	**High**
J	Construct a new 0.360-mile-long, two-lane roadway connecting CW Stevens Boulevard north to KY 9 at KY 1. (Section 1 of 3.)	Long-Term	$3,000,000	**High**
L	Provide dual left-turn lanes on I-64 westbound off-ramp at KY 1.	Long-Term	$600,000	**High**
Z	Provide a right-turn lane on KY 3297 at East Carter Middle School's southernmost entrance.	Long-Term	$235,000	**High**
BB	Construct new 0.540-mile two-lane roadway from CW Stevens Boulevard (MP 0.230) south (over I-64) to KY 3297 (MP 0.800). (Section 2 of 3. See J for Section 1.)	Long-Term	$9,600,000	**High**
BB1	Construct new 0.720-mile two-lane roadway from KY 3297 (over the Little Sandy River) to US 60 (MP 24.632) at KY 1. (Section 3 of 3. See J for Section 1.)	Long-Term	$8,500,000	**High**
JJ	Safety improvements at East Carter High School. PIF 09 022 D0001 1345.0 PIF 09 022 D0001 45.80	Long-Term	$3,520,000	**High**
KK	KY 7 and KY 1 (Carol Malone Boulevard) widening from the Little Sandy River Bridge to Academic Parkway. PIF 09 022 D007 1284.0 Item Number 09-144.00	Long-Term	$3,640,000	**High**

* *Lighting may become a local project if warrants are not met.*

ES Table 2: Medium Priority Projects

Project ID	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
T	Provide drainage improvements on South Hord Street (CS 1126) along Town Branch Creek south of Womack Road.	Local	$70,000	**Medium**
Y	Provide drainage improvements along Rupert Street.	Local	$375,000	**Medium**
E	Provide drainage improvements along KY 1 (South) from US 60 to Hillview Drive to minimize flooding.	Short-Term	$50,000	**Medium**
F	Provide drainage improvements along KY 1 (South) near Beech Grove Road, including 600 feet of ditching.	Short-Term	$50,000	**Medium**
Q	Provide drainage improvements to minimize flooding on KY 1 near the former Ralph's Food Fair.	Short-Term	$70,000	**Medium**
C	Reconstruct deficient sidewalks and extend them from KY 1/KY 7 east to the Little Sandy River Bridge.	Long-Term	$620,000	**Medium**
G	Add two-way left-turn lane (TWLTL), widen lanes, and provide signage to direct motorists to the appropriate lane along US 60 from KY 1/KY 7 to the Little Sandy River Bridge.	Long-Term	$490,000	**Medium**
N	Conduct a KY 1 (Carol Malone Boulevard) access management study from Academic Prkwway north to Everman Street to provide for a more efficient corridor.	Long-Term	$700,000	**Medium**
W	Shift KY 1910 approach to KY 3297 east and improve turn radii.	Long-Term	$225,000	**Medium**
AA	Reconstruct sidewalk along KY 3297 from Prichard Elementary School on US 60 to Prichard Street.	Long-Term	$460,000	**Medium**
HH	Improve operational efficiency and reduce congestion on KY 3297 from Rupert Street east to the Little Sandy River Bridge. PIF 09 022 D3297 39.00	Long-Term	$13,220,000	**Medium**
II	Correct geometric and width deficiencies (narrow shoulders) on KY 3297 from the Little Sandy River Bridge to US 60 to improve operational efficiency and system connectivity. PIF 09 022 D3297 40.00	Long-Term	$10,060,000	**Medium**
LL*	Improve safety at the KY 7/KY 773 intersection. Add left-turn lane and improve sight distance on KY 7. Item Number 09-8312.10	Long-Term	$1,050,000	**Medium**

* *Item Number 09-8312.00 included Safety Improvements to KY 773 from KY 7 to KY 1 from MP 0.100 to 3.505; however, the KYTC District 9 is only pursuing improvements at the KY 7/KY 773 intersection. The total cost represents updated cost estimates (from the KYTC District 9 staff) for the intersection project only.*

ES Table 3: Low Priority Projects

Project ID	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
CC	Provide sidewalks along both sides of Rupert Street.	Local	$490,000	**Low**
A1	Restripe US 60 and provide left-turn pockets from Court Street to KY 1/KY 7.	Short-Term	$5,000	**Low**
A	Restripe US 60 and provide TWLTL from Old Town Branch Road to KY 1/KY 7 with parking on one side.	Long-Term	$200,000	**Low**
B	Provide additional one-lane access road from US 60 to the Fairgrounds east of the entrance.	Long-Term	$1,100,000	**Low**
K	Connect Everman Street and Academic Parkway with a two-lane roadway. Close the entrance from Everman Street to KY 1 once the connection has been constructed.	Long-Term	$2,900,000	**Low**
M	Close Interstate Drive at KY 1 and the two entrances closest to the KY 1/I-64 eastbound on-ramp, and route those motorists to Super Eight Lane and the roadway directly across KY 1 from McClave Street. Relocate truck parking and improve internal circulation.	Long-Term	$2,230,000	**Low**
P	Conduct a pedestrian walkability, safety, and Americans with Disabilities Act (ADA) compatibility study for the community of Grayson to supplement the sidewalk information collected by the KYTC and the FIVCO ADD.	Long-Term	$150,000	**Low**
R	Install lighting along KY 7 from KY 773 to Cabin Creek Road.*	Long-Term	$320,000	**Low**
S	Construct sidewalks along both sides of KY 7 from Cabin Creek Road north over Little Sandy River Bridge (estimated one side of bridge) to Little Sandy Lane.	Long-Term	$690,000	**Low**
X	Improve turning radii from KY 3297 at East Third Street.	Long-Term	$155,000	**Low**
EE	Correct horizontal, vertical, and width deficiencies on KY 1 from the Lawrence County Line to US 60 in Grayson to improve safety, sight distances, systems connectivity, operational efficiency, and southern access into Grayson for area residents. PIF 09 022 D0001 45.00	Long-Term	$111,390,000	**Low**
FF	Correct geometric and width deficiencies for safety and better accessibility on KY 1 from I-64 to the Greenup County Line. PIF 09 022 D0001 43.00	Long-Term	$36,760,000	**Low**
GG	Correct geometric and width deficiencies on KY 7 from KY 1661 to and including the Little Sandy River. Bridge to improve access and systems connectivity between Grayson and Sandy Hook, increase the efficiency of the route, and enhance economic growth in the area. PIF 09 022 D0007 46.20	Long-Term	$9,880,000	**Low**

* *Lighting may become a local project if warrants are not met.*

1.0 INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated a Small Urban Area (SUA) Study for the city of Grayson in Carter County. The purpose of the study is to identify and examine transportation improvements related to safety and congestion in the city and its surrounding area.

The study focused on (1) short-term improvements—projects quickly and effectively implemented at both an individual intersection level and at an area-wide level; and (2) long-term future improvement projects requiring more significant resources to implement. The initial focus of the study was to examine state-maintained roads; however, as the study progressed, it became important to study several local roads as well

Specific project activities included inventorying existing conditions, examining future conditions, proposing and analyzing practical solution improvement options, developing cost estimates, conducting public involvement activities throughout the study process, prioritizing improvements, and documenting the study process and its results.

1.1 Study Area

The study area was developed to encompass the Federal Highway Administration's (FHWA) Adjusted Urban Area Boundary of Grayson, as shown in **Figure 1.** It is approximately 24 square miles and includes study area roadways I-64, US 60, KY 1, KY 7, KY 9, US 60, KY 773, KY 1910, KY 1947, and KY 3297. Two noteworthy local streets, CW Stevens Boulevard and Rupert Street, were also included. In addition, during the planning process the Project Team expanded the area to include the following:

- KY 773 bridges slated for improvement at the Little Sandy River on the south side.
- KY 1947 and US 60 intersection on the west side.
- US 60 overpass on the west side.
- Fairgrounds on the west side.
- East of Damron Mayo Road on the east side.

According to the U.S. Census Bureau, Carter County has a total area of 412 square miles, of which 409 square miles (99%) is land and 2.6 square miles (less than 1%) is water. The county was formed in 1838 from portions of Greenup and Lawrence counties and was named after a state senator at the time, William Grayson Carter. Carter County's population as of the 2010 census was 27,720.[2] The county seat is Grayson.

Grayson is located in the northeastern part of the state on Interstate 64 (I-64) about 25 miles south and west of the Ohio and West Virginia borders. As of the 2010 census, the population of Grayson was 4,217. Downtown Grayson is at the crossroads of US 60 and KY 7. I-64 is along the northern edge of the city and just north of I-64 is KY 9, which connects Grayson to Cincinnati and provides transportation access that benefits both commerce and tourism. The

[2] Source: http://quickfacts.census.gov/qfd/states/21/21043.html

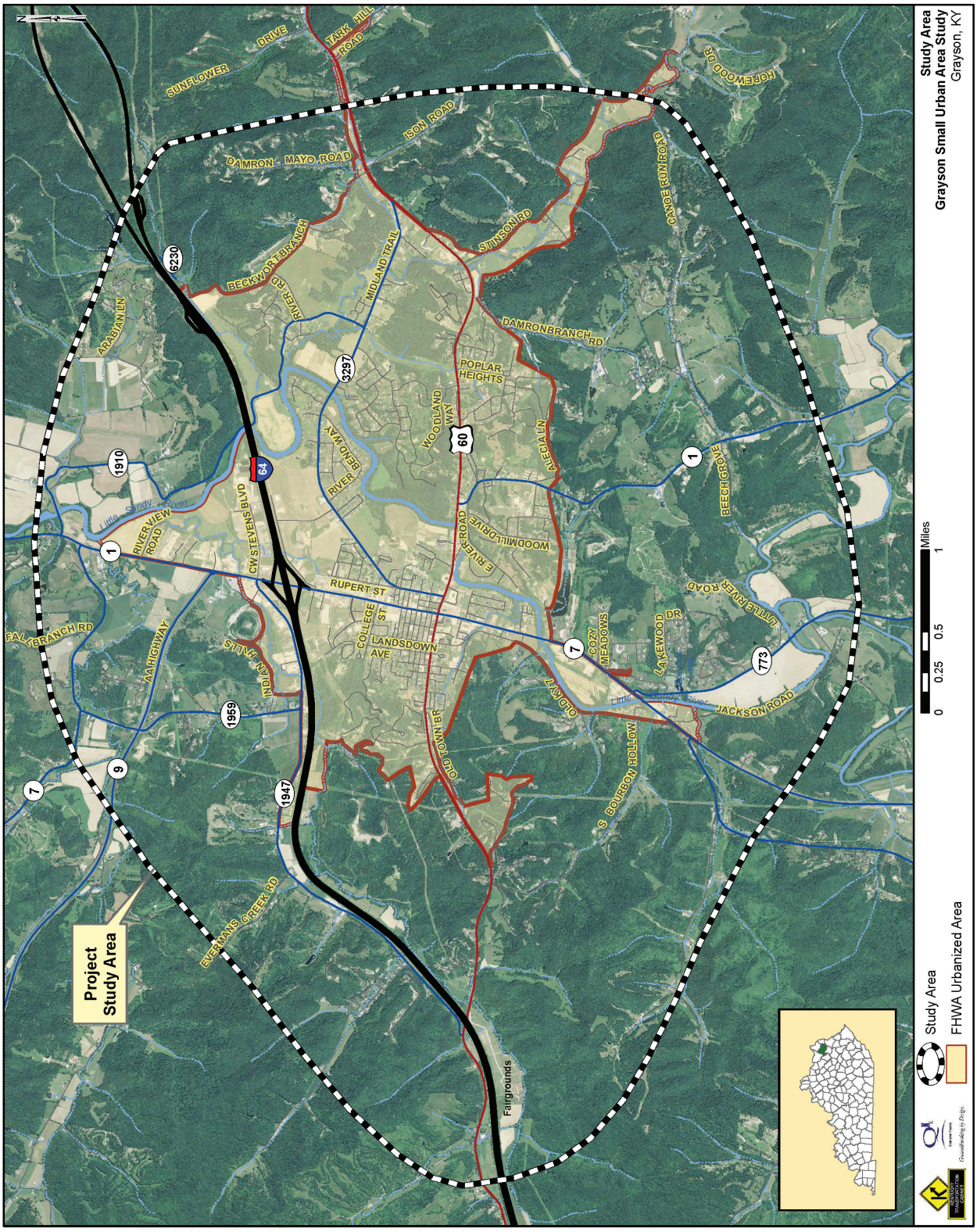


Figure 1: Study Area

city limits of Grayson encompass approximately 2.5 square miles.

Grayson is nicknamed the “Heart of the Parks” (**Photo 1**) because of its location near the center of a quadrangle formed by four Kentucky State Parks: Grayson Lake (south of KY 7 in Olive Hill), Carter Caves (west along I-64 in Olive Hill), Greenbo Lake (north on KY 1 near Greenup), and Yatesville Lake (southeast on KY 1 in Louisa). Grayson has one I-64 interchange at KY 1; therefore, most motorists must negotiate KY 1 to travel into and out of Grayson from I-64. Within the city, Grayson’s topography is relatively flat, and is bisected by the Little Sandy River; hence, Grayson experiences flooding/drainage issues on various routes.

Photo 1: Grayson Heart of the Parks

1.2 Previously Identified Projects

The KYTC has not conducted an SUA planning study for the city of Grayson or Carter County. Projects currently in the KYTC’s FY 2016–FY 2022 Highway Plan (Highway Plan) dated June 2016, and those with Project Identification Forms (PIF) but not in the Highway Plan are shown in **Figure 2.**

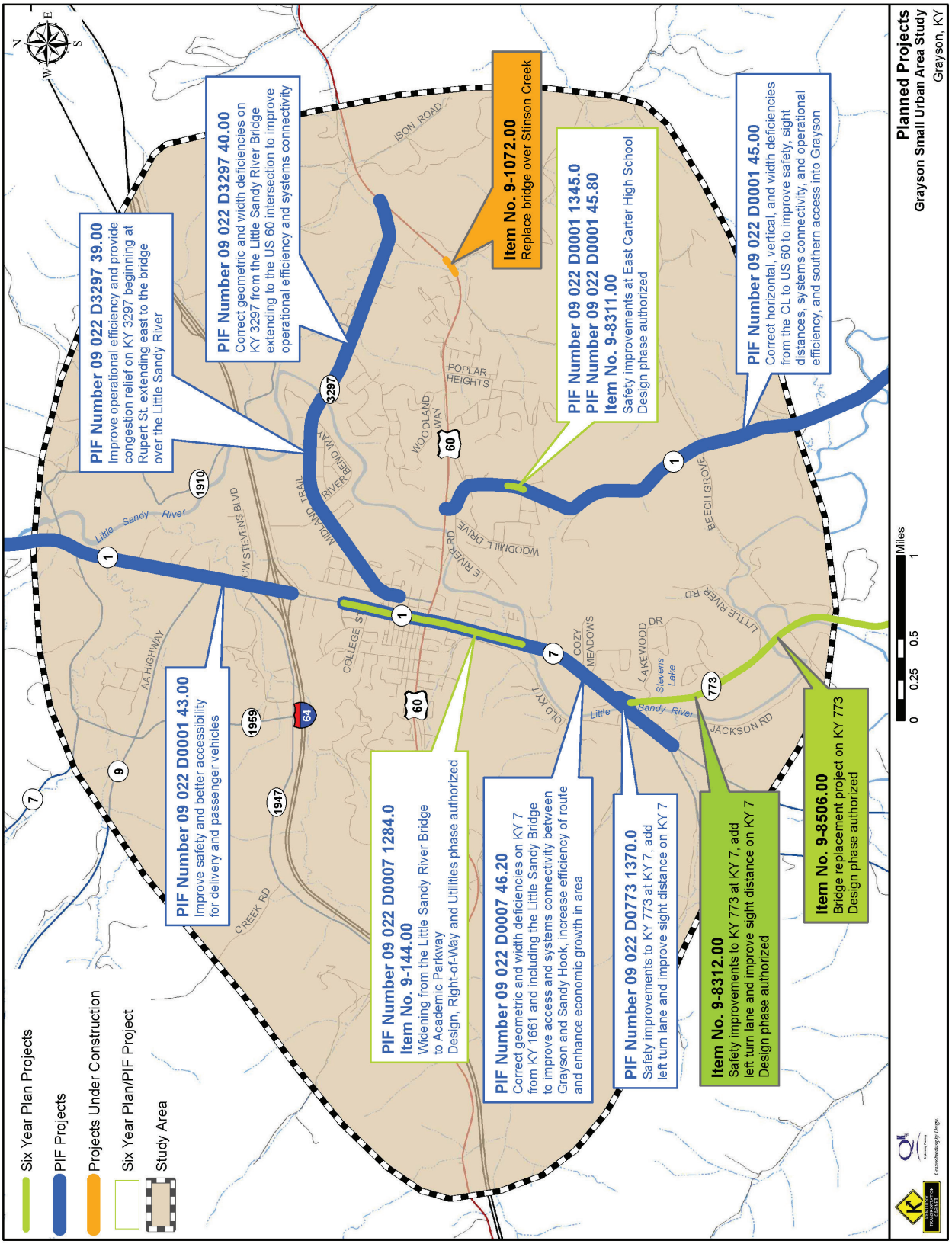


Figure 2: Highway Plan Projects and PIFs

1.3 Study Scope

The study scope was to conduct an SUA planning study for the city of Grayson and portions of the surrounding unincorporated areas of Carter County. This study examines existing transportation conditions in terms of both safety and operational characteristics. Basic project tasks include:

- Evaluating existing conditions, crash history, and geometric deficiencies to identify possible safety issues.
- Evaluating capacity needs of state-maintained routes and several routes of local significance.
- Working with Local Officials/Stakeholders (LO/S) and the Project Team to identify trouble spots and potential projects to address congestion and safety.
- Developing a list of short- and long-term recommendations the KYTC, Grayson, Carter County, and/or private developers could advance for further project development and implementation.
- Prioritizing local, short-term, and long-term improvement recommendations.
- Documenting the study process and recommendations.

The Grayson SUA includes the prioritization of active PIF projects **(Figure 2, p. 4)**. The active PIF project concepts were not further developed within this study; however, they were included in the prioritization of future projects for this SUA.

Because Highway Plan projects shown in **Figure 2** have Design, Right-of-Way, Utilities, or Construction phases funded, these projects were considered “committed” projects; however, some were included in the prioritization of future needs because these projects have not progressed in the project development process and await additional funding.

The study includes analyses of state-maintained US and KY routes, excluding I-64 (roadways highlighted in white on **Figure 3, p. 6**). City streets integral to traffic operations in Grayson were included; however, funding for improvements will be the responsibility of the City of Grayson, Carter County, or private entities.

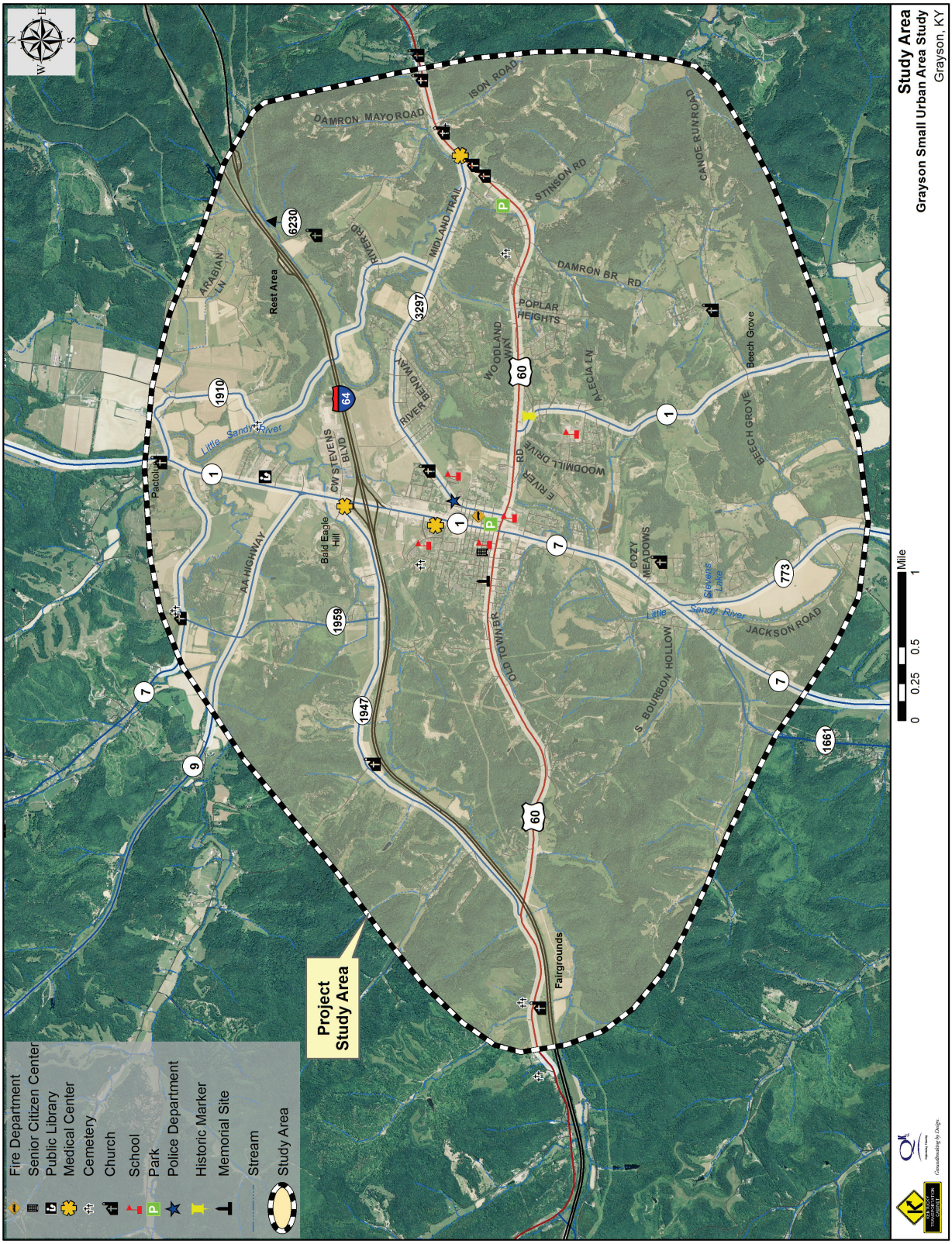


Figure 3: Study Area Routes

2.0 EXISTING CONDITIONS

The study area's existing transportation network conditions are described in the following sections. The information includes roadway facilities and geometrics, crash history, and traffic volumes. Data for this section were collected from the KYTC's Highway Information System (HIS) database, the Kentucky State Police's collision database, bridge inspection reports, National Bridge Inventory forms, traffic counts, and field reviews.

2.1 Roadway Characteristics

Functional classification is the process of grouping streets and highways according to the character of travel service they provide. This classification system recognizes travel involves movement through a hierarchical system of facilities that progress from lower classifications handling short, locally-oriented trips to higher classifications serving longer distance travel at a higher level of mobility.

Over the years, functional classification has come to assume additional significance. Functional classification includes expectations about roadway design, such as vehicle speed, capacity, and relationship to existing and future land use development. Federal legislation uses functional classification in determining eligibility for funding under the Federal-aid program. Transportation agencies describe roadway system performance, benchmarks, and goals by functional classification. The following are short definitions of major functional classes for this SUA:

- **Principal Arterials (other than Freeways)** serve major centers of metropolitan areas, provide a high degree of mobility, and can also provide mobility through rural areas.
- **Minor Arterials (Arterial Streets in urban areas)** provide service for trips of moderate length, serve geographic areas smaller than their higher arterial counterparts, and offer connectivity to the higher arterial system. The primary difference is usually multiple arterial routes serve a particular urban area, radiating from the urban center to serve the surrounding region. In contrast, an expanse of a rural area of equal size would often be served by a single arterial.
- **Collectors (Collector Streets in urban areas)** gather traffic from Local Roads and funnel them to the arterial network. Within the context of functional classification, collectors are categorized as either Major Collectors or Minor Collectors. In the rural environment, collectors generally serve primarily intra-county travel and shorter trips.
- **Local Roads** are not intended for use in long distance travel, except at the origin or destination end of the trip, due to their direct access to abutting land. They are often designed to discourage through traffic.

Figure 4 shows the functional classification of roadways within the study area. Major state routes (other than I-64) in Grayson are KY 9, KY 1, KY 7, and US 60.

KY 9 is a major north-south Principal Arterial from Grayson to Northern Kentucky. Motorists travel US 60 from Grayson to Ashland for shopping and other activities. KY 1 is traveled north to Greenbo Lake State Park and KY 7 south to Grayson Lake State Park. Local officials identified additional routes—CW Stevens Boulevard, KY 1947, KY 3297, and KY 773—as important to the community. Although KY 773 south is classified as a Minor Collector, both bridges over the

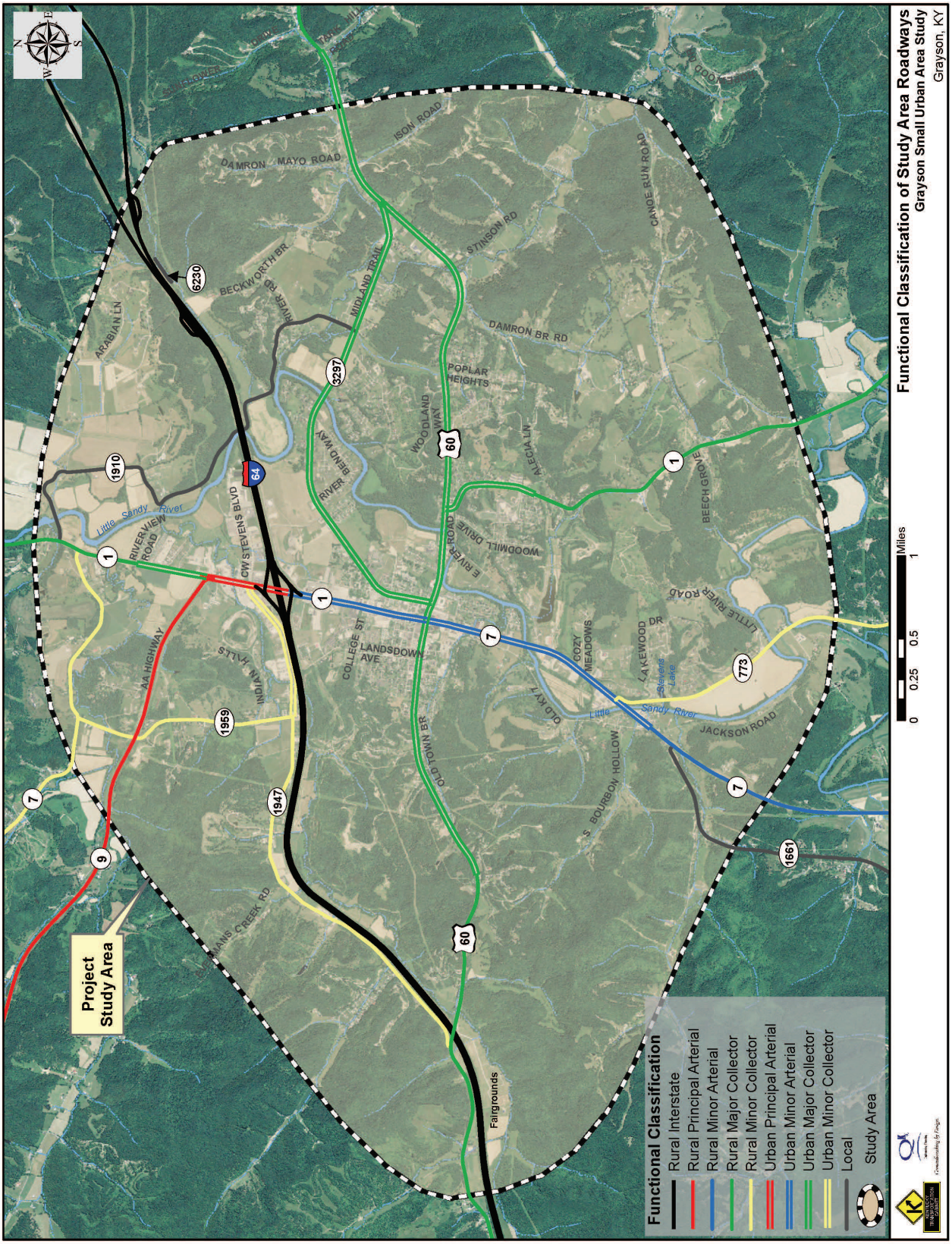


Figure 4: Functional Classification of Study Area Roadways

Little Sandy River are one-lane, posted for 15 tons. These bridges have been identified for replacement under Item No. 09-8506.00. Other roads, such as US 60 from west of KY 1/KY 7 to the eastern study area boundary and KY 3297, are classified as Major Collector.

The National Highway System (NHS) consists of roadways important to the nation's economy, defense, and mobility **(Figure 5)**. Area NHS roadways include I-64, KY 9 west of KY 1, and KY 1 south of KY 9 to I-64. The NHS designation[3] includes the following subsystems of roadways:

- Interstate: The complete Interstate System of highways is listed on the NHS.
- Other Principal Arterials: Highways in rural and urban areas which provide access between an arterial and a major port, airport, public transportation facility, or another intermodal transportation facility.

In compliance with the Surface Transportation Assistance Act of 1982 (STAA), Kentucky has established a network of highways on which commercial vehicles with increased dimensions may operate. These "STAA" vehicles include semi-trailers with 53-foot-long trailers and single-unit trucks with a total length of 45 feet. These designated truck routes are shown in **Figure 6, (p. 11)**. I-64 is the only Federal Designated Truck Route in the study area. KY 9, and KY 1 south of KY 9 to I-64 are State Designated Truck Routes.

KY 1 from MP 10.646 to MP 12.009, KY 7 from MP 0.0 to 10.865, KY 9, and US 60 from MP 23.691 to 24.632 are on the Kentucky Highway Freight Network.

2.2 Geometric Characteristics

The current number of lanes and approximate lane widths along study area roadways are shown in **Figure 7 (p. 12)**. Current KYTC design guidelines suggest a minimum of 11-foot-wide lanes on arterial and collector roadways (12-foot-wide lanes for 2,000 or greater ADT). KY 7, has 10-foot-wide or less travel lanes from south of US 60 to just north of the Little Sandy River Bridge. KY 1910, which is a two-lane roadway, has nine-foot-wide or less travel lanes. KY 1947 west of KY 1959 to US 60, KY 7 west of KY 1, KY 3297 from Grayson east to US 60, KY 1 from the southern SUA boundary north to US 60, and KY 773 near the southern study area boundary are two-lane facilities with 10-foot-wide lanes.

Approximate shoulder widths along study area roadways are shown in **Figure 8 (p. 13)**. KYTC design guidelines suggest arterial routes should have shoulders at least eight feet wide, the recommended minimum for such roadways. Some of the more rural routes—KY 1947, KY 1 from the southern study area boundary to US 60, KY 3297 from Grayson east to US 60, and KY 7 from west of KY 1 to the western study area boundary—have shoulders between two and four feet wide. Downtown streets shown as having one-foot-wide or no shoulders are usually curb or curb and gutter and include KY 7 north of the Little Sandy River Bridge and south of US 60 in Grayson, and US 60 east and west of KY 1/KY 7 in downtown Grayson.

