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US 62 CORRIDOR STUDY

Final Report | July 2023

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Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated the US 62 Corridor Study with the objective to identify and evaluate potential solutions to improve safety, congestion, and access management along US 62 in Elizabethtown, Hardin County, Kentucky. The study area extends from Brook Street to Gregory Street, mile point (MP) 18.839 to MP 20.560, shown in **Figure ES-1**. The study evaluated multiple corridor-wide and I-65 interchange improvement concepts and recommends those which KYTC may use for further project development and implementation.

Improvements along US 62 were previously identified and recommended in the East Elizabethtown Connectivity Study sponsored by the Lincoln Trail Area Development District (ADD) in coordination with the City of Elizabethtown and KYTC. US 62 has become the primary access point from I-65 as well as a gateway to Elizabethtown. With a dramatic increase in commercial development in the area along with an overall expected growth due to recent industrial activity, it is anticipated congestion as well as crash density and severity will worsen.

The project team identified goals for the study based on the transportation challenges in the area. The goals of the study are to:

- Develop a range of concepts that can be further studied and/or refined in the Preliminary Engineering and Environmental Phase that address safety, operational, geometric, and multimodal challenges.
- Develop improvement strategies to address increased multimodal congestion along one of the primary mobility connections on the east side of Elizabethtown.
- Identify project challenges early and establish associated costs to inform funding requests, including potential federal grants and the biennial highway plan.
- Establish a broader project team including city engineering and planning staff to understand the implications of project decisions on the gateway concept.

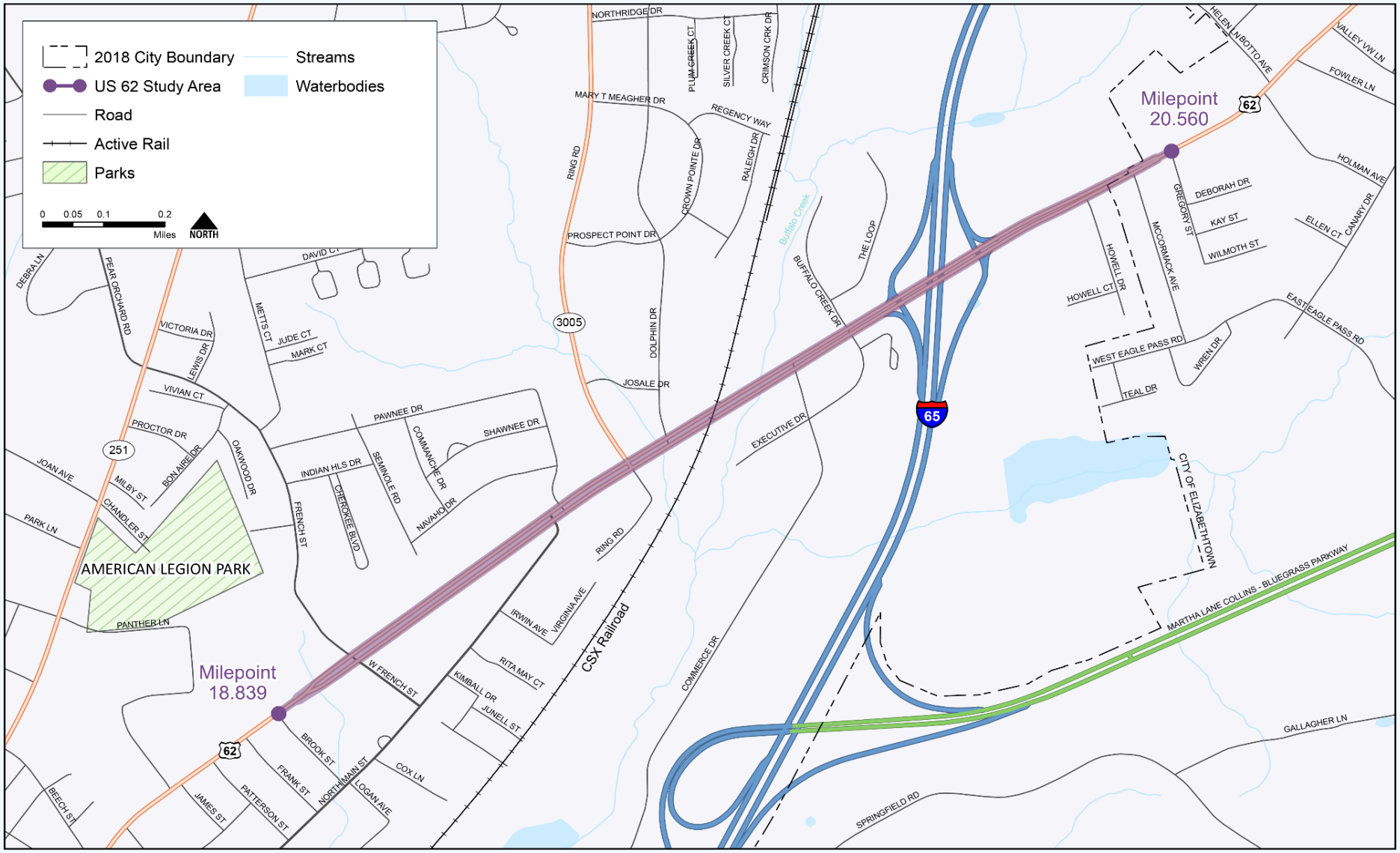
Existing Conditions

A detailed inventory of current physical and geometric design characteristics was completed to evaluate the existing conditions of US 62. US 62 is classified as an Urban Minor Arterial west of I-65 and as an Urban Major Collector east of I-65. It is not on the National Highway System (NHS) nor is it a Federally Designated Truck Route. The speed limit in the study area is 35 mph west of Brook Street and 45 mph east of Brook Street. It is a four-lane facility with two lanes in each direction, and lane widths are 12 feet wide throughout with median and shoulder widths varying throughout. There are 14 intersections in the study area, eight are unsignalized and six are signalized.

The CSX railroad bridge over US 62 provides 32 feet of horizontal clear width for each direction of travel. The eastbound opening provides 15 feet, 4 inches of vertical clearance with the westbound opening providing 14 feet, 2 inches, which is less than the minimum requirement of 16 feet, 6 inches under a CSX railroad facility.

Pedestrian and bicycle activity levels were investigated using Strava and StreetLight Data. There is significant pedestrian activity and the highest levels are present between North Main Street and Buffalo Creek Drive. Bicycle usage on US 62 appears to be low with the highest area of usage the same as for pedestrians.

Figure ES-1: US 62 Study Area



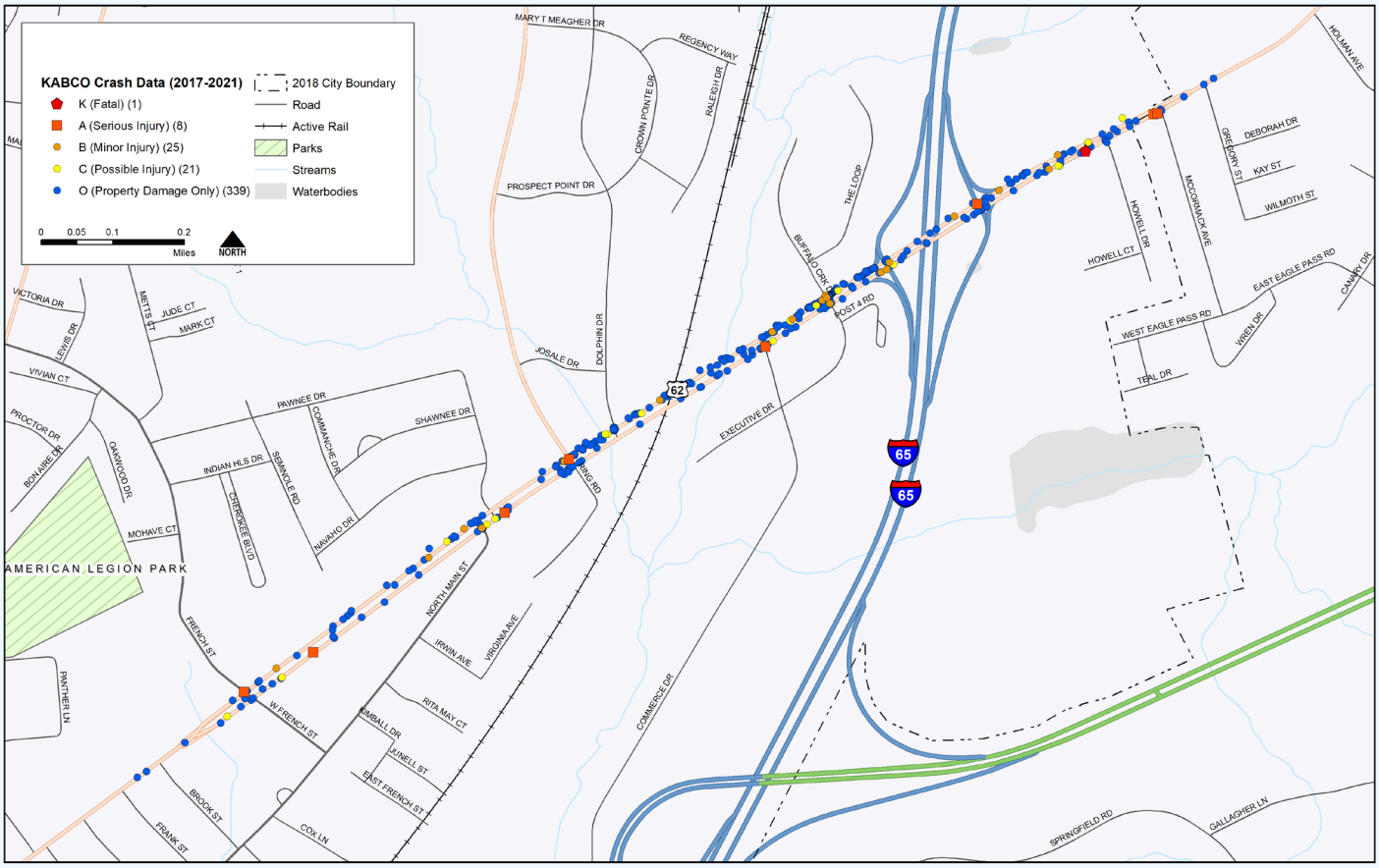
Traffic Volume and Operations

A traffic analysis was performed addressing three major topics: volumes, operations, and safety. Tasks included examining historical and existing (2022) traffic volumes as well as forecasting future traffic to the design year of 2045. Traffic volumes are projected to grow 0.5% per year. The 2045 AADT volumes range from a low of 15,055 vehicles per day (vpd) east of I-65 to a high of 36,835 vpd between KY 3005 (Ring Road) and Commerce Drive. Intersection operations were analyzed using Synchro Version 11 (HCM 6th Edition) analysis software to evaluate the AM and PM peak hours Level of Service (LOS). Under existing traffic conditions and in 2045, all intersections operate at LOS D or better in both the AM and PM. KY 3005 (Ring Road) is the only intersection expected to operate at LOS D in 2045.

Safety

A historical crash analysis was performed to examine traffic safety trends and to identify potential safety issues on US 62. Within the five-year (2017– 2021) analysis period, 394 crashes were reported in the study area. A breakdown of the crashes by severity found that one fatal crash occurred, and eight serious injury crashes (2%) occurred over the five-year period. Most crashes (339, 86%) were property damage-only. Of these, seven involved pedestrians. An examination of the crashes by manner of collision showed most (173, 43.9%) were rear end crashes. Approximately 72% of rear end crashes occurred near signalized intersections where queuing occurs. The location and density of crashes within the US 62 study area are shown in **Figure ES-2.**

Figure ES-2: **US 62 Crash Density Map (2017 - 2021)**



Development and Evaluation of Potential Improvement Concepts

In addition to project team meetings between the consultant team, KYTC, and the City of Elizabethtown, outreach for this study included two meetings with local officials and stakeholders, as well as an online public survey. Using the existing conditions, traffic, and safety analysis, along with input from the local stakeholders, an initial list of potential improvement concepts was developed and presented to the project team. These concepts included multiple typical sections, intersection improvements, interchange types, and railroad crossing options. After meeting with the project team for an initial screening of the potential improvement concepts, the concepts that remained were grouped into full-corridor concepts for evaluation and presentation to the local officials and stakeholders. Four interchange options and two railroad options were also evaluated.

Each full corridor and interchange potential improvement concept was evaluated with respect to safety, traffic operations, right-of-way impacts, environmental impacts, and concept costs. Planning level cost estimates were prepared for design, right-of-way, utility relocation, and construction for each option. The full-corridor improvement concepts were shared with the project team and based on the analysis; the team was able to make a recommendation for which concepts to move forward to the next phase of project development.

Recommendations

The full-corridor concepts with typical section, intersection control type, and interchange options that were recommended at the final project team meeting are summarized below.

- Move forward with a curb and gutter typical section with 10-foot shared use paths on both sides. In Preliminary Engineering (Phase 1 Design), investigate moving the shared use path further away from the roadway.
- Move forward with a corridor that provides roundabouts at West French Street and Commerce Drive. Further investigate the intersection type at KY 3005 (Ring Road) in Phase 1 Design, including keeping the intersection signalized, a Continuous Green T, a roundabout, or other restricted crossing U-turn (RCUT) solution. Restrict the Buffalo Creek Drive/Executive Drive intersection to right in – right out. The corridor should provide RCUT/U-turning opportunities between major intersections.
- Move forward with the Buffalo Creek Extension, providing a connection from Buffalo Creek Drive to Commerce Drive. The exact alignment and tie in with Buffalo Creek Drive will be determined in Phase 1 Design. The extension of Buffalo Creek Drive would not need to be constructed at the same time as US 62 improvements. A phased construction approach could be taken.
- All four interchange concepts (improved diamond, single point urban interchange, diverging diamond, and roundabout) are recommended to carry forward into Phase 1 Design for further evaluation.
- KYTC is applying for a grant for a new railroad crossing. If that application is successful, then a new crossing is recommended. If it is not, then modifying the typical section under the existing railroad bridge to allow for 4-foot sidewalks is recommended.
- Include aesthetic treatments to beautify the corridor and create a gateway to Elizabethtown.

The Design, Right-of-Way, Utilities, and Construction (D, R, U, and C) costs in 2023 dollars for the corridor improvement concepts are presented in **Table ES-1** and for the interchange concepts in **Table ES-2**. The D, R, U, and C costs in 2023 dollars for the railroad crossing improvements are shown in **Table ES-3**. Upon completion of this study, selected recommended improvement concepts will be further examined and moved through project development. Funds for future project development phases of this corridor are in *Kentucky's Enacted Fiscal Year (FY) 2022 – FY 2028 Highway Plan (Highway Plan) as Item No. 4-80200.00*. The next steps for any identified concepts are Preliminary Engineering and Environmental Analysis, commonly referred to as "Phase I Design."

Table ES-1: US 62 Roundabout with Curb and Gutter Concept Cost Estimates

Phase	Corridor Improvement Concept			
	Base Roundabout Corridor (with Buffalo Creek Drive Extension)	Roundabout Corridor with KY 3005 (Ring Road) Signalized	Roundabout Corridor with RIRO at KY 3005 (Ring Road) with roundabouts at Pawnee Drive and Dolphin Drive	Roundabout Corridor with no Buffalo Creek Drive Extension
Design	$1,200,000	$1,200,000	$1,300,000	$900,000
Right-of-Way	$3,600,000	$3,600,000	$3,900,000	$2,500,000
Utilities	$900,000	$900,000	$1,200,000	$700,000
Construction	$9,600,000	$9,600,000	$10,400,000	$6,900,000
Total	**$15,300,000**	**$15,300,000**	**$16,800,000**	**$11,000,000**

In 2023 dollars, RIRO = Right in – right out intersection

Table ES-2: I-65 Interchange Cost Estimates

Phase	Interchange Improvement Concept			
	Improved Diamond Interchange	Single Point Urban Interchange (SPUI)	Diverging Diamond Interchange (DDI)	Roundabout Interchange
Design	$400,000	$2,100,000	$400,000	$500,000
Right-of-Way	$0	$0	$100,000	$200,000
Utilities	$0	$0	$100,000	$100,000
Construction	$2,900,000	$17,300,000	$3,300,000	$3,900,000
Total	**$3,300,000**	**$19,400,000**	**$3,900,000**	**$4,700,000**

In 2023 dollars

Table ES-3: CSX Railroad Crossing Cost Estimates

Phase	Railroad Improvement Concept		
	Two-Track Railroad Bridge	Three-Track Railroad Bridge	Narrow US 62 Lanes and Sidewalks
Design	$2,300,000	$2,600,000	$100,000
Right-of-Way	$100,000	$100,000	$0
Utilities	$300,000	$300,000	$0
Construction	$18,700,000	$21,200,000	$800,000
Total	**$21,400,000**	**$24,200,000**	**$900,000**

In 2023 dollars

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1 Introduction

WSP USA Inc. (WSP) was contracted by the Kentucky Transportation Cabinet (KYTC) to perform a study to identify potential solutions to improve safety, congestion, and access management along U.S. Route (US) 62 in Elizabethtown, Hardin County, Kentucky. The study area extends from Brook Street to Gregory Street, mile point (MP) 18.839 to MP 20.560, shown in **Figure 1**. The study evaluated multiple corridor-wide and interchange improvement concepts and recommends those which KYTC may use for further project development and implementation. Members of the project team included KYTC District 4, KYTC Central Office Division of Planning, the City of Elizabethtown, the City of Elizabethtown, and the WSP consultant team which includes HDR and TSW.

Improvements along US 62 were previously identified and recommended in the East Elizabethtown Connectivity Study sponsored by the Lincoln Trail Area Development District (ADD) in coordination with the City of Elizabethtown and KYTC. US 62 has become the primary access point from Interstate (I) 65 as well as a gateway to Elizabethtown. With a dramatic increase in commercial development in the area along with an overall expected growth due to recent industrial activity, it is anticipated that congestion, crash density and severity will worsen as rapid growth continues.

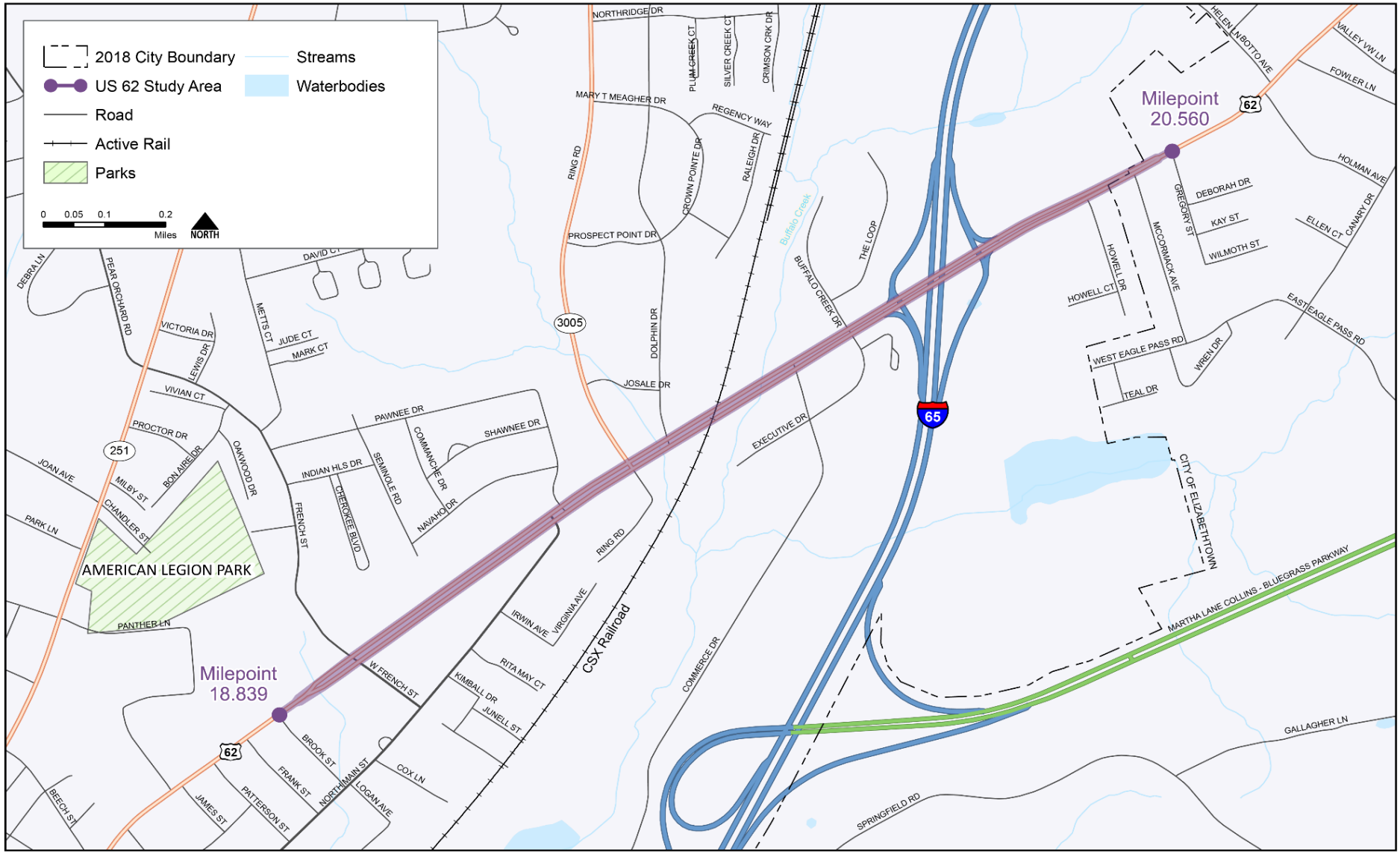
1.1 Recent, Committed, and Proposed Projects/Relevant Studies

KYTC provided a list of committed and proposed projects in the study area vicinity. There are five projects included in *Kentucky's 2022-2028 Enacted Highway Plan (Highway Plan)* and five projects in in the KYTC Continuous Highway Analysis Framework (CHAF) database, listed below with the year of phase programming shown. There are two projects in the study area vicinity that are included in the Radcliff/Elizabethtown Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) and Metropolitan Transportation Plan (MTP). Additionally, there are three recently completed studies that were performed in the area that were drawn upon for this study.

Highway Plan Projects

- 4-153.01 – Improve KY 251 from KY 3005 (Ring Road) to KY 434 | Design, Right-of-Way, and Utilities Authorized, Construction 2023, 2025, 2026
- 4-198.00 – Extend KY 3005 (Ring Road) from the Western Kentucky Parkway to I-65 (includes to US 31W) | Design and Right-of-Way Authorized, Utilities 2024, Construction 2025
- 4-442.00 – Improve Safety, Mobility, and Geometrics on US 62 from I-65 to Upper Colesburg Road | Design 2025, Right-of-Way 2026, Utilities 2027, Construction Non-Six Year
- 4-80200.00 – Address Safety, Mobility, and Access Management, Along with Potentially Reconfiguring the I-65 Interchange | Design 2024, Right-of-Way 2025, Utilities 2026, Construction 2027
- 4-80250.00 – Extend KY 3005 (Ring Road) from US 31W to KY 61 | Design 2023, Right-of-Way 2025, Utilities 2026, Construction 2027

Figure 1: US 62 Study Area



CHAFs

- IP20070166 – Curb and Gutter Along US 62 from Brook Street to I-65
- IP20070175 – Extend New Glendale Road from US 31W to Commerce Drive (Under Design by City of Elizabethtown)
- IP20210078 – Address Safety, Congestion, and Access Management from North Main Street through the I-65 Interchange.
- IP20210094 – Commerce Drive extension from its current terminus at US 62 to Buffalo Creek Drive.

Radcliff/Elizabethtown MPO TIP and MTP Projects

- 4-9012.20 – Construct a Mini Roundabout at Dolphin Drive and Josale Drive | Open to Traffic
- 4-9012.30 – Construct a Mini Roundabout at Commerce Drive and Executive Drive | Construction 2023

Relevant Studies

- East Elizabethtown Connectivity Study, 2021
- Radcliff/Elizabethtown Bicycle Facilities Study, 2016
- Elizabethtown Trail Master Plan, 2017

1.2 Study Objective

The objective of the US 62 Corridor Study is to identify and evaluate potential improvement concepts to address safety, congestion, and access management along US 62 from Brook Street to Gregory Street in Elizabethtown.

