EAST Elizabethtown CONNECTIVITY STUDY

# FINAL REPORT

Prepared For:
Radcliff/ Elizabethtown
Metropolitan Planning
Organization

September 16, 2021

Planning for the transportation needs of the region.

Prepared by:
Qk4, Inc.
1046 East Chestnut Street
Louisville, KY 40204

# EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) and the Radcliff/Elizabethtown Metropolitan Planning Organization (MPO) initiated a study to analyze East Elizabethtown Transportation Connectivity in April 2020. The study boundary encompasses the area between US 31W and I-65 in the north, from I-65 crossing the Bluegrass Parkway, KY 567, KY 210, KY 61, ending at US 31W in the south. Study efforts also included portions of I-65, specifically the US 62/I-65 interchange, as well as state-maintained roadways and local routes integral to traffic operations within the study boundaries.

Goals of the study include identifying existing safety and congestion issues in the transportation and pedestrian networks and identifying and prioritizing multiple recommended short-term and long-term projects. To develop these recommendations, the project team researched existing planned projects in the area, reviewed historic traffic and crash data, solicited public and stakeholder input, completed an environmental, socioeconomic, and historical study, completed traffic forecasting, and ran capacity analyses. With all historic data, feedback, and analyses the team was able to identify multiple locations for improvement options along and east of US 31W in Hardin County, Kentucky, for both highway and pedestrian networks.

Over thirty connectivity, mobility, and safety improvement project recommendations were identified, researched, and presented to the local officials, local stakeholders, and the public. The feedback was analyzed and then each recommendation was revisited, edited if necessary, and prioritized. These project locations are shown in **Figure i** below and described in detail in **Section 6.0** of the report.

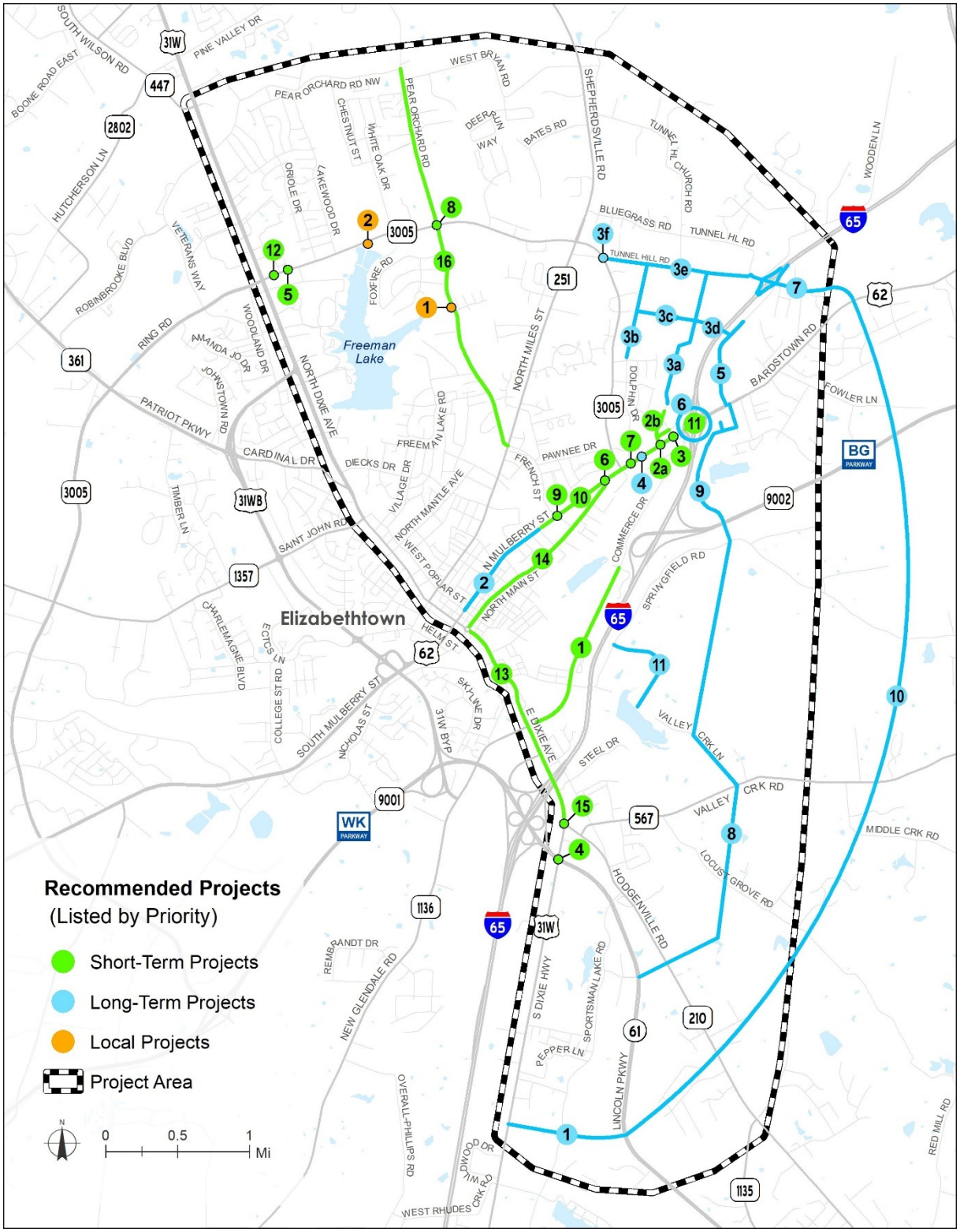



Figure i. Recommended Projects

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES



# APPENDICES

A. Traffic Forecast Report
B. Capacity Analyses Reports
C. Historic Crashes
D. Environmental Overview/Socioeconomic Data
E. Meeting Summaries and Online Engagement
F. Recommended Project one-sheets

# ACRONYMS LIST

| | |
|---|---|
| ADT | Average Daily Traffic |
| CCRF | Critical Crash Rate Factor |
| CHAF | Continuous Highway Analysis Framework |
| DHV | Design Hourly Volume |
| EECS | East Elizabethtown Transportation Connectivity Study |
| FHWA | Federal Highway Administration |
| HCM | Highway Capacity Manual |
| HDM | Highway Design Manual |
| HIS | Highway Information System |
| HSIP | Highway Safety Improvement Program |
| KDFWR | Kentucky Department of Fish and Wildlife Resources |
| KDOW | Kentucky Division of Water |
| KGS | Kentucky Geological Survey |
| KSS | Kentucky Speleological Survey |
| KTC | Kentucky Transportation Center |
| KYTC | Kentucky Transportation Cabinet |
| LTADD | Lincoln Trail Area Development District |
| LO/S | Local officials/stakeholders |
| LOS | Level of Service |
| LWCFA | Land and Water Conservation Fund Act |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| MPO | Metropolitan Planning Organization |
| MP | Milepoint |
| mph | miles per hour |
| MPO | Metropolitan Planning Organization |
| MTP | Metropolitan Transportation Plan |
| NBIS | National Bridge Inventory System |
| NHS | National Highway System |
| NRCS | Natural Resource Conservation Service |
| NRHP | National Register of Historic Places |
| NWI | National Wetland Inventory |
| OKNP | Office of Kentucky Nature Preserves |
| PDO | property damage only |
| STAA | Surface Transportation Assistance Act |
| STIP | Statewide Transportation Improvement Program |
| TAZ | Traffic Analysis Zone |
| TED | Transportation Enterprise Database |
| TIP | Transportation Improvement Program |
| TWLTL | two-way left-turn lane |
| USEPA | US Environmental Protection Agency |
| USFWS | US Fish and Wildlife Service |
| v/c | volume-to-capacity ratio |

# 1.0 INTRODUCTION

The Radcliff/Elizabethtown Metropolitan Planning Organization (MPO) and the Kentucky Transportation Cabinet (KYTC) initiated the East Elizabethtown Transportation Connectivity Study (EECS) in April 2020. The connectivity study analyzed improvement options for highways and pedestrians at various locations along and east of US 31W in Hardin County, Kentucky. Both immediate and long-range improvement opportunities have been identified to enhance connectivity, mobility, and safety in the study area.

## 1.1 Study Background

In recent years, the City of Elizabethtown has experienced rapid growth in commercial development and traffic volumes along several routes. This has resulted in safety issues across Elizabethtown, especially on routes that lead to the downtown area. Specifically, pedestrian safety and significant congestion are concerns on US 62 from the US 62/I-65 interchange south. This exit from I-65 onto US 62 is used to access large retail outlets and restaurants via US 62 leading to Ring Road and US 31W. Numerous businesses, including hotels, gas stations, and restaurants have recently opened near this interchange adding even more traffic congestion.

Elizabethtown officials and residents have also expressed interest in revitalizing the southern part of their community. They have identified several concerns. Currently, a new school is under construction on KY 1136 (New Glendale Road), which could increase traffic and spur residential development in the area. The addition of businesses in the downtown area along US 31W has increased pedestrian and vehicular traffic. There is also a lack of pedestrian and motor vehicle access and connectivity between major roadways southeast of I-65. The EECS was initiated to address these issues and plan for future growth

## 1.2 Study Area

The East Elizabethtown study area, illustrated in **Figure 1**, encompasses areas along and to the east of US 31W and along and to the south of Pear Orchard Road NW. The southern portion of the study area includes I-65 crossing the Bluegrass Parkway, portions of KY 567, KY 210, KY 61, ending at US 31W near Dawn Avenue. Study efforts included portions of I-65, specifically the US 62/I-65 interchange, as well as state-maintained roadways and local routes integral to traffic operations within the study boundaries.

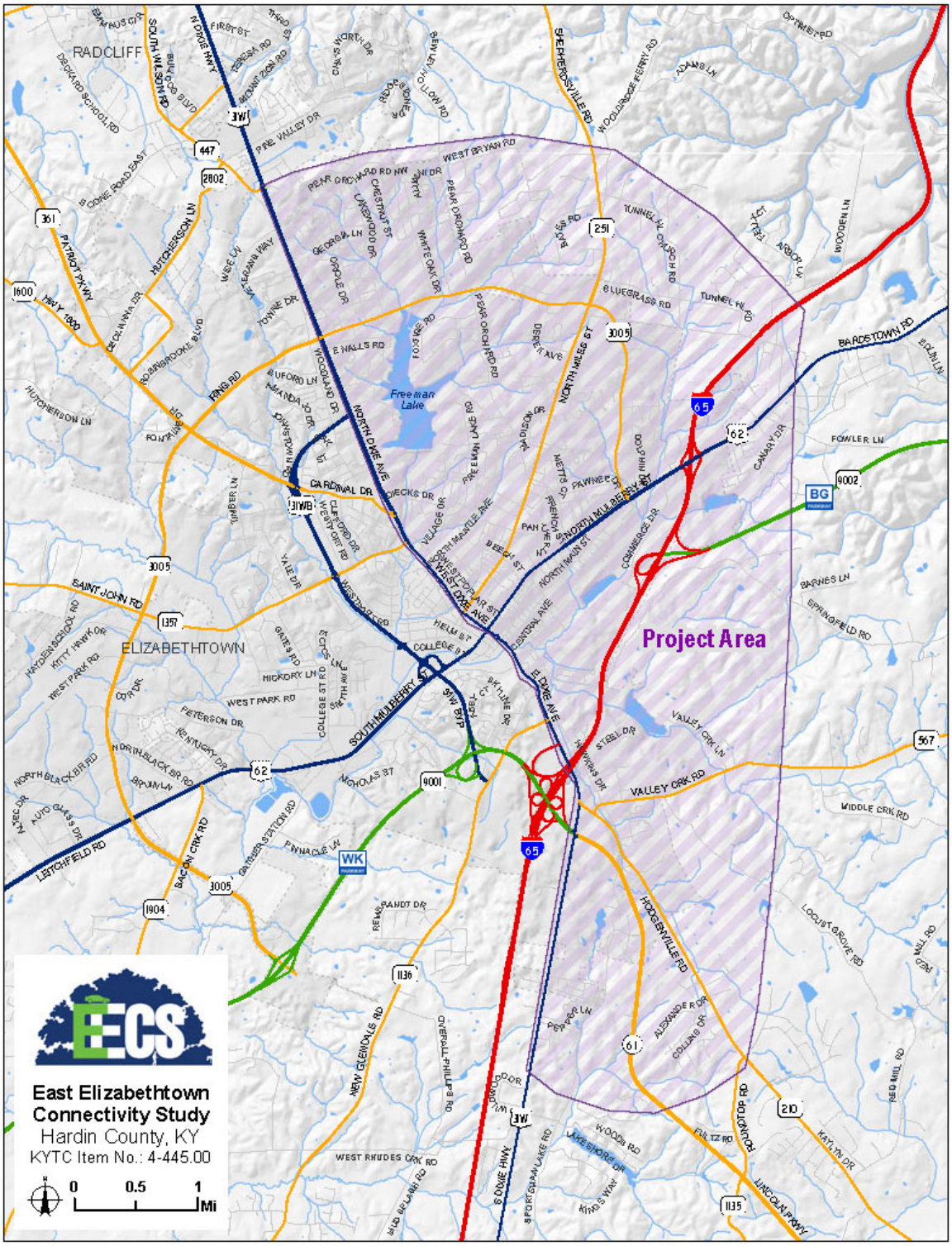



Figure 1. Study Area

## 1.3 Study Goals

Goals of the study include identifying existing safety and congestion issues in the transportation and pedestrian networks and identifying and prioritizing multiple potential improvement concepts. These improvement concepts include short-term "quick-wins" and long-term projects that require programming. **Figure 2** illustrates the study tasks.

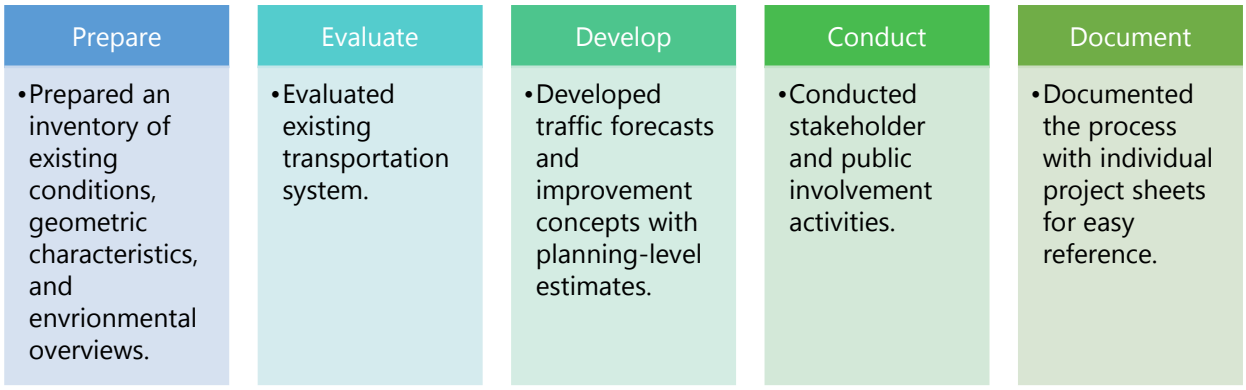



Figure 2. Study Tasks

## 1.4 Previous Studies Identified and Committed Projects

Studies previously completed and several planned and committed transportation improvement projects were identified within the study area in Hardin County. The following sections detail projects identified from Kentucky's FY 2020 – 2026 Six-Year Highway Plan,[1] the Continuous Highway Analysis Framework (CHAF) database, Kentucky's Statewide Transportation Improvement Plan (STIP), Radcliff/Elizabethtown's Metropolitan Transportation Plan (MTP) and Transportation Improvement Program (TIP), and local plans prepared for the Hardin County Planning and Development Commission and the City of Elizabethtown.

### *1.4.1 Previous Studies*

Transportation studies have been completed by the city, county, and state over the last several years. Recent studies are identified below and have been reviewed and incorporated into this planning effort.

- The northern portion of the study area overlaps with the area considered in the 04-00153.00 – KY 251 Scoping Study[2]. The study was completed in 2012 and identified improvement strategies for KY 251 from KY 3005 to KY 313. The goal of this study was to provide a better connection between Elizabethtown and Fort Knox in Hardin County.
- A portion of the 04-08505.00 – Improved Hodgenville to I-65 Connection Study[3] area overlaps with the southern portion of this study boundary. This study was initiated by local

[1] https://transportation.ky.gov/Program-Management/Highway%20Plan/2020HighwayPlanAll.pdf
[2] https://transportation.ky.gov/Planning/Planning%20Studies%20and%20Reports/man_KY251_final_20120517-%20Complete%20Report.pdf
[3] https://transportation.ky.gov/Planning/Planning%20Studies%20and%20Reports/Improved%20Hodgenville%20to%20I-65%20Connection%20FINAL%20Report.pdf

officials in LaRue County to identify a more reliable and safer connection between Hodgenville and I-65 / Glendale.

- The Pear Orchard Road Corridor Study was completed for the City of Elizabethtown in 2015, identifying design improvements appropriate for the functional use of the area. The corridor has seen an increase in traffic as an alternative route to US 31W and Ring Road and is expected to continue to grow as the long-range plan indicates a transition to more urban residential development in the area.
- In 2016, the Radcliff/Elizabethtown Metropolitan Planning Organization completed a bicycle facilities study[4] to plan for the development of a connected system of on- and off-road bicycle facilities in Hardin and Meade counties.
- The Elizabethtown Tourism & Convention Bureau in coordination with the City of Elizabethtown developed the *Elizabethtown Trail Master Plan*[5] in July 2017. This plan was developed to connect restaurants and hotels near the I-65 Exit 94 to downtown on both the east and west sides of the CSX railroad. The west side focuses on existing roadway corridors, and the east side focuses on expanding the Buffalo Lake trail network.
- Hardin County Planning and Development Commission completed a *Comprehensive Development Guide*[6] in 2019. This guide established policies for the future development of the community.
- The Radcliff/Elizabethtown Metropolitan Planning Organization completed their 2020 – 2045 Metropolitan Transportation Plan[7] (MTP) in 2020, fiscally balancing transportation improvement projects over the next 20 years.
- The City of Elizabethtown adopted the *Envision Elizabethtown 2040 Comprehensive Plan*[8] in 2020. It examined future possibilities to establish a defined direction for the vision of the community.

### 1.4.2 Planned and Committed Projects

Committed projects and planned concepts for future improvement in the area are shown in

[4] http://radcliff-elizabethtown-mpo.org/wp-content/uploads/2018/03/RadcliffEtownMPO_BicycleFacilitiesPlan_smaller.pdf
[5] June 2017. Elizabethtown Trail Master Plan. Taylor Siefker Williams Design Group
[6] https://24107ddc-67ea-44d4-bd66-55c5dfb1db1c.filesusr.com/ugd/67a6e3_a981b3e2867d4b14b2c086c926c1f9a3.pdf
[7] https://radcliff-elizabethtown-mpo.org/wp-content/uploads/2020/03/FINAL-Radcliff_Etown-MPO-2045-MTP.pdf
[8] https://envisionetown.org/

**Table 1** lists the projects mapped. Projects programmed in Kentucky's FY 2020 – 2026 Highway Plan are assumed to be advancing independent from this study.

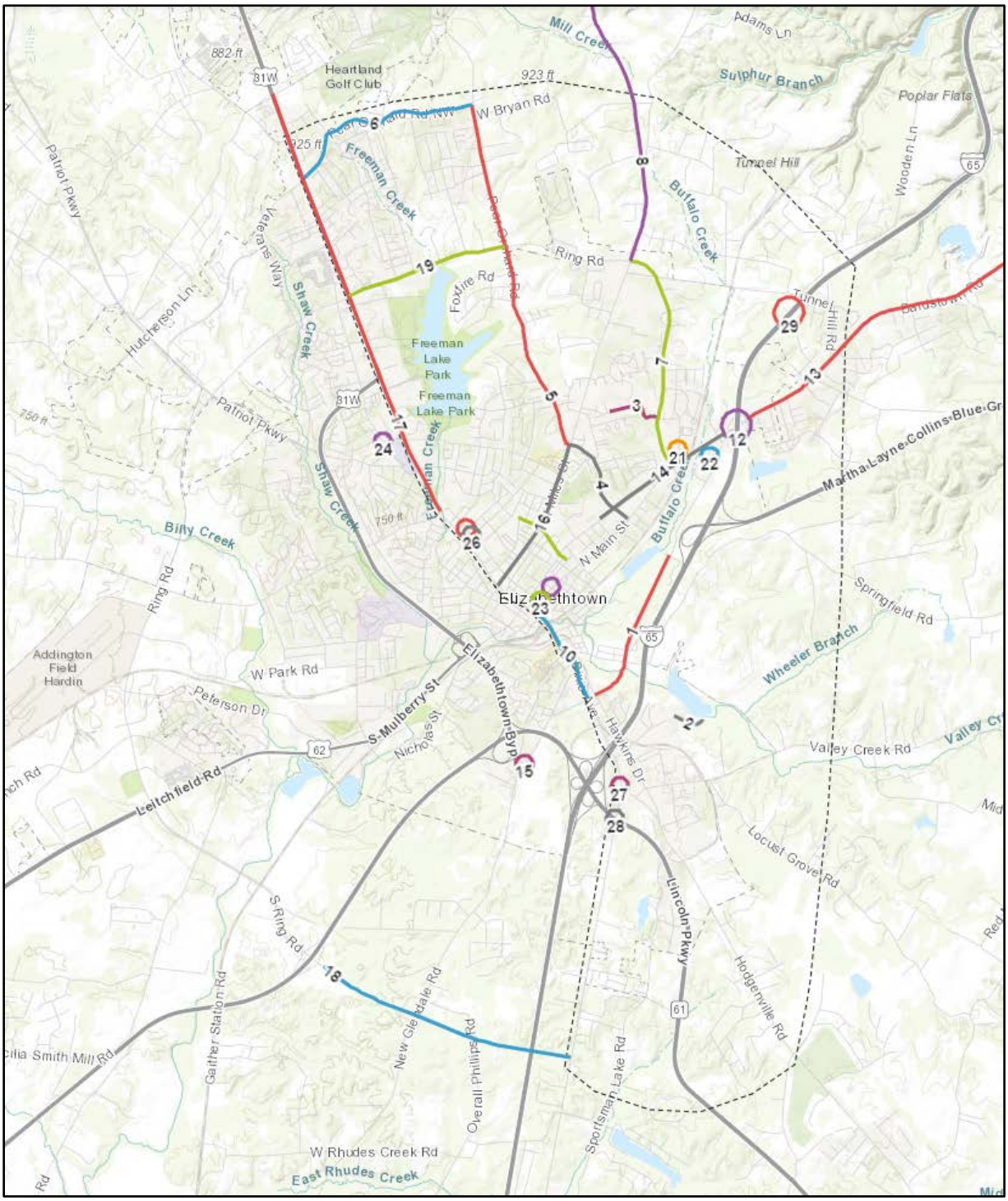



Figure 3. Planned Projects

Table 1. Planned Projects

| Map # | KYTC Item Number | CHAF ID | Route | Recommended Improvement Description |
|---|---|---|---|---|
| **1** | - | IP20070175 | KY 1136 | Extension of Commerce Drive to New Glendale Road |
| **2** | - | - | CS-1471 | Steel Drive Extension |
| **3** | - | - | CS-1385 | Colonial Drive Area Connector |
| **4** | - | - | CS-1418 | West French Street Improvements |
| **5** | - | - | CR-1012<br>CS-1327 | Pear Orchard Road Reconstruction |
| **6** | - | - | CR1013<br>CS-1297 | Pear Orchard Road NW Realignment |
| **7** | | IP20190034 | KY 3005 | Ring Road Transportation Study |
| **8** | 4-153.01 | IP20150448 | KY 251 | KY 251 Improvements form KY 3005 to KY 434 |
| **9** | - | IP20070159 | US 31W | Widen US 31W from Bishop Lane to Valley Creek Bridge |
| **10** | - | IP20070161 | US 31W | Convert US 31W from a 4-lane undivided to a 3-lane divided from New Glendale Road to Elizabethtown Square |
| **11** | - | - | CS-1030 | Beech Street Traffic Calming |
| **12** | - | - | I 65<br>US 62 | I-65/US 62 Interchange Improvements |
| **13** | 4-442 | IP20070167 | US 62 | Improve safety, mobility, and geometrics of US 62 from I-65 to Upper Colesburg Road |
| **14** | - | IP20070166 | US 62 | Construct curb and gutter and improve safety along US 62 from Brooks Street to I-65 |
| **15** | 4-9017 | - | KY 1136<br>US 31W Bypass | Construct a roundabout at KY 1136/US 31W Bypass |
| **16** | 4-9016 | - | KY 251 | Overlay and restripe KY 251 from 4- to 3-lane section from W Dixie Avenue to Pear Orchard Road. Construct mini roundabouts as W Poplar Street, Beech Street, Panther Lane, and Pear Orchard Road. |
| **17** | 4-154.20/4-20011/4-9008.5 | IP20150340 | US 31W | US 31W Rehab/RCUT/Access Projects |
| **18** | 4-198 | IP20150339 | KY 3005 | Ring Road Extension from Western Kentucky Parkway to US 31W |
| **19** | | | KY 3005 | Construction of turning lanes on Ring Road between US 31W and Pear Orchard Road |
| **20** | 4-9012.1 | - | CS-1004 | Construct a mini roundabout at the intersection of N Main Street and Crutcher Street |
| **21** | 4-9012.2 | - | CS-1430 | Construct a mini roundabout at the intersection of Dolphin Drive and Josdale Drive |

| Map # | KYTC Item Number | CHAF ID | Route | Recommended Improvement Description |
|---|---|---|---|---|
| **22** | 4-9012.3 | - | CS-1108 | Construct a mini roundabout at the intersection of Executive Drive and Commerce Drive |
| **23** | 4-9012.4 | - | CS-1004 | Construct a mini roundabout at the intersection of N Main Street and Poplar Street |
| **24** | 4-9012.5 | - | CS-1193 | Construct a mini roundabout at the intersection of Woodland Drive and Layman Lane/Hill Street |
| **25** | 4-9012.6 | - | CS-1068 | Construct a mini roundabout at the intersection of Poplar Street and Sycamore Street |
| **26** | 4-9012.7 | - | CS-1068 | Construct a mini roundabout at the intersection of Poplar Street and Mantle Avenue |
| **27** | - | - | US 31W KY 210 | Improve safety of US 31W/KY 210 intersection |
| **28** | - | - | US 31W KY 61 | Improve safety of US 31W/KY 61 interchange |
| **29** | - | - | I-65 | Study feasibility of new I-65 interchange north of US 62 |

## 2.0 EXISTING CONDITIONS

The following sections describe the existing conditions in the Elizabethtown study area. Information on the characteristics of roadway geometry, functional classification, bridges, traffic volumes and operations, and crash history were obtained from the KYTC's Highway Information System (HIS) database, KYTC's Transportation Enterprise Database (TED), bridge inspection reports, traffic counts, field reviews, and desktop reviews. The major roadways in the study area are listed in **Table 2**.

Table 2. Study Area Routes

| Route Number | Route Name | Begin MP | End MP |
|---|---|---|---|
| **KY 61** | Lincoln Parkway | 2.742 | 5.309 |
| **KY 210** | Hodgenville Road | 0.000 | 2.503 |
| **KY 251** | North Miles Street/Shepherdsville Road | 0.000 | 3.998 |
| **KY 567** | Valley Creek Road | 0.000 | 1.648 |
| **KY 1135** | Round Top Road | 5.047 | 4.897 |
| **KY 3005** | Ring Road | 6.550 | 10.582 |
| **US 31W** | Dixie Highway | 12.835 | 20.799 |
| **US 62** | S Mulberry Street/Bardstown Road | 17.947 | 21.191 |
| **I-65** | Interstate 65 | 91.394 | 95.771 |

| Route Number | Route Name | Begin MP | End MP |
|---|---|---|---|
| **CS-1025** | N Mantle Avenue | 0.000 | 0.835 |
| **CS-1068** | W Poplar Street | 0.095 | 0.335 |
| **CS-1278** | Joan Avenue | 0.000 | 0.181 |
| **CS-1297/CR-1013** | Pear Orchard Road NW | 0.000 | 1.222 |
| **CS-1327/CR 1012** | Pear Orchard Road | 0.000 | 1.903 |
| **CS-1320** | N Main Street | 0.000 | 1.404 |
| **CS-1390** | French Street | 0.000 | 0.646 |
| **CS-1418** | W French Street | 0.000 | 0.127 |
| **CS-1553** | Hawkins Drive | 0.243 | 1.049 |
| **CS-1652** | New Glendale Road | 0.000 | 0.065 |
| **CR-1012** | Pear Orchard Road | 0.000 | 0.859 |
| **CR-1013** | Pear Orchard Road NW | 0.000 | 0.372 |
| **CR-1100** | Bewley Hollow Road | 2.481 | 2.586 |
| **BG-9002** | Martha Layne Collins-Bluegrass Parkway | 0.000 | 1.133 |

## 2.1 Functional Class and Roadway Systems

Roadway functional classification groups highways and streets together by the types of travel service and access to adjacent land use they provide. This hierarchical classification system groups systems service from lower classifications handling short, locally oriented trips to higher classifications serving longer distances at a higher rate of mobility. Roadways are further classified as urban or rural based upon their geographical location within/outside the Federal Highway Administration's (FHWA) Adjusted Urban Area Boundaries. **Figure 4** provides the descriptions of the major functional classifications.

| | |
|---|---|
| Local Roads | Not intended for long distance travel, except at the origin or destination end of the trip, due to their direct access to abutting land. Often designed to discourage through traffic. |
| Collectors | Gather traffic from local roads and funnel them to the arterial netowrk. Classified as either a major or minor collector; generally serve intracounty travel and shorter trips. |
| Minor Arterials | Provide service trips of moderate length, serve geopgraphic areas smaller than their higher arterial counterparts, and offer connectivity to the higher arterial system. |
| Principal Arterials | Serve major centers for metropolitan areas, provide a high degree of mobility, and can also provide mobility through rural areas. |
| Freeways & Interstates | Provide high speed, high mobility links for long distance trips. |

Figure 4. Functional Class Descriptions

Functional classification is used as a tool for agencies and designers because it indicates expectations about roadway design — specifically, vehicle speed, capacity, and the roadway's relationship to land use development. Federal legislation utilizes functional classification in determining funding eligibility under the Federal-aid program. Functional classification is also typically used by transportation agencies to describe roadway system performance, benchmarks, and goals.

**Functional Classification.** **Figure 4** shows the functional classification of study area routes. Aside from I-65 and the Bluegrass Parkway, routes providing the highest levels of mobility in the area (Arterials) are:

- US 31W
- US 62
- KY 61
- KY 3005

**National Highway System.** The National Highway System (NHS) includes roadways important to the nation's economy, defense, and mobility. Study area NHS routes include:

- I-65
- US 31W
- Martha Layne-Collins Bluegrass Parkway (BG-9002)

**Truck Routes.** In compliance with the Surface Transportation Assistance Act of 1982 (STAA), Kentucky 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. **Figure 5** shows study area truck routes.

Federally designated truck routes include:

- I-65, which is also on the National Freight Network
- US 31W from US 31WB north
- Bluegrass Parkway.

