FINAL REPORT

KY 8 Licking River Bridge Scoping Study
Campbell and Kenton Counties

Item No. 6-1086.00

Prepared for:

Kentucky Transportation Cabinet
Central Office, Division of Planning
Highway District 6, Covington

Prepared by:

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KYTC Item No. 6-1086.00

Executive Summary

The Kentucky Transportation Cabinet (KYTC) initiated the KY 8 Licking River Bridge Scoping Study to evaluate the need for and impacts of rehabilitating or replacing the KY 8 (4th Street) bridge over the Licking River. This study serves as the first step in establishing the purpose and goals of the project, identifying potential concerns, and evaluating preliminary alternatives.

KY 8 is an east-west state highway through northern Kentucky and serves as one of only two connectors between Covington and Newport over the Licking River. KY 8 provides access to Ohio via the Clay Wade Bailey Bridge (US 25), Roebling Bridge (KY 17), and Brent Spence Bridge (I-75) to the west and the Taylor Southgate Bridge (US 27) and Daniel Carter Beard Bridge (I-471) to the east. The current location of the bridge serves as an ideal site for connectivity through Newport and Covington. The study was performed with the use of Federal State Planning and Research (SPR) funds. Future phases of the project are not funded in the current biennium. The project has Federal Bridge Replacement (BRX) funds allocated for 2023 for design, right-of-way, utility relocation, and construction.

Purpose and Need

The purpose of the project is to provide a safe, modern, efficient, and multi-modal crossing of the Licking River within the existing corridor. The KY 8 Licking River Bridge, also known as the Veterans Memorial Bridge, was constructed in 1936 and carries about 17,500 vehicles per day with over 10 percent trucks. The steel truss bridge has sidewalks on both sides and is a heavily-used bicycle and pedestrian corridor as a large housing complex is located southeast of the bridge as well as the historic neighborhoods to the west in Covington.

At 80 years old, the bridge has exceeded its original design life. The KY 8 Licking River Bridge is classified as functionally obsolete (FO) due to the narrow shoulder widths (one-foot) which do not meet current design standards. The bridge was load rated by KYTC in May 2016. After this load rating, the bridge was posted for 17 tons indicating that the bridge is also structurally deficient (SD). The load posting indicated several elements of the bridge would require replacement and/or strengthening, including full replacement of the deck truss approach spans. As the condition of the Veterans Memorial Bridge continues to worsen over time, additional reductions in the load rating will be required to maintain safety.

Historically, the KY 8 Licking River Bridge and the approach roads have had a AAA truck weight classification for loads up to 80,000 pounds. Large trucks traveling between Covington and Newport relied on the bridge for passage. However, the recent load rating of 17 tons will force trucks to detour to the 12th Street Bridge (Licking Valley Girl Scout Bridge) one mile to the south.

Under current conditions, bicycles traveling between Covington and Newport are forced to ride in the roadway since they are prohibited by law from riding on the sidewalks. The narrow lanes

and minimal shoulders cause bicyclists to slow traffic over the bridge by blocking (impeding) a lane of travel. The addition of a shared-use facility or dedicated bicycle lanes would improve connectivity and safety for bicycles between Covington and Newport, better encourage and accommodate multimodal travel, and improve vehicular travel.

The KY 8 Licking River Bridge has narrow four-foot wide sidewalks for passage across the river. The American with Disabilities Act (ADA) requires walkways on pedestrian access routes that are less than five feet to have passing spaces at maximum intervals of 200 feet. A five-foot by five-foot passing space is required every 200 feet to provide an opportunity for wheelchairs to pass each other and provide maneuver run for a wheelchair to turn around. The existing bridge and its approaches do not accommodate adequate passing spaces.

Based on the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) pedestrian count, over 700 pedestrians cross the KY 8 Licking River Bridge every day. A majority of these pedestrians come from low income households who are less reliant on cars and much more reliant on walking and biking. These are daily users who need this point of connection to go to work and for their day-to-day living needs. The Riverfront Commons Project, a proposed riverfront bicycle and pedestrian trail along the Licking River, plans to connect to this bridge which will add additional recreational users to its already overcrowded sidewalks.

Alternatives Development

Over the course of the study, the project team held three meetings to coordinate on key issues. The project team consisted of representatives from KYTC Central Office Planning, KYTC Central Office Design, District 6 staff, Northern Kentucky Area Development District (NKADD), OKI, and the consultant. Within the project study area, several factors influenced the roadway alignment. In Kenton County, on the western side of the Licking River Bridge, there are two historic districts: the Ohio Riverside Historic District and the Licking Riverside Historic District. The boundaries of these historic districts can be seen in **Figure ES-1**. In Campbell County, on the eastern side of the bridge, KYTC District 6 is working to realign KY 9 through Newport (KYTC Item No. 6-8101). A five-legged roundabout is being constructed east of the Licking River Bridge at the relocated KY 8 intersection with KY 9. The project location can be seen in Figure ES-1.

A range of initial concepts were developed based on the existing conditions analysis (bridge characteristics, multimodal considerations, traffic analysis, crash analysis, and environmental and geotechnical overviews), previous studies, roadway alignment, and input received from the project team. All alternatives hold the existing curb line on the north side of the bridge and widen to the south. This will create the least amount of impacts to adjacent properties and the historic districts. Widening to the south will directly impact an existing rock wall and an adjacent parking lot. The parking lot is for the Workforce Development Cabinet's building which is currently vacant.

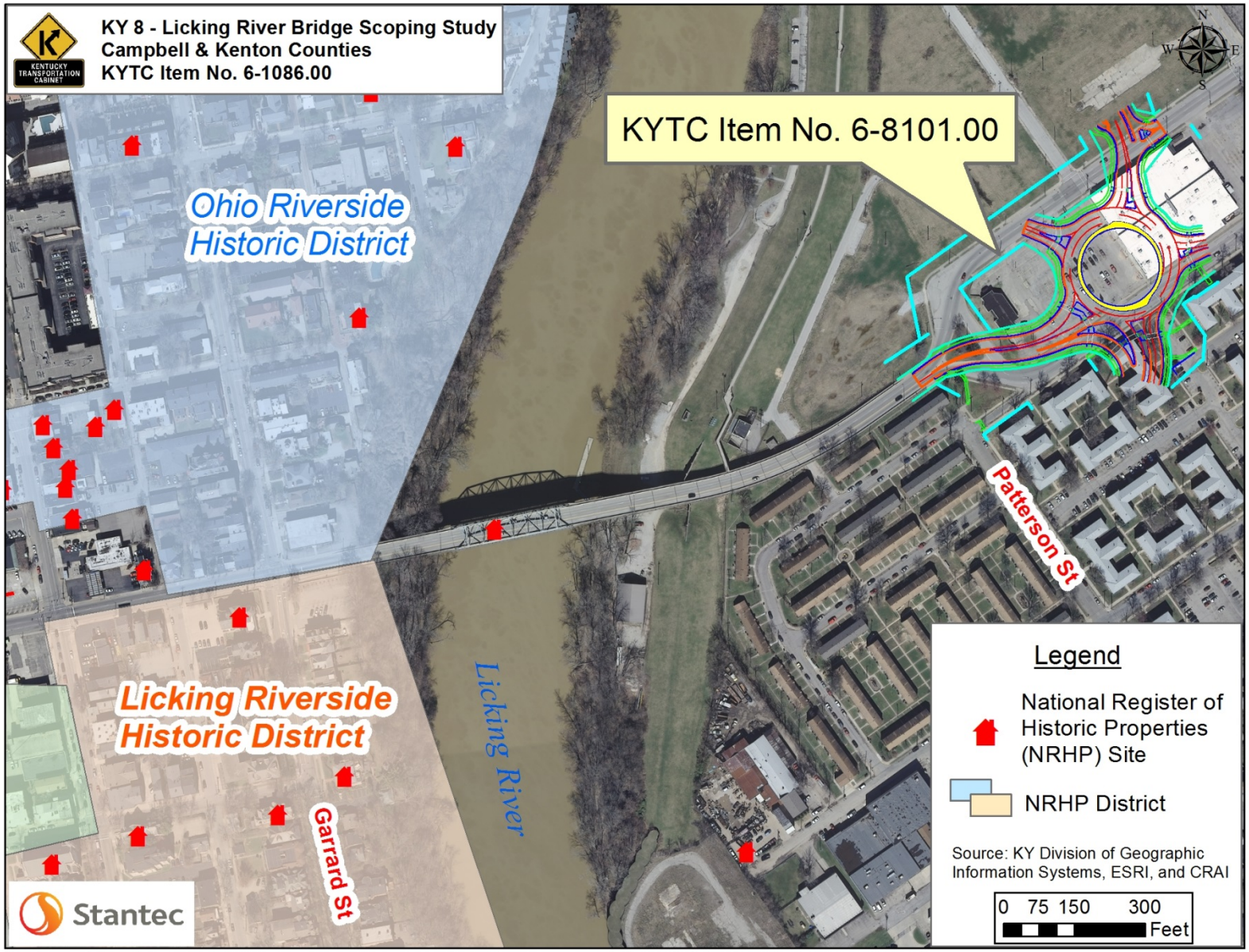

Figure ES-1: Roadway Alignment Considerations

In addition to the No-Build alternative and the Major Rehabilitation alternative, this study examined four initial concepts for bridge replacement: (1) a Truss Bridge, (2) a Plate Girder Vehicular Bridge and Signature Pedestrian Bridge, (3) a Stage-Constructed Plate Girder Bridge, and (4) a Signature Extradosed Bridge.

