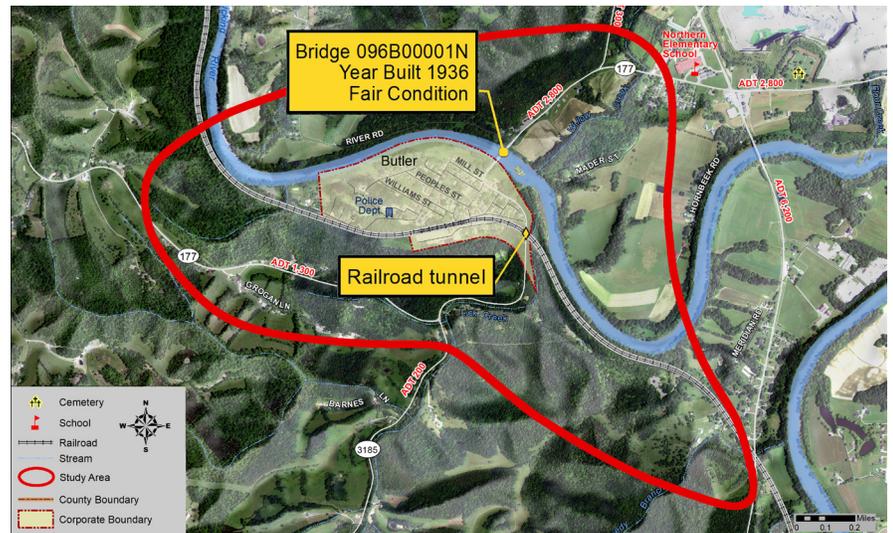
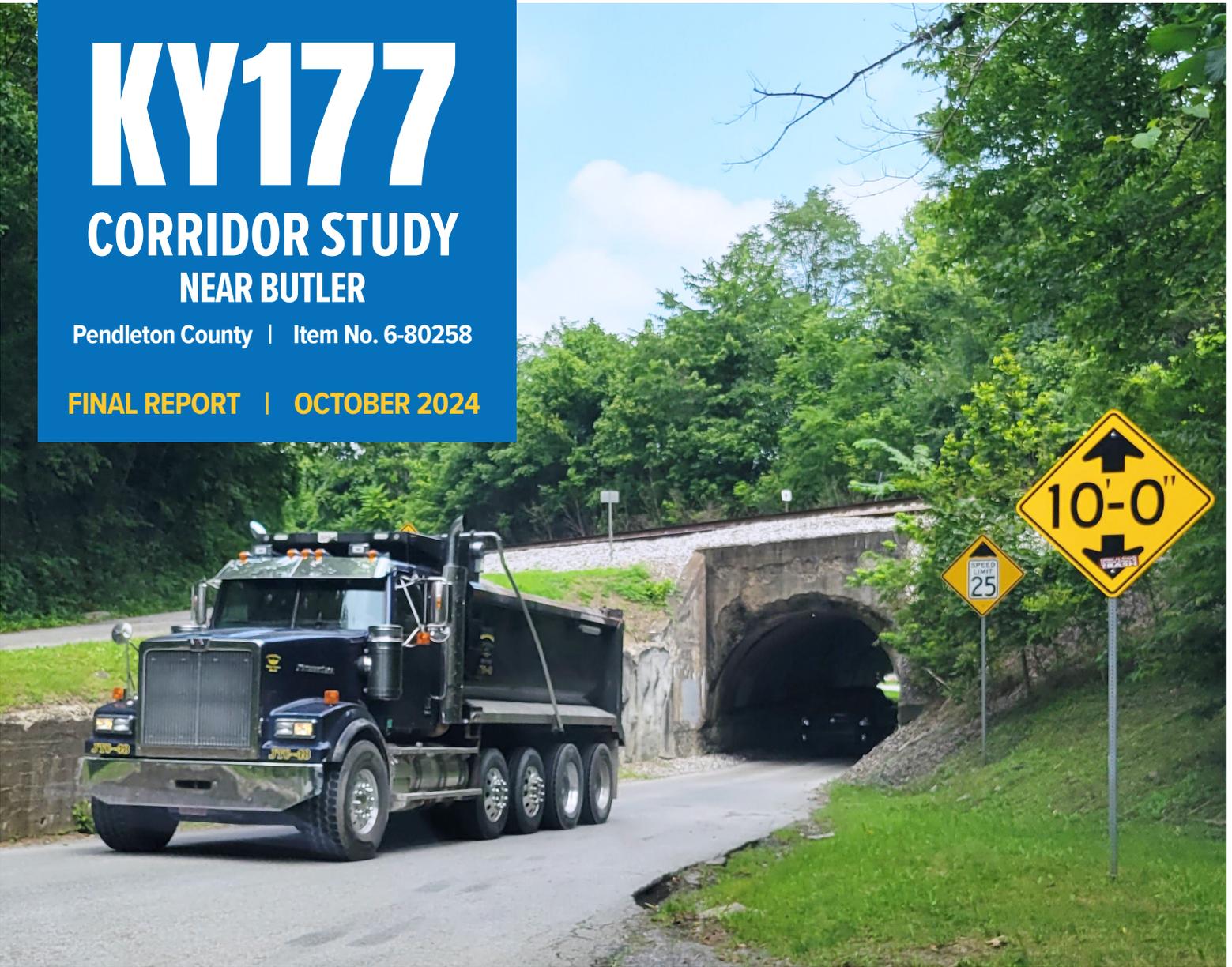


# KY177

## CORRIDOR STUDY NEAR BUTLER

Pendleton County | Item No. 6-80258

FINAL REPORT | OCTOBER 2024



PREPARED BY



IN PARTNERSHIP WITH



## EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated a corridor study for the KY 177 corridor near Butler in northern Pendleton County. Regionally, the corridor represents the sole east-west connection over a roughly 15-mile stretch in the rural highway network. However, two key constraints—a bridge over the Licking River and a tunnel beneath a railroad line—limit mobility along the corridor, especially for truck traffic. A large quarry and asphalt plant along KY 177 east of US 27 contribute to the number of commercial vehicles traveling throughout the area. The study area (**Figure ES-1**) encompasses milepoints (MP) 4.2 to 7.0 of KY 177, plus a buffer around the community to consider new alignment connections.

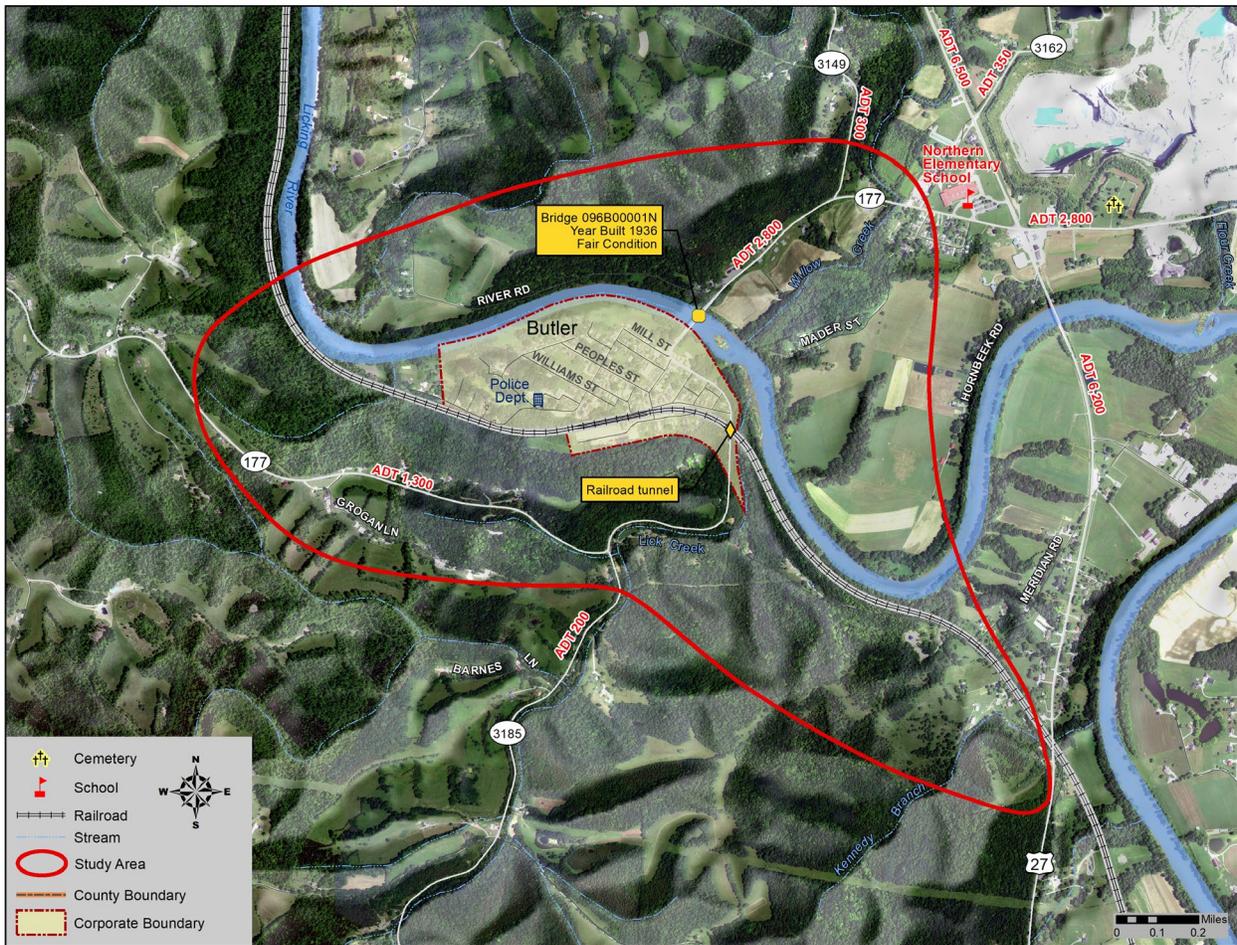


Figure ES-1: Study Area Limits

Two funded projects in Kentucky’s 2024-2030 Enacted Highway Plan overlap the 6-80258 study area. **Table ES-1** provides key facts for each, including current funding allocations.

Table ES-1: Funded KY 177 Projects in Study Area

Location	Description	Source	Phase	Year	Amount
KY 177 MP 5.8-9.2	<b>Item No. 6-80258:</b> Reconstruct KY 177 from KY 3185 in Butler to KY 467	SPP	Design	2025	\$2.0M
KY 177 MP 5.0-5.9	<b>Item No. 6-80310:</b> Reconstruct KY 177 from Licking River Bridge in Butler to KY 3185	SPP	Design	2025	\$2.0M
			ROW	2027	\$0.6M
			Utility	2027	\$1.1M
			Const.	2028	\$26.4M

This 6-80258 study area also overlaps a small portion of a larger, long-term vision to create an improved east-west connection in northern Kentucky, which has been discussed for decades. Most recently, KYTC's 2021 *Northern Kentucky Outer Loop* planning study (Item No. 6-458)<sup>1</sup> explored new east-west connectors in southern Boone, Kenton, and Campbell counties or northern Gallatin, Owen, Grant, Pendleton, and Bracken counties. The purpose was "to stimulate economic opportunities through regional mobility by providing a safer and more efficient east-west corridor between I-71 and the AA Highway (KY 9)."

### Existing Conditions

KY 177 is classified as a rural major collector route, providing one of few east-west corridors for the region. The nearest east/west freight routes between US 27 and I-75 are I-275 to the north or US 62 to the south. KY 177 has two 11-foot-wide driving lanes with one-foot paved shoulders for most of its length. The speed limit varies: posted at 25 mph in town, 35 mph between US 27 and the river, and 55 mph continuing south/west.

The steepest section in the study area follows the hill west of the KY 177/KY 3185 intersection. At this location, eastbound KY 177 travels down an 11.5% grade with a stop-control intersection in a horizontal curve at the bottom. The sharpest KY 177 curve in the study area is at the bottom of the Licking River bridge coming into town.

Two structures limit mobility for larger vehicles.

- Bridge 096B00001N carries KY 177 over the Licking River. It stretches between KY 177 MP 4.85-4.97. It is in Fair condition but is weight posted to limit loads—restricted to 20-32 tons, depending on axle configuration. It is 24 feet wide (curb to curb) and approximately 15 feet above the river.

<sup>1</sup> Online at <https://transportation.ky.gov/Planning/Pages/Planning-Studies-and-Reports.aspx>

- A quarter mile south, KY 177 runs below the CSX railroad via a low-clearance, narrow tunnel near MP 5.3. It lies in the floodplain and floods during high water events.

KY 177 carried up to 2,800 vehicles per day (vpd) in 2023, with the busiest stretch near the school, northeast of the study area. Truck traffic comprised 10-20% of peak hour volumes. No cyclists and few pedestrians were observed. Based on population projections and the statewide travel demand model, traffic is projected to increase to 3,000 in the 2045 No-Build scenario, including 13% trucks. No capacity concerns were identified in either scenario.

During 2018-2022, 32 crashes were reported on state routes in the study area. There were no fatalities, but six crashes resulted in injuries. Single vehicle crashes are the leading crash type, accounting for 75% of all reported crashes. Overall, 34% of crashes occurred during nighttime, 41% occurred in wet or icy conditions, and 44% were roadway departures, which tend to be more severe than other crash types. The highest cluster of crashes was at the KY 177/KY 3185 intersection, where eastbound KY 177 descends a steep grade to a stop-condition in a horizontal curve. The segment south of the Licking River Bridge (MP 5.0-7.0) and the KY 177/KY 3149 intersection result in a poor Level of Service of Safety (LOSS) rating, indicating crash frequencies greater than predicted by mathematical formulas.

### Build Concepts Considered

Any Build concepts developed should address both local and regional transportation demands: local access for the community of Butler and regional freight access as part of the larger highway network.

Traffic forecasts estimate up to 3,400 vpd may use a new bypass around Butler in 2045. If part of a larger regional connection from I-75 to US 27, improved KY 177 could carry up to 4,500 vpd in 2045. A two-lane highway provides adequate capacity for either forecast daily traffic volume.

The team explored a wide range of corridors to ensure all possible/practical solutions were considered before any were eliminated. Build concepts represent high-level corridors with broad assumptions rather than an alignment-level decision. Regional connectors were organized geographically, with the most competitive in each category advancing for LO/S input. Small-scale spot improvements at key intersections were initially considered, but do not satisfy both study goals unless joined with a larger corridor solution. The initial range of Build corridors considered are presented in **Figure ES-2**.

Corridors north and south of town effectively bypass Butler, requiring a river crossing at or near the current truss to preserve local access. Corridors in town lead to more home and business relocations, especially for options that create a grade separated rail crossing. Lower design speeds reduce curve radii but may be less suited for regional freight trips. Corridors crossing in or near town tend to be lower in elevation with shorter span lengths, raising concerns about emergency access during high-water events. Construction costs ranged from \$16-80 million in 2023 dollars.

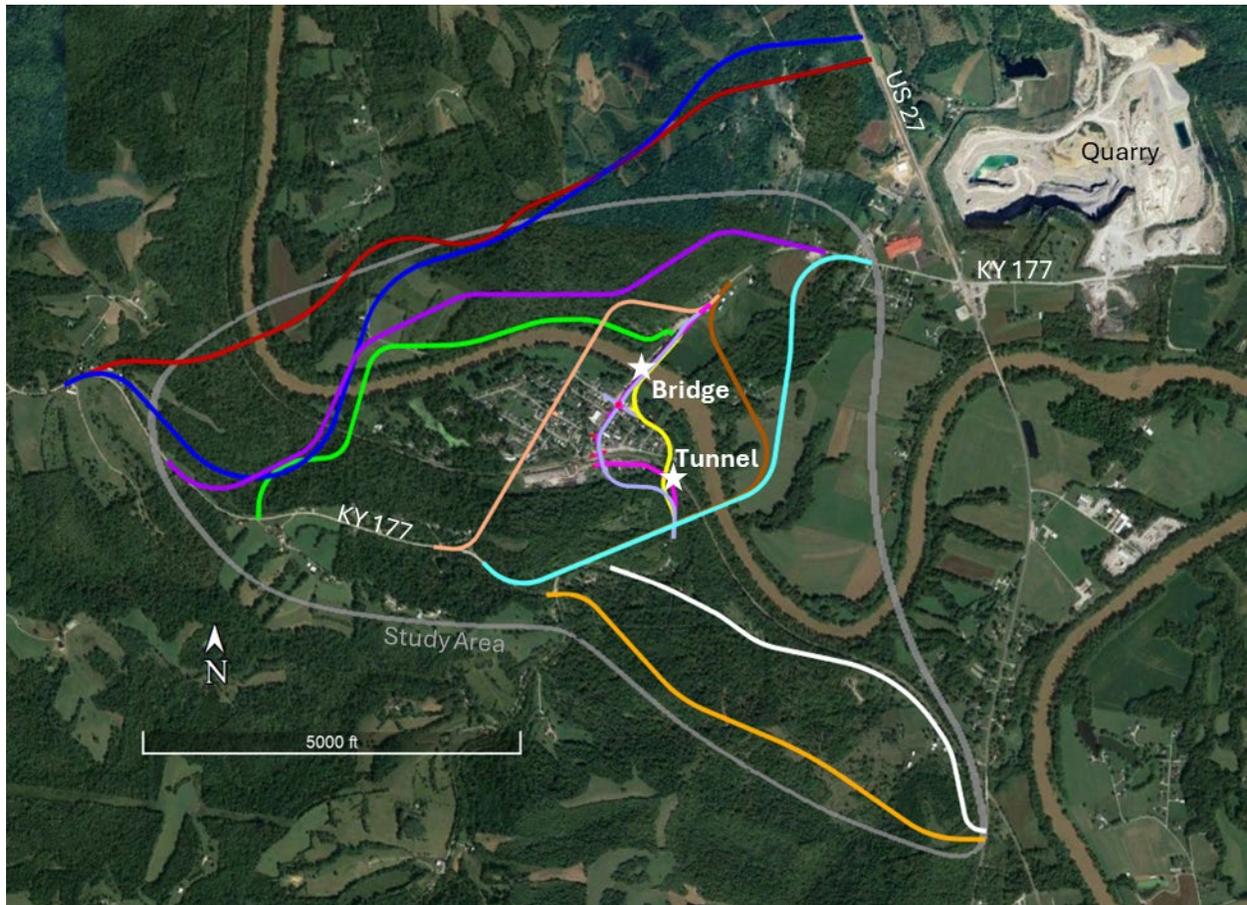


Figure ES-2: Initial Build Corridors

### Meetings

The project team met at three milestones throughout the study process and presented a subset of Build corridors to local officials/stakeholders (LO/S) during June 2024. Key local input included concerns about economic impacts of a bypass, access during high-water events, and preservation of the historic truss. Most attendees preferred the Yellow corridor as it balances local access without major disruptions for the city. However, safety improvements at the KY 177/KY 3185 intersection are also important.

### Recommendations

The initial set of 12 corridors was screened down to a combination of two Build concepts recommended for further consideration. Variations of the Yellow and Teal corridors merit further exploration during future project development phases.

- **Yellow Base** constructs a new bridge east of the existing truss, follows KY 177 around the eastern edge of town, overpasses the railroad, and ties back to existing KY 177 near MP 5.4.

The total length is 0.7 miles. The replacement river crossing is similar to the existing, which does not span the entire floodway. This option could be paired with the spot improvement at KY 177/KY 3185 (**Figure ES-3**) to address local concerns.