1.3 Study Goals

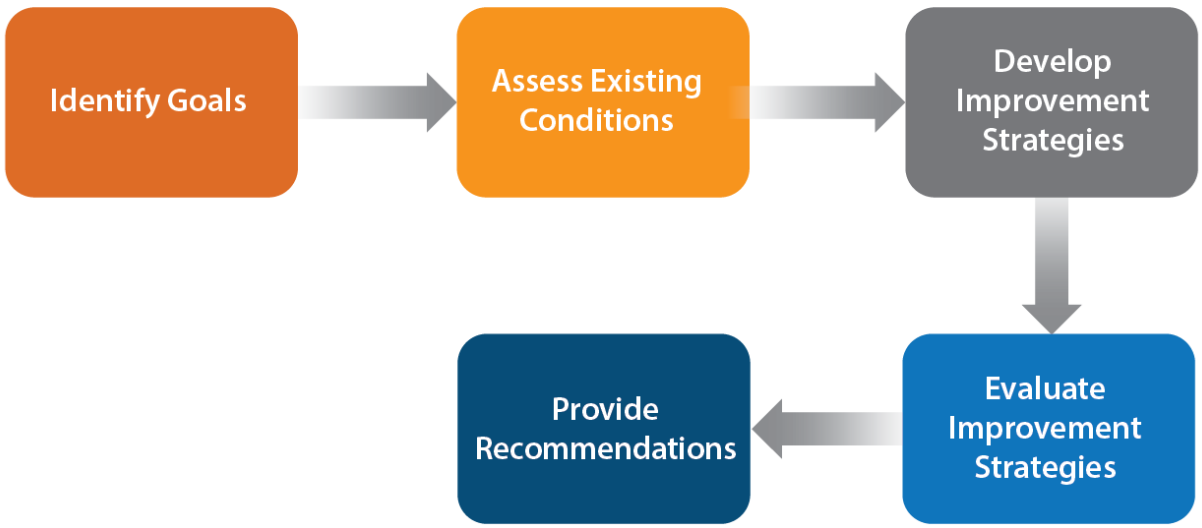
The goals of the study are to:

- Develop a range of concepts that can be further studied and/or refined in the Preliminary Engineering and Environmental Phase that address safety, operational, geometric, and multimodal challenges.
- Develop improvement strategies to accommodate increased multimodal congestion along one of the primary mobility connections on the east side of Elizabethtown.
- Identify project challenges early and establish associated costs to inform funding requests, including potential federal grants and the biennial highway plan.
- Establish a broader project team including city engineering and planning staff to understand the gateway implications of project decisions.

1.4 Study Process

The study process consists of five major elements, shown in **Figure 2**. The subsequent chapters of this report detail these steps, with additional information provided in the appendices.

Figure 2: Study Process



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2 Existing Conditions

The *2021 East Elizabethtown Connectivity Study* evaluated several roadway systems and characteristics, which are summarized for this study. That study included an Environmental Overview, which was used to evaluate the environmental impacts resulting from improvement concepts developed as part of this study. To further evaluate the existing conditions along US 62, a detailed inventory of the existing physical and geometric design characteristics was completed using the following sources:

- KYTC Highway Information System (HIS) data
- KYTC record plans and bridge inspection reports
- Google Earth aerial imagery and Street View
- Field review

2.1 Roadway Geometrics

An inventory of roadway characteristics was completed to identify factors contributing to safety and congestion issues along US 62.

2.1.1 Functional Classification, Roadway System Designation, and Truck Routes

US 62 is classified as an Urban Minor Arterial (Functional Class 4) west of I-65 and as an Urban Major Collector (Functional Class 5) east of I-65. It is neither part of the National Highway System nor is it a Federal Designated Truck Route. The corridor allows for "AAA" Weight Class trucks with an 80,000-pound maximum weight. The study area is classified as Tier 3, having Statewide Regional Significance, for the Kentucky Highway Freight Network (KHFN), meaning the truck average annual daily traffic (AADT) is between 500 and 4,000 Vehicles Per Day (vpd).

2.1.2 Speed Limit

The posted speed limit is set at 35 miles per hour (mph) west of Brook Street and 45 mph east of Brook Street.

2.1.3 Lane, Shoulder, and Median Width

According to HIS data and a field review, a 12-foot lane width is maintained throughout the study area. US 62 consists of four-lanes divided for most of the study area with varying median types. A four-lane undivided section is present from MP 18.839 to 18.873 (just east of Brook Street) and from MP 20.287 to 20.48 (east of McCormack Avenue). At the eastern end of the corridor there is a transition from the four-lane divided section to a two-lane undivided facility at McCormack Avenue. Three different median types and widths exist on the corridor (see **Figure 3):**

- A 35-foot depressed median is present from MP 18.873 to MP 19.786
- A 22-foot flush median is present from MP 19.786 to MP 19.977
- A 22-foot Raised Non-Mountable concrete median is present from MP 19.977 to MP 20.287

The median widths have changed over the years with restriping and paving; therefore the information in HIS is different from the record plans, which show a 32-foot depressed median between MP 18.873 and 19.786 and a 20-foot raised non-mountable concrete median from MP 19.977 to MP 20.287. Two-foot curbed shoulders are present from MP 17.535 to MP 18.873 and from MP 19.856 to MP 19.977. There are 10-foot paved shoulders from MP 18.873 to MP 19.856.

Figure 3: Study Area Existing Median Widths

2.1.4 Right-of-Way Widths

Ample right-of-way is available on US 62, ranging from a minimum total width of 64 feet at Gregory Street to 195 feet at Buffalo Creek Drive. The following list provides a few examples of the overall right-of-way width at locations along the corridor:

- Brook Street: 80 feet
- West French Street: 160 feet
- North Main Street: 180 feet
- CSX Railroad Crossing: 160 feet
- Buffalo Creek Drive: 195 feet
- Medley Lane: 119 feet
- Gregory Street: 64 feet

2.1.5 Horizontal Alignment

The mainline horizontal curves throughout the study area meet both the minimum radius criteria and the superelevation criteria for a 45 mph design speed.

2.1.6 Vertical Alignment

The *KYTC Highway Design Manual* states that the maximum vertical grade is 8.0% for a design speed of 35 mph and 7.0% for a design speed of 45 mph for rolling terrain urban arterials. According to the *2018 Green Book*, vertical curves must meet stopping sight distance for crest vertical curves and headlight sight distance for sag vertical curves. The required stopping sight distance is 250 feet for a 35 mph facility and 360 feet for a 45 mph facility, which is met throughout the study area.

2.1.7 Roadway Lighting

Roadway lighting is present along the US 62 corridor from Brook Street to McCormack Avenue. The lighting is maintained by the City of Elizabethtown through an agreement with KYTC District 4.

2.1.8 Railroad Bridge Dimensions

The railroad bridge crossing US 62 at MP 19.704 is a key identifying feature of the corridor. CSX operates the rail line, which carries two tracks over US 62. The bridge's vertical clearance in the eastbound direction is 15 feet, 4 inches and in the westbound direction is 14 feet, 2 inches. Vertical clearance in both directions of travel does not meet the current minimum clearance under a CSX railroad facility of 16 feet, 6 inches using steel deck plate girder beams. The bridge's horizontal clear width in both directions of travel is 32 feet.

2.1.9 I-65 Bridge Dimensions

The bridge that carries US 62 over I-65 is a four-span steel plate girder structure with a total length of 352 feet. It consists of two separate structures with bridge 047B00130R carrying eastbound traffic and 047B00130L carrying westbound traffic. US 62 lane and shoulder widths across the bridges consist of two 12-foot-wide through lanes in each direction, single 12-foot-wide left turn lanes at the entrance ramps, and 10-foot-wide outside shoulders. In total, the face of barrier wall to face of barrier wall width is 88 feet or 44 feet for each bridge.

Bridge condition ratings, along with other factors, are used by KYTC to help assess maintenance, rehabilitation, and replacement needs. KYTC bridge inspection reports follow national Bridge Inspection Standard (NBIS) reporting requirements and note the bridge condition and Health Index for all existing structures. The bridge condition is determined by using the lowest rated National Bridge Inventory (NBI) condition rates for the deck, superstructure, and substructure components. These ratings are based on a 0 to 10 scale and can be classified as follows:

- Good – Lowest component rating is greater than or equal to 7
- Fair – Lowest component is rated as 5 or 6
- Poor – Lowest component rating is less than or equal to 4

The Health Index is an indicator of the overall structural health of a bridge. It is expressed as a percentage and varies from 0% (worst possible condition) to 100 % (best possible condition). **Table 1** provides the NBI condition rating for each component, the overall Bridge Rating and the Health Index of each structure.

Table 1: I-65 2020 Bridge Component Ratings

Component	047B00130L	047B00130R
Bridge Deck	6	6
Superstructure	6	6
Substructure	7	7
Overall Bridge Rating	Fair	Fair
Health Index	93.71%	92.79%

2.2 Intersections and Access Points

There are 81 total access points across the 1.7 miles of the US 62 study area. Sixty-seven access points are private driveways, eight are unsignalized intersections, and six are signalized intersections, 14 in total. The access control is listed as "By Permit" except through the I-65 interchange, which is Fully Controlled access. See **Figure 4** for locations of access points and intersections in the study area.

Figure 4: Study Area Intersections and Access Points

2.2.1 Intersection Control

There are 14 intersections in the study area. Six are signalized and eight are stop controlled, shown in **Table 2**.

Table 2: Study Area Intersection Control Types

Intersection #	Cross Street	Control Type
1	Brook Street	Stop
2	West French Street	Signalized
3	North Main Street	Stop
4	Pawnee Drive	Stop
5	Ring Road (KY 3005)	Signalized
6	Dolphin Drive	Stop
7	Commerce Drive	Signalized
8	Buffalo Creek Drive/Executive Drive	Signalized
9	I-65 Southbound Ramp	Signalized
10	I-65 Northbound Ramp	Signalized
11	Medley Lane	Stop
12	Howell Drive	Stop
13	McCormack Avenue	Stop
14	Gregory Street	Stop

2.2.2 Intersection Skew and Sight Distance

Stopping sight distance on level roadways is 250 feet for 35 mph roadways and 360 feet for 45 mph roadways. All intersections meet the intersection sight distance requirement. Intersections should also be square and not skewed. Skewed intersections make turning and visibility difficult for drivers. All intersections are square and meet at a 90-degree angle with US 62.

2.2.3 Turn Lanes

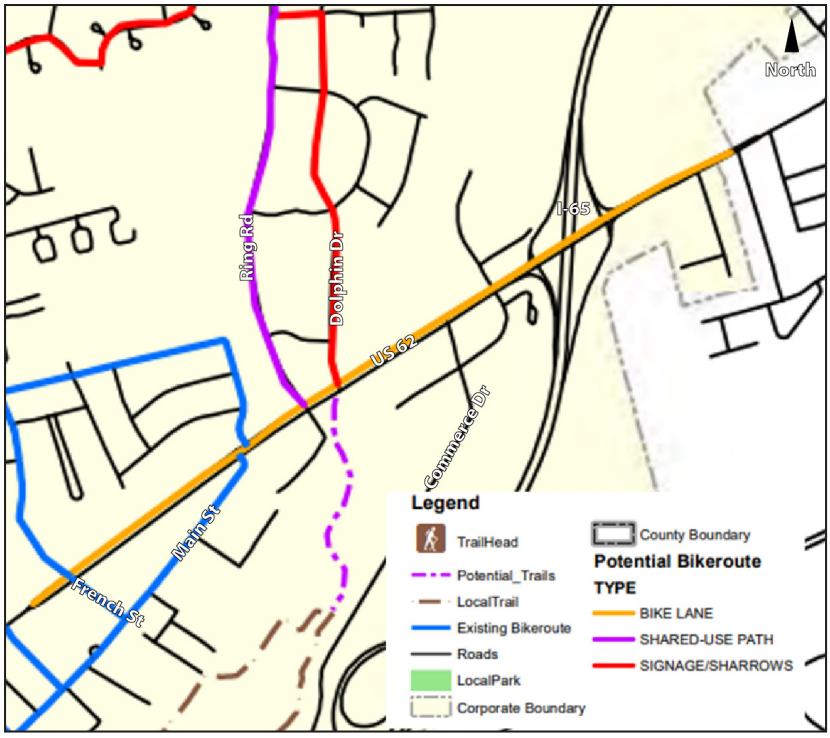
Turn lanes are intermittent along the US 62 study area. Three positive offset left turn lanes exist, two at Commerce Drive and one along the eastbound approach to Buffalo Creek Drive. One non-standard turn lane pair is the uncontrolled parallel left turn lanes between Main Street and French Street without a median barrier. **Figure 5** shows the uncontrolled parallel left turn lanes.

Figure 5: Uncontrolled Parallel Left Turn Lanes

2.3 Bicycle and Pedestrian Activity

A review of the Radcliff/Elizabethtown *Metropolitan Planning Organization* (MPO) Bicycle Facilities Study along with a field review and activity data were utilized to establish bicycle and pedestrian existing conditions along US 62. The *Radcliff/Elizabethtown Bicycle Facilities Study* proposed on street bicycle facilities along the study corridor from Brook Street to McCormack Ave. Bicycle facilities and routes were proposed along connecting corridors, including French Street, Main Street, and Pawnee Ave where existing facilities are present. A proposed shared use path along Ring Road, and a proposed bicycle signage and striping project for Dolphin Drive with a trail connection south towards Buffalo Lake were also recommended. **Figure 6** shows a map from the *Radcliff/Elizabethtown MPO Bicycle Facilities Study* zoomed in on the US 62 corridor.

Figure 6: Radcliff/Elizabethtown MPO Bicycle Facilities Study Potential Bike Routes along US 62



Two data sources, Strava and StreetLight Data, were consulted to examine pedestrian activity along US 62. According to 2022 Strava Metro data, high pedestrian activity is present in the study area between Brook Street and Ring Road (KY 3005) as pedestrians travel between downtown Elizabethtown and Ring Road (KY 3005). East of Ring Road (KY 3005), pedestrian activity appears to be low to medium. However, this data source is limited by representing typically recreational pedestrian movements. The consultant team also queried StreetLight Data, which showed most pedestrian activity occurring between North Main Street and Buffalo Creek Drive. This observation was corroborated by District and City staff and stakeholders who indicated pedestrians travel between the hotels on Commerce Drive and Executive Drive to restaurants and commercial sites across US 62 on Buffalo Creek Drive.

Pedestrian infrastructure on US 62 is infrequent despite the activity that is present. Sidewalks are present west of the study area up to around Brook Street. Short sidewalk sections are near the intersections of North Main Street, Ring Road (KY 3005), Buffalo Creek Drive, and Howell Drive. Paths have been worn into the roadside by pedestrians on US 62 between Buffalo Creek Drive and Commerce Drive. Sidewalks are also present on Ring Road (KY 3005) leading to US 62. Crosswalks and pedestrian crossing signals are located at the intersections of Ring Road (KY 3005) and Buffalo Creek Drive/ Executive Drive. **Figure 7** shows pedestrian activity obtained from StreetLight Data.

Bicyclist activity is low along the US 62 corridor according to 2022 Strava Metro data. StreetLight Data shows the primary area of activity is similar to pedestrian activity, between North Main Street and Commerce Drive. The project team and stakeholders noted that bicyclists ride on the trails around Buffalo Lake, just south of the study area, and recreational cycling is becoming increasingly important to tourism in the area. No cycling infrastructure is currently present on US 62. **Figure 8** shows bicyclist activity obtained from StreetLight Data.

Figure 7: StreetLight Pedestrian Activity in the Study Area

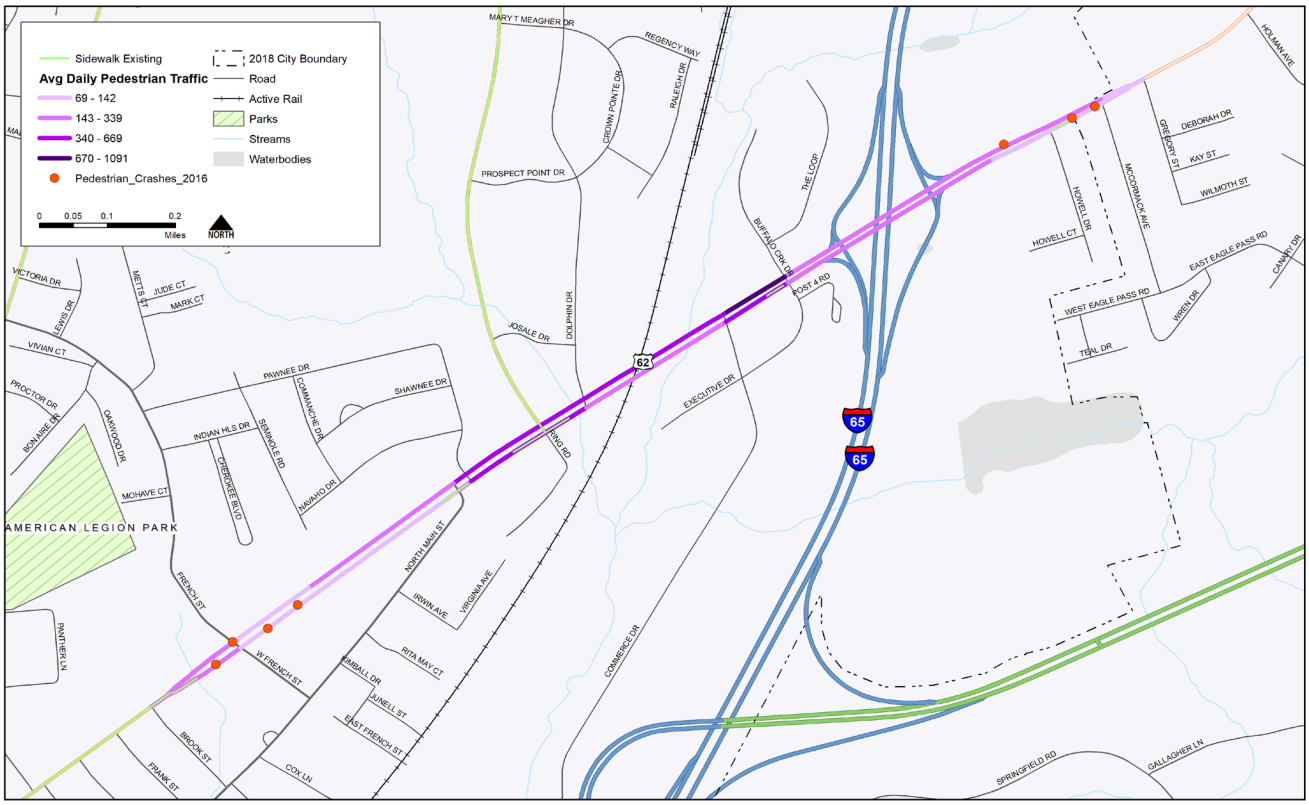


Figure 8: Bicyclist Activity in the Study Area

3 Traffic Volumes and Operations

The traffic analysis addressed three major topics: traffic volumes, traffic operations, and traffic safety. The first two topics are covered in this chapter, while traffic safety is presented in **Chapter 4**. The traffic volume work included examining historical traffic count data, gathering existing traffic counts, and forecasting future traffic to design year 2045. The traffic operations analysis utilized Synchro software to determine if there are any existing operational deficiencies or if any are anticipated by 2045. Raw traffic count data as well as detailed traffic forecasts are presented in the *US 62 Traffic Forecast Report* attached in **Appendix A**. An overview of existing and future year traffic conditions is presented below.

3.1 Existing (2022) Volumes

The existing traffic volumes for this study are comprised of Annual Average Daily Traffic (AADT), Design Hour Volumes (DHV), and percent heavy vehicles. The project team selected 2022 as the baseline year for the existing conditions analysis. Current and historical AADT, K factors, and truck percentage data were obtained from KYTC for three count stations in the study area where there are short-term hourly counts. Existing turning movement counts (TMCs) were collected from one of three sources: KYTC District 4 (D4), the *2021 East Elizabethtown Connectivity*, or StreetLight (SL) data (see **Table 4**), during the AM and PM peak hours. All existing count data are presented in the *US 62 Traffic Forecast Report* in **Appendix A**.

Current and historical average AADT, K factors, and truck percentage information was obtained from KYTC along US 62 in the study area at the following count stations for years 2017, 2020, or 2021, as available:

- 047A35 (US 62 – MP 18.178 to 19.391)
- 047B72 (US 62 – MP 19.391 to 20.115)
- 047B44 (US 62 – MP 20.115 to 20.823)

The counts provided hourly traffic volume data by vehicle class and direction. **Table 3** presents these counts.

Table 3: US 62 Study Area Historical Count Station Data

Station	County	Route	Begin MP	End MP	Count Year	AADT	K Factor	D Factor	% Single Truck*	% Combo Truck*	% Total Trucks*
047A35	Hardin	US 62	18.178	19.391	2020	12,375	8.8	51	3.6	2.1	5.7
047B72	Hardin	US 62	19.391	20.115	2021	23,378	9.2	61	3.6	2.1	5.7
047B44	Hardin	US 62	20.115	20.823	2017	8,918	9.0	61	6.0	3.2	9.2

**Rounded to the nearest 0.1%*

3.1.1 2022 Intersection Volumes

Peak period intersection TMCs were obtained from KYTC District 4 (D4), StreetLight Data (SL), and the *2021 East Elizabethtown Connectivity* (EECS). The project team utilized turning movement volumes estimated from Street Light Data for intersections where counts were not already available. **Table 4** lists the intersections evaluated as part of this study and the source of the TMCs for each. The project team initially did not intend to include the Pawnee Drive intersection in the analysis due its close proximity to North Main Street, thus it was not counted or included in the traffic forecast or initial capacity analysis. However, as concept development progressed, the team decided to include it, and intersection volumes were estimated through a process of balancing with the forecasted volumes of North Main Street and KY 3005 (Ring Road).

Table 4: US 62 Study Area Intersections and TMC Sources

Intersection #	Cross Street	Count Source
1	Brook Street	SL
2	West French Street	D4
3	North Main Street	EECS
4	Pawnee Drive	N/A
5	KY 3005 (Ring Road)	D4
6	Dolphin Drive	EECS
7	Commerce Drive	EECS
8	Buffalo Creek Drive/Executive Drive	D4
9	I-65 Southbound Ramp	D4
10	I-65 Northbound Ramp	D4
11	Medley Lane	SL
12	Howell Drive	SL
13	McCormack Avenue	SL
14	Gregory Street	SL

The count data shows that volumes are lowest at the ends of the study area and highest near the I-65 interchange and the intersections immediately to the west of the interstate. Traffic flows are highest in the westbound direction in the AM peak and eastbound in the PM peak. **Figure 9** presents year 2022 volumes.

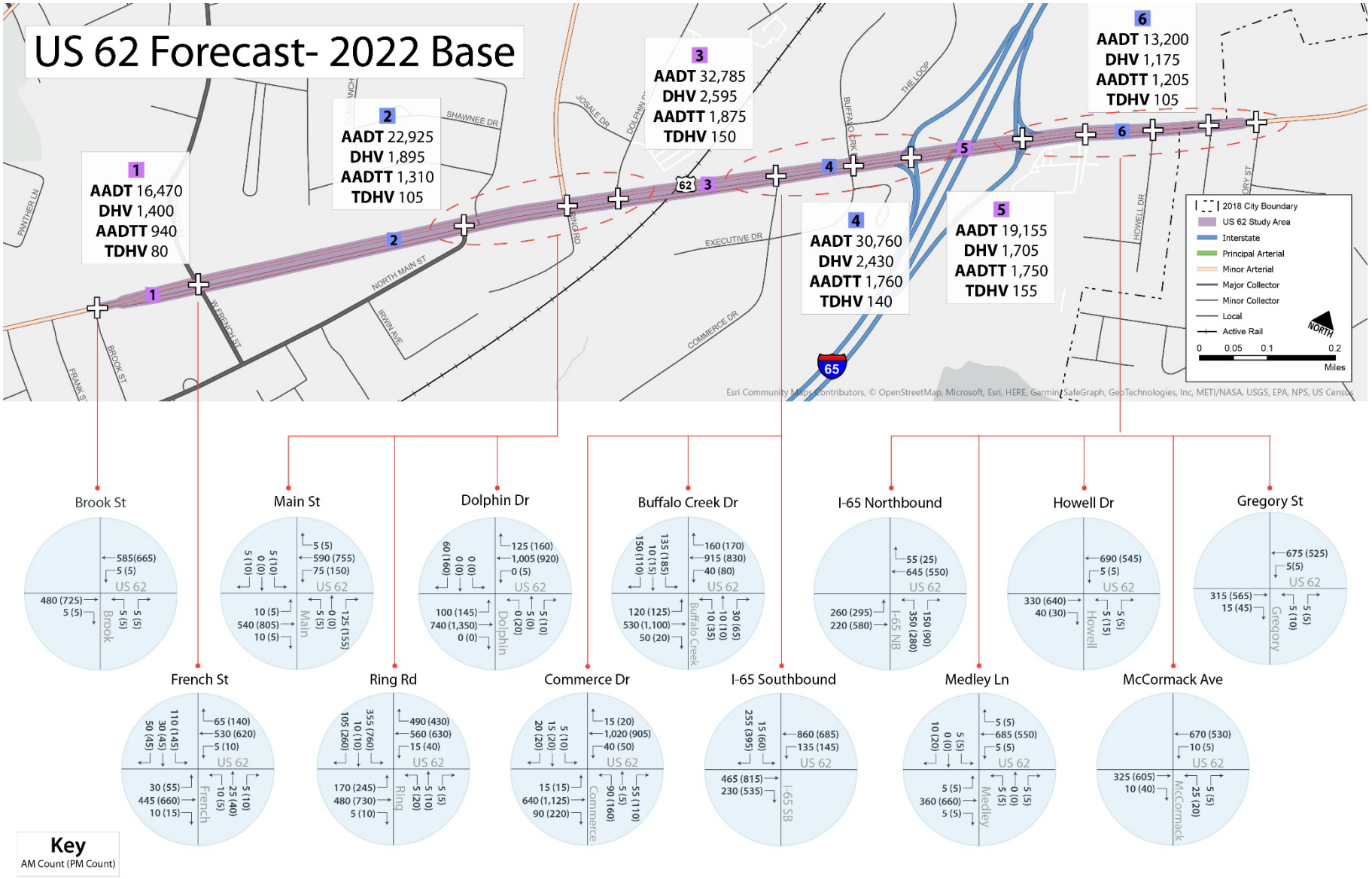
3.1.2 2022 AADT and DHV volumes

The corridor was divided into six segments for evaluation, shown in **Table 5**. AM and PM DHV for the segments were determined by using the maximum realized volume between intersections from the balanced intersection volume in segments 1-5. The project team determined a DHV between the highest and lowest balanced volume would be used in Segment 6, as there are multiple intersections between the ends of the segment. The AADT chosen for the segment forecast is the maximum calculated by combining AM and PM DHVs with the relative peak hour K Factor. The resulting AADT volumes are presented in **Table 5**. AADTs increased west to east with the highest volumes experienced between KY 3005 (Ring Road) and I-65, after which volume decreases east of the interstate.