A new truss bridge would have a similar look to the existing bridge. The proposed bridge could maintain grades similar to the existing bridge and still meet United States Coast Guard (USCG) vertical clearance requirements.

The steel plate girder bridge concept provides the most straightforward and least expensive construction for the roadway structure, but would require an increase in the profile grade (approximately six feet) to maintain minimum USCG vertical clearance requirements. Stage-construction would maintain traffic and better provide for bicycle and pedestrian accommodations throughout construction. The staged construction would require a shift in alignment and additional widening into the Licking Riverside Historic District. This would also introduce a lane shift in the alignment of the KY 8 through lanes across the Garrard Street intersection. Eliminating the staged construction would remove the shift in alignment and reduce impacts to the historic district. As a result, the project team decided to move forward with the plate girder bridge alternative without the staged construction.

The project team also eliminated the signature pedestrian bridge option from further consideration. The community along Riverside Drive is adamantly against a bridge in their vicinity and a bridge closer to the mouth of the Licking River is problematic with barges, which makes a pedestrian bridge at this location cost prohibitive. As a result, the project team decided that pedestrians and bicycles would be accommodated on the new bridge.

The Extradosed Bridge is a hybrid of a cable stay and deck girder bridge. It has the highest cost of the concepts, but it would not require as high of a raised vertical grade as the plate girder bridge options. The project team eliminated the signature Extradosed Bridge from further consideration due to the high cost.

The project team considered several possible typical sections, understanding that the typical section will ultimately be decided during the design phase of the project. The potential for development in Covington and Newport, while not completely quantified in the OKI model, is very much expected. One example is the new Ovation development which is directly adjacent to the eastern side of the bridge. The development is a large, mixed-use site which will provide an estimated 1.1 million square feet of office space in five separate buildings. This development is not completely accounted for in the OKI model. Another significant redevelopment opportunity is the Internal Revenue Service (IRS) Service Center site located north of KY 8 just west of the study area. With its convenient location and availability of 23 acres, there has long been interest by private developers to redevelop this site and to allow expansion of the Northern Kentucky Convention Center which is currently landlocked by the IRS. Development of sites such as these can have a dramatic effect on travel demand through the KY 8 corridor.

Considering the potential for development and the desire of any newly constructed bridge to accommodate traffic demand over its entire design life (50 to 100 years), a four-lane bridge is recommended for consideration in future project phases. The recommended typical section includes four 11-foot lanes, a one-foot bicycle buffer (consisting of two four-inch wide white stripes with a four-inch gap), five-foot wide bike lanes, and 8.5-foot wide sidewalks. Southbank Partners, advocates for the Licking River Greenway that will create an urban trail along the banks of the Licking River through the cities of Covington, Taylor Mill, Newport and Wilder, support the proposed typical section for the bridge and approaches. The enhanced bicycle and pedestrian accommodations on a new Licking River Bridge would connect the Greenway trail segments across the Licking River, thus eliminating the need for constructing and maintaining a separate pedestrian-only river crossing.

The project team produced an evaluation matrix, shown in **Figure ES-2**, for the No-Build alternative, the Major Rehabilitation alternative, a Truss Bridge alternative, and a Steel Plate Girder Bridge alternative.

Recommendations

The project team recommended the steel truss alternative and the steel plate girder alternative move forward for consideration in future project phases. The major rehabilitation alternative was dismissed from further consideration because it does not satisfy the purpose and need of the project and its cost would likely grow significantly after additional structural studies are performed. The major rehabilitation alternative would increase the load carrying capacity of the bridge but the bridge would remain functionally obsolete with sidewalks that do not meet ADA requirements and shoulders that cause bicyclists to slow traffic over the bridge by blocking (impeding) a lane of travel.

The next phase for the project would be Phase 1 Design (Preliminary Engineering and Environmental Analysis) to further evaluate the two options recommended for advancement. Further funding will be necessary to advance this project to the design phase. Cost estimates for the two bridge replacement alternatives are shown **Table ES-1**. Regardless of which alternative is selected, a new truss bridge or a plate girder bridge, it will likely take a full construction season to build. A vehicular detour would be necessary during that time. Pedestrian and bicycle accommodations will also need to be considered.

Alternative	Design	Right-of-Way	Utilities	Construction	Total
TRUSS	$2,100,000	$920,000	$1,000,000	$20,800,000	$24,820,000
STEEL PLATE GIRDER	$1,700,000	$920,000	$1,000,000	$16,500,000	$20,120,000

Table ES-1: 2016 Cost Estimates

Alternative	Description	Representative Graphic	Satisfies Purpose and Need? (The purpose of this project is to provide a safe, modern, efficient, and multi-modal crossing of the Licking River within the existing corridor.)	Maintenance of Traffic Concerns	2016 Total Cost (All Phases)
NO-BUILD	Do nothing alternative.		No - does not improve efficiency, connectivity, or safety for any mode. The condition of the bridge and the recent reduction in load rating will result in on-going maintence costs. Trucks over 17 tons will have to use an alternate route.	N/A	$0
MAJOR REHABILITATION	Improvements to existing bridge to prolong structure life and increase load carrying capacity. Bridge was recently load rated for 17 tons.		No - would increases the load carrying capacity. Bridge would remain functionally obsolete with current (minimal) pedestrian accommodations and no dedicated bicycle accommodations.	Would likely require closure of the bridge for up to one construction season.	$5,700,000
STEEL TRUSS	Replace the existing bridge with a steel truss, similar in character to the existing bridge. Requires shifting the piers horizontally out of the river and minimal increase in roadway profile grade per U.S. Coast Guard requirements.		Yes - provides wide sidewalks and bicycle lanes as well as an additional travel lane for vehicles.	Would require closure of the bridge for one construction season.	$24,820,000
STEEL PLATE GIRDER	Replace the existing bridge with a steel plate girder bridge, similar in nature to the "Girl Scout Bridge" carrying 12th Street over the Licking River. Requires a significant increase in roadway profile (approximately 6').		Yes - provides wide sidewalks and bicycle lanes as well as an additional travel lane for vehicles.	Would require closure of the bridge for one construction season.	$20,120,000

Figure ES-2: Evaluation Matrix

A new truss bridge would have a similar look to the existing bridge, shown in **Figure ES-3**. The proposed bridge could maintain grades similar to the existing bridge and still meet USCG vertical clearance requirements. To meet USCG horizontal clearance requirements, the river piers will be placed on the banks thereby increasing the truss span.

Figure ES-3: Truss Alternative Layout

The steel plate girder bridge alternative, shown in **Figure ES-4**, provides the most straightforward and least expensive construction for the roadway structure, but would require an increase in the profile grade (approximately six feet) to maintain minimum USCG vertical clearance requirements.

Figure ES-4: Steel Plate Girder Alternative Layout

1.0 INTRODUCTION

The KY 8 Licking River Bridge Scoping Study, Item Number 6-1086.00, was initiated by the Kentucky Transportation Cabinet (KYTC) to evaluate the need for and impacts of rehabilitating or replacing the KY 8 (4th Street) Bridge over the Licking River. The Licking River Bridge, also known as the Veterans Memorial Bridge, was constructed in 1936 and carries about 17,500 vehicles per day (vpd) with over 10 percent trucks. The steel truss bridge has sidewalks on both sides and is a heavily-used bicycle and pedestrian corridor as a large housing complex is located southeast of the bridge as well as the historic neighborhoods to the west in Covington. The next nearest Licking River crossing is KY 1120 (12th Street) one mile to the south. The scoping study is needed to identify the feasibility of rehabilitating the existing bridge, explore possible bridge types should replacement be determined necessary, identify and assess likely project impacts, and better estimate project costs prior to the design phase for the project.

This planning study was performed with the use of Federal State Planning and Research (SPR) funds. Future phases of the project are not funded in the current biennium. As shown in **Table 1**, the project has Federal Bridge Replacement (BRX) funds allocated for 2023 for design, right-of-way, utility relocation, and construction.

