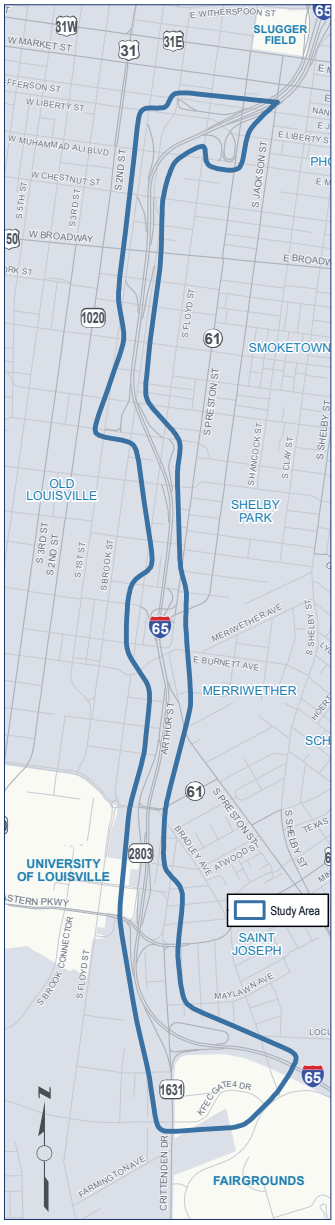


FINAL REPORT
OCTOBER 2021

I-65 CORRIDOR STUDY

I-264 TO EAST JEFFERSON STREET

JEFFERSON COUNTY
ITEM NO. 5-569

PREPARED FOR

KENTUCKY TRANSPORTATION CABINET

KIPDA
Kentuckiana Regional Planning and Development Agency

IN PARTNERSHIP WITH

AECOM

QK4
Engineering Planning

ehi CONSULTANTS

BA ENGINEERS
A Division of Bryant Associates, Inc.

EXECUTIVE SUMMARY

In partnership with the Kentuckiana Regional Planning and Development Agency (KIPDA), the Kentucky Transportation Cabinet (KYTC) initiated a corridor study for Interstate 65 (I-65) through downtown Louisville from north of the I-264 interchange near milepoint (MP) 131 to Jefferson Street near MP 136.

The study examines transportation needs related to safety and mobility, identifying practical, affordable solutions to address current needs. It represents a fresh look at existing needs and proposed solutions and updates the 2008 *I-65 Ramp Modifications Scoping Study*.[1] The study area limits are shown in **Figure ES - 1**.

The study section of I-65 represents a unique interstate facility within the Commonwealth: an elevated expressway cutting through the heart of the city. It is packed with closely spaced ramps to provide access to a host of major attractions along the corridor, including the Kentucky Exposition Center, the University of Louisville, neighborhoods, and hospitals. Louisville's Muhammad Ali International Airport is located just south of the study area, contributing to the diverse traffic mix served by the facility. KY 61 (Preston Street) stops at either side of the railroad tracks; motorists must travel 1,500 feet of I-65 and its ramps to continue along KY 61.

Existing Conditions

I-65 contains six 12-foot-wide lanes through most of the study limits—three northbound and three southbound. A fourth southbound lane is added south of the Crittenden Drive interchange. I-65 has 10-foot paved shoulders on the outside and 3-foot paved shoulders on the inside, separated by a concrete median barrier for the entire corridor length. The posted speed limit is 50-55 mph.

Intelligent Transportation System (ITS) deployments along the corridor are coordinated through Traffic Response and Incident Management Assisting the

Figure ES - 1: Study Area

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

River Cities (TRIMARC), maintaining six cameras and an overhead variable message sign near St. Catherine Street.

The study corridor contains a higher density of ramps than any other interstate facility in Kentucky. Within the five-mile study limits, there are 25 individual ramp connections to the mainline. Many have short merge or diverge lengths, limiting drivers' abilities to reach a safe speed to interact with mainline thru traffic. While standard practice guidelines for ramp length vary based on the design speed and grade, driver perception and elevated crash trends indicate that existing transition lengths are deficient at several interchanges.

There are 29 bridges along I-65 within the study limits; three are noted in poor condition. In 2019, KYTC conducted the *I-65 Bridges from I-264 to Kennedy Interchange Planning Study*.[2] The study recommended repairs be divided between four priority groups with combined costs totaling $42 million. As a result, a bridge rehabilitation/replacement project (Item No. 5-20061) is anticipated to advance for construction in 2023 to address the three bridges identified as the highest priorities: 05600179N over CSX railroad tracks, Burnett Avenue, and Hill Street; 05600183N over Brook and Kentucky streets; and 05600191N over Jacob Street, Broadway, and Gray Street.

Traffic Volumes

Average Daily Traffic (ADT) flows for 2020—factored to reduce the influence of the pandemic—range from 41,400 to 79,700 vehicles per day (vpd) per direction on the mainline. Peak hour level of service (LOS) for mainline thru lanes are shown in **Figure ES - 2**.

KIPDA's travel demand model helped forecast future No-Build traffic volumes for 2030 and 2045 analysis years. By 2045, the range of mainline thru volumes are projected to increase to 48,000-85,000 vpd per direction. Analyses showed that operations degrade moving into the future with larger stretches of the corridor operating at LOS E/F during peak hours.

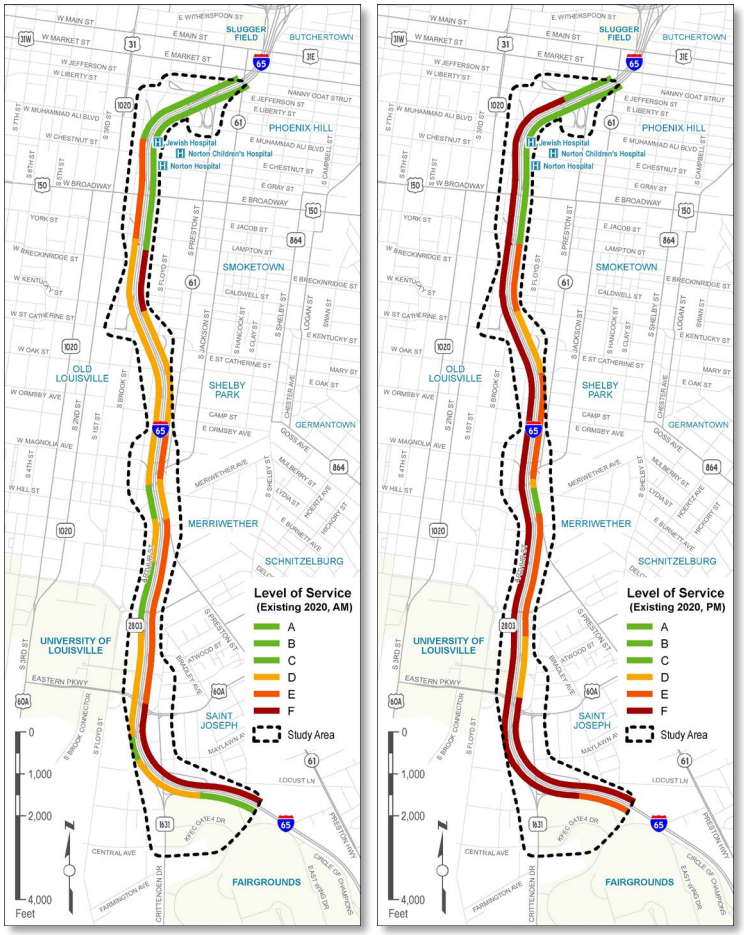


Figure ES - 2: 2020 Peak Hour Level of Service

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

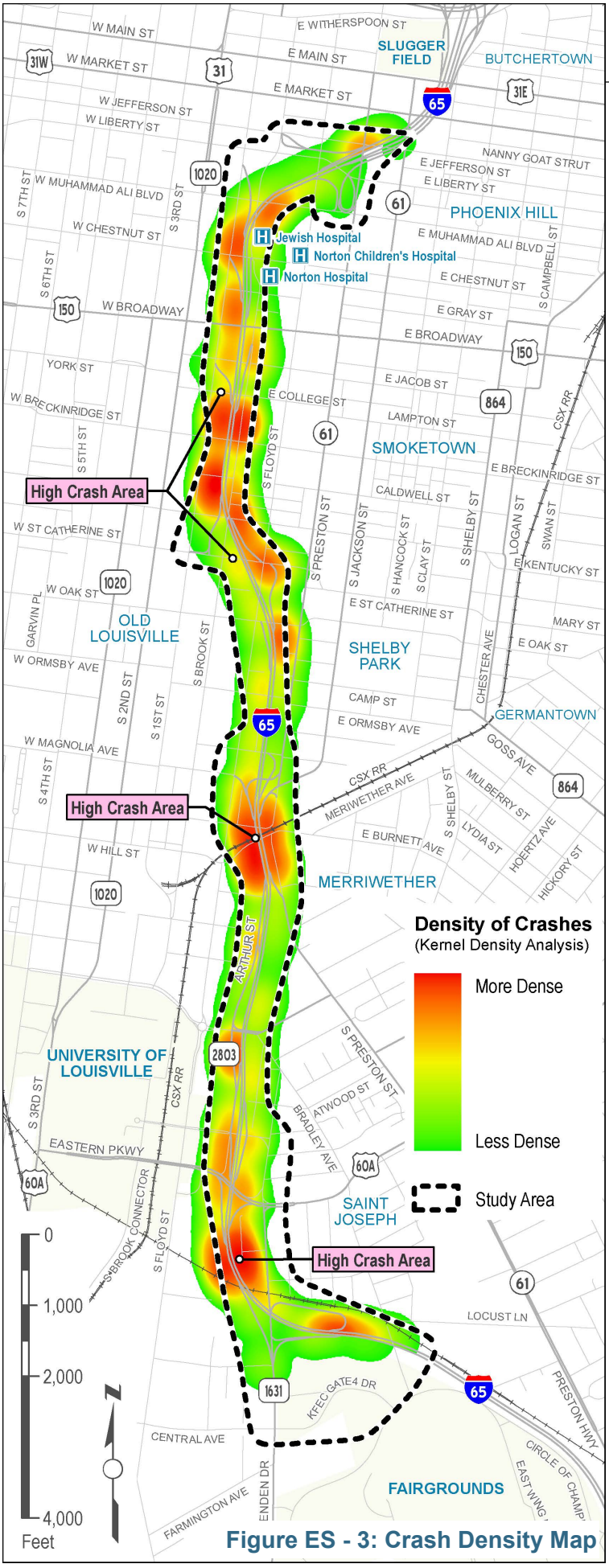


Figure ES - 3: Crash Density Map

Crash History

During the three-year analysis period (January 2017 to December 2019), 1,194 collisions were reported along the study portion of I-65. There were four fatal crashes, 191 injury collisions, and the remainder were property damage only (PDO) crashes. Manner of collision trends reveal the majority of crashes were rear end crashes (48%) followed by same direction sideswipe crashes (29%). Crash distributions were analyzed to create a heat map for northbound and southbound crashes (**Figure ES - 3**), with green areas representing less frequent crashes through red area representing the most frequent crash locations. Areas with the highest crash densities are between College Street and St. Catherine Street, near the railroad/Hill Street/Burnett Avenue overpass, and between Eastern Parkway and Crittenden Drive.

Critical Crash Rate Factor (CCRF) represents a systematic screening technique used by KYTC to analyze crashes, weighing results to account for the number of lanes, lengths, and traffic volume. A CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. There are six high CCRF segments, which vary in length to divide wherever volumes or geometry change. There are also 26 high CCRF spots along the corridor, representing 0.1-mile-long concentrations. Additional crash data is presented in **Section 2.7**.

Environmental Considerations

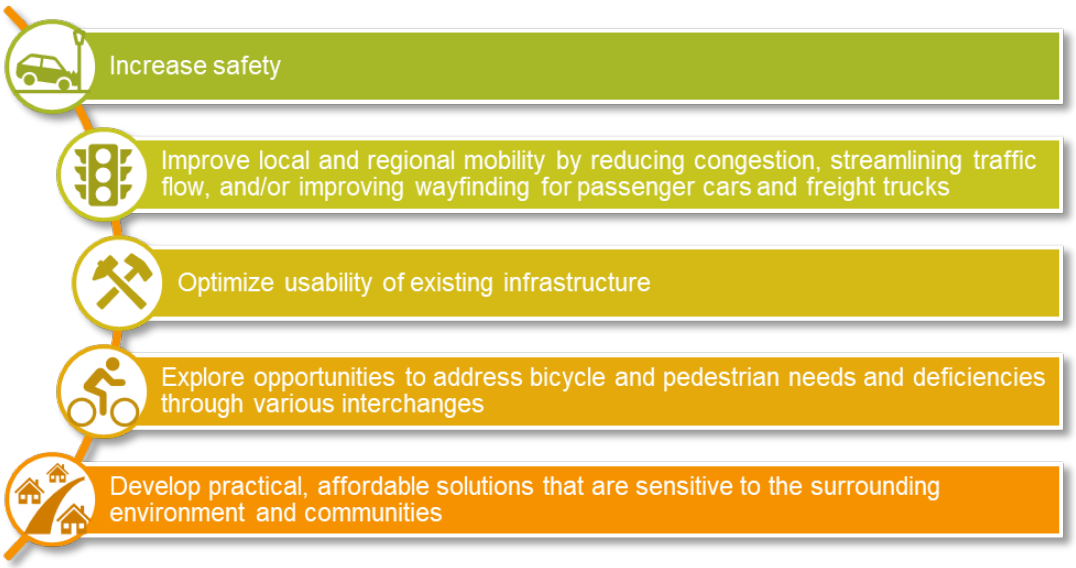
An environmental overview was prepared to understand the surrounding communities that could be most affected by any proposed improvements. In a densely developed urban corridor, few natural environmental features remain.

- There are seven hospitals and two colleges/universities immediately adjacent to the corridor.
- Four districts listed on the National Register of Historic Places (NRHP) overlap the study area—the Olmsted-designed US 60A Eastern Parkway corridor, the Old Louisville neighborhood, a set of residences along Preston and St. Catherine streets, and the First Street Historic District—along with a handful of individually listed structures.
- Nearby concentrations of low-income and minority populations are protected from disproportionate and adverse effects by federal Executive Order 12898.
- Numerous neighborhoods and community features along the corridor represent noise-sensitive receptors, requiring consideration of noise impacts if capacity is added. With relatively high-density developments close to the busy highway, any mitigation measures are likely to result in high benefits for a low cost per benefitted receptor.

Development of Improvement Concepts

Prior to developing improvement concepts, KYTC launched a public survey to get input and gain insight on the community's perspective on transportation needs in the study area. In total, 315 survey responses were compiled over the six-week comment period. In ranked order, the top cited problems along the study corridor were entrance/exit ramp lengths, safety, traffic congestion, frequent entrance/exit ramps, signage, and interactions with non-drivers on ramps and surface streets. Along with a traditional survey, an online crowdsourcing application asked respondents to drop pins to identify specific areas needing improvement.

Building on the existing conditions data and community input, the team defined a series of goals for the study:



Improvement concepts were developed based on a review of existing traffic and safety needs, field reconnaissance, and community input to address these goals. **Figure ES - 4** summarizes this exercise visually: poor LOS segments, locations with elevated crash frequencies, and common public concerns were overlaid, identifying four primary focus areas (purple boxes in figure) along I-65 for improvement concepts.

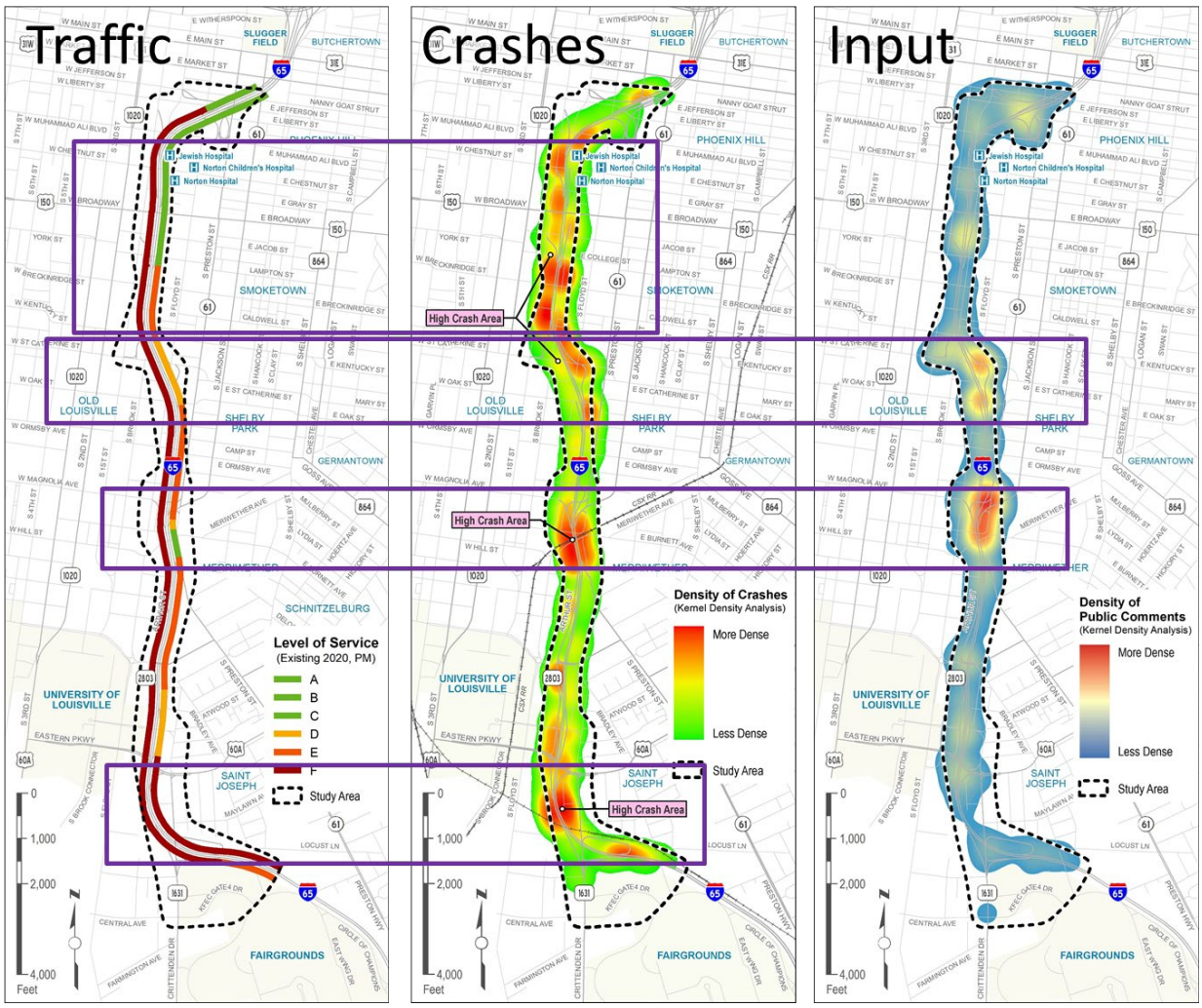


Figure ES - 4: Focus Areas for Concept Development

Beyond the location-specific improvements, a host of other concepts and strategies were considered to improve corridor safety and operations. While the scope of this 5-569 study was restricted to mainline and ramp improvements, other concepts could be pursued as separate future projects:

- Major widening is not recommended due to associated costs and impacts on adjacent properties.
- Improved transit services—either along the corridor or parallel—could also add base capacity.

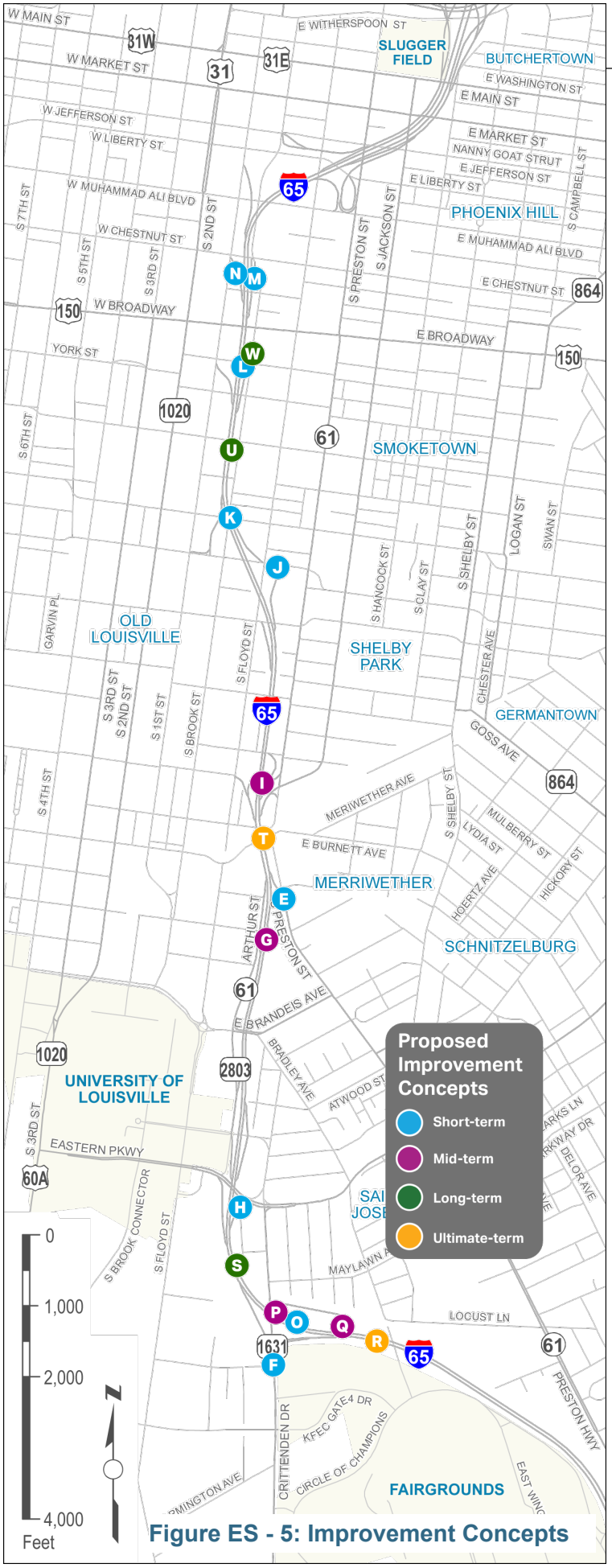


Figure ES - 5: Improvement Concepts

- Additional ITS deployments could improve operating efficiency; automated real-time warning systems for downstream queues, speeding in curves, slippery bridge decks, or individual lane controls are presented in the main body of the report (See Section 7.2.3).
- Safe, efficient movements for bicycles and pedestrians where ramps connect to surface streets are important and were incorporated into several proposed improvement concepts.
- Aesthetic enhancements with low life-cycle costs could help create a consistent, cohesive, community-specific brand for the gateway corridor.

A host of concepts were discussed, grouped into one of four categories as shown in **Figure ES - 5**. Many represent safety-focused solutions that would have minimal impact on everyday mainline traffic operations. Others were coded into a microsimulation network to quantify anticipated improvements to mainline LOS.

Proposed improvement concepts were presented to local officials and key stakeholders during Spring 2021 with another public survey effort to gauge community preferences. Input from these groups was considered alongside technical analysis—safety improvements, travel time savings, benefit/cost analyses—to produce a prioritized list of recommended measures. Key metrics for each improvement concept are summarized in **Table ES - 1**, noting whether each is recommended as a high or low priority for implementation. Project sheets (found in **Section 9.3**) present more detailed data for each—including descriptions of proposed improvement elements, traffic and safety statistics, resulting benefits, and planning-level cost estimates by phase.

Table ES - 1: Summary of Improvement Concept Prioritization

ID	Description	Improves	Cost	Benefit / Cost	Public Input	Priority
E	Preston striping	Safety	$35,000	7.1	Low	High
F	Close Boxley Ave link	Safety	$43,000	0.0	Moderate	High
G	Consolidate Arthur ramps	Safety, Traffic	$1.4 million	6.0	Highly Positive	High
H	T Eastern Pkwy NB Off-Ramp	Safety	$680,000	0.7	Moderate	High
I	Preston/Woodbine Interchange	Safety, Traffic	$1.1 million	0.9	Highly Positive	High
J	St Catherine NB Off-Ramp	Safety	$350,000	0.6	Highly Positive	High
K	NB St Catherine Accel.	Safety, Traffic	$1.1 million	0.3	Highly Positive	High
L	Brook/Broadway Striping	Safety, Traffic	$520,000	10.6	Highly Positive	High
M	Two-lane Brook/Chestnut	Safety, Traffic	$4.7 million	0.0	Low	Low
N	Remove First/Chestnut Ramp	Safety, Traffic	$6.1 million	0.5	Low	Low
O	NB Crittenden Accel.	Safety, Traffic	$330,000	1.9	Moderate	High
P	NB Crittenden Accel.	Safety, Traffic	$2.1 million	0.4	Low	Eliminated
Q	NB Crittenden Accel.	Safety, Traffic	$1.0 million	1.0	Low	Eliminated
R	Central Ave Extension	Safety, Traffic	$19.1 million	0.2	N/A	Low
S	Crittenden to University NB Auxiliary Lane	Safety, Traffic	$8.6 million	1.3	Low	Low
T	Reconnect Preston St.	Safety, Traffic	$11.8 million	0.1	N/A	Low
U	St. Catherine to Brook NB Auxiliary Lane	Safety, Traffic	$5.7 million	-0.2	Low	Eliminated
W	Two-lane Brook/Broadway	Safety, Traffic	$1.2 million	4.5	Moderate	Low

◆ Short-term ◆ Mid-term ◆ Long-Term ◆ Ultimate-term

Concepts A-D omitted from prioritization as they may be incorporated into Item 5-20061 or a future pavement rehabilitation project.

Concept V consolidated ramps near Eastern Parkway but was eliminated early for excessive structure costs

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List of Acronyms

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
ATR	Automatic Traffic Recorder
BCR	Benefit-Cost Ratio
BQWS	Back of Queue Warning System
BRT	Bus Rapid Transit
CCRF	Critical Crash Rate Factor
CHAF	Continuous Highway Analysis Framework
CMF	Crash Modification Factor
EJ	Environmental Justice
FHWA	Federal Highway Administration
GIS	Geographic Information System
HIS	Highway Information System
HSIP	Highway Safety Improvement Program
IMR	Interchange Modification Report
ITS	Intelligent Transportation Systems
JCTC	Jefferson Community and Technical College
KHFN	Kentucky Highway Freight Network
KIPDA	Kentuckiana Regional Planning & Development Agency
KTC	Kentucky Transportation Center
KYTC	Kentucky Transportation Cabinet
LOS	Level of Service
MP	Milepoint
mph	Miles per hour
MTP	Metropolitan Transportation Plan
NHS	National Highway System
NRHP	National Register of Historic Places
PDO	Property Damage Only
STRAHNET	Strategic Highway Network
TARC	Transit Authority of River City
TED	Transportation Enterprise Database
TIP	Transportation Improvement Program
TRIMARC	Traffic Response & Incident Management Assisting River City
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
vpd	Vehicles per day

1.0 INTRODUCTION

In partnership with the Kentuckiana Regional Planning and Development Agency (KIPDA), the Kentucky Transportation Cabinet (KYTC) initiated a corridor study for Interstate 65 (I-65) through downtown Louisville from north of the I-264 interchange near milepoint (MP) 131 to Jefferson Street near MP 136.

The study examines transportation needs related to safety and mobility, identifying practical, affordable solutions to address those current needs. The study area limits are shown in **Figure 1** on the following page.

Study tasks include creating an inventory of existing conditions, defining the study goals and objectives, forecasting existing and future traffic, identifying red flag environmental issues, developing build concepts with construction cost estimates, and documenting the study process and results. The following chapters explore these efforts.

This study was prepared using federal Metropolitan Planning (PL) funds.

1.1 Project History

As discussed in the following chapter, this section of I-65 represents a unique interstate facility within the Commonwealth: an elevated expressway cutting through the heart of the city. It is packed with closely spaced ramps to provide access to a host of major attractions along the corridor, including the Kentucky Exposition Center, the University of Louisville, neighborhoods, and hospitals. Louisville's Muhammad Ali International Airport is located just south of the study area, contributing to the diverse traffic mix served by the facility.

The study represents a fresh look at existing needs and proposed solutions and updates the *I-65 Ramp Modifications Scoping Study*[3] completed in 2008, discussed below.

1.2 Previous Transportation Studies

A rich history of planning defines the dense urban study area. A selection of the most relevant recent studies is presented for reference.

☑ In 1999, the South Central Louisville Development Coordination Study examined a 15-square mile study area to generate a collaborative approach to future development potential, including recommendations for infrastructure investments. Consolidating ramps, improving wayfinding, and reconstructing Phillips Lane were identified as priorities.

☑ In 2008, KYTC and Louisville Metro completed the *I-65 Ramp Modifications Scoping Study*[3] (Item No. 5-8102), which examined traffic, safety, and access along I-65 between Crittenden Drive and St. Catherine Street. The study relied on empirical traffic and safety data plus input from key stakeholders to identify problem locations. Key stakeholders included the Transit Authority of River City (TARC), the Kentucky Exposition Center, the University of Louisville, Traffic Response and Incident Management Assisting the River Cities (TRIMARC), Churchill Downs, KIPDA, Jefferson County Public Schools, St. Joseph's Area Association, and the Old Louisville Neighborhood Association.

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

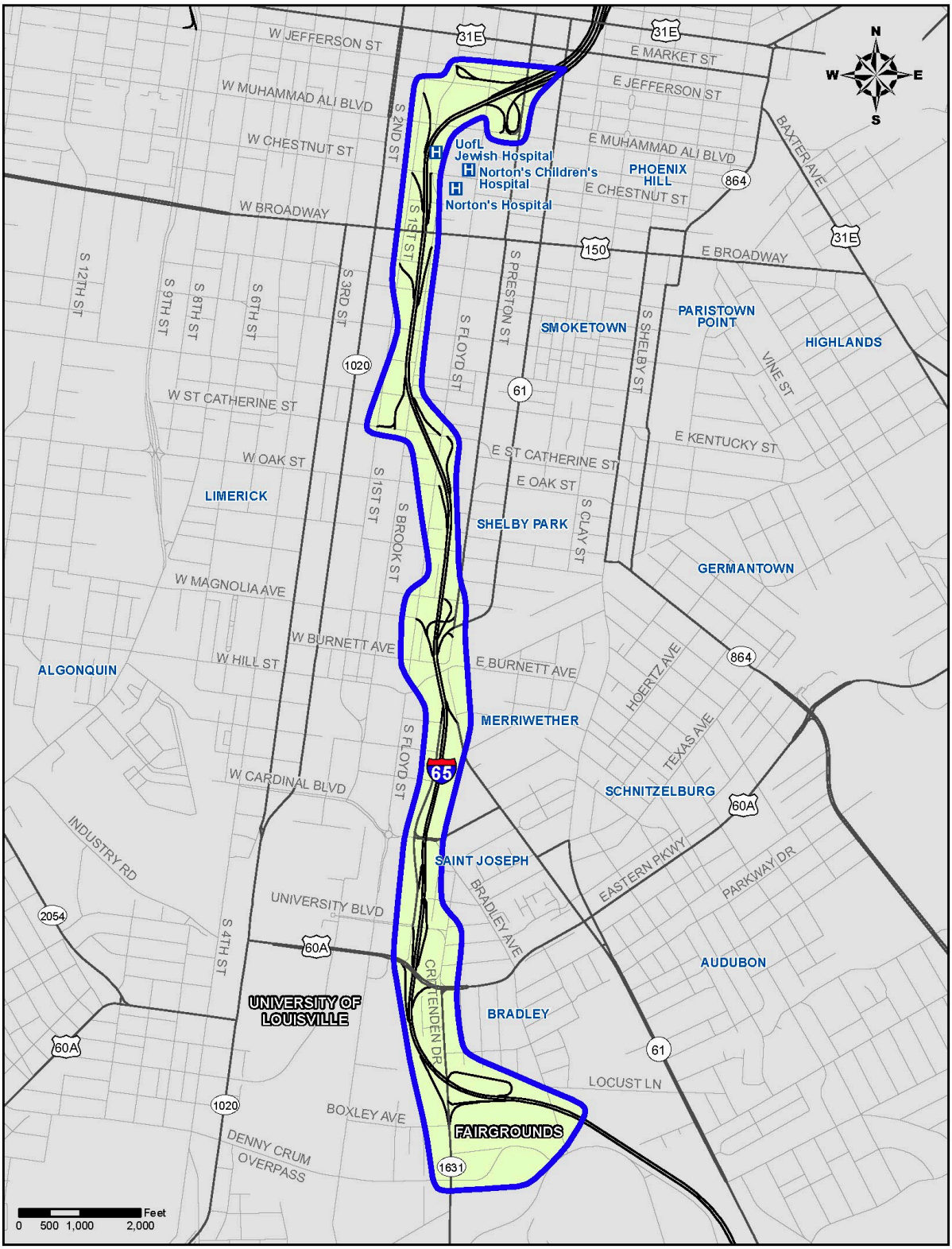


Figure 1: Study Area Map

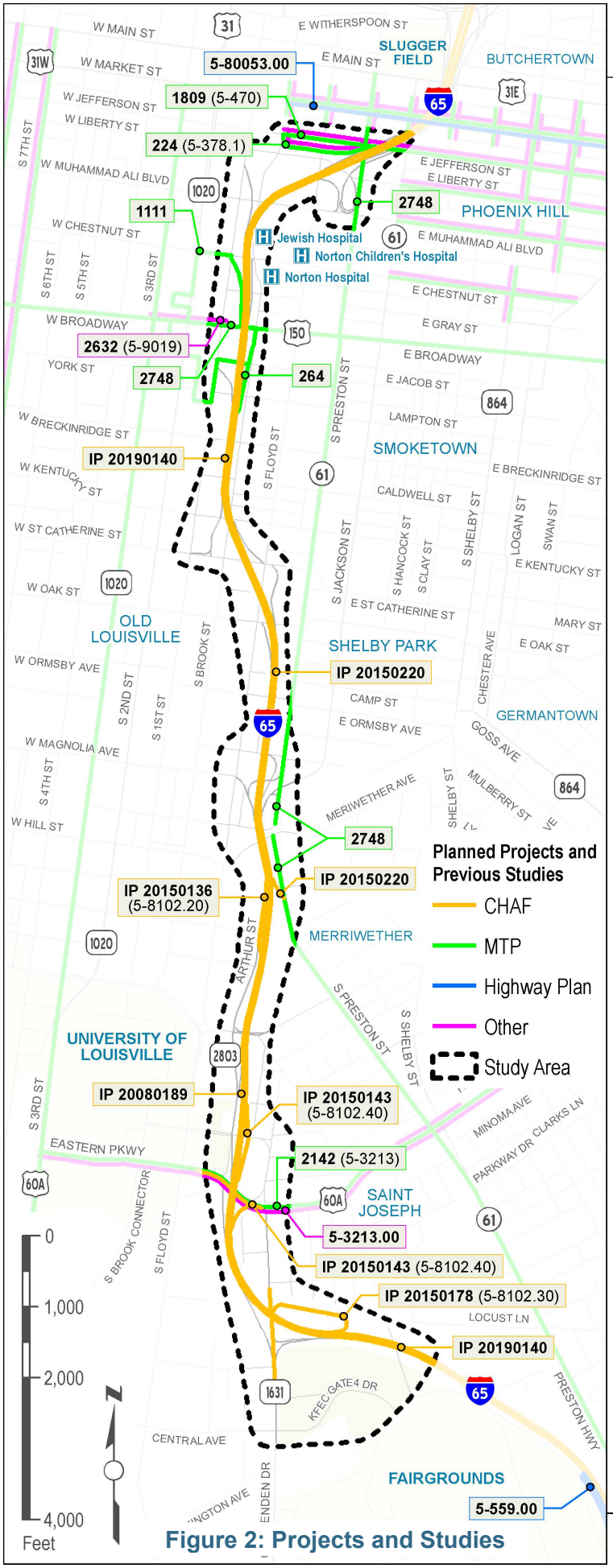


Figure 2: Projects and Studies

Meetings with key stakeholders were held to collect input; most frequently cited transportation concerns included too many ramps, short merge lengths, inadequate queue storage, inadequate wayfinding, safety issues, and congested traffic flow around the University of Louisville.