Table 5: 2022 Baseline Traffic Volumes

Segment	Description	AADT	AM DHV	PM DHV	AADTT	AM TDHV	PM TDHV
1	Brook Street to West French Street	16,470	1,075	1,400	940	65	80
2	West French Street to KY 3005 (Ring Road)	23,100	1,340	1,895	1,320	85	110
3	KY 3005 (Ring Road) to Commerce Drive	32,850	1,905	2,595	1,880	110	150
4	Commerce Drive to I-65 Southbound Ramp	30,760	1,810	2,430	1,760	105	140
5	I-65 Southbound Ramp to I-65 Northbound Ramp	19,155	1,475	1,705	1,750	150	155
6	I-65 Northbound Ramp to Gregory Street	13,200	1,050	1,175	1,205	105	105

Figure 9: 2022 AADT and DHV



3.1.3 2022 Truck Volumes

Truck percentage data was obtained from the KYTC Statewide Traffic Counts Map[1]. These data were used to estimate Average Annual Daily Truck Traffic (AADTT) and truck DHVs (TDHV). Trucks make up approximately 6% of the daily traffic west of the interstate and 9% of the daily traffic east of the interstate. The TDHVs range from a low of 65 vph at the western end of the study area to a high of 155 vph at the I-65 interchange. **Table 5** presents 2022 AADTT and TDHV for each segment along US 62.

3.2 Future (2045) Volumes

Traffic volumes were projected to the 2045 design year to be consistent with the American Association of State Highway and Transportation Officials (AASHTO) policy, which calls for forecasts to be at least 20 years beyond the year in which the project plans, specifications, and estimates for construction are approved. The traffic forecast includes projections for AADT, DHV, and truck volumes. Details for the volume forecasting work are presented in the *US 62 Traffic Forecast Report* attached in **Appendix A**.

3.2.1 Traffic Growth Rate

The traffic growth rate was based on three factors:

1. Historical traffic counts for growth trends
2. Results from travel demand models
    a. KYTC Hardin-Meade Model
    b. Kentucky Statewide Travel Demand Model (KYSTM Build 5976)
3. Expected population growth in Hardin County

The historical traffic growth along US 62 showed negative growth or no growth in traffic volumes from the year 2007 to the present. The KYTC Hardin-Meade Model shows a growth rate of 0.36% per year, while the Statewide Model shows a growth rate of approximately 1.3% per year. The population in Kentucky between 2010 and 2020 grew at a rate of approximately 0.4% per year and is expected to continue this trend out to 2045. Hardin County experienced a historical growth rate of 0.5% per year and is expected to grow at a rate of 0.6% per year in the future.

Given the low historical growth, model growth rates and population growth, a 0.5% annual growth rate for AADT, DHV, and truck volumes was selected for this study. This growth rate is sufficient to test traffic operational performance in the study area over the next 23 years.

3.2.2 2045 Volumes

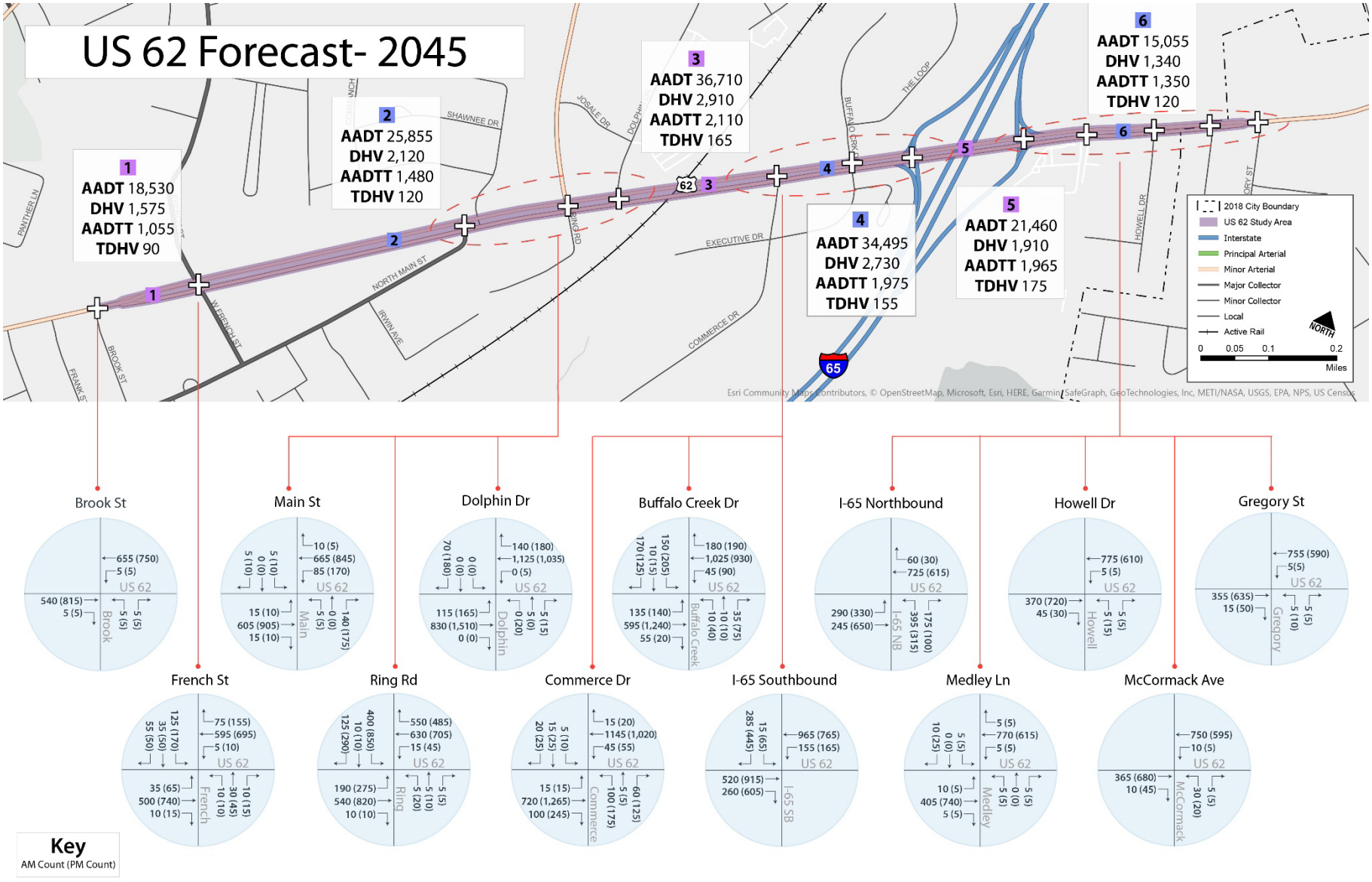
The projected 2045 AADT, DHVs, and truck volumes are presented in **Table 6** and **Figure 10**. AADTs are expected to range from 15,055 vpd east of the I-65 interchange to 36,835 vpd just west of the I-65 interchange. Similarly, the DHVs range from 1,340 east of I-65 to 2,910 just west of I-65.

Table 6: Future Year (2045) Traffic Volumes

Segment	Description	AADT	AM DHV	PM DHV	AADTT	AM TDHV	PM TDHV
1	Brook Street to West French Street	18,530	1,205	1,575	1,055	70	90
2	West French Street to KY 3005 (Ring Road)	25,855	1,510	2,120	1,480	95	120
3	KY 3005 (Ring Road) to Commerce Drive	36,835	2,140	2,910	2,110	125	165
4	Commerce Drive to I-65 Southbound Ramp	34,555	2,030	2,730	1,975	115	155
5	I-65 Southbound Ramp to I-65 Northbound Ramp	21,460	1,655	1,910	1,965	170	175
6	I-65 Northbound Ramp to Gregory Street	15,055	1,170	1,340	1,350	115	120

1 https://maps.kytc.ky.gov/trafficcounts/

Figure 10: 2045 AADT and DHV



3.3 Traffic Operational Analysis

The traffic operational analysis was conducted using Synchro software, which is based on the *Highway Capacity Manual (HCM), 6th Edition* methods to determine capacity and Level of Service (LOS). The operational analysis was focused on intersection operations and delay because US 62 is a four-lane section throughout the study area and capacity between intersections was not a concern.

At intersections, LOS is a measure of average operating conditions during an hour. It is based on average delay per vehicle for a specified time period. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). Signalized intersection LOS is defined by the average vehicle delay incurred from the signal controllers. **Table 7** provides LOS criteria for unsignalized and signalized intersections.

Table 7: LOS Criteria for Unsignalized and Signalized Intersections

LOS	Average Control Delay Unsignalized (sec/veh)	Average Control Delay Signalized (sec/veh)	LOS Description
A	≤ 10	≤ 10	Little or no delay
B	> 10 and < 15	> 10 and < 20	Short traffic delays
C	> 15 and < 25	> 20 and < 35	Average traffic delays
D	> 25 and < 35	> 35 and < 55	Long traffic delays
E	> 35 and < 50	> 55 and < 80	Very long traffic delays
F	> 50	> 80	Severe congestion

Using the criteria listed above, intersection as well as segment analysis was completed for both existing (2022) and future (2045) traffic along US 62. The software outputs of the traffic operational analysis can be found in **Appendix B**.

3.3.1 Existing Conditions (2022) Analysis

Of the 13 intersections analyzed, all operate at LOS D or better during both the AM and PM peak hours. The results are presented in **Table 8** below.

Table 8: 2022 Intersection Level of Service

Intersection	Control Type	AM Peak Hour Delay (s)	AM Peak Hour LOS	PM Peak Hour Delay (s)	PM Peak Hour LOS
Brook Street	Unsignalized	0.2	A	0.1	A
West French Street	Signalized	11.7	B	14.0	B
North Main Street	Unsignalized	2.0	A	3.5	A
KY 3005 (Ring Road)	Signalized	26.1	C	43.0	D
Dolphin Drive	Unsignalized	0.0	A	0.0	A
Commerce Drive	Signalized	13.9	B	22.4	C
Buffalo Creek Drive/Executive Drive	Signalized	19.7	B	31.8	C
I-65 Southbound Ramp	Signalized	10.2	B	14.4	B
I-65 Northbound Ramp	Signalized	21.5	C	19.5	B
Medley Lane	Unsignalized	0.3	A	0.4	A
Howell Drive	Unsignalized	0.1	A	0.2	A
McCormack Avenue	Unsignalized	0.5	A	0.5	A
Gregory Street	Unsignalized	0.2	A	0.4	A

3.3.2 Future Conditions (2045) Analysis

All 13 intersections are expected to operate at LOS D or better in the year 2045, as shown in **Table 9**.

Table 9: 2045 Intersection Level of Service

Intersection	Control Type	AM Peak Hour Delay (s)	AM Peak Hour LOS	PM Peak Hour Delay (s)	PM Peak Hour LOS
Brook Street	Unsignalized	0.1	A	0.1	A
West French Street	Signalized	12.4	B	16.0	B
North Main Street	Unsignalized	2.1	A	5.1	A
KY 3005 (Ring Road)	Signalized	29.6	C	49.3	D
Dolphin Drive	Unsignalized	0.0	A	0.0	A
Commerce Drive	Signalized	14.9	B	24.2	C
Buffalo Creek Drive/Executive Drive	Signalized	20.7	C	34.6	C
I-65 Southbound Ramp	Signalized	12.8	B	17.7	B
I-65 Northbound Ramp	Signalized	24.7	C	19.4	B
Medley Lane	Unsignalized	0.4	A	0.4	A
Howell Drive	Unsignalized	0.1	A	0.2	A
McCormack Avenue	Unsignalized	0.6	A	0.5	A
Gregory Street	Unsignalized	0.2	A	0.4	A

3.4 Corridor Speeds

Travel speeds can be an indicator of how a roadway is operating. Under normal operating conditions drivers would typically be traveling close to the posted speed limit. Locations with recurring operating speeds below the posted speed could indicate a geometric deficiency, such as a curve with a tight radius, or the lower speeds could be the result of intersection related delay, such as vehicles slowing down to turn into cross streets or from having to stop at signalized intersections. To aid in the speed evaluation, KYTC provided 2021 HERE speed data for the US 62 study area. The speed data was used to determine typical operating speeds in one-hour increments throughout the day, including during the AM and PM peak hours.

Operating speeds were analyzed temporally and geographically to assess the efficiency of traffic flow along US 62. By time of day, 85th percentile speeds are generally consistent and typically only vary by up to 5 mph at a location during any hour. US 62 85th percentile speeds in the 45 mph posted speed limit area were generally within +/- 10 mph of the posted speed limit. Observed speeds in the 35 mph posted speed limit area at Brook Street were generally greater than 10 mph over posted. Speeds tended to decrease at the approaches to intersections controlled by traffic signals with the largest decrease in speeds occurring at the KY 3005 (Ring Road) intersection. **Figures 11** and **12** show eastbound and westbound 85th percentile speeds, respectively, throughout the day by mile point. Additional speed graphs are included in **Appendix C**.

Figure 11: Eastbound 85th Percentile Speeds

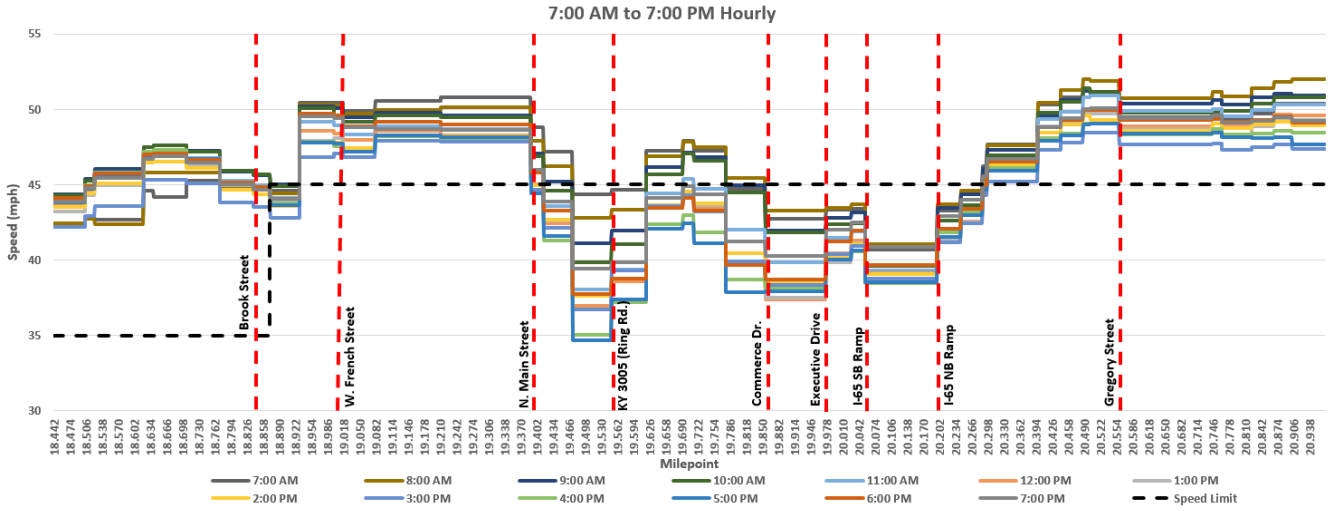
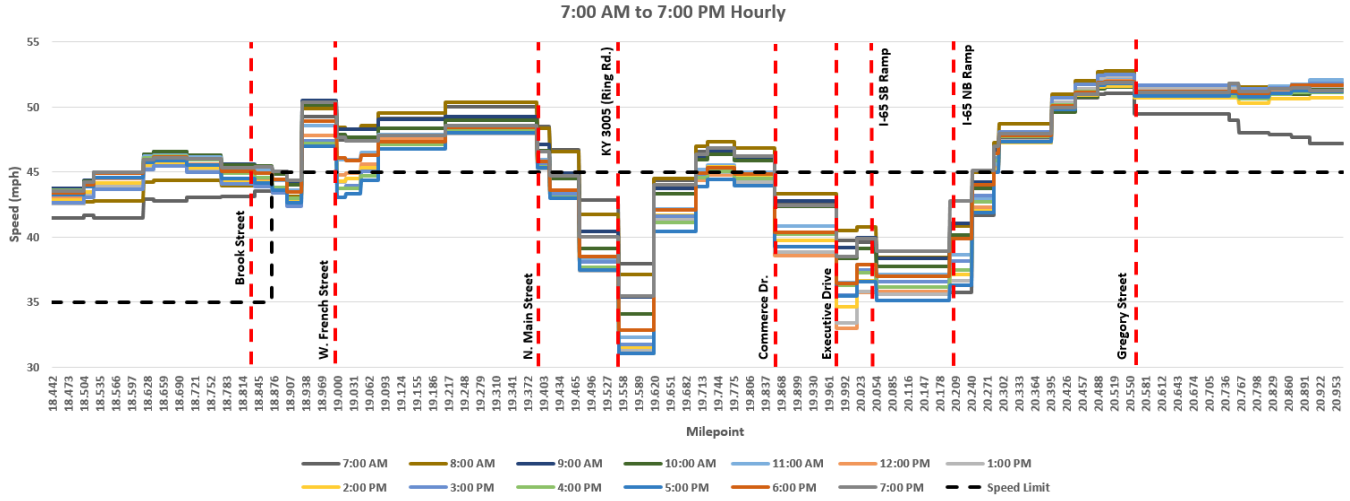


Figure 12: Westbound 85th Percentile Speeds



4 Safety

4.1 Historic Crash Analysis

A historical crash analysis was performed to examine traffic safety trends and to identify potential safety issues along US 62. The crash data was derived from data provided by KYTC and the Kentucky State Police (KSP) database. Five years of data (2017 to 2021) were used in the analysis and are presented throughout the rest of this chapter. It should be noted that the KYTC crash data from the Crash Data Access Tool (CDAT) was updated midway through the project from the 2016-2020 five-year crash data to the 2017-2021 five-year crash data. The crash data excluding crash ID numbers can be found in **Appendix D**.

Within the five-year analysis period, 394[2] crashes were reported in the study area. A breakdown of the crashes by severity is presented in **Table 10** and is shown in **Figure 13**. A majority of the crashes (86%) were property damage only (PDO) crashes. There were eight serious injury and 25 minor injury crashes over the 5-year study period. There was one fatal crash reported.

Table 10: US 62 Crash Severity (2017-2021)

Severity of Crash	Crashes	Percent
Fatal Injury	1	0.3%
Serious Injury	8	2.0%
Minor Injury	25	6.3%
Possible Injury	21	5.3%
Property Damage Only	339	86.0%
Total	394	100.0%

2 41 crashes were identified in the KSP data that were not in the CDAT data as they were actually coded to side streets and not US 62.

Figure 13: US 62 Crash Severity by Location (2017-2021)

An examination of the type of crashes along US 62 is presented in **Table 11** and **Figure 14**. Approximately 44 percent of crashes in the study area were rear end crashes followed by angle (31.2%), and sideswipe, same direction (11.9%) type crashes. A review of the locations of these crashes suggests that approximately 80% of them occurred at intersections or driveways. **Figure 15** shows manner of collision by intersection. Rear end and angle crashes were common at these intersections and driveways. This is consistent with the nature of the study area with its 81 access points, as discussed in **Section 2.2**.

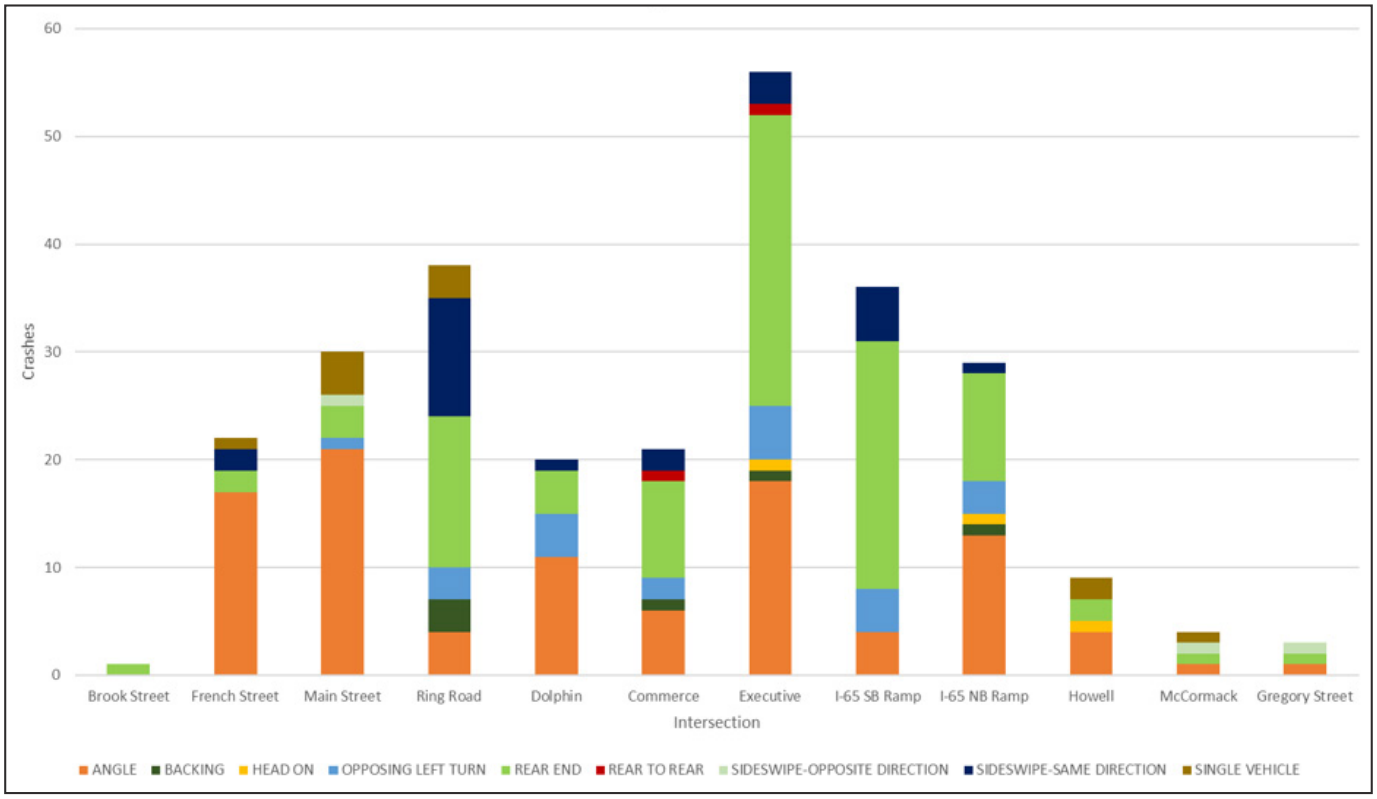
A closer review of rear end crashes was performed to determine if there were any trends or contributing factors. Approximately 72% of rear end crashes involved a signalized intersection where queuing occurs. More specifically, the most rear end crashes occurred in the westbound direction weaving section between the I-65 southbound ramp and the Buffalo Creek Drive intersection, a location with a right turn yield and queuing at the intersection. Angle crashes occur at intersections and locations with a lot of access points. As stated above there was one fatal crash and eight serious injury crashes reported during the 5-year study period. Of the nine severe crashes, four were angle crashes, two were opposing left turn crashes, two involved pedestrians, and the other was a single vehicle crash.