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[3] Source: http://www.fhwa.dot.gov/planning/national_highway_system/

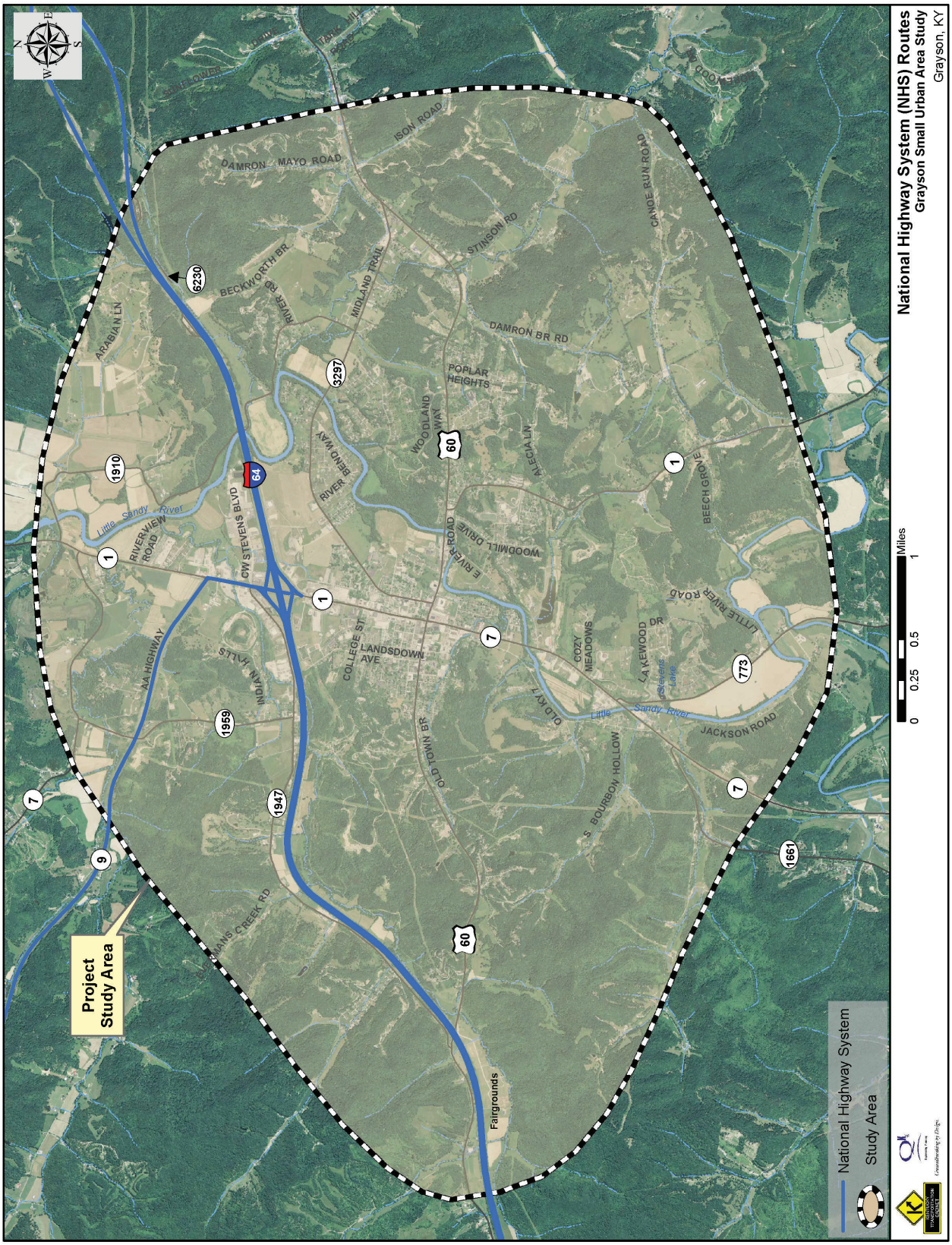

Figure 5: National Highway System (NHS) Routes

Figure 6: Designated Truck Routes

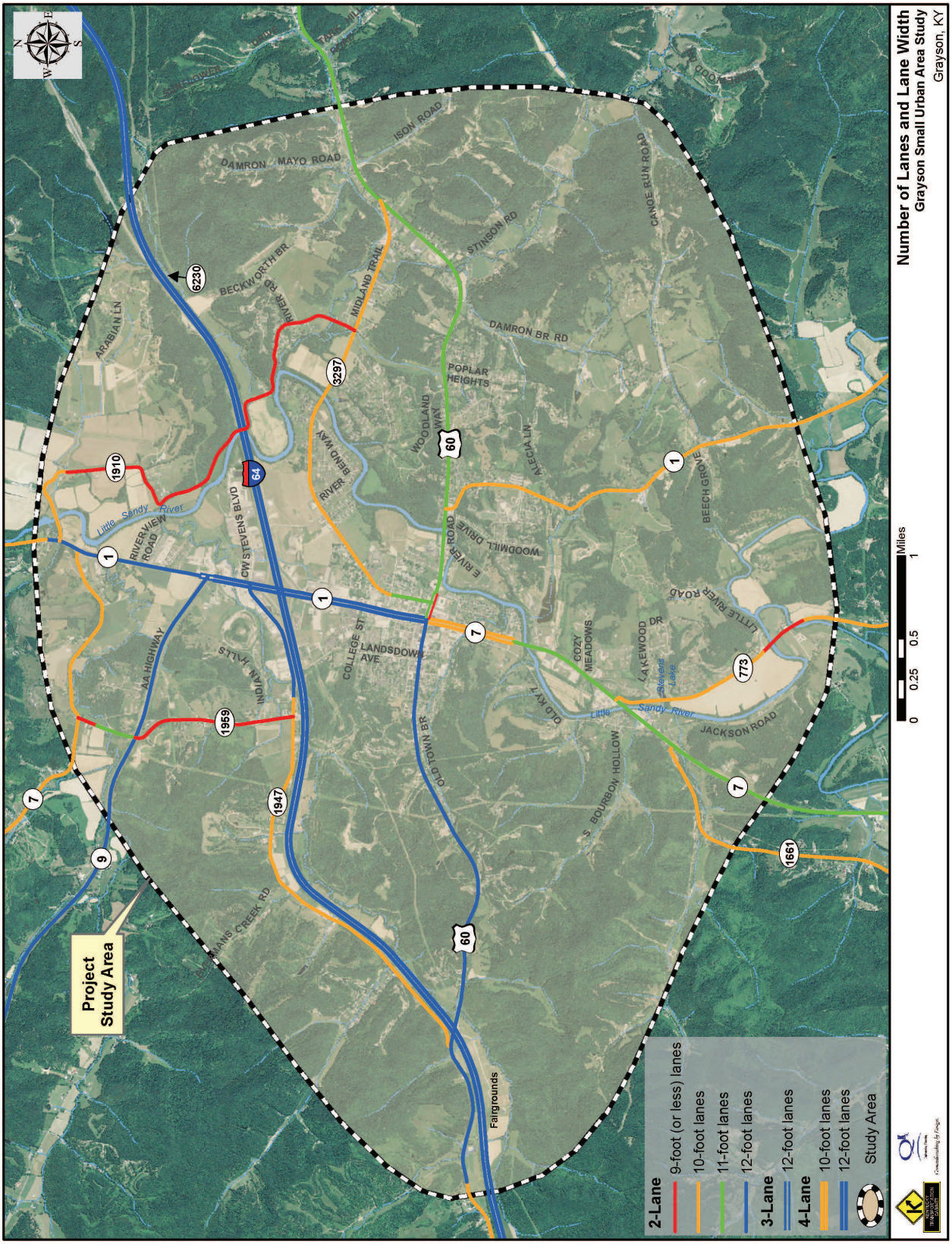

Figure 7: Number of Lanes and Lane Widths

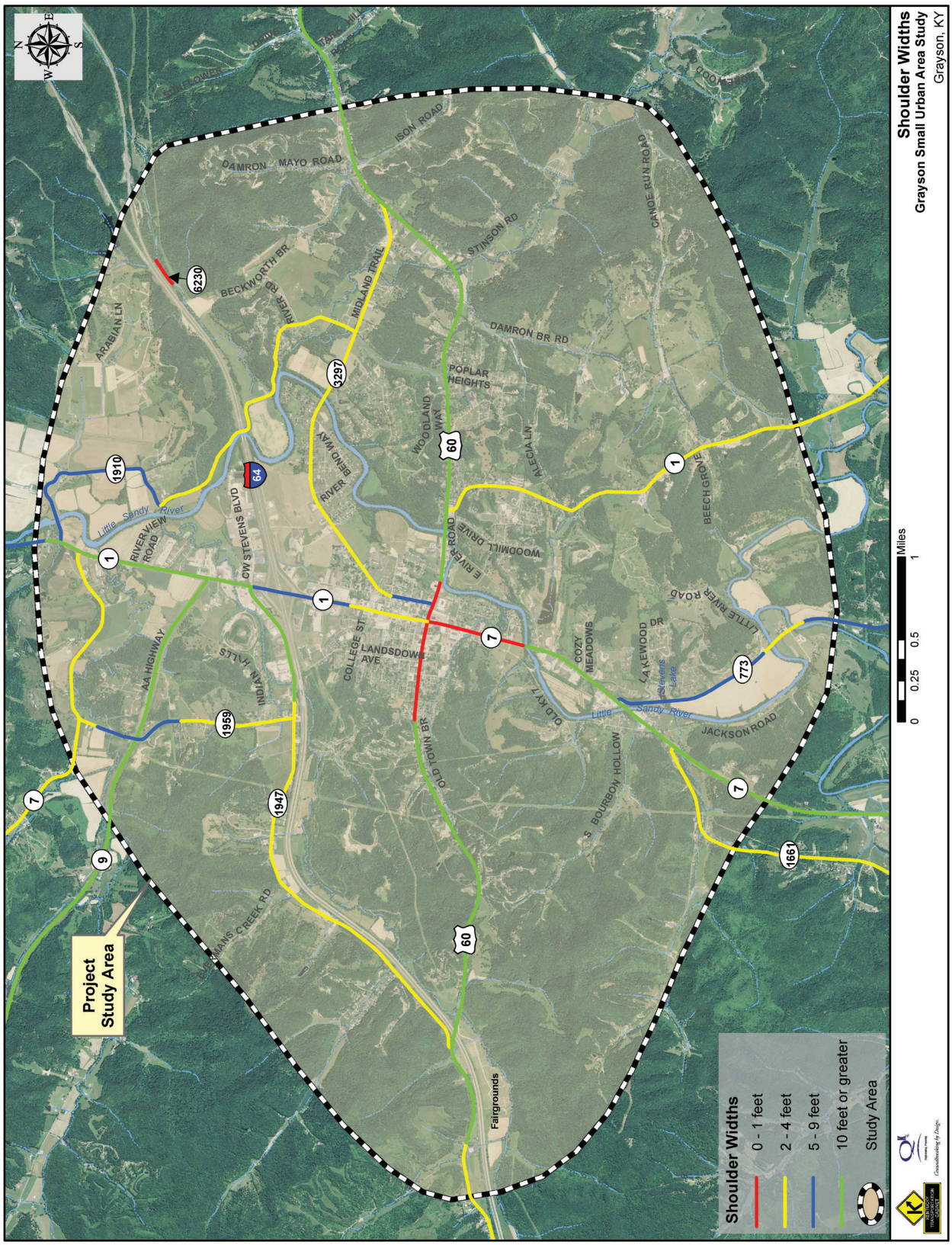

Figure 8: Shoulder Widths

2.3 Bridges/Structures

The KYTC's Bridge Data Miner shows 17 bridges along study area roads **(Figure 9)**. In accordance with federal standards, bridges are inspected every two years to evaluate their conditions and other elements. A sufficiency rating—a numeric score from 0 to 100 describing the sufficiency of the bridge to remain in service—is calculated during each inspection. Bridges considered functionally obsolete are not necessarily unsafe. The category indicates the bridge has older design features not built to today's standards. A functionally obsolete bridge is likely not wide enough or tall enough to accommodate current vehicle sizes, weights, and traffic volumes.

Structurally deficient bridges cannot safely carry the weight they were originally designed to carry and are proscribed (by signage) from doing so. According to the KYTC, a bridge structure is eligible for federal replacement funds when it meets two criteria: (1) the bridge has a sufficiency rating below 50.0, and (2) the bridge is considered either structurally deficient or functionally obsolete. According to the KYTC's Division of Maintenance records, four of the study area's 17 bridges are identified as structurally deficient and one bridge is classified as functionally obsolete.

2.4 2016 Traffic Volumes and Current Year Operational Analysis

The Grayson SUA Study area roadways and their associated 2016 average daily traffic (ADT) volumes are shown in **Figure 10 (p. 16)** and **Appendix A**. ADT volumes on state-maintained routes in the study area range from 700 vehicles per day (vpd) on KY 1910 to 13,620 vpd on KY 1 south of I-64. North of I-64, KY 1 carries between 3,120 vpd and 7,720 vpd. KY 1 carries between 3,300 vpd and 5,180 vpd south of US 60. On KY 7 south of US 60, traffic volumes range from 3,960 vpd to 8,760 vpd. For US 60, traffic volumes range from 2,720 vpd to 5,720 vpd west of KY 1/KY 7 and from 3,960 vpd to 9,100 vpd east of the intersection.

The metrics used to describe traffic conditions in the study area include ADT, volume to capacity (v/c) ratio, level of service (LOS), delay, and queue lengths (for intersections).

Utilizing the KYTC's District 9 Area Travel Demand Model (District 9 ATDM) to evaluate study area routes, 2016 ADT volumes were compared to each route's theoretical capacity. A v/c[4] ratio greater than 1.0 indicates additional lanes may be justified.

LOS is a qualitative measure, as defined in the Highway Capacity Manual (HCM 2010)[5], that describes traffic conditions based on measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS typically represents a driver's perspective of traffic conditions based on perceived congestion. LOS A is associated with free-flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no freedom to maneuver, and high delays. Although

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4 v/c—volume a roadway is carrying versus the volume it has the capacity to carry expressed as a ratio. The KYTC targets v/c 1.0 in urban areas and v/c 0.9 in rural areas.

5 Highway Capacity Manual, Transportation Research Board, National Research Council, Washington, D.C., 2010.

Figure 9: Bridges

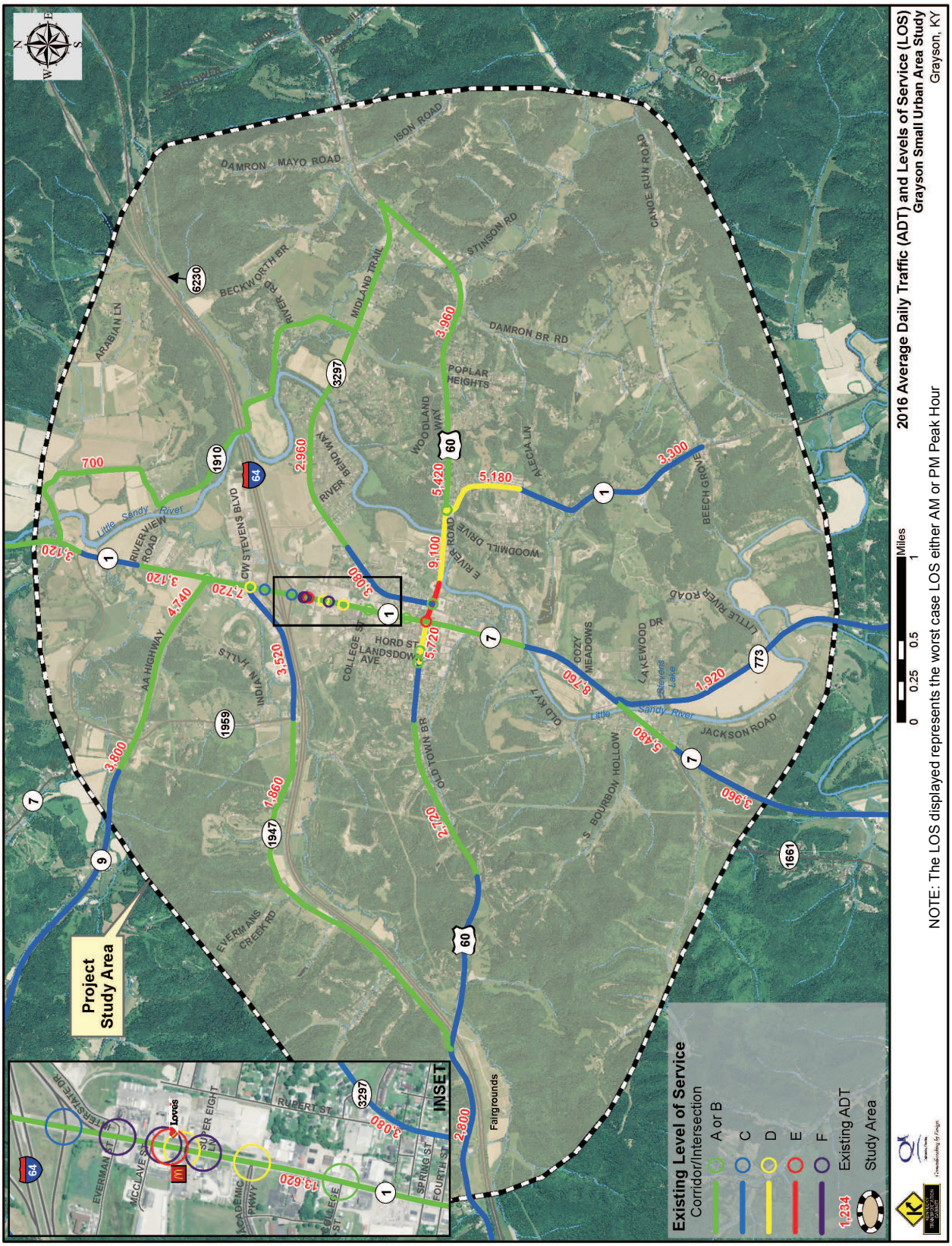

Figure 10: 2016 Average Daily Traffic (ADT) Volumes and Levels of Service (LOS)

LOS C is desirable in urban areas, LOS D is generally acceptable. In rural areas, LOS B is desirable; however, LOS C is acceptable.

2.4.1 2016 Volume to Capacity Ratios

Utilizing the District 9 ATDM volumes for 2016 and HCM procedures, a v/c ratio analysis showed a segment of US 60 between KY 7 and KY 1 (South) with a v/c ratio greater than 1.0. All other roadway segments are expected to operate at less than capacity with a v/c ratio less than 1.0, as shown in **Figure 11**.

2.4.2 2016 Segment Levels of Service (LOS)

LOS for study area routes are shown in **Figure 10 (p. 16)**. Based on a planning-level analysis, one segment of US 60 east of KY 1/KY 7 is currently operating at LOS E.

2.4.3 2016 Intersection Levels of Service (LOS)

To assess intersections in the study area, AM and PM peak hour turning movement counts along KY 1 and US 60 were collected at 17 intersections, of which 11 are signalized and six (along KY 1) are unsignalized. Using 2016 ADT and Design Hour Volumes, signal timings, geometry, and current HCM software, analysis of study area intersections identified in **Table 1 (p. 19) and Figure 10 (p. 16)** shows eight intersections with approaches (northbound, southbound, eastbound, or westbound) operating at LOS C or better in both the AM and PM peak hour. LOS C is typically desired in urban areas; however, LOS D is generally acceptable.

Although most study area routes in Grayson exhibit an acceptable v/c ratio, KY 1 has intersections or their approaches operating below an acceptable LOS for an urban area. Intersection LOS is measured in delay (seconds/vehicle).

KY 1 from KY 1947 south to US 60 carries 13,620 vehicles per day (vpd). Five intersections or their approaches (i.e., westbound or eastbound) operate at LOS E or F in either/both the AM or PM peak hour (denoted with red letters on Table 1). Four of the five intersections are along KY 1 at Interstate Drive/Everman Street, Love's North and South entrances, and Super Eight Lane.

A review of the latter intersections shows average queues (50% queues) for four intersections of three vehicles or less, which was not considered critical. Of note, two of the intersections are slated for improvement under Item Number 09-144.00, and one intersection is a private roadway.

Detailed summaries of the intersection capacity analysis results including delays, v/c ratio, queue, and LOS for both the overall intersection and individual movements are contained in **Appendix A.**

Figure 11: 2016 Volume to Capacity (v/c) Ratios

Table 1: 2016 Levels of Service for Study Area Intersections

Intersection	MP	Turning Movement #*	LOS AM Peak Hour Approach or Intersection LOS				LOS AM Peak Hour Approach or Intersection LOS			
			NB	SB	WB	EB	NB	SB	WB	EB
KY 1/KY 9	12.009	1	A				A			
KY 1/KY 1947/CW Stevens Boulevard**	11.746	2	C				D			
KY 1/Interstate Drive/Everman Drive (unsignalized)	11.391	3	A	A	C	E	B	B	F	F
KY 1/I-64 WB ramp terminal**	11.648	4	B				D			
KY 1/I-64 EB ramp terminal	11.480	5	B				B			
KY 1/Love's Truck Stop North Entrance (unsignalized)	11.340	6	A	A	B	C	B	B	B	F
KY 1/Love's Truck Stop South Entrance (unsignalized)	11.310	7	A	A	B	D	B	B	E	D
KY 1/McDonald's Entrance (unsignalized)**	11.280	8	B			D	B		D	
KY 1/Super Eight Lane (unsignalized)	11.240	9		A	C			B	F	
KY 1/Academic Parkway (unsignalized)**	11.159	10	A			C	B			D
KY 1/College Street	11.004	11	A				A			
KY 1/Third Street	10.766	12	A				A			
US 60/Landsdowne Avenue	23.691	13	A				A			
US 60/South Hord Street	23.756	14	A				A			
US 60/KY 1/KY 7 (US 60 MP 23.94)	10.646	15	E				D			
US 60/KY 3297	24.078	16	B				B			
US 60/KY 1 (US 60 MP 24.632)	24.632	17	B				A			

NOTES: *Red letters signify intersection operating at LOS E or F in either/both the AM or/and PM peak hour.*
**Turning movement number matches Appendix A*
*** Intersection approaches operating at acceptable LOS D or above but at least one movement (left, through, right) operating at LOS E or F.*

2.5 Crash History

Historical crash data were plotted along study area roadways for a three-year period between 2013 and 2015 **(Figure 12)**. A total of 436 crashes were reported. It is important to note the frequency of angle crashes along KY 1 (Carol Malone Boulevard). As shown in **Table 2**, the majority of the crashes occurred on three major routes: KY 1, US 60, and KY 7.

Table 2: Study Areas Roadways and Crash Types

Route	Total Crashes	Property Damage Only Crashes	Injury Crashes	Fatal Crashes	% of Total Crashes
KY 1	223	196	27	0	51%
KY 7	60	44	16	0	14%
KY 9	5	4	1	0	1%
KY 773	5	5	0	0	1%
KY 1910	1	1	0	0	0%
KY 1947	29	21	8	0	7%
KY 3297	26	20	6	0	6%
US 60	87	68	18	1	20%
Total	436	359	76	1	100%

Figure 12: Crash History by Manner of Collision

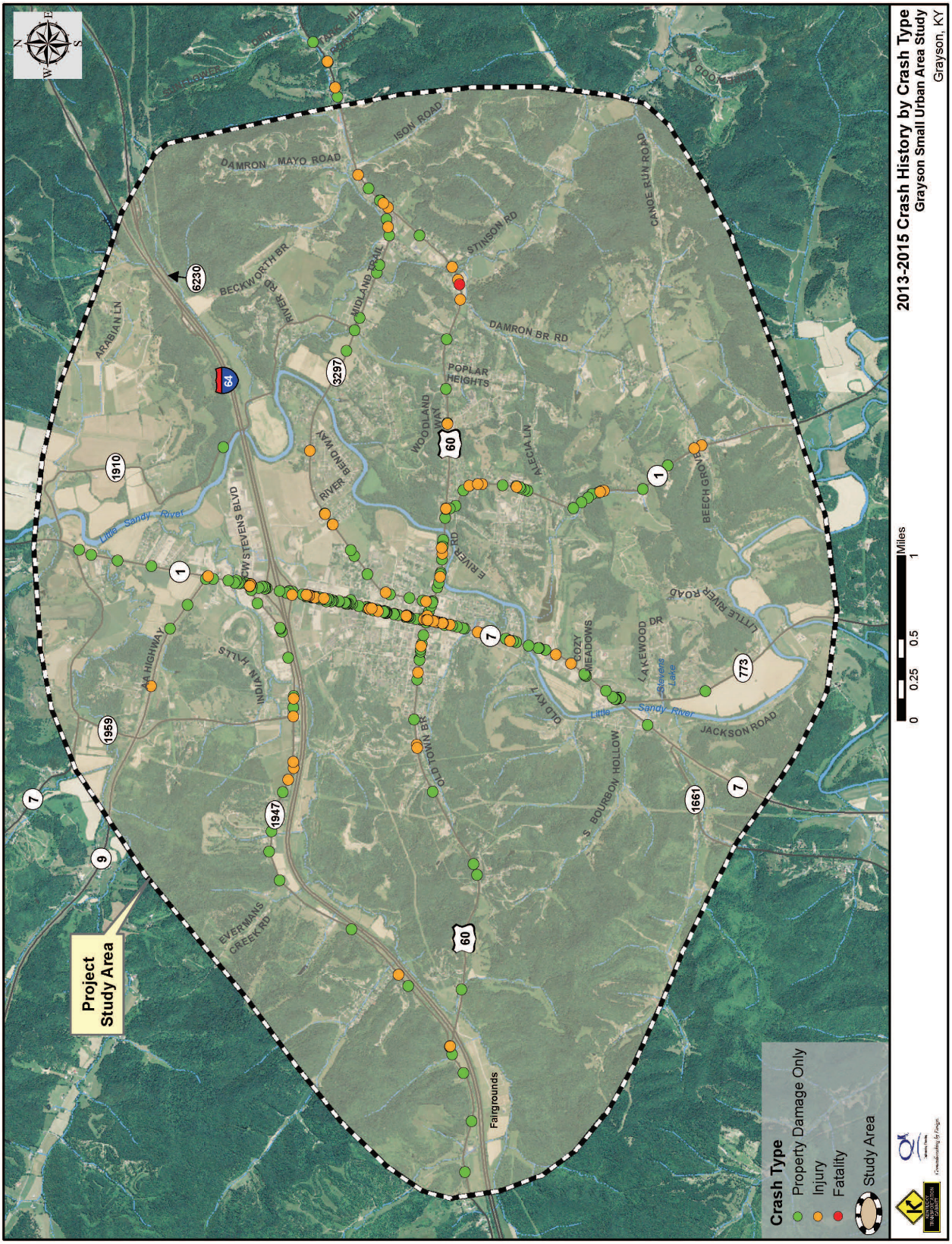

Figure 13: Crash History by Crash Type

All corridor crashes by crash type are shown in **Figure 13 (p. 21)**. A dataset of crashes are located in **Appendix B.**

The Kentucky Transportation Cabinet uses a systematic procedure to identify locations having high crash rates. The actual number of crashes, as obtained from the Kentucky State Police's (KSP) Kentucky Open Portal Solutions (KYOPS) Database, occurring within a roadway segment is used to calculate the Actual Crash Rate using the actual number of crashes, roadway length, AADT, and the number of years for which crash data are being examined. Using an analysis procedure from the Kentucky Transportation Center (KTC) and referenced in *The Analysis of Traffic Crash Data in Kentucky (2010-2014)*[6], Actual Crash Rates are compared to the Critical Crash Rate for similar types of Kentucky roadways. The Critical Crash Rate is the rate which is greater statistically, than the average crash rate for similar roadways and represents a rate above which crashes may be occurring in a non-random fashion. This ratio of Actual Crash Rate to the Critical Crash Rate is the Critical Crash Rate Factor (CCRF). Thus, a CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. This procedure is a screening technique indicating locations where further analysis may be needed. It is neither a definitive statement of nor a measurement of a crash problem.

Utilizing crash history, CCRFs for 0.1-mile spots were calculated for the study area routes. Thirteen 0.1-mile spots with CCRF values greater than 0.95 are summarized in **Table 3** and shown in **Figure 14 (p. 24)**. **Table 4** provides approximate descriptions of these crashes, as cited in police crash reports (where available). Five of the 0.1-mile high crash spots are along KY 1 between CW Stevens Boulevard and US 60 (MPs 10.6 – 11.8 in the table).

Table 3: Summary of 0.1-Mile Spots with CCRF Greater Than 0. 95

Route	Begin MP	End MP	Average Annual Daily Traffic*	Number Lanes	R/U**	Functional Class Rate	Crashes				CCRF
							Fatal	Injury	PDO***	Total	
KY 1	9.5	9.6	3,209	2	R	0.26	0	2	3	5	**1.29**
KY 1	10.6	10.7	13,603	4	U	0.44	0	2	49	51	**3.76**
KY 1	10.7	10.8	13,603	4	U	0.44	0	2	12	14	**1.03**
KY 1	10.9	11.0	13,603	4	U	0.44	0	3	11	14	**1.03**
KY 1	11.3	11.4	13,603	4	U	0.57	0	4	19	23	**1.40**
KY 1	11.7	11.8	7,713	4	U	0.57	0	2	19	21	**1.92**
KY 7	10.8	10.9	8,084	4	U	0.57	0	7	9	16	**1.41**
US 60	23.3	23.4	2,703	2	U	0.51	0	1	4	5	**0.97**
US 60	23.9	24.0	9,085	2	U	0.51	0	1	14	15	**1.32**
US 60	24.1	24.2	9,085	2	U	0.51	0	0	12	12	**1.05**
KY 773	0.0	0.1	2,337	2	R	0.26	0	0	4	4	**1.22**
KY 1947	3.3	3.4	2,830	2	U	0.51	0	1	8	9	**1.69**
KY 3297	0.0	0.1	3,407	2	U	0.51	0	2	4	6	**1.01**

* *Average Annual Daily Traffic from 2013 – 2015*

** *R-Rural; U-Urban*

*** *Property Damage Only*

[6] http://www.ktc.uky.edu/projects/analysis-of-traffic-crash-data-in-kentucky-2010-2014/

Table 4: Predominant Crashes with 0.1-Mile Crash Spots with CCRF Greater Than 0.95

Route	Begin MP	End MP	Total Spot Crashes	CCRF	Crash Details
KY 1 South (Hitchens Road)	9.5	9.6	5	**1.29**	1 head-on crash 1 crossed centerline 1 deer strike 2 driver error ran off the road (1 wet surface) All 5 crashes occurred in a curve 0 crashes occurred in 2015
KY 1	10.6	10.7	51	**3.76**	23 in parking lots (according to crash reports) 7 driver error 3 equipment failure 5 turning into or out of turn-lane or establishment
KY 1	10.7	10.8	14	**1.03**	9 rear-end, 1 sideswipe, 1 pedestrian collision, 3 angle
KY 1	10.9	11.0	14	**1.03**	1 collision with animal, 5 rear-end, 3 vehicles entering/leaving entrance
KY 1	11.3	11.4	23	**1.40**	14 angle, 12 of which were entering/leaving entrance 3 rear-end, 3 sideswipe same direction
KY 1	11.7	11.8	21	**1.92**	7 angle, 3 of which were vehicle entering/leaving entrance, 6 rear-end, 3 sideswipe; 5 ran red lights at Carol Malone and CW Stevens Boulevard
KY 7	10.8	10.9	16	**1.41**	6 angle crashes vehicles entering/leaving businesses; 5 rear-end, 1 pedestrian, 1 lost consciousness
US 60	23.3	23.4	5	**0.97**	1 parking lot, 2 vehicles parked, 1 rear-end, 2 making left turn, 4 on straight and grade roadway
US 60	23.9	24.0	15	**1.32**	4 parking lot, 1 DUI, 5 rear-end, 1 pedestrian strike (pedestrian lost balance); 4 making lefts
US 60	24.1	24.2	12	**1.05**	7 total rear-end with 2 citing bright sun; 2 changing lanes, 2 equipment failure (1 rear-end)
KY 773	0.0	0.1	4	**1.22**	3 single vehicle crashes lost control in curves; 1 deer strike, 1 equipment failure, 1 rear-end cited in curve
KY 1947	3.3	3.4	9	**1.69**	5 rear-end, 2 in parking lots; all in daylight, 1 fatality due to medical emergency; remaining crashes 1 failure to yield and 1 ran a red light
KY 3297	0.0	0.1	6	**1.01**	3 turning vehicles, 1 DUI, 1 pedestrian, 1 rear-end

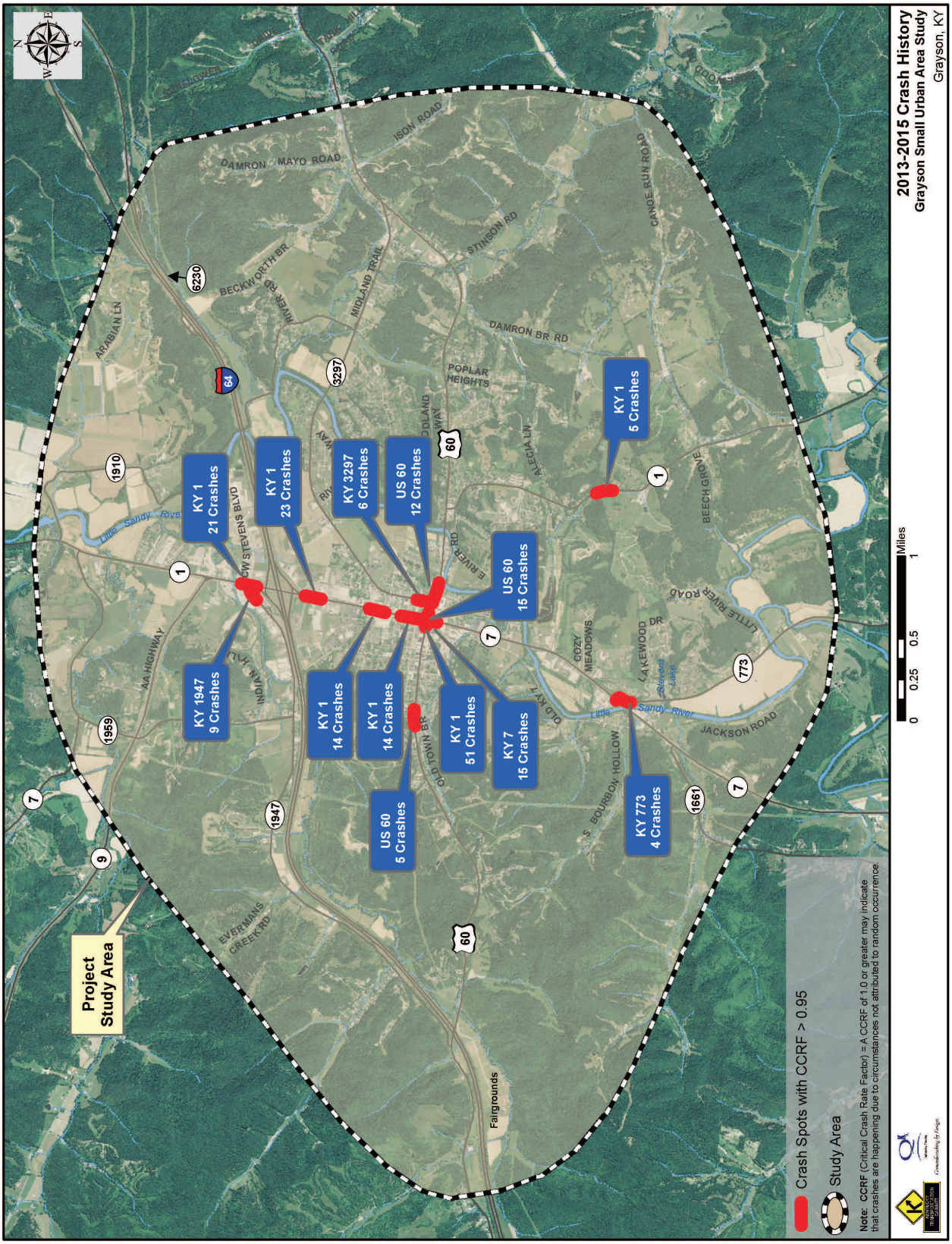

Figure 14: 0.1-Mile Crash Spots with CCRF Greater Than 0.95

3.0 ENVIRONMENTAL OVERVIEW

An Environmental Overview was conducted to identify environmental resources and potential issues of concern for consideration during the future development of transportation projects in the study area. Natural and human environmental resources were identified from a literature/ database review. Study area environmental resources are shown in **Figure 15** and are summarized in the following sections.

3.1 Natural Environment

The natural environment typically refers to all living and non-living things found to occur in nature. It includes aquatic ecology such as rivers, streams, and wetlands; threatened and endangered species; prime and unique farmland; and geotechnical resources.