KY 61 is the only designated "state truck route" in the study area. The following are on the Kentucky Freight Network:

- US 31W
- US 62 (between US 31W and I-65)
- KY 61
- KY 3005
- Bluegrass Parkway

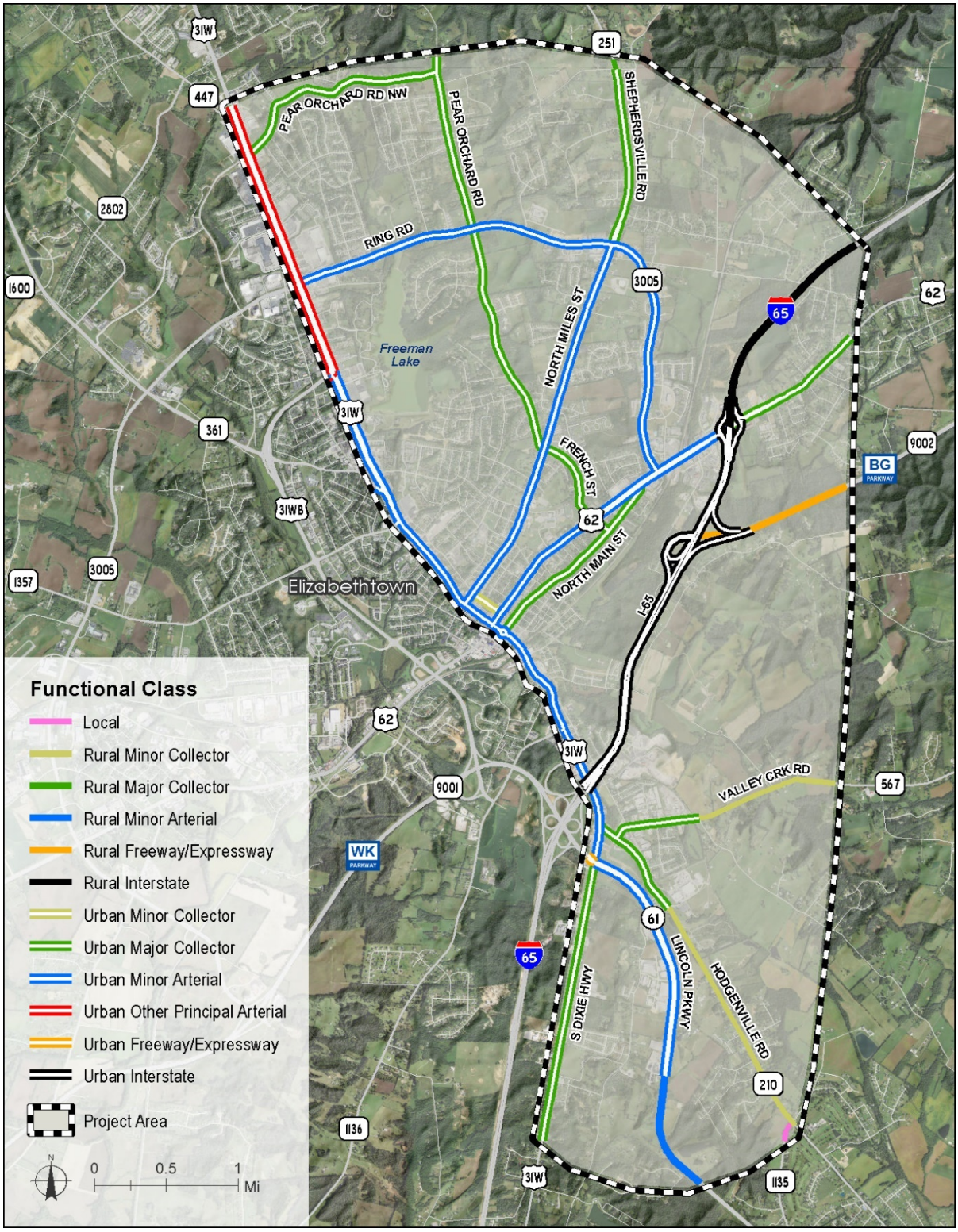



Figure 5. Functional Classification Map

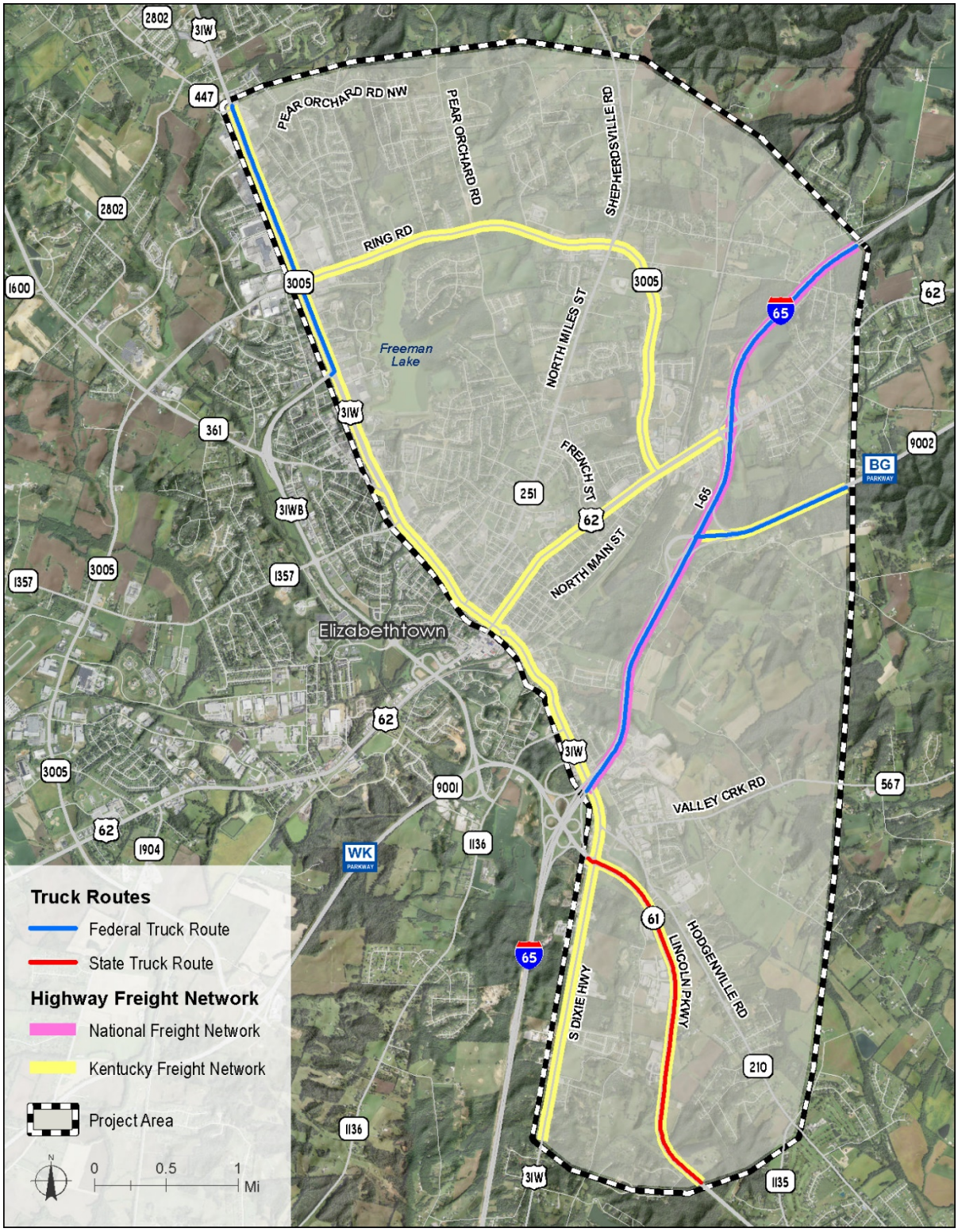



Figure 6. Truck Routes

## 2.2 Roadway Geometric Characteristics

KYTC's HIS database was queried to obtain route geometric characteristics, including speed limits, number of lanes and lane widths, shoulder type and width, and horizontal and vertical curve data. This information was compared with KYTC's 2020 Highway Design Manual (HDM) minimum design recommendations for urban roadways detailed in Exhibit 700-04.[9]

**Speed Limits.** The character and function of roadway segments are influenced by speed limits. As shown in **Figure 6**, study area routes have speed limits ranging from 25 to 70 mph. The highest speed limits are on I-65 and Bluegrass Parkway. Route speeds gradually reduce along routes as they transition from rural to urban with the lowest speed limits on collectors and local routes throughout the city.

**Number of Lanes and Lane Widths.** **Figure 7** indicates the number of lanes and lane widths for routes in the study area. Most study area routes have two lanes except for the Bluegrass Parkway and I-65, and portions of US 31W, US 62, KY 251, and KY 61, all of which have three or more lanes. Per HDM guidelines, urban and local collector routes are recommended to have a minimum of 10-foot-wide lanes with speeds 35 mph or less. KY 1135, Bewley Hollow Road, and a portion of KY 210 are two-lane routes with narrow lanes (9 feet or less).

**Shoulder Types and Widths.** Study routes shoulder type and width are illustrated in **Figure 8.** Most routes have shoulder widths four feet or less, including curbed sections. A small portion of US 62 has narrow (0 to 1 foot) shoulders.

**Medians.** Median widths for study routes is shown in **Figure 9.** Most routes currently do not have medians. The following routes have medians varying in width from 11 to 60 feet: KY 210, KY 251, US 31W, US 62, KY 61, the Bluegrass Parkway, and I-65.

**Horizontal and Vertical Curves.**

KYTC HIS vertical and horizontal curve data were collected and compared to the HDM design recommendations for maximum vertical grades and minimum horizontal curves.

HIS assigns grade levels for horizontal curves based on degree of curvature: ranked from A (most sweeping) to F (sharpest, 28 degrees or greater), as shown in **Table 4**. The 2020 HDM calculates maximum degree of curvature based on geometric factors. HIS grade levels for vertical slopes are based on steepness: rated from A (flattest) to F (steepest, 8.5% or greater), as listed in **Table 5**. Varying by functional class, terrain types, and speed limits, the 2020 HDM recommends maximum vertical grades ranging from 8% to 15% for local routes, 6% to 14% for collectors, and 5% to 13% for arterials.

**Figure 10** shows grade and curve deficiencies within the study area. HIS notes no vertical deficiencies but Class F horizontal curves were noted on US 31W, US 62, and KY 1135.

Table 3. Horizontal Curve Class

| Code | Description (degrees) |
|---|---|
| **A** | 0.0 - 3.4 |
| **B** | 3.5 - 5.4 |
| **C** | 5.5 - 8.4 |
| **D** | 8.5 - 13.9 |
| **E** | 14.0 - 27.9 |
| **F** | 28+ |

Table 4. Vertical Curve Class

| Code | Description (degrees) |
|---|---|
| **A** | 0.0 - 0.4 |
| **B** | 0.5 - 2.4 |
| **C** | 2.5 - 4.4 |
| **D** | 4.5 - 6.4 |
| **E** | 6.5 - 8.4 |
| **F** | 8.5+ |

[9] https://transportation.ky.gov/Organizational-Resources/Policy%20Manuals%20Library/Highway%20Design.pdf

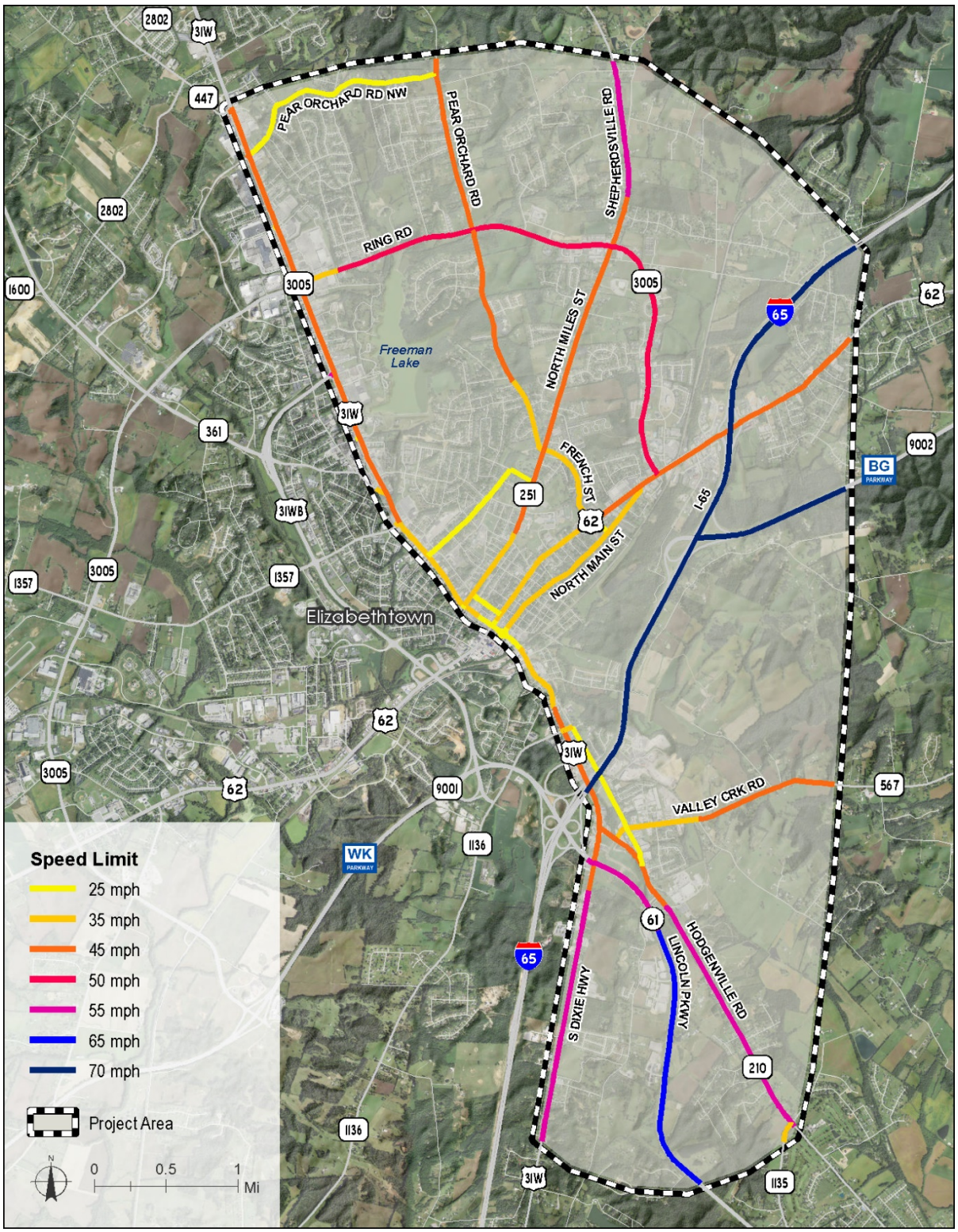



Figure 7. Speed Limits

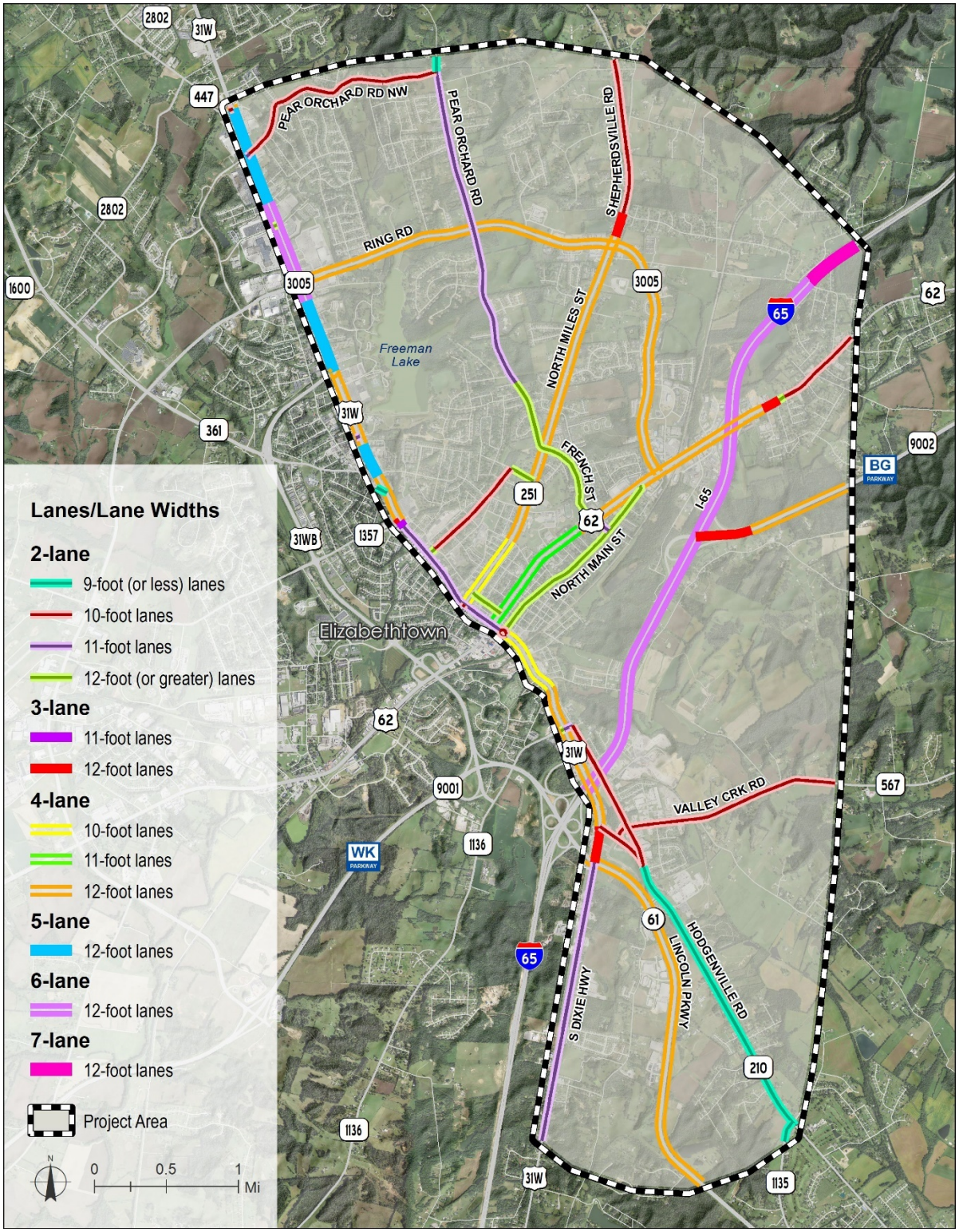



Figure 8. Lane Widths

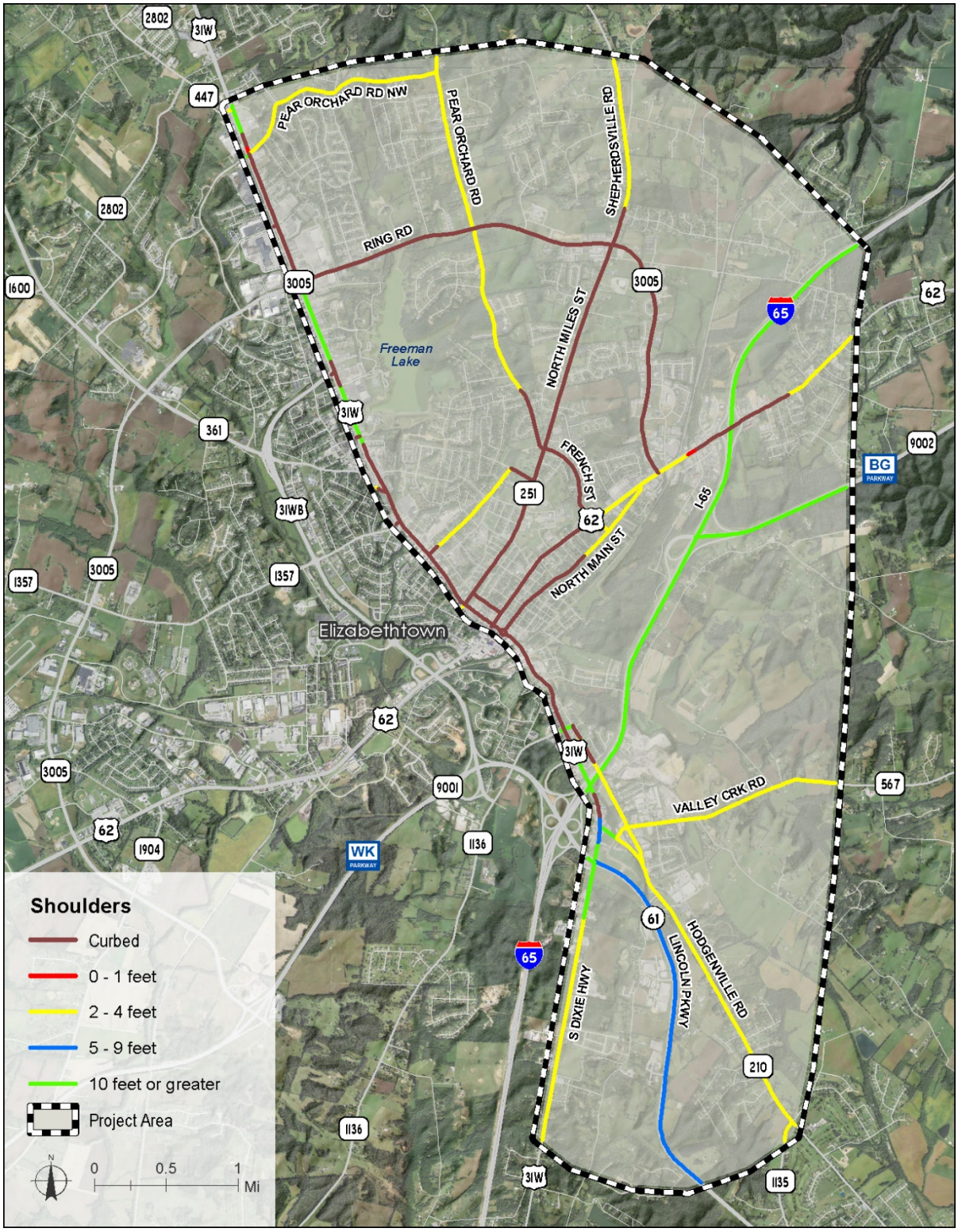



Figure 9. Shoulder Widths

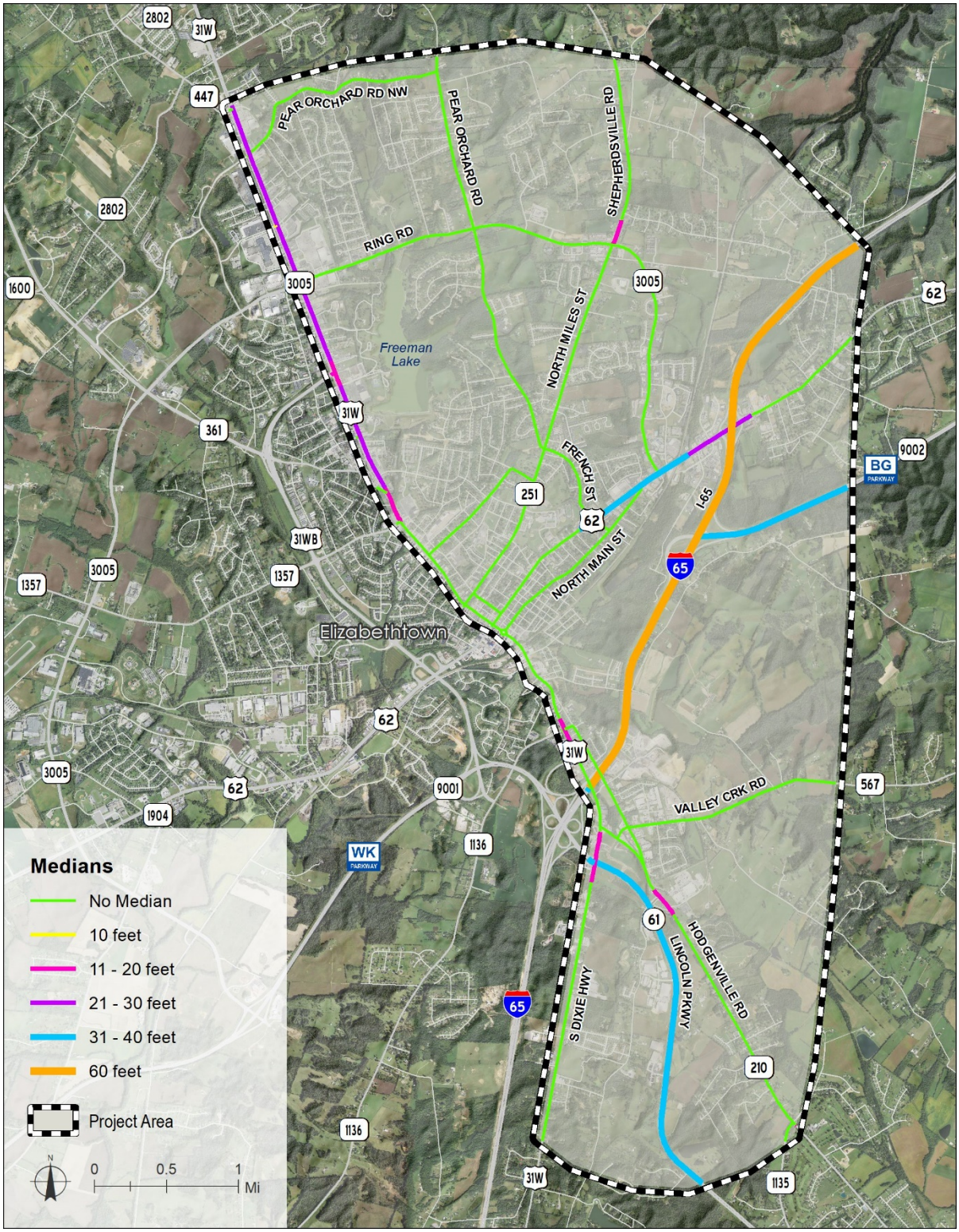



Figure 10. Median Widths

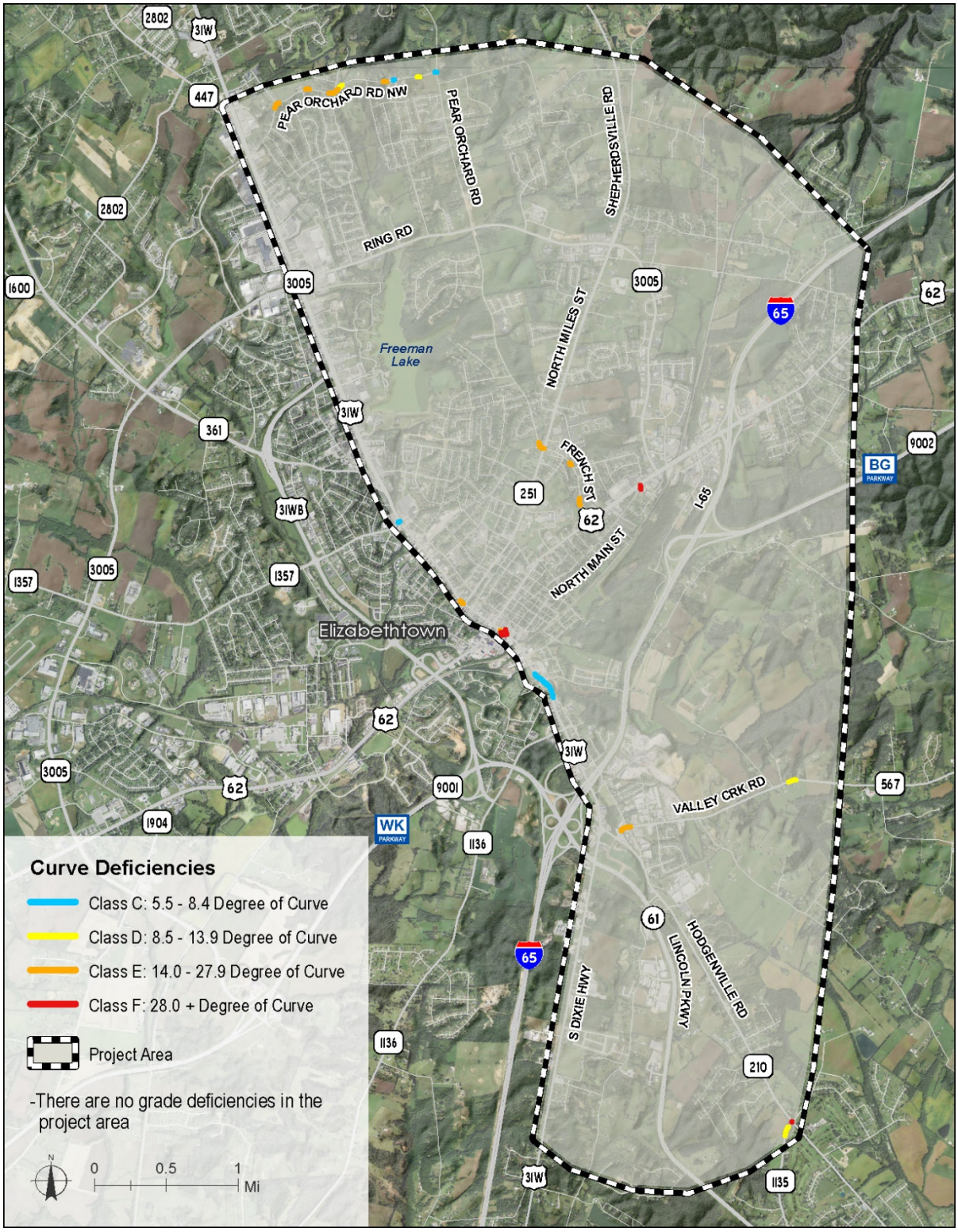



Figure 11. Curve Deficiencies

## 2.3 Bridges

As shown in **Figure 11**, there are 24 bridges in the study area, including 10 in fair condition and 14 in good condition.

The National Bridge Inventory (NBI) condition rating is determined by the lowest rating for the deck, superstructure, substructure, or culvert. The condition ratings are listed in **Table 5**. A bridge is considered structurally deficient if any bridge component (deck, superstructure, substructure, or culvert) is in poor or worse condition.

Table 5. NBI Bridge Condition Rating

| Condition Classification | Condition Rating |
|---|---|
| **Good** | ≥7 |
| **Fair** | 5-6 |
| **Poor** | ≤4 |

Another metric used to evaluate bridge condition is sufficiency rating. It is a method of calculating four separate factors to obtain a numeric value (percentage) that is indicative of bridge sufficiency to remain in service, with 100% sufficient and 0% insufficient or deficient. This value is important for determining Highway Bridge Program federal funding eligibility. A score of **80%** or less is required for federal repair funding, and a score of 50% or less is required for federal replacement funding.[10] Bridge sufficiency ratings are included in **Table 6**, highlighting bridges eligible for federal funding.

- Seven study area bridges meet the **80%** or less sufficiency rating for federal repair funding.
- No study area bridges meet the 50% or less sufficiency rating for federal replacement funding.