Table 11: US 62 Crashes by Manner of Collision (2017-2021)

Crash Type	Crashes	Percent
Angle	123	31.2%
Backing	3	0.8%
Head On	3	0.8%
Opposing Left Turn	25	6.3%
Rear End	173	43.9%
Rear to Rear	0	0.0%
Sideswipe, Opposite Direction	2	0.5%
Sideswipe, Same Direction	47	11.9%
Single Vehicle	18	4.6%
Total	**394**	**100.0%**

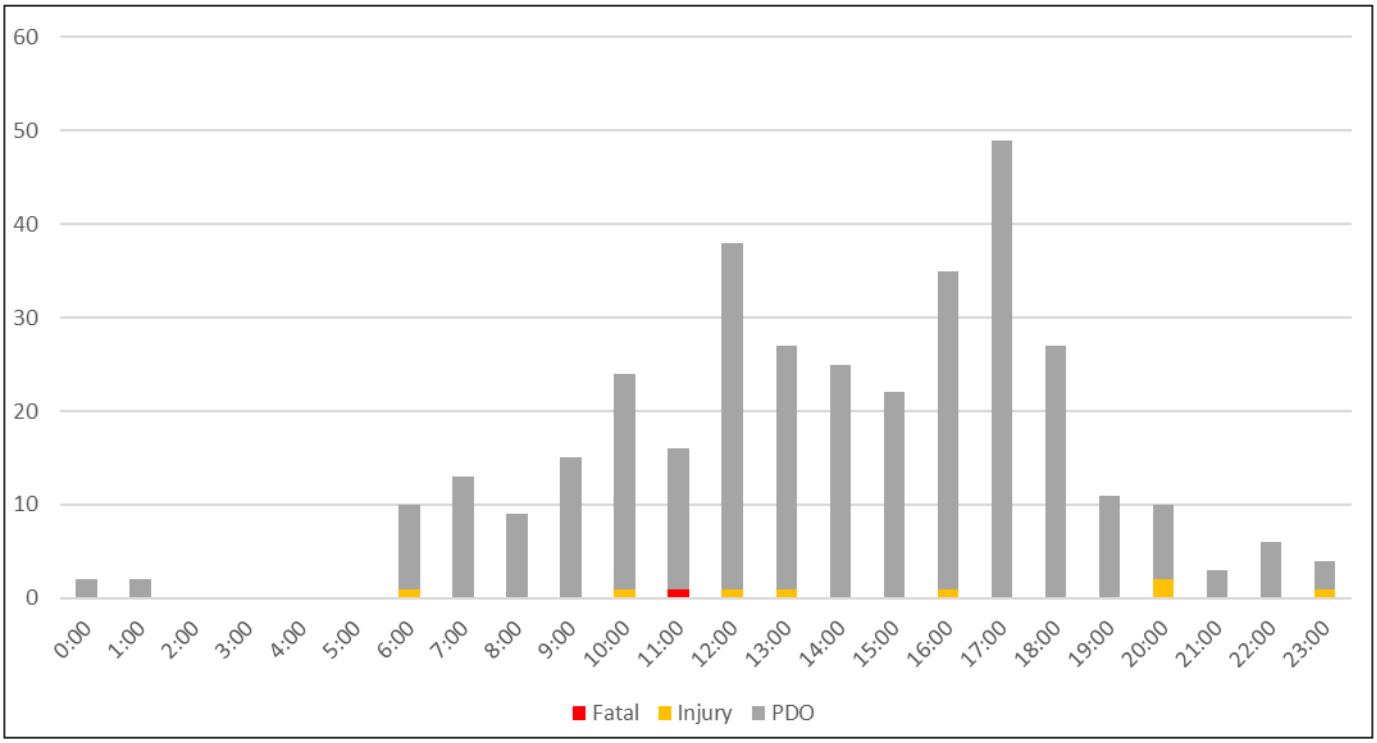
Figure 14: US 62 Crash Type by Location (2017-2021)

Figure 15: Manner of Collision by Intersection (2017-2021)



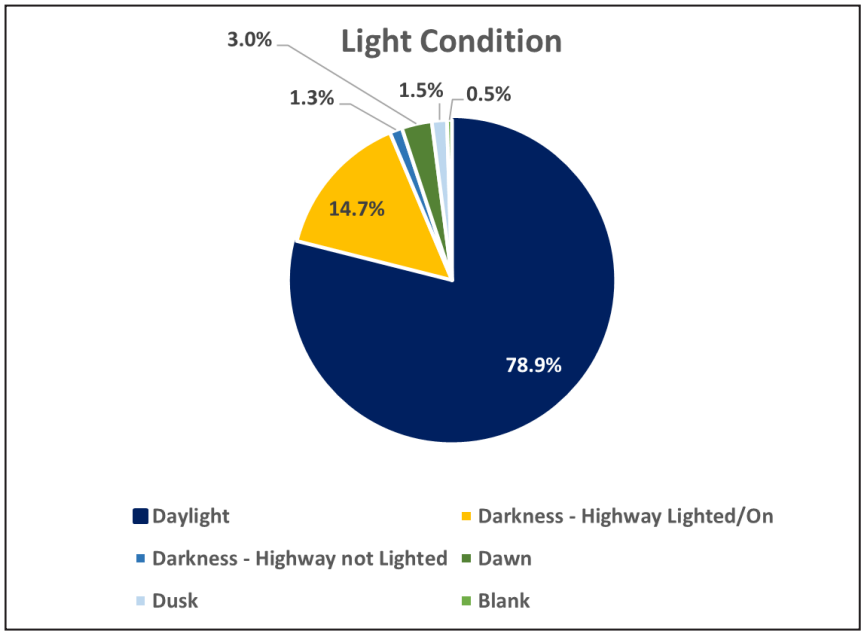
A review of crashes and crash severity by time of day, **Figure 16**, shows that crashes have a slightly abnormal pattern with a spike in crashes around lunch time at noon and the largest number of crashes occurring during the PM peak period of 5:00 PM to 6:00 PM.

Figure 16: Crash Severity by Time of Day (2017-2021)



A majority of the crashes occurred during daylight hours (**Figure 17**); however, approximately 21% occurred during dark or dawn/dusk hours indicating that the present lighting is not an issue along the study area. Crashes during dark and dawn/dusk conditions appear to be lower than similar corridors without lighting, where dark or dawn/dusk crashes are typically around 33%.

Figure 17: Crashes by Light Condition (2017-2021)



Seven pedestrian crashes occurred along the corridor with two of these crashes resulting in a serious injury. Two of the crashes indicated that the pedestrian was in a crosswalk crossing US 62, one crash indicated the pedestrian was crossing US 62 outside of a crosswalk, and the remaining four crashes indicated that the pedestrian was walking along the shoulder parallel to US 62 and was struck by vehicles exiting side streets or businesses or vehicles traveling along US 62.

The density of crashes along the study area was plotted (**Figure 18**) to show locations with higher concentrations of crashes. Two trends emerged from a review of the plotted crash densities. The first is that crashes are denser at intersections, such as at West French Street, North Main Street, KY 3005 (Ring Road), Commerce Drive, Buffalo Creek Drive, and the I-65 interchange ramps, than at segments in between intersections. The second is that crashes are generally denser west of the I-65 interchange where a higher concentration of driveways and intersecting roadways are present. As stated above, most crashes are occurring in the westbound direction between the I-65 southbound ramp and the Buffalo Creek Drive signalized intersection.

Figure 18: US 62 Crash Density (2017-2021)

US 62 intersection and segment crash rates were calculated using the 2017-2021 crash data and traffic volumes. The entire section of US 62 is considered an urban, four-lane divided highway. The crash rates calculated for these sections were compared to statewide urban, four-lane divided highway average crash rates[3].

The analysis showed that US 62 experienced a higher-than-average number of crashes per 100 million vehicle miles traveled (MVM) compared to similar type facilities throughout Kentucky in the urban, four-lane divided highway sections. **Tables 12** and **13** provide further crash rate analysis details for both intersections and the full corridor.

Table 12: US 62 Intersection Crash Rate – All Crashes

Intersection	Begin MP	AADT	Number of Crashes[1]	Crash Rate[2]	Fatal/Serious Injury Crashes
Brook Street	18.839	16,600	5	0.17	0
West French Street	18.999	19,586	33	0.92	1
North Main Street/Pawnee Drive	19.391	23,021	21	0.50	1
KY 3005 (Ring Road)	19.551	35,302	33	0.51	1
Dolphin Drive	19.601	26,150	26	0.54	0
Commerce Drive	19.856	26,150	32	0.67	1
Buffalo Creek Drive/Executive Drive	19.977	26,400	64	1.33	0
I-65 Southbound Ramp	20.038	26,400	35	0.73	0
I-65 Northbound Ramp	20.198	9,500	29	1.67	1
Medley Lane	20.320	9,200	0	0.00	0
Howell Drive	20.398	9,200	33	1.97	1
McCormack Ave	20.488	9,200	7	0.42	2
Gregory Street	20.560	9,200	3	0.18	0

[1]*Includes 5-year crash data from 2017-2021*

[2]*Rate per 1 million vehicle miles traveled (MVM)*

Table 13: US 62 Segment Crash Rate – All Crashes

Segment	Begin MP	End MP	Number of Crashes[1]	Crash Rate[2]	Statewide Average Crash Rate
Four-Lane Divided	18.839	20.560	394	473	3403

[1]*Includes 5-year crash data from 2017-2021*

[2]*Rate per 100 million vehicle miles traveled (MVM)*

[3]*Average statewide crash rate (5-year average) for urban four-lane divided highways per 100MVM for all crashes*

3 Analysis of Traffic Crash Data in Kentucky 2017 - 2021, Research Report KTC-21-26/KSP2-21-1F

4.2 Excess Expected Crashes

KYTC and the Kentucky Transportation Center (KTC) have developed a more refined statistical methodology based on the *Highway Safety Manual (HSM)* to rank the safety needs of projects. Excess Expected Crashes (EEC) is based on a crash prediction model estimating the number of crashes expected on an average roadway segment of a given type and length. It represents the number of excess crashes a segment is experiencing compared to other similar type roadways, adjusting for traffic volumes and relevant statistical corrections. EEC is positive when more crashes are occurring than expected and negative when fewer crashes are occurring than expected.

The EEC values for US 62 were obtained from KYTC and are color coded on **Figure 19**. US 62 experiences a mixture of positive and negative EEC values at intersections and segments. Basic trends from the EEC analysis show that the intersections with North Main Street, Dolphin Drive, Buffalo Creek Drive, and Howell Drive are experiencing greater than expected crashes. The segments are experiencing a mix of higher and lower expected crashes with the higher expected crashes occurring between KY 3005 (Ring Road) and Dolphin Drive, Commerce Drive and the I-65 southbound ramp, and the I-65 northbound ramp and McCormack Lane, which have positive EEC values.

When looked at as a group, the segments and intersections within the study area are experiencing an overall negative EEC value, which have a mix of positive and negative EEC values throughout the corridor. The study area has a negative EEC value of –56.75 indicating it experiences fewer than the expected number of crashes. These results indicate that overall, US 62 is operating better than would be predicted for an arterial roadway with similar traffic volumes. Intersections along this roadway, however, are experiencing slightly higher than expected crashes.

Figure 19: US 62 Excess Expected Crashes Map (2017-2021)

4.3 Summary of Safety Issues and Use of Safety Data

Overall, safety is performing nearly as expected when comparing to similar corridors across the state of Kentucky. Major issues appear to occur at intersections and locations with a high density of access points, specifically east of I-65 and west of the KY 3005 (Ring Road) intersection. For multimodal purposes, the lack of connected pedestrian and bicycle facilities has resulted in seven pedestrian crashes. One location that did not have pedestrian crashes reported was the railroad bridge, a location where pedestrians use the shoulder as they approach the bridge, and the sidewalks underneath are less than three feet wide. Pedestrian activity could become a safety problem in the future at this location. Pedestrian crashes also occurred within crosswalks or in mid-block locations where crosswalks are not present. Some locations did not have crosswalk paint and some only have the two parallel line approach, lacking visibility for drivers. Another key issue is the crosswalk length across US 62 with crosswalk distances of approximately 110 feet and a lack of pedestrian refuge. Adding pedestrian detection may negatively impact signal timing; however, adding a median refuge could mitigate the impacts to signal operations while improving pedestrian safety.

Vehicular crashes typically occur at intersections, specifically the I-65 southbound ramp to the Buffalo Creek Drive intersection, the Howell Drive intersection, and the Main Street intersection. For the I-65 southbound ramp to Buffalo Creek Drive intersection, rear ends and angle crashes are higher than average, possibly due to the pairing of a short weaving section, a yield for right-turning vehicles at the I-65 southbound ramp, and the short intersection spacing that typically shows queuing at peak hours throughout the day. The Howell Drive intersection has a two-way left turn lane and a merge section with full access to the roadway, including a lot of potentially dangerous scenarios for a driver exiting Howell Drive. The North Main Street intersection is unsignalized and closely spaced to the Pawnee Drive access point, as well as numerous driveways of commercial businesses to the east and west. The left turn movement has a longer distance to perform what can be considered a dangerous maneuver. The higher density of access points paired with the double left turn lanes can also lead to driver confusion.

The results for potential safety and traffic operational improvements at these locations are explored later in this report. The historic crash data, EEC information, and crash rates (calculated using the crash and volume data) were all used to develop potential improvement concepts.

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5 Development of Potential Improvement Concepts

Based on the existing conditions, traffic, and safety analysis, an initial list of potential improvement concepts was developed and presented to the project team at the second Project Team Meeting. Separate tables were presented for corridor-wide concepts, intersection concepts, interchange concepts, and for the railroad crossing.

5.1 East Elizabethtown Connectivity Study Concept Refinement

The *2021 East Elizabethtown Connectivity Study identified* 11 improvement concepts on US 62 in the study area, comprised of nine short-term and two long-term. The consultant team reviewed the concepts with the existing conditions data and traffic analyses to evaluate the potential of these concepts to be incorporated into corridor-wide and spot improvement concepts. **Table 14** lists the improvement concepts from that study.

Table 14: Recommendations from the 2021 East Elizabethtown Connectivity Study

Location	Improvement Concept	Time Frame
US 62 @ Commerce Drive	Update Intersection Alignment	Short-Term
US 62 @ Commerce Drive	New Connection from Commerce Drive to Buffalo Creek Drive	Short-Term
US 62 @ Buffalo Creek Drive	Complete a Dedicated Intersection Traffic Study	Short-Term
US 62 @ Main Street/Pawnee Drive	Add a Dedicated Right-Turn Lane from US 62 to Pawnee Drive and Reconfigure the Median	Short-Term
US 62 @ Dolphin Drive	Add a Right-Turn Lane from WB US 62 to NB Dolphin Drive, Redefine Median, and Improve Left Turn Movement with Striping	Short-Term
US 62 @ West French Street	Redefine and Offset the Left Turn Lanes	Short-Term
US 62 from Brook Street to Buffalo Creek Drive	Fill in Missing Sidewalk Sections and Aesthetic Upgrades	Short-Term
US 62 @ I-65 Overpass	Create a Fenced-Off Pedestrian Walkway Along One Side of the Overpass	Short-Term
US 62 @ CSX Railroad Underpass	Construct a Wider Bridge	Long-Term
US 62 @ I-65 Interchange	Redesign the Interchange into a Single Point Urban Interchange	Long-Term

5.2 Corridor-wide Potential Improvement Concepts

Potential improvement concepts that could be implemented for the entire corridor or sections of the corridor were developed, and a high-level analysis of each concept was performed. This included expected right-of-way impacts, the type of access management that would be possible, high-level traffic and safety performance, and what, if any, environmental impacts may result. This list is shown in **Table 15**.

During the second Project Team Meeting the team decided not to move forward with certain concepts based on the information presented and discussed. The various improvement concepts presented are discussed in the following sections.

5.2.1 Existing with Pedestrian Upgrades Only

The first corridor-wide improvement concept added pedestrian and bicycle facilities to US 62 using two options. Concept 1.A provided a five-foot sidewalk on the south side of US 62 and a 10-foot-wide shared use path on the north side, both at the back of right-of-way. Concept 1.B provided a sidewalk on both sides of US 62 at the back of right-of-way and 6-foot-wide bike lanes on US 62. The travel lanes remained 12 feet wide, and the median did not change. Access management was not addressed with this concept. This typical section is shown in **Figure 20**.

5.2.2 Restricted Crossing U-Turn (RCUT) Corridor with Existing Wide Median

The second corridor-wide improvement concept added pedestrian and bicycle facilities to US 62 using two options, and managed access by extending the 32-foot-wide depressed median and providing RCUTS. Concept 2.A provided a five-foot sidewalk on the south side of US 62 and a 10-foot-wide shared use path on the north side, both at the back of right-of-way. Concept 2.B provided a sidewalk on both sides of US 62 at the back of right-of-way and 6-foot-wide bike lanes on US 62. The travel lanes remained 12 feet wide with shoulders. Where left turns from US 62 were still allowed, raised channelization would be added. This typical section is shown in **Figure 21.**

5.2.3 RCUT Corridor with Narrowed Median (Outside Shoulders Remain)

The third corridor-wide improvement concept added pedestrian and bicycle facilities to US 62 using two options, and managed access by adding a 20-to 24-foot-wide raised median and providing RCUTs. Concept 3.A provided a five-foot sidewalk on the south side of US 62 and a 10-foot-wide shared use path on the north side, both at the back of right-of-way. Concept 3.B provided a sidewalk on both sides of US 62 at the back of right-of-way and 6-foot-wide bike lanes on US 62. The travel lanes were reduced to 11 feet wide with outside shoulders still provided. Where left turns from US 62 were still allowed, raised channelization would be added. This typical section is shown in **Figure 22**.

5.2.4 RCUT Corridor with Narrowed Median and Curb and Gutter

The fourth corridor-wide improvement concept added pedestrian and bicycle facilities to US 62 using two options, replaced shoulders with curb and gutter, managed access by adding a 20- to 24-foot-wide raised median, and provided RCUTs. Concept 4.A provided a five-foot sidewalk on the south side of US 62 and a 10-foot-wide shared use path on the north side, both offset from curb and gutter. Concept 4.B provided a sidewalk on both sides of US 62 offset from curb and gutter and 6-foot-wide bike lanes on US 62. The travel lanes were reduced to 11 feet wide. Where left turns from US 62 were still allowed, raised channelization would be added. This typical section is shown in **Figure 23**.

5.2.5 Roundabout Corridor with Narrowed Median and Curb and Gutter

The fifth corridor-wide improvement concept added pedestrian and bicycle facilities to US 62 using two options, replaced shoulders with curb and gutter, and managed access by adding a 20- to 24-foot-wide raised median. Signalized intersections would be converted to roundabouts. Concept 5.A provided a five-foot sidewalk on the south side of US 62 and a 10-foot-wide shared use path on the north side, both offset from curb and gutter. Concept 5.B provided a sidewalk on both sides of US 62 offset from curb and gutter and 6-foot-wide bike lanes on US 62. The travel lanes were reduced to 11 feet wide. Where left turns from US 62 were still allowed raised channelization would be added. This typical section is shown in **Figure 23**.

Table 15: Initial List of Potential Corridor-Wide Improvement Concepts

Concept No.	"Corridor Concept Description (See Typical Sections)"	Through Lanes	Lane Width	Outside Shoulder or Curb & Gutter	Pedestrian Facilities "A - Shared Use Path Option B - Bike Lane Option"	Bike Facilities "A - Shared Use Path Option B - Bike Lane Option"	Median Type	Access Management	Cost	Right-of-Way Impacts	Utility Impacts	Potential Crash Reduction	Notes	Comments
1	Existing With Pedestrian Upgrades Only	4	12'	10' Paved	A - Sidewalk on south side of US 62 B - Sidewalk on both sides of US 62	A - SUP on north side of US 62 B - Bike Lanes	Depressed Grass / Flush Pavement	None	Low	Low	Low	Low	This concept adds pedestrian/bicycle facilities along US 62. Pedestrian and bike facilities are on a separate alignment at the back of right-of-way.	Does not substantially address safety, instead focuses mostly on providing pedestrian access.
2	RCUT Corridor with Existing Wide Median		12'	10' Paved			Depressed Grass / Raised Concrete	Close access points, convert some to RIRO, extend medians, remove back to back left turn lanes, and accommodate left turns by U-turn	Medium	Medium	Medium	RCUTS/U-turns reduce Fatal and injury crashes ~22-63%	This concept keeps through lanes and existing outside shoulder in current location, works with existing geometry as much as possible. Adds pedestrian/bike facilities. Implements access management and a RCUT U-turn corridor plan. Pedestrian and bike facilities are on a separate alignment at back of right-of-way.	
3	RCUT Corridor with Narrowed Median (Outside Shoulders Remain)		12' or 11'	10' Paved			Raised Grass and Concrete	Close access points, convert some to RIRO, extend medians, remove back to back left turn lanes, and accommodate left turns by U-turn	Medium	Medium	Medium	- RCUTS/U-turns reduce Fatal and injury crashes ~22-63% - Narrowing lanes to 11' increases crashes by 2%	This concept pushes through lanes into the median (maintains a 20' to 24' raised median). Keeps a 10' wide outside shoulder. Adds pedestrian/bike facilities. Implements access management and a RCUT U-turn corridor plan. Pedestrian and bike facilities are along a separate alignment on right-of-way.	Narrower median may make U-turns more difficult, but wider shoulder can help accommodate.
4	RCUT Corridor with Narrowed Median and Curb & Gutter		12' or 11'	Curb & Gutter			Raised Grass and Concrete	Close access points, convert some to RIRO, extend medians, remove back to back left turn lanes, and accommodate left turns by U-turn	High	Medium	Medium	- RCUTS/U-turns reduce Fatal and injury crashes ~22-63% - Narrowing lanes to 11' increases crashes by 2%	This concept pushes through lanes into the median (maintains a 20' to 2't raised median). Uses curb and gutter with pedestrian/bike facilities behind. Implements access management and a RCUT U-turn corridor plan.	Narrower median may make U-turns more difficult. Curb and Gutter should aid in creating a "Gateway to Elizabethtown" and slowing down traffic.
5	Roundabout Corridor with Narrowed Median and Curb & Gutter		12' or 11'	Curb & Gutter			Raised Grass and Concrete	Close access points, convert some to RIRO, extend medians, remove back to back left turn lanes, and accommodate left turns by roundabouts	High	High	Medium	- Converting signalized intersection to roundabout reduces Fatal and Injury crashes by 78%. - Narrowing lanes to 11' increases crashes by 2%	This concept pushes through lanes into the median (maintains a 20' to 24' raised median). Uses curb and gutter with pedestrian/bike facilities behind. Implements access management. Removes traffic signals and provides turning access at roundabouts.	Roundabouts remove the need to provide U-turn loons. Curb and Gutter should aid in creating a "Gateway to Elizabethtown" and slowing down traffic.