In addition to the No-Build option, four build configurations were studied, two of which were recommended for additional design and phased implementation. Planning-level costs were estimated at $61 to $69 million for these combined concepts, presented in 2005 dollars.

☑ In 2019, KYTC completed an assessment of I-65 bridges between I-264 and the Kennedy Interchange, entitled *I-65 Bridges Planning Study*.[4] It recommended a series of critical repair and rehabilitation efforts; study findings are discussed further in **Section 2.2** and have been considered/incorporated as 5-569 improvement concepts were developed.

1.3 Nearby Transportation Projects

Numerous proposed projects and planning study recommendations exist within the vicinity, compiled from the current Highway Plan, KYTC's Continuous Highway Analysis Framework (CHAF) database, and from KIPDA's latest Metropolitan Transportation Plan (MTP)—*Connecting Kentuckiana 2040*—and *Transportation Improvement Program* (TIP).

Shown in **Figure 2**, two projects in the *FY 2020—2026 Highway Plan* are near the study area: Item No. 5-559, a recent planning study at the I-65/I-264 interchange, and Item No. 5-80053, a proposed streetscape project along East Market Street with 2023 federal construction funding.

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

Six CHAF concepts overlap the study area:

- IP 20190140, Intelligent Transportation System (ITS) deployments to support truck parking—part of a larger, multi-state federal grant program.
- IP 20150220, reconstruction of the Preston Street ramp, access to Preston/Jackson streets, removal of the Woodbine Street ramp, and potential closure of Magnolia Avenue.
- IP 20150136, reconstruction of the southbound Arthur Street ramps
- IP 20080189, improve I-65
- IP 20150143, reconstruct northbound University Boulevard ramps and remove the northbound Eastern Parkway off-ramp
- IP 20150178, reconstruct the northbound Crittenden Drive on-ramp

KIPDA's MTP and TIP list seven additional concepts to improve transportation in the vicinity:

- 1809, two-way Jefferson Street
- 224 and Item No. 5-378.1, reconstruction of the Brook Street/Jefferson Street ramp
- 2632, Broadway intersections
- 2748, create premium transit corridors, including Preston Street and Broadway through the study area limits
- 1111, Jefferson Community and Technical College (JCTC) bike/pedestrian improvements
- 264, Brook Street/Broadway ramp improvements

Finally, Louisville Metro's *Eastern Parkway Transportation Plan,*[5] completed in 2020 included a planning-level analysis for the rehabilitation and upgrade of Eastern Parkway to modern standards, including possible lane reductions and complete street elements such as additional bicycle lanes, shared use paths, and sidewalks. Also listed as Item No. 5-3213, the Eastern Parkway Study corridor overlaps a portion of the 5-569 study area.

[5] Online at http://louisvilleparkways.org/

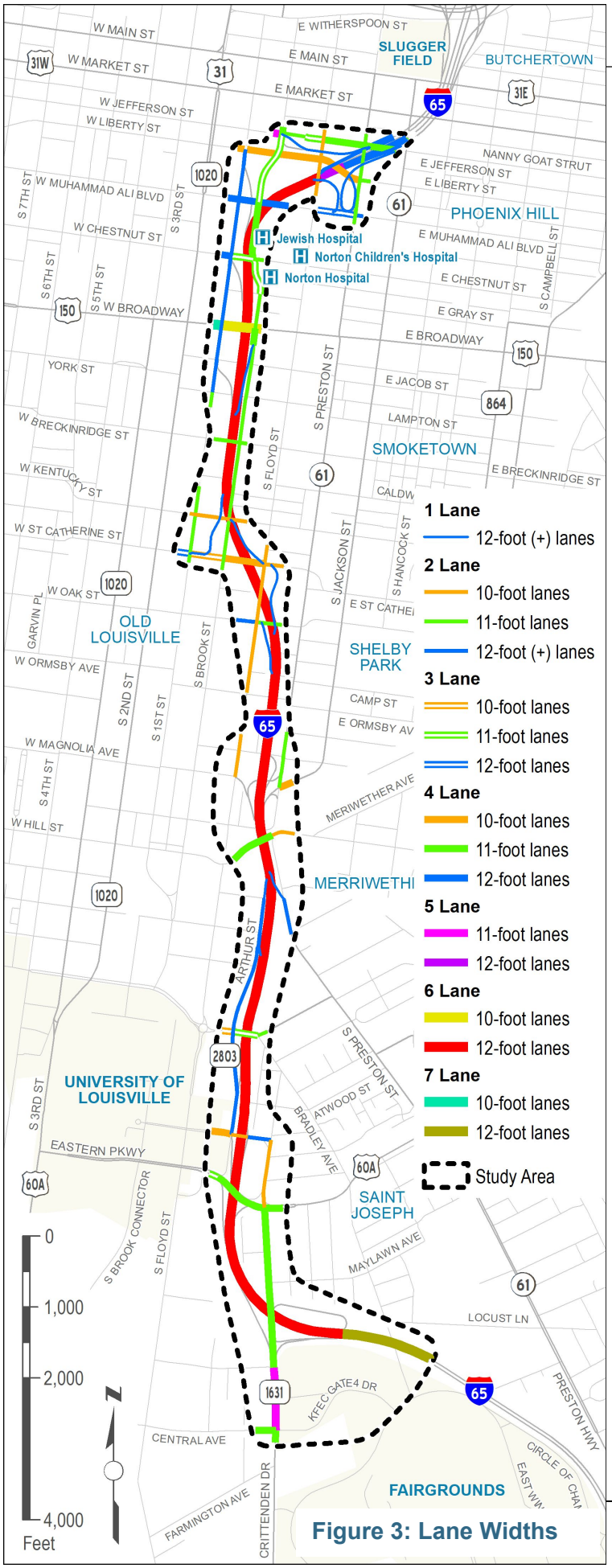


Figure 3: Lane Widths

2.0 EXISTING CONDITIONS

This section describes existing transportation network conditions within the study area and includes information on roadway systems and geometry, bridges, traffic volumes and operations, and crash history. Data was compiled from the KYTC's Highway Information System (HIS) database, KYTC's Transportation Enterprise Database (TED), bridge inspection reports, traffic counts, aerial photography, and field reviews.

2.1 Roadway Systems and Geometric Characteristics

KYTC's HIS database was queried during August 2020 to obtain roadway systems information and geometric characteristics of the I-65 study corridor and other major roadways within the study area boundary. Data assembled from HIS for analyses included:

- Lane, shoulder, and median widths
- Speed limits
- Truck routes
- Functional classifications and other roadway system designations

Lanes

I-65 contains six 12-foot-wide lanes through most of the study limits—three northbound and three southbound. South of the Crittenden Drive ramps, I-65 expands to seven lanes with a fourth southbound lane continuing to the I-264 interchange. North of Liberty Street, there are four mainline thru lanes but an adjacent collector-distributor system provides additional connections to/from the Kennedy Interchange. Lane counts and widths are summarized visually in **Figure 3**.

Shoulders

Figure 4 presents shoulder widths for routes within the study area. I-65 has 10-foot paved asphalt shoulders on the outside and 3-foot paved asphalt shoulders on the inside for the entire corridor length. Nearby surface streets have curb/gutter.

Medians

Like all interstates, the corridor has a divided cross-section. A concrete median barrier separates I-65 northbound and southbound traffic.

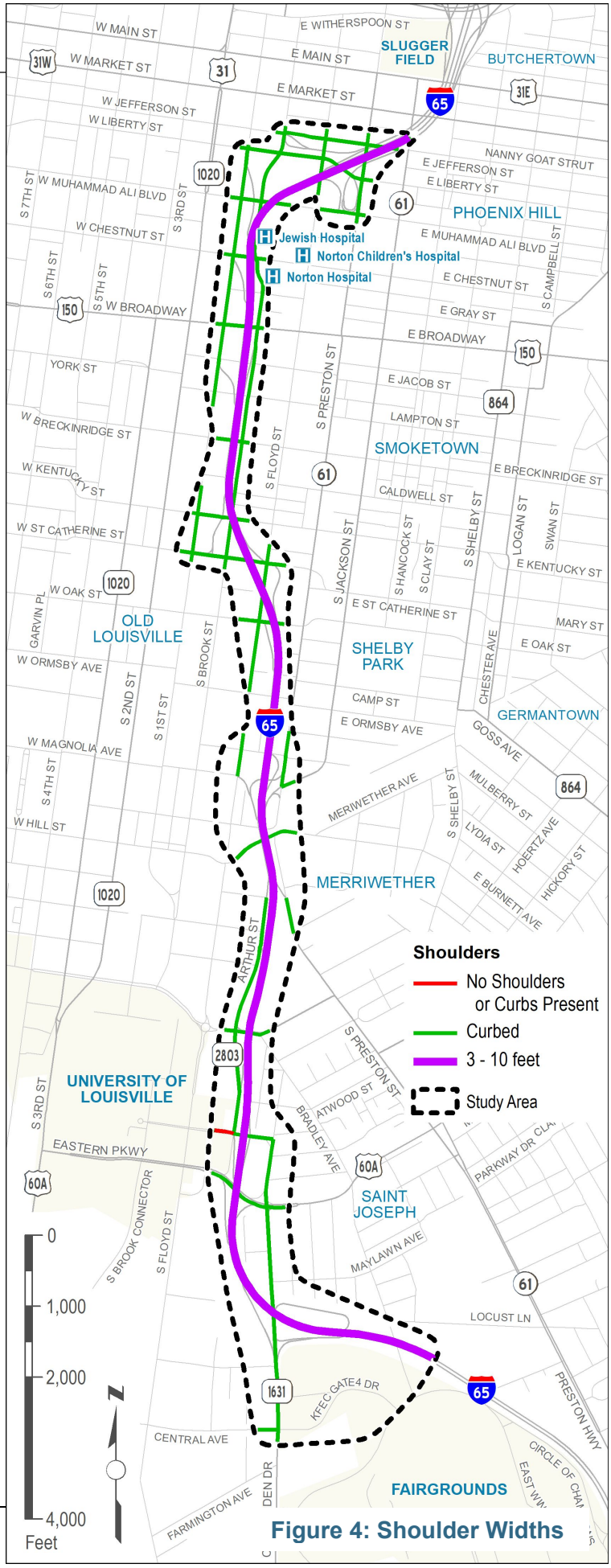


Figure 4: Shoulder Widths

Ramps

The study corridor contains a higher density of ramps than any other interstate facility in Kentucky. Within the five-mile study limits, there are 25 individual ramp connections to the mainline, divided between northbound/southbound and on/off ramps, as shown in **Table 1**. Many of the ramps have short merge or diverge lengths, limiting drivers' abilities to reach a safe speed to interact with mainline thru traffic. While standard practice guidelines for ramp length vary based on the design speed and grade, driver perception and elevated crash trends (**Section 2.7**) emphasize that existing merge/diverge/weave lengths are deficient at several interchanges.

Table 1: Ramp Taper/Transition Lengths

Type	To/From	Length (ft)
NORTHBOUND		
Merge	Crittenden Dr.	328
Diverge	Eastern Pkwy. (Exit 132)	111
Diverge	University Blvd. (Exit 133)	346
Merge	University Blvd.	382
Weave	Preston St.	873
Diverge	Preston St. (Exit 134 A)	229
Diverge	Woodbine St. (Exit 134 B)	113
Diverge	St Catherine St. (Exit 135)	300
Merge	St Catherine St.	113
Diverge	Brook St./Jacob St. (Exit 136A)	350
Diverge	Brook St./Chestnut St. (Exit 136B)	400
Diverge	Muhammad Ali Blvd. (Exit 136C)	200
SOUTHBOUND		
Merge	First St./Liberty St.	353
Merge	First St./Chestnut St.	151
Weave	First St./Jacob St. to St. Catherine St. (Exit 135)	1328
Merge	Oak St.	281
Weave	Floyd/Magnolia/Preston to Arthur/Gaulbert (Exit 134)	764
Merge	Arthur St./Lee St.	237
Diverge	Arthur St./University Blvd. (Exit 133)	182
Merge	University Blvd.	182
Weave	Eastern Pkwy. to Crittenden Dr. (Exit 132)	734

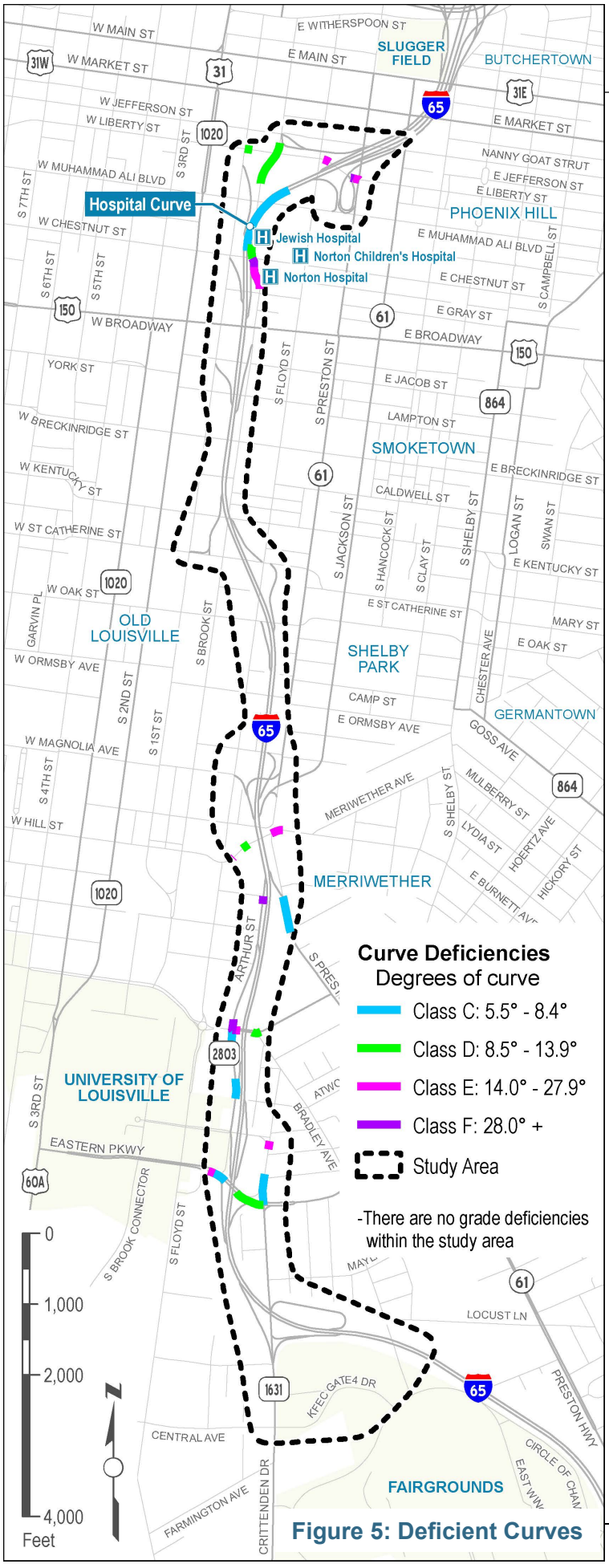


Figure 5: Deficient Curves

Geometric Deficiencies

HIS data was reviewed to identify any substandard grades or curves along study area routes. At a planning level, KYTC classifies vertical grades into six classes, graded A through F. Similarly, KYTC classifies horizontal curves into six classes, graded A through F.

One class C horizontal curve (5.5 to 8.4 degree of curve) is located along I-65, locally known as "Hospital Curve" for its proximity to a large cluster of medical facilities. Warning signage and retroreflective median tape warn northbound motorists. Surface streets in the study area exhibit a selection of substandard horizontal curves, shown graphically in **Figure 5**, but no vertical deficiencies were noted in HIS records.

Speed Limits and Travel Speeds

Posted speed limits can help suggest the character and intended function of highway segments. The posted speed limit along I-65 is 55 mph south of MP 135—near the Breckinridge Street overpass—and 50 mph north of MP 135. Surface streets have 25 or 35 mph speed limits through the urban area.

Travel times during 2019 peak commuter periods (7 -- 9 AM and 4 -- 6 PM) are summarized in **Table 2**, which illustrates the effect of congestion on travel times. The largest slowdowns are associated with southbound traffic during the PM peak period, primarily north of the Oak Street ramp. Additional discussion is presented in the *Traffic Forecast and Modeling Report* in **Appendix A**.

Table 2: 2019 Travel Time Trends

Statistic	AM Peak	PM Peak
Northbound		
Minimum	38 mph	44 mph
Maximum	56 mph	58 mph
Average	48 mph	53 mph
Southbound		
Minimum	44 mph	20 mph
Maximum	49 mph	55 mph
Average	49 mph	38 mph

Truck Routes

As an interstate facility, I-65 is a federally designated truck route and designated as a Tier 1 facility on the Kentucky Highway Freight Network (KHFN). US 150 (West Broadway) is the only other federally designated truck route within the study limits. Other routes on the KHFN include KY 1631 (Crittenden Drive), US 60A (Eastern Parkway), KY 61 including portions of Brandeis Avenue, Arthur Street, South Preston Street, and Jackson Street.

Functional Classification

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

Over the years, functional classification has come to assume additional significance. Functional classification includes expectations about roadway design, such as vehicle speed, capacity, and relationship to land use development. Federal legislation uses functional classification in determining eligibility for funding under the Federal-aid program. Transportation agencies often describe roadway system performance, benchmarks, and goals by functional classification.

The following are short definitions of major functional classes:

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

Figure 6 on the following page shows the functional classification of roadways within the study area.

Highway Systems

I-65 is also part of the following systems:

- The National Highway System (NHS), consisting of roadways important to the nation's economy, defense, and mobility.
- The Strategic Highway Network or "STRAHNET" encompasses highways that provide "defense access, continuity, and emergency capabilities for movements of personnel and equipment in both peace and war."
- The State Primary System, which includes Interstates, parkways, and other long distance, high volume intrastate routes of statewide significance that generally link major urban areas within the state.

An interesting item to note: KY 61 (Preston Street) breaks at the railroad tracks; motorists must travel along I-65 and its ramps to continue on KY 61. From the south, KY 61 follows South Preston and Arthur streets to join I-65 to cross the railroad tracks. Continuing north, KY 61 follows the next set of ramps to return to the surface street network along South Preston and Jackson streets into downtown.

Figure 7: KY 61 Northbound along I-65

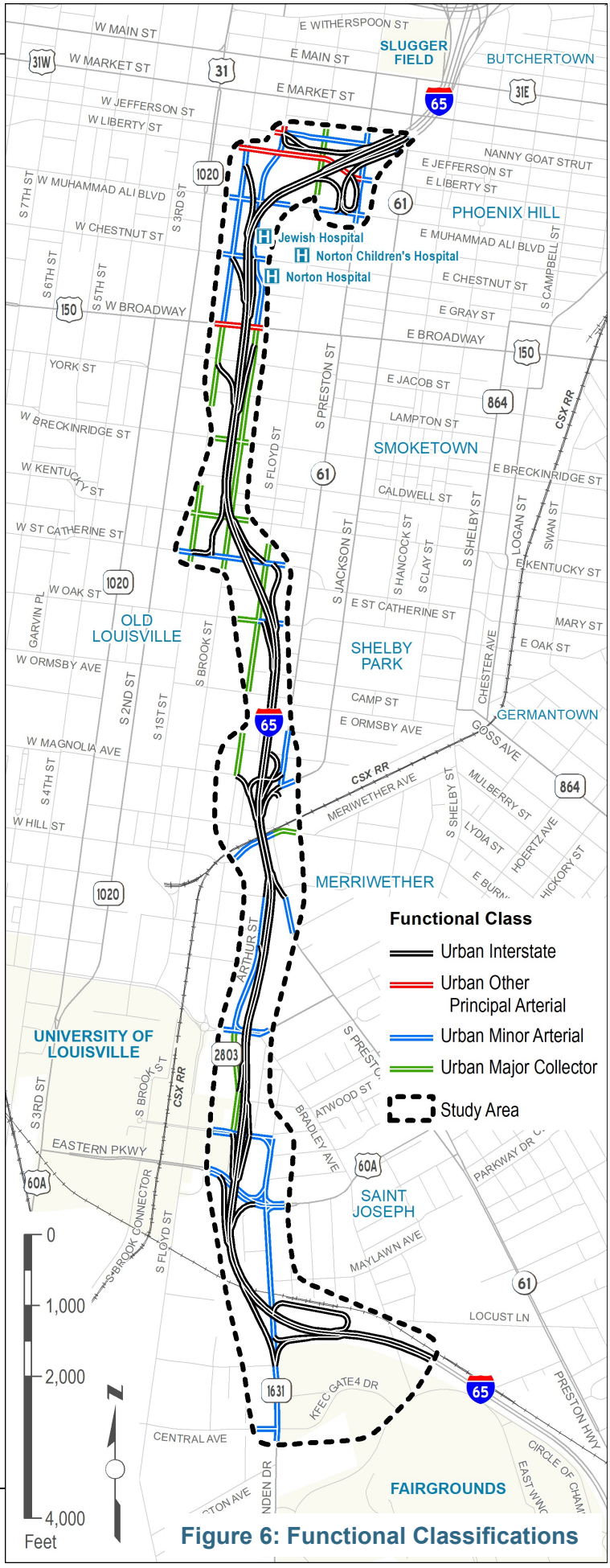


Figure 6: Functional Classifications

2.2 Bridges

The 29 bridges along I-65 within the study limits are listed in **Table 3** and illustrated in **Figure 8** on the following page. In accordance with federal standards, bridges are inspected by KYTC every two years to evaluate their conditions and other elements as part of the National Bridge Inventory (NBI) program. Bridge conditions are rated as Good, Fair, or Poor based on their deck, superstructure, and substructure conditions. To receive a Good rating, the NBI condition ratings for the deck, superstructure, and substructure must be 7 or higher on the 10-point scale. Poor indicates one of the three components is rated below 4; Fair captures all other scenarios. There are two poor condition structures on the study corridor.

Table 3: Study Area Bridges

Bridge ID	Rating	Route	Intersecting Feature
056B00212N	Fair	I-65	Bradley Ave-North Entrance to Fairground
056B00213N	Fair	I-65	Crittenden Dr (Ky 1631)
056B00205N	Fair	I-65	Norfolk Southern Railroad
056B00180N	Fair	I-65	Eastern Pkwy
056B00181N	Fair	I-65	University Blvd.
056B00182N	Fair	I-65	Brandeis Ave
056B00179N	Poor	I-65	CSX Railroad, Burnett, Hill St
056B00208N	Fair	I-65 Ramp	Preston On-Ramp to I-65 South
056B00207N	Fair	I-65	S Preston St On-Ramp
056B00206N	Fair	I-65	Woodbine St
056B00187N	Fair	I-65	E Ormsby Ave
056B00186N	Fair	I-65	Oak St
056B00185N	Fair	I-65	Floyd St
056B00184N	Fair	I-65	St Catherine St
056B00183N	Poor	I-65	S Brook, E Kentucky St
056B00190N	Fair	I-65	Caldwell St
056B00189N	Fair	I-65	E Breckinridge St
056B00188N	Fair	I-65	College St
056B00191N	Fair	I-65	Jacob, Broadway, Gray St
056B00192N	Fair	I-65	Chestnut St
056B00193N	Fair	I-65	Brook St, Muhammad Ali
056B00194N	Fair	I-65 SB On-Ramp	Muhammad Ali
056T00903N	Good	I-65 NB On-Ramp	Liberty St
056B00195R	Fair	I-65 NB	Floyd St
056T00901L	Good	I-65 SB, Ramp	Floyd St
056B00197R	Fair	I-65 NB	Liberty St
056T00902L	Good	I-65 SB	Liberty St
056B00196N	Fair	I-65 SB Off-Ramp	Floyd St
056T00904N	Good	I-65, Ramps	Preston, Jefferson St

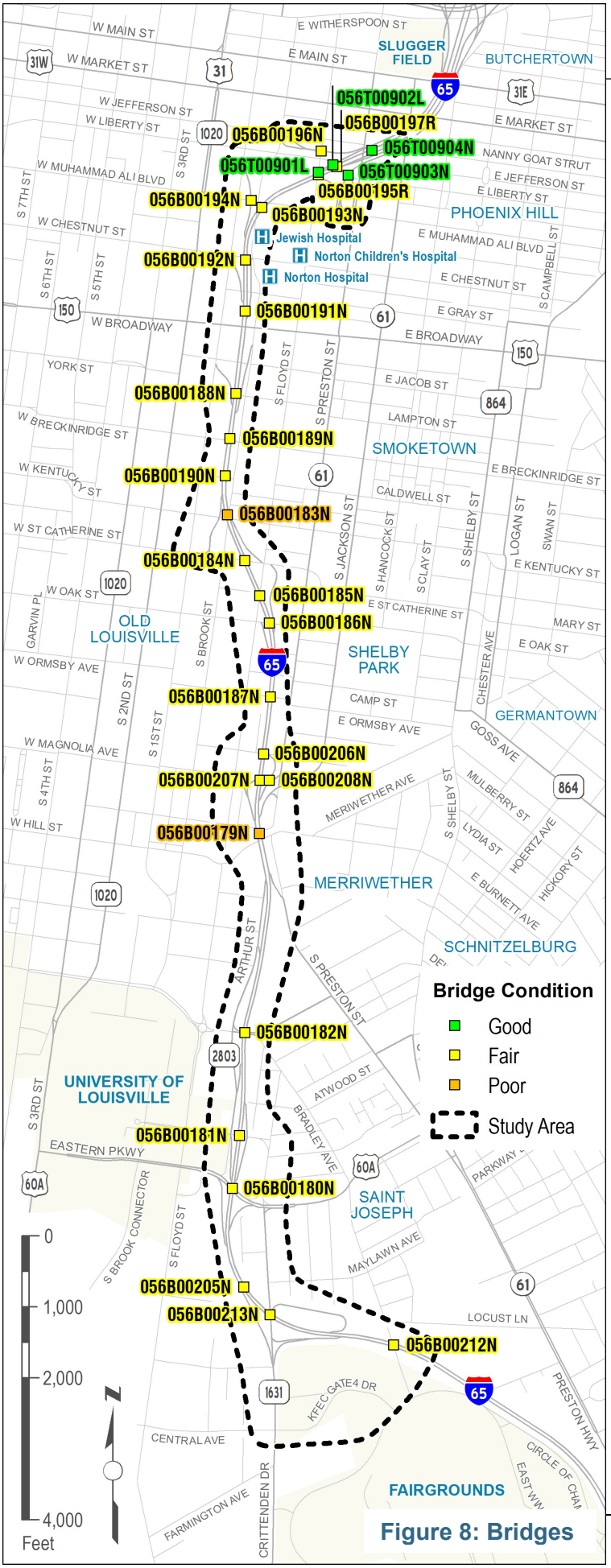


Figure 8: Bridges

KIPDA identifies many of the overpasses along this corridor as "freight impedances" as they provide less than 16 feet of vertical clearances for surface streets below.

2019 Planning Study for I-65 Bridges

In 2019, KYTC conducted a planning-level assessment of I-65 bridges in Jefferson County between I-264 and the Kennedy Interchange. One of the goals of this 5-569 study was to incorporate findings from the 2019 bridge study to the extent practical.

A bridge rehabilitation project (Item No. 5-20061) is scheduled for construction in 2023 to address the three bridges identified as the highest priorities for KYTC:

- **179N** (over CSX railroad tracks, Burnett Avenue, and Hill Street) recently received emergency shoring due to disintegration of some of the south abutment's concrete-bearing areas. Costs for concrete repair, superstructure replacement, and a complete replacement were provided.
- **183N** (over Brook and Kentucky streets within the Old Louisville Historic District) has fracture critical steel straddle bents and numerous undesirable geometries and structural details. Multiple repair and replacement options were examined; replacement options identified recommend leaving most or all existing abutments in place and spanning them.
- **191N** (over Jacob Street, Broadway, and Gray Street) consists of seven different structural units; a reinforced concrete unit over Broadway Street has a severely deteriorated girder. It can be repaired in place by using a fiber reinforced polymer fabric bonded to the repaired surface, or by removing the damaged girder line and replacing the girder line with a new prestressed concrete girder and slab area.

Baseline repair cost estimates include conventional repair techniques for concrete restoration and other typical bridge repairs, such as resetting, cleaning, and greasing steel rocker bearings; spot painting; and embankment repairs. Summarized graphically in **Figure 9**, the study recommends repairs be divided between four priority groups:

- High Priority— Repair Package No. 1 - discussed above—totaling $14.5 million.
- Moderate Priority – Repair Package No. 2 - bridges between College and Liberty streets, totaling $7.7 million.
- Moderate Priority – Repair Package No. 3 - bridges between Phillips Lane and Brandeis Avenue, totaling $11.2 million.
- Low Priority – Repair Package No. 4 - bridges totaling $8.9 million.

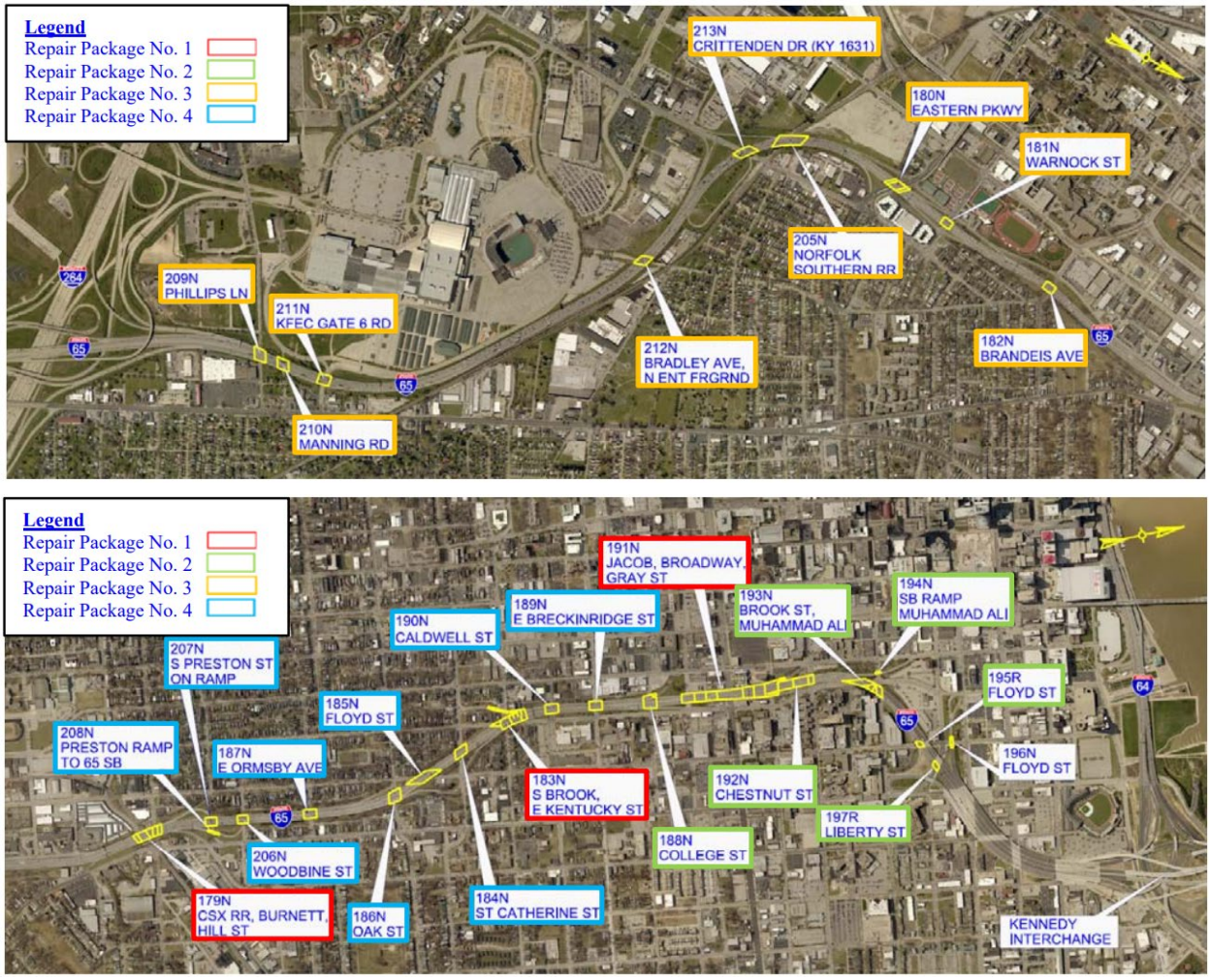


Figure 9: Bridge Repair Packages

2.3 Bicycles and Pedestrians

While there are no bicycle or pedestrian facilities along the interstate, sidewalk connections exist along one or both sides of almost all surface streets in the vicinity. An extensive network of bicycle facilities serves the area, as shown in **Figure 10**.

Bike lanes are striped as a separate travel lane from the adjacent vehicle driving lanes, while a **neighborway** includes painted markings in driving lanes, where cyclists and motorists share space.

Louisville Metro's *Pedestrian Master Plan* (2010)[6] identifies a grand vision: "for Louisville to become the safest and most appealing community for pedestrians." In support, the plan identifies numerous goals and objectives for implementation, including (1.1a) to provide sidewalks on both sides of all principal arterial roads and at least one side of all other streets in Louisville where feasible.