3.1.1 Rivers and Streams

Carter County is dissected by three major drainage systems: Buffalo Creek (northwestern), Tygarts Creek (western), and the Little Sandy River (eastern). The Little Sandy River bisects the study area. The following 12 United States Geological Survey (USGS) named streams are:

- Barrett Creek
- Beckwith Branch
- Black Branch
- Damron Branch
- Easterling Branch
- Everman Creek
- Fall Branch
- Little Fork Little Sandy River
- Lower Stinson Creek
- Stan Branch
- Town Branch
- Upper Stinson Creek

In addition to these named resources, approximately 38 unnamed streams are documented.

3.1.2 Wetlands and Ponds

Sixty-five known National Wetlands Inventory (NWI) wetlands are illustrated throughout the study area, with the majority being freshwater ponds (50 ponds totaling 59 acres), followed by 10 forested/shrub wetlands (40 acres), four emergent wetlands (seven acres) and one riverine wetland. The freshwater ponds are generally scattered locations outside downtown Grayson.

3.1.3 Groundwater

Approximately 122 water wells are known, of which 65 are listed as monitoring, 24 remediation, 19 domestic use (single-household), two industrial use, and 12 either unlisted or have an unknown use. Most of the documented water wells occur along KY 9, KY 1, and US 60.

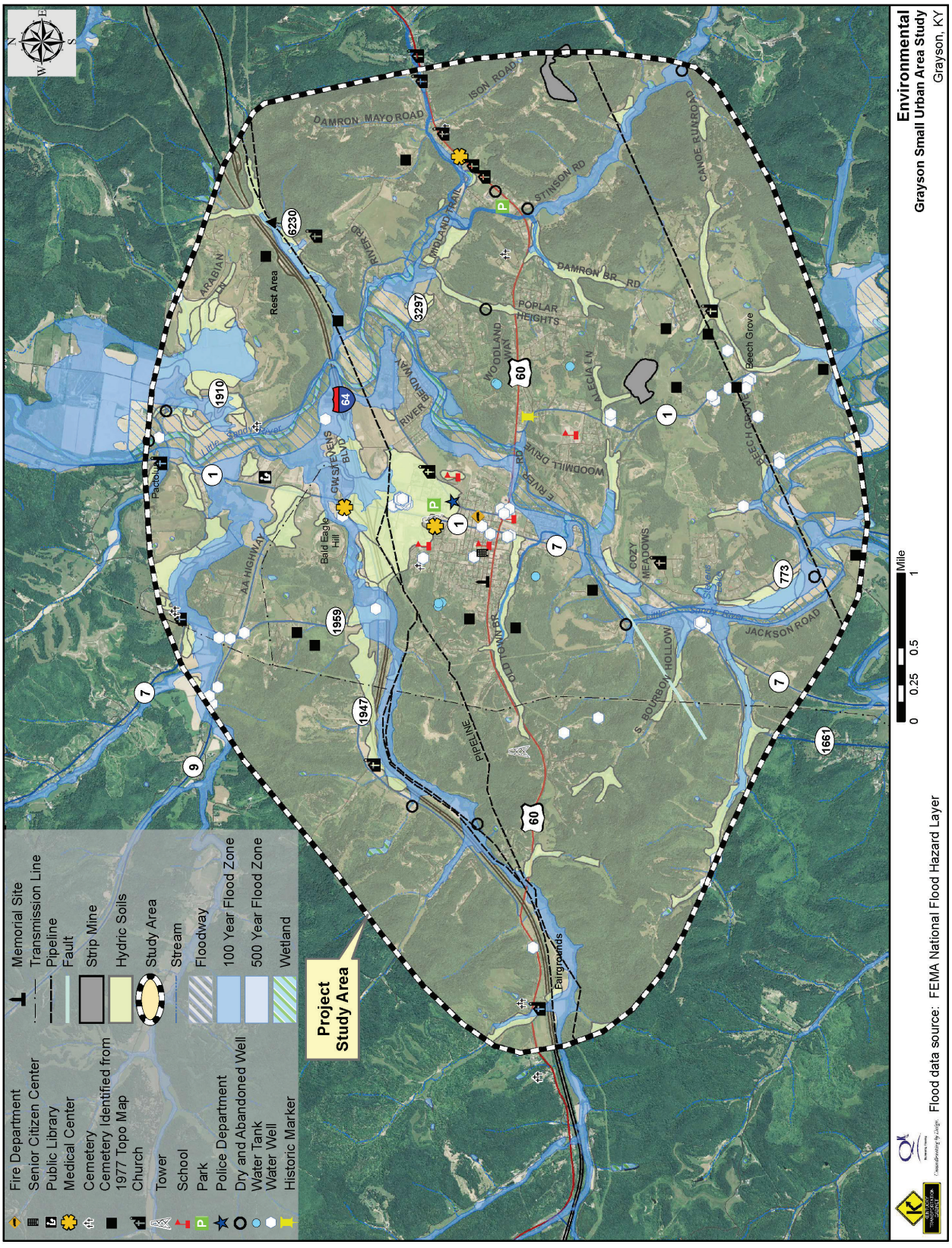

Figure 15: Environmental Overview

3.1.4 Floodplain/Floodway

Federal Emergency Management Agency (FEMA) 100-year floodplain occurs primarily along the Little Sandy River. The river runs north-south through Grayson and east-west along Barrett Creek parallel to I-64 and Everman Creek. The 100-year floodplain also occurs along Stinson Creek in the southeast quadrant of the study area. According to FEMA National Flood Hazard data, a designated floodway occurs along the Little Sandy River.

3.1.5 Threatened and/or Endangered Species

Based on review of available database information from the U.S. Fish and Wildlife Service (USFWS), the Kentucky Division of Fish and Wildlife Resources (KDFWR), and the Kentucky State Nature Preserves Commission (KSNPC), five federally listed species are known to occur or have the potential to occur in Carter County. The species identified during the review are summarized in **Table 5**:

Table 5: Threatened and/or Endangered Species

Group	Scientific Name	Common Name	Federal Status	Resource Agency
Mammals	*Myotis septentrionalis* *	northern long-eared bat	Threatened	USFWS, KDFWR, KSNPC
	Myotis sodalis	Indiana bat	Endangered	USFWS, KDFWR, KSNPC
	Myotis grisescens	gray bat	Endangered	USFWS, KDFWR, KSNPC
	Corynorhinus (=plecotus) townsendii virginianus	Virginia big-eared bat	Endangered	USFWS
Mussels	*Cyprogenia stegaria*	fanshell	Endangered	USFWS, KDFWR, KSNPC
	Epioblasma triquetra	snuffbox	Endangered	USFWS, KDFWR, KSNPC

* *Threatened, with 4D Rule, which allows USFWS to focus on protections necessary/advisable to conserve species listed as "threatened."*

The study area is located within known maternity, foraging, and/or hibernation habitats for four protected bat species. Tree removal could have impacts to summer roosting habitat for the Indiana and northern long-eared bats and potential foraging habitat for all four species. Therefore, impacts to wooded habitats should be minimized to the extent possible.

Potential habitat and known populations for the federally listed mussel species occur within Tygart's Creek, which is considered outside the Grayson SUA study area. Therefore, proposed improvement projects are not expected to impact endangered mussel species.

3.1.6 Prime Farmland

According to the Natural Resources Conservation Service (NRCS) web soil survey, the majority of prime farmland is located within the urban boundary (approximately 2,637 acres). As shown in **Figure 16**, areas designated as farmland of statewide importance (955 acres) also exist; however, the majority of the outer portions of the study area are not considered prime farmland (approximately 9,588 acres).

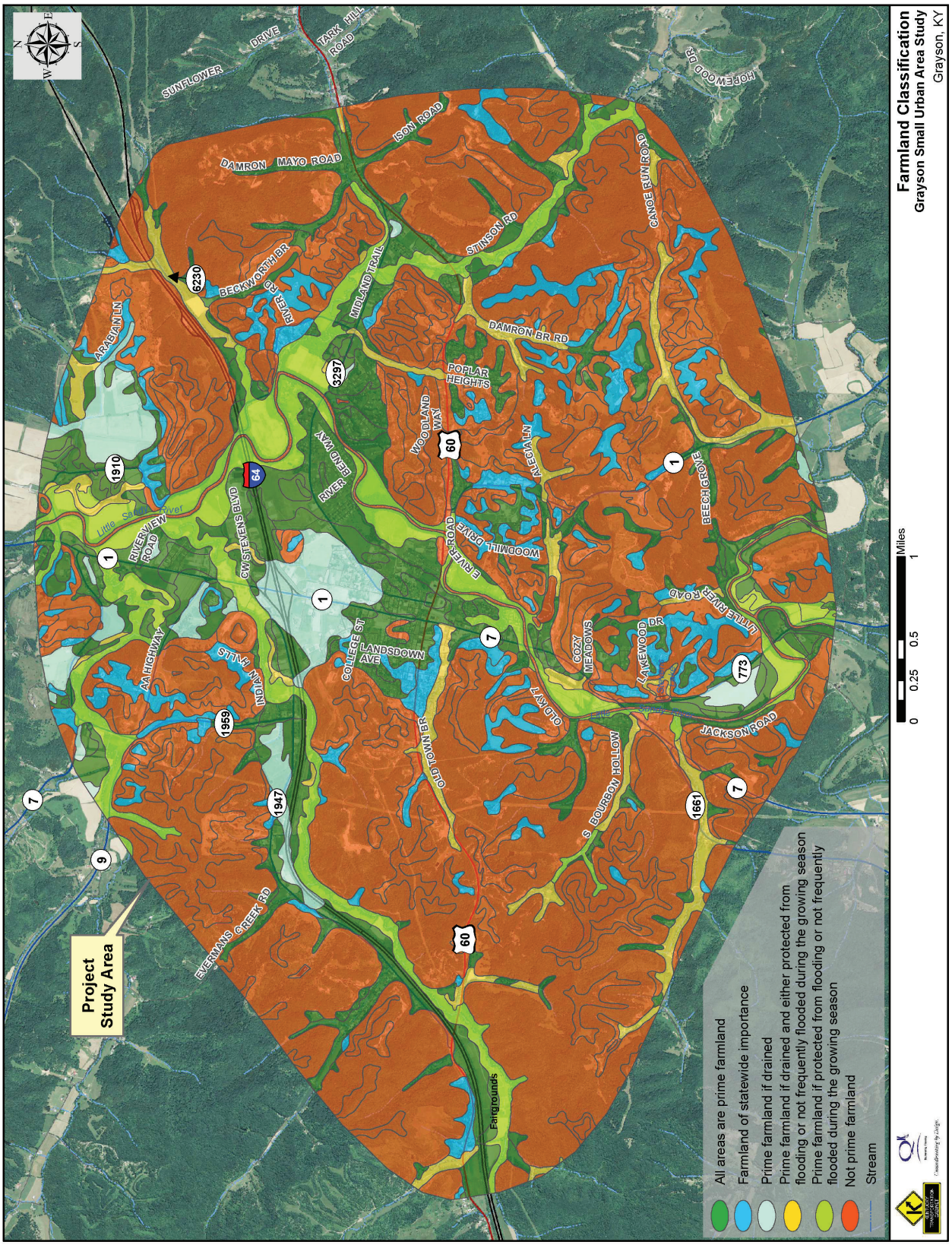

Figure 16: Prime Farmland

3.1.7 Karst Potential

Kentucky Geologic Survey's (KGS) karst potential classification[7] (three simplified classes: intense, prone, and non-karst) characterizes sections of Carter County as underlain by karst limestone; however, the study area is designated "non-karst," and there are no documented depressions and/or sinkholes.

3.1.8 Geotechnical Considerations

The geotechnical overview consists of a map of geologic conditions and a description of existing conditions **(Appendix C)**. Carter County is in the Eastern Kentucky Coal Field physiographic region **(Figure 17)**. The eastern half of the study area is dominated by the Middle Breathitt Group and western half by the Princess and Hyden formations. The topography surrounding Grayson consists of long and narrow ridgetops, steep hillsides, and narrow valleys. Geologic outcrops exist along I-64 and US 60. One fault is documented in the southwestern portion of the study area west of KY 7.

Most of the soils in Carter County are formed in material weathered from sandstone, siltstone, shale, or limestone of the Pennsylvanian and Mississippian periods. According to the NRCS's soil report, the study area encompasses over 15,500 acres and is characterized by 45.4% Latham-Shelocta association, steep, and other sandy loam and silt loam soils.

One monitoring well appears to be located along CW Stevens Boulevard. Dry and abandoned wells are located along US 60 in the east central portion of the study area.

3.2 Human Environment

The human environment is often defined as the "built" environment. Potential sensitive resources that may affect the human environment were identified and are discussed in the following sections.

3.2.1 Land Use

Carter County is located near the foothills of the Appalachians with elevations ranging from 542 feet near the Little Sandy River to 1,280 feet about 0.6 mile north of I-64 at the Rowan County line. Much of the land use is rural residential and agricultural. As previously mentioned, Grayson is also known as the "Heart of the Parks" by virtue of being geographically located near the center of a quadrangle formed by four of the Commonwealth's state parks.

Grayson is the economic, cultural, and medical center, and county seat, of Carter County. The city limits of Grayson encompass approximately 2.5 square miles consisting of a mix of urban and suburban land uses. It is best known throughout the Commonwealth for being home to Kentucky Christian University (KCU), a private, comprehensive, baccalaureate-level university. Industrial land uses are located just north of I-64, and travel-focused commercial land uses are just south of I-64.

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[7] http://kgs.uky.edu/kgsmap/kgsgeoserver/viewer.asp#

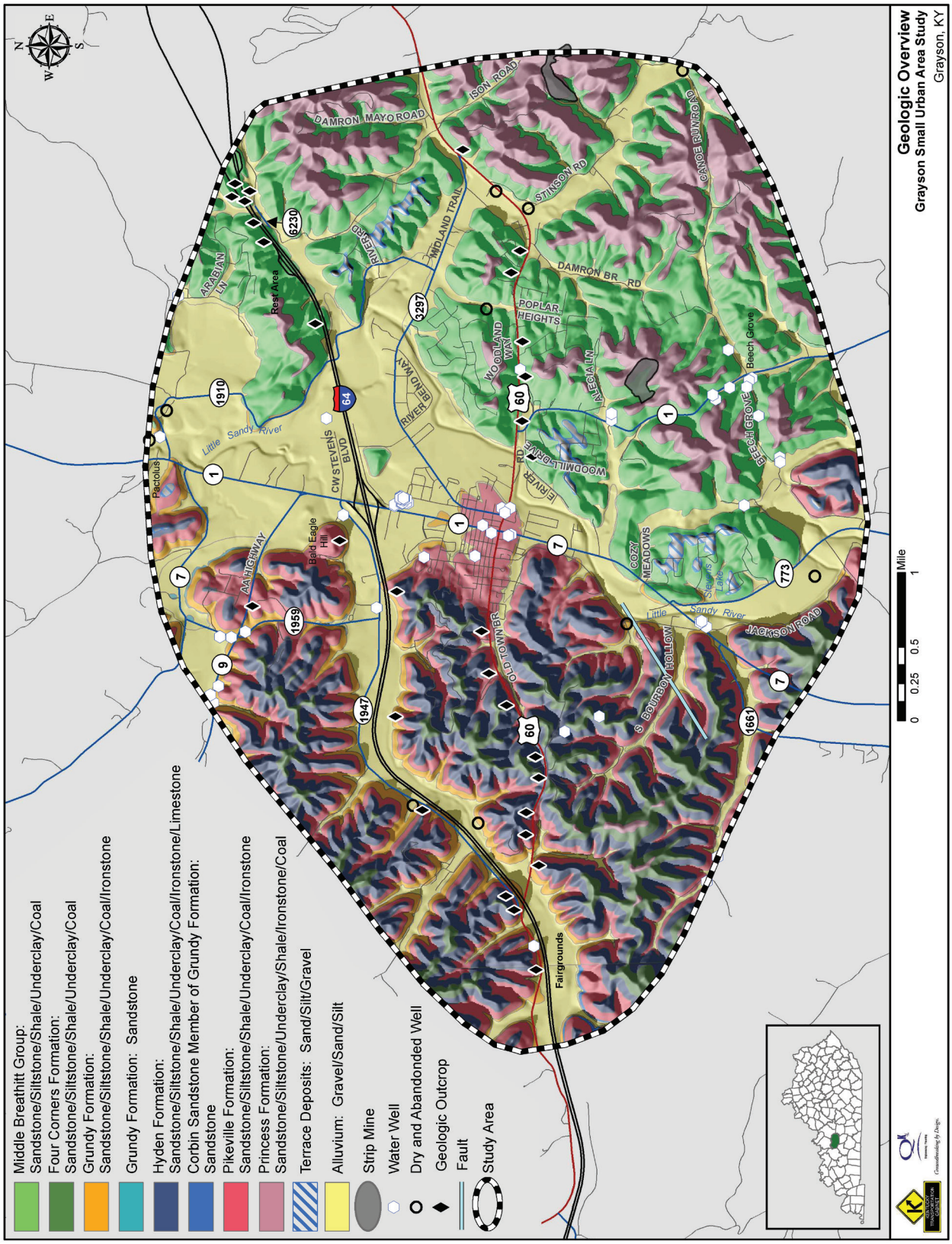

Figure 17: Geologic Overview

3.2.2 Socioeconomic Study

Issues pertaining to minority, elderly, disabled, limited English proficiency, and low income (persons living below poverty level) populations in the study area were evaluated and documented by the FIVCO ADD. A copy of the report is in **Appendix D**. According to census data, shown in **Figure 18**, eight Census Tract Block Groups (10% or more residents) fall within the study area, two of which are completely within the study area (960500 2 and 960600 2). Census Tract 960700 was excluded from the study area because more than 90% of the households are outside the study area. **Table 6** presents a summary of the census data and highlights potential areas of concern (i.e., they exceed the state or county average). All categories have at least one block group exceeding the county average.

Projects resulting from this SUA Study should not disproportionately impact the disadvantaged residences, but should benefit the residents of these census block groups.

Table 6: Census Tract and Block Group Data

Census Tract	Block Group	Minority		Age 65 and Older		Poverty		Population Speaking English Less Than Very Well		Disabled Population between 16 and 64	
		Exceeds County Average	Exceeds State Average	Exceeds County Average	Exceeds State Average	Exceeds County Average	Exceeds State Average	Exceeds County Average	Exceeds State Average	Exceeds County Average	Exceeds State Average
960500	1	☐	☐	☐	☐	☑	☑	☑	☐	☐	☐
	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	3	☑	☐	☐	☐	☑	☐	☑	☐	☑	☑
960600	1	☐	☐	☑	☑	☐	☐	☐	☐	☐	☐
	2	☑	☐	☐	☑	☑	☐	☑	☐	☐	☑
	3	☑	☐	☐	☐	☑	☐	☐	☐	☐	☑
	4	☑	☐	☑	☑	☐	☐	☐	☐	☑	☑

NOTE: Checkmark indicates above state/county average.

3.2.3 Churches

As shown in **Figure 15 (p. 26)**, 14 churches or houses of worship were identified in the SUA study area.

3.2.4 Schools

Three public school facilities—Prichard Elementary School, East Carter Middle School, and East Carter County High School—were identified in the study area. Kentucky Christian University (KCU) is located between College Street and Academic Parkway just west of Carol Malone Boulevard. (See **Figure 15**.)

3.2.5 Cemeteries

Based on available GIS and historical mapping, five known cemeteries were identified in the study area. (See **Figure 15**.)

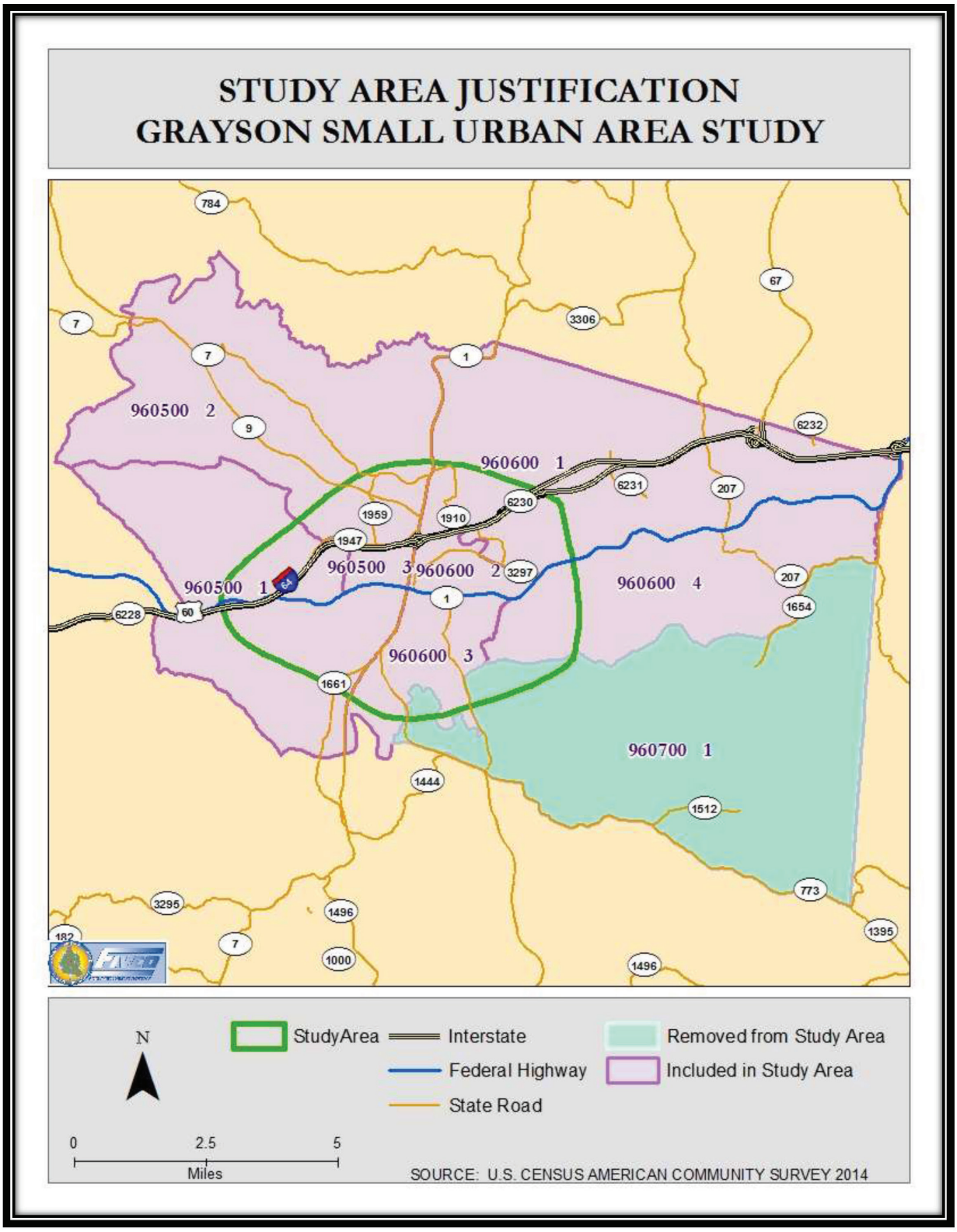

Figure 18: Census Block Groups

3.2.6 Public Services

The City of Grayson operates separate departments that provide public safety, emergency services, and public works, as follows. Their locations are shown on **Figure 15 (p. 26)**.

- Grayson has a police force including a Chief and full-time, part-time, and civilian officers.
- The streets-parks-public works department has employees who maintain the public rights-of-way, including approximately 20 miles of streets and sidewalks; and provide general maintenance to City Hall other public buildings, and public parks.
- The Grayson Fire Department was established as a volunteer department in 1933 and still remains fully volunteer staffed. The department covers approximately 90 square miles of suburban and rural areas surrounding the city limits of Grayson, as well as providing mutual aid to neighboring communities. It currently has over 30 staff and operates five apparatuses out of one station located at 316 East Third Street, adjacent to the Grayson Police Station.
- The Emergency Management (EM) department, located in the fire department headquarters, is staffed with a director and volunteers. EM is charged with providing a comprehensive plan for emergencies that affect the safety and welfare of the city and adjacent area by mitigating weather related disasters, chemical spills and leaks or threats to homeland security.
- The Carter County Library has a branch on West Main Street.

3.2.7 Cultural Historic Resources

According to the National Register of Historic Places (NRHP), five registered historic properties are listed in Carter County; however, none are within the study area and a survey of historic sites was not part of this SUA Study.

3.2.8 Section 4(f) of the 1966 U.S. Department of Transportation Act

Section 4(f) provides protection to publicly owned parks and recreation areas, wildlife refuges, and historic sites. No documented wildlife refuges exist in Carter County and the five historic sites noted above are not in the study area. Regarding public parks/recreation areas, the following were identified: Dixie Park Community Park is situated near Church Street just north of East Midland Trail in the northeast quadrant of the study area; a baseball/softball field complex is located on US 60 east of Grayson just east of Upper Stinson Road; Carter County Fairgrounds are in the northwest quadrant of the study area south of I-64 and west of US 60; Crossbar Sports Complex, a 34-acre sports complex that will include soccer and baseball/softball fields, is proposed on US 60 in the next two years. If proposed roadway projects use public recreation land, Section 4(f) issues may arise.

3.2.9 Section 6(f) of the Land and Water Conservation Fund (LWCF)

Parks using grants from the LWCF are afforded certain protections. Based on current LWCF records, nine properties in Carter County have received funds **(Appendix E)**, two of which are in the SUA study area: Grayson Park and the Grayson Swimming Pool. If proposed roadway projects would affect the recreational land/facilities benefitted by LWCF grants, Section 6(f) issues may arise.

3.2.10 UST/Hazmat Considerations

Hazardous materials are a concern for transportation projects as they can be costly to remove if acquired for right-of-way, and during construction, workers can be exposed to harmful chemicals. Therefore, a database search of known sites that handle or have handled hazardous materials was conducted through Environmental Data Resources Inc. (EDR) for the Grayson area **(Appendix F)**. The search included 50 databases managed by federal, state, local, and other jurisdictions, and approximately 136 unique sites. A majority of those are not of concern. A summary of those of concern follows:

- Thirty-nine registered Underground Storage Tanks (USTs) are in the study area. Should USTs be encountered by projects, an open records request to the Kentucky Department of Environmental Protection, UST Branch to identify past volitions or spills.
- The Grayson/Carter County landfill is east of Grayson, off I-64, outside the study area.

No sites are identified on the Federal CERCLIS list, a list of sites on or proposed for the National Priorities List (NPL) sites.

3.2.11 Air Quality

Carter County is in attainment for all of National Ambient Air Quality Standards (NAAQS) for the six major air quality pollutants: particulate matter (PM), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). Traffic delays and vehicle idling can lead to increased emissions, especially in terms of CO and Mobile Source Air Toxics (MSAT). U.S. Environmental Protection Agency (EPA) regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. This will both reduce the background level of MSAT as well as the possibility of MSAT emissions created within the project study area.

3.2.12 Noise

Due to the size of the study area, the environmental overview examined general, county-wide issues for noise. Noise-sensitive receptors, as identified per the FHWA's Noise Abatement Criteria[8] (NAC) and the KYTC's Noise Analysis and Abatement Policy (July 2015)[9], are present throughout the study area, including specified activity categories (land uses) for:

- Category B—Residential areas.
- Category C/D—Active sports areas, cemeteries, hospitals, parks, picnic areas, places of worship, playgrounds, Section 4(f) sites, schools, exterior and interior.
- Category E—Hotels, motels, offices, restaurants/bars, etc., exterior.

Based on the recommendations developed for this SUA Study, specific traffic noise impact analyses may need to be conducted for individual projects.

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[8] http://www.ecfr.gov/cgi-bin/text-dx?c=ecfr;sid=1253e5cedf4b79ecfc5150fe9d7d00e7;rgn=div5;view=text;node=23%3A1.0.1.8.44;idno=23;cc=ecfr

[9] http://transportation.ky.gov/Environmental-Analysis/ Environmental %20Resources/ 2015%20KYTC%20Noise%20Analysis%20and%20Abatement%20Policy.pdf

4.0 INITIAL MEETINGS

Two types of meetings were held during the course of the study: Project Team meetings and Local Officials/Stakeholders (LO/S) meetings. The Project Team was composed of KYTC District 9 and Central Office staff from various disciplines. Involvement of local officials and stakeholders was an important role in this SUA Study. The purpose of this outreach component was to bring different groups of people together to express their ideas, identify areas of concern, and develop potential solutions. The public involvement component of this study was used to:

- Inform and educate local officials and stakeholders on the study and its goals.
- Gauge interest in the desire for transportation improvement projects.
- Identify needs of the study area.
- Identify project issues and goals.
- Identify and prioritize potential improvement projects.

Summaries of all meetings are found in **Appendix G**.

4.1 Project Team Meeting No. 1

The first Project Team meeting was held July 8, 2016, at the FIVCO ADD office in Grayson. The purpose of the meeting was to review existing conditions data including high crash locations, current congestion issues, and an environmental overview. The following issues were discussed:

- KY 1 from KY 1947 south to US 60 carries 13,620 vehicles per day (vpd). Five intersections or their approaches (i.e., westbound or eastbound) operate at LOS E or F in either/both the AM or PM peak hour. Four of the five are along KY 1 at Interstate Drive/Everman Street, Love's North and South entrances, and Super Eight Lane.
- Approaches to four intersections along KY 1 between KY 1947 south and US 60 operate at an acceptable LOS D or above, but have at least one movement (i.e., left, through, right) operating at LOS E or F (identified by an asterisk [*] on **Table 1, p. 19**).
- A crash analysis yielded 13 high crash 0.1-mile spots, five of which are between CW Stevens Boulevard and KY 1/KY 7.
- US 60 between KY 1/KY 7 intersection and KY 1 (South) operates at LOS E.
- An advance warning sign is needed at the US 60/KY 1947 (west) intersection.
- New or improved sidewalks can reduce congestion and serve as improvement options.
- KY 1910 has narrow lane and shoulder widths, substandard curves, slope stability issues, flooding problems, and a less-than-desirable grade near the intersection with KY 3297.

4.2 Local Officials/Stakeholders (LO/S) Meeting No. 1

The first LO/S meeting was held the afternoon of July 8, 2016, following the first Project Team meeting, to present the study area, solicit feedback on existing conditions, and identify a broad range of potential problem areas and possible solutions. Attendees included representatives from city and county emergency management, the Grayson fire department, Carter County

E-911, ambulance services, schools, major industries, and officials from the city, state, and the U.S. Congress. Attendees were divided into small groups and participated in an exercise to identify transportation issues related to safety, congestion, and growth in the study area. Attendees identified 16 trouble spots due to congestion, 28 locations related to safety, and four areas of growth. Major concern areas were CW Stevens Boulevard and KY 1 (Carol Malone Boulevard). The approximate locations of trouble spots, and a new route identified to aid with congestion and safety are illustrated in **Figures 19 and 20 (p. 38)**, respectively. Locations where growth is likely to occur according to LO/S are shown in **Figure 21 (p. 39)**.

The information gleaned at these meetings and analyses of the existing conditions was used to develop new projects to improve safety and congestion.