Figure 20: Existing with Pedestrian Upgrades Only

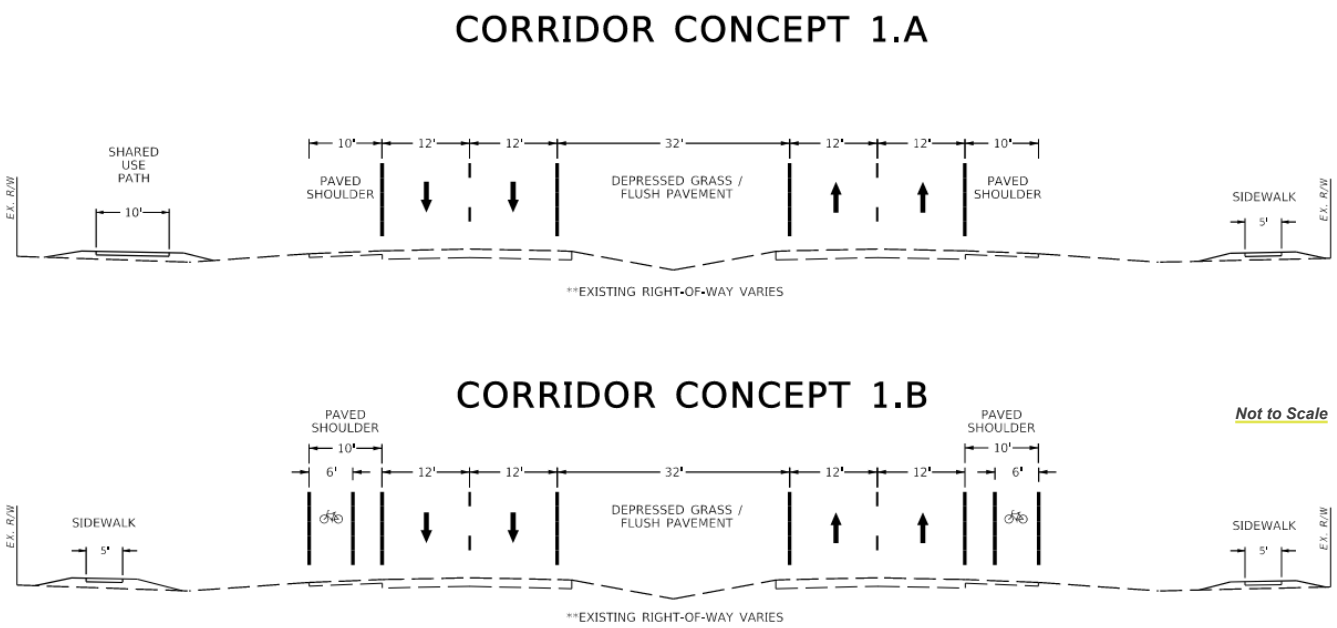


Figure 21: RCUT Corridor with Existing Wide Median

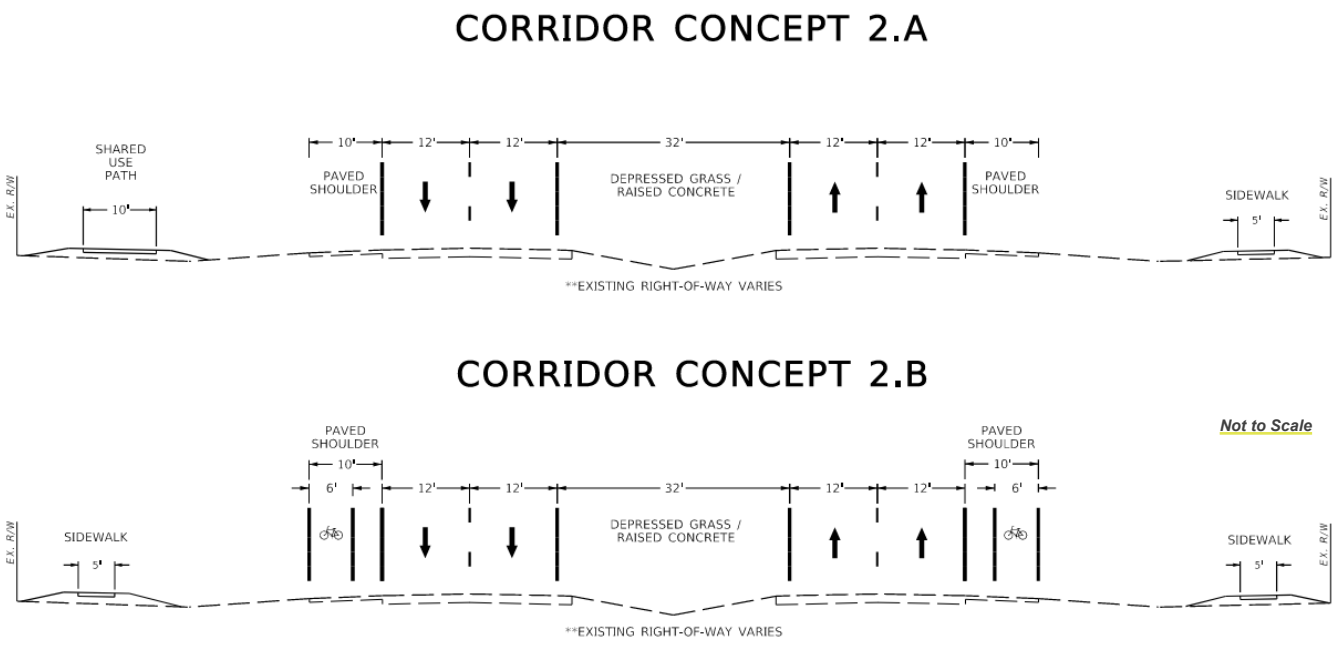


Figure 22: RCUT Corridor with Narrowed Median (Outside Shoulders Remain)

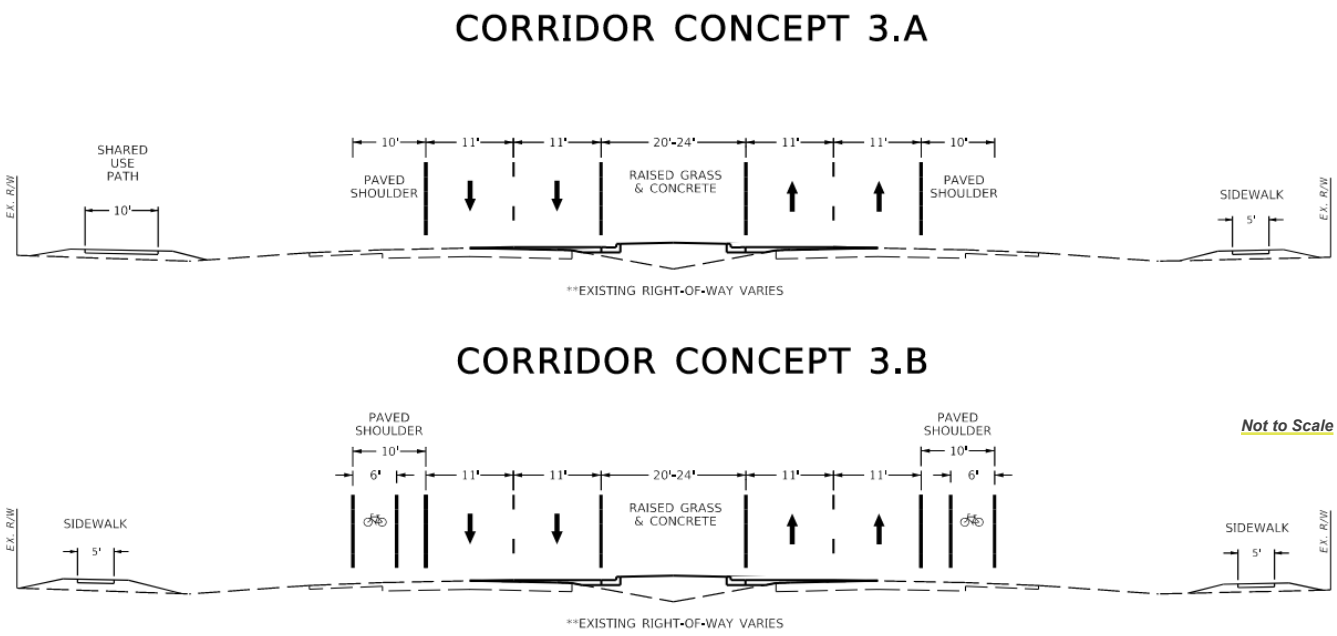
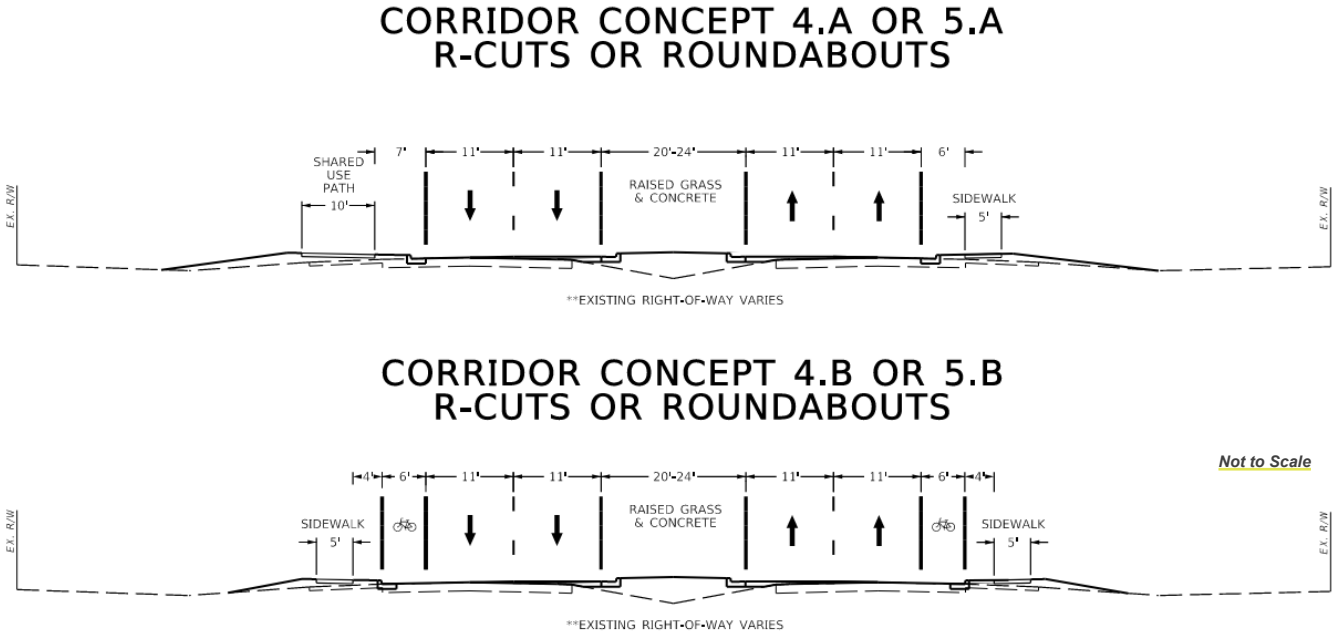


Figure 23: RCUT or Roundabout Corridor with Narrowed Median and Curb and Gutter



5.2.6 Summary of Corridor-Wide Potential Improvement Concepts

The corridor-wide potential improvement concepts described above were shared with the project team at the second Project Team Meeting. The project team agreed to eliminate the first concept, which only added pedestrian and bicycle facilities to the corridor, since this concept did not meet the study objective to reduce congestion and provide access management. The remaining four concepts were retained for additional analysis.

Both bicycle and pedestrian accommodation options were discussed and the concepts that included bike lanes were removed from further consideration since the use of bike lanes did not fit within the long-term vision of the US 62 corridor. A new bicycle and pedestrian option was developed that provided a shared use path on both sides of US 62 and was incorporated in to the remaining concepts.

5.3 Potential Intersection Improvement concepts

In addition to corridor-wide improvement concepts, intersection concepts were also developed based on a review of geometric, safety, and traffic data as well as a field review. A qualitative assessment was conducted as to the level of right-of-way impacts anticipated and concept cost. The potential improvement concepts presented at the second Project Team Meeting are described in the following sections. The two intersections at the I-65 interchange are included in **Section 5.4** on Interchange Concepts.

5.3.1 Brook Street

The intersection at Brook Street and US 62 is controlled by a minor street stop condition, which operates as a LOS A in the AM and PM. In total, five property damage only crashes occurred at this intersection. Two concepts were developed at this intersection. **Table 16** shows additional information at this location.

Table 16: Brook Street Intersection Concepts

	Concept 1	Concept 2
Improvement Concept Description	Westbound Left Turn Lane on US 62	Extend Median to turn intersection into Right In – Right Out
Potential Crash Improvement	27%	45%
Right-of-Way Impacts	Medium	Low
Cost	Medium	Low
Advantages	Provides a refuge for Westbound vehicles waiting to turn left at intersection	Westbound vehicles no longer have to stop in the through lane waiting for gap to turn left
Disadvantages	Requires right-of-way and utility relocations	Requires some right-of-way and utility relocations
Notes	Turn lane not warranted	Left turning traffic would move to adjacent intersections

5.3.2 West French Street

The intersection with West French Street is currently signalized with left turn lanes provided on US 62 and the southbound approach to the intersection. Thirty-three crashes occurred at this intersection, including one serious injury crash. It operates at LOS B in both the AM and PM. The left turn lanes on US 62 are a unique condition in that instead of a two-way left-turn lane (TWLTL) back-to-back left turn lanes are present for opposing traffic. Six concepts were considered and are described in **Table 17**.

Table 17: West French Street Intersection Concepts

	Concept 1	Concept 2
Improvement Concept Description	Remove back-to-back left turn lanes and improve storage (offset left)	Increase westbound right turn lane storage length
Potential Crash Improvement	33%	N/A
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages	Improves a confusing situation	Removes vehicles from through queue
Disadvantages	Consider median drainage	Right-of-way and utility impacts
Notes	None	None

	Concept 3	Concept 4
Improvement Concept Description	Add northbound left turn lanes on West French Street	Improve turning radius at intersection
Potential Crash Improvement	27%	44%
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages	Provides more storage length	Reduces vehicle overtracking
Disadvantages	Traffic signal upgrades needed	Larger distances for pedestrians to cross
Notes	None	Possible utility impacts

	Concept 5	Concept 6
Improvement Concept Description	Close entrances closest to intersection to manage access	Change intersection to multilane round-about
Potential Crash Improvement		Reduce fatal and injury crashes by 78%
Right-of-Way Impacts	Low	Medium
Cost	Low	Medium
Advantages	Improves driveway distance to intersec-tion	Removes traffic signal
Disadvantages	None	Right-of-way and utility impacts
Notes	Extending median accomplishes this too	Requires intersection lighting

5.3.3 North Main Street

The North Main Street intersection provides a westbound left turn lane from US 62 and there is a commercial driveway present. There is a median opening in this turn lane that provides access to Pawnee Drive (from eastbound US 62) and a commercial business to the south. This intersection operates at a LOS A in both the AM and PM peaks. In total and including the Pawnee Drive intersection, 21 crashes occurred at this intersection including one serious injury crash. Five concepts were considered and are described in **Table 18**.

Table 18: North Main Street Intersection Concepts

	Concept 1	Concept 2
Improvement Concept Description	Extend Median to turn intersection into Right In – Right Out	Restrict left turn out of N. Main St., but allow left turn in if Pawnee Dr. converted to a Right In – Right Out
Potential Crash Improvement	45%	
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages	Potential crash reduction	Removes turning movements within turn lane
Disadvantages	Traffic diverted to other intersection	Traffic diverted to other intersection
Notes	Impacts left turn from opposite entrance	Impacts car wash access

	Concept 3	Concept 4
Improvement Concept Description	Remove the N. Main St. intersection and replace with cul-de-sac. Access N. Main St. by using W. French St. intersection	Convert intersection to a multilane roundabout
Potential Crash Improvement		+92% PDO, -20% Injury
Right-of-Way Impacts	Medium	Medium
Cost	Low	Medium
Advantages	Remove conflict points	Provides full access
Disadvantages	Right-of-way and utility impacts	Right-of-way and utility impacts
Notes	Impacts Advance Auto Parts entrance	Will require intersection lighting

	Concept 5	
Improvement Concept Description	Extend N. Main St. further east to tie in across from Pawnee Dr. (Offset Lefts)	
Potential Crash Improvement	33%	
Right-of-Way Impacts	Medium	
Cost	Medium	
Advantages	Removes offset intersection	
Disadvantages	Requires right-of-way and utility relocations.	
Notes	Impacts car wash access	

5.3.4 Pawnee Drive

There are no turn lanes present on US 62 for Pawnee Drive. Eastbound drivers must slow down in the mainline and stop in the median opening. This intersection operates at a LOS A in both the AM and PM peaks. In total and including North Main Street intersection, 21 crashes occurred at this intersection including one serious injury crash. Three concepts were considered and are described in **Table 19**.

Table 19: Pawnee Drive Intersection Concepts

	Concept 1	Concept 2
Improvement Concept Description	Extend Median to turn intersection into Right In – Right Out	Restrict left turn out of Pawnee Dr., but allow left turn in if N. Main St. converted to a Right In – Right Out
Potential Crash Improvement	45%	
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages	Improves safety	Improves safety
Disadvantages	Travel patterns change to use W. French Street	Travel patterns change to use W. French Street
Notes	Impacts car wash access	Impacts car wash access

	Concept 3	
Improvement Concept Description	Convert intersection into a multilane roundabout	
Potential Crash Improvement	+92% PDO, -20% Injury	
Right-of-Way Impacts	Medium	
Cost	Medium	
Advantages	Provides full access	
Disadvantages	Right-of-way and utility impacts	
Notes	Need to consider car wash entrance and will require intersection lighting	

5.3.5 KY 3005 (Ring Road)

The intersection at Ring Road (KY 3005) is signalized with left turn lanes provided on US 62. Dual left turn lanes are provided at the eastbound approach and the southbound approach. This intersection operates at a LOS C in the AM peak and at LOS D in the PM peak. In total, 33 crashes occurred at this intersection including one serious injury crash. Four concepts were considered and are described in **Table 20**.

5.3.6 Dolphin Drive

A channelization island on Dolphin Drive prevents vehicles from turning left out of this minor street stop-controlled intersection. An eastbound left turn lane on US 62 is present. The eastbound left turn movement into Dolphin Drive operates at a LOS A in the AM peak and in the PM peak. In total, 26 crashes occurred at this intersection, all non-fatal or injury related. Four concepts were considered and are described in **Table 21**.

Table 20: KY 3005 (Ring Road) Intersection Concepts

Improvement Concept	Concept 1	Concept 2
Improvement Concept Description	Add intersection to coordinated signal system timing and reoptimize the whole corridor. This improvement could be implemented now, outside of this study.	Lengthen the westbound left turn lane and westbound right turn lane on US 62
Potential Crash Improvement		N/A
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages		Removes queued vehicles from mainline
Disadvantages		
Notes		

Improvement Concept	Concept 3	Concept 4
Improvement Concept Description	Lengthen the eastbound dual left turn lane storage length	Convert intersection into a multilane roundabout
Potential Crash Improvement	N/A	+92% PDO, -20% Injury
Right-of-Way Impacts	Low	Medium
Cost	Low	Medium
Advantages	Removes queued vehicles from mainline	
Disadvantages		
Notes		Intersection would need to be lighted

Table 21: Dolphin Drive Intersection Improvements

Improvement Concept	Concept 1	Concept 2
Improvement Concept Description	Close the left in from eastbound US 62 and make intersection a Right In – Right Out	Add a westbound right turn lane from US 62 to Dolphin Drive
Potential Crash Improvement	45%	30% rear end crash reduction
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages		
Disadvantages	Moves traffic to KY 3005 (Ring Road)	Westbound right turn requires right-of-way
Notes		May impact signature entrance signs

Improvement Concept	Concept 3	Concept 4
Improvement Concept Description	Keep the left-in from eastbound US 62, but better define this by a raised channelized median	Convert Dolphin Drive to an entrance only, remove the left turn from eastbound US 62.
Potential Crash Improvement		
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages		Reduces conflict points
Disadvantages		Removes movement to US 62
Notes		Moves traffic to KY 3005 (Ring Road)

5.3.7 Commerce Drive

The intersection at Commerce Drive is signalized with offset left turn lanes provided on US 62. A Speedway gas station entrance is present on one approach to this intersection, and it has a signal phase. This intersection operates at a LOS B in the AM peak and at LOS C in the PM peak. In total, 32 crashes occurred at this intersection including one serious injury crash. Four concepts were considered and are described in **Table 22**.

Table 22: Commerce Drive Intersection Concepts

Improvement Concept	Concept 1	Concept 2
Improvement Concept Description	Extend Commerce Drive through Speedway gas station and tie into Buffalo Creek Drive	Close Commerce Drive intersection and remove traffic signal. All traffic uses Buffalo Creek Drive intersection
Potential Crash Improvement		
Right-of-Way Impacts	High	Low
Cost	High	Low
Advantages	Allows turning movements at Buffalo Creek Drive to be removed and shifts more traffic farther away from I-65 interchange	
Disadvantages	Purchase Speedway parcel	
Notes	Possible environmental mitigation at Speedway gas station	May impact signature entrance signs

Improvement Concept	Concept 3	Concept 4
Improvement Concept Description	Buy Speedway gas station and close access. Provide channelization and convert intersection to continuous green T	Convert intersection to a multilane roundabout
Potential Crash Improvement		+92% PDO, -20% Injury
Right-of-Way Impacts	High	High
Cost	High	High
Advantages		
Disadvantages	Purchase Speedway Gas Station parcel	Purchase Speedway Gas Station parcel
Notes	Possible environmental mitigation at Speedway gas station	Possible environmental mitigation at Speedway gas station

5.3.8 Buffalo Creek Drive/Executive Drive

The intersection at Buffalo Creek Drive/Executive Drive is signalized with left turn lanes provided on US 62. A westbound weaving lane starts at the ramp and drops as a right turn only lane at Buffalo Creek Drive. This intersection operates at a LOS B in the AM peak and at LOS C in the PM peak. In total, 64 crashes occurred at this intersection, none of which were fatal or severe injury. Five concepts were considered and are described in **Table 23**.

Table 23: Buffalo Creek Drive/Executive Drive Intersection Concepts

Improvement Concept	Concept 1	Concept 2
Improvement Concept Description	If Commerce Drive is extended through the Speedway gas station parcel to tie into Buffalo Creek Drive north of US 62, convert this intersection into a Right In – Right Out. Remove the traffic signal	If Commerce Drive is extended through the Speedway gas station parcel to tie into Buffalo Creek Drive north of US 62, add a raised median to allow left turn in from US 62. Remove the traffic signal
Potential Crash Improvement	45%	
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages		
Disadvantages		
Notes		

Improvement Concept	Concept 3	Concept 4
Improvement Concept Description	Provide positive offset of the westbound US 62 left turn lane	Remove the westbound weave between the I-65 exit ramp and Buffalo Creek Drive
Potential Crash Improvement	33%	
Right-of-Way Impacts	Low	Low
Cost	Low	Low
Advantages	Improves sight distance for left turners	
Disadvantages		
Notes		

Improvement Concept	Concept 5
Improvement Concept Description	Convert Executive Drive to inbound traffic only. Only if Buffalo Creek Drive is extended to the Commerce Drive intersection
Potential Crash Improvement	45%
Right-of-Way Impacts	Low
Cost	Low
Advantages	
Disadvantages	
Notes	

5.3.9 Medley Lane

Medley Lane is a side street stop-controlled intersection. There are also two access points close to this intersection that provide access to hotels and a gas station. The left turn into Medley Lane from the US 62 TWLTL operates at LOS A in the AM peak and in the PM peak. Zero crashes occurred at this intersection. One concept was considered and is described in **Table 24**.

Table 24: Medley Lane Intersection Concepts

Improvement Concept	Concept 1
Improvement Concept Description	Combine access points and remove access near Medley Lane
Potential Crash Improvement	100% of left turn related crashes
Right-of-Way Impacts	Medium
Cost	Medium
Advantages	Reduces closely spaced intersections
Disadvantages	Requires right-of-way and utility relocations
Notes	

5.3.10 Howell Drive

Howell Drive is a side street, stop-controlled intersection. Just to the west of this intersection, two eastbound US 62 lanes begin to merge into a single eastbound lane through the intersection. The left turn into Howell Drive from the US 62 TWLTL operates at LOS A in both the AM and PM peaks. In total, 33 crashes occurred at this intersection, with one being fatal. Two concepts were considered and are described in **Table 25.**

Table 25: Howell Drive Intersection Concepts

Improvement Concept	Concept 1	Concept 2
Improvement Concept Description	Shift Howell Drive to the west to tie-in across from development entrance. Convert intersection to roundabout	Shift Howell Drive to the west to tie-in across from development entrance
Potential Crash Improvement	47%	
Right-of-Way Impacts	Medium	Medium
Cost	Medium	Medium
Advantages	Removes intersection offset and provides better spacing	Removes intersection offset and provides better spacing
Disadvantages	Right-of-way and utility relocation impacts	Right-of-way and utility relocation impacts
Notes	Close adjacent access	Would require intersection lighting

5.3.11 McCormack Avenue

McCormack Avenue is a side street stop-controlled intersection. Just to the west of this intersection, two eastbound US 62 lanes are merged into a single lane. No left turn lane into McCormack Avenue from the US 62 is present, but the left turning movement operates at LOS A in both the AM and PM peaks. In total, seven crashes occurred at this intersection, with two of them being serious injury. One concept was considered and is described in **Table 26**.

Table 26: McCormack Avenue Intersection Concepts

Improvement Concept	Concept 1
Improvement Concept Description	Extend eastbound lane and drop at Mc-Cormack Ave. Remove the merged lane
Potential Crash Improvement	
Right-of-Way Impacts	Low
Cost	Low
Advantages	Removes merge at intersection
Disadvantages	Right-of-way and utility relocations
Notes	

5.3.12 Gregory Street

Gregory Street did not have any intersection improvements as it was the end of the study corridor and did not have any mobility or safety issues with only three property damage only crashes. It did not have a noted intersection sight distance issue. The left turning movement operates at LOS A in both the AM and PM peaks.

5.3.13 Summary of Intersection Improvement Concepts

The potential intersection improvement concepts described above were presented to the project team at the second Project Team Meeting. It was decided to show the Buffalo Creek Drive intersection at the Second Stakeholders/LEO Meeting with some turning movements restricted, such as preventing left turns out of the intersection. The intersection improvement concepts that were eliminated from further consideration as a result of that meeting include:

1. Brook Street – Remove Concepts 1 and 2
2. North Main Street – Remove Concepts 3 and 5
3. KY 3005 (Ring Road) – Remove Concept 1
4. Commerce Drive – Remove Concepts 2 and 3
5. Buffalo Creek Drive/Executive Drive – Remove Concept 5
6. Medley Lane – Remove Concept 1

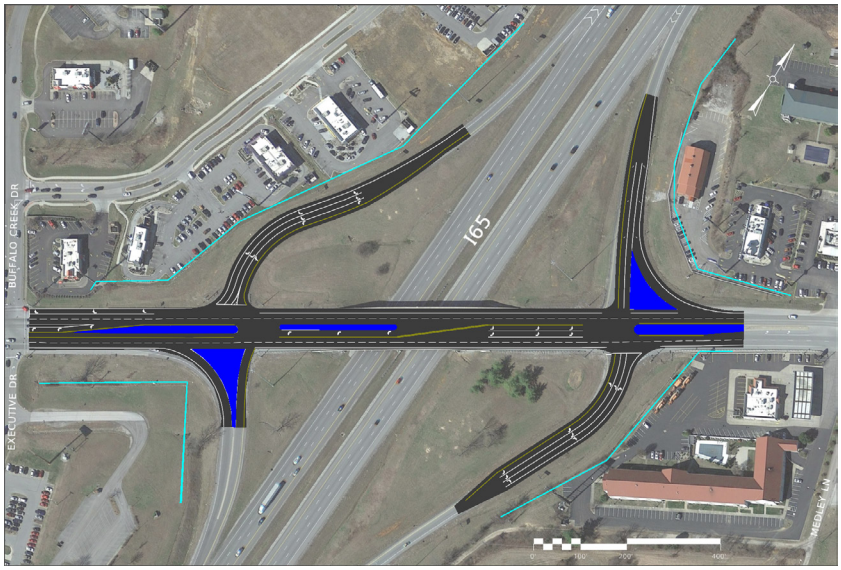
5.4 Potential Interchange Improvement Concepts

Four interchange concepts were evaluated as part of this stage of the study. All four of these concepts included accommodating pedestrians across I-65. Also included in each concept was the removal of the westbound auxiliary lane between the southbound ramp intersection and Buffalo Creek Drive.