Louisville Metro's *Bicycle Master Plan (2018-2022 Update)*[7] identifies goals and priorities for implementing additional bikeways throughout the city. One proposed project overlaps the study limits: updating bike lanes along Floyd Street from Broadway to Market Street.

The 2020 *Eastern Parkway Transportation Plan* included specific recommendations for non-motorized facilities along Eastern Parkway, a key gateway for the university.

Potential impacts to bicyclists and pedestrians are a critical consideration while developing improvement concepts, especially at ramp connections to surface streets and at underpasses.

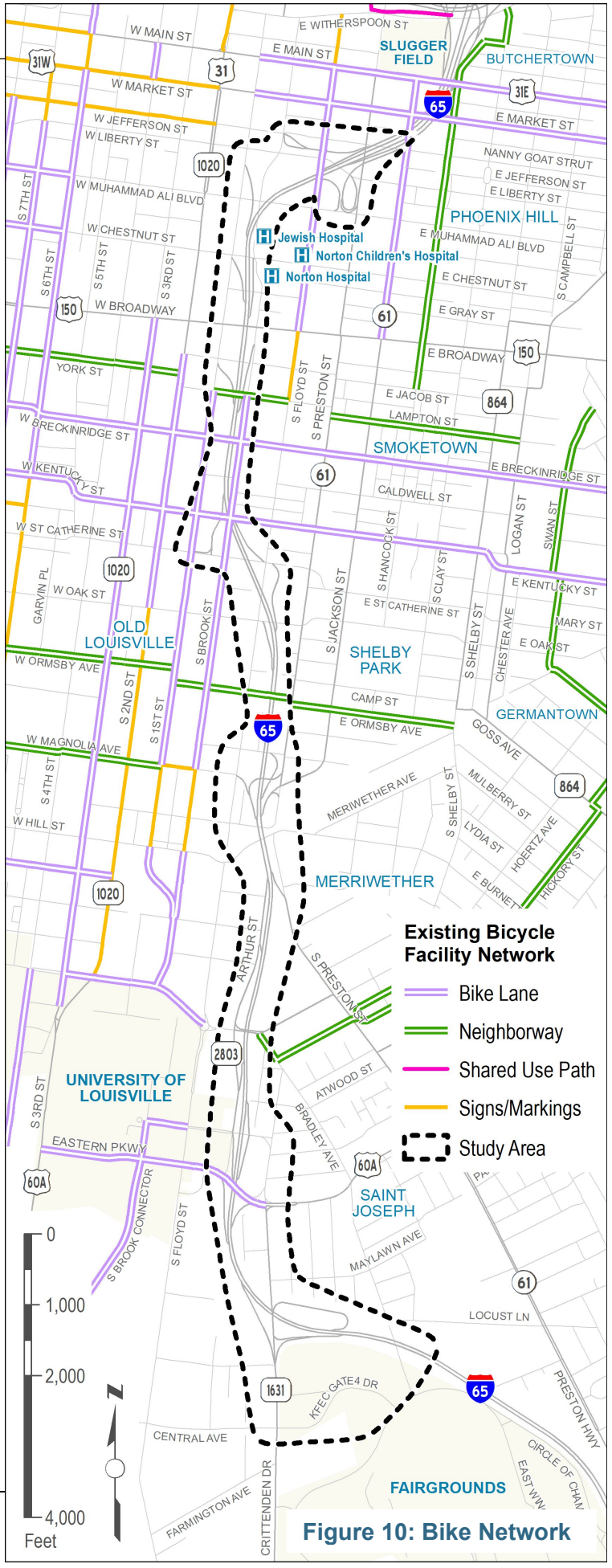


Figure 10: Bike Network

[6] Online at https://louisvilleky.gov/government/bike-louisville/pedestrian-master-plan

[7] Online at https://louisvilleky.gov/government/bike-louisville/bike-master-plan

2.4 Transit

Regional transit operations are run by TARC, which provides a variety of services throughout the greater Louisville area. Services include fixed route buses, a complimentary trolley-style circulator route for downtown attractions, commuter express lines, paratransit for senior and disabled riders, and partnership programs with local non-profits. The fixed route service alone covered over 12.5 million trips annually in recent years.

While no routes currently travel along I-65 in the study limits, TARC is in the process of updating its comprehensive operations analysis and long-range plan to define its vision for the future.

2.5 ITS and Wayfinding Signage

Figure 11 presents an inventory of existing signage and intelligent transportation systems (ITS) infrastructure along the study corridor. ITS deployments are coordinated through TRIMARC, part of the original national initiative to deploy ITS to 75 of the nation's largest metropolitan areas. It includes an integrated system of sensors, cameras, dynamic message signs, highway advisory radio, and computers monitoring more than 100 miles of interstate traffic in the Louisville Metro area and more than 50 miles of interstate traffic in Northern Kentucky.

Within the study corridor, TRIMARC maintains six cameras to monitor live traffic feeds, plus an overhead variable message sign near St Catherine Street to communicate real time with northbound motorists. To monitor around-the-clock traffic data, KYTC maintains an automatic traffic recorder (ATR) count station near MP 133.4 north of Brandeis Avenue. Other signage along the corridor identifies upcoming exits or nearby attractions. Beyond mile markers and exits, informational signs along the corridor are shown in **Figure 11**, with northbound traffic callouts on the right side of the map and southbound callouts on the left.

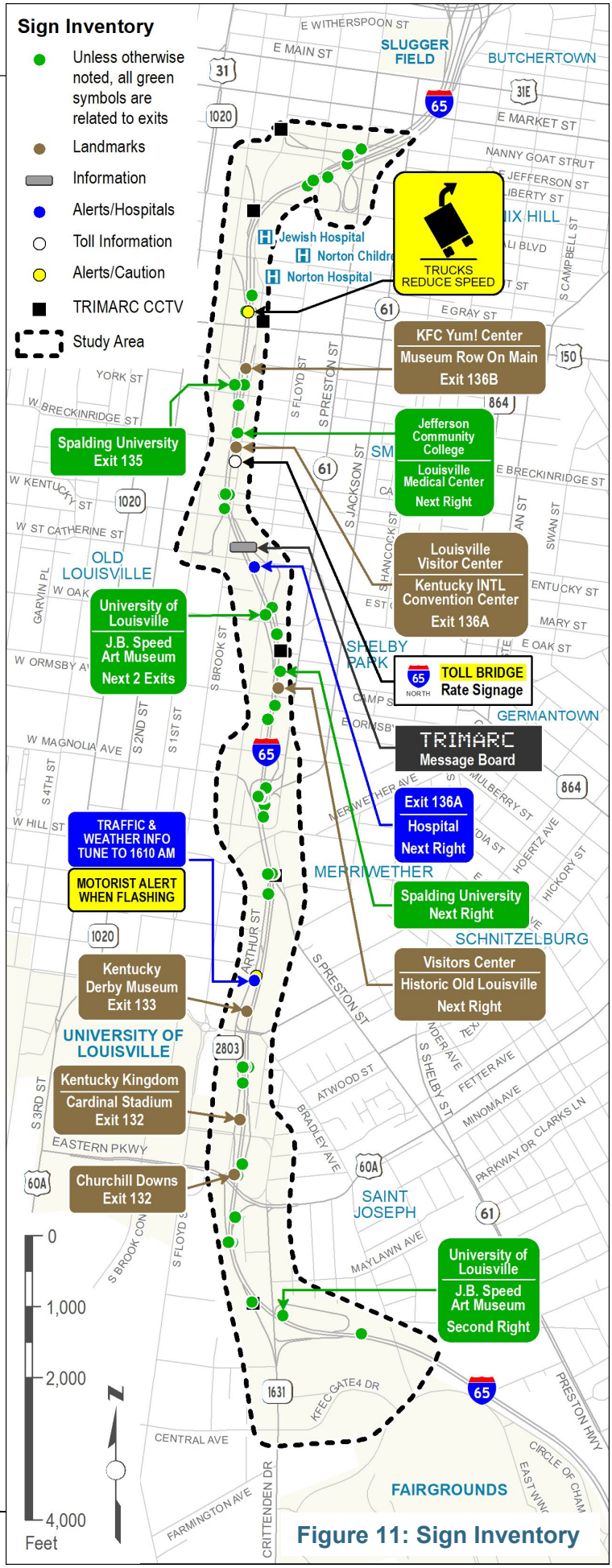


Figure 11: Sign Inventory

2.6 2020 Existing Traffic

Extensive research undertaken to collect existing traffic information throughout the study area enabled analysis using a synthesis of historic counts and comparisons from third-party data and KIPDA's regional travel demand model. Data was collected prior to March 2020 or factored accordingly to adjust for the influence of the COVID-19 pandemic. The effort is documented in the *Traffic Forecast and Modeling Report* in **Appendix A**.

2.6.1 Historic Counts

Three I-65 mainline count stations cover the length of the corridor:

- Station 056787 covers MP 130.710 to 132.890, physically just north of the interchange with I-264, with 132,900 vehicles per day (vpd) recorded in 2019. Trucks made up 7.9% of the daily volume.
- Station 056P99 covers MP 132.890 to 135.195, physically located just north of Brandeis Avenue, with 125,400 vpd recorded in February 2020. Trucks made up 13.5% of the daily volume.
- Station 056M36 covers MP 135.195 to 136.357, located just north of Liberty Street, with 84,000 vpd recorded in 2012. Trucks made up 13.5% of the daily volume.

Figure 12 shows the hourly volume flow at Station 056P99 by direction, illustrating strong peak trends towards downtown in the morning and away in the afternoon. Historic counts suggest this section of I-65 has shown no significant growth/decline in daily traffic volume over the past 20 years. Volume data collected by KIPDA throughout 2020 suggests about an 18% decline in traffic due to the COVID pandemic; counts collected since March 2020 were adjusted accordingly. Average Daily Traffic (ADT) volumes are presented in **Figure 13**.

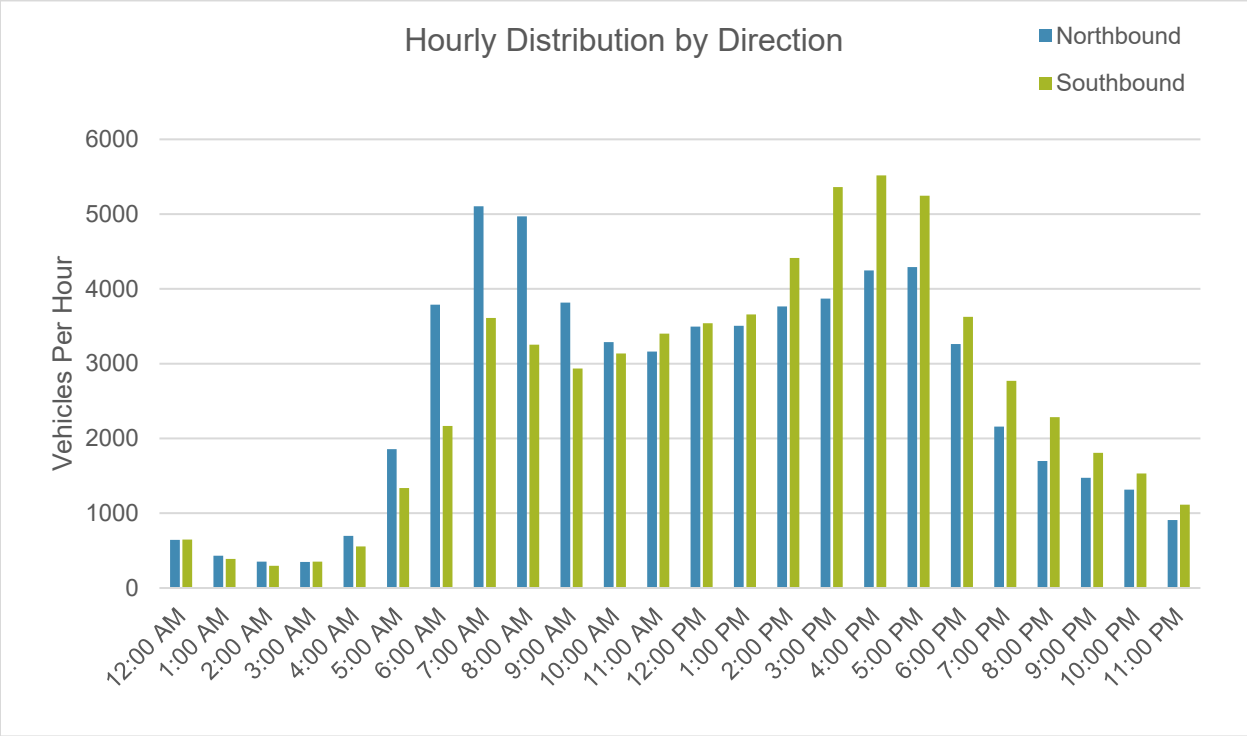


Figure 12: Hourly Volume Distribution by Direction

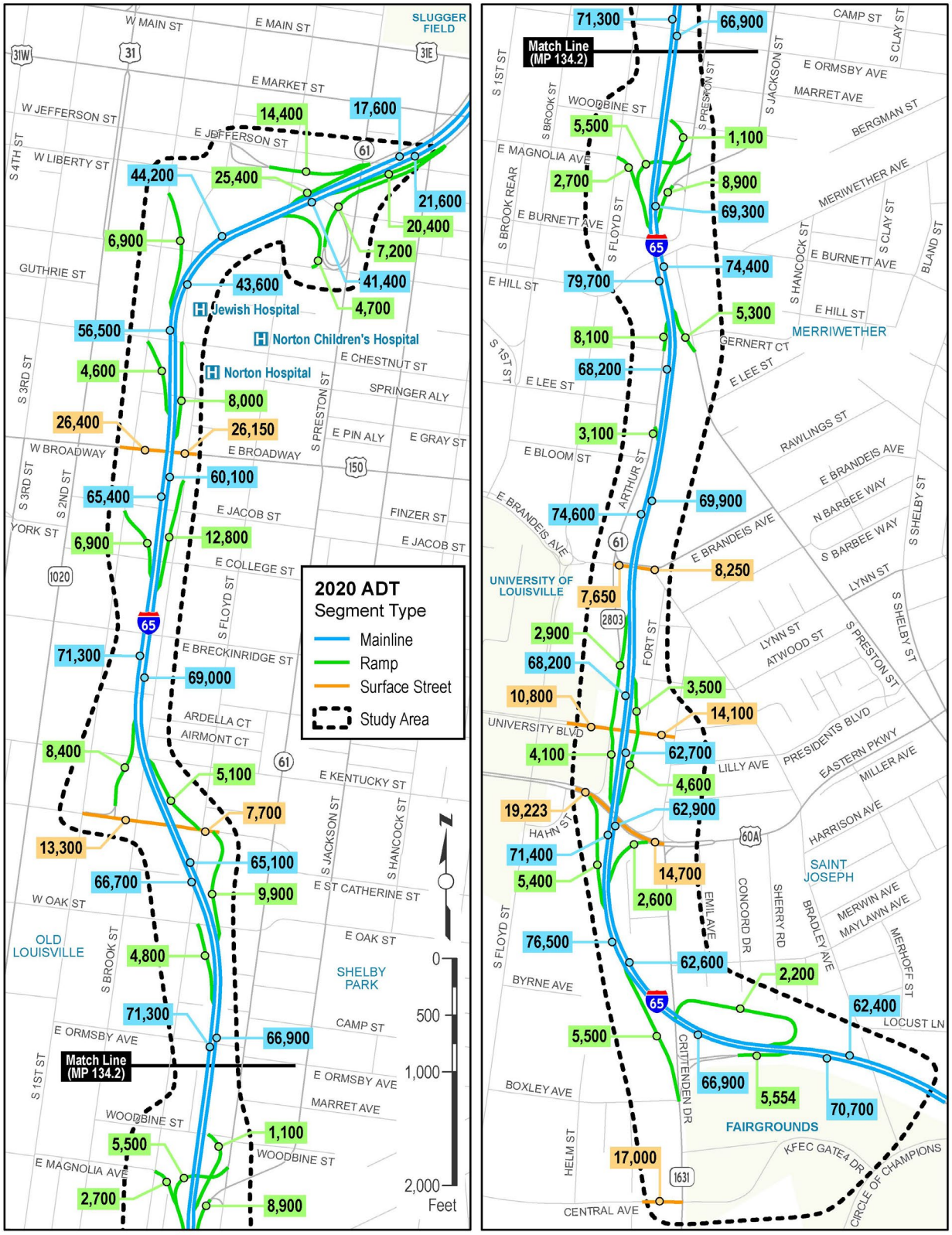


Figure 13: 2020 ADT Volumes

2.6.2 Travel Times

Along with volume data, analysts collected information on corridor travel times. During September 2020 traffic counts, GPS-based devices collected real-time location and speed data during AM and PM peak commuter periods. With reduced congestion due to lower traffic volumes during COVID, these circuits represent largely free-flow speeds showing minor slowdowns over the railroad bridge (AM northbound and PM southbound) and northbound through Hospital Curve (both periods). Results are presented graphically in **Figure 14**.

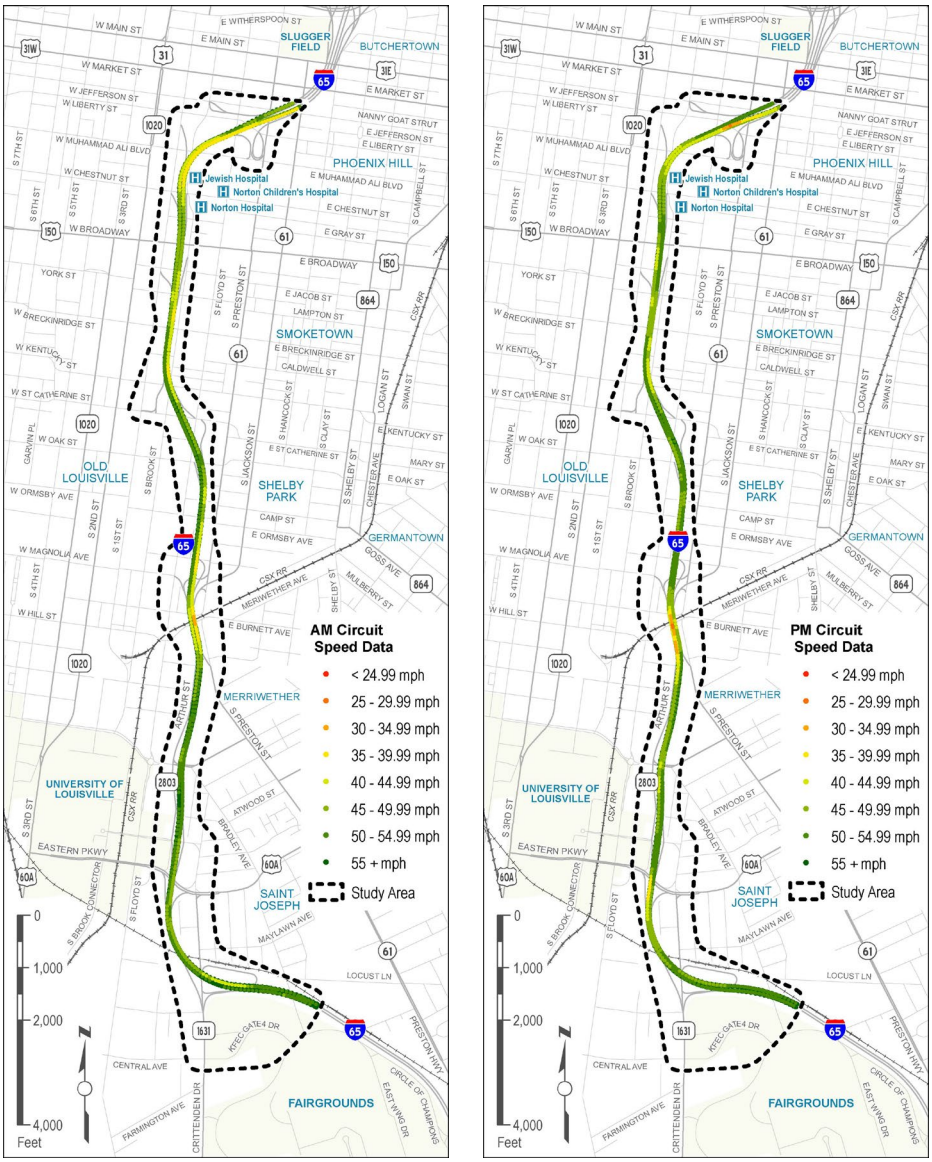


Figure 14: September 2020 Speed Data

Third-party data from 2018 and 2019 provided a pre-COVID comparison. Shown in **Figure 15** for the worst 15-minute increment, peak directional slowdowns are more pronounced—particularly in the PM peak.

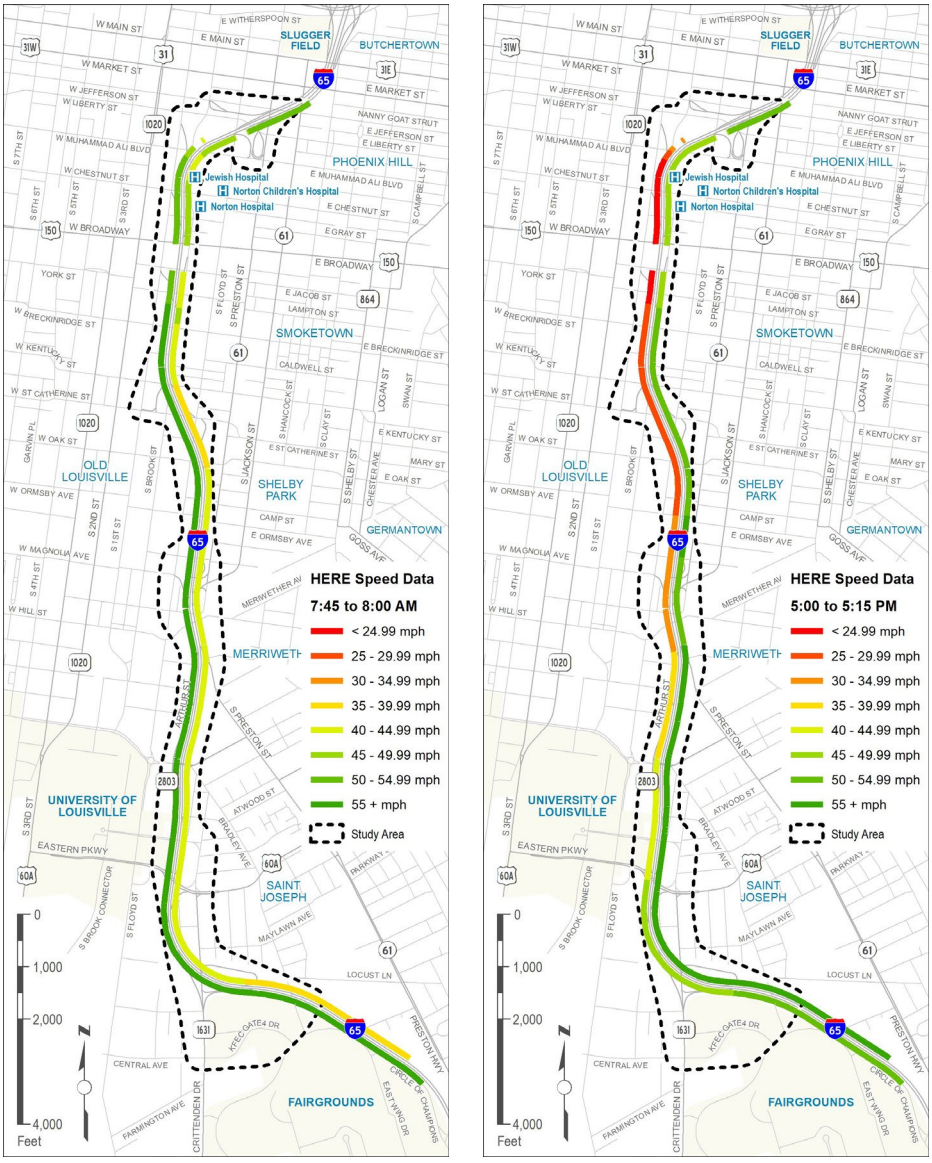


Figure 15: 2018-2019 HERE Speed Data

2.6.3 Existing Traffic Operations

Several metrics exist to measure traffic operations, such as Level of Service (LOS), delay, and queue lengths at intersections. LOS is a qualitative measure describing traffic conditions based on speed, travel time, freedom to maneuver, traffic interruptions, comfort, and driver convenience. LOS A is associated with free flow conditions, high freedom to maneuver, and little or no delay. LOS E represents conditions at or near capacity. At LOS F, traffic conditions are oversaturated and beyond capacity, with low travel speeds, little or no freedom to maneuver, and high delays. As a rule of thumb, LOS C or better is desirable in urban areas; however, LOS D is generally acceptable.

Microsimulation

For this study, TransModeler SE microsimulation software was used to model corridor operations. While any model has limitations—particularly in over capacity congested conditions—the model

represents the best tool available to approximate current and future traffic scenarios. To calibrate the model, analysts collected information regarding existing traffic conditions: signal timing plans on connected surface streets, queue lengths, operating speeds, etc. Additional technical information about the microsimulation modeling tasks is included in **Appendix A**.

In addition to illustrating existing needs within the study area, the microsimulation model forms a baseline to test how proposed infrastructure improvement concepts would affect traffic operations.

Figure 16 presents peak hour operations along I-65 mainline for the 2020 scenario. As shown, 33% of the northbound mainline operates at LOS E or F during the AM peak. During the PM peak, operations degrade further: 55% of the corridor length operates at LOS F.

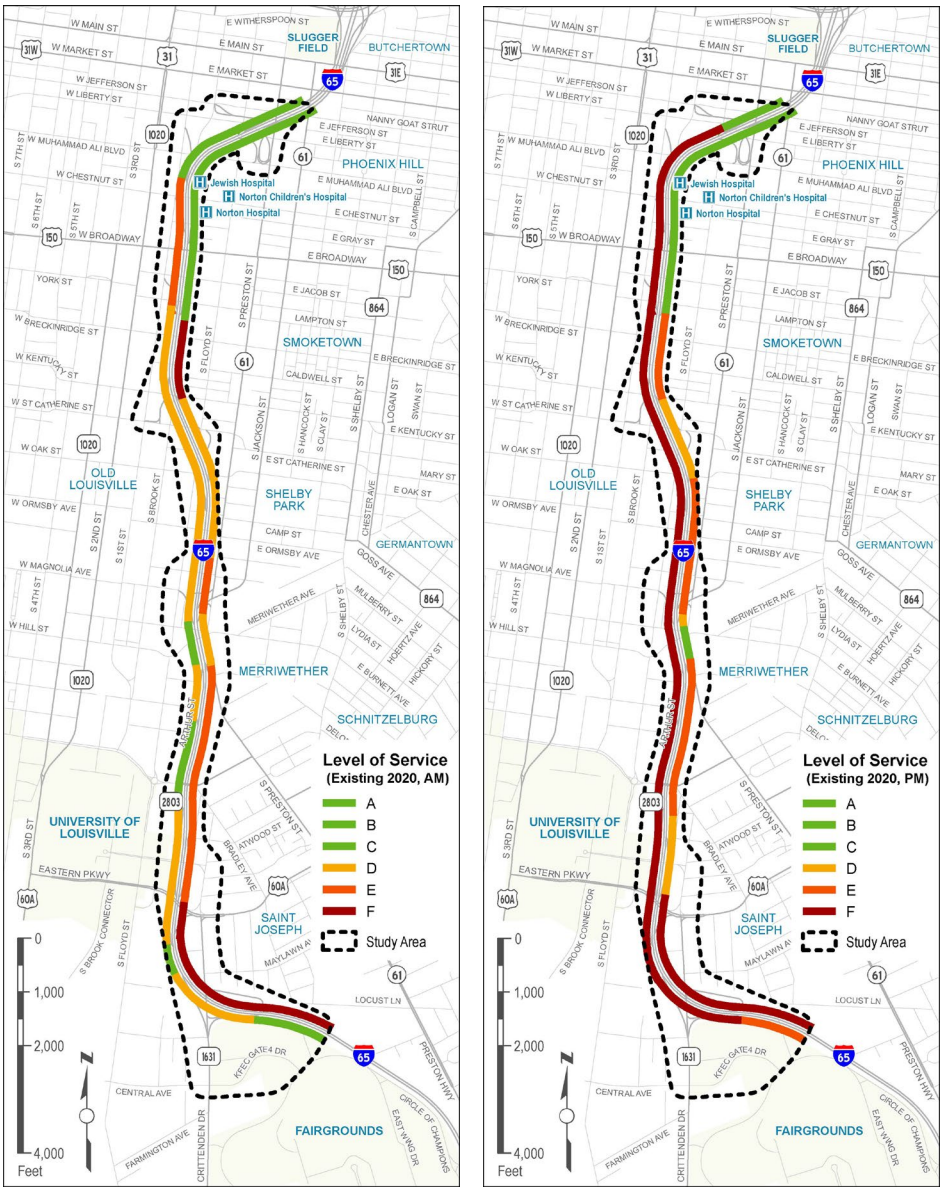


Figure 16: 2020 Existing Peak Hour LOS

2.7 Crash History

Historical crash data for the three-year period from January 2017 through December 2019 were plotted within the study area. During this period, 1,194 collisions were reported along the study portion of I-65, as shown in **Figure 17**. Individual collision records are included in **Appendix B**.

Four fatalities were reported along the corridor during the analysis period:

- October 2019, a southbound pedestrian walking in the I-65 travel lanes near the railroad crossing mid-afternoon, possibly from a nearby disabled vehicle.
- December 2018, a southbound car lost control in wet conditions, sliding under a nearby semi-truck near the off-ramp to St. Catherine Street
- September 2018, a southbound pedestrian walking along the southbound I-65 shoulder/travel lane near the Bradley Avenue overpass during the PM rush hour.
- December 2017, a northbound semi-truck exiting at Brook Street struck the adjacent concrete barrier, catching fire.

In addition, there were 191 injury collisions and 1,001 property damage only (PDO) crashes.

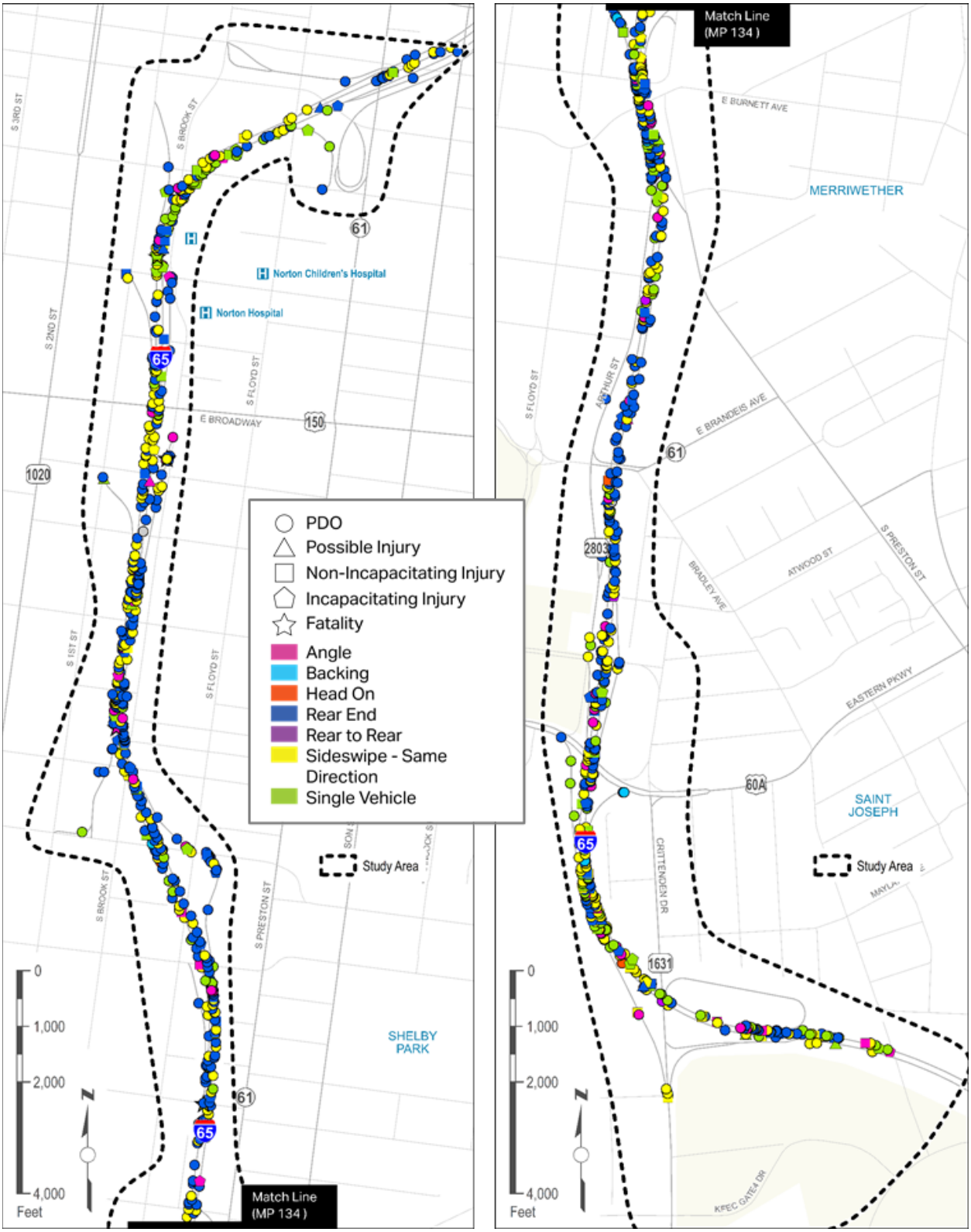


Figure 17: Crashes by Manner of Collision and Severity

Shown in **Figure 18**, manner of collision trends reveal the majority of crashes were rear end crashes (48%) followed by same direction sideswipe crashes (29%).