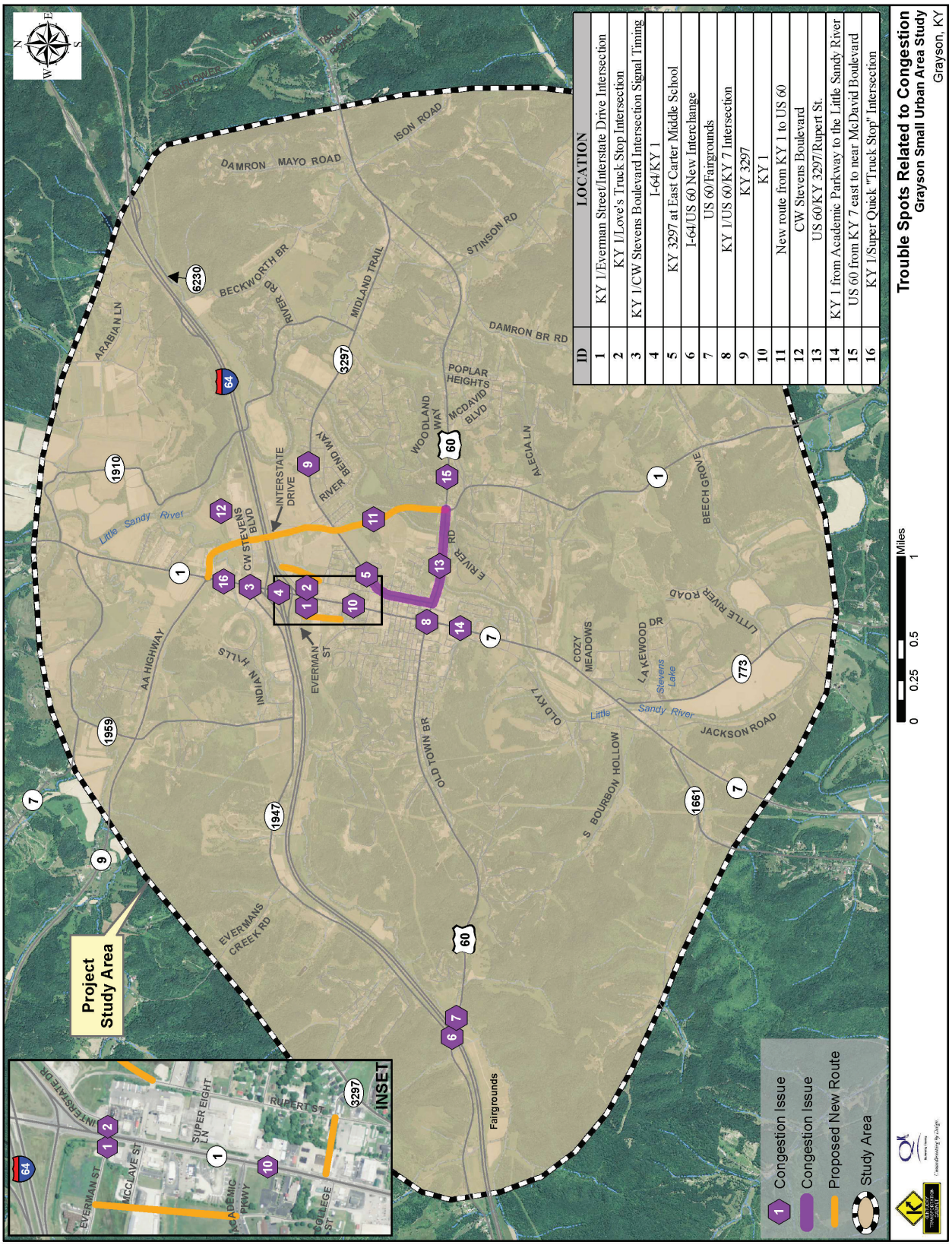


Figure 19: Trouble Spots Related to Congestion

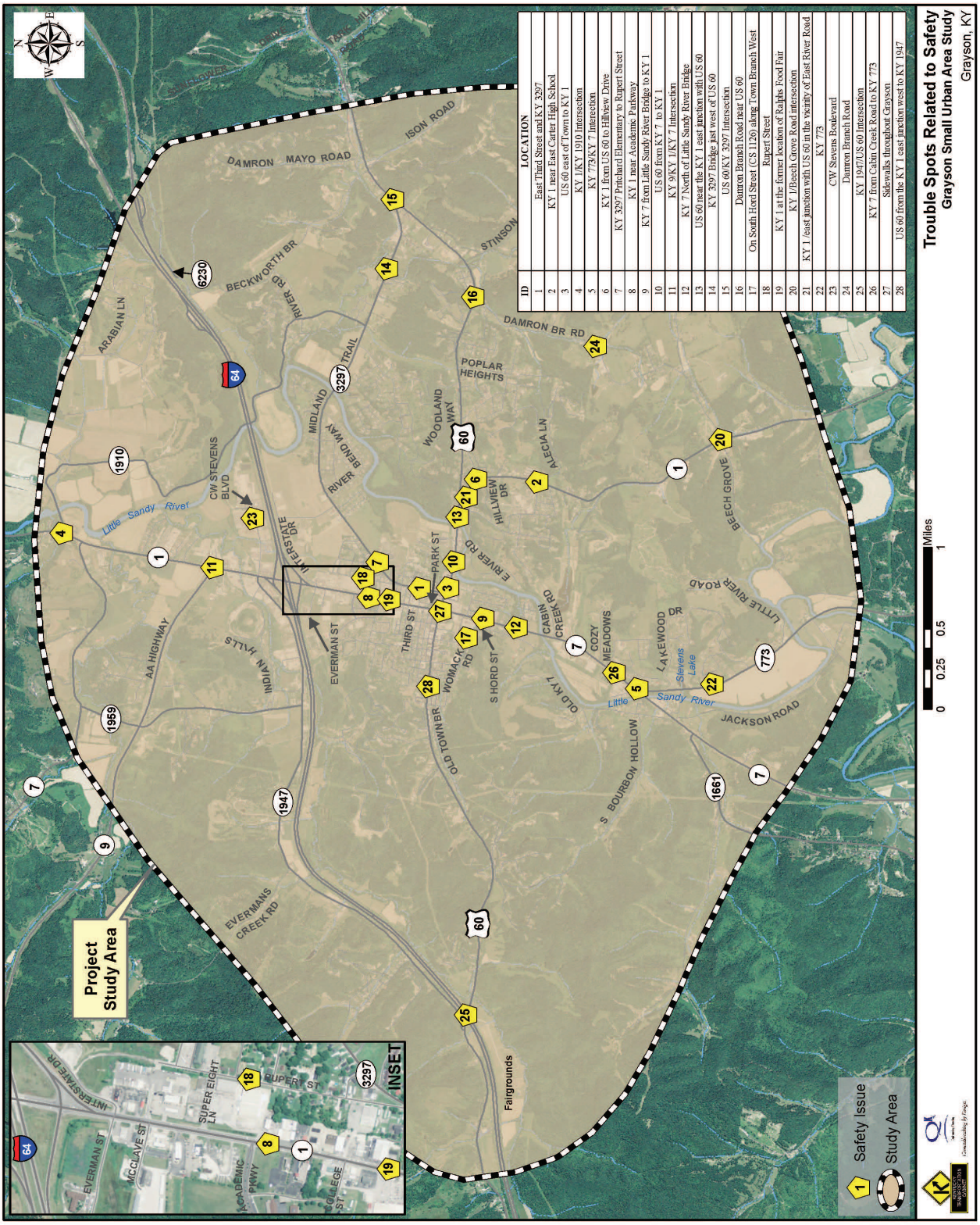


Figure 20: Trouble Spots Related to Safety

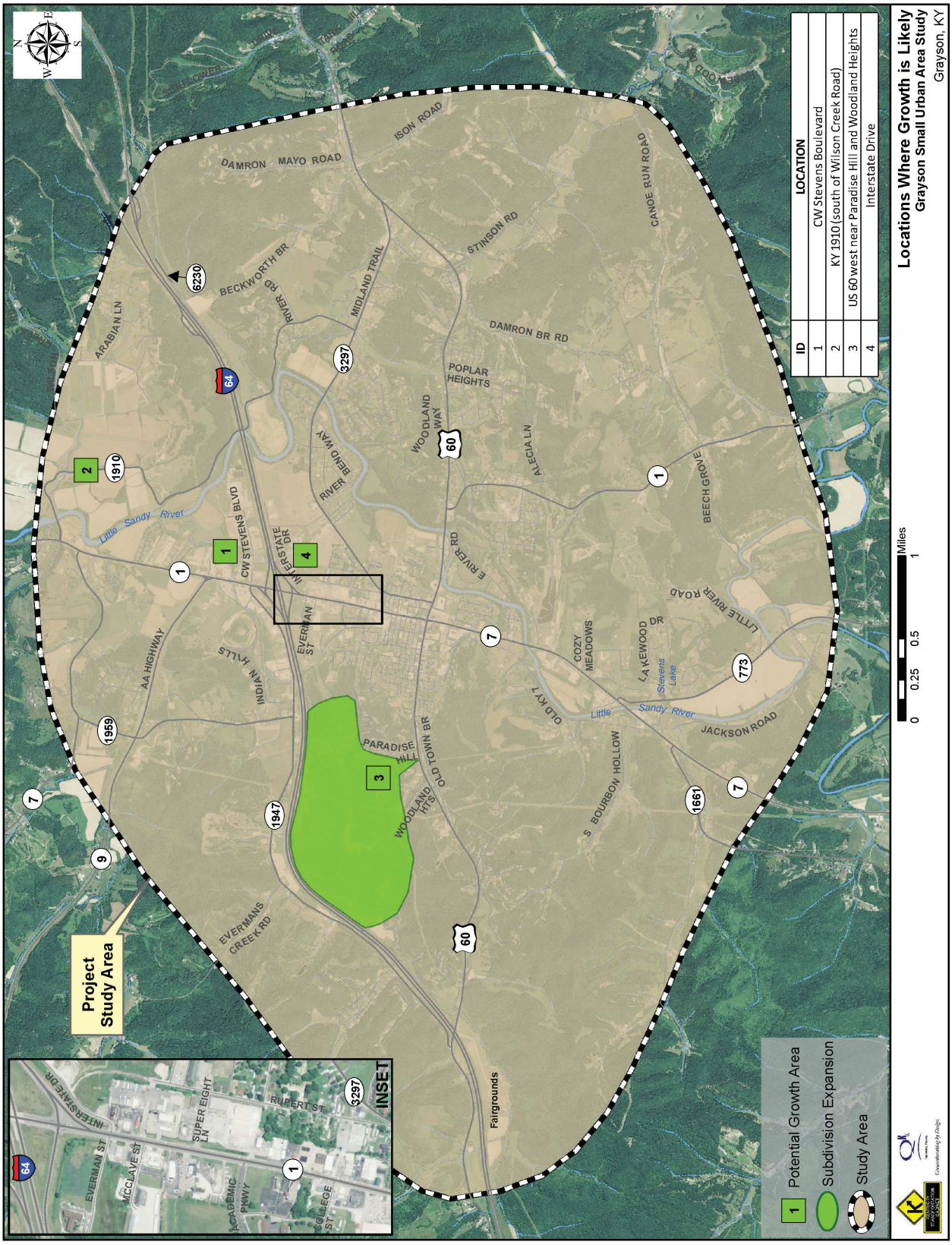


Figure 21: Locations Where Growth Is Likely

5.0 TRAFFIC FORECAST AND FUTURE YEAR OPERATIONAL ANALYSES

This chapter summarizes the anticipated future traffic conditions within the study area. The Abbreviated Traffic Forecast is in **Appendix A**.

5.1 District 9 Area Travel Demand Model (ATDM)

The traffic forecast for the Grayson SUA was developed from the District 9 ATDM, which covers eight District 9 counties, including Carter County, as well as three southern Ohio counties. The model was first developed in 2015 based on the KYTC's preferred model structure and contains household and employment information and an updated roadway network for the 2015 base year.

Traffic Analysis Zones (TAZs) form the geographical basis for delineating and organizing the socioeconomic data used by the model to generate the vehicular trips assigned to the roadway network. Household and population data, as well as employment and school enrollment, are stored in each zone. Forecast values for households and population are used to determine levels of travel demand throughout the model area.

TAZ boundaries from the Kentucky Statewide model and the Rowan County model initially served as the basis for development of the model's TAZ boundaries for the District 9 area, including Carter County. To add more zonal details, TAZs from both models were further refined to focus on urbanized areas in Kentucky. These zones for urbanized areas in the District 9 model depict the interaction of local trips within a small city the size of Grayson to the level of detail needed for this SUA. These smaller, more defined zones made it possible to represent the distribution of trips between zones more accurately, which meant a better fit of traffic assignments and observed counts on the study area roadway network.

Initially, household growth forecast in Carter County for the 2040 future year model was developed from county-wide level growth factors calculated from population forecasts produced by the Kentucky State Data Center. Employment growth was based on a third party forecast using trends from the Bureau of Labor Statistics.

As part of the development of this study, the Grayson area was further updated to reflect 2015 socioeconomic conditions and roadway updates. Household and employment data for the 2040 forecast year were also revised to more accurately reflect the local development patterns expected to occur. At the first LO/S meeting, participants were asked to identify anticipated areas of future housing and business development. This information was collected and incorporated into the 2040 scenario. Discussion included new/proposed or changes in school locations, future enrollment, and areas of potential industrial or business growth or traffic generators with significant truck traffic. In addition, a questionnaire was provided to industry representatives to glean information regarding industry expansion and peak hour truck information. Although no surveys were returned, the major employer in the region, Smithfield Foods, attended the first LO/S meeting and provided information to the KYTC Division of Planning Modeling Branch.

The KYTC consulted LO/S to update the socioeconomic data for the 2040 future year model within Carter County. Locations of proposed developments were identified and physical and infrastructure-related constraints influencing future growth were taken into account in the placement of future households and employment centers. While population projections were

reasonable, the amount of job growth was tempered and was redirected to grow in areas based on LO/S input. Changes in population and jobs within each of the TAZs in the study area are shown in **Figure 22** and **Figure 23 (p. 43)**, respectively.

Model runs for the 2015 and 2040 No Build traffic were provided by the KYTC. These extracts were used to develop v/c ratios for all study area roadways.

5.2 2040 No Build Traffic Forecasts

Following calibration of the ATDM, the KYTC provided a regional-level study area annual growth rate of 0.58%. This growth rate was used to forecast 2040 No Build traffic and AM and PM peak hour intersection turning movement volumes. The 2040 volumes developed from the updated ATDM are shown on **Figure 24 (p. 44)**. The 2040 model includes projects listed in the 2016 KYTC Highway Plan and includes the following PIFs as committed projects **(Table 7)**:

Table 7: Committed Projects

Route	Begin MP	End MP	PIF Description	PIF Number
KY 7	9.157	10.296	Correct geometric and width deficiencies on KY 7 from KY 1661 (MP 9.2) to and including the Little Sandy River Bridge (MP 10.3) to improve access and systems connectivity between Grayson and Sandy Hook, increase efficiency of route, and enhance economic growth in area.	09 022 D0007 46.20
KY 3297	0.200	1.634	Improve operational efficiency and provide congestion relief on KY 3297 between Rupert Lane (MP 0.279) and the Little Sandy River Bridge (MP 1.634).	09 022 D3297 39.00
	1.750	2.930	Correct geometric and width deficiencies (narrow shoulders) on KY 3297 from the Little Sandy River Bridge (MP 1.750) extending to the US 60 intersection (MP 2.932) to improve operational efficiency and systems connectivity.	09 022 D3297 40.00

5.3 2040 No Build Volume to Capacity (v/c) Ratios

To evaluate congestion on study area roadways, 2040 ADT volumes were compared to the roadways theoretical capacity. A v/c ratio developed using the HCM procedures shows two short segments with a v/c ratio greater than 1.0: CW Stevens Boulevard, and US 60 between KY 7 and Rupert Street. A v/c ratio greater than 1.0 indicates additional lanes might be justified. All other roadway segments are expected to operate at less than capacity with a v/c ratio less than 1.0, as shown in **Figure 25 (p. 45).**

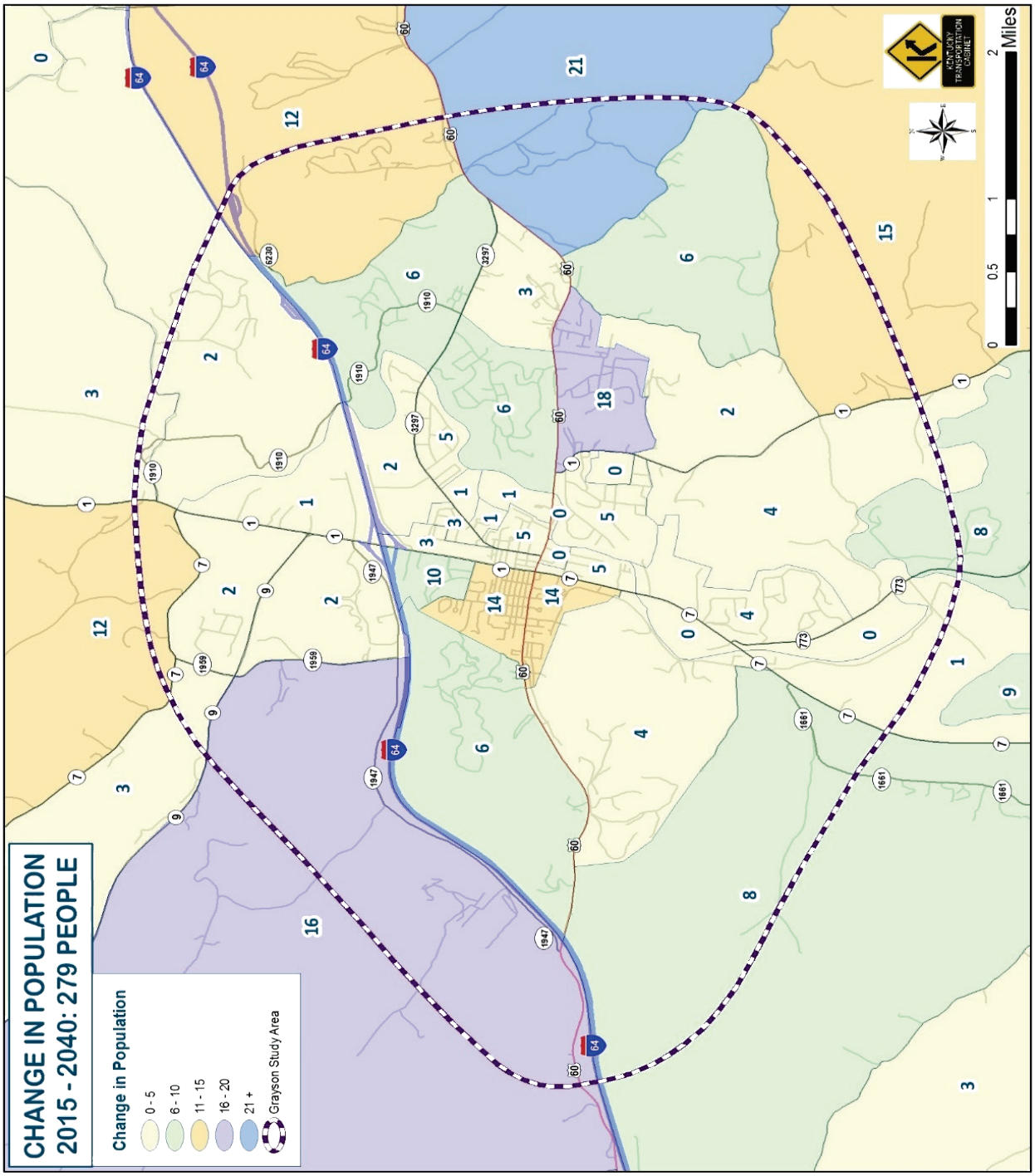


Figure 22: Change in Population

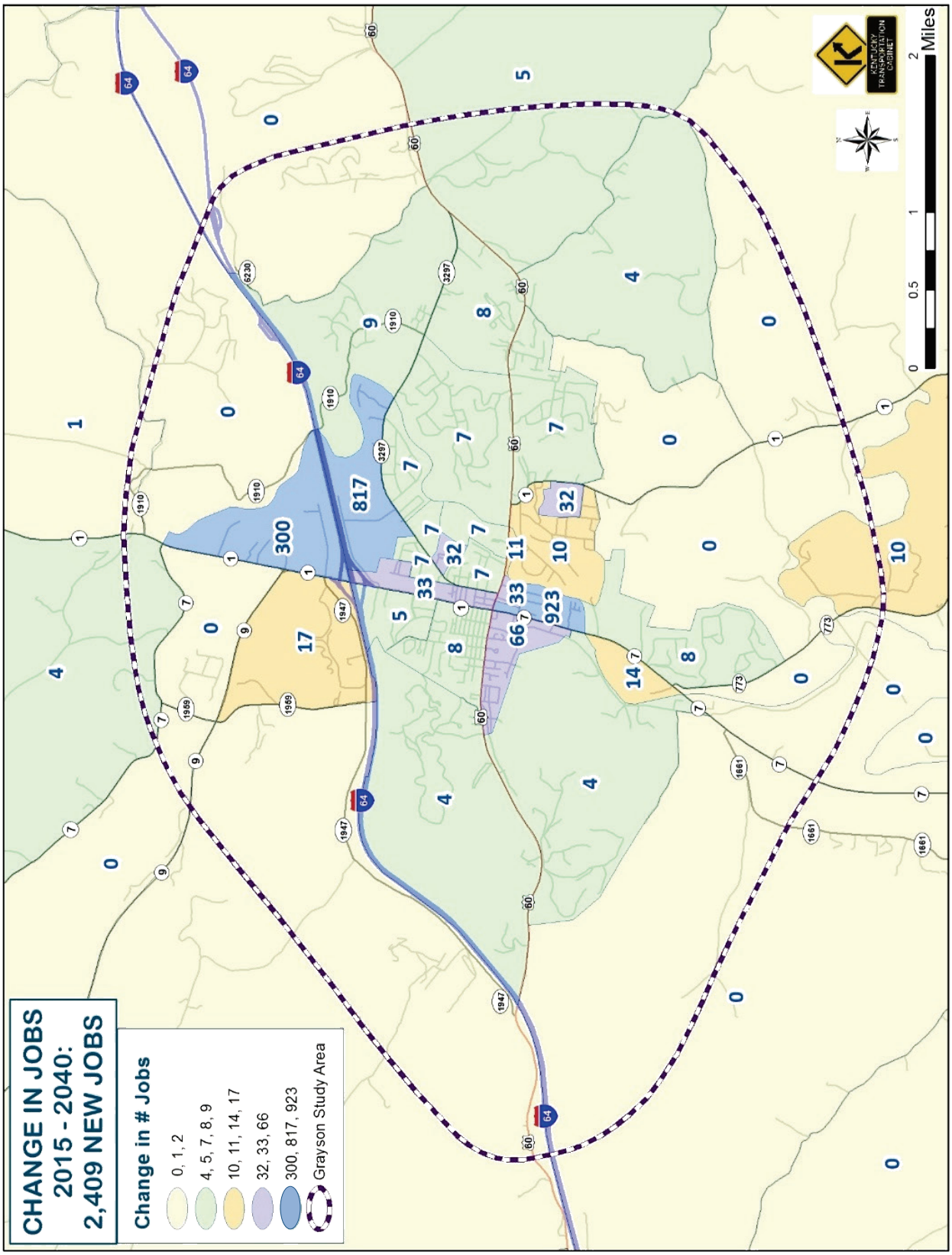


Figure 23: Change in Jobs

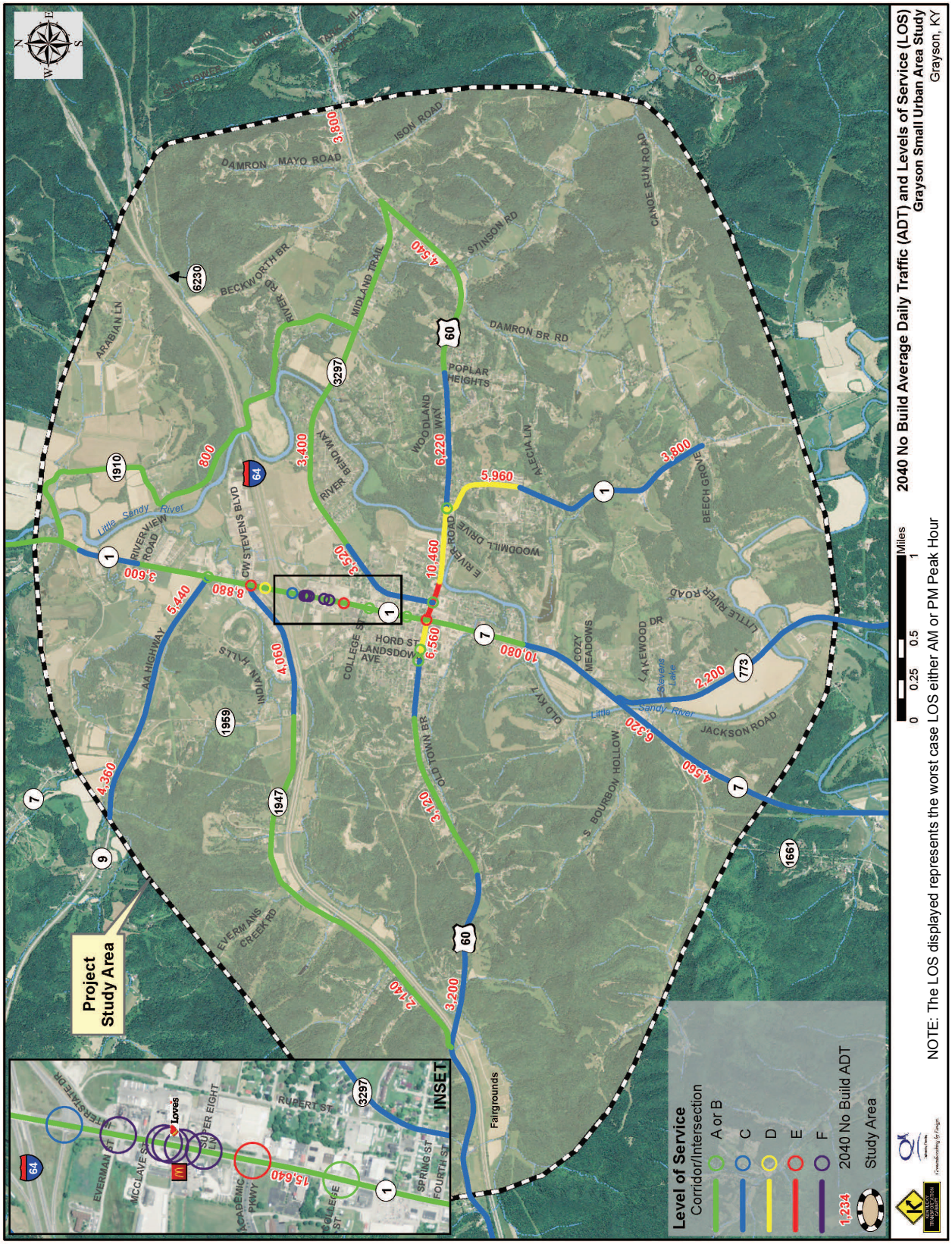


Figure 24: 2040 No Build ADT and LOS

Figure 25: 2040 No Build Volume to Capacity (v/c) Ratios

5.4 2040 No Build Levels of Service (LOS)

Design year 2040 LOS were calculated for study area roadways and intersections as shown in **Figure 24 (p. 44)**. The following sections provide a brief discussion of the results.

5.4.1 2040 Segment Analysis

Using the regional annual growth rate provided by the KYTC, segment ADTs were projected for design year 2040. Then HCM software was used to determine a No Build LOS for each study area route. As shown in **Figure 24**, the 2040 analysis projected LOS E on US 60 from the KY 1/KY 7 intersection east to the rural typical section (MP 23.940), then LOS D to KY 1 (South) between US 60 and to Old Saw Mill Road (MP 10.105) is projected to operate at LOS D.

5.4.2 2040 Intersection Analysis

Utilizing the regional growth rate provided by the KYTC, study area intersection AM and PM peak hour volumes identified in Section 2.4 were projected to 2040. Using 2040 ADT, signal timings, geometry, and current HCM software, analysis of study intersections identified in **Table 8** resulted in nine intersections or their approaches operating at LOS D or better in both the AM and PM peak hour. Eight KY 1 intersections or approaches (e.g., westbound or eastbound) are expected to operate at LOS E or F in either or both the AM or PM peak hour. Two additional KY 1 intersections have at least one movement (i.e., left, through, right) operating at LOS E or F (identified by * in **Table 8**).

Table 8: 2040 No Build Peak Hour Levels of Service for Study Area Intersections

Intersection	MP	Turning Movement #*	LOS AM Peak Hour Approach or Intersection LOS				LOS AM Peak Hour Approach or Intersection LOS			
			NB	SB	WB	EB	NB	SB	WB	EB
KY 1/KY 9	12.009	1	A				A			
KY 1/KY 1947/CW Stevens Boulevard	11.746	2	C				E			
KY 1/Interstate Drive/Everman Drive (unsignalized)	11.391	3	B	B	C	F	B	B	F	F
KY 1/I-64 WB ramp terminal*	11.648	4	B				D			
KY 1/I-64 EB ramp terminal*	11.480	5	C				B			
KY 1/Love's Truck Stop North Entrance	11.340	6	A	A	B	D	B	B	B	F
KY 1/Love's Truck Stop South	11.310	7	B	A	B	F	B	B	F	E
KY 1/McDonald's Entrance (unsignalized)	11.280	8	B			F	B			E
KY 1/Super Eight Lane (unsignalized)	11.240	9		B	C			B	F	
KY 1/Academic Parkway (unsignalized)	11.159	10	A			C	B			E
KY 1/College Street	11.004	11	A				A			
KY 1/Third Street	10.766	12	A				A			
US 60/Landsdowne Avenue	23.691	13	A				A			
US 60/South Hord Street	23.756	14	A				A			
US 60/KY 1/KY 7 (US 60 MP 23.94)	10.646	15	E				E			
US 60/KY 3297	24.078	16	B				B			
US 60/KY 1 (US 60 MP 24.632)	24.632	17	B				B			

NOTES:

Red letters signify areas of concern or intersection operating at LOS E or F in either/both the AM or PM peak hour.

** Additional KY 1 intersections with approaches operating at acceptable LOS D or above but at least one movement (left, through, right) operating at LOS E or F.*

6.0 PROJECT DEVELOPMENT

Projects were developed to improve safety and congestion taking into consideration high crash locations, existing and future year traffic and associated levels of service, v/c ratio analysis, identified areas of growth, and LO/S input. Concepts were not developed for projects currently underway (Highway Plan projects) with either funds not authorized or projects not progressing, and previously identified PIFs.

Cost estimates were provided for each new project based on pavement, structures, and an estimate of earthwork quantities utilizing KYTC District 9 unit bid prices. Other detail items such as curb and gutter, culverts, signal heads, retaining walls, etc. were estimated where appropriate. KYTC District 9 staff provided right-of-way and utility estimates for each new project. PIF projects' previous construction cost estimates were updated to 2015 dollars using the KYTC's 2015 construction cost index, and inflated to arrive at 2016 dollars. Design, right-of-way, and utility estimates for PIF projects were also adjusted utilizing an inflation rate to 2016.

6.1 Project Team Meeting No. 2

November 1, 2016, a second Project Team meeting was held in Flemingsburg at the KYTC District 9 office. The purpose of the meeting was to review each identified projects to determine whether there should be modifications and/or additions/deletions to the priority lists. The discussion included the following:

- Project H—KYTC has made numerous safety improvements to mitigate crashes at the KY 9/KY 1 intersection, and the reported three-year crash history (three crashes at or near this location, one of which was a collision with an animal) does not indicate a crash safety issue. The Project Team agreed additional intersection improvements were not necessary. Project H now consists of a District 9 review of signage/striping for KY 9 in advance of KY 1.
- Project K—KY 1 from Interstate Drive to College Street should be separated into two projects (see Projects K and M), and the cost for a traffic signal should be removed.
- Project KK—A proposed crosswalk at Academic Parkway was removed from consideration and included with Project KK (KYTC Item Number 09-144.00: KY 1 widening from the Little Sandy River Bridge to Academic Parkway).
- Project O—After a discussion of short- and long-term projects, the closure of Park Street was identified as a new, short-term project. The entrance to Park Street, in the northeast quadrant of the US 60/KY 1/KY 7 intersection, is in the functional area of the intersection and contributes to congestion.
- Project DD—Damron Branch Road, near the intersection of Beech Grove Road, is adjacent to a creek. Due to large drainage area, proximity of the channel to the roadway, and flood zone location, alleviating drainage problems would require major road reconstruction/relocation, additional right-of-way acquisitions, and utility relocations. Therefore, a concept was not developed and improvements are not recommended at this time.

To accommodate revisions (such as additions/ deletions) to the alphabetically ordered list of projects, several project names have been changed as shown in **Table 9**.

Table 9: Revisions to Original Project Names

Former Name	New Name	Former Name	New Name
GG	G	EE	T
II	I	HH	U
JJ	L	FF	Y
KK	O	BB: CW Stevens Boulevard to KY 3297	BB
Original O	Combined with KYTC Item Number 9-144.00	BB KY 3297 to US 60	BB1

At the conclusion of the second Project Team meeting, the new projects were categorized as follows:

- **Local:** Local projects are not located on the state-maintained system and would likely need to be funded by the city of Grayson or Carter County. A private developer could also assume this responsibility.
- **Short-Term:** Short-term projects are typically lower-cost implemented in the near term. These types of improvements require little or no right-of-way to construct and in some cases may be implemented by the KYTC Division of Maintenance.
- **Long-Term:** Long-term projects are higher-cost that would require more significant resources to implement. These project types will require additional right-of-way to construct and would likely need to be funded through the KYTC Highway Plan (SYP) process.

Project Team meeting minutes are in **Appendix F**.

6.2 2040 Build Traffic

The District 9 ATDM was used to compare the 2040 No Build scenario to a 2040 Build scenario. Three projects—J, BB, and BB1—were modeled together to determine an approximate amount of traffic along study area routes and also traffic diverted from KY 1 to the new "east bypass (J, BB, BB1)." Study area route Build volumes were adjusted utilizing a ratio of modeled No Build/Build traffic applied to the 2040 forecasted traffic volumes in Section 5.2 of this report.

The reader should exercise caution when utilizing the Build traffic volume output from the travel demand model as shown in **Figure 26** for Projects J, BB, and BB1. These volumes are an indicator of the projects' viability and could be over- or underestimated by the traffic model by as much as 30%.

6.3 2040 Build Volume to Capacity (v/c) Ratios

To evaluate congestion on study area roadways for the Build scenario, 2040 Build ADT volumes were compared to the roadways' theoretical capacity using the ATDM. A v/c analysis shows two short segments with a v/c ratio greater than 1.0: segments on CW Stevens Boulevard, and on US 60 between KY1/KY 7 and Robert and Mary Street. A v/c ratio greater than 1.0 indicates additional lanes may be justified. All other roadway segments are expected to operate at less than capacity with a v/c ratio less than 1.0, as shown in **Figure 27 (p. 50)**.