KYTC Item No. 6-1086.00 Replace bridge over Licking River on West 4th Street (KY 8) in Covington/Newport at Kenton/Campbell County line.	Phase	Funding Code	Estimated Cost	Fiscal Year
	Design	BRX	$2,000,000	2023
	Right-of-way	BRX	$3,000,000	2023
	Utility Relocation	BRX	$2,000,000	2023
	Construction	BRX	$30,000,000	2023

Table 1: KYTC Item No. 6 -1086.00 Funding

1.1 STUDY AREA

The study area for the KY 8 Licking River Bridge Scoping Study is a 2,000-foot corridor centered on KY 8, shown in **Figure 1**. The project includes an examination of KY 8 in Kenton County from KY 17 (MP 7.321) to the Campbell County line (MP 7.662) and in Campbell County from the Kenton County line (MP 0.00) to US 27 (MP 0.543). KY 8 is an east-west state highway through northern Kentucky and serves as a connector between Covington and Newport over the Licking River. KY 8 provides access to Ohio via the Clay Wade Bailey Bridge (US 25), Roebling Bridge (KY 17), and Brent Spence Bridge (I-75) to the west and the Taylor Southgate Bridge (US 27) and Daniel Carter Beard Bridge (I-471) to the east.

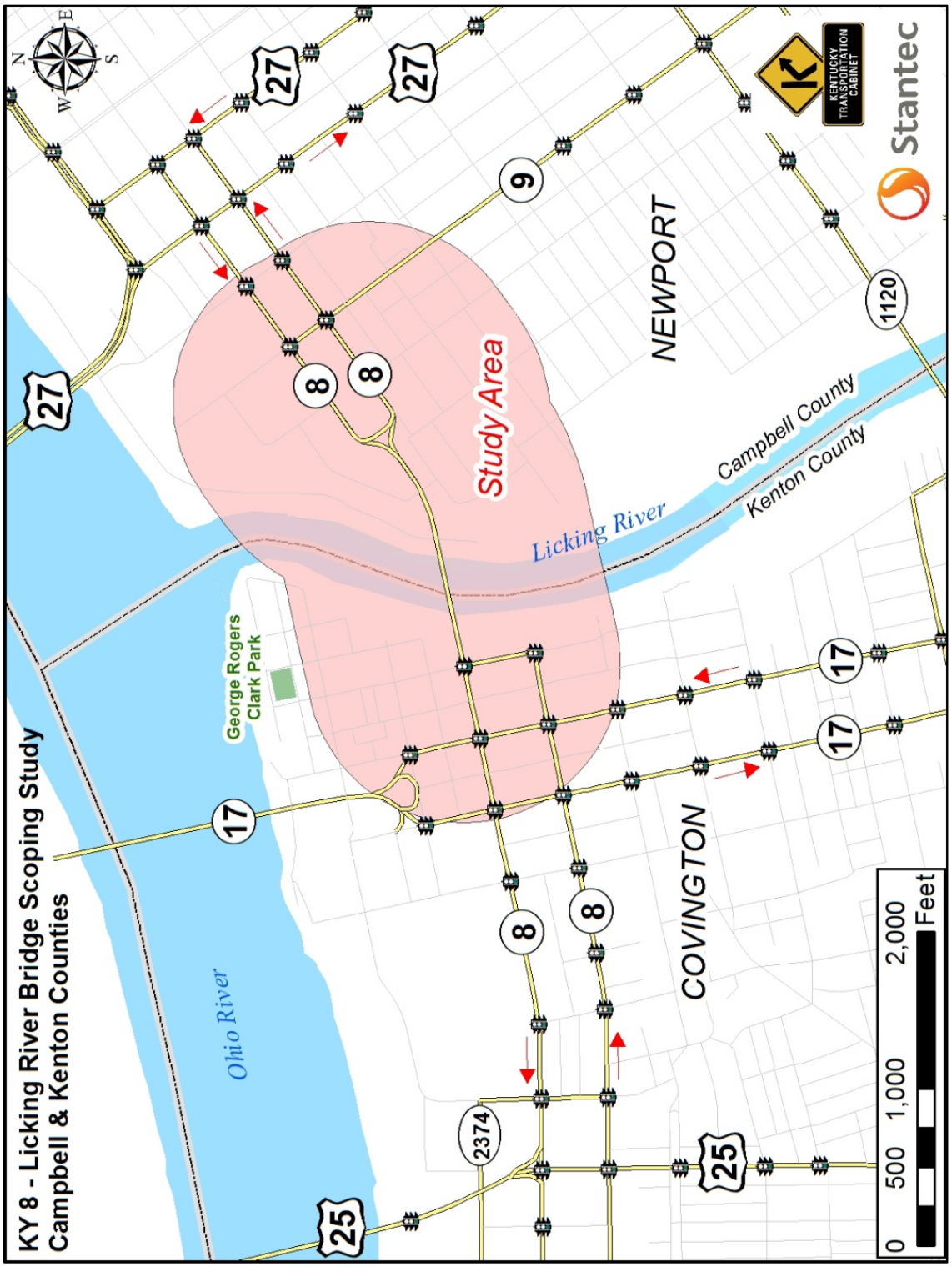

Figure 1: Study Area

1.2 PREVIOUS STUDIES

The area between Covington and Newport has several previous and ongoing studies and projects. These projects have the potential to affect the area surrounding the KY 8 Licking River Bridge. The five projects with the potential to affect the study area are:

- The Ovation – Riverfront Development[1], located along the Ohio River northeast of the bridge in Newport, is a large, mixed-use site proposed by Corporex and has been in development stages since the early 2000's. Ovation will provide an estimated 1.1 million square feet of office space in five separate buildings along with 5,000 new jobs. An Economic Impact Study details the expected $42.4 billion of economic activity over 30 years. The proposed site is located on the banks of the Licking River and Ohio River in Newport, Kentucky. The site would be directly adjacent to the eastern side of the Licking River Bridge.

- KYTC District 6 is working to realign KY 9 along the Licking River to meet KY 8 in Newport, Kentucky (KYTC Item No. 6-8101). A five-legged roundabout is proposed east of the Licking River Bridge at the relocated KY 8 intersection with KY 9. The road expansion will have a dramatic impact on the redevelopment of the area and future land uses along the Licking River. This project will improve access and open opportunities for bicycle and pedestrian trails. The realignment is located on the eastern side of the KY 8 Licking River Bridge. Construction is scheduled to begin in 2017.

- The Riverfront Commons[2] project is a proposed continuous riverfront corridor that provides riverbank stabilization and an 11.5-mile bicycle and pedestrian trail that runs along the Ohio River between Ludlow and Ft. Thomas. The planned path will be 15 to 20 feet wide and will accommodate bikers and walkers. The preferred alternative for crossing the Licking River is to connect to the bicycle and pedestrian facilities on the new KY 8 Licking River Bridge. Southbank Partners, advocates for the Riverfront Commons project would like enhanced bicycle and pedestrian accommodations on a new Licking River Bridge, thus eliminating the need for constructing and maintaining a separate pedestrian-only river crossing. The Riverfront Commons Project is not pursuing a separate pedestrian bridge because the community along Riverside Drive is adamantly against a bridge in their vicinity and a bridge closer to the mouth of the Licking River is problematic with barges, which makes it cost prohibitive.

- The Central Area Loop Study[3] was commissioned by the OKI in 1999, and was directed by the Central Area Loop Study Advisory Committee. The scope of the study included three distinct elements: the analysis of a loop circulator system between Cincinnati,

[1] http://www.newportriverfront.com/

[2] http://www.southbankpartners.com/Portals/southbankpartners/Documents/Projects/Riverfront%20Commons%20Brochure.pdf

[3] http://www.oki.org/studies-plans/central-area-loop-study/

Covington, and Newport, the evaluation of traffic congestion on 4th and 5th Streets in Newport and Covington, and determination of the feasibility of constructing a light rail link to Newport from the proposed I-71 Corridor Light Rail Transit (LRT) line. Several problems were identified by the study, including the difficulty to identify and negotiate the bridge connections across the river, especially for visitors not familiar with the area. Another problem was how the transportation system that links the central riverfront areas of Cincinnati, Covington, and Newport has reached its maturity and how the system tends to break down during special events like Bengals and Reds games. Lastly, the study found a shortage of parking in the Cincinnati central business district and said that if the cities were linked more efficiently, parking in Newport and Covington could be utilized. The study area for the Loop Study directly coincides with the study area for the KY 8 Licking River Bridge Scoping Study in the Covington and Newport areas.

- The Licking River Greenway Plan[4] proposes bicycle and pedestrian trails, creating new river access points, and enhancing habitat along the banks of the Licking River, while making connections with parks, schools, and other existing facilities in adjacent neighborhoods. The project will create a shared-use path along the banks of the Licking River through the cities of Covington, Taylor Mill, Newport and Wilder. The proposed Greenway crosses the Licking River at the KY 8 bridge and the 12th Street bridge. The 12th Street bridge has pedestrian and bicycle accommodations. It is important for the Greenway that the redesigned KY 8 bridge also accommodate walkers and cyclists.

