US 51

CORRIDOR STUDY

Fulton, Hickman, Carlisle, & Ballard Counties, KY

FINAL REPORT | JUNE 2025

PREPARED BY

TEAM KENTUCKY
TRANSPORTATION CABINET

IN PARTNERSHIP WITH

QK4

EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) initiated this *US 51 Corridor Study* to analyze existing conditions and anticipated traffic to identify priority investments along US 51 between the cities of Fulton and Wickliffe, a distance of roughly 40 miles through Fulton, Hickman, Carlisle, and Ballard counties in Kentucky. Nearly $45 million in projects for the US 51 corridor are shown in the biennium of the *FY 2024–FY 2030 Enacted Highway Plan*.[1] In light of projected funding, this study employs a programming approach to support prioritization of all previously identified projects along the route.

The study corridor (pink in **Figure ES-1**) forms an important north-south regional link for both passenger cars and freight. With the planned replacement of the aging US 51/Ohio River Bridge connecting Wickliffe, Kentucky to Cairo, Illinois and the conversion of the Julian M. Carroll Purchase Parkway to Interstate 69 (I-69), the importance of the corridor to regional transportation will continue to grow.

FIGURE ES-1: STUDY VICINITY

[1] Online at https://transportation.ky.gov/Program-Management/Pages/default.aspx

Existing Conditions

The northernmost 4.6 miles of the corridor, from Illinois to its intersection with US 60, is part of the National Highway System and classified as a Principal Arterial. South of US 60, it is classified as a Minor Arterial. The entire length is a state-designated truck route.

US 51 features two lanes for most of its length, excepting a three-lane section south of Wickliffe. **Figure ES-2** maps total pavement width along the corridor. Rural sections of the route are 24 to 26 feet wide in Ballard, Carlisle, and Fulton counties, dropping to 20–22 feet through most of Hickman County. The posted speed limit is 55 mph, dropping to 25 to 35 mph within each town and 40 mph on the US 51 Ohio River Bridge.

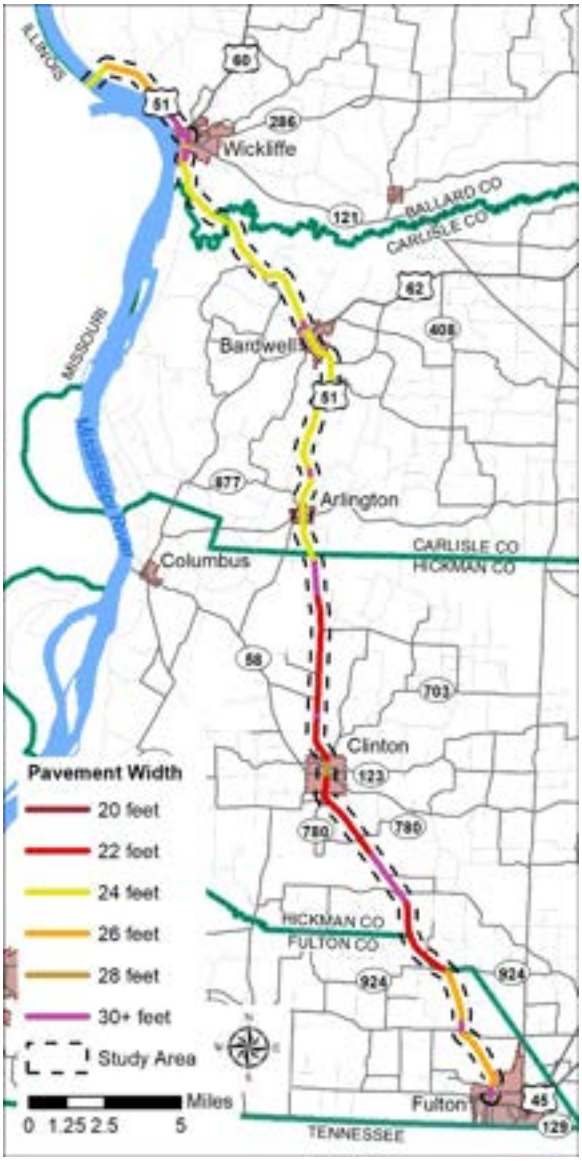


FIGURE ES-2: PAVED WIDTH

Much of the alignment satisfies KYTC's *Highway Design Manual* common practice guidelines; notable exceptions are discussed below and illustrated in **Figure ES-3**.

- The 1.3-mile stretch south of Wickliffe near Phoenix Paper (Ballard milepoint [MP] 1.8 to 3.1) exhibits eight steeper-than-recommended grades (up to 9%) and three Class C horizontal curves. Truck climbing lanes are provided in both directions: a half-mile northbound beginning at the truck entrance to Phoenix Paper and a quarter-mile southbound in front of Fort Jefferson Memorial Park.
- Approaching Bardwell's southern limits, a Class E curve at Front Street has warning flashers and advisory speed/curve signs. Continuing south, two Class F grades (up to 10%) may limit sight distance.

Other steep grades along the route are smaller but may limit visibility for motorists.

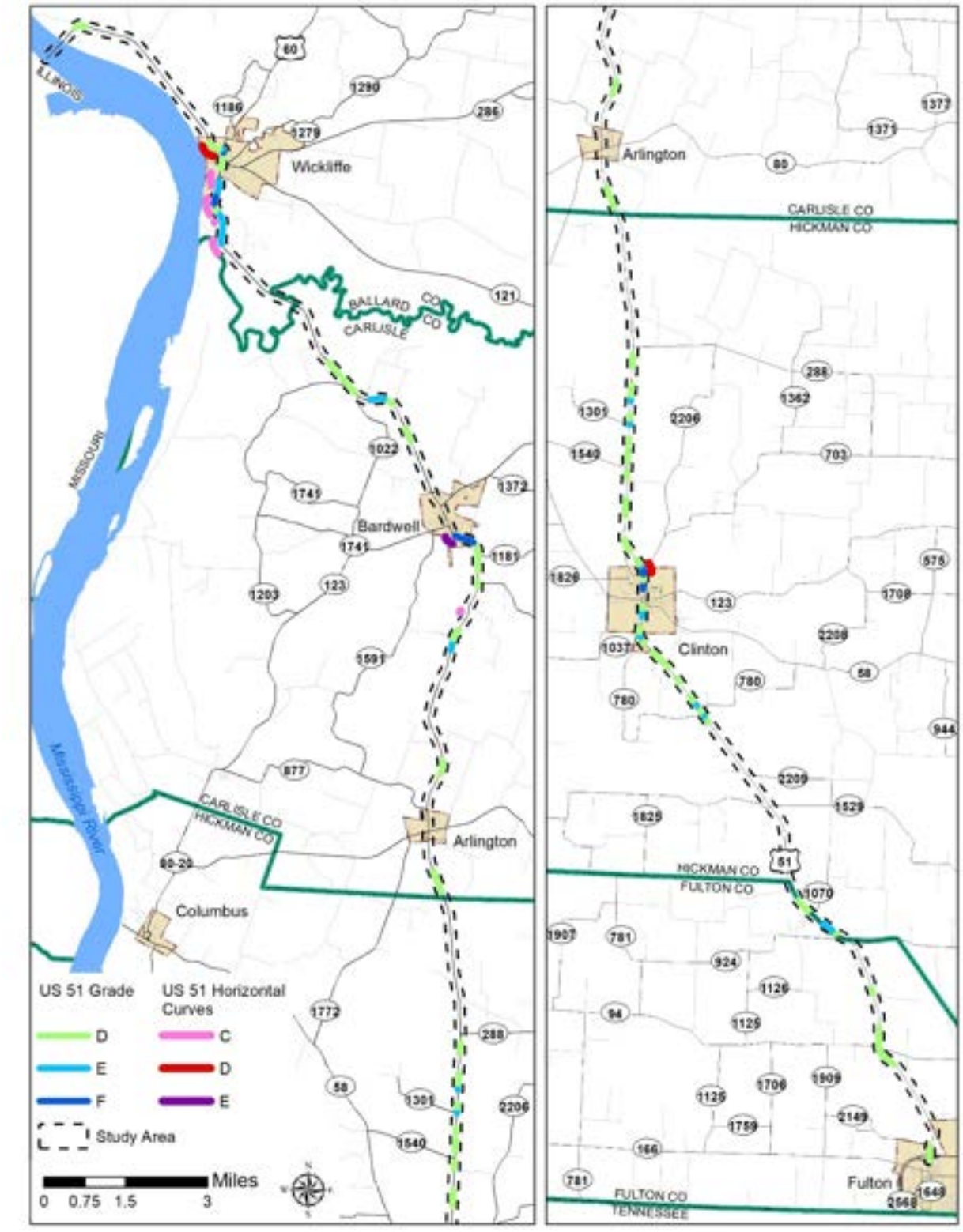


FIGURE ES-3: STEEP HILLS AND SHARP CURVES

There are 23 bridges along the corridor plus one overpass; two are in poor condition with potential funding to replace the poor-condition structure at Brush Creek as part of KYTC Item No. 1-10144.

Traffic & Modal Users

US 51 carries 1,600–2,700 vehicles per day (vpd) along rural sections of the corridor, increasing in Clinton (4,600 vpd), Bardwell (3,600 vpd), and north of Wickliffe (6,600 vpd). Heavy trucks make up 15–45% of these volumes. Origin-destination flows suggest few thru trips travel the entire 40-mile corridor. Analyses indicated most roadway segments and intersections within the study area provide adequate capacity for existing traffic. The heaviest traffic volumes were observed at the US 51/US 60 intersection in Wickliffe; potentially restrictive geometry coupled with heavy truck volumes may influence operations as much as volume—as seen in **Figure ES-4**.

FIGURE ES-4: WIDE-TURNING TRUCK

An annual 1.58% growth rate was applied to derive 2045 No-Build traffic volumes, increasing US 51 daily volumes to 2,200–9,200 vpd. Projected increases in traffic degrade operations with peak hour performance at Level of Service (LOS) E/F at three of six studied intersections.

The needs of all modal users are critical considerations.

- Many surrounding land uses represent agricultural fields, with slow-moving farm equipment relying on US 51 during key seasons. Oversize vehicles operating below the posted speed limit paired with limited passing opportunities appear to contribute to crash trends as motorists attempt to pass obstacles.
- Sidewalks are concentrated within towns and many of the walkways are disconnected, in potentially poor condition, or may not meet current Americans with Disabilities Act (ADA) requirements.
- Portions of the corridor link regional bicycle routes, but identified routes do not have dedicated, developed bicycle facilities, only scattered signage. Local leaders report very few cyclists travel the route.
- Bus service is limited to school buses, but several public entities provide demand-response transit services within the study counties.

Crash Analyses

Five years of historical crash data (2019 – 2023) were evaluated for the study corridor, mapped in **Figure ES-5**. Three crashes (<1%) were fatalities, 39 (19%) resulted in injuries, and 160 (80%) resulted in property damage only (PDO). By type, most crashes involved a single vehicle (45%), and 20% represent head on or opposite direction sideswipes. Roadway departures represent 54% of crashes, which tend to be more severe than other crash types. Considering only crashes in rural stretches between towns, 79% of crashes were roadway departures.

A broader look at ten years of crash records showed 11 fatalities and 27 severe injury crashes along US 51 over the past decade. These were concentrated in Carlisle County; single vehicle (55%) and head-on collisions (26%) were the most common types, which are often correlated with narrow pavement widths and higher severities.

Overall, 32% of reported 2019-2023 crashes involved commercial vehicles. Considering the importance of freight movements along US 51, analysts took a closer look: 65 commercial vehicle crashes were reported along US 51, with one resulting in a fatality and seven resulting in injuries. The highest truck volumes—and greatest number of truck crashes—occurred in Ballard County. Single vehicle (31%) and opposite direction sideswipes (29%) were most common along the 40-mile corridor. Roadway departures represent 67% of the dataset. About 27% occurred after dark and 19% were on wet/icy roadways.

Coordination Meetings

The project team met at three key milestones throughout the study process and engaged with local officials and stakeholders (LO/S) twice.

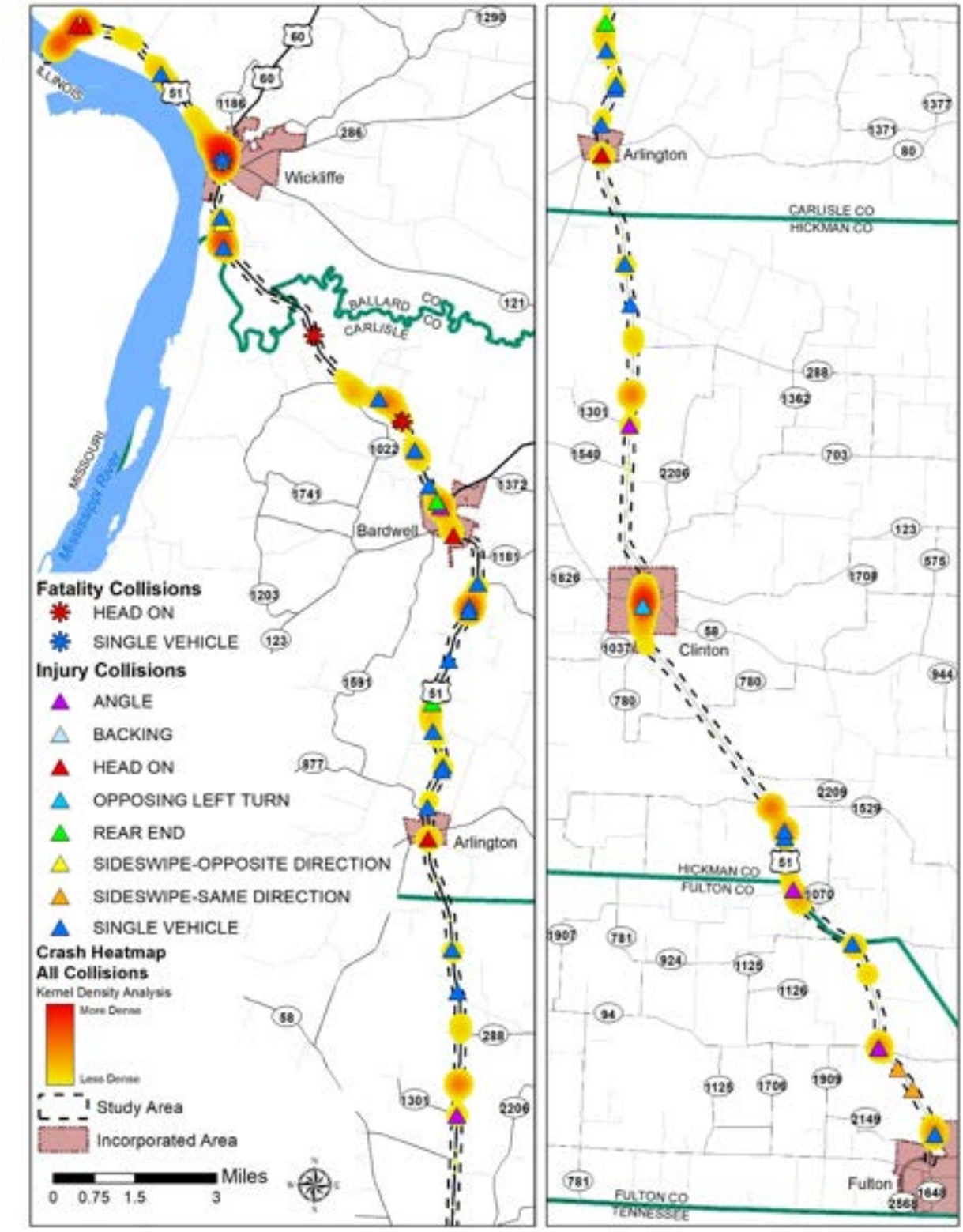


FIGURE ES-5: HEAT MAP WITH FATAL/INJURY CRASHES

Build Concepts

Build concepts were developed to address three primary goals:

Improve safety, with a focus on higher-severity crash locations

Consider all users: trucks, farm equipment, pedestrians, etc.

Address both existing and future mobility needs

Improvement concepts were developed in two categories: smaller scale safety improvements at intersections and in-town pedestrian facilities, and larger scale roadway realignment and widening options with higher costs and longer implementation timeframes. Smaller scale spot improvements are shown in the left panel of **Figure ES-6**. Larger scale concepts are shown in the middle panel of **Figure ES-6**; Concepts F and G reconstruct the route as a 2+1 and cover the entire study corridor outside of cities, divided into potential construction sections shown on the right.

Four additional Build concepts were added following heavy flooding in February 2025. Three low-lying areas in Hickman County were added, along with a fourth corridor widening option (Concept H) considering a Super-2 configuration.

Table ES-1 provides additional information about proposed Build concepts: a brief description of each, estimated planning-level costs in 2024 dollars, 2019-2023 crashes within improvement limits, and a comparison of benefits and costs. It should be noted that larger scale concepts are less detailed and should be interpreted as order-of-magnitude level estimates.

While planning-level estimates aim to be conservative, larger projects having extended implementation timelines are likely to face significant cost increases.

A benefit-cost ratio (BCR) greater than 1.0 suggests the discounted present value of the benefits exceeds the discounted present value of the costs, suggesting the project may be worthwhile. As shown, many of the smaller scale safety improvements result in BCRs < 1.0, indicating monetized safety benefits outweigh capital costs. It should be noted that improved sidewalks provide additional benefits that are difficult to quantify at the planning stage—such as quality of life and

increased economic revenues for adjacent businesses. BCRs for Concepts F, G, and H were calculated by construction segment with only one section showing a result greater than 1.0.

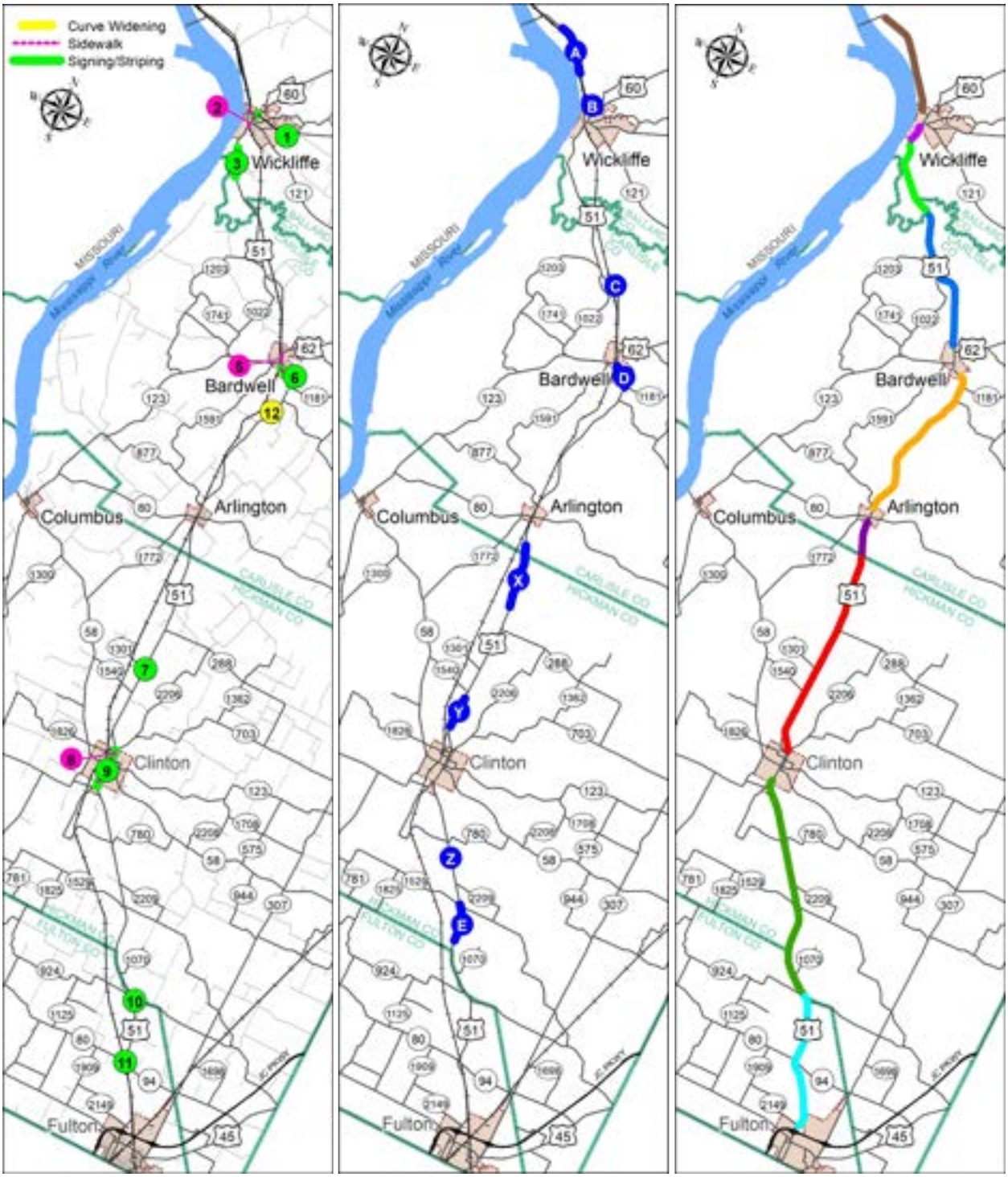


FIGURE ES-6: SPOTS, CONCEPTS, AND POTENTIAL CONSTRUCTION SECTIONS

An initial Spot 4 was dismissed when adjusting traffic control at the US 51/US 62 intersection at Bardwell potentially addressed needs driving the larger Item No. 1-333 improvement.

TABLE ES-1: BUILD CONCEPT OVERVIEW

Concept	2024 Cost	Crashes	BCA	Priority
Smaller Scale				
1: US 51/US 60 Bypass Lane	$530k	8	1.9	High
2: Safety Through Wickliffe	$280k	20	46	High
3: Phoenix Drainage Improvements	$1.2M	12	2.0	Med
5: Bardwell Sidewalks	$9.8M	9	Qualitative	Med/Low
6: Bardwell Hill/Curve (Low Cost)	$460k	2	3.1	High
7: US 51/KY 1301 Profile	$1.9M	2	0.2	Low
8: 1-80203 Clinton Reconstruction	$9.5M	20	Qualitative	In Design
9: Clinton Small-scale Safety Imp.	$800k	20	3.7	High
10: US 51/KY 924 Signing	$350k	3	1.3	Med
11: US 51/KY 94 Signing	$460k	3	3.0	Med
12: US 51/Tom Looney Realignment	$2.1M	7	1.4	High
Larger Scale				
A: 40-Foot-Wide North of Wickliffe	$8M	7	<0.1	Combined
B: North Wickliffe Bypass	$10-20M	21	0.2	Med
C: Curve at Railroad Overpass	$6M	6	0.2	Med
D: Bardwell Hill Profile	$10M	2	<0.1	Low
E: Cane Creek Curves	$6M	7	0.4	Med
F: 2+1 Widening	$250M	202	0.0–2.2	Dismiss
G: 2+1 Reconstruction	$260M	202	0.1–2.1	Long-Term
H: Super-2 Widening	$175M	202	0.1–2.3	Long-Term
X: Obion Creek Profile	$22M	4	NA	Med
Y: Cane Creek Profile	$3.0M	1	NA	Med
Z: Bayou de Chien Ditching	$1.7M	1	NA	Med

In addition to monetary costs, effects on the human and natural environment were also considered. Some of the Build options are contained within existing pavement or within existing right-of-way and would result in minimal impacts. Others have a larger footprint and, therefore, the potential to impact the surrounding environment: water resources, managed conservation lands, historic resources, and more.

Details about each recommended improvement are shown on project sheets in **Section 8.1** (page 68). Concept F was dismissed in favor of Concept G, which addresses substandard alignment elements in addition to pavement width, resulting in similar costs and impacts as F. Concept H

also addresses pavement width and incorporates safe passing opportunities, but with fewer impacts and lower costs than either Concepts F or G. Therefore, Concept H is generally preferred over Concept G but both scenarios should be considered during any future design phases. Whichever template is selected, the same approach is expected to be applied along the entire corridor to create a consistent driver expectation rather than combining some sections of Super-2 and some 2+1.

Funding exists to advance improvements along some segments of the larger corridor. Some of the recommended improvements herein are low-cost actions requiring little advance preparation and could be implemented relatively quickly by KYTC maintenance forces. Others are higher-cost projects that must compete for funding and progress through the project development process.

EXECUTIVE SUMMARY ES-1
1. INTRODUCTION 1
1.1. OTHER STUDY AREA PLANS AND PROJECTS 3
2. EXISTING CONDITIONS 9
2.1. Highway Systems 9
2.2. Roadway Geometric Characteristics 13
2.3. Bridges 17
2.4. Other Roadway Users 19
2.5. Railroad 21
2.6. 2024 Traffic Volumes and Operations 21
2.7. Crash History 26
3. ENVIRONMENTAL RESOURCES 32
3.1. Natural Environment 34
3.2. Human Environment 39
4. INITIAL COORDINATION EFFORTS 47
4.1. First Project Team Meeting 47
4.2. First Local Official/Stakeholder Meeting 47
5. 2045 NO-BUILD TRAFFIC FORECAST AND OPERATIONS 48
5.1. Future Year Traffic Growth 48
5.2. 2045 No-Build Operations 49
6. CONCEPT DEVELOPMENT 50
6.1. Study Goals & Objectives 50
6.2. Initial Concepts Descriptions 51
6.3. Intersection Control Evaluations 56
6.4. Second Project Team Meeting 56
6.5. Cost Estimates 57
7. FINAL MEETINGS, BENEFITS, AND IMPACTS 60
7.1. Second Local Official and Stakeholder Meeting 60
7.2. Transportation Benefits 61
7.3. Environmental Impacts 62
7.4. Third Project Team Meeting 64
8. RECOMMENDATIONS 67
8.1. Project Sheets 68
9. NEXT STEPS 103
9.1. Potential Funding Streams 104
10. ADDITIONAL INFORMATION 106

FIGURES

Figure ES-1: Study Vicinity ES-1
Figure ES-2: Paved Width ES-2
Figure ES-3: Steep hills and Sharp Curves ES-3
Figure ES-4: Wide-Turning Truck ES-4
Figure ES-5: Heat Map with Fatal/Injury Crashes ES-6
Figure ES-6: Spots, Concepts, and Potential construction sections ES-8
Figure 1: Study Corridor 2
Figure 2: US 51 Bridge 3
Figure 3: Nearby Transportation Projects 4
Figure 4: Regional Corridors 6
Figure 5: Item 1-183 Recommendations 7
Figure 6: Improvements at Clay St (left) and Mayfield Rd (right) 8
Figure 7: Rendering of New Cairo Bridge 8
Figure 8: Truck Routes 12
Figure 9: Paved Width 13
Figure 10: Representative Lanes/Shoulders in Rural Section 13
Figure 11. Posted Speed Limits 14
Figure 12: Horizontal and Vertical Alignment Classifications 16
Figure 13: Existing Bridges 18
Figure 14: Existing Pedestrian and Bicycle Facilities 20
Figure 15: On-Road Tractor 21
Figure 16: 2024 Traffic, North Section 22
Figure 17: 2024 Traffic, South Section 23
Figure 18: Level of Service (LOS) 24
Figure 19: Wide-Turning Truck 25
Figure 20: Reported Crashes (2019-2023) 27
Figure 21: Fatal/Injury Crashes (2019-2023) 28
Figure 22: Fatalities 29
Figure 23: Crashes by Type 29
Figure 24: Truck Crashes (2019-2023) 31
Figure 25: Environmental Overview Map 33
Figure 26: Mines and Minerals 37
Figure 27. Communities 39
Figure 28. Opportunity Zones 41
Figure 29: Industrial Developments 42
Figure 30: Census Geographies 46
Figure 31: Angle Parking in Wickliffe 51
Figure 32: Item No. 1-333 Design 52
Figure 33: US 51 North of Wickliffe 53
Figure 34: Potential construction sections for Corridor widening 55
Figure 35: Proposed Typical Section for 2+1 Widening 54
Figure 36: Typical Project Development Process 59
Figure 37: Build Priorities 68

TABLES

Table ES-1: Build Concept Overview ES-9
Table 1: Study Segments 1
Table 2: Six-Year Plan and CHAF Projects along US 51 5
Table 3. 2022 Recommended Bike/Ped Improvements Along US 51 9
Table 4: Grades/Curves 15
Table 5: 2023 Existing Bridge Conditions 17
Table 6: 2024 Intersection LOS 25
Table 7: Threatened and Endangered Species 35
Table 8: NRHP Listed Resources 44
Table 9: NRHP-Eligible Resources 44
Table 10. Potentially Significant Historic Sites 44
Table 11: Summary of Demographic Trends 45
Table 12: Daily Traffic by Highway Segment 48
Table 13: 2045 No-Build Intersection LOS 49
Table 14: ICE Findings at Study Intersections 56
Table 15: Build Costs by Phase 58
Table 16: Concepts F-G Build Costs by Segment 58
Table 17: Long-Term Costs Escalated for implementation Timelines 60
Table 18: Benefit-Cost Analyses 62
Table 19: Supplemental Costs by Phase 67
Table 20: Build Priorities 67
Table 21: Highway Plan funding versus Recommendations 103

APPENDICES

A. Traffic Forecast Report

B. Crash Data

C. Geotechnical Overview

D. Historic Overview

E. PADD Socioeconomic Report

F. Meeting Summaries

G. Cost Estimates

H. ICE Spreadsheets

I. Hydraulic Modeling at Three Low-Lying Sites

ACRONYMNS LIST

ADA	Americans with Disabilities Act
BCR	Benefit-Cost Ratio
BMP	Best Management Practices
CEDS	Comprehensive Economic Development Strategy
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHAF	Continuous Highway Analysis Framework
CMF	Crash Modification Factor
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HIS	Highway Information System
HSIP	Highway Safety Improvement Program
ICE	Intersection Control Evaluation
KDOW	Kentucky Division of Water
KHC	Kentucky Heritage Council
KHFN	Kentucky Highway Freight Network
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
NBI	National Bridge Inventory
NHS	National Highway System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NTN	National Truck Network
OSRW	Outstanding State Resource Water
PADD	Purchase Area Development District
PDO	property damage only
RCRA	Resource Conservation/ Recovery Act
SHIFT	Strategic Highway Investment Formula for Tomorrow
STAA	Surface Transportation Assistance Act
STIP	Statewide Transportation Improvement Program
TED	Transportation Enterprise Database
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
v/c	volume-to-capacity ratio
VMT	vehicle-miles traveled
vpd	vehicles per day
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area

1. INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated this *US 51 Corridor Study* in November 2023 to analyze existing conditions and anticipated traffic to identify priority investments along US 51 between the cities of Fulton and Wickliffe, a distance of roughly 40 miles through Fulton, Hickman, Carlisle, and Ballard counties in Kentucky. Shown in **Figure 1**, these four counties stretch along the far western boundary of Kentucky, abutting the Mississippi River. The region has a rich agricultural heritage with abundant natural resources and a series of small communities along its main highways.

FIGURE 1: STUDY COUNTIES

- Fulton, the largest city in Fulton County, has an estimated population of 2,300. The city touts itself as the "banana capital of the world" and is home to the annual banana festival. Fulton lies just past the southern end of the study area on the Tennessee state line. The largest city along the study route, it is served by I-69, US 45, and other state routes.
- Clinton, county seat of Hickman County, has an estimated population of 1,200. The city is promoted as the "small town with a big heart." KY 58 and KY 123 provide Clinton's main east/west roadway connections.
- Arlington, initially founded as a stop along the railroad line, is home to almost 400 persons in southern Carlisle County and is located at the US 51/KY 80 crossroads.
- Bardwell, county seat of Carlisle County, has a population around 700. US 62 and KY 123 provide east/west roadway connections for the city.
- Wickliffe, county seat of Ballard County, is home to 650 persons. The city sits at the confluence of the Mississippi and Ohio rivers near the northern study area limits. Key highways serving the city include US 60, KY 286, and KY 121.

The US 51 corridor forms an important north-south regional link for both passenger cars and freight, roughly parallelling an established rail line. The study corridor is shown in **Figure 2**, with milepoint (MP) limits listed by county in **Table 1**. With the planned replacement of the aging US 51/Ohio River Bridge connecting Wickliffe, Kentucky to Cairo, Illinois and the conversion of the Julian M. Carroll Purchase Parkway to Interstate 69 (I-69), the importance of the corridor to regional transportation will continue to grow.

TABLE 1: STUDY SEGMENTS

COUNTY	BEGIN MP	END MP
BALLARD	0.000	8.297
CARLISLE	0.000	12.655
HICKMAN	0.000	15.095
FULTON	0.000	4.682

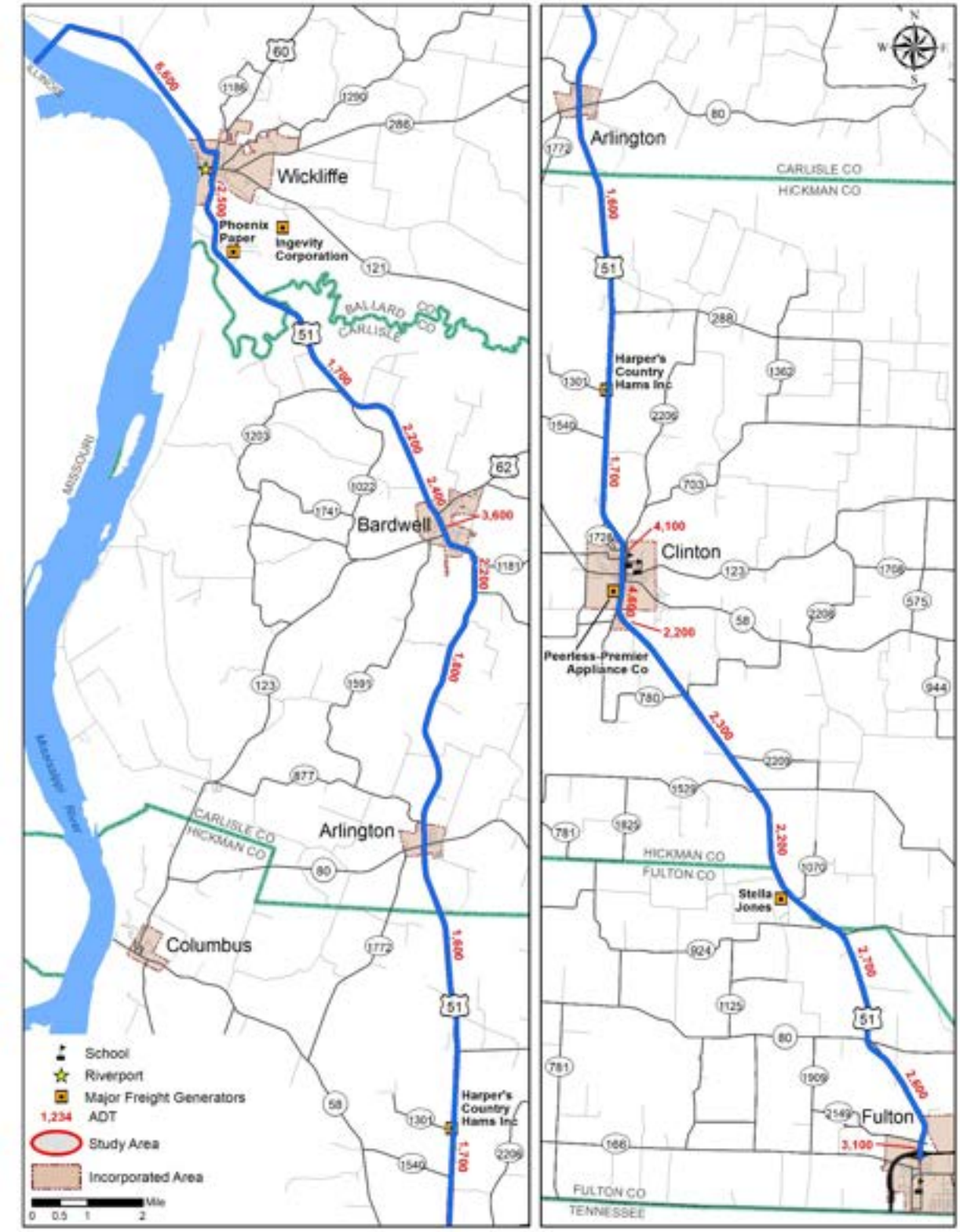


FIGURE 2: STUDY CORRIDOR

1.1. OTHER STUDY AREA PLANS AND PROJECTS

Area transportation plans and projects could influence long-term traffic flow and inform recommendations for the US 51 corridor. Both local and KYTC projects were reviewed.