- **Yellow + Tail** mirrors Yellow Base but extends the southern end up the hill, connecting to existing KY 177 near MP 6.0. The length totals 1.1 miles.
- **Yellow/Teal Hybrid** combines the Teal bypass with a shortened version of Yellow, relying on a new bypass to provide cross-river connectivity for the city. Together, it is 1.9 miles long. The new river crossing is longer and higher to span the entire floodway; the existing truss would no longer be a necessary component of the state highway system. This option has a higher design speed, more consistent with the vision of a regional freight connector.



Figure ES-3: KY 177/KY 3185 Curve Realignment

Cost estimates for the detailed study options are summarized in **Table ES-2**.

Table ES-2: Cost Estimates by Phase

Concept	D	R	U	C	TOTAL
Yellow Base	\$2M	\$5M	\$6M	\$20M	\$33 million
KY 177/KY 3185 Intersection	\$0.2M	\$0.2M	\$0.1M	\$1.3M	\$1.8 million
Yellow + Tail	\$4M	\$5.5M	\$6M+	\$40M	\$55 million
Yellow/Teal Hybrid	\$3M	\$9M	\$7.5M	\$30M	\$50 million

Alongside costs, impacts to the human and natural environment are another consideration when evaluating Build options. With similar corridors for the detailed study concepts, the type of impacts is

similar for each. **Figure ES-4** overlays the three detailed study options on the environmental overview map for reference.

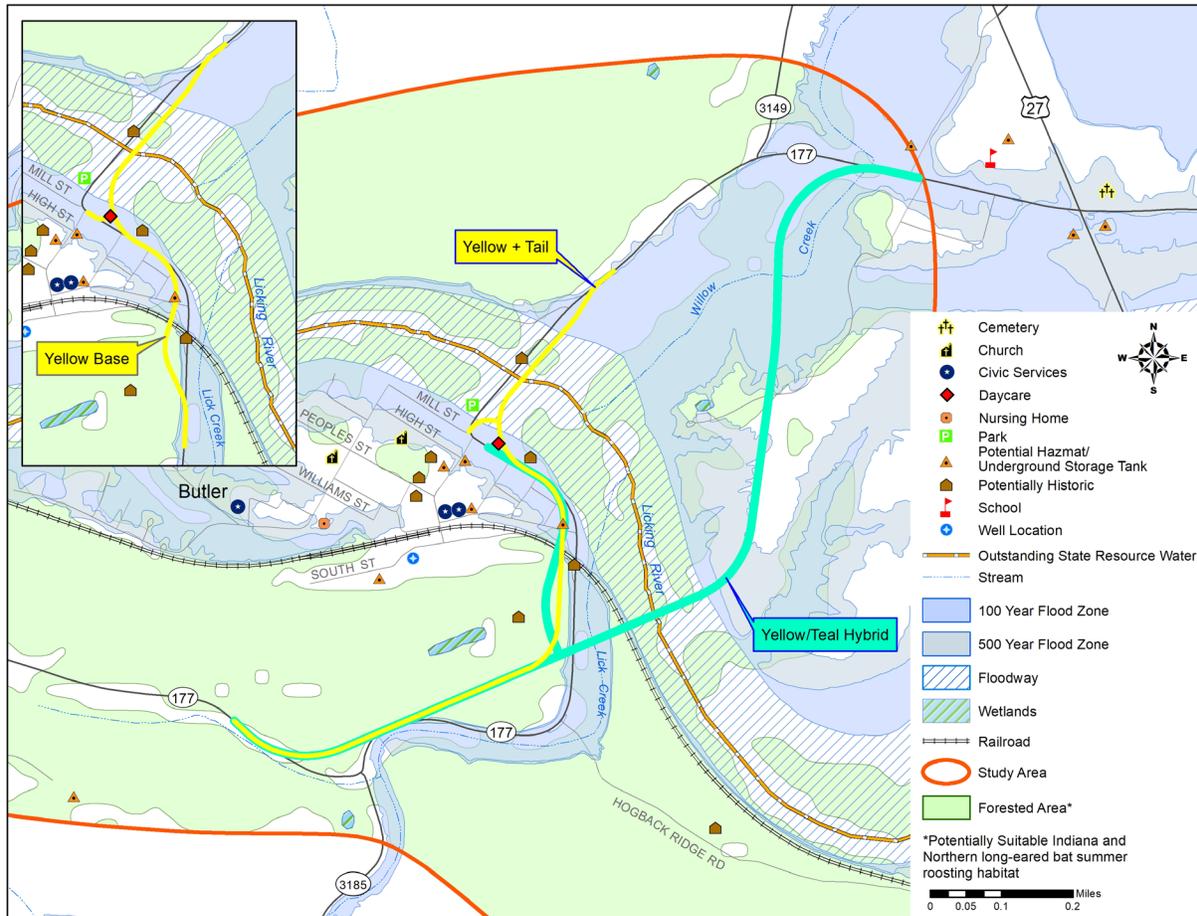


Figure ES-4: Detailed Study Options with Environmental Overview

- Each detailed study option impacts groundwater resources. Bridge work will require coordination with the US Army Corps of Engineers (USACE), the US Coast Guard (USCG), and Kentucky Division of Water (KDOW) for permits. While design-level decisions will determine elevations and explore specific impacts, floodplains cover much of the study area and will play a major role in project decision-making.
- The Licking River represents suitable habitat for protected mussel species; impacts will likely require a Biological Assessment. Seasonal survey restrictions may impact future project timelines. Impacts to endangered bat species can likely be processed through KYTC's Programmatic Agreement with seasonal clearing restrictions.

- KYTC's Geotech Branch identified "significant concerns" based on the terrain and underlying geology of the study area that will require consideration throughout any future design process.
- The Yellow corridors skirt around the eastern edge of Butler, reducing disruptions to the city center and more densely developed areas. However, any Build corridor in this area will result in an estimated 6-8 relocations. This includes a preschool-age daycare facility, which may be one of the only childcare service providers in the local community. Windshield surveys also suggest households near the railroad tracks and floodplain may represent low-income populations. Census data also indicates the region may contain concentrations of minority, age 65+, and/or disabled populations. Traditionally underserved populations should be provided opportunities for meaningful engagement throughout the decision-making process.
- Three potentially historic resources are near the detailed study corridors: the 1936 truss bridge, an I-House and outbuilding at 302 Mill Street, and the Alec Caldwell House (PD-2) which was not visible from public right-of-way. Measures should be taken to avoid or minimize impacts; should a Build concept advance with federal funding, formal field surveys and coordination with SHPO will be required to assess project effects to cultural historic resources.

Each of the three detailed study concepts warrant consideration during preliminary design.

Limited public involvement has occurred to date; engaging with key stakeholders and impacted property owners will be important during the design process. Engagement measures should be sensitive to potentially impacted environmental justice populations to ensure equal opportunities are provided.

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## Acronyms

ADA	Americans with Disabilities Act
CDAT	Crash Data Analysis Tool
CHAF	Continuous Highway Analysis Framework
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HIS	Highway Information System
KDOW	Kentucky Division of Water
KYTC	Kentucky Transportation Cabinet
LEP	Limited English Proficiency
LO/S	Local Officials/Stakeholders
LOS	Level of Service
LOSS	Level of Service of Safety
LWCF	Land and Water Conservation Fund
MP	Milepoint
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NBI	National Bridge Inspection
NEPA	National Environmental Policy Act
NKADD	Northern Kentucky Area Development District
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
ODOT	Ohio Department of Transportation
PDO	Property Damage Only
SHIFT	Strategic Highway Investment Formula for Tomorrow
SHPO	State Historic Preservation Office
SPP	State Priority Project
STIP	Statewide Transportation Improvement Program
TED	Transportation Enterprise Database
USACE	US Army Corps of Engineers
USCG	US Coast Guard
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
v/c	Volume-to-Capacity Ratio
vpd	vehicles per day

## 1.0 INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated a corridor study for the KY 177 corridor near Butler in northern Pendleton County.

Regionally, the corridor represents the sole east-west connection over a roughly 15-mile stretch in the rural highway network. However, two key constraints—a bridge over the Licking River and a tunnel beneath a railroad line—limit mobility along the corridor, especially for truck traffic. A large quarry and asphalt plant along KY 177 east of US 27 contribute to the amount of commercial vehicles traveling throughout the area.

Shown in **Figure 2**, the study area encompasses milepoints (MP) 4.2 to 7.0 of KY 177, plus a buffer around the community to consider new alignment connections. With a population around 650, Butler is one of two cities in Pendleton County and is located approximately 10 miles north of the county seat at Falmouth.

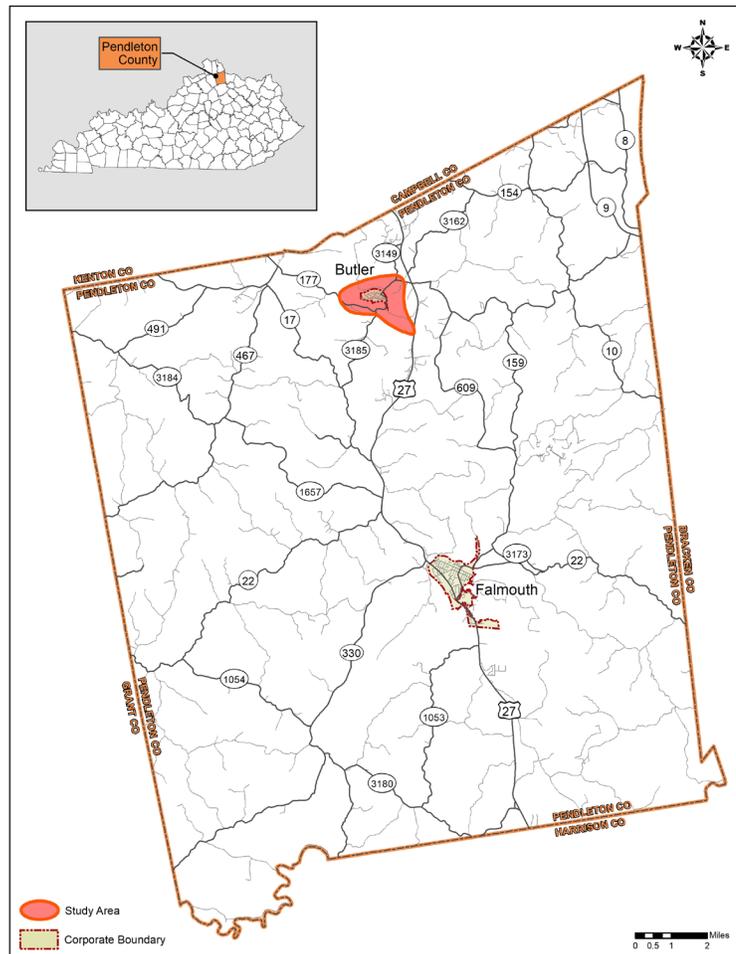


Figure 1: General Project Location

The goal of this study is to identify transportation needs, and then develop improvement concepts to address both local and regional transportation demands:

- The local community relies on the KY 177 Licking River Bridge for everyday access between homes, civic services, schools, etc.
- Regionally, the corridor is the only cross-river east/west highway link over a 15-mile stretch between Falmouth and the Northern KY metro area.



- In 2017, the *Brent Spence Strategic Corridor Study* (Item No. 6-431)<sup>2</sup> prioritized completion of the I-71/I-75 Brent Spence Bridge project (Item No. 6-17)<sup>3</sup> over an eastern Cincinnati Bypass concept (**Figure 3**, purple) intended to divert traffic away from the existing interstate corridor. It also suggested that a bypass may offer economic development benefits and enhance cross-river mobility, making the concept worth additional study.

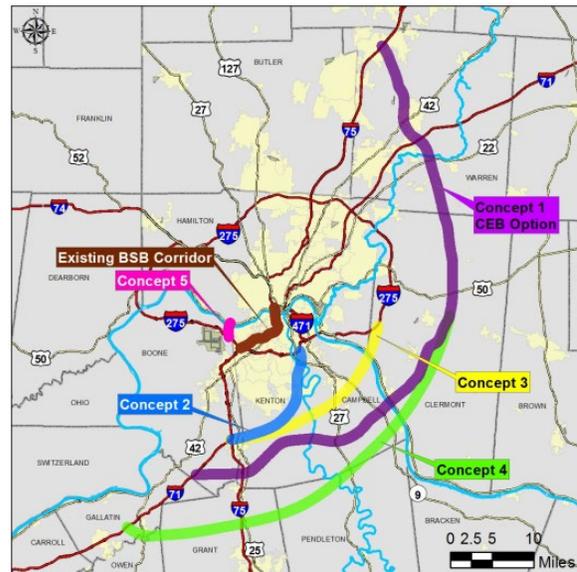


Figure 3: Cincy Eastern Bypass Concept

- In 2019, Ohio Department of Transportation (ODOT) released a finding to the Ohio General Assembly<sup>4</sup> stating, “construction of an eastern bypass may reduce traffic on the Brent Spence bridge in the year 2040. However, the reduction does not relieve travel congestion in the I-75 corridor... completion of the Brent Spence Bridge Corridor project should be the priority” and that “it is ODOT’s opinion that no further expenditures of funding and staff time be put toward the Cincinnati Eastern Bypass.”
- The 2021 *Northern Kentucky Outer Loop* planning study<sup>5</sup> (Item No. 6-458) explored new east-west connectors in southern Boone, Kenton, and Campbell counties or northern Gallatin, Owen, Grant, Pendleton, and Bracken counties. Such connections would serve the growing need for east-west travel within the region, connecting communities to resources along the I-71 and I-75 corridors and providing local opportunities for growth within the counties served. The purpose was “to stimulate economic opportunities through regional mobility by providing a safer and more efficient east-west corridor between I-71 and the AA Highway (KY 9).”

Four 6-458 Build concepts were studied in detail (**Figure 4**), with B1 and D2 running just north of the 6-80258 study area. Analyses compared environmental impacts, traffic benefits, socioeconomic effects, employment growth, and capital costs to evaluate each concept, with and without a potential future extension into Ohio. Cost estimates in 2019 dollars ranged from

<sup>2</sup> Online at <https://transportation.ky.gov/Planning/Pages/Planning-Studies-and-Reports.aspx>

<sup>3</sup> Online at <https://brentspencebridgecorridor.com/>

<sup>4</sup> Online at [https://2050.oki.org/wp-content/uploads/2020/04/ODOT-2019-Report-to-Legislature\\_w\\_attachment\\_Final.pdf](https://2050.oki.org/wp-content/uploads/2020/04/ODOT-2019-Report-to-Legislature_w_attachment_Final.pdf)

<sup>5</sup> Online at <https://transportation.ky.gov/NKYOuterLoop/Pages/Home.aspx>

\$1.2 to \$2.1 billion with the central section (I-75 to US 27) identified as the highest priority for three of the four Build concepts.

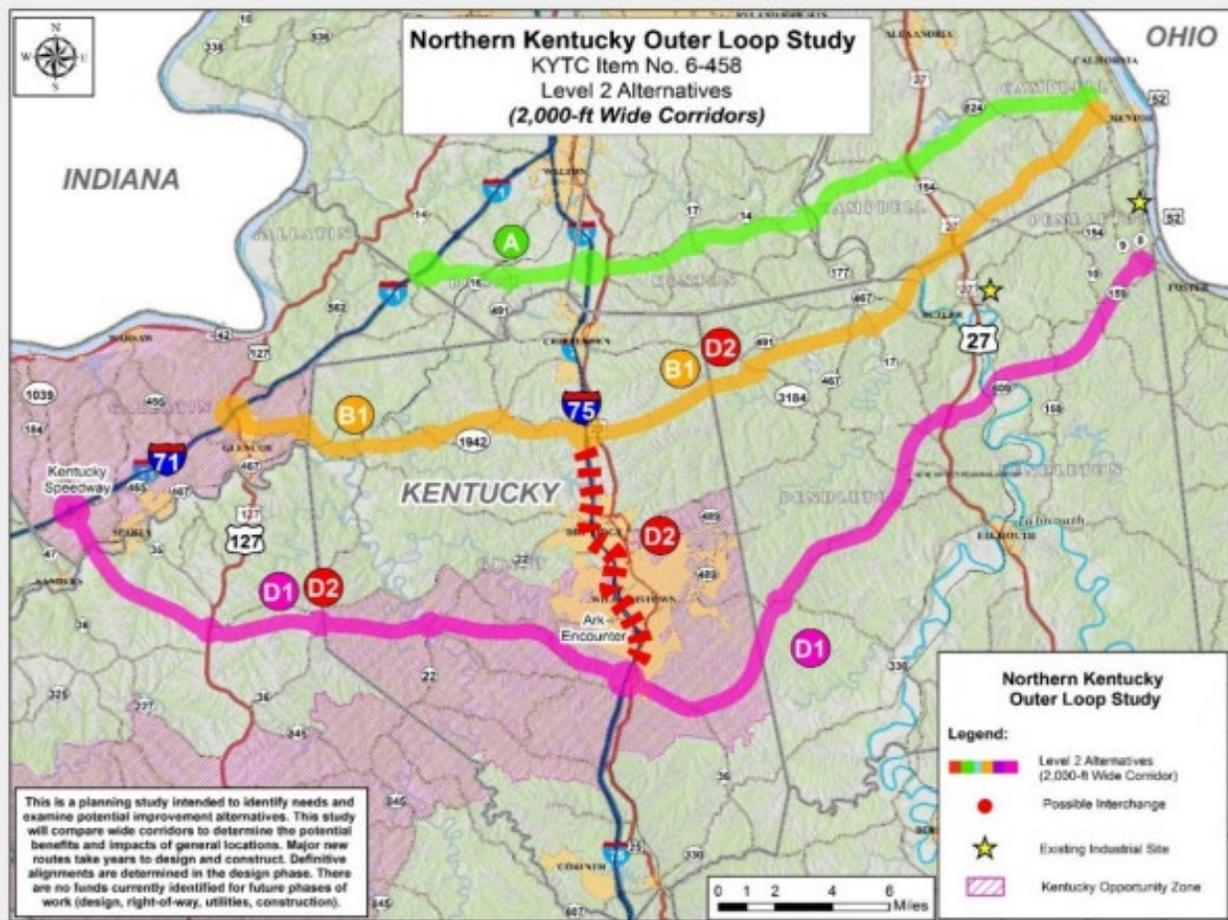


Figure 4: Tier 2 Corridors from 2021 NKY Outer Loop Study

## 1.2 COMMITTED AND PLANNED PROJECTS

Every two years, the Commonwealth’s transportation budget is established by the state legislature in its biennial highway plan. In the current *2024–2030 Enacted Highway Plan*,<sup>6</sup> two committed projects are identified within the study area, with a few others in the general vicinity. Other conceptual projects near the study area were compiled from the Continuous Highway Analysis Framework (CHAF)

<sup>6</sup> Online at <https://transportation.ky.gov/Program-Management/Pages/default.aspx>

database. The CHAF database is the starting point for the biennial SHIFT process<sup>7</sup> that evolves into the two-year budget cycle identified in Kentucky’s Highway Plan.

Active CHAF concepts and Highway Plan projects near the study area are shown in **Figure 5** with additional details summarized in **Table 1**.