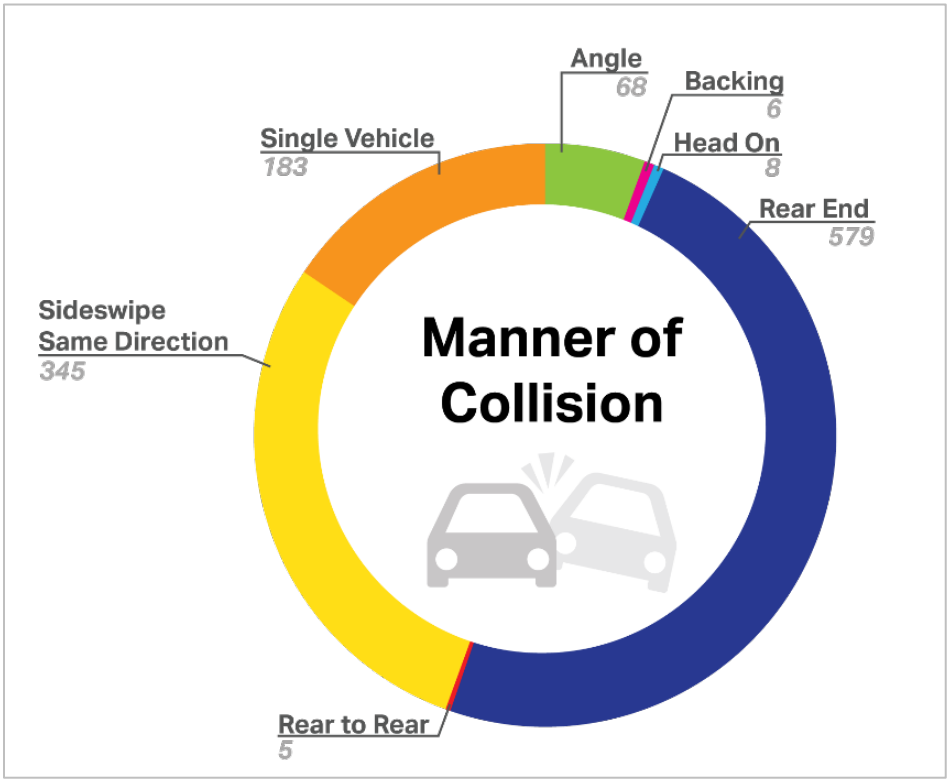


Figure 18: Crash Type Trends

Crash distributions were analyzed to create a heat map (**Figure 19**), showing the areas by direction with the highest crash densities: between College Street and St. Catherine Street, near the CSX Railroad/Hill Street/Burnett Avenue overpass, and between Eastern Parkway and Crittenden Drive.

KIPDA identifies top crash spots and segments for its metropolitan planning jurisdiction. Three of these sites overlap the study corridor though none involve the interstate facility directly:

- US 150 (Broadway) intersection with South First Street
- US 150 (Broadway) intersection with South Brook Street
- St. Catherine Street intersection with South First Street

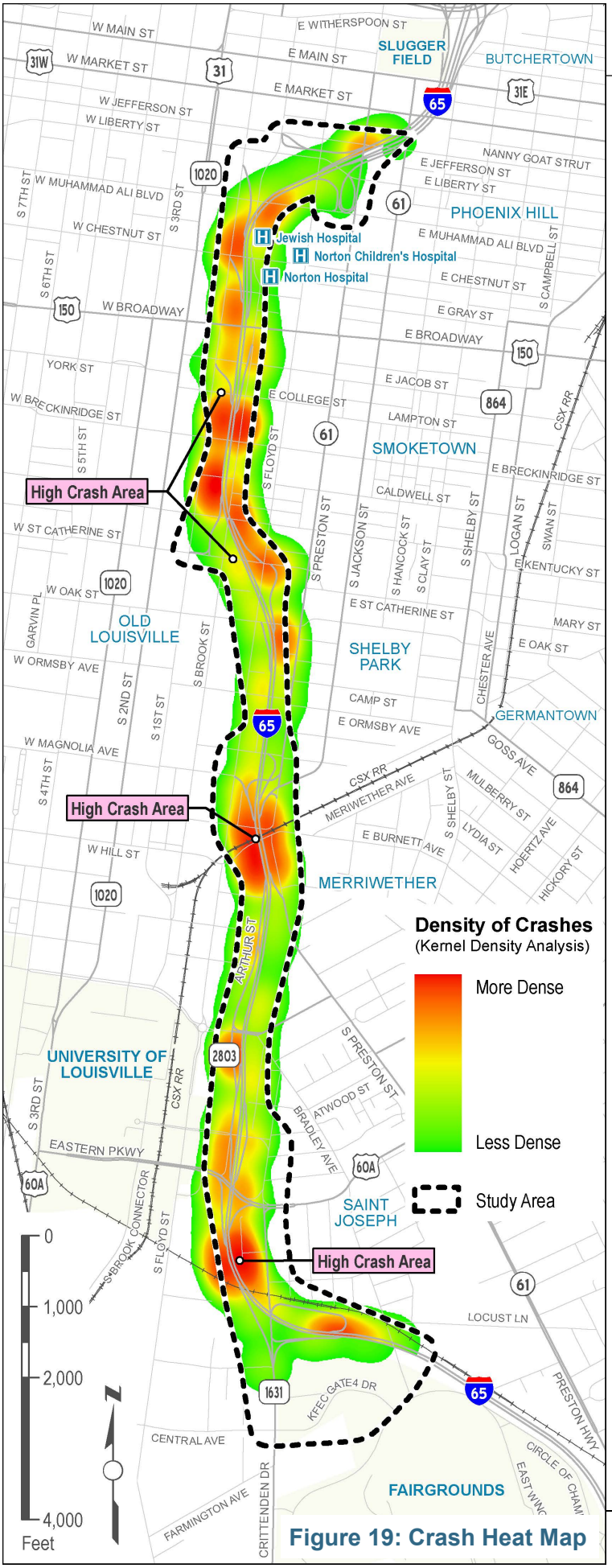


Figure 19: Crash Heat Map

2.7.1 Critical Crash Rate Factor

KYTC uses a systematic screening technique to identify locations having high crash rates. The actual number of crashes (obtained from KYTC's database) occurring within a roadway segment is used to calculate the Actual Crash Rate accounting for the roadway length, annual average daily traffic (AADT), and the number of years for which crash data are being examined. Using an analysis procedure from the Kentucky Transportation Center (KTC) and referenced *in The Analysis of Traffic Crash Data in Kentucky (2014 -- 2018)*, Actual Crash Rates are compared to the Critical Crash Rate for similar types of Kentucky roadways. The Critical Crash Rate is the rate that compares collision conditions to the average crash rate for similar roadways and represents a rate above which crashes may be occurring in a non-random fashion. This ratio of Actual Crash Rate to the Critical Crash Rate is the Critical Crash Rate Factor (CCRF). A CCRF greater than 1.0 indicates crashes may be occurring more often than can be attributed to random occurrence. This screening technique indicates locations where further analysis may be needed. It is neither a definitive statement of nor a measurement of a crash problem.

As defined in the KTC methodology report, two analysis types exist: "segments" and "spots."

- Segments vary in length and are divided along roadways as geometry or traffic volumes change.
- Spots are defined by analyzing 0.1-mile-long sections where crashes are concentrated.

High crash spots and segments are presented in **Figure 20**.

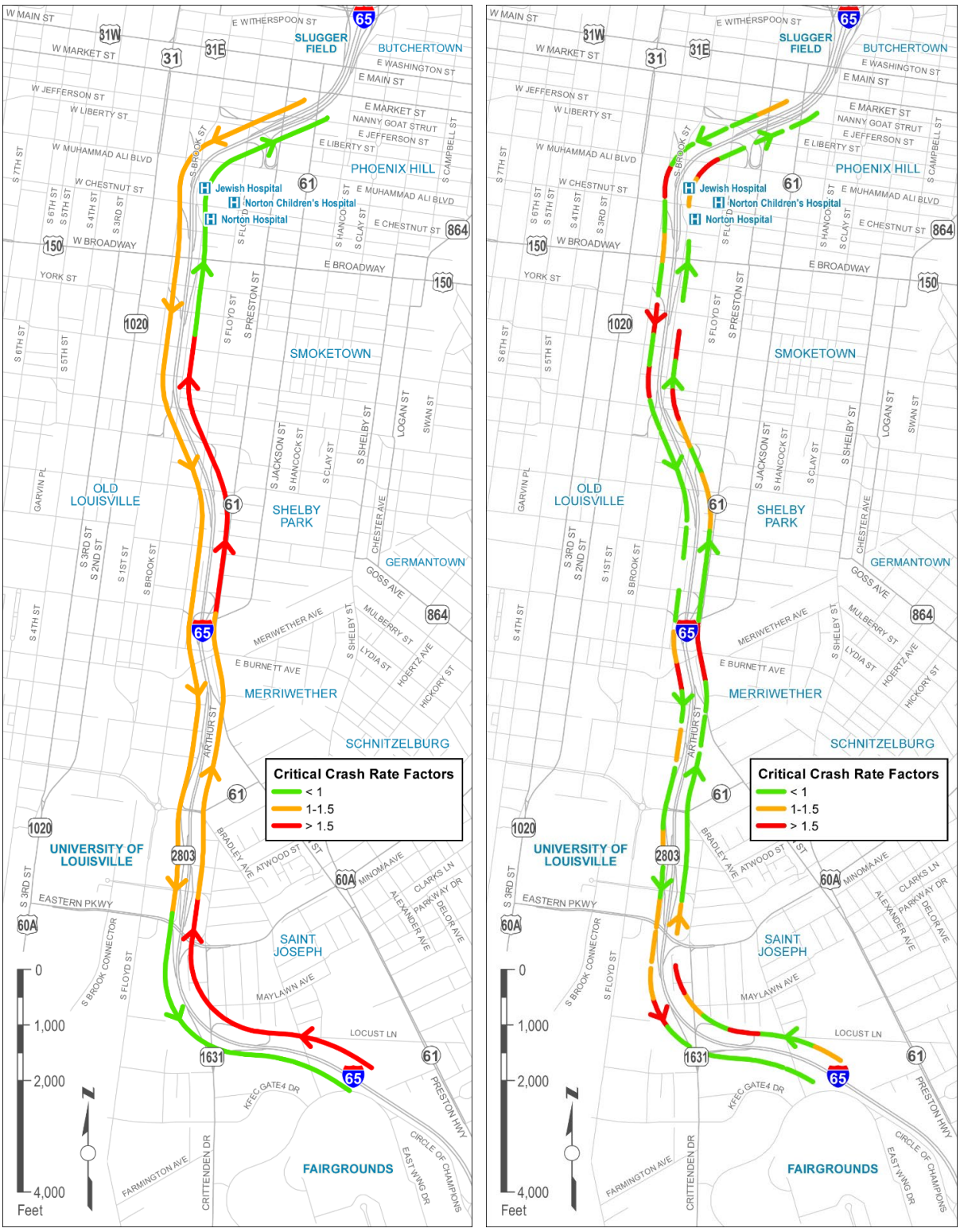


Figure 20: High CCRF Segments (left) and Spots (right)

Segments

Much of the corridor has segments with a CCRF greater than 1.0, but only two sections show CCRF rates higher than 1.5. These segments are both in the northbound direction, shown in red above. All segments with a CCRF greater than 1.0 are listed in **Table 4**.

Table 4: High CCRF Segments

Dir	Location	AADT	Crashes (Fatal/Injury)	CCRF
NB	Southern end of study area to Eastern Pkwy *MP 132-133*	65,114	201 (0/45)	2.00
NB	Eastern Pkwy to Preston St *MP 133-134*	61,454	126 (0/20)	1.26
NB	Preston St to Breckinridge St *MP 134-135*	61,454	165 (0/31)	1.65
SB	Jefferson St to Breckinridge St *MP 135-136*	65,113	148 (1/17)	1.39
SB	Breckinridge St to Preston St *MP 134-135*	65,113	123 (2/12)	1.16
SB	Preston St to Eastern Pkwy *MP 133-134*	65,113	150 (0/19)	1.41

0.1-Mile Spots

Twenty-six spots with a CCRF greater than 1.0 were identified along the corridor, divided evenly between the northbound and southbound directions. Statistics for each high CCRF spot are presented in **Table 5**. The highest CCRF spot is on a northbound section near Eastern Parkway and has a CCRF of 3.44. This 0.1-mile section saw 54 collisions during the 2017-2019 analysis period. The second highest CCRF spot is also located on a northbound section and is found farther north near Breckinridge Street; it saw 39 collisions during 2017-2019 with a CCRF of 2.63.

Table 5: High CCRF Spots

Dir	Location	AADT	Crashes	CCRF
NB	Southern end of study area *MP 132.0-132.1*	65,114	17	1.08
NB	Bradley Ave. *MP 132.1-132.2*	65,114	34	2.16
NB	*MP 132.35-132.45*	65,114	25	1.59
NB	Crittendon Dr *MP 132.56-132.66*	65,114	19	1.20
NB	South of Eastern Pkwy *MP 132.66-132.76*	65,114	54	3.44
NB	Eastern Pkwy *MP 132.88-132.98*	61,454	18	1.22
NB	Hill St *MP 133.77-133.87*	61,454	26	1.76
NB	Oak St *MP 134.39-134.49*	61,454	21	1.42
NB	St Catherine St *MP 134.6-134.7*	61,454	20	1.35
NB	E Kentucky St *MP 134.7-134.8*	61,454	31	2.09
NB	Breckinridge St *MP 134.9-135.0*	61,454	39	2.63
NB	Brook St *MP 135.45-135.55*	61,454	15	1.01
NB	Muhammad Ali Blvd *MP 135.55-135.65*	61,454	31	2.09
SB	Jefferson St *MP 135.9-136.0*	65,113	21	1.36
SB	Brook St *MP 135.44-135.54*	65,113	26	1.69
SB	E Broadway *MP 135.22-135.32*	65,113	21	1.36
SB	E College St *MP 134.97-135.07*	65,113	30	1.95
SB	Caldwell St *MP 134.77-134.87*	65,113	36	2.34
SB	Preston St/Burnett Ave *MP 133.86-133.96*	65,113	23	1.49
SB	Hill St *MP 133.76-133.86*	65,113	37	2.40
SB	Arthur St (Near Bloom St) *MP 133.53-133.63*	65,113	16	1.03
SB	Arthur St (Near Brandeis Ave) *MP 133.19-133.29*	65,113	23	1.49
SB	University Blvd *MP 132.97-133.07*	65,113	18	1.17
SB	Eastern Pkwy *MP 132.85-132.95*	65,113	17	1.10
SB	South of Eastern Pkwy *MP 132.73-132.83*	65,113	17	1.04
SB	Near Crittenden Dr Exit Ramp *MP 132.62-132.72*	65,113	28	1.72

3.0 ENVIRONMENTAL OVERVIEW

Included as **Appendix C**, an environmental overview was conducted to identify resources and potential issues for consideration during the development of build alternatives. Natural and human environmental resources were identified from a literature/database review. Study area environmental resources are described in the following sections. As the setting is a densely developed urban corridor, few natural environmental resources (streams, wetlands, endangered species) are present.

US Fish and Wildlife Service (USFWS) identifies the potential to encounter endangered bats (gray, Indiana, and northern long-eared), mussels, or running buffalo clover along the corridor. While little to no habitat is likely to exist in the study area, future coordination with USFWS may be required to confirm this assumption if a federally funded project is advanced from this study.

3.1 Land Use and Community Resources

Land use along the corridor is illustrated in **Figure 22**, highlighting potentially noise sensitive areas such as neighborhoods and parks. Noise analyses, including an assessment of mitigation measures, will likely be required if a federally funded, capacity-adding project is advanced from this study.

Figure 21 highlights other community resources. There are 689 parcels in the study limits beyond state-owned right-of-way. Beyond the major regional attractions noted throughout previous chapters, other community resources include:

- Seven hospitals, located just east of I-65's "Hospital Curve" and generally bounded by US 150 (Broadway), Hancock Street, Muhammad Ali Boulevard, and I-65.
- Three colleges/universities: JCTC near Broadway and the University of Louisville main campus are within the study area limits. Spaulding University is also nearby, west of the study corridor.
- There are 18 other schools within half a mile of the study limits, four of which are located within the corridor: J. Graham Brown magnet school (K-12), Heuser Hearing Institute, Engelhard Elementary, and Churchill Park School for special needs students.
- There are 42 places of worship within the half a mile of the study corridor.
- Louisville Metro has two fire stations and four police facilities within a half mile of the study corridor.
- There are 20 cemeteries within a half mile of the study limits. St. Stephens Cemetery is within the boundary, just east of the interstate and roughly bounded by Brandeis Avenue and KY 61 (Preston Street).
- No public recreational facilities or parks abut the study corridor although several fall within a half-mile buffer.

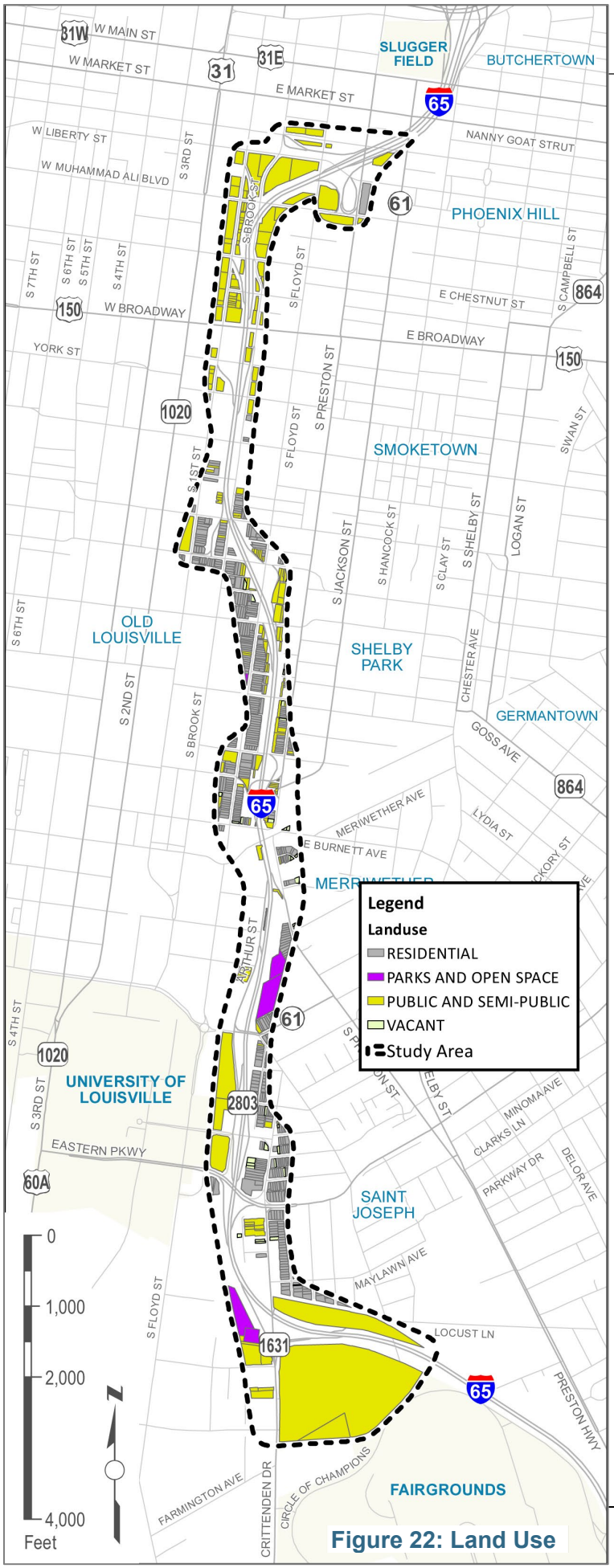


Figure 22: Land Use

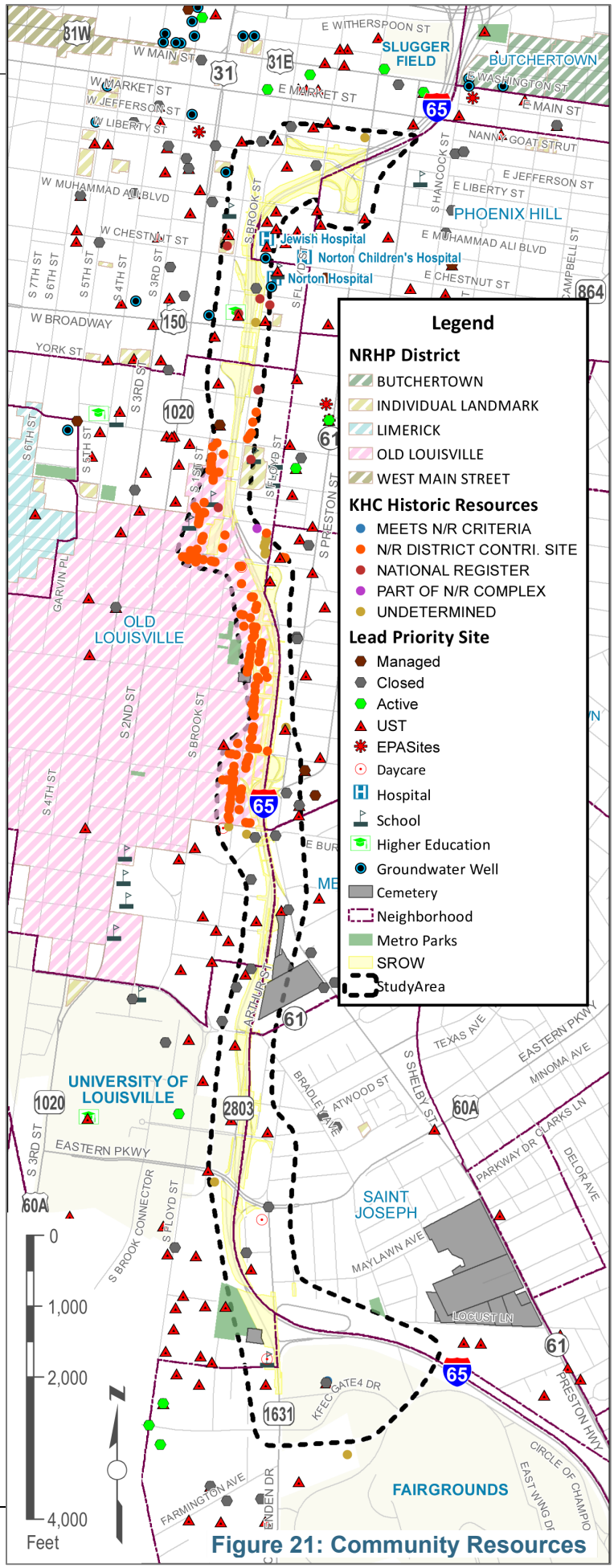


Figure 21: Community Resources

3.2 Historic Resources

Also shown in **Figure 21**, numerous historic structures and districts abut the study area. At the federal level, the National Register of Historic Places (NRHP), administered by the National Park Service, is the nation's official list of properties recognized for their significance in American history, architecture, archaeology, engineering, and culture. Properties are protected under the *National Historic Preservation Act* and Section 4(f) of the *US Department of Transportation Act*. In addition, Louisville Metro maintains its own historic preservation districts—many of which overlap with NRHP boundaries. Local districts are overseen by the Historic Landmarks and Preservation Districts Commission.

South to north, the following NRHP districts overlap the study area:

- US 60A Eastern Parkway corridor, one of several Olmsted parkways throughout the city, which were listed as a group in 1982.
- Old Louisville, roughly bounded by the university to the south, Seventh Street to the west, Kentucky Street to the north, and I-65 to the east. The district was listed in 1975 with hundreds of contributing structures.
- Preston-St. Catherine Street Historic District, listed in 1985, contains 18 structures, mostly Queen Anne-style residences.
- First Street Historic District, listed in 1984, represents 17 buildings along First Street that transition between the Old Louisville district and the central business district.

There are also seven individual structures—former schools, residences, churches, and more—that are individually listed on the NRHP.

If proposed improvement concepts involve additional right-of-way from within a listed historic site or a site meeting the criteria to qualify for NRHP eligibility, consultation with the Kentucky Heritage Council must occur and Section 4(f) requirements must be considered during future project development phases.

Archaeological Potential

Based on previous disturbances within the corridor, there is low potential to encounter intact archaeological deposits. Within the study area, I-65 was constructed on fill or structure; areas within its right-of-way were likely disturbed by previous construction activities. However, field surveys and/or coordination with the Kentucky Heritage Council will be required if a proposed improvement concept with ground-disturbing activities is selected for further development.

3.3 Population Demographics

An assessment of demographic trends was completed to identify potential sensitive population concentrations. This socioeconomic study reviewed 2015 -- 2019 Census estimates to identify potential environmental justice (EJ) concentrations of low-income, minority, elderly, disabled, or limited English proficiency persons. **Figure 23** presents the data graphically, highlighting areas with above average concentrations of any of these population groups.

- Minorities comprise 28% of Jefferson County's population and 34% of the population within one mile of the study corridor. Eighteen of 36 block groups exceed the one-mile buffer average.

- Low-income households comprise 14% of the county population and 17% of the population within one mile of the study corridor. There are 13 block groups at or above the one-mile buffer average.
- Persons over 65 years in age comprise 17% of the county population and 13% of the population within one mile of the study corridor. Nine of 36 block groups exceed the one-mile buffer average.
- Disabled persons comprise 14% of the county population and 20% of the population within one mile of the study corridor. There are 17 block groups at or above the one-mile buffer average.
- No block groups have a concentration of limited English proficiency persons (age 5+ years) exceeding the county threshold (1.2%).

3.4 Air Quality Concerns

Jefferson County is in attainment for four of six National Ambient Air Quality Standards criteria pollutants monitored by the USEPA: lead, nitrogen dioxide, carbon monoxide, and particulate matter. It is designated non-attainment for 8-hour ozone standards. Nationally, air quality has been steadily improving with these criteria pollutants declining over the past few decades.

To demonstrate air quality conformity, federally funded transportation capacity projects recommended for further development should be modeled and then included in KIPDA's TIP and KYTC's Statewide TIP to ensure conformity requirements are satisfied.

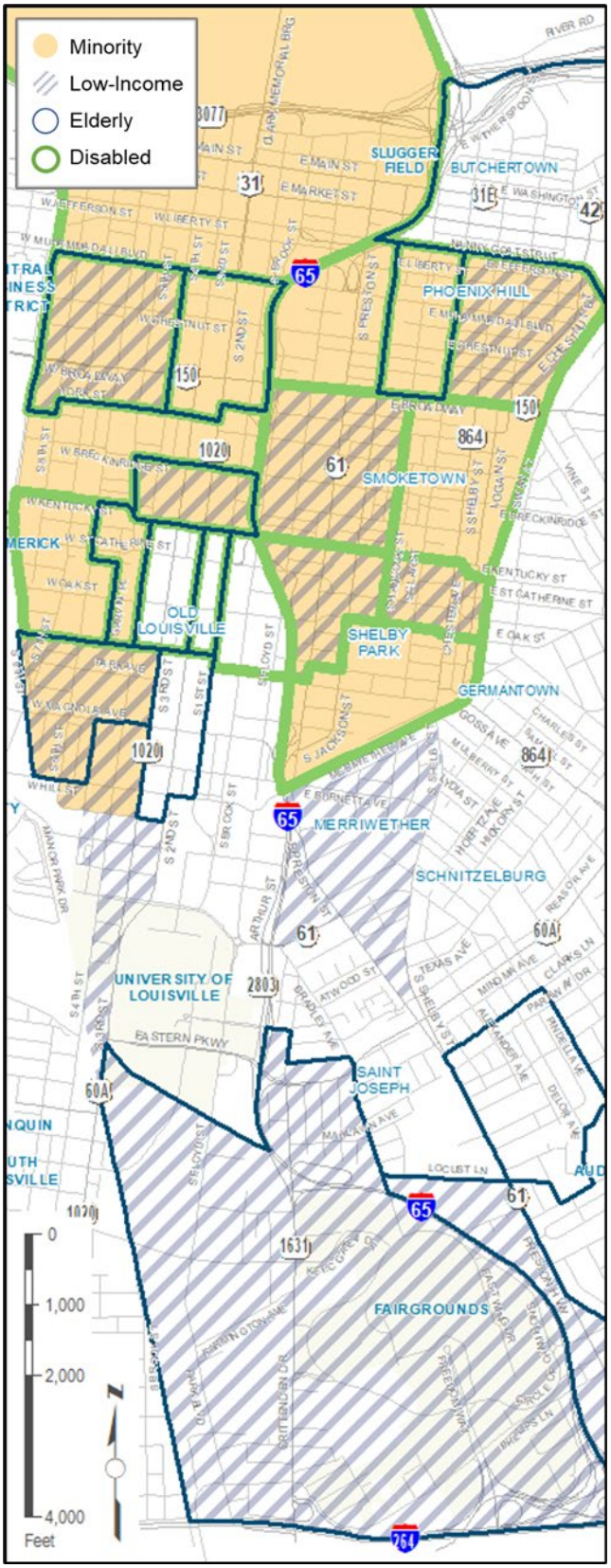


Figure 23: Demographic Concentrations

3.5 Noise Considerations

Federally funded transportation projects typically require consideration of noise impacts. Noise sensitive receptors in the vicinity include residential areas, cemeteries, hospitals, churches, schools, etc. Some commercial properties with exterior uses are also considered noise sensitive.

Specific traffic noise impact analyses may be required as part of future project development activities if improvement concepts are identified that add capacity or shift traffic closer to sensitive receptors. With the density of receptors near the high-volume interstate route, any mitigation measures are likely to result in high benefits for a low cost per benefitted receptor and would also likely mitigate noise and aesthetic concerns for EJ populations.

4.0 FUTURE NO-BUILD TRAFFIC

Year 2030 and 2045 No-Build forecasts were generated using KIPDA's regional travel demand model with a 2040 future analysis year. KIPDA's model examines future socioeconomic growth patterns (i.e., households and employment) and anticipated changes to the regional transportation network to predict link-by-link volumes for different what-if scenarios. Future year 2045 forecasts were extrapolated from model runs for 2030 and 2040. A map summarizing key volumes for the 2045 No-Build scenario is presented in **Figure 24**; **Appendix A** contains additional technical details.

LOS for mainline I-65 movements are presented in **Figure 25** and **Figure 26** for the AM and PM peak hours, respectively. Analyses indicated that operations degrade moving into the future with larger stretches of the corridor operating at LOS E/F during peak hours.

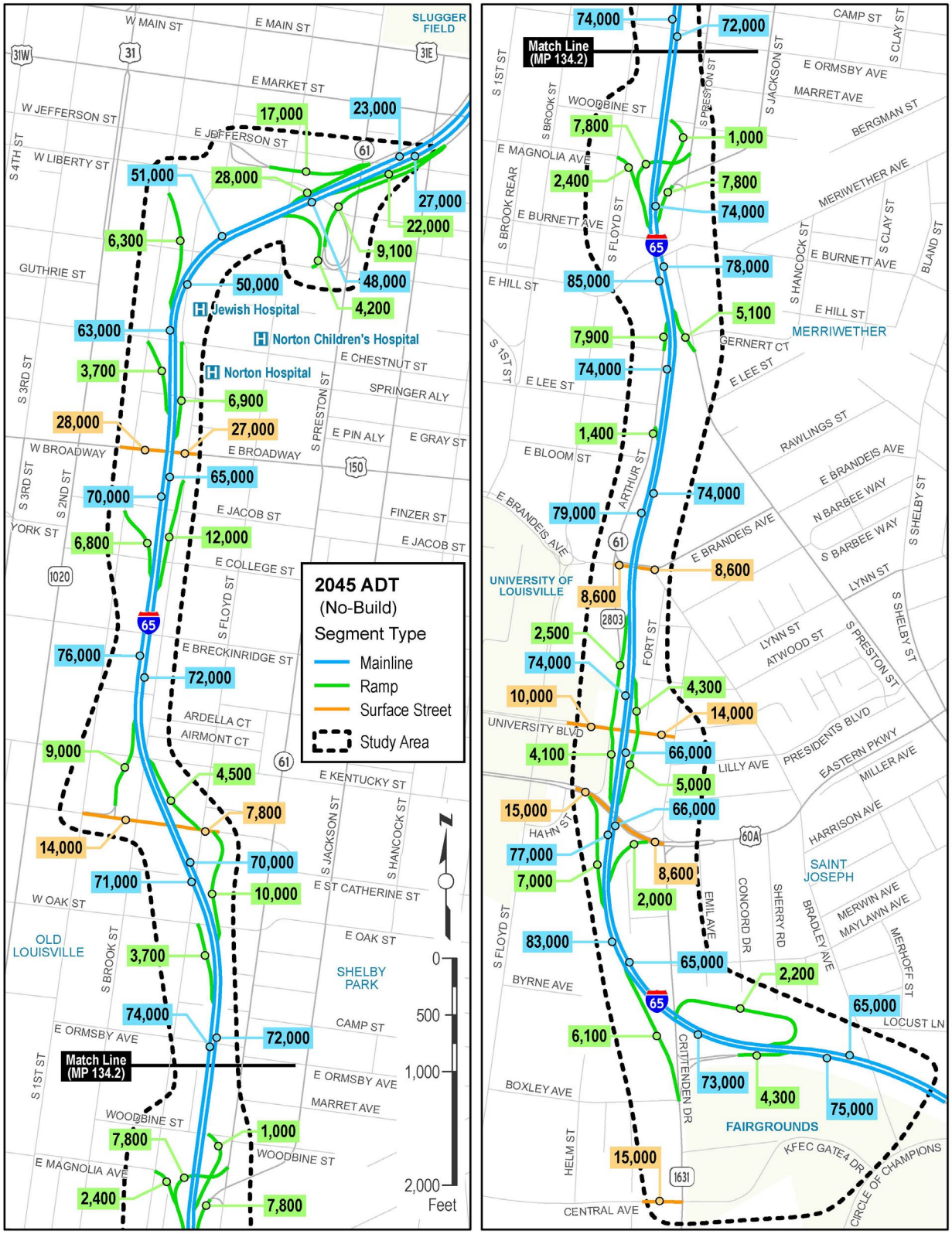


Figure 24: 2045 No-Build ADTs

Figure 25: Future No-Build LOS, AM Peak Hour

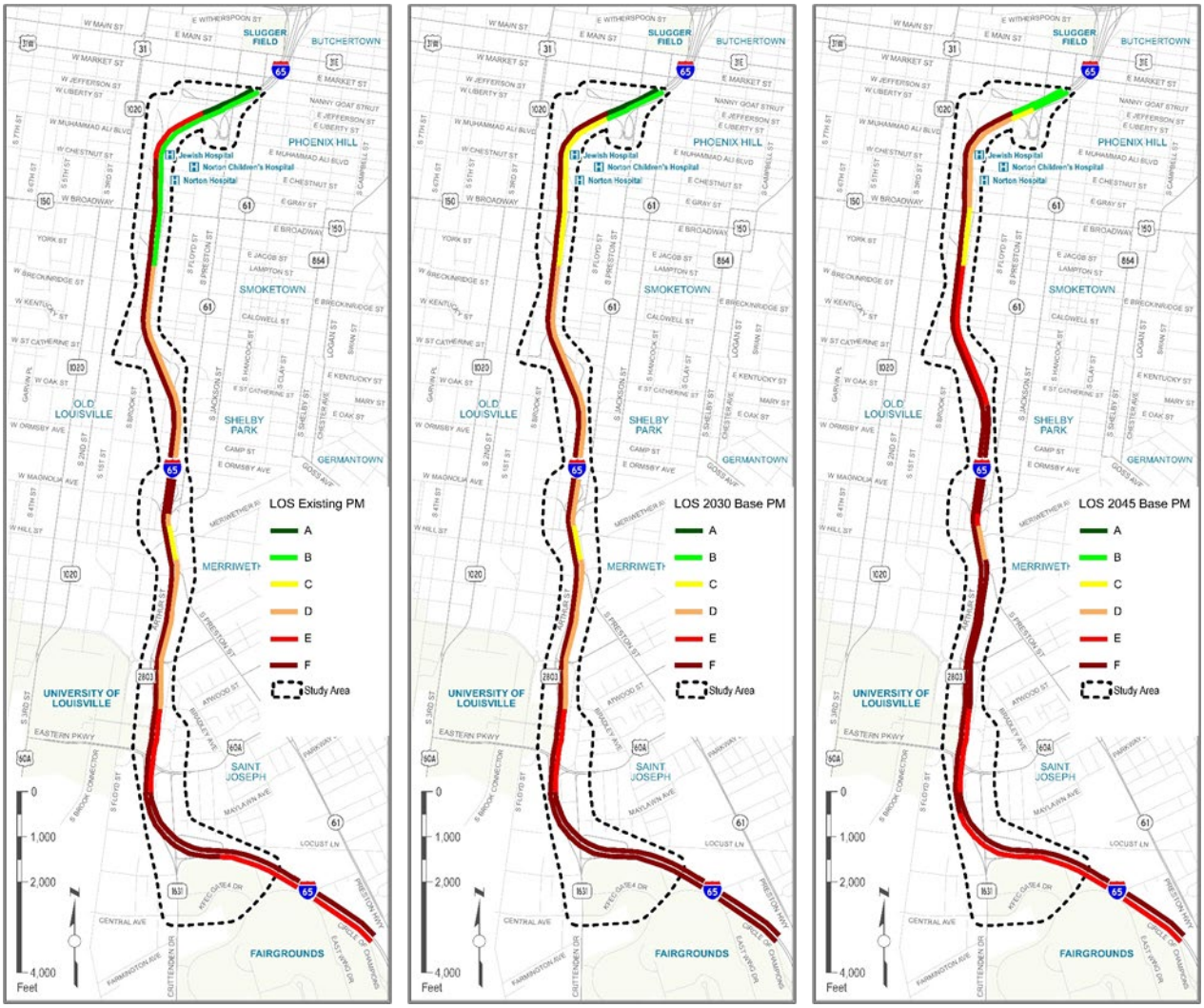


Figure 26: Future No-Build LOS, PM Peak Hour

5.0 INITIAL COORDINATION EFFORTS

Coordination with the project team occurred throughout the study process. The project team consisted of KYTC District 5 and Central Office staff, representatives from KIPDA, the Federal Highway Administration (FHWA), and consultant staff. Summaries of project meetings presented chronologically are in **Appendix D**.