Nearby Transportation Projects

Two main sources identify transportation projects:

- Every two years, the Kentucky General Assembly approves a Six-Year Highway Plan, which defines the Commonwealth's biennial transportation budget. The current plan is the *FY 2024 – FY 2030 Enacted Highway Plan.*[2]
- Other potential future projects near the study corridor have been compiled from the Continuous Highway Analysis Framework (CHAF) database, which is the starting point for the biennial SHIFT process[3] that evolves into the two-year budget cycle identified in the Highway Plan. CHAF projects are not currently funded but compete statewide for limited funding.

Highway Plan and CHAF projects cover 88% of the study corridor length and are presented in **Figure 4** with additional information in **Table 2**, arranged from north to south. Over $45 million in projects for the US 51 corridor are shown in the biennium. Two major projects bookend the study corridor: the US 51 Bridge to Illinois and the Purchase Parkway conversion to I-69.

The US 51 Bridge Replacement project[4] (KYTC Item No. 1-1140), under development for several years, will construct a new bridge adjacent to the existing structure (**Figure 3**), which will remain open until completion of its replacement, at which time it will be demolished. The intent is to improve cross-river mobility between Wickliffe and Cairo by addressing the safety and reliability issues caused by narrow lane widths, lack of shoulders, and a tight curve between the existing bridge and its approaches. Currently, the bridge does not allow oversize or overweight permit loads.

FIGURE 3: US 51 BRIDGE

[2] Online at https://transportation.ky.gov/Program-Management/Pages/default.aspx
[3] 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.
[4] Online at https://us51bridge.com/

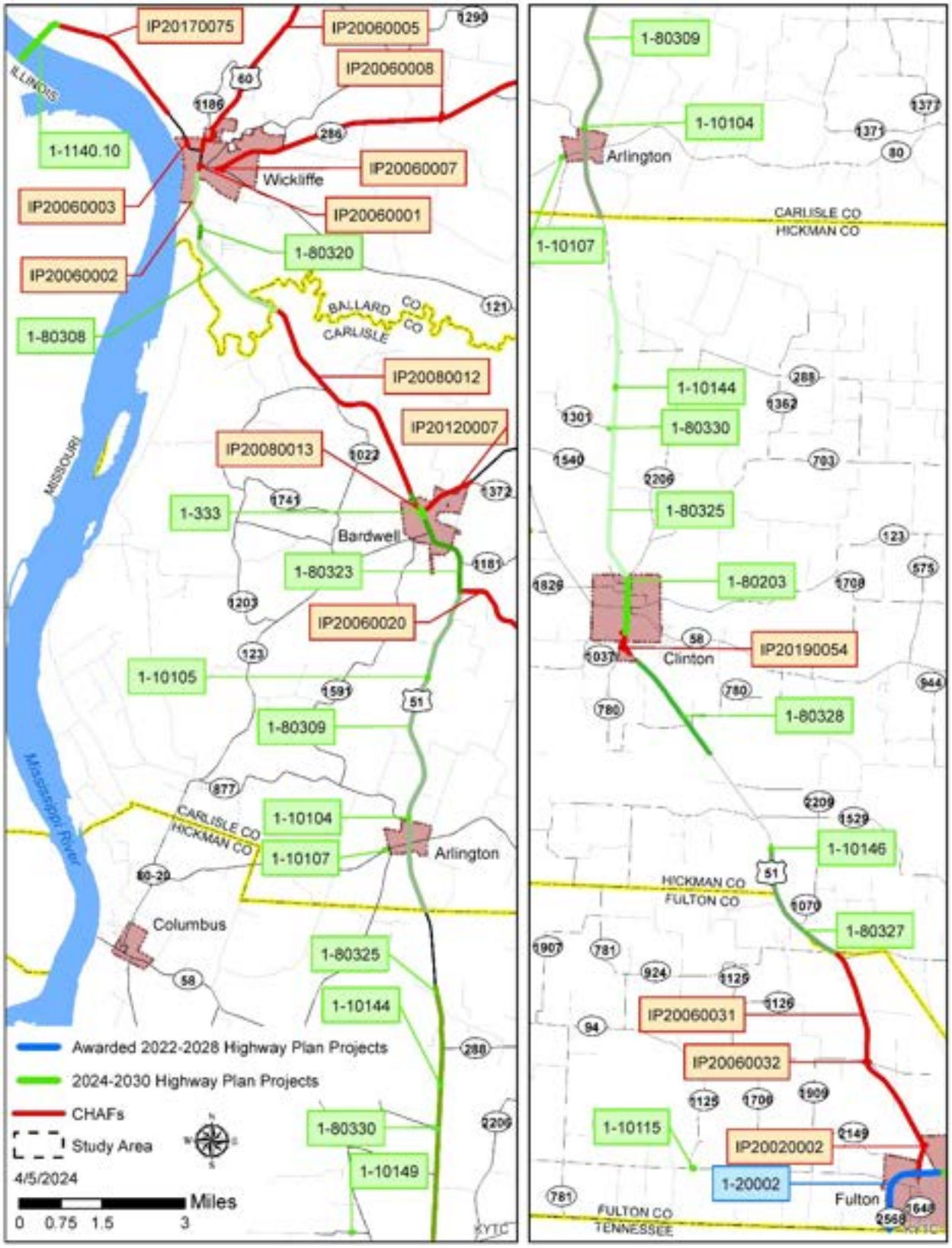


FIGURE 4: NEARBY TRANSPORTATION PROJECTS

TABLE 2: SIX-YEAR PLAN AND CHAF PROJECTS ALONG US 51

ID	Description	Approx. MP	Biennium Funding
Ballard Co.			
1-1140.01	Cairo Bridge Replacement	7.3-8.3	$19.2M design
1-1140.20	Cairo Bridge Replacement/Approach	7.5-7.8	-
IP20170075	Reconstruct, north of Wickliffe to Bridge	4.6-7.3	-
IP20060003	Truck access to Riverport	3.9-4.0	-
IP20060001	Turn Radius at KY 121	3.3-3.4	-
IP20060002	Fort Jefferson Park Entrance	2.6-2.7	-
1-80320	Freight Access to Riverport	2.0-2.2	$300,000 design
1-80308	Reconstruct, Carlisle Co to RR overpass	0.0-3.2	$2.1M plan, design*
Carlisle Co.			
IP20080012	Reconstruct, Ballard Co to Truman Creek	8.3-12.7	-
1-333	Intersection improvement at US 62/Front/Elm	7.8-8.0	$340,000 const.
1-80323	Reconstruct, KY 1377 to Truman Creek	6.1-8.3	-*
1-10105	Bridge at Little Mayfield Creek	4.4	$1.5M design, const.
1-80309	Reconstruct, Hickman Co to KY 1377	0.0-6.1	$2.1M design*
1-10104	Bridge at Gaddie Creek	1.7	$120,000 design
Hickman Co.			
1-80325	Reconstruct, KY 703 to Obion Creek	8.3-13.7	$7.2M design, ROW
1-10144	Bridge at Bruch Creek	11.9	$2.2M design, const.
1-80330	Intersection Imp. at KY 1301/Harpers Hams	11.1-11.4	$1.0M design, ROW, utilities*
1-80203	Realign, Clayton to KY 703	7.2-8.3	$4.0M ROW, utilities
IP20190054	Reconstruct, Ezell Ln to Clayton St	6.9-7.3	-
1-80328	Reconstruct, Bayou de Chien to Martin Rd	4.5-6.6	$1.0M design
1-10146	Bridge at Cane Creek	2.4	$460,000 design, const.
1-80327	Reconstruct, Fulton Co to Cane Creek	0.0-2.4	$2.0M design, ROW
Fulton Co.			
IP20060031	Major Widening, Parkway to Hickman Co	0.0-4.7	-
IP20060032	Intersection Imp. at KY 94/Railroad overpass	2.4-2.5	-
IP20020002	Access to Fulton Co Ind. Park	0.2-0.6	-

** NH funding source, restricted to National Highway System routes (only northernmost 4.6 miles of US 51 on NHS)*

The conversion of the Purchase Parkway to interstate standards extends I-69 from Mayfield, Kentucky approximately 19 miles southwest to Fulton. Together with the ongoing I-69 Ohio River crossing project between Henderson, Kentucky and Evansville, Indiana (KYTC Item No. 2-1088), this will complete I-69 improvements through Kentucky.

FIGURE 5: REGIONAL CORRIDORS

Previous Transportation Studies

KYTC completed two US 51 planning studies[5] in 2004, recommending spot improvements at intersections and considering bypass options.

- Item No. 1-183 considered US 51 through Bardwell, assessing existing and future traffic demands, crash history, roadway design elements to identify goals and develop potential solutions. Eight Build concepts were evaluated, including intersection improvements, minor widening, bypass options, and a one-way couplet. Community input was collected via a project work group, meetings with local officials/stakeholders (LO/S), agency coordination, and public open houses at two key milestones. Illustrated in **Figure 6**, reconstruction was recommended—including the hill and curves south of town—with turn lanes and other improvements at key intersections.

[5] Online at https://transportation.ky.gov/Planning/Pages/Planning-Studies-and-Reports.aspx

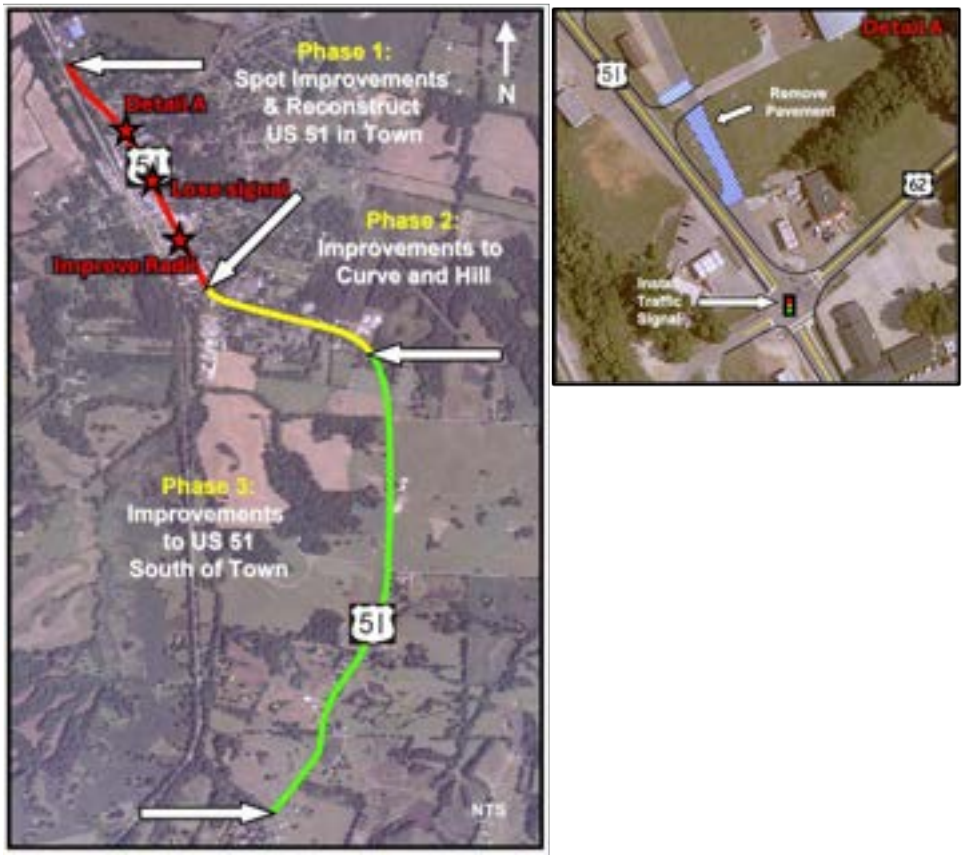


FIGURE 6: ITEM 1-183 RECOMMENDATIONS

- Item No. 1-182 examined US 51 through Clinton, considering traffic operations, safety trends, and geometric constraints to identify needs. Thirteen Build concepts were developed, including intersection improvements, adding a two-way left-turn lane, and creating a bypass. Recommendations include a three-lane section through town with intersection improvements (**Figure 7**) at US 51/KY 58/KY 123 (Clay Street) and US 51/KY 58 (Mayfield Road). The study included a project work group, meetings with LO/S, agency coordination, and public open houses at two key milestones.

  Design work is ongoing as part of KYTC Item No. 1-80203 concurrent with this planning study. To limit impacts within town, an improved two-lane section with consistent sidewalks is being considered.

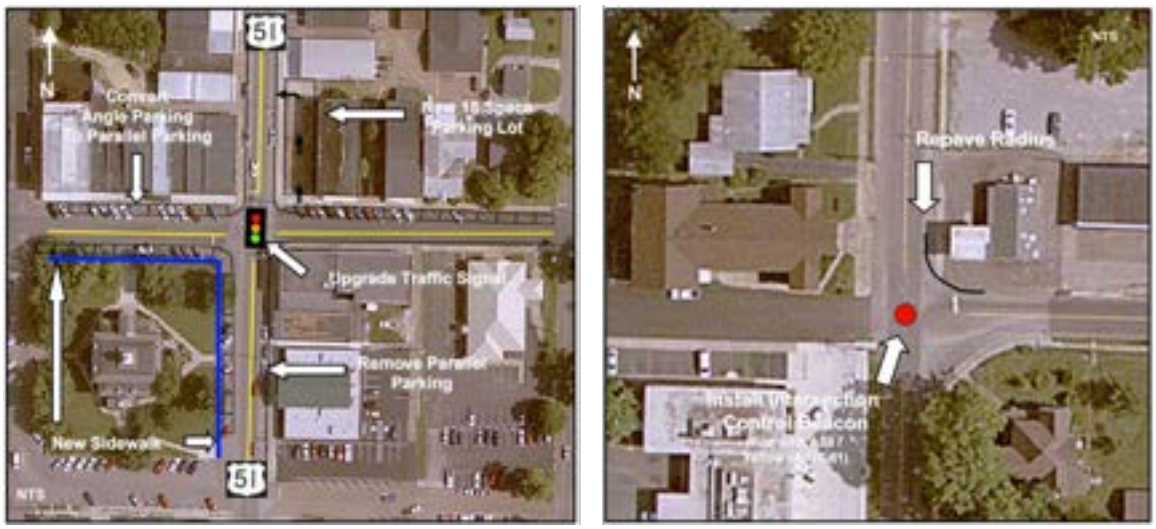


FIGURE 7: IMPROVEMENTS AT CLAY ST (LEFT) AND MAYFIELD RD (RIGHT)

A 2014 KYTC planning study considered rehabilitation or replacement of the US 51 Bridge between Cairo and Wickliffe. The project since advanced for design and environmental investigations, mentioned above. The process collected information on conditions of the 1936 truss, existing and future traffic needs, environmental constraints, and community input to develop a range of Build concepts between Barlow/Mound City and the confluence of the Ohio and Mississippi rivers. The preferred alternative will construct a new two-lane structure just upstream of the current crossing, similar to the rendering in **Figure 8**.

FIGURE 8: RENDERING OF NEW CAIRO BRIDGE

The Purchase District Health Department completed bicycle and pedestrian plans[6] for Bardwell, Clinton, and Fulton in 2022. Each plan included a kickoff meeting with LO/S, followed by a survey circulated to the larger community. Recommended infrastructure to support healthy communities from each were considered, including connecting sidewalk gaps, repairing existing infrastructure, adding/enhancing crosswalks, and constructing shared-use paths in a few locations. Long term, there is local interest in someday converting the rail line paralleling US 51 to a regional trail. **Table 3** presents recommendations along US 51 from north to south. Recommendations for Fulton are beyond the study corridor.

TABLE 3. 2022 RECOMMENDED BIKE/PED IMPROVEMENTS ALONG US 51

Recommended Infrastructure	Direction	Begin		End	
		Route	MP	Route	MP
Bardwell – Carlisle County					
Extend Sidewalk	Both	Hardware Store	8.215	US 62 (Paducah Road)	7.873
Add Shared-Use Path	West	US 62 (Paducah Road)	7.873	W. Court Street	7.257
Extend Sidewalk	Both	W. Court Street	7.257	Ken Winters Road	6.960
Clinton – Hickman County					
Stripe Bike Lanes	Both	KY 1826 (Depot Street)	8.045	KY 58 (Mayfield Road)	7.648
Replace/Connect Sidewalks	Both	Spring Street	8.267	Kimbro Street	6.949
Add Shared-Use Path	West	Clayton Drive	7.264	Kimbro Street	6.949

2. EXISTING CONDITIONS

Existing transportation network conditions reviewed include roadway geometrics, highway systems, multimodal facilities, crash history, and traffic volumes. Data collected from KYTC's Highway Information System (HIS) database, KYTC's Transportation Enterprise Database (TED), traffic counts, and field reviews are summarized herein.

2.1. HIGHWAY SYSTEMS

KYTC classifies its highway network into a variety of systems and categories, based on its role, importance, function, and more.

The **National Highway System (NHS)** consists of roadways important to the nation's economy, defense, and mobility. US 51 is on the NHS north of US 60—MP 3.644 to 8.297 in Ballard County. The Federal Highway Administration (FHWA) tracks a series of performance measures statewide, including pavement and bridge conditions for NHS routes, delay, truck travel time reliability,

[6] Online at https://www.purchaseadd.org/local-government/transportation/

emissions, and more. Any improvements to this stretch of US 51 would have an incremental effect on these metrics.

The **Kentucky State Highway System** classifies state-maintained roadways by the type of service and function they provide. Major state-owned routes, including US 51, are on the State Primary System. This includes interstates, parkways and other long distance, high volume intrastate routes of statewide significance that generally link major urban areas within the state.

Functional Class

Functional Classification is the process of grouping 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.

US 51 is classified as a Principal Arterial north of US 60 in Wickliffe and as a Minor Arterial south to Fulton. By classification, from north to south, other major roadways connected to US 51 include:

- Principal Arterial: US 60
- Minor Arterial: KY 286, KY 121, US 62, KY 123 at Bardwell
- Major Collector: KY 80, KY 58, KY 94
- Interstate: Purchase Parkway (Future I-69)

Scenic Byways

Portions of US 51 are a part of the Great River Road Scenic Byway, a National All-American Road that follows the Mississippi River for 3,000 miles from the Gulf to northern Minnesota. FHWA All-American Roads are nationally significant, have one-of-a kind features, and let the road serve as the destination, meaning they provide an exceptional traveling experience and are the primary reason for a trip.

The Great River Road Scenic Byway follows US 51 between the Ohio River and KY 1203, representing the northernmost 10.1 miles of the study corridor in Ballard and northern Carlisle counties.

Truck Routes

In compliance with the Surface Transportation Assistance Act of 1982 (STAA), Kentucky established a network of highways on which commercial vehicles with increased dimensions may operate. These "STAA" vehicles include semi-trucks with 53-foot-long trailers and single-unit trucks with a total length of 45 feet. STAA routing in Kentucky corresponds to the National Truck Network (NTN), plus state-maintained highways within five miles of the NTN, 15 miles from interstate or parkway interchanges, and one mile from the interchange on other public highways.

US 51 is a state designated truck route and is also a Tier 3 route on the Kentucky Highway Freight Network (KHFN), meaning it is significant for regional connectivity.

Major freight generators are shown alongside the corridor in **Figure 9**. In addition to existing freight generators, large-scale investments in public riverports are proposed in both Wickliffe and Cairo, with planning efforts underway concurrent with this study. Both developments are anticipated to increase freight demand throughout the region.

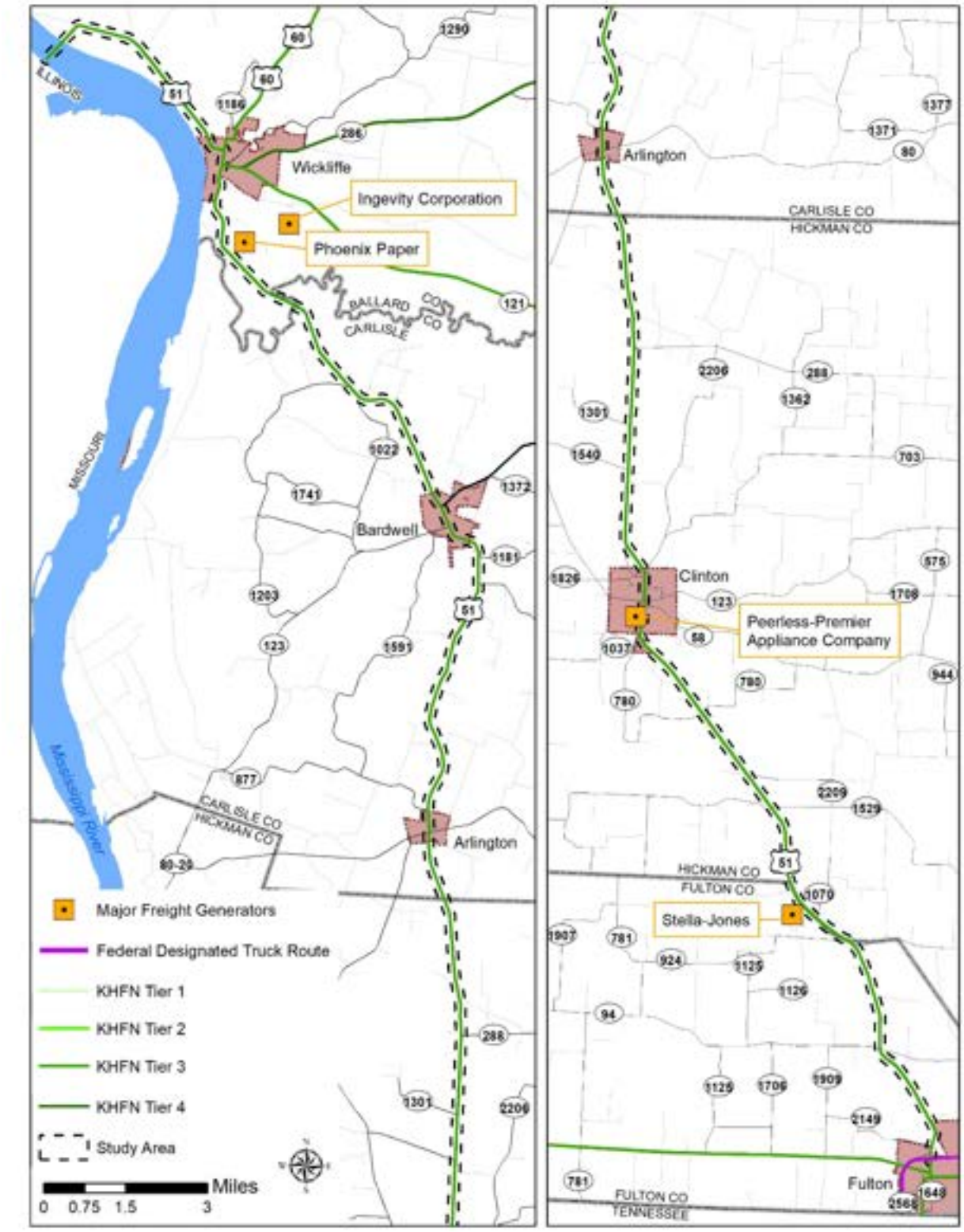


FIGURE 9: TRUCK ROUTES

2.2. ROADWAY GEOMETRIC CHARACTERISTICS

KYTC's HIS database was queried to obtain geometric characteristics for US 51.

Typical Section

US 51 features two 10- to 12-foot-wide lanes for most of its length, excepting a three-lane section south of Wickliffe and sections with wider lane widths in Wickliffe, Clinton, and at the parkway interchange. Shoulder widths vary but for 63% of the length, paved shoulder width is less than a foot wide. **Figure 10** maps total pavement width along the corridor. Rural sections of the route are 24 to 26 feet wide in Ballard, Carlisle, and Fulton counties, dropping to 20 – 22 feet through most of Hickman County.

The speed limit is 55 mph for much of its length, dropping to 25 to 35 mph within each town (**Figure 12**) and 40 mph on the US 51 Ohio River Bridge.

KYTC's current *Highway Design Manual* (HDM)[7] recommends 12-foot-wide lanes and 6- to 8-foot-wide usable shoulders for Rural Arterials with a 55-mph speed limit.

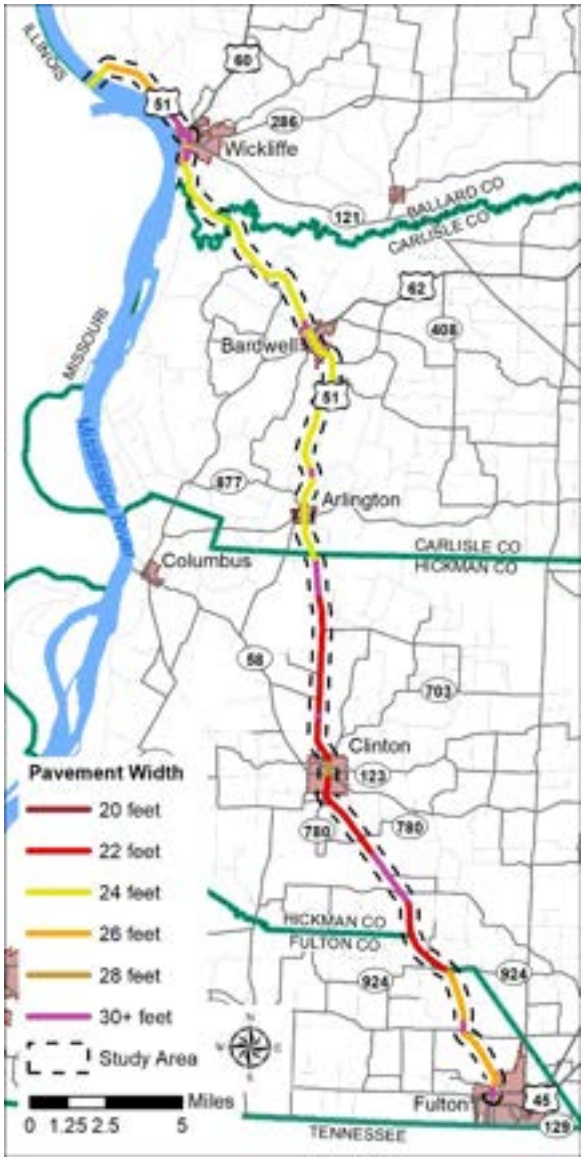


FIGURE 10: PAVED WIDTH

FIGURE 11: REPRESENTATIVE LANES/SHOULDERS IN RURAL SECTION

[7] Online at https://transportation.ky.gov/Highway-Design/Pages/default.aspx

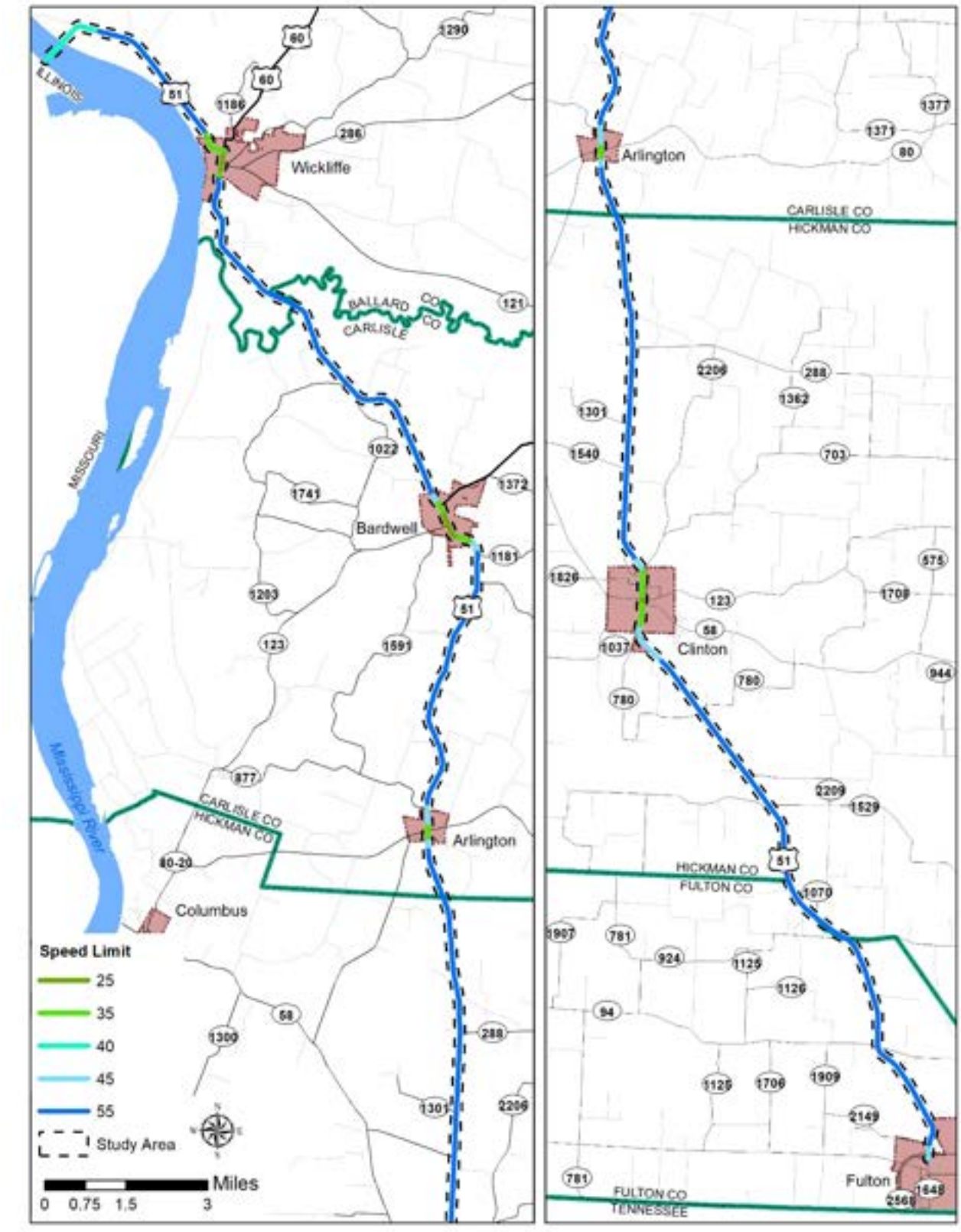


FIGURE 12. POSTED SPEED LIMITS

Alignment

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

HIS assigns grade levels for vertical slopes based on steepness: rated from A (flattest) to F (steepest, 8.5% or greater). Varying by functional class, terrain types, and speed limits, the HDM recommends maximum vertical grades ranging from 4% to 8% for arterials in flat to rolling terrain—generally Class C or better.

HIS categorizes horizontal curves based on degree of curvature: ranked from A (most sweeping) to F (sharpest, 28 degrees or greater). The HDM bases recommended minimum radius on design speed, superelevation, and traffic volume. Generally, for a 55-mph design speed, recommended minimum radius falls into Class C or better.

Figure 13 shows the steepest grades and sharpest curves within the study area. **Table 4** lists total lengths by county of sections that do not meet current design standards for curvature or grade. Most of the alignment satisfies HDM recommendations; notable exceptions are discussed below. Other substandard grades along the route are smaller but may limit visibility for motorists.

TABLE 4: GRADES/CURVES

County	D E F Grades	C D E Curves
Ballard	1.5 mi	0.9 mi
Carlisle	1.9 mi	0.2 mi
Hickman	3.3 mi	0.1 mi
Fulton	0.8 mi	0.0 mi

- The 1.3-mile stretch south of Wickliffe near Phoenix Paper (Ballard MP 1.8 to 3.1) exhibits eight steeper-than-recommended grades (up to 9%) and three Class C horizontal curves. Truck climbing lanes are provided in both directions: a half-mile northbound beginning at the truck entrance to Phoenix Paper and a quarter-mile southbound in front of Fort Jefferson Memorial Park.
- Approaching Bardwell's southern limits, a Class E curve at Front Street has warning flashers and advisory speed/curve signs. Continuing south, two Class F grades (up to 10%) may limit sight distance.

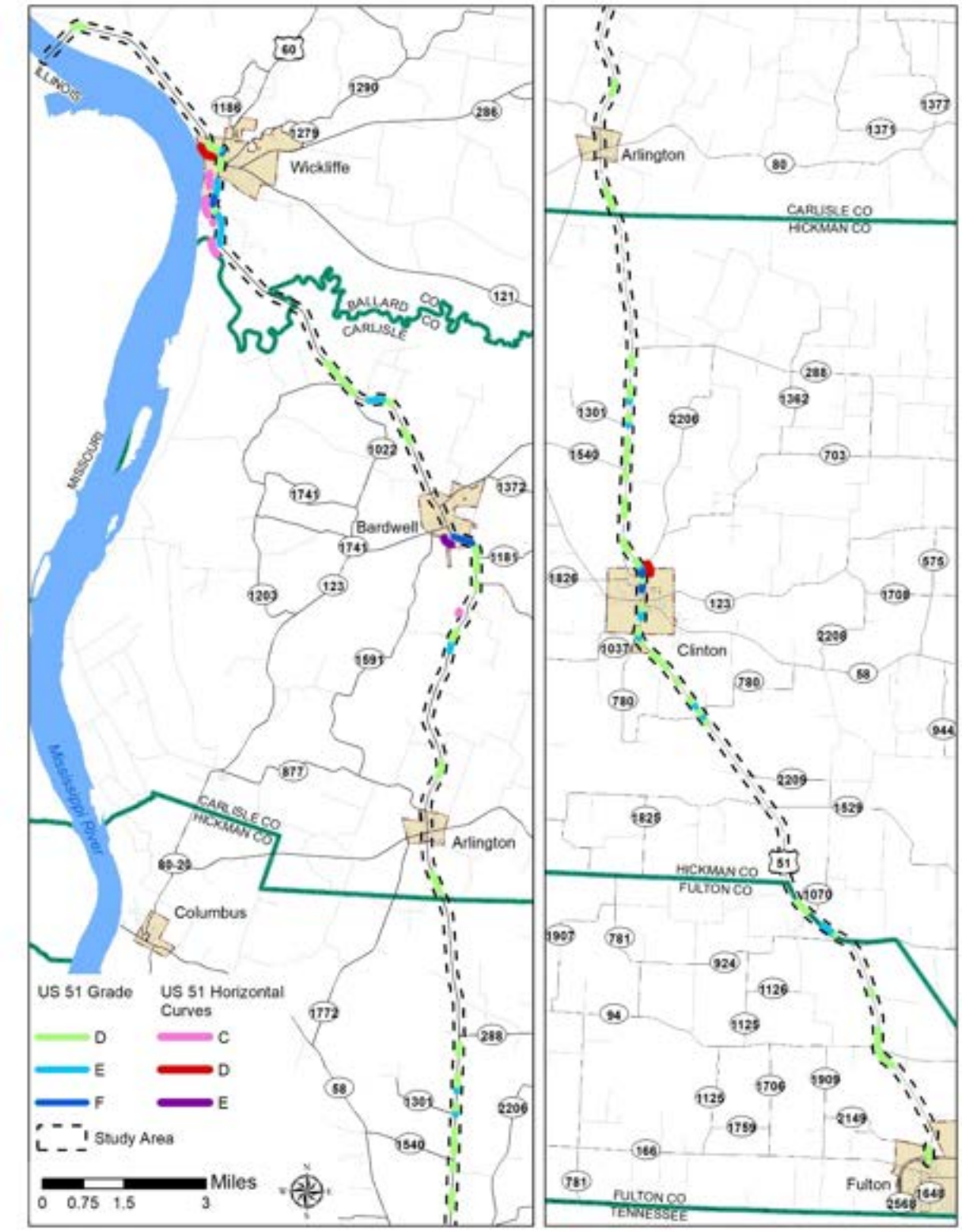


FIGURE 13: HORIZONTAL AND VERTICAL ALIGNMENT CLASSIFICATIONS

2.3. BRIDGES

Figure 14 shows 23 bridges identified along the corridor plus one overpass. National Bridge Inventory (NBI) inspections listed two in poor condition, and the remainder in fair condition (14) or good condition (8). Summary information about each can be found in **Table 5**, listed from north to south. Five bridge replacement projects (bold text in the table) are potentially funded in the current Highway Plan, including one bridge rated as poor. A Functionally Obsolete rating indicates the bridge no longer meets current design standards.