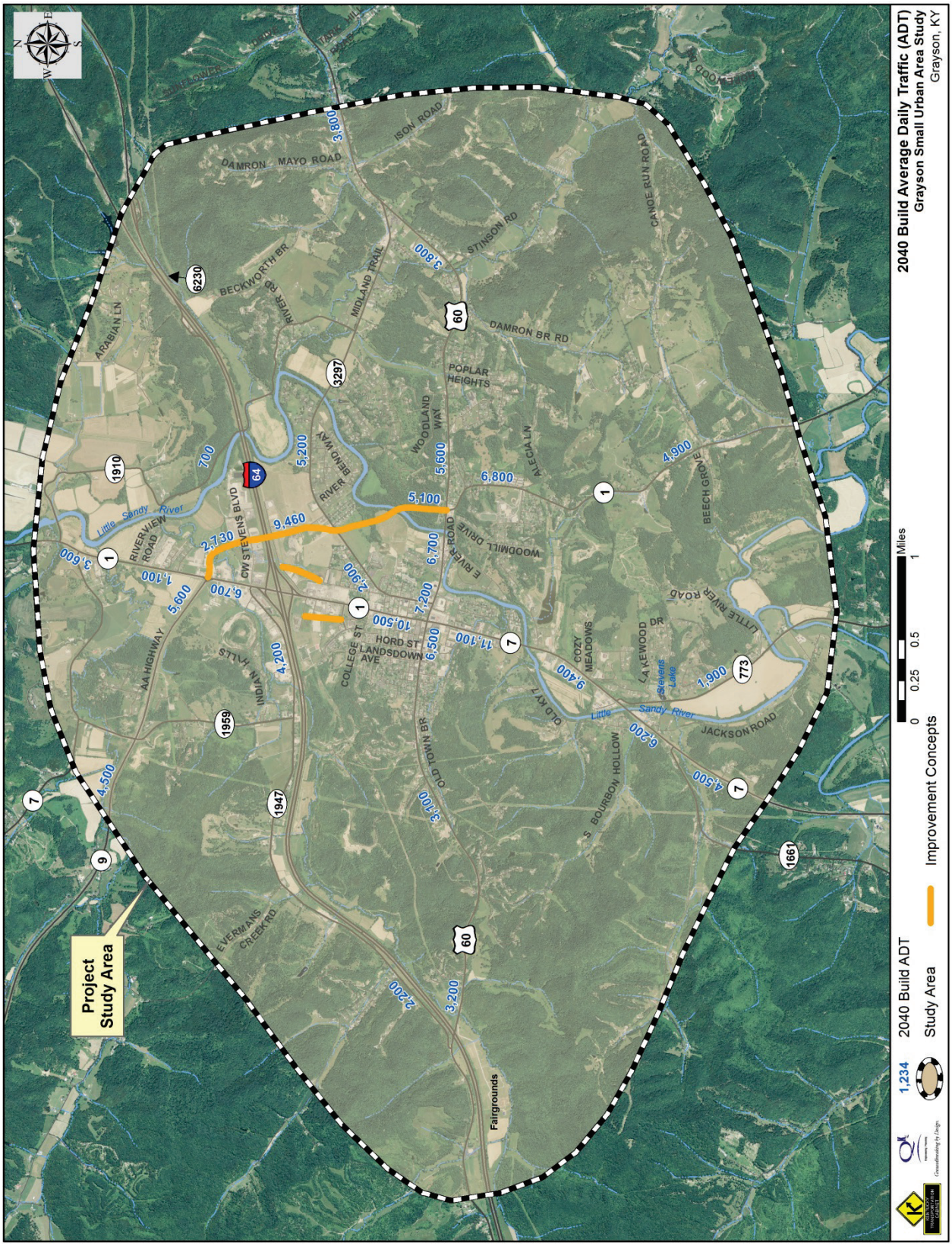


Figure 26: 2040 Build Average Daily Traffic (ADT)

Figure 27: 2040 Build Volume to Capacity (v/c) Ratios

6.4 Project Descriptions

Individual project sheets including detailed descriptions, project concepts, and photos follow. As stated previously, if an identified PIF or current Highway Plan project existed to address safety or congestion, a new project was not developed to reassess that need. All project total costs and associated concepts or alignments are preliminary and subject to change as each project progresses through the development process. **Figure 28** shows the general location of each project.

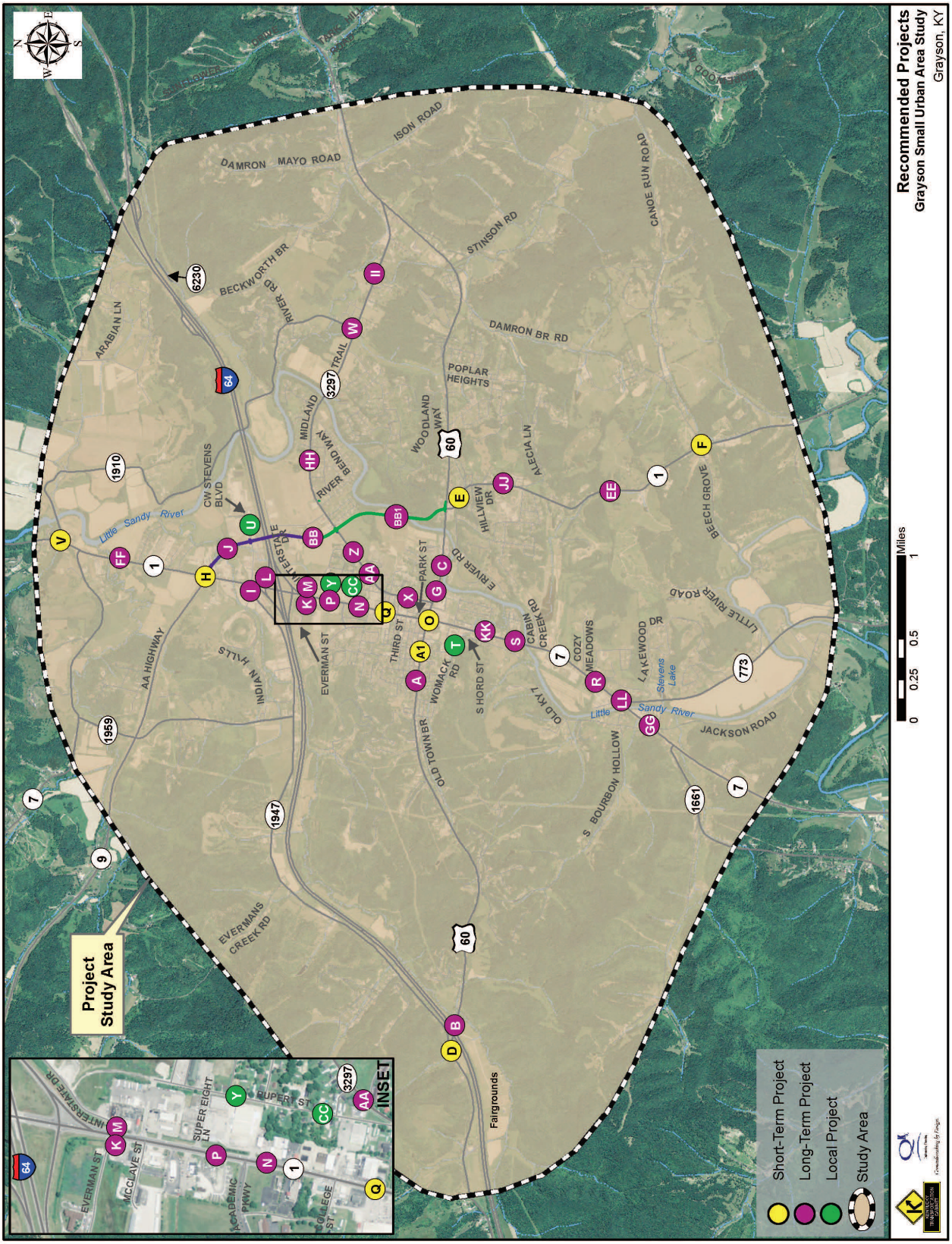
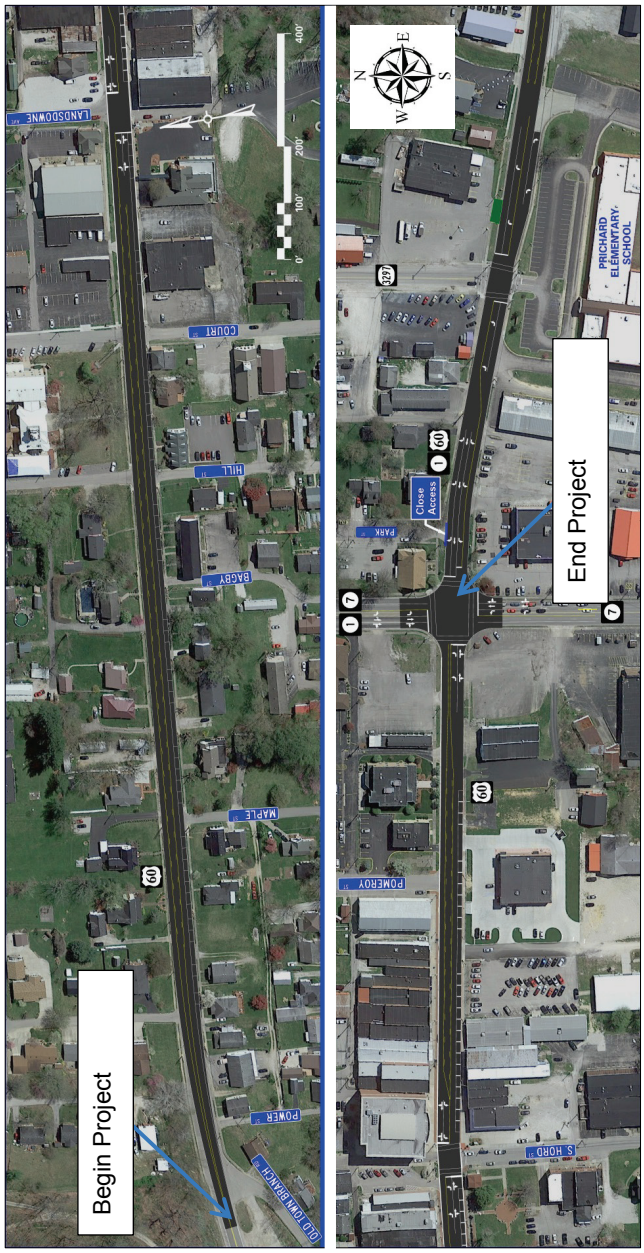


Figure 28: Recommended Projects

A Long-Term	**LOCATION** **US 60** **(MP 23.346 – MP 23.940)**	**PROJECT PRIORITY** **LOW**
	Description Restripe US 60 and provide TWLTL from Old Town Branch Road to KY 1/KY 7 intersection with parking on one side only.	**Cost Estimate:** Planning: $0 Design: $20,000 Right-of-Way: $0 Utilities: $0 Construction: $180,000 Total: $200,000



Problem Statement: US 60 between Old Town Branch Road and KY 1/KY 7 intersection carries between 2,720 vpd and 5,720 vpd and has multiple access points. In addition, parking is allowed along both sides of the roadway and there are wide driveways rather than channelized entrances. US 60 near Old Town Branch Road has a CCRF of 0.97. Stakeholders requested a two-way left-turn lane (TWLTL) be considered to relieve congestion and facilitate left turns.

Bagby Park and South Hord streets are the only signalized intersections along this section of US 60.

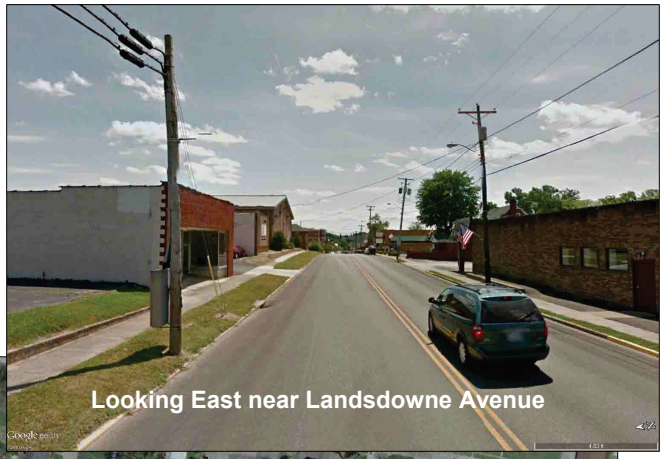
Project A would include a TWLTL beginning near Old Town Branch Road and terminating at KY 1/KY 7 to provide for a more efficient traffic operation and better facilitate left-turning movements. This improvement would eliminate parking on one side of US 60.


Looking East near Bagby Park Street

A1 Short-Term	LOCATION US 60 (MP 23.620 – MP 23.940)	PROJECT PRIORITY LOW
	Description Restripe US 60 and provide left-turn pockets from Court Street to KY 1/KY 7.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $5,000 Total: $5,000

Problem Statement: US 60 between Court Street and KY 1/KY 7 intersection carries between 2,720 vpd and 5,720 vpd and has multiple access points. In addition, parking is allowed along both sides of the roadway and there are wide driveways rather than channelized entrances. US 60 near Old Town Branch Road has a CCRF of 0.97.

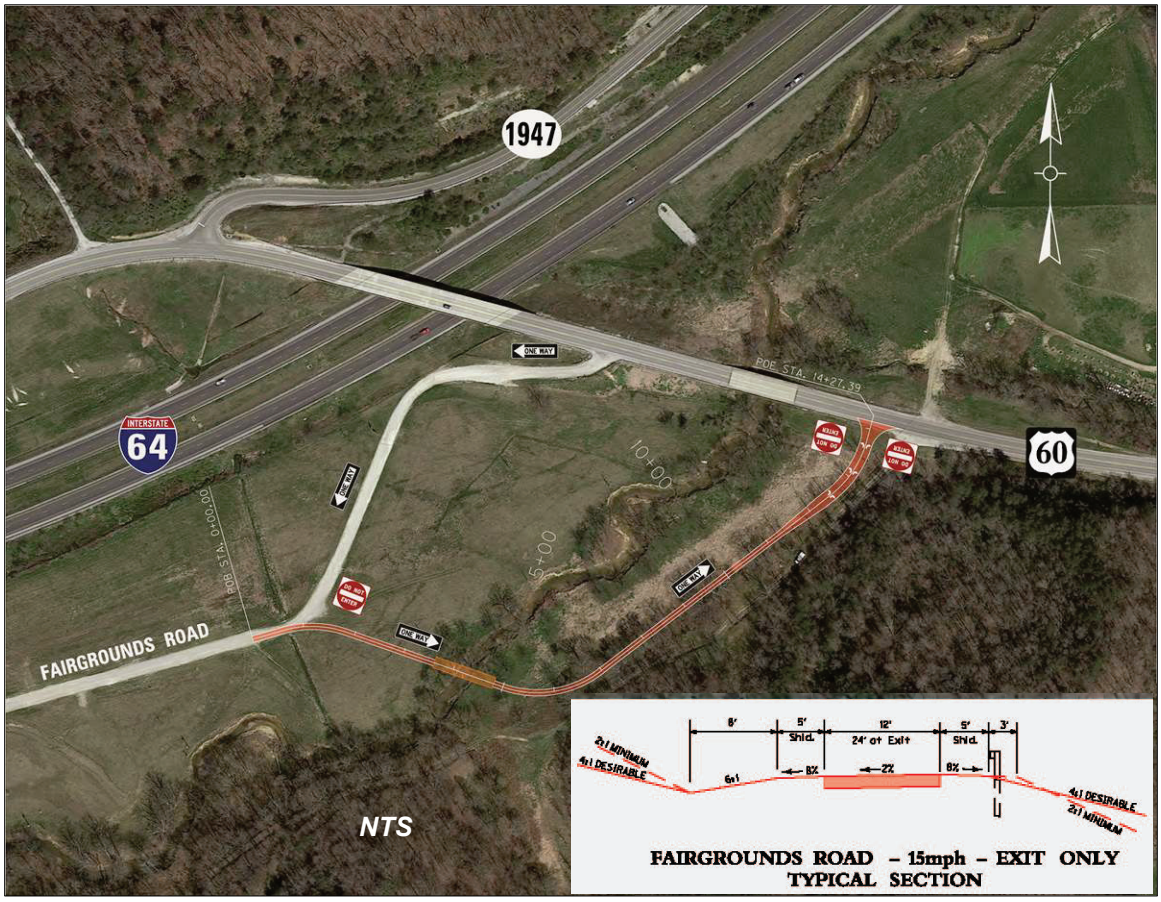
.Project A1 would differ from Project A in that it proposes only striping improvements including an eastbound and westbound left-turn pocket at Court Street (unsignalized), and westbound left-turn pockets at Bagby Park/Landsdowne Avenue and South Hord Street. Project limits are US 60 between Court Street and KY 1/KY 7 which carries 5,720 vpd. Either Project A or A1 would be implemented, not both.



B Long-Term	**LOCATION** **US 60** **(MP 21.380 – MP 21.381)**	**PROJECT PRIORITY** **LOW**
	Description Provide additional one-lane access road from US 60 to the Fairgrounds east of the existing entrance.	**Cost Estimate:** Planning: $0 Design: $350,000 Right-of-Way: $50,000 Utilities: $75,000 Construction: $625,000 Total: $1,100,000

Problem Statement: US 60 near the Carter County Fairgrounds carries approximately 2,800 vpd. The Fairgrounds has many large events and concerts throughout the year. Currently, Fairgrounds Road is the only access from US 60 to enter or leave the Fairgrounds. This intersection is close (180 feet) to the bridge over I-64, and the guardrail at the intersection reduces the sight distance exiting the Fairgrounds. During events, traffic queues on US 60 west, which is 800 feet to KY 1947—an intersection terminating in a curve.

Project B would add a second, 12-foot-wide one-lane access road with five-foot-wide shoulders that would provide separation from the US 60 bridge over I-64, add more queuing space before the US 60/KY 1947 intersection, and help relieve congestion on US 60 during events. Project B would provide options to open dual entrances/exits before and after events or to maintain one-way-in/one-way-out traffic pattern. If a two-lane ingress/egress is desired, the cost estimate for Project B would double.



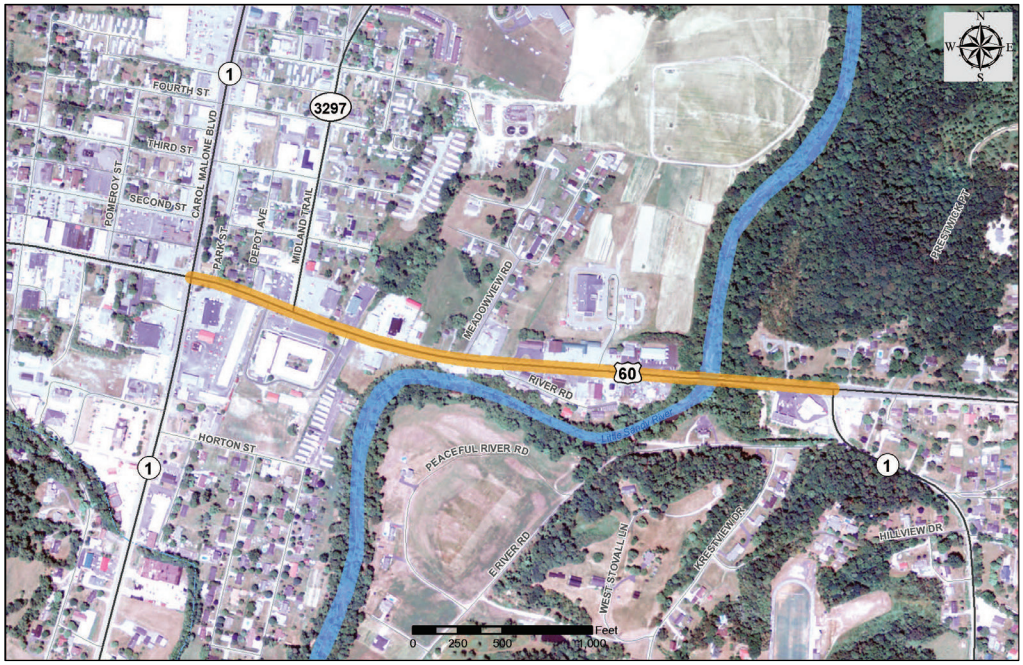
C Long-Term	**LOCATION** **US 60** **(MP 23.940 – MP 24.500)**	**PROJECT PRIORITY** **MEDIUM**
	Description Reconstruct deficient sidewalks and extend them from KY 1/KY 7 east to the Little Sandy River Bridge. Due to bridge's age, width, and length, a sidewalk from the bridge east to KY 1 will be included in a future project when this bridge is replaced.	**Cost Estimate:** Planning: $0 Design: $25,000 Right-of-Way: $0 Utilities: $50,000 Construction: $545,000 Total: $620,000

Problem Statement: US 60 between KY 1/KY 7 and the Little Sandy River Bridge carries approximately 9,100 vpd. Sidewalks have been reconstructed along the south side of US 60 directly in front of Prichard Elementary School. Also, with Item Number 09-144.00, improved sidewalks at the US 60/KY 1/KY 7 intersection will be ADA compliant.

Project C reconstructs deficient sidewalks from the US 60/KY 1/KY 7 intersection to the Little Sandy River Bridge. The bridge currently has a three-foot-wide, raised concrete sidewalk along only the north side. The US 60 Bridge over the Little Sandy River was constructed in 1949, has a Sufficiency Rating of 62.6, and is considered Functionally Obsolete. The Project Team deferred providing an ADA compliant sidewalk over the river and sidewalks east to KY 1 until replacement of the bridge.


US 60 looking east toward KY 1 South intersection.


US 60 looking west toward US 60/KY 1/KY 7 intersection.



D Short-Term	**LOCATION** **US 60 and KY 1947** **(MP 21.220 – MP 21.221)** **(MP 0.000 – MP 0.100)**	**PROJECT PRIORITY** **HIGH**
	Description Provide lighting at the intersection of US 60 and KY 1947 and remove hill (along the south side of KY 1947) to improve sight distance.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $50,000 Construction: $20,000 Total: $70,000

Problem Statement: KY 1947 in this area carries 1,860 vpd and terminates abruptly at its intersection with US 60 just south of a sharp curve. This area was identified by stakeholders as having dark conditions without lighting. Although there is no crash history, a field review identified the area as a concern because of the absence of lighting and a hillside between I-64, US 60, and KY 1947 obstructs sight distance for the KY 1947 traffic approaching US 60.

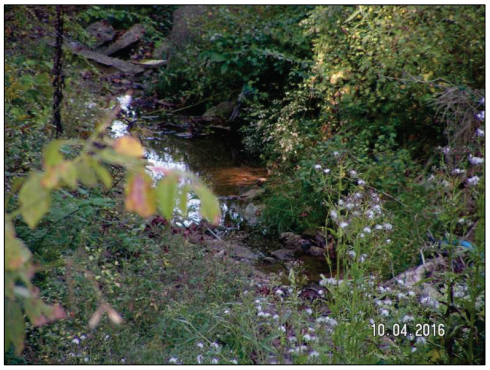
Project D would install lighting and remove the hillside to improve visibility and sight distance at the /US 60/KY 1947 intersection. Lighting may become a local project if warrants are not met.

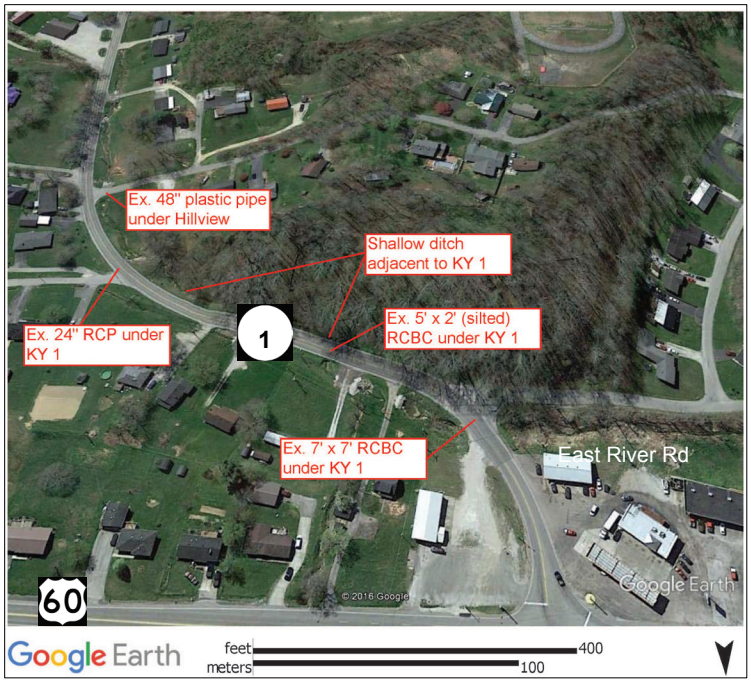
E Short-Term	**LOCATION** **KY 1 (South)** **(MP 10.414 – MP 10.646)**	**PROJECT PRIORITY** **MEDIUM**
	Description Provide drainage improvements along KY 1 (South) from US 60 to Hillview Drive to minimize flooding.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $50,000 Total: $50,000

Problem Statement: KY 1 near US 60 was identified by stakeholders as flood-prone. The 100-year flood (and possibly other storm events) can back up Little Sandy River under KY 1 and inundate the area just south of US 60. Downstream of Hillview Drive, the ditch on the west side of KY 1 is very shallow, vegetated, and close to the road. The shallow ditch is adjacent to a steep and wooded hillside. This ditch drains to a silted, 5x2-foot Reinforced Concrete Box Culvert (RCBC), located approximately 250 feet south of a 7x7-foot box culvert, and conveys flow west to east under KY 1 into a deep ditch. Due to silt, the culvert is over 50% clogged.

Project E would widen, deepen, and regrade the ditch and clean the 5x2-foot RCBC. In addition, two approximate 30-inch culverts would be constructed adjacent to the 7x7-foot box culvert.

An optional solution would be to widen and deepen the roadside ditch, cap the box culvert under KY 1, construct a new ditch to East River Road, and construct a 54-inch pipe under East River Road. Rather than adding flow to the already full-flowing ditch on the east side of KY 1, these measures would convey runoff directly to the large ravine that drains to the Little Sandy River. The issue with this option is the new ditch could require excavation into the adjacent hillside, possibly resulting in expensive construction costs, utility relocations, and additional right-of-way acquisition. This option would require more detailed study beyond the scope of this preliminary analysis. The above cost estimate does not include this solution.





F Short-Term	**LOCATION** **KY 1 (South)** **(MP 8.863 – MP 8.870)**	**PROJECT PRIORITY** **MEDIUM**
	Description Provide drainage improvements along KY 1 (South) near Beech Grove Road including 600 feet of ditching.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $50,000 Total: $50,000

Problem Statement: Stakeholders identified a flooding issue at the intersection of KY 1 and Beech Grove Road. A site visit revealed an 18-inch Reinforced Concrete Pipe (RCP) that conveys 19 acres of runoff from west to east under KY 1. Approximately 50 feet south of this location, a 24-inch RCP under Damron Branch Road drains 56 acres of runoff from the north to south side of the road. There is minimal cover over both pipes.

Project F includes cleaning the 18-inch RCP and constructing a new 24-inch pipe adjacent to the existing 24-inch RCP structure. The structure would be removed and re-laid approximately one foot lower than its existing inlet elevation, and a new 30-inch pipe would be constructed adjacent. The ditch between the two pipes would be regraded and cleaned. Cover height restrictions preclude the total replacement of the structures with a large, single pipe at either location.

G Long-Term	LOCATION US 60 (MP 23.940 – MP 24.500)	PROJECT PRIORITY MEDIUM
	Description Add a TWLTL, widen lanes, and provide signage to direct motorists to the appropriate lane along US 60 from KY 1/KY 7 to the Little Sandy River Bridge.	**Cost Estimate:** Planning: $0 Design: $40,000 Right-of-Way: $50,000 Utilities: $75,000 Construction: $325,000 Total: $490,000

Problem Statement: US 60, between the KY 1/KY 7 intersection and the Little Sandy River Bridge, carries approximately 9,100 vpd and operates at LOS D. This section of US 60 has narrow lanes, congestion associated with school traffic, and many access points with wide driveways. Near Prichard Elementary School and KY 3297, US 60 is two lanes westbound and one lane eastbound even though the eastbound traffic is slightly higher in both peak hours.

Project G eliminates one westbound lane to widen all lanes in front of Prichard Elementary to 12 feet. Project G widens US 60 east of MP 24.2 (end of existing curb) to add a TWLTL to move traffic more efficiently and facilitate left turns to and from the roadway.

Note: HIS lists this section of US 60 as having 12-foot-wide lanes; however, on aerial photography and in the field, it appears to be as narrow as 9.5 feet wide.

H Short-Term	**LOCATION** **KY 1 (Carol Malone Boulevard)** **(MP 12.010 – MP 12.011)**	**PROJECT PRIORITY** **HIGH**

Description

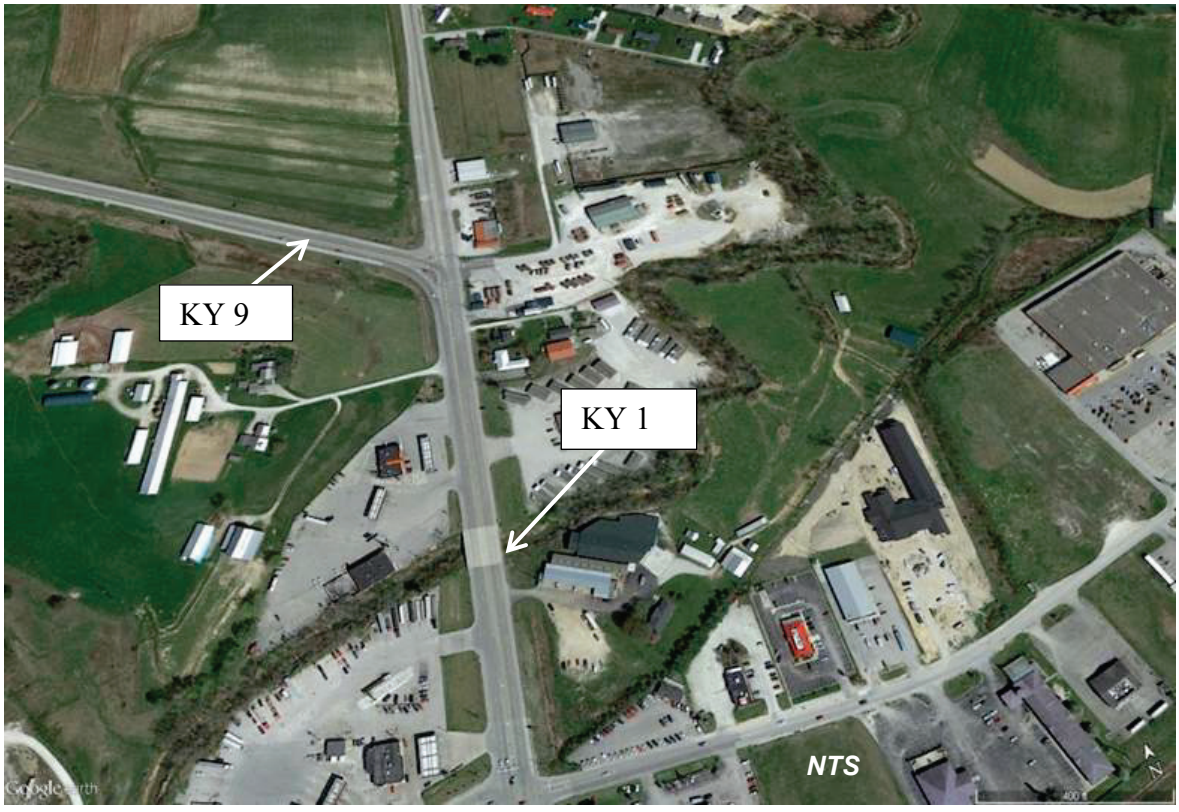
District 9 will review signage/striping for KY 9 in advance of the intersection with KY 1.

Cost Estimate:

Planning:	$0
Design:	$0
Right-of-Way:	$0
Utilities:	$0
Construction:	$0
Total:	$0

Problem Statement: Stakeholders identified the KY 1/KY 9 intersection as a crash concern. A three-year crash analysis did not show a high crash spot (three crashes near the intersection, one was a deer strike). However, District 9 staff did relay past crash experience with motorists continuing through the intersection and across KY 1 into businesses directly opposite KY 9. Recent KYTC signing, rumble strips, advanced warning lights, and other mitigation measures have been installed on KY 9 near the intersection to reduce crashes.

Project H commits District 9 staff to review signage and striping at this location, but no improvement project is proposed.



I Long-Term	LOCATION KY 1947 (MP 3.310 – MP 3.398)	PROJECT PRIORITY HIGH
	Description Provide a right-turn lane on KY 1947 at KY 1.	**Cost Estimate:** Planning: $0 Design: $50,000 Right-of-Way: $75,000 Utilities: $75,000 Construction: $270,000 Total: $470,000

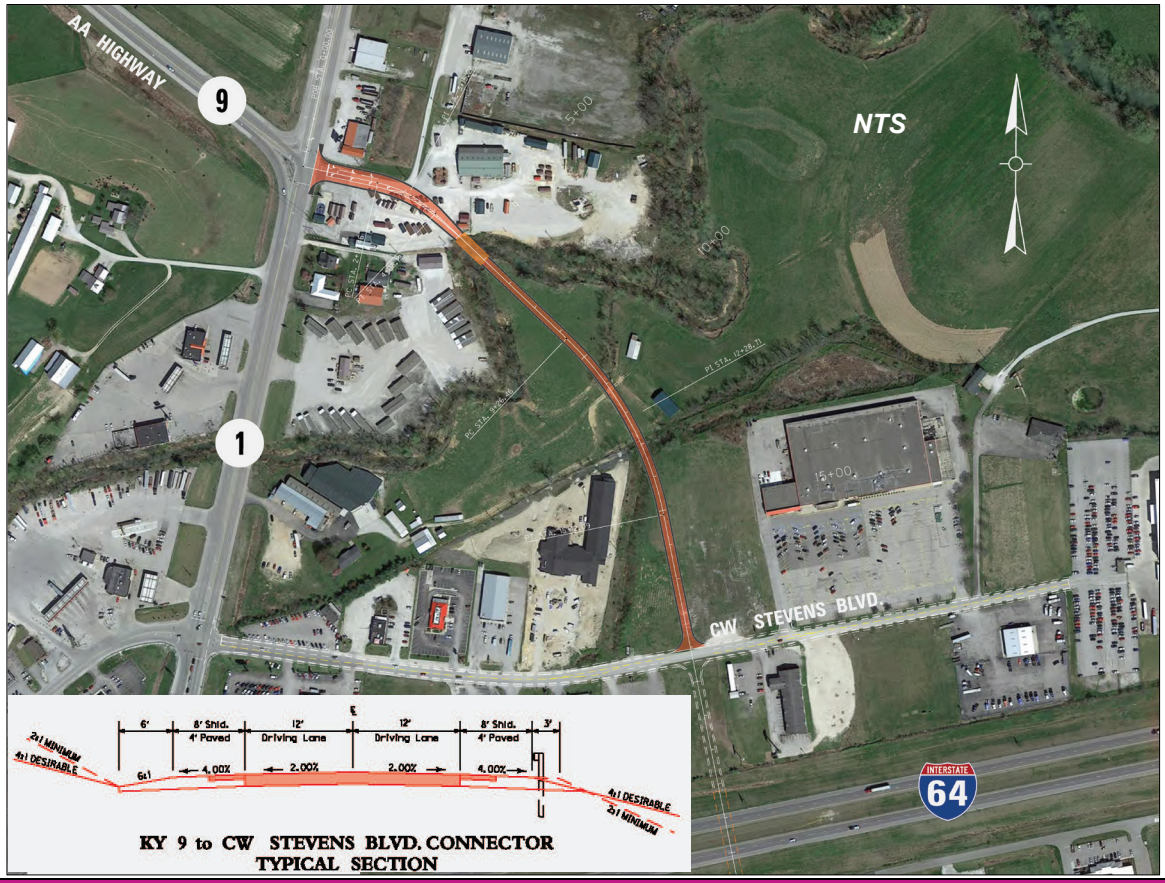
Problem Statement: The KY 1/KY 1947 intersection operates at LOS D in the PM peak hour (worst case) with 47.3 seconds/vehicle of overall delay. However, the through/right (eastbound/southbound) movement operates at LOS F (96 seconds/ vehicle delay). In addition, the intersection is less than 100 feet from the I-64 on-ramp, too close to function efficiently. In the 2040 PM peak hour (worst case), 260 vehicles are projected to turn right (southbound) from KY 1947 resulting in a 133 seconds/vehicle of delay.