5.1 Project Team Meeting No. 1

Following the existing conditions inventory, the project team met virtually on October 29, 2020, to discuss the study process to date. Key discussion items included:

- Mainline bridge conditions are a major concern. In November 2019, the district had to close two southbound lanes of the CSX Railroad/Hill Street/Burnett Avenue overpass for emergency repairs. Then during 2020, the district performed semi-monthly inspections of

the bridge over Kentucky and Brook Streets in order to avoid a closure on the interstate until emergency repairs for that bridge could be completed in December 2020. Even with those repairs complete, concerns remain. KYTC Item No. 5-20061 will address three of the most critical bridges through rehabilitation or replacement. This project has an anticipated construction year of 2023.

- Any bicycle/pedestrian concepts should be coordinated with the university's campus plan.
- Acceleration/deceleration lane lengths are a major concern: without adequate length to merge and match a safe travel speed, mainline motorists must brake or swerve for merging traffic. This quickly degrades operations, especially during peak periods.
- Drain boxes near St. Catherine Street are a recurring maintenance concern.
- Improvement strategies should look at short-, medium-, and long-term solutions, emphasizing to the public how much the resulting congestion, repair work, and crashes truly cost.

Additional discussion focused on the upcoming stakeholder coordination outreach and public website.

5.2 Local Officials Meeting No. 1

On December 1, 2020, the project team hosted a virtual meeting for local officials and stakeholders. Attendees represented Louisville Metro, downtown businesses and advocates, TARC, TRIMARC, area universities, nearby hospitals, first responders, state and local level elected officials, and others. The meeting introduced the existing conditions website,[8] encouraged attendees to promote a public survey over the coming weeks, and included a question and answer session.

Key discussion items examined the link between this 5-569 study and other planning efforts nearby: e.g., Louisville Metro's upcoming Preston Corridor Master Plan and proposed two-way conversions of various surface streets. Following the meeting, the project team undertook a series of one-on-one listening sessions with several groups, as summarized in **Table 6**. The meeting discussions also clarified the scale of improvement concepts that were envisioned for the study.

Table 6: Listening Sessions following Local Officials Meeting No. 1

Group	Meeting Date
Representatives from Old Louisville Neighborhood	Dec 17, 2020
Louisville Metro	Dec 17, 2020
University of Louisville	Jan 8, 2021
Louisville Metro Emergency Services	Jan 8, 2021
TARC	Jan 13, 2021
Property owner from Smoketown Neighborhood	Jan 19, 2021
TRIMARC	Feb 8, 2021

Each stakeholder listening session identified specific concern areas:

[8] Online at https://arcg.is/0fGqyP2

- Louisville Metro has several two-way street conversions envisioned; improvements should be consistent with these plans. Left side ramp connection—e.g., at Brook Street—precludes conversions.
- Surface street connections back up, leading to ramp queues that can extend into mainline travel lanes. Increased storage space or signal detectors may help.
- Intersection improvements at or near ramp connections could improve safety, specifically at the Muhammad Ali Boulevard intersections with Floyd and Preston streets.
- Free flow ramps—such as at Jackson and St. Catherine streets—dump high-speed interstate traffic into residential neighborhoods. Measures to reduce speeds should be considered but must be balanced with the operational performance of the exit ramp itself. Safety and access for cyclists and pedestrians are also a consideration.
- Lighting and low-cost aesthetic treatments add benefits.
- Specific safety concerns at several short ramps were identified: southbound from University Boulevard, southbound to Arthur Street/Gaulbert Street, southbound to St. Catherine Street, and northbound from Preston Street.
- The Old Louisville neighborhood would like to see truck traffic prohibited or reduced on residential streets.

5.3 Public Survey on Corridor Needs

Following the first local officials meeting, the project team launched a website and public survey, intended to share project information with a larger audience and collect community feedback on study area needs. The website presented GIS-based tabs with an overview of the study, existing roadway conditions, 2017-2019 crash trends, existing and future No-Build LOS, and environmental features. The accompanying survey asked participants how they interact with the corridor, what their biggest concerns were, and for basic demographic information. An interactive mapping application let users drop a pin to highlight location-specific transportation needs. Additional information about the data collection exercise is in **Appendix D**.

In total, 315 survey responses were compiled over the 6-week comment period. As summarized in **Figure 27**, most respondents drive the corridor, relying on I-65 for its proximity to their homes and to access common destinations. Over 65% of respondents travel along I-65 multiple times each week, indicating they are very familiar with the facility.

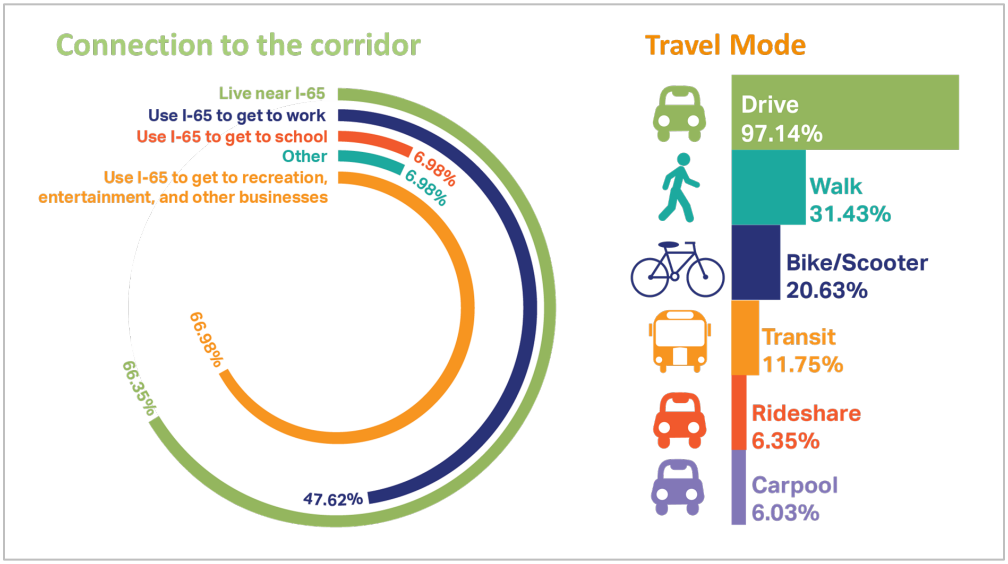


Figure 27: Survey Results on Corridor Usage

Participants were asked to rate their comfort level traveling the study portion of I-65. While results were distributed as illustrated in **Figure 28**, 70% agreed they were less comfortable traveling the corridor during weekday rush hour.

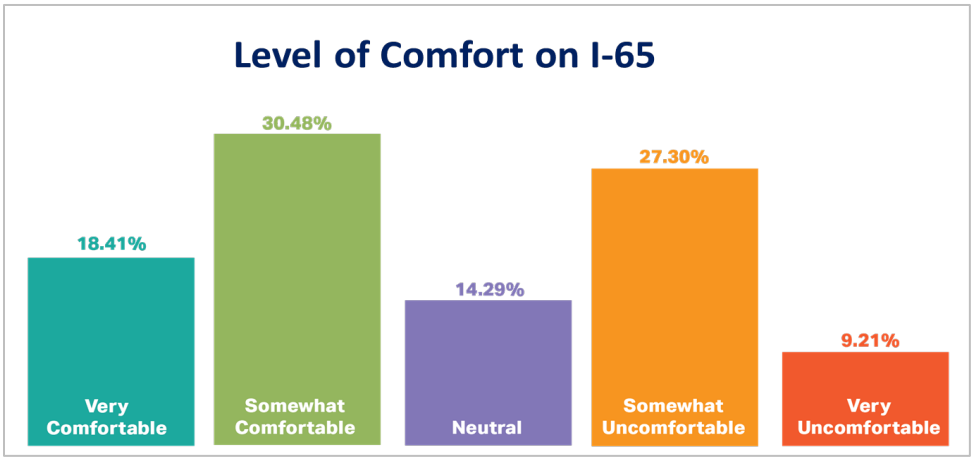


Figure 28: How Comfortable do you feel traveling I-65?

In ranked order, the top cited problems along the study corridor were:

- Entrance/exit ramp lengths
- Safety in general
- Traffic congestion
- Too many entrance/exit ramps
- Confusing signage or lack of signage
- Interactions with non-drivers on ramps and surface streets

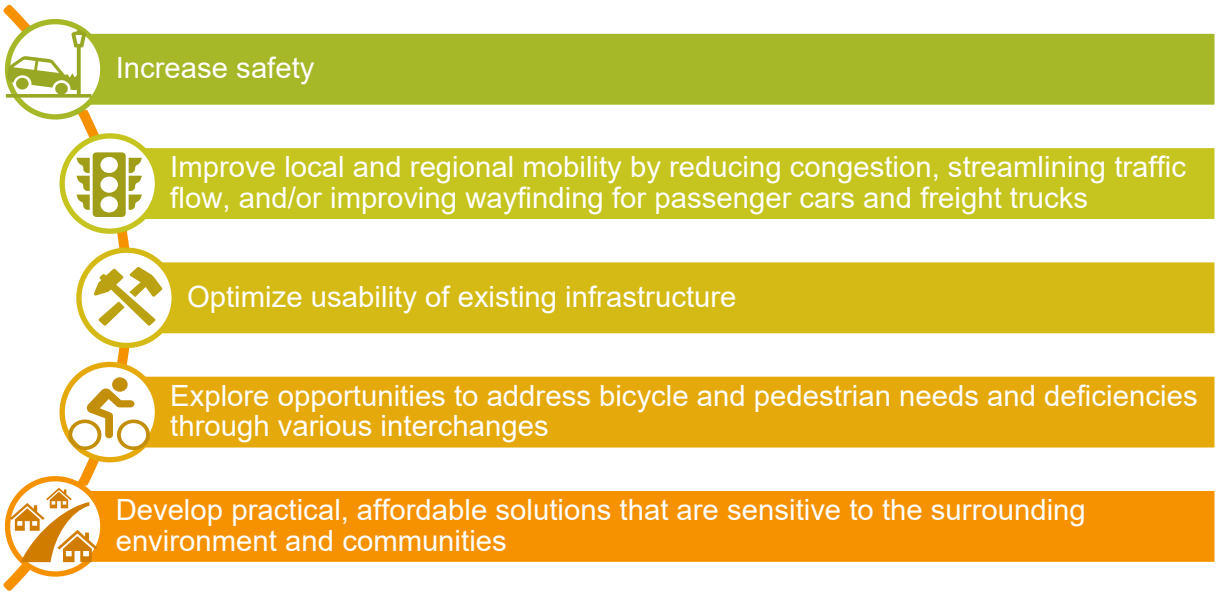
Other open-ended concerns are presented visually in **Figure 29** where the larger text sizes represent more frequently mentioned concerns.

Figure 29: Additional Comments on Comfort and Experience along I-65

During the same comment period, 354 pins were added to the GIS comment map. The most frequently cited issue was connectivity of Preston Street at Burnett Avenue, which is disrupted by a rail line. Of the map themes, connectivity (78) was the most frequently cited concern, followed by ramp issues (65), general comments about design (38), surface street safety (34), the environment and community character (27), then trucks (16).

6.0 STUDY GOALS AND PROJECT PURPOSE

The goal of this study is to identify short-term and long-term improvement concepts that KYTC or others may use to address the transportation needs presented throughout **Chapter 2**. Specific goals for the study are to:



While each improvement concept advanced to a project will have its own Purpose and Need Statement, each should focus on one or more of these overarching goals.

7.0 INITIAL SPOT IMPROVEMENTS

Improvement concepts were developed based on a review of existing traffic and safety needs, field reconnaissance, and community input. **Figure 30** summarizes this exercise visually: poor LOS segments, elevated crash frequencies, and common public concerns were compared, identifying four primary focus areas (purple boxes in figure) along I-65 for improvement concepts. The primary focus areas included:

1) The I-65 interchanges and curve near Crittenden Drive, which exhibit poor LOS during the PM peak hour and elevated crash concentrations in both directions. The focus area is bounded by the Crittenden Drive interchange on the south and the US 60A Eastern Parkway interchange on the north, stretching between the Kentucky Fair and Expo Center and University of Louisville.
2) The area near the railroad crossing, Hill Street, and Burnett Avenue, which experiences poor southbound LOS during the PM peak, elevated crash rates, and the highest cluster of public comments. I-65 carries KY 61 through this stretch, where the CSX rail line disjoints the local street network.
3) The St. Catherine Street vicinity, with poor southbound LOS during the PM peak, elevated northbound crash rates, and many community concerns. A collection of one-way streets running east-west carries traffic to/from the Old Louisville neighborhood and interstate ramps.
4) The northern segment of the corridor, roughly between Kentucky Street and Hospital Curve, with poor southbound LOS during the PM peak hour and numerous high crash clusters. Tightly spaced ramps in this section provide access to downtown and the hospitals, providing the first/last opportunity to access local destinations south of the Kennedy Interchange.

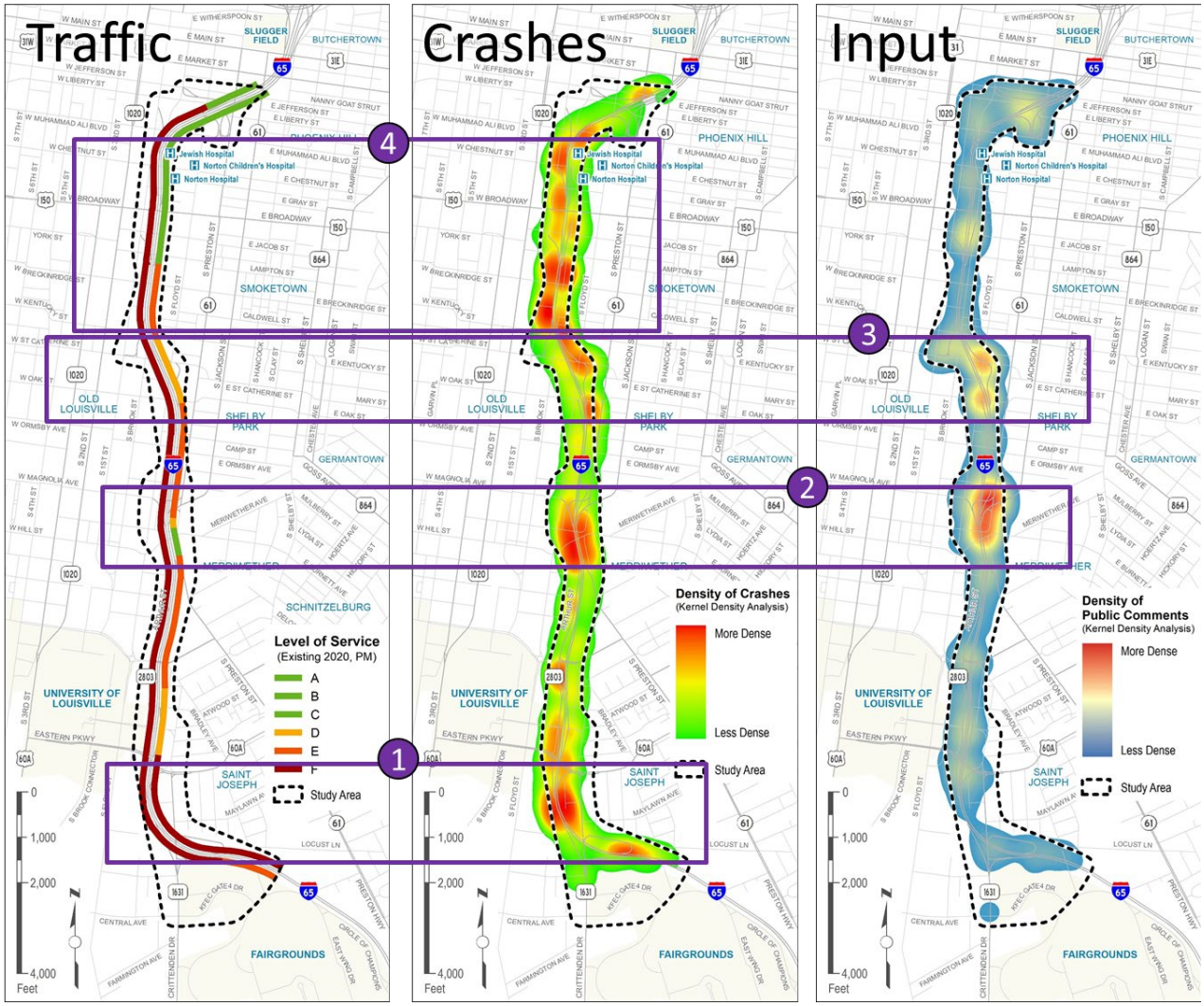


Figure 30: Focus Areas for Concept Development

An initial set of potential improvements were developed and then shared with the project team to identify the most practical set to advance for further consideration. This chapter describes the development of spot improvement concepts advanced for consideration.

7.1 Initial Concepts

A series of potential improvement locations were initially considered, presented south-to-north in the following subsections. Additionally, a set of corridor-wide "quick fix" improvements were also discussed—e.g., signing, striping, ITS deployments, drainage improvements—many of which may be incorporated into the Item No. 5-20061 pavement rehabilitation/bridge repair project

anticipated for construction in 2023. Where feasible, improvement concepts were developed to not inhibit future two-way conversions as proposed by Louisville Metro.

7.1.1 Crittenden Drive Area (Focus Area 1)

Near the southern limits of the study corridor, KY 1631 (Crittenden Drive) interchanges with I-65 in a curve. The railroad tracks immediately north of this location constrain ramp connections, especially for the northbound on-ramp. Crittenden Drive has 4 to 5 lanes carrying 10,200 vpd with a 35 mph posted speed limit. In the southwest quadrant of the interchange, closely spaced cross-streets and driveways are adjacent to the high-speed southbound off-ramp.

Several concepts were discussed to address traffic flow and crash patterns in this vicinity.

- Reconstruct the I-65 northbound loop on-ramp from Crittenden Drive to improve acceleration distances and merge lengths. To meet current design standards, this would impact the adjacent business or require a wider I-65 structure over Crittenden Drive.
- Add an I-65 northbound auxiliary lane or collector-distributor system between the northbound Crittenden Drive on-ramp and northbound off-ramp to Eastern Parkway or University Boulevard.
- Close Boxley Avenue to eliminate this conflict point for I-65 southbound off-ramp traffic. This intersection abuts the high-speed ramp connection to Crittenden Drive.
- As recommended in the 2008 *I-65 Ramp Modifications Scoping Study*, extend Central Avenue with a new I-65 interchange, eliminating the existing interchange with Crittenden Drive.

An **auxiliary lane** is an extra lane between two nearby ramps, providing extra space for weaving traffic.

A **collector-distributor** roadway provides a similar function but is separated from adjacent thru lanes by shoulders or a barrier.

7.1.2 Near the University of Louisville (Focus Area 1)

Continuing north, the next stretch of I-65 provides access to the University of Louisville Belknap campus with interchanges at Eastern Parkway, University Boulevard, and ramps along Arthur Street. Conversations with university leaders during January 2021 highlighted specific needs: short ramps with abrupt stops for turning traffic and limited merge/weave distances. Overall, stakeholders noted the benefits of “cleaner” gateways to campus, featuring improved aesthetics, enhanced lighting, and clear pedestrian connections. There are disjointed bike paths, particularly along Eastern Parkway. Of the 5,200 students living on/near campus, about 4,200 live on the west side of I-65 and 1,000 on the east. An updated campus master plan is scheduled to begin soon.

Numerous concepts were discussed to address traffic flow and crash patterns in this vicinity.

- Eliminate or consolidate the short I-65 ramps to/from Arthur Street, which today provide two southbound lanes with numerous driveway and cross-street connections north of Brandeis Avenue. Arthur Street would function more like a local street in this scenario, providing access to adjacent properties but no access to I-65. Some sections of Arthur Street could be closed or converted for two-way traffic to separate local traffic from the remaining I-65 ramps.
- Increase access management along Arthur Street to allow it to function more like a ramp than a local access road, reducing conflict points and driver confusion.

- Eliminate or consolidate closely spaced ramps at University Boulevard and/or Eastern Parkway.
- Improve ramp acceleration and deceleration lengths or add a southbound auxiliary lane.
- Improve bicycle/pedestrian connections along surface streets, particularly Eastern Parkway through its interchange with I-65.
- Reconfigure Brandeis Avenue for two-way traffic.
- Improve signage for visitors trying to access the university.
- As recommended in the 2020 *Eastern Parkway Transportation Plan*, realign the I-65 northbound off-ramp to Eastern Parkway to increase the weave distance to its intersection with Crittenden Drive and construct a section of sidewalk along south side to address a gap in pedestrian connectivity.

7.1.3 Railroad Overpass near Hill/Burnett (Focus Area 2)

KY 61 deserves specific consideration. For much of the route, KY 61 is designated as Preston Highway or Preston Street. The route runs roughly parallel with I-65 through Jefferson County. However, there is no KY 61 crossing of the railroad tracks near Burnett Street. The railroad creates a disconnect in the KY 61 route. Per KYTC Official Order 91152, KY 61 terminates at the I-65 ramps south of the railroad tracks, "runs concurrently with I-65" (Official Order), and then restarts at the ramps north of the railroad tracks (**Figure 31**). Signage directs drivers traveling KY 61 that the route runs onto the ramps, then concurrently with I-65, then off the next ramp.

A pedestrian overpass east of the interstate provides connectivity for cyclists and pedestrians over the railroad. In both directions, the traffic volume in this section of I-65 is the highest along the five-mile study corridor: 6% to 16% higher than traffic along adjacent segments. This section of I-65 exhibited some of the highest crash concentrations (spot CCRFs of 1.8 northbound and 2.4 southbound) and received 18 public comments, the most frequently cited need during the December 2020 survey.

Stakeholder and public comments noted a desire to "connect" KY 61 with a new grade separated crossing over the railroad tracks specifically for KY 61. Concepts that were discussed to improve traffic flow and crash patterns in this vicinity fit into one of two categories.

Figure 31: Configuration at Preston

- Construct a separate structure over the railroad to reconnect KY 61 separate from I-65, as considered in the 2008 *I-65*

Ramp Modifications Scoping Study. Auxiliary lanes or a collector-distributor system could provide a similar function.

- Reconfigure the Preston/Woodbine streets interchange, removing ramps and/or adjusting connections to the local street network. Analysts examined adjustments to signal timing/phasing plans, realigning ramps to form stop-controlled T-intersections, introducing roundabouts, two-way conversions, and more.

The 2008 *I-65 Ramp Modifications Scoping Study* recommended a northbound connection from Preston Street, overpassing the railroad tracks and removing the off-ramp to Woodbine Street (**Figure 32**). Costs were estimated at $15 million in 2005 dollars.

Figure 32: Proposed Preston Connection (left) versus Existing (right) in 2008 Study

While these concepts were determined to be beyond the scope of this 5-569 study, comments were relayed to Louisville Metro for their Preston corridor study.

7.1.4 St. Catherine Vicinity (Focus Area 3)

Continuing north, the I-65 interchange at St Catherine and Oak streets provides access to the Old Louisville neighborhood. Public comments in the vicinity highlighted the incompatibility of the existing ramps dumping high-speed and truck traffic onto residential neighborhood streets. Summarized visually in **Figure 33**, short merge/diverge lengths and poor visibility at select intersections were also noted. On the I-65 northbound off-ramp, 18 crashes were reported during the three-year analysis period, primarily rear end collisions approaching the intersection with St. Catherine Street.

Representatives from the neighborhood advocated for eliminating the interchange with St. Catherine Street.

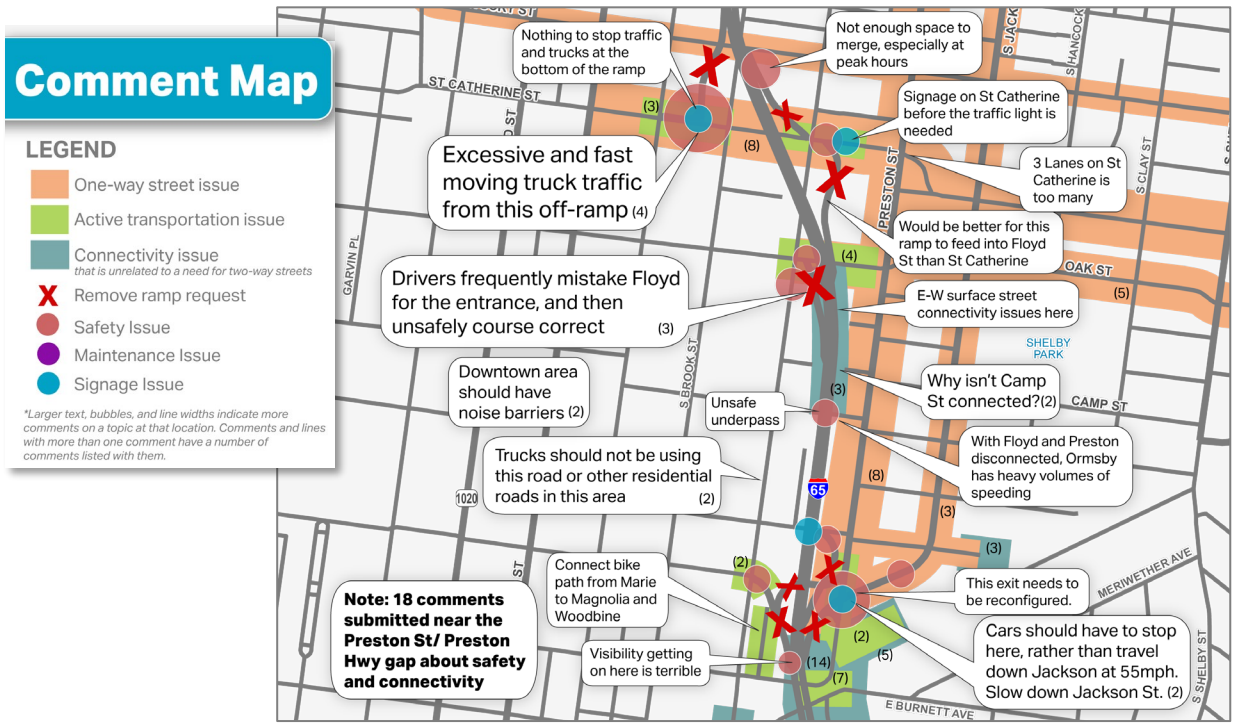


Figure 33: Public Comments on Needs near St. Catherine Street/Old Louisville

Several concepts were discussed to address traffic flow and crash patterns in this vicinity.

- Realign I-65 off-ramps to St. Catherine Street as stop-controlled T-intersections to slow down traffic. Widen as needed to increase queue storage space and throughput.
- Remove one or both I-65 northbound ramps.
- Adjust signal timing or intersection configuration at intersection of St. Catherine and Floyd streets to improve operations.

7.1.5 Northern Study Limit (Focus Area 4)

The northernmost section of the study corridor contains three I-65 northbound off-ramps and three I-65 southbound on-ramps, ending just north of Hospital Curve. Tight geometry and complex connections to the downtown street grid complicate traffic operations in this section. During the 2017-2019 analysis period, numerous crashes occurred in this section, particularly southbound, with a 1.4 CCRF segment southbound and six 0.1-mile spots having a CCRF over 1.5. Pre-COVID, southbound travel speeds showed dramatic reductions through this section during the PM peak period.

Several concepts were discussed to address traffic flow and crash patterns in this vicinity.

- Remove one of the three I-65 southbound on-ramps from First Street.
- Widen the northbound off-ramp to Brook Street/Broadway and eliminate the connection to Jacob Street.
- Widen the northbound off-ramp to Chestnut Street.
- Improve ramp acceleration/deceleration distances.

7.2 Other Improvement Considerations

Beyond the location-specific improvements in the previous section, a host of other concepts and strategies were considered to improve corridor safety and operations. While the scope of this 5-569 study was restricted to I-65 mainline and ramp improvements, other concepts are presented herein and could be pursued as separate future projects.

7.2.1 Adding Capacity: Major I-65 Widening

FHWA[9] identifies three general categories for strategies to deal with congestion:1) adding more base capacity, 2) operating existing capacity more efficiently, and 3) encouraging travel and land use patterns that use the system in less congestion-producing ways.

Adding one mainline travel lane in each direction was considered conceptually but quickly dismissed as a non-viable solution. Despite minor operational improvements, costs and impacts outweigh benefits.

- Construction costs to widen this section of I-65 are estimated at $150 million or more. This cost does not include widening the inside median or bridge replacements—just bridge widening. If all the bridges were reconstructed as well, the construction cost would be over $300 million.
- Widening would require significant impacts to buildings and properties along the corridor.
- Adding capacity would require a noise analysis, likely identifying a need for noise mitigation. This increases construction costs and would affect aesthetics along the corridor.

Project team members and key stakeholders—Louisville Metro and TARC—opposed considerations of additional general-purpose lanes on this section of I-65. Nationally, there is debate on whether it is possible to "build a way out" of congestion. Would additional lanes simply induce more traffic, being quickly filled by pent up traffic demand? The project team concluded that this study should focus on improving safety and reducing congestion through improvements that do not include full-scale widening.

7.2.2 Adding Capacity: Transit Improvements

Another alternative to add base capacity is adding transit capacity—either along the corridor or parallel.

- Mainline widening to create dedicated bus lanes is not recommended for the same reasons presented above.
- Designating one of the existing general purpose lanes to serve as a dedicated bus lane is likewise not recommended for the congested urban corridor.
- With 3-foot shoulders on the inside and closely spaced ramps, this section of I-65 is not conducive to "hard shoulder running" for transit.

Hard shoulder running allows vehicles—specifically buses in this instance—to drive on the shoulder, either at peak times or when incidents constrain capacity. This adds capacity without adding pavement.

[9] Online at https://ops.fhwa.dot.gov/congestion_report/

Though beyond the scope of this 5-569 study, the project team considered improved transit capacity running north-south parallel to I-65 to have merit. In the future, the community might consider the merits of dedicating a north-south surface street to Bus Rapid Transit (BRT) or other options like Light Rail. Project 2748 in KIPDA's MTP establishes Premium Transit Corridors along the Broadway, Preston Street, and US 60 corridors downtown—with a smart traffic management system that includes signal prioritization for buses.

Louisville's first BRT line was recently implemented along **Dixie Highway**. It features branded buses/stops, queue-jump lanes, signal priority, and sidewalk connections.

TARC expressed interest in exploring the concept of allowing buses to run on shoulders for short segments to bypass congestion. In certain contexts, this strategy could add value by enhancing travel time reliability, a key performance metric for successful transit operations. The I-65 corridor poses challenges to implementing such a strategy. The existing shoulders on I-65 are not continuous, though there are long stretches where the outside shoulders are 10 feet wide. Ten-foot shoulders are less than the 11.5-feet recommended shoulder width for bus-on-shoulder strategies. Even so, these shoulders could theoretically be used by buses when mainline congestion reduces speeds significantly (e.g., below 35 mph). Closely spaced ramps, steep approach grades, and short transition lengths add potential safety issues, placing paramount importance on driver training and skill. Driver training would be critical to ensure that the buses only use the shoulders when shoulder width and speeds allow. This strategy is not recommended at this time; should congestion on I-65 continue to increase, this strategy might be worth further consideration.