TABLE 5: 2023 EXISTING BRIDGE CONDITIONS

Bridge	Condition	Length (ft)	Width (ft)	Built	Carries	Intersects	Note*
004B00021N	**Fair**	**5,865**	**24**	**1937**	**US 51**	**Ohio River/RR**	**FO, LP**
004B00063N	Good	371	47	1994	US 51	Minor Slough	-
004B00066N	Good	3,306	47	2000	US 51	Willow Slough	-
004B00060N	Fair	375	47	1990	US 51	Railroad and Beech Creek	-
004X00001N	Fair	151	34	1968	PR 1205	US 51 @ 1.871 (Phoenix Paper Truck Entrance)	-
020B00058N	Fair	683	43	1986	US 51	Mayfield Creek	-
020B00056N	Good	63	43	1986	US 51	Gray Creek	-
020B00007N	Fair	24	28	1920	US 51	Fork of Mayfield Creek	LP
020B00057N	Fair	182	43	1986	US 51	Railroad	-
020B00006N	Poor	22	0	1920	US 51	Fork of Mayfield Creek	-
020B00061N	Good	96	47	1989	US 51	Trumans Creek	-
020B00004N	**Fair**	**23**	**28**	**1920**	**US 51**	**Little Mayfield Creek**	**FO, LP**
020B00063N	Good	75	47	1998	US 51	Hurricane Creek	-
020B00002N	**Fair**	**47**	**29**	**1926**	**US 51**	**Gaddie Creek**	**FO, LP**
053B00097N	Fair	432	47	1991	US 51	Obion Creek	-
053B00096N	Fair	148	47	1991	US 51	Obion Creek	-
053B00002N	**Poor**	**54**	**28**	**1926**	**US 51**	**Brush Creek**	LP
053B00101N	Good	78	45	2000	US 51	Cane Creek	-
053B00075N	Fair	28	56	1927	US 51	Town Branch	FO
053B00086N	Good	27	0	1982	US 51	Bayou De Chien Overflow	-
053B00085N	Good	126	43	1982	US 51	Bayou De Chien Creek	-
053B00029N	**Fair**	**52**	**28**	**1926**	**US 51**	**Cane Creek**	**FO**
038B00078N	Fair	238	43	1985	US 51	Railroad	-
038B00012N	Fair	202	79	1968	US 51	Jackson Purchase Parkway	-

* SD = structurally deficient; FO = functionally obsolete; LP = Load Posted

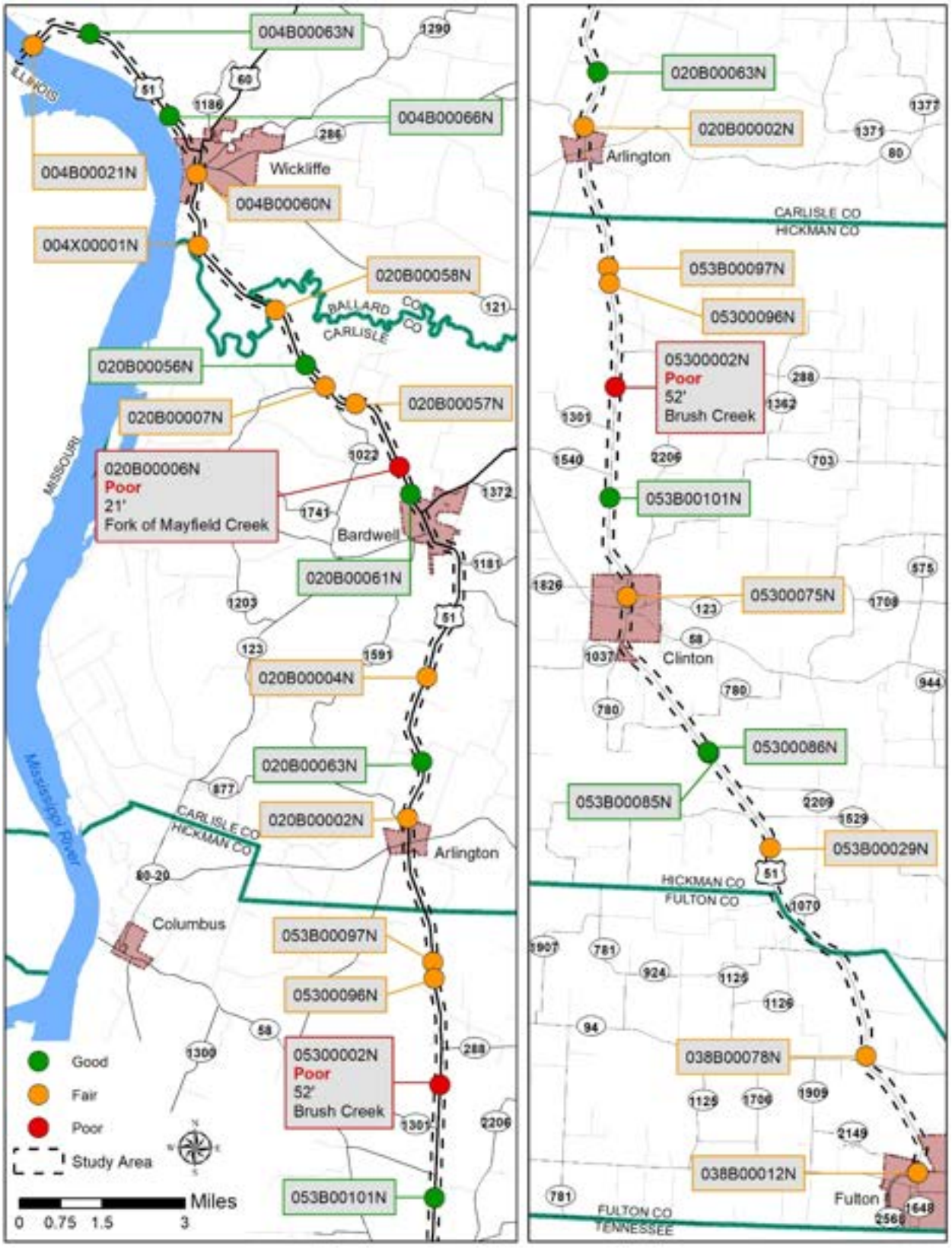


FIGURE 14: EXISTING BRIDGES

2.4. OTHER ROADWAY USERS

KYTC adopted a *Complete Streets Policy* in 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.
- Ensure early coordination to identify potential actions/strategies.

The needs of all modal users are critical considerations throughout the planning and project development process.

Cyclists and Pedestrians

Strava heat maps show negligible recreational roadway users—pedestrians or cyclists—though data is limited to individuals using the app. **Figure 15** illustrates existing pedestrian and bicycle facilities within the study area. Sidewalks are concentrated within towns and many of the walkways are disconnected, in potentially poor condition, or may not meet current Americans with Disabilities Act (ADA) requirements.

Portions of the corridor link regional bicycle routes, but identified routes do not have dedicated, developed bicycle facilities, only scattered signage.

Great River Road Bike Route follows the Mississippi River through ten states, crossing all four study corridor counties. The route heads south along US 51 from the Ohio River Bridge near Wickliffe to KY 1203.

Ramblin' River Bike Tour (US Bike Route 35) is primarily an east-west route along Kentucky's northern border. It follows the Mississippi and Ohio rivers and connects Hickman east to the Ohio River in northeastern Kentucky. The trail is along US 51 at Wickliffe: from KY 286 northwest to the US 51 Bridge. It crosses US 51 again to the south at KY 123 in Bardwell and KY 1529 between Clinton and Fulton.

Mississippi River Trail is over 1,000 miles long and crosses seven states, including 65 miles in Kentucky from the US 51 Ohio River Bridge near Wickliffe southward to the Tennessee state line. It runs concurrent with the Great River Road route mapped below.

Southern Lakes Tour begins at the Mississippi River in Hickman, extending east primarily along Kentucky's Tennessee border. It crosses US 51 at KY 1529 between Clinton and Fulton, concurrent with the Ramblin' River Tour in the vicinity.

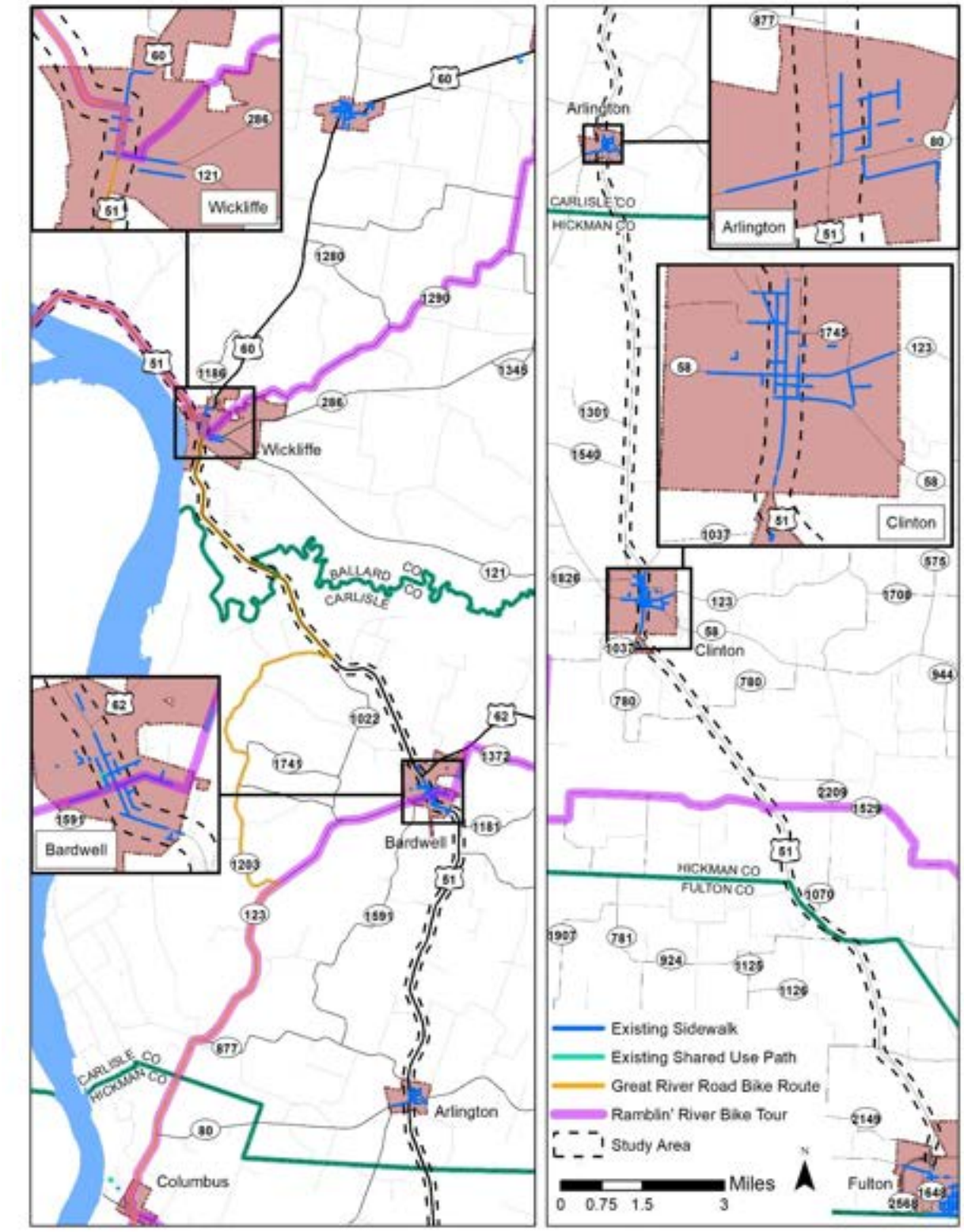


FIGURE 15: EXISTING PEDESTRIAN AND BICYCLE FACILITIES

Other Vehicle Types

Several entities provide demand-response transit services within the study counties.

- Paducah Area Transit System serves residents of Ballard, McCracken, and Marshall counties.
- Fulton County Transit Authority serves residents of Carlisle, Hickman, Graves, and Fulton counties.
- Local transportation services are also provided for elders as needed through Ballard, Carlisle, and Hickman counties' senior centers.

In addition, many surrounding land uses represent agricultural fields, with slow-moving farm equipment relying on US 51 during key seasons. Oversize vehicles operating below the posted speed limit paired with limited passing opportunities appear to contribute to crash trends as motorists attempt to pass obstacles.

FIGURE 16: ON-ROAD TRACTOR

2.5. RAILROAD

The Canadian National Class I railroad runs primarily parallel to and west of US 51 in Kentucky, linking the network to Illinois and Tennessee. There are no at-grade crossings on US 51; however, there are several on adjacent streets in Wickliffe, Bardwell, Arlington, Clinton, and Fulton. As shown in **Figure 14**, four railroad underpasses intersect US 51 at bridges 004B00021N, 004B00060N, 020B00057N, and 038B00078N.

2.6. 2024 TRAFFIC VOLUMES AND OPERATIONS

To understand current roadway users, video-based peak period turning movement counts were conducted at six key intersections along the corridor during January 2024. 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**. US 51 carried 1,600 – 2,700 vehicles per day (vpd) along rural sections of the corridor, increasing in Clinton (4,600 vpd), Bardwell (3,600 vpd), and north of Wickliffe (6,600 vpd). Heavy trucks make up 15 – 45% of these volumes. **Figure 17** and **Figure 18** summarize traffic: daily volumes are in red and peak hour counts are in circles at study intersections with PM peaks in parentheses.

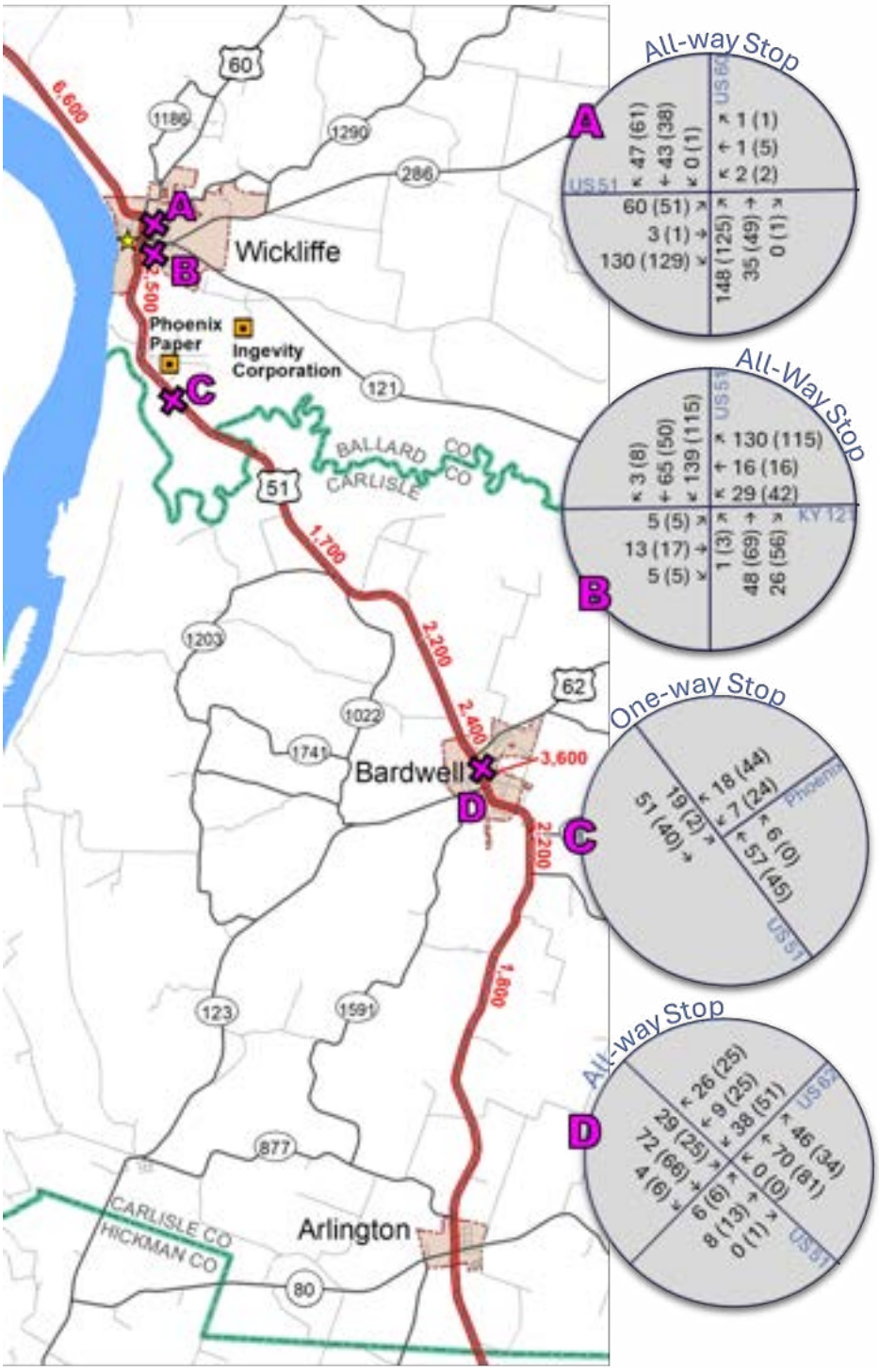


FIGURE 17: 2024 TRAFFIC, NORTH SECTION

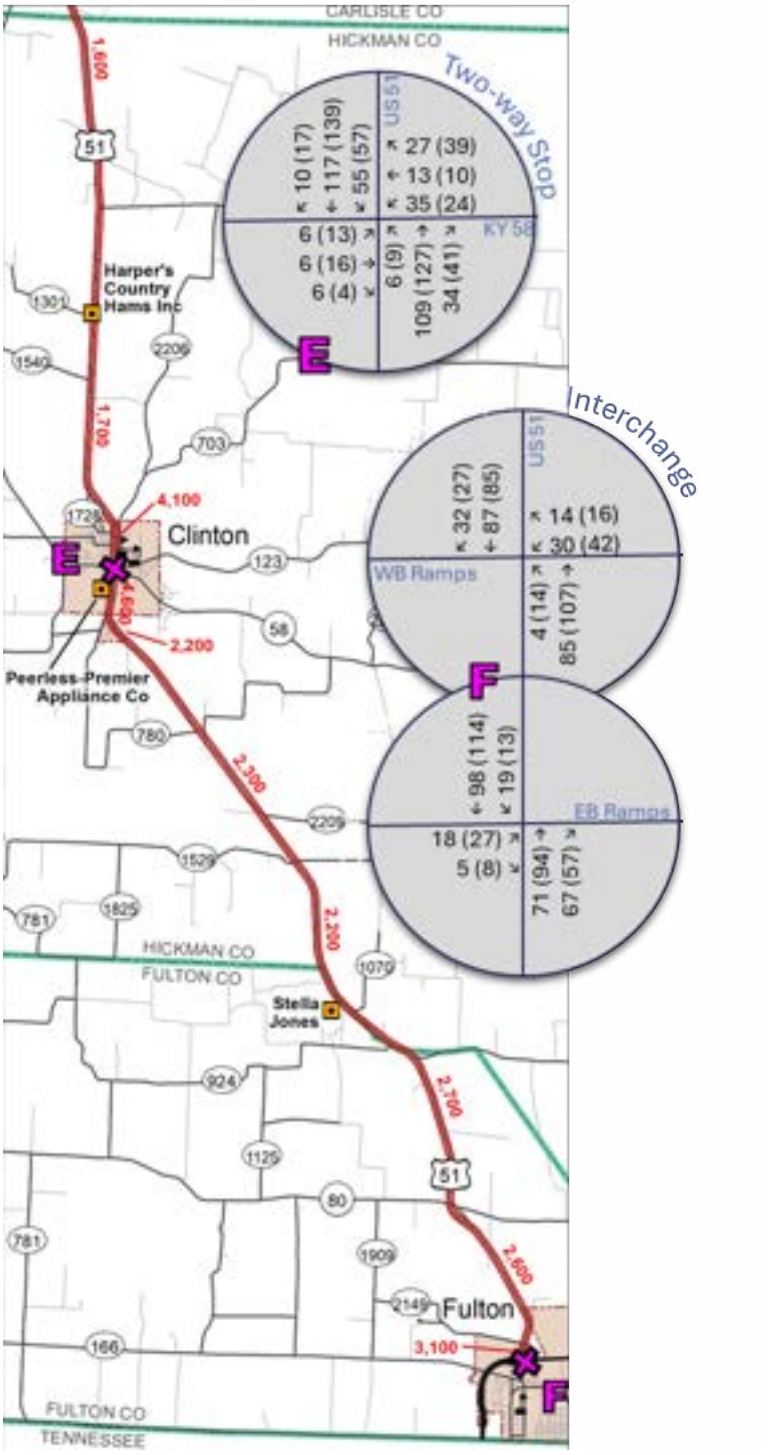


FIGURE 18: 2024 TRAFFIC, SOUTH SECTION

Origin-Destination Flows

Third-party StreetLight data provided estimates on origin-destination flows along the corridor. Data from 2021 shows few trips travel through the entire 40-mile corridor but rural areas tend to have small sample sizes for use extrapolating trends.

- Of all traffic using the US 51 Ohio River Bridge in either direction, 70% goes to/comes from Paducah via US 60 or KY 286. Considering only truck traffic on the bridge, 61% travels to/from Paducah. Roughly 4% of bridge traffic or 7% of bridge trucks travel US 51 south of Clinton.
- Of all traffic traveling on US 51 just north of the parkway in either direction, 15% continues along US 51 as far as Bardwell. Considering only truck traffic, an estimated 20% continues to the Ohio River bridge; truck traffic on US 51 near Fulton is a smaller volume than in Ballard County.

Traffic Operations

Traffic operations analyses included two commonly applied highway performance indicators used to describe quality of facility performance: Level of Service (LOS) and volume-to-capacity (v/c) ratios. Computations were performed in concurrence with the *Highway Capacity Manual* (HCM) 7th edition procedures for study route segments.

LOS is a qualitative measure describing traffic conditions based on measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS typically represents a driver's perspective of traffic conditions based on perceived congestion. As illustrated in **Figure 19**, LOS A is associated with free flow conditions, high freedom to maneuver, and little or no delay. Conditions at or near capacity typically are associated with LOS E. At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no

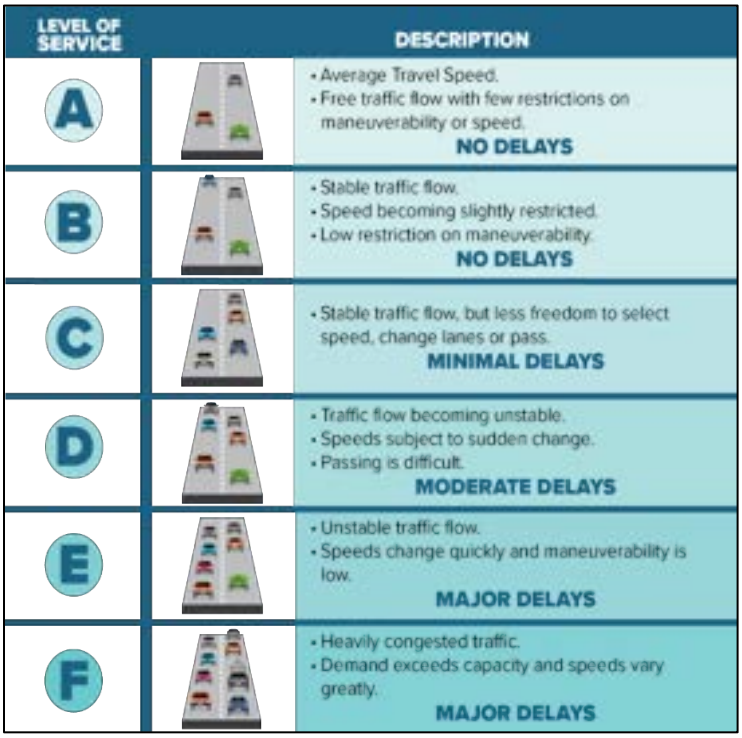


FIGURE 19: LEVEL OF SERVICE (LOS)

freedom to maneuver, and lengthy delays. As a general rule, LOS C or better is typically desirable in rural areas.

For intersections, LOS is also measured on the same A-F scale, but with different methodologies based on traffic control. At signals, all movements experience delay so an overall average for the entire intersection can be calculated, in addition to LOS for each approach and each turning movement. At all-way stop-controlled intersections, calculations are similar but the thresholds between each letter grade are lower than at signals. For one- or two-way stop control intersections, LOS is only calculated for approaches that must stop as free-flow thru moves on the major street experience no delay.

V/c ratios compare the traffic volume on a facility to its theoretical capacity over a specific duration, one hour in this instance. A v/c ratio greater than 1.0 indicates a route has exceeded its theoretical capacity and additional lanes may be justified. As v/c is measured over an hour period by segment, a roadway or intersection could be congested during brief periods but show a relatively low v/c when averaged over a longer duration.

Analyses indicated most roadway segments and intersections within the study area provide adequate capacity for existing traffic. Key operational metrics at study intersections are presented in **Table 6**; aside from the US 51/US 60 intersection, all v/c are less than 0.4.

TABLE 6: 2024 INTERSECTION LOS

US 51 INTERSECTION	CONTROL	AM LOS	AM v/c	PM LOS	PM v/c
US 60/4th St/Green St, Wickliffe	All-way Stop	C	≤0.7	C	≤0.7
KY 121 (Court St), Wickliffe	All-way Stop	B	≤0.4	B	≤0.4
Phoenix Paper Entrance	One-way Stop	A	≤0.1	A	≤0.1
US 62 (Paducah Rd), Bardwell	All-way Stop	A	≤0.3	A	≤0.3
KY 58 (Mayfield Rd)/South St, Clinton	Two-way Stop	B	≤0.2	B-C	≤0.2
WKP/I-69 Westbound Ramps	One-way Stop	A	≤0.2	B	≤0.3
WKP/I-69 Eastbound Ramps	One-way Stop	B	≤0.1	B	≤0.1

The heaviest traffic volumes were observed at the US 51/US 60 intersection in Wickliffe. Within the past few years, the signal was removed and replaced with a four-way stop. Potentially restrictive geometry coupled with heavy truck volumes (**Figure 20**) may influence operations as much as volume. Capacity analyses show LOS C operations during both peak hours with the eastbound US 51 (Green Street) approach demonstrating a 0.7 v/c.

FIGURE 20: WIDE-TURNING TRUCK

2.7. CRASH HISTORY

Five years of historical crash data (2019 – 2023) were evaluated for the study corridor. During the analysis years, 202 crashes were reported along US 51. **Figure 21** shows crash locations by severity and type. Individual crash records are summarized in **Appendix B**.

Crashes by Severity. The "KABCO" scale classifies crashes by severity with letters representing injury levels:

K	A	B	C	O
Killed	Suspected Severe Injury	Suspected Minor Injury	Possible Injury	Property Damage

Of the reported 202 crashes, three (<1%) were fatalities, 39 (19%) resulted in injuries, and 160 (80%) resulted in property damage only (PDO). Injury crashes represent 13 "A" severe injuries, 12 "B" minor, and 14 "C" possible injuries. The three fatal crashes include:

- Cyclist crossing through traffic near courthouse, May 2021 (Ballard County MP 3.430)
- Head-On collision when a northbound semi crossed centerline to pass slower moving traffic, November 2019 (Carlisle County MP 12.029)
- Head-On collision when an impaired southbound motorist crossed centerline into oncoming traffic, September 2021 (Carlisle County MP 9.585)

Whereas traditional road safety strives to modify human behavior and prevent all crashes, the US Department of Transportation's **Safe System Approach**[8] 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. **Figure 22** presents the same five years of crash data replacing PDO crashes with a heat map to illustrate densities while highlighting more severe crash types.

[8] Online at https://www.transportation.gov/NRSS/SafeSystem

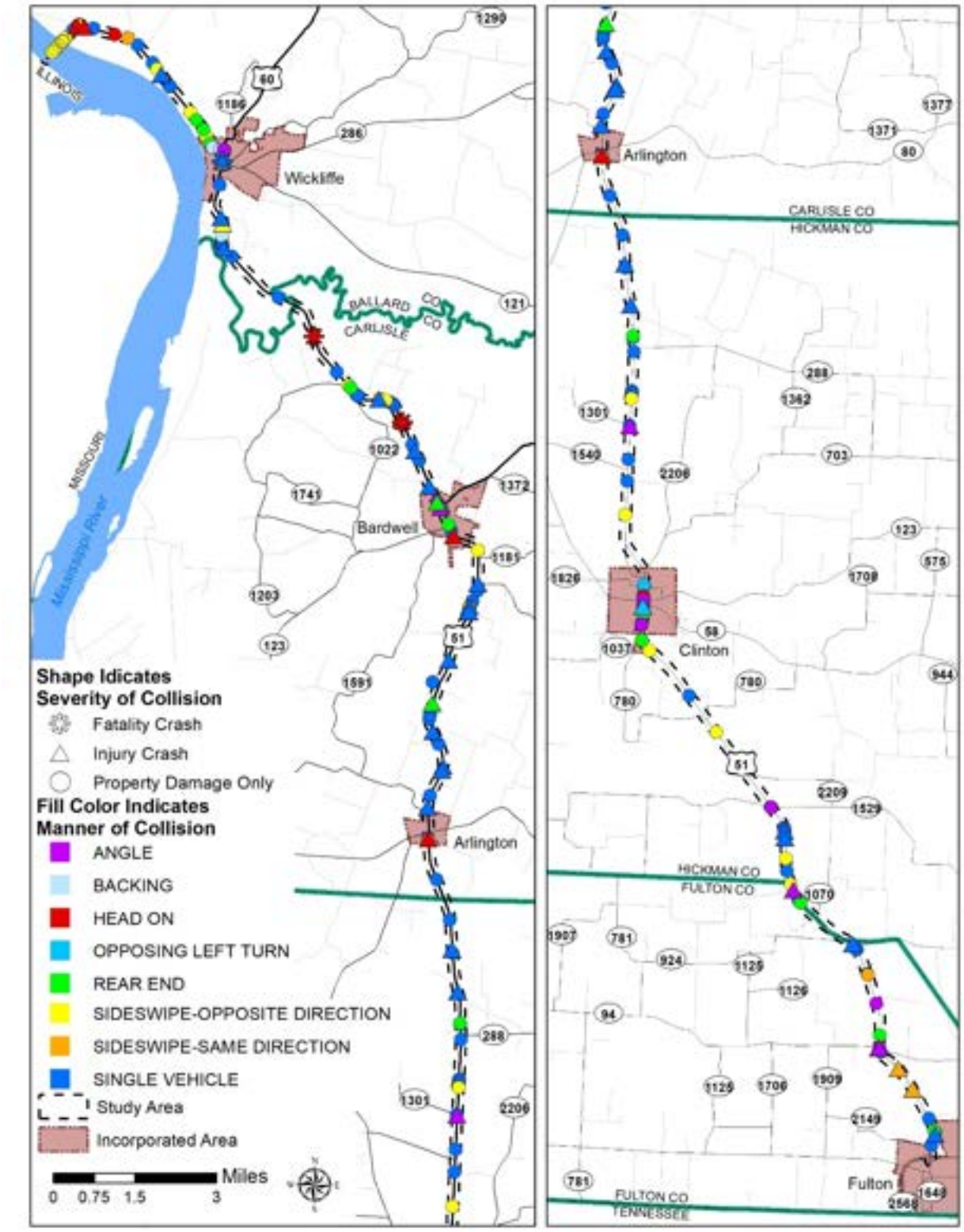


FIGURE 21: REPORTED CRASHES (2019-2023)

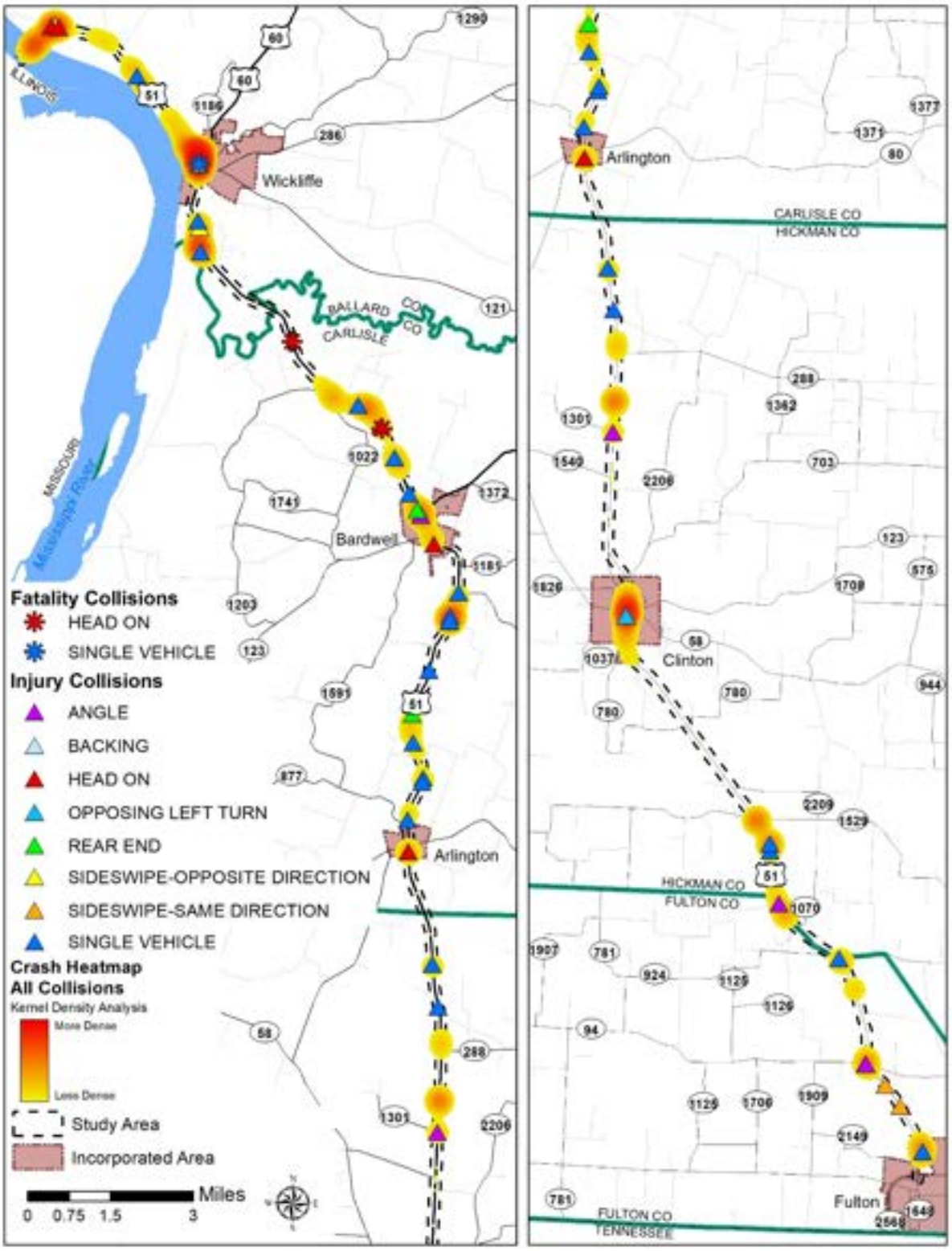


FIGURE 22: FATAL/INJURY CRASHES (2019-2023)

A broader look at ten years of crash records (**Figure 23**) showed 11 fatalities and 27 severe injury crashes along US 51 over the past decade. These were concentrated in Carlisle County; single vehicle (55%) and head-on collisions (26%) were the most common types, which are often correlated with narrow pavement widths and higher severities.