Project I would separate KY 1947 eastbound right turns from the through movement via a 300-foot-long right-turn lane. Given the same current signal timing, Project I would reduce 2040 delay for KY 1947 eastbound through and right movements by 55 seconds/vehicle, and improve the overall intersection 2040 LOS to E.

J Long-Term	**LOCATION** **New Connector between CW Stevens Boulevard and KY 1**	**PROJECT PRIORITY** **HIGH**
	Description Construct a new 0.360-mile two-lane roadway connecting CW Stevens Boulevard (MP 0.230) north to KY 9 at KY 1 (MP 12.009). Section 1 of 3, see Project BB for Section 2 and Project BB1 for Section 3.	**Cost Estimate:** Planning: $0 Design: $250,000 Right-of-Way: $500,000 Utilities: $150,000 Construction: $2,100,000 Total: $3,000,000

Problem Statement: CW Stevens Boulevard (City Street [CS] 1110) carries approximately 6,300 vpd. Currently, motorists traveling westbound on CW Stevens Boulevard must negotiate the congested KY 1/CW Stevens Boulevard intersection to travel to and from KY 9. Among the many businesses located along this city street are Smithfield Foods (with 600 employees, the largest freight generator on this route), Kmart, Shoney's, a large car lot, and a new, 100-bed rehabilitation center.

Project J would provide a direct two-lane, 45 mph connection to KY 9 to (1) reduce congestion at the KY 1/CW Stevens Boulevard and I-64/KY 1 intersections and along KY 1, (2) move left turns farther from the I-64/KY 1 interchange, and (3) align with the traffic signal at KY 9. The 2040 travel demand model projects approximately 2,700 vpd for this connection. Although according to HCS, Project J would not have a significant impact on both AM and PM peaks (two seconds/vehicle) at the KY 1/CW Stevens Boulevard intersection. The southbound left and right turns diverted from CW Stevens Boulevard north to KY 9 are low in both peak hours (100 right turns and fewer than 20 vehicles for the remaining movements).



K Long-Term	LOCATION KY 1 (Carol Malone Boulevard) (MP 11.159 – 11.391)	PROJECT PRIORITY LOW
	Description Connect Everman Street and Academic Parkway with a two-lane roadway. Close entrance from Everman Street to KY 1 once the connection has been constructed.	**Cost Estimate:** Planning: $0 Design: $250,000 Right-of-Way: $1,000,000 Utilities: $400,000 Construction: $1,250,000 Total: $2,900,000

Problem Statement: KY 1 (Carol Malone Boulevard) from Academic Parkway north to Everman Street carries over 13,500 vpd and is projected to carry over 15,500 vpd in 2040. Five KY 1 intersections (Academic Parkway, Super Eight Lane, Love's North, Love's South, and Everman Street) have approaches or intrsection legs which currently (2016) operate at LOS E and are projected (2040) to operate at LOS F. Fourteen driveways/access points exist in this 0.25-mile section of KY 1. Between Exxon/Love's (MP 11.3) and Everman Street and Interstate Drive (MP 11.4), KY 1 has a CCRF of 1.40 with 23 total crashes in the three-year review period. Fourteen of these crashes were angle crashes and coded as vehicles entering or leaving an entrance. The KY 1/Everman Street intersection has a CCRF of 1.4. The intersection is within 500 feet of the I-64 eastbound off-ramp and approximately 10 feet from the entrance to Speedway.

Project K would reduce conflict points on KY 1 near the I-64/KY 1 interchange, to lessen crashes while providing a parallel route to KY 1. It would connect Everman Street and Academic Parkway with a two-lane roadway and close Everman Street to KY 1. Everman Street is a 0.2-mile-long roadway terminating near practice facilities for Kentucky Christian College (KCC) and Chapel Care Communities, a large assisted living home. Due to potential utility and right-of-way conflicts (gas line, storage units, and KCC's practice facilities), two roadway alignment options are shown (in black), only one of which would be implemented.

Speedway's direct access to KY 1 would be closed (green shading) and patrons would use McClave Street. Exxon's direct access to KY 1 (10 feet from McClave Street) would also be closed. KYTC Item Number 09-144.00 provides a traffic signal at Academic Parkway to give traffic diverted from Everman Street access to KY 1 via a traffic signal.

This project could be implemented with Project M (improvements to right half of the map) to further improve safety on KY 1 in the project area. Similar access management techniques could be implemented south of this location as recommended in Project N.

L Long-Term	**LOCATION** **I-64 Westbound Off-Ramp** **(MP 0.176 – MP 0.252)**	**PROJECT PRIORITY** **HIGH**
	Description Provide dual left-turn lanes on I-64 westbound off-ramp at KY 1.	**Cost Estimate:** Planning: $0 Design: $75,000 Right-of-Way: $75,000 Utilities: $75,000 Construction: $375,000 Total: $600,000

Problem Statement: The KY 1/I-64 westbound off-ramp intersection currently operates at LOS C in the PM peak hour; however, the westbound left turns operate at LOS F with 89.04 seconds/vehicle in delay. In the 2040 No Build design year the overall intersection drops to LOS D, including a significant westbound left delay in the PM peak hour of 144.6 seconds/vehicle, with a 50% queue backup of 28 vehicles.

Project L would provide dual left-turn lanes on the I-64 westbound off-ramp at KY 1 to reduce delay. The overall intersection 2040 Build LOS would improve to LOS C, including a left turn improvement to LOS E with nearly 100 seconds/vehicle reduction in delay.

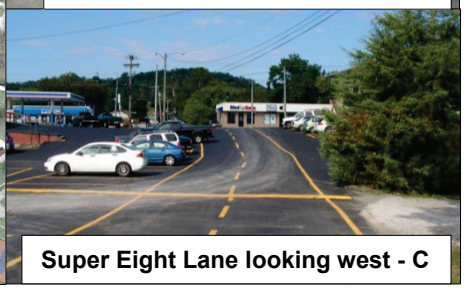
M Long-Term	**LOCATION** **KY 1 (Carol Malone Boulevard)** **(MP 11.159 – MP 11.391)**	**PROJECT PRIORITY** **LOW**
	Description Close Interstate Drive at KY 1 and two entrances closest to the KY 1/I-64 eastbound on-ramp. Route motorists to Super Eight Lane and the roadway directly across KY 1 from McClave Street. Relocate truck parking and improve internal circulation.	**Cost Estimate:** Planning: $0 Design: $250,000 Right-of-Way: $1,000,000 Utilities: $400,000 Construction: $580,000 Total: $2,230,000

Problem Statement: KY 1 from Academic Parkway north to Interstate Drive currently carries over 13,500 vpd and is projected to carry over 15,500 vpd in 2040. Five KY 1 intersections (Academic Parkway, Super Eight Lane, Love's North, Love's South, and Everman Street) currently operate at LOS E and are projected to operate at LOS F in 2040. Fourteen driveways/access points exist in this 0.25-mile section of KY 1. Interstate Drive is located less than 100 feet from the eastbound I-64 on-ramp and some access points are approximately 10 feet apart. Between Exxon/Love's (MP 11.3) and Everman Street and Interstate Drive (MP 11.4), KY 1 has a CCRF of 1.40 with 23 total crashes in the three-year review period. Fourteen of these were angle crashes as vehicles entering or leaving an entrance.

Project M (to the east side of KY 1) provides an example of access management techniques to improve traffic flow on KY 1 by consolidating or removing access points and funneling motorists to the road across from McClave Street or Super Eight Lane to Rupert Street for access. A traffic signal would most likely be warranted to allow a safe left turn movement onto KY 1. With traffic diverted from Interstate Drive to the KY 1/McClave Street intersection, Highway Capacity Software (HCS) analysis shows the KY 1/McClave Street intersection will operate at LOS B in both peak hours. This analysis did not include the traffic from the two access points between Interstate Drive and McClave Street. Project M could be implemented with Project K (left side of the below exhibit) to further improve safety on KY 1 in the project area. Similar access management techniques could be implemented south of this location as recommended in Project N.


KY 1 looking north - A


Rupert Street looking north - B


Super Eight Lane looking west - C

N Long-Term	**LOCATION** **KY 1 (Carol Malone Boulevard)** **(MP 10.646 – MP 11.391)**	**PROJECT PRIORITY** **MEDIUM**
	Description Conduct an access management study from Academic Prkwway north to Everman Street to provide for a more efficent corridor.	**Cost Estimate:** Planning: $700,000 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $0 Total: $700,000

Problem Statement: KY 1 from Academic Parkway north to Everman Street carries over 13,500 vpd and is projected to carry over 15,500 vpd in 2040. Five KY 1 intersections (Academic Parkway, Super Eight Lane, Love's North, Love's South, and Everman Street) currently (2016) operate and are projected (2040) to operate at LOS E and F, respectively. Fourteen driveways/access points exist in this 0.25-mile section of KY 1. Between Exxon/Love's (MP 11.3) and Everman Street and Interstate Drive (MP 11.4), KY 1 has a CCRF of 1.40 with 23 total crashes in the three-year review period. Fourteen were angle crashes as vehicles entering or leaving an entrance. Access, traffic flow, and safety along KY 1 are problems between US 60 and I-64. Many of the crashes shown as colored symbols below are sideswipe (green), rear ends (orange), and vehicles entering and leaving entrances (yellow) as a result of the excessive number of entrances along the corridor. Addressing the entire route is beyond the scope of this SUA Study.

Project N proposes to conduct an access management study to provide for a more efficient corridor.

O Short-Term	**LOCATION** **US 60** **(MP 23.960 – MP 23.990)**	**PROJECT PRIORITY** **HIGH**
	Description Close the Park Street entrance from US 60, and provide curb and sidewalk across the entrance.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $5,000 Total: $5,000

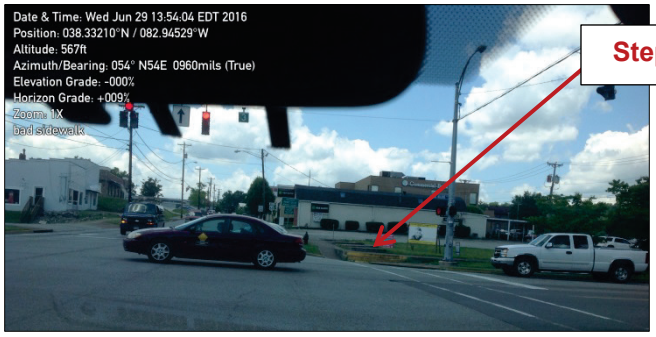
Problem Statement: The US 60/KY 1/KY 7 intersection currently (2016) operates at LOS E and is projected to do the same in 2040. KYTC Item Number 09-144.00 will provide improvements to this intersection by adding left- and right-turn lanes on all intersection legs. However, motorists on US 60 traveling east queue to the KY 1/KY 7 intersection while making the left turn movement at Park Street.

Project O, a short-term project to help relieve congestion, would close Park Street at US 60 and construct a curb and sidewalk across the entrance. Access to Park Street from US 60 would be possible via Depot Avenue or KY 3297 (Robert and Mary Street east of the map area), which are one and two blocks east, respectively.

P Long-Term	**LOCATION** **Various Routes**	**PROJECT PRIORITY** **LOW**
	Description Conduct a pedestrian walkability, safety, and ADA compatibility study for the community of Grayson to supplement sidewalk information collected by the KYTC and the FIVCO ADD.	**Cost Estimate:** Planning: $150,000 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $0 Total: $150,000

Problem Statement: Grayson residents enjoy the benefits of walking around their community; however, some sidewalks are in disrepair and connectivity is lacking.

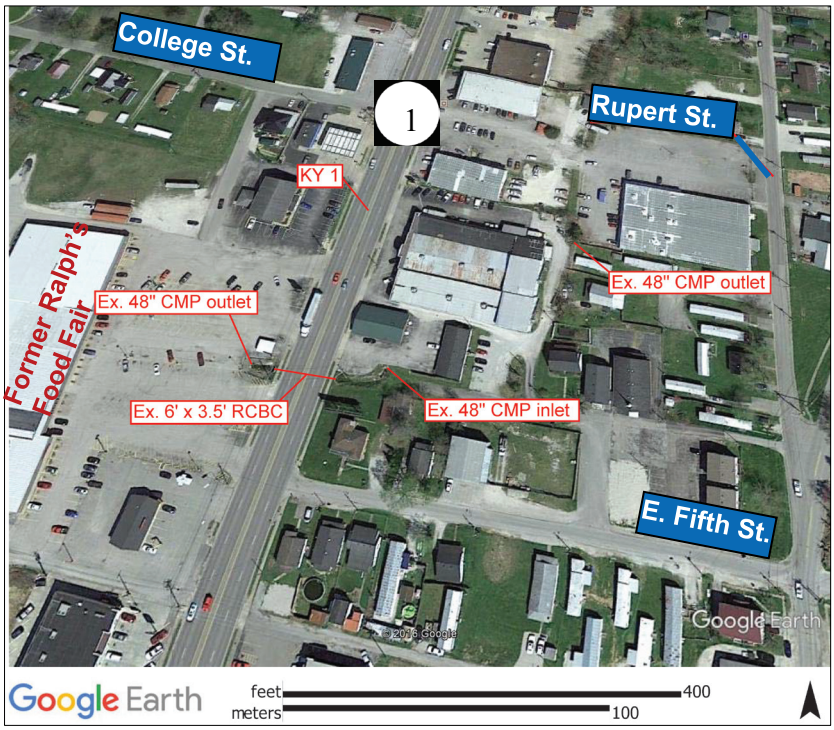
Project P proposes a pedestrian walkability, safety, and ADA compatibility study for Grayson to supplement sidewalk information collected by the KYTC and the FIVCO ADD.



Q Short-Term	**LOCATION** **KY 1 (Carol Malone Boulevard)** **(MP 10.886 – MP 11.004)**	**PROJECT PRIORITY** **MEDIUM**
	Description Provide drainage improvements to minimize flooding on KY 1 near the former Ralph's Food Fair.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $10,000 Construction: $60,000 Total: $70,000

Problem Statement: KY 1 carries approximately 13,600 vpd near the former Ralph's Food Fair. This area experiences flooding and it is unknown whether the flooding issues involve some or all of the roadway, the upstream parking lot, and the area on the east side of KY 1. KY 1 from College Street to north of Second Street drains to this low point. A review of 1967 roadway plans reveals very few roadway inlets to collect roadway runoff. Paved parking lots and other paved areas contribute runoff to the older roadway storm sewer system. A thorough drainage analysis would be required to determine whether the roadway storm sewer is inadequate to handle the flows, thus, contributing to the current flooding issues. The surrounding topography has greatly changed since the nearly 40-year-old system was constructed. The physical condition could not be assessed during the site visit, so it is unclear if clogging issues exist in the system. A 6x3.5-foot RCBC conveys runoff from west to east under KY 1. The RCBC has an overgrown outlet ditch draining to a 48-inch corrugated metal pipe (CMP). This pipe extends under a parking lot, and possibly under a number of buildings; discharge travels through a series of pipes and a vegetated ditch to a paved ditch along Rupert Street. Only two roadway catch basins (on the east and west side of KY 1) drain the low point of the road.

Alterative Q proposes possible short-term solutions to pave the outlet ditch from the 6X3.5-foot RCBC to the 48-inch CMP inlet, and flush/clean the 48-inch CMP under the parking lot and buildings to ensure the system is not clogged and is functioning properly.



R Long-Term	**LOCATION** **KY 7** **(MP 9.580 – MP 10.230)**	**PROJECT PRIORITY** **LOW**
	Description Install lighting along KY 7 from KY 773 to Cabin Creek Road.	**Cost Estimate:** Planning: $0 Design: $20,000 Right-of-Way: $0 Utilities: $50,000 Construction: $250,000 Total: $320,000

Problem Statement: KY 7 carries about 8,760 vpd between KY 773 and Cabin Creek Road. Stakeholders identified this as a section of KY 7 that does not have lighting and is experiencing commercial and some residential development. The three-year crash history shows 15 crashes in the corridor, with two at night, one at dusk, and one at dawn (27% of crashes). The KY 7/KY 773 intersection is also identified as a crash location. A hill on the east side of KY 7 partially obscures daylight through the area.

Project R would provide lighting on both sides of KY 7. This project may become the responsibility of local officials unless crash warrants are met.

S Long-Term	**LOCATION** KY 7 (MP 10.228 – MP 10.423)	**PROJECT PRIORITY** LOW
	Description Construct sidewalks along both sides of KY 7 from Cabin Creek Road north over Little Sandy River Bridge (estimated one side of bridge) to Little Sandy Lane.	**Cost Estimate:** Planning: $0 Design: $150,000 Right-of-Way: $0 Utilities: $0 Construction: $540,000 Total: $690,000

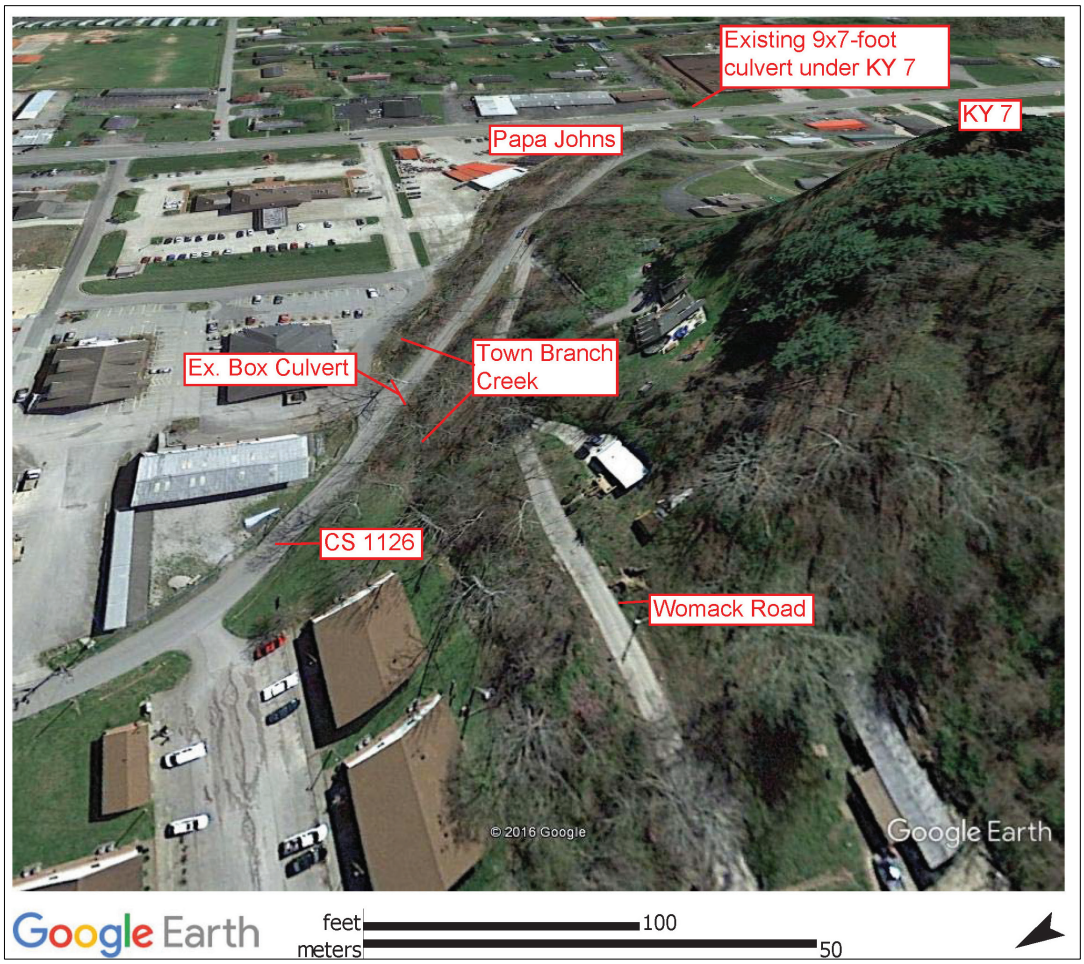
Problem Statement: KY 7 carries 8,760 vpd over the Little Sandy River Bridge (MP 10.318). KYTC Item Number 09-144.00 will reconstruct sidewalks on both sides of KY 7 from Little Sandy Lane (MP 10.423) to US 60 (MP 10.865).

Project S would complete sidewalks from Cabin Creek Road (MP 10.228) north to Little Sandy Lane providing pedestrian connectivity on one side of the Little Sandy River Bridge.

T Local	**LOCATION** **South Hord Street (CS 1126)** **(MP 0.243 – MP 0.438)**	**PROJECT PRIORITY** **MEDIUM**
	Description Provide drainage improvements on South Hord Street (CS 1126) along Town Branch Creek south of Womack Road.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $70,000 Total: $70,000

Problem Statement: West of KY 7, Town Branch Creek crosses under South Hord Street (CS 1126) via a box culvert. From this location, the stream passes under KY 7 through a 9x7-foot RCBC and ultimately drains into the Little Sandy River. The drainage area is approximately 493 acres. The channel upstream of the inlet is heavily wooded and very close to the edge of CS 1126. It appears the roadway lies atop the box culvert with minimal cover. Due to the volume of flow through the structure and the angle of the incoming channel, CS 1126 could flood and become impassable. Because of the hillside on the south side of CS 1126, it may be expensive to reroute the channel into the box culvert at a less severe angle.

Project T would clean and widen the channel, removing much of the overgrown vegetation and large trees, and utilize channel lining to form a berm/dike to better direct flow into the inlet. The cost estimate includes Fees In Lieu Of (FILO) of $50,000 for stream impacts.



U Local	**LOCATION** **CW Stevens Boulevard** **(CS 1110)** **(MP 0.000 – MP 0.472))**	**PROJECT PRIORITY** **HIGH**

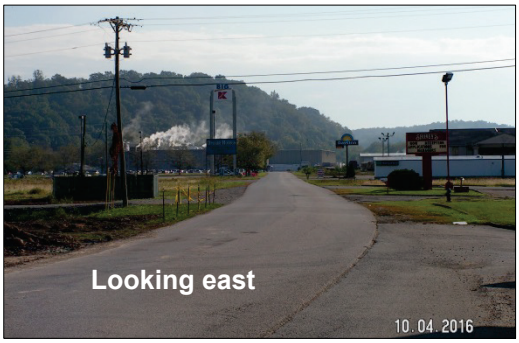
Description

Widen CW Stevens Boulevard; add curb and gutter, sidewalks; and improve turning radii at KY 1.

Cost Estimate:

Planning:	$0
Design:	$100,000
Right-of-Way:	$100,000
Utilities:	$250,000
Construction:	$1,670,000
Total:	$2,120,000

Problem Statement: CW Stevens Boulevard (CS 1110) carries approximately 6,300 vpd. The CW Stevens Boulevard/KY 1 intersection currently operates at LOS D with the westbound left turn movement operating at LOS F in the PM peak hour. Smithfield Foods, the largest and most recognized freight generator with approximately 600 employees, is located on this route. K-mart, a 100-bed rehabilitation facility, a large car lot, Shoney's, and other businesses are along the 0.5-mile route, and several empty lots remain. In November 2016, the City of Grayson widened the road five feet, and improved striping and drainage. The KYTC noted recent enhancements did not include all drainage necessary, and structures would require retrofitting for sidewalks and curb and gutter.



Project U improves turning radii at KY 1, adds sidewalks, curb and gutter, and eliminates on-street parking.

V Short-Term	**LOCATION** KY 1 (North) (MP 12.940 – MP 12.941)	**PROJECT PRIORITY** COMPLETED
	Description Install "No Through Trucks" sign at KY 1/KY 1910 intersection.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $1,000 Total: $1,000

Problem Statement: KY 1910 is a two-lane road that carries approximately 700 vpd. Lane widths are eight feet or less for most of its length. GPS units guide vehicles onto KY 1910, which is unsuitable for semi-tractor trailers. Additionally no location exists to turn around. Currently, a "Local Delivery Only" sign is located on KY 1910 about 50 feet from KY 1.

Project V, completed during the course of this study, installed a "No Through Trucks" sign on KY 1 approaching KY 1910.

W Long-Term	**LOCATION** KY 1910 (MP 0.000 – MP 0.020)	**PROJECT PRIORITY** MEDIUM
	Description Shift KY 1910 approach to KY 3297 east and improve turn radii.	**Cost Estimate:** Planning: $0 Design: $25,000 Right-of-Way: $25,000 Utilities: $75,000 Construction: $100,000 Total: $225,000

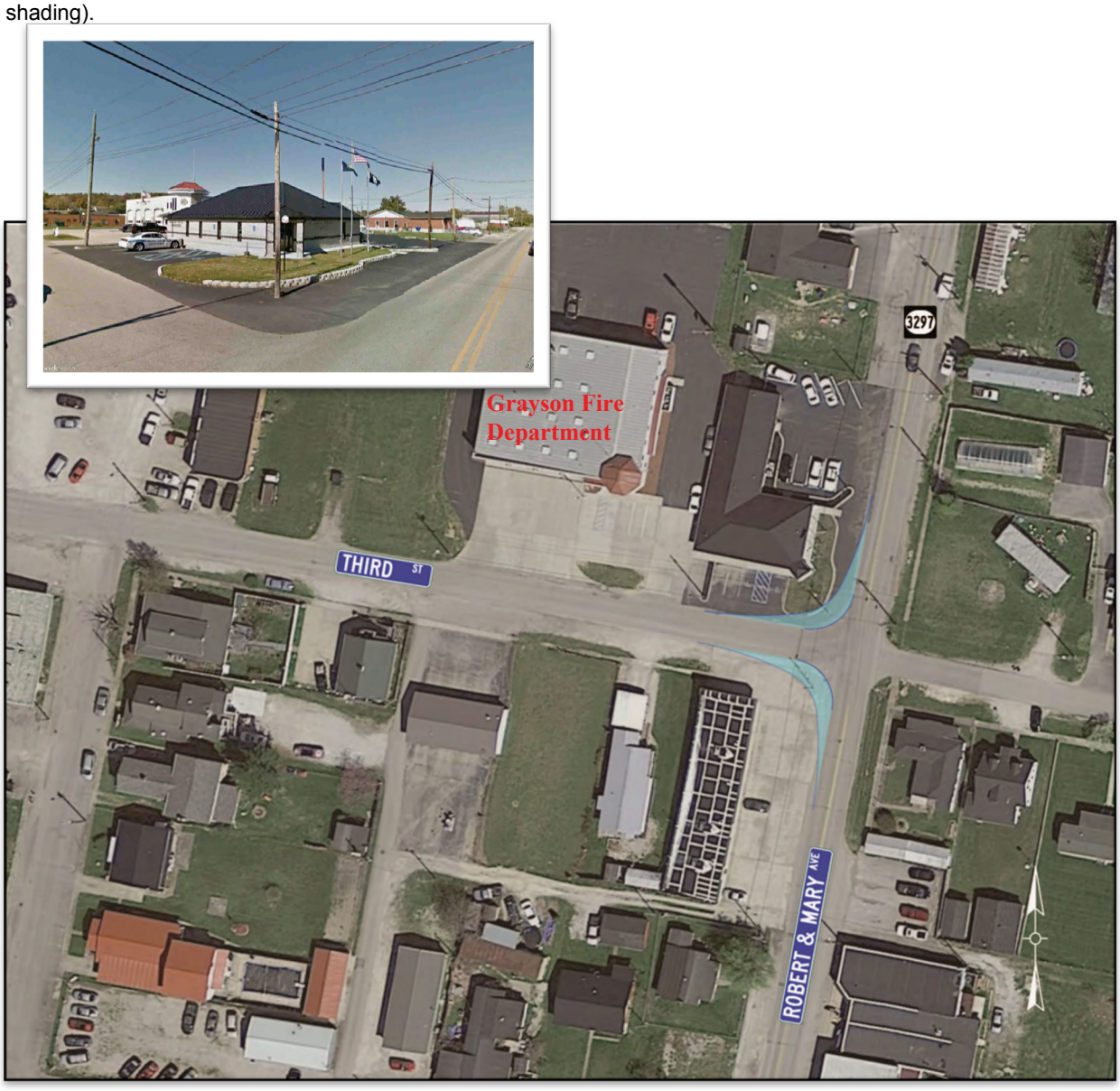
Problem Statement: KY 3297 carries approximately 2,960 vpd near KY 1910. Stakeholders and a field review identified difficult turn movements due to narrow lanes, poor sight distance, and tight turning radii at the KY 3297/ KY 1910 intersection. Sight distance turning from KY 1910 is limited due to the presence of guardrail and the grade approaching the intersection.

Project W would shift the KY 1910 approach to KY 3297 east, widen the lanes to 12 feet near the intersection, improve the turn radii, and provide a flatter landing area. The shift would avoid the reinforced concrete box culvert west of KY 1910 and would replace the guardrail. The power pole in the northeast quadrant may require relocation.

X Long-Term	**LOCATION** **KY 3297** **(MP 0.129 – MP 0.167)**	**PROJECT PRIORITY** **LOW**
	Description Improve turning radii on KY 3297 at East Third Street.	**Cost Estimate:** Planning: $0 Design: $25,000 Right-of-Way: $30,000 Utilities: $50,000 Construction: $50,000 Total: $155,000

Problem Statement: Stakeholders identified poor turning radii on KY 3297 (Robert and Mary Avenue) at the intersection with East Third Street, especially for fire trucks.

Project X would relocate utility poles and improve turning radii to better facilitate the mobility of fire trucks (blue shading).



Y Local	**LOCATION** **Rupert Street (CS 1059)** **(MP 0.000 – MP 0.438)**	**PROJECT PRIORITY** **MEDIUM**
	Description Provide drainage improvements along Rupert Street.	**Cost Estimate:** Planning: $0 Design: $100,000 Right-of-Way: $0 Utilities: $75,000 Construction: $200,000 Total: $375,000

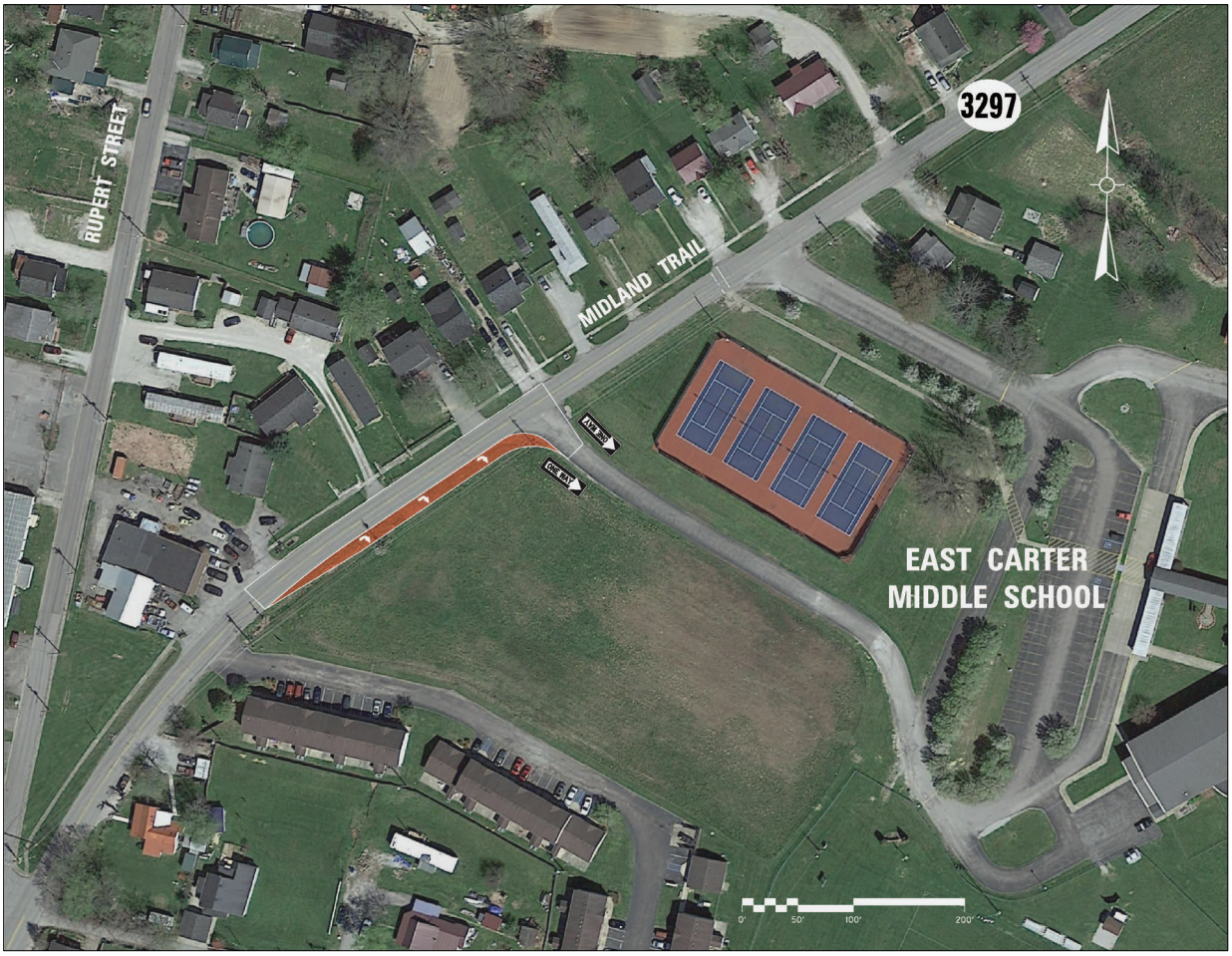
Problem Statement: Stakeholders identified flooding issues along Rupert Street between KY 3297 and Super Eight Lane. Rupert Street is approximately 24 feet wide with roll curb and gutter. Based on a field review and discussions with District 9 staff, flooding results from a lack of catch basins to drain the pavement. The only drainage currently provided is via slotted drain pipes in a few isolated locations. The slotted drain pipes appear clogged with debris. An elliptical pipe outfall (on the east side of Rupert Street near the Dixie Street intersection) connects to a paved ditch adjacent to Rupert Street. It was assumed the slotted and elliptical pipes must be connected between KY 3297 and Dixie Street.