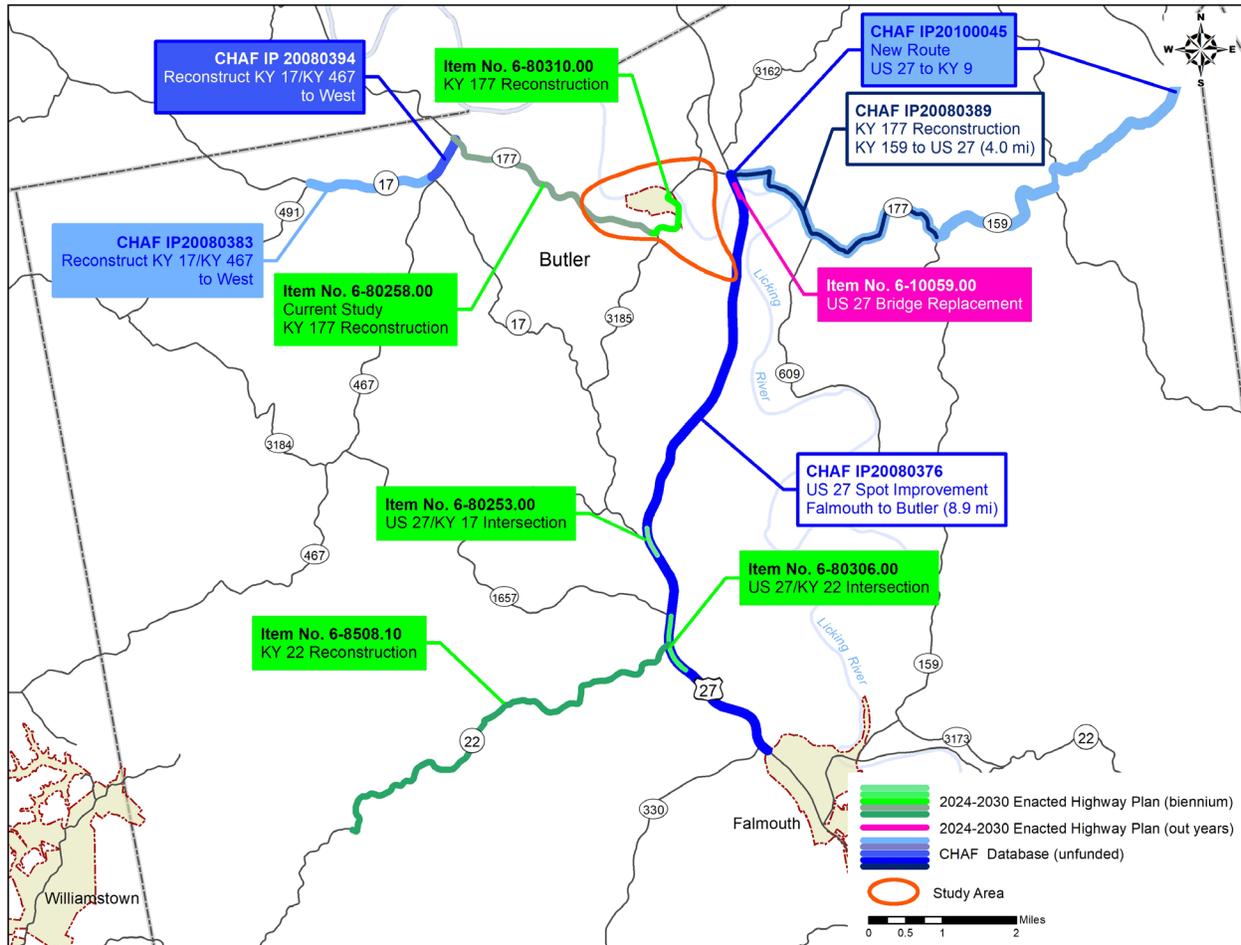


Figure 5: Nearby Transportation Projects

<sup>7</sup> SHIFT, or the Strategic Highway Investment Formula for Tomorrow, is a data-driven project scoring process to compare and prioritize statewide capital improvement projects to make better use of limited transportation funds in the Commonwealth’s biennial budget.

Table 1: Nearby Projects & Concepts

ID	Route & MP	Purpose	Biennium Funding
Item 6-8508.1	KY 22 4.3-10.4	Relocate KY 22 from Fryer Road/KY 330 to US 27	\$2.7M
Item 6-80253	US 27 11.6-12.0	Improve safety and mobility on US 27 at KY 22 intersection	\$0.8M
Item 6-80258 Current Study	KY 177 5.8-9.2	Reconstruct KY 177 from KY 3185 in Butler to KY 467	\$2.0M
Item 6-80306	US 27 11.6-12.0	Improve safety and mobility on US 27 at KY 22 intersection	\$0.8M
Item 6-80310	KY 177 5.0-5.9	Reconstruct KY 177 from Licking River Bridge in Butler to KY 3185	\$2.1M
Item 6-10059	US 27 16.87-16.984	Address US 27 Bridge deficiencies over South Fork Licking River	-
IP20080376	US 27 8.25-17.15	Improve safety and mobility on US 27 from Bridge in Falmouth to KY 177 Butler	-
IP20080383	KY 17 7.00-8.74	Reconstruct KY 17 from KY 467 to KY 491	-
IP20080389	KY 177 0.00-4.01	Reconstruct KY 177 from KY 159 to US 27 in Butler	-
IP20080394	KY 147 MP 9.69-10.29	Reconstruct KY 467 from KY 17 to KY 177	-
IP20100045	New	Construct a new route from US 27 to KY 9	-



## 2.0 EXISTING CONDITIONS

Existing transportation conditions are described in the following sections. Data were obtained from KYTC's Highway Information System (HIS) database, KYTC's Transportation Enterprise Database (TED), the Federal Highway Administration's (FHWA) National Bridge Inventory (NBI), traffic counts, and field reviews.

### 2.1 ROADWAY SYSTEMS

Functional Classification is a systemic grouping of streets and highways according to the character of travel service and access to adjacent land use they provide. This classification system recognizes that travel involves movement through a hierarchical system of facilities that progress from lower classifications handling short, locally oriented trips to higher classifications serving longer-distance travel at higher mobility levels. Traditionally, a roadway's classification is further designated as urban or rural based upon whether it is within FHWA's Adjusted Urban Area boundaries. More recently, design policies acknowledge a broader spectrum of land use contexts: rural, rural town, suburban, urban, and urban core. The major functional classes with brief definitions are listed below.

Freeways & Interstates	Provide high speed, high mobility links for long distance trips.
Principal Arterials	Serve major centers for metropolitan areas, provide a high degree of mobility, and can also provide mobility through rural areas.
Minor Arterials	Provide service for trips of moderate length, serve geographic areas smaller than their Principal Arterial counterparts, and offer connectivity to the Principal Arterial system.
Collectors	Gather traffic from local roads and funnel to the arterial network. Classified as either a major or minor collector; generally serve intra-county travel and shorter trips.
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.

Additionally, functional classification is used as a tool for transportation agencies and designers. A roadway's functional class suggests expectations about roadway design: specifically, vehicle speed, capacity, and the roadway's relationship to land use development. Federal legislation uses functional classification in determining eligibility under the Federal-aid program. Transportation agencies typically describe roadway system performance, benchmarks, and goals by functional classification.

**Figure 6** shows functional classifications throughout the region.

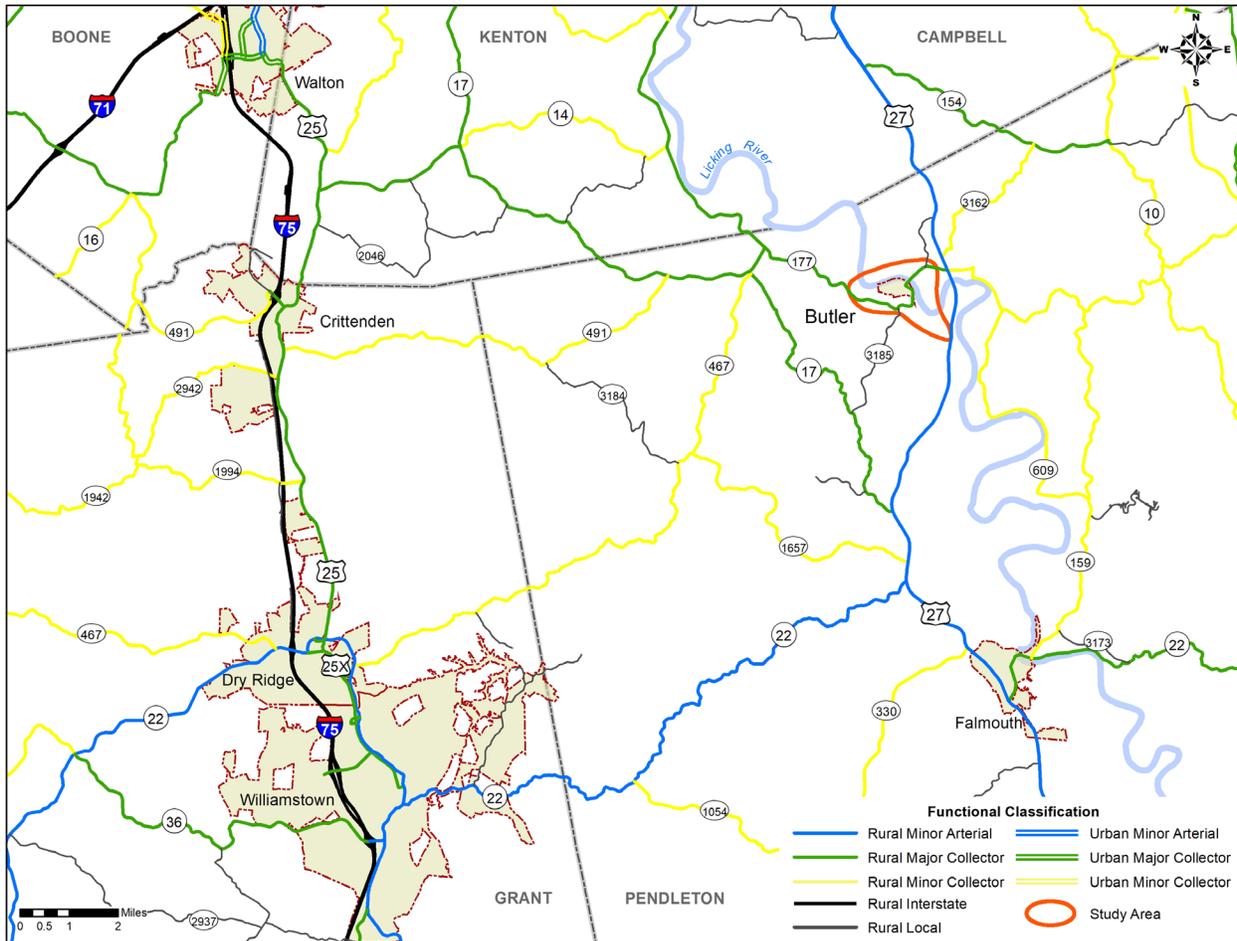


Figure 6: Regional Functional Classification

US 27 along the eastern edge of the study area provides the highest mobility corridor for the region, which is over 12 miles from the nearest interstate. This two-lane minor arterial runs north-south through central Pendleton County, connecting Falmouth and other small communities to Cincinnati and Lexington urban centers.

KY 177 is classified as a rural major collector route, providing one of few east-west corridors for the region. Paired with KY 17, KY 14, and US 25, the corridor provides a two-lane, 19-mile linkage between US 27 and I-75 near Crittenden. The nearest Licking River crossings are US 27 east of Butler, US 27 north of Falmouth—paired with KY 22 (minor arterial) towards Williamstown for east-west access, or KY 536 (major collector) near Alexandria.

KY 177 is listed in Kentucky’s state secondary system, meaning it is a regionally significant route of shorter distance which provides mobility and access to land use activity, generally serving smaller cities and county seats within a region. It is not part of the National Highway System or a designated freight route.

The nearest east/west freight routes between US 27 and I-75 are I-275 to the north or US 62 to the south. Illustrated in **Figure 7**, this leads to a substantial gap in coverage for the freight network. KYTC considers numerous factors—functional classification, pavement width, alignment, clearances, and more—in evaluating its highways for inclusion in the freight network.

## 2.2 ROADWAY GEOMETRY

KYTC’s HIS database was queried to obtain geometric characteristics related to speed limits, driving lanes, shoulders, vertical grades, and horizontal curves. Existing KY 177 geometrics were compared to KYTC’s *Highway Design Manual* (HDM)<sup>8</sup> to identify roadway characteristics that do not meet current practice guidelines.

**SPEED LIMITS.** Shown in **Figure 8**, the posted speed limit for KY 177 varies as it passes through the study area. It is posted at 25 mph in town, 35 mph between US 27 and the river, and 55 mph continuing south/west. US 27 is posted at 45-55 mph in the vicinity with a traffic signal at the US 27/KY 177 intersection.

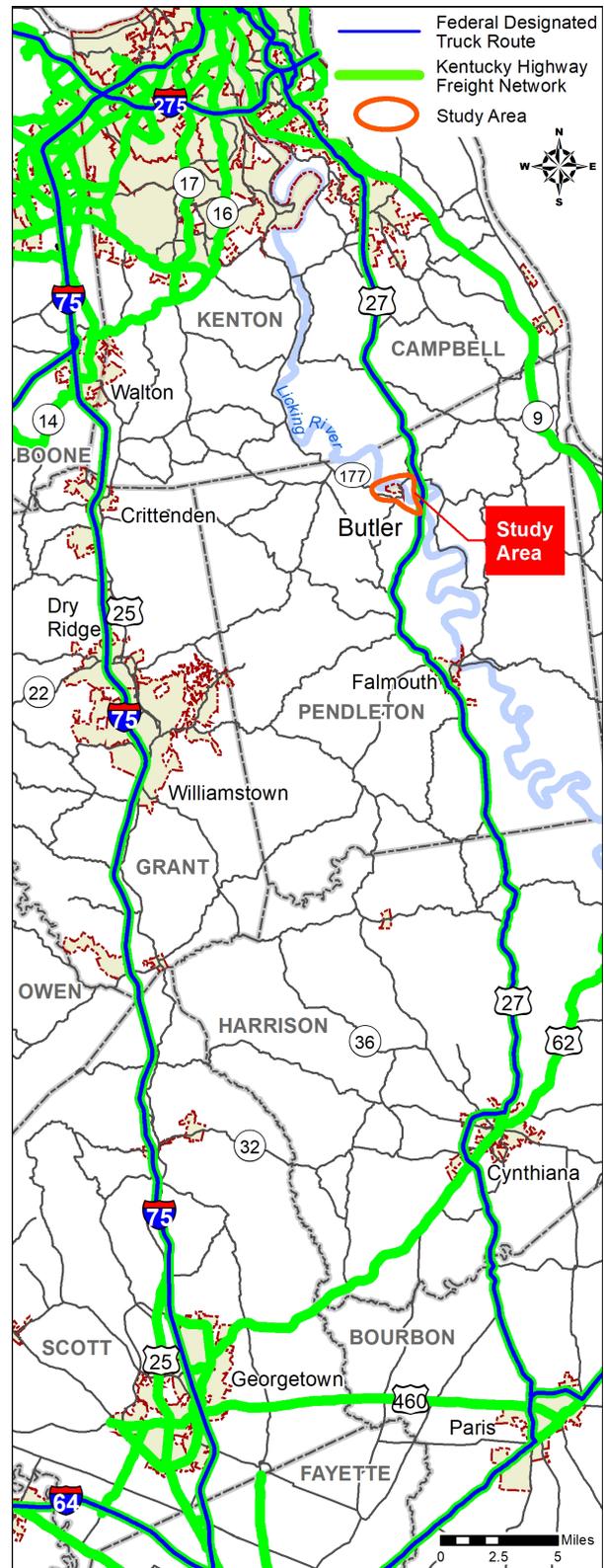


Figure 7: Regional Freight Routes

<sup>8</sup> Online at <https://transportation.ky.gov/Highway-Design/Pages/default.aspx>

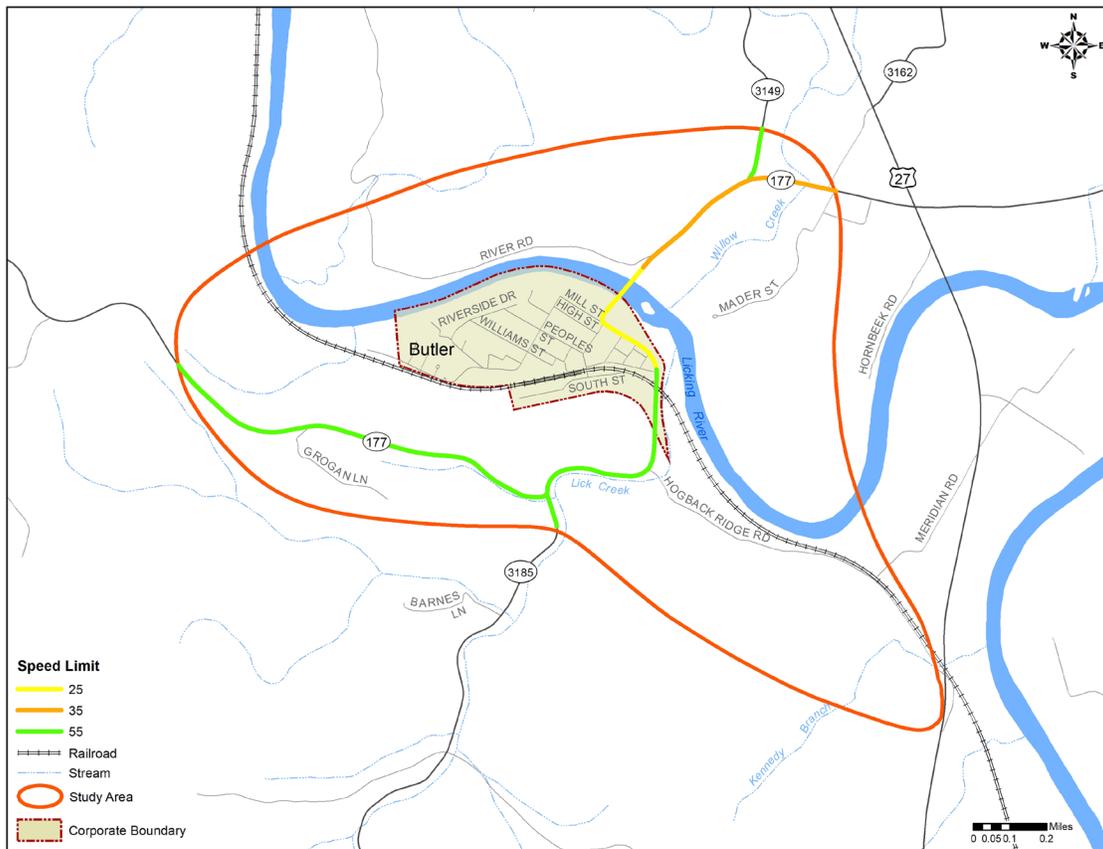


Figure 8: Speed Limits on Study Area Highways

**LANES AND SHOULDERS.** HDM Exhibit 700-02 recommends 11-foot-wide lanes for rural collector routes carrying over 2,000 vehicles per day (vpd). KY 177 has two 11-foot-wide driving lanes. Shoulders widths vary, with concrete curb-and-gutter along a two-block section of downtown, and 2-4 feet (one foot paved) beyond. For comparison, US 27 provides 6-foot shoulders (2-4 feet paved) in the vicinity.