7.2.3 Optimizing Capacity for Efficiency: ITS Deployments

At a regional or corridor-level, a handful of ITS strategies could provide operational benefits:

- A Back of Queue Warning System (BQWS) provides advanced notification to drivers when there is slowed or stopped traffic ahead. The BQWS utilizes existing and/or proposed vehicle detection systems (such as side fire radar) or crowdsourced probe data (e.g. Waze) to monitor traffic speeds in the corridor. When speeds drop below a pre-defined threshold, the BQDS post automated messages on dynamic message signs to warn motorist of slowed/stopped traffic ahead. TRIMARC has 12 cameras and two dynamic message boards along the corridor; preliminary conversations suggest the BQWS could be deployed with crowdsource probe data and two additional message boards. However there is a five-mile gap in fiberoptic communications cable that would also have to be filled; deployment costs are estimated at $1.8 million.
- A curve warning system provides advanced notification to a driver if they are approaching a curve too fast. The standalone system relies on radar detection to monitor vehicle speeds, triggering a downstream flashing warning sign if over a predetermined threshold. Each unit costs around $100,000.
- Bridge Deck Warning System provides advanced warning to drivers that a bridge deck they are approaching has slippery conditions. The system uses non-invasive pavement sensors to monitor pavement condition on the bridge deck, activating upstream LED flashers on "Bridge Ices Before Roadway" signs as long as slippery conditions persist. Each sensor costs $75,000 plus $25,000 for the flashing signage, bringing the cost per direction per bridge to $100,000.

- Active Lane Control relies on overhead trusses with dynamic signs over each lane; a sample setup from Michigan's US 23 is shown in **Figure 34**. Control room operators can utilize the lane control signs to open and close lanes for incidents or maintenance or to post advisory speed limits in real time. This system requires Advanced Transportation Management System software and is estimated to cost $1 million per mile per direction for infrastructure plus $500,000+ for software upgrades.

Figure 34: Active Lane Control, MI

Ramp metering was also considered, which utilizes traffic signal heads to control when vehicles enter the freeway from on ramps, varying in complexity from pretimed to real-time dynamic detection. However, the short ramp lengths, steep ramp grades, and substandard taper lengths along this portion of I-65 diminish its applicability.

7.2.4 Bike/Ped Improvements

Bicycle and pedestrian connections are another important operational element where ramps connect to the surface street network. While the study focuses on I-65 mainline traffic operations and safety, interactions with vulnerable users were considered and incorporated into improvement concepts as appropriate. Early conversations about Brandeis Avenue safety improvements led to an initial concept sketch (**Figure 35**) that was subsequently eliminated. Though beyond the scope of this 5-569 study, Louisville Metro or other entities may opt to pursue similar improvements at this location in the future.

Figure 35: Two-Way Concept at Brandeis Ave

7.2.5 Two-Way Conversions

During this study, various stakeholders and the public expressed interest in converting surface streets adjacent to the I-65 corridor from one-way to two-way operations. Acknowledging the interest in these street conversions at some point in the future, the project team developed improvement concepts that are generally compatible with one-way to two-way conversions.

One of the specific locations discussed was Brook Street at Chestnut Street. While Louisville Metro indicated that they would like to two-way Brook Street, the I-65 northbound off-ramp makes this challenging. Metro suggested removing that ramp. During the study, the project team

screened ramps to determine which might be viable candidates for removal. The northbound off-ramp to Brook/Chestnut streets was not recommended for removal as part of this study as it does not meet the goal to improve mainline traffic operations and safety.

Figure 36: Brook Street Ramp (left) connection to Brook and Chestnut streets

However, if Louisville Metro seeks to advance this concept in the future, the following should be considered:

- Will removal of the ramp significantly improve interstate safety or operations? Coordination with KYTC, FHWA, and preparation of an Interchange Modification Report will be required.
- Discussions with EMS confirmed that this ramp is not heavily used by ambulances for hospital access.
- Based on this 5-569 study's forecasts, it appears that the ramps immediately north and south of the I-65 northbound Brook/Chestnut off-ramp could accommodate the likely redistribution of traffic.

7.2.6 Aesthetics

Aesthetics are also an important consideration along the corridor. Discussed further in **Appendix E,** many opportunities along the corridor could enhance the viewshed from and of the interstate. Louisville's 2040 Comprehensive Plan identifies a mobility goal that its "transportation facilities are designed to complement the character of the surrounding neighborhood." In cooperation with Louisville Metro, guidelines could define future improvements to create a consistent, cohesive, and community-specific branding by means of colors, materials, lighting, landscaping, walls, fencing, signage, and other design features for ramp facilities and their connection with local streets. Consideration of safety impacts, lifecycle costs, and stakeholder input are critical.

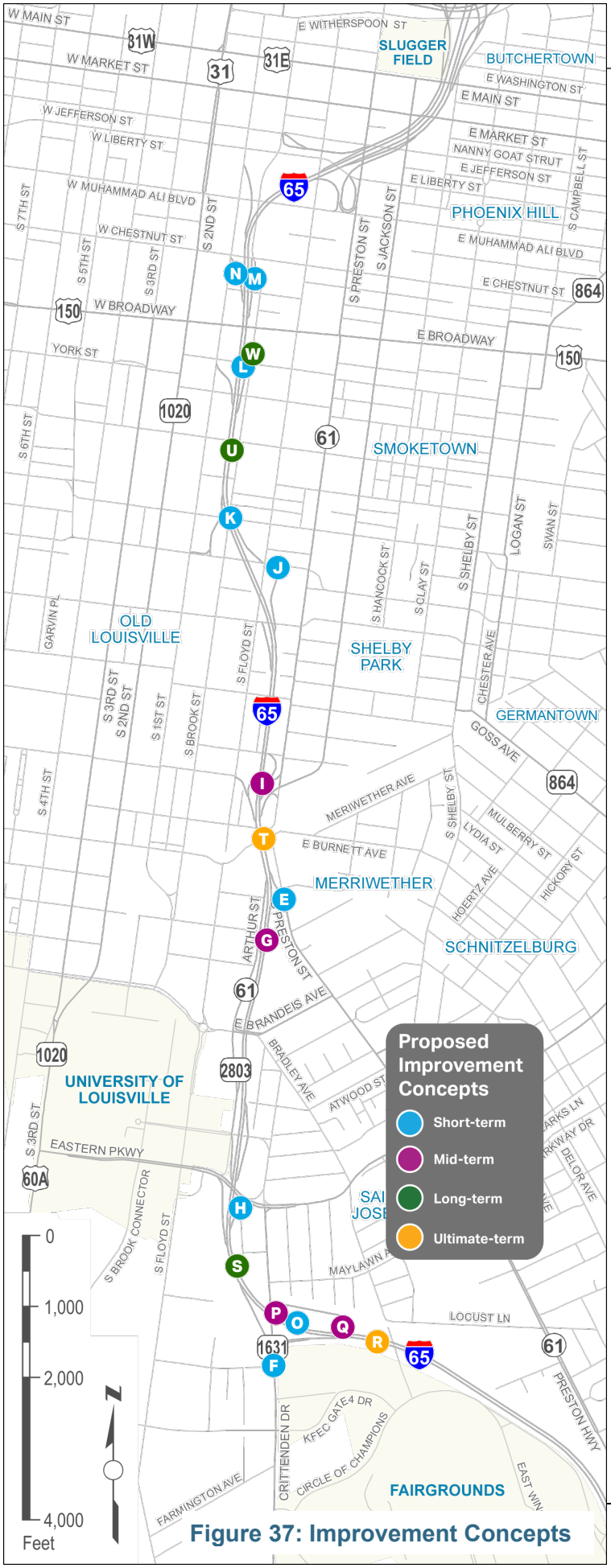


Figure 37: Improvement Concepts

7.3 Project Team Meeting No. 2

The project team met virtually February 16, 2021, to discuss the initial improvement concepts. A host of preliminary concepts were discussed, grouped into short-term, long-term, and other consideration categories. A summary of the meeting is in **Appendix D**. Attendees were provided with concept sketches and a matrix to provide feedback on each, intending to consolidate the range of concepts advanced for development. A follow-up project team meeting occurred March 9, 2021, to review input from the comment matrix distributed in February and coordination with the upcoming 5-20061 bridge/paving project.

Between meeting discussions and the subsequent survey, the following conclusions were reached:

- Major widening of the corridor—i.e., an extra thru lane in each direction—should be discussed conceptually but not presented alongside other concepts for prioritization. The concept is cost prohibitive and would have significant impacts to adjacent communities.
- Any concepts advanced should directly impact I-65 mainline or its ramps. Other concepts—e.g., two-way conversions of surface streets—may be valuable concepts but are beyond the scope of this assessment.
- Additional traffic modeling is needed before sharing concepts with stakeholders.

Each of the improvement concepts advanced for further development are shown in **Figure 37**. Project sheets in **Section 9.3** (page 60) contain a description of each concept. Concepts A through D (drainage, striping, signing, and ITS deployments) identified specific measures throughout the study corridor and may be incorporated into Item 5-20061 or a future pavement rehabilitation project.

For traffic modeling, the project team agreed to combine individual improvement concepts into one of five tiers for simulation. Concepts from earlier buckets are folded into later; i.e., Tier 2 includes Tier 1, Tier 3 includes Tiers 1 and 2, etc. **Table 7** lists each concept and its corresponding tier.

Table 7: Improvement Concept Tiers for Microsimulation

Tier	Improvement Concepts Included
Tier 1 Potentially part of Item No. 5-20061	A. Drainage B. Striping C. Signing D. ITS Deployments
Tier 2 2030 Modest Scenario	E. Preston Striping F. Close Boxley Ave Link H. Square Eastern Parkway NB Off J. Square St Catherine NB Off K. NB St Catherine Accel L. Brook/Broadway Striping M. Two-lane Brook/Chestnut N. Remove First/Chestnut Ramp O. NB Crittenden Accel
Tier 3 2030 Robust Scenario	G. Consolidate Arthur Ramps I. Preston/Woodbine Interchange P/Q. NB Crittenden Accel
Tier 4 2045 Modest Scenario	S. Crittenden to University NB Aux U. St Catherine to Brook NB Aux W. Two-lane Brook/Broadway
Tier 5 2045 Robust Scenario	R. Central Ave Extension T. Reconnect Preston

7.4 Build Traffic Scenarios

Building from the 2030 and 2045 No-Build scenarios discussed in **Chapter 4.0**, proposed improvement concepts were grouped into one of four build scenarios: 2030 Modest, 2030 Robust, 2045 Modest, and 2045 Robust. Each build scenario was coded into the TransModeler network and run to simulate impacts to mainline I-65 traffic flows. Additional information is included in **Appendix A**.

Figure 38 and **Figure 39** on the following pages present a side-by-side comparison of LOS for each build scenario alongside the corresponding No-Build operations. It should be noted that impacts to ramps and surface streets were beyond the scope of this analysis.

The 2030 Modest Build Scenario includes rehabilitation efforts as part of Item No. 5-20061 (i.e., drainage, striping, signing, and bridge repairs) plus nine short-term improvements from **Figure 37**/**Table 7**. As shown in the LOS summary maps, these are primarily safety improvements and would have minimal impact on mainline traffic operations.

The 2030 Robust Build Scenario (Tiers 1-3 in **Table 7**) includes 5-20061 rehabilitation efforts, nine short-term and three mid-term improvement concepts. As shown, this scenario demonstrates some traffic benefits, particularly for southbound I-65 near the university.

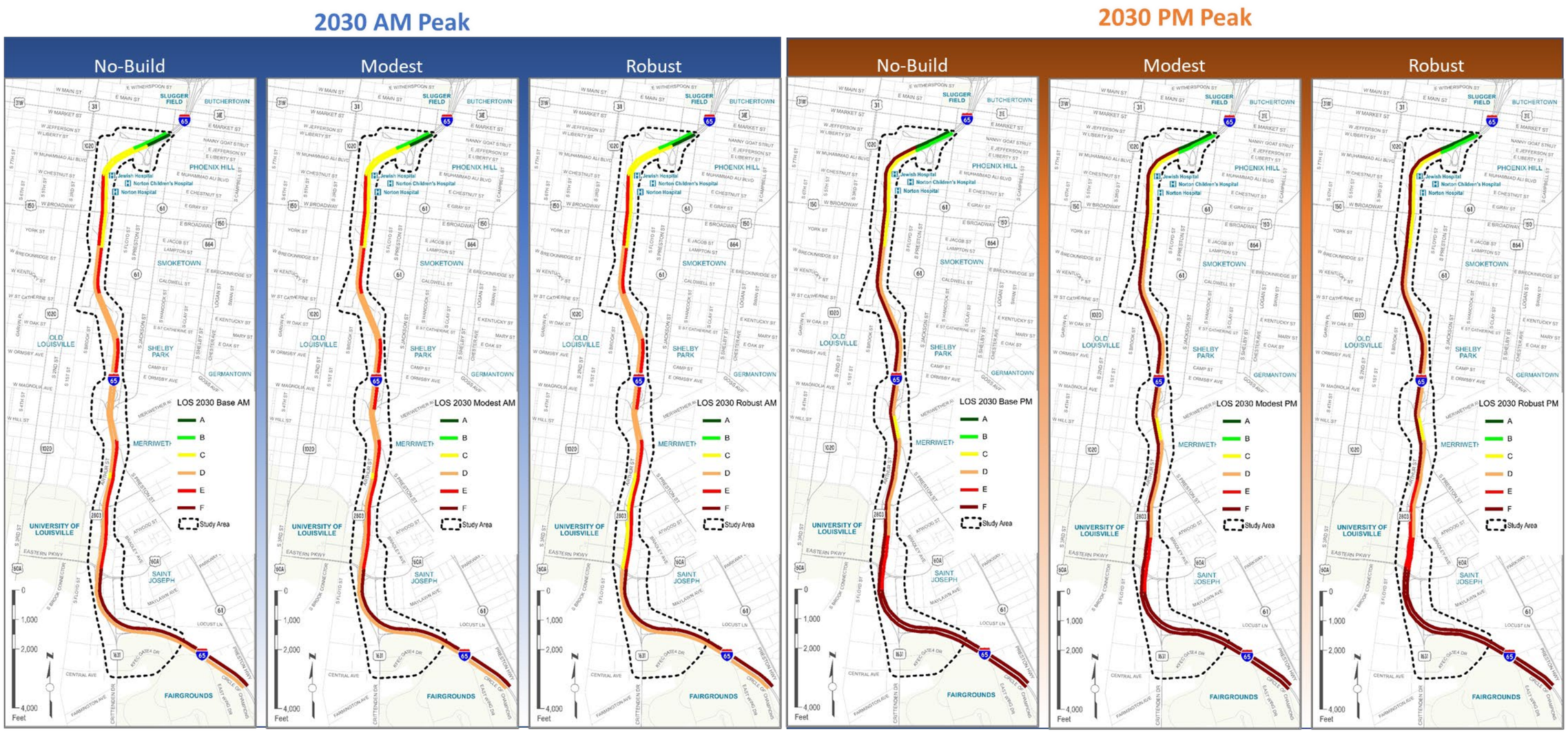


Figure 38: Comparison of 2030 LOS for Mainline I-65

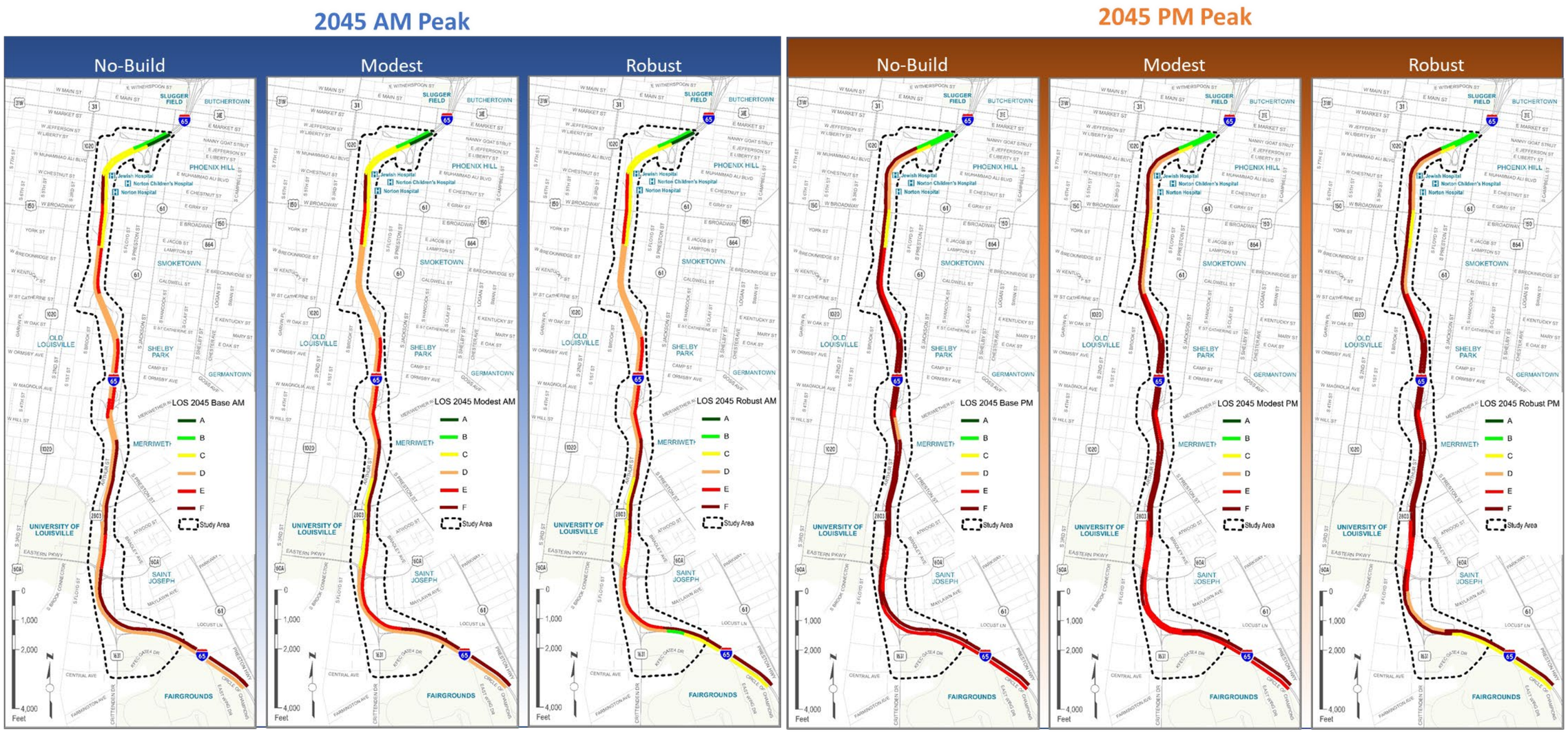


Figure 39: Comparison of 2045 LOS for Mainline I-65

The 2045 Modest Build Scenario in **Table 7** includes everything from the 2030 Robust Scenario plus three long-term improvement concepts. As shown in **Figure 39**, this scenario demonstrates noticeable traffic benefits, improving LOS by a letter grade for northbound I-65 near the Crittenden Drive curve, for southbound I-65 approaching Eastern Parkway, and for northbound I-65 just north of the St. Catherine Street interchange.

Travel times were also calculated for each of the 2045 scenarios. As shown in **Table 8**, each direction of travel experiences savings during each peak hour—suggesting traffic is moving more effectively. The largest savings are seen southbound in the PM peak hour. While saving 20 seconds on a 6-minute trip seems minor, incremental travel time savings applied to all vehicles traveling through the corridor translate to sizeable benefits.

Table 8: Travel Time Savings for 2045 Modest Scenario, in seconds

	2045 No-Build	2045 Modest	Difference
Northbound, AM Peak Hour	380	359	21
Southbound, AM Peak Hour	361	340	21
Northbound, PM Peak Hour	345	329	16
Southbound, PM Peak Hour	512	482	30

The 2045 Robust Build Scenario (Tier 5 in **Table 7**) includes all the concepts presented above, adding the two ultimate term concepts—Central Avenue Extension and reconnecting Preston Street—to the 2045 Modest Build Scenario. This results in LOS improvements for the southernmost section of the corridor. **Table 9** compares travel times versus 2045 No-Build; again, each direction of travel experiences savings during both peak hours.

Table 9: Travel Time Savings for 2045 Robust Scenario, in seconds

	2045 No-Build	2045 Robust	Difference
Northbound, AM Peak Hour	380	343	37
Southbound, AM Peak Hour	361	345	16
Northbound, PM Peak Hour	345	316	29
Southbound, PM Peak Hour	512	491	21

7.4.1 Sub-Area Models

In addition, three sub-area models were developed to examine impacts that proposed improvement concepts will have on the surface streets adjacent to I-65. Their locations were:

- First Street between Jacob Street and Liberty Street (Concepts L, M, and N)
- Woodbine/Jackson/Preston streets Interchange (Concept I)
- Arthur Street between Gaulbert Avenue and Eastern Parkway (Concept G)

Though the focus of this overall I-65 study is to improve operations and safety on I-65 mainline and its ramps, some of the improvement concepts would impact traffic flow on the adjacent surface streets. This effort was to determine whether such impacts represent a “fatal flaw” to the implementation of the proposed improvement concept.

In each case, sub-area models were clipped from the larger TransModeler models simulating 2030 baseline and 2030 robust scenarios. Each was supplemented with signal timing plans,

KIPDA's third-party estimates for turning movement volumes, and recent count data as available. A flat growth rate was assumed for surface streets for 2030 forecasts.

Sub-area modeling showed surface streets and related intersections showed no fatal flaws for the 2030 robust scenario. However, during any future development efforts, current turning movement counts and related data should be gathered with more detailed simulation modeling.

8.0 FINAL COORDINATION EFFORTS

Once the concepts were defined, the project team reached out to local officials, stakeholders, the public, and resource agencies to solicit feedback. Additional details are provided in **Appendix D**.

8.1 Local Officials Meeting No. 2

A second virtual meeting for local officials and key stakeholders was held May 6, 2021. Beyond the project team, 40 individuals representing 16 organizations participated. The meeting presented an update of the study structured around the website, with new tabs for the improvement concepts, build traffic scenarios, and a public survey. Individuals were encouraged to promote the website and survey with their constituents. Attendees were encouraged to submit comments via the website; several set up one-on-one follow-up meetings with the project team (**Table 10**).

Table 10: Listening Sessions following Local Officials Meeting No. 2

Group	Meeting Date(s)
Louisville Metro	May 14 and June 11, 2021
TARC	May 14, 2021
University of Louisville	May 18 and July 1, 2021
Kentucky Exposition Center	June 3, 2021
University of Louisville Medical Facilities	July 7, 2021

Key comment themes included the following:

- Native plants in the right-of-way could reduce mowing requirements.
- The group brainstormed ways to engage with underserved communities within the confines of public health concerns.
- Autonomous vehicles were not anticipated in future traffic models as future trends are highly speculative.
- If ramps do not meet current design standards, should they be removed? Interchanges and surface streets by the Old Louisville neighborhood were emphasized with a focus on trucks and travel speeds.
- The Central Avenue Extension (Concept R) could improve operations at the expo center though minor tweaks in future design phases could fine-tune it. The location of the proposed ramp underpass along Bradley Avenue currently floods.

8.2 Public Survey on Improvements

A second public survey collected community input on the proposed improvement concepts during May and June 2021. As a continued effort to expand outreach and increase engagement, an informational flyer was distributed throughout various neighborhoods along the corridor and to churches, social organizations, and the main University of Louisville campus. This effort was intended to increase the diversity of respondents, which ultimately provided the project team with a broader base of feedback to ensure recommendations are inclusive of the entire community's views.

In total, 77 survey responses were received. Regarding improvement concept preferences, survey questions asked respondents to identify their top three and bottom two spots in each category, separating improvements into short- and mid-/long-term categories. One point was added for each top ranking and one point subtracted for each bottom ranking, assigning a relative preference between each category. **Figure 40** summarizes public preferences between nine short-term concepts; Concept L (northbound off-ramp to Brook Street/Broadway) was the best liked, followed by Concept J (northbound off-ramp to St. Catherine Street), and Concept K (extend/widen northbound on-ramp from St. Catherine Street). Concept E (reconfigure striping at Preston Street on-ramp) received the least support.

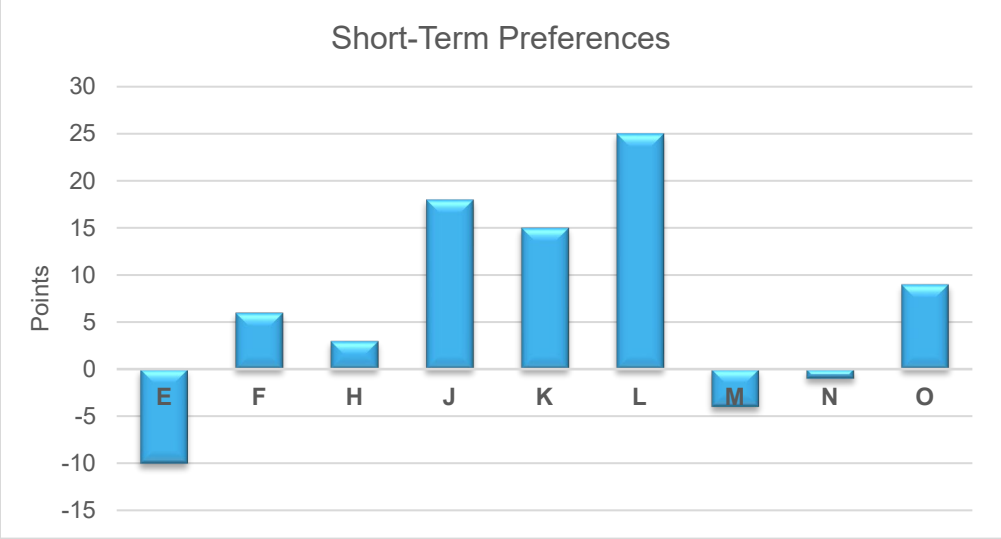


Figure 40: Public Survey Priorities for Short-Term Concepts

Figure 41 summarizes public preferences between six mid- to long-term concepts. As shown, support for Concepts G (consolidate Arthur Street ramps) and I (simplify Woodbine/Preston interchange) was very positive. Other concepts in this category were less favorably received, with Concept U (northbound auxiliary lane from St. Catherine Street to Brook Street/Broadway exit) receiving the least support.

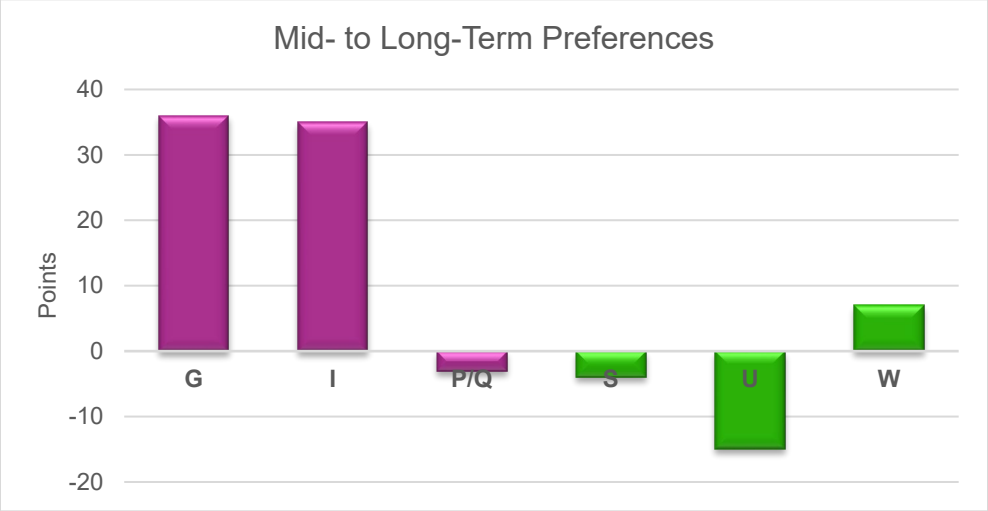


Figure 41: Public Survey Priorities for Mid- to Long-Term Concepts

Many open-ended comments emphasized a desire to reduce the physical impact of I-65, which divides the city center. Individual comments ranged from eliminating/burying the interstate to preserving its existing capacity—not adding through lanes—but enhancing east-west connectivity. Other open-ended comments suggested concepts to consider: reduce truck traffic in residential areas, eliminate ramps, improve pedestrian safety, improve ramp/merge safety, and/or invest in transit.

8.3 Project Team Meeting No. 3

A third project team meeting was held virtually on July 12, 2021 to review community input and build consensus regarding study recommendations discussed in the following chapter. Eighteen potential improvement concepts were discussed, examining cost estimates, traffic and safety benefits, public input, and other relevant factors to identify priorities for implementation.

In addition to priority information presented in **Chapter 9.0**, team discussions included the following items:

- Subsequent/additional conversations with university officials indicate their reservations about Concept G, consolidation of the Arthur Street ramps and creating a cul-de-sac between University Boulevard and Eastern Parkway.
- Changing access to the JCTC parking lot in Concept L requires a much longer route to access the facility.
- While ramp improvements in Concepts M, N, and W would provide benefits, the high cost to widen the structures is a drawback. Lower cost options should be explored, such as the performance-based flexible solution at Brook Street (Concept W) illustrated in **Figure 42**.
- Concept W was refined to eliminate the connection to Jacob Street. Appropriate pedestrian crossing options should be studied further during future design phases.

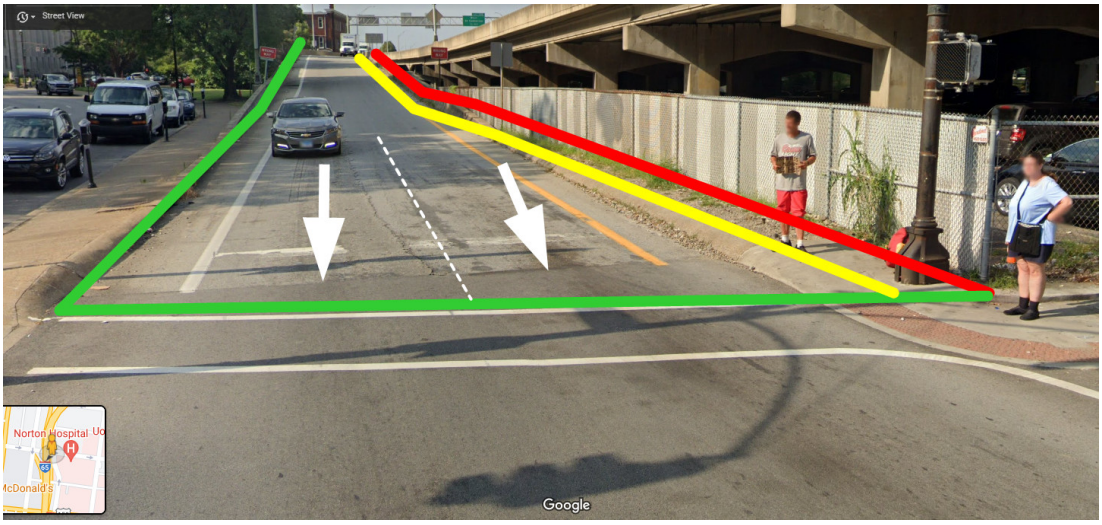


Figure 42: Lower Cost Concept at Brook Street Off-Ramp (Concept W)

8.4 Resource Agency Coordination

Resource agency coordination was conducted to help identify potential environmental resources, development plans, or other issues. The KYTC Division of Planning emailed approximately 60 federal, state, and local resource agencies a packet of project-related information including purpose and need, existing traffic and safety information, preliminary build concepts, and an environmental overview exhibit. Responses are in **Appendix F**.

9.0 PRIORITIZED RECOMMENDATIONS

This chapter presents the final, prioritized recommendations of the study's findings—including an assessment of costs and impacts. Project sheets in **Section 9.3** (pages 60+) provide a succinct overview of each concept.

9.1 Cost Estimates

Design models were used to estimate quantities of high-cost construction items including earthwork, pavement, and structures. Construction costs were tabulated using KYTC District 5 average unit bid prices. KYTC District 5 provided right-of-way and utility cost estimates where appropriate. Planning-level cost estimates by phase are presented in **Table 11**. Each construction cost includes an additional 40% for contingencies. All costs are presented in 2021 dollars.

Table 11: Cost Estimates by Phase

ID	Description	Design	ROW	Utilities	Construction	Total
E	Preston striping	$10,000	-	-	$25,000	$35,000
F	Close Boxley Ave link	$10,000	-	$2,000	$31,000	$43,000
G	Consolidate Arthur ramps	$120,000	$15,000	$55,000	$1.2 million	$1.4 million
H	T Eastern Pkwy NB Off	$80,000	-	-	$600,000	$680,000
I	Preston/Woodbine Intchg.	$100,000	-	-	$990,000	$1.1 million
J	St Catherine NB Off	$70,000	-	-	$280,000	$350,000
K	NB St Catherine Accel.	$100,000	-	-	$1.0 million	$1.1 million
L	Brook/Broadway Striping	$70,000	-	-	$450,000	$520,000
M	Two-lane Brook/Chestnut	$450,000	-	-	$4.2 million	$4.7 million
N	Remove First/Chestnut ramp	$550,000	-	-	$5.5 million	$6.1 million
O	NB Crittenden Accel.	$80,000	-	-	$250,000	$330,000
P	NB Crittenden Accel.	$190,000	-	-	$1.9 million	$2.1 million
Q	NB Crittenden Accel.	$190,000	$50,000	-	$800,000	$1.0 million
R	Central Ave Extension	$1.6 million	$1.5 million	-	$16 million	$19.1 million
S	Crittenden to University NB Auxiliary Lane	$780,000	$50,000	-	$7.8 million	$8.6 million
T	Reconnect Preston St.	$1.0 million	-	$290,000	$10.5 million	$11.8 million
U	St. Catherine to Brook NB Auxiliary Lane	$520,000	-	$25,000	$5.2 million	$5.7 million
W	Two-lane Brook/Broadway	$100,000	-	$260,000	$850,000	$1.2 million

◆ Short-term ◆ Mid-term ◆ Long-Term ◆ Ultimate-term

Concepts A-D omitted as they may been incorporated into Item 5-20061 or a future pavement rehabilitation project.

Concept V consolidated ramps near Eastern Parkway but was eliminated early for excessive structure costs

9.2 Benefit-Cost Analyses

Crash modification factors (CMF) from the CMF Clearinghouse[10] were applied to the three years of crash data discussed in **Section 2.7** to estimate potential safety benefits for each of the

[10] Online at www.cmfclearinghouse.org/

proposed improvements discussed above. Monetized values of crashes by severity were taken from the 2019 *Kentucky Traffic Collision Facts* report.[11]

Peak hour travel time savings discussed in **Section 7.4** were applied for concepts where benefits represented a substantial savings versus the No-Build scenario. To create a conservative estimate, all travel time benefits were assumed to occur within the AM and PM peak hours, despite congested operations at other periods during the day. Monetized travel time values were coordinated with the adjacent recently completed I-65 study just south of this study area, Item No. 5-559, with a value-of-time cost of $33.52 per hour.

It should be noted that both safety and travel time benefits were calculated based solely on mainline traffic flows. This represents a conservative approach; additional benefits for ramp traffic, surface streets, and intersections are not quantified in the results.