5.4.1 Improved Diamond Interchange

The improved diamond interchange concept sought to maximize the operations of the existing interchange while not significantly altering its geometry. This concept would provide additional turn lanes at the ramp termini as needed to improve traffic operations, and would increase the storage length of turn lanes to remove queues that spilled back into the through lanes. Traffic signals at both ramps would remain, but timing would be optimized. Ramp intersection conflict points are not reduced with this concept. It was anticipated that the existing bridge over I-65 would remain in place and lanes shifted to accommodate a shared use path on one side of US 62 separated by a barrier wall. This concept is shown in **Figure 24.**

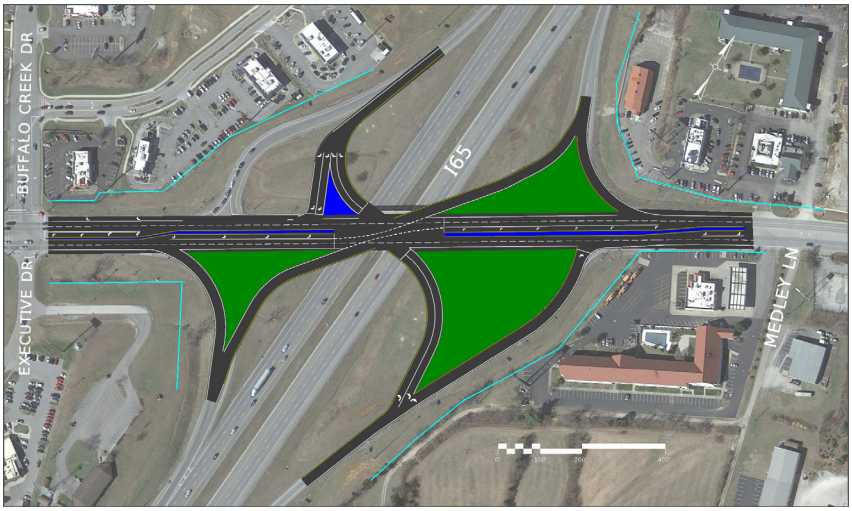
Figure 24: Improved Diamond Interchange



5.4.2 Single Point Urban Interchange (SPUI)

The SPUI interchange concept would replace the existing two ramp intersections with a single intersection directly above I-65. This would remove one traffic signal and provide increased spacing between the adjacent intersections at Buffalo Creek Drive/Executive Drive west of I-65 and Medley Lane to the east. The traffic signal would be expected to operate more efficiently over the existing condition since a signal phase could be eliminated. Overall, the total conflict points can be reduced from 26 at a conventional diamond interchange to 24 with the SPUI. A new bridge would need to be constructed, which would have a high cost given the need for the bridge to be asymmetric to accommodate ramps. Pedestrians and cyclists would be carried across the new bridge on one side. This concept is shown in **Figure 25.**

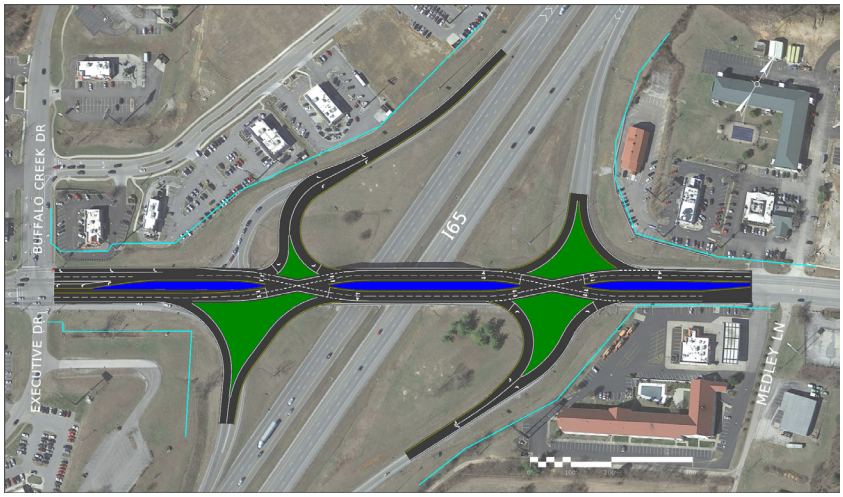
Figure 25: Single Point Urban Interchange



5.4.3 Diverging Diamond Interchange (DDI)

The DDI interchange concept keeps the two ramp termini as signalized intersections, but by crossing traffic on US 62 over to the opposite side through the interchange, these intersections operate more efficiently as two-phase traffic signals. The crossing of the through movement over to the opposite side replaces the left turn conflicts with same direction merge and diverge movements. Overall, the total conflict points can be reduced from 26 at a conventional diamond interchange to 14 with the DDI. The spacing to the next closest intersection for a DDI is critical for overall corridor operations. When pairing the DDI option with any of the corridor-wide options, attention should be given to the Buffalo Creek Road/ Executive Drive intersection to remove the traffic signal at this location. The existing bridge is expected to remain, and pedestrian/bicycle traffic accommodated by a path in the middle of the bridge protected by barrier walls. This concept is shown in **Figure 26.**

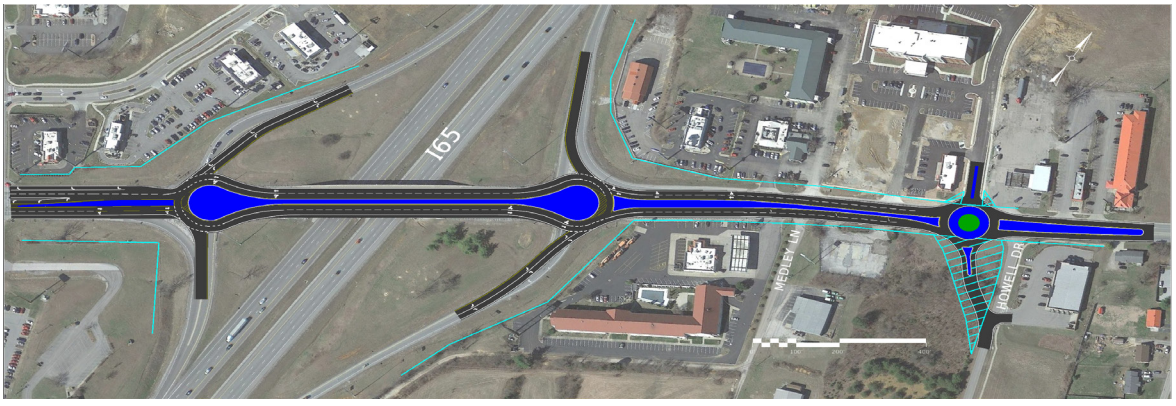
Figure 26: Diverging Diamond Interchange



5.4.4 Roundabout Interchange

The roundabout interchange removes the two ramp termini signalized intersections and replaces these with roundabouts to control traffic. A raised median is provided between the roundabouts and also east and west of them to the nearest intersection. Because of this raised median an additional roundabout is needed to the east near Howell Drive and the Best Western entrance to provide left turn access out of entrances to the interchange. Overall, the total conflict points can be reduced from 26 at a conventional diamond interchange to 24 with a multilane roundabout and possibly more after additional traffic analysis is conducted to determine the number of approach lanes and circulating lanes within the roundabout. It is anticipated the existing bridge over I-65 can remain and pedestrian/bicycles could be accommodated. This concept is shown in **Figure 27.**

*Figure 27: **Roundabout Interchange***



5.4.5 Summary of Interchange Improvement Concepts

The I-65 interchange potential improvement concepts described above were shared with the project team at the second Project Team Meeting. All four interchange types were retained for further analysis and are summarized in **Table 27.**

Table 27: Potential Interchange Improvement Concepts

Interchange Type	Southbound Ramp Traffic Control	Northbound Ramp Traffic Control	Right-of-Way Impacts	Cost	Safety	Pedestrian/ Bicycle Accommodations	Advantages	Disadvantages	Notes
Improved Existing Diamond Interchange	Traffic Signal	Traffic Signal	Low - Within existing Right-of-Way	Low	Remove channelized right turns along exit ramps to remove continuous flow towards Executive Dr.	Add pedestrian crossing across bridge by adding barrier wall to one side and shifting lanes. Reduces shoulder width across the bridge	Can reuse existing bridge. Lower Cost	Adjacent intersection spacing issues still exist.	Removes the westbound auxiliary lane on US 62 between the southbound exit ramp and the Buffalo Creek Dr. intersection.
Single Point Urban Interchange (SPUI)	Traffic Signal - 3 phase		Low - Within existing Right-of-Way	High	No CMF available	Less pedestrian friendly, could accommodate on both sides	Better spacing between adjacent intersections	Harder to accommodate pedestrians. Will need to rebuild bridge	
Diverging Diamond Interchange (DDI)	Traffic Signal - 2 phase	Traffic Signal - 2 phase	Low - Possible in interchange corners	Medium	Reduces conflicts from 26 (traditional diamond) to 14 conflicts. CMF = 0.858 (overall crashes)	Can accommodate in median across bridge. Two-phase signal operation provides more crossing time per phase. Crossing only one direction of traffic at a time	High probability of reusing existing bridge. Better flow through interchange	Not as efficient when close to adjacent signalized intersections	Crossover Design Speed 20-35mph. Lanes typically widen out through cross over area
Roundabout Interchange	Yield Sign	Yield Sign	Low - Possible in interchange corners	Medium	"Single lane roundabout crash reduction - 24%. Multilane roundabout increase PDO crashes 92%, decrease fatal/injury crashes 20%."	Could accommodate on both sides. May need RRFB on multilane approaches	Increased safety	Multilane roundabout with truck traffic. Yield pedestrian accommodations	Designed using a WB-67 truck

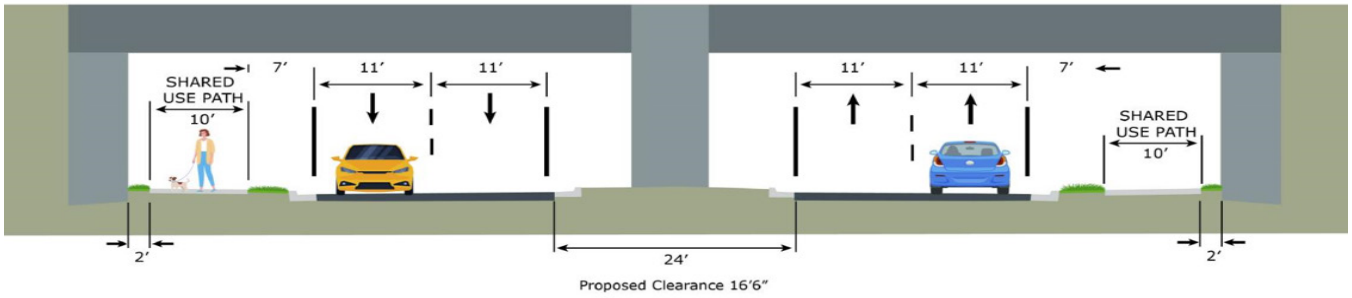
CMF = Crash Modification Factor, PDO = Property Damage Only

5.5 Potential Railroad Improvement Concepts

5.5.1 New Railroad Bridge

This concept provides a new bridge for the CSX railroad over US 62 that improves the horizontal and vertical clearances to meet the current railroad clearance standards. As shown in **Figure 28**, the bridge would be wide enough to provide room for the through lanes and pedestrian/bicycle facilities on both sides of US 62. Vertical and horizontal clearance minimums were obtained from the CSX *Public Projects Manual*[4], showing the minimum vertical clearance between the roadway to the bottom of beam needed to be 16.5 feet for a steel deck plate girder bridge. Drainage under US 62 would need to be further investigated. The new bridge may need to be wide enough to accommodate a future third track. To maintain train operations a railroad runaround consisting of temporary track, ballast, and possibly a temporary bridge would be needed to divert train traffic around the new bridge during construction, resulting in additional right-of-way and utility impacts.

Figure 28: New Railroad Bridge Typical Section



5.5.2 Tunnel Under Railroad

This option constructs a pedestrian and bicycle tunnel under the railroad tracks on the north side of US 62. The tunnel would be sized to meet *AASHTO Bike Guide* standards for a shared use path structure and provide at least 10 feet in width and 10 feet in height under the railroad. It is anticipated that the tunnel would need to be lighted. Identified issues with this option include constructability at the railroad crossing, the depth and approach work needed, and drainage of this facility.

5.5.3 Multiuse Overpass

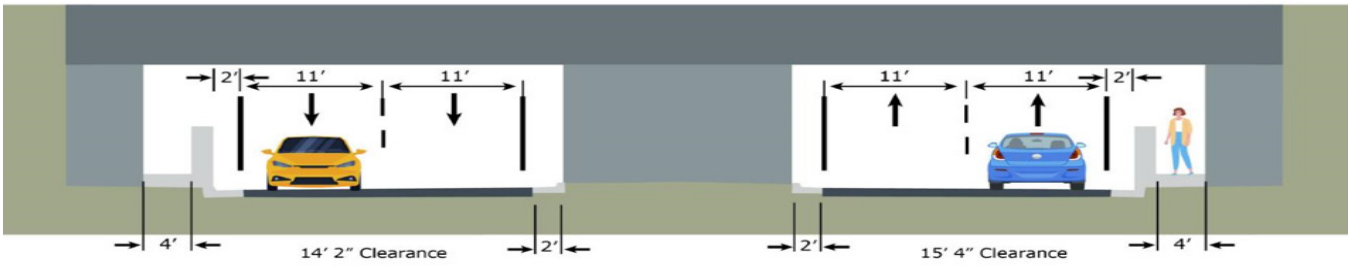
This option would provide a pedestrian/bicycle structure over the railroad. It would be wide enough to meet *AASHTO Bike Guide* standards and would need to be enclosed to meet railroad standards. This structure would need to be a minimum of 23 feet over the tracks and the piers placed outside of railroad right-of-way to meet CSX standards.

4 CSX Public Projects Manual

5.5.4 Narrow Existing Lanes and Add Sidewalk

The existing railroad bridge over US 62 has a horizontal clear width of 32 feet in both directions of travel and vertical clearances of 14 feet, 2 inches in the westbound direction and 15 feet, 4 inches in the eastbound direction. As shown in **Figure 29**, this option would narrow the travel lanes from 12 feet to 11 feet wide and provide space for a 4-foot-wide sidewalk protected by a barrier wall. Shoulders would be narrowed to 2 feet wide.

Figure 29: Narrowed Existing Lanes with Sidewalk Typical Section



5.5.5 Summary of Railroad Crossings

At Project Team Meeting #2, these four railroad crossing concepts were discussed. It was decided to remove the tunnel under the railroad concept due to its high-cost potential, difficulty obtaining permission from the railroad for a new crossing, potential drainage issues, and difficulty locating the tunnel near US 62. The multiuse overpass concept was removed from further consideration due to high costs, the low probability of pedestrians and cyclist using the overpass since they would need to travel out of the way and locating the overpass near US 62. The new railroad bridge concept and the concept that narrows lanes and adds sidewalk to US 62 under the existing bridge were both retained for further examination.

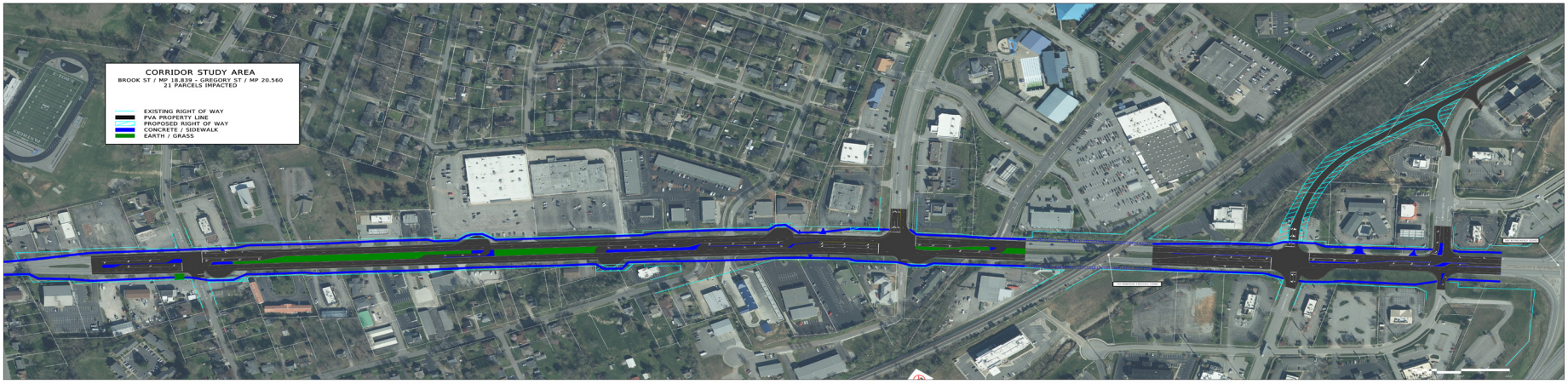
5.6 Refinement of Potential Improvement Concepts

The typical section, intersection, and interchange concepts that were not eliminated in the initial screening were consolidated into four full-corridor options based on feedback from the project team and criteria based on the goals and objectives of the project. The four options consisted of three RCUT corridors and one roundabout corridor, as described below:

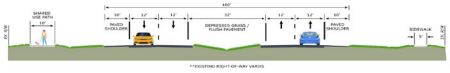
1. Concept 1: RCUT corridor with 12-foot lanes, a 32-foot depressed grass/flush pavement median (at intersections), and 10-foot paved outside shoulders. This option can be paired with a 5-foot sidewalk on one side and a 10-foot shared use path on the other, or a 10-foot shared use path on both sides. It works with any of the four interchange concepts and any of the railroad options. Access along the corridor is strictly managed through the use of medians with U-turn loons provided throughout the corridor. West French Street, KY 3005 (Ring Road) and Commerce Drive remain signalized, and Buffalo Creek Drive has left out access removed. The Speedway gas station at Commerce Drive is removed and a connection to Buffalo Creek Drive is created. See **Figure 30**.
2. Concept 2: RCUT corridor similar to Concept 1 but with 11-foot lanes and a 20- to 24-foot raised grass and concrete median, and 10-foot paved outside shoulders. See **Figure 31**.
3. Concept 3: RCUT corridor similar to Concept 2 but with curb and gutter instead of paved shoulders. See **Figure 32**.
4. Concept 4: Roundabout corridor with 11-foot lanes, a 20- to 24-foot raised grass and concrete median, and curb and gutter. This option can be paired with a 5-foot sidewalk on one side and a 10-foot shared use path on the other, or a 10-foot shared use path on both sides. It works best with the roundabout interchange concept, and any of the railroad options. The signalized intersections at West French Street, KY 3005 (Ring Road) and Commerce Drive become roundabouts. The Speedway gas station at Commerce Drive is removed and a connection to Buffalo Creek Drive is created. Buffalo Creek Drive has left out access removed. See **Figure 33**.

These concepts were shared with local stakeholders, as well as the public via an online public survey to obtain feedback on preferences for the potential solutions.

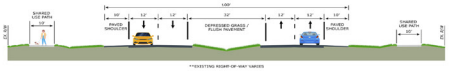
Figure 30: Corridor Concept 1



CORRIDOR CONCEPT 1.A



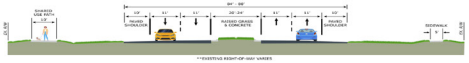
CORRIDOR CONCEPT 1.B



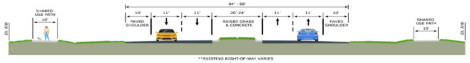
EAST OF INTERCHANGE

Figure 31: Corridor Concept 2

CORRIDOR CONCEPT 2.A

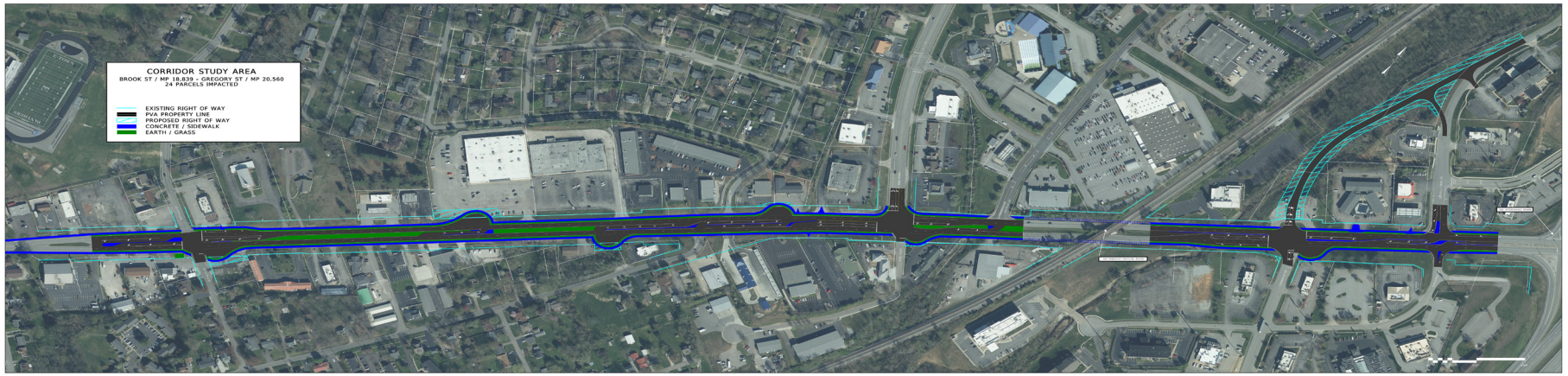


CORRIDOR CONCEPT 2.B

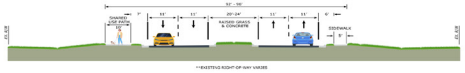


EAST OF INTERCHANGE

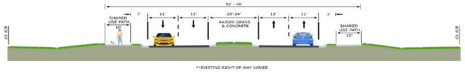
Figure 32: Corridor Concept 3



CORRIDOR CONCEPT 3.A

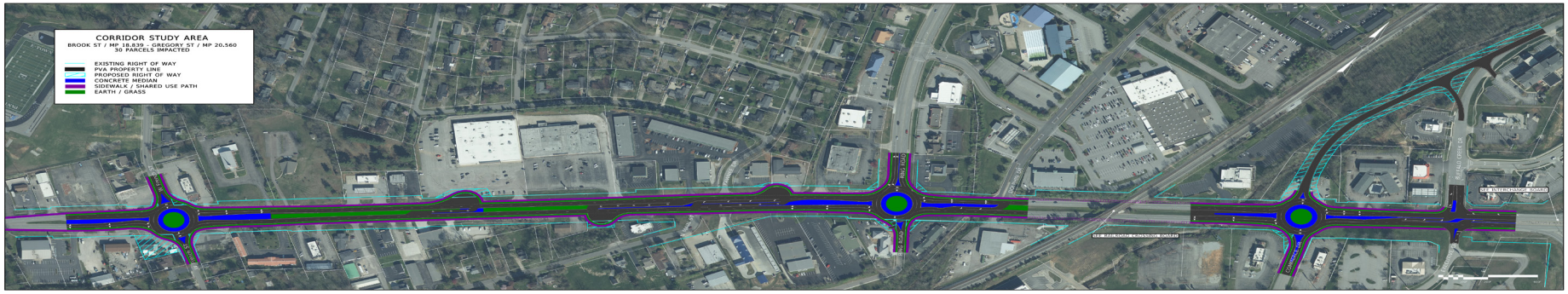


CORRIDOR CONCEPT 3.B

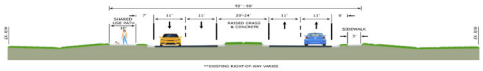


EAST OF INTERCHANGE

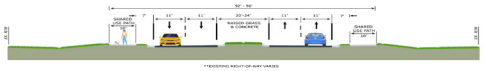
Figure 33: Corridor Concept 4



CORRIDOR CONCEPT 4.A



CORRIDOR CONCEPT 4.B



EAST OF INTERCHANGE

6 Stakeholder Outreach

In addition to Project Team Meetings between the consultant team and KYTC, outreach for this project included two meetings with local officials and stakeholders and a public survey. Project Team Meeting minutes can be found in **Appendix E**. Local official and stakeholder comments, and public survey results can be found in **Appendix F**.