2.0 PURPOSE AND NEED STATEMENT

As a result of the existing conditions analysis, project team input and design considerations, a purpose and need statement for this study was developed to be used during future project development efforts, including design and environmental activities. The purpose and need statement establishes why KYTC is proposing to advance a transportation improvement and drives the process for improvements, alternative consideration, analysis, and selection.

> *The KY 8 (4th Street) Bridge over the Licking River was constructed in 1936.* ***The purpose of this project is to provide a safe, modern, efficient, and multi-modal crossing of the Licking River within the existing corridor.***

The safety of vehicles, bicycles, and pedestrians is the primary concern on the KY 8 Licking River Bridge. The following needs were identified over the course of the study.

2.1 PROJECT NEEDS

The KY 8 Licking River Bridge is classified as functionally obsolete (FO) due to the narrow shoulder widths (one-foot) which do not meet current design standards. The bridge was load rated by KYTC Central Office staff in May 2016. Subsequent to this load rating, the bridge was posted for

[4] http://www.lickingrivertrail.org/master-plan/

17 tons indicating that the bridge is also structurally deficient (SD). The load posting of the bridge indicated several elements of the bridge that would require replacement and/or strengthening, including full replacement of the deck truss approach spans. Other deficiencies on the existing bridge include:

- General failure of the protective paint coating system used to protect the steel spans;
- Various degrees of corrosion and section loss in steel truss members and connections;
- Expansion joint failures; worn deck overlays; heaved and misaligned sidewalks; and
- Spalling and delamination of concrete with exposed and rusted reinforcing steel in reinforced concrete deck girders and pier caps.

At 80 years old, the bridge has exceeded its original design life. As the condition of the KY 8 Licking River Bridge continues to worsen over time, additional reductions in the load rating will be required to maintain safety.

KY 8 is an east-west state highway through northern Kentucky and serves as one of only two connectors between Covington and Newport over the Licking River. KY 8 provides access to Ohio via the Clay Wade Bailey Bridge (US 25), Roebling Bridge (KY 17), and Brent Spence Bridge (I-75) to the west and the Taylor Southgate Bridge (US 27) and Daniel Carter Beard Bridge (I-471) to the east. The current location of the bridge serves as an ideal site for connectivity through Newport and Covington.

Historically, the KY 8 Licking River Bridge and the approach roads have had a AAA truck weight classification for loads up to 80,000 pounds. Large trucks traveling between Covington and Newport relied on the bridge for passage. However, the recent load rating of 17 tons will force the trucks to detour to the 12th Street Bridge (Licking Valley Girl Scout Bridge) one mile to the south.

The most common type of transit bus, the two-axle 40-foot model, has a maximum capacity ranging from 61 to 92 passengers and a range of fully-loaded weights between approximately 30,000 and 44,000 pounds[5]. The 17-ton load rating severely restricts the transit opportunities that can use the bridge.

The KY 8 Licking River Bridge provides narrow four-foot wide sidewalks for passage across the river. The Americans with Disabilities Act (ADA) require walkways on pedestrian access routes that are less than five feet to have passing spaces at maximum intervals of 200 feet. A five-foot by five-foot passing space is required to provide an opportunity for wheelchairs to pass each other and provide maneuver run for a wheelchair to turn around. The existing bridge and its approaches do not accommodate adequate passing spaces.

[5] https://www.apta.com/resources/reportsandpublications/Documents/An-Analysis-of-Transit-Bus-Axle-Weight-Issues-TCRP-J11-T20.pdf

Based on the OKI pedestrian count, over 700 pedestrians cross the KY 8 Licking River Bridge each day. A majority of these pedestrians come from low income households who are less reliant on cars and much more reliant on walking and biking. These are daily users who need this point of connection to go to work and for their day-to-day living needs. The Riverfront Commons Project, a proposed riverfront bicycle and pedestrian trail along the Licking River, preferred alternative connects to this bridge, which will add additional recreational users to its already overcrowded sidewalks. Under current conditions, bicycles traveling between Covington and Newport are forced to ride in the roadway as they are prohibited from riding on the sidewalks. The narrow lanes and minimal shoulders cause bicyclists to slow traffic over the bridge by blocking (impeding) a lane of travel. The addition of a shared-use facility or dedicated bicycle lanes would improve connectivity and safety for bicycles between Covington and Newport and better encourage and accommodate multimodal travel.

3.0 EXISTING CONDITIONS

Conditions of the study area's existing transportation network are examined in the following section. The information compiled includes roadway facilities and geometrics, bridge geometrics and deficiencies, traffic volumes and analysis, and a crash history within the study area. Data for this section were collected from the Kentucky Transportation Cabinet's (KYTC) Highway Information System (HIS) database, aerial photography, KYTC bridge inspection reports, bridge repair layout structural drawings, bridge load rating report, and field reviews.

3.1 ROADWAY SYSTEM

Functional classification is the grouping of roads, streets, and highways into integrated systems ranked by the level of mobility for through movements and access to adjoining land. This grouping acknowledges that roads serve multiple functions and it provides a basis for comparing roads. Functional classification can be used for, but is not limited to, the following purposes:

- Provide a framework for highways serving mobility and connecting regions and cities within a state.
- Provide a basis for development of minimum design standards according to function.
- Provide a basis for evaluating present and future needs.
- Provide a basis for allocation of limited financial resources.

Figure 2 shows the functional classification of roadways within the study area. KY 8 in the study area is an Urban Principal Arterial.

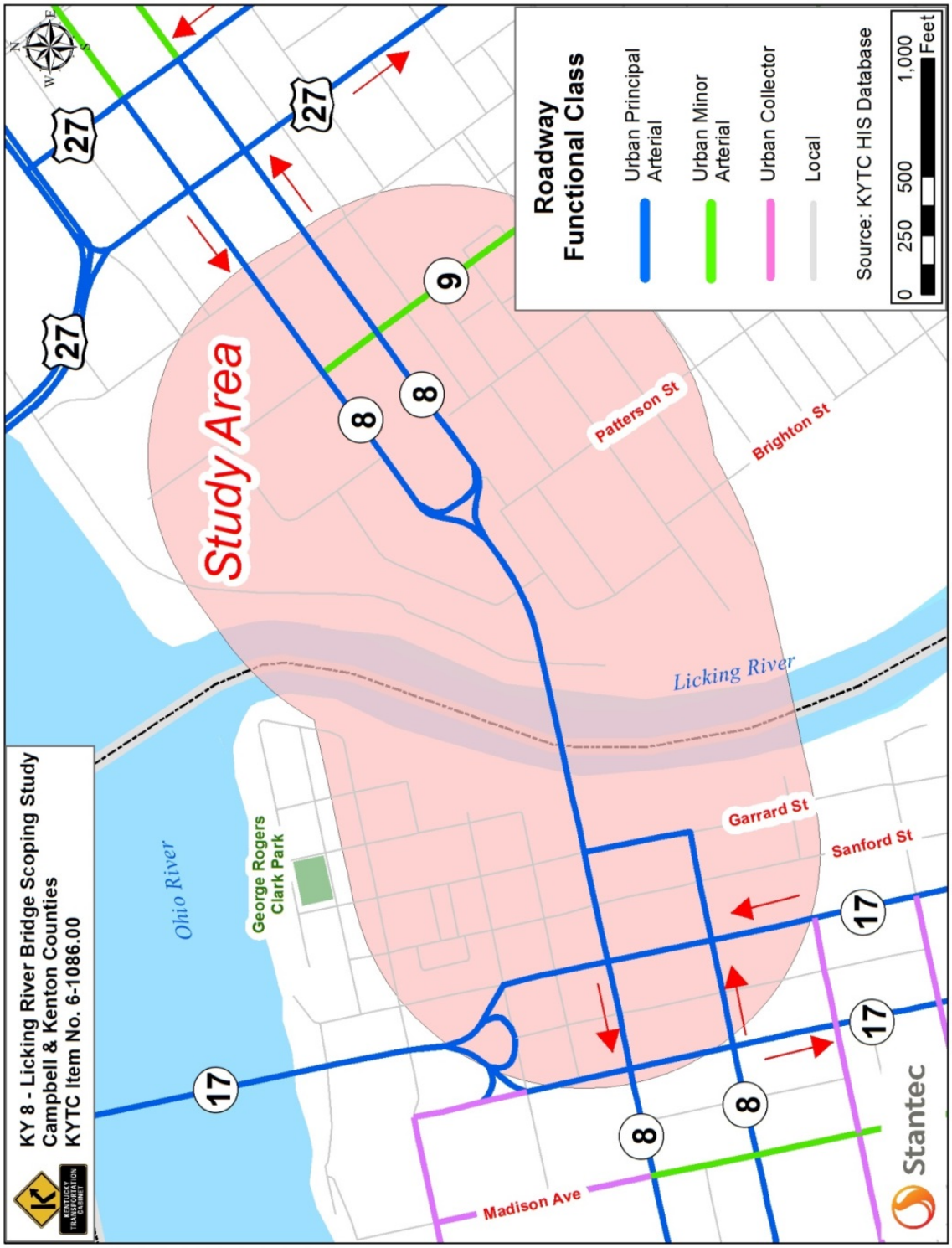

Figure 2: Functional Classification

3.2 ROADWAY GEOMETRIC CHARACTERISTICS

KYTC's Highway Information System database was used to compile the existing roadway characteristics of KY 8 in the study area. **Figure 3** and **Figure 4** show the lane and shoulder widths of the existing roadways. **Figure 5** shows the posted speed limits.