Crashes by Type. As shown in **Figure 24**, by type, most crashes involve single vehicle (45%) and 20% represent head on or opposite direction sideswipes. Roadway departures—when a vehicle leaves its travel lane—represent 54% of crashes, which tend to be more severe than other crash types. Roadway departures are one of the emphasis areas identified by KYTC's Office of Highway Safety.[9] Considering only crashes in rural stretches between towns, 79% of crashes were roadway departures.

FIGURE 23: K A CRASHES

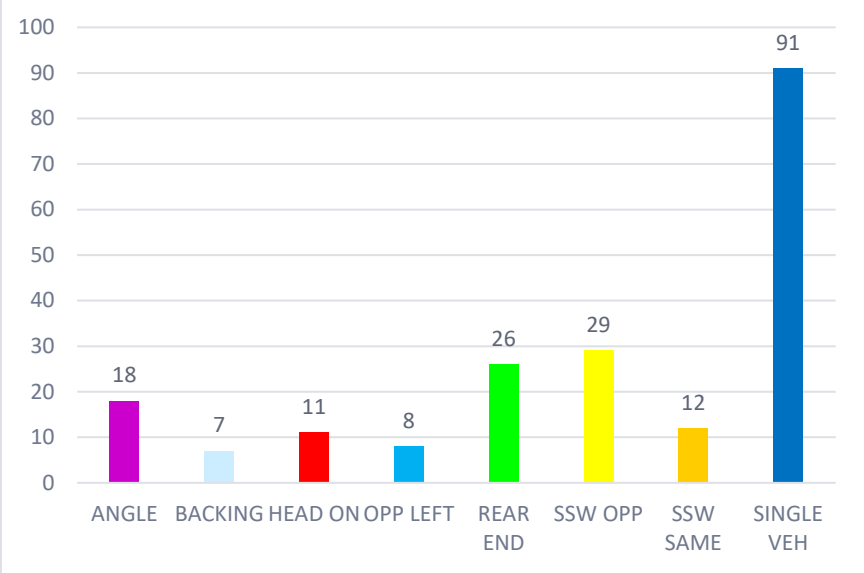


FIGURE 24: CRASHES BY TYPE

[9] Online at https://transportation.ky.gov/HighwaySafety/Pages/default.aspx

Geographic Distribution. At the county level, crash rates are proportional to vehicle-miles traveled (VMT). For example, Ballard County contains 36% of reported crashes along US 51 and accounts for 35% of the VMT along the entire corridor. A closer look reveals higher crash rates at specific locations.

- The highest concentration of crashes occurs over the northernmost 4 miles of the corridor, between the river and Wickliffe. Over five years, there were 30 crashes in this segment, half of which were on the Ohio River Bridge that will be replaced through a separate ongoing project. Head-on and opposite direction sideswipes represent 18 of reported crashes. Overall, 16 involved commercial vehicles.
- There were 28 crashes within the 0.7 miles of US 51 within Wickliffe's city limits. While reports show a range of crash types, 39% of incidents occurred at intersections and 54% involved commercial vehicles.
- A half-mile stretch of curves south of Wickliffe (Ballard MP 1.5-2.0) saw nine crashes in five years, including eight single vehicle crashes and five on wet or icy roadways.
- There were 19 crashes within the 1.2 miles inside Clinton's city limits. With more intersections and conflict points than along rural sections, angle collisions were more common (47%).

Other Trends. Records were compared to identify correlations in the data that could highlight underlying concerns.

- 28% of reported crashes occurred after dark, with no streetlights beyond city limits.
- 23% occurred on wet or icy roadways.
- 8% involved a collision with a deer or other animal. Concurrent with this study, KYTC is developing a **Wildlife-Vehicle Collision Reduction Program** to identify measures to reduce these crash types across the Commonwealth.
- 32% of crashes involved commercial vehicles.

Considering the importance of freight movements along US 51, analysts took a closer look at truck crashes, mapped in **Figure 25**. Over five years, 65 commercial vehicle crashes were reported along US 51, with one resulting in a fatality and seven resulting in an injury. The highest truck volumes—and greatest number of truck crashes—occurred in Ballard County. Single vehicle (31%) and opposite direction sideswipes (29%) were most common types along the 40-mile corridor. Roadway departures represent 67% of the dataset. About 27% occurred after dark and 19% were on wet/icy roadways.

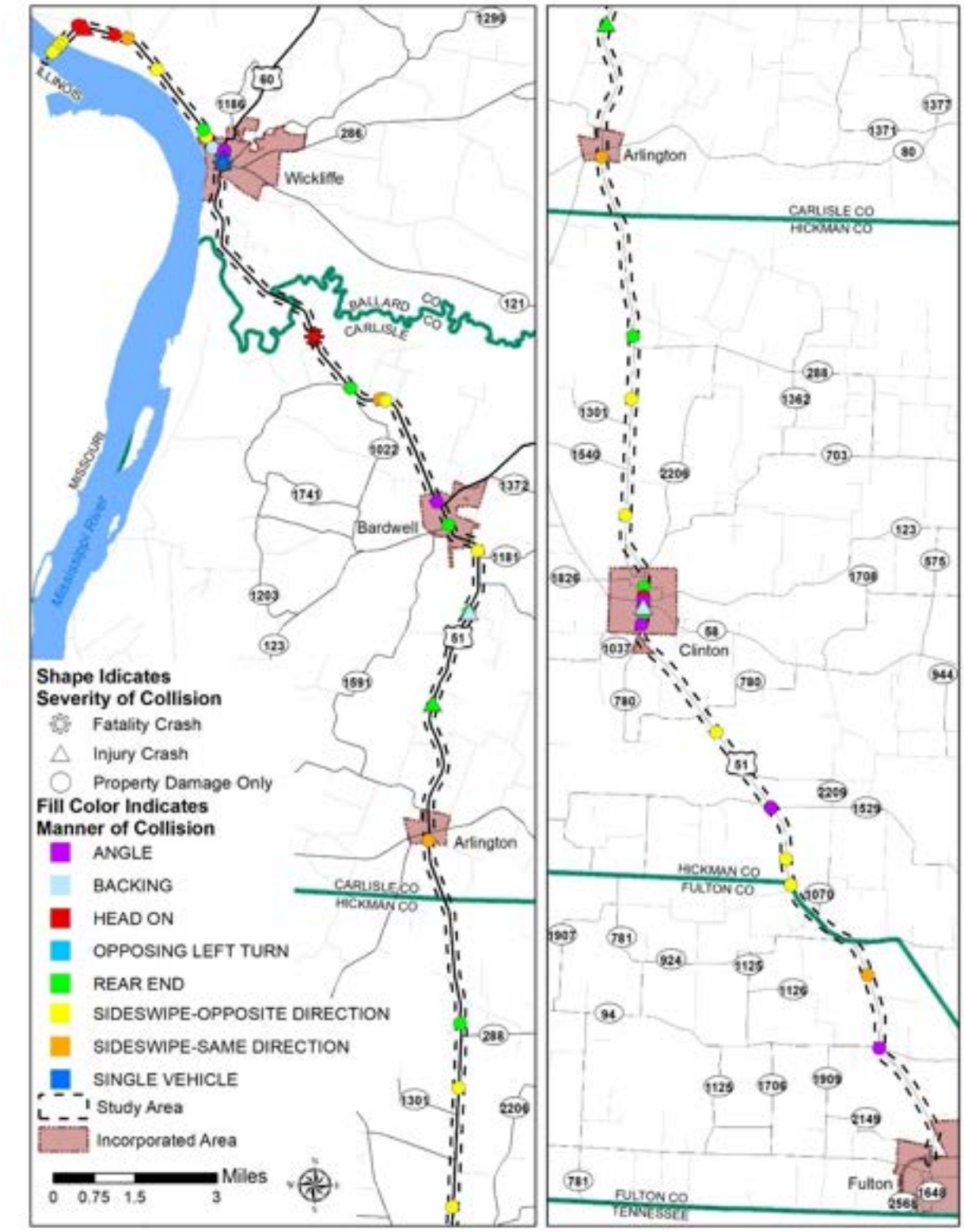


FIGURE 25: TRUCK CRASHES (2019-2023)

Statistical Crash Analyses

Level of Service of Safety (LOSS) is a refined statistical methodology in the *Highway Safety Manual* and is 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 more substantial improvements.

Considering K, A, and B severities, no segments demonstrate a LOSS 3 or 4, but five intersections exhibit higher crash rates than mathematically predicted. These intersections include:

- Ballard MP 3.376: KY 121 (Court Street) in Wickliffe (LOSS 4), which has overhead flashing lights on all four stop-controlled approaches
- Carlisle MP 7.873: US 62 (Paducah Road) at Bardwell (LOSS 4), which was converted to a four-way stop in Summer 2024
- Carlisle MP 5.612: CR-1229 Tom Looney Road (LOSS 3) forms a Y intersection in a gentle (Class B-C) S-curve
- Carlisle MP 1.270: KY 80 (Milburn and Columbia streets) at Arlington (LOSS 4), which has overhead flashers stretching diagonally across the two-way stop intersection.
- Fulton MP 0.297: KY 2149 (Airport Road), just north of the parkway interchange at Fulton (LOSS 4)

3. ENVIRONMENTAL RESOURCES

A planning-level environmental overview was prepared to identify resources and potential issues to consider during the development of transportation improvement concepts. Natural and human environmental resources identified from readily available databases are shown in **Figure 26** and summarized in the following sections. Potential environmental issues that may require additional investigation during any future project development activities are identified but detailed impacts are not quantified at this stage.

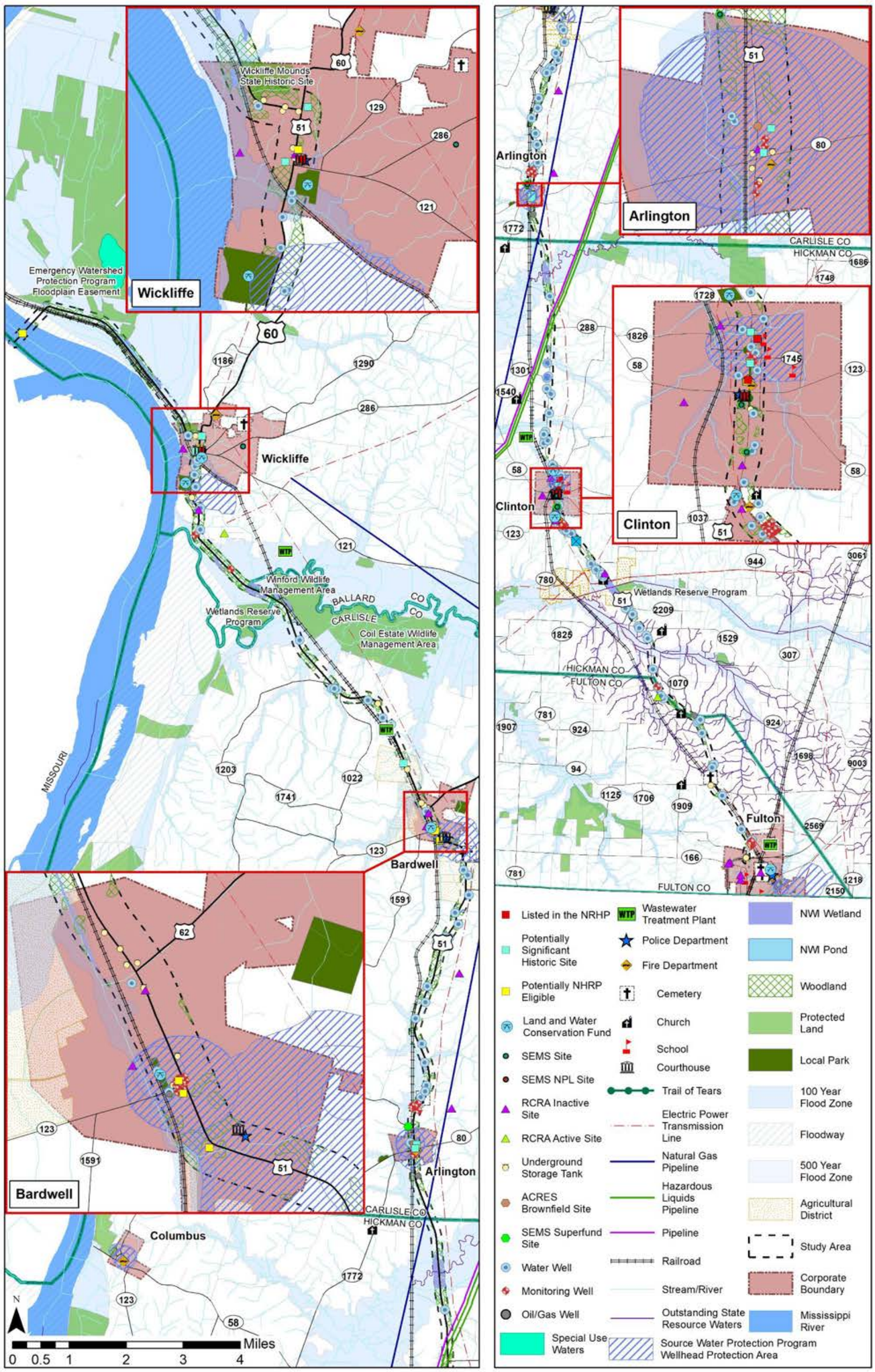


FIGURE 26: ENVIRONMENTAL OVERVIEW MAP

3.1. NATURAL ENVIRONMENT

"Natural environment" typically refers to all living and non-living things found to occur in nature such as streams, wetlands, protected species, farmlands, bedrock, soils, and more.

Water Resources

At its northernmost terminus, the study corridor approaches the Ohio River. Numerous streams, tributaries, and creeks intersect US 51.

Outstanding State Resource Waters (OSRW) in the study area were designated by the Kentucky Energy and Environment Cabinet for their national recreational or ecological significance.

- In Hickman County, Obion Creek intersects US 51 at MP 14.14 (Bridge 053B00097N). It is designated an OSRW, as a reference reach, good macroinvertebrate community, and good fish community.
- In Hickman County, Bayou de Chien intersects US 51 at MP 4.54 (Bridge 053B00086N). It is designated an OSRW for Relict darter (*etheostoma chienense)*, a federally protected fish species.
- Several tributaries of Cane Creek intersect US 51 in Hickman (MP 0.000-3.966) and Fulton (MP 1.745-4.682) counties. The creek and its tributaries are designated OSRW for protection of the Relict darter.

No federally designated Wild or Scenic Rivers are within the study area limits.

Wellhead Protection Areas (WHPA) are present along US 51 at Wickliffe, Bardwell, Arlington, Clinton, and Fulton. WHPA's are regulated to protect the public water supply. To minimize potential contamination, future project(s) drainage patterns in these areas would warrant special considerations during design, construction, and operation of the roadway. These could include best management practices (BMP) to minimize and treat stormwater runoff during both construction and roadway operations.

Surface drainage flows primarily through Mayfield Creek (north section), Obion Creek (central), and Bayou de Chien Creek (south) into the Mississippi River. Other named tributaries in the study area include Beech Creek, Gray Creek, Thomas Creek, Truman Creek, Little Mayfield Creek, Caney Creek, Hurricane Creek, Gaddie Creek, Long Creek, Brush Creek, and Cane Creek. There are also several smaller unnamed streams and scattered ponds along the study corridor.

Floodplains and floodways surround larger streams and low-lying areas: 218 acres of floodplains and 17 acres of floodways within a 100-foot buffer of the existing highway. The corridor north of

Wickliffe, surrounding Mayfield Creek (Ballard/Carlisle County line), and near Arlington exhibit the most areas prone to flooding.

Many streams are associated with wetlands habitats. While smaller wetlands are present adjacent to US 51 throughout the corridor, larger wetland areas are concentrated near the Ohio River in Wickliffe, the Winford Wildlife Management Area, near Obion Creek south of Arlington, and near Bayou de Chien south of Clinton. National Wetlands Inventory data shows 12.8 total acres of wetlands within a 100-foot buffer of the existing highway.

Impacts to streams and wetlands require permit coordination with the US Army Corps of Engineers, US Coast Guard, and/or Kentucky Division of Water (KDOW), depending on the scale of the water resource and potential disturbance. Impacts to an OSRW require individual Section 401 and KPDES permits.

Protected Species

The US Fish and Wildlife Service (USFWS) maintains a database of federally protected species that are listed as endangered or threatened under the *Endangered Species Act*. There are 15 federally listed species within the study area, identified in **Table 7.** Tricolored bats, alligator snapping turtles, and Monarch butterflies are also proposed for protection. No designated critical habitat lies within the study area.

TABLE 7: THREATENED AND ENDANGERED SPECIES

Common Name	Scientific Name	Status
Gray bat	*Myotis grisescens*	Endangered
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Endangered
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered
Whooping crane	*Grus americana*	Experimental Population Non-Essential
Alligator snapping turtle	*Macrochelys temminckii*	Proposed Threatened
Pallid sturgeon	*Scaphithynchus albus*	Endangered
Relict darter	*Etheostoma chienense*	Threatened
Clubshell	*Pleurobema clava*	Endangered
Fanshell	*Cyprogenia stegaria*	Endangered
Fat pocketbook	*Potamilus capax*	Endangered
Longsolid	*Fusconaia subrotunda*	Threatened
Northern riffleshell	*Epioblasma rangiana*	Endangered
Orangefoot Pimpleback (pearlymussel)	*Plethobasus cooperianus*	Endangered
Pink mucket (pearlymussel)	*Lampsilis abrupta*	Endangered

Common Name	Scientific Name	Status
Rabbitsfoot	*Qyadrula cylindrica cylindrica*	Threatened
Ring pink (mussel)	*Obovaria retusa*	Endangered
Rough pigtoe	*Pleurobema plenum*	Endangered
Monarch butterfly	*Danaus plexippus*	Candidate

Projects that occur within an area of known or potential habitat will require project-specific evaluation to assess appropriate minimization/mitigation measures. Coordination with the USFWS Kentucky Field Office will be necessary to determine the need for future project-specific surveys.

This portion of the state has historically been a hot spot for waterfowl migration patterns. Coordination with the USFWS may be needed to comply with the *Migratory Bird Treaty Act* of 1918 and the *Bald and Golden Eagle Protection Act* should protected species be encountered.

Geotechnical

The study area lies in the northern region of the Mississippian Embayment Physiographic Region, a low-lying basin filled with unconsolidated sediments, characterized by relatively flat terrain with numerous lakes, ponds, sloughs, and swamps.

Four geological formations comprise most of the study area:

- Alluvium is loosely deposited silt, sand, gravel, and clay found in the lowest elevations within the floodplains of the Mississippi River; the Mayfield, Obion, and Bayou de Chien creeks; and associated tributaries.
- Loess is primarily silt deposits blanketing much of the project, which can exceed 30 feet in thickness and, due to the high silt content, is highly erosive and prone to slumping when over steepened and/or wet. Cut slopes in this material may require gentle slopes (2.5:1 or flatter), especially in areas with high water tables.
- Continental Deposits composed of gravel, sand, and silt are found directly beneath the loess. Areas adjacent to US 51 have been mined for road metal and construction purposes.
- Jackson and Claiborne Formations are the oldest sediments that may be encountered, buried beneath the formations listed above but exposed along flanks of stream valleys. These formations are composed of sand, silt, clay, and clay breccia. Shown in **Figure 27**, thick clay beds near the northern study area are commercially mined in the area for stoneware, pottery, and brick.

The region has abundant groundwater at moderate to shallow depths. Water wells for industrial, agricultural, and private use can be found along the corridor.

Two existing landslides have been identified, located near US 51 MP 0.4 and 2.3 in Ballard County.

This region is underlain by a system of deep-seated faults related to the New Madrid Seismic Zone.

Soils in the area are generally suitable for embankment construction, but settlement could be an issue for embankments over 10 feet tall. Stabilization and working platforms with durable rock are often recommended in flood-prone areas. Bridges typically require deep foundations and should be designed for Seismic Risk Zone 3 earthquake damage. In thick clay deposits, undercutting subgrade and replacing with durable rock is typically recommended. Durable rock will not be available from roadway excavation; chemical modification has been recommended for other projects in the area. Additional details are presented in **Appendix C**.

FIGURE 27: MINES AND MINERALS

Protected Conservation Properties

Some properties have additional protections (e.g., easements or deed restrictions) to establish lands dedicated to conservation uses. **Figure 26** shows several protected areas along the US 51 corridor, including:

- Natural Resources Conservation Service (NRCS) Emergency Watershed Protection Program Floodplain Easements are held by the US Secretary of Agriculture and are perpetual. The easements are located at the far northern limits of the study corridor.
- NRCS Wetlands Reserve Program Easements have varying protection timeframes from 30-years to perpetual. Deed restrictions would provide specific term lengths. Several of these easements abut US 51 right-of-way in Ballard and Hickman counties.

- Kentucky Department of Fish and Wildlife Resources' Winford Wildlife Management Area (WMA) covers 236 acres in northern Carlisle County and is protected by Section 4(f)[10] of the *US Department of Transportation Act*. Because the area is open to the public for hunting, it is protected by the Kentucky Revised Statute (KRS) 150.0241 "No Net Loss" policy, which requires the state to maintain the amount of public hunting lands. This statue specifies replacement acreage requirements, if impacts are unavoidable. A 1:1 replacement ratio may not sufficiently offset adverse impacts. The easement is bounded by the railroad tracks and does not abut the highway. The property is also covered by an NRCS Wetlands Reserve Program easement.

Farmland Soils

NRCS soil surveys identify 32% of the study area soils as prime farmlands. If drained or otherwise protected from flooding, an additional 35% meets the criteria for prime farmland. Additionally, 5% of study area soils represent farmlands of statewide importance. The remaining 27% are neither prime farmland soils nor of statewide importance. Conversion to non-agricultural uses will require coordination with NRCS to comply with the *Farmland Protection Policy Act*.

There are three agricultural districts in the vicinity: two in Carlise County and one in Hickman County. These districts are administered by the KY Energy and Environment Cabinet and shown as yellow dotted polygons in **Figure 26**. Participation in the program is voluntary and changes over time. Land within agricultural districts cannot be annexed or condemned without mitigation. No other protected farmland easements were identified in the vicinity of the study area.

Hazardous Materials

Readily available records from the US Environmental Protection Agency (USEPA) were compiled to illustrate the range of monitored sites within or near the study corridor. Due to the age of structures and prevalence of agricultural land uses, aboveground storage tanks, improperly stored pesticides/herbicides, informal waste disposal sites, and structures containing asbestos could be encountered should build concepts require additional right-of-way. Records show the following types of monitored sites in/near the study area:

- Hazardous Waste sites, which generate, transport, treat, store, or dispose of hazardous materials. The *Resource Conservation/Recovery Act* (RCRA) regulates the management and disposal of solid and hazardous waste in the US.

[10] Section 4(f) 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.

- Superfund Enterprise Management System, which tracks contaminated sites under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) of 1980, providing funds to respond to hazardous releases that may endanger public health or the environment. The National Priority List represents priority sites eligible for investigation and remediation under the CERCLA program.
- Brownfield sites are defined by their former uses: industrial or commercial properties such as gas stations, dry cleaners, landfills, etc. Redevelopment is often complicated by real or perceived contamination. USEPA's "ACRES" database tracks these properties and associated cleanup efforts.
- Underground Storage Tanks, often containing petroleum products or other potentially hazardous substances.

3.2. HUMAN ENVIRONMENT

The human environment is often defined as the built environment—the communities in which we live. Such resources potentially impacted by roadway projects are discussed in the following sections. Five small, rural communities intersect the US 51 study corridor (**Figure 28**), from north to south:

- Wickliffe (Ballard County), the county seat, is situated just east of the Ohio and Mississippi rivers' confluence. It serves as the crossroads linking Kentucky to Missouri and Southern Illinois. The city's history and natural setting attract local/regional visitors for hunting, birdwatching, fishing, and sightseeing. The population was 670 in 2020, declining since the 1970s.
- Bardwell (Carlisle County) is the county seat and touts itself as "a tight-knit family friendly community built on traditional strong morals and work ethics." Primarily reliant on agriculture, the county attracts ATV and horseback riders, hunters, and campers with its views of the river. As of the 2020 Census, the city's population was 714, which has been on the decline since the 1960s.
- Arlington (Carlisle County) had a 2020 population of 264 as of

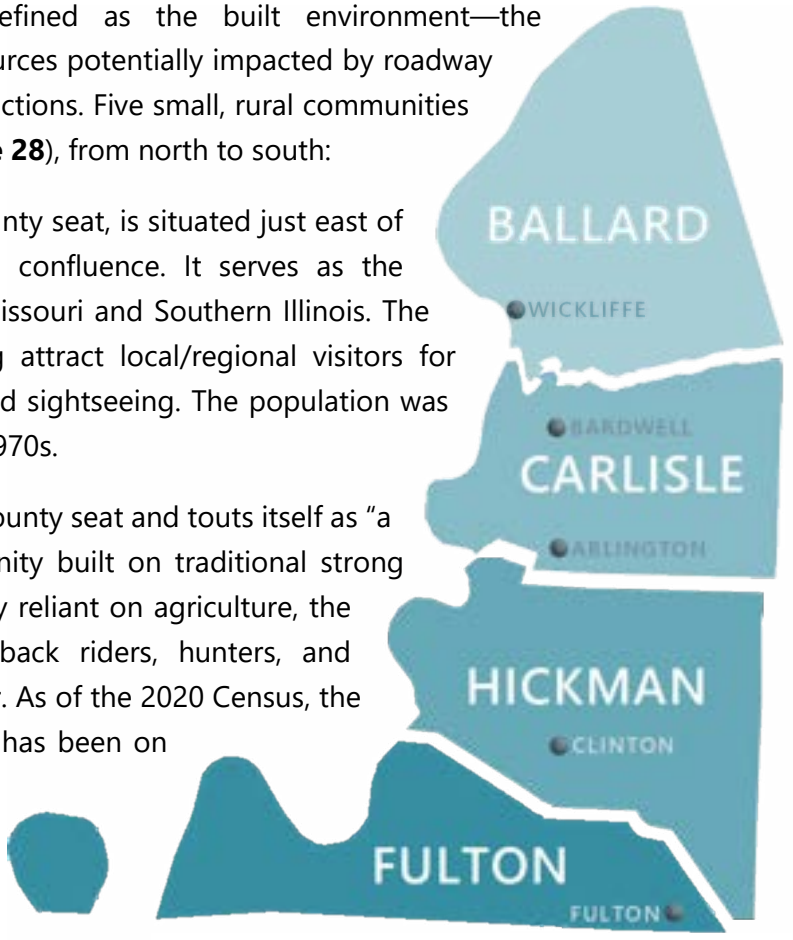


FIGURE 28. COMMUNITIES

2020, making it the smallest city along the study corridor. The city was founded as a stop along the railroad line.

- Clinton (Hickman County) is the county seat with a 2020 population of 1,222, declining since the 1980s. The city avows itself to be "a small town with a big heart," and promotes its recent small business additions (a boutique, barber shops, hair salons, convenience store, and café) and community events (Chicken Festival, Relay for Life, Halloween Parade, Arts & Crafts Fair, and Parade of Lights).

- Fulton (Fulton County) is the most populous city along the study corridor at 2,357 people as of 2020 though declining since the 1960s. It is a transportation hub with direct connections to the Purchase Parkway (future I-69 corridor), Illinois Central Railroad, and Hickman-Fulton County Riverport.

Land Use Plans

Land use influences regional traffic demands. Much of the adjacent land use is undeveloped, agricultural, or rural residential with residential and commercial properties more densely developed near town centers. Three of the four counties maintain formal land use plans, with the Purchase Area Development District's (PADD) 2022–2027 *Comprehensive Economic Development Strategy* (CEDS) [11] covering a regional vision. The PADD CEDS lists a vision for each study county.

> ***Ballard County's*** *primary mission is to provide its citizens a rural quality of life without sacrificing access to goods and services through partnerships and collaborations.*
>
> ***Carlisle County's*** *prime strategic business location is surrounded by natural paradise paired with an easy drive to diverse populations. Access to a strong workforce, infrastructure, and logistical hubs-paired with low barrier entry into business gives us many strategic advantages. Our objective is to maximize the opportunity within our County while supporting our local residents and local businesses. We strive to attract new businesses and industries as well as improve broadband within the area and maximize leisure, recreation, and agriculture resources.*
>
> ***Hickman County's*** *primary objective is to improve the quality of life for all its citizens through community development and economic growth. Our growth strategies include universal access to reliable broadband, commercial and industrial expansion, and developing and marketing our unique recreational and tourism assets.*
>
> ***Fulton County's*** *primary objective is to improve the quality of life for all its citizens through community development and economic growth. Our growth strategies include improving multi-modal assets for industrial sites and the Hickman-Fulton County Riverport as well as enhancing utility infrastructure (including broadband), workforce training, and tourism assets throughout the county.*

[11] https://www.purchaseadd.org/local-government/comprehensive-economic-development-strategy/

Ballard County's 2018 *Strategic Economic Development Plan, 20/20 Xtreme*[12] noted Wickliffe should develop parking lots and attractions for semi-trucks and should improve sidewalk access/connectivity. Focus areas include ecotourism, agricultural manufacturing, IT investment, and logistics/distribution.

Carlisle County's 2018 *Strategic Plan, 20/20 Xtreme*[13] suggests options for attracting development to the area, with an emphasis on ecotourism, agriculture, construction/manufacturing, technology, and logistics. The plan identifies Bardwell's need for better developed sidewalks and Arlington's need for added curb appeal in the historic downtown district.

Fulton's 2015 *Comprehensive Plan* expects the land use along US 51 north of the city to convert from the primarily rural, undeveloped, agricultural area to industrial.[14]

Portions of three of the study counties have been identified as **Opportunity Zones**, which are designated low-income census tracts that have tax incentives to focus on communities that have been historically underserved (**Figure 29**).

FIGURE 29. OPPORTUNITY ZONES

Beyond long-term visions, a few specific developments in the region could further influence land use along US 51.

- Since the reopening of Phoenix Paper (green in **Figure 30**) in 2019, the mill has seen major improvements and expansions, and is now home to over 300 jobs near Wickliffe.
- Engineering is underway to develop the new Western Kentucky Regional Riverport (WKRR, yellow in **Figure 30**) on 69 developable acres south of Wickliffe. Post-construction, this site is expected to generate over 50 jobs within the region. Two industries have already signed letters of intent and a third is in the works.[15]

[12] https://www.discoverballardcounty.com/wp-content/uploads/2018/08/Strategic-Plan-2018-Updated.pdf
[13] https://www.carlislecountyky.com/wp-content/uploads/2018/12/Carlisle-Strategic-Plan_V3.pdf
[14] https://fulton-ky.com/wp-content/uploads/2016/08/2015-City-of-Fulton-Comprehensive-Plan.pdf
[15] https://wkrra.com/project-timeline/

- Environmental studies are underway for a potential Cairo Riverport (pink in **Figure 30**) in Illinois, to be built on 190+ acres. Illinois Department of Transportation provided a $40 million grant in 2021.
- In late 2023, Fulton County Fiscal Court was awarded state funds, as part of Kentucky's statewide "Build-Ready" initiative, to develop about 40 acres of Enterprise Park, just off US 51, for site development and rail readiness.[16]

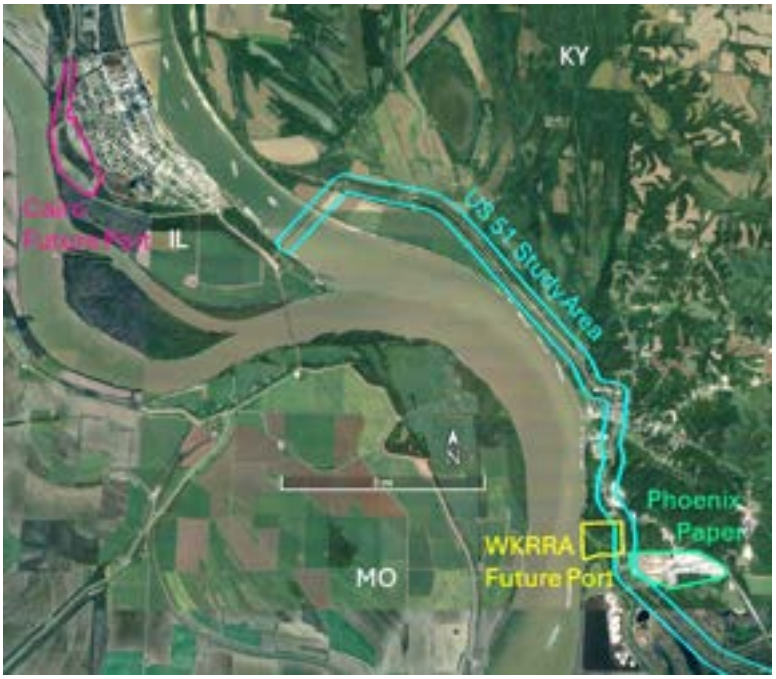


FIGURE 30: INDUSTRIAL DEVELOPMENTS

Community Resources

Concentrated in each of the small towns, community resources are identified in **Figure 26** above and discussed briefly below.

Schools. No public schools lie within the study corridor. In Clinton, each of the county schools are located one to two blocks east of US 51. Fulton City High School is located approximately a half mile south of the US 51 interchange with Purchase Parkway. Students in Wickliffe, Arlington, Bardwell, and other rural areas along US 51 are served by schools farther from the study corridor but rely on the route for access.

First Responders. Fire stations serving the study area are located in the Wickliffe, Bardwell Clinton, and Fulton communities. Law enforcement is provided by county sheriffs based in Wickliffe, Bardwell, and Clinton based near the respective courthouses. Fulton is served by both a police department and sheriff's office, both located beyond the study corridor.