Project Y would add catch basins and storm sewer pipes to help mitigate the flooding problems along Rupert Street. Between KY 3297 and Dixie Street, the catch basins and storm pipe would connect to the elliptical pipe with junction boxes. From Dixie Street to Super Eight Lane the catch basins and storm pipe would outlet to the paved ditch adjacent to Rupert Street. Catch basins would be installed on both sides of the roadway approximately 200 feet apart. Fifteen-inch storm sewer pipe would be used to connect the catch basins as well as connect to the elliptical pipe or paved ditches.

Z Long-Term	LOCATION KY 3297 (MP 0.360 – MP 0.420)	PROJECT PRIORITY HIGH
	Description Provide a right-turn lane on KY 3297 at East Carter Middle School's southernmost entrance.	**Cost Estimate:** Planning: $0 Design: $35,000 Right-of-Way: $0 Utilities: $50,000 Construction: $150,000 Total: $235,000

Problem Statement: KY 3297 carries approximately 3,080 vpd near East Carter Middle School. According to school officials and other stakeholders, KY 3297 becomes congested with long queues as motorists wait to turn into the East Carter Middle School parking lot. These long queues delay through motorists traveling KY 3297.

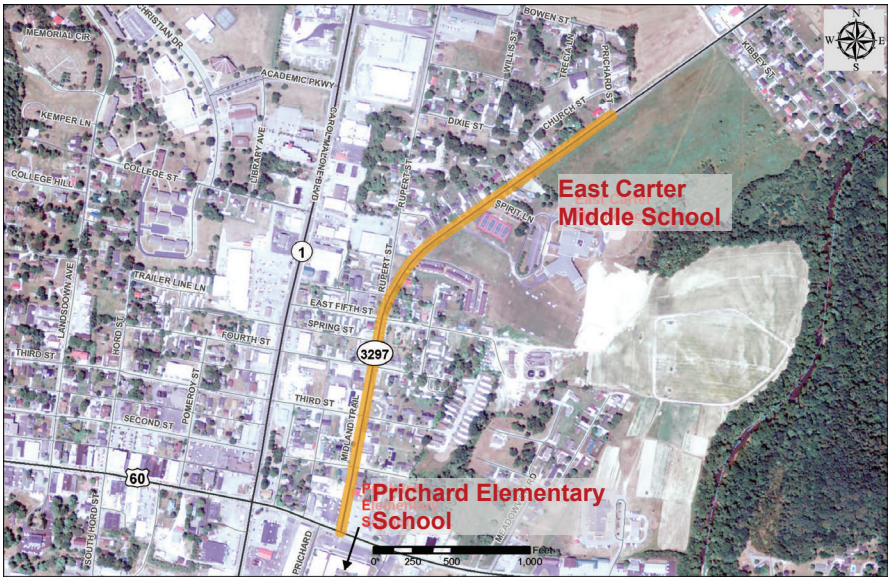
Project Z would provide a right-turn lane at the southernmost entrance to the school to reduce congestion.



AA Long-Term	LOCATION KY 3297 (MP 0.000 – MP 0.660)	PROJECT PRIORITY MEDIUM
	Description Reconstruct sidewalk along KY 3297 from Prichard Elementary School on US 60 to Prichard Street.	**Cost Estimate:** Planning: $0 Design: $50,000 Right-of-Way: $0 Utilities: $75,000 Construction: $335,000 Total: $460,000

Problem Statement: KY 3297 carries approximately 3,080 vpd from US 60 to Prichard Street. The west-side sidewalk is in disrepair.

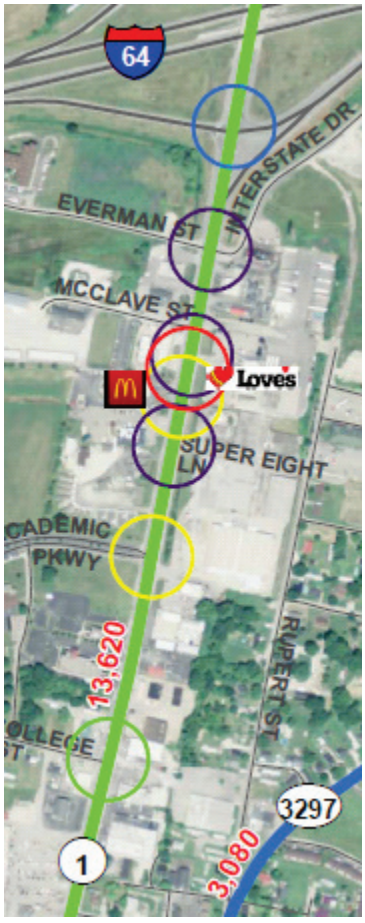
Project AA would reconstruct the west-side sidewalk to ADA standards from US 60, in front of Prichard Elementary School, to Prichard Street, across from East Carter Middle School.



BB Long-Term	**LOCATION** **New Connector between CW Stevens Boulevard and KY 3297**	**PROJECT PRIORITY** **HIGH**
	Description Construct new 0.540-mile two-lane roadway from CW Stevens Boulevard (MP 0.230) south (over I-64) to KY 3297 (MP 0.817). Section 2 of 3. See Project J for Section 1 and Project BB1 for Section 3.	**Cost Estimate:** Planning: $0 Design: $560,000 Right-of-Way: $250,000 Utilities: $3,150,000 Construction: $5,640,000 Total: $9,600,000

Problem Statement: Carol Malone Boulevard (KY 1) is congested approaching the I-64 interchange area. Six intersections along the route have one or more of their approaches operating at LOS D, E, or F (photo below: yellow, red, or purple circles) in the AM and/or PM peak hour. This section carries between 7,720 vpd and 13,620 vpd. Congestion exists due to the lack of a parallel north-south route and lack of an access road for new development east of Carol Malone Boulevard.

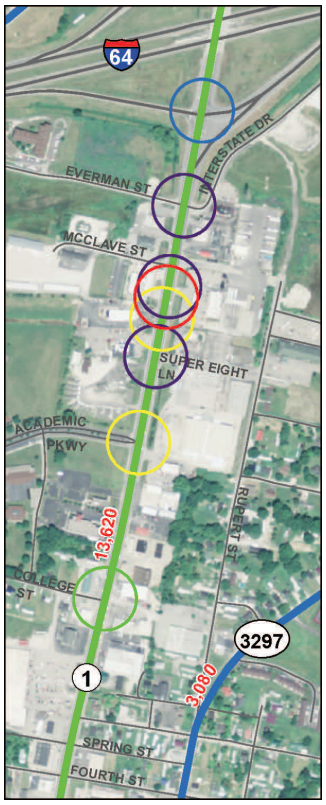
Project BB would construct a two-lane, 45 mph connector road between CW Stevens Boulevard and KY 3297 near East Carter Middle School. Project costs were estimated assuming 12-foot-wide lanes and eight-foot wide shoulders (four feet paved). The travel demand model projects 2040 Build traffic for this section to be almost 9,500 vpd, much of which would be traffic diverting from KY 1.



BB1 Long-Term	**LOCATION** **New Connector between KY 3297 and US 60**	**PROJECT PRIORITY** **HIGH**
	Description Construct new 0.720-mile, two-lane roadway from KY 3297 (MP 0.817) to US 60 (MP 24.632) / KY 1 (South) intersection, crossing Little Sandy River north of the intersection.	**Cost Estimate:** Planning: $0 Design: $850,000 Right-of-Way: $500,000 Utilities: $250,000 Construction: $6,900,000 Total: $8,500,000

Problem Statement: Carol Malone Boulevard (KY 1) is congested approaching the I-64 interchange area. Six intersections along the route generally have one or more of their approaches operating at LOS D, E, or F (photo below: yellow, red, or purple circles) in the AM and/or PM peak hour. Congestion exists due to the lack of a parallel north-south route and lack of an access road for new development east of Carol Malone Boulevard. The US 60/ KY 1/KY 7 intersection operates at LOS E. US 60 carries approximately 9,100 vpd between the KY 1/KY 7 intersection and KY 1 (South).

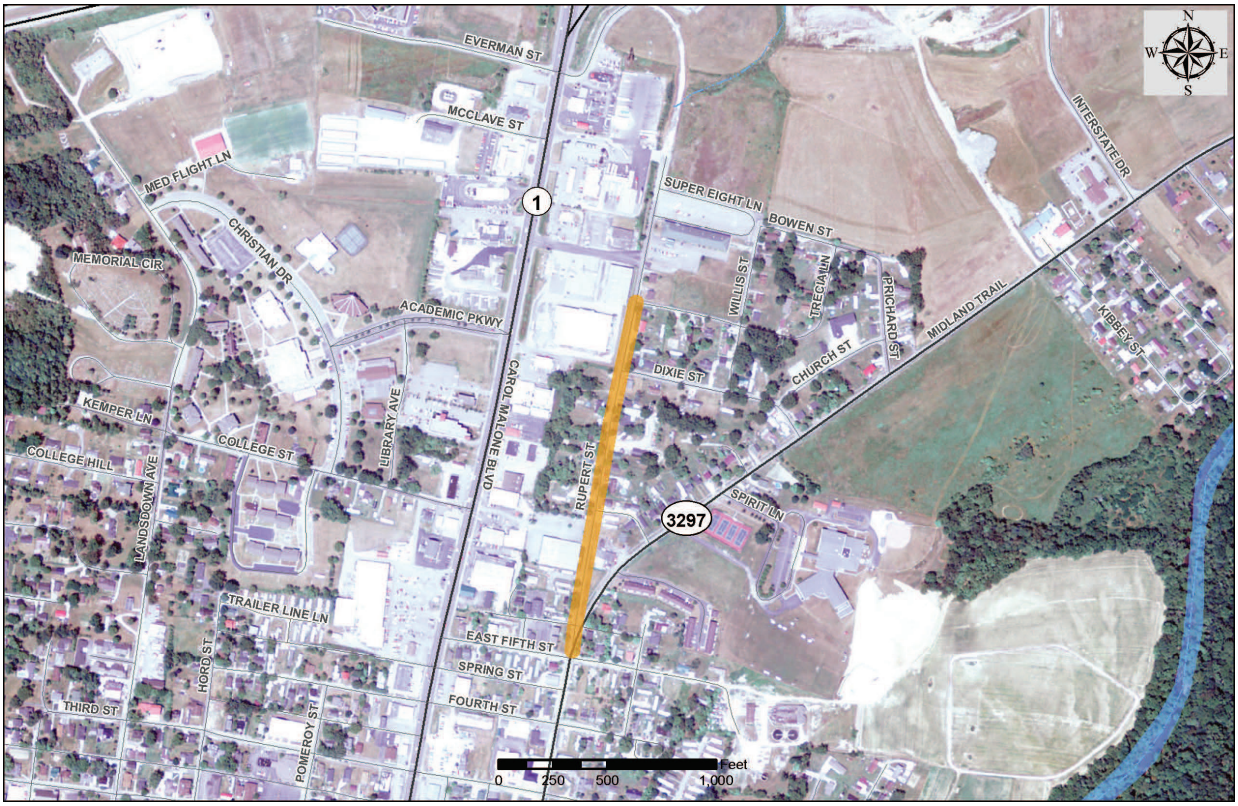
Project BB1 would construct a two-lane, 45 mph connector road between KY 3297 and US 60 at KY 1 (South). Project costs were estimated assuming 12-foot-wide lanes and eight-foot-wide shoulders (four feet paved).The travel demand model projects 2040 Build traffic for this section to be 5,100 vpd.



CC Local	LOCATION Rupert Street (CS 1059) (MP 0.000 – MP 0.310)	PROJECT PRIORITY LOW
	Description Provide sidewalks along both sides of Rupert Street.	**Cost Estimate:** Planning: $0 Design: $50,000 Right-of-Way: $50,000 Utilities: $75,000 Construction: $315,000 Total: $490,000

Problem Statement: Grayson stakeholders desire improved pedestrian mobility along Rupert Street from KY 3297 north to beyond the neighborhood houses. The east sidewalk is in disrepair.

Project CC would reconstruct the east sidewalk and provide new sidewalks on both sides (if feasible) of Rupert Street from KY 3297 north to beyond the neighborhood houses. An east-side sidewalk would have a total cost of $245,000.



DD Local	**LOCATION** **Damron Branch Road** **(MP 0.107 – MP 0.117)**	**PROJECT PRIORITY** **NOT RANKED**
	Description Improve drainage and flooding issues along Damron Branch Road. Due to large drainage area, proximity of the channel to the roadway, and flood zone location, there is no simple remedy to this issue. Therefore, an improvement project is not recommended.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $0 Total: $0

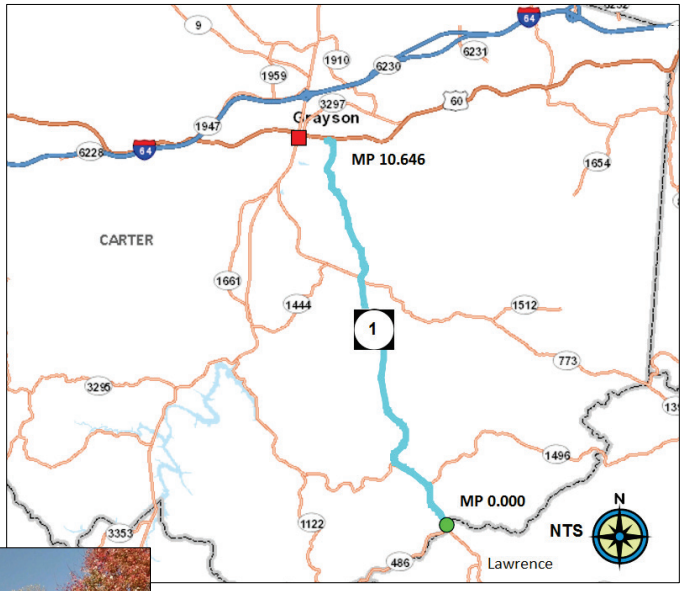
Problem Statement: Flooding along Damron Branch Road near its intersection with US 60 was identified by stakeholders. For much of its length, Damron Branch Creek parallels Damron Branch Road. South of the intersection with US 60, the creek flows under a number of driveways, turns and then flows east connecting to Upper Stinson Creek. An 84-inch steel pipe and two 36-inch corrugated metal pipes are under the driveways. The drainage area to these structures is approximately 583 acres. The portion of the creek that parallels the roadway in this vicinity is only four to five feet in depth. The entrance pipes in this area are physically constrained by the channel section as the top are roughly at the same elevation as the adjacent roadway.

Due to the large drainage area, proximity of the channel to the roadway, and flood zone location, there is not a simple solution and requires more study. To mitigate the flooding in this area, the roadway would likely have to be relocated away from the channel at a higher elevation, which would entail additional right-of-way acquisitions with the added potential of utility relocations. The entrance pipes may be replaced with larger box culverts.

EE 09 022 D0001 45.00 Long-Term	LOCATION KY 1 (South) (MP 0.000 – MP 10.646)	PROJECT PRIORITY LOW
	Description Correct horizontal, vertical, and width deficiencies on KY 1 from the Lawrence County Line (MP 0.000) to US 60 in Grayson (MP 10.646) to improve safety, sight distance, systems connectivity, operational efficiency, and southern access into Grayson for area residents.	**Cost Estimate:** Planning: $740,000 Design: $9,030,000 Right-of-Way: $21,460,000 Utilities: $5,180,000 Construction: $74,980,000 Total: $111,390,000

Problem Statement: KY 1, south of US 60, has 10-foot-wide lanes, zero to three-foot-wide shoulders, and traffic volumes ranging from 3,300 vpd to 5,180 vpd. Numerous horizontal and vertical deficiencies exist along KY 1 including a sharp curve and steep grade near its junction with US 60. Within the study area, one 0.1-mile high crash location was identified along KY 1, between MP 9.5 and MP 9.6, with five crashes over three years.

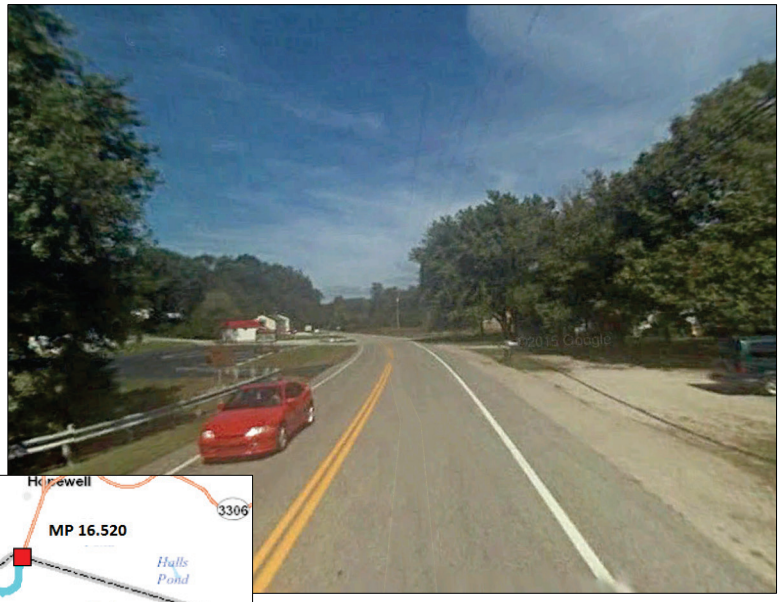
Project EE would correct horizontal, vertical, and width deficiencies on KY 1 from the Lawrence County Line (MP 0.000), outside the study area, to US 60 in Grayson (MP 10.6) to improve safety, sight distances, system connectivity, operational efficiency, and southern access into Grayson for area residents.

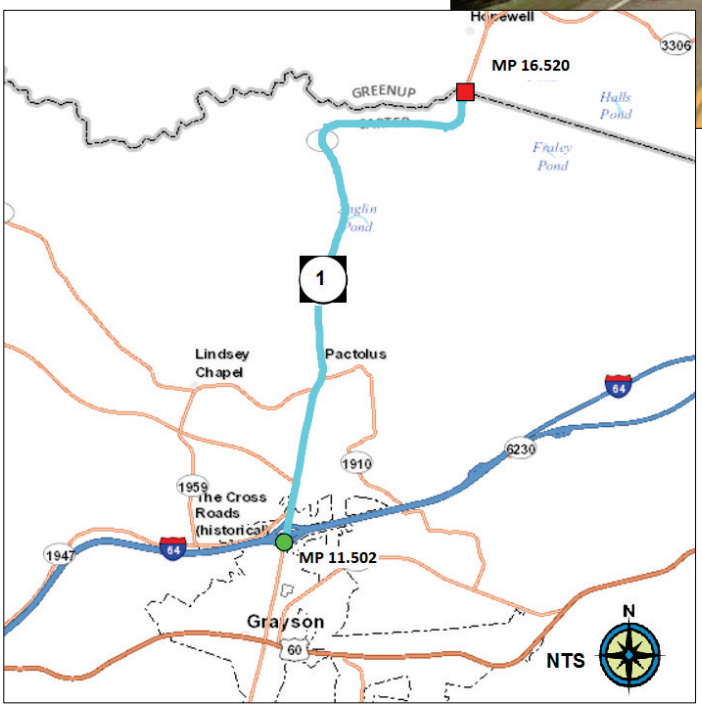


FF 09 022 D0001 43.00 Long-Term	LOCATION KY 1 (North) (MP 11.502 – MP 16.520)	PROJECT PRIORITY LOW
	Description Correct geometric and width deficiencies for safety and better accessibility on KY 1 from I-64 to the Greenup County Line.	**Cost Estimate:** Planning: $280,000 Design: $3,380,000 Right-of-Way: $4,500,000 Utilities: $2,800,000 Construction: $25,800,000 Total: $36,760,000

Problem Statement: KY 1 carries 7,720 vpd between I-64 and KY 9, and 3,120 vpd north of KY 9. Although the number of trucks has decreased, the road is used as a shortcut for trucks and delivery vehicles. The KYTC's HIS data indicates a narrow and winding road just beyond the study area, and safety issues arise when the road's 10-foot-wide lanes and three- to five-foot-wide shoulders cause vehicles passing in opposite directions to drive on shoulders to avoid a collision.

Project FF would correct geometric and width deficiencies and improve safety and accessibility for delivery and passenger vehicles on KY 1 from I-64 north to the Greenup County Line.





GG 09 022 D0007 46.20 Long-Term	LOCATION KY 7 (MP 9.157 – MP 10.296)	PROJECT PRIORITY LOW

Description

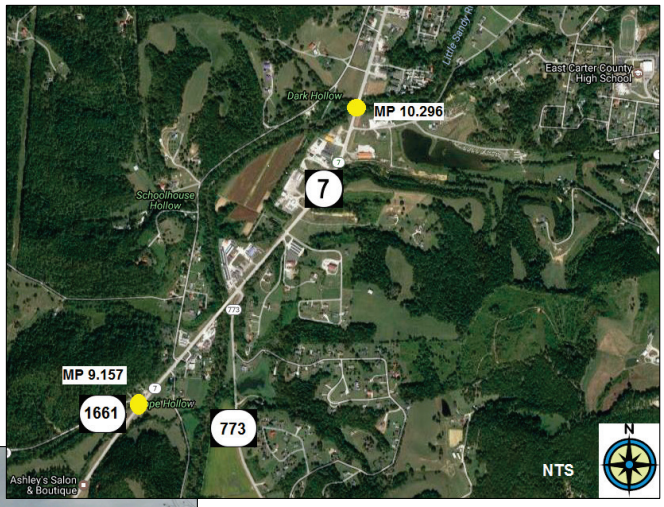
Correct geometric and width deficiencies on KY 7 from KY 1661 (MP 9.157) to and including the Little Sandy River Bridge (MP 10.296) to improve access and system connectivity between Grayson and Sandy Hook, increase route efficiency, and enhance economic growth in the area.

Cost Estimate:

Planning:	$0
Design:	$1,300,000
Right-of-Way:	$2,080,000
Utilities:	$1,560,000
Construction:	$4,940,000
Total:	$9,880,000

Problem Statement: KY 7 from KY 1661 to the four-lane section in Grayson (including the Little Sandy River Bridge) is a two-lane roadway consisting of 11-foot-wide driving lanes and 12-foot-wide unpaved shoulders. Item Number 09-144.00 reconstructs KY 7 to five lanes to south of the post office (MP 10.296). The remaining two-lane portion of KY 7 is currently used by local residents, tourists, commercial users, and others for access to I-64, Grayson Lake, and the communities of Grayson and Sandy Hook.

Project GG would correct geometric and width deficiencies on KY 7 from KY 1661 (MP 9.157) to north of the Little Sandy River Bridge (MP 10.296). Omission of this project when combined with all segments of construction proposed on KY 7 from Sandy Hook to Grayson would result in a gap in the roadway system.



HH 09 022 D3297 39.00 Long-Term	LOCATION KY 3297 (MP 0.279 – MP 1.634)	PROJECT PRIORITY MEDIUM
	Description Improve operational efficiency and reduce congestion on KY 3297 from Rupert Street east to the Little Sandy River Bridge.	**Cost Estimate:** Planning: $85,000 Design: $850,000 Right-of-Way: $3,375,000 Utilities: $1,690,000 Construction: $7,220,000 Total: $13,220,000

Problem Statement: KY 3297 carries approximately 3,000 vpd (LOS C), with 10-foot-wide driving lanes and four-foot-wide or less shoulders (photo right). KY 3297 serves several major traffic generators along the route including an apartment complex, East Carter Middle School, numerous residences, and several rapidly growing subdivisions. Also located on KY 3297 is a recently constructed approach road that provides access to a commercial development area adjacent to I-64. Traffic congestion through this section of roadway is a steadily growing problem.

Project HH, according to the PIF, would improve operational efficiency and reduce congestion by increasing lane and shoulder widths and providing a shared use path on KY 3297 from Rupert Street to the Little Sandy River Bridge (photo left).

II 09 022 D3297 40.00 Long-Term	**LOCATION** KY 3297 (MP 1.750 – MP 2.930)	**PROJECT PRIORITY** MEDIUM
	Description Correct geometric and width deficiencies (narrow shoulders) on KY 3297 from the Little Sandy River Bridge to US 60 to improve operational efficiency and system connectivity.	**Cost Estimate:** Planning: $110,000 Design: $850,000 Right-of-Way: $2,250,000 Utilities: $1,690,000 Construction: $5,160,000 Total: $10,060,000

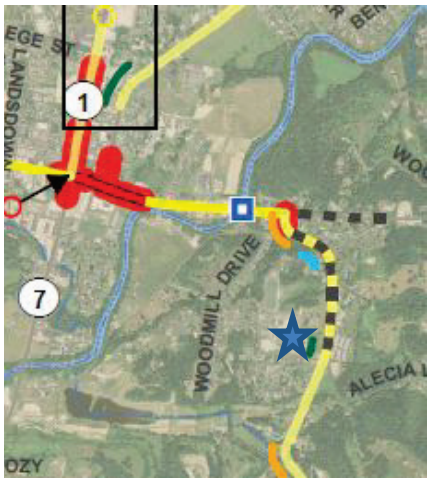
Problem Statement: KY 3297 is a narrow roadway—10-foot-wide lanes with four-foot-wide shoulders— located in an area of increasing residential development. .

Project II, a continuation of Project HH, would begin at the Little Sandy River Bridge and end at its junction with US 60. Project II would correct geometric and width deficiencies on KY 3297 to improve operational efficiency and system connectivity.

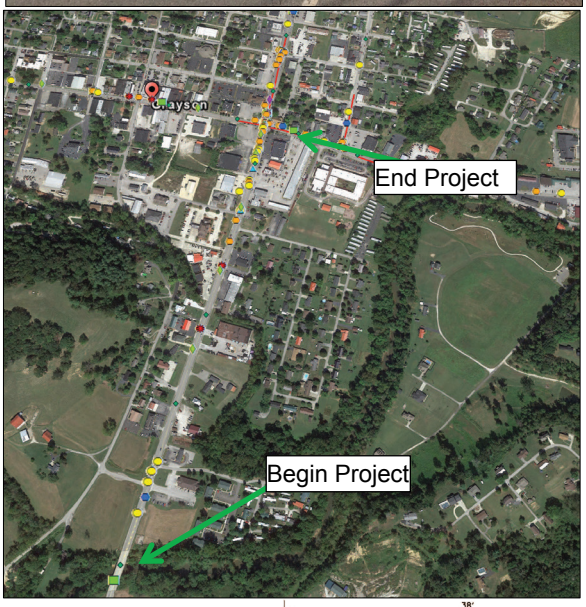
JJ **Item No. 09-8311.00** 09 022 D0001 1345.0 09 022 D0001 45.80 **Long-Term**	**LOCATION** **KY 1 (South)** **(MP 10.080 – MP 10.180)**	**PROJECT PRIORITY** **HIGH**
	Description Safety improvements at East Carter High School.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $870,000 Utilities: $570,000 Construction: $2,080,000 Total: $3,520,000

Problem Statement: KY 1 near East Carter High School (ECHS) carries 3,300 vpd to the south and 5,180 vpd to the north. The high school entrance (below photo) ties into KY 1 in a Class C horizontal curve (blue star on bottom right exhibit) and at the crest of a vertical grade (gray hash marks) creating sight distance issues. Project JJ would provide safety improvements along KY 1 at East Carter High School.

Project JJ would reduce congestion during school peak hours and correct vertical deficiencies, provide a right-turn lane and west-side sidewalk, while potentially combining Stovall Lane and the school entrance. The picture below shows the sight distance available to the driver exiting ECHS looking north.

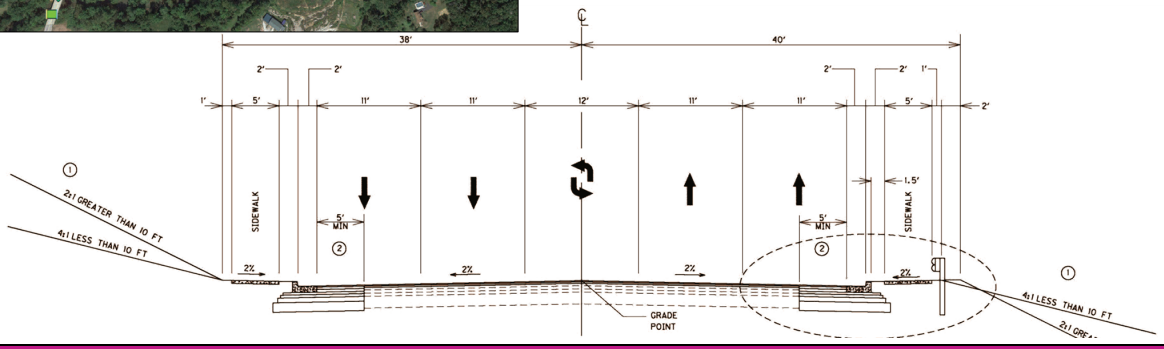


KK **Item No. 09-144.00** 09 022 D007 1284.0 **Long-Term**	**LOCATION** **KY 7 (MP 10.318 – MP 10.865) and KY 1 (MP 10.646 – MP 11.159)**	**PROJECT PRIORITY** **HIGH**
	Description Widen KY 7 (Carol Malone Boulevard) from the Little Sandy River Bridge (MP 10.318) to US 60 (MP 10.865). Widen KY 1 (Carol Malone Boulevard) from US 60 (MP 10.646) to Academic Parkway (MP 11.159).	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $0 Utilities: $0 Construction: $3,640,000 Total: $3,640,000



Problem Statement: As shown in the exhibit (bottom left), rear-end crashes (orange) and vehicles entering and leaving entrances (yellow) are prevalent. Four 0.1-mile high crash spots exist from south of US 60 north to Third Street, and between College and Fifth Streets.

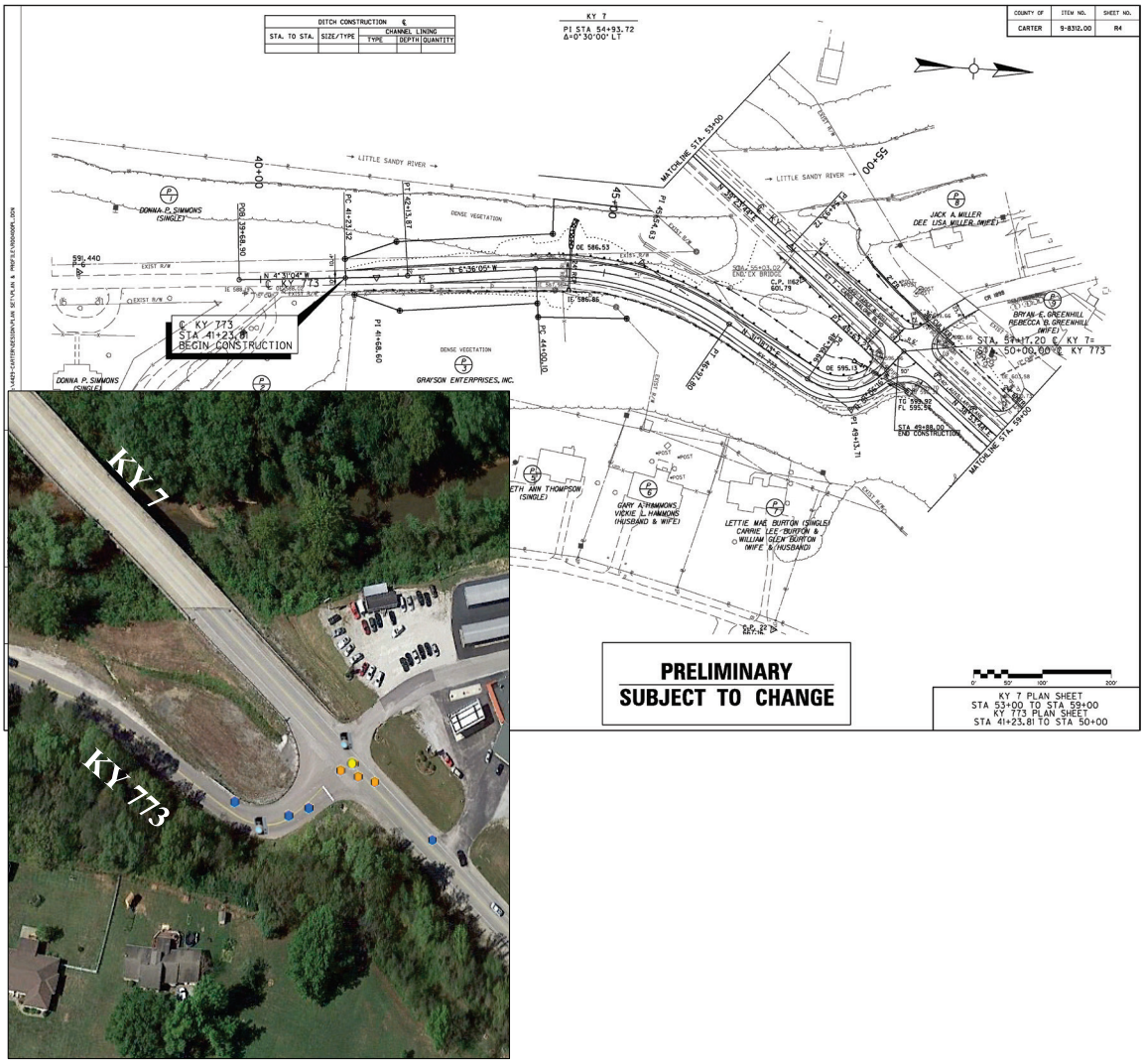
Project KK would widen KY 7 and KY 1 to provide for a center left-turn lane from near the post office north of the Little Sandy River Bridge on KY 7 and continuing through the US 60 intersection to the five-lane section of KY 1 at Academic Parkway (typical section). The project also includes sidewalks on both sides of KY 1 and KY 7. Right- and left-turn lanes would be provided at US 60, and a signal and crosswalk would be installed at Academic Parkway. Right-of-way has been purchased for this project, which awaits construction funding. It is recommended access management be considered if construction is funded. If right-turn lanes are constructed at the US 60/ KY 1/KY 7 intersection for all approaches, the 2040 intersection LOS is expected to improve from LOS E to D.