KY 8 comprises a one-way couplet on each side of the river (4th Street and 5th Street) with a 30 mile per hour (MPH) posted speed limit. The bridge over the Licking River is a steel truss with three 11-foot wide lanes, with two lanes in the westbound direction and a single lane in the eastbound direction. There are four-foot, one-inch wide sidewalks on the outside of the bridge.

Figure 6 presents a map of the designated truck routes in the study area. It should be noted that the Veterans Memorial Bridge is neither a Federal nor a State-designated truck route. **Figure 7** presents a map of the truck weight classifications of the roadways included in the study area. Even though the KY 8 Bridge has a AAA truck weight classification (80,000 lbs.), in May 2016, it was load rated to 17 tons.

3.3 BRIDGE GEOMETRICS

Data for the bridge geometrics and deficiencies came primarily from the following sources and are included in **Appendix A**:

- KYTC Bridge Inspection Reports;
- Original 1934 General Layout structural drawings;
- Bridge Repair Layout structural drawings (1982); and
- Load rating calculations (May 2016) provided by KYTC Bridge Maintenance Division.

The Veterans Memorial Bridge was opened to traffic in 1936. It crosses the river at Licking River channel mile 0.4 from the confluence of the Licking River with the Ohio River.

The original construction drawings show the overall bridge length to be 1,002'–1 7⁄16". The west/Covington approach is 225'–3 15⁄16" long, the main span over the Licking River is 251'–1" long and the east/Newport approach is 525'–8 1⁄2" long. The west/Covington approach consists of two reinforced concrete deck girder (RCDG) spans and a single steel deck truss span. The main span is a simple span through truss with 18'-0" vertical clearance from roadway to sway frame members. The east/Newport approach consists of a single deck truss span and nine RCDG spans. The deck is 36 feet curb-to-curb with three traffic lanes (two from Newport to Covington; one from Covington to Newport). The KY 8 bridge geometrics are shown on **Figure 8**.