Results in **Table 12** present the estimated benefit-cost ratio (BCR) for each improvement concept over a 20-year analysis horizon. No discount factors are applied. A BCR greater than one suggests the value of the benefits exceeds the value of the costs, suggesting the concept is fiscally worthwhile. Red text identifies BCRs less than 1.0.

Table 12: Benefit Cost Analysis Results

ID	Description	Travel Time Benefit	Annual Crash Reduction	Safety Benefit	Cost	Mainline BCR
E	Preston striping	-	0.9 crashes	$12,000	$35,000	7.1
F	Close Boxley Ave link	-	N/A[1]	-	$43,000	0.0
G	Consolidate Arthur ramps	$326,000	6.4 crashes	$89,000	$1.4 million	6.0
H	T Eastern Pkwy NB Off	-	1.6 crashes	$23,000	$680,000	0.7
I	Preston/Woodbine Intchg.	$51,000	N/A[1]	-	$1.1 million	0.9
J	St Catherine NB Off	-	0.7 crashes	$10,000	$350,000	0.6
K	NB St Catherine Accel.	-	1.0 crashes	$14,000	$1.1 million	0.3
L	Brook/Broadway Striping	-	2.3 crashes	$270,000	$520,000	10.6
M	Two-lane Brook/Chestnut	-	N/A[1]	-	$4.7 million	0.0
N	Remove First/Chestnut ramp	$140,000	N/A[1]	-	$6.1 million	0.5
O	NB Crittenden Accel.	-	2.1 crashes	$31,000	$330,000	1.9
P	NB Crittenden Accel.	-	3.0 crashes	$45,000	$2.1 million	0.4
Q	NB Crittenden Accel.	-	3.6 crashes	$54,000	$1.0 million	1.0
R	Central Ave Extension	$75,000	3.8 crashes	$130,000	$19.1 million	0.2
S	Crittenden to University NB Auxiliary Lane	$410,000	11.1 crashes	$160,000	$8.6 million	1.3
T	Reconnect Preston St.	$28,000	2.9 crashes	$53,000	$11.8 million	0.1
U	St. Catherine to Brook NB Auxiliary Lane	-$150,000	6.3 crashes	$98,000	$5.7 million	-0.2
W	Two-lane Brook/Broadway	-	2.3 crashes	$270,000	$1.2 million	4.5

[1]No applicable CMF identified; benefits not quantified

[11] Online at http://kentuckystatepolice.org/wp-content/uploads/2020/10/CrashFacts2019_FY2020.pdf

9.3 Project Sheets

Considering costs, potential traffic and safety benefits, other impacts, and community feedback, the project team ranked each of the improvement concepts as a high or low priority. Further, four concepts were not recommended to advance:

- Concepts P and Q provide larger scale, higher cost solutions at the Crittenden Drive loop ramp, which is effectively addressed by Concept O for a lower cost.
- Concept U, a northbound auxiliary lane between St. Catherine and Brook streets, increases mainline travel times and was not favored by public survey responses.
- Due to high costs, Concept W—widening the Brook Street/Broadway off-ramp to two lanes—was modified to represent a lower cost option that would provide similar benefits with fewer impacts.

The following pages contain project sheets for each of the spot improvements. **Table 13** contains an overview summary of the recommendations with key information. Implementation of all high-ranked priorities totals just over $5.5 million in 2021 dollars.

Table 13: Summary of Priorities

ID	Description	Improves	Cost	BCR	Community Input	Priority
E	Preston striping	Safety	$35,000	7.1	Low	High
F	Close Boxley Ave link	Safety	$43,000	0.0	Moderate	High
G	Consolidate Arthur ramps	Safety, Traffic	$1.4 million	6.0	Highly Positive	High
H	T Eastern Pkwy NB Off	Safety	$680,000	0.7	Moderate	High
I	Preston/Woodbine Intchg.	Safety, Traffic	$1.1 million	0.9	Highly Positive	High
J	St Catherine NB Off	Safety	$350,000	0.6	Highly Positive	High
K	NB St Catherine Accel.	Safety, Traffic	$1.1 million	0.3	Highly Positive	High
L	Brook/Broadway Striping	Safety, Traffic	$520,000	10.6	Highly Positive	High
M	Two-lane Brook/Chestnut	Safety, Traffic	$4.7 million	0.0	Low	Low
N	Remove First/Chestnut ramp	Safety, Traffic	$6.1 million	0.5	Low	Low
O	NB Crittenden Accel.	Safety, Traffic	$330,000	1.9	Moderate	High
P	NB Crittenden Accel.	Safety, Traffic	$2.1 million	0.4	Low	Eliminated
Q	NB Crittenden Accel.	Safety, Traffic	$1.0 million	1.0	Low	Eliminated
R	Central Ave Extension	Safety, Traffic	$19.1 million	0.2	N/A	Low
S	Crittenden to University NB Auxiliary Lane	Safety, Traffic	$8.6 million	1.3	Low	Low
T	Reconnect Preston St.	Safety, Traffic	$11.8 million	0.1	N/A	Low
U	St. Catherine to Brook NB Auxiliary Lane	Safety, Traffic	$5.7 million	-0.2	Low	Eliminated
W	Two-lane Brook/Broadway	Safety, Traffic	$1.2 million	4.5	Moderate	Low

Concepts A-D omitted from prioritization as they may been incorporated into Item 5-20061 or a future pavement rehabilitation project.

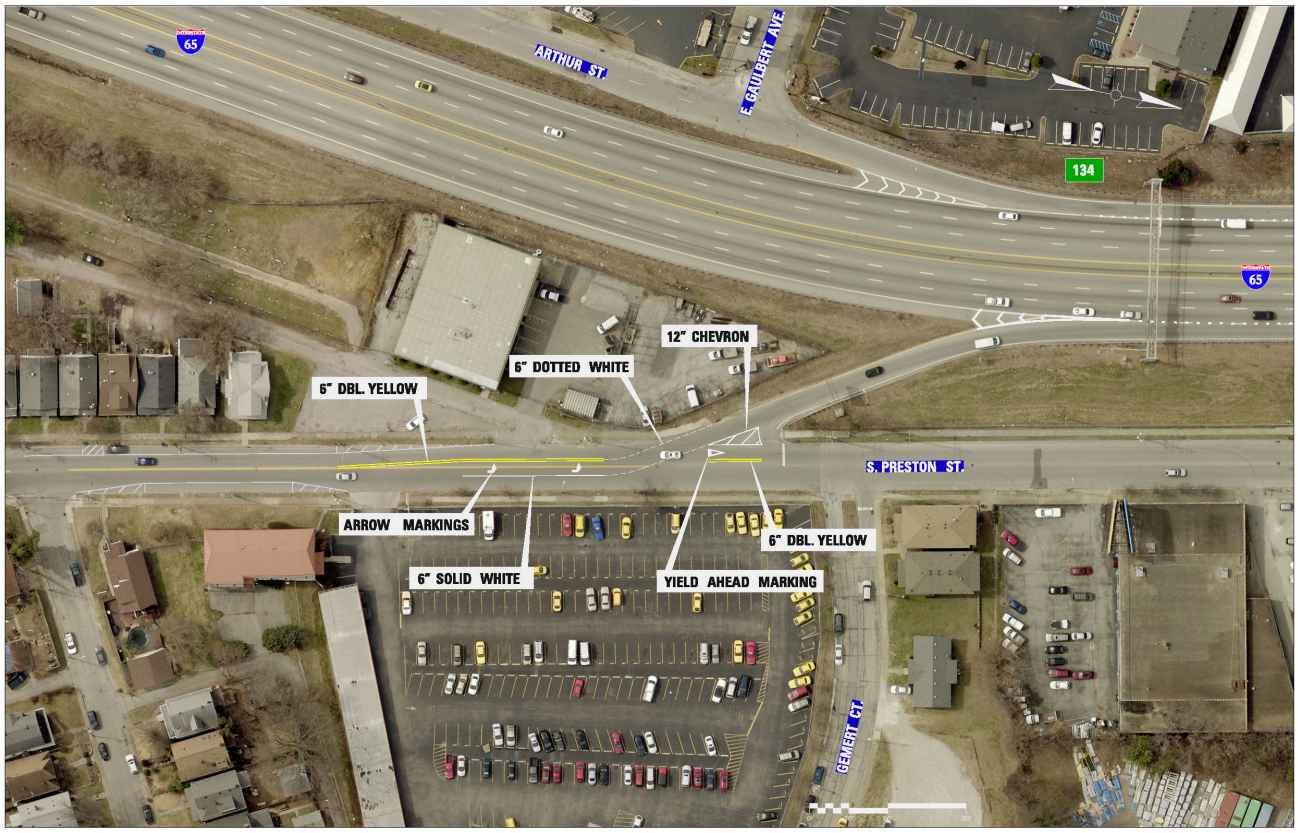
Concept V consolidated ramps near Eastern Parkway but was eliminated early for excessive structure costs

Concept E: Preston Striping	**Short Term**	**Priority** High
Project Description:	**Work Type:**	Striping
Re-stripe Preston Street at I-65 northbound on-ramp		
KY 61 MP **10.895** to MP **10.955**	Project Length:	**0.06** MI

Identified Needs:	**Proposed Benefits:**
• Poor delineation on local street leads to driver confusion	• Reduce driver confusion by visually defining movements • Improves pedestrian safety

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	N/A	Design:	$	10,000
Functional Class:	Urban Local	Right-of-Way:	$	0
2020 ADT:	8,000 vpd Preston | 5,300 vpd ramp	Utilities:	$	0
2045 No-Build ADT:	5,100 vpd ramp	Construction:	$	25,000
2017-2019 Crashes:	3			
Bike/Ped Facilities:	Sidewalks along both sides	**Total Cost:**	**$**	**35,000**

Project Concept:



Concept F: Close Boxley Ave Intersection	**Short Term**	**Priority** High

Project Description: **Work Type:** Access Management

Close Boxley Avenue at Crittenden Drive near the end of the interstate off-ramp from I-65 southbound

MP **N\A** to MP **N\A** Project Length: **N\A** MI

Identified Needs:	**Proposed Benefits:**
• Cross-street access point immediately adjacent to high speed off ramp	• Close intersection between Boxley Ave/Crittenden Drive to reduce conflict points • Churchill Park School and adjacent properties retain access via Central Avenue and Helm Street

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	N/A	Design:	$	10,000
Functional Class:	Urban Minor Arterial (Crittenden)	Right-of-Way:	$	0
2020 ADT:	13,000 vpd Critt. | 5,500 vpd ramp	Utilities:	$	2,000
2045 No-Build ADT:	6,100 vpd ramp	Construction:	$	31,000
2017-2019 Crashes:	30 within 80 ft of Boxley intersection			
Bike/Ped Facilities:	Sidewalk west side Crittenden	**Total Cost:**	**$**	**43,000**

Project Concept:

◆ New Pavement ◆ Remove Pavement

Concept G: Arthur Street Ramps	**Mid-Term**	**Priority:** High

Project Description: **Work Type:** Ramp Removal

Reconfigure Arthur Street, including southbound ramps: 1) Extend merge area from Magnolia on-ramp; 2) close off-ramp to Arthur at Gaulbert; 3) close on-ramp from Arthur at Lee; 4) two-way Arthur, eliminating connection to Brandeis; 5) add off-ramp to Brandeis; 6) close Arthur St connection to University Blvd.; 7) extend merge area from University Blvd. on-ramp. Other concepts should be explored during future design phases.

MP **133.3** to MP **133.8** Project Length: **0.46** MI

Identified Needs:

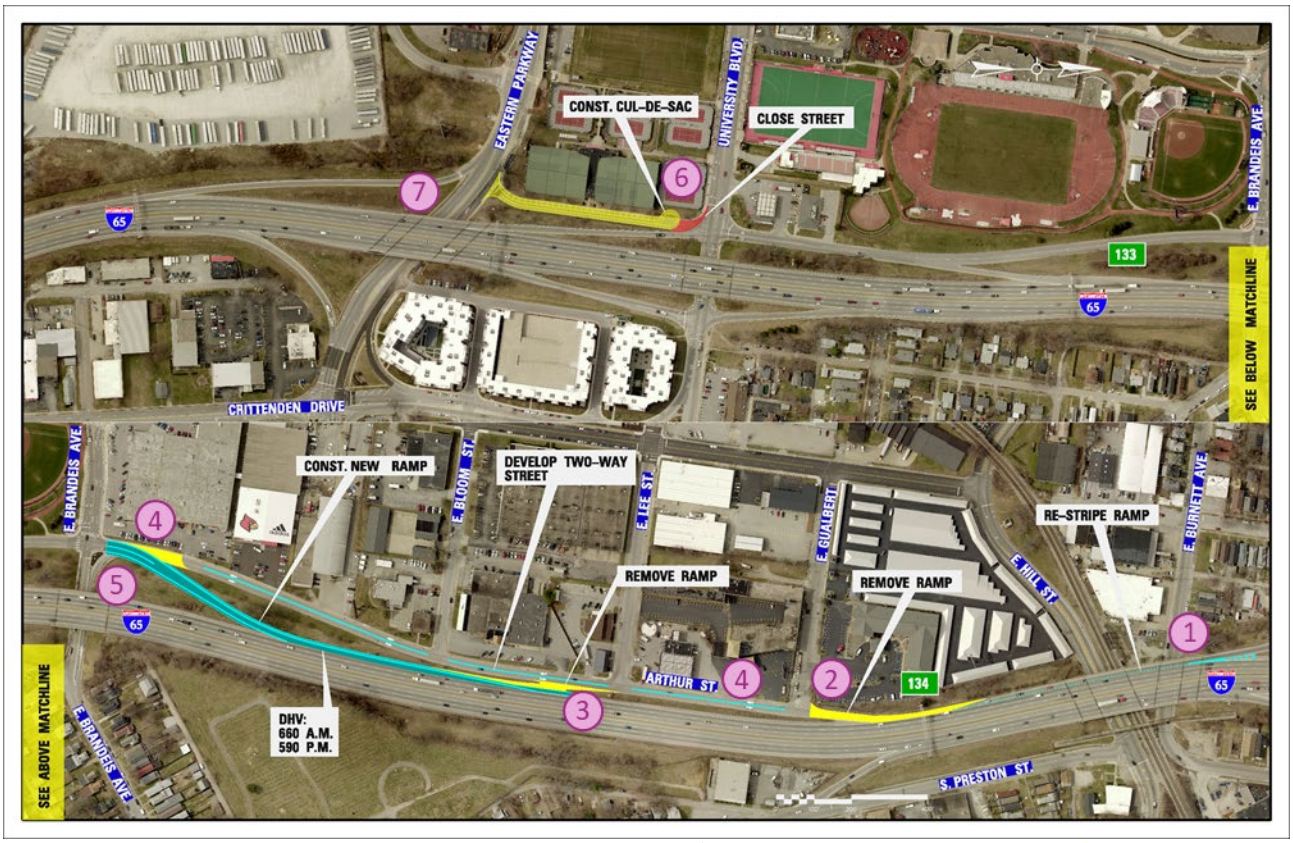
- Arthur St. is one-way southbound with 2 lanes, providing 4 short ramp connections between Hill St. and Eastern Pkwy.
- Ramps lead to turbulent traffic flow with extra conflict points

Proposed Benefits:

- Reduces conflict points
- Reduces driver confusion by separating local and ramp traffic
- Increases merge lengths from Magnolia and University on-ramps

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	CHAF IP20150136	Design:	$	120,000
Functional Class:	Urban Local/Interstate Ramp	Right-of-Way (N/A):	$	15,000
2020 ADT | % Trucks:	3,100-7,100 vpd on Arthur | 9%	Utilities:	$	55,000
2045 No-Build ADT:	Not available	Construction:	$	1,200,000
2017-2019 Crashes:	13 on SB Ramp, 44 on Arthur			
Bike/Ped Facilities:	Sidewalks along both sides of Arthur	**Total Cost:**	**$**	**1,390,000**

Project Concept:



Concept H: Eastern Parkway Ramp	**Short Term**	**Priority** High

Project Description: **Work Type:** Ramp Reconstruction

Reconfigure I-65 northbound off-ramp to Eastern Parkway as a "T intersection" and extend deceleration area. Construct sidewalk along south side of Eastern Parkway to address gap in pedestrian connectivity.

MP **132.7** to MP **132.9** Project Length: **0.19** MI

Identified Needs:

- Along Eastern Parkway, 130 feet between ramp terminus and stop bar at Crittenden limits merge/weave distances, compounded by queued vehicles
- Gap in sidewalk network

Proposed Benefits:

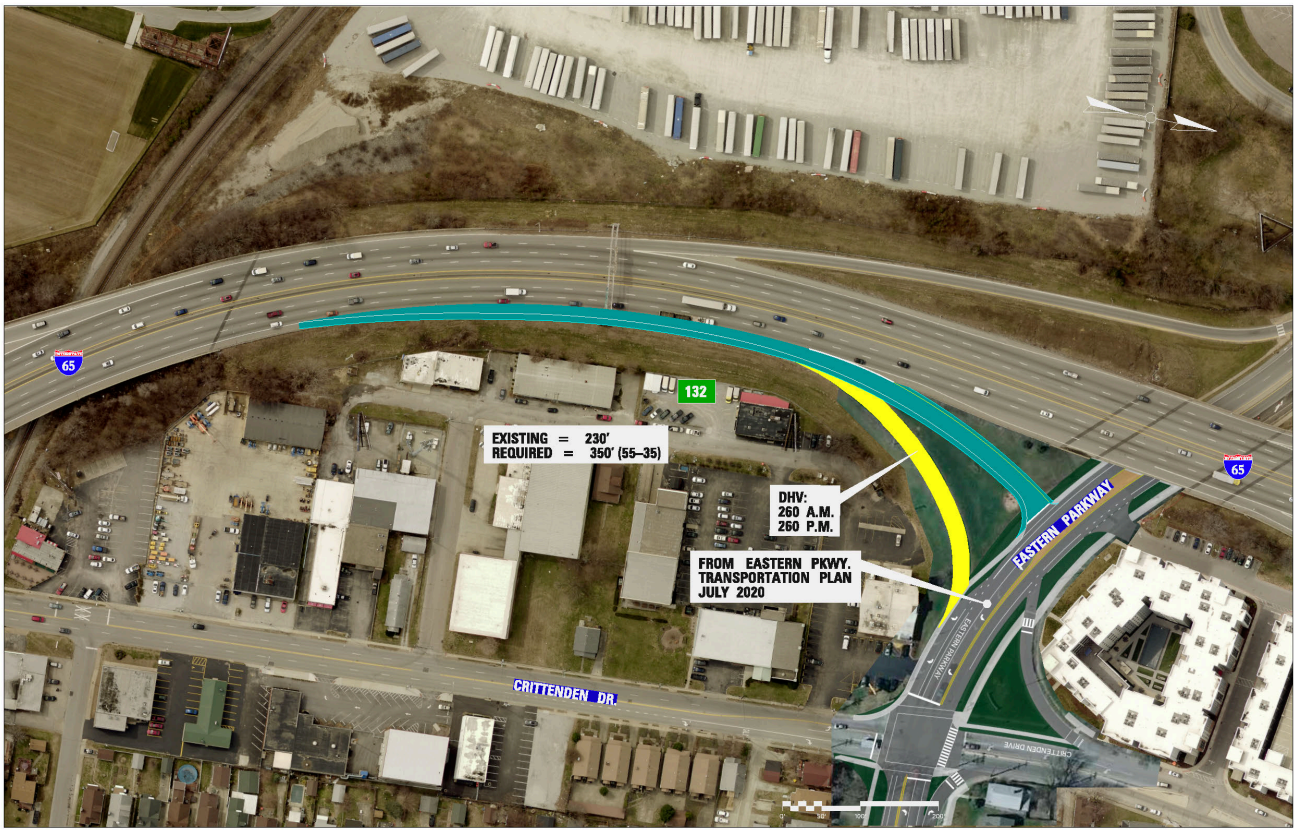
- Increases deceleration length along I-65
- Increases weave distance to reach left turn lane onto Crittenden Drive
- Improves pedestrian safety

Aligns with Eastern Parkway Study

Project Info:	
KYTC/KIPDA ID:	2142 (only sidewalk component)
Functional Class:	Urban Minor Arterial (Eastern)
2020 ADT:	14,700 vpd Eastern | 2,600 vpd ramp
2045 No-Build ADT:	8,600 vpd Eastern | 2,000 vpd ramp
2017-2019 Crashes:	7 between ramp and Crittenden
Bike/Ped Facilities:	Sidewalks along both sides

Project Phase Estimates:		**(2021 Dollars)**
Design:	$	80,000
Right-of-Way:	$	0
Utilities:	$	0
Construction:	$	600,000
Total Cost:	**$**	**680,000**

Proposed Concepts:



New Pavement Remove Pavement

Concept I: Woodbine/Preston Ramps	**Mid-Term**	**Priority** High

Project Description: **Work Type:** Ramp Removal

Reconfigure Woodbine/Preston interchange: 1) Remove northbound I-65 off-ramp to Woodbine; 2) Remove southbound I-65 on-ramp from Preston; 3) reconfigure Preston as two-way between Jackson and Woodbine. Additionally, 4) the bridge carrying I-65 over the southbound on-ramp could be replaced with fill, reducing future maintenance costs.

MP **133.900** to MP **134.100** Project Length: **0.2** MI

Identified Needs:

- 230 feet between ramps 134A-134B limits space to maneuver
- Tight merge while accelerating for I-65 southbound on-ramp
- Connections to local street network introduce extra midblock conflict points

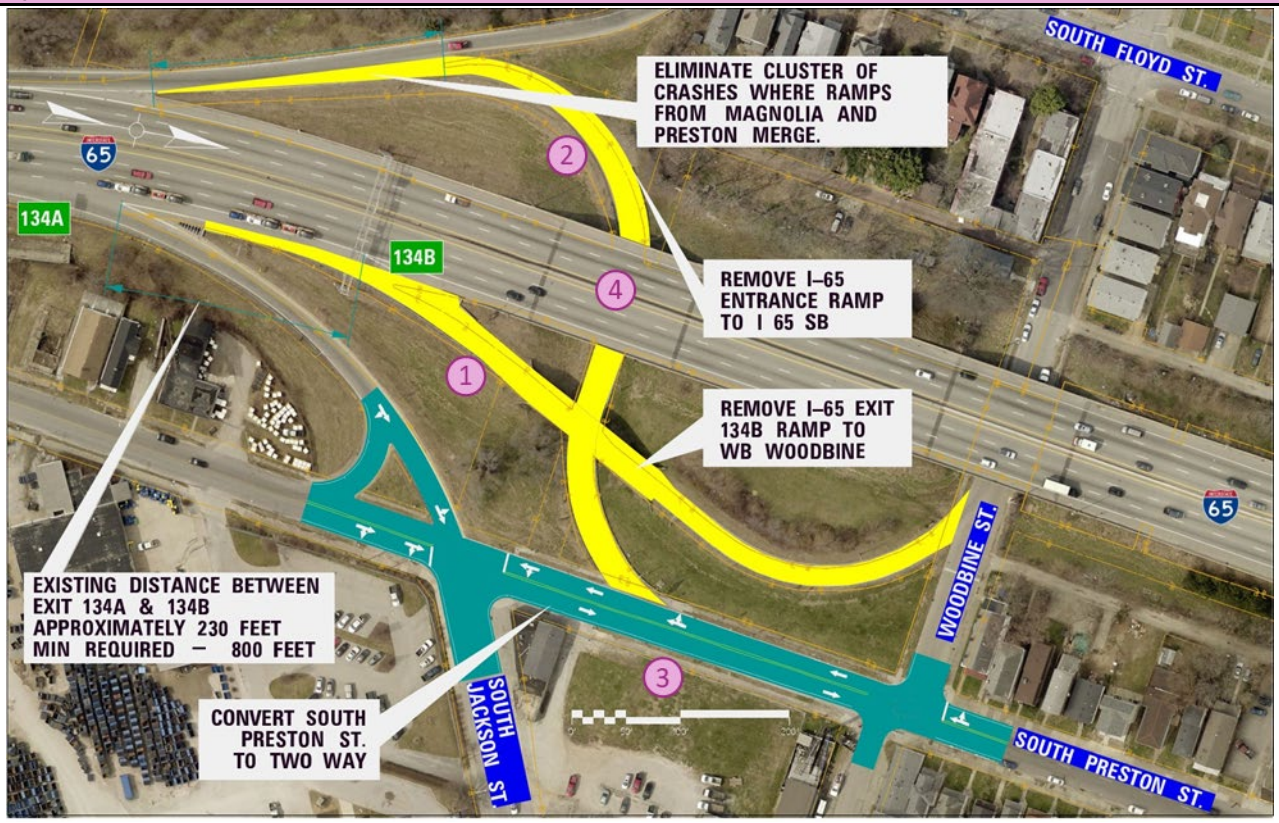
Proposed Benefits:

- Improves safety associated with multiple merging locations
- Removes substandard consecutive off-ramps
- Lessens driver confusion

Project Info:	
KYTC/KIPDA ID:	CHAF IP20150220
Functional Class:	Urban Interstate Ramps
2020 ADT:	1,100 to 8,900 vpd per ramp
2045 No-Build ADT:	100 to 7,900 vpd per ramp
2017-2019 Crashes:	55 on I-65 within 200 ft of ramp termini plus 9 ramp crashes
Bike/Ped Facilities:	Sidewalks along surface streets

Project Phase Estimates:		**(2021 Dollars)**
Design:	$	100,000
Right-of-Way:	$	0
Utilities:	$	0
Construction:	$	990,000
Total Cost:	**$**	**1,090,000**

Project Concept:



Concept J: St Catherine T	**Short Term**	**Priority** High

Project Description: **Work Type:** Ramp Reconstruction

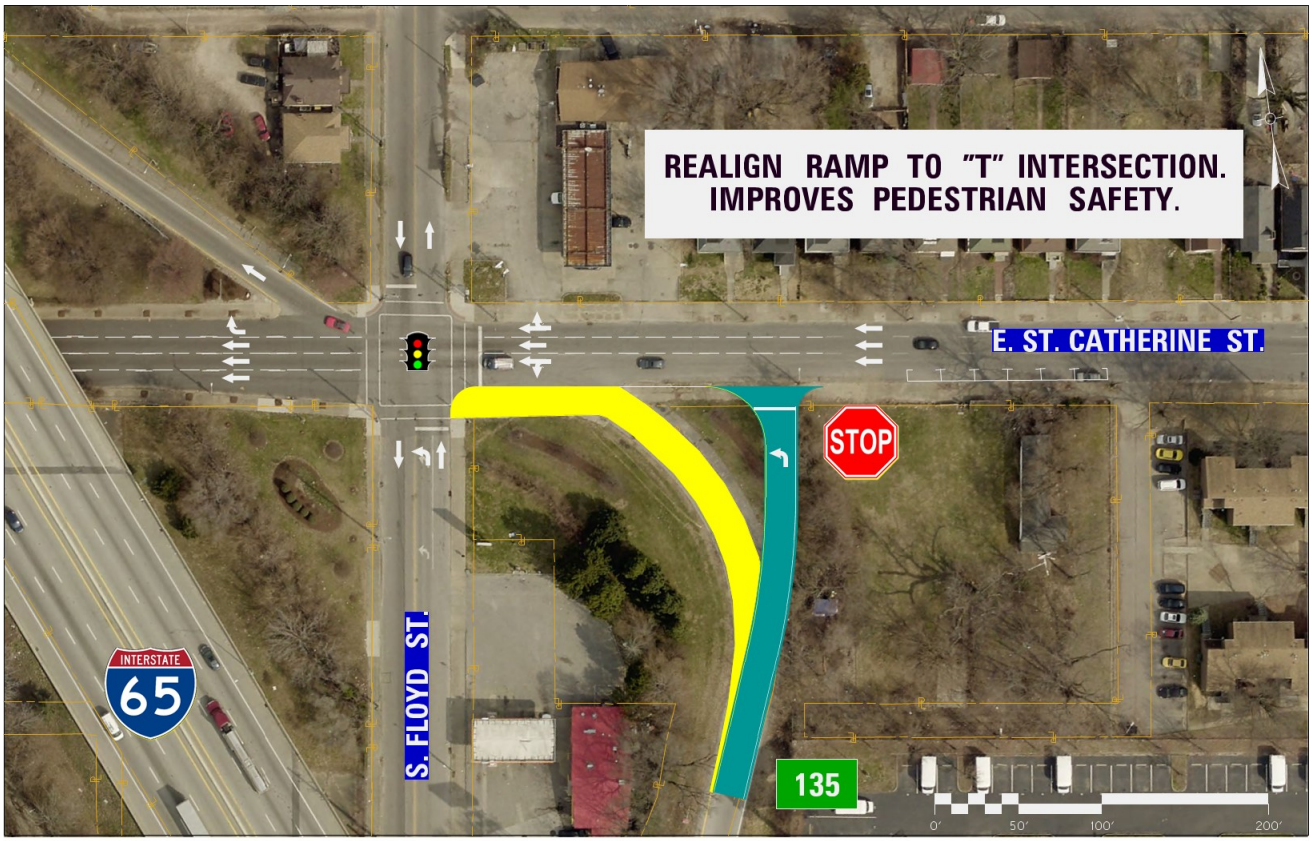
Realign northbound I-65 off-ramp to St. Catherine Street to a stop-controlled "T intersection"

MP **N/A** to MP **N/A** Project Length: **0.047** MI

Identified Needs:	**Proposed Benefits:**
• Slip ramp ties to St Catherine St approx. 80 feet from S Floyd St intersection, limiting merge/weave distance • Poor sight distance due to angle of ramp • Pedestrian crossing without traffic control device on ramp	• Improve safety • Allows for possible future conversion of St. Catherine for two-way traffic

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	N/A	Design:	$	70,000
Functional Class:	Urban Interstate Ramp	Right-of-Way:	$	0
2020 ADT:	9,900 vpd (ramp) | 7,700 vpd (St Cat)	Utilities:	$	0
2045 No-Build ADT:	10,500 vpd (ramp) | 7,800 (St Cat)	Construction:	$	280,000
2017-2019 Crashes:	15 on ramp approaching St Catherine			
Bike/Ped Facilities:	Sidewalks both sides St Catherine	**Total Cost:**	**$**	**350,000**

Proposed Concept:



New Pavement Remove Pavement

Concept K: NB Accel from St Catherine	**Short Term**	**Priority** High

Project Description: **Work Type:** Major Widening

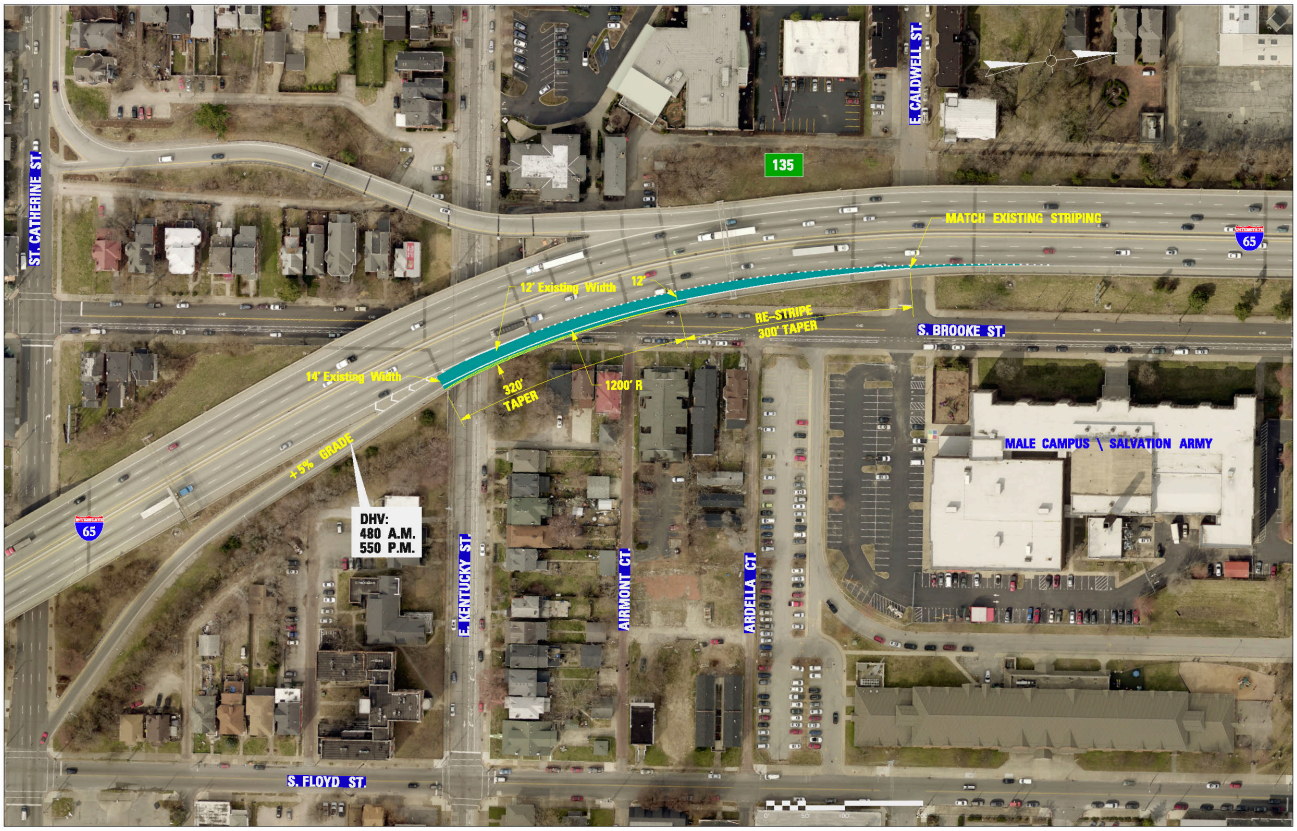
Extend I-65 northbound on-ramp from St Catherine Street to allow for longer acceleration/merge area

MP **134.7** to MP **134.9** Project Length: **0.20** MI

Identified Needs:	**Proposed Benefits**
• Acceleration lane from St Catherine does not meet current design criteria	• Increases acceleration length to improve safety *May be included as part of Item No. 5-20061*

Project Info:		**Project Phase Estimates:**		**(2021 Dollars)**
KYTC/KIPDA ID:	N/A	Design:	$	100,000
Functional Class:	Urban Interstate	Right-of-Way: N/A	$	0
2020 ADT | % Trucks:	69,000 vpd northbound | over 13%	Utilities: N/A	$	0
2045 No-Build ADT:	72,000 vpd northbound	Construction:	$	1,000,000
2017-2019 Crashes:	21 northbound within 200 ft of merge			
Bike/Ped Facilities:	N/A	**Total Cost:**	**$**	**1,100,000**

Project Concept:



◆ New Pavement

Concept L: Brook/Broadway Ramp	**Short Term**	**Priority** High

Project Description: **Work Type:** Ramp Improvements

Restripe I-65 northbound off-ramp to Brook Street/Broadway to clarify movements; eliminate access to Jacob Street and Alley; shift pedestrian crossing; reduce median length.