[10] https://www.fhwa.dot.gov/indiv/hbrrpeli.cfm

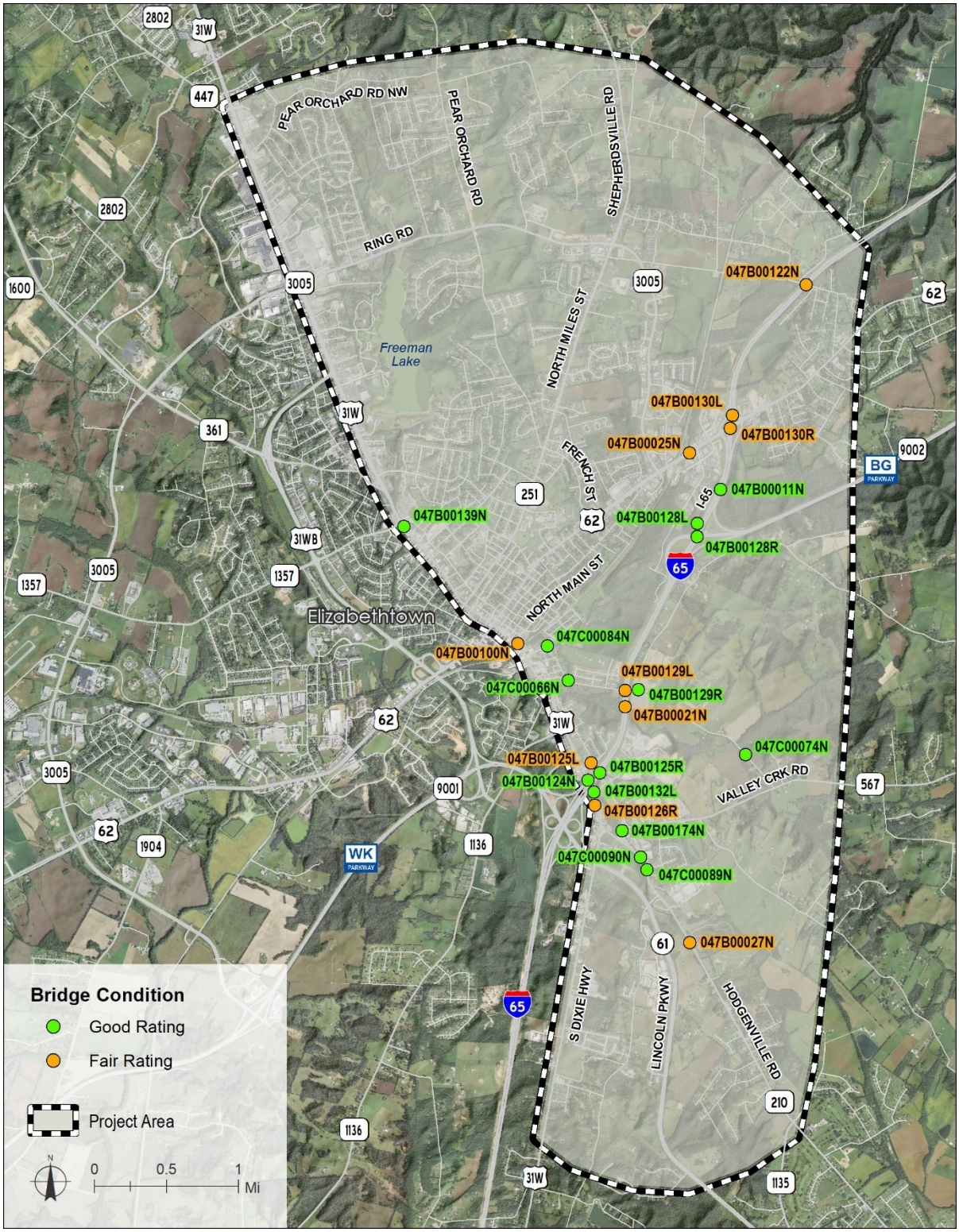



Figure 12. Bridge Condition Ratings

Table 6. Bridge Sufficiency Rating

| Bridge ID Good/Fair Rating | Sufficiency Rating | Inspection Date |
|---|---|---|
| 047B00122N | 94.1 | 11/16/2020 |
| 047B00130R | 93.8 | 11/04/2020 |
| 047B00130L | 93.6 | 11/04/2020 |
| 047B00025N | 51.9 | 11/20/2019 |
| 047B00125L | NA | 11/17/2019 |
| 047B00011N | 76.3 | 11/05/2019 |
| 047B00139N | 75.4 | 11/25/2019 |
| 047B00128R | 91.7 | 11/10/2020 |
| 047B00128L | 81.2 | 11/10/2020 |
| 047B00100N | 65.0 | 11/03/2020 |
| 047C00084N | 63.0 | 05/10/2020 |
| 047C00066N | 100.0 | 05/10/2020 |
| 047B00129R | 91.6 | 11/12/2019 |
| 047B00129L | 89.2 | 11/12/2019 |
| 047B00021N | 74.4 | 11/14/2019 |
| 047C00074N | 97.0 | 05/06/2020 |
| 047B00125R | 91.8 | 11/13/2019 |
| 047B00132L | 83.6 | 11/11/2020 |
| 047B00126R | 91.8 | 07/24/2019 |
| 047B00124N | 85.0 | 11/16/2020 |
| 047B00174N | 79.9 | 11/09/2020 |
| 047C00090N | 97.0 | 05/11/2020 |
| 047C00089N | 94.5 | 05/05/2020 |
| 047B00027N | 81.9 | 11/14/2019 |

## 2.4 Pedestrian and Bicycle Accommodations

FHWA's 2019 *Bicycle and Pedestrian Planning, Program, and Project Development* guidance[11] identifies corresponding federal legislation and reference material. This guidance states that pedestrian and bicycle needs must be given "due consideration" under federal surface transportation law. Pedestrians and bicyclists who have the same origins and destinations are also considered roadway system users (labeled other system users). Thus, improving safety and infrastructure for these modes creates an

[11] Online at https://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/guidance_2019.pdf

integrated, intermodal transportation system, providing safe and convenient access to all types of facilities.

In accordance with federal requirements, KYTC's 2002 *Pedestrian & Bicycle Travel Policy*[12] states KYTC will consider incorporation of pedestrian and bicycle facilities on all new or reconstructed state-maintained roadways. Furthermore, KYTC will consider accommodating bicycle transportation when planning the resurfacing of roadways, including shoulders.

**Pedestrian Facilities.** **Figure 13** shows the existing pedestrian facilities along routes maintained by KYTC in the study area. Aerial imagery was reviewed to identify existing conditions along county and city routes.

Most study routes do not have pedestrian facilities. W Poplar Street is the only study route that is completely lined on both sides by sidewalks. KY 567, US 62, US 31W, Main Street, French Street, N Mantle Avenue, and Pear Orchard Road NW have non-contiguous sidewalks. Main Street is predominantly lined on both side by sidewalk becoming non-contiguous farther from downtown. The sidewalks along Main Street have deteriorated and are not Americans with Disabilities Act (ADA) compliant. The ADA requires public transportation services and facilities for persons with disabilities, including supplemental service in areas where fixed transit service is operated.

**Bicycle Facilities.** As shown in **Figure 13**, there are currently no dedicated bicycle facilities within the study area. The 2016 Radcliff/Elizabethtown Metropolitan Planning Organization *Bicycle Facilities Study* serves as a guide for future bicycle facility improvements. The top three goals developed by the MPO Technical Advisory Committee are:

1. Develop a bicycle system that is integrated into the transportation network and is safe and convenient for all bicyclists.
2. Identify and secure adequate funding for bicycle improvements in the MPO region.
3. Promote, encourage, and support bicycle safety, education, and enforcement programs.

**Trail Facilities.** Elizabethtown is Kentucky's "First Urban Trail Town" due to the efforts of Greenspace Inc.[13] The existing trail network in the study area includes:

- A network leading to and around Freeman Lake Park along Freeman Creek
- A network connecting downtown to the Buffalo Lake area along Buffalo Creek.

Figure 13. Trail Sign

As stated above in Section 1.3.1, The Elizabethtown Tourism & Convention Bureau developed the *Elizabethtown Trail Master Plan* in July 2017. This plan was developed to connect restaurants and hotels near the I-65 Exit 94 to downtown on both the east and west side of the CSX railroad. The west side focuses on existing roadway corridors, and the east side focuses on expanding the Buffalo Lake trail network.

[12] Online at https://transportation.ky.gov/BikeWalk/Pages/Laws-and-Policy.aspx
[13] https://greenspaceky.com/

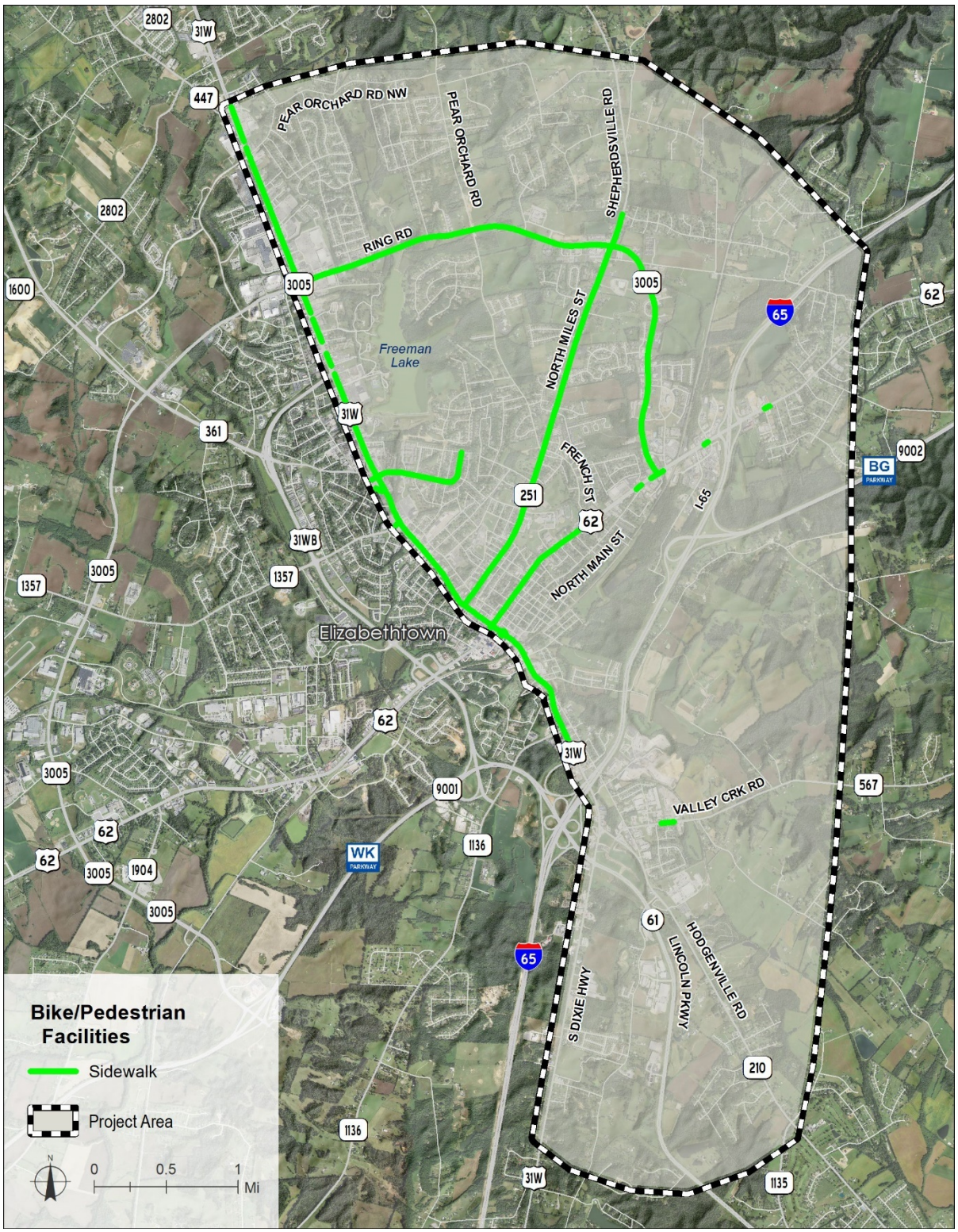



Figure 14. State-Maintained Bike/Pedestrian Facilities

## 2.5 Transit

As shown in **Figure 15**, the Transit Authority of Central Kentucky[14] (TACK) provides vanpools, park-and-ride, and door-to-door non-emergency medical transportation to pre-booked recipients and special needs clients on a scheduled basis in Hardin and Meade counties. As of August 2015, 14 vans were in operation and each is able to carry 13 people. The park-and-ride serivce inlcudes 28-seat buses departing at three times each workday morning at 5:40, 6:10, and 6:40.


Figure 15. TACK Service Area

## 2.6 2020 Traffic Volumes and Operations

### 2.6.1 2020 Traffic Volumes

Historic KYTC traffic volumes for study area roadways were reviewed, including average daily traffic (ADT), truck percentages, K-factors[15], and peak hour directional distributions as available. Most traffic counts were collected from 2016 through 2019, with a few older counts from 2009 through 2011. Segment volumes were calculated for 2020 based on historic trends, adjusting pre-2020 volumes to create a consistent dataset to minimize influence of COVID-19 pandemic observed traffic volumes. Additionally, 12-hour turning movement counts were collected at 11 intersections, classifying vehicles into one of five categories: motorcycles, cars, buses, single unit trucks, and articulated trucks. Pedestrian and bicycle activity was also recorded.

The project team reviewed available data including crash history, existing counts, traffic volume, planned development, and other metrics into account and selected the following intersections for 12-hour turning movements counts:

1. US 62 and I-65 NB Ramps
2. US 62 and I-65 SB Ramps
3. US 62 and Buffalo Creek Drive
4. US 62 and Commerce Drive
5. US 62 and Dolphin Drive
6. US 62 and Ring Road
7. US 62 and Main Street
8. US 62 and US 31W
9. Ring Road and Pear Orchard Road
10. Ring Road and KY 251
11. US 31W and Springfield Road

[14] https://www.tacktransit.org/index.asp
[15] K-factor is defined as the proportion of annual average daily traffic occurring in an hour.

Considering the dedicated turning movement counts and historic traffic trends, pre-2020 volume counts were adjusted accordingly to create a consistent a 2020 traffic dataset to work from. Additional information is available in the *Traffic Forecast Report* in **Appendix A**.

### 2.6.2 Traffic Operations

Traffic operations analyses included two commonly applied highway performance indicators used to describe quality of facility performance: Level of Service (LOS) and volume-to-capacity (v/c) ratios. Computations were performed in concurrence with the *Highway Capacity Manual* (HCM) 6th edition procedures for study route segments.

**Level of Service.** LOS is a qualitative measure 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. As illustrated in **Figure 16**, 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. LOS F represents oversaturated traffic conditions beyond capacity, with low travel speeds, little or no freedom to maneuver, and lengthy delays. LOS D is generally acceptable. 2020 LOS was determined for the worst traffic hour based on design hourly volume (DHV) calculations. **Table 7** lists the LOS information for major roadway segments respectively within the study area based on the analyses completed for this study in 2021. Full capacity analysis reports for these and other smaller roadway segments can be found in **Appendix B**. **Figure 17** shows the last recorded existing LOS values in the area at the beginning of this study. Both the online data and dedicated analysis show the study routes are operating at acceptable LOS A – D, except for a segment along US 31W currently operating near capacity at LOS E. Study routes typical weekday vehicle hours of delay are shown in **Figure 18**. Segments of I-65, US 31W, and KY 3005 experience the highest vehicle hours of delay on a typical weekday. A typical queue at Public Square/US 31W is shown in **Figure 17**.

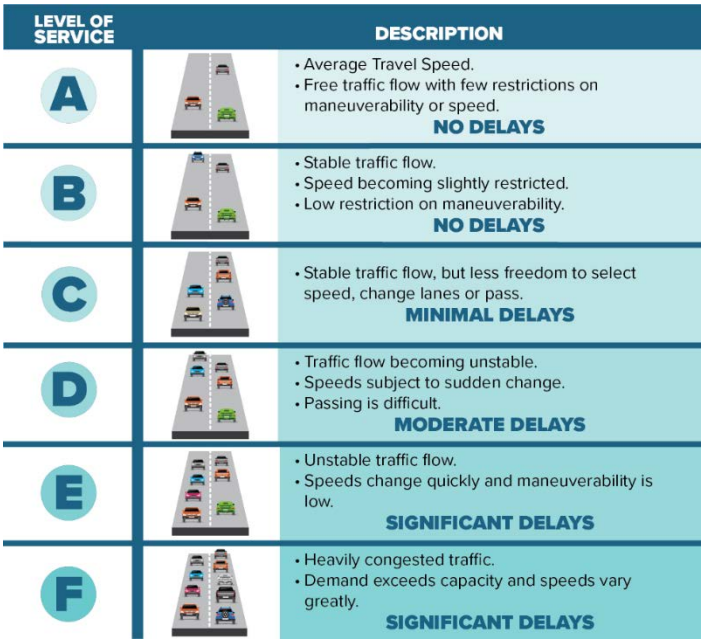


Figure 16. Level of Service (LOS) Descriptions

Figure 17. Queue at Public Square/US 31W

Volume-to-Capacity. Volume-to-capacity (v/c) compares traffic volume using a facility to its theoretical capacity over a specific duration, one hour in this instance. A v/c ratio greater than 1.0 indicates a route has exceeded it theoretical capacity and additional lanes may be justified. Because v/c is measured over an hour period by segment, a roadway or intersection could be congested during peak commuter periods but show a relatively low v/c averaged over a longer duration.

**Table 7** lists the LOS and v/c ratio information for major roadway within the study area based on the analyses completed for this study in 2021. Full analysis reports for these and other smaller roadway segments can be found in **Appendix B**. **Figure 19** shows existing v/c ratios in the study area at the beginning of this study. Based on both results, no routes currently exceed their theoretical capacity; however, segments of I-65 and US 31W have v/c ratios greater than 0.5 — at more than half of their theoretical capacity.

Table 7. Existing Segment Volume-to-Capacity Ratio and Level of Service

| Segment Analysis | | | | |
|---|---|---|---|---|
| **Route** | **Begin MP** | **End MP** | **v/c** | **LOS** |
| **US 62** | 17.763 | 17.965 | 0.36 | C |
| **US 62** | 17.965 | 18.178 | 0.31 | B |
| **US 62** | 18.178 | 18.873 | 0.31 | B |
| **US 62** | 18.873 | 19.391 | 0.31 | B |
| **US 62** | 19.391 | 19.785 | 0.36 | B |
| **US 62** | 19.785 | 20.115 | 0.36 | B |
| **US 62** | 21.006 | 26.896 | 0.11 | A |
| | | | | |
| **US 31W** | 9.530 | 13.255 | 0.13 | B |
| **US 31W** | 13.255 | 14.670 | 0.27 | C |
| **US 31W** | 14.670 | 15.049 | 0.27 | C |
| **US 31W** | 15.049 | 15.461 | 0.16 | A |
| **US 31W** | 15.461 | 15.769 | 0.23 | A |
| **US 31W** | 15.769 | 16.184 | 0.21 | A |
| **US 31W** | 16.184 | 16.649 | 0.21 | B |
| **US 31W** | 16.649 | 16.702 | 0.37 | C |
| **US 31W** | 16.702 | 16.943 | 0.47 | D |

| | | | | |
|---|---|---|---|---|
| **US 31W** | 16.943 | 17.677 | 0.57 | E |
| **US 31W** | 17.677 | 17.889 | 0.59 | E |
| **US 31W** | 17.889 | 18.818 | 0.28 | B |
| **US 31W** | 18.818 | 19.478 | 0.43 | C |
| **US 31W** | 19.478 | 20.432 | 0.32 | B |
| **US 31W** | 20.432 | 20.772 | 0.40 | B |
| **US 31W** | 20.772 | 21.143 | 0.27 | B |
| | | | | |
| **KY 3005** | 5.244 | 6.456 | 0.27 | B |
| **KY 3005** | 6.456 | 6.550 | 0.27 | B |
| **KY 3005** | 6.550 | 7.518 | 0.24 | A |
| **KY 3005** | 7.518 | 7.834 | 0.25 | A |
| **KY 3005** | 7.834 | 8.829 | 0.23 | A |
| **KY 3005** | 8.829 | 10.582 | 0.24 | A |
| | | | | |
| **KY 251** | 0 | 0.765 | 0.12 | A |
| **KY 251** | 0.765 | 1.189 | 0.17 | A |
| **KY 251** | 1.189 | 2.681 | 0.11 | A |
| **KY 251** | 2.681 | 2.747 | 0.26 | C |
| **KY 251** | 2.866 | 3.046 | 0.08 | A |
| **KY 251** | 3.046 | 6.288 | 0.07 | A |
| | | | | |
| **KY 210** | 0 | 0.585 | 0.25 | C |
| **KY 210** | 0.585 | 0.802 | 0.25 | C |
| **KY 210** | 0.802 | 2.469 | 0.25 | C |

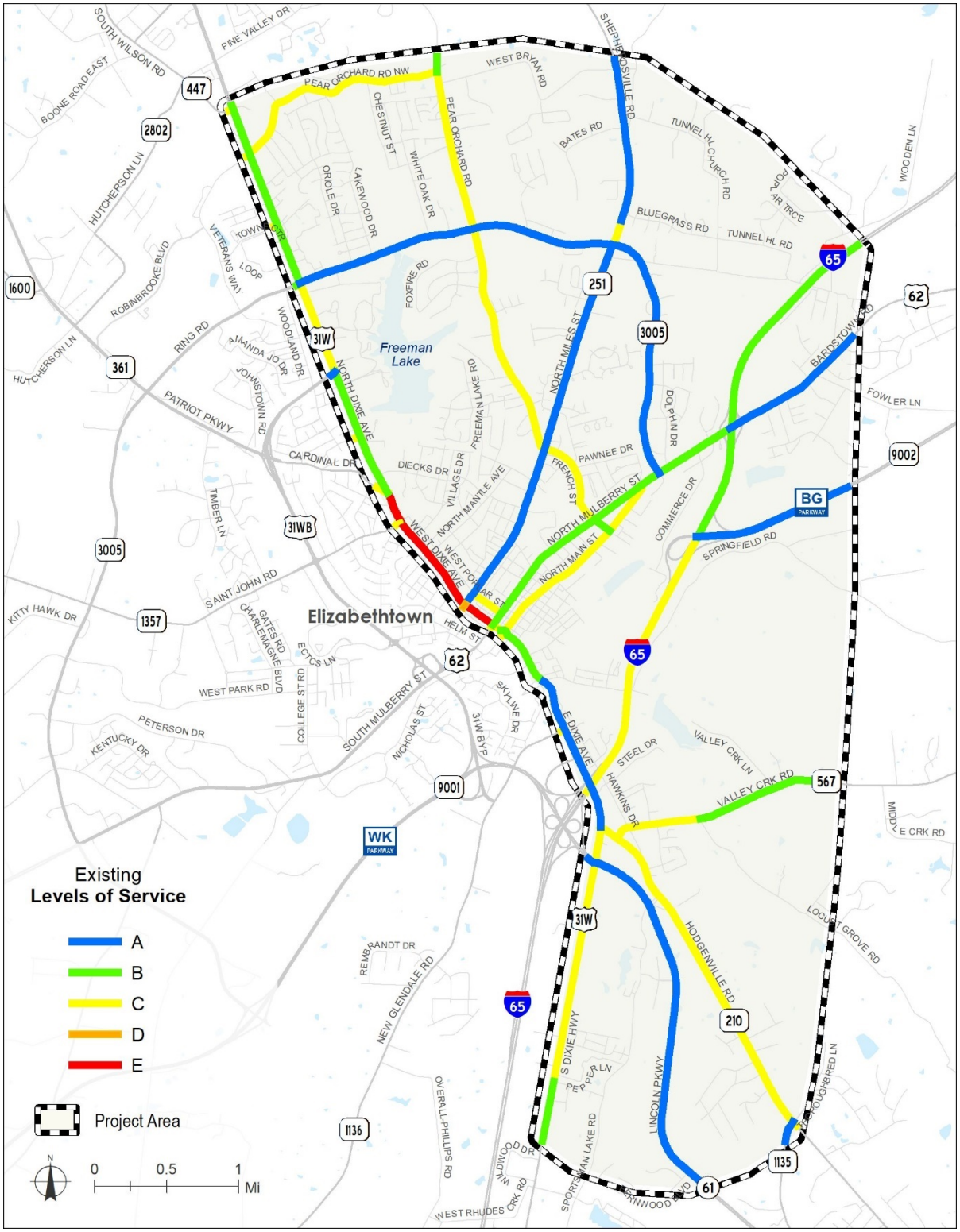



Figure 18. Existing Level of Service (LOS)

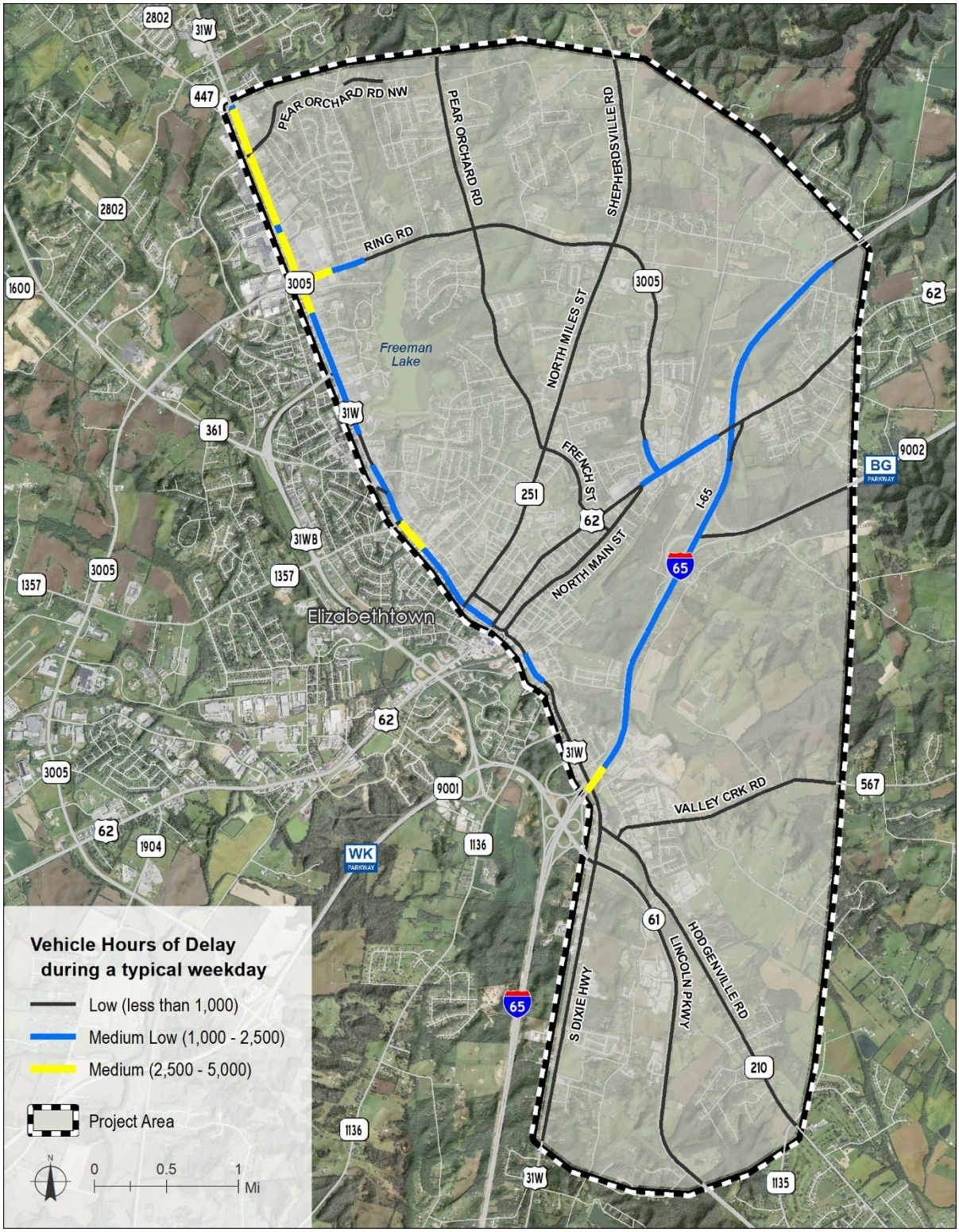



Figure 19. Typical Weekday Vehicles Hours of Delay

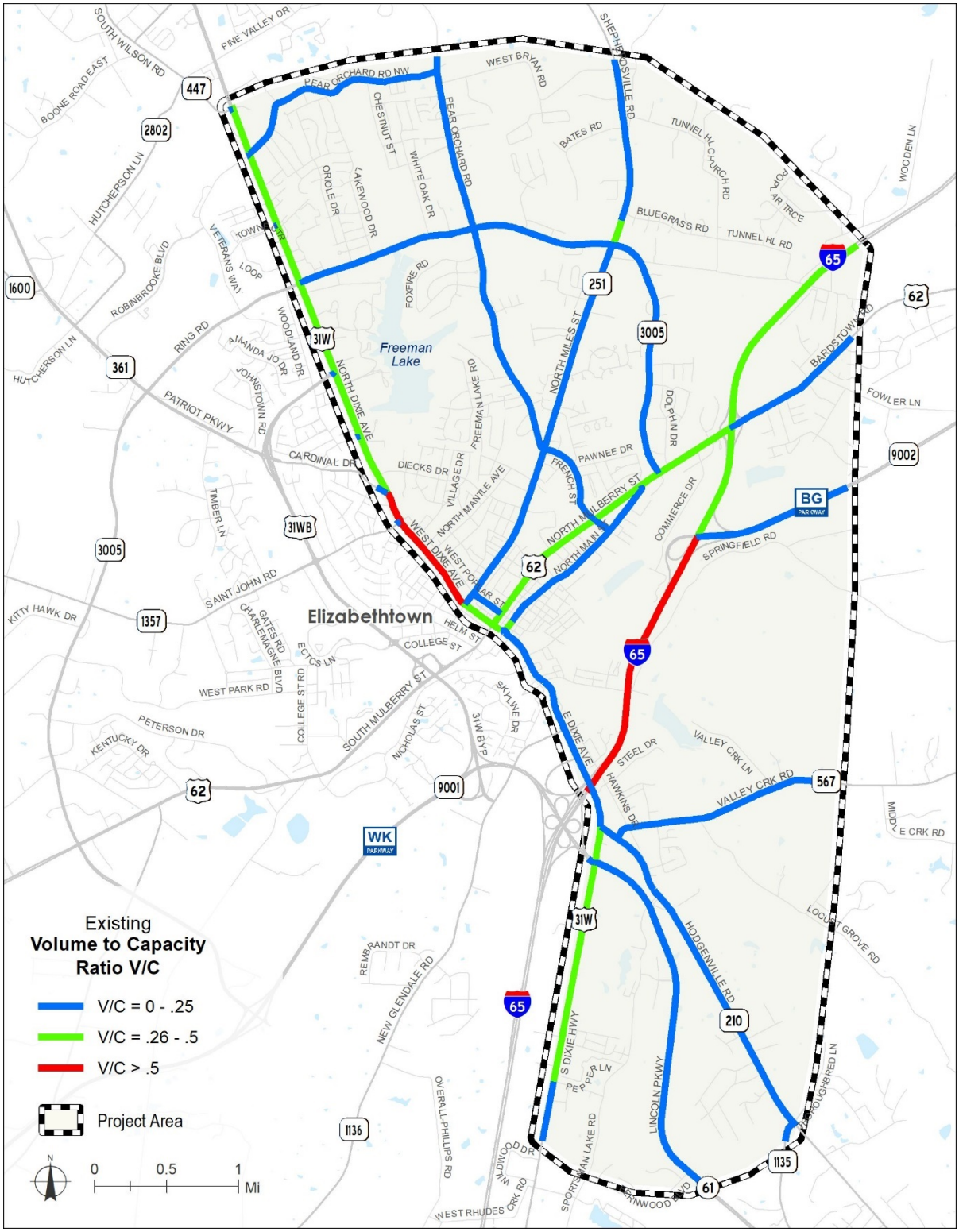



Figure 20. Existing Volume-to-Capacity (v/c)

## 2.7 Crash History and Analyses

### 2.7.1 Crash History

Historical crash data was obtained from the Transportation Enterprise Database (TED) warehouse for study area roadways for a three-year period from January 2017 through December 2019 (**Appendix C**). During the analysis period, a total of 2,952 crashes were reported on study area roadways. **Figure 21** shows the kernel density analysis (heat map) of the crashes on study routes, with red indicating a higher density of crashes and yellow a less dense area of crashes. Crashes were also sorted into three categories by severity — fatality, injury, and property damage only (PDO) — and were mapped by manner of collision in **Figure 22**.

As shown in **Figure 21**, a higher number of crashes are occurring along US 31W from the northwestern study limit to US 62, predominantly concentrated at intersections: US 62 from KY 3005 to the I-65 interchange, and at the KY 61/US 31W/I-65 interchange.

Severity. The historical crash data shows 8 fatal and 373 injury crashes in the project area over the three-year period. The injury crashes occur throughout the study area mostly at major intersections, with over 65% occurring along the largest, most congested roads —US 62, US 31W, and KY 3005.

The fatal crashes were a mixture of single- and multiple-vehicle crashes: 3 fatal crashes occurred in 2017, 4 in 2018, and 1 in 2019. The 3 single-vehicle fatal crashes where collisions with fixed objects and occurred at night or on a curve and grade. Of the 5 multiple-vehicle fatal crashes, 1 was a rear end, 1 was a sideswipe, 2 were angle collisions, and 1 was a head-on collision. The rear-end, fatal crash occurred on I-65S, north of the US 62 interchange. The side-swipe crash was a hit and run on US 31W near KY 210 where a driver hit a pedestrian. The 2 angle collisions occurred when one vehicle involved was entering or exiting a business along US 62 and US 31W. The head-on collision occurred on Bluegrass Parkway near the I-65 interchange. The only location with multiple fatal injury crashes was the stretch of roadway on Bluegrass Parkway near the I-65 interchange, but the crashes were more than a year apart and different in type, time of day, and other characteristics.