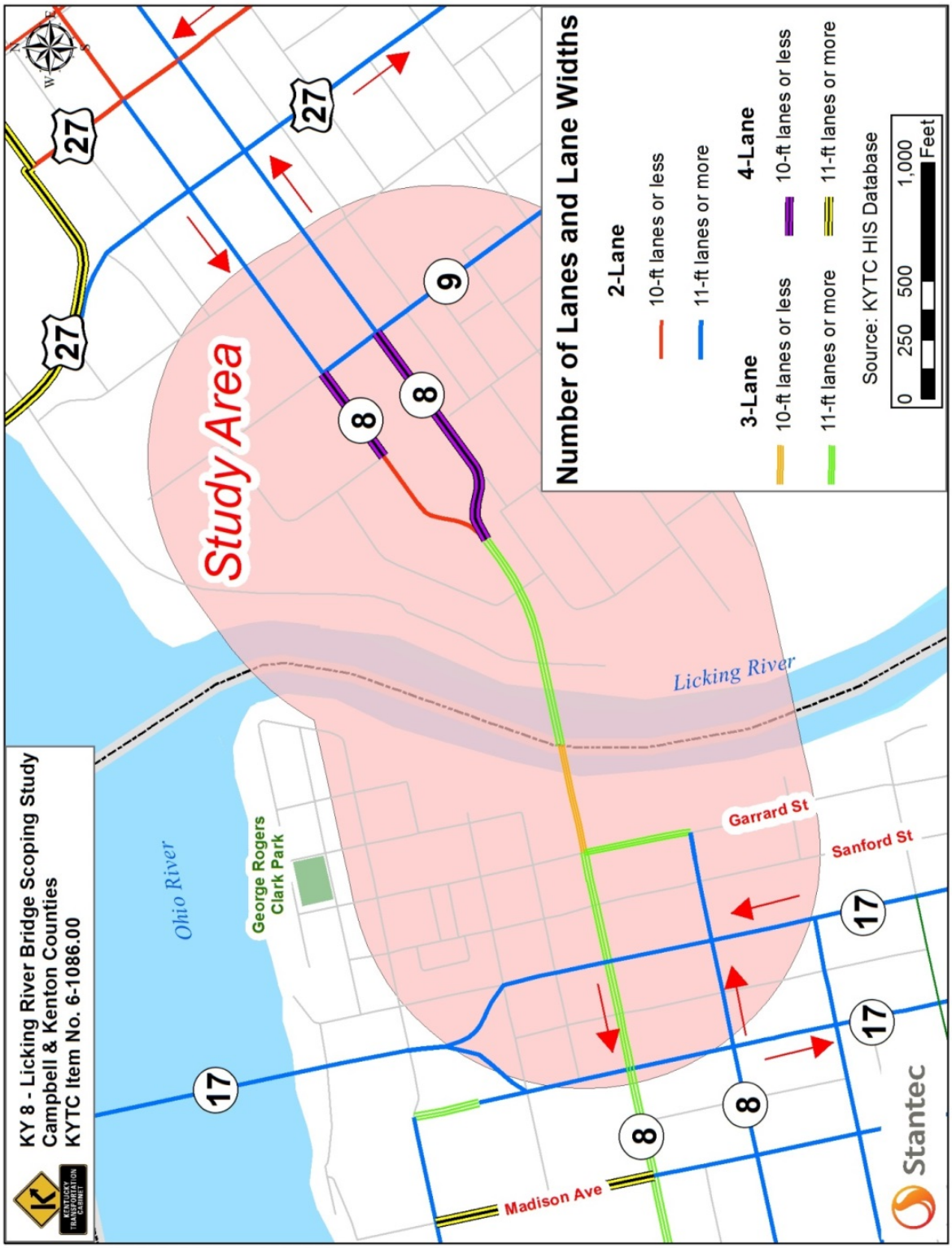

Figure 3: Lane Widths

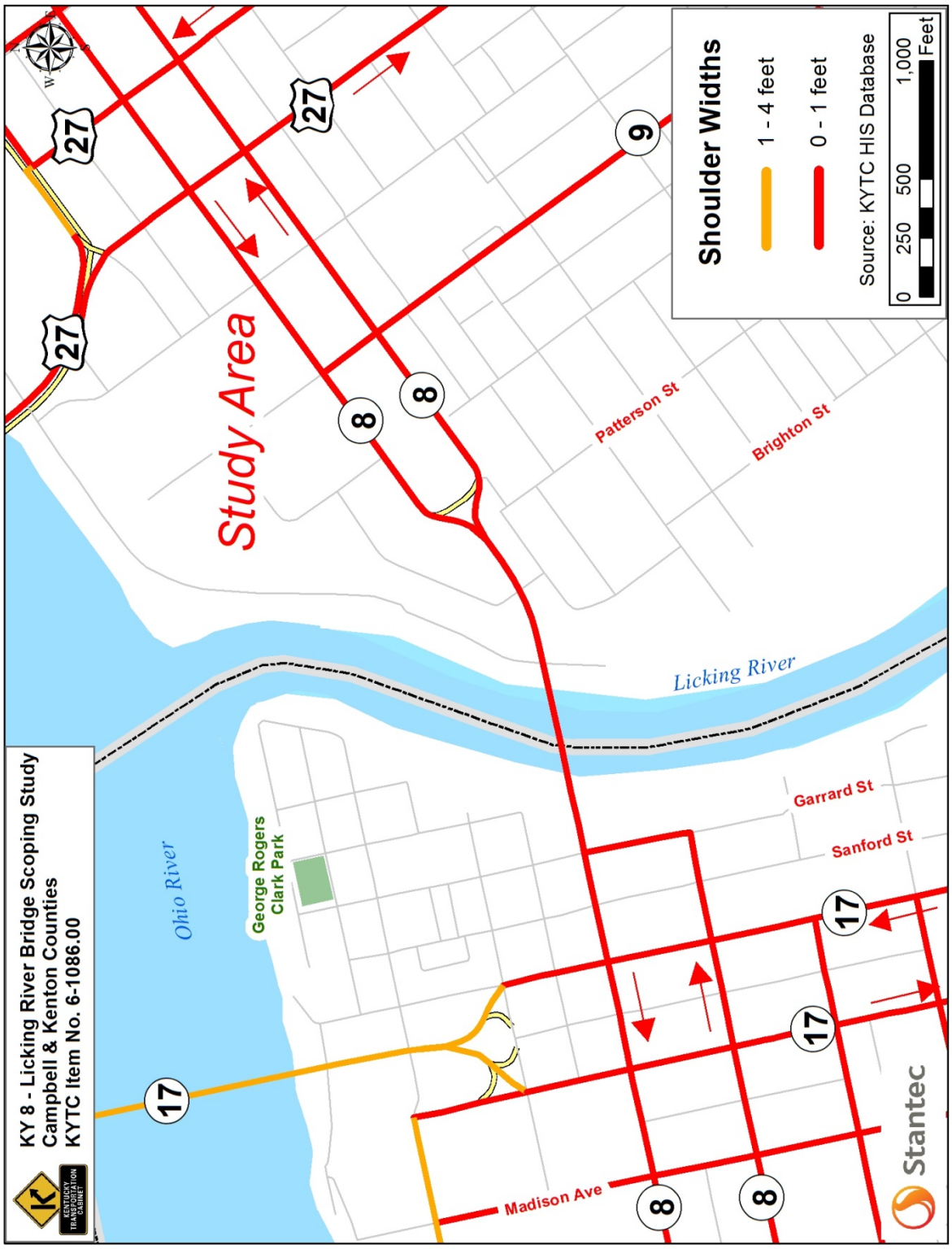

Figure 4: Shoulder Widths

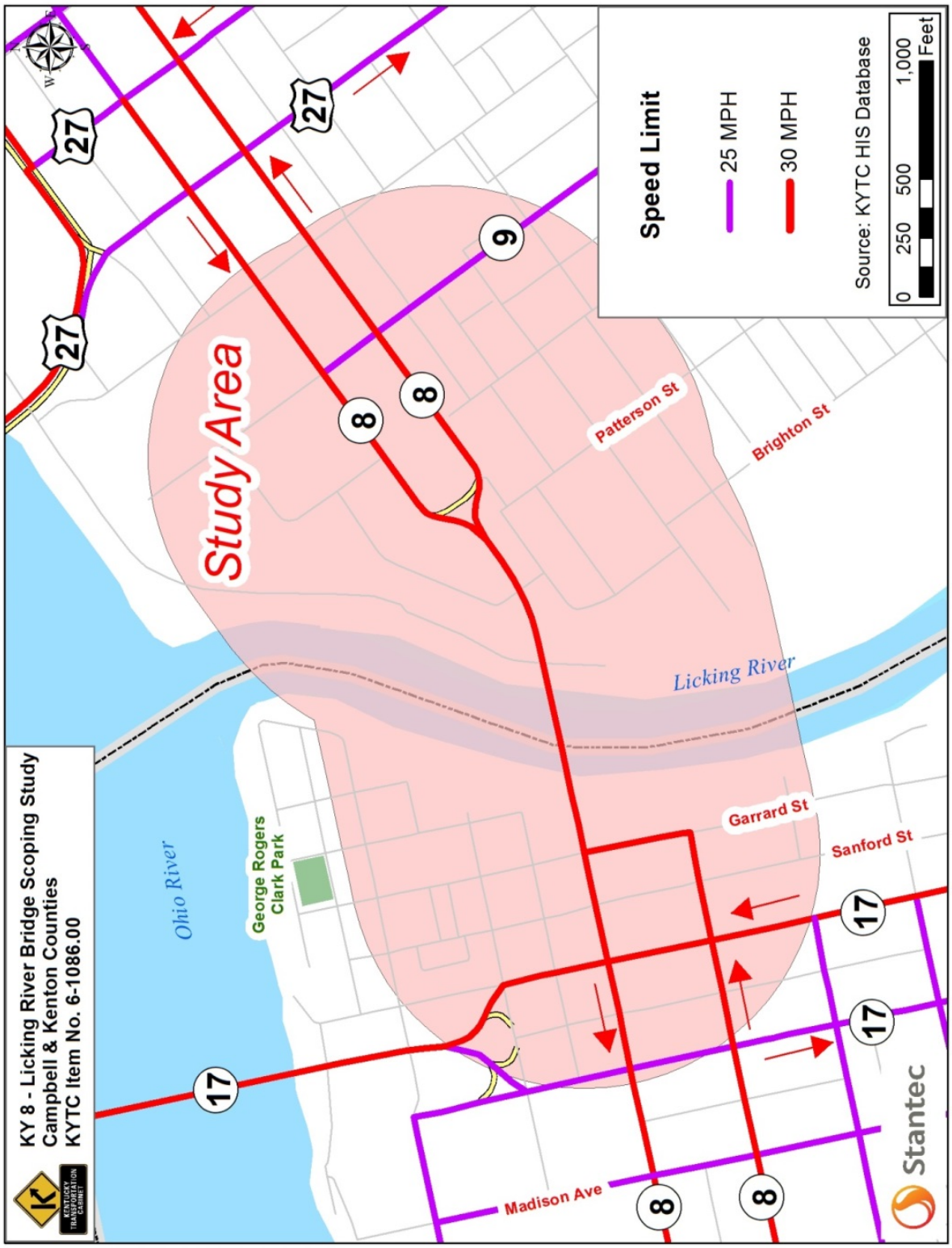

Figure 5: Speed Limits

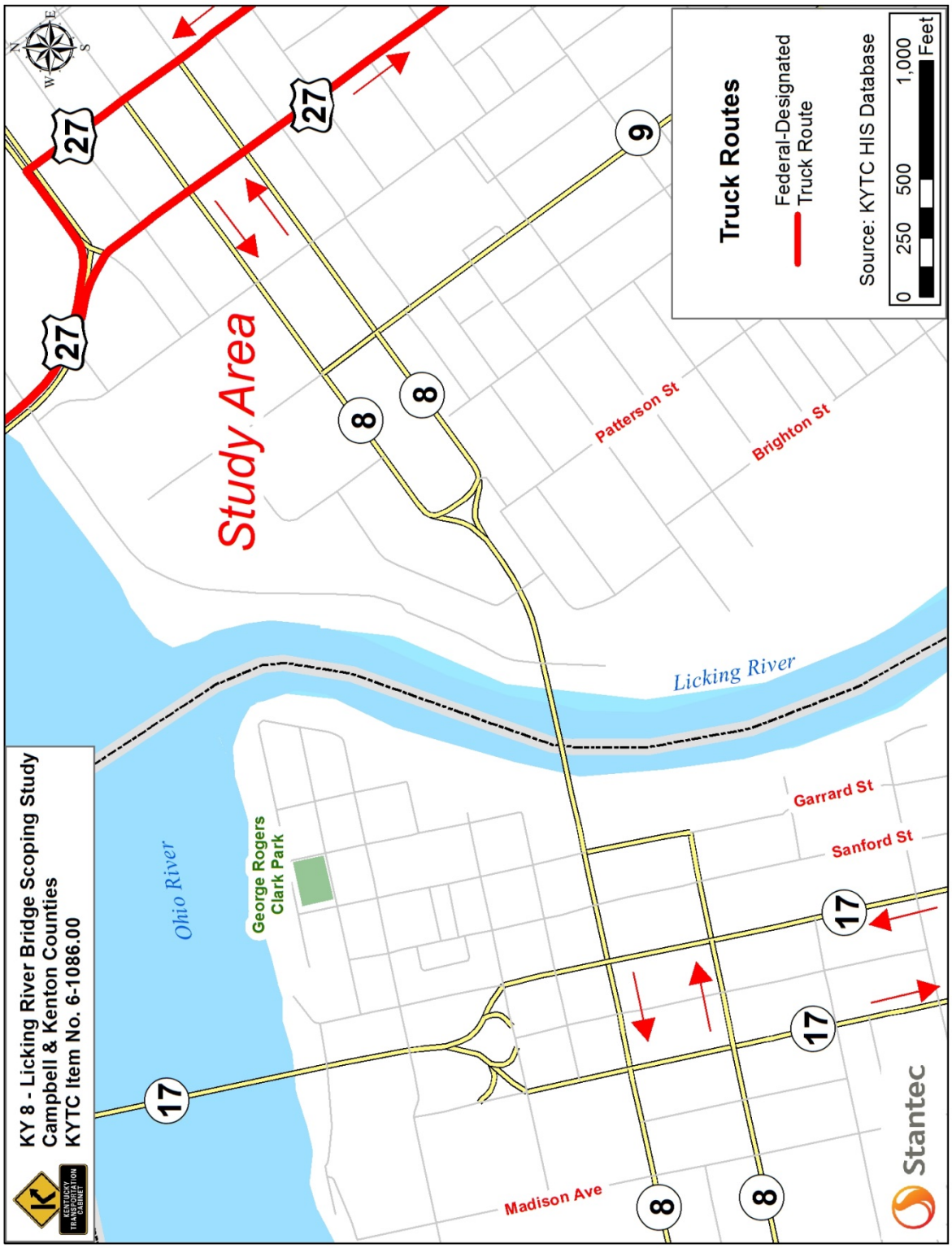

Figure 6: Designated Truck Routes

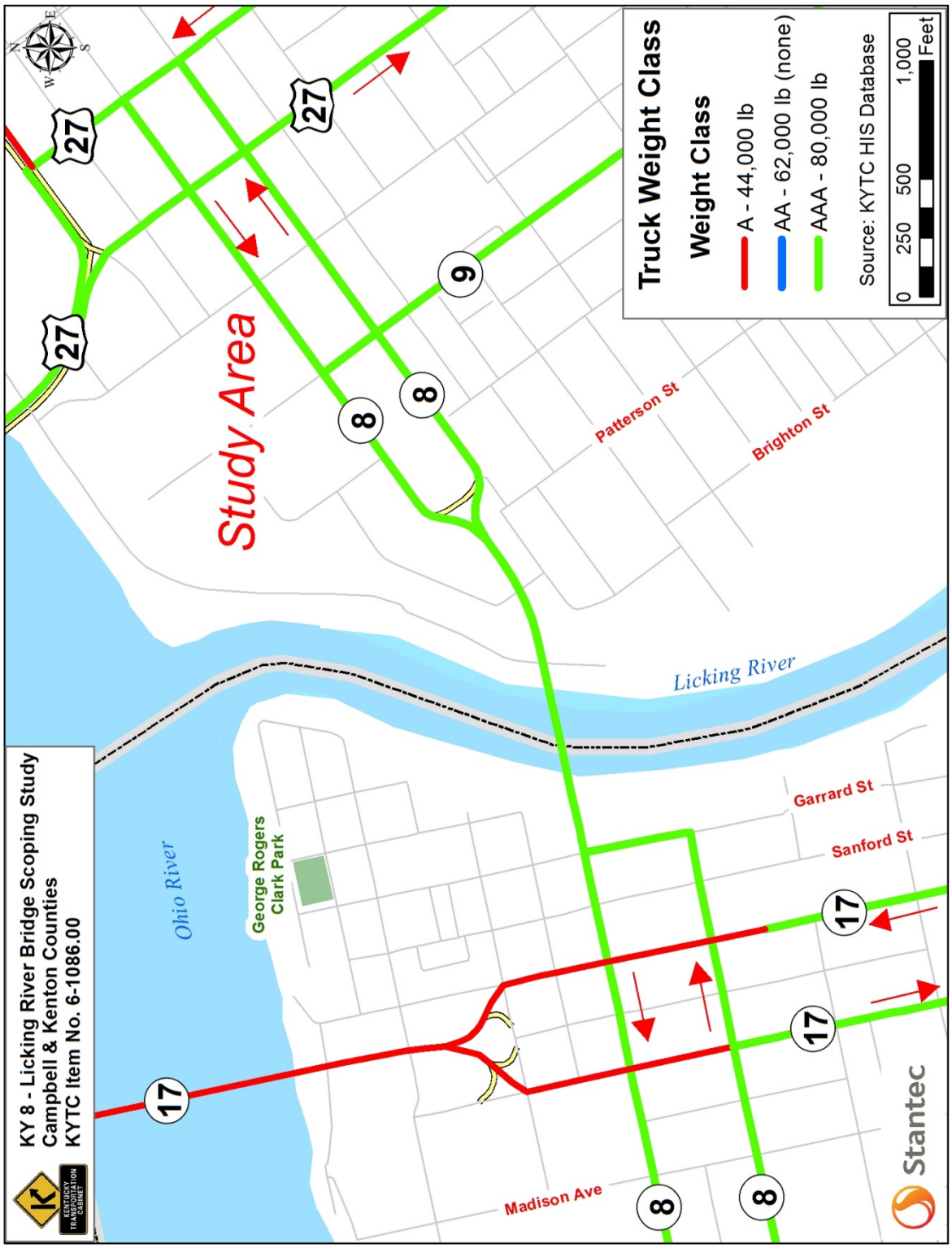

Figure 7: Weight Classifications

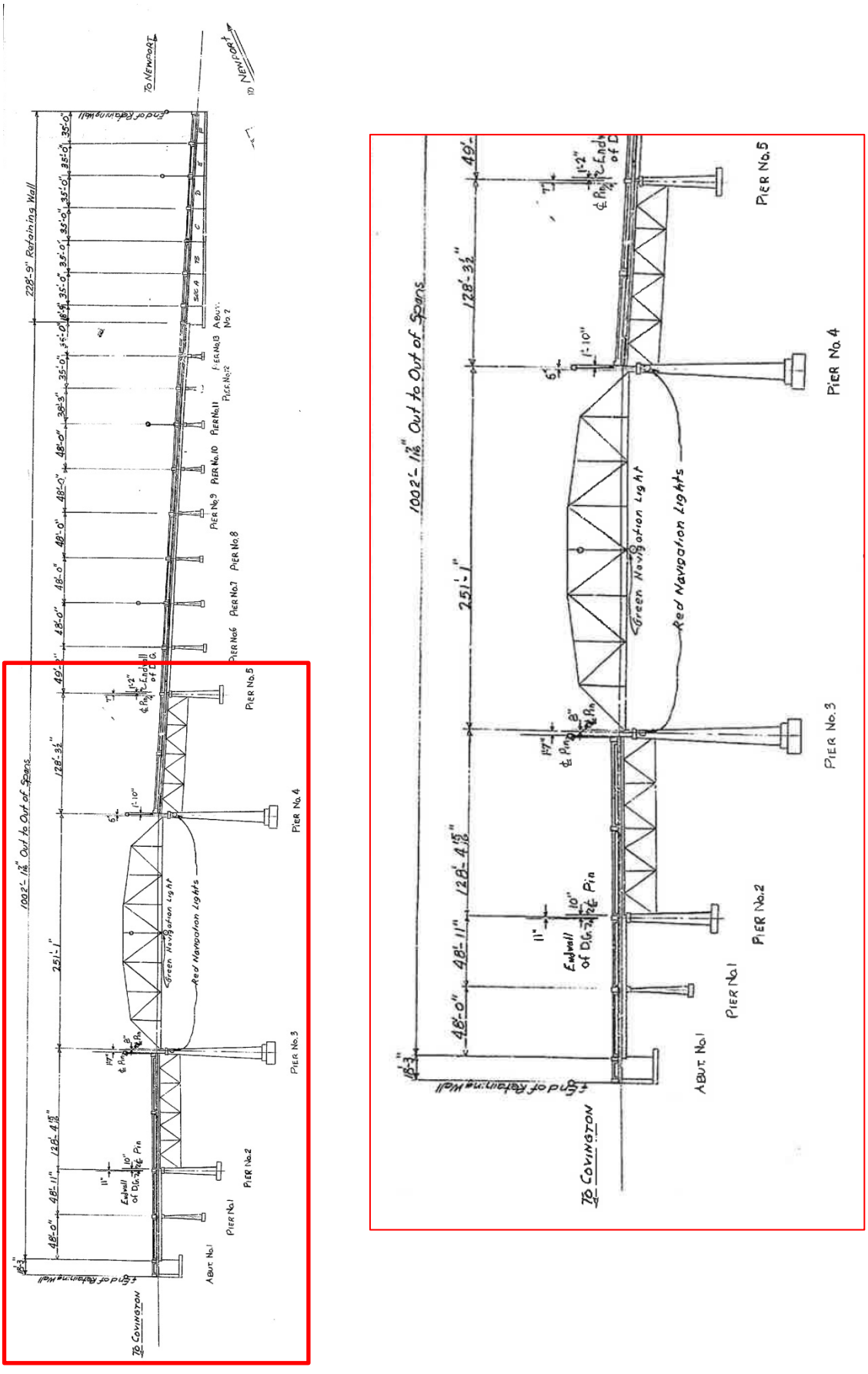

Figure 8: Existing Bridge Geometrics

3.3.1 Navigation

Chart 115A of the Ohio River Navigation Charts produced by the US Army Corps of Engineers, Louisville District, provides river information and is included in **Appendix A**. Normal pool for the Licking River at the bridge is at Elevation 455 feet. Low steel elevation for the bridge is Elevation 519.25 feet, providing a vertical clearance at normal pool stage of 64.25 feet. The horizontal navigation clearance between the piers is 240 feet.

3.3.2 1982 Bridge Retrofit

In 1982, a retrofit of the bridge was performed, designed by the then Kentucky Bureau of Highways. The retrofit included:

- cleaning and painting all existing steel;
- structural steel repairs;
- pier cap repairs;
- application of masonry coating to concrete spans in east/Newport approach;
- replacement and widening of the reinforced concrete bridge deck including new traffic barriers, sidewalks moved further outboard, and new support brackets to support the sidewalks;
- modifications to the abutments and retaining walls; and
- new expansion joints, drains, navigation lighting, and bridge lighting.