Figure 9: KY 177 Typical Rural Section

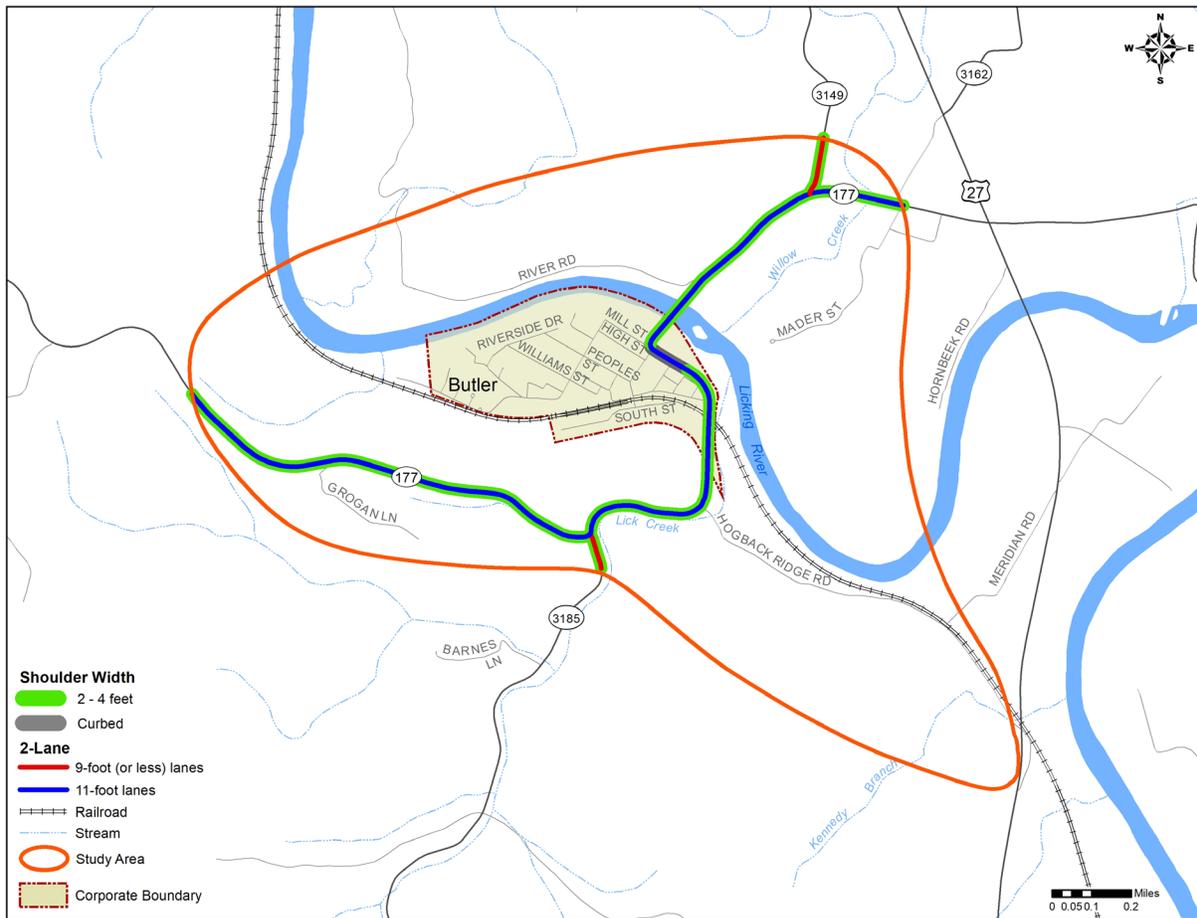


Figure 10: Lane and Shoulder Widths on Study Area Highways

**VERTICAL GRADES.** HIS data were reviewed to identify substandard grades (i.e., steep hills) along the study route. Vertical grades are organized into six classes, graded A (flattest) through F (steepest), as shown in **Table 2**. HDM Exhibit 700-02 recommends 7% maximum grade for 55 mph rural collectors in rolling terrain, i.e., Class E or better.

The steepest section in the study area follows the hill west of the KY 177/KY 3185 intersection. At this location, eastbound KY 177 travels down an 11.5% grade with a stop-control intersection in a horizontal curve at the bottom.

**Figure 11** shows steep vertical grades and sharp horizontal curves along the study corridor.

Table 2: Vertical Grade Class

Code	Description (percent)
<b>A</b>	0.0-0.4
<b>B</b>	0.5-2.4
<b>C</b>	2.5-4.4
<b>D</b>	4.5-6.4
<b>E</b>	6.5-8.4
<b>F</b>	8.5+

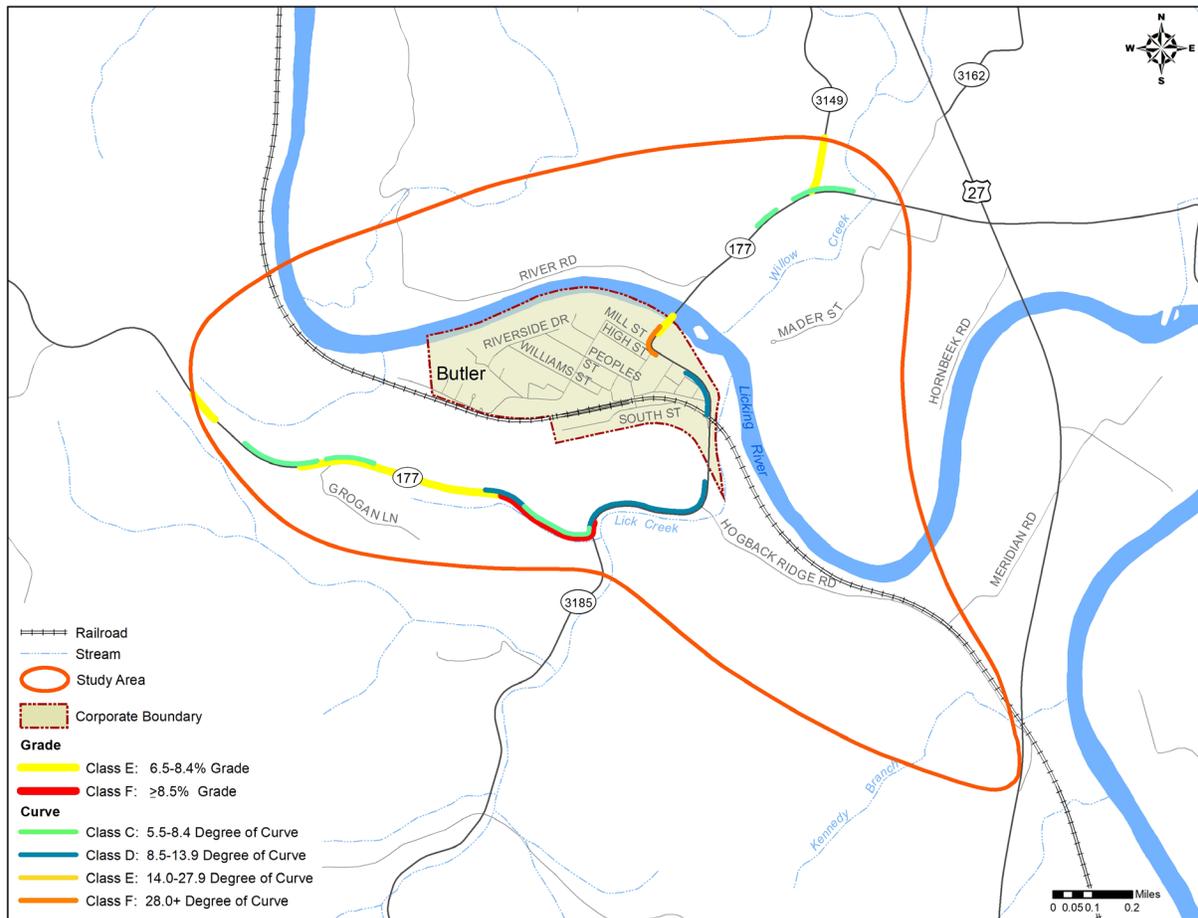


Figure 11: Steep Vertical Grades and Sharp Horizontal Curves

**HORIZONTAL CURVES.** HIS data were reviewed to identify horizontal curves along the study routes. At a planning level, KYTC organizes horizontal curves into six classes, graded A (most sweeping) through F (sharpest), as listed **Table 3**. Design guidelines vary by area type (rural versus urban), design speed, and superelevation, with the minimum radius for 55 mph rural collectors falling into Class B or C. **Figure 11** shows steep vertical grades and sharp horizontal curves along the study corridor.

Table 3: Horizontal Curve Class

Code	Degrees	Radius (ft)
<b>A</b>	0.0-3.4	≥1,680
<b>B</b>	3.5-5.4	1,640-1,060
<b>C</b>	5.5-8.4	1,040-680
<b>D</b>	8.5-13.9	670-410
<b>E</b>	14.0-27.9	410-205
<b>F</b>	28.0+	≤205

The sharpest KY 177 curve in the study area is at the bottom of the Licking River bridge coming into town (**Figure 12**). The highway makes a 170-foot radius turn to continue through town. Two local streets (Mill and Matilda streets) intersect KY 177 within the curve with adjacent parking areas introducing additional conflict points.



Figure 12: Class F Horizontal Curve south of Bridge

**SIDEWALKS.** A network of sidewalks serve the main residential streets within Butler and run alongside portions of KY 177 through downtown and over the Licking River Bridge. There are currently no crosswalks and some locations do not satisfy *American Disabilities Act* (ADA) requirements. Representative photos are shown in **Figure 13**.



Figure 13: Representative Sidewalk Views in Butler

KYTC adopted a Complete Streets Policy<sup>9</sup> in September 2022, committing to partnering with other agencies to:

- Identify opportunities to promote and provide safe, convenient access and travel for all users of the transportation network while reducing crash rates and the severity of crashes.
- Improve mobility and accessibility for all individuals.
- Support mode shift to non-motorized transportation.

<sup>9</sup> Online at <https://transportation.ky.gov/BikeWalk/Pages/Complete-Streets.aspx>

- Ensure early coordination to identify potential actions/strategies.

Consideration of the needs of all modal users is critical throughout the planning and project development process.

## 2.3 STRUCTURES

There are four structures within the study area (**Figure 14**), two of which limit mobility for larger vehicles.

Bridge 096B00001N (**Figure 15**) carries KY 177 over the Licking River. The structure was built in 1936 and consists of three Parker Through Trusses spanning 630 total feet. As of April 2023, it was rated in Fair condition but is weight posted to limit loads. It is 24 feet wide (curb to curb) and approximately 15 feet above the river. The structure was rehabilitated in 2008-2009 then repainted in 2010. A sidewalk runs along the northwest edge of the structure.

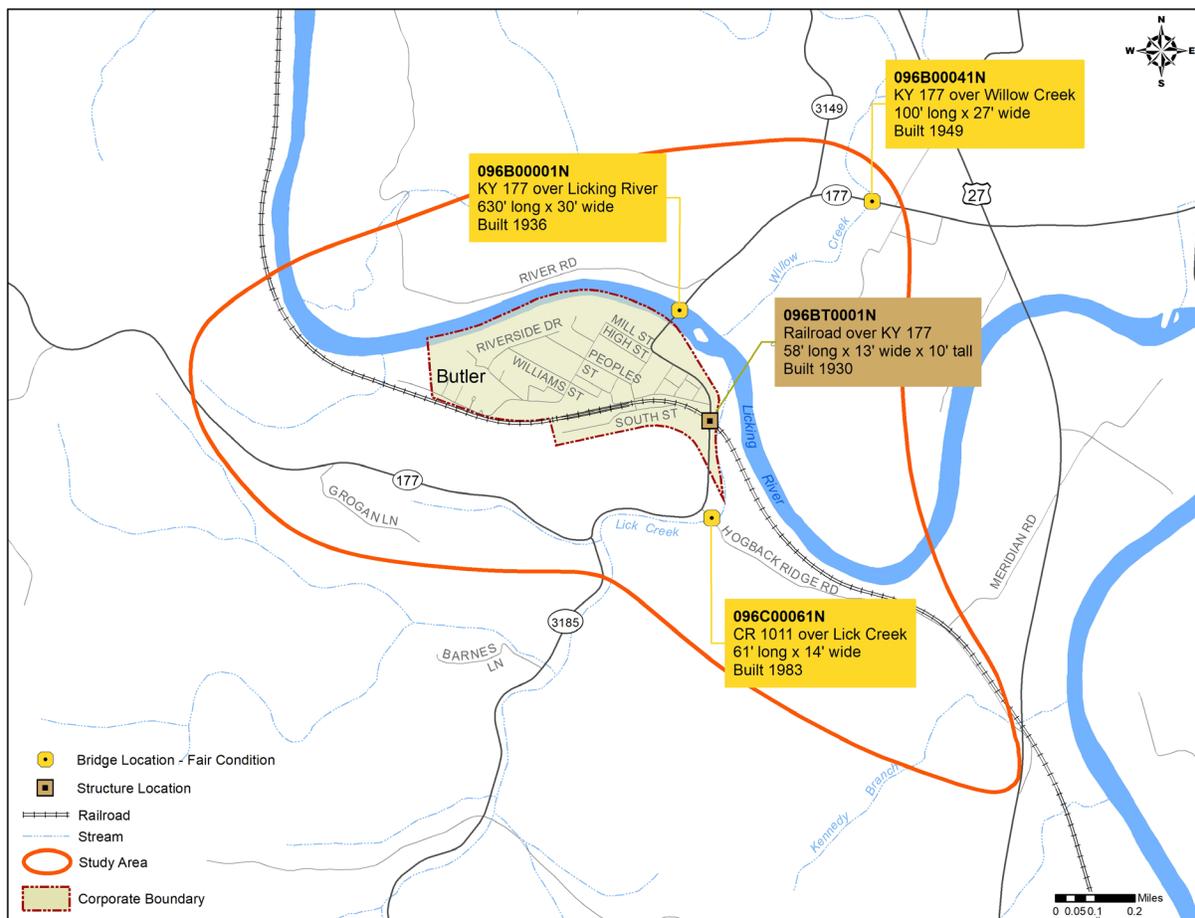


Figure 14: Study Area Structures



Figure 15: KY 177 over Licking River

With its driving surface at approximate elevation 532 feet, the bridge lies within the floodway and can be inaccessible during high-water events. Historic NOAA flood data<sup>10</sup> at the nearby Falmouth gauge shows six flood events since 2020 where crest flows exceed this level, overtopping the bridge.

A quarter mile south, KY 177 runs below the CSX railroad via a low-clearance, narrow tunnel. The rail line carries 13 trains per day per the Federal Railroad Administration crossing inventory, with speeds of 35-40 mph. Built in 1930, the tunnel (**Figure 16**) is 10 feet tall, 13 feet wide, and 58 feet long. It lies in the floodplain and floods during high water events. As of the August 2023 inspection, no restrictions were recommended though wing walls show evidence of cracking and spalling.



Figure 16: KY 177 Tunnel and South Street

An at-grade railroad crossing along Matilda Street (**Figure 17**) provides a second crossing opportunity although South Street south of the tracks is one lane wide and not suitable for truck traffic. The rail crossing has dynamic warning flashers and crossbar gates.

<sup>10</sup> Online at <https://water.noaa.gov/gauges/flmk2>



Figure 17: Matilda Street Crossing (left) with narrow South Street (right)

## 2.4 2023 TRAFFIC

To understand current roadway users, video-based peak period turning movement counts were conducted at three key intersections along the corridor during August 2023. Counts were conducted at US 27/KY 177 (signalized), KY 177/Mill Street/Matilda Street (local approaches stop), and KY 177/South Street (one-way stop). Counts classified vehicles into one of five categories—motorcycles, cars, buses, single-unit trucks, and articulated trucks—and identified any pedestrians and bicyclists.

Analysts also reviewed historic KYTC volume data, including truck percentages, hourly factors, and peak-hour directional distributions. Additional information is in **Appendix A**. Daily, KY 177 carried up to 2,800 vpd in 2023, with the busiest stretch near the school, northeast of the study area. No cyclists and few pedestrians were observed during August counts. Third-party data from StreetLight supports these trends with low bike/pedestrian volumes concentrated near the school and downtown. Strava heatmaps suggest recreational cyclists follow low-volume rural highways in the area, including KY 177.

### 2.4.1 TRAFFIC OPERATIONS

Two commonly applied highway performance indicators, level of service (LOS) and volume-to-capacity (v/c) ratios, were calculated to describe traffic operations along the corridor. Computations were performed in accordance with current *Highway Capacity Manual* (HCM) procedures.

**LEVEL OF SERVICE.** LOS is a qualitative measure that describes traffic conditions based on metrics such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS typically represents a driver's outlook on traffic conditions based on perceived congestion. As illustrated in **Figure 18**, 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; whereas LOS F represents oversaturated traffic conditions beyond capacity, with low travel speeds, little or no freedom to maneuver, and lengthy delays.

LOS can be measured as an average for a highway segment or for any stop-controlled movement(s) at an intersection, though the delay thresholds vary based on whether the intersection is signalized or stop-controlled. As a general rule, LOS D is acceptable for urban areas and LOS C for rural areas.

**VOLUME-TO-CAPACITY.** Another measure, *v/c*, compares a facility's traffic volume 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 its theoretical capacity and additional throughput may be justified.

LEVEL OF SERVICE	DESCRIPTION
<b>A</b>	 <ul style="list-style-type: none"> <li>Average Travel Speed.</li> <li>Free traffic flow with few restrictions on maneuverability or speed.</li> </ul> <p><b>NO DELAYS</b></p>
<b>B</b>	 <ul style="list-style-type: none"> <li>Stable traffic flow.</li> <li>Speed becoming slightly restricted.</li> <li>Low restriction on maneuverability.</li> </ul> <p><b>NO DELAYS</b></p>
<b>C</b>	 <ul style="list-style-type: none"> <li>Stable traffic flow, but less freedom to select speed, change lanes or pass.</li> </ul> <p><b>MINIMAL DELAYS</b></p>
<b>D</b>	 <ul style="list-style-type: none"> <li>Traffic flow becoming unstable.</li> <li>Speeds subject to sudden change.</li> <li>Passing is difficult.</li> </ul> <p><b>MODERATE DELAYS</b></p>
<b>E</b>	 <ul style="list-style-type: none"> <li>Unstable traffic flow.</li> <li>Speeds change quickly and maneuverability is low.</li> </ul> <p><b>MAJOR DELAYS</b></p>
<b>F</b>	 <ul style="list-style-type: none"> <li>Heavily congested traffic.</li> <li>Demand exceeds capacity and speeds vary greatly.</li> </ul> <p><b>MAJOR DELAYS</b></p>

Figure 18: Level of Service Thresholds

No capacity concerns were identified based on existing traffic volumes. KY 177 segments operate at LOS A with a *v/c* less than 0.3 during both peaks. The heaviest traffic flows were at the signalized US 27/KY 177 intersection, which operates at LOS B or better during both peak hours. One turn movement has a *v/c* greater than 0.4: the single lane westbound approach during the AM peak exhibits a 0.6 *v/c*. Truck traffic comprised up to 10% of peak hour volumes on three of the four intersection approaches and up to 20% on the westbound approach which provides access to a large quarry and asphalt plant.

## 2.5 CRASH HISTORY

Safety analyses were conducted using crash data retrieved from KYTC's TED warehouse and the Crash Data Analysis Tool (CDAT). Historical crash data were evaluated for a five-year period (January 2018 through December 2022) to determine trends (see **Appendix B**). **Figure 19** shows crash locations by severity and type. During the analysis period, 33 crashes were reported on state routes in the study area: 32 on KY 177 and one on KY 3185.