Health Care. No hospitals, emergency care facilities, or other health care facilities are located within the study area. Area residents rely on regional hospitals in surrounding cities for medical needs: Paducah to the north, Mayfield to the east, Union City to the south, or Sikeston to the west.

[16] https://www.westkentuckystar.com/News/Local-Regional/Beshear-announces-funding-for-Fulton-s-Enterprise

Parks and Recreation. Shown in dark green in **Figure 26,** several parks abut the corridor, including:

- Wickliffe Park—roughly bounded by US 51, KY 121, 6th Street, and Beech Grove Road—features playgrounds, shelters, disc golf, plus courts for tennis, pickleball, and basketball.
- Fort Jefferson Hill Park and Memorial Cross lies between US 51 and the Mississippi River, with a walking trail and scenic overlook. Wickliffe's visitor/welcome center is located on the same property.
- Hickman County Fairgrounds is located west of US 51 at the north edge of Clinton.
- Rotary Park in Clinton is roughly bounded by US 51, Kimbro Street, and KY 780 and provides playground equipment, shelters, restrooms, and a fishing pond.

Public parks and recreational areas are protected by Section 4(f), discussed above. Lands/amenities developed with Land and Water Conservation Funds (LWCF) are also protected by Section 6(f) regulations. Records show LWCF have been invested in Wickliffe Park, Jefferson Hill, and Rotary Park; therefore, should any site be directly impacted by a project, coordination with the Department of Local Government would be needed to confirm whether Section 6(f) protections apply to the entire property or only specific investments.

Churches and Cemeteries. There are more than ten churches and four known cemeteries along the study corridor, including two large burial grounds on both sides of US 51 immediately south of Bardwell. Additional unmarked burial grounds may exist, particularly as small family plots are common in more rural areas.

Cultural Historic Resources

Historic resources listed in or eligible for listing on the National Register of Historic Places (NRHP) are afforded special protections under Section 106 and Section 4(f). The *National Historic Preservation Act* requires federal agencies to consider the effect of an undertaking upon historic properties. This involves making a "reasonable and good faith effort" to identify and evaluate historic properties, to document the effects upon these properties, and to determine measures to mitigate any adverse effects.

A *Historical Overview* was completed April 2024 (**Appendix D**) to identify—to the extent possible from existing right-of-way—resources that are potentially significant, listed, or eligible for listing in the NRHP. This effort included a Kentucky Heritage Council (KHC) database search and windshield survey.

No historic districts but several historic properties are located along the study corridor. KHC records show 139 surveyed properties within the study area. Of these, most have an "undetermined" status but four are NRHP listed (**Table 8**), four are NRHP eligible (**Table 9**), and eight have been identified as potentially significant (**Table 10**).

TABLE 8: NRHP LISTED RESOURCES

BA-1
Ballard County Courthouse
132 4th St, Wickliffe, KY 42087

HIC-2
Marvin College Boys' Dormitory
404 and 416 N. Washington St, Clinton, KY 42031

HIC-5
Hickman County Courthouse
110 E. Clay St, Clinton, KY 42031

HIC-8
First Christian Church
201 N. Washington St, Clinton, KY 42031

TABLE 9: NRHP-ELIGIBLE RESOURCES

ID	Name	Location
BA 2	First Methodist Episcopal Church	410 Ohio St, Wickliffe, KY 42087
BA 241	Ohio River Bridge/Cairo Bridge, 004B00021N	US 51 MP 7.95
CEB 5	First United Methodist Church	104 Elm St, Bardwell, KY 42023
CEB 24	House	246 US 51, Bardwell, KY 42023

TABLE 10. POTENTIALLY SIGNIFICANT HISTORIC SITES

ID	Name	Location
CRA 1	Wickliffe Motel	520 4th St, Wickliffe, KY 42087
CRA 2	Wickliffe United States Post Office	330 Court St, Wickliffe, KY 42087
CRA 3	Arlington United States Post Office	178 Walnut St, Arlington, KY 42021
CRA 4	Façade of Commercial Building	700 Milburn St, Arlington, KY 42021

ID	Name	Location
CRA 5	Illinois Central Gulf Railroad Culvert, 020B00006N	US 51 MP 8.79, Carlisle County
HIC 64	Clinton Post Office	304 S. Washington Street, Clinton, KY 42031
HIC 34	Culvert, 053B00075N	US 51 MP 7.96, Hickman County
HIC 22	Culvert	US 51, MP 8.172, Hickman County

Additionally, a 0.9-mile section of the Benge Route of the Trail of Tears National Historic Trail is along US 51 in Clinton. Research is needed to determine NRHP eligibility based on whether the route retains integrity of location, design, materials, workmanship, feeling, setting, or association.

Archaeological Resources. An *Archaeological Overview* was also prepared to collect information about potential resources in the area. Dozens of past surveys have been conducted—on file with the Office of State Archaeology—with eight known sites within the study area. Most notably, a mound complex was discovered in the 1930s by an amateur archaeologist during the construction of US 51. Today, Kentucky State Parks manages Wickliffe Mounds State Historic Site, which preserves an ancient Mississippian archeological site that dates to 1100–1350 AD. The park features a museum curating prehistoric artifacts excavated onsite, a welcome center, gift shop, trails, and picnic areas. In addition, soil data shows that portions of the study area have high potential to contain deeply buried archaeological deposits.

If any proposed improvements involve additional right-of-way from within a listed or eligible NRHP site, Section 4(f) requirements must be considered during future project development phases. Consultation with the KHC would also be required in accordance with Section 106 of the *National Historic Preservation Act*.

Demographic Trends

Included as **Appendix E**, an assessment of demographic trends identified potential sensitive population concentrations. This socioeconomic study reviewed 2022 Census estimates to identify potential concentrations of low-income, minority, elderly, disabled, or limited English proficiency (LEP) persons. Summarized in **Table 11** and **Figure 31**, the analysis concluded that all block groups show elevated concentrations of one or more of these demographic categories. Red text in the table highlights concentrations greater than the corresponding countywide average.

TABLE 11: SUMMARY OF DEMOGRAPHIC TRENDS

Geography	Population	Minority (%)	Poverty (%)	Age 65+ (%)	Disability (%)	LEP (%)
Kentucky	4,502,935	16.8	16.1	16.8	21.1	3.4
PADD Region	196,820	13.5	16.7	19.7	20.9	1.1
Ballard County	7,742	8.1	14.3	22.3	19.8	1.5

Geography	Population	Minority (%)	Poverty (%)	Age 65+ (%)	Disability (%)	LEP (%)
CT 9503 BG 2	722	10.8	10.8	23.3	13.8	0.0
CT 9503 BG 3	867	18.7	40.1	17.1	30.3	0.0
Carlisle County	4,782	7.7	20.1	20.1	20.5	0.1
CT 9602 BG 1	973	7.8	22.4	19.1	35.0	0.0
CT 9602 BG 2	866	9.2	30.2	28.1	21.0	0.0
CT 9603 BG 1	1,043	7.7	15.5	14.9	14.4	0.0
CT 9603 BG 2	445	13.5	24.9	28.5	23.0	1.0
Hickman County	4,491	13.9	16.7	24.5	24.4	0.5
CT 9701 BG 1	828	20.8	13.0	21.0	20.7	1.2
CT 9701 BG 3	658	9.6	8.0	26.3	28.2	0.0
CT 9701 BG 4	1,903	7.7	19.1	26.4	23.0	0.0
CT 9701 BG 5	520	12.7	24.1	16.5	21.0	0.0
Fulton County	6,480	30.2	27.4	21.0	25.0	0.0
CT 9601 BG 1	544	2.8	28.1	9.9	24.3	0.0
CT 9601 BG 2	638	16.8	9.4	43.1	35.6	0.0

Additional analyses may be required as part of future project development phases, especially if improvements result in additional right-of-way acquisition and/or residential relocations that impact these populations.

Air Quality Considerations

The USEPA monitors National Ambient Air Quality Standards for all six criteria pollutants: ozone, lead, nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter. All four counties are currently in attainment for all six criteria pollutants.

To demonstrate air quality conformity, federally funded transportation capacity projects recommended for further development should be modeled and included in KYTC's Statewide Transportation Improvement Program (STIP) to ensure conformity requirements are satisfied. A project that adds capacity may need to consider mobile source air toxics and greenhouse gas emissions.

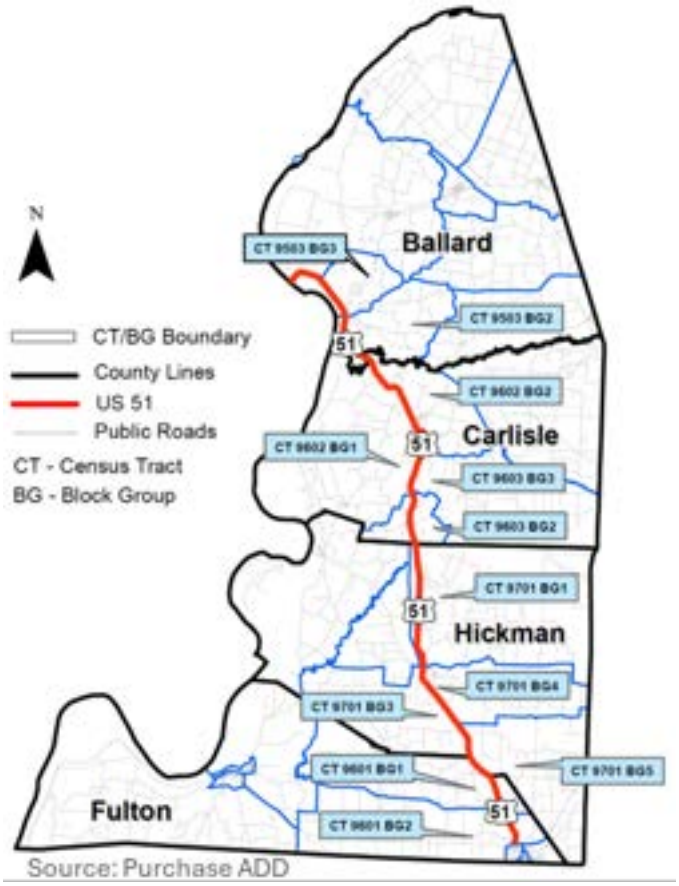


FIGURE 31: CENSUS GEOGRAPHIES

Noise Considerations

Federally funded transportation projects typically require consideration of noise impacts. Noise sensitive receptors in the vicinity of improvements include residential areas, parks, cemeteries, hospitals, churches, schools, etc. Some commercial properties with exterior uses are also considered noise sensitive. Specific traffic noise impact analyses may be required as part of future project development activities if projects are identified that add capacity or shift traffic closer to sensitive receptors.

4. INITIAL COORDINATION EFFORTS

The project team, consisting of representatives from KYTC Central Office, KYTC District 1, PADD, and the consultant, coordinated key tasks and engaged with local officials and stakeholders (LO/S) to explore existing conditions and discuss transportation needs. Meeting summaries are arranged chronologically in **Appendix F**.

4.1. FIRST PROJECT TEAM MEETING

The project team met April 4, 2024, in Paducah to review existing conditions data and prepare for the first LO/S coordination meeting. The team assessed area planned projects, past studies, current Highway Plan funding, and current conditions (including roadway geometry, traffic flow, crash trends, and environmental resources), as detailed in **Chapters 2** and **3**.

4.2. FIRST LOCAL OFFICIAL/STAKEHOLDER MEETING

On May 23, 2024, the project team met with LO/S at the courthouse in Bardwell to present an overview of existing roadway conditions and to gather local insights on transportation needs in the study area.

Key discussion topics covered were:

- A section of KY 286 is not part of the state or nationally designated truck route, increasing truck flows along US 62 and US 51 instead.
- There was a 2024 fatality near Phoenix Paper not reflected in the data.
- Near Phoenix Paper, the overpass transitioning to a series of curves is challenging for trucks.
- Drivers tend to speed through Clinton faster than they should.

- Some tight turns in Clinton are challenging for large trucks. Adjusting the stop bars or removing a few parking spaces could address the problem.
- Sidewalks abut the roadway in Clinton, which can be uncomfortable for pedestrians.

5. 2045 NO-BUILD TRAFFIC FORECAST AND OPERATIONS

KYTC's statewide travel demand model, along with 2024 weekday turning movement counts and input from community leaders, formed the basis of future year 2045 traffic projections. The complete *Traffic Forecast Report* is in **Appendix A**.

5.1. FUTURE YEAR TRAFFIC GROWTH

KYTC's statewide travel demand model estimated future year growth for all study area roadway segments. The model simulates a 24-hour period, relying on factors to derive daily traffic estimates. The model overlays the roadway network onto the anticipated 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.

Two decades of KYTC traffic counts along state-maintained highways in the study area show traffic volumes are steady to trending downward. Census estimates and population projections from the Kentucky State Data Center also exhibit negative population growth for the area through 2050. The statewide travel demand model (KYSTMv20, 5972 zones) shows declining population and employment trends at the county level throughout the study area. Model assumptions were verified after conversations with LO/S to ensure projections account for the riverport expansions, a new river crossing at Cairo, and conversion of the Purchase Parkway to I-69.

Considering each of these factors, KYTC applied an annual 1.58% growth rate to derive 2045 No-Build traffic volumes, increasing US 51 daily volumes as shown in **Table 12**. Segments are listed from north to south in the table.

TABLE 12: DAILY TRAFFIC BY HIGHWAY SEGMENT

County	MP Range	2024 ADT	Truck %	2045 No-Build ADT
Ballard	3.644-8.297	6,600	44.1	9,200
Ballard	1.871-3.644	2,500		3,500
Ballard Carlisle	0.000-1.871 10.852-12.655	1,700	24.5	2,400
Carlisle	8.423-10.852	2,200		3,100
Carlisle	7.874-8.423	2,400		3,300
Carlisle	7.494-7.873	3,600		5,000

County	MP Range	2024 ADT	Truck %	2045 No-Build ADT
Carlisle	6.134-7.494	2,200	20.6	3,100
Carlisle	1.270-6.134	1,900		2,600
Carlisle Hickman	1.111-1.270 12.538-15.095	1,600	31.3	2,200
Hickman	8.275-12.538	1,700	24.7	2,400
Hickman	7.766-8.275	4,200		5,800
Hickman	7.148-7.766	4,700		6,500
Hickman	6.650-7.148	2,200	17.7	3,100
Hickman	3.037-6.650	2,300		3,200
Hickman	0.000-3.037	2,200		3,100
Fulton	2.500-4.682	2,700		3,800
Fulton	0.297-2.500	2,600		3,600
Fulton	0.000-0.297	3,100	20.7	4,300

5.2. 2045 NO-BUILD OPERATIONS

The No-Build scenario applies future traffic volumes to the existing roadway network, without any infrastructure improvements or changes in type of traffic control. No-Build operations were calculated at study intersections, as shown in **Table 13**.

TABLE 13: 2045 NO-BUILD INTERSECTION LOS

US 51 INTERSECTION	CONTROL	AM LOS	PM LOS
US 60/4th St/Green St, Wickliffe	All-way Stop	F	F
KY 121 (Court St), Wickliffe	All-way Stop	D	E
Phoenix Paper Entrance	One-way Stop	B	B
US 62 (Paducah Rd), Bardwell	All-way Stop	B	B
KY 58 (Mayfield Rd)/South St, Clinton	Two-way Stop	EB C WB E	F
I-69 Westbound Ramps	One-way Stop	A	B
I-69 Eastbound Ramps	One-way Stop	B	C

Increased traffic degrades operations:

- At the US 51/US 60 intersection, maintaining a single lane approach for eastbound US 51 pushes that leg to LOS F in both peak hours with a 1.1–1.2 v/c. The northbound US 51 approach also approaches capacity at LOS D with a 0.8 v/c.

- At the next study intersection continuing south, southbound US 51 approaching KY 121 operates at LOS E/F with a 0.9 v/c during peak hours. In the PM peak, the westbound KY 121 approach also degrades to LOS E.

  Adequate pavement exists to add capacity via striping changes when/if congestion becomes a concern. It should be noted this would impact parking opposite the courthouse, which is a concern for local officials.

- At US 51/KY 58 (Mayfield Road)/South Street in Clinton, increased traffic on US 51 reduces the number of gaps to turn out from stop-controlled cross-streets. The westbound approach is projected to be over capacity in the PM peak, at LOS F with a 1.2 v/c.

  This intersection is within the limits of an ongoing design project: Item No. 1-80203. Analyses show replacing the two-way stop with a signal provides adequate capacity, when/if warrants are met.

6. CONCEPT DEVELOPMENT

Based on the data collection results described in previous sections, analysts explored study goals then defined potential improvement concepts to address identified needs.

6.1. STUDY GOALS & OBJECTIVES

A review of existing conditions paired with LO/S coordination helped define the main goals driving this planning effort.

Build concepts were developed to address three primary goals, ranked by relevance:

Improve safety, with a focus on higher-severity crash locations

Consider all users: trucks, farm equipment, pedestrians, etc.

Address both existing and future mobility needs

In light of projected funding in the FY2024–2030 *Enacted Highway Plan*, the study employs a programming approach to support prioritization of all previously identified projects along the route. Build concepts will range from low-cost, low impact maintenance actions up to major corridor widening.

6.2. INITIAL CONCEPTS DESCRIPTIONS

Improvement concepts were developed in two categories:

- Smaller scale safety improvements at intersections and in-town pedestrian facilities.
- Larger scale roadway realignment and widening options with higher costs and longer implementation timeframes.

Smaller Scale Spots

The following small-scale improvements were initially considered, presented to the project team in September 2024.

Spot 1: US 51/US 60 Intersection. Improve turn radius or add an eastbound bypass lane, paired with improved lighting. Adding this channelized turn lane improves 2045 projected LOS to C/D during the peak hours.

Spot 2: Through Wickliffe. Add edgeline striping and missing stop bars. Reconstruct sidewalks to improve drainage and address missing ADA elements. Add a midblock pedestrian crossing to courthouse. Convert the angle parking spaces near the courthouse to parallel spaces. The angle spaces are too short for full-size pickup trucks. To avoid obstructing motorists, trucks park on the sidewalk (**Figure 32**).

FIGURE 32: ANGLE PARKING IN WICKLIFFE

Spot 3: Phoenix Drainage. Improve drainage and add warning signs near Phoenix Paper.

Spot 4: US 51/US 62 Intersection. Implement Item No. 1-333 to reconstruct US 51/US 62/Front Street intersection. Designs exist (**Figure 33**) but require additional funding for construction.

FIGURE 33: ITEM NO. 1-333 DESIGN

Spot 5: Bardwell Sidewalks. Reconstruct sidewalks through Bardwell with curb/gutter to address drainage issues, including sidewalk extensions north and south identified in the 2022 Purchase District Health Department bicycle and pedestrian study. Spot also includes ADA ramps and detectible warning mats plus improved lighting.

Spot 6: Bardwell Hill/Curve. Adjust speed limit, add signage, and clear vegetation in the curve and hill south of town.

Spot 7: US 51/KY 1301 Intersection. Adjust profile to improve sight distance.

Spot 8: Clinton Reconstruction. Corresponds to ongoing design work under Item No. 1-80203 to improve sidewalks or add a multi-use path through town.

Spot 9: Clinton Striping and Signing. Implement small-scale safety improvements such as adding edgeline striping and missing stop bars, installing backplates on signals, and shifting existing signs to improve visibility. Construct a midblock pedestrian crossing to courthouse.

Spot 10: US 51/KY 924 Intersection. Add dynamic warning signs at intersection where alignment may limit visibility for turns from cross-streets.

Spot 11: US 51/KY 94 Intersection. Add dynamic warning signs at intersection where alignment may limit visibility for turns from cross-streets.

Larger Scale Segments

Representative larger scale Build options provide proof-of-concept drawings but require closer engineering examinations to minimize costs/impacts. Initial planning-level concepts in this category are intended to provide order-of-magnitude costs to facilitate conversations about priorities. The following concepts were initially considered, presented to the project team in September.

Concept A: 40-Foot Width North of Wickliffe. Widen pavement between bridges to provide a consistent typical section north of town to the river. Currently, this 1.6-mile segment provides 26 feet of pavement between Minor and Willow sloughs (**Figure 34** top) compared to 40 feet proposed (**Figure 34** bottom).

FIGURE 34: US 51 NORTH OF WICKLIFFE

Concept B: North Wickliffe Bypass. Construct a new alignment connection between US 51 and US 60.

Concept C: Curve at Railroad Overpass. Combine disjointed horizontal curves and smooth profile, providing wider 40-foot paved section for vehicle recovery.

Concept D: Bardwell Hill Profile. Adjust profile of steep hill south of Bardwell, providing a 32-foot-wide paved section (**Figure 35**). Realign intersection with Front Street. Replace sidewalks where feasible.

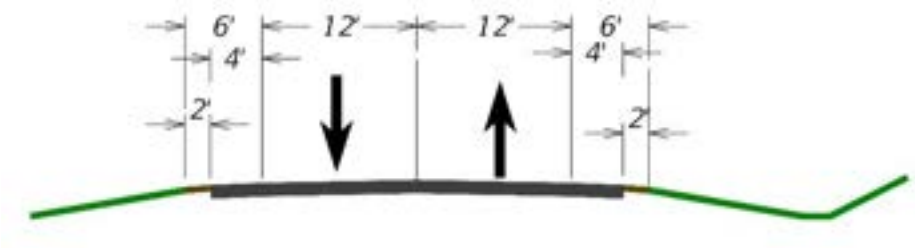


FIGURE 35: BARDWELL HILL PROPOSED TYPICAL

Concept E: Cane Creek Curves. Combine disjointed horizontal curves and provide 32-foot-wide paved section.

Concept F: 2+1 Widening. Reconstruct existing alignment with a 52-foot-wide paved section (**Figure 36**) to convert roadway to a symmetric 2+1 with alternating passing lanes in rural areas. The corridor is divided into eight construction sections south of Wickliffe (**Figure 37**), dividing at county lines and where the route meets city limits.

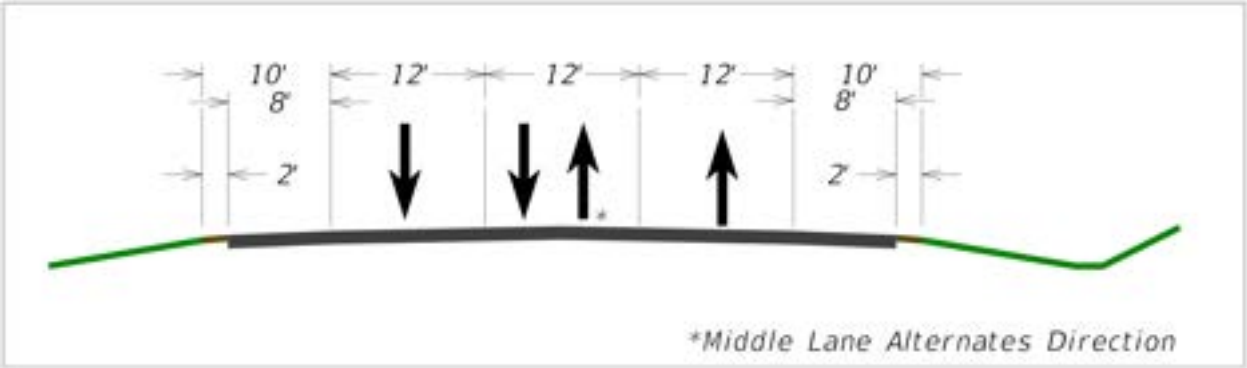


FIGURE 36: PROPOSED TYPICAL SECTION FOR 2+1 WIDENING

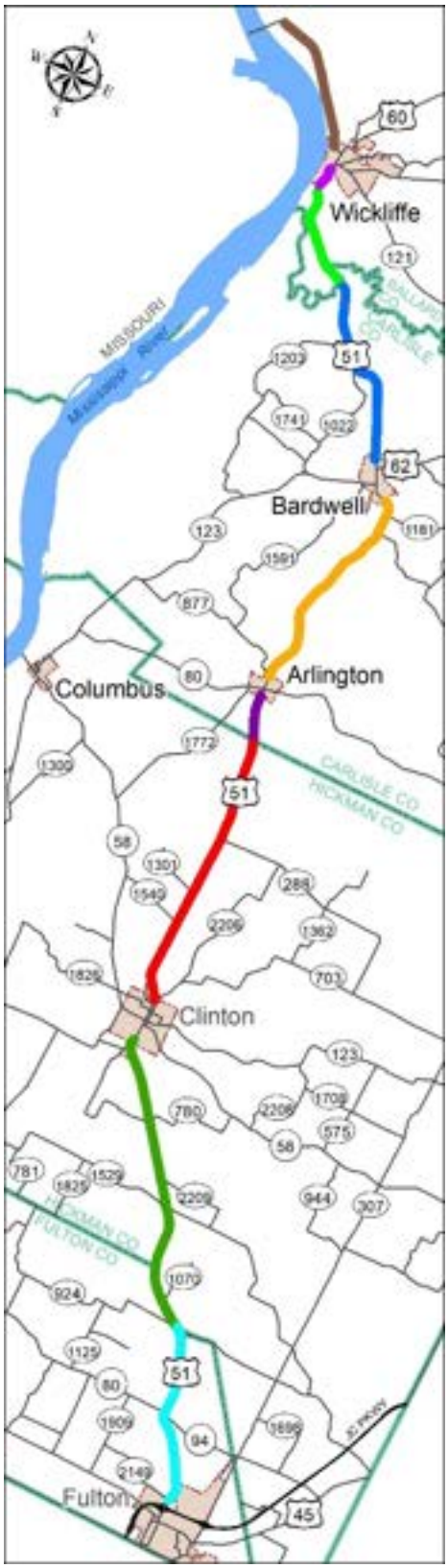


FIGURE 37: POTENTIAL CONSTRUCTION SECTIONS FOR CORRIDOR WIDENING

6.3. INTERSECTION CONTROL EVALUATIONS

KYTC's new Intersection Control Evaluation (ICE) policy provides a data-driven, performance-based framework to screen different intersection configurations, predicting both safety and traffic operational measures. Stage 1 (screening) is applied during planning studies while Stage 2 is used to select a preferred alternative, typically in Preliminary Design. The tool is set up for a range of traditional and innovative intersection layouts, as well as grade-separated interchanges. Results at five at-grade study intersections are summarized in **Table 14** with additional information in **Appendix H**. As shown, traditional intersection configurations typically provide adequate capacity and safety for the 2045 No-Build scenario and require smaller footprints, minimizing impacts.

TABLE 14: ICE FINDINGS AT STUDY INTERSECTIONS

Intersection	Layout	Capacity (v/c)	Safety Score	Practical?
US 51/US 60	All-way Stop	0.8	99	Yes
	Signal	0.7	99	Yes
	Quadrant	0.5	99	No
	Displaced Left	0.5	99	No
	Bowtie	0.8	100	No
	Roundabout	0.6	100	Possible
US 51/KY 121	All-way Stop	0.7	99	Yes
	Signal	0.6	98	Yes
	Roundabout	0.5	100	No
US 51/Phoenix	One-way Stop	0.3	99	Yes
	Signal	0.2	100	Yes
	Roundabout	0.2	100	Yes
US 51/US 62	Two-way Stop	0.4	100	Yes
	All-way Stop	0.4	100	Yes
	Signal	0.3	100	Yes
	Roundabout	0.2	100	Possible
US 51/KY 58	Two-way Stop	0.9	99	Yes
	All-way Stop	0.7	100	Yes
	Signal	0.5	99	Yes
	Roundabout	0.5	100	Possible

6.4. SECOND PROJECT TEAM MEETING

The project team met September 13, 2024, at KYTC District 1 to discuss the initial Build concepts. Key discussion topics included:

- High friction pavement through the curves at Phoenix Paper may help (Spot 3), paired with shoulder grading and oversize chevrons. A public riverport is proposed opposite the paper plant, which could result in changes to this stretch of roadway.
- At Bardwell, the US 51/US 62 intersection (Spot 4) was recently converted to a four-way stop, though US 51 thru trips do not tend to stop unless someone is waiting to turn out. This solution appears to have addressed safety concerns with fewer impacts than proposed Item No. 1-333 designs.
- The S-curves near CR-1229 (Tom Looney Road) will be added as a new Spot 12. There were seven crashes within 500 feet over five years—primarily single vehicle crashes—resulting in an LOSS 3 rating for KAB crashes.
- Concept A provides an option to widen between bridges to get a consistent 40-foot-wide typical section north of Wickliffe. A 2+1 typical over the entire 4 miles will be added as part of Concept F.
- A new Concept G should be added, with the same typical section as Concept F but revising curves and grades that do not meet HDM common practice guidelines. It can be divided into the same construction sections shown in **Figure 37**.

6.5. COST ESTIMATES

Planning-level designs for Build concepts were used to estimate preliminary quantities of high-cost construction items including earthwork and pavement. Construction costs were tabulated using Bid Express average unit bid prices for the four study counties' construction bids since January 2021, with adjustments for larger quantities based on KYTC District 1 feedback. Parametric factors were applied to account for drainage, traffic control, mobilization, and miscellanea. A 30% contingency factor was also applied to construction cost totals. KYTC District 1 provided right-of-way and utility cost estimates based on conceptual modeled disturb limits, aerial imagery, approximate locations of property lines, and utility records.

Planning-level cost estimates by phase (i.e., design, right-of-way acquisition, utility relocations, and construction) are presented in **Table 15** with details included as **Appendix G**. Costs are presented in 2024 dollars. It should be noted that larger scale concepts are less detailed and should be interpreted as order-of-magnitude level estimates; costs are rounded to reflect this assumption.

TABLE 15: BUILD COSTS BY PHASE

Concept	D	R	U	C	Total
Smaller Scale					
1: US 51/US 60	$40k	$200k	$20k	$270k	$530k
2: Through Wickliffe*	$50k	-	-	$230k	$280k
3: Phoenix Drainage	$200k	-	-	$1.0M	$1.2M
5: Bardwell Sidewalks	$1.2M	$0.4M	$0.5M	$7.7M	$9.8M
6: Bardwell Hill/Curve	$60k	-	-	$400k	$460k
7: US 51/KY 1301	$200k	$100k	$150k	$1.4M	$1.9M
8: 1-80203 at Clinton	$0.5M	$1.5M	$2.5M	$5.0M	$9.5M
9: Clinton Small-scale Safety	$100k	-	-	$700k	$800k
10: US 51/KY 924	$50k	-	-	$300k	$350k
11: US 51/KY 94	$60k	-	-	$400k	$460k
12: US 51/Tom Looney	$260k	$150k	-	$1.7M	$2.1M
Larger Scale					
A: 40-Foot North of Wickliffe	$1.0M	$0.8M	-	$6.4M	$8M
B: North Wickliffe Bypass	$1.2-2.6M	$0.5M	$0.5-1.5M	$8-17M	$10-20M
C: Curve at Railroad Overpass	$700k	$250k	$100k	$4.6M	$6M
D: Bardwell Hill Profile	$0.9M	$0.4M	$2.5M	$5.8M	$10M
E: Cane Creek Curves	$0.7M	$0.6M	$0.3M	$4.8M	$6M
F: 2+1 Widening	$27M	$19M	$20M	$180M	$250M
G: 2+1 Reconstruction	$28M	$19M	$20M	$190M	$260M

** Excludes sidewalk improvements per subsequent LO/S input*

Combined DRUC costs for Concepts F and G by segment (**Figure 37**) are listed in **Table 16**. Segments are listed from north to south in the table.

TABLE 16: CONCEPTS F-G BUILD COSTS BY SEGMENT

Segment	Length (mi)	Concept F DRUC	Concept G DRUC
1 North of Wickliffe, Ballard MP 3.9-7.3	3.4	$15M	$20M
2 Phoenix to Wickliffe, Ballard MP 2.7-3.2	0.5	$3M	$4M
3 South of Phoenix, Ballard MP 0.0-2.5	2.5	$30M	$30M
4 North of Bardwell, Carlisle MP 8.1-12.6	4.6	$30M	$35M
5 Arlington to Bardwell, Carlisle MP 1.6-7.0	5.4	$30M	$30M
6 South of Arlington, Carlisle 0.0-1.1	1.1	$6M	$6M
7 North of Clinton, Hickman 8.3-15.0	6.9	$60M	$65M
8 South of Clinton, Hickman 0.0-7.2	7.2	$45M	$40M
9 Parkway to Hickman, Fulton 0.3-4.7	4.4	$25M	$30M

Future Cost Escalation

The traditional project development process, illustrated in **Figure 38**, involves several phases before construction can begin. It starts with project-level planning, followed by design, right-of-way acquisition, utility relocations, construction, and ultimately maintenance phases. Each phase can potentially take a year or more to complete depending on the project's size and complexity. Unique risk factors can emerge at each stage, which can extend timelines. Challenges such as public opposition, environmental investigations, geotechnical issues, and redesigns or alternative approaches due to unforeseen conditions can delay progress. Added risks include legal complications related to property acquisition, long lead times for specialty materials, unexpectedly high construction bids, and change orders, all of which may require reevaluating earlier decisions.

FIGURE 38: TYPICAL PROJECT DEVELOPMENT PROCESS

Each phase also needs added funding, typically identified through the biennial Highway Plan. For large-scale projects, securing sufficient funding often requires competing across multiple budgetary cycles at the state level. As projects advance, uncertainty and risk continue, and the time value of money becomes a critical factor in long-term estimates.

FHWA's National Highway Construction Cost Index[17] tracks constant-dollar expenditures across various highway construction categories. As of 2023, construction costs have tripled compared to 2003 baselines, with a 50% increase since 2021.

While planning-level estimates aim to be conservative, larger projects having extended implementation timelines are likely to face significant cost increases. **Table 17** presents current year cost estimates (**Table 15**) extrapolated to account for increasing costs over time for long-

[17] Online at https://www.fhwa.dot.gov/policy/otps/nhcci/

term concepts. These risk-inflated estimates should be considered ballpark approximations as implementation timeframes and future inflation trends are highly speculative.

TABLE 17: LONG-TERM COSTS ESCALATED FOR IMPLEMENTATION TIMELINES

Concept	D +10%	R +20%	U +20%	C +50%	Escalated Total
Larger Scale					
A: 40-Foot North of Wickliffe	$1.1M	$1.0M	-	$9.6M	$12M
B: North Wickliffe Bypass	$1.3-2.9M	$0.6M	$0.6-1.8M	$12-26M	$15-30M
C: Curve at Railroad Overpass	$800k	$300k	$120k	$6.9M	$8M
D: Bardwell Hill Profile	$1.0M	$0.5M	$3.0M	$8.7M	$13M
E: Cane Creek Curves	$0.8M	$0.7M	$0.4M	$7.2M	$9M
F: 2+1 Widening	$30M	$23M	$24M	$270M	$350M
G: 2+1 Reconstruction	$31M	$23M	$24M	$290M	$370M

7. FINAL MEETINGS, BENEFITS, AND IMPACTS

After developing initial improvement concepts discussed in **Section 6.2**, the project team engaged with LO/S to gather feedback on proposed Build concepts.

7.1. SECOND LOCAL OFFICIAL AND STAKEHOLDER MEETING

The project team presented LO/S with proposed improvement concepts on November 18, 2024, at the Carlisle County Courthouse. Key discussions items during the meeting included:

- Recently converted all-way stops at US 51/US 60 and US 51/US 62 are working well. To encourage safe speeds, other signals—like the one at US 51/Clay Street—could potentially be replaced with all-way stops.
- Sidewalks in Wickliffe are in relatively decent shape; locals will not want to lose parking.
- In Clinton, improved sidewalks and crosswalks are needed at the Phillips Drive intersection to safely accommodate students walking near the school.
- Of the smaller scale spots, the bypass lane for trucks at US 51/US 60 is a high priority.
- Of the larger scale concepts, the curves at Cane Creek are a lower priority. An improved 2+1 highway would be an asset, potentially working south to north since there is an improved section south of Clinton.