Manner of Collision. The historical crash data shows 1,204 rear end crashes, 717 angle crashes, 398 same-direction side-swipe crashes, 351 single-car crashes, 102 opposing left-turn crashes, 90 backing crashes, 41 opposing-direction side-swipe crashes, 29 head-on crashes, 19 rear-to-rear crashes, and 1 crash of unrecorded manner.

Of the 2,952 crashes recorded in the study area, 90 were collisions with a parked vehicle. Of the 717 angle crashes, 17 were collisions with a parked vehicle. Of the 90 backing crashes, 25 were collisions with a parked vehicle. Of the 29 head-on crashes, 7 were collisions with a parked vehicle. Of the 1,204 rear-end crashes, 8 were collisions with a parked vehicle. Of the 19 rear-to-rear crashes, 2 were collisions with a parked vehicle. Of the 41 opposing-direction side-swipe crashes, 9 were collisions with a parked vehicle. Of the 398 same-direction side-swipe crashes, 22 were collisions with a parked vehicle.

**Bicycles/ Pedestrians.** Of the 2,952 crashes recorded, 18 were crashes involving pedestrians, 1 crash was the fatality detailed above, and the other 17 were single-vehicle crashes — 14 resulting in varying degrees of injuries. All but 3 of these crashes occurred on straight, level stretches of road, and over 50% of these crashes occurred at various locations along two busy corridors within the study area – US 62 and US 31W.

In addition to the crashes involving pedestrians, 5 crashes with bicyclists were recorded. All were single vehicle crashes — 2 resulting in injury. Only 1 crash was after dusk during poor weather conditions. Two crashes occurred on US 31W and 2 occurred on KY 251. All crashes involving bicyclist and pedestrians can be seen in **Figure 20**.

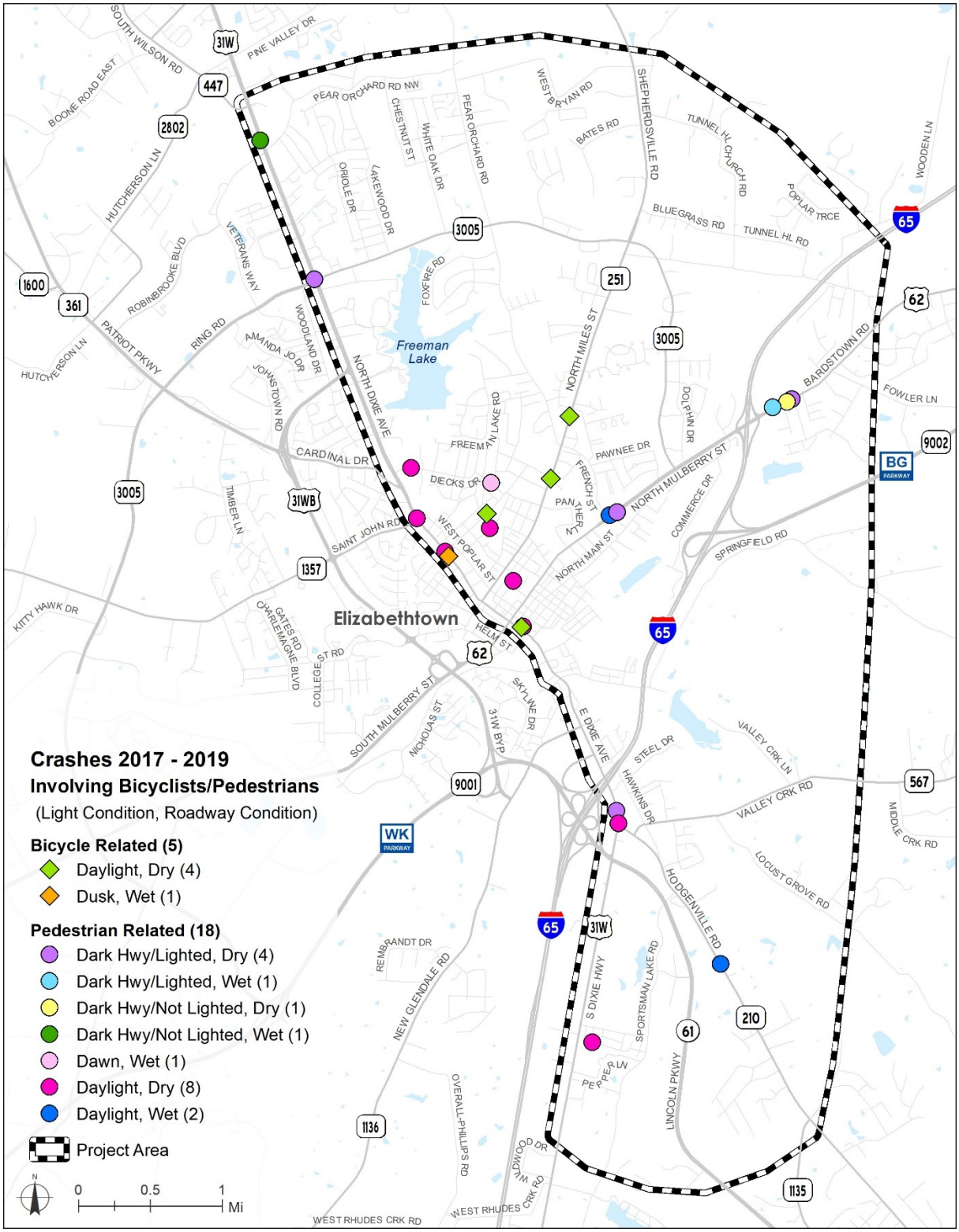



Figure 21. Crashes Involving Bicycles/ Pedestrians 2017 – 2019

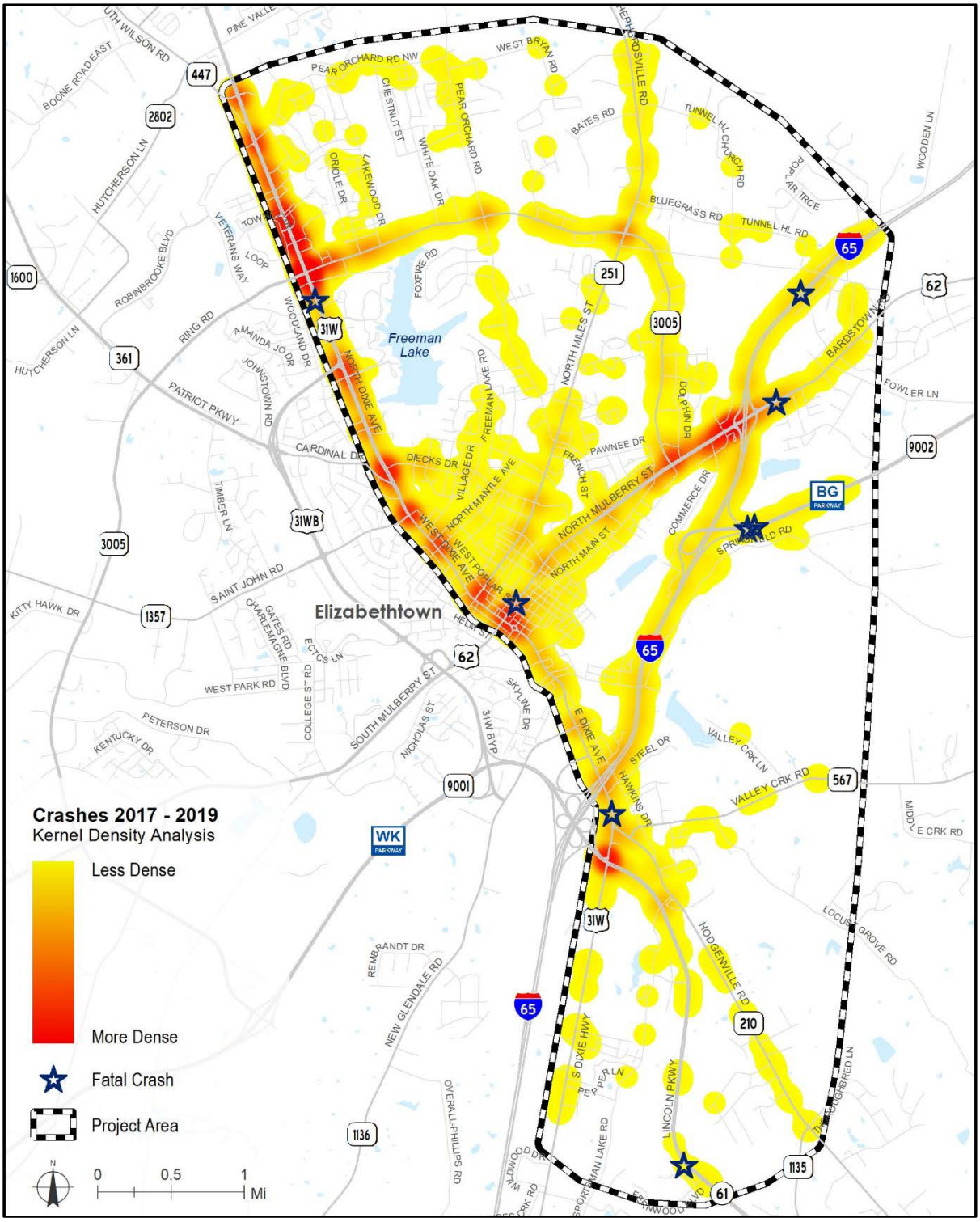



Figure 22. Crashes 2017 – 2019

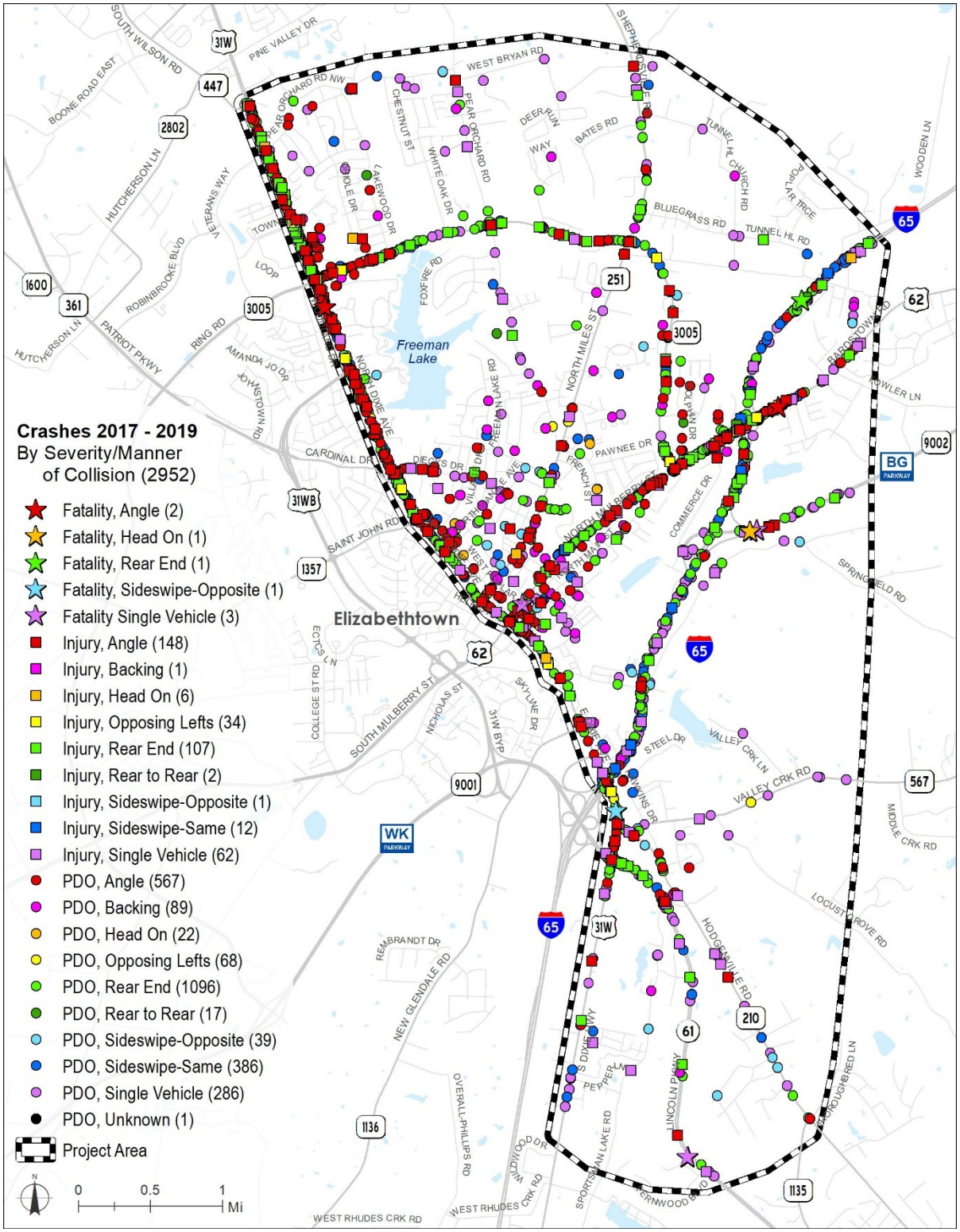



Figure 23. Crashes (2017 – 2019) by Severity and Manner of Collision

### 2.7.2 Statistical Crash Analyses

To compare existing crash rates with crash rates of similar types of facilities throughout Kentucky, two types of statistical crash analyses were performed on study area routes: *Critical Crash Rate Factor* (CCRF) and *Excess Expected Crashes* (EEC).

**Critical Crash Rate Factor.** Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above-average crash rates. The Critical Crash Rate methodology used by the KYTC is defined in the Kentucky Transportation Center (KTC) research report *Analysis of Traffic Crash Data in Kentucky (2014 – 2018).*[16] The report defines two analysis types performed on study routes: "segments" and "spots."

- Segments vary in length and are divided along roadways as geometry or traffic volumes change.
- Spots are identified by analyzing 0.1-mile-long sections for concentrated crash areas.

The crash numbers, traffic volumes, roadway type, lane numbers, and segment length were used to determine the CCRF for each roadway segment and spot. CCRF is one measure of roadway safety, expressed as a ratio of the crash rate at a given location compared to statewide crash rates for similar roadways. A crash reduction factor (CRF) greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. This procedure is a screening technique identifying locations where further analysis may be needed; it is neither a definitive statement nor measurement of a crash problem.

CCRF analyses were completed for the three major interior corridors in the study area: US 62, KY 3005 (Ring Road), KY 251. The analysis included 4 segments and 24 spots on US 62, 4 segments and 41 spots on KY 3005, and 5 segments and 39 spots on KY 25. The analysis identified 4 segments and 13 spots with a CRF greater than 1.0. These segments and spots are listed in **Table 8** and **Table 9,** respectively, and are illustrated on **Figure 23**.

Table 8. High CRF Segments

| | | | | Crashes | | | | |
|---|---|---|---|---|---|---|---|---|
| **Route** | **Begin Mile point** | **End Mile point** | **ADT** | **Total** | **Fatal** | **Injury** | **PDO** | **CRF** |
| **US 62** | 19.391 | 20.115 | 24650 | 179 | 0 | 23 | 156 | 1.57 |
| **US 62** | 20.115 | 20.300 | 8918 | 24 | 0 | 2 | 22 | 1.49 |
| **KY 3005** | 6.550 | 7.518 | 21129 | 147 | 0 | 14 | 133 | 1.14 |
| **KY 251** | 0.000 | 0.765 | 7849 | 66 | 0 | 10 | 56 | 1.17 |

[16] Online at https://uknowledge.uky.edu/ktc_researchreports/1645/

Table 9: High CRF Spots

| Route | Begin Milepoint | End Milepoint | ADT | Crashes | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Total | Fatal | Injury | PDO | CRF |
| **US 62** | 17.90 | 18.00 | 12319 | 17 | 0 | 2 | 15 | 1.07 |
| **US 62** | 18.00 | 18.10 | 12319 | 19 | 0 | 4 | 15 | 1.19 |
| **US 62** | 18.90 | 19.00 | 16300 | 18 | 0 | 3 | 15 | 1.12 |
| **US 62** | 19.50 | 19.60 | 24650 | 23 | 0 | 3 | 20 | 1.05 |
| **US 62** | 19.80 | 19.90 | 24650 | 27 | 0 | 6 | 21 | 1.23 |
| **US 62** | 19.90 | 20.00 | 24650 | 49 | 0 | 6 | 43 | 2.23 |
| **US 62** | 20.00 | 20.10 | 24650 | 30 | 0 | 3 | 27 | 1.36 |
| **US 62** | 20.20 | 20.30 | 8918 | 11 | 0 | 0 | 11 | 1.05 |
| **KY 3005** | 6.55 | 6.65 | 21129 | 55 | 0 | 2 | 53 | 2.81 |
| **KY 3005** | 6.65 | 6.75 | 21129 | 29 | 0 | 1 | 28 | 1.48 |
| **KY 3005** | 8.75 | 8.85 | 18930 | 22 | 0 | 0 | 22 | 1.22 |
| **KY 251** | 0.00 | 0.10 | 7849 | 29 | 0 | 6 | 23 | 2.52 |
| **KY 251** | 0.50 | 0.60 | 7849 | 13 | 0 | 2 | 11 | 1.13 |

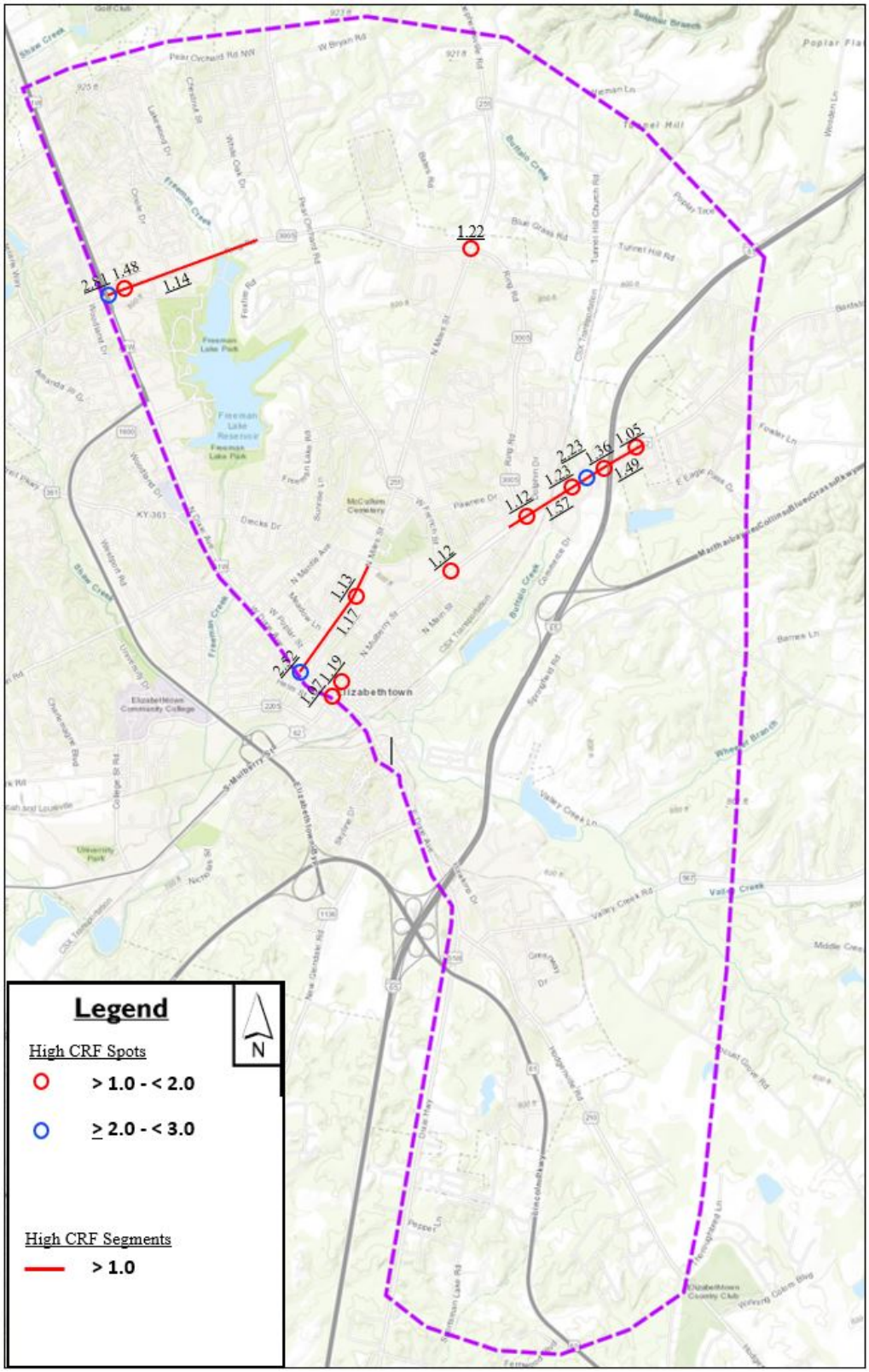



Figure 24. High CRF

## Excess Expected Crashes.

KYTC and the KTC developed a more refined statistical methodology based on the *Highway Safety Manual* (HSM) to evaluate safety needs of projects, including those in the 2020 SHIFT[17] process. EEC is based on a crash prediction model estimating the number of crashes expected on an average roadway segment of a given type and length. It represents the number of excess crashes a segment is experiencing compared to other roadways of its type, adjusting for traffic volumes and a statistical correction. EEC is positive when more crashes are occurring than expected and negative when fewer crashes are occurring than expected.

EECs are then grouped into one of four categories, identified as the Level of Service of Safety (LOSS). Summarized graphically in **Figure 24** LOSS categories I and II represent sites with fewer than anticipated crashes, up to category IV, which has more than 1.5 standard deviations more crashes than expected. Because LOSS-IV sites experience such elevated crash rates, there is a higher probability that safety countermeasures at these locations will result in larger improvements. Error! Reference source not found. describes the crash reduction potential per LOSS category.

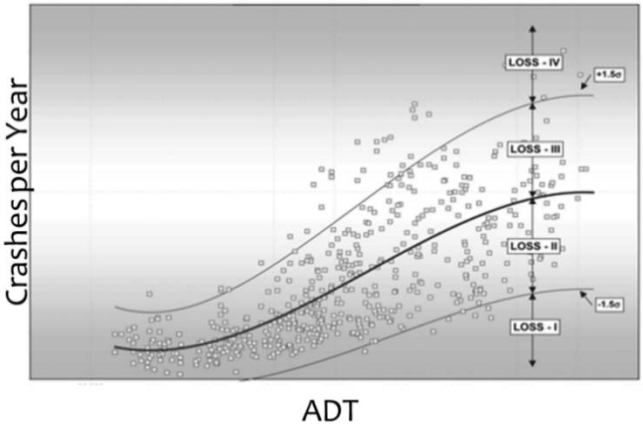
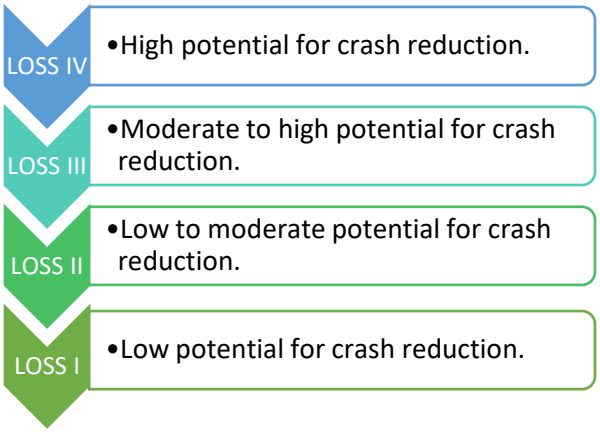



Figure 25. Level of Service of Safety




\LOSS categories are mapped by crash severity. **Figure 25** shows non-severe (i.e., possible injury and PDO) and **Figure 26** shows severe (i.e., fatal and apparent injury) crash types. Considering severe crashes, the highest site EECs are listed in **Table 10**. In these areas there is a higher probability that severe crashes would be reduced should safety countermeasures be implemented. Intersections

[17] SHIFT, or the Strategic Highway Investment Formula for Tomorrow is a data-driven project scoring process to compare and prioritize capital improvement projects to make better use of the limited transportation funds in the biennial budget.

with the highest probability to reduce severe crashes are summarized in **Table 11.**

Table 10. High and Medium-High Severe Crash Sites Exceeding Expected Crash Frequencies

| Road Class | Route | Begin MP | End MP | Exceeding Expected Crash Frequencies KAB Rating |
|---|---|---|---|---|
| Urban Multilane Undivided | US 62 | 20.287 | 20.379 | Medium-High |
| Urban Multilane Undivided | KY 3005 | 6.756 | 6.795 | Medium-High |
| Urban Multilane Divided | KY 61 | 4.843 | 5.290 | **High** |
| Urban Multilane Divided | US 62 | 19.875 | 19.958 | Medium-High |
| Urban Multilane Divided | US 31W | 20.451 | 20.495 | Medium-High |
| Urban Multilane Divided | US 62 | 19.018 | 19.372 | Medium-High |
| Urban Multilane Divided | US 31W | 18.415 | 18.581 | **High** |
| Urban Multilane Divided | US 31W | 20.601 | 20.753 | Medium-High |
| Urban Multilane Divided | US 31W | 18.051 | 18.275 | Medium-High |
| Urban Multilane Divided | US 31W | 18.619 | 18.702 | Medium-High |
| Urban Two-Lane | CS-1390 | 0.171 | 0.201 | Medium-High |
| Urban Two-Lane | CS-1327 | 1.044 | 1.201 | **High** |
| Urban Two-Lane | US 31W | 17.393 | 17.42 | Medium-High |
| Rural Interstate/Parkway | BG-9002 | 0.414 | 1.414 | Medium-High |
| Rural Interstate/Parkway | BG-9002 | 0.000 | 0.376 | Medium-High |
| Rural Multilane Divided | KY 61 | 2.883 | 3.572 | Medium-High |
| Rural Two-Lane | KY 210 | 2.405 | 2.450 | **High** |
| Rural Two-Lane | KY 210 | 1.827 | 1.883 | **High** |
| Rural Two-Lane | KY 210 | 1.169 | 1.283 | Medium-High |

Table 11. High Severe Crash Intersections Exceeding Expected Crash Frequencies

| Main Route | Main Route MP | Intersecting Route | Intersecting Route MP | Exceeding Expected Crash Frequencies KAB Rating |
|---|---|---|---|---|
| **KY 251** | 0.092 | CS-1068 | 0.335 | **High** |
| **KY 251** | 0.54 | CS-1030 | 0.327 | **High** |
| **KY 251** | 1.189 | CS-1390 | 0 | **High** |
| **US 31W** | 15.278 | CS-1471 | 0 | **High** |
| **US 31W** | 15.769 | KY 1136 | 10.655 | **High** |
| **US 31W** | 18.032 | CS-1061 | 0 | **High** |
| **US 62** | 18.06 | CS-1068 | 0.095 | **High** |
| **US 62** | 18.442 | CS-1030 | 0.075 | **High** |
| **US 31W** | 18.721 | CS-1148 | 0.014 | **High** |
| **US 31W** | 19.121 | CS-1207 | 0.015 | **High** |
| **US 62** | 19.62 | CS-1430 | 0.013 | **High** |
| **US 62** | 19.977 | CS-1410 | 0 | **High** |
| **US 31W** | 20.141 | CS-1285 | 0.013 | **High** |

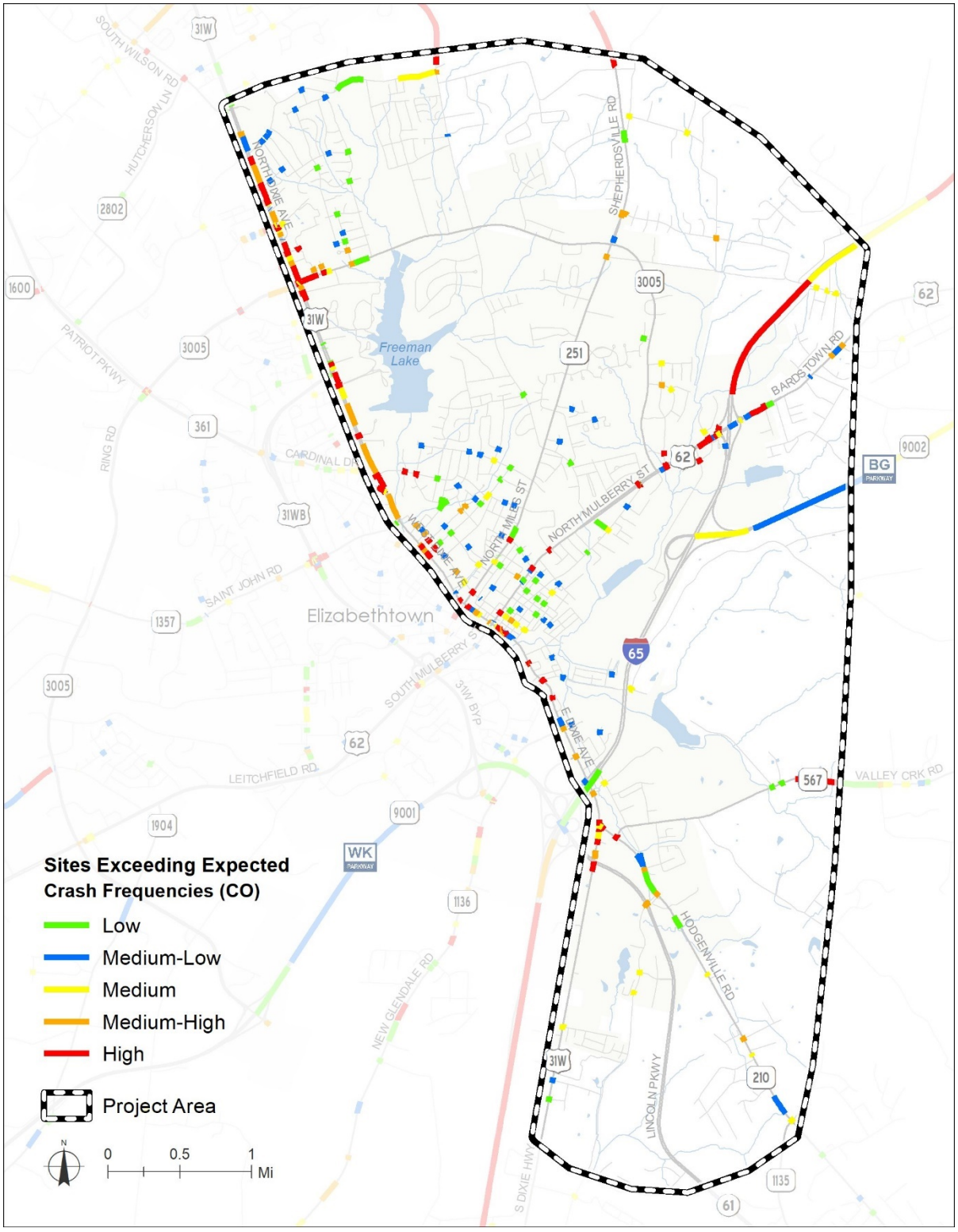



Figure 26. Sites Exceeding Expected Crash Frequencies (CO)

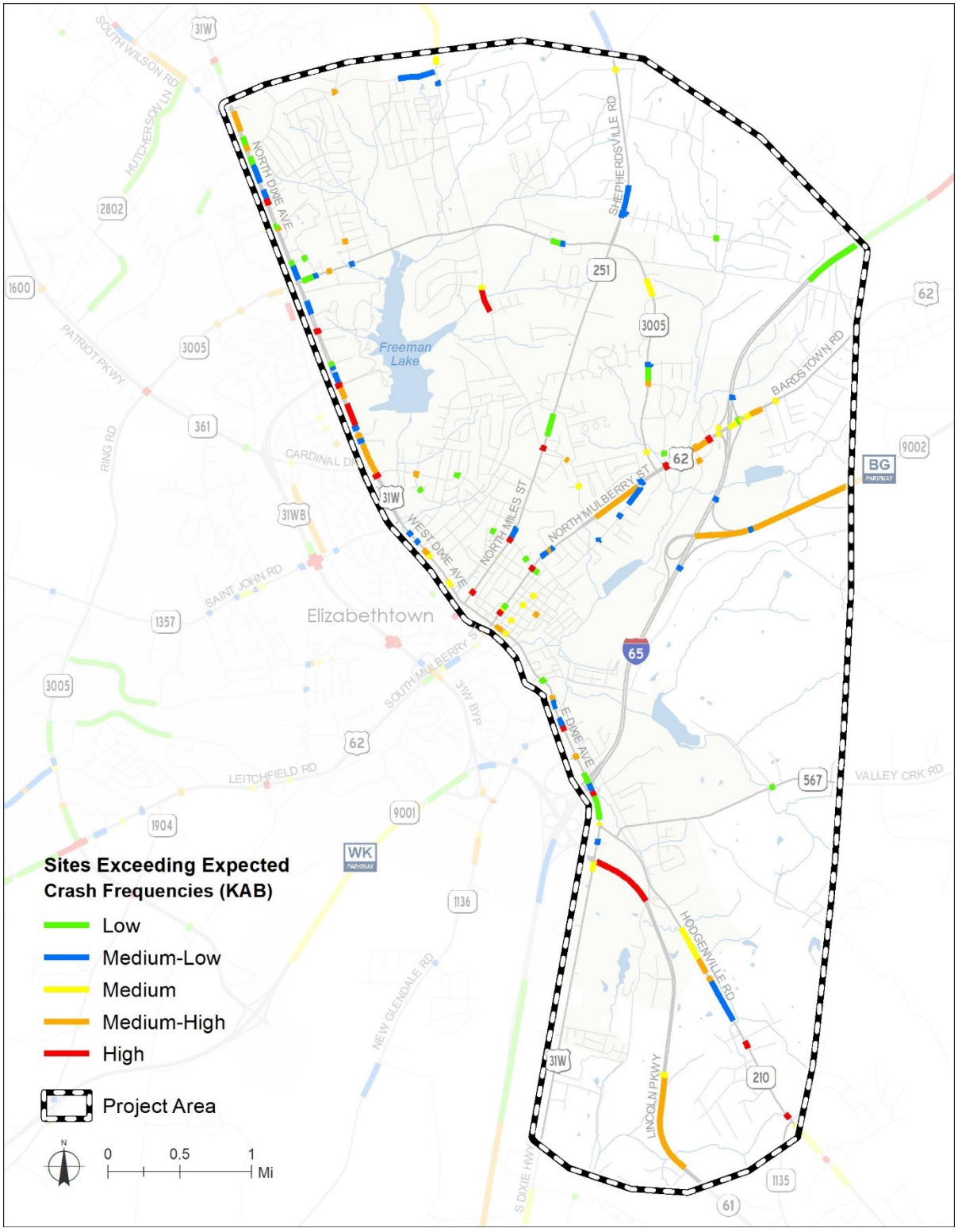



Figure 27. Sites Exceeding Expected Crash Frequencies (KAB)

# 3.0 ENVIRONMENTAL

An environmental overview was prepared to identify and document environmental resources, including potential jurisdictional features and other resources that warrant consideration during the development of potential transportation improvements. Due to the large study area, general, countywide areas of concern were identified rather than site-specific resources. A desktop analysis and windshield survey were completed. Readily available databases were reviewed to identify and quantify environmental resources ("red flags") within the study area. Resources are mapped and briefly described in the following sections. Environmental Resources that warrant further considerations are summarized in **Table 12**. The full report is available in **Appendix D**.