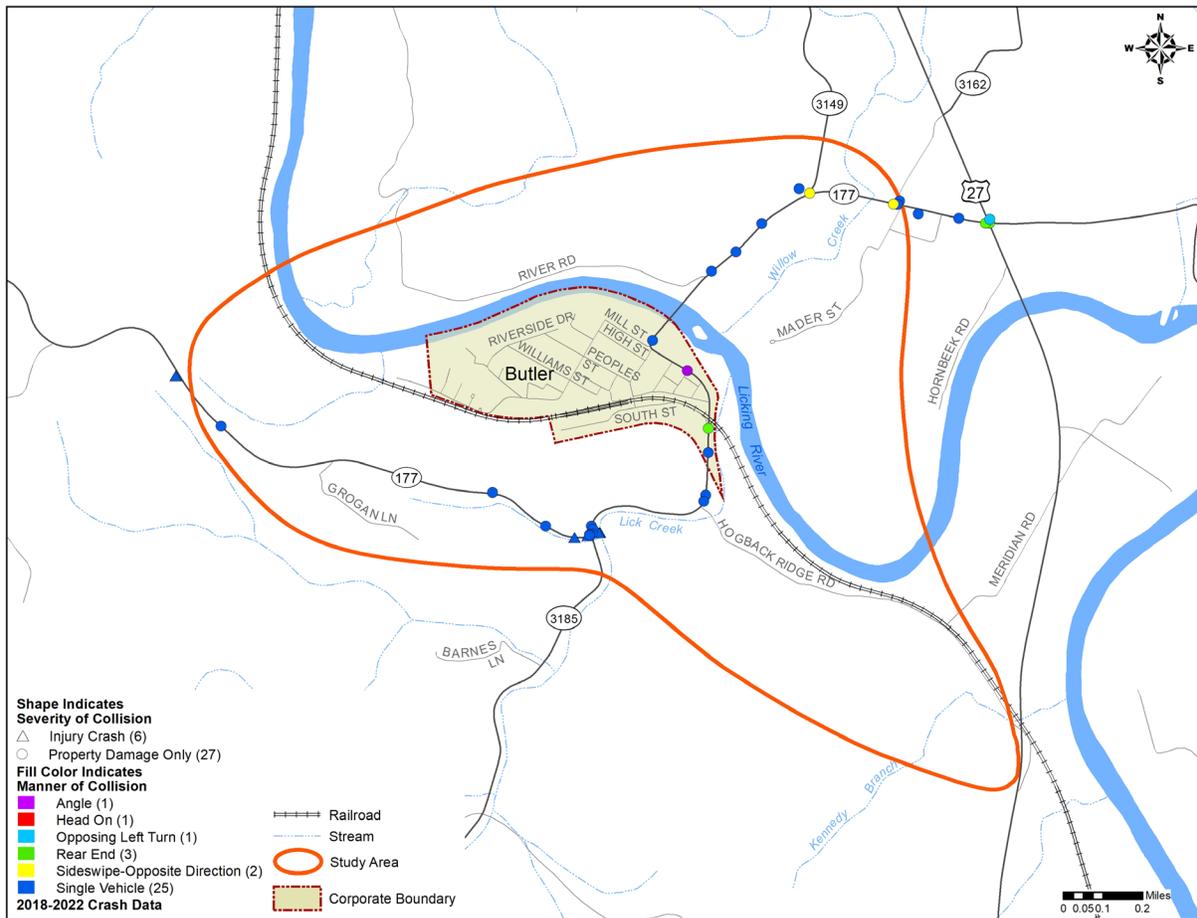


Figure 19: Crash Location, Severity, and Type

BY SEVERITY. The “KABCO” scale classifies crashes by severity with letters representing injury levels:

<b>K</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>O</b>
Killed	Suspected Severe Injury	Suspected Minor Injury	Possible Injury	Property Damage

During the analysis period, there were no fatalities but six crashes resulted in injuries.

Whereas traditional road safety strives to modify human behavior and prevent all crashes, the US Department of Transportation’s Safe System Approach<sup>11</sup> refocuses design and operation on anticipating human mistakes and lessening impact forces to reduce crash severity and save lives. It also emphasizes shared responsibility: everyone has a role to play in prioritizing safety.

<sup>11</sup> Online at <https://www.transportation.gov/NRSS/SafeSystem>

Of the six injury collisions in the study area, two were severe (A) and four were minor (B). Both severe injury crashes occurred at the KY 177/KY 3185 intersection where a vehicle overshot the stop condition coming downhill, landing in the creek/trees opposite.



Figure 20: View East along KY 177 at KY 3185 Intersection

**BY TYPE.** Single vehicle crashes are the leading crash type, accounting for 75% of all reported crashes, followed by rear end collisions (9%) and opposite direction sideswipes (6%).

**OTHER CRASH TRENDS.** Further analysis identified crash trends along KY 177.

- 34% of crashes occurred during nighttime. There are streetlights at the school driveways, across the bridge, and through town to the tunnel but the remainder of the corridor is unlit. Eight of 11 nighttime crashes were beyond lighted areas.
- 41% of crashes occurred in wet or icy conditions.
- 44% of crashes were roadway departures, which tend to be more severe than other crash types. Roadway departure is one of the emphasis areas identified by the Office of Highway Safety.<sup>12</sup>

### 2.5.1 STATISTICAL ANALYSIS: LEVEL OF SERVICE OF SAFETY

Statistical analyses were performed using the Kentucky Transportation Center's CDAT to find areas of crash concentrations. The measure is Level of Service of Safety (LOSS)—a refined statistical methodology in the *Highway Safety Manual* used to evaluate safety needs. LOSS categories 1 and 2 represent sites with fewer than anticipated crashes, while categories 3 and 4 represent sites with more than anticipated crashes. Because LOSS 4 sites experience such elevated crash rates, there is a higher probability that safety countermeasures at these locations will result in larger improvements.

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<sup>12</sup> 2020–2024 Strategic Highway Safety Plan, online at <https://transportation.ky.gov/HighwaySafety/Pages/default.aspx>

LOSS for the corridor was calculated for KAB severity crash distributions, considering both highway segments and intersections. Results are summarized in **Figure 21**. As shown, segments south of the bridge (MP 5.0-7.0) result in a LOSS 3 rating, indicating crash frequencies greater than predicted by mathematical formulas. The KY 177/KY 3149 intersection also exhibits a LOSS 3 rating considering KAB crashes.

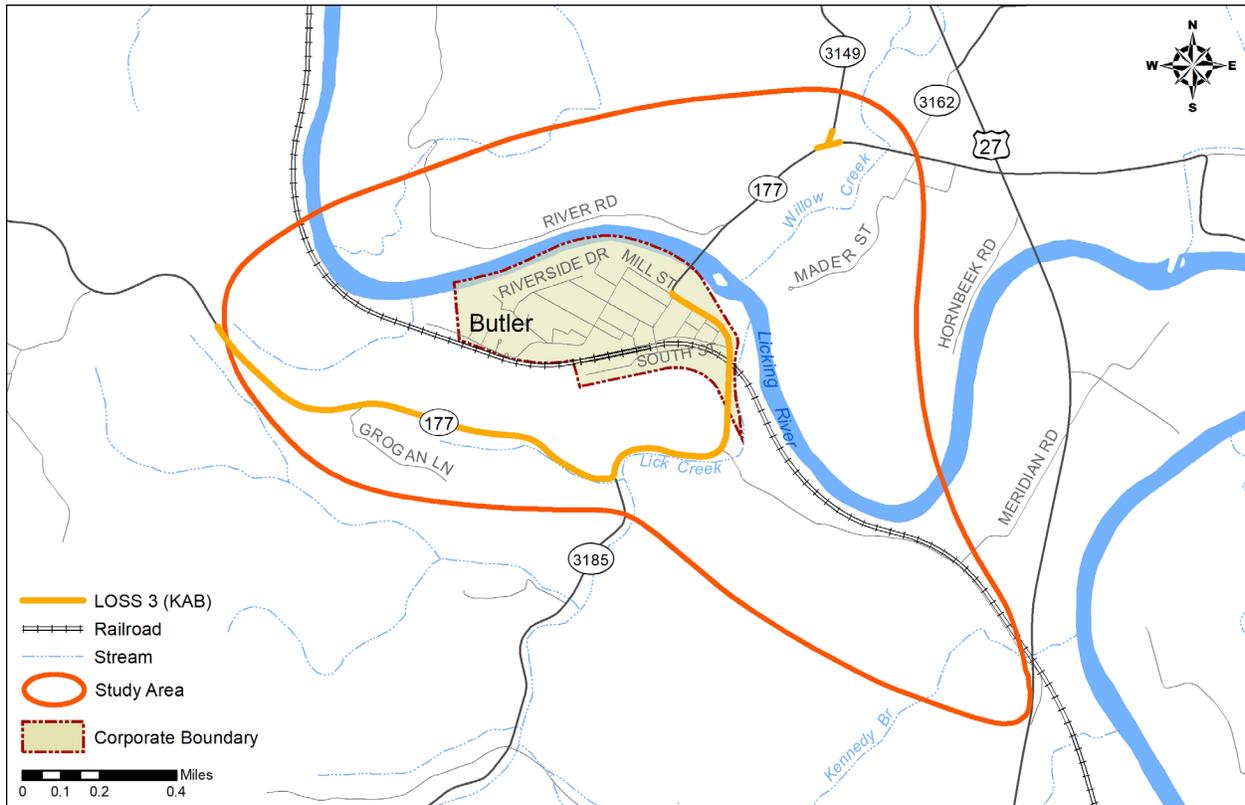


Figure 21: Segment and Intersection LOSS



## 3.0 ENVIRONMENTAL OVERVIEW

The purpose of this environmental overview is not to quantify environmental impacts, but instead to identify potential environmental issues to consider during the project development process. This information should aid the project team in making decisions to avoid, minimize, and/or plan for mitigation of potential project impacts, as appropriate. Should future projects develop following this study, additional environmental studies may be required.

If there is a federal nexus (e.g., 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, that federal actions 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 weighed to reach a decision that is in the best overall public interest.

**Figure 22** provides a visual summary of environmental resources near the study corridor.

### 3.1 NATURAL ENVIRONMENT

The natural environment 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.

#### 3.1.1 WATER RESOURCES

The most notable water resource is the Licking River, which flows to the northwest over its 300-mile length to drain in the Ohio River. Within the study area, it is designated by the Kentucky Division of Water (KDOW) as an Outstanding State Resource Water for protected mussel species but its 2022 assessment notes impairment associated with warm water habitat and recreational contact. Two named tributaries join the river within the study area—Lick Creek and Willow Creek—plus additional, unnamed intermittent tributaries. Associated floodways and floodplains cover much of the town and low-lying farmlands surrounding.

The *National Wetlands Inventory* records 15 wetlands beyond riverine habitat along the creek, including forested habitats and freshwater ponds.

Impacts to streams and wetlands require permit coordination with the US Army Corps of Engineers (USACE), US Coast Guard (USCG), and/or Kentucky Division of Water (KDOW), depending on the scale of the water resource and potential disturbance. Any impacts to the Licking River will require an individual water quality certification from KDOW, which can be a lengthy permitting process.



### 3.1.2 PROTECTED SPECIES

The US Fish and Wildlife Service (USFWS) maintained database of federally protected species are listed as endangered or threatened under the *Endangered Species Act*. Three listed bat and eleven mussel species potentially inhabit the study area. There is no critical habitat along the study corridor. **Table 4** lists potential threatened and endangered species in the area.

Table 4: Listed Threatened and Endangered Species

Group	Name	Scientific Name	Status
Mammals	Gray bat	<i>Myotis grisescens</i>	Endangered
	Indiana bat	<i>Myotis sodalis</i>	Endangered
	Northern long-eared	<i>Myotis septentrionalis</i>	Endangered
Mussels	Northern riffleshell	<i>Epioblasma rangiana</i>	Endangered
	Longsolid	<i>Fusconaia subrotunda</i>	Threatened
	Clubshell	<i>Pleurobema clava</i>	Endangered
	Fanshell	<i>Cyprogenia stegaria</i>	Endangered
	Purple cat's paw	<i>Epioblasma obliquata</i>	Endangered
	Pink mucket	<i>Lampsilis abrupta</i>	Endangered
	Rabbitsfoot	<i>Quadrula cylindrica</i>	Threatened
	Round hickorynut	<i>Obovaria subrotunda</i>	Threatened
	Rough pigtoe	<i>Pleurobema plenum</i>	Endangered
	Snuffbox	<i>Epioblasma triquetra</i>	Endangered
	Salamander mussel	<i>Simpsonaias ambigua</i>	Proposed Endangered
Insect	Monarch butterfly	<i>Danaus plexippus</i>	Candidate

A habitat assessment may be needed in the early stages of project development for future project(s) to assess potential project impacts to threatened and endangered species. Projects that occur within an area of known bat habitat will require project-specific evaluation to assess appropriate minimization/mitigation measures. KYTC maintains a *Programmatic Conservation Memorandum of Agreement for Forest Dwelling Bats* to streamline measures to minimize impacts for Indiana and northern long-eared bats. For other federally listed species, specific ecological surveys may be required for projects that have the potential to impact habitat. Coordination with the USFWS Kentucky Field Office will be necessary to determine the need for future project-specific surveys.

### 3.1.3 FARMLAND CLASSIFICATIONS

While little of the study area is actively farmed, Natural Resource Conservation Service (NRCS) classifies farmlands based on soil type. As shown in **Figure 23**, 4% of study area soils qualify as farmlands of statewide importance, with another 17-23% classified as prime farmlands. No protected easements or

agricultural districts were identified within the study area. Should federal funds be used on future projects, the *Farmland Protection Policy Act* must be followed. If there is potential to convert farmland, coordination with the local NRCS office is required.

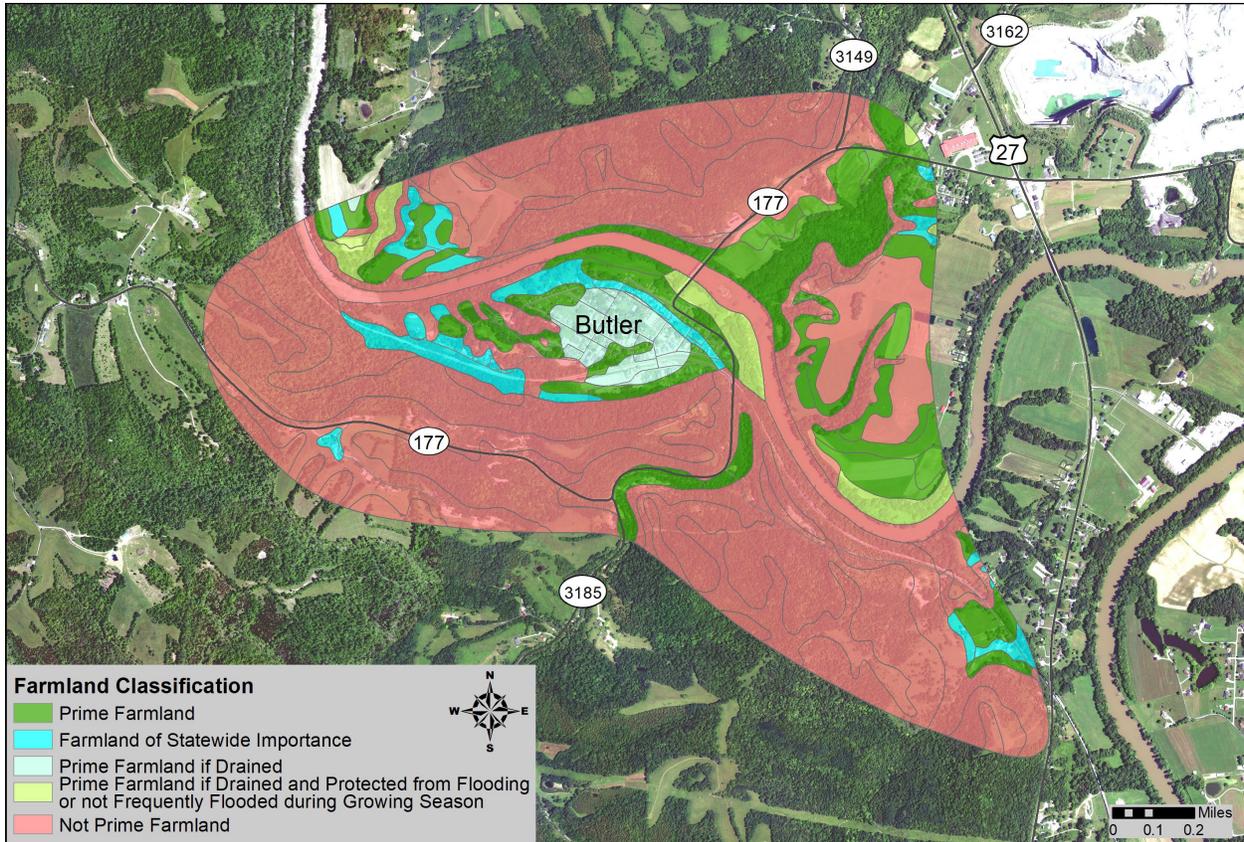


Figure 23: Farmland Soil Classifications

### 3.1.4 GEOTECHNICAL

KYTC completed a Geotechnical Overview for this study, included as **Appendix C**. The project study area is located within the Outer Bluegrass Physiographic Region of Kentucky. Topography is characterized by a wide meandering floodplain along the Licking River surrounded by rolling terrain consisting of broad ridge tops and relatively narrow valleys. Typical vertical relief is in the magnitude of 300 feet. The area is underlain by Quaternary deposits and Ordovician aged bedrock. Unconsolidated sediment above bedrock consists of clay, silt, sand, and gravel in the Alluvium and Terrace deposits and interbedded shale and limestone within the Fairview, Kope, and Point Pleasant formations (**Figure 24**).

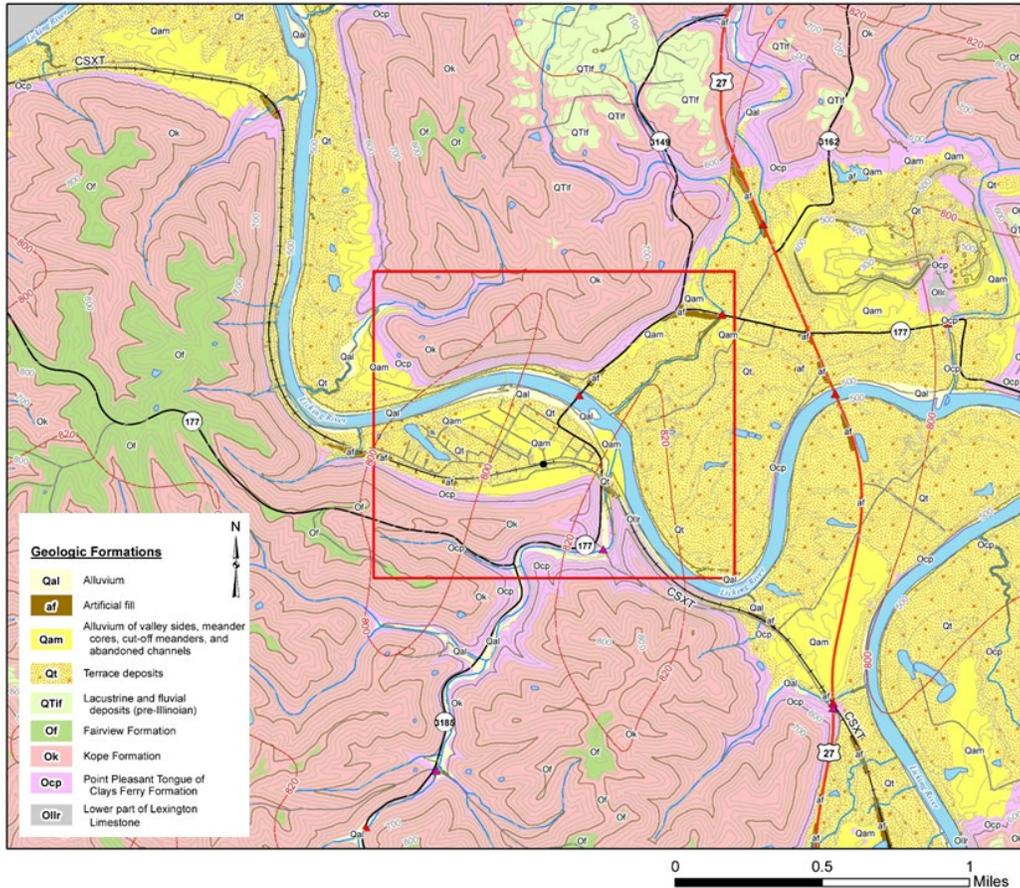


Figure 24: Geologic Formations

Groundwater above the river valley is insignificant but hillside seeps and springs are common as groundwater can travel between bedrock strata and joints.