7.2. TRANSPORTATION BENEFITS

Travel time savings and predicted crash reductions were weighed against project costs (**Section 6.5**). For consistency, each Build concept was assumed open to traffic in 2027, accruing benefits through 2049 with a 3.1% discount rate per federal guidance. A benefit-cost ratio (BCR) greater than 1.0 suggests the discounted present value of the benefits exceeds the discounted present value of the costs, suggesting the project is worthwhile. **Table 18** summarizes results of the BCR analyses.

Safety benefits were calculated based on one or more of the following factors from the Crash Modification Factor (CMF) Clearinghouse.[18]

- Improve pavement friction (CMF 2301) showing a 57% decrease in crashes.
- Install periodic passing lanes on rural two-lane highway (CMF 4083) with a 42% reduction in fatal and injury crashes.
- Change lane width (CMFs 4812-4813) with a formula to calculate savings given before and after conditions, varying by severity.
- Change shoulder width (CMFs 4818-4819) with a formula to calculate savings given before and after conditions, varying by severity.
- Provide highway lighting (CMF 5160) with a 20% reduction in nighttime crashes.
- Improve angle of channelized right turn (CMF 8428) with a 44% reduction in all crashes.
- Install systemic signing and mark improvements at stop-controlled intersection (CMF 8872) with 25% decrease.
- Flatten horizontal curve (CMF 9525) with a 69% reduction in all crashes.
- Install edgelines (CMF 10243) with a 15% decrease in all crash types and severities.
- Improve curve delineation (CMF 10613) with a 28% reduction in crashes.
- Install wider longitudinal pavement markings (CMF 10644) with a 28% decrease in crashes.
- Install intersection lighting (CMF 10993) with a 21% reduction in all crashes.
- Lower posted speed limit (CMF 11288) with a 14% decrease in fatal and injury crashes.

[18] Online at https://cmfclearinghouse.fhwa.dot.gov/

As shown, many of the smaller scale safety improvements result in BCRs greater than one, indicating monetized safety benefits outweigh capital costs. It should be noted that improved sidewalks provide additional benefits that are difficult to quantify at the planning stage—such as quality of life and increased economic revenues for adjacent businesses. BCRs for Concepts F and G were calculated by construction segment with only one section showing a positive result. This corresponds to Carlisle County MP 8.1–12.6 north of Bardwell with two fatalities during the analysis period increasing potential crash savings.

TABLE 18: BENEFIT-COST ANALYSES

Concept	2024 Cost	Benefits	From	BCR
Smaller Scale				
1: US 51/US 60	$530k	$1.5M	Safety, Travel Time	1.9
2: Through Wickliffe	$280k	$25M	Safety	46
3: Phoenix Drainage	$1.2M	$4.4M	Safety	2.0
5: Bardwell Sidewalks	$9.8M	$1.2M	Safety	Qualitative
6: Bardwell Hill/Curve	$460k	$2.1M	Safety	3.1
7: US 51/KY 1301	$1.9M	$0.6M	Safety	0.2
8: 1-80203 Clinton	$9.5M	$0.8M	Safety	Qualitative
9: Clinton Small-scale Safety	$800k	$4.5M	Safety	3.7
10: US 51/KY 924	$350k	$0.7M	Safety	1.3
11: US 51/KY 94	$460k	$2.1M	Safety	3.0
12: US 51/Tom Looney	$2.1M	$4.3M	Safety	1.4
Larger Scale				
A: 40-Foot North of Wickliffe	$8M	$0.3M	Safety	<0.1
B: North Wickliffe Bypass	$10-20M	$3-5M	Safety, Travel Time	0.2
C: Curve at Railroad Overpass	$6M	$1.7M	Safety	0.2
D: Bardwell Hill Profile	$10M	$1.2M	Safety	<0.1
E: Cane Creek Curves	$6M	$3.6M	Safety	0.4
F: 2+1 Widening	$250M	$130M	Safety	0.0–2.2
G: 2+1 Reconstruction	$260M	$180M	Safety, Travel Time	0.1–2.1

7.3. ENVIRONMENTAL IMPACTS

In addition to monetary costs, effects on the human and natural environment were also considered. Some of the Build options are contained within existing pavement or within existing right-of-way and would result in minimal impacts: Spots 2, 3, 6, 9, 10, and 11. Others have a larger footprint and, therefore, the potential to impact the surrounding environment, as discussed in **Chapter 3**. Each would require more detailed analyses during future design stages.

Water Resources. Impacts to streams and wetlands require permit coordination with individual permits for impacted OSRW. Spots 5 and 8 and Concepts B through G are likely to impact streams, with most crossing US 51 at existing culverts or bridges.

Impacts within floodplains require a Floodplain Construction Permit from KDOW. Portions of Spots 3, 5, and 8 and all larger scale concepts except C and E lie within designated floodplains, requiring consideration during future design work. Build options should examine design parameters to maintain "No Rise" to the Base Flood Elevation.

Impacts within WHPAs at Wickliffe, Bardwell, Arlington, Clinton, and Fulton warrant special drainage considerations during design, construction, and operation of the roadway, which could include BMPs to minimize and treat stormwater runoff.

Protected Species. Portions of the corridor north of Bardwell and south of Clinton represent known summer habitat for endangered Indiana bats. With any Build option, impacts to trees must be assessed for potential impacts to bat habitat. Mitigation for tree removal may be required.

This portion of the state has historically been a hot spot for waterfowl migration patterns; extra coordination with the USFWS may be needed, especially for Concepts A, B, F, and G due to their proximity to the Ohio River and WMAs. Should birds or their nests need to be relocated, an avian take permit from the Secretary of the Interior via the USFWS Atlanta Office would be necessary.

Managed Properties. Managed properties protected by Section 4(f) and other potential deed restrictions occur throughout the region. Concepts A, B, F, and G abut such properties, illustrated as light green polygons in **Figure 26** (page 33). Public parks are also protected by Section 4(f); Spot 8 and Concepts F and G are adjacent to public parks, shown as dark green polygons in **Figure 26**. Avoidance of these properties is recommended though minor strip takings could be processed as *de minimis*.

Because several sites along the corridor have received LWCF funding, they are protected by Section 6(f). Concepts F and G abut Jefferson Hill and Rotary Park, both of which have utilized LWCFs. If impacted, coordination with the Department of Local Government is necessary to confirm if Section 6(f) protections apply to the entire property or only specific investments.

Cultural Historic. Historic resources listed in or eligible for NRHP listing are also protected by Section 4(f). Shown as red, blue, and yellow squares in **Figure 26**, several of the Build options lie near potentially historic resources, requiring additional consideration during future design efforts.

- Ballard County Courthouse (BA-1) and First Methodist Episcopal Church South (BA-2) abut Spot 2; however, due to their small scale, proposed improvements are unlikely to adversely affect either resource.

- The house at 246 US 51 (CEB-24) in Bardwell is recommended as NRHP eligible. The building is set back 30 feet from the existing sidewalk. Sidewalks are proposed for reconstruction as part of Spot 5, with minimal impacts to adjacent structures.
- Bardwell's First United Methodist Church (CEB-5) is located at the sharp curve at US 51/Front Street, adjacent to proposed improvements as part of Spot 6 and Concept D.
- Four sites in Clinton require consideration as part of the ongoing Item No. 1-80203 design project (Spot 8): two potentially significant culverts (HIC-22 and HIC-34), the NRHP-listed First Christian Church (HIC-8), and the NRHP-listed Hickman County Courthouse (HIC-5). Spot 9 also covers similar limits as Spot 8 but the scale of proposed improvements is unlikely to adversely affect the resources.

Spot 5 and Concepts D, F, and G abut agricultural districts. Land cannot be annexed or condemned without mitigation.

Any Build options that acquire new right-of-way or impact previously undisturbed soils are likely to require archaeological testing. Concepts A, B, F, and G near the Wickliffe Mounds State Historic Site and Trail of Tears have higher potential to encounter archaeological resources. If discovered, Tribal consultation would be required.

Population Demographics. Census data suggests potential low-income and minority population concentrations may exist throughout the corridor. Concepts B, D, F, and G are likely to result in one or more residential relocations.

Potential Contaminants. Hazardous materials may be present along the corridor. Spot 1 traverses land that was historically a gas station; contaminated soils may be present.

7.4. THIRD PROJECT TEAM MEETING

The project team met January 21, 2025, to review study findings and reach consensus on priorities. Key discussions are summarized below.

Since Spot 8 (Item No. 1-80203) is in design, its prioritization should reflect that project development activities are underway. Feedback during the January 12, 2025, public meeting for Clinton was positive although there was some hesitancy regarding the potential roundabout. Spot 9 overlaps the Item No. 1-80203 MP limits in the Highway Plan but would require a different funding source if the intent is to advance small-scale safety countermeasures ahead of the larger project.

There was discussion about whether a 40-foot-wide (Concept A) or 52-foot-wide (Concept G1) typical section between the Ohio River Bridge and Wickliffe is preferred. Planning studies along US 60 and KY 286 are examining potential 2+1 typicals for these regional routes, which could influence what fits best along US 51. While passing opportunities along this stretch would be nice, it was noted that a narrower typical would reduce costs/impacts.

Since costs for Concepts F and G are very similar, G (addressing substandard curves and grades) should advance over F (widening along existing alignment). Reconstruction as a 2+1 represents a long-term priority and should generally progress north to south, following the highest traffic and safety needs. Sections G2 and G3 should be combined to have enough length to make a 2+1 viable.

7.5. SUPPLEMENTAL BUILD OPTIONS

During February 2025, extreme rainfalls of up to 7 inches over 24 hours[19] led to flash flooding and a host of road closures throughout the region. In response, KYTC expanded the planning effort to consider improvements to three low-lying areas in Hickman County.

FIGURE 39: US 51 FLOODING, HICKMAN COUNTY

Concept X: Raise profile at Obion Creek. During wet weather events, water overtops the roadway in low-lying areas on both sides of the Obion Creek bridges in northern Hickman County. Hydraulic modeling shows raising the roadway and Bridges 053B00096N and 05300097N up to 3.5 feet provides adequate clearance for a 50-year design storm. This results in an estimated 2.1

19 https://www.weather.gov/pah/February2025ClimateSummary#:~:text=There%20was%20a%20significant%20range,departures%20realized%20across%20west%20Kentucky.

miles of roadway reconstruction—including both bridges—between Hickman County MP 13.3 and Carlisle County MP 0.3.

Concept Y: Raise profile at Cane Creek. A low-lying stretch north of Bridge 053B00101N over Cane Creek (Hickman County MP 9.9) also floods. Hydraulic modeling shows raising the roadway on either side of the bridge up to 2.5 feet provides adequate clearance for a 50-year design storm without adjusting the bridge elevation. This results in an estimated 0.4 miles of roadway reconstruction.

Concept Z: Clearing/Grading at Bayou de Chien. Bridges 05300085N and 05300086N carry Bayou de Chien under US 51 near MP 4.5. A large ditch on the west side of the highway is constrained by an embankment behind it, which protects the adjacent agricultural field from flooding. However, this backs water up onto the highway instead (**Figure 39**). Maintenance actions are recommended to address ponding: regrading the ditch to provide a flat-bottom typical, cleaning out culverts at both ends, adding flowable fill cross-drains, and dredging the channel leading from 053B00086N to the main stream.

Additional information on each location is presented in **Appendix I**.

Based on high costs associated with Concepts F and G, a third corridor widening concept was added as well.

Concept H: Super-2. A "Super-2" highway adds an intermittent passing lane to a rural, two-lane highway to provide safe passing opportunities. Between passing opportunities, two-lane US 51 is widened to provide 12-foot lanes and 8-foot paved shoulders (**Figure 34**) for 40–52 feet total pavement widths along the corridor. For the planning-level concept, half-mile passing lanes were added to rural tangent sections between bridges, alternating directions and positioned to avoid increasing speeds approaching towns. There are two proposed passing zones in Fulton County (one per direction), five in Hickman County, three in Carlisle County, and one in Ballard County, south of Phoenix Paper. Concept H can be divided into the same construction segments as Concepts F-G, shown in **Figure 37** (page 55) although no changes are proposed in H2 (purple) as truck climbing lanes serve this piece.

Costs by phase are presented in **Table 19**, presented in 2024 dollars and rounded to reflect order-of-magnitude level precision. Escalated total applies the same assumptions to extrapolate costs for timeline uncertainty as other concepts in **Table 17**.

TABLE 19: SUPPLEMENTAL COSTS BY PHASE

Concept	D	R	U	C	Total (2024$)	Escalated Total
Larger Scale						
H: Super-2 Widening	$20M	$17M	$18M	$120M	**$175M**	$244k
X: Obion Creek Profile	$2.7M	$0.5M	$0.2M	$18M	**$22M**	$31M
Y: Cane Creek Profile	$0.4M	$150k	$40k	$2.4M	**$3.0M**	$4.3M
Z: Bayou de Chien Ditching	$0.2M	-	-	$1.5M	**$1.7M**	$2.5M

8. RECOMMENDATIONS

This US 51 Corridor Study identified a range of conceptual improvements recommended for future implementation. Study area needs are driven by safety over mobility and should accommodate all user types. **Table 20** and **Figure 40** summarize prioritization results for both small-scale spots and larger scale concepts.

TABLE 20: BUILD PRIORITIES

Concept	2024 Cost	Crashes	BCA	Priority
Smaller Scale				
1: US 51/US 60	$530k	8	1.9	High
2: Through Wickliffe	$280k	20	46	High
3: Phoenix Drainage	$1.2M	12	2.0	Med
5: Bardwell Sidewalks	$9.8M	9	Qualitative	Med/Low
6: Bardwell Hill/Curve	$460k	2	3.1	High
7: US 51/KY 1301	$1.9M	2	0.2	Low
8: 1-80203 Clinton	$9.5M	20	Qualitative	In Design
9: Clinton Small-scale Safety	$800k	20	3.7	High
10: US 51/KY 924	$350k	3	1.3	Med
11: US 51/KY 94	$460k	3	3.0	Med
12: US 51/Tom Looney	$2.1M	7	1.4	High
Larger Scale				
A: 40-Foot North of Wickliffe	$8M	7	>0.1	Combined
B: North Wickliffe Bypass	$10-20M	21	0.2	Med
C: Curve at Railroad Overpass	$6M	6	0.2	Med
D: Bardwell Hill Profile	$10M	2	>0.1	Low
E: Cane Creek Curves	$6M	7	0.4	Med
F: 2+1 Widening	$250M	202	0.0–2.2	Dismiss
G: 2+1 Reconstruction	$260M	202	0.1–2.1	Long-Term
H: Super-2 Widening	$175M	202	0.1–2.3	Long-Term

Concept	2024 Cost	Crashes	BCA	Priority
X: Obion Creek Profile	$22M	4	NA	Med
Y: Cane Creek Profile	$3.0M	1	NA	Med
Z: Bayou de Chien Ditching	$1.7M	1	NA	Med

FIGURE 40: BUILD PRIORITIES

Concept F was dismissed in favor of Concept G, which addresses substandard alignment elements in addition to pavement width, resulting in similar costs and impacts as F. Concept H also addresses pavement width and incorporates safe passing opportunities, but with fewer impacts and lower costs than either Concepts F or G. Therefore, Concept H is generally preferred over Concept G but both scenarios should be considered during any future design phases. Whichever template is selected, the same approach is expected to be applied along the entire corridor to create a consistent driver expectation rather than combining some sections of Super-2 and some 2+1.

Concept H does not include improves between Wickliffe and Phoenix Paper (purple segment in **Figure 37**, page 55) as this section already provides truck climbing lanes.

8.1. PROJECT SHEETS

This section contains project sheets for each recommended concept. Additional discussion on funding streams is included in **Section 9.1**.

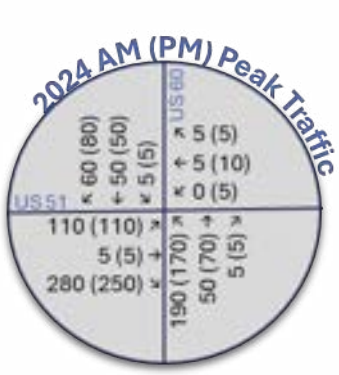
1. US 51/US 60 Truck Bypass Lane

US 51 Ballard Co, MP 3.6-3.7		High Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Add eastbound bypass lane to channel large trucks around restrictive intersection geometry.	Design	$40,000
	Right-of-Way	$200,000
	Utilities	$20,000
	Construction	$270,000
	Total Cost	**$530,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	6,600 vpd (44% trucks) on US 51 north and 3,800 vpd (23% trucks) on US 60 north; turn movement diagram below. All-way Stop operates at LOS C in both peak hours.
2045 No-Build Traffic:	9,200 vpd on US 51 north and 5,300 vpd on US 60 north; turn movement diagram below. All-way Stop operates at LOS F in both peak hours.
Safety:	Overhead flashers at intersection. Semi's cross into oncoming lane to maneuver tight turns. 8 crashes (all PDO) during 2019-2023; 50% rear ends and 50% involving trucks.

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Notes: Eastbound US 51 climbs 12-14% grade approaching US 60.
BCA of 1.9 based on crash savings and reduced travel time
Consider traditional Highway Plan funding

2. Wickliffe Striping Improvements		
US 51 Ballard Co, MP 3.3-3.6		High Priority
IMPROVEMENT DESCRIPTION: Add edgeline striping and stop bars through town. Improve lighting at US 60 and KY 121 intersections. Upgrade existing crosswalks for visibility including ADA improvements at corners.	**Phase Estimate**	**(2024 $'s)**
	Design	$50,000
	Right-of-Way	-
	Utilities	-
	Construction	$230,000
	Total Cost	**$280,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	2,500 vpd (25% trucks) through town
2045 No-Build Traffic:	3,500 vpd through town
Safety:	20 crashes (1 fatal, 1 injury) during 2019-2023; 35% involving trucks. US 51/KY 121 intersection at LOSS 4 considering KAB crash severities.

STUDY GOALS: ☐ Mobility ☒ Safety ☒ Multimodal

18-foot travel lanes through Wickliffe without edgeline striping to define travel way.
High-visibility crosswalks reduce risk of pedestrian strikes.

Notes: BCA of 46 based on crash savings
Consider HSIP, FE01, or FD05 funding

3. Drainage Improvements near Phoenix Paper		
US 51 Ballard Co, MP 1.4-2.4		Medium Priority
IMPROVEMENT DESCRIPTION: Regrade shoulders, clean ditches/culverts, restripe with 6-inch thermoplastic, install high friction pavement in curves, and add oversize chevrons.	**Phase Estimate**	**(2024 $'s)**
	Design	$200,000
	Right-of-Way	-
	Utilities	-
	Construction	$1.0 million
	Total Cost	**$1.2 million**

IDENTIFIED NEEDS:

2024 Existing Traffic:	1,700-2,500 vpd (25% trucks)
2045 No-Build Traffic:	2,400-3,500 vpd
Safety:	Grades up to 7.6% and three sharper-than-recommended horizontal curves. 12 crashes (3 injury) during 2019-2023; 64% wet weather crashes.

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal

Notes: BCA of 2.0 based on crash savings
Overlaps with Item No. 1-80308 (MP 0.0-3.219, correct geometry, passing, travel speeds, connectivity).
FY2024-2030 Plan shows NH funds for 1-80308 but US 51 not eligible as it is not on NHS.
Consider FD05, FE01, or HSIP funding for future phases

5. Bardwell Sidewalk Improvements

US 51 Carlisle Co, MP 7.2-7.9 — Med/Low Priority

IMPROVEMENT DESCRIPTION:

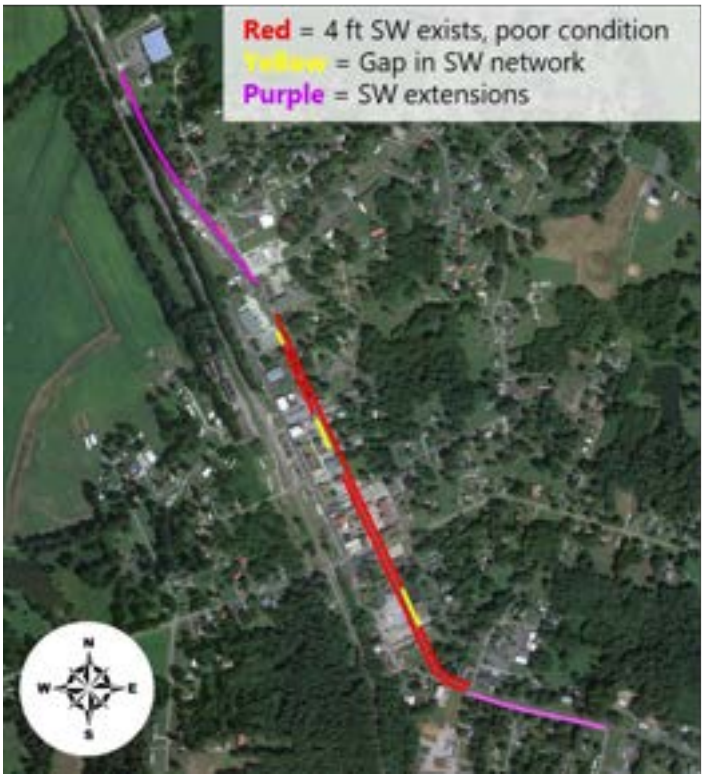
Reconstruct/extend sidewalks through Bardwell, with curb/gutter, lighting, and ADA ramps/pads. Include ladder-style crosswalks at stop-controlled approaches.

Phase Estimate	(2024 $'s)
Design	$1.2 million
Right-of-Way	$400,000
Utilities	$500,000
Construction	$7.7 million
Total Cost	**$9.8 million**

IDENTIFIED NEEDS:

2024 Existing Traffic:	2,200-3,600 vpd (20% trucks) through town
2045 No-Build Traffic:	3,100-5,000 vpd
Safety:	9 vehicular crashes (3 injury) during 2019-2023 with no pedestrian strikes

STUDY GOALS: ☐ Mobility ☐ Safety ☒ Multimodal



Poor condition existing sidewalks

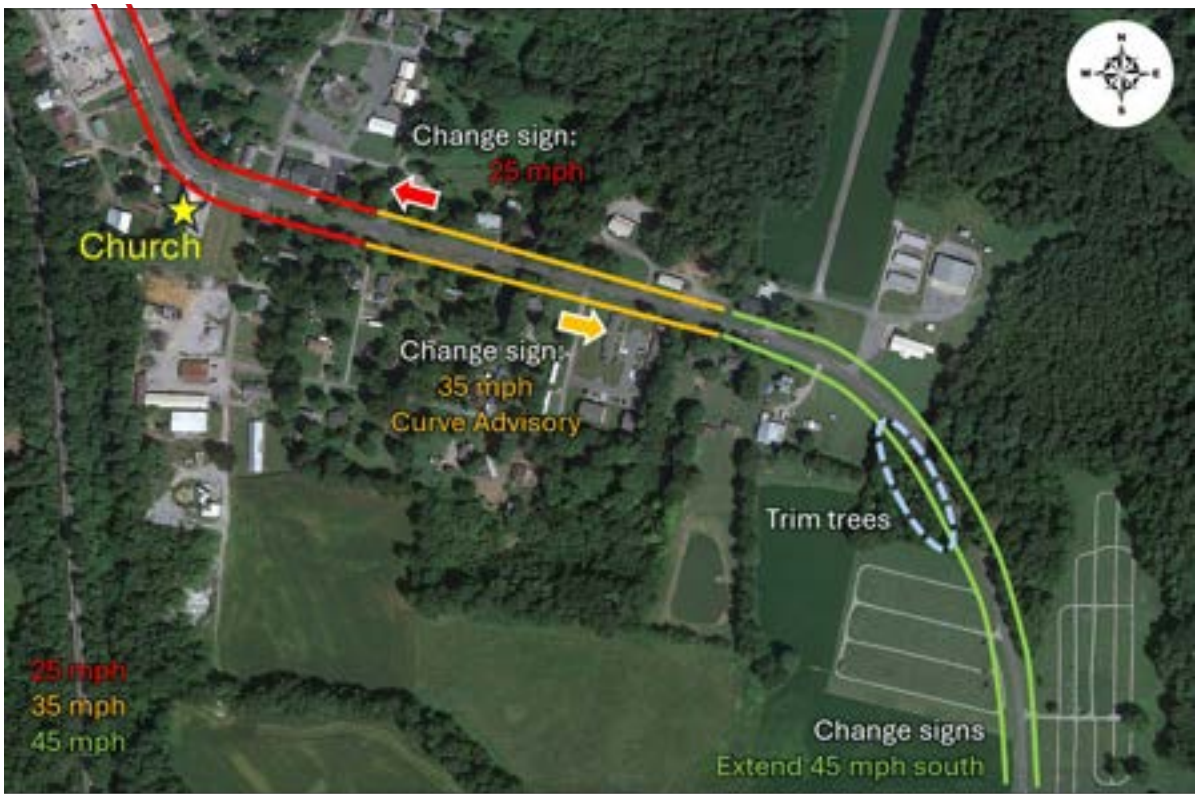
Notes: Overlaps with Item No. 1-80323 (MP 6.134-8.268, correct substandard roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80323 but US 51 not eligible as it is not on NHS.
Consider TAP (if divided into sections), federal grant (ATIIP), or traditional Highway Plan funding

6. Bardwell Hill (Low-Cost Option)		
US 51 Carlisle Co, MP 6.7-7.4		High Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Drop speed limit, adjust signage, add streetlights to existing poles, and trim vegetation inside curve	Design	$60,000
	Right-of-Way	-
	Utilities	-
	Construction	$400,000
	Total Cost	**$460,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	2,200 vpd (20% trucks)
2045 No-Build Traffic:	3,100 vpd
Safety:	Alignment includes grades up to 10% and 300-foot radius curve 2 crashes (1 injury) during 2019-2023

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal



Notes: BCA of 3.1 based on crash savings
Overlaps with Item No. 1-80323 (MP 6.134-8.268, correct substandard roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80238 but US 51 not eligible as it is not on NHS.
Consider HSIP, FE01, or FD05 funding for future phases

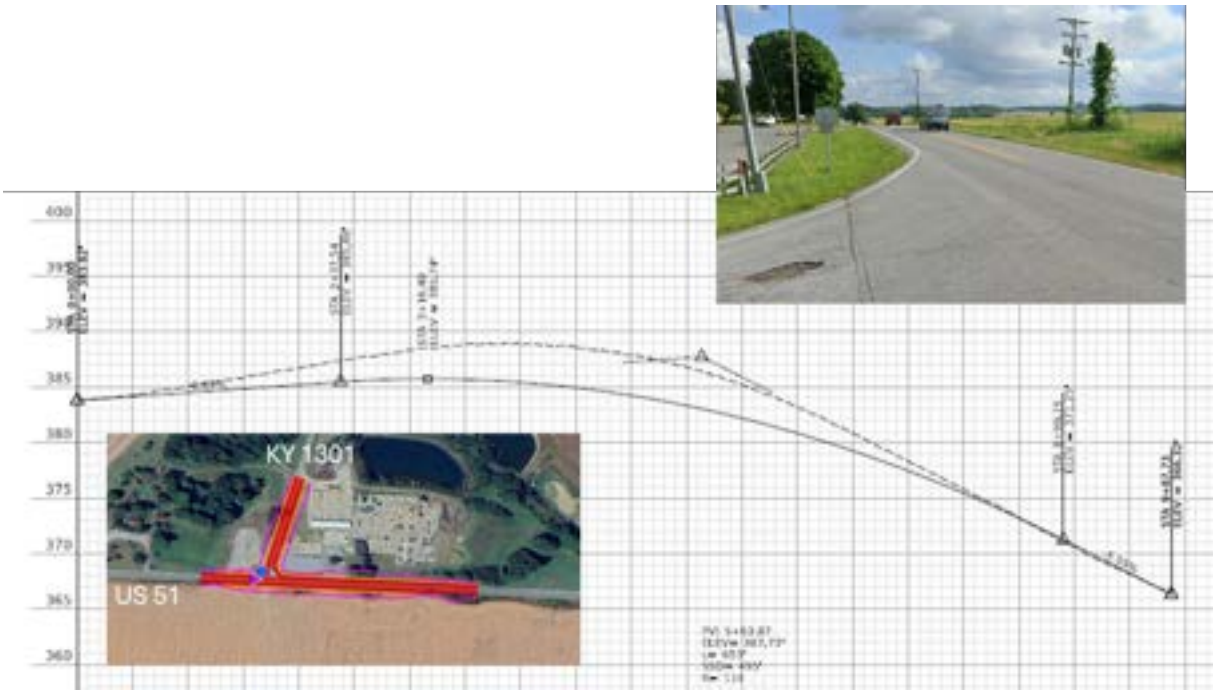
7. US 51/KY 1301 Intersection

US 51 Hickman Co, MP 11.1-11.3		Low Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Adjust profile to improve sight distance at US 51/KY 1301 Intersection	Design	$200,000
	Right-of-Way	$100,000
	Utilities	$150,000
	Construction	$1.4 million
	Total Cost	**$1.9 million**

IDENTIFIED NEEDS:

2024 Existing Traffic:	1,700 vpd (25% trucks) on US 51
2045 No-Build Traffic:	2,400 vpd
Safety:	6% grade limits visibility; 2 crashes (1 injury) during 2019-2023

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal

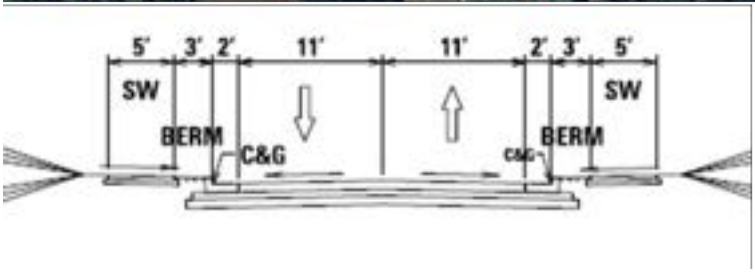


Notes: BCA of 0.2 based on crash savings but redevelopment of nearby site likely to increase truck traffic
Item No. 1-80330 (improve intersection geometrics and address sight distance). FY2024-2030 Plan shows NH funds for 1-80330 but US 51 not eligible as it is not on NHS
Consider traditional Highway Plan funding for future phases

8. Item No. 1-80203 through Clinton		
US 51 Hickman Co, MP 7.1-8.3		*Currently in Design
IMPROVEMENT DESCRIPTION:	Phase Estimate	(2024 $'s)
ONGOING DESIGN PROJECT	Design	$500,000
Address pavement condition and pedestrian access	Right-of-Way	$1.5 million
	Utilities	$2.5 million
	Construction	$5.0 million
	Total Cost	$9.5 million

IDENTIFIED NEEDS:	
2024 Existing Traffic:	4,200-4,700 vpd through town
2045 No-Build Traffic:	5,800-6,500 vpd
Safety:	20 crashes (1 injury) during 2019-2023; 45% angle crashes

STUDY GOALS: ☐ Mobility ☒ Safety ☒ Multimodal



Notes: Item No. 1-80203 (MP 7.264-8.275, correct geometric deficiencies). FY2024-2030 Plan shows STP and SPP funds for 1-80203
Consider federal grant (ATIIP) or traditional Highway Plan funding for future phases

9. Clinton Small-scale Safety Improvements

US 51 Hickman Co, MP 7.0-8.3		High Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Small-scale spot improvements, including striping, signal backplates, and signage. Add midblock crossing to courthouse.	Design	$100,000
	Right-of-Way	-
	Utilities	-
	Construction	$700,000
	Total Cost	**$800,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	4,200-4,700 vpd through town
2045 No-Build Traffic:	5,800-6,500 vpd
Safety:	20 crashes (1 injury) during 2019-2023; 45% angle crashes

STUDY GOALS: ☐ Mobility ☒ Safety ☒ Multimodal

Full Length: 6-inch thermo edgeline striping

North St: Add stop signs & stop bars for cross-street

KY 123 (Clay St): Add lighting, remove signal, install ped ramps

Courthouse: Add midblock crosswalk with flashing beacons

Jackson St: Install ped ramps/flashers

KY 58 (Mayfield Dr): Add lighting, stop bar, flashing beacons
Shift signs in SW quadrant for visibility

Notes: BCA of 3.7 based on crash savings
Overlaps Item No. 1-80203 (correct geometric deficiencies) but intended as separate, low-cost project
Consider HSIP, FE01, FE04, or FD05 funding for future phases

10. US 51/KY 924 Safety Improvements		
US 51 Fulton Co, MP 4.4-4.6		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Improve signage/striping at US 51/KY 924 intersection	Design	$50,000
	Right-of-Way	-
	Utilities	-
	Construction	$300,000
	Total Cost	**$350,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	2,700 vpd (23% trucks)
2045 No-Build Traffic:	3,800 vpd
Safety:	3 crashes (1 injury) during 2019-2023; all in wet weather

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal

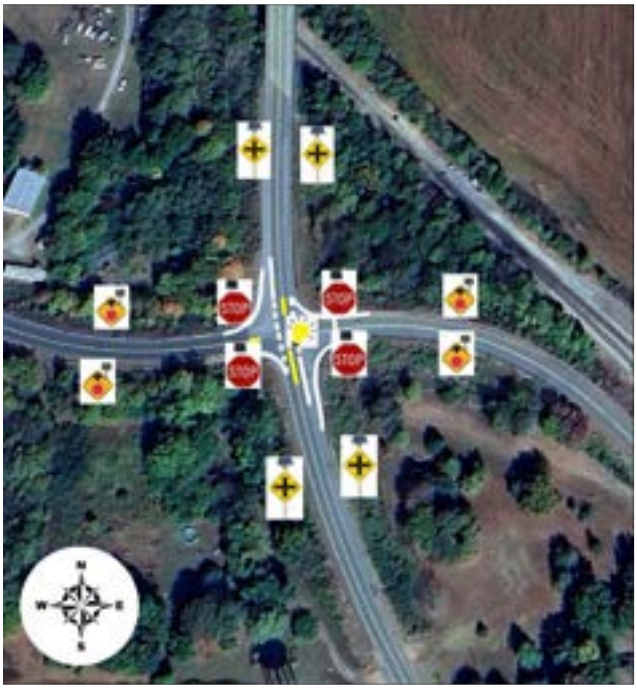
Notes: BCA of 1.3 based on crash savings
Consider HSIP, FE04, or FD05 funding

11. US 51/KY 94 Safety Improvements		
US 51 Fulton Co, MP 2.4-2.6		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Improve signage/striping at US 51/KY 94 intersection	Design	$60,000
	Right-of-Way	-
	Utilities	-
	Construction	$400,000
	Total Cost	**$460,000**

IDENTIFIED NEEDS:

2024 Existing Traffic:	2,700 vpd (23% trucks)
2045 No-Build Traffic:	3,800 vpd
Safety:	3 crashes (2 injury) during 2019-2023; all angle collisions

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal



Notes: BCA of 3.0 based on crash savings
Consider HSIP, FE04, or FD05 funding

12. US 51/CR-1229 (Tom Looney Rd) S-curves		
US 51 Carlisle Co, MP 5.5-5.7		High Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Realign S-curves and widen pavement (11-foot-wide lanes + 4-foot-wide shoulders), consolidating Y-shaped approach to T-intersection	Design	$260,000
	Right-of-Way	$150,000
	Utilities	-
	Construction	$1.7 million
	Total Cost	**$2.1 million**