LL Item No. 09-8312.10 Long-Term	LOCATION KY 773 (MP 0.000 – MP 0.100) KY 7 (MP 9.500 – MP 9.700)	PROJECT PRIORITY MEDIUM
	Description Improve safety at KY 7/KY 773 intersection. Add left-turn lane and improve sight distance on KY 7.	**Cost Estimate:** Planning: $0 Design: $0 Right-of-Way: $50,000 Utilities: $500,000 Construction: $500,000 Total: $1,050,000

Problem Statement: KY 773 carries 1,920 vpd and KY 7 from the Little Sandy River Bridge south of KY 773 to US 60 ranges from 5,480 vpd to 8,760 vpd. KY 773 approaching KY 7 has a CCRF of 1.22 with four crashes in the three-year review period.

Project LL would provide a southbound left-turn lane on KY 7 and improve sight distance at the intersection. Three additional crashes are shown on KY 773 (blue dots on aerial photo). KYTC Item Number 09-8312.10 also includes improvements to KY 773; however, the only project pursued by the KYTC at this time is the left-turn lane.



6.5 LO/S Meeting No. 2

A second LO/S meeting was held December 7, 2016, at the FIVCO ADD in Grayson. At this meeting, a brief overview and review of the SUA Study's purpose and goals were provided with a presentation of new projects. The LO/S attendees were given a map identifying recommended new project locations and Project Evaluation Worksheets organized by local, short-term and long-term projects to garner their level of support for each project.

An explanation of the overall scoring system was provided with each project group (local, short-term and long-term). For example, Local projects included four projects for a total of four points (one point possible for each project). Each LO/S was asked to support at least two projects, preventing all four points from being allocated for just one project. It was also explained that giving each project a score of one would not provide the Project Team with discernible differences among LO/S priorities; therefore, careful thought should be given when applying scores to priorities. The Project Team emphasized the projects were conceptual in nature and could change in future project development phases.

Thirty-nine projects were presented for scoring including four local, seven short-term, and 27 long-term projects, the locations of which are illustrated on **Figure 28 (p. 52)**. The results are illustrated in **Figure 29**.

Meeting minutes are located in **Appendix G**.

Figure 29: Local Official/Stakeholder Recommended Project Scores

7.0 RECOMMENDATIONS

Directly following the second LO/S meeting, the third Project Team meeting was held to review the LO/S scores (**Figure 29)** and prioritize projects.

Local Projects

Because local projects are on city streets or county roads that are the responsibility of local government, they were prioritized **(Table 10)** using only the scores of the LO/S. **Figure 30 (p. 97)** shows the locations of the local projects. One ranked high, two were medium, one was low, and another was not recommended for advancement. Additional information follows:

- Project U was prioritized as high because recent improvements to CW Stevens Boulevard by the City of Grayson were considered a temporary solution. The corridor still needs sidewalks, curb and gutter, radius improvements at KY 1/KY 7, and drainage improvements including retrofitting drainage basins for curb and gutter.
- Project DD was not recommended because, where the creek is parallel to Damron Branch Road, much of the roadway would require relocation, which would entail additional right-of-way acquisitions and utility relocations.

Short- and Long-Term Projects

Based on project scores, crash data, current and future traffic, recent improvements, cost, benefit, and status of the Highway Plan and previously identified PIFs, the Project Team prioritized short- and long-term projects as high, medium, and low.

As listed in **Table 11** and illustrated on **Figure 31 (p. 98)**, a total of 12 projects were recommended by the Project Team as high priority projects. Projects D, H, O, and V were identified as short-term and the rest were identified as long-term. Note that Project V was completed during the conduct of this study, but remains herein to report its status.

The Project Team recommended 11 projects as medium priority projects, as listed in **Table 12 (p. 99)** and shown on **Figure 32 (p. 100)**. Projects E, F, and Q were identified as short-term and all three address drainage improvements along KY 1. The remaining eight projects were identified as long-term.

Recommended low priority projects are listed in **Table 13 (p. 101)** and shown on **Figure 33 (p. 102).** A total of 12 projects were recommended as low priority including one short-term and 11 long-term.

Table 10: Recommended Local Projects

Project ID	Route	Begin MP	End MP	Length	Project Type	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
U	CW Stevens Boulevard (CS 1110)	0.000	0.472	0.472	Widening and Sidewalks	Widen CW Stevens Boulevard; add curb and gutter, sidewalks, and improved turning radii at KY 1.	Local	$2,120,000	High
T	South Hord Street (CS 1126)	0.243	0.438	0.195	Drainage Improvements	Provide drainage improvements on South Hord Street (CS 1126) along Town Branch Creek south of Womack Road.	Local	$70,000	Medium
Y	Rupert Street (CS 1059)	0.000	0.438	0.438	Drainage Improvements	Provide drainage improvements along Rupert Street.	Local	$375,000	Medium
CC	Rupert Street (CS 1059)	0.000	0.310	0.310	Sidewalks	Provide sidewalks along both sides of Rupert Street.	Local	$490,000	Low

Table 11: Recommended High Priority Projects

Project ID	Route	Begin MP	End MP	Length	Project Type	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
D	US 60	21.220	21.221	0.001	Lighting	Provide lighting at the intersection of US 60 and KY 1947 and remove hill (along the south side of KY 1947) to improve sight distance. Lighting may become a local project if warrants are not met.	Short-Term	$70,000	High
H	KY 1 (Carol Malone Boulevard)	12.010	12.011	0.001	N/A	District 9 will review signage/striping for KY 9 in advance of the intersection with KY 1, but no improvement project is recommended.	Short-Term	$0	High
O	US 60	23.960	23.990	0.018	Access Management	Close the Park Street entrance from US 60, and provide curb and sidewalk across the entrance.	Short-Term	$5,000	High
V	KY 1 (North)	12.940	12.941	0.001	Signing	Install a "No Through Trucks" sign at the intersection of KY 1/KY 1910 intersection.	Short-Term	**Completed**	High
I	KY 1947	3.310	3.398	0.088	Right-Turn Lane	Provide a right-turn lane on KY 1947 at KY 1.	Long-Term	$470,000	High
J	New Connector	New Route	New Route	0.360	Congestion Relief New Route	Construct a new 0.360-mile two-lane roadway connecting CW Stevens Boulevard north to KY 9. (Section 1 of 3)	Long-Term	$3,000,000	High
L	I-64 Westbound Off-Ramp	0.176	0.252	0.076	Left-Turn Lane	Provide dual left-turn lanes on I-64 westbound off-ramp at KY 1.	Long-Term	$600,000	High
Z	KY 3297	0.360	0.420	0.060	Right-Turn Lane	Provide a right-turn lane on KY 3297 at East Carter Middle School's southernmost entrance.	Long-Term	$235,000	High
BB	New Connector	New Route	New Route	0.540	Congestion Relief New Route	Construct new 0.540-mile two-lane roadway from CW Stevens Boulevard south (over I-64) to KY 3297 (MP 0.800). (Section 2 of 3. See J for Section 1.)	Long-Term	$9,600,000	High
BB1	New Connector	New Route	New Route	0.720	Congestion Relief New Route	Construct new 0.720-mile, two-lane roadway from KY 3297 (over the Little Sandy River) to US 60 (MP 24.632) at KY 1. (Section 3 of 3. See J for Section 1.)	Long-Term	$8,500,000	High
JJ	KY 1 (South)	10.080	10.180	0.100	Safety Improvements	Safety improvements at East Carter High School. PIF 09 022 D0001 1345.0 and 45.80 Item Number 09-8311.00	Long-Term	$3,520,000	High
KK	KY 7 and KY 1 (Carol Malone Boulevard)	10.318 10.646	10.865 11.159	1.06	Widening	Widen KY 7 from the Little Sandy River Bridge to US 60. Widen KY 1 (Carol Malone Boulevard) from US 60 to Academic Parkway. PIF 09 022 D007 1284.0 Item Number 09-144.00	Long-Term	$3,640,000	High

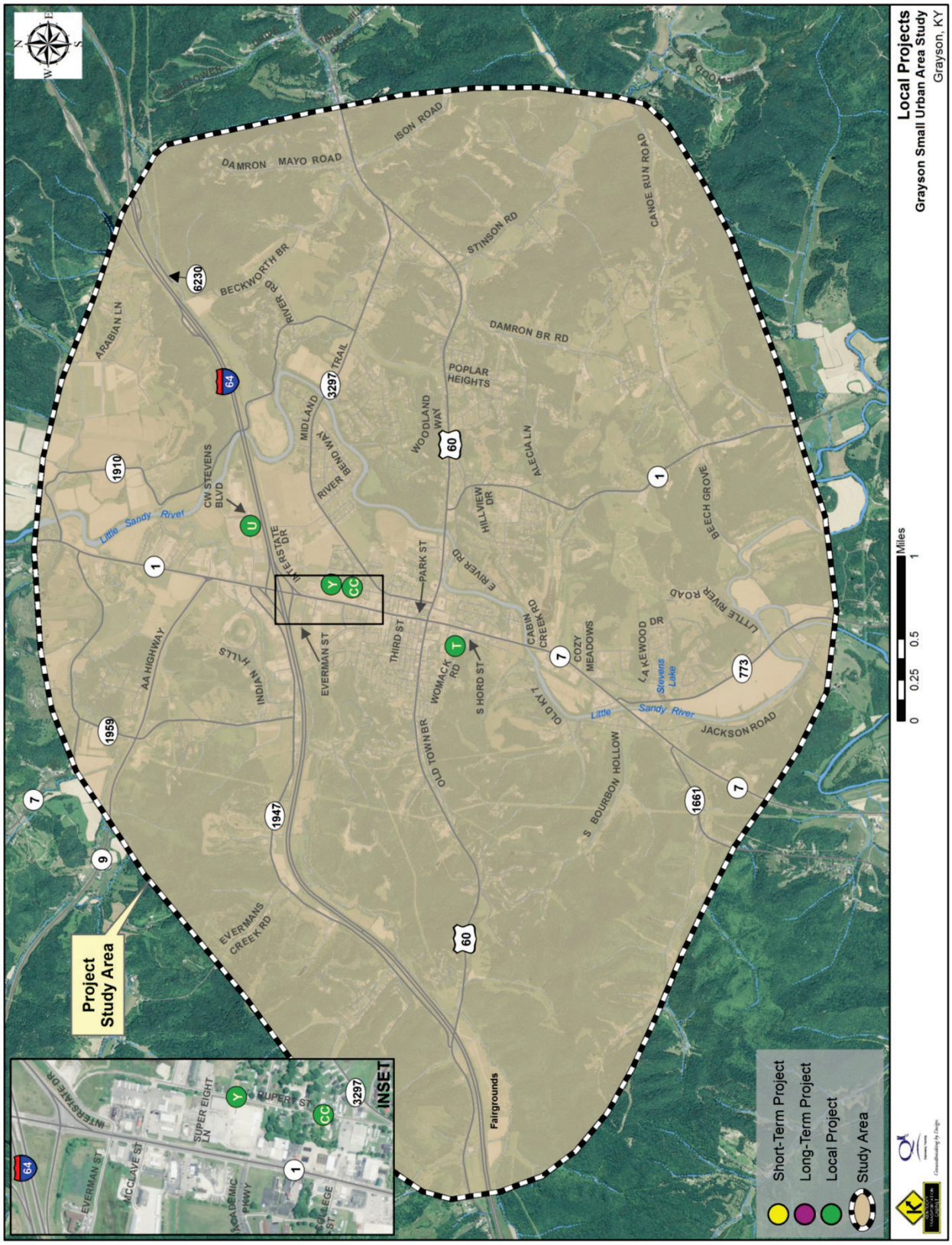


Figure 30: Local Projects

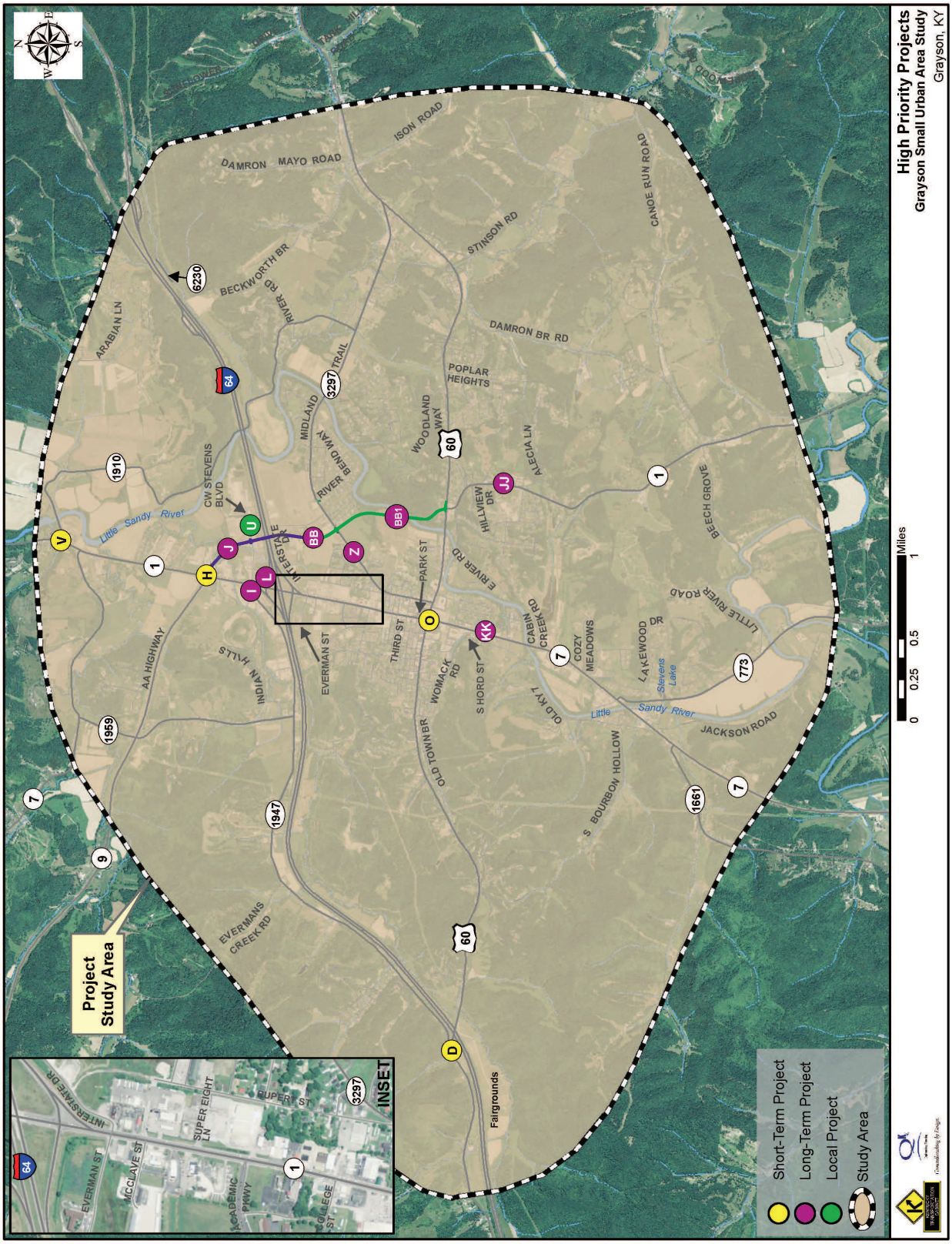


Figure 31: High Priority Projects

Table 12: Recommended Medium Projects

Project ID	Route	Begin MP	End MP	Length	Project Type	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
E	KY 1 (South)	10.414	10.646	0.232	Drainage Improvements	Provide drainage improvements along KY 1 (South) from US 60 to Hillview Drive to minimize flooding.	Short-Term	$50,000	Medium
F	KY 1 (South)	8.863	8.870	0.007	Drainage Improvements	Provide drainage improvements along KY 1 (South) near Beech Grove Road including 600 feet of ditching.	Short-Term	$50,000	Medium
Q	KY 1 (Carol Malone Boulevard)	10.886	11.004	0.118	Drainage Improvements	Provide drainage improvements to minimize flooding on KY 1 near the former Ralph's Food Fair.	Short-Term	$70,000	Medium
C	US 60	23.940	24.500	0.560	Sidewalks	Reconstruct deficient sidewalks and extend them from KY 1/KY 7 east to the Little Sandy River Bridge.	Long-Term	$620,000	Medium
G	US 60	23.940	24.500	0.56	Widening and Signage	Add two-way left-turn lane (TWLTL), widen lanes, and provide signage to direct motorists to the appropriate lane along US 60 from KY 1/KY 7 to the Little Sandy River Bridge.	Long-Term	$490,000	Medium
N	KY 1 (Carol Malone Boulevard)	10.646	11.391	0.745	Access Management	Conduct an access management study from Academic Prkwway north to Everman Street to provide for a more efficient corridor.	Long-Term	$700,000	Medium
W	KY 1910	0.000	0.004	0.020	Realignment	Shift KY 1910 approach to KY 3297 east and improve turn radii.	Long-Term	$225,000	Medium
AA	KY 3297	0.000	0.660	0.660	Sidewalks	Reconstruct sidewalk along KY 3297 from Prichard Elementary School on US 60 to Prichard Street.	Long-Term	$460,000	Medium
HH	KY 3297	0.279	1.634	1.355	Widening and Congestion and Safety Improvements	Improve operational efficiency and reduce congestion on KY 3297 from Rupert Street east to the Little Sandy River Bridge. PIF 09 022 D3297 39.00	Long-Term	$13,220,000	Medium
II	KY 3297	1.750	2.930	1.180	Widening and Congestion and Safety Improvements	Correct geometric and width deficiencies (narrow shoulders) on KY 3297 from the Little Sandy River Bridge to US 60 to improve operational efficiency and system connectivity. PIF 09 022 D3297 40.00	Long-Term	$10,060,000	Medium
LL*	KY 773	0.000	0.100	0.100	Left-Turn Lane and Safety Improvements	Improve safety at the KY 7/KY 773 intersection. Add left-turn lane and improve sight distance on KY 7. Item Number 09-8312.10	Long-Term	$1,050,000	Medium

* *Item Number 09-8312.00 included Safety Improvements to KY 773 from KY 7 to KY 1 from MP 0.100 to 3.505; however, the KYTC District 9 is only pursuing improvements at the KY 7/KY 773 intersection. The total cost represents updated cost estimates (from the KYTC District 9 staff) for the intersection project only.*

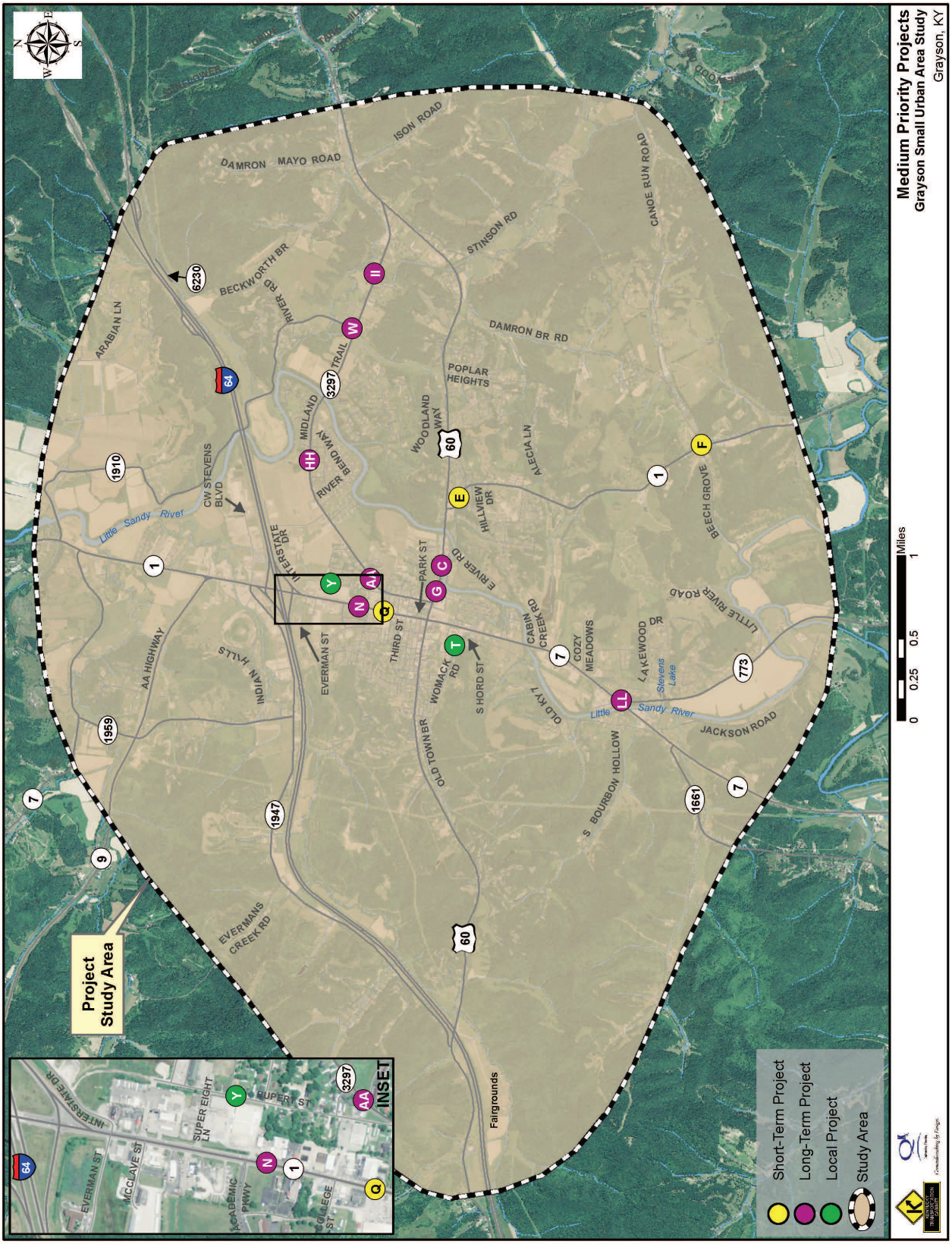


Figure 32: Medium Priority Projects

Table 13: Recommended Low Priority Projects

Project ID	Route	Begin MP	End MP	Length	Project Type	Project Description	Local, Short-Term, or Long-Term	Cost Estimate (2016 Dollars)	Priority
A1	US 60	23.620	23.940	0.320	Restripe for Left-Turn Pockets	Restripe US 60 and provide left-turn pockets from Court Street to KY 1/KY 7.	Short-Term	$5,000	Low
A	US 60	23.346	23.940	0.594	Restripe for Two-Way-Left Turn Lane	Restripe US 60 and provide Two-Way-Left-Turn-Lane (TWLTL) from Old Town Branch Road to KY 1/KY 7 with parking on one side only. (See Project G)	Long-Term	$200,000	Low
B	US 60	21.380	21.381	0.001	Congestion Relief New Route	Provide additional one-lane access road from US 60 to the Fairgrounds east of the existing entrance.	Long-Term	$1,100,000	Low
K	KY 1 (Carol Malone Boulevard)	New Route KY 1 (11.159)	New Route KY 1 (11.391)	0.232	New Route and Access Management	Connect Everman Street and Academic Parkway with a two-lane roadway. Close the entrance from Everman Street to KY 1 once the connection has been constructed.	Long-Term	$2,900,000	Low
M	KY 1 (Carol Malone Boulevard)	11.159	11.391	0.232	Access Management	Close Interstate Drive at KY 1 and the two entrances closest to the KY 1/I-64 eastbound on-ramp, and route those motorists to Super Eight Lane and the roadway directly across KY 1 from McClave Street. Relocate truck parking and improve internal circulation.	Long-Term	$2,230,000	Low
P	Various Routes	N/A	N/A	N/A	Walkability Study	Conduct a pedestrian walkability, safety, and ADA compatibility study for the community of Grayson to supplement the sidewalk information collected by the KYTC and the FIVCO ADD.	Long-Term	$150,000	Low
R	KY 7	9.580	10.230	0.650	Lighting	Install lighting along KY 7 from KY 773 to Cabin Creek Road. Lighting may become a local project if warrants are not met.	Long-Term	$320,000	Low
S	KY 7	10.228	10.423	0.195	Sidewalks	Construct sidewalks along both sides of KY 7 from Cabin Creek Road north over the Little Sandy River Bridge (estimated one side of bridge) to Little Sandy Lane.	Long-Term	$690,000	Low
X	KY 3297	0.129	0.167	0.038	Safety Improvements	Improve turning radii from KY 3297 at East Third Street.	Long-Term	$155,000	Low
EE	KY 1 (South)	0.000	10.646	10.646	Safety Improvements	Correct horizontal, vertical, and width deficiencies on KY 1 from the Lawrence County Line to US 60 in Grayson to improve safety, sight distances, systems connectivity, operational efficiency, and southern access into Grayson for area residents. PIF 09 022 D0001 45.00	Long-Term	$111,390,000	Low
FF	KY 1 (North)	11.502	16.520	5.018	Safety Improvements	Correct geometric and width deficiencies for safety and better accessibility on KY 1 from I-64 to the Greenup County Line. PIF 09 022 D0001 43.00	Long-Term	$36,760,000	Low
GG	KY 7	9.157	10.296	1.139	Safety Improvements	Correct geometric and width deficiencies on KY 7 from KY 1661 to and including the Little Sandy River Bridge to improve access and systems connectivity between Grayson and Sandy Hook, increase the efficiency of the route, and enhance economic growth in the area. PIF 09 022 D0007 46.20	Long-Term	$9,880,000	Low

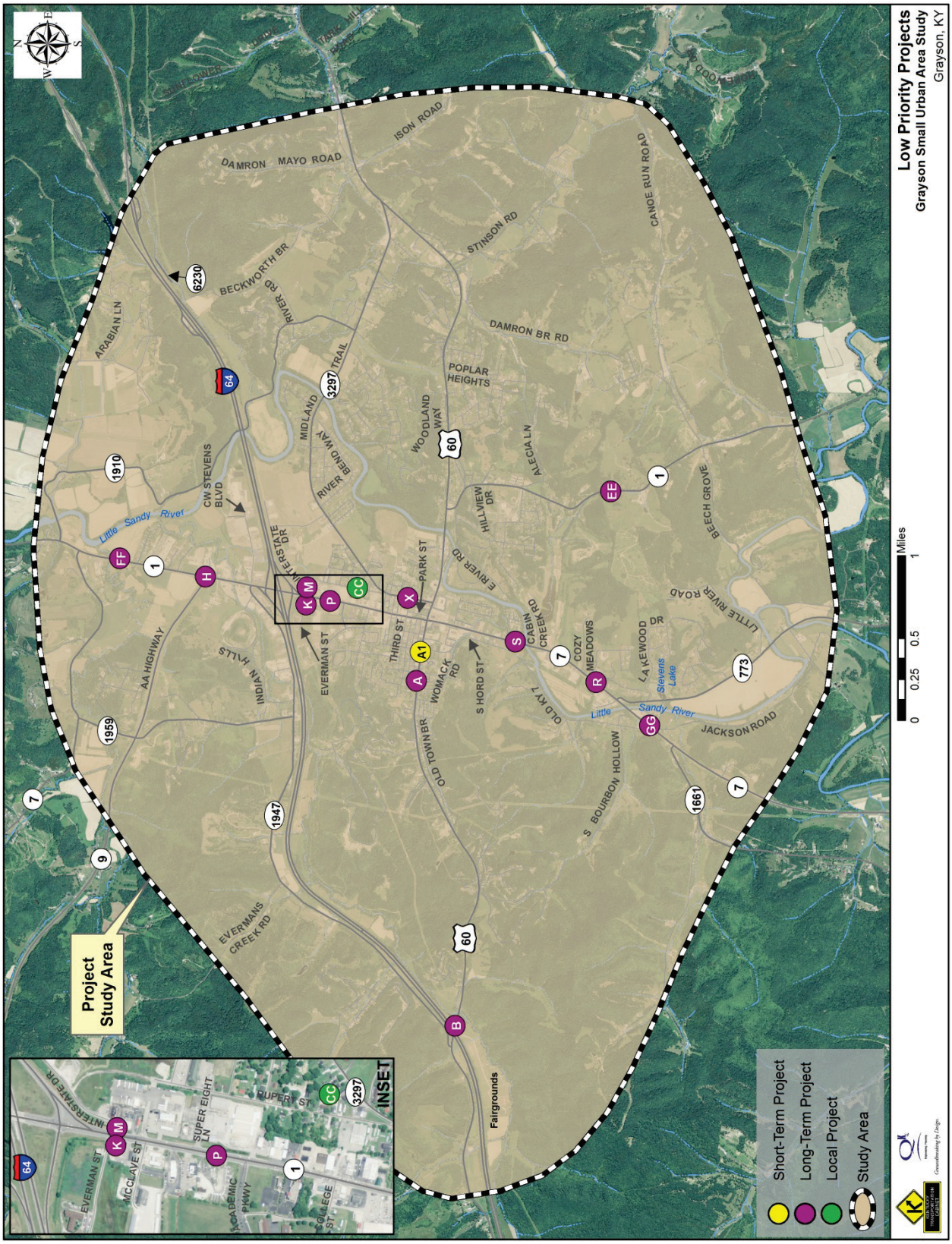


Figure 33: Low Priority Projects

The next phase for recommended projects in the SUA Study not associated with a KYTC Item Number would be Phase 1 Design (Preliminary Engineering and Environmental Analysis). Funding will be necessary to advance a project to the next project development phase. Projects identified in **Figure 34**, with the exception of KYTC Item Number 09-144.00, have some authorized funding but have not been advanced.

KYTC Item Number 09-144.00 awaits construction funding. Right-of-way has been purchased for the project. If this project does not advance, right- and left-turn lanes at the US 60/KY 1/KY 7 intersection should be considered to improve the LOS at this intersection.

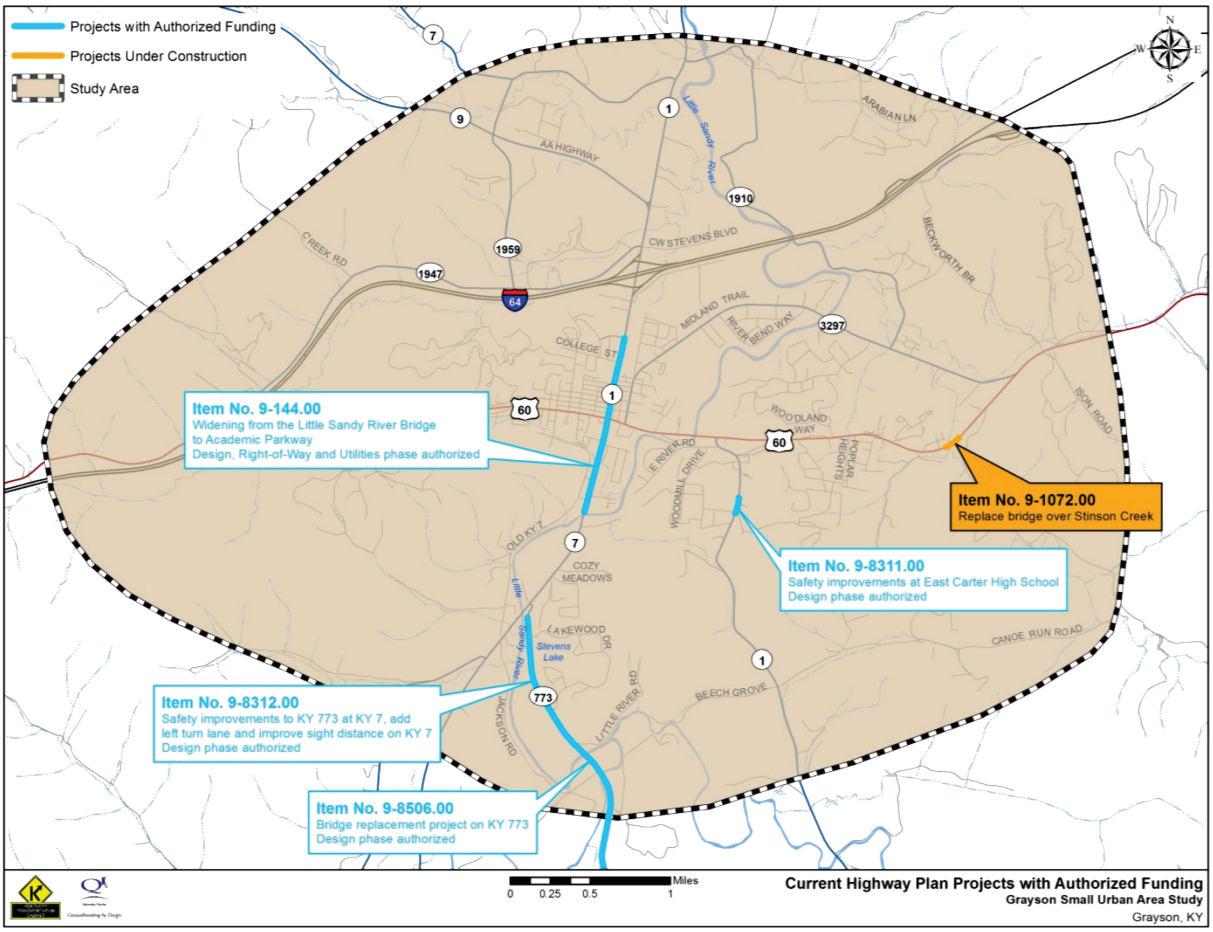


Figure 34: Current Highway Plan Projects with Authorized Funding

8.0 CONTACT INFORMATION

Written requests for additional information should be sent to John Moore, Director, KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from the KYTC District 9, Joe Callahan, at (606) 845-2551 (email at Joe.Callahan@ky.gov).