As shown in **Figure 25**, the entirety of the project area is notorious for cut and fill slope stability failures. The driving force behind these instabilities can be attributed to groundwater movement, poor rock mass quality, deep colluvium accumulations, primary and secondary structures of the river valley deposits, and the proximity to the Licking River and potential high water levels. Multiple landslides and subsequent repairs are present in the vicinity.

The overview notes that “significant geotechnical concerns” should be considered when evaluating future projects. This includes any large-scale alignment changes or small-scale spot improvements that involve disturbing the current earthwork. Due to the weathering characteristics and percentage of shale in each formation, bedrock within the study area is considered non-durable. Geotechnical drilling will be needed for any future roadway cuts, fills, and structures.

An active open pit limestone quarry exists approximately 1.4 miles northeast of Butler off KY 177. The quarry is currently operated by Hilltop Stone, LLC and is extracting limestone aggregate from the Lexington Limestone Formation.

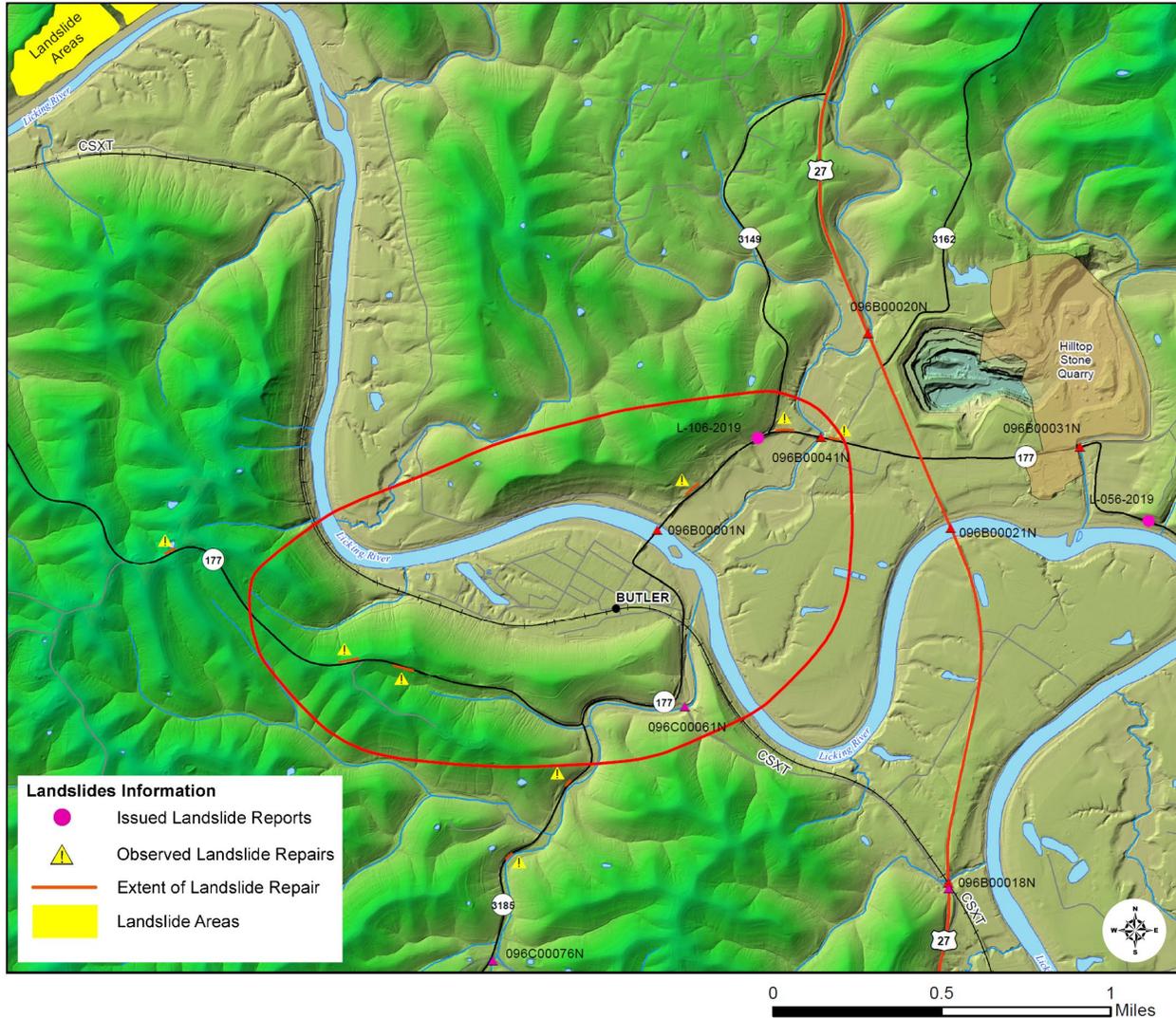


Figure 25: Topography and Landslides

### 3.1.5 HAZARDOUS MATERIALS

A detailed third-party records search was conducted during November 2023 to identify potential hazardous materials concerns in the vicinity. A windshield survey was also completed to highlight any other sites not tracked in formal databases. Investigations identified eleven potential red flags—orange triangles in **Figure 22**—near the study area. Details are listed in **Table 5** with additional information included as **Appendix D**.

Table 5: Potential Hazardous Materials Concerns

Name	Address	Description
T&G LLC	210 Matilda Street	Former Underground Storage Tank (UST)
Butler Products, Inc.	103 South Street	Potential Hazardous Materials
Nelly's Place	201 Mill Street	Potential Former UST

Name	Address	Description
Combs Garage	400 Front Street	Former UST
Northern Elementary	925 KY-177	Potential Former UST
Shell Station	10216 US 27	UST
27 Auto	10233 US 27	Potential Former UST
O'Hara Trucking	41 Lock Road	Potential Petroleum Storage
Butler Market	106 Front Street	Potential Former Petroleum Sales
Grogan's ATV Salvage	374 Grogan Land	Potential Petroleum Storage

### 3.1.6 AIR QUALITY CONSIDERATIONS

The US Environmental Protection Agency (USEPA) has set up National Ambient Air Quality Standards (NAAQs) for six criteria pollutants: ozone, lead, nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>). The region is currently in attainment for all criteria pollutants monitored by the USEPA.

To prove air quality conformity, federally funded transportation projects recommended for further development should be modeled and included in KYTC's statewide transportation improvement program (STIP) to ensure conformity requirements are satisfied.

Future federal projects may need to address potential Mobile Source Air Toxics (MSAT) impacts based on the project type. FHWA has developed a tiered approach for three categories to analyze MSATs in NEPA documents, each depending on specific project circumstances. The three tiers are no potential/exempt projects requiring no analysis, low potential requiring a qualitative analysis, and higher potential requiring quantitative analysis. Based on traffic volumes, any proposed improvements most likely fall into one of the lower two categories.

## 3.2 HUMAN ENVIRONMENT

The human environment includes people and the resources they define: land use, community features, cultural historic resources, etc. Each could potentially be affected by future projects. The following sections identify these resources for consideration during any future project development phases. **Figure 22** shows corresponding locations.

### 3.2.1 LAND USE AND COMMUNITY RESOURCES

Butler is a home-rule city in northern Pendleton County with a population around 650. Pendleton County is part of the Northern Kentucky Area Development District (NKADD); the County Department of Planning and Zoning serves the unincorporated areas of the county but there is no formal zoning within Butler.

Shown in **Figure 26**, land use within Butler is a mix of residential, civic, and commercial uses. The largest business is a pallet company, located at the west end of South Street. The 2017 countywide

comprehensive plan<sup>13</sup> puts an emphasis on economic development and tourism, while also protecting the rural environment that defines its character. From a transportation perspective, the plan acknowledges that the county faces numerous issues, including poor connectivity/interstate access, geographic barriers, emergency access during floods, and gaps in bicycle/pedestrian facilities. Planned future land use near Butler is largely unchanged, although potential sewage treatment plant locations and a pocket of industrial land use are considered east of US 27.

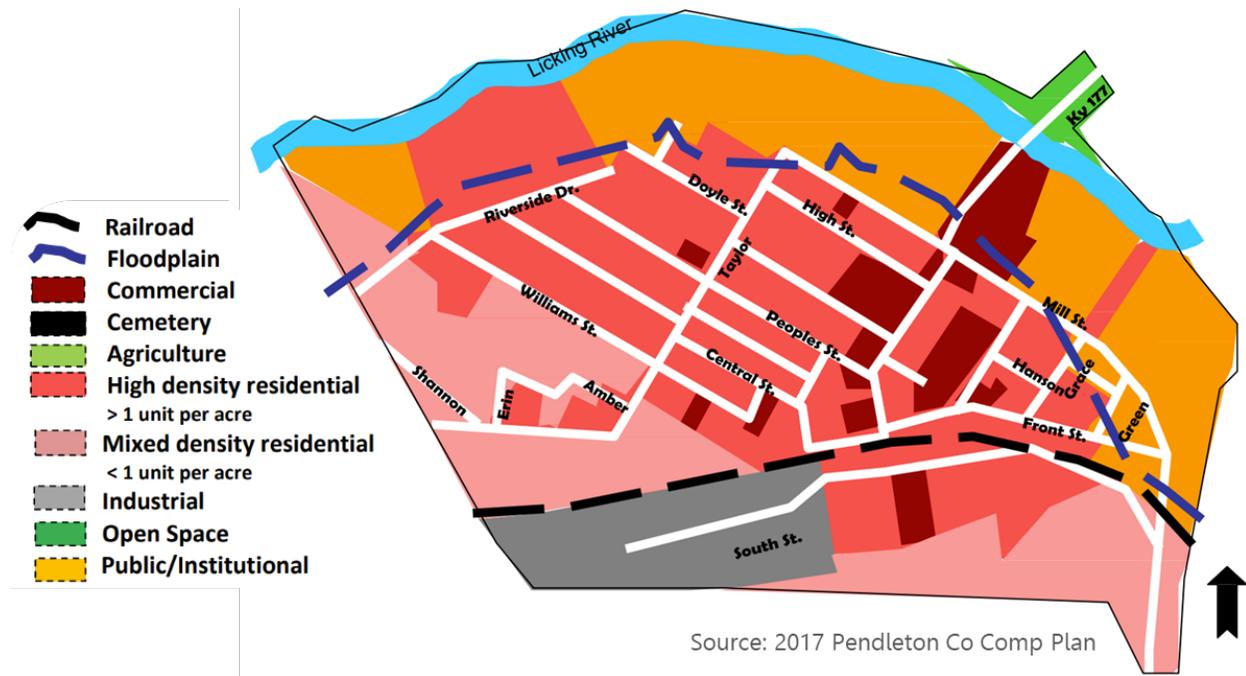


Figure 26: Butler Land Use

Specific community resources in town include:

**SCHOOLS.** Northern Elementary School is located just outside the study area boundary, northwest of the US 27/KY 177 intersection. It serves approximately 500 K-5 students. Older students are bused to Sharp Middle School (midway between Butler and Falmouth) or Pendleton County High School (in Falmouth). The Butler Learning Center provides daycare services for preschool age children, located along KY 177 downtown.

**MEDICAL.** The nearest hospitals are in Falmouth, Williamstown, or the Northern Kentucky metro area.

**ELDER CARE.** River Valley Nursing Home is a private facility with 60 beds located on Taylor Street.

<sup>13</sup> Online at <https://pendletoncounty.ky.gov/Government/Pages/Planning-and-Zoning.aspx>

**CIVIC SERVICES.** The City’s municipal building faces Front Street, housing the Mayor’s office, city clerk, and City Council chambers. The post office is next door. The police department and volunteer fire department operate out of a facility on Taylor Street.



Figure 27: City Hall, School, and Fire/Police

**PARKS.** Butler City Park is located west of KY 177, bounded by Mill Street and the river. The park features a playground, shelter, and basketball court. To the west, the old fire station serves as a community center with an adjacent picnic shelter and greenspace for gatherings.



Figure 28: Butler City Park

**CHURCHES.** There are two churches within the study area: Butler Christian Church on High Street and Butler Baptist Church on Peoples Street. There are no known cemeteries in the study area limits.

### 3.2.2 HISTORIC RESOURCES

Section 106 of the *National Historic Preservation Act of 1966* requires federal agencies to consider impacts to historic properties when making project decisions, in coordination with the State Historic Preservation Office (SHPO).

A *Cultural Historic Overview* (**Appendix E**) was completed for the study area to identify properties listed or eligible for listing on the National Register of Historic Places (NRHP). A records review found three previously surveyed resources within or adjacent to the study area: the Samuel T. Hauser House (demolished), the Alec Caldwell House, and the Licking River truss bridge. Windshield surveys during Fall 2023 found eight potential resources over 50 years in age, summarized in **Table 6** and shown on **Figure 22**.

Table 6: Potentially Significant Historic Resources

 <p>KY 177 Truss Bridge</p>	 <p>302 Mill Street I-House</p>	 <p>Railroad Underpass<sup>1</sup></p>
 <p>210 Matilda Street former Public School</p>	 <p>214 Peoples Street Tudor Revival Residence</p>	 <p>219 Peoples Street Gothic Revival Residence</p>
 <p>Alec Caldwell House<sup>2</sup></p>		 <p>Hogback Ridge House<sup>3</sup></p>
<p><sup>1</sup> Not individually eligible but has not been evaluated within context of larger rail system  <sup>2</sup> Previously surveyed but not visible from public right-of-way  <sup>3</sup> Added to study area following initial windshield surveys</p>		

KYTC completed statewide assessments of its historic bridges, including the 1936 Parker through truss carrying KY 177 over the Licking River within the study area. Research for the 2018 report on trusses

found it to be one of nine Parker through trusses remaining statewide but received a low “historic importance factor” despite likely being NRHP eligible.

Much of the housing stock within the community is 50+ years old but did not appear to be potentially significant and/or retain sufficient integrity to be NRHP eligible. Likewise, the area does not appear to display a consistent development pattern within a cohesive period of time so no potential historic district was identified.

Should federal monies or permits be included in future projects, field survey and coordination with SHPO will be required to assess project effects on cultural historic resources.

From an archaeological perspective, three previous surveys were completed but no known sites fall within the study area limits. Soil data suggests there is potential to encounter deeply buried deposits along floodplains and terraces. Additional testing in undisturbed areas and coordination with SHPO will be needed should a Build option advance.

### 3.2.3 SOCIOECONOMIC PROFILE

NKADD completed a socioeconomic study for the corridor (**Appendix F**) to highlight potential areas statistically likely to contain elevated concentrations of minority, elderly, low-income, limited English proficiency (LEP), and/or disabled populations. The study area covers portions of two US Census block groups, shown in **Figure 29**. Statistics are summarized in **Table 7**, reported from 2021 American Community Survey five-year estimates. Concentrations for the encompassing county serve as the reference threshold, highlighting any block group populations exceeding this level.

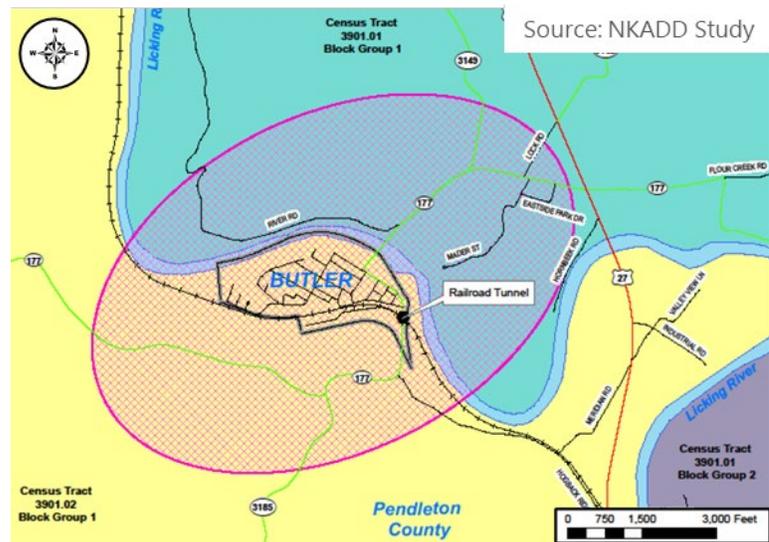


Figure 29: Census Geographies

As shown, Tract 9301.01 Block Group 1 (green in **Figure 29**) has higher minority and disabled population concentrations than the county threshold. Tract 9301.02 Block Group 1 (yellow in **Figure 29**) has higher age 65+ and disabled population concentrations than the county threshold. It should be noted that block groups encompass much larger areas than the study area limits. While Census-level projections do not highlight low-income population concerns, windshield surveys of housing

stock within low-lying portions of the community suggest there could be pockets of low-income clusters within the study area limits.

Table 7: Socioeconomic Metrics for Study Area Block Groups

Geography	Population	Minority	Low-Income	Age 65+	Disabled	LEP
United States	329,725,481	40.6%	12.6%	16.0%	12.6%	4.2%
Kentucky	4,494,141	16.4%	16.3%	16.4%	17.4%	1.4%
NKADD	331,492	11.2%	11.0%	14.6%	13.1%	1.1%
Pendleton	14,625	<b>5.7%</b>	<b>18.8%</b>	<b>15.9%</b>	<b>18.4%</b>	<b>0.0%</b>
BG 1 CT 3901.01	1,953	6.1%	5.2%	14.5%	22.6%	0.0%
BG 2 CT 3901.01	1,040	4.1%	31.3%	17.3%	29.1%	0.0%
BG 1 CT 3901.02	1,165	4.9%	15.9%	36.1%	29.1%	0.0%

### 3.2.4 SECTION 4(F)

Section 4(f) of the *Department of Transportation Act of 1966* is a substantive law that applies to federally funded projects using land from publicly owned public parks, recreation areas, and wildlife or waterfowl refuges; and publicly or privately owned historic sites eligible for or listed on the NRHP. Section 4(f) requires that transportation projects avoid use of such protected properties unless no feasible and prudent alternative exists and project planning minimizes harm to Section 4(f) sites.

Section 4(f) protected properties within the study area include the parks and any historic resources that may meet NRHP criteria. No wildlife and waterfowl refuges are found within the study area.

### 3.2.5 SECTION 6(F)

The *Land and Water Conservation Fund (LWCF) Act* was established to safeguard natural areas, water resources, and cultural heritage, and to provide recreation opportunities. The fund helps strengthen communities, preserve history, and protect the national endowment of lands and waters. The LWCF provides federal grants to acquire land for outdoor recreation, protect important natural areas, and develop or renovate outdoor recreation facilities (e.g., campgrounds, picnic areas, swimming facilities, etc.). Section 6(f) of the LWCF Act addresses protection from permanent conversion of outdoor recreation property acquired or developed using LWCF funds. Impacts must be addressed when projects would result in permanent conversion of grant-assisted facilities. No Section 6(f) investments lie along the study corridor.