6.1.1 Project Team Meeting #1

The first Project Team Meeting was held on November 18, 2022, at KYTC's District 4 office in Elizabethtown, with a virtual option. The purpose of the meeting was to introduce the project team to the study's background and relevant existing conditions data. The consultant team presented the study schedule, as well as existing conditions including geometrics, other relevant KYTC and city projects, and pedestrian and bicycle activity. Traffic and safety analyses were discussed, including level of service, HERE speed data, crash data and trends, and calculated EEC. Crash patterns were discussed, including hotspot locations, the effect of the interchange, and temporality of the crashes. A local stakeholders meeting was planned to solicit input on the existing conditions and gather additional issues. The next step was agreed to generate concepts to address identified issues within the study area for discussion at Project Team Meeting #2.

6.1.2 Local Officials and Stakeholders Meeting #1

A hybrid virtual and in-person meeting was held with local officials and stakeholders on December 13, 2022, at the Elizabethtown Tourism and Convention Bureau. An online survey tool, Slido, was used throughout the presentation to gather comments from attendees. First, the project goals and objectives, schedule, and background were presented, followed by an overview of existing conditions. There was discussion about how adjacent projects may affect needs on US 62. Attendees also provided information on pedestrian and bicycle activity and crash locations along the corridor. At the end of the meeting, attendees ranked improvement types by preference. The top three improvement types chosen were 1) adding pedestrian facilities, 2) providing a gateway into Elizabethtown, and 3) improving access management along the corridor. The project team shared that the next step would be to generate various concepts, and these would be presented at the second Local Officials and Stakeholders meeting in spring 2023.

6.1.3 Project Team Meeting #2

Project Team Meeting #2 was held on February 6, 2023, at KYTC's District 4 office in Elizabethtown, with a virtual option. The purpose of the meeting was to present the initial improvement concepts to the project team. An update on the status of traffic growth in the corridor was given along with intersection turning volumes and 2022 intersection LOS. All intersections, except for KY 3005 (Ring Road) operated at LOS C or better. Five corridor-wide concepts, four railroad crossing concepts, and four I-65 interchange improvement concepts were presented. In addition, several intersection improvements were presented at the study area primary intersections. After much discussion, several of the concepts were eliminated from further consideration. These include eliminating corridor-wide concept 1, railroad crossing concepts 2 and 3, and several intersection improvement concepts. Preparations for the second Local Officials and Stakeholders meeting were discussed along with the public survey.

6.1.4 Local Officials and Stakeholders Meeting #2

A second in-person meeting for local officials and stakeholders was hosted on March 9, 2023, at the Elizabethtown Tourism & Convention Bureau. The purpose of the meeting was to review the potential corridor, interchange, and railroad bridge improvement options with the stakeholder group and gather feedback. The potential improvement concepts were presented in a brief presentation; then the attendees were invited to view large prints of the concepts around the room. Comments were collected on the printouts and with a paper survey.

Results from the stakeholder meeting indicated a significant preference for curb and gutter and shared-use paths on both sides of the road throughout the corridor. The roundabout corridor (Concept #4) was selected as the most preferred corridor-wide option, followed by the RCUT corridor (Concept #3). For interchange options, the preferences were more evenly

matched. The roundabout interchange option was slightly preferred, followed by the options to improve the existing diamond interchange and construct a diverging diamond interchange. Attendees also preferred a new railroad bridge instead of adding narrow sidewalks in the existing tunnel.

6.1.5 Public Survey

Community engagement with the public was conducted via a public survey to gauge preferences for the potential improvement concepts. Using ESRI's ArcGIS Story Map platform, a summary of the project, existing conditions for traffic and safety, and descriptions of the improvement concepts was created. Questions about the primary needs on the corridor and preferences for corridor-wide, pedestrian, interchange, and railroad bridge improvements were asked throughout the story map.

Results indicated a slight preference for paved shoulders (56%) on the corridor, as well as a strong preference for shared use paths on both sides of the road (82%). Most respondents also favored building a new railroad bridge with shared use paths. Comments expressed concern that the existing bridge is too narrow to safely accommodate a sidewalk, even with barriers. Several comments also noted the road floods under the bridge and hoped a new bridge could fix this issue as well.

For intersection options, RCUTs (58%) were preferred over roundabouts (34%). Comments not in favor of roundabouts expressed concern over driver awareness of how to drive in a roundabout, specifically the proposed 2-lane roundabout at US 62 and KY 3005 (Ring Road). There were also comments expressing favor to the roundabout option for providing consistent traffic flow through current signalized intersections.

The improved diamond interchange option was the top preference of respondents (45%) among the four interchange improvement options. Comments in favor of improving the existing diamond interchange spoke to not seeing issues with the current interchange. The second preference was the roundabout interchange concept (22%), followed by the diverging diamond interchange (20%), and the SPUI (13%).

6.1.6 Project Team Meeting #3

The final Project Team Meeting was a hybrid virtual and in-person meeting held on April 20, 2023. After updates on feedback from the stakeholder meeting and preliminary public survey results were presented, all corridor and interchange concepts were discussed regarding predicted safety, travel time, cost, and suitability. The evaluation process for the concepts consisted of selecting a typical section (curb and gutter or shoulder), then selecting the intersection control types (RCUT or roundabout), and finally selecting an interchange option and a railroad crossing improvement. The project team separated the concepts into those that would or would not be pursued in the next phase, Preliminary Engineering (Phase 1 Design). The curb and gutter typical section with a dual shared use path was selected as well as the roundabout intersection option. All four interchange improvements were selected to continue into Preliminary Engineering and both railroad crossing options. Other specifics of the concepts, such as the extension of Buffalo Creek Drive, would be explored further in Preliminary Engineering.

7 Evaluation of Potential Improvement Strategies

The four full-corridor options were evaluated with regards to safety, traffic operations, environmental impacts, right-of-way impacts, and cost. During the evaluation phase it became evident that there were variations on the RCUT and roundabout corridors that needed to be examined due to operational and environmental issues. For the RCUT corridor, this included looking at an option that keeps the Speedway gas station and not providing a new connection to Buffalo Creek Drive (see **Figure 34**), and another option that changes the KY 3005 (Ring Road) intersection to a Continuous Green T (see **Figure 35**). For the roundabout corridor, variations included keeping KY 3005 (Ring Road) signalized (see **Figure 36**), making KY 3005 (Ring Road) right in – right out and placing roundabouts on either side at Pawnee Drive/North Main Street and Dolphin Drive (see **Figure 37**), and removing the Buffalo Creek Drive connection (see **Figure 38**).

The five evaluation criteria and the analysis for each with regards to the typical section, intersection, and interchange configuration are discussed in the following sections.

Figure 34: RCUT Corridor that keeps Speedway and does not provide a New Connection to Buffalo Creek Drive

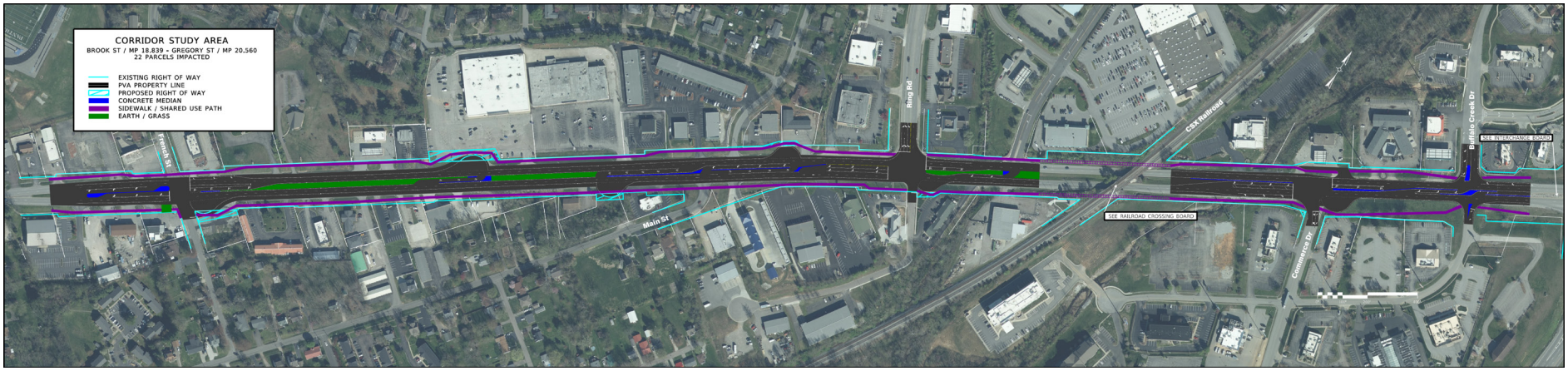


Figure 35: Continuous Green T at KY 3005 (Ring Road)

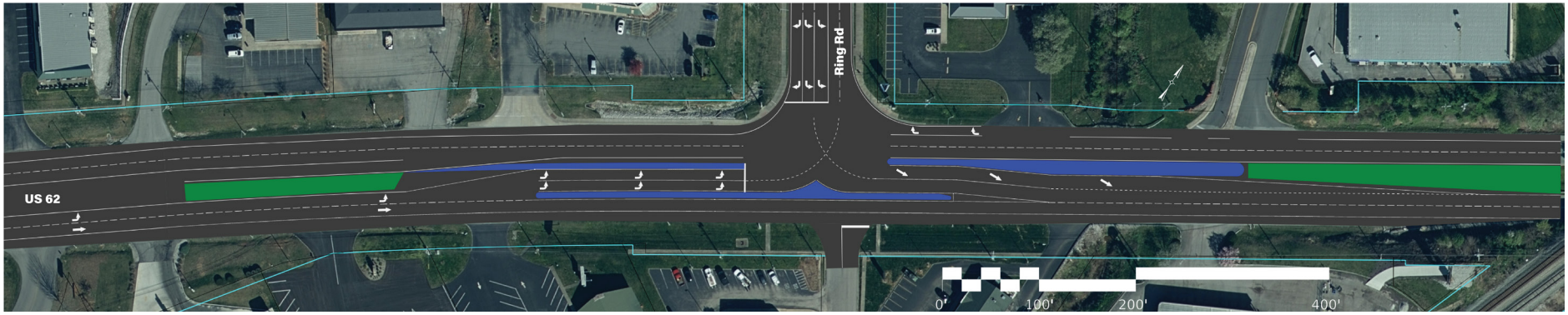


Figure 36: Roundabout Corridor with KY 3005 (Ring Road) Remaining Signalized

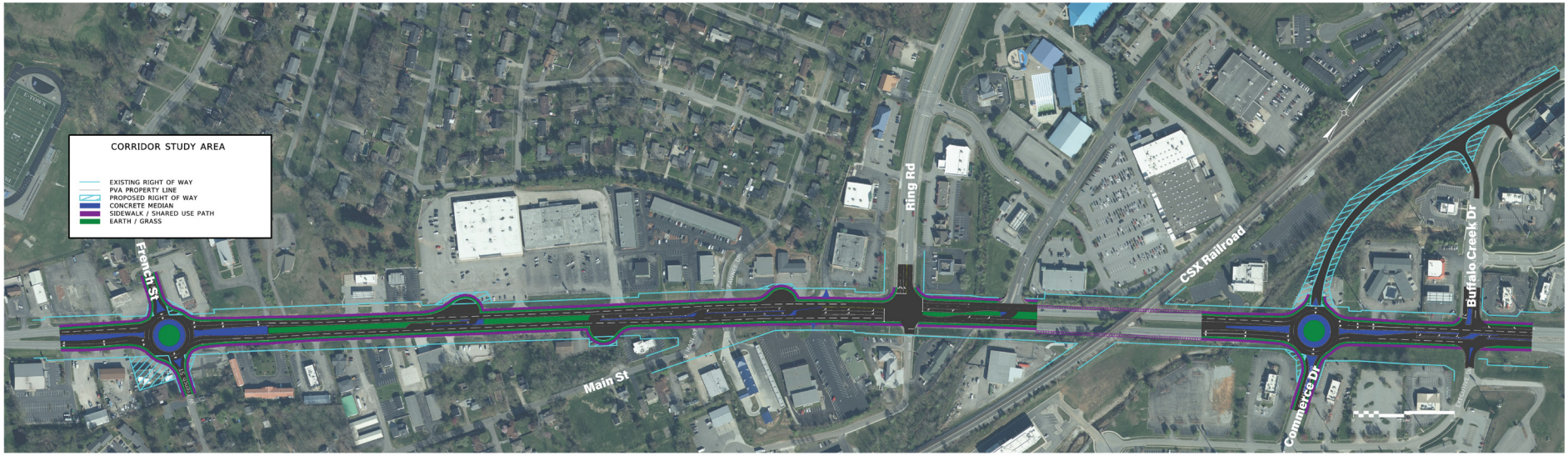


Figure 37: Roundabout Corridor with KY 3005 (Ring Road) Right in – Right out and Roundabouts at Pawnee Drive/North Main Street and Dolphin Drive

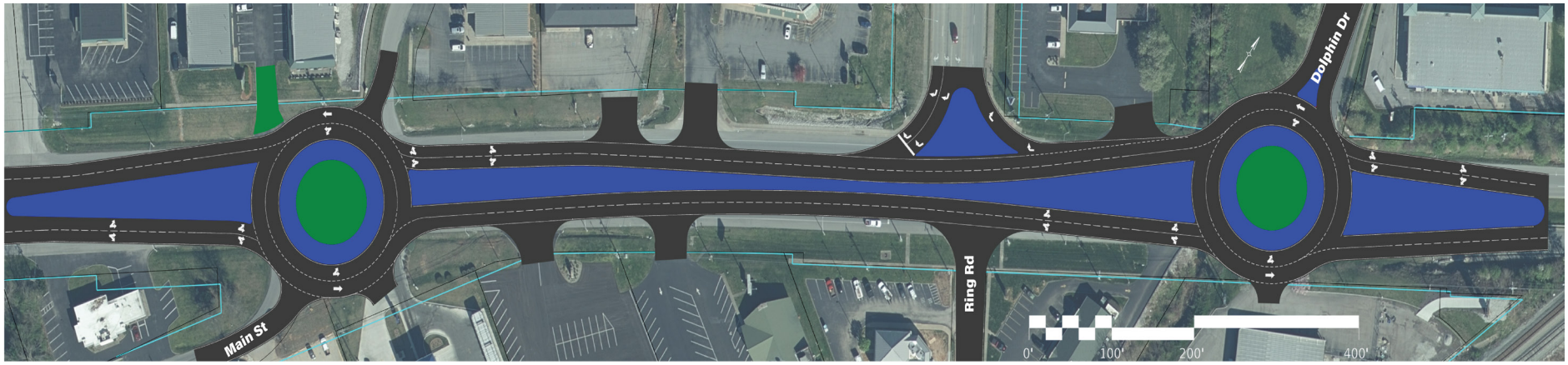
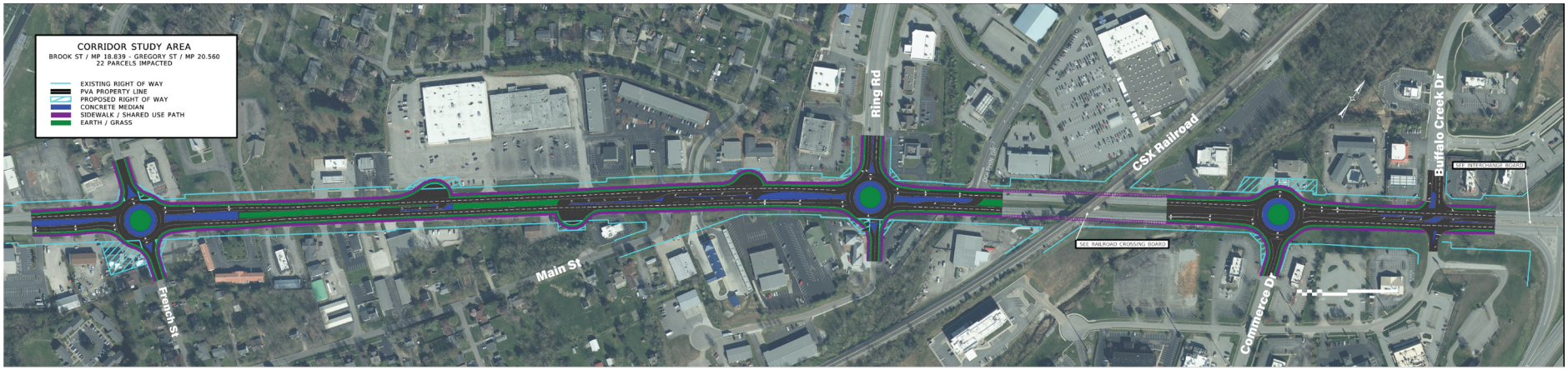


Figure 38: Roundabout Corridor that does not provide a New Connection to Buffalo Creek Drive



7.1 Safety

A predictive safety analysis was performed for each improvement concept to estimate the potential reduction in crashes over a 20-year period. Applicable Crash Modification Factors (CMFs) were identified from the Highway Safety Manual (HSM), CMF Clearinghouse[5], or other published sources. The CMFs were applied to relevant historic crashes to estimate the number and percent of crashes that could have been prevented. The results were then extrapolated to estimate the crashes that could be prevented over a 20-year period. This analysis was performed separately for the typical sections, the intersections along each RCUT and roundabout corridor, as well as for each interchange type.

7.1.1 Safety Analysis of Typical Sections

Applicable CMFs were noted for each of the four typical section options. **Table 28** shows the applicable CMFs used and **Table 29** shows the CMFs applied for each typical section. The separated sidewalk CMF was not factored into the total CMF; however, it is expected that the separate sidewalk or shared use path would offer significant pedestrian safety and comfort benefits, including a potential reduction in pedestrian crashes.

Table 28: Improvement Concept Crash Modification Factors

CMF Description	CMF ID/HSM Source	Value
CMF for Access Management; Converting TWLTL to Barrier	CMF ID 2514	0.77
CMF for Shoulder Width; Converting 10' Paved Shoulder to Curb and Gutter	CMF ID 2375	0.89
CMF for Adding a Separated Sidewalk (Pedestrian Related Crashes Only)	CMF ID 9259	0.33

Table 29: CMFs for Each Typical Section

Typical Section	Intersection Types	Concept	Location	Shoulder CMF	Median CMF	Total CMF
1	RCUT	Shoulders + Depressed Median	East of Commerce Drive	1.00	1.00	1.00
			West of Commerce Drive	1.00	0.77	0.77
2	RCUT	Shoulders + Raised Median	East of Commerce Drive	1.00	1.00	1.00
			West of Commerce Drive	1.00	0.77	0.77
3	RCUT	Curb & Gutter + Raised Median	East of Commerce Drive	0.89	1.00	0.89
			West of Commerce Drive	0.89	0.77	0.69
4	Roundabout	Curb & Gutter + Raised Median	East of Commerce Drive	0.89	1.00	0.89
			West of Commerce Drive	0.89	0.77	0.69

5 http://www.cmfclearinghouse.org/

7.1.2 Safety Analysis of RCUT and Roundabout Corridor Intersections

The CMF method was used for the intersection safety analysis as well. For multilane roundabouts, several CMFs were considered due to the range of reported values in the research for multilane roundabouts. Another consideration was that turbo roundabouts could be examined for the multilane roundabouts in the corridor. These roundabout designs use raised lane separators to limit lane changing within the roundabout.

Ultimately, a range of CMFs was selected for the roundabout alternatives. The more conservative benefit scenario (higher number of crashes) assumed a CMF of 0.8 for fatal and injury crashes and a property damage only CMF of 1.92. These values were drawn from the CMF Clearinghouse. The more aggressive benefit scenario (lower number of crashes) assumed a CMF of 0.68 for all crashes. This CMF was based on recent research by the Pennsylvania Department of Transportation (PennDOT). This research evaluated the conversion of signalized intersections to multilane roundabouts at 32 locations and utilized crashes from three years before conversion and three years after for comparison. Given that two sets of CMFs were used, a range of predicted crashes was considered for the roundabout alternatives.

The RCUT corridor used the CMF ID 10382 with a 0.8 CMF for RCUT intersections. Below are the specific safety analysis details for both the roundabout and the RCUT corridors.

For all the corridor intersection evaluations below, the interchange safety benefits have been removed from the analysis. The interchange alternatives are discussed independently in **Section 7.1.3**. All crash cost values are shown in 2021 dollars per the latest Federal Highway Administration (FHWA) crash cost values.

RCUT Corridor without Buffalo Creek Drive Extension

The basic RCUT corridor option (not including the interchange), which keeps the Speedway gas station at Commerce Drive and does not include the extension to Buffalo Creek Drive, shows a 20-year crash reduction of 380 crashes, with an estimated safety benefit of $9.3 million. **Table 30** shows the crash reduction percentage at each intersection in the study area, with the exception of Brook Street as the improvement concept does not extend that far.

Table 30: Intersection Crash Reduction for RCUT Corridor with No Buffalo Creek Drive Extension

Intersection	% Crash Reduction
West French Street	29%
North Main Street	29%
KY 3005 (Ring Road)	29%
Dolphin Drive	11%
Commerce Drive	29%
Buffalo Creek Drive/Executive Drive	32%
Medley Lane	51%
Howell Drive	11%
McCormack Avenue	11%
Gregory Street	11%

RCUT Corridor with Buffalo Creek Drive Extension

Adding the Buffalo Creek Drive extension at Commerce Drive impacts the safety benefit of the Commerce Drive and Buffalo Creek Drive intersections, as it increases traffic volumes at the Commerce Drive intersection and reduces traffic volumes at the Buffalo Creek Drive intersection. **Table 31** shows the crash reduction percentage at these two intersections.

Table 31: Intersection Crash Reduction for RCUT Corridor with Buffalo Creek Extension

Intersection	% Crash Reduction
Commerce Drive and Buffalo Creek Drive Intersections (combined)	~29%

RCUT Corridor with Continuous Green T at KY 3005 (Ring Road)

A Continuous Green T intersection at KY 3005 (Ring Road) was evaluated to see if it could improve operations at the intersection which has a very heavy movement of southbound left turns from KY 3005 (Ring Road) onto eastbound US 62 toward the I-65 interchange. The Green T is shown in **Figure 35**. Since this concept eliminates certain movements at the KY 3005 (Ring Road) intersection and also requires a median barrier in front of Dolphin Drive, which eliminates left turns into Dolphin Drive, it requires U-turns up and downstream of those intersections. This creates impacts from North Main Street to Commerce Drive due to traffic redistribution. **Table 32** shows the estimated crash reduction percentage at the impacted intersections.

Table 32: Intersection Crash Reduction for RCUT Corridor with a Continuous Green T at Ring Road

Intersection	% Crash Reduction
North Main Street	29%
KY 3005 (Ring Road)	4%
Dolphin Drive	11%
Commerce Drive	29%

Roundabout Corridor

The basic roundabout corridor concept converts the signalized intersections of West French Street, KY 3005 (Ring Road), Commerce Drive, and the I-65 southbound and northbound ramps into roundabout intersections. It includes a new connector from Commerce Drive to Buffalo Creek Drive and converts the existing Buffalo Creek Drive intersection into a right in – right out. There are also opportunities for U-turns between West French Street and KY 3005 (Ring Road). These would be multi-lane roundabouts. The roundabout corridor concept also converts the unsignalized Howell Drive intersection on the east side of the interchange into a roundabout.

For multilane roundabouts, the CMF Clearinghouse provides CMFs that show a predicted increase in property damage only crashes, but reductions in fatal and injury crashes. However, recent research by PennDOT shows a decrease in all crashes as drivers become more familiar with roundabouts and how to use them. Therefore, a range of rates was used as discussed previously.

Based on the selected CMFs, the 20-year safety analysis for the entire roundabout corridor predicted no change in crashes for the low crash reduction assumptions and a decrease of 470 crashes for the high crash reduction assumptions. This analysis applies to the intersections and segments but does not include the interchange. The benefit to society of these prevented crashes ranges from $0 to $12.2 million depending on the assumptions.

Table 33 shows the crash reduction percentage at each intersection in the study area (not including Brook Street or the interchange ramp terminals, which are addressed in Section 7.1.3).

Table 33: Intersection Crash Reduction for Roundabout Corridor

Intersection	% Crash Reduction CMFs from the HSM or CMF Clearinghouse (Injury Crashes/PDO Crashes)	% Crash Reduction Round-about CMFs from PennDOT Research (All Crashes)
West French Street	29% / -71%	39%
North Main Street	29% / 29%	29%
KY 3005 (Ring Road)	29% / -71%	39%
Dolphin Drive	11% / 11%	11%
Commerce Drive	29% / -71%	39%
Buffalo Creek Drive/Executive Drive	53% / 40%	53% Injury / 40% PDO
Medley Lane	51% / 51%	51%
Howell Drive	29% / -71%	39%
McCormack Avenue	11% / 11%	11%
Gregory Street	11% / 11%	11%

Note: Negative values indicate an increase in that crash type.