Table 12. Environmental Resources "Red Flags"

| Feature/Source | | Identified | Comments |
|---|---|---|---|
| Water Resources | Floodplains | Yes | Mapped 100-year floodplains are along Freeman Creek, Buffalo Creek, and Valley Creek, and along many tributaries to these streams. |
| | Streams | Yes | 5 major streams were identified within the study area: Valley Creek, Freeman Creek, Buffalo Creek, Rhudes Creek, and Wheeler Branch (a tributary to Valley Creek). Numerous unnamed tributaries are associated with these streams. The study area is located within five (5) HUC-12 watersheds: 051100011002, 051100011003, 051100011004, 051401021301, and 051401030601. |
| | NWI Wetland Features | Yes | National Wetland Inventory mapping identifies 89 features including impounded portions of Freeman Creek (Freeman Lake), Buffalo Creek (Buffalo Lake), an unnamed lake in Valley Creek, and in a tributary to Buffalo Creek. Other NWI features include ponds and forested, scrub shrub, emergent, and aquatic bed wetlands. |
| | Water Wells (KGS) | Yes | 65 water wells were identified by the Kentucky Geological Survey as being within the study area. |
| | Groundwater Wells (KDOW) | Yes | 334 groundwater wells were identified by the Kentucky Division of Water as being within the study area. |
| | Wellhead Protection Areas | Yes | The KDOW reported most of the study area is within a Zone 1 Well Head Protection Area. |
| | Springs | Yes | 5 springs were identified within the study area. |
| | 303(d)/305(b) Listed Streams | Yes | No 303(d) impaired waters were listed within the study area. One stream, Valley Creek (MP 10.8 to MP 12.6), is listed as a 305(b) impaired water. |
| | Special Waters[1] | No | No Coldwater Aquatic Habitats, Outstanding State/National Resource Waters, Exceptional Waters, State Wild Rivers, or Federally Designated Wild / Scenic Rivers were identified within the study area. |
| Threatened and Endangered Species Habitat | USFWS IPaC (T&E) Species | Yes | The US Fish and Wildlife Service lists 4 threatened and endangered (T&E) species to be considered as part of the effect analysis for the project: gray bat (Myotis grisescens), Indiana bat (Myotis sodalis), northern long-eared bat (Myotis septentrionalis), and snuffbox mussel (Epioblasma triquetra). The rattlesnake-master borer moth (Papaipema eryngii) is listed as a candidate species. No critical habitat was identified. |
| | OKNP Records | Yes | The Office of Kentucky Nature Preserves reports 13 occurrences of endangered, threatened, or special concern plants and animals monitored by their office within 1 mile of the study area. |
| | KDFWR Records | Yes | The Kentucky Department of Fish and Wildlife Resources reports that three federally listed species are known to occur within 10 miles of the study area: Indiana bat (Myotis sodalis), gray bat (Myotis grisescens), and northern long-eared bat (Myotis septentrionalis). An additional 18 state-listed species were identified within 1 mile of the study area. |
| | KDOW Records | Yes | The KDOW reports that the HUC8 (HUC8 05110001) watershed, which encompasses most of the study area, is identified by the KDFWR as a conservation |

| Feature/Source | | Identified | Comments |
|---|---|---|---|
| | | | area for aquatic, crayfish, and mussel species, and is identified as a priority conservation area for mussel species of greatest conservation need. |
| | KSS Records | Yes | The Kentucky Speleological Survey reports two 2 caves within three 3 miles of the study area. |
| | Forests | Yes | Approximately 1,813 acres of forested habitat (Indiana and northern long-eared bat summer roost habitat) is visible on aerial imagery within the study area. |
| | Quarries/Mine Adits (Geologic Quadrangle) | No | 1 quarry was identified on mapping, but field reconnaissance found no quarry in the reported location. No mine adits were identified. |
| | Karst, e.g. Sinkholes | Yes | The study area includes 35 mapped sinkholes which may provide bat habitat. Field reconnaissance indicates the many of these sinkholes do not have openings suitable for bats. |
| | Permitted Mine Boundaries | No | No permitted mine boundaries were identified within or within ½ mile of the study area. |
| | Mined-Out Areas | No | No mined-out areas were identified within or within ½ mile of the study area. |
| Hazardous Materials | Oil and Gas Wells | Yes | 2 oil or gas wells were identified within the study area. |
| | USTs/HazMat Sites | Yes | 354 underground storage tank and hazardous materials sites identified by Environmental Data Resources as located within or in proximity to the study area were determined to represent potential underground storage tank and/or hazardous material concerns. |
| Community Resources | Air Quality | No | Hardin County is in the North Central Kentucky Intrastate Air Quality Control Region, which is in attainment for all 6 pollutants included in the National Ambient Air Quality Standards (NAAQS). |
| | Sensitive Noise Receptors | Yes | Numerous Activity Category B, C, D, and E sensitive noise receptors as defined by FHWA were identified within the study area. |
| | Prime/Statewide Important Farmland | Yes | The rural portion of the study area contains scattered areas of Prime and Statewide Important Farmland. |
| | Local Parks | Yes | Several local parks were identified within the study area, including Freeman Lake Park, Elizabethtown Nature Park, Elizabethtown City Park, Haycraft Neighborhood Park, American Legion Park/Water Park. |
| | Public Hunting Areas | No | No public hunting areas were identified within the study area. |
| | Wildlife Management Areas | No | No Wildlife Management Areas were identified within the study area. |
| | State/National Parks | No | No state or national parks were identified within the study area. |
| | LWCF (f) Outdoor Recreation Areas[2] | Yes | Freeman Lake Park and American Legion Park were identified as having received Land and Water Conservation Fund grants, which classifies them as 6(f) outdoor recreation areas. |
| | Area/Point Landmarks | Yes | Landmarks are mapped. |
| | US Military Installations | No | No US Military Installations were identified within the study area. |
| Socioeconomic | Low Income[3] and Minority Populations[4] based on Census Tract | Yes | The study area is comprised of 7 census tracts (CTs). CTs 11, 12, and 14.02 are entirely within the study area, and a portion of CTs 10.01, 10.02, 15, and 16 are within the study area. Low-income and minority populations are present. |

[1] Special Waters are defined as Cold Water Aquatic Habitats, Outstanding State/National Resource Waters, Exceptional Waters, State Wild Rivers, and Federal Wild/Scenic Rivers.

[2] Section 6(f) of the Land and Water Conservation Fund Act (LWCFA) shall be addressed when transportation projects result in permanent conversion of outdoor recreation property that was acquired or developed using LWCFA grant assistance. Conversion of LWCFA property is defined as a change in use to one other than outdoor recreation. In Kentucky, LWCFA coordination is administered by the Department for Local Government (DLG).

[3] Tracts are considered low income if the poverty rate is at least 20 percent, or the median family income does not exceed 80 percent of statewide median family income or, if in a metropolitan area, the great of 80 percent statewide median family income.

[4] Values were calculated using data extracted from US Census Bureau, 2014-2018 American Fact Finder 5-Year Estimates and U.S. Census Quick Facts.

If there is a federal nexus (federal funds, lands, permits, etc.) on a future project, then the procedures established from the National Environmental Policy Act (NEPA) must be followed. NEPA requires to the fullest practicable extent, policies, regulations, and laws of the Federal Government be

interpreted and administered in accordance with its environmental protection goals. It requires an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. The potential environmental impacts and need for safe and efficient transportation must be considered to reach a decision that is in the best overall public interest.

## 3.1 Natural Environment

The natural environmental includes all living and non-living things occurring naturally (not artificial or human-built). This includes aquatic ecology, such as rivers, streams, and wetlands; threatened and endangered species; farmlands; and geotechnical resources. The identified resources are discussed in the following sections.

### 3.1.1 Water Resources

Water resources for the study area are shown in **Figure 27**. The study area contains reaches of Valley Creek, Freeman Creek, Buffalo Creek, Rhudes Creek, and tributaries to these streams, including Wheeler Branch, a tributary to Valley Creek. National Wetland Inventory (NWI) mapping identifies 89 features, including impounded portions of Freeman Creek (Freeman Lake), Buffalo Creek (Buffalo Lake), and an unnamed lake in Valley Creek and in a tributary to Buffalo Creek. Other NWI features include ponds and forested, scrub shrub, emergent, and aquatic bed wetlands. The impaired Valley Creek has established Total Maximum Daily Loads (TMDL).

Also mapped is a 100-year floodplain on Freeman Creek, Buffalo Creek, Valley Creek, and many of their tributaries.

Impacts to streams and wetlands require permit coordination with the US Army Corps of Engineers, US Coast Guards, and/or Kentucky Division of Water, depending on the scale of the water resource and potential disturbance.

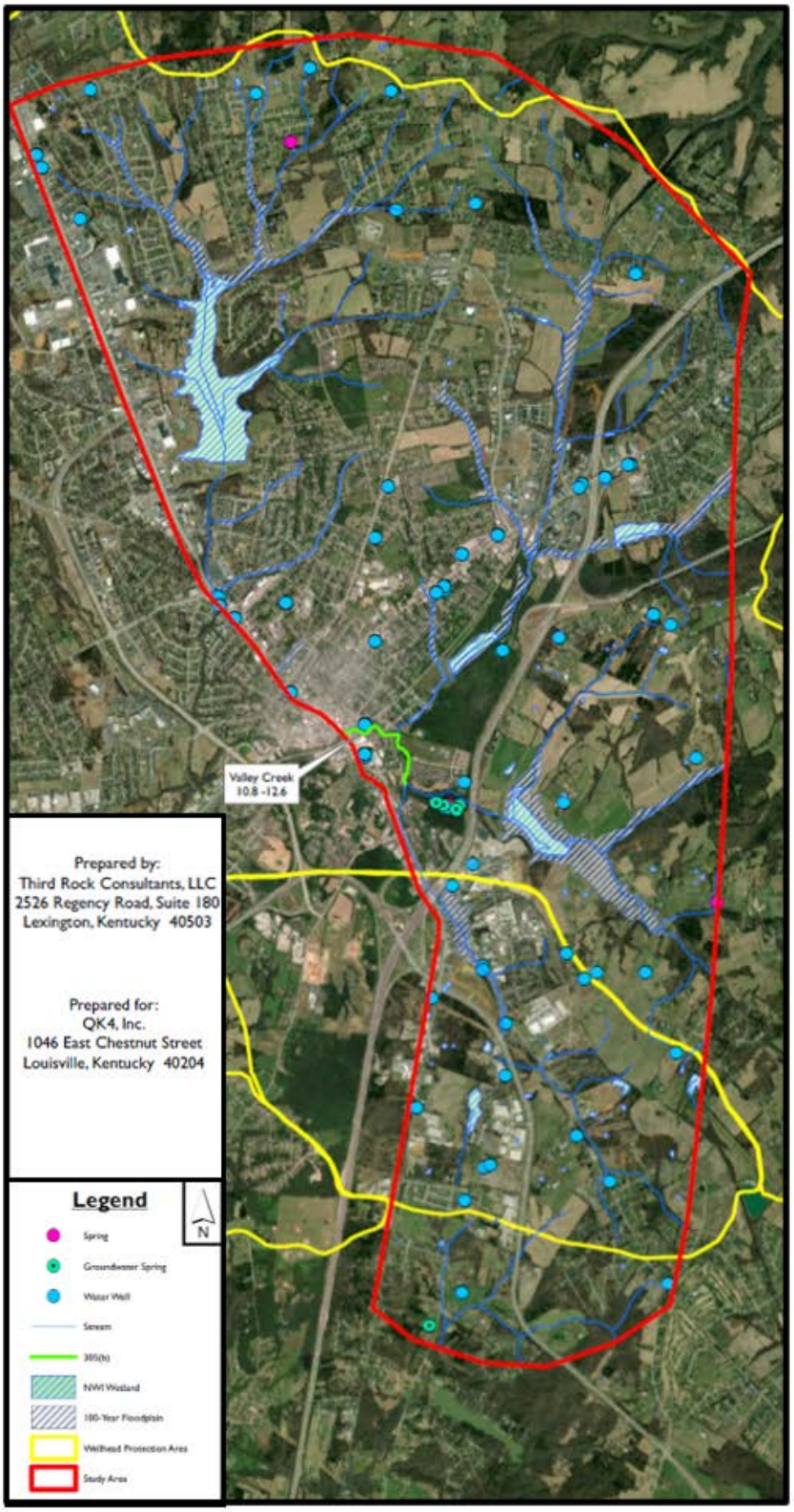



Figure 28. Water Resources

### 3.1.2 Listed Species

The USFWS lists four threatened and endangered (T&E) species and one candidate species that should be considered as part of the effect's analysis for the project, as follows:

- Gray bat (Myotis grisescens) — endangered species
- Indiana bat (Myotis sodalis) — endangered species
- Northern long-eared bat (Myotis septentrionalis) — threatened species
- Snuffbox mussel (Epioblasma triquetra) — endangered species
- Rattlesnake-master borer moth (Papaipema eryngii) — candidate species

The study area does not contain any designated critical habitat for these species. The Kentucky Division of Water (KDOW) reports that the HUC 8 (HUC8 05110001) watershed, which encompasses nearly the entire study area, is identified by the Kentucky Division of Fish and Wildlife Resources (KDFWR) as a conservation area for aquatic species, crayfish species, and mussel species, and is identified as a priority conservation area for mussel species of greatest conservation need. The T&E Species Habitats in the project area are shown in **Figure 28**.

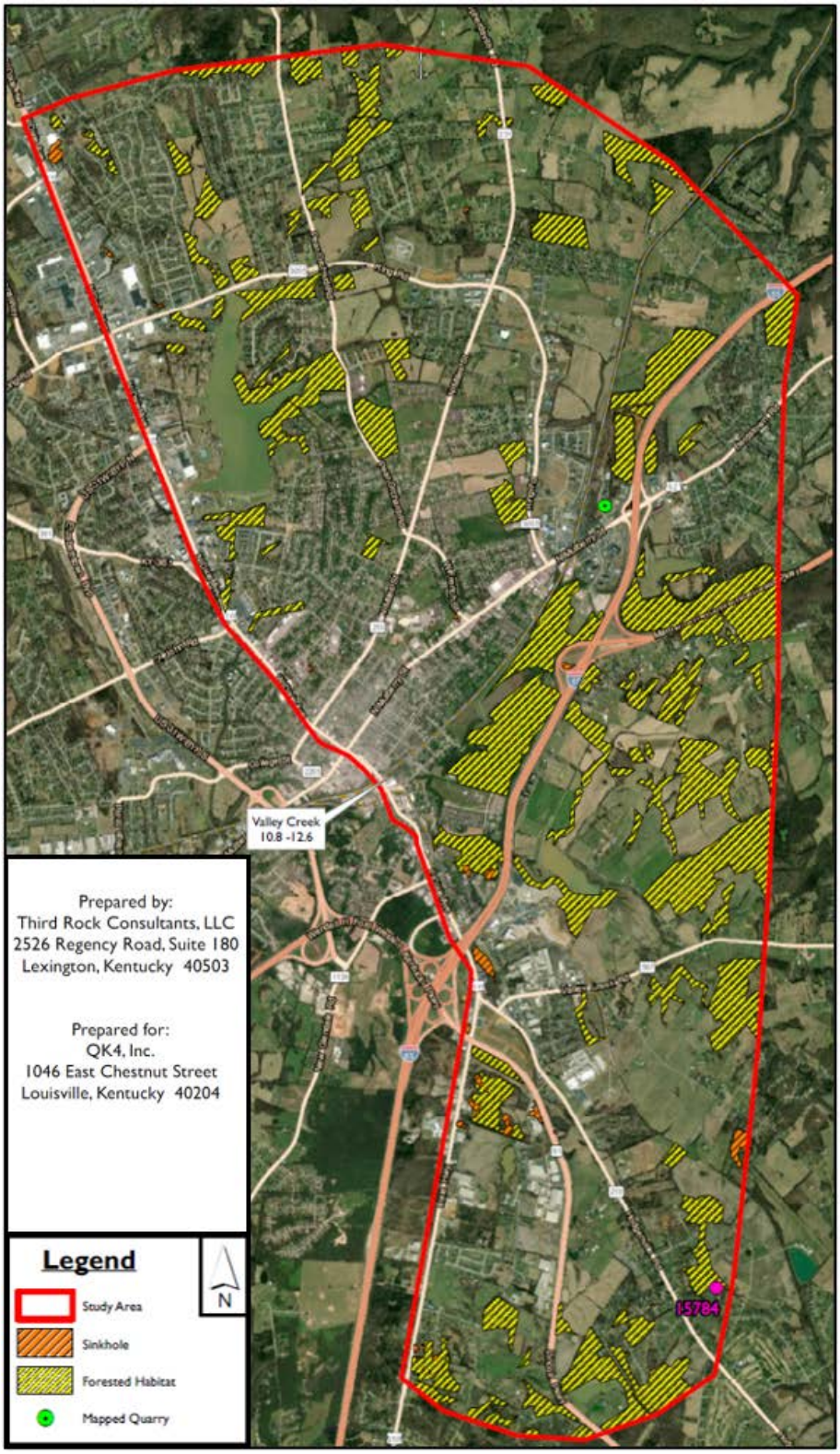



Figure 29. T&E Species Habitat

Projects that occur within an area of known bat habitat (i.e., near caves, forested parcels, or stream corridors) will require project-specific evaluation to assess appropriate minimization/mitigation measures. Coordination with the US Fish and Wildlife Service Kentucky Field Office will be necessary to determine the need for future project-specific surveys.

## 3.2 Human Environment

The human environment includes people and the resources built from them. Such resources include land use, community features, cultural historic resources, pollution (hazardous materials, air quality, noise), etc. These resources could potentially be impacted from future projects and are identified in the following sections for consideration during the project development process.

### 3.2.1 Community Features

The study area contains numerous schools, churches, a hospital (Baptist Health Hardin), and cemeteries, as well as a major commercial area and mall with large retail stores and restaurants along the northwestern edge of US 31W (Dixie Avenue). The commercial district extends south along US 31W through the downtown area and into the southern end of the study area. Public recreational facilities are found throughout Elizabethtown, including Freeman Lake Park, Elizabethtown Nature Park, Elizabethtown City Park, Haycraft Neighborhood Park, American Legion Park/Water Park, and various walking trails in parks and other areas. Hotels and restaurants are clustered along US 62 near the I-65 interchange. Industrial facilities are located between US 31W and Lincoln Parkway in the south end of the study area.

**Section 4(f) and 6(f) Resources.** There are several public parks and recreational facilities within the study area that would be considered Section 4(f) resources, which are protected under Section 4(f) of the *US Department of Transportation Act*.. Section 4(f) may also apply to athletic fields associated with schools if they are available for public use. Historic resources such as buildings, transportation facilities, bridges, historic districts, and archaeological sites are protected by Section 4(f) if they are listed or eligible for listing in the National Register of Historic Places (NRHP). The National Parks Service on-line data base identifies Freeman Lake Park and American Legion Park as having received Land and Water Conservation Fund Act (LWCFA). Any property acquisition from these parks would be considered a Section 6(f) impact. These community resources are shown in **Figure 29**.

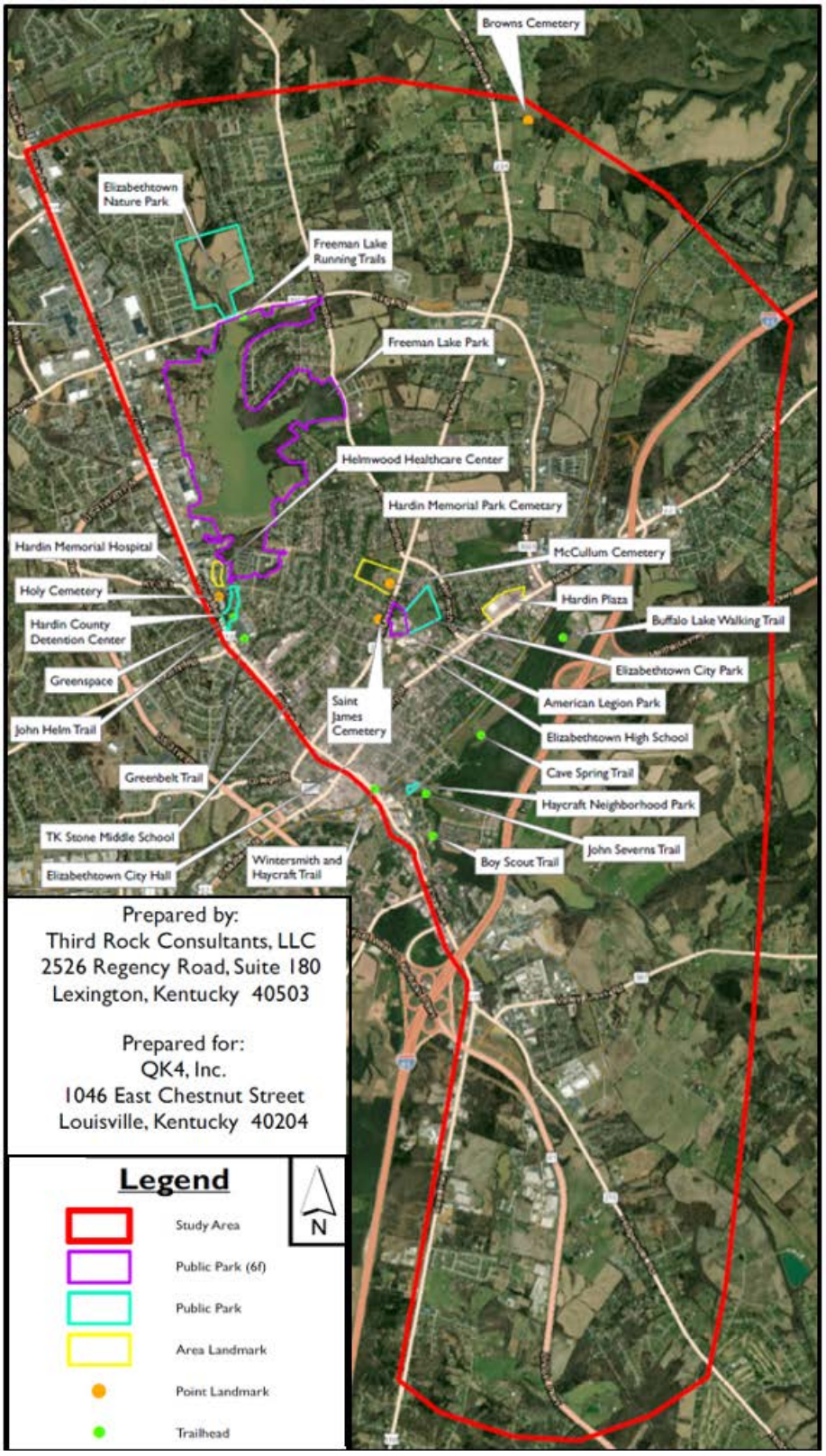



Figure 30. Community Resources

### 3.2.2 Historic Resources

Research was conducted to identify existing resources and assess the potential for undiscovered resources. At the federal level, the National Register of Historic Places (NRHP), administered by the National Park Service, is the nation's official list of properties recognized for their significance in American history, architecture, archaeology, engineering, and culture. Such properties are protected under Section 106 of the National Historic Preservation Act and Section 4(f) of the US Department of Transportation Act.

**Archaeological Resources.** Only a small portion of the study area has been previously surveyed for archaeological resources, predominantly linear surveys along the corridor. None of the 27 sites identified have been listed or determined eligible for listing in the NRHP. Additional resources are expected to be found, especially surrounding extant and demolished historical resources and within alluvial environments. On file with KYTC is additional information about the archaeological resources. To protect identified resources, known site locations are not included in public mapping. Should federal monies or permits be included in future projects, field survey and coordination with the Kentucky Heritage Council will be required to assess project impacts to archaeological resources.

Regardless of survey requirements, if human remains are encountered in future projects, they must be reported to local law enforcement, the county coroner, and the Kentucky Heritage Council pursuant to KRS 72.020.

**Cultural Historic Resources.** Previous surveys have documented cultural historic resources, predominantly located in downtown Elizabethtown. Two historic districts — NAME THEM — and 29 resources listed individually in the NRHP were identified in the study area. Should federal monies or permits be included in future projects, field survey and coordination with the Kentucky Heritage Council will be required to assess project impacts to cultural historic resources. The complete overview is included in **Appendix D**.

### 3.2.3 Low Income and Minority Populations

U.S. Census records and shapefiles were reviewed to identify relevant state, county, and census tract (CT) data related to minority and low-income populations within the study area. CTs 11, 12, and 14.02 are entirely within the study area, which also includes portions of CTs 10.01, 10.02, 15, and 16, as shown in **Figure 30** and **Figure 31** below. **Table 13**, summarizes minority and poverty data for Kentucky, Hardin County, City of Elizabethtown, and the CTs within the study area.