### 3.2.6 NOISE CONSIDERATIONS

Federally funded transportation projects typically require consideration of noise impacts. Noise sensitive receptors include residential areas, parks, cemeteries, hospitals, churches, schools, etc. Commercial properties with exterior uses can also be considered noise sensitive. Specific traffic noise

impact analyses may be needed as part of future project development activities if projects are shown to add capacity or shift traffic closer to sensitive receptors.

As the corridor has access by permit with numerous intersections and driveways providing access to adjacent low density land uses, it is unlikely that noise mitigation measures would be recommended even if noise increases were predicted.

## 4.0 INITIAL COORDINATION EFFORTS

The project team includes representatives from KYTC Central Office, KYTC District 6, NKADD, and the consultant. The project team met at key milestones over the course of the study. Detailed meeting summaries are arranged chronologically in **Appendix G**.

### 4.1 FIRST PROJECT TEAM MEETING

The project team met virtually October 11, 2023, to review existing conditions information. The team reviewed area planned projects, previously completed studies, and existing conditions including roadway geometry, traffic flow, crash trends, and environmental resources as presented in **Chapters 1.0** through **3.0**. Much of the discussion centered on highway users, comparing traffic insights from turning movement counts, traffic models, other studies, and third-party StreetLight data. Origin-destination estimates from the 2045 statewide model shows mostly east-west flows for bridge trips, spanning from I-71/I-75 into Mason County. By comparison, 2021 StreetLight data shows an even distribution between north-south US 27 trips and east-west flows using the existing Licking River Bridge.

The team also discussed the need for a kickoff meeting with local officials and stakeholders (LO/S) but agreed to hold a meeting later in the study process once build concepts are ready to share.

### 4.2 STUDY GOALS

Any Build concepts developed should address both local and regional transportation demands:

- Local access for the community of Butler, which relies on the KY 177 Licking River Bridge for everyday access between homes, civic services, schools, etc.
- Regional access, particularly for freight, as the corridor is the only cross-river east/west highway link over a 15-mile stretch.

## 5.0 2045 TRAFFIC AND OPERATIONS

KYTC's statewide travel demand model formed the basis of future year 2045 traffic projections. Historic KYTC traffic counts since 2003 demonstrate stagnant to declining traffic growth. Population projections from the KY State Data Center also project negative growth for the county. The complete *Traffic Forecast Report* is in **Appendix A**.

### 5.1 FUTURE YEAR BACKGROUND TRAFFIC GROWTH

KYTC's statewide travel demand model estimated future year growth for the study corridor. The model simulates a 24-hour period, relying on factors to derive peak hour traffic flows. From a high-level perspective, the model overlays the roadway network over predicted changes in household and employment levels for geographic zones to project changes in traffic flows. It is built to examine typical weekday traffic patterns for a broad area.

A 0.5% annual growth rate was conservatively applied to forecast future No-Build traffic. Modeled growth is largely attributed to growth in surrounding counties and Cincinnati to the north, rather than localized increases in housing or employment. Within the study area, KY 177 carries up to 2,800 vpd today and is projected to increase to 3,000 in the 2045 No-Build scenario, including 13% trucks.

Existing segments and intersections provide adequate capacity for anticipated future No-Build traffic volumes.

### 5.2 BUILD TRAFFIC PROJECTIONS

A representative connection on new alignment north of Butler was coded within the statewide travel demand model to test if a future connection would increase traffic flows. This Build scenario demonstrated minimal growth compared to the No-Build Scenario. Combining background growth from the No-Build scenario with a new northern connector, up to 3,400 vpd may use a new bypass around Butler, avoiding the tunnel and truss. The model reflects that the existing highway through Butler would continue to serve local trips (<500 vpd) while the regional through trips would shift to this new connection.

To test the model's sensitivity, a Build scenario with a larger regional connection was also considered, stretching from I-75 between Dry Ridge and Crittenden to US 27 near Butler. An improved east/west regional connection is forecast to carry up to 4,500 vpd in 2045.

For comparison, KYTC's 6-458 Northern KY Outer Loop study (**Section 1.1**) estimated 5,000-12,000 vpd along a longer regional connector (i.e., I-71 Gallatin County to AA Highway). Given that study's greater length and extensive analyses to forecast induced employment growth through several counties, this range provides an upper limit for the 6-80258 study.

In each Build scenario, a two-lane highway provides adequate capacity for forecast daily traffic.

## 6.0 CONCEPT DEVELOPMENT

Relying on the data collection results described above, analysts were tasked to define a list of potential improvement concepts that could address observed needs. Connector concepts were developed based on review of existing geometric deficiencies, existing and future traffic operations, crash concentrations, field reconnaissance, environmental constraints, and input from the project team.

The team explored a wide range of corridors to ensure all possible/practical solutions were considered before any were eliminated. Build concepts represent high-level corridors with broad assumptions rather than an alignment-level decision. If any concept advances to preliminary design, multiple alignment options within a single corridor would be explored. The planning process can recommend reasonable options to advance, as well as document why less favored options should be dismissed.

Regional connectors were organized geographically, with the most competitive in each category advancing for LO/S input. Small-scale spot improvements at key intersections were initially considered, but do not satisfy both study goals unless joined with a larger corridor solution. The initial range of Build corridors considered are presented in **Figure 30**.

Build corridors outside of town assume two 12-foot travel lanes with 8-foot shoulders (6-foot paved) with a 45-55 mph design speed. Corridors through town are generally narrower with lower design speeds to reduce impacts.

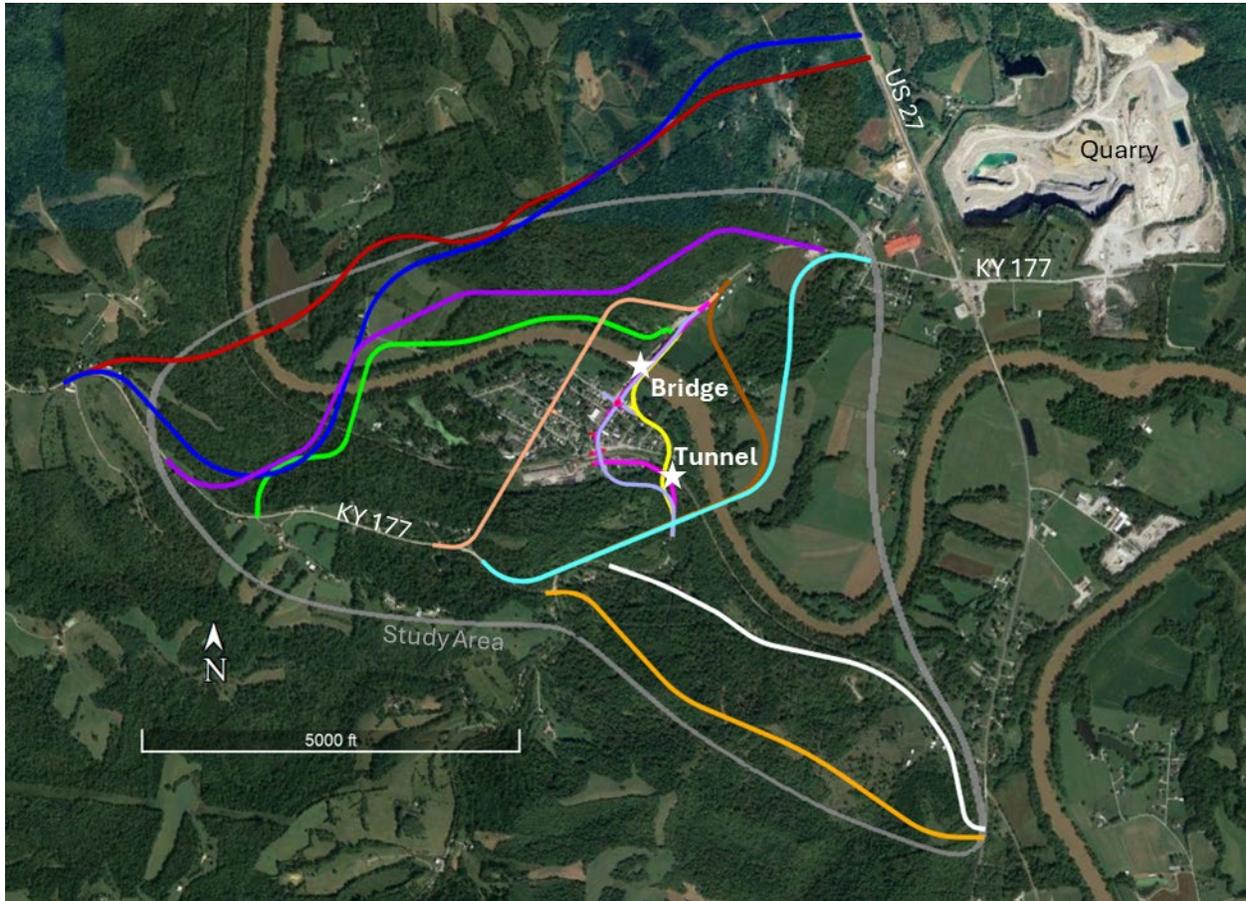


Figure 30: Initial Build Corridors

## 6.1 CONCEPTS NORTH OF TOWN

Four corridors north of Butler were considered. With each, a new Licking River crossing is included downriver but the existing truss bridge is assumed to be replaced at or near its current location to preserve a connection into Butler for local traffic. Therefore, KYTC would maintain two Licking River Bridges in the vicinity with each of these Build concepts, increasing costs and maintenance commitments for the state.

- **Red** and **Blue** tie to US 27 north of KY 177, crossing on new alignment to tie to existing KY 177 near MP 7.2 on the hilltop. These connectors have the longest lengths and high earthwork quantities, related to the aggressive terrain north of town (**Figure 31**).

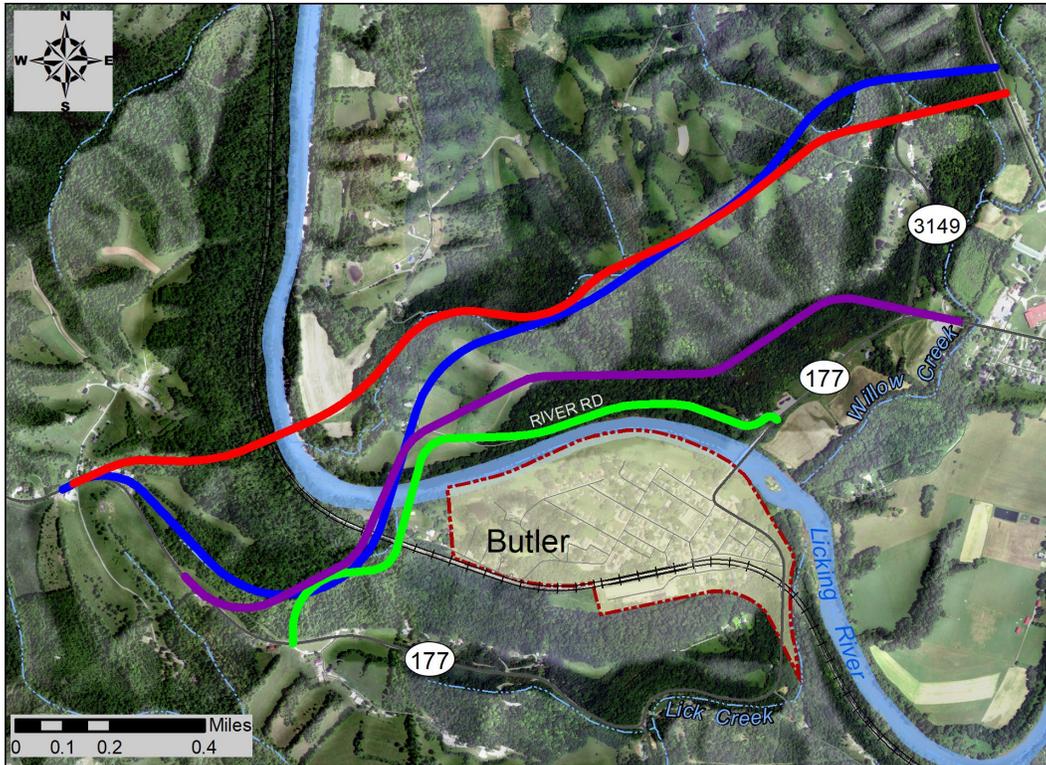


Figure 31: Terrain for Northern Build Concepts

- **Purple** connects to KY 177 near MP 4.5, crossing on new alignment to tie to existing KY 177 near MP 7.0 on the hilltop. It has a slightly shorter length but high earthwork quantities, related to the aggressive terrain north of town.
- **Green** follows existing River Road to the extent practical, placing it lower in elevation with a lower design speed (35 mph) than other corridors considered north of town. This reduces earthwork; however, there are significant geological concerns that will require investigation should this corridor advance. About 75% of its length lies within the floodplain.

## 6.2 CONCEPTS SOUTH OF TOWN

Four Build concepts south of town were considered. With each, the existing truss bridge is assumed to be replaced at or near its current location to preserve a connection to Butler for local traffic.

- **Brown** and **Teal (Figure 32)** tie to KY 177 east of the truss bridge, running through low lying floodplains near Willow Creek, and rejoining KY 177 near MP 5.8 near the existing KY 3185 intersection.

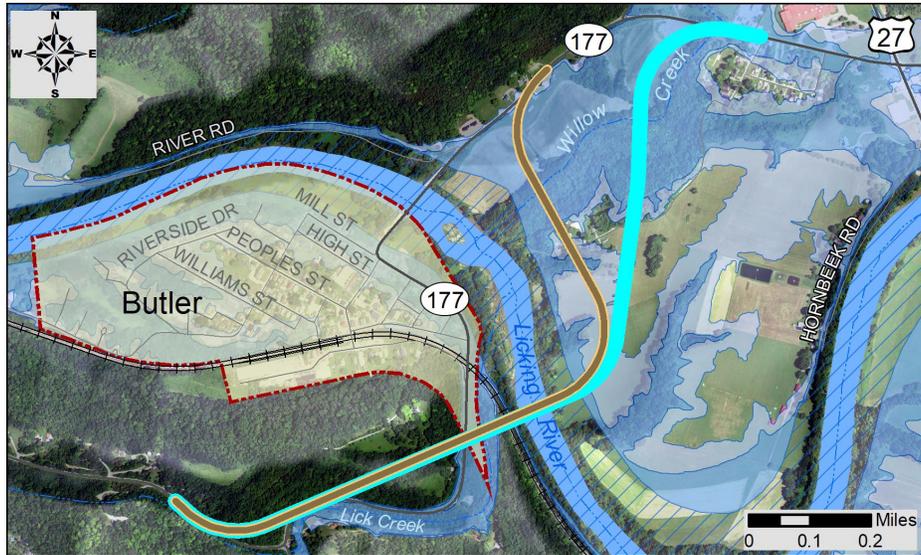


Figure 32: Detail for Brown and Teal Build Concepts

- **White** generally follows existing Hogback Ridge Road, which will require extensive reconstruction to provide widths and grades that satisfy HDM guidelines. South of the river, no new Licking River crossing is required. By following an existing roadbed, earthwork quantities are reduced but property impacts are increased compared to new alignment options.
- **Orange** is similar to white, but shifted south to run on new alignment to US 27. No new river crossing is required. Rugged terrain in the vicinity (**Figure 33**) increases earthwork but reduces property impacts.

The farthest south options considered, White and Orange would increase travel times/lengths for quarry trips compared to the existing KY 177 route.



Figure 33: Terrain for Southern Build Concepts

### 6.3 CONCEPTS IN TOWN

Three Build corridors were considered in town, which tend to have greater property impacts than more remote connections. However, bypassing town entirely could contribute to negative repercussions for local businesses and the overall local economy. Design speeds and typical sections for these concepts were reduced to minimize impacts. Each concept assumes a single river crossing is maintained, replacing the existing truss bridge at or near its current location. Each also provides an alternative KY 177 connection bypassing the existing tunnel beneath the rail line.

Shown in **Figure 34, Pink At-Grade** replaces the existing bridge immediately east of the current location, assuming a structure approximately the same height and length as the historic truss. The corridor follows existing Matilda Street through town and crosses the railroad tracks at-grade at the same location as today. The route turns east, reconstructing South Street south of its current alignment to tie to KY 177 and bypass the tunnel.

Through town, the corridor assumes 11-foot lanes with curb/gutter and extends a consistent sidewalk between the bridge and Front Street. Pink At-Grade has a 25-mph design speed, similar to the current conditions.

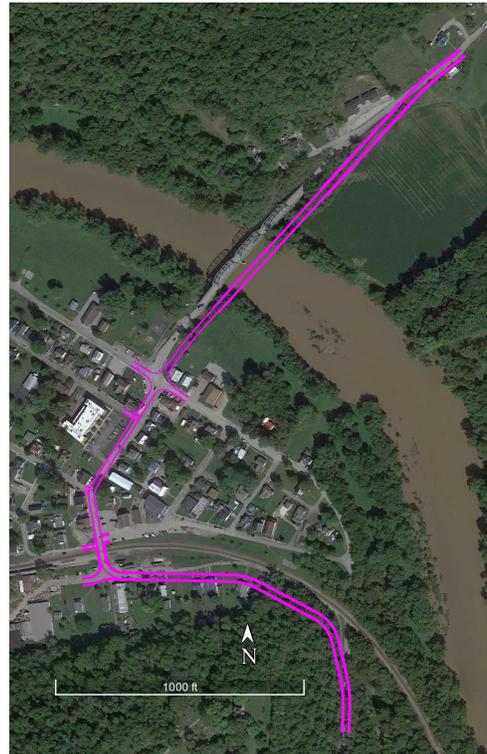


Figure 34: Pink Concept

**Pink Grade-Separated** follows the same path but higher in elevation to create a grade-separated overpass above the railroad line. This reduces conflict points and potential delay for thru traffic, but results in greater impacts within the community as the footprint is larger than Pink At-Grade. The intersection at Mill Street/Matilda Street downtown provides access to the local street grid, but the remainder of the alignment is elevated without connections. Access for the few remaining homes and businesses south of the railroad tracks—including the largest business in town—would be challenging.

An option along **Taylor Street** creates a new river crossing west of the existing bridge and city park, follows Taylor Street through town, and overpasses the rail line to meet existing KY 177 near the water tower (MP 6.1). The required elevation leads to large disturb limits through town and high property impacts, relying on an at-grade intersection at Peoples Street to tie to the local street grid. The corridor assumes a 35-mph design speed.