3.3.3 Bridge Loading

An H-20 loading is represented by a two-axle single unit truck weighing 20 tons (40,000 pounds) with four tons (8,000 pounds) on its steering axle and 16 tons (32,000 pounds) on its drive axle, shown in **Figure 9**. An HS-20 loading is represented by a three-axle semitrailer combination weighing 36 tons (72,000 pounds) with four tons (8,000 pounds) on its steering axle and 16 tons (32,000 pounds) on its drive axle and 16 tons (32,000 pounds) on the semitrailer axle. The "20" in HS-20 stands for 20 tons (four tons on the steering axle and 16 tons on the drive axle). The "S" stands for semitrailer combination which adds in the additional 16 tons for the third axle to give a total of 36 tons or 72,000 pounds.[6]

The Veterans Memorial Bridge inventory load rating is HS-16 based on the deck truss spans. As a matter of comparison, the corresponding design load used by KYTC before switching to AASHTO mandated Load and Resistance Factor Design (LRFD) design was HS-25 (56 percent greater

[6] http://www.fhwa.dot.gov/reports/tswstudy/Vol3-Chapter6.pdf

than the current load rating). The original design load for the bridge was very close to what became the AASHTO H-20.

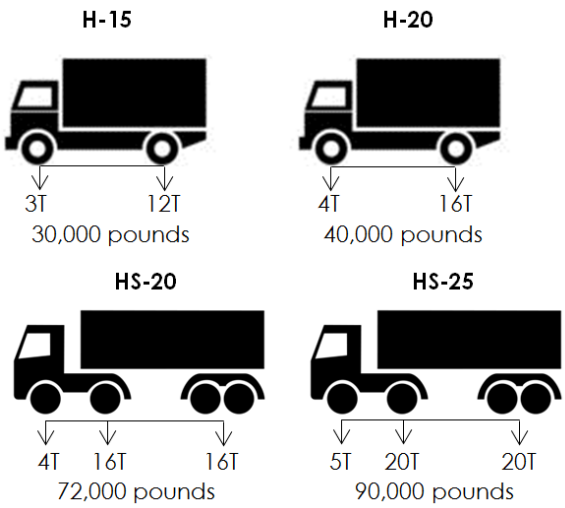

Figure 9: AASHTO Historical Design Trucks

3.3.4 Bridge Inspections

The most recent fracture critical Structure Inventory and Appraisal (SI&A) Sheet (dated 4/21/2014) lists the deck condition rating as six (satisfactory). The superstructure and substructure conditions were rated five (fair). The bridge is classified as functionally obsolete due to the narrow shoulder widths (one-foot) which do not meet current design standards. The bridge was load rated by KYTC Central Office staff in May 2016. After this load rating, the bridge was posted for 17 tons. KYTC policy is to load post a state-owned structure if its rating is less than 20 tons for the KY Type 1 Truck (i.e. a single unit truck with two axles), which is similar to an H-20 loading. Load posting the bridge is an indication that the bridge is also structurally deficient (SD).

Other findings in the most recent fracture critical SI&A Sheet include: general failure of the protective paint coating system used to protect the steel spans; various degrees of corrosion and section loss in steel truss members and connections, especially in the floor system under expansion joints; expansion joint failures; worn deck overlay with moderate to heavy amount of transverse cracking; heaved and misaligned sidewalks posing tripping hazards; clogged deck drains; spalling and delamination of concrete with exposed and rusted reinforcing steel in reinforced concrete deck girders and pier caps; and rusted utility conduits with broken utility supports.

An underwater bridge inspection of the river piers (Pier 3 on the Covington/west side and Pier 4 on the Newport/east side) was conducted on July 17, 2014, by Collins Engineers, Inc. The purpose of the inspection was to perform a detailed visual and tactile underwater investigation of the river piers, obtain channel-bottom depth measurements, and to determine the condition

of the shorelines in the vicinity of the structure. Their findings regarding the river piers was light scaling on the submerged concrete surfaces of both piers and an area of poor concrete consolidation on Pier 4 extending from the downstream nose to the west face of the pier (measuring four inches vertical by four feet horizontal by two inches deep). No repairs were recommended. Regarding channel measurements, a sounding plan and channel cross-sections were developed but no recommendations were given. Furthermore, the report states that no design or as-built plans were available for the bridge so no assessment of scour was given.

Stantec has obtained the original design drawings, which show pier footings founded on rock at Piers 3 and 4. Thus, undermining of these foundations due to scour is not a concern. Lastly, the shorelines were noted to be moderately sloped and vegetated with minor erosion.

3.4 MULTIMODAL

The OKI Regional Bicycle Plan is a component of the region's multi-modal Regional Transportation Plan. The Regional Transportation Plan contains a summary of the existing bicycle facilities and of the recommendations for improving cycling conditions in the region. It is the focus of the Regional Bicycle Plan that vehicular travel by bicycle becomes an integral mode of travel, both by its inclusion in OKI's regional transportation planning process, and by its consideration as a choice for trip-making by residents of the OKI region. The goals of the plan are to develop a regional bicycle system that is integrated with other transportation systems, promote an active and supportive bicycle culture in the Cincinnati region, and encourage and support bicycle safety, education and enforcement programs. Currently, OKI labels the Veterans Memorial Bridge as "street usage only – use with caution".

3.4.1 Bicycles

Under current conditions, bicycles traveling between Covington and Newport are forced to ride in the roadway as they are prohibited from riding on the sidewalks. The narrow lanes and minimal shoulders cause bicyclists to slow traffic over the bridge by blocking (impeding) a lane of travel. The Riverfront Commons Project, a proposed continuous riverfront corridor that provides an 11.5-mile bicycle and pedestrian trail that runs along the Ohio River between Ludlow and Ft. Thomas, will use the KY 8 Licking River Bridge to cross the Licking River. This will add a significant number of recreational bicyclists to the existing driving lanes if a shared-use facility or dedicated bicycle lanes are not constructed.

3.4.2 Transit

The Transit Authority of Northern Kentucky (TANK) does not currently have local or express routes across the Veterans Memorial Bridge. To travel from the western banks of the Licking River in Covington to the eastern banks of Newport by transit, a commuter would have to cross the Ohio River into Cincinnati on the Clay Wade Bailey Bridge (US 25) using route 20 (South Newport), 25 (Alexandria), or 33 (St. Elizabeth Edgewood), then back to Kentucky on the Taylor Southgate Bridge (US 27).

3.4.3 Pedestrians

The KY 8 Licking River Bridge provides narrow four-foot wide sidewalks for passage across the Licking River. The American with Disabilities Act (ADA) require walkways on pedestrian access routes that are less than five-feet to have passing spaces at maximum intervals of 200 feet. Five-foot by five-foot passing space is required to provide an opportunity for wheelchairs to pass each other and provide maneuver run for a wheelchair to turn around. The existing bridge and its approaches do not accommodate adequate passing spaces.

As a part of the OKI Plan, pedestrian counts were conducted in 15-minute intervals between November 19, 2015, and December 17, 2015. The three count locations in the study area include the levee trail in Newport, the sidewalk on the south side of the bridge, and the sidewalk on the north side of the bridge. The average daily traffic (ADT) for the levee trail was 169 pedestrians per day. The ADT for the sidewalk on the south side of the bridge was 368 pedestrians per day and the ADT for the sidewalk on the north side of the bridge was 361 pedestrians per day. Based on these counts, 729 pedestrians cross the KY 8 Licking River Bridge daily. A majority of these pedestrians come from low income households who are less reliant on cars and much more reliant on walking and biking. These are daily users who need this point of connection to go to work and for their day-to-day living needs. The proposed Riverfront Commons Project will add additional recreational users to the already overcrowded sidewalks.

3.5 EXISTING TRAFFIC ANALYSIS

A summary of the existing traffic volumes contained within the KYTC HIS database is shown in **Figure 10**. Traffic counts were conducted by the KYTC between 2012 and 2015 at several locations on KY 8 and surrounding roadways in the study area. Based on the counts, the current ADT volume on the Licking River Bridge is 17,500 vpd, with 10 percent of the ADT being trucks.

To evaluate the adequacy of roadway segments, 2015 design hour volumes were compared to the road's theoretical capacity. This is the preferred KYTC methodology for evaluating the adequacy of roadway segments. A volume-to-capacity ratio (V/C) represents the number of vehicles using the road in a specific time period (i.e., design hour volume, or DHV) compared to the number of vehicles the road was designed to be able to handle during that period. The target V/C ratio is 1.0 for urban areas. A V/C greater than this indicates the road is congested (i.e., operating above capacity). After performing a capacity analysis of the existing traffic, all roadway segments operate at less than full capacity with an eastbound one lane V/C ratio of 0.85 and westbound two lane V/C ratio of 0.67. The results of this analysis suggest the current lane configuration can adequately accommodate the existing traffic demand.