MP **135.060** to MP **135.200** Project Length: **0.140** MI

Identified Needs:

- Intersection 600 feet from ramp terminus, forcing vehicles to rapidly decelerate going downhill to complete left to Jacob
- Cross-ramp thru movement on Jacob discouraged with low median but not prevented
- Pedestrian crossing concerns
- Short merge length approaching Broadway

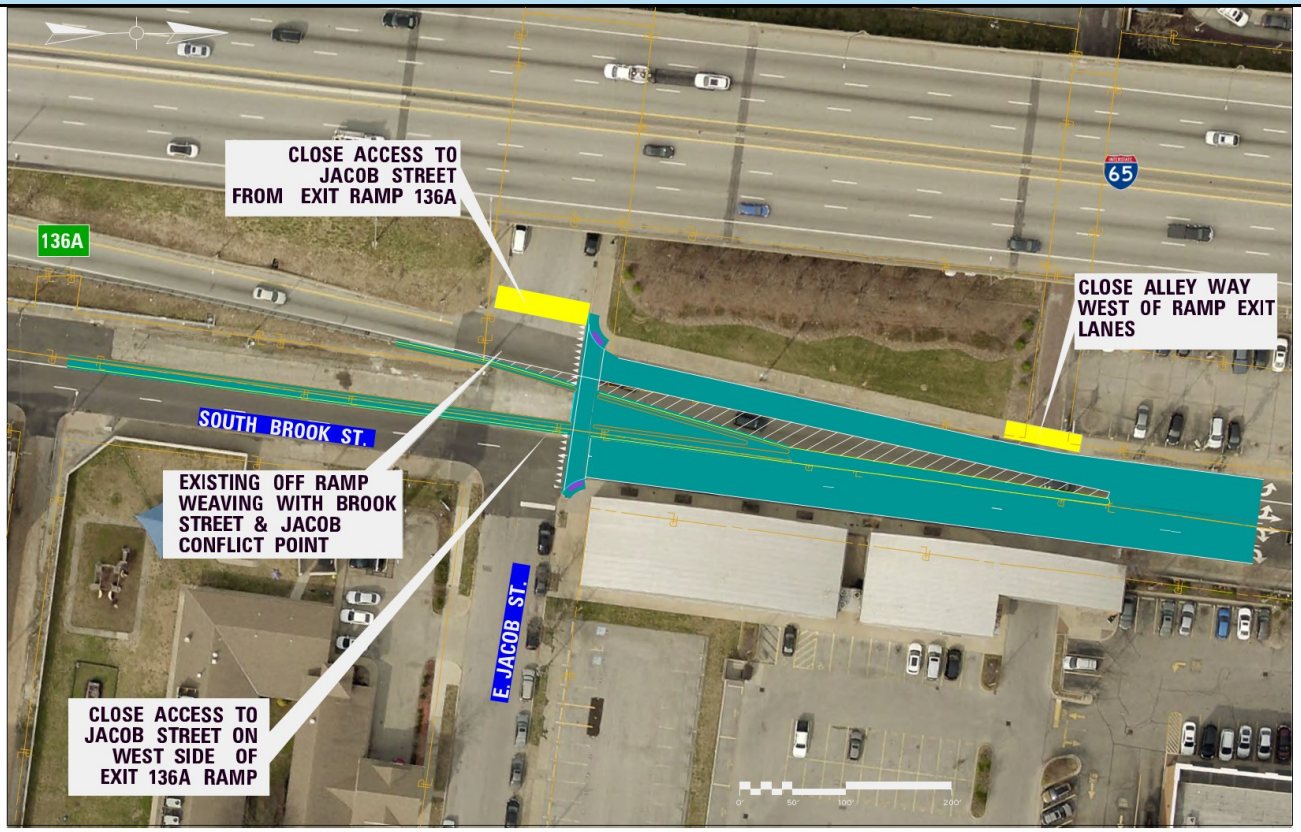
Proposed Improvements:

- Reduces conflict points and driver confusion
- Improves visibility by shifting median
- Relocates pedestrian crossing

Project Info:	
KYTC/KIPDA ID:	#264
Functional Class:	Urban Interstate Ramp
2020 ADT:	9,300 vpd on ramp
2045 No-Build ADT:	11,700 vpd on ramp
2017-2019 Crashes:	14 ramp crashes
Bike/Ped Facilities:	N/A

Project Phase Estimates:		**(2021 Dollars)**
Design:	$	70,000
Right-of-Way:	$	0
Utilities:	$	0
Construction:	$	450,000
Total Cost:	**$**	**520,000**

Proposed Concept:



Concept M: Brook/Chestnut Ramp	**Short Term**	**Priority** Low

Project Description: **Work Type:** Ramp Widening

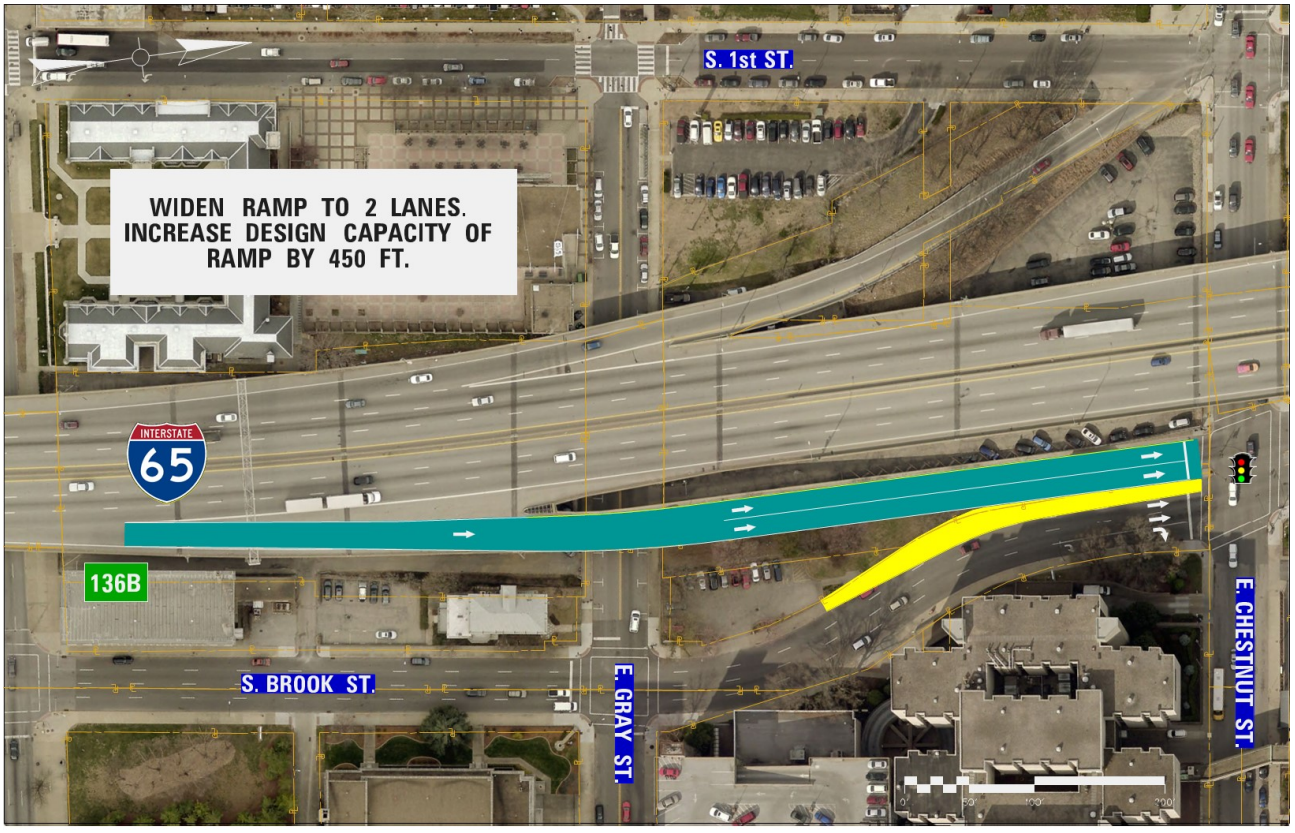
Widen northbound off-ramp to Brook Street at Chestnut to accommodate two lanes of traffic

MP **N/A** to MP **N/A** Project Length: **0.196** MI

Identified Needs:	**Proposed Benefits:**
• Drivers queue side-by-side on ramp even though it's not striped that way, leading to increased confusion and conflicts at intersection with Chestnut Street	• Increased queue storage space • Reduced driver confusion

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	N/A	Design:	$	450,000
Functional Class:	Urban Interstate	Right-of-Way:	$	0
2020 ADT:	8,000 vpd on ramp	Utilities:	$	0
2045 No-Build ADT:	6,900 vpd on ramp	Construction:	$	4,200,000
2017-2019 Crashes:	8 on ramp			
Bike/Ped Facilities:	Sidewalks on both sides of Brook	**Total Cost:**	**$**	**4,650,000**

Proposed Concept:



Concept N: First Street Ramps	**Short Term**	**Priority** Low

Project Description: **Work Type:** Ramp Improvements

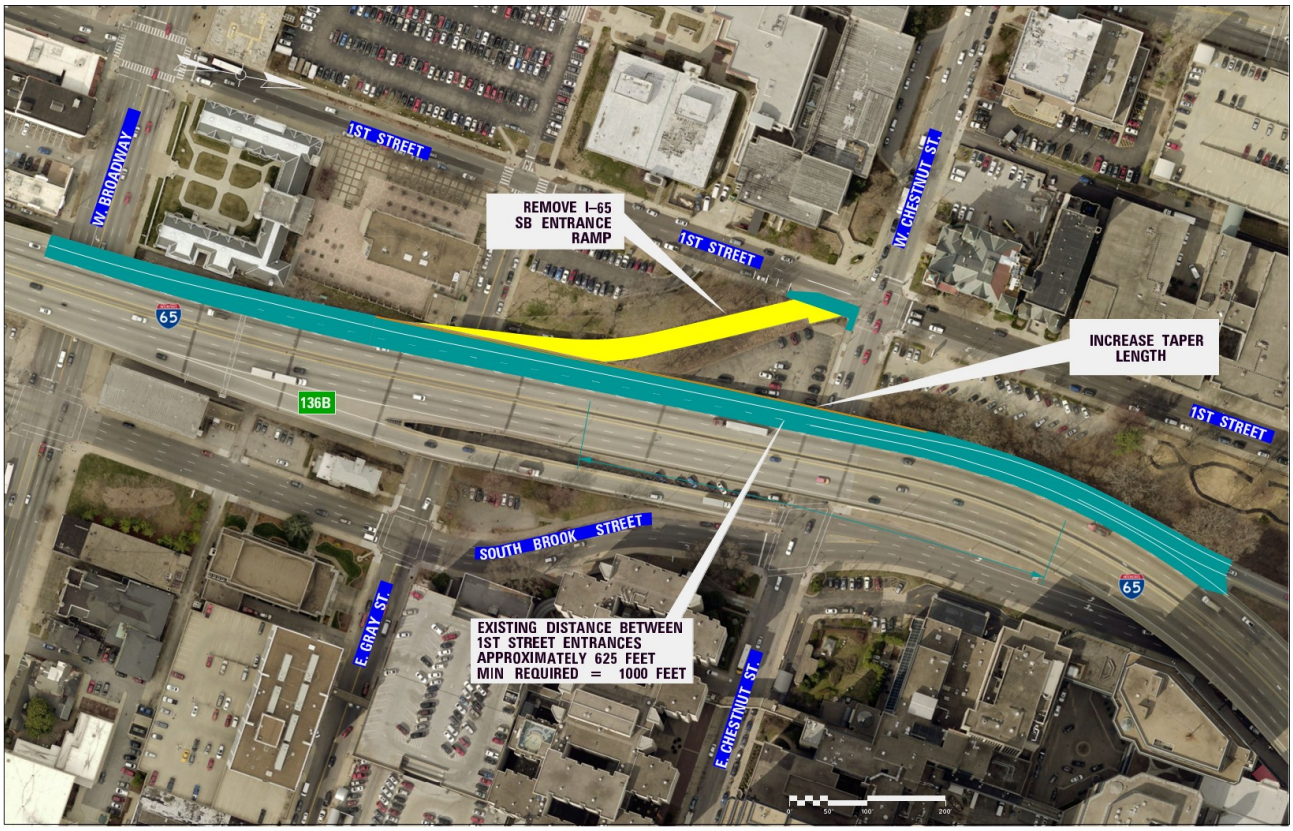
Remove middle of three I-65 southbound on-ramps from First Street (near Jacob Street) and lengthen merge area for northern First Street on-ramp (near Liberty)

MP **135.250** to MP **135.500** Project Length: **0.250** MI

Identified Needs:	**Proposed Benefits:**
• Closely spaced on ramps lead to turbulent mainline traffic flow, compounded by short merge/acceleration lengths	• Improves safety by reducing conflict points • Improves safety by extending acceleration distance

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**
KYTC/KIPDA ID:	N/A	Design:	$ 550,000
Functional Class:	Urban Interstate Ramp	Right-of-Way:	$ 0
2020 ADT:	56,000-65,000 vpd southbound | 6,900 vpd on ramp	Utilities:	$ 0
2045 No-Build ADT:	63,000-70,000 vpd southbound	Construction:	$ 5,500,000
2017-2019 Crashes	38 SB in 200 ft of two north ramps		
Bike/Ped Facilities:	N/A	**Total Cost:**	**$ 6,050,000**

Proposed Concept:



Concept O: Crittenden Loop Ramp	**Short Term**	**Priority** High

Project Description: **Work Type:** Reconstruct Ramp

Lengthen/widen ramp from Crittenden to I-65 northbound to maximum extent possible without widening I-65 bridge over Crittenden Drive

MP **132.3** to MP **132.5** Project Length: **0.31** MI

Identified Needs:

- Tight curve on ramp reduces available length to accelerate, compounded by short merge distance

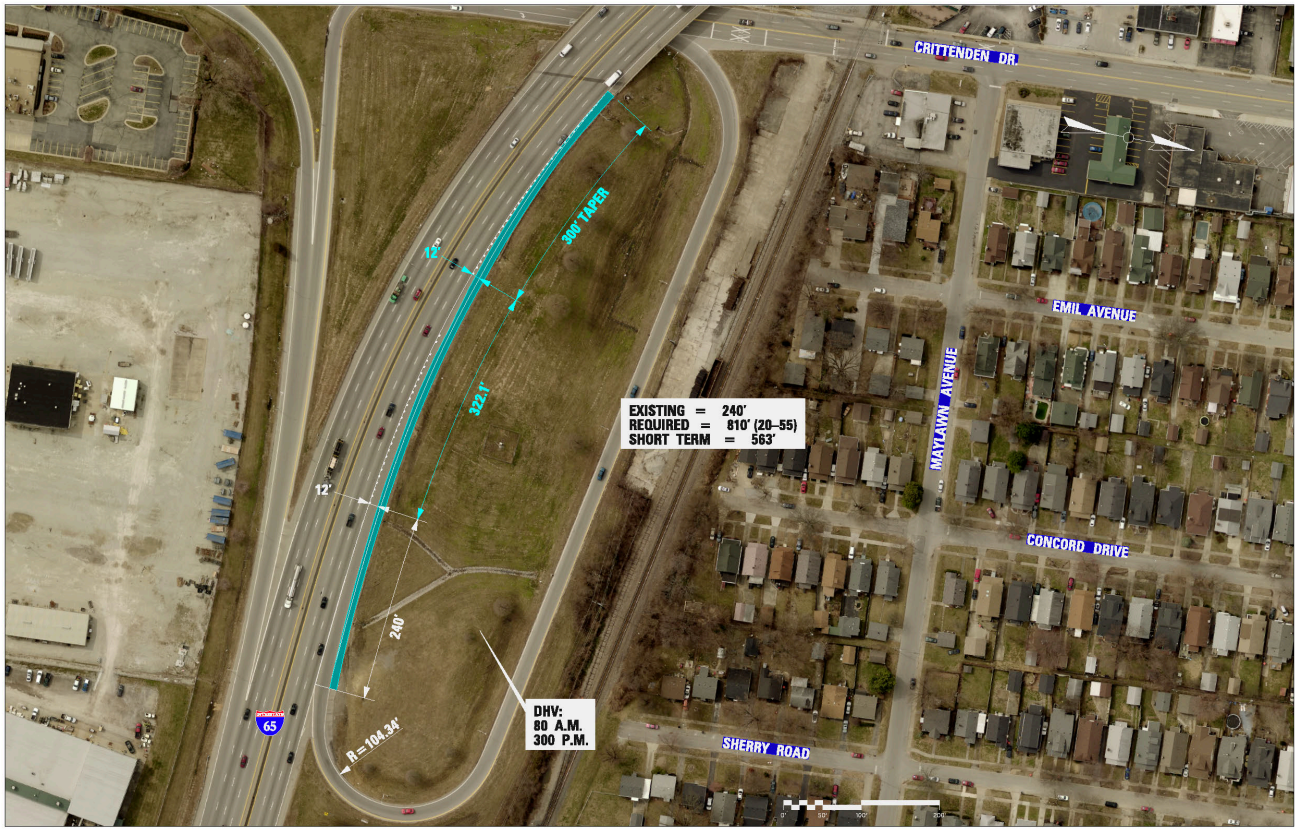
Proposed Benefits:

- Improve safety and traffic flow with longer acceleration lane

Mid-term Spots P/Q addresses same need to meet current design standards

Project Info:		**Project Phase Estimates:**		**(2021 Dollars)**
KYTC/KIPDA ID:	CHAF IP20150178/Item 5-8102.3	Design:	$	80,000
Functional Class:	Urban Interstate Ramp	Right-of-Way:	$	0
2020 ADT:	2,200 vpd on ramp	Utilities:	$	0
2045 No-Build ADT:	2,200 vpd on ramp	Construction:	$	250,0000
2017-2019 Crashes:	30 NB within 200 ft of ramp terminus			
Bike/Ped Facilities:	N/A	**Total Cost:**	**$**	**330,000**

Project Concept:



◆ New Pavement

Concept R: Central Ave Extension	**Ultimate Term**	**Priority** Low

Project Description: **Work Type:** New Interchange

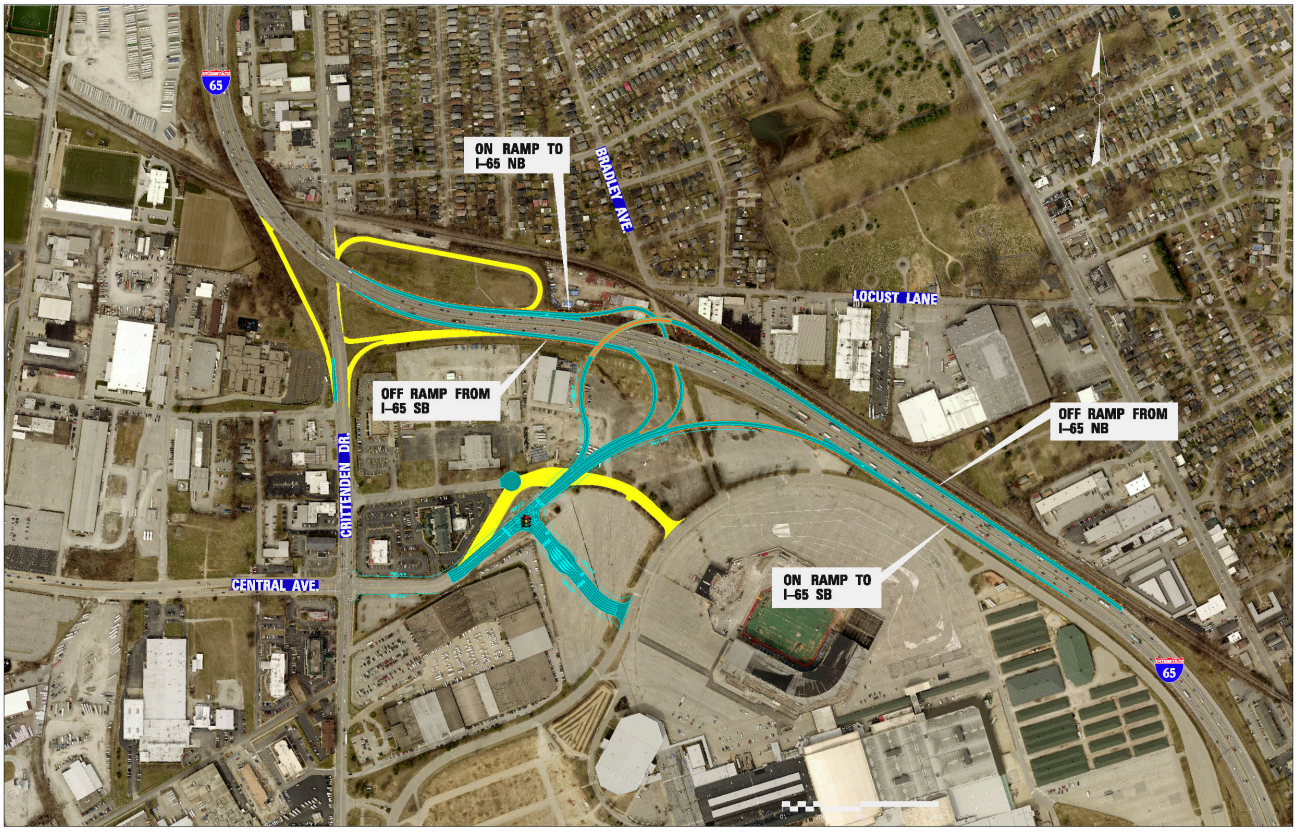
Extend Central Avenue to I-65 and construct a new interchange accommodating all movements; remove Crittenden Drive interchange. Any future design efforts should be coordinated with the Kentucky Exposition Center.

MP **N/A** to MP **N/A** Project Length: **2.39** MI

Identified Needs:	**Proposed Benefits:**
• Crittenden Drive Interchange located in curve with substandard geometric components	• Improved spacing between interchanges • Improved access to Expo Center

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**
KYTC/KIPDA ID:	N/A	Design:	$ 1,600,000
Functional Class:	Urban Minor Arterial (Central)	Right-of-Way:	$ 1,500,000
2020 ADT:	17,000 vpd (Central)	Utilities:	$ 0
2045 No-Build ADT:	14,900 vpd (Central)	Construction:	$ 16,000,000
2017-2019 Crashes:	N/A new alignment		
Bike/Ped Facilities:	N/A	**Total Cost:**	**$ 19,100,000**

Project Concept:



◆ New Pavement ◆ Remove Pavement ◆ On Structure

Concept S: Northbound Aux Lane	**Long Term**	**Priority** Low

Project Description: **Work Type:** Major Widening

Provide an auxiliary lane northbound between Crittenden Drive and University Boulevard. The northbound off-ramp to Eastern Parkway would be eliminated.

MP **132.4** to MP **133.0** Project Length: **0.64** MI

Identified Needs:	**Proposed Benefits:**
• Acceleration lane from Crittenden Dr. and deceleration lane to University Blvd. do not meet current criteria • Ramp spacing between Eastern Pkwy. and University Blvd. does not meet current criteria	• Increases acceleration length from Crittenden Dr. • Increases deceleration length to University Blvd. • Reduces conflict points

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	CHAF IP20150143	Design:	$	780,000
Functional Class:	Urban Interstate	Right-of-Way:	$	50,000
2020 ADT | % Trucks:	63,000 vpd northbound | 13%	Utilities:	$	0
2045 No-Build ADT:	65,000-66,000 vpd northbound	Construction:	$	7,800,000
2017-2019 Crashes:	142 northbound between ramps			
Bike/Ped Facilities:	N/A	**Total Cost:**	**$**	**8,630,000**

Project Concept:

New Pavement Remove Pavement On Structure

Concept T: Preston Collector-Distributor	**Ultimate Term**	**Priority** Low

Project Description: **Work Type:** New Interchange

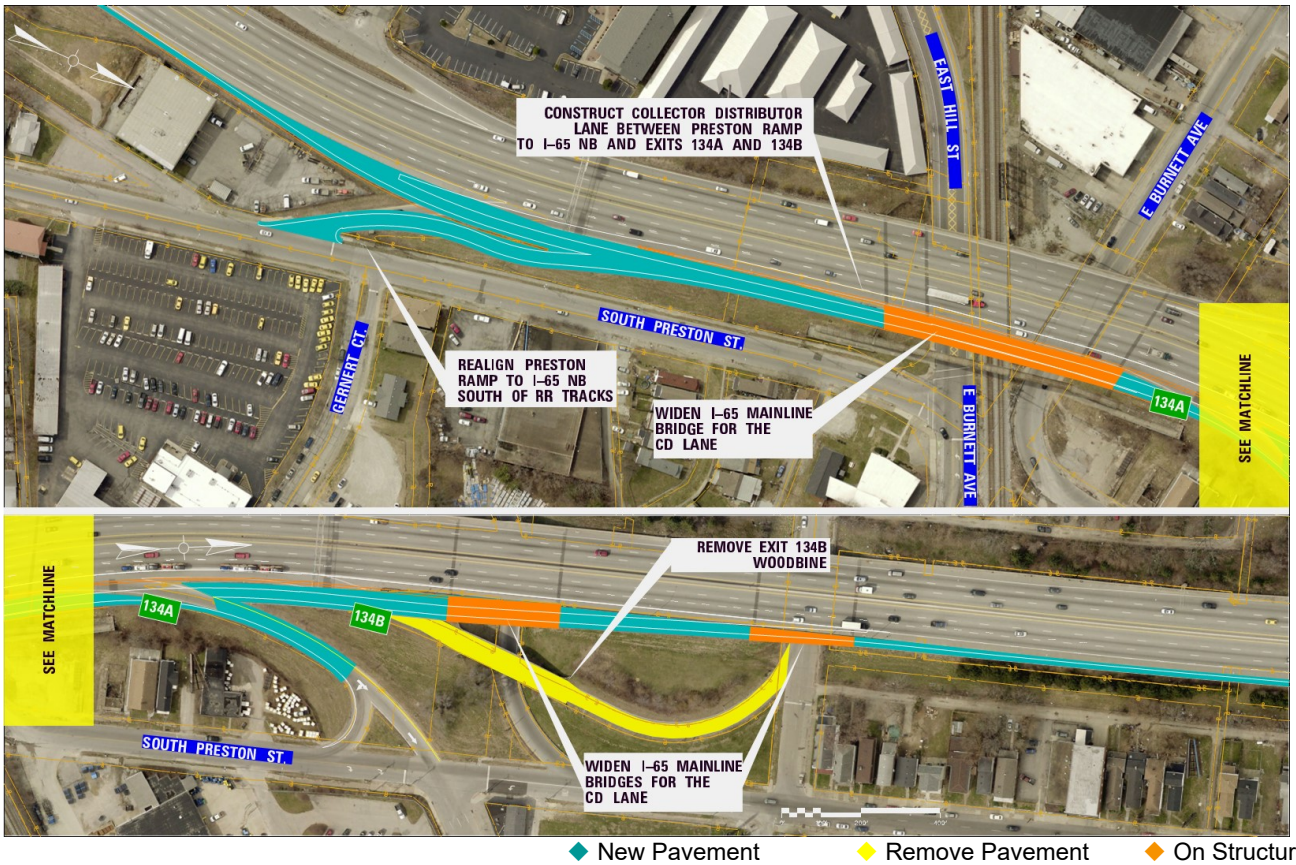
Add a northbound collector-distributor between Preston Street and the Jackson Street exit

MP **133.6** to MP **134.2** Project Length: **0.60** MI

Identified Needs:	**Proposed Benefits:**
• Preston is disconnected, running along 1,500 ft of I-65 to cross the railroad tracks • Highest traffic volumes in the study area • 18 public comments during Dec 2020 survey	• Improved traffic flow • Safer merge/diverge areas

Project Info:		**Project Phase Estimates:**	**(2021 Dollars)**	
KYTC/KIPDA ID:	N/A	Design:	$	1,000,000
Functional Class:	Urban Interstate	Right-of-Way:	$	0
2020 ADT | % Trucks:	74,400 vpd northbound | 14%	Utilities:	$	285,000
2045 No-Build ADT:	78,000 vpd northbound	Construction:	$	10,500,000
2017-2019 Crashes:	51 northbound between ramps			
Bike/Ped Facilities:	N/A	**Total Cost:**	**$**	**11,785,000**

Project Concept:



Concept W-a: Brook/Broadway Ramp	**Long Term**	**Priority** Low

Project Description: **Work Type:** Ramp Improvements

Widen northbound I-65 off-ramp to Brook Street/Broadway to accommodate two lanes. Access to the alley and Jacob Street is eliminated. Thru movements along Jacob Street eliminated. Pedestrians shifted further from ramp.

MP **135.060** to MP **135.200** Project Length: **0.14** MI

Identified Needs:

- Intersection 600 feet from ramp terminus, forcing vehicles to rapidly decelerate going downhill to complete left to Jacob
- Cross-ramp thru movement on Jacob discouraged with low median but not prevented
- Pedestrian crossing concerns
- Short merge length approaching Broadway

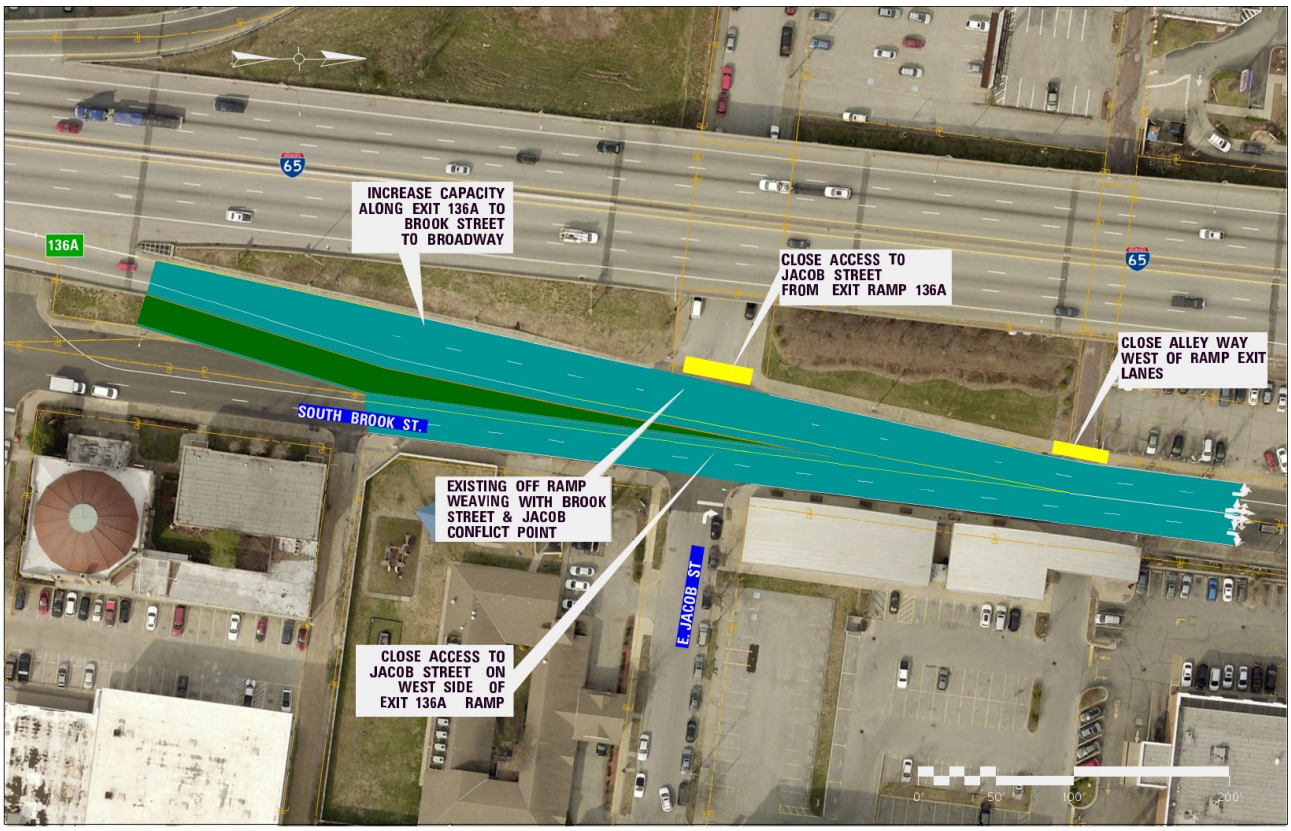
Proposed Benefits:

- Increases capacity
- Reduces conflict points and driver confusion
- Provides turn lane to decelerate for lefts onto Jacob
- Relocates pedestrian crossing

Project Info:	
KYTC/KIPDA ID:	#264
Functional Class:	Urban Interstate Ramp
2020 ADT:	9,300 vpd on ramp
2045 No-Build ADT:	11,700 vpd on ramp
2017-2019 Crashes:	14 ramp crashes
Bike/Ped Facilities:	N/A

Project Phase Estimates:	**(2021 Dollars)**	
Design:	$	100,000
Right-of-Way:	$	0
Utilities:	$	260,000
Construction:	$	850,000
Total Cost:	**$**	**1,210,000**

Project Concept:



New Pavement Remove Pavement

10.0 NEXT STEPS

Further funding will be necessary to advance an improvement concept to the design phase; no concepts presented herein have programmed funding at this time.

For larger scale recommended concepts, the next phase in the project development process is Phase I Preliminary Design, likely including environmental analyses to be eligible for federal funding. Additional traffic and safety analyses are likely warranted to demonstrate compliance with federal requirements for the interstate system; an Interchange Modification Report (IMR) demonstrates how proposed changes in access satisfy FHWA policies regarding safety and traffic flow.

Improvements should be coordinated with KIPDA to incorporate concepts into the MTP and TIP, demonstrating air quality compliance. Likewise, KYTC's STIP should be amended to reflect any future project development phases.

Short-term projects may be initiated through District 5's routine maintenance and traffic programs, through an upcoming project like the Item No. 5-20061 paving/bridge repairs, or become part of systematic specialty programs such as the Highway Safety Improvement Program (HSIP).

Coordination with local officials, key stakeholders, and the public will be critical considering the potential for impacts to the already congested corridor and adjacent neighborhoods.

11.0 ADDITIONAL INFORMATION

Any written requests for additional information regarding the study may be sent to:

Director of KYTC Division of Planning 200 Mero Street Frankfort, KY 40622 Phone: 502.564.7183	KIPDA Transportation Division 11520 Commonwealth Drive Louisville, KY 40299 Phone: 502.266.6084