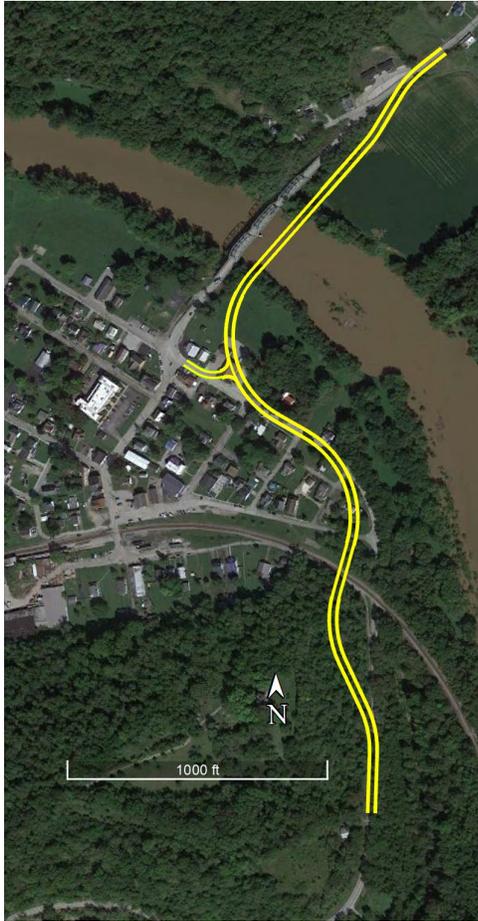


Figure 35: Yellow Concept

Shown in **Figure 35, Yellow** crosses the river just east of the existing bridge, generally following KY 177 around the eastern edge of town. It climbs in elevation to span above the railroad line and ties back to existing KY 177 near MP 5.4. The new river bridge is assumed to be approximately the same height and length as the historic truss; an at-grade connection to the local street grid is provided at Mill Street but Main, Grace, and Front streets would likely dead-end as the new alignment grade climbs. Yellow assumes a 35-mph design speed with 12-foot lanes and 6-foot paved shoulders.

### 6.3.1 INTERSECTION IMPROVEMENTS

In addition, two spot improvements were initially considered at intersections. Alone, neither option satisfies the study goals.

The KY 177/KY 3185 intersection is located in a horizontal curve, with eastbound KY 177 coming downhill stop-controlled. This was the highest observed crash cluster, with nine single-vehicle crashes in five years, including four injury collisions. Three involved commercial vehicles overturning. Shown in **Figure 36**, a realignment option was developed to improve the curve to 45 mph and make KY 177 the thru movement so northbound KY 3185 would stop.

Just south of the existing bridge, the KY 177 (Mill Street) intersection with Matilda exhibits complex geometry (**Figure 12**). KY 177 approaches form a sharp horizontal curve as the grade drops from the bridge. Adjacent parking and a diagonal cross-street in the west quadrant increase pavement widths and conflict points, with an electrical pole surrounded by curbs forming an island inside the intersection. There are no crosswalks marked although sidewalks exist on several approaches. There were no reported crashes during the five-year analysis period. Design options considered reconstructing the intersection as a traditional four-leg intersection or roundabout and incorporating pedestrian safety measures.



Figure 36: KY 177/KY 3185 Curve Realignment

## 6.4 SECOND PROJECT TEAM MEETING

The project team met January 22, 2024, to discuss initial Build concepts considered to date. The team reviewed existing conditions and environmental resources, discussed merits of various concepts, and considered unit cost assumptions. Following discussions, the grade-separated railroad options in town presented above were added. The team agreed to postpone a LO/S meeting until the 2024 Highway Plan passed as this could influence future project development stages.

### 6.4.1 CORRIDOR IMPACT COMPARISON

During the project team meeting and subsequent coordination, high-level impacts for each Build corridor were compared to identify the most competitive options to share with LO/S. Results are summarized in **Table 8**. Corridors north and south of town effectively bypass Butler, requiring a river-crossing at or near the current truss to preserve local access. Corridors in town lead to more home and business relocations, especially for options that create a grade separated rail crossing. Lower design speeds reduce curve radii but may be less suited for regional freight trips. Corridors crossing in or near town tend to be lower in elevation with shorter span lengths, raising concerns about emergency access during high-water events.

Table 8: Comparison of Corridor-level Impacts

Concept	Length (mi)	River Crossings	Flood Concerns	Earthwork	Relocations	Design Speed
Red	2.2	2	Low	High	±3	55
Blue	2.6	2	Low	High	±5	55
Purple	1.9	2	Low	High	±1	55
Green	1.3	2	High	Med	±4	35
Brown	1.3	2	High	Med	±3	45
Teal	1.5	2	High	Med	±0	45
White	1.2	1	Low	Med	±3	55
Orange	1.3	1	Low	High	±0	55
Pink At Grade	0.7	1	High	Low	±12	25
Pink Separated	0.9	1	High	Med	±18	25
Taylor	1.1	1	Med	Med	>25	35
Yellow	0.7	1	High	Med	±6	35

Accordingly, several options were eliminated from further consideration, with the remainder advancing for coordination with LO/S:

- Red and Blue were eliminated due to their lengths and earthwork requirements, as well as the likelihood to encounter geotechnical challenges.
- Brown and Teal are functionally similar; only one should advance.
- Taylor results in significant property impacts, including the nursing home and police/fire station. It severs the town. Other in-town options provide similar benefits for fewer impacts.

## 6.5 COST ESTIMATES

Planning-level designs for Build corridors were used to estimate preliminary quantities of high-cost construction items including earthwork and pavement. Construction costs were tabulated using Bid Express<sup>14</sup> average unit bid prices for construction bids in Pendleton and adjacent counties since January 2021. Parametric factors were applied to account for drainage, traffic control, mobilization, and miscellanea. A 30% contingency factor was also applied to construction cost totals. For Build corridors advanced for coordination with LO/S, KYTC District 6 provided right-of-way and utility cost estimates based on conceptual modeled disturb limits, aerial imagery, approximate locations of property lines, and utility records.

<sup>14</sup> Online at <https://bidx.com/ky/main>

Planning-level cost estimates by phase (i.e., design, right-of-way acquisition, utility relocations, and construction) are presented in **Table 9** with details included as **Appendix H**. Costs are presented in 2023 dollars.

Table 9: Cost Estimates by Phase

Concept	D	R	U	C	TOTAL
Purple	\$8M	\$3M	\$3M	\$80M	\$94 million
Green	\$7M	\$3M	\$3M	\$70M	\$83 million
Teal	\$4M	\$3M	\$2.5M	\$40M	\$50 million
White	\$2M	\$1.5M	\$2M	\$20M	\$25 million
Orange	\$7M	\$1.5M	\$2M	\$70M	\$80 million
Pink At Grade	\$1M	\$1.5M	\$2M	\$16M	\$20 million
Pink Grade Separated	\$2M	\$5M	\$1.5M	\$25M	\$34 million
Yellow	\$2M	\$5M	\$6M	\$20M	\$33 million

## 7.0 FINAL COORDINATION MEETINGS

Following concept development, the project team reached out to local leaders to solicit feedback on transportation needs and Build concepts.

### 7.1 LOCAL OFFICIAL AND STAKEHOLDER MEETING

The project team met with LO/S on June 26, 2024, at the Pendleton County Courthouse in Falmouth. The purpose of the meeting was to present proposed improvement concepts (**Chapter 6.0**) and gather local input. The group also spent time reviewing funding allocations in the latest Highway Plan, which includes design funds in the biennium for two separate projects overlapping the current study area.

Key group discussions included:

- Options that bypass Butler could have a detrimental impact on the city’s economy. The largest business in Butler is the pallet supplier, located off South Street, that generates millions of dollars in revenue annually. Each bypass option assumes a bridge at/near the existing crossing remains in place to serve town.
- So close to the river, flooding is a recurring issue. Access for emergency responders is important.
- There is local interest in preserving the historic truss.
- Most attendees preferred the Yellow corridor as it balances local access without major disruptions for the city. Additionally, safety improvements at the KY 177/KY 3185 intersection are also important and should be addressed with any Build concept to advance. A hybrid

Yellow/Teal concept was also discussed to provide a truck-friendly bypass and preserve local access.

## 7.2 THIRD PROJECT TEAM MEETING

A third and final project team meeting occurred August 7, 2024; the purpose of the meeting was to review study findings to date and reach a consensus on recommendations. Three variations on a Yellow Build corridor were presented (discussed in the next chapter); the team agreed all three were viable solutions worth further study as part of a future design phase.

## 8.0 RECOMMENDATIONS

A wide range of Build corridors were considered throughout this planning study, which compares associated costs and impacts to narrow down the range of options considered as part of a future design effort. Any Build concepts developed should address both local traffic and regional freight needs.

An initial set of 12 corridors (**Figure 30**) was screened down, leaving a combination of two Build concepts remaining recommended for further consideration.

- Corridors north of town—including **Red**, **Blue**, and **Purple**—bypass Butler, leading to local concerns about economic impacts. These concepts have the longest lengths and among the highest earthwork quantities, resulting in higher construction costs than other Build options considered. The truss bridge must be replaced at or near its current location to preserve access to town, increasing KYTC costs and maintenance commitments. Rugged terrain contributes to lengthy structures and long grades approaching the river, paired with geotechnical concerns for much of the region.
- The **Green** corridor also bypasses town. It is shorter than other northern options but lower in elevation, following the existing terrain. About 75% of its length lies within the floodplain. There are also substantial geotechnical concerns: due to the weathering characteristics and percentage of shale, bedrock within the study area is considered non-durable.
- South of town, **White** and **Orange** do not require a new Licking River structure although the existing truss must be replaced at or near its current location to preserve access to town. However, southern routes still bypass the community and increase travel times/distances to access the quarry. White follows existing Hogback Ridge Road, leading to increased property impacts. Orange follows new alignment but, as with northern options, rugged topography contributes to higher earthwork quantities and increased costs. Geotechnical concerns with

large-scale earthwork are another concern, difficult to quantify until more detailed investigations are completed.

- Both **Pink** and **Taylor** options bisect the community, leading to substantial property impacts and altering its character and viewshed. Lower design speeds paired with surrounding residential land uses are less consistent with the vision of a regional freight route.

## 8.1 DETAILED STUDY OPTIONS

Variations of the Yellow and Teal corridors were presented during the third project team meeting, each of which merits further exploration during future project development phases.

- **Yellow Base** is the same Build option presented in **Figure 35**: new bridge east of existing, following KY 177 around the eastern edge of town, overpassing the railroad, and tying back to existing KY 177 near MP 5.4. The total length is 0.7 miles. The replacement river crossing is similar to the existing, which does not span the entire floodway. This option could be paired with the spot improvement at KY 177/KY 3185 presented in **Figure 36** to address local concerns.
- **Yellow + Tail** mirrors Yellow Base but extends the southern end up the hill, connecting to existing KY 177 near MP 6. The length totals 1.1 miles.
- **Yellow/Teal Hybrid** combines the Teal bypass with a shortened version of Yellow, relying on a new bypass to provide cross-river connectivity for the city. Together, it is 1.9 miles long. The new river crossing is longer and higher to span the entire floodway; the existing truss would no longer be a necessary component of the state highway system. This option has a higher design speed, more consistent with the vision of a regional freight connector.

### 8.1.1 COSTS AND ENVIRONMENTAL IMPACTS

Cost estimates for the detailed study options are summarized in **Table 10**.

Table 10: Cost Estimates by Phase

Concept	D	R	U	C	TOTAL
Yellow Base	\$2M	\$5M	\$6M	\$20M	\$33 million
KY 177/KY 3185 Intersection	\$0.2M	\$0.2M	\$0.1M	\$1.3M	\$1.8 million
Yellow + Tail	\$4M	\$5.5M	\$6M+	\$40M	\$55 million
Yellow/Teal Hybrid	\$3M	\$9M	\$7.5M	\$30M	\$50 million

Alongside costs, impacts to the human and natural environment are another consideration when evaluating Build options. With similar corridors for the detailed study concepts, the type of impacts

are similar for each. **Figure 37** overlays the three detailed study options on the environmental overview map for reference.

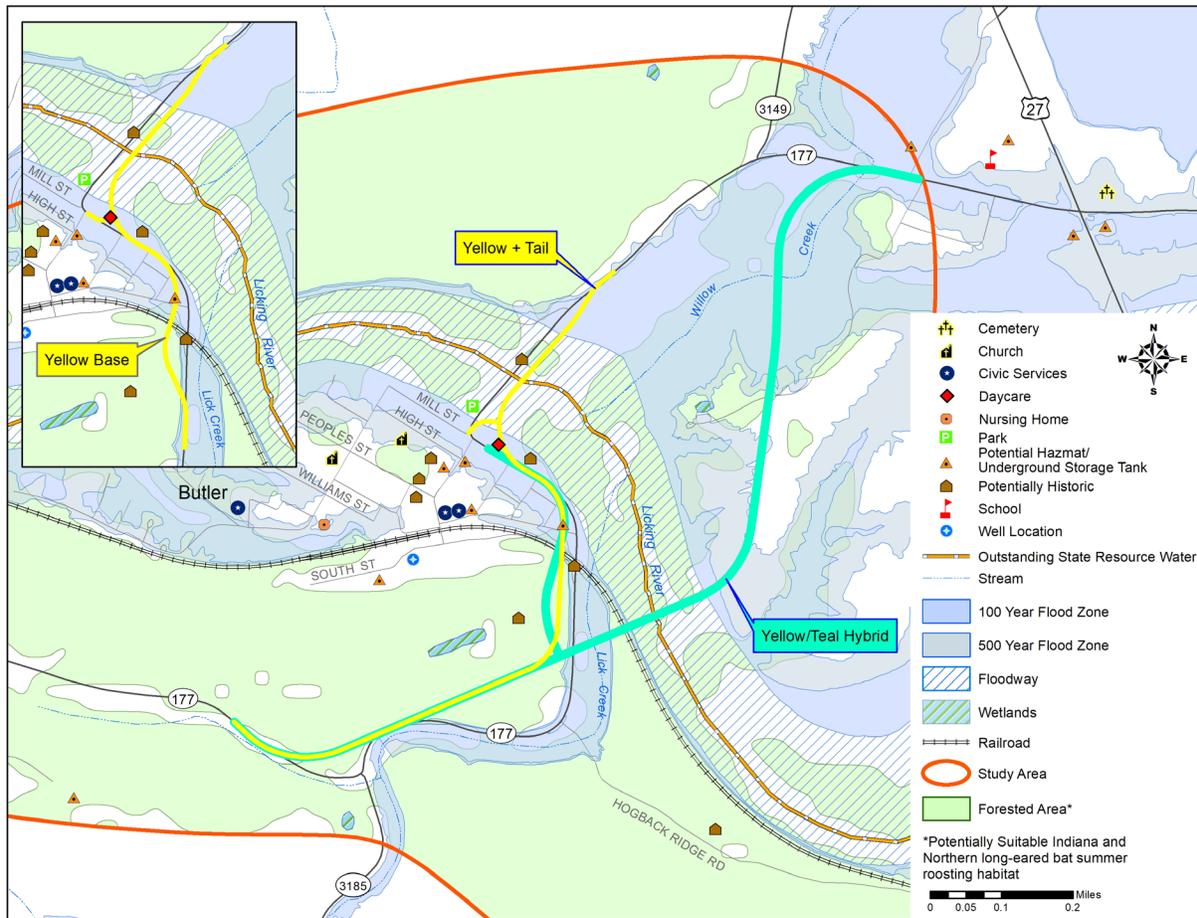


Figure 37: Detailed Study Options with Environmental Overview

**WATER RESOURCES.** Each detailed study option impacts water resources. Each includes a new structure across the Licking River, which is navigable and an Outstanding State Resource Water for protected species habitat. Bridge work will require coordination with USACE, USCG, and KDOW for Section 9, Section 10, and Sections 401/404 individual permits.

While design-level decisions will determine elevations and explore specific impacts, floodplains cover much of the study area and will play a major role in project decision-making.

- Yellow Base and Yellow + Tail stretch roughly 900-1000 feet within the floodway, compared to 600 feet with Yellow/Teal Hybrid since the floodway is narrower south of town. Cost estimates for Yellow Base and Yellow + Tail are based on a 530-foot bridge, similar to the existing truss

bridge, which does not span the entire floodway width today. The Yellow/Teal Hybrid bridge is assumed to be 925 across, longer and higher in elevation than the floodzone.

- Yellow Base and Yellow + Tail impact 1,500-2,000 feet within the 100-year flood zone, compared to 3,700+ feet with Yellow/Teal Hybrid that passes through low-lying areas around Willow Creek.

**KEY HABITATS.** The Licking River represents suitable habitat for protected mussel species (**Table 4**); Impacts to the river will likely require a Biological Assessment. Seasonal survey restrictions may impact future project timelines, waters must reach a certain temperature to assess for mussels, typically between April and October. Based upon historic occurrence records reported by the Office of Kentucky Nature Preserves, this may require formal consultation with the USFWS and the issuance of a Biological Opinion. Impacts to woodland habitat for endangered bat species can likely be processed through KYTC's Programmatic Agreement with seasonal clearing restrictions.

**GEOTECHNICAL CONCERNS.** KYTC's Geotech Branch identified "significant concerns" based on the terrain and underlying geology of the study area that will require consideration throughout any future design process. As stated, "geotechnical drilling will be needed for roadway cut/fills and structures. If a portion of this project will be a widening project, information on existing pavement structure should be obtained to assist the team in pavement design. Chemical modification may not be feasible so a granular subgrade could be utilized. Sampling of foundation soils should be performed for embankment situations... A thorough geotechnical exploration of the proposed alignment and grade will be required to properly anticipate and plan for special requirements necessary for the design and construction of the proposed alignment."

**COMMUNITY IMPACTS.** The Yellow corridors skirt around the eastern edge of Butler, reducing disruptions to the city center and more densely developed areas. However, any Build corridor in this area will result in an estimated 6-8 relocations. This includes a preschool-age daycare facility, which may be one of the only childcare service providers in the local community.

Windshield surveys also suggest households near the railroad tracks and floodplain may represent low-income populations—protected by environmental justice<sup>15</sup> regulations. Census data also indicates the region may contain concentrations of minority, age 65+, and/or disabled populations. Executive Order 12898 directs federal agencies to develop strategies to address disproportionately high and adverse human health or environmental effects of their programs on minority and low-income populations. Another important consideration is to ensure traditionally underserved populations are

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<sup>15</sup> Online at <https://www.epa.gov/environmentaljustice>

provided opportunities for meaningful engagement throughout the decision-making process—in compliance with Title VI of the Civil Rights Act.

**CULTURAL/HISTORIC RESOURCES.** Three potentially historic resources are located in close proximity to the detailed study corridors: the 1936 truss bridge, an I-House and outbuilding at 302 Mill Street, and the Alec Caldwell House (PD-2) which was not visible from public right-of-way. Measures should be taken to avoid or minimize impacts; should a Build concept advance with federal funding, formal field surveys and coordination with SHPO will be required to assess project effects to cultural historic resources.

Archaeological investigations in undisturbed areas and coordination with SHPO will be needed should a Build option advance.



## 9.0 NEXT STEPS

Two funded projects along KY 177 overlap the 6-80258 study area:

Table 11: Funded KY 177 Projects in Study Area

Location	Description	Source	Phase	Year	Amount
KY 177 MP 5.8-9.2	<b>Item No. 6-80258:</b> Reconstruct KY 177 from KY 3185 in Butler to KY 467	SPP	Design	2025	\$2.0M
KY 177 MP 5.0-5.9	<b>Item No. 6-80310:</b> Reconstruct KY 177 from Licking River Bridge in Butler to KY 3185	SPP	Design ROW Utility Const.	2025 2027 2027 2028	\$2.0M \$0.6M \$1.1M \$26.4M

The next phase in the project development process is Preliminary Design and Environmental Analyses per NEPA, if federal funding or permits create a federal nexus. Each of the three detailed study concepts warrant consideration during preliminary design.

Limited public involvement has occurred to date; engaging with key stakeholders and impacted property owners will be important during the design process. Engagement measures should be sensitive to potentially impacted environmental justice populations to ensure equal opportunities are provided—accommodating work schedules, accessibility, and even childcare sensitivities. Hosting any in-person meetings at a venue within Butler would be ideal.

## 10.0 ADDITIONAL INFORMATION

Written requests for additional information should be sent to:

KYTC Division of Planning  
 ATTN: Director  
 200 Mero Street  
 Frankfort, KY 40622  
 By phone: 502.564.7183