IDENTIFIED NEEDS:

2024 Existing Traffic:	1,900 vpd (31% trucks)
2045 No-Build Traffic:	2,600 vpd
Safety:	7 crashes (3 injury) during 2019-2023; 57% single vehicle crashes

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal

Notes: BCA of 1.4 based on crash savings
Overlaps Item No. 1-80309 (MP 0.0-6.134, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80309 but US 51 not eligible as it is not on NHS
Consider HSIP or traditional Highway Plan funding for future phases

B. North Wickliffe Bypass		
Ballard County: US 51 MP 3.644-4.2 and US 60 MP 0.0-0.6		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
New two-lane highway connection between US 60 and US 51 north of Wickliffe	Design	$1.2-2.6 million
	Right-of-Way	$500,000
**Cost varies by alignment*	Utilities	$0.5-1.5 million
	Construction	$8-17 million
	Total Cost*	**$10-20 million**
IDENTIFIED NEEDS:	Escalated Cost	$15-30 million
2024 Existing Traffic:	6,600 vpd (44% trucks) on US 51 and 3,800 vpd (23% trucks) on US 60; turn movement diagram below. All-way Stop operates at LOS C in both peak hours.	
2045 No-Build Traffic:	9,200 vpd on US 51 and 5,300 vpd on US 60; turn movement diagram below. All-way Stop operates at LOS F in both peak hours.	
Safety:	21 crashes (2 injury) on bypassed sections of US 51/US 60 during 2019-2023	
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal	

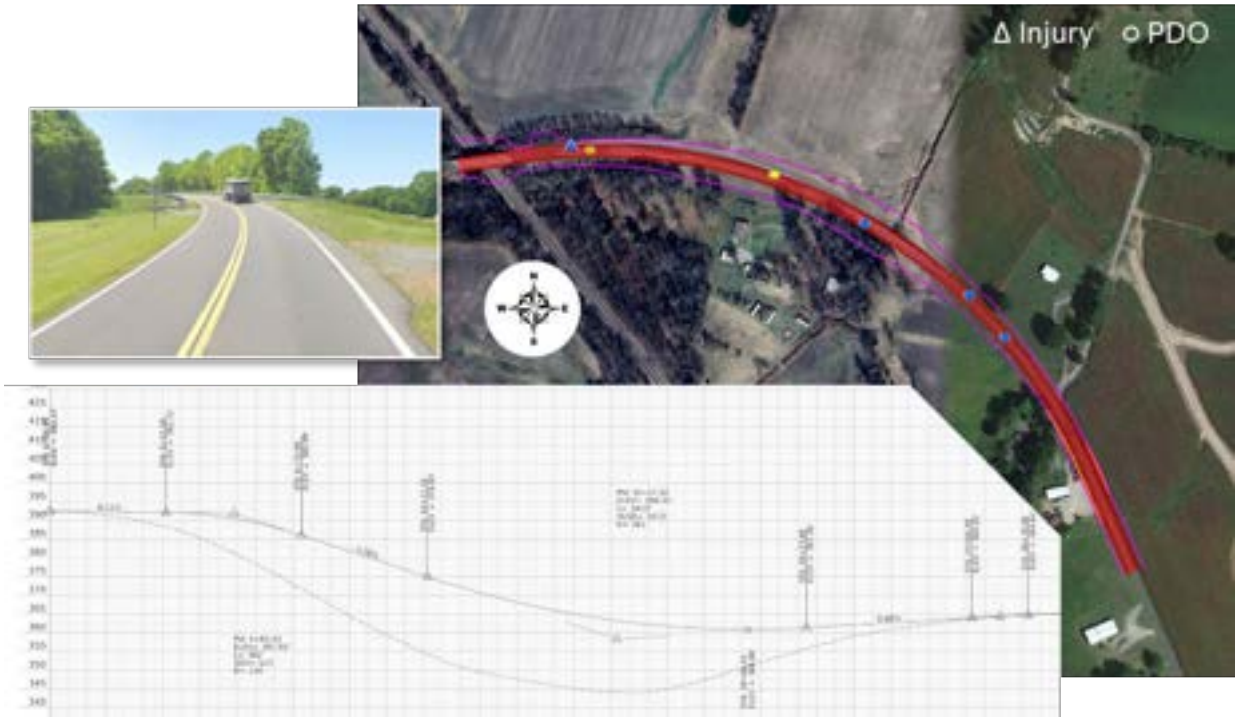
Impacts:	Floodplains, Streams, Tree clearing, potential for archaeology, 0-1 residential relocations
Notes:	BCA of 0.2 based on crash savings and reduced travel time Consider federal grant (RAISE) or traditional Highway Plan funding

C. Curve at Railroad Overpass

Carlisle County: US 51 MP 9.8-10.3		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Realign curves and smooth profile, widening pavement to increase recovery area (12-foot-wide lanes + 8-foot-wide shoulders)	Design	$700,000
	Right-of-Way	$250,000
	Utilities	$100,000
	Construction	$5 million
	Total Cost	**$6 million**
IDENTIFIED NEEDS:	Escalated Cost	$8 million

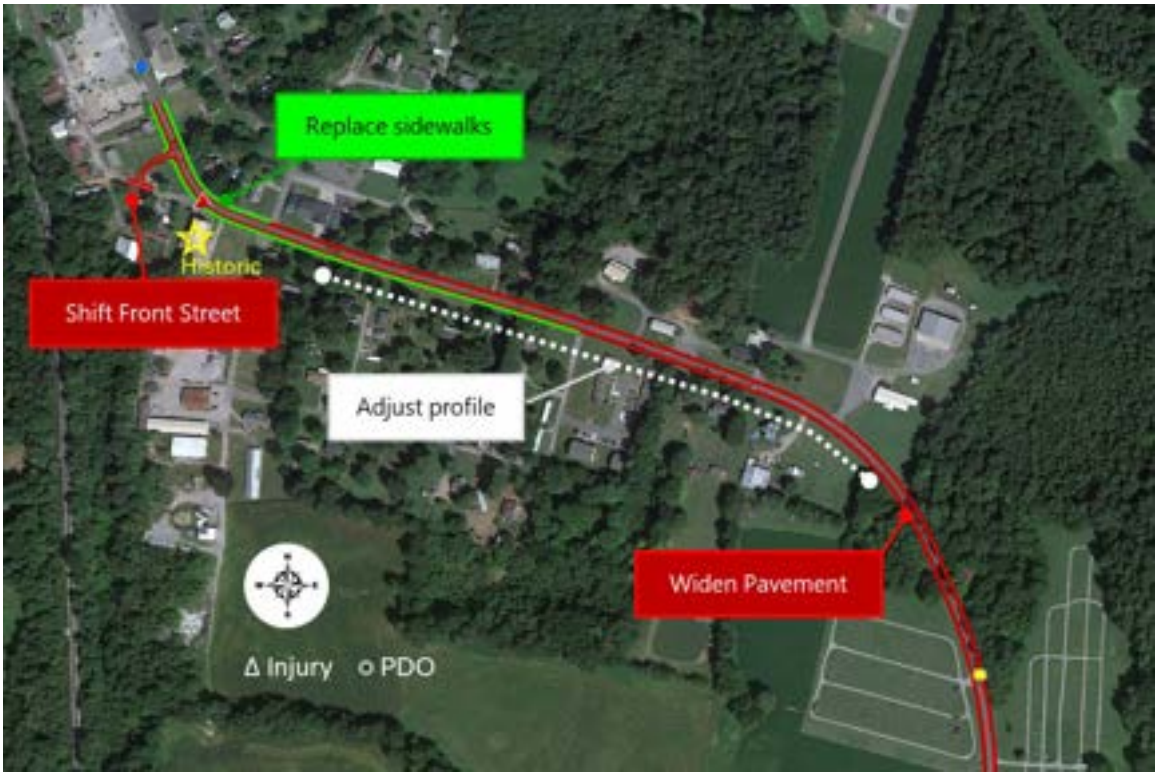
2024 Existing Traffic:	2,200 vpd (24%)
2045 No-Build Traffic:	3,100 vpd
Safety:	6 crashes (1 injury) during 2019-2023, including 6 roadway departures and 50% in wet conditions. Sag curve in profile contributes to drainage concerns.

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing
Notes:	BCA of 0.2 based on crash savings Consider HSIP or traditional Highway Plan funding

D. Bardwell Hill Profile		
Carlisle County: US 51 MP 6.6-7.4		Low Priority
IMPROVEMENT DESCRIPTION: Realign substandard grade, widening pavement to increase recovery area (12-foot-wide lanes + 4-foot-wide shoulders). Realign Front Street intersection and replace sidewalks.	**Phase Estimate**	**(2024 $'s)**
	Design	$900,000
	Right-of-Way	$400,000
	Utilities	$2.5 million
	Construction	$5.8 million
	Total Cost	**$10 million**
IDENTIFIED NEEDS:	Escalated Cost	$13 million
2024 Existing Traffic:	2,200 vpd (20% trucks)	
2045 No-Build Traffic:	3,100 vpd	
Safety:	Alignment includes grades up to 10% and 300-foot radius curve 2 crashes (1 injury) during 2019-2023	
STUDY GOALS:	☐ Mobility ☒ Safety ☒ Multimodal	



Impacts:	Adjacent homes with steep frontage; 1 potential relocation; Cemeteries; Ag District
Notes:	BCA of <0.1 based on crash savings Overlaps Item No. 1-80323 (MP 6.134-8.268, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80323 but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

E. Cane Creek Curves

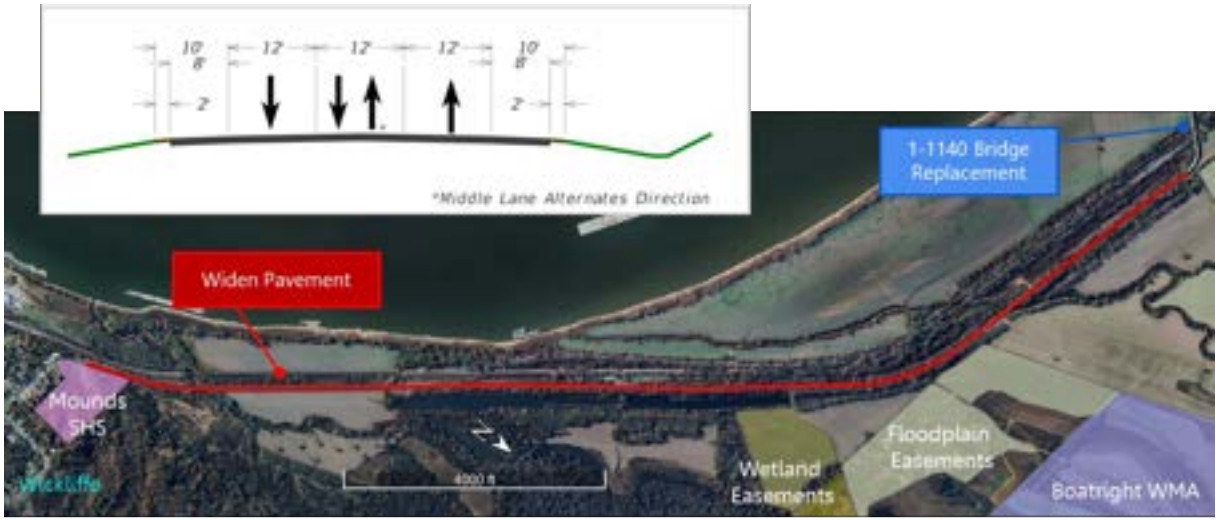
Hickman County: US 51 MP 1.9-3.1		Medium Priority
IMPROVEMENT DESCRIPTION: Realign disjointed curves into single smooth curve, widening pavement to increase recovery area (12-foot-wide lanes + 4-foot-wide shoulders).	**Phase Estimate**	**(2024 $'s)**
	Design	$700,000
	Right-of-Way	$600,000
	Utilities	$300,000
	Construction	$4.8 million
	Total Cost	**$6.4 million**
IDENTIFIED NEEDS:	Escalated Cost	$9 million

2024 Existing Traffic:	2,200 vpd (20% trucks)
2045 No-Build Traffic:	3,100 vpd
Safety:	7 crashes (1 injury) during 2019-2023; 71% roadway departures

STUDY GOALS: ☐ Mobility ☒ Safety ☐ Multimodal

Impacts:	OSRW immediately to south; Tree clearing
Notes:	BCA of 0.4 based on crash savings Overlaps Item No. 1-80327 (MP 0.0-2.399, improve safety, access, connectivity, roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80323 but US 51 not eligible as it is not on NHS Consider HSIP or traditional Highway Plan funding

G1. Widening North of Wickliffe		
Ballard County: US 51 MP 3.9-7.3		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway to provide wider typical section. Costs based on symmetric 2+1 typical but recommendation contingent on other nearby planning studies.	**Phase Estimate**	**(2024 $'s)**
	Design	$1.8 million
	Right-of-Way	$1.8 million
	Utilities	$2.0 million
	Construction	$12 million
Consider alongside H1	**Total Cost**	**$18 million**
IDENTIFIED NEEDS:	Escalated Cost	$25 million
2024 Existing Traffic:	6,600 vpd (44% trucks)	
2045 No-Build Traffic:	9,200 vpd	
Safety:	17 crashes (2 injuries) during 2019-2023	
STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal		



Impacts:	Tree clearing; Floodplains; Conservation easements; Potential for archaeology
Notes:	BCA of 0.2 based on crash savings and reduced travel time Consider federal grant (PROTECT) or traditional Highway Plan funding

H1. Widening North of Wickliffe

Ballard County: US 51 MP 4.9-7.3		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway to provide wider typical section. Costs based on two-lane typical shown but recommendation contingent on other nearby planning studies.	Design	$0.8 million
	Right-of-Way	$1.6 million
	Utilities	$1.8 million
	Construction	$5.1 million
Consider alongside G1	**Total Cost**	**$9.3 million**
IDENTIFIED NEEDS:	**Escalated Cost**	$13 million

2024 Existing Traffic:	6,600 vpd (44% trucks)
2045 No-Build Traffic:	9,200 vpd
Safety:	11 crashes (2 injuries) during 2019-2023

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal

Impacts:	Tree clearing; Floodplains; Conservation easements; Potential for archaeology
Notes:	BCA of <0.1 based on crash savings Consider federal grant (PROTECT) or traditional Highway Plan funding

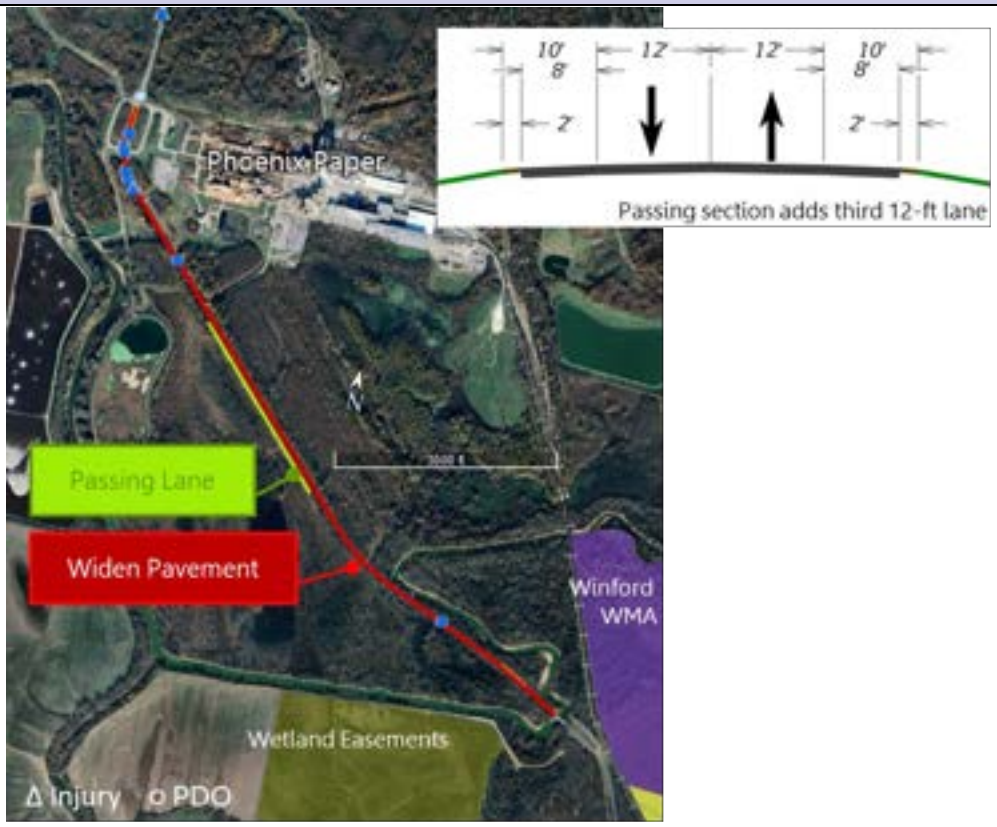
G2 & G3. 2+1 Reconstruction, south of Wickliffe		
Ballard County: US 51 MP 0.0-3.2		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	**Phase Estimate**	**(2024 $'s)**
	Design	$4.0 million
	Right-of-Way	$1.6 million
	Utilities	$1.9 million
	Construction	$26 million
Consider alongside H3	**Total Cost**	**$34 million**
IDENTIFIED NEEDS:	Escalated Cost	$48 million

2024 Existing Traffic:	1,700-2,500 vpd (25% trucks)
2045 No-Build Traffic:	2,400-3,500 vpd
Safety:	14 crashes (3 injury) during 2019-2023; 86% single vehicle crashes 7 steeper-than-recommended grade segments totaling 1.0 mile

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal

Impacts:	Tree clearing; WHPA; Abuts Fort Jefferson Hill Park; Proposed WKRRA port
Notes:	BCA of 0.1 based on crash savings and reduced travel time Includes truck climbing lanes, requiring minimal widening if following existing alignment Overlaps Item No. 1-80320 (MP 1.0-2.6, support growth/development and safe access). FY2024-2030 Plan shows SPP funds Consider traditional Highway Plan funding or linkage with future economic development efforts

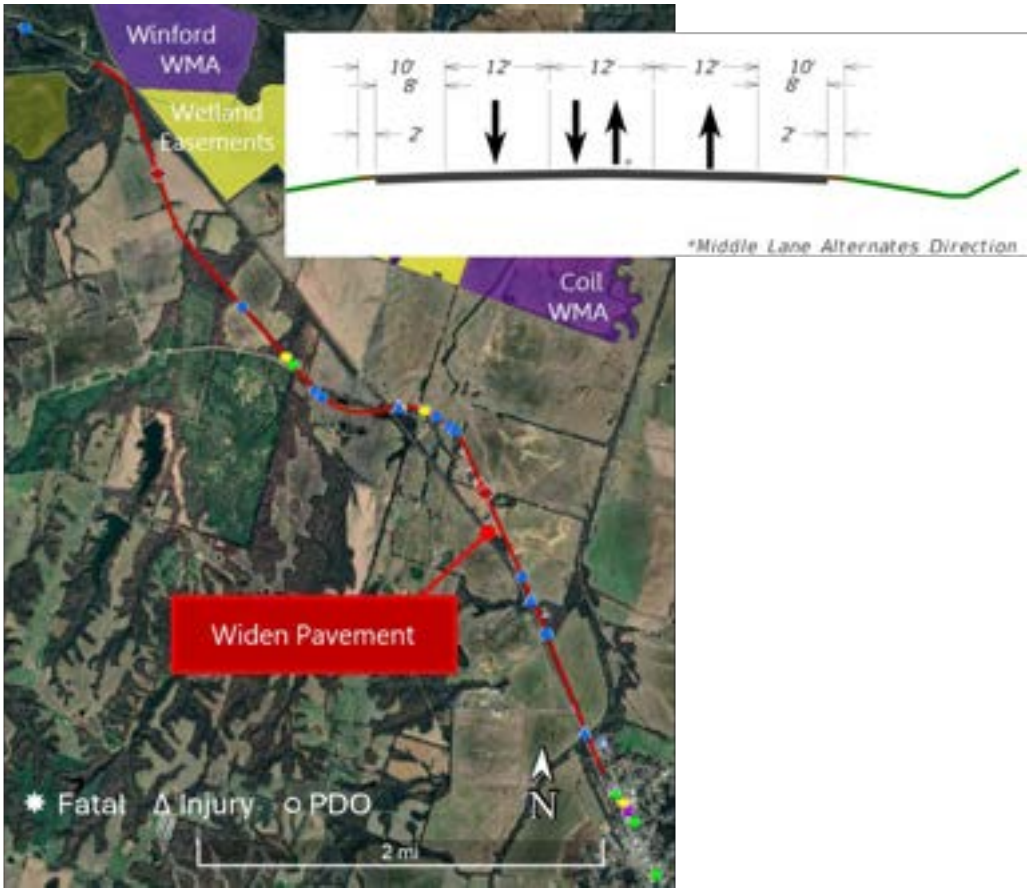
H3. Super-2, south of Wickliffe		
Ballard County: US 51 MP 0.0-2.5		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with half-mile southbound passing lane in tangent south of Phoenix Paper.	Design	$0.8 million
	Right-of-Way	$1.2 million
	Utilities	$1.4 million
	Construction	$5.0 million
Consider alongside G2/G3	**Total Cost**	**$8.4 million**
IDENTIFIED NEEDS:	Escalated Cost	$12 million
2024 Existing Traffic:	1,700-2,500 vpd (25% trucks)	
2045 No-Build Traffic:	2,400-3,500 vpd	
Safety:	9 crashes (1 injury) during 2019-2023; all single vehicle crashes 4 steeper-than-recommended grade segments totaling 0.6 mile	
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal	



Impacts:	Tree clearing; WHPA; Proposed WKRRA port
Notes:	BCA of 0.1 based on crash savings Overlaps Item No. 1-80320 (MP 1.0-2.6, support growth/development and safe access). FY2024-2030 Plan shows SPP funds Consider traditional Highway Plan funding or linkage with future economic development efforts

G4. 2+1 Reconstruction, north of Bardwell		
Carlisle County: US 51 MP 8.1-12.6		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	**Phase Estimate**	**(2024 $'s)**
	Design	$3.8 million
	Right-of-Way	$2.4 million
	Utilities	$2.5 million
	Construction	$25 million
Consider alongside H4	**Total Cost**	**$34 million**
IDENTIFIED NEEDS:	Escalated Cost	$48 million

2024 Existing Traffic:	2,400 vpd (25% trucks)
2045 No-Build Traffic:	3,300 vpd
Safety:	18 crashes (2 fatal, 4 injury) during 2019-2023; 89% roadway departures 10 steeper-than-recommended grade segments totaling 1.4 miles
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal



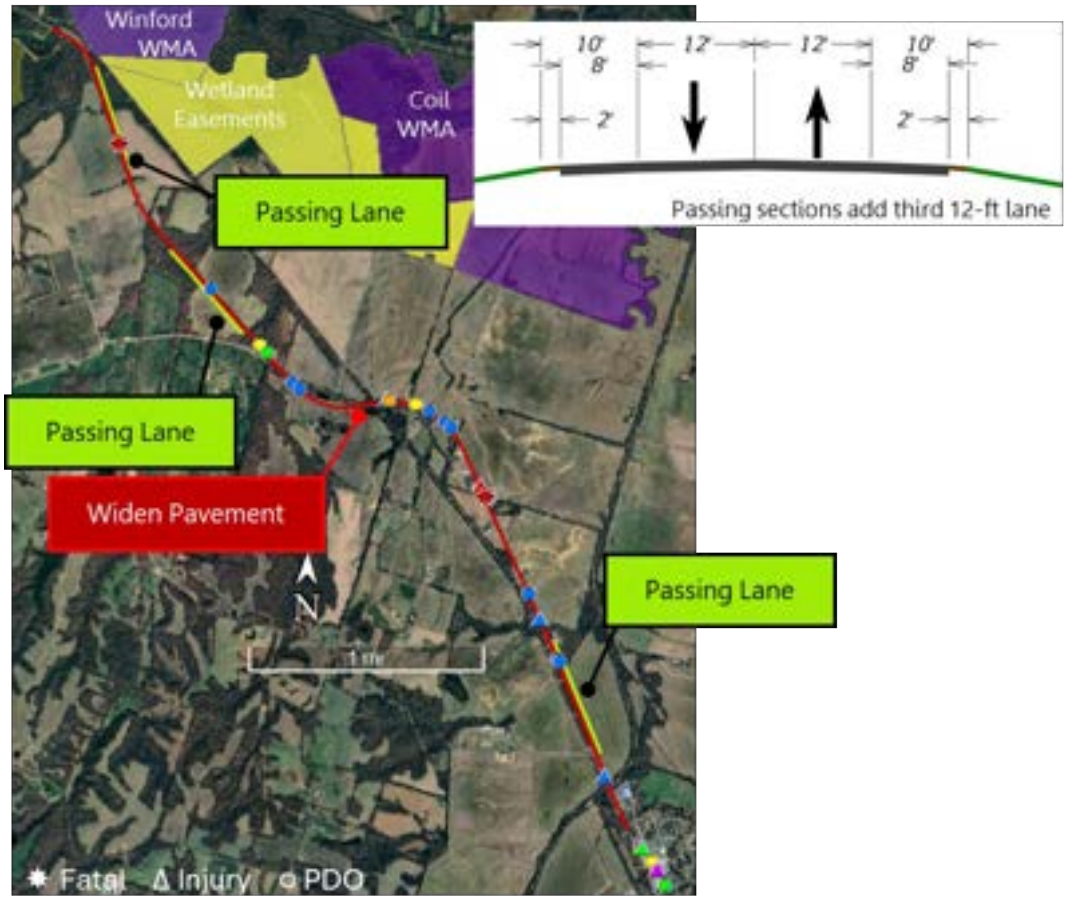
Impacts:	Tree clearing; Floodplains; ±2 residential relocations; Agricultural District
Notes:	BCA of 2.1 based on crash savings and reduced travel time Consider federal grant (PROTECT) or traditional Highway Plan funding

H4. Super-2, north of Bardwell

Carlisle County: US 51 MP 8.1-12.6		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with half-mile passing lanes in tangents—two northbound and one southbound to balance adjacent sections.	Design	$2.1 million
	Right-of-Way	$2.2 million
	Utilities	$2.3 million
	Construction	$14 million
Consider alongside G4	**Total Cost**	**$21 million**
IDENTIFIED NEEDS:	Escalated Cost	$29 million

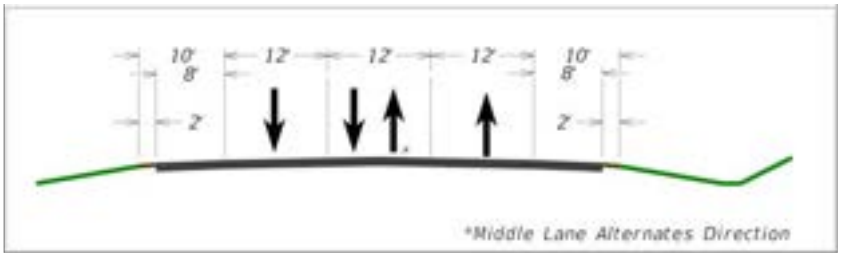
2024 Existing Traffic:	2,400 vpd (25% trucks)
2045 No-Build Traffic:	3,300 vpd
Safety:	18 crashes (2 fatal, 4 injury) during 2019-2023; 89% roadway departures 10 steeper-than-recommended grade segments totaling 1.4 miles

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing; Floodplains; ±2 residential relocations; Agricultural District
Notes:	BCA of 2.3 based on crash savings Consider federal grant (PROTECT) or traditional Highway Plan funding

G5. 2+1 Reconstruction, Arlington to Bardwell		
Carlisle County: US 51 MP 1.6-7.0		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	Design	$3.0 million
	Right-of-Way	$2.8 million
	Utilities	$2.5 million
	Construction	$20 million
Consider alongside H5	**Total Cost**	**$28 million**
IDENTIFIED NEEDS:	Escalated Cost	$40 million
2024 Existing Traffic:	1,900-2,200 vpd (20% trucks)	
2045 No-Build Traffic:	2,600-3,100 vpd	
Safety:	21 crashes (10 injury) during 2019-2023; 57% roadway departures	
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal	



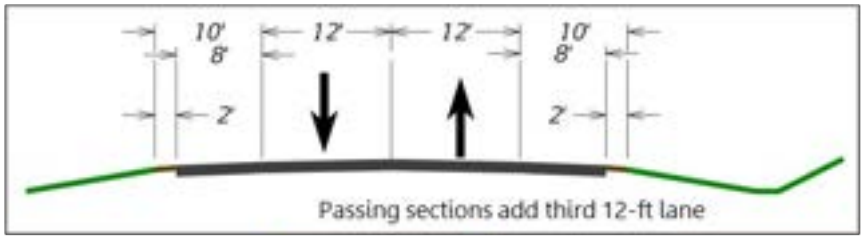
Impacts:	Tree clearing; Abuts cemeteries; ±3 residential relocations; Stream crossings; Floodplains; Agricultural District
Notes:	BCA of 0.4 based on crash savings and reduced travel time Overlaps Item No. 1-80309 (MP 0.0-6.134, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80309 but US 51 not eligible as it is not on NHS Consider federal grant (PROTECT) or traditional Highway Plan funding

H5. Super-2, Arlington to Bardwell

Carlisle County: US 51 MP 1.6-7.0		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with half-mile passing lanes in tangents—two per direction.	Design	$3.2 million
	Right-of-Way	$2.5 million
	Utilities	$2.3 million
	Construction	$21 million
Consider alongside G5	**Total Cost**	**$29 million**
IDENTIFIED NEEDS:	Escalated Cost	$40 million

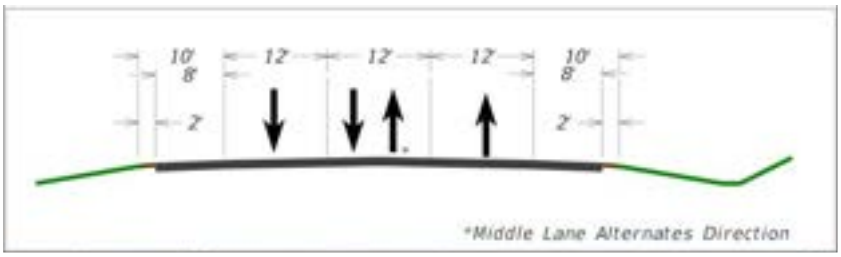
2024 Existing Traffic:	1,900-2,200 vpd (20% trucks)
2045 No-Build Traffic:	2,600-3,100 vpd
Safety:	21 crashes (10 injury) during 2019-2023; 57% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing; Abuts cemeteries; ±3 residential relocations; Stream crossings; Floodplains; Agricultural District
Notes:	BCA of 0.2 based on crash savings Overlaps Item No. 1-80309 (MP 0.0-6.134, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80309 but US 51 not eligible as it is not on NHS Consider federal grant (PROTECT) or traditional Highway Plan funding

G6. 2+1 Reconstruction, south of Arlington		
Carlisle County: US 51 MP 0.0-1.1		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	Design	$0.6 million
	Right-of-Way	$0.6 million
	Utilities	$0.8 million
	Construction	$3.8 million
Consider alongside H6	**Total Cost**	**$6 million**
IDENTIFIED NEEDS:	Escalated Cost	$8 million
2024 Existing Traffic:	1,600 vpd (31% trucks)	
2045 No-Build Traffic:	2,200 vpd	
Safety:	2 crashes (both PDO) during 2019-2023; both roadway departures	
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal	



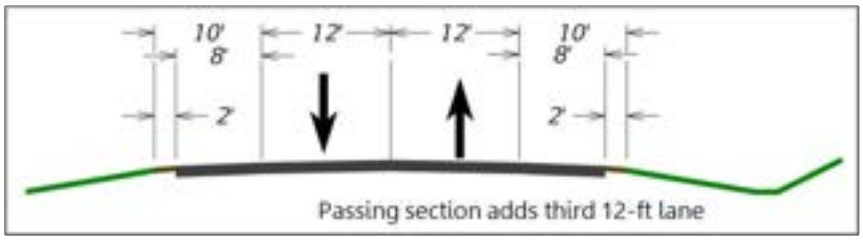
Impacts:	Tree clearing; Streams; Floodplains
Notes:	BCA of 0.1 based on crash savings and reduced travel time Overlaps Item No. 1-80309 (MP 0.0-6.134, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80309 but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

H6. Super-2, south of Arlington

Carlisle County: US 51 MP 0.0-1.1		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with half-mile southbound passing lane in tangent.	Design	$0.5 million
	Right-of-Way	$0.5 million
	Utilities	$0.7 million
	Construction	$3.4 million
Consider alongside G6	**Total Cost**	**$5.2 million**
IDENTIFIED NEEDS:	Escalated Cost	$7 million

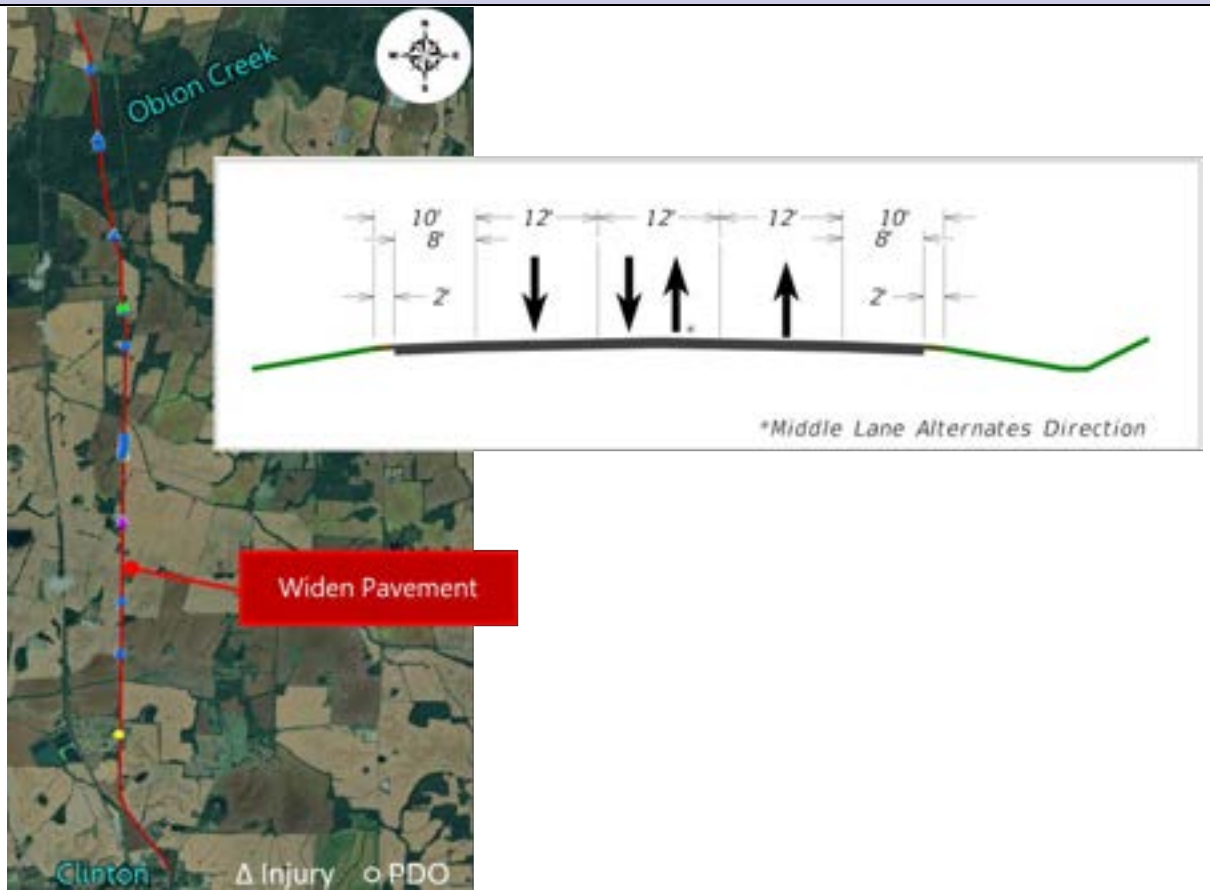
2024 Existing Traffic:	1,600 vpd (31% trucks)
2045 No-Build Traffic:	2,200 vpd
Safety:	2 crashes (both PDO) during 2019-2023; both roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing; Streams; Floodplains
Notes:	BCA <0.1 based on crash savings Overlaps Item No. 1-80309 (MP 0.0-6.134, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80309 but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