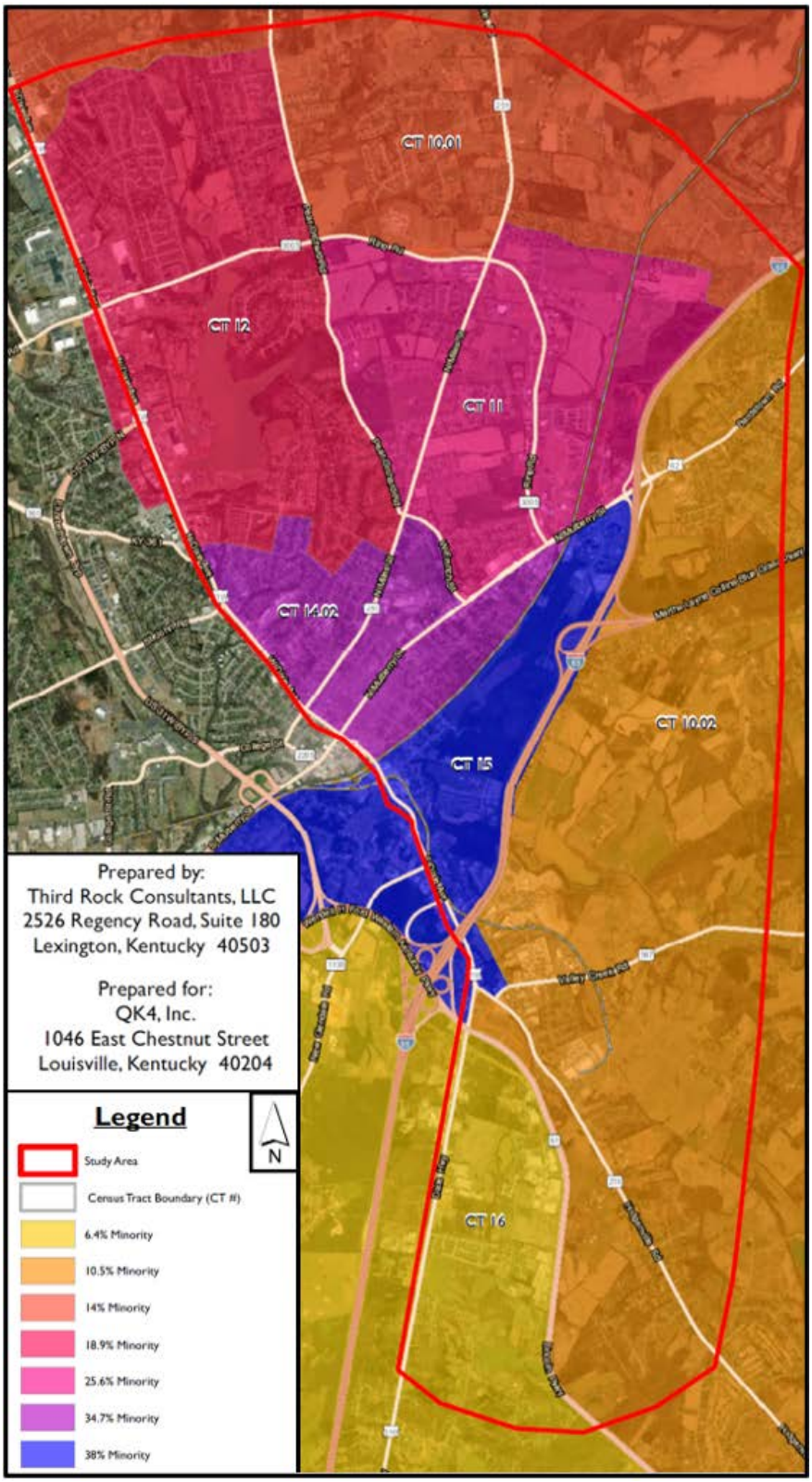



Figure 31. Minority Populations

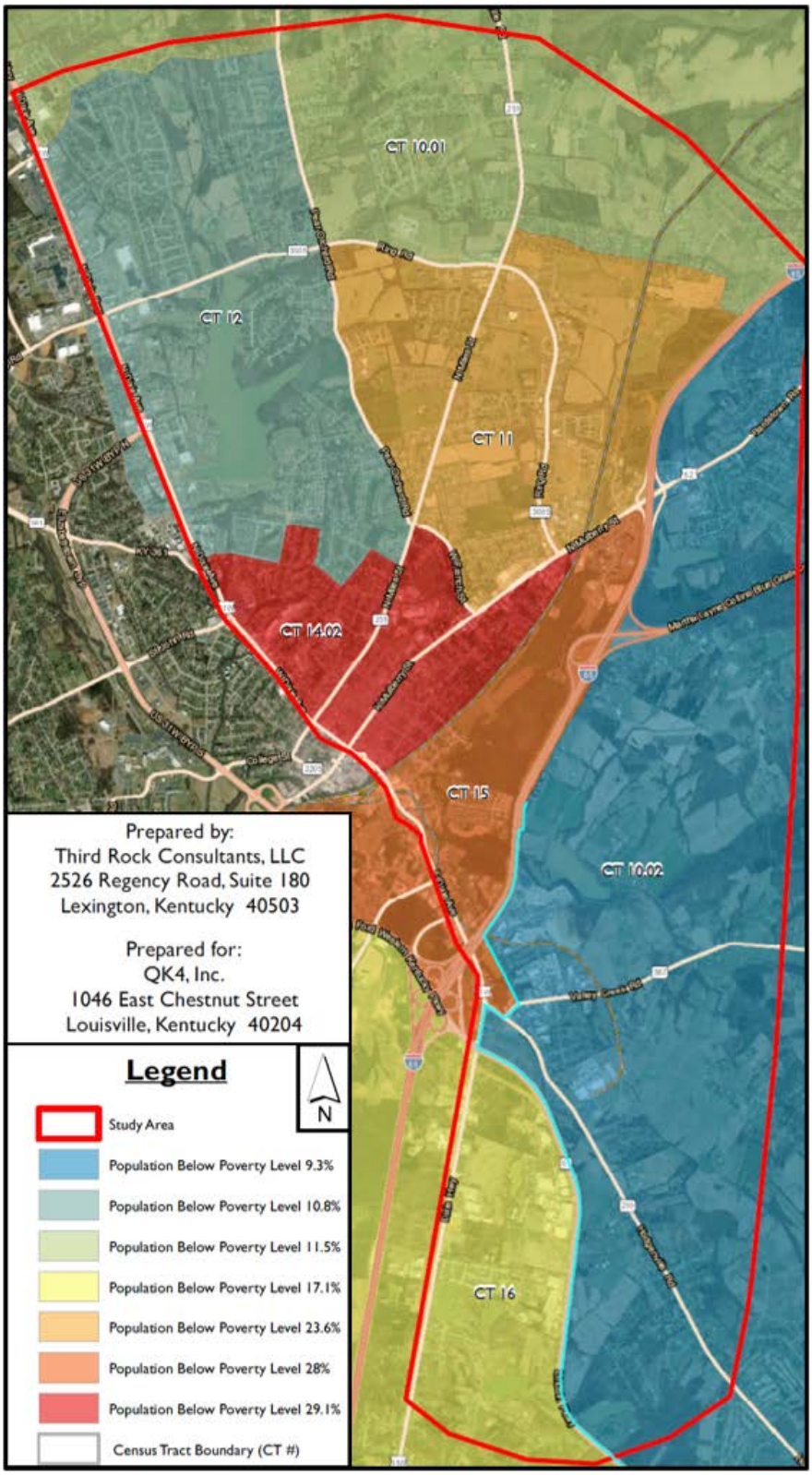



Figure 32. Low Income Populations

Table 13. Minority and Poverty Statistics

| Geographic Area | Population | Number of Households | Median Income per Household | Minority | Population in Poverty[1] |
|---|---|---|---|---|---|
| **Kentucky** | 4,467,673 | 1,728,681 | $48,392 | 12.4% | 16.9% |
| **Hardin Co.** | 110,958 | 39,853 | $53,168 | 19.5% | 13.4% |
| **Elizabethtown** | 30,289 | 12,144 | $46,129 | 20.7% | 16.3% |
| **CT 10.01** | 7,269 | 2,672 | $83,265 | 14.0% | 11.5% |
| **CT 10.02** | 8,693 | 3,510 | $60,758 | 10.5% | 9.3% |
| **CT 11** | 3,812 | 1,747 | $41,551 | 25.6% | 23.6% |
| **CT 12** | 5,589 | 2,397 | $47,486 | 18.9% | 10.8% |
| **CT 14.02** | 4,340 | 1,935 | $39,052 | 34.7% | 29.1% |
| **CT 15** | 2,696 | 985 | $33,361 | 38.0% | 28.0% |
| **CT 16** | 9,506 | 3,288 | $64,688 | 6.4% | 17.1% |

Source: US Census Bureau, 2014 - 2018 American Fact Finder 5-Year Estimates and U.S. Census Quick Facts

[1] Population in poverty percentage above 20% is considered high.

Note: Blue shading indicated consistently higher minority and poverty percentages.

### 3.2.4 Hazardous Materials Considerations

Environmental Data Resources, Inc (EDR) was contacted to produce an electronic review of applicable environmental databases. A variety of environmental databases were reviewed, including those pursuant to ASTM standards. Of the sites reported by EDR, 354 were determined to warrant further consideration due to the "presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment" (ASTM Standard E1527). Most of the sites are industrial and commercial facilities located along US 31 W and KY 61, as shown in **Figure 32** and summarized in the table included in Appendix E of the attached Environmental Overview (**Appendix D**), along with EDR Executive Summary and explanation of acronyms used.

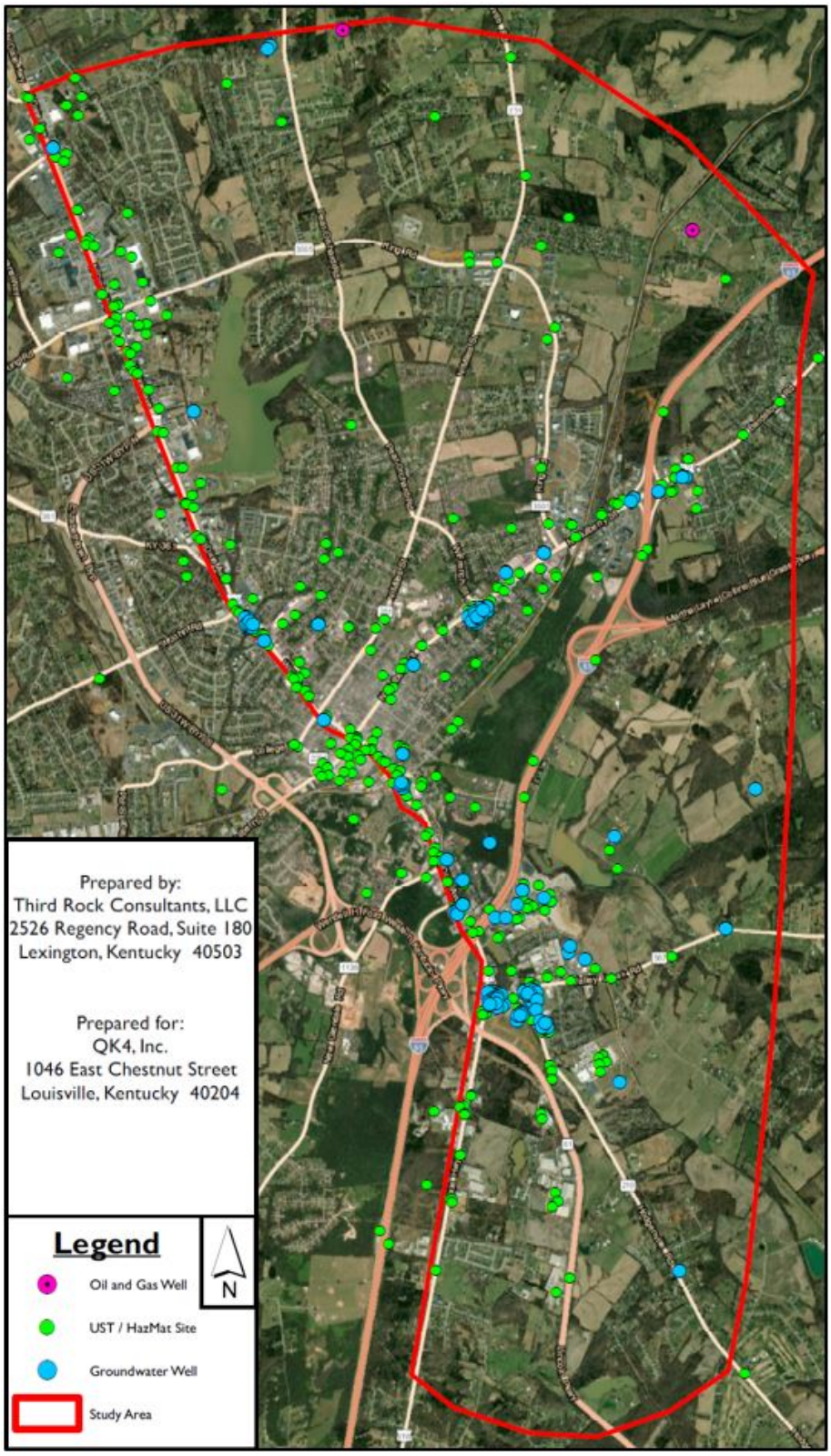



Figure 33. USTs / HazMat Sites

# 4.0 COORDINATION EFFORTS

## 4.1 Project Team Meetings

Throughout the study the project team assembled to review progress and engage local officials and stakeholders. These meetings are described below. Agendas and other pertinent meeting information are in **Appendix E**.

May 27th, 2020 Project Kick-Off Meeting

Attendees included the project team from Qk4 and Stantec, members of the Lincoln Trail Area Development District (LTADD), the Radcliff/Elizabethtown Metropolitan Planning Organization (MPO), multiple engineers from KYTC, and representatives from the City of Elizabethtown and Hardin County. The team members introduced themselves, discussed the Scope of Work for the study, and planned how to best kick off the project.

June 5th, 2020 Traffic Modeling Scoping Meeting

Members of the project team from Qk4 and Stantec met and discussed the traffic data and model needs for the study. A plan was developed that included researching online data, collecting traffic counts, and creating and calibrating a base model.

July 9th, 2020 LTADD Policy Committee Zoom Meeting

Members of the East Elizabethtown Connectivity Study (EECS) team introduced themselves to and presented the plan for the study to the LTADD Policy Committee.

July 27th, 2020 Elizabethtown City Council Meeting

Members of the EECS team introduced themselves and presented the major scope items for the study to the Elizabethtown City Council.

October 14th/15th , 2020 LTADD Technical Advisory and Policy Committees

Members from the EECS team presented a progress update to the LTADD Technical Advisory and Technical Policy committees. These updates included discussing feedback received from the Local Officials and Stakeholders and from the public via the online map shared on the webpage. The team also discussed the crash history, identified problem areas, previously identified transportation projects in the TIP and MTP. Locations for turning movements were also selected.

March 11th, 2021 Local Officials/Stakeholders (LO/S) Meeting

The project team presented over 30 proposed short-term and long-term projects in ArcGIS Story Map form to the LO/S team. After review and discussion, the LO/S team was given a survey to rate the priority of each project and present additional comments or concerns.

## 4.2 Online Public Engagement

Due to the continued caution taken by businesses and the public during the height of the COVID 19 pandemic, no public meetings were held. To engage the public, Qk4 created a unique website for the East Elizabethtown Connectivity Study (www.qk4.com/EECS), and utilized Facebook, Twitter, and Instagram to generate data about the community's opinions in real-time.

These online platforms were the natural way to reach those community members seeking involvement with the planning process, especially given the on-going restrictions precluded public meetings. The website launched in May 2020 when the study began, and by June 2020 the site had over 1,800 visitors. The use of social media allowed the community to be involved in the planning process by connecting, gaining insight, and staying engaged throughout the project. More than 6,365 people were reached by promoting three Facebook advertisements, an average of over 2,000 reaches per advertisement.

The main use of these platforms was to engage the public and receive comments on the website. An interactive map on the website prompted visitors to place virtual "pins" on study area map to identify locations of transportation issues/problems, as shown in Error! Reference source not found..

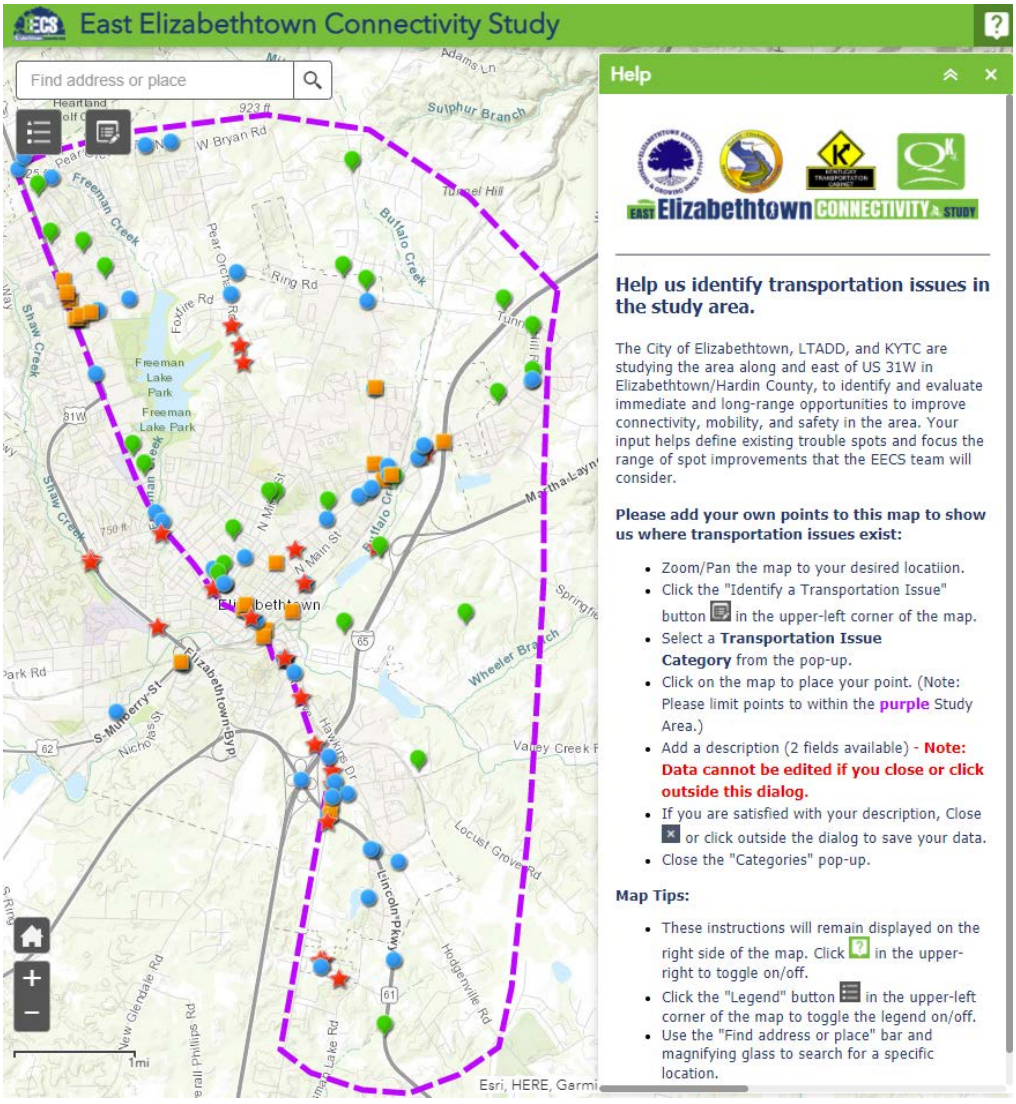



Figure 34. Online Public Comment Interactive Map

The project team took the comments into consideration when developing improvement recommendations. Once the recommendations were developed, a new map with the project parameters and details was uploaded to the webpage with an embedded survey to acquire public

feedback, as shown **Figure 34**. The map received over 1,000 views and 174 responses to the survey were collected.

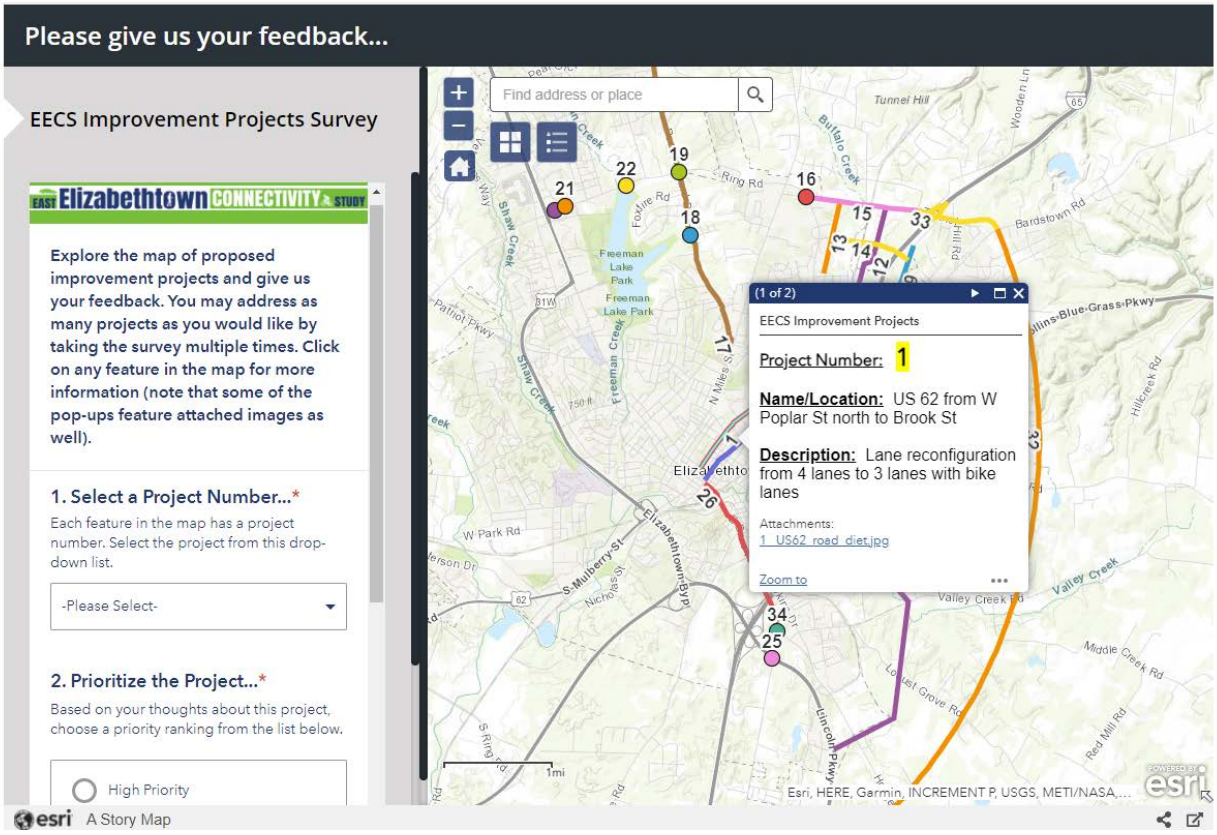



Figure 35. Online Public Recommendation Feedback Survey

# 5.0 2045 TRAFFIC FORECAST AND NO-BUILD OPERATIONS

An existing 2020 traffic model was created using available historic data and traffic volumes specifically collected for this study. Those volumes were used as a base for all future traffic forecasts and analyses.

## 5.1 Intersection Turning Movement Counts

As described in **Section 2.6**, existing traffic data from online databases and 11 dedicated turning movement counts were collected from key intersections throughout the study area to get the most accurate 2020 traffic information. The intersections were chosen based on gaps in available data, crash history, potential for future project location, and input from the public and stakeholders. Taking these metrics into account, counters were set up at the following locations:

1. US 62 and I-65 NB Ramps
2. US 62 and I-65 SB Ramps
3. US 62 and Buffalo Creek Drive

4. US 62 and Commerce Drive
5. US 62 and Dolphin Drive
6. US 62 and Ring Road
7. US 62 and Main Street
8. US 62 and US 31W
9. Ring Road and Pear Orchard Road
10. Ring Road and KY 251
11. US 31W and Springfield Road

## 5.2 Model Development

When developing traffic forecasts, the consultant team acquired the Hardin/Meade Travel Demand Model ("the model") from KYTC to develop growth rates for network corridors and links in the study area. A validation assessment of the model's calibrated base year (2017) using the most recent available traffic counts found that, while assignment error on low-volume rural roads away from Elizabethtown was high, overall model assignments for large volume roads such as those within the study area were within a reasonable and acceptable range of the recent traffic counts collected for the study. In addition to checking the model against recent counts, a few network updates outside the study area were made to reflect the current 2020 network. This updated 2020 model was used as the base for all future models.

## 5.3 2045 No-Build Traffic

To create the 2045 No-Build model the calibrated 2020 model was grown to 2045 by utilizing household population and employment growth projections between the 2017 and 2045. The model files were summarized and reviewed by the project team and local officials. During the review process an error in the projected employment for a single Traffic Analysis Zone (TAZ) in the northeast was identified and corrected. In addition to this correction, a small number of existing and committed (E+C) projects outside the study area were added to the 2045 network.

**Figure 35** shows the following network revisions and E+C additions made to create the 2045 No-Build traffic model:

- Ring Road (KY 3005) between US 62 and the Western Kentucky Parkway was activated in the model network ('In_Network' field values changed from 0 to 1).
- Patriot Parkway (KY 361) between US 31W and KY 1600 data was updated from KY 1600 to KY 361, as follows:
  - Updated from 2 to 4 lanes between US 31W Bypass (31WB) and KY 1600.
  - Added Patriot Parkway (KY 361) between KY 1600 and KY 313.
  - Included the ramps at the US 31WB interchange with KY 361 in the network ('In_Network' field values changed from 0 to 1), and updated the ramp configuration.

- Ring Road was extended from Western Kentucky Parkway to US 31W with a new I-65 interchange.
- KY 313 was widened to 4 lanes between Patriot Parkway and the Bullion Boulevard Connector.

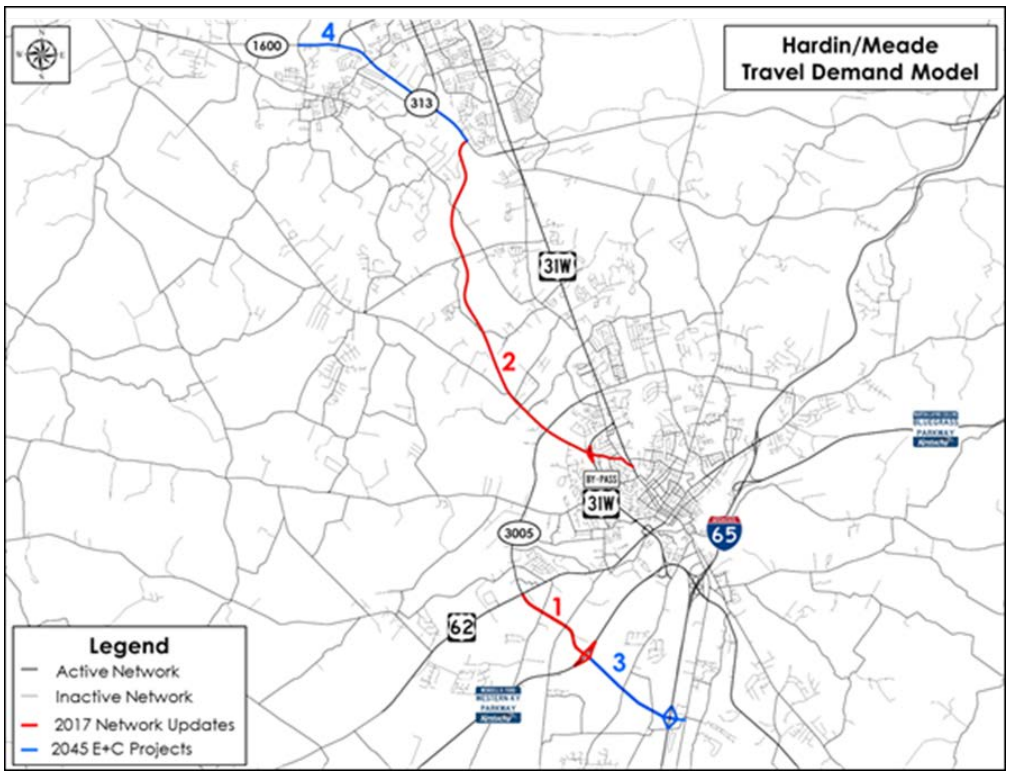



Figure 36: 2045 Traffic Model Updates

With the model validated and model network and TAZ files updated, compound average growth rates (CAGR) of traffic were calculated for corridors within the study area using base year and 2045 E+C future year model assignments. These growth rates served as one set of input factors for growing current traffic to 2045 for future year analyses.

According to the 2045 base model, most growth rates were small and uniform across eastern Elizabethtown. To be conservative with future traffic volume projections, a base growth rate of 1% was used where the model showed no or minor growth rates. Using these growth rates Level-of-Service (LOS) and Volume-to-Capacity (v/c) analyses were completed as described in **Section 0.**

**Table 14** lists the LOS and v/c values for study area roadway segments based on the analyses completed. **Figure 36** and **Figure 37** show the LOS and v/c ratios on the study area map.

Full analysis reports for these and smaller roadway segments are in **Appendix B**.

Table 14: NB 2045 Segment Level of Service and Volume to Capacity

| Segment Analysis | | | | |
|---|---|---|---|---|
| **Route** | **Begin MP** | **End MP** | **v/c** | **LOS** |
| **US 62** | 17.763 | 17.965 | 0.48 | D |
| **US 62** | 17.965 | 18.178 | 0.41 | C |
| **US 62** | 18.178 | 18.873 | 0.41 | C |
| **US 62** | 18.873 | 19.391 | 0.41 | C |
| **US 62** | 19.391 | 19.785 | 0.48 | C |
| **US 62** | 19.785 | 20.115 | 0.48 | C |
| **US 62** | 21.006 | 26.896 | 0.14 | A |
| | | | | |
| **US 31W** | 9.530 | 13.255 | 0.18 | B |
| **US 31W** | 13.255 | 14.670 | 0.57 | E |
| **US 31W** | 14.670 | 15.049 | 0.38 | D |
| **US 31W** | 15.049 | 15.461 | 0.21 | A |
| **US 31W** | 15.461 | 15.769 | 0.30 | B |
| **US 31W** | 15.769 | 16.184 | 0.28 | B |
| **US 31W** | 16.184 | 16.649 | 0.28 | B |
| **US 31W** | 16.649 | 16.702 | 0.49 | D |
| **US 31W** | 16.702 | 16.943 | 0.62 | E |
| **US 31W** | 16.943 | 17.677 | 0.76 | E |
| **US 31W** | 17.677 | 17.889 | 0.78 | E |
| **US 31W** | 17.889 | 18.818 | 0.37 | B |
| **US 31W** | 18.818 | 19.478 | 0.57 | C |
| **US 31W** | 19.478 | 20.432 | 0.42 | C |
| **US 31W** | 20.432 | 20.772 | 0.52 | C |
| **US 31W** | 20.772 | 21.143 | 0.35 | B |
| | | | | |
| **KY 3005** | 5.244 | 6.456 | 0.44 | C |

| Segment Analysis | | | | |
|---|---|---|---|---|
| Route | Begin MP | End MP | v/c | LOS |
| **KY 3005** | 6.456 | 6.550 | 0.41 | C |
| **KY 3005** | 6.550 | 7.518 | 0.31 | B |
| **KY 3005** | 7.518 | 7.834 | 0.34 | B |
| **KY 3005** | 7.834 | 8.829 | 0.30 | B |
| **KY 3005** | 8.829 | 10.582 | 0.32 | B |
| | | | | |
| **KY 251** | 0 | 0.765 | 0.15 | A |
| **KY 251** | 0.765 | 1.189 | 0.22 | A |
| **KY 251** | 1.189 | 2.681 | 0.15 | A |
| **KY 251** | 2.681 | 2.747 | 0.37 | D |
| **KY 251** | 2.866 | 3.046 | 0.12 | A |
| **KY 251** | 3.046 | 6.288 | 0.11 | A |
| | | | | |
| **KY 210** | 0 | 0.585 | 0.43 | D |
| **KY 210** | 0.585 | 0.802 | 0.36 | D |
| **KY 210** | 0.802 | 2.469 | 0.33 | C |
| | | | | |
| **KY447** | 0.000 | 2.116 | 0.18 | C |
| | | | | |
| **KY 567** | 0.000 | 0.643 | 0.23 | C |
| **KY 567** | 0.643 | 3.450 | 0.11 | B |
| | | | | |
| **KY 61** | 0.000 | 4.824 | 0.29 | A |
| | | | | |
| **CR-1012** | 0.000 | 1.119 | 0.28 | C |
| **CR-1013** | 0.000 | 0.563 | 0.16 | C |
| **CR-1100** | 0.000 | 2.586 | 0.08 | B |
| **CS-1068** | 0.095 | 0.335 | 0.24 | C |
| **CS-1126** | 0.000 | 0.229 | 0.44 | D |

| Segment Analysis | | | | |
|---|---|---|---|---|
| **Route** | **Begin MP** | **End MP** | **v/c** | **LOS** |
| **CS-1180** | 0.000 | 0.169 | 0.27 | C |
| **CS-1297** | 0.000 | 1.032 | 0.16 | C |
| **CS-1320** | 0.000 | 0.082 | 0.37 | C |
| **CS-1320** | 0.082 | 1.404 | 0.30 | C |
| **CS-1321** | 0.066 | 0.263 | 0.65 | E |
| **CS-1327** | 0.000 | 0.646 | 0.28 | C |
| **CS-1390** | 0.000 | 0.646 | 0.21 | C |
| **CS-1418** | 0.000 | 0.127 | 0.07 | B |
| **CS-1448** | 0.000 | 1.294 | 0.23 | C |
| **CS-1683** | 0.000 | 1.294 | 0.34 | C |

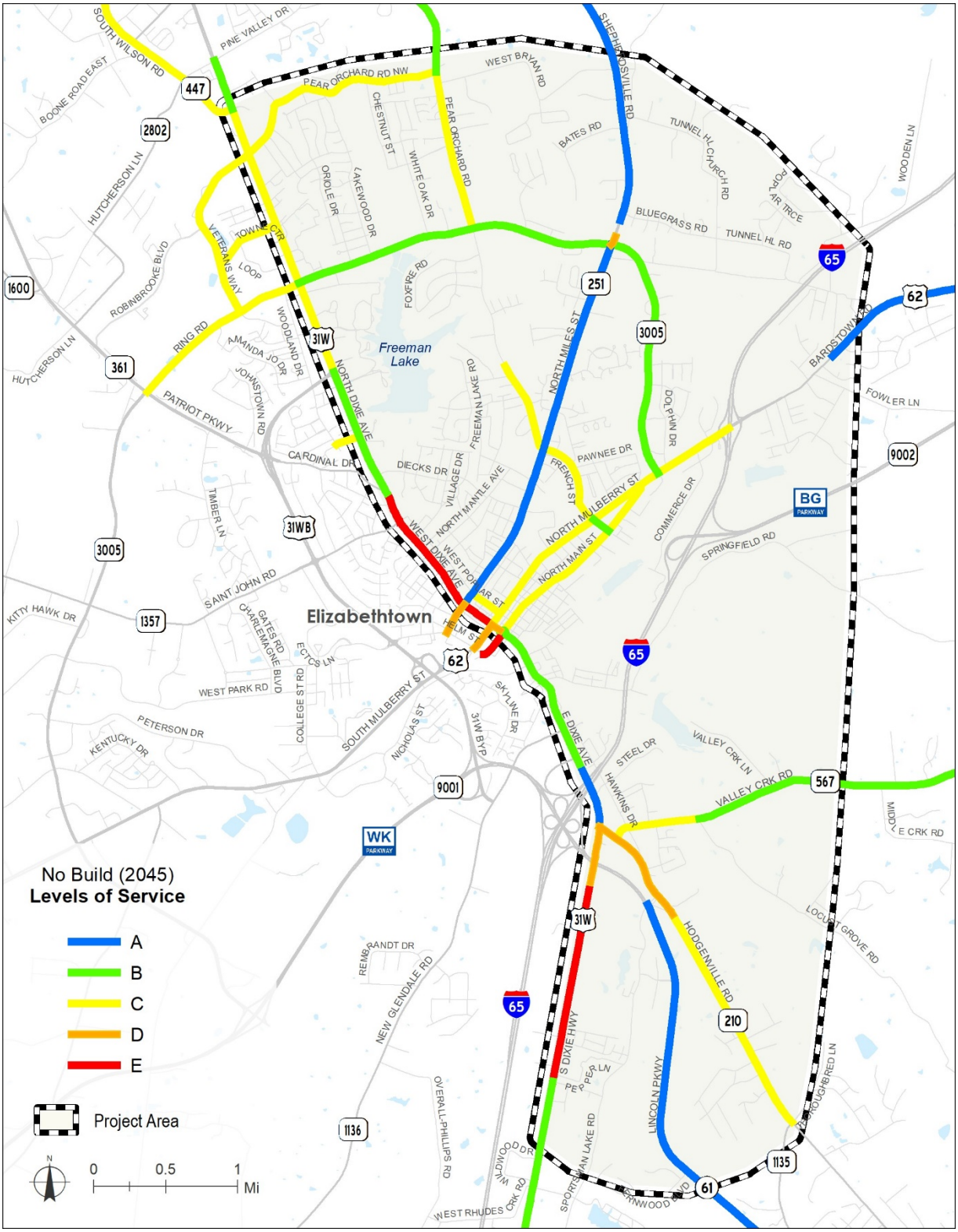



Figure 37: 2045 No-Build Level of Service (LOS)