Roundabout corridor with KY 3005 (Ring Road) Signalized

The high number of southbound left turns at KY 3005 (Ring Road) resulted in the poor operations of the roundabout at that intersection, which will be discussed in further detail in **Section 7.2**. Therefore, an option was explored that kept the KY 3005 (Ring Road) intersection signalized (see **Figure 36**), which would only impact the safety performance of KY 3005 (Ring Road), keeping the predicted number of future crashes the same as the no-build condition at that intersection.

Roundabout Corridor with Right in – Right out at KY 3005 (Ring Road) and Roundabouts at Pawnee Drive and Dolphin Drive

In an effort to address the KY 3005 (Ring Road) operational issues, an additional concept was developed that would remove the roundabout at KY 3005 (Ring Road) and would turn that intersection into a right in – right out intersection. This concept would install a roundabout at Dolphin Drive. It would also realign North Main Street with Pawnee Drive and bring them into a new roundabout west of Ring Road (see Figure 37). Similar to the other potential multilane roundabouts in the corridor, this would likely result in a reduction in severe crashes, but it could result in an increase (or decrease) in property damage only crashes. Ultimately, as drivers become more familiar with roundabouts, it is expected that even property damage only crashes could decrease.

Roundabout Corridor with no Buffalo Creek Drive Extension

Given the high cost and environmental constraints of providing a connection to Buffalo Creek Drive, which will be discussed later in this chapter, the option of a three-legged roundabout at Commerce Drive without that connection was explored. A three-legged roundabout could reduce severe crashes and increase property damage only crashes, but it is expected to function better than a standard full four-leg multilane roundabout.

7.1.3 Safety Analysis of Interchange Concepts

Applicable CMFs were utilized for each of the four typical interchange options. **Table 34** shows the applicable CMFs used, and **Table 35** shows the safety impacts of each interchange. It should be noted that the roundabout interchange would also work well with a new single lane roundabout to the east of the interchange (which was part of the corridor analysis).

Table 34: Improvement Concept Crash Modification Factors

CMF Description	CMF ID/HSM Source	Value(s)
Improved Diamond	1410	0.85
SPUI	Virginia CMF Guide[6]	0.62
DDI	10300 (KABC)/10763 (PDO)	0.558/0.92
Roundabouts	9886 (KABC)/9887 (PDO) High Range: PennDOT (All)	Low Crash Reduction: 0.8/1.92 High Crash Reduction: 0.68

Table 35: Safety Analysis of Interchange Types

Interchange Type	20-yr Reduced Injury Crashes	20-yr Reduced PDO Crashes	20-yr Estimated Safety Benefit
Improved Diamond	10	61	$1.7 million
SPUI	19	117	$3.3 million
DDI	21	48	$3.4 million
Roundabouts	121 to 172	-1851 to 1032	$1.1 million[1] to $2.9 million[2]

[1]*Represents the conservative (lower number of crashes prevented) prediction*

[2]*Represents the aggressive (higher number of crashes prevented) prediction*

Note: Negative values indicate an increase in that crash type.

7.2 Traffic Operations

Each improvement concept was evaluated with regards to traffic operations to determine the LOS and delay at study area intersections and interchanges, as well as the travel time through the corridor. The typical sections do not change operations and therefore are not part of the evaluation.

7.2.1 Intersection and Interchange LOS and Delay

Tables 36 and **37** show the intersection and LOS and delay at the study area intersections for the various RCUT and roundabout corridor concepts, as well as the 2045 No Build, in the AM and PM peaks, respectively. Any cells that are shaded in gray operate the same as the 2045 No Build.

7.2.2 Corridor Travel Times

End to end travel times through the corridor were also estimated using Synchro's Sim Traffic for the 2045 No Build and RCUT options and using Sidra for the roundabout corridor options. Travel times were measured in the eastbound and westbound directions in both the AM and PM peaks, as shown in ***Tables 38*** and **39**.

6 https://www.virginiadot.org/business/resources/vhsip/VA-State-Preferred-CMF-List_acc050222.pdf

Table 36: AM Intersection LOS and Delay

Intersection	Improvement Concept															
AM Peak	2045 No Build		Base RCUT		RCUT with Buffalo Creek Drive Extension		RCUT with Continuous Green T at Ring Road		Base Roundabout		Roundabout with Ring Road Signalized		Roundabout Corridor with RIRO at Ring Road with roundabouts at Pawnee Drive and Dolphin Drive		Roundabout Corridor with no Buffalo Creek Drive Extension	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
French Street	B	12.4	B	13.9					A	6.3						
Main Street / Pawnee Drive*	A	2.1	A	1.7			A	1.7					A	6.8		
Ring Road	C	29.6	C	22.4			B	17.5	A	6.4	C	29.6	B	12.6		
Dolphin Drive*	A	0	A	0			A	0					B	13.2		
Commerce Drive	B	14.9	B	14.1	B	18.6	C	23.9	B	11.0					A	8.3
Buffalo Creek Drive	C	20.7	A	3.9	A	2.0	A	2								
I-65 SB	B	12.8	A	5.2	A	5.2	A	5.1	A	9.5						
I-65 NB	C	24.7	B	17.6	B	17.6	B	17.6	B	13.6						
Howell Drive*	A	0.1	A	0.1					A	9.1						

**Denotes that the intersection is currently unsignalized*

Table 37: PM Intersection LOS and Delay

Intersection	Improvement Concept															
PM Peak	2045 No Build		Base RCUT		RCUT with Buffalo Creek Drive Extension		RCUT with Continuous Green T at Ring Road		Base Roundabout		Roundabout with Ring Road Signalized		Roundabout Corridor with RIRO at Ring Road with roundabouts at Pawnee Drive and Dolphin Drive		Roundabout Corridor with no Buffalo Creek Drive Extension	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
French Street	B	16	B	16.5					A	8.5						
Main Street / Pawnee Drive*	A	5.1	A	2.4			A	2.4					C	15.5		
Ring Road	D	49.3	D	35.1			C	23.2	E	37.9	D	49.3	C	23.1		
Dolphin Drive*	A	0	A	0			A	0					C	20.2		
Commerce Drive	C	24.2	C	30.6	C	33.1	D	51.6	D	31.3					C	20.1
Buffalo Creek Drive	C	34.6	A	3.7	A	2.0	A	3.8								
I-65 SB	B	17.7	A	6.1	A	6.2	B	10.5	C	21.8						
I-65 NB	B	19.5	B	13.8	B	13.3	B	15.2	B	12.7						
Howell Drive*	A	0.2	A	0.2					A	9.2						

**Denotes that the intersection is currently unsignalized*

Table 38: AM Corridor Travel Times

	Improvement Concept															
AM Peak	2045 No Build		Base RCUT		RCUT with Buffalo Creek Drive Extension		RCUT with Continuous Green T at Ring Road		Base Roundabout		Roundabout with Ring Road Signalized		Roundabout Corridor with RIRO at Ring Road with roundabouts at Pawnee Drive and Dolphin Drive		Roundabout Corridor with no Buffalo Creek Drive Extension	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Travel Time (min)	4.8	5.4	4.4	5.1	4.6	5.2	4.4	5.5	4.7	4.8	4.7	5	4.6	5	4.7	4.7

Table 39: PM Corridor Travel Times

	Improvement Concept															
PM Peak	2045 No Build		Base RCUT		RCUT with Buffalo Creek Drive Extension		RCUT with Continuous Green T at Ring Road		Base Roundabout		Roundabout with Ring Road Signalized		Roundabout Corridor with RIRO at Ring Road with roundabouts at Pawnee Drive and Dolphin Drive		Roundabout Corridor with no Buffalo Creek Drive Extension	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
Travel Time (min)	5.8	5.9	5.4	5.6	5.6	6.2	5.2	7.7	7.9	4.7	6.9	6.8	4.8	4.8	7.9	4.8

7.3 Environmental Impacts

Data used to analyze and discuss the environmental constraints for the US 62 Corridor project were obtained from the Environmental Overview (EO) conducted for the *2021 East Elizabethtown Connectivity Study*. Desktop review of the EO was performed to identify and locate areas of importance or concern that lie within the existing US 62 corridor from MP 18.839 (Brook Street) to MP 20.56 (Gregory Street) including the interchange area at I-65. Once resources were identified, those resources were considered within the context of improvement concepts and the potential for those concepts to impact the identified resources.

The EO considers resources in the following categories: Natural Environment (i.e., ecological resources (streams, wetlands, and floodplains); threatened and endangered species and important habitats; and Human Environment (i.e., air quality and noise issues; Environmental Justice (EJ)/socioeconomic data; land use; hazardous materials; and historic and archaeological resources).

The US 62 project corridor occurs within an urbanized commercial area characterized by gas stations, restaurants, strip malls, and business centers. A key consideration for all improvement concepts was whether they occur outside of existing right-of-way. Those occurring outside of existing right-of-way or creating new ground disturbance have greater potential to impact the natural and human environmental resources than those within existing right-of-way. Concepts ultimately chosen during the design phase will require in-depth analysis and review to provide National Environmental Policy Act (NEPA) location approval (NEPA documentation) before transitioning to future phases of project development.

7.3.1 NATURAL ENVIRONMENT

The natural environment includes ecological resources, threatened and endangered species, and important habitats. The potential to encounter natural environment resources is minimal. The desktop review identified that potential habitats for threatened and endangered species are found in only a small, forested segment of the US 62 corridor on the south side across from Hardin Plaza. Similarly, one perennial stream crossing (Buffalo Creek) and its associated floodplain exists in the corridor. Two unnamed tributaries to Buffalo Creek also intersect the corridor. No wetland areas were identified on National Wetland Inventory (NWI) mapping.

The nature of improvement concepts considered as part of this study limit the potential impacts to these resources, since most will occur within existing right-of-way and within previously disturbed areas or include minor strip takings adjacent to right-of-way. The items below provide a brief summary of the potential natural environment impacts to consider as a result of some of the conceptual improvements.

- **Corridor Concepts (RCUTs Only or RCUTS with Roundabouts):** Reconstruct US 62 from Brook Street to Gregory Street with RCUTs and/or Roundabouts at intersections; minor strip takings near intersections – This improvement has the potential to impact Buffalo Creek, its 100-year floodplain and bat habitat (trees).
- **Corridor Concepts that include Buffalo Creek Drive Extension:** Reconstruct US 62 from Brooks Street to Gregory Street with RCUTs and/or Roundabouts at intersections with the addition of extending Buffalo Creek Drive – Bat habitat (trees), floodplains, and the perennial stream Buffalo Creek may be impacted by this conceptual improvement, which can negatively impact aquatic resources.
- **Interchange Concepts (Improved Diamond, SPUI, DDI, Roundabout):** Improvements which include the above four interchange concepts at I-65 which all occur within existing right-of-way – these various interchange improvements have minimal impact to the natural environment as all occur within heavily disturbed existing interstate right-of-way. Impacts will require use of erosion controls where impacts may occur.
- **Railroad Bridge Replacement:** Improvement which includes the construction of a new railroad bridge which meets height and weight requirements above roadways that all occur within existing right-of-way or may require temporary easements for track realignment during construction – this improvement has minimal impact to the natural environment as all occur within or adjacent to heavily disturbed railroad right-of-way.

7.3.2 HUMAN ENVIRONMENT

The human environment includes air quality and noise issues; EJ/socioeconomic data; land use/farmland; hazardous materials; and historic and archaeological resources. As with the natural environment, the potential for the improvement concepts to impact human made considerations is limited by the fact that most improvements would likely occur within existing right-of-way or directly adjacent to existing right-of-way within previously disturbed areas. However, conceptual improvements do create impacts, particularly where right-of-way may be required, for hazardous materials associated with gas stations. No Section 4(f) resources, National Register of Historic Places listed historic sites, public parks, noise, air quality, or archaeological resources are identified in the project corridor. EJ populations are also a consideration relative to minority and low-income populations in the study area.

The *2021 East Elizabethtown Connectivity Study* EO assessed the potential for EJ populations in the study area. The potential for impacts to EJ populations must be considered in any future NEPA document. The EO used 2014-2018 U.S. Census Bureau American Community Survey (ACS) data. The EO reported data for the U.S., Kentucky, Hardin County and the four census tracts (CT 10.02, 11, 14.02, 15) included in the study area. The EO from the *2021 East Elizabethtown Connectivity Study* noted that there is a higher concentration of low income and minority persons in CTs 11, 14.02, and 15 in the study area as compared to local and state averages. The shared use path, which is proposed for addition to both sides of US 62, will be beneficial for all individuals who walk or bicycle through the area. It may be most beneficial, however, for the identified EJ populations who might be more reliant on non-automobile modes of transportation.

The items below provide a brief summary of the potential human impacts to consider relative to some of the conceptual improvements.

- **Corridor Concepts (RCUTs Only or RCUTS with Roundabouts):** Reconstruct US 62 from Brook Street to Gregory Street with RCUTs and/or Roundabouts at intersections; minor strip takings near intersections – This improvement has the potential to impact underground storage tanks (UST)/hazardous materials (HAZ) properties along both sides of the roadway.
- **Corridor Concepts that include Buffalo Creek Drive Extension:** Reconstruct US 62 from Brooks Street to Gregory Street with RCUTs and/or Roundabouts at intersections with the addition of extending Buffalo Creek Drive – This improvement has the potential to impact UST/HAZ properties along both sides of the roadway in addition to one total take gas station at the Buffalo Creek Drive extension.
- **Interchange Concepts (Improved Diamond, SPUI, DDI, Roundabout):** Improvements which include the above four interchange concepts at I-65 which all occur within existing right-of-way –These various interchange improvements have minimal impact to the human environment as all occur within heavily disturbed existing interstate right-of-way.
- **Railroad Bridge Replacement:** Improvement which includes the construction of a new RR bridge which meets height and weight requirements above roadways which all occur within existing right-of-way or may require temporary easements for track realignment during construction – this improvement has minimal impact to the human environment as all occur within or adjacent to heavily disturbed railroad right-of-way.

7.4 Right-of-Way Impacts

For each improvement concept, the number of estimated parcels impacted (needed for right-of-way and easement), acres of right-of-way required and property acquisitions (how many properties would require a building take) were quantified. The costs of these impacts were included in the cost estimates. Right-of-way needs centered mostly at intersections, where U-turn loons are provided, and east of the I-65 interchange. The two buildings identified for needing taking are the Speedway gas station at Commerce Drive and the building in the southwest corner of US 62 and West French Street. **Table 40** shows the estimated right-of-way impacts for each of the concepts.

Table 40: Concept Right-of-Way Impacts

Concept	Parcels Impacted	Acres of Right-of-Way	Building Takes
RCUT Corridor – No Buffalo Creek Drive Extension	27	1.3	0
RCUT Corridor – With Buffalo Creek Drive Extension	33	3.8	1
Roundabout Corridor – No Buffalo Creek Drive Extension	31	3.5	2
Roundabout Corridor – With Buffalo Creek Drive Extension	36	4.5	2
Roundabout Corridor – KY 3005 (Ring Road) Signalized – No Buffalo Creek Drive Extension	28	3.4	2
Improved Diamond Interchange	0	0	0
SPUI	0	0	0
DDI	1	0.2	0
Roundabouts	4*	0.5	0

**Three parcels already impacted by US 62 corridor-wide improvement options*

7.5 Cost Estimates

Cost estimates for each corridor and spot improvement concept were developed in 2023 dollars using recent unit costs. These include estimates for design, right-of-way, utility, and construction costs, and assume the curb and gutter typical section with a 10-foot shared use path on both sides. The RCUT and roundabout corridor estimates are shown in **Tables 41** and **42**, and do not include the cost of the interchange. Cost estimates for each interchange option are shown in **Table 43**.

Table 41: RCUT Corridor Cost Estimates

Phase	Improvement Concept		
	Base RCUT	RCUT with Buffalo Creek Extension	RCUT with Continuous Green T at KY 3005 (Ring Road)
Design	$800,000	$1,100,000	$800,000
Right-of-Way	$600,000	$2,900,000	$600,000
Utilities	$700,000	$900,000	$700,000
Construction	$6,000,000	$8,700,000	$6,200,000
Total	**$8,100,000**	**$13,600,000**	**$8,300,000**

Costs in 2023 dollars

Table 42: Roundabout Corridor Cost Estimates

Phase	Improvement Concept			
	Base Roundabout (with Buffalo Creek Drive Extension)	Roundabout with KY 3005 (Ring Road) Signalized	Roundabout Corridor with RIRO at KY 3005 (Ring Road) with roundabouts at Pawnee Drive and Dolphin Drive	Roundabout Corridor with no Buffalo Creek Drive Extension
Design	$1,200,000	$1,200,000	$1,300,000	$900,000
Right-of-Way	$3,600,000	$3,600,000	$3,900,000	$2,500,000
Utilities	$900,000	$900,000	$1,200,000	$700,000
Construction	$9,600,000	$9,600,000	$10,400,000	$6,900,000
Total	**$15,300,000**	**$15,300,000**	**$16,800,000**	**$11,000,000**

Costs in 2023 dollars. RIRO = Right in – right out intersection

Table 43: Interchange Cost Estimates

Phase	Improvement Concept			
	Improved Diamond	SPUI	DDI	Roundabouts
Design	$400,000	$2,100,000	$400,000	$500,000
Right-of-Way	$0	$0	$100,000	$200,000
Utilities	$0	$0	$100,000	$100,000
Construction	$2,900,000	$17,300,000	$3,300,000	$3,900,000
Total	**$3,300,000**	**$19,400,000**	**$3,900,000**	**$4,700,000**

Costs in 2023 dollars

7.6 Railroad Crossing Evaluation

The two railroad crossing options that remained after initial screening were to either 1) build a new crossing which would allow for a wider typical section and space for a separated 10-foot shared use path in both directions or 2) modify the existing typical section to 11-foot lanes with curb and gutter to allow for a 4-foot sidewalk in either direction. Operationally, either option would not impact LOS or travel times; however, the new crossing is much safer. To construct the new railroad bridge over US 62, a temporary track and runaround would be expected. The cost of acquiring this easement and also relocating any utilities in this area were accounted for. Cost estimates were developed for both options and are shown in **Table 44.**

Table 44: Railroad Crossing Cost Estimates

Phase	Improvement Concept		
	Two-Track Railroad Bridge	Three-Track Railroad Bridge	Narrow US 62 Lanes and Sidewalks
Design	$2,300,000	$2,600,000	$100,000
Right-of-Way	$100,000	$100,000	$0
Utilities	$300,000	$300,000	$0
Construction	$18,700,000	$21,200,000	$800,000
Total	**$21,400,000**	**$24,200,000**	**$900,000**

Costs in 2023 dollars

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8 Study Recommendations

The full-corridor concepts with the various typical sections, intersection control types, and interchange options were presented to the project team at the third and final Project Team Meeting. During that meeting, the analysis that is included in Chapter 7 was presented, and the project team made the following recommendations:

- Move forward with the curb and gutter typical section with a 10-foot shared use path on both sides. In Phase 1 Design, investigate moving the shared use path further away from the roadway.
- Move forward with a corridor that provides roundabouts at West French Street and Commerce Drive. Further investigate the intersection type at KY 3005 (Ring Road) in Phase 1 Design, including keeping the intersection signalized, a Continuous Green T, or a roundabout or other RCUT solution at that location. The corridor could provide RCUT/U-turning opportunities between major intersections.
- Move forward with the Buffalo Creek Extension, providing a connection from Buffalo Creek Drive to Commerce Drive. The exact alignment and tie in with Buffalo Creek Drive will be determined in Preliminary Phase 1 Design Engineering. The extension of Buffalo Creek Drive would not need to be constructed at the same time as US 62 improvements. A phased construction approach could be taken.
- All four interchange concepts are recommended to carry forward into Phase 1 Design for further evaluation. Any of these could be paired with the roundabout corridor, and additional analysis in Phase 1 Design can help make the determination of the best option.
- KYTC is applying for a grant for a new railroad crossing. If that application is successful, then a new crossing is recommended; if it is not, then modifying the typical section under the existing railroad bridge to allow for 4-foot sidewalks is recommended.
- Include aesthetic treatments to beautify the corridor and create a gateway to Elizabethtown.

8.1 Benefit Cost

A high-level benefit-cost analysis (BCA) was conducted to estimate the value of the recommended improvement concept. This concept assumes the curb and gutter typical section with a 10-foot shared use path on each side, the combination roundabout and RCUT corridor with roundabouts at West French Street, KY 3005 (Ring Road), Commerce Drive, I-65 southbound, I-65 northbound, and Howell Drive, as well as an RCUT turnaround in between West French Street and KY 3005 (Ring Road). It does not include the cost of the railroad bridge, as that would only be constructed if awarded a grant. This analysis compared the predicted 20-year crash reduction to the concept level cost estimate (including design, right-of-way, utility relocation, and construction). The value of the crashes prevented was based on US Department of Transportation (USDOT) average crash cost by severity (in 2021 dollars). The future benefits were discounted at the USDOT recommended 7% discount rate. The total predicted crash savings ranges from $12.6 million to $15.6 million (in 2021 dollars) depending on the crash reduction assumptions used for the roundabouts.

Travel time savings were not included in the analysis, as the total travel time for the system over the course of a typical day is not expected to change substantially. The proposed improvement options increase the travel distance for some drivers due to the closure of some median access locations, but they also increase the average travel speeds. For example, average travel speeds in the study area are predicted to increase from 18 mph to 25 mph in the AM peak hour and from 15 mph to 19 mph in the PM peak hour, indicating that the recommended concept reduces intersection delay.

Improvement concept costs were converted to 2021 dollars using the US Bureau of Labor Statistics Consumer Price Index (CPI). The total cost of the project (curb and gutter, combination roundabout/RCUT corridor, Buffalo Creek Drive extension, and roundabout interchange) was estimated at $20.0 million in 2023 dollars. Given the approximately 13.6% inflation experienced between April 2021 and April 2023, this cost is estimated to be $17.6 million in 2021 dollars.

The resulting BCA ratio ranges from 0.72 to 0.88 depending on the assumptions for crashes prevented at the roundabouts. If other non-safety benefits were included in this analysis (such as reduced emissions, improved walking environment, off-peak travel efficiency, and reduced long term maintenance and operations costs for the signals) these ratios would be higher.

8.2 IIJA Program Funding Analysis

The Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), was passed by Congress in late 2021 and created several new programs for funding critical transportation projects across the county. Some of these new programs are competitive grant programs7, while other programs apportion funds to states based on formulas specified in Federal law. These new programs have different focus areas and address a variety of transportation needs.

Given the importance of US 62 in Elizabethtown, it is a good candidate for receiving IIJA funding from one of several Federal grant programs as discussed below.

- ***Regional and Local Project Assistance Program***[8] – This grant program is also known as the USDOT RAISE grant program. It is designed for projects that offer local and regional benefits. Priority evaluation criteria include safety, environmental sustainability, mobility and community connectivity, and quality of life. The maximum that can be requested is $25 million. BIL substantially increased funding for this popular grant program. This project would address several of the key grant criteria well, but special attention would need to be given to the benefit-cost ratio calculations.
- **Active Transportation Infrastructure Investment Program** – This program would be a good candidate for securing funding to support improved pedestrian and bicycle facilities in the corridor. In particular, the shared use path could be funded in part using these funds if a demonstrated need and safety benefits could be documented. This program may be more difficult to coordinate with the overall plan as the shared use path location would need to be selected such that it would work with the ultimate roadway typical section. This program is also fairly small compared to many of the other national grant programs.
- **Safe Streets and Roads for All (SS4A) Program**[9] **(with an approved Safety Action Plan)** – This program is not available to state entities (such as KYTC). The City of Elizabethtown was successful in securing funds to create a Vision Zero Action Plan. If that action plan identifies safety improvements on US 62, then those concepts could be pursued for implementation funding. For example, if a shared use path or roundabouts at certain intersections were included in the plan, then those could be submitted for future SS4A implementation grant funding.
- **Consolidated Rail Infrastructure and Safety Improvements (CRISI) Grant Program**[10] – This program provides funding for capital projects that improve passenger and freight rail transportation systems in terms of safety, efficiency, or reliability. Capital projects can include highway-rail grade crossing improvement projects, including installation, repair, or improvement of grade separations. The upgrade of the CSX Bridge used by RJ Corman could be a potentially eligible project, though CSX is not an eligible applicant. The application would have to be turned in by KYTC, RJ Corman, or some other eligible entity.

7 Bipartisan Infrastructure Law Grant Programs | US Department of Transportation Bipartisan Infrastructure Law Grant Programs | US Department of Transportation
8 About RAISE Grants | US Department of Transportation
9 Safe Streets and Roads for All (SS4A) Grant Program | US Department of Transportation
10 Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program | FRA (dot.gov)

9 Next Steps

Upon completion of this study, selected recommended improvement concepts will be moved through project development. There are funds for future project development phases of this corridor in the *Highway Plan as Item No. 4-80200.00*. The next steps for any identified concepts are Preliminary Engineering and Environmental Analysis, commonly referred to as "Phase I Design."

9.1 Contacts

Written requests for additional information should be sent to the KYTC Division of Planning Director, 200 Mero Street, Frankfort, Kentucky 40622.

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TRANSPORTATION CABINET

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