G7. 2+1 Reconstruction, north of Clinton		
Hickman County: US 51 MP 8.3-15.0		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	**Phase Estimate**	**(2024 $'s)**
	Design	$7.4 million
	Right-of-Way	$3.5 million
	Utilities	$4.0 million
	Construction	$59 million
Consider alongside H7	**Total Cost**	**$64 million**
IDENTIFIED NEEDS:	Escalated Cost	$90 million
2024 Existing Traffic:	1,600-1,700 vpd (31% trucks)	
2045 No-Build Traffic:	2,200-2,400 vpd	
Safety:	17 crashes (3 injury) during 2019-2023; 47% roadway departures	
STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal		



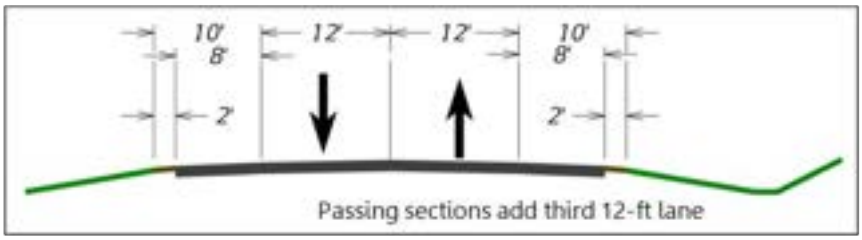
Impacts:	Tree clearing; Stream crossings; Floodplains; Wetlands; OSRW
Notes:	BCA of 0.1 based on crash savings and reduced travel time Overlaps Item No. 1-80325 (MP 8.275-13.680, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80325 but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

H7. Super-2, north of Clinton

Hickman County: US 51 MP 8.3-15.0		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with three passing lanes in tangents—two northbound and one southbound to balance adjacent sections.	Design	$5.7 million
	Right-of-Way	$3.2 million
	Utilities	$3.6 million
	Construction	$38 million
Consider alongside G7	**Total Cost**	**$51 million**
IDENTIFIED NEEDS:	Escalated Cost	$71 million

2024 Existing Traffic:	1,600-1,700 vpd (31% trucks)
2045 No-Build Traffic:	2,200-2,400 vpd
Safety:	17 crashes (3 injury) during 2019-2023; 47% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal

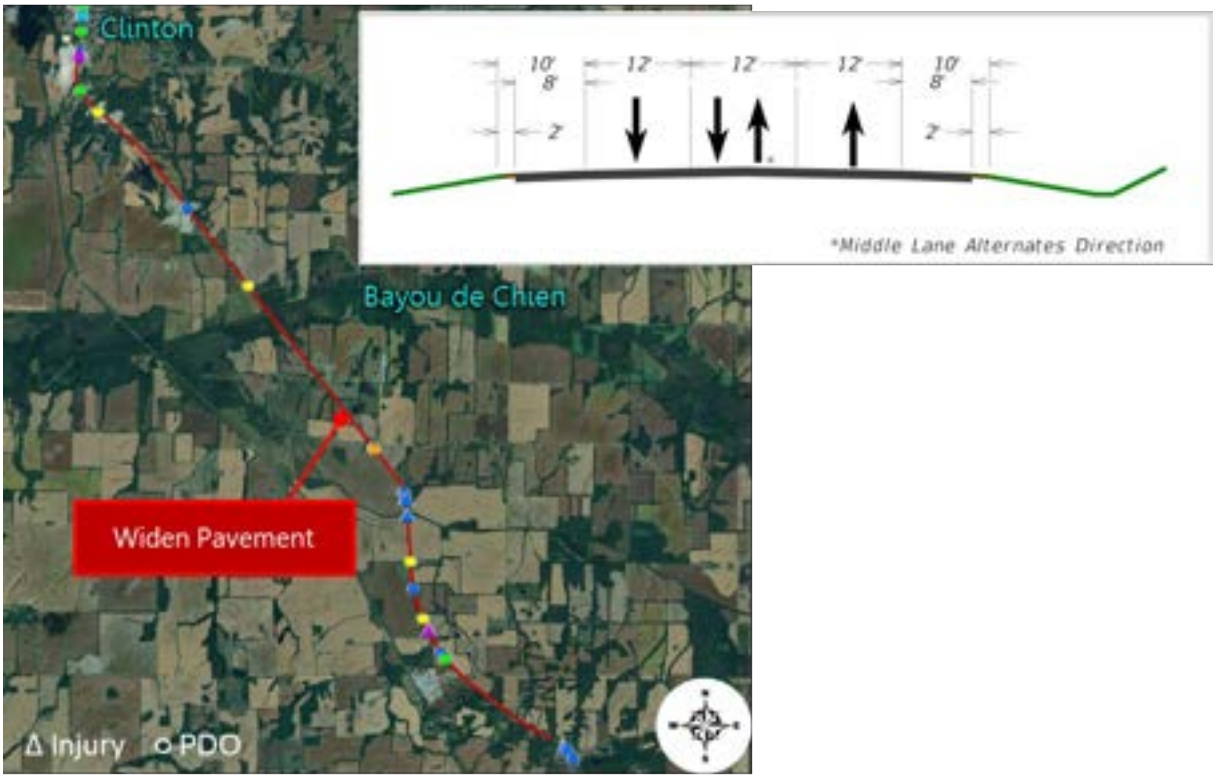


Impacts:	Tree clearing; Stream crossings; Floodplains; Wetlands; OSRW
Notes:	BCA <0.1 based on crash savings Overlaps Item No. 1-80325 (MP 8.275-13.680, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80325 but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

G8. 2+1 Reconstruction, south of Clinton		
Hickman County: US 51 MP 0.0-7.2		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	**Phase Estimate**	**(2024 $'s)**
	Design	$4.5 million
	Right-of-Way	$3.8 million
	Utilities	$4.0 million
	Construction	$30 million
Consider alongside H8	**Total Cost**	**$42 million**
IDENTIFIED NEEDS:	Escalated Cost	$59 million

2024 Existing Traffic:	2,200-2,300 vpd
2045 No-Build Traffic:	3,100-3,200 vpd
Safety:	21 crashes (3 injury) during 2019-2023; 62% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



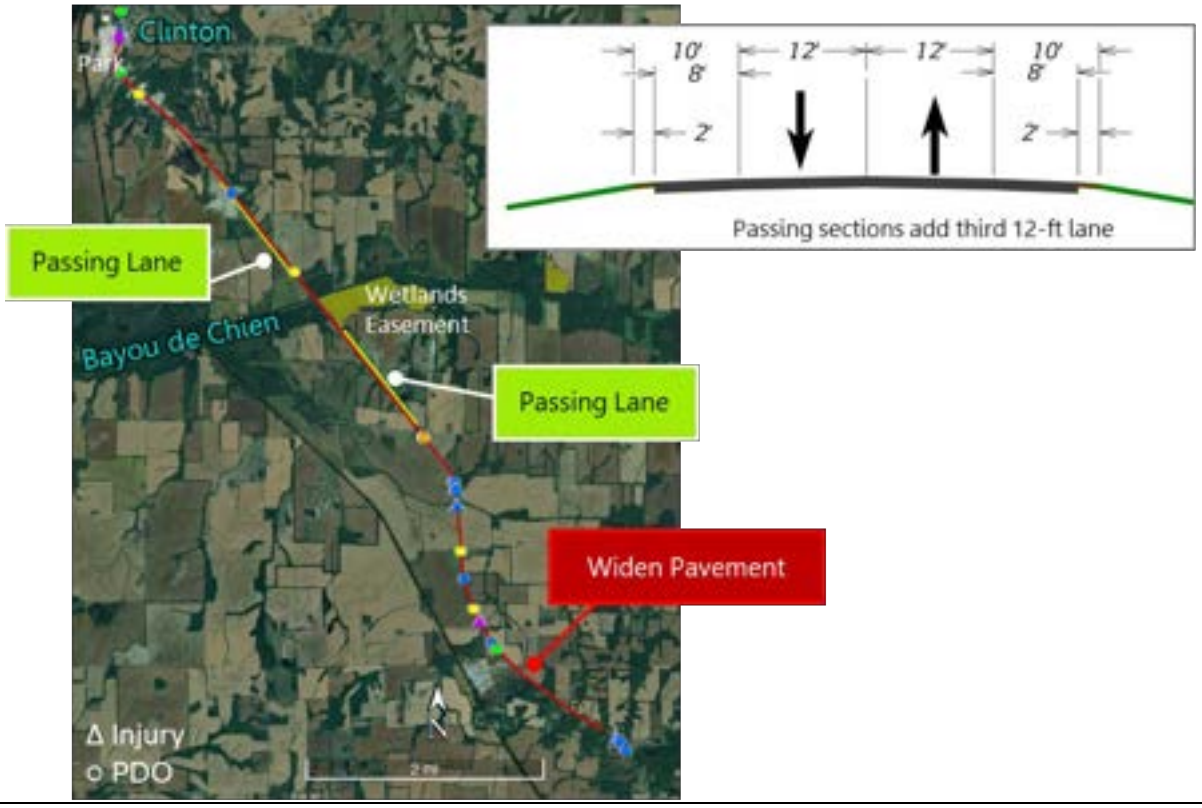
Impacts:	Abuts park; Tree clearing; Floodplains; Abuts wetland reserve easement; ±1 residential relocation; OSRW/streams; Wetlands: Agricultural District
Notes:	BCA of 0.2 based on crash savings and reduced travel time Overlaps Items No. 1-80327 (MP 0.0-2.399) and 1-80328 (MP 4.506-6.650). FY2024-2030 Plan shows NH funds for both but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

H8. Super-2, south of Clinton

Hickman County: US 51 MP 0.0-7.2		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with one half-mile passing lane per direction in tangents.	Design	$3.6 million
	Right-of-Way	$3.4 million
	Utilities	$3.6 million
	Construction	$24 million
Consider alongside G8	**Total Cost**	**$35 million**
IDENTIFIED NEEDS:	Escalated Cost	$48 million

2024 Existing Traffic:	2,200-2,300 vpd
2045 No-Build Traffic:	3,100-3,200 vpd
Safety:	21 crashes (3 injury) during 2019-2023; 62% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal

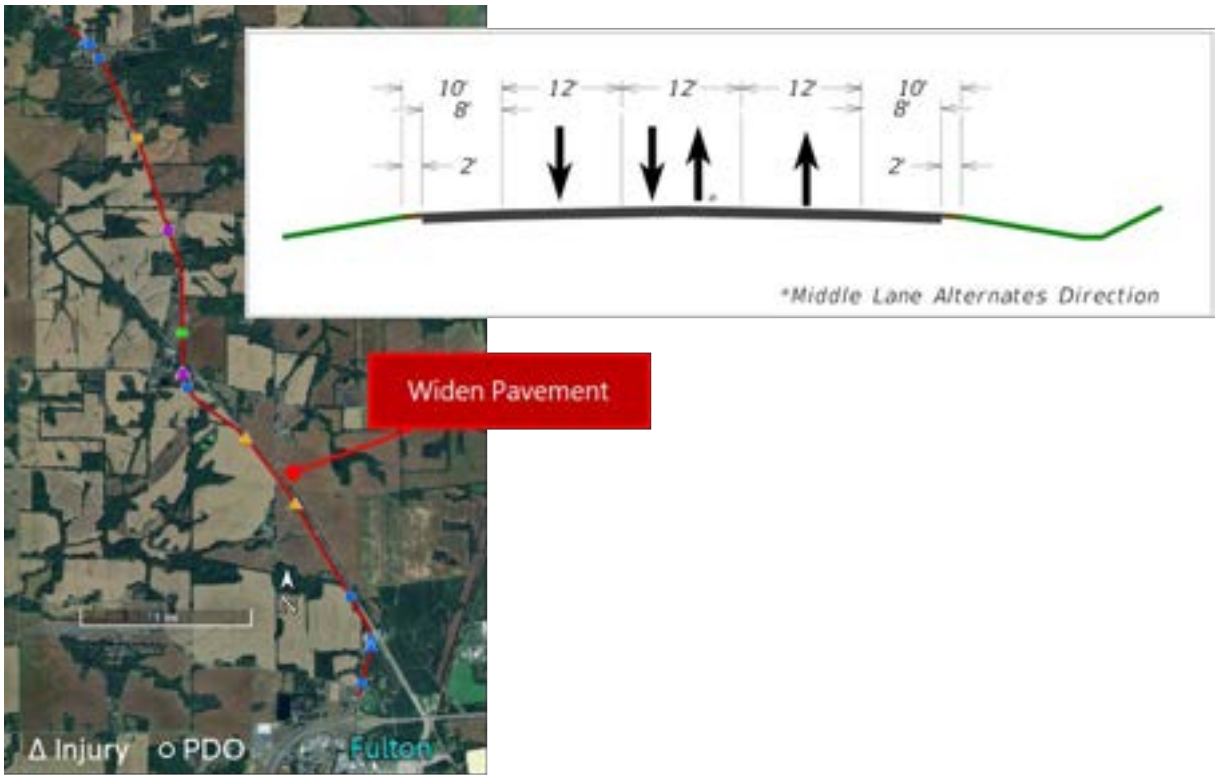


Impacts:	Abuts park; Tree clearing; Floodplains; Abuts wetland reserve easement; ±1 residential relocation; OSRW/streams; Wetlands; Agricultural District
Notes:	BCA <0.1 based on crash savings Overlaps Items No. 1-80327 (MP 0.0-2.399) and 1-80328 (MP 4.506-6.650). FY2024-2030 Plan shows NH funds for both but US 51 not eligible as it is not on NHS Consider traditional Highway Plan funding

G9. 2+1 Reconstruction, Fulton Co.		
Fulton County: US 51 MP 0.3-4.7		Long-Term Priority
IMPROVEMENT DESCRIPTION: Reconstruct highway as symmetric 2+1 typical with alternating passing lanes, correcting substandard alignment elements.	**Phase Estimate**	**(2024 $'s)**
	Design	$2.9 million
	Right-of-Way	$2.3 million
	Utilities	$2.5 million
	Construction	$19 million
Consider alongside H9	**Total Cost**	**$27 million**
IDENTIFIED NEEDS:	Escalated Cost	$37 million

2024 Existing Traffic:	2,600-2,700 vpd
2045 No-Build Traffic:	3,600-3,800 vpd
Safety:	19 crashes (6 injury) during 2019-2023; 63% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



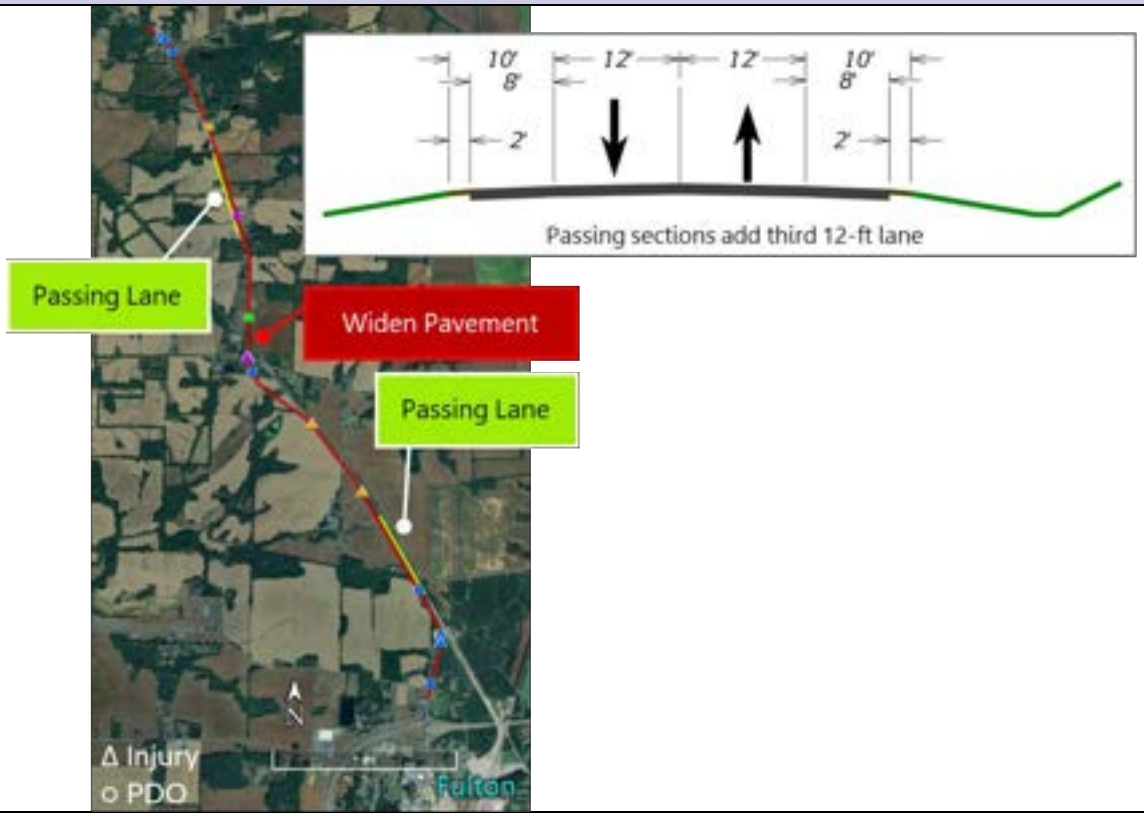
Impacts:	Tree clearing; ±1 residential relocation; Stream crossing
Notes:	BCA of 0.3 based on crash savings and reduced travel time Consider traditional Highway Plan funding

H9. Super-2, Fulton Co.

Fulton County: US 51 MP 0.3-4.7		Long-Term Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Reconstruct highway as Super-2 with one half-mile passing lane per direction in tangents.	Design	$2.1 million
	Right-of-Way	$2.1 million
	Utilities	$2.3 million
	Construction	$14 million
Consider alongside G9	**Total Cost**	**$21 million**
IDENTIFIED NEEDS:	Escalated Cost	$29 million

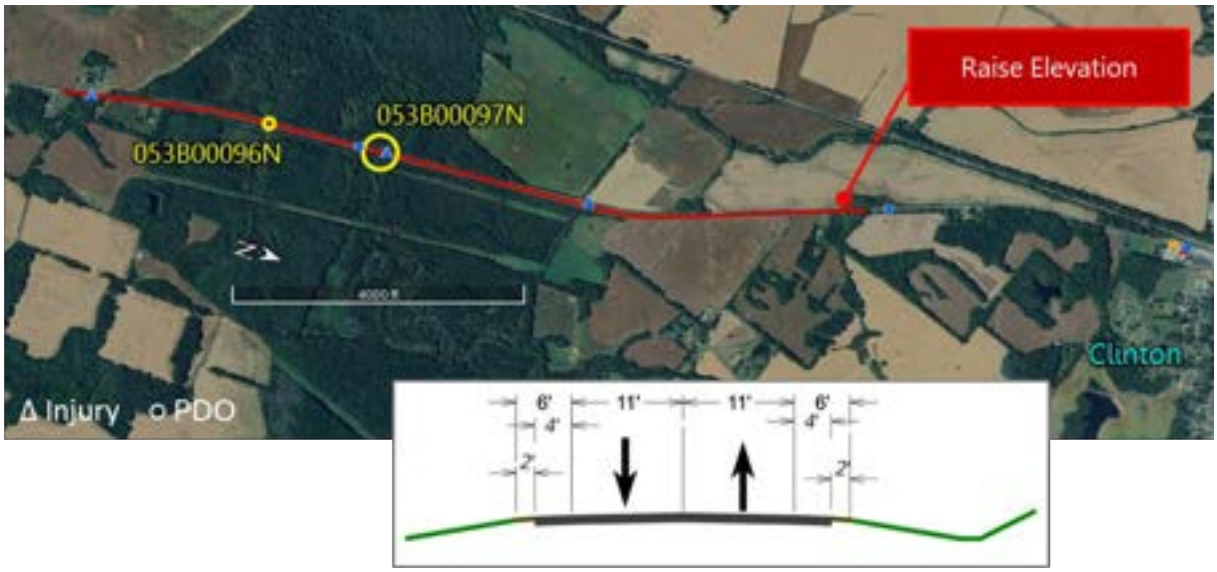
2024 Existing Traffic:	2,600-2,700 vpd
2045 No-Build Traffic:	3,600-3,800 vpd
Safety:	19 crashes (6 injury) during 2019-2023; 63% roadway departures

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing; ±1 residential relocation; Stream crossing
Notes:	BCA of 0.1 based on crash savings and reduced travel time Consider traditional Highway Plan funding

X. Raise Profile at Obion Creek		
Hickman County US 51 MP 13.3-15.095 & Carlisle County US 51 MP 0.0-0.3		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Raise elevation of roadway up to 3.5 feet, including replacement of two bridges, to accommodate 50-year design storm	Design	$2.7 million
	Right-of-Way	$0.5 million
	Utilities	$0.2 million
Coordinate with future bridge maintenance needs	Construction	$18 million
	Total Cost	**$22 million**
IDENTIFIED NEEDS:	Escalated Cost	$31 million
2024 Existing Traffic:	1,600 vpd	
2045 No-Build Traffic:	2,200 vpd	
Safety:	Roadway overtopped by 5-year design storm 4 crashes (2 injury) during 2019-2023	
STUDY GOALS:	☒ Mobility ☒ Safety ☐ Multimodal	



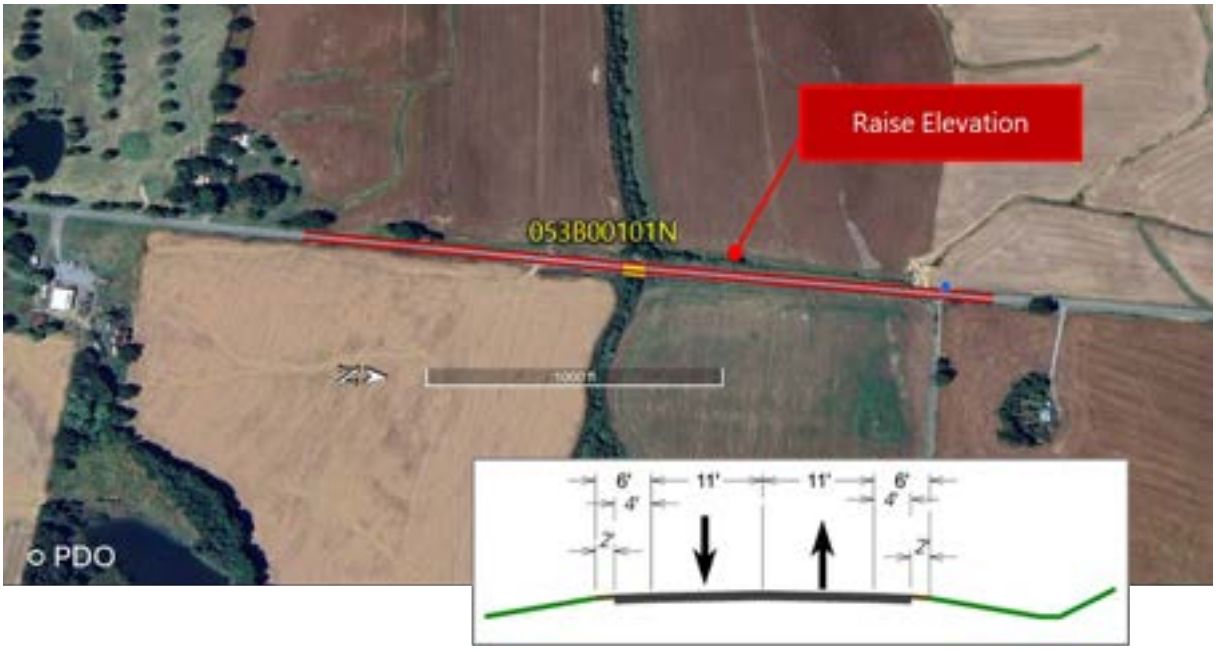
Impacts:	Tree clearing; Stream crossings
Notes:	Consider federal grant (PROTECT) or traditional Highway Plan funding

Y. Raise Profile at Cane Creek

Hickman County US 51 MP 9.7-10.1		Medium Priority
IMPROVEMENT DESCRIPTION: Raise elevation of roadway up to 2.5 feet to accommodate 50-year design storm. Existing Bridge 053B00101N should provide adequate clearance at current elevation.	**Phase Estimate**	**(2024 $'s)**
	Design	$360,000
	Right-of-Way	$150,000
	Utilities	$40,000
	Construction	$2.4 million
	Total Cost	**$3.0 million**
IDENTIFIED NEEDS:	Escalated Cost	$4.3 million

2024 Existing Traffic:	1,700 vpd
2045 No-Build Traffic:	2,400 vpd
Safety:	Roadway overtopped by 25-year design storm One crash (single vehicle PDO) during 2019-2023

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



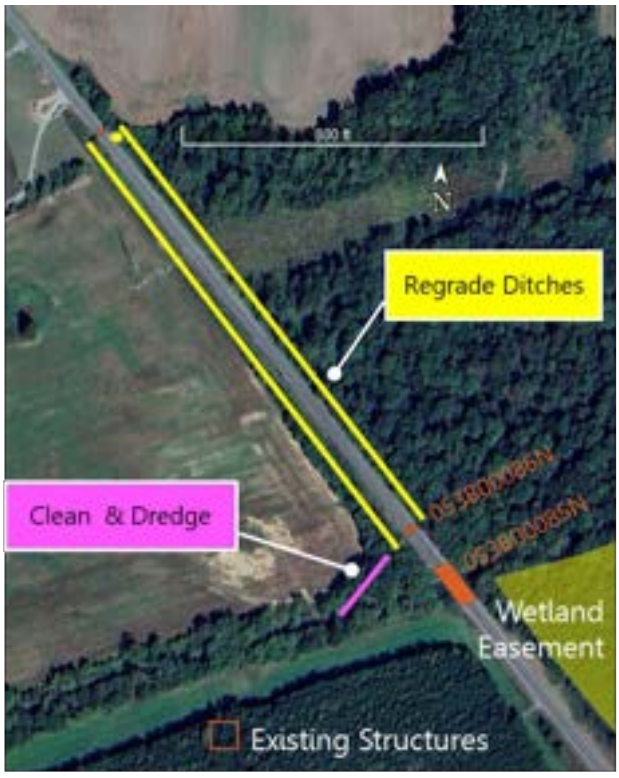
Impacts:	Tree clearing; Stream crossing
Notes:	Overlaps Item No. 1-80325 (MP 8.275-13.680, correct roadway geometrics). FY2024-2030 Plan shows NH funds for 1-80325 but US 51 not eligible as it is not on NHS Consider federal grant (PROTECT) or traditional Highway Plan funding

Z. Bayou de Chien Ditches & Culverts

Hickman County US 51 MP 4.5-4.8		Medium Priority
IMPROVEMENT DESCRIPTION:	**Phase Estimate**	**(2024 $'s)**
Clean culverts, regrade ditches, add cross-drains, dredge path from culvert 053B0086N to main channel	Design	$200,000
	Right-of-Way	-
	Utilities	-
	Construction	$1.5 million
	Total Cost	**$1.7 million**
IDENTIFIED NEEDS:	Escalated Cost	$2.5 million

2024 Existing Traffic:	2,300 vpd
2045 No-Build Traffic:	3,200 vpd
Safety:	Roadway overtopped by 2-year design storm One crash (PDO sideswipe) during 2019-2023

STUDY GOALS: ☒ Mobility ☒ Safety ☐ Multimodal



Impacts:	Tree clearing; Stream crossing
Notes:	Overlaps Item No. 1-80328 (MP 4.506-6.650). FY2024-2030 Plan shows NH funds for both but US 51 not eligible as it is not on NHS Consider FE01, federal grant (PROTECT), or traditional Highway Plan funding

9. NEXT STEPS

Funding exists to advance improvements along some segments of the larger corridor. Some of the recommended improvements herein are low-cost actions requiring little advance preparation and could be implemented relatively quickly by KYTC maintenance forces. Others are higher-cost projects that must compete for funding and progress through the project development process: preliminary design/environmental, final design, right-of-way acquisition, utility relocation, then construction. **Table 21** compares recommended priorities against the *FY 2024-2030 Enacted Highway Plan* budget to suggest which projects District 1 may want to focus on first.

TABLE 21: HIGHWAY PLAN FUNDING VERSUS RECOMMENDATIONS

ID	Description	Biennium $	Approx. MP	Overlapping Projects (Priority)
Ballard Co.				
1-1140.01	Cairo Bridge	$19.2M	7.3-8.3	-
1-1140.20	Cairo Bridge	-	7.5-7.8	-
1-80320	Freight Access	$300,000	2.0-2.2	Concept H3 (Long-Term)
1-80308	Reconstruct	$2.1M	0.0-3.2	Spot 3 (Medium)
Carlisle Co.				
1-333	Intersection	$340,000	7.8-8.0	-
1-80323	Reconstruct	-	6.1-8.3	Spot 5 (Medium) Spot 6 (High) Concept D (Low)
1-10105	Bridge	$1.5M	4.4	-
1-80309	Reconstruct	$2.1M	0.0-6.1	Spot 12 (High) Concepts H5-H6 (Long-Term)
1-10104	Bridge	$120,000	1.7	-
Hickman Co.				
1-80325	Reconstruct	$7.2M	8.3-13.7	Concept H7 (Long-Term)
1-10144	Bridge	$2.2M	11.9	-
1-80330	Intersection	$1.0M	11.1-11.4	Spot 7 (Low)
1-80203	Realign	$4.0M	7.2-8.3	Spot 8 (Design underway) Spot 9 (High)*
1-80328	Reconstruct	$1.0M	4.5-6.6	Concept H8 (Long-Term)
1-10146	Bridge	$460,000	2.4	-
1-80327	Reconstruct	$2.0M	0.0-2.4	Concept E (Medium) Concept H8 (Long-Term)

** Limits overlap but small-scale safety improvements likely to pull funding from beyond Highway Plan.*

For those competing for traditional Highway Plan funds, CHAF forms should be created or modified so potential projects can compete for future funding in the next SHIFT cycles.

Limited public involvement has occurred to date; engaging with key stakeholders and affected property owners will be important during the design process.

9.1. POTENTIAL FUNDING STREAMS

Traditionally, most funds for highway projects statewide are allocated within the biennial Highway Plan, competing against other projects through the SHIFT process. Beyond SHIFT, a range of other federal grants[20] and other funding streams align with specific project types and could represent other mechanisms to advance smaller projects. A brief discussion follows, with notes on projects sheets in **Section 8.1** to suggest which Build options could align with which programs. It should be noted that many of the federal funds are allocated through the *Infrastructure Investment and Jobs Act* (IIJA) that runs through fiscal year 2026. The next federal transportation bill is likely to change funding levels and even which programs are available.

Within SHIFT/Highway Plan

The federal Surface Transportation Block Grant (**STBG**) program provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway; bridge and tunnel projects on any public road; pedestrian and bicycle infrastructure; and transit capital projects, including intercity bus terminals. The annual budget is around $250 million.

Dedicated federal funds for bridges (**FBP, BRO, BRX, BRZ**) are set aside for structures and their approaches. The annual budget is about $112 million statewide.

National Highway Performance Projects (**NH**) are federal funds supporting the condition and performance of the NHS, including US 51 north of US 60/Wickliffe. Kentucky receives an estimated $0.5 billion in NH funds annually.

New under the IIJA, the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (**PROTECT**) grant program targets surface transportation projects that improve resiliency and address climate change. It includes both formula and competitive components, with applications accepted annually in late winter. Kentucky's annual budget is around $25 million, not counting competitive grant awards.

State Priority Projects (**SPP**) funds target high priority construction projects based on prioritized needs. The annual budget varies but can be over $1 billion.

State-Managed Funds Beyond SHIFT/Highway Plan

The federal Highway Safety Improvement Program (**HSIP**) targets strategic, data-driven safety applications with over $50 million for Kentucky annually. Funding is overseen by the KYTC Division

[20] In late January 2025, the White House announced a pause to federal grants to assess alignment with the administration's policies, introducing uncertainty regarding funding streams.

of Traffic Operations, with an Investment Plan establishing funding targets for intersections, roadway departure corridors, and vulnerable roadway users.

The federal Transportation Alternatives Program (**TAP**) is available for non-motorized transportation projects such as sidewalks, trails, bike lanes, etc. Traditionally, there is a 20% local match although the GRANT Program of 2024[21] provides competitive funding to offset the local match. TAP is managed through the KYTC Office of Local Programs with applications collected each spring.

Limited **FE01** maintenance funds are allocated to each District to address low-cost repairs like striping or roadside clearing. A similar **FE02** budget covers bridge maintenance needs.

Limited **FE04** funds are available to the Division of Traffic Operations to improve signal systems, lighting, and similar operational measures.

Pavement overlays and striping projects can be funded through **FD05** funds, overseen through the Division of Maintenance.

Other Federal Grant Opportunities

The IIJA, also known as the *Bipartisan Infrastructure Law*[22], provides federal highway programs more than $350 billion over a five-year period (fiscal years 2022–2026). Most of this funding is distributed to states based on formulas spelled out in legacy programs such as the Federal-aid Highway Program and HSIP. However, funds may also be provided through competitive grant programs. The Grants.gov website provides a one-stop shop for information on available grant programs across multiple agencies, including a feature to search by keyword.

For example, the Safe Streets for All (**SS4A**) program is open to MPOs, local, and Tribal governments to develop or implement projects from a Comprehensive Safety Action Plan. The program is funded with about $1 billion per year nationally with a 20% local match component. However, a project must be from the local/regional Action Plan to be eligible for SS4A implementation funding. Applications are typically accepted annually in the Spring.

Rebuilding American Infrastructure with Sustainability and Equity (**RAISE**) grants support multi-modal, multi-jurisdictional projects with a significant national, regional, or local impact that are difficult to support through traditional programs. Applications require a solid benefit-cost analysis to compete; awards start at $1 million for rural areas.

Active Transportation Infrastructure Investment Program (**ATIIP**) funds focus on safe connections for sidewalks, bike lanes, and other active transportation facilities. State DOTs,

[21] Online at https://ced.ky.gov/grant
[22] Online at https://www.fhwa.dot.gov/bipartisan-infrastructure-law/funding.cfm

MPOs, local, and Tribal governments are eligible with around $45 million awarded throughout the nation annually.

10. ADDITIONAL INFORMATION

Written requests for additional information should be sent to:

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