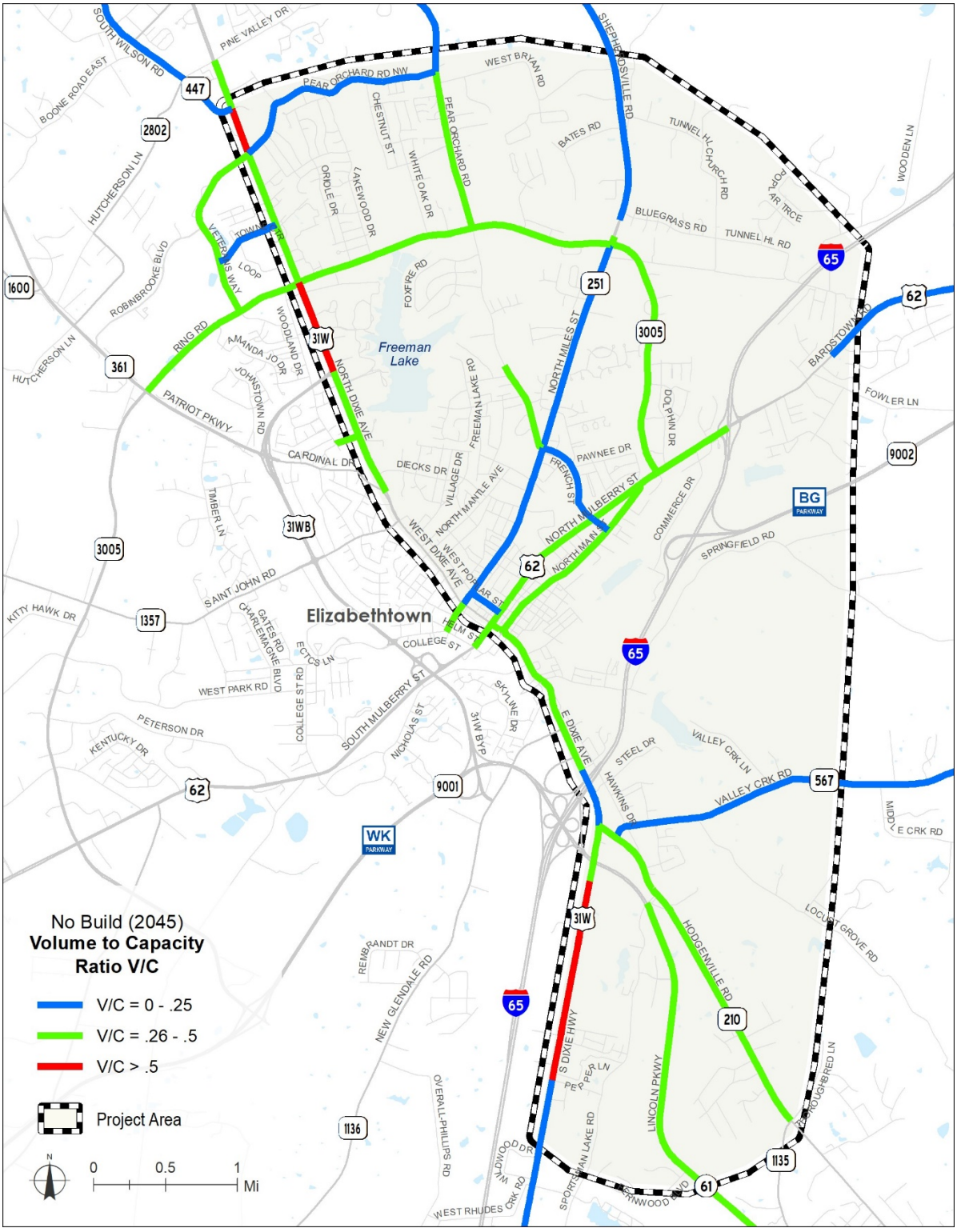



Figure 38: 2045 No-Build Volume to Capacity (v/c)

## 5.4 2045 Build Traffic

The majority of the project recommended focus on addressing major crash location, connectivity issues, pedestrian needs, future development potential, and other factors that aren't traffic volume specific. For this reason, only a few large-scale traffic impacting projects were added to the 2045 model to create a 2045 Build model. The future network was also edited to incorporate the following facilities:

- An eastern connection of Ring Road with a new northern interchange with I-65 at the current grade separated crossing of Tunnel Hill Road.
- Various configurations of a new eastern connection from Ring Road across I-65 to the Lincoln Parkway.
- The extension of Commerce Drive to US 31W.
- New connections linking Ring Road, Tunnel Hill Road, and Buffalo Creek Drive.

Multiple model runs were completed to capture changes from build phases, building upon the previous phase:

1. Extension of Commerce Drive south to US-31W/Dixie Avenue.
2. Additional connectivity between Tunnel Hill Road and Mulberry Street.
3. Add connector development to Mulberry Street.

The model assignments for these alignments were included as part of the evaluation of the viability of various project alternatives under consideration. These project recommendations are described in detail in Section 6.0.

Most growth rates were similar to those in the No-Build 2045 model with some minor differences. The volumes outputs in both models can be seen in **Figure 38** and **Figure 39.** As with the previous models, the outputs from the build models were used to complete LOS and v/c analyses as described in **2.6.2Traffic Operations**.

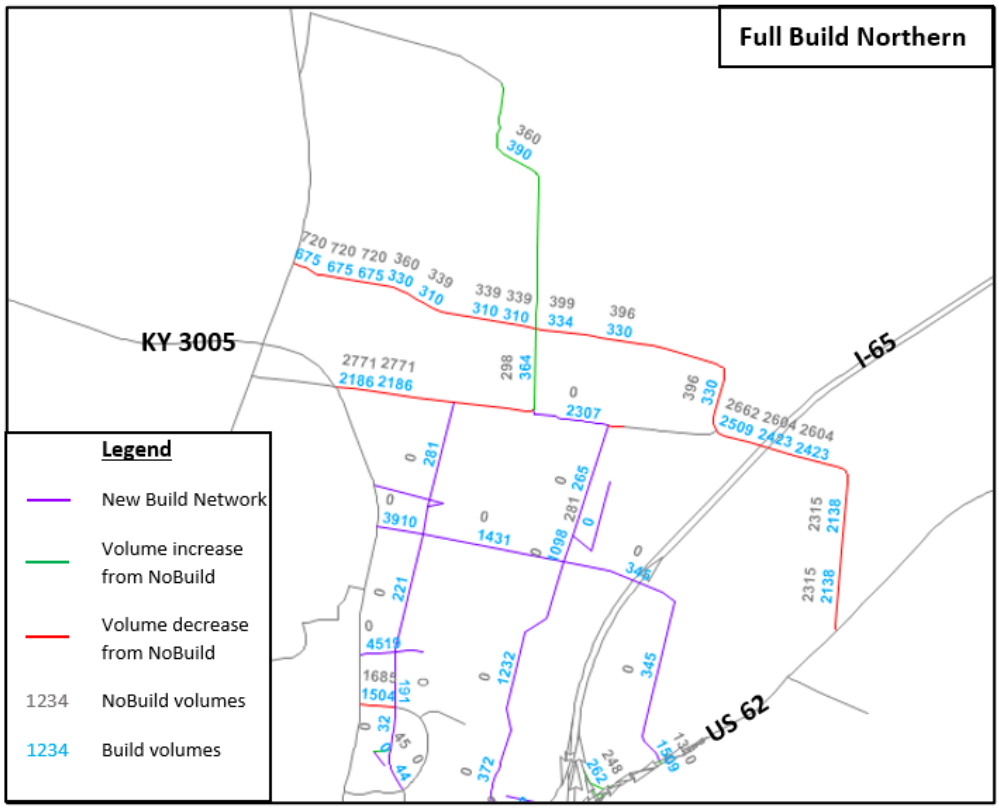



Figure 39: 2045 Northern Build Model Differences

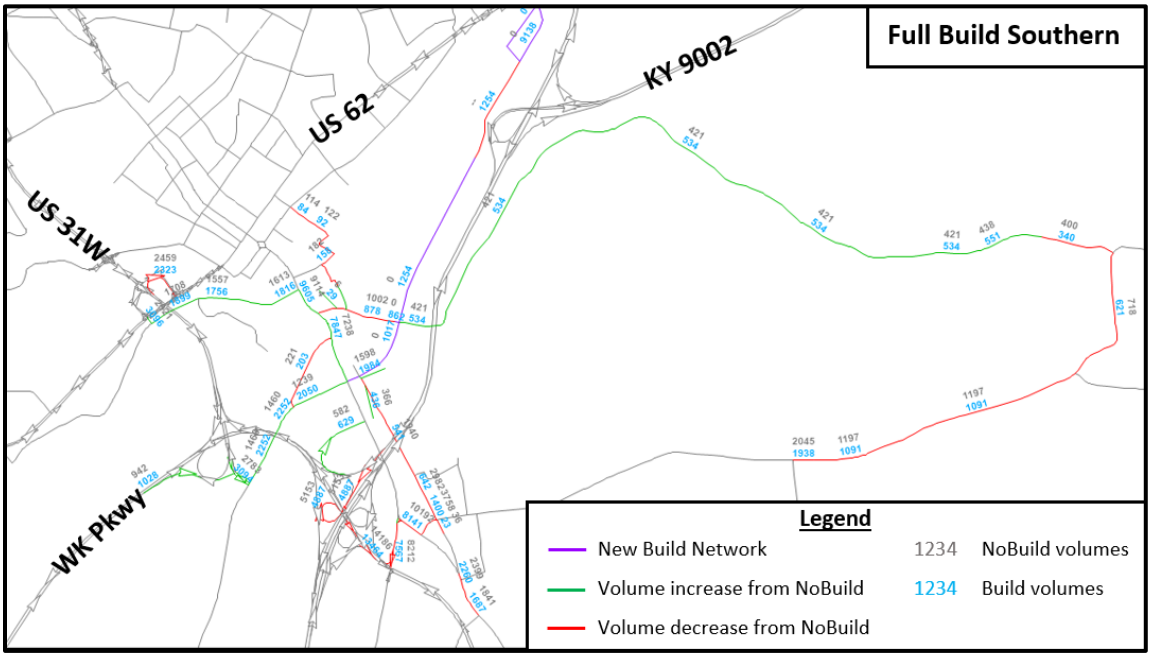



Figure 40: 2045 Southern Build Model Differences

**Table 15** list the LOS and v/c values for study area roadway segments based on the analyses completed. **Figure 40** and **Figure 41** show the LOS and v/c ratios on the study area map. A base growth rate of 1% and the No-Build analysis results were used where the model output changes from the No-Build to the Build model were negligible. Full analysis reports for these and smaller roadway segments can be found in **Appendix B**.

Table 15: Build 2045 Segment Level of Service and Volume to Capacity

| Segment Analysis | | | | |
|---|---|---|---|---|
| **Route** | **Begin MP** | **End MP** | **v/c** | **LOS** |
| **US 62** | 17.763 | 17.965 | 0.48 | D |
| **US 62** | 17.965 | 18.178 | 0.40 | C |
| **US 62** | 18.178 | 18.873 | 0.40 | C |
| **US 62** | 18.873 | 19.391 | 0.40 | C |
| **US 62** | 19.391 | 19.785 | 0.47 | C |
| **US 62** | 19.785 | 20.115 | 0.46 | C |
| **US 62** | 21.006 | 26.896 | 0.14 | A |
| | | | | |
| **US 31W** | 9.530 | 13.255 | 0.18 | B |
| **US 31W** | 13.255 | 14.670 | 0.57 | E |
| **US 31W** | 14.670 | 15.049 | 0.34 | C |
| **US 31W** | 15.049 | 15.461 | 0.21 | A |
| **US 31W** | 15.461 | 15.769 | 0.30 | B |
| **US 31W** | 15.769 | 16.184 | 0.30 | B |
| **US 31W** | 16.184 | 16.649 | 0.30 | B |
| **US 31W** | 16.649 | 16.702 | 0.50 | D |
| **US 31W** | 16.702 | 16.943 | 0.78 | E |
| **US 31W** | 16.943 | 17.677 | 0.78 | E |
| **US 31W** | 17.677 | 17.889 | 0.80 | E |
| **US 31W** | 17.889 | 18.818 | 0.37 | B |
| **US 31W** | 18.818 | 19.478 | 0.57 | C |

| Segment Analysis | | | | |
|---|---|---|---|---|
| Route | Begin MP | End MP | v/c | LOS |
| **US 31W** | 19.478 | 20.432 | 0.42 | C |
| **US 31W** | 20.432 | 20.772 | 0.52 | C |
| **US 31W** | 20.772 | 21.143 | 0.35 | B |
| | | | | |
| **KY 210** | 0 | 0.585 | 0.41 | D |
| **KY 210** | 0.585 | 0.802 | 0.33 | C |
| **KY 210** | 0.802 | 2.469 | 0.32 | C |
| | | | | |
| **KY 567** | 0.000 | 0.643 | 0.16 | C |
| **KY 567** | 0.643 | 3.450 | 0.10 | B |

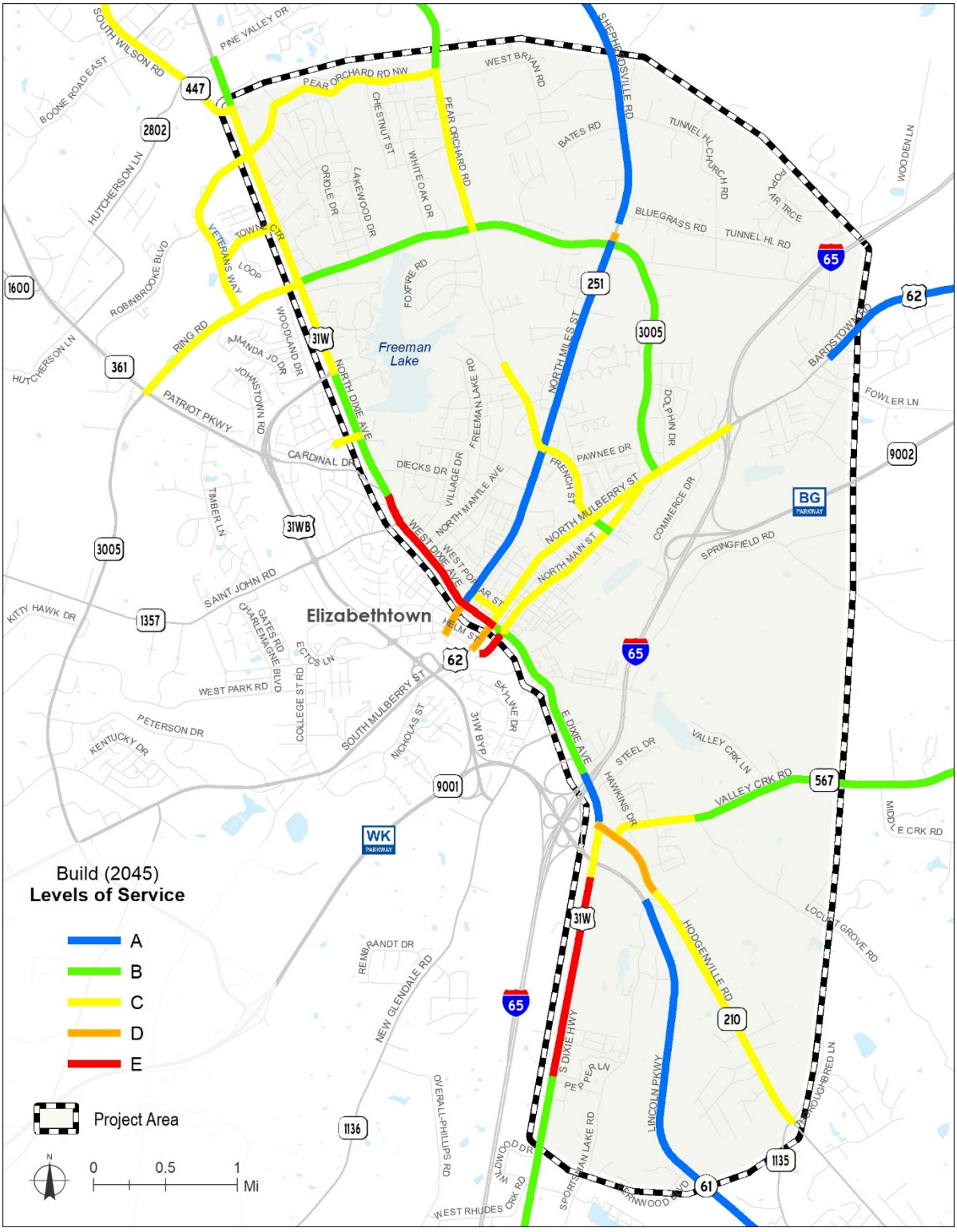



Figure 41: 2045 Build Level of Service (LOS)

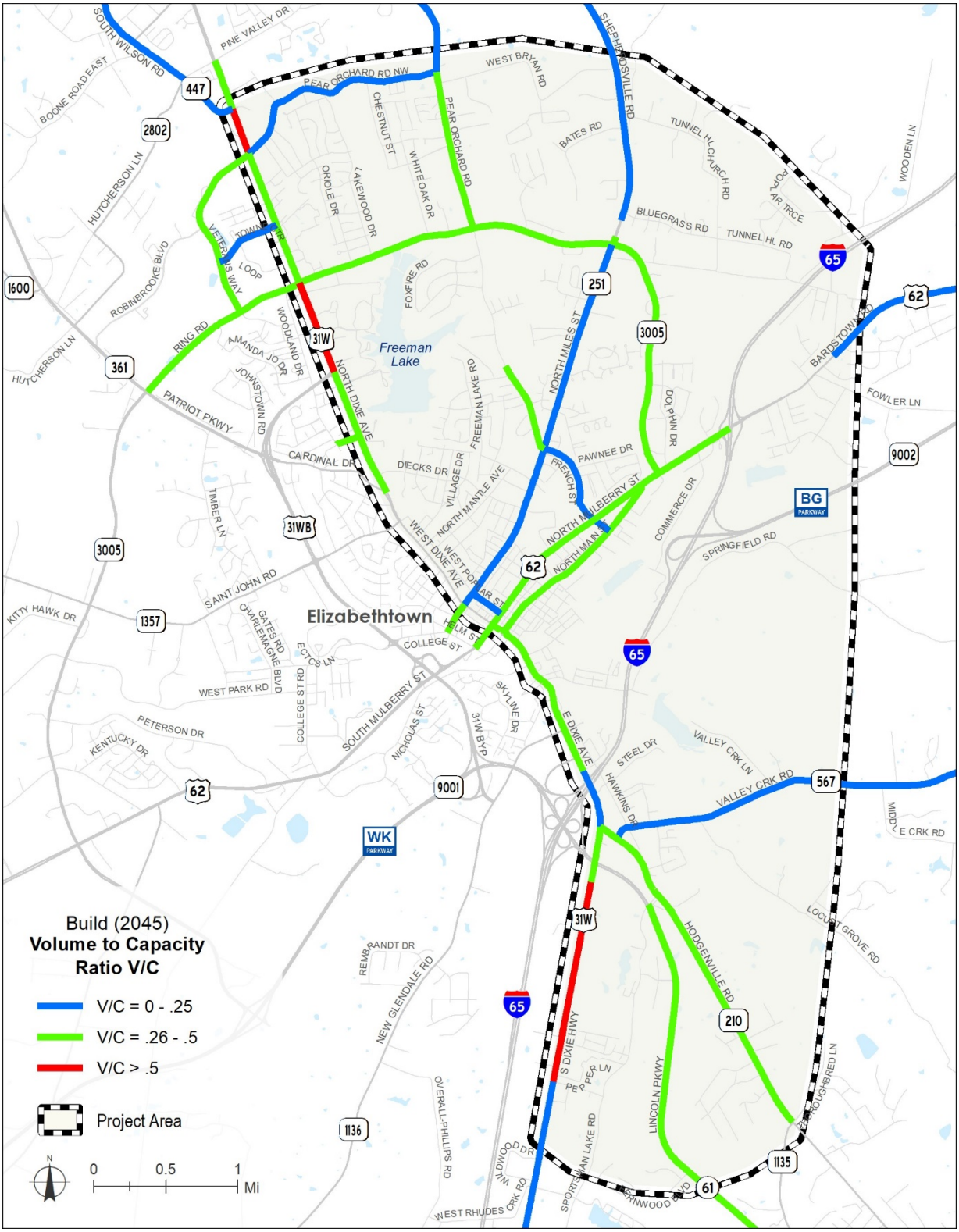



Figure 42: 2045 Build Volume to Capacity

## 5.5 Model Observations

The Phase 1 extension observes an increase of 10% trips (250 vehicles) north of Commerce Drive, primarily along Tunnel Hill Road, compared to the No-Build volumes. However, the additional capacity and accessibility provided by Phases 2 and 3 generate a 13% decrease (325 vehicles) from the No-Build volumes along these same roadways. These additional trips have no significant impact on the nearby arterials — Ring Road (KY-3005) and Bardstown Road (KY 62).

The extension of and development on Commerce Drive saw an increase of 1,000 trips/day along Commerce Drive as well as a routing shift to the south from the I-65 interchange to the US 31W Bypass interchange. Traffic along New Glendale Road (KY 1136) increases by 800 vehicles per day (vpd), along Nicholas Street by 200 vpd, and a decrease of 2,000 vpd along Hawkins Drive.

# 6.0 RECOMMENDATIONS

## 6.1 Concept Development

The process of analyzing data, traffic flow, forecasts, and local public and stakeholder input is designed to identify, screen, and prioritize future projects. The goals of such projects can include one or more site-specific objectives such as safety, connectivity, congestion mitigation, multi-modal services, and economic development. Initial concepts to improve the study area and support future growth were developed based on reviews of existing geometric deficiencies, existing and future traffic operations, crash concentrations, and field reconnaissance; and input from the project team, community leaders, and the public. For this study area, geographically, the recommendations generally relate to the following areas:

- US 62 (N. Mulberry Street) Corridor — Improvements using the existing roadway and infrastructure.
- The approximately 0.75-square-mile undeveloped area **(Figure 42)** bounded by the following: north of developments along US 62, west of Ring Road and the CSX track, Tunnel Hill Road, and east of I-65. This area is zoned for development, is near more intense land uses, is visible and accessible to I-65, but the existing roadway network and connectivity is notably deficient. New east-west and north-south roads — including a grade-separated crossing of the CSX track and I-65 — either should be constructed or, at a minimum, should have their corridors defined for right-of-way preservation prior to development plan approvals by the City and/or County.

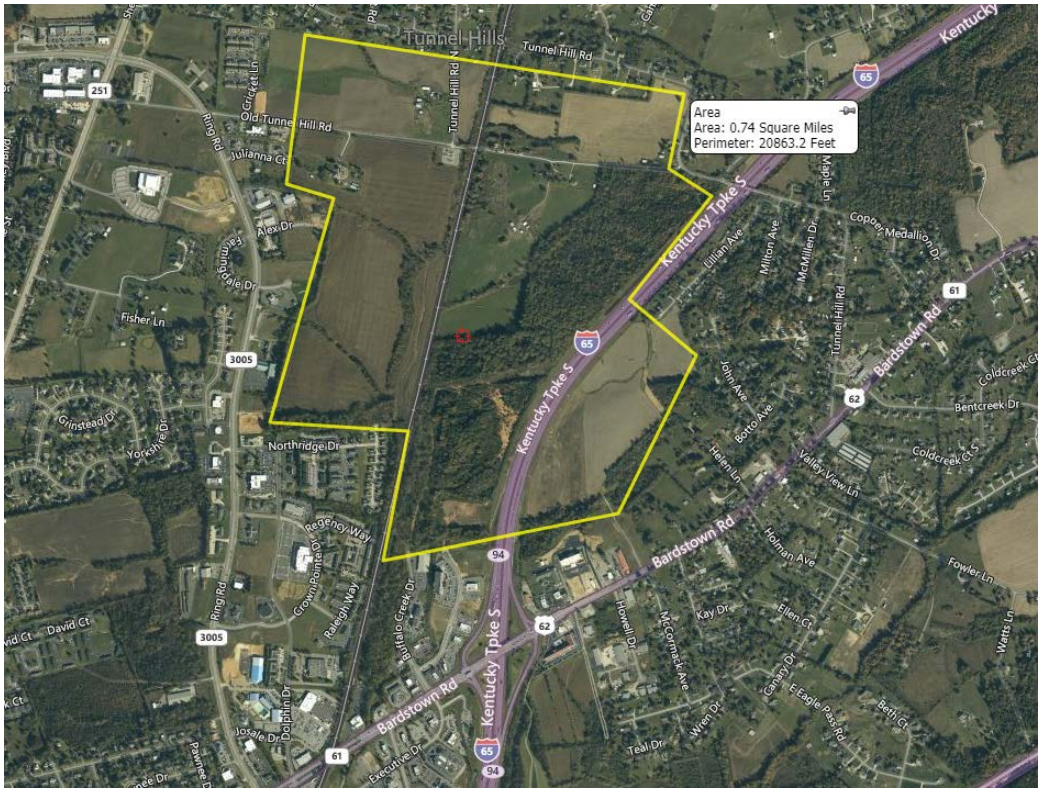



Figure 43. Area Zoned for Development

- East of I-65 — This area lacks adequate roadways to carry large traffic volumes continuously from north to south, and the northern portion of this area offer only one way west of I-65 via Springfield Drive. From US 62 south to US 31W south of town a host of new roadway connections have been considered to meet the travel demand and support long-term growth in this area. These proposed connections include bridging over the Martha Lane Collins - Blue Grass Parkway (BG Parkway); reestablishing connections cut off by the city reservoir; and, in the south, extending Ring Road to the Lincoln Parkway. These range in priority from short term to long term.

Multiple projects were developed in these areas along with various other spot improvements throughout the study area — including a variety of sidewalk connections, multi-use paths, right-turn lanes, and intersection realignments — to address Elizabethtown's existing transportation needs and prepare for future growth. Each recommended project was presented to the team, reviewed, edited, and ultimately sorted and ranked into three groups:

- **Short-Term** improvement concepts address major, existing problems, tend to be lower cost projects, and should be considered in the near future.
- **Long-Term** improvement concepts address larger or future problems and deficiencies in East Elizabethtown's roadway network. The majority of these are relatively high-cost projects, often requiring additional right-of-way or additional project development activities and will be development driven.

- **Local** improvement concepts address deficiencies in public facilities and would likely fall to local groups to fund and implement.

**Figure 43**, the following sections, and the single-page project sheets in **Appendix F** give details specific to each project, which are listed by priority and ranking.

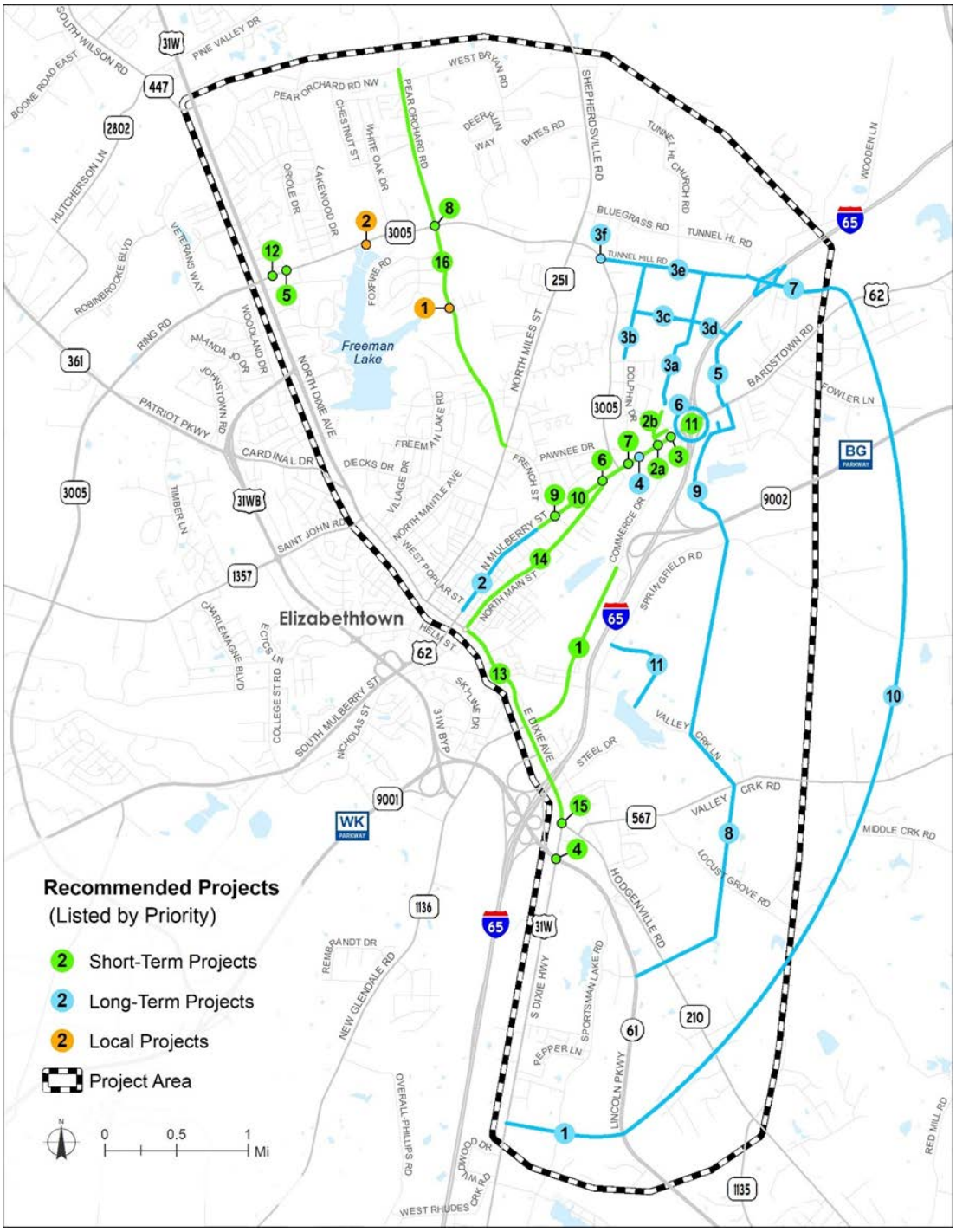


Figure 44. Recommended Projects

## 6.2 Short-Term Priorities

Recommendations for short-term projects address high-crash locations, major congestion issues, pedestrian safety, connectivity holes in the network, and other the major issues currently facing East Elizabethtown motorists, cyclists, and pedestrians.

1) Extend Commerce Drive south to Hawkins Drive

Regarding new roadway connections, the highest priority should be the already-planned (CHAF ID: IP20070175) extension of Commerce Drive from its southern terminus 1.3 miles south, including Commerce Drive through the Beechwood Subdivision area, to US 31W, as illustrated in **Figure 44**.


Figure 45. Extension of Commerce Drive

This connection would:

- Attract traffic from US 62/N. Mulberry Street, N. Main Street, and the Square.
- Improve this area of Elizabethtown's network connectivity.
- Connect a low-income area to the commercial center at US 62 and I-65.
- Attract local trips from I-65.
- Provide access to the Buffalo Lake and trails and recreational facilities.
- Increase economic development opportunities, per the roads name.

This future connection should be located to minimize drainage and impacts to Buffalo Lake, nearby streams, and the floodplain area, as well as to provide trailhead connectivity. The road should also include an 8-to-12-foot-wide multi-use path along the west side to provide safe access for bicyclists and pedestrians heading to/from the Buffalo Lake recreational area, the residential areas in the south, and the commercial areas in the north. This recommendation is in concert with the 2017 *Elizabethtown Trails Master Plan*, the source of **Figure 45**.

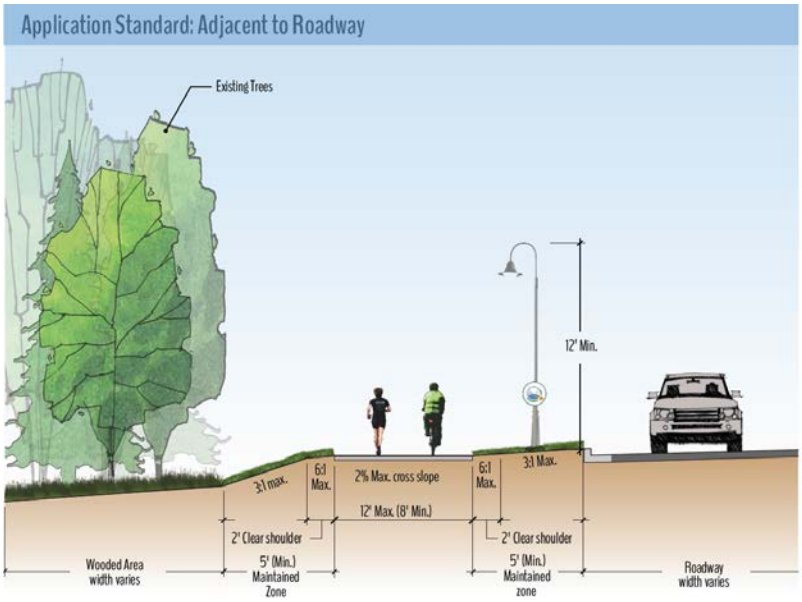



Figure 46. 2017 Elizabethtown Trail Master Plan Application Standard

The cost estimate based on SHIFT[18] is $13,340,000.

2) US 62/Commerce Drive Intersection

2a) Update Intersection Alignment

This project involves alignment updates to the complicated US 62/Commerce Drive intersection. Currently, the intersection has a skewed alignment and confusing signal phasing that neglects left-turning vehicles on the northern leg. The proposed improvements would provide a more straight angled, four-leg alignment, updated signal phasing, and offset left-turn lanes on US 62, as shown in **Figure 46**. These updates would improve sight lines and allow safer turning movements.

[18] Ibid., p. 39.


Figure 47. US 62 at Commerce Drive Intersection Concept

The planning level cost estimate, not including right-of-way or utilities, is $80,000.

2b) New Connection from Commerce Drive to Buffalo Creek Drive

This project would address the issues at the US 62/Commerce Drive intersection as a part of a proposed new connection beginning at the intersection and extending north then east to Buffalo Creek Drive. Completing this project would require the purchase of a gas station and other properties. The alignment should be given further attention, taking into consideration the potential environmental impacts, business impacts, and future development.

This project would provide congestion relief by attracting local trips and turning movements away from the Buffalo Creek Road intersection, and by providing the added benefits of moving turning traffic farther from the I-65 interchange and improving the connectivity to the area of expected development.

The planning level cost estimate, not including right-of-way or utilities, is $5,230,000.

3) US 62/Buffalo Creek Drive Intersection

The US 62/Buffalo Creek Drive intersection is less than 200 feet from the adjacent I-65 interchange. Buffalo Creek Drive attracts local and interstate trips because it is the only way to access multiple fast-food restaurants and a coffee shop, making the intersection extremely congested, especially during peak hours. Because of the heavy traffic volumes and proximity to the intersection, the recommendation is to complete a dedicated intersection traffic study that would provide an in-depth traffic analysis, identify specific deficiencies, explore improvement alternatives, and identify the best methods to address the intersection's congestion and other issues.

The cost estimate for a basic intersection study is $50,000.

4) US 31W/Lincoln Parkway Intersection

The US 31W/Lincoln Parkway intersection has multiple storage and spatial issues that can be improved upon. The proposed improvements include:

- Restriping the intersection.
- Improving lighting and other aesthetic elements.
- Adding a right-turn lane from Lincoln Parkway WB to Dixie Avenue NB.
- Adding a second NB travel lane on the northern leg on Dixie Avenue
- Adding a second left-turn lane on EB Lincoln Parkway to NB Dixie Avenue.
- Adding a right-turn 'slip ramp' from EB Lincoln Parkway to SB Dixie Avenue.
- Adding a second left-turn lane on NB Dixie Avenue to WB Lincoln Parkway.
- Looking into other traffic safety improvements.

The additional turning and travel lanes will reduce congestion and waiting time at the intersection, making travel through the intersection smoother and improving safety at that location.

The planning level cost estimate, not including right-of-way or utilities, is $1,560,000.

5) Ring Road/Lowes Drive Intersection

To improve congestion on Ring Road, the project would add a dedicated right-turn lane leading up to the Ring Road/Lowes Drive intersection. This addition will alleviate some congestion on Ring Road westbound caused by right turns into Lowes Drive. Drivers turning right onto Lowes Drive will not have to wait on thru traffic through an entire light cycle for through traffic to clear the intersection, and thru traffic will not have to slow down or stop for right-turning vehicles.

The planning level cost estimate, not including right-of-way or utilities, is $910,000.

6) US 62/Main Street/ Pawnee Drive Intersection

US 62 has several ill-defined, wide-open median cuts used to make U-turns for accessing side streets and businesses. Multiple conflict points contribute to driver confusion and crashes. Therefore for the section of US 62 at Main Street and Pawnee Drive, the project would add a dedicated right-turn lane from US 62 WB to Pawnee Drive and reconfigure the median, as shown in **Figure 47**.


Figure 48. US 62 at Main Street/Pawnee Drive Intersection Concept

These updates will reduce conflicts points and provide safer turning movements from US 62 onto Main Street, Pawnee Drive, and business entrances; and provide dedicated locations and adequate space for safe U-turns. The added right-turn lane will reduce congestion on US 62.

The planning level cost estimate, not including right-of-way or utilities, is $1,020,000.

7) US 62/Dolphin Drive Intersection

Improvements recommended on US 62 at Dolphin Drive involve adding a right-turn lane from WB US 62 to NB Dolphin Drive, redefining the median to create more defined cut through points, and striping to improve left-turn movements from US 62, as shown in **Figure 48**.

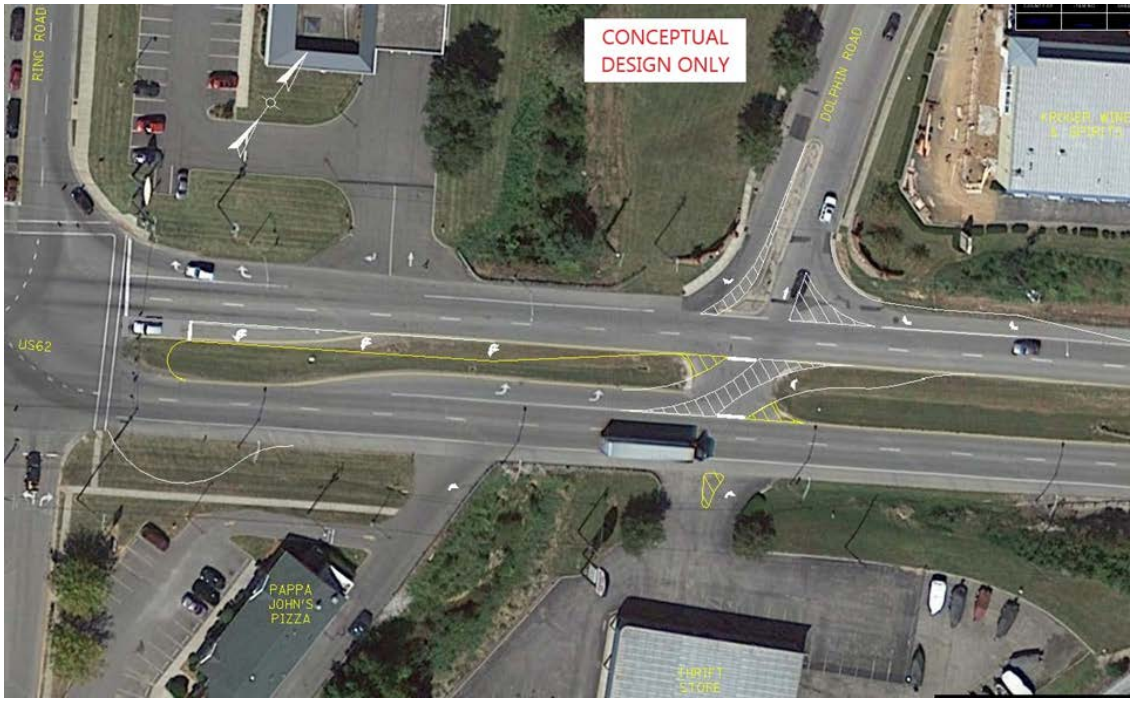



Figure 49. US 62 at Dolphin Drive Intersection Concept

The planning level cost estimate, not including right-of-way or utilities, is $240,000.

8) Pear Orchard Road/Ring Road Intersection

To address congestion and rear-end crashes at the Pear Orchard Road/Ring Road intersection, add a dedicated right-turn lane from EB Ring Road to SB Pear Orchard Road will reduce thru-traffic congestion on Ring Road eastbound caused by right-turning vehicles and allow right-turning vehicles to turn without waiting on thru traffic.

The planning level cost estimate, not including right-of-way or utilities, is $360,000.

9) US 62/French Street Intersection

On US 62 at French Street, the proposed project would redefine and offset the left-turn lanes at the intersection as shown in **Figure 49**.


Figure 50. US 62 at French Street Intersection Concept

The planning level cost estimate, not including right-of-way or utilities, is $150,000.

10) US 62 from Brook Street to Buffalo Creek Drive

To address pedestrian needs, this project would fill in missing sidewalk sections along the north side of US 62 from the existing sidewalk's terminus near Brook Street northeast to Buffalo Creek Drive. Aesthetic upgrades should be included when feasible. The project will connect pedestrians in multiple neighborhoods to groceries, pharmacies, restaurants, and other important businesses, and likely make the area more appealing to local residents and visitors.

The planning level cost estimate, not including right-of-way or utilities, is $640,000.

11) US 62 @ I-65 Overpass

To continue the pedestrian connectivity along US 62, the proposed project would create a fenced-off pedestrian walkway along one side of the overpass. The walkway would provide better connectivity between residences and businesses on either side of the interstate and improve pedestrian safety on the overpass.

The planning level cost estimate, not including right-of-way or utilities, is $1,340,000.

12) Ring Road in front of Murphy Express and at Walmart Lane

One of the most congested and crash prone stretches of roadway is adjacent to the Ring Road and US 31W intersection. Many past projects have focused on this area and some improvements have already been made. The recommended next step is to address crashes and conflict points approaching the major intersection. The project would add temporary median barriers, such as flexible delineated posts, on Ring Road in front of the adjacent Murphy Express business entrance to prevent dangerous left turns to and from the business. Traffic patterns and crashes should be assessed before and after project completion to determine the benefit of the barrier, and then a more permanent solution can be considered.

The planning level cost estimate, not including right-of-way or utilities, is $70,000.

13) US 31W from KY 210 north to the downtown square

This project would fill in missing sidewalk sections and make other pedestrian facility and aesthetic improvements so the area would become more accessible and appealing to pedestrians and potential development.

The planning level cost estimate, not including right-of-way or utilities, is $590,000.

14) N. Main Street from downtown to US 62

Recent updates including two mini-roundabouts have been constructed on N. Main Street to improve traffic flow and attract more people to use the corridor as an alternative to taking US 62. To attract pedestrian traffic and continue improving the aesthetics of the corridor, the broken, narrow sidewalks would be repaired or replaced and new sidewalks would be added where there are missing pedestrian facilities.

The planning level cost estimate, not including right-of-way or utilities, is $610,000.

15) US 31W/KY 210 Intersection

To improve the pedestrian safety at the US 31W/KY 210 intersection, the proposed project would add pedestrian facilities along Dixie Avenue and Hodgenville Road leading up to the intersection and multiple pedestrian crossings at the intersection.

The planning level cost estimate, not including right-of-way or utilities, is $550,000.

16) Pear Orchard Road from KY 251 north to Pear Orchard Road NW

This short-term priority project recommendation would construct a multi-use path on the west side of Pear Orchard Road starting at KY 251 and extending north to Pear Orchard Road NW. Sidewalks are absent in this area, and the roadway can be treacherous for bicyclists. A multi-use path

would allow pedestrians and cyclists to travel through the area more safely to access its many amenities.

The planning level cost estimate, not including right-of-way or utilities, is $2,480,000.

## 6.3 Long-Term Priority Projects

Each project in this section is recommended because of potential future growth and should be considered as Elizabethtown grows and develops. Cost estimates given are based on the general project concept and are in 2021 dollars.

1) Ring Road extension from US 31W east to Lincoln Parkway

The southern part of Elizabethtown lacks connectivity between its major roadways and US 31W. This project will extend Ring Road from US 31W east to the Lincoln Parkway. (The extension of Ring Road to US 31W is included in the already planned I-65 interchange project in the southern portion of Elizabethtown).

The planning level cost estimate is $9,000,000.

2) US 62 from W Poplar Street to Brook Street

The existing traffic numbers and business density on US 62 northeast of the downtown square make this corridor an excellent candidate for a road diet. The recent mini-roundabout and other potential updates made to North Main Street are expected to draw some traffic away from this section of US 62, thus keeping the expected traffic numbers lower.

This project is a lane reconfiguration from 4 lanes to 3 lanes with dedicated bike lanes, and would include aesthetic upgrades when feasible. This would make the best use of the space and allow motorists and cyclists to use the area more safely and efficiently.

The planning level cost estimate, not including right-of-way or utilities, is $430,000.

3) Extensions and connections north of US 62

A series of projects should be considered long-term to support future growth in the approximately 0.75-square-mile area zoned for future development, as detailed above in **Section 6.1** and shown in **Figure 50**. The recommended projects include:

- Extending Buffalo Creek Drive north to connect US 62 to Old Tunnel Hill Road **(Blue).**
- Extending Dolphin Drive north to connect to Old Tunnel Hill Road **(Orange)**.
- Construct a new connector road over the CSX railroad from the proposed Dolphin Drive extension east to the proposed Buffalo Creek Drive extension **(Yellow)**.

- Construct a new connector road from proposed Buffalo Creek extension east across I-65 **(Pink)**.
- Repave and widen Old Tunnel Hill Road from Tunnel Hill Road west to Ring Road **(Green)**.
- Realign and improve the Tunnel Hill Road and Ring Road intersection to accommodate increased traffic **(Red)**.

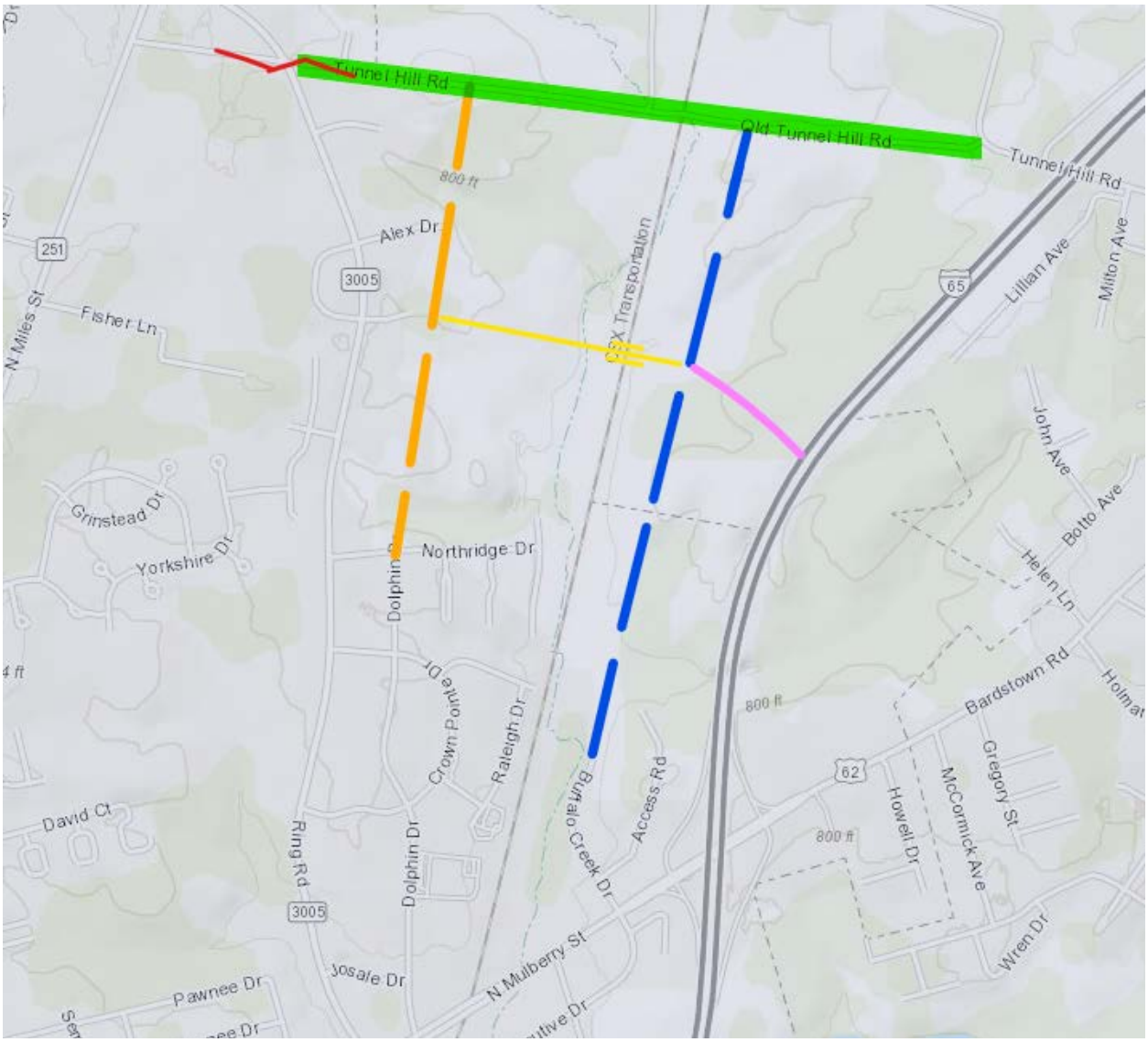



Figure 51. Conceptual Extensions and Connections north of US 62

Each project should be considered independently and given more dedicated research in the future as the area develops. The cost estimates for the projects range from $1.2 million for the intersection realignment to over $8 million for each new roadway.

4) US 62 @ CSX Railroad underpass

The CSX railroad underpass is one of the most dangerous and unappealing areas for motorists and pedestrians. The underpass is narrow, leaving no room for adding a safe pedestrian walkway. Providing at-grade crossing facilities to the north of the underpass was considered as an alternative for pedestrian connectivity, but CSX bylaws prohibit such action. Constructing a pedestrian bridge over the railroad was also considered but would be cost prohibitive, be difficult to construct given the terrain, and would not address all the problems the current bridge creates. Therefore, the recommendation is to construct a wider bridge with better defined travel lanes, wider shoulders, dedicated a pedestrian walkway; and to factor aesthetics into the bridge's design. This would be a large undertaking; however, as Elizabethtown grows, high priority should be given the project that would improve the aesthetic of the city's main entrance corridor, create pedestrian connectivity along US 62 in the study area, and create adequate facilities as traffic volumes increase.

The planning level cost estimate for a new bridge replacement is $12,500,000.

5) New access road from US 62 north

The area east of the I-65/US 62 interchange is developing quickly. To promote and support this growth an extension of the newly constructed Prosperity Drive should be constructed adjacent to the new hotel, as shown in **Figure 51**. (This road could be extended farther northeast in the future if a connection to Lillian Avenue is ever desired.)

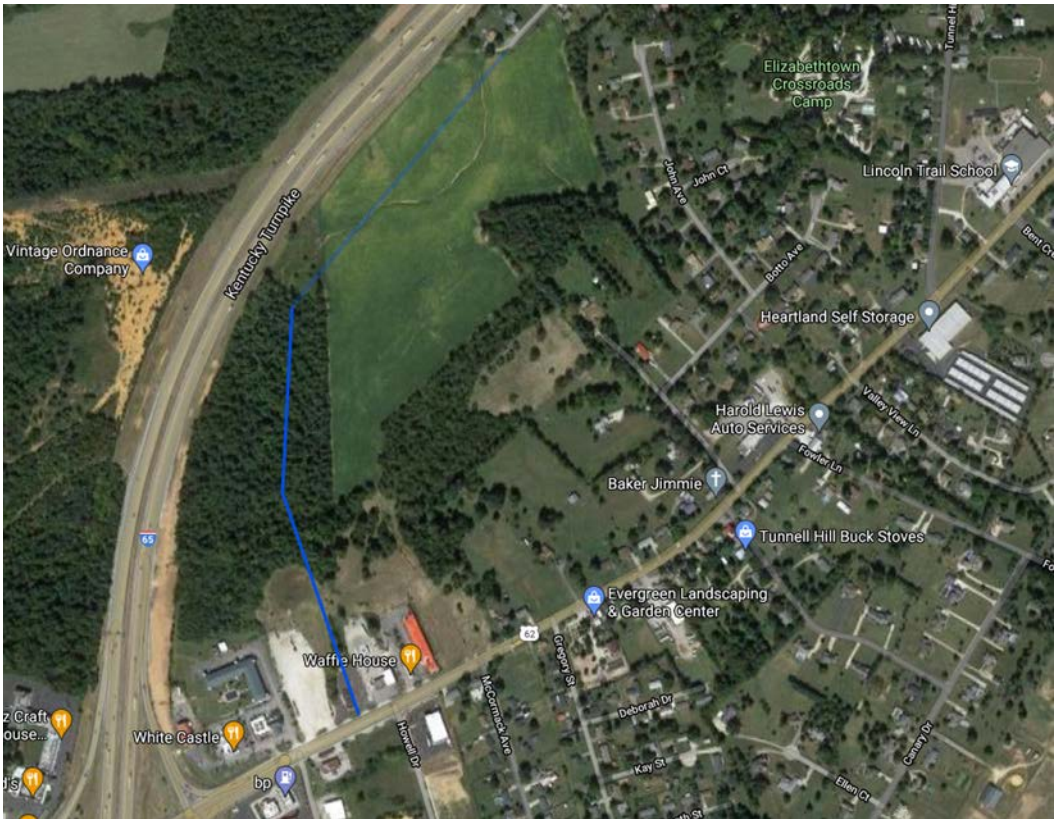



Figure 52. Conceptual Access Road from US 62 north

The planning level cost estimate, not including right-of-way or utilities, is $3,520,000.

6) US 62/I-65 Interchange

As Elizabethtown grows, the demands on the I-65 interchange at US 62 will increase and a redesign may become necessary to support the additional traffic. Multiple interchange options were considered. The interchange capacity analysis results from these evaluations are included in **Appendix B**. Based on these analyses, the recommendation is to redesign the interchange into a single point urban interchange (SPUI) when warranted to better accommodate increased traffic.

The planning level cost estimate, based on the recent SPUI redesign in Bowling Green, Kentucky, is $12,000,000.

7) New I-65 Interchange concept north of existing US 62 Interchange

Another means of supporting additional traffic accessing Elizabethtown from I-65 is to construct a new interchange on I-65 north of the existing interchange with US 62. This option would be worth consideration if the northern portion of Elizabethtown develops in the future. Because of the lack of dedicated traffic in that area at present, future traffic models do not show this interchange attracting

much traffic; however, traffic volumes will increase as the surrounding areas develop and become more desirable destinations.

The planning level cost estimate for a new interchange, based on the newest I-65 interchange and Ring Road extension, is $22,000,000.

8) New connection from Springfield Road south to Lincoln Parkway

As the eastern side of Elizabethtown develops, traffic demands will warrant the construction of larger connector roads. This project is a new connector road from Springfield Road south through Valley Creek Road to Lincoln Parkway.

The planning level cost estimate for this project is $36,000,000.

9) New connection from US 62 south to new Springfield Road

This project is a new connector road from US 62 south over Bluegrass Parkway to Springfield Road. This new roadway would promote development, provide much needed connectivity on the eastern side of Elizabethtown, provide an alternative route south, and pull some traffic off the congested US 62 route.

The planning level cost estimate for this project is $17,000,000.

10) East Elizabethtown connector

In addition to or as an alternative to the smaller-scale connector roads detailed in long term project 8 and project 9 above, this recommendation is to construct a new Ring Road-style connector east of I-65 to provide better access as this area develops.

The planning level cost estimate for a conceptual, Ring Road-style connecter road on the eastern side of Elizabethtown is $68,000,000.

11) New connection from Valley Creek Lane to Springfield Rd

If future traffic in the area develops, construct a new connector road around the Valley Creek reservoir from Valley Creek Lane northwest to Springfield Road, as shown in **Figure 52**.


Figure 53. Conceptual Connection over Valley Creek

The planning level cost estimate for this project is $4,030,000.

## 6.4 Local Projects

Recommended local projects involve making improvements to and around public areas at three trailheads. These projects will likely pull 100% of their funding from local, rather than state and federal, sources.

1) Pear Orchard Road @ Pirtle Interpretive Trailhead

The parking lot adjacent to the Pirtle Interpretive Trail and Emerald Cathedral Amphitheater is small and ill-defined. Additionally, there are no pedestrian facilities in the immediate area to connect the nearby neighborhoods or community buildings to the trail area, and at peak park hours there are heavy turning movements to and from the parking lot. The project would redesign and expand the parking lot, adding a drop-off zone and a second entrance/exit to help relieve congestion and conflicting movements within the parking lot; and add sidewalks and crosswalks leading up to the parking lot, as shown in **Figure 53**.

The planning level cost estimate, not including right-of-way or utilities, is $510,000.

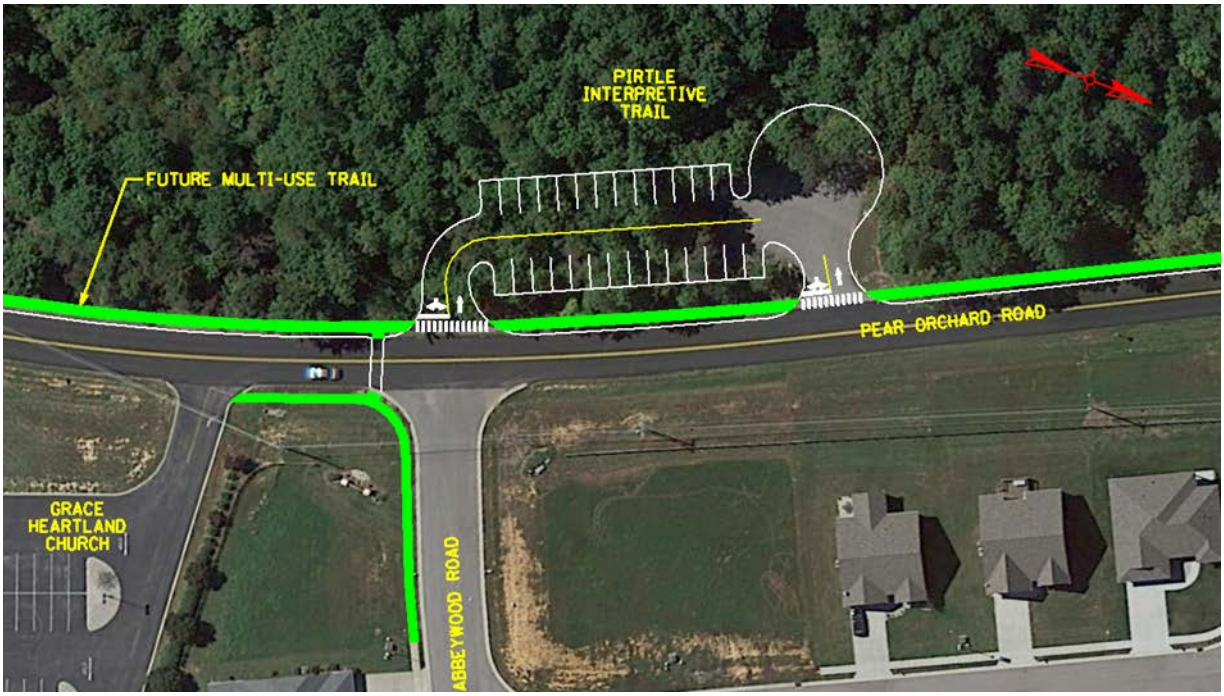



Figure 54. Conceptual Pirtle Interpretive Trailhead Improvements

2) Ring Road @ Freeman Lake Trailhead

The parking lot adjacent to the Freeman Lake Trail lacks sufficient parking or a drop-off area. Additionally, the right turns into the parking lot create congestion on Ring Road. The project would redesign and expand the parking lot, adding a drop-off zone and a dedicated right-turn lane leading up to the parking lot to relieve some congestion on Ring Road, as shown in **Figure 54**.

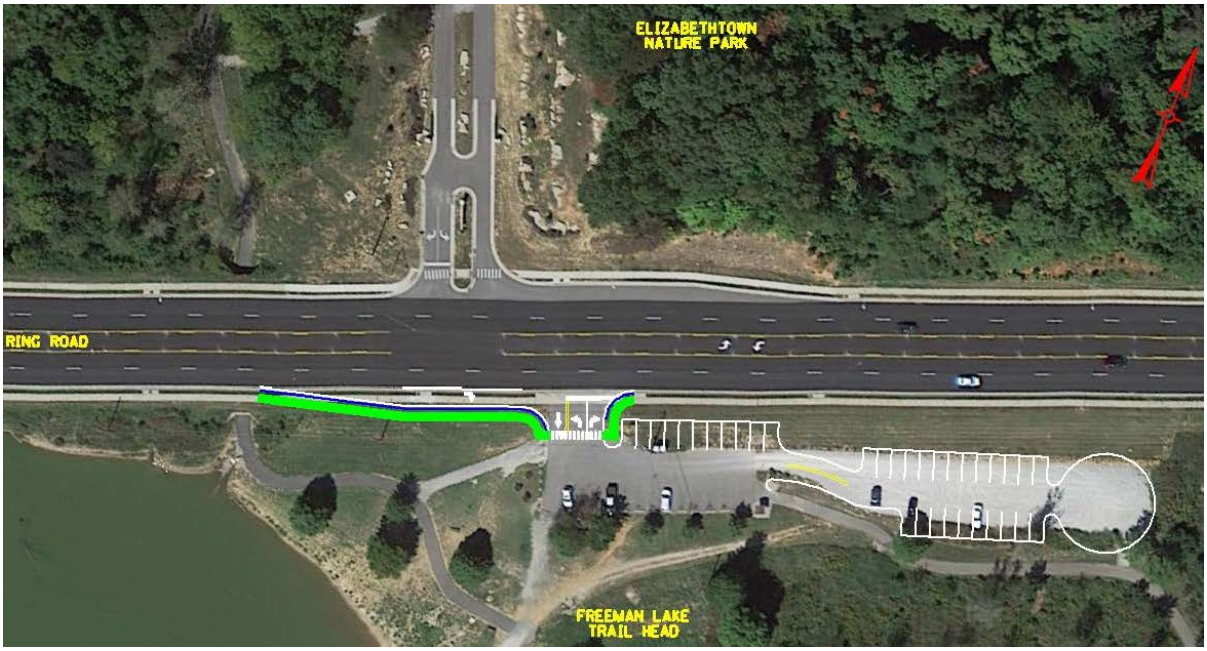



Figure 55. Conceptual Freeman Lake Trailhead Improvements

The planning level cost estimate, not including right-of-way or utilities, is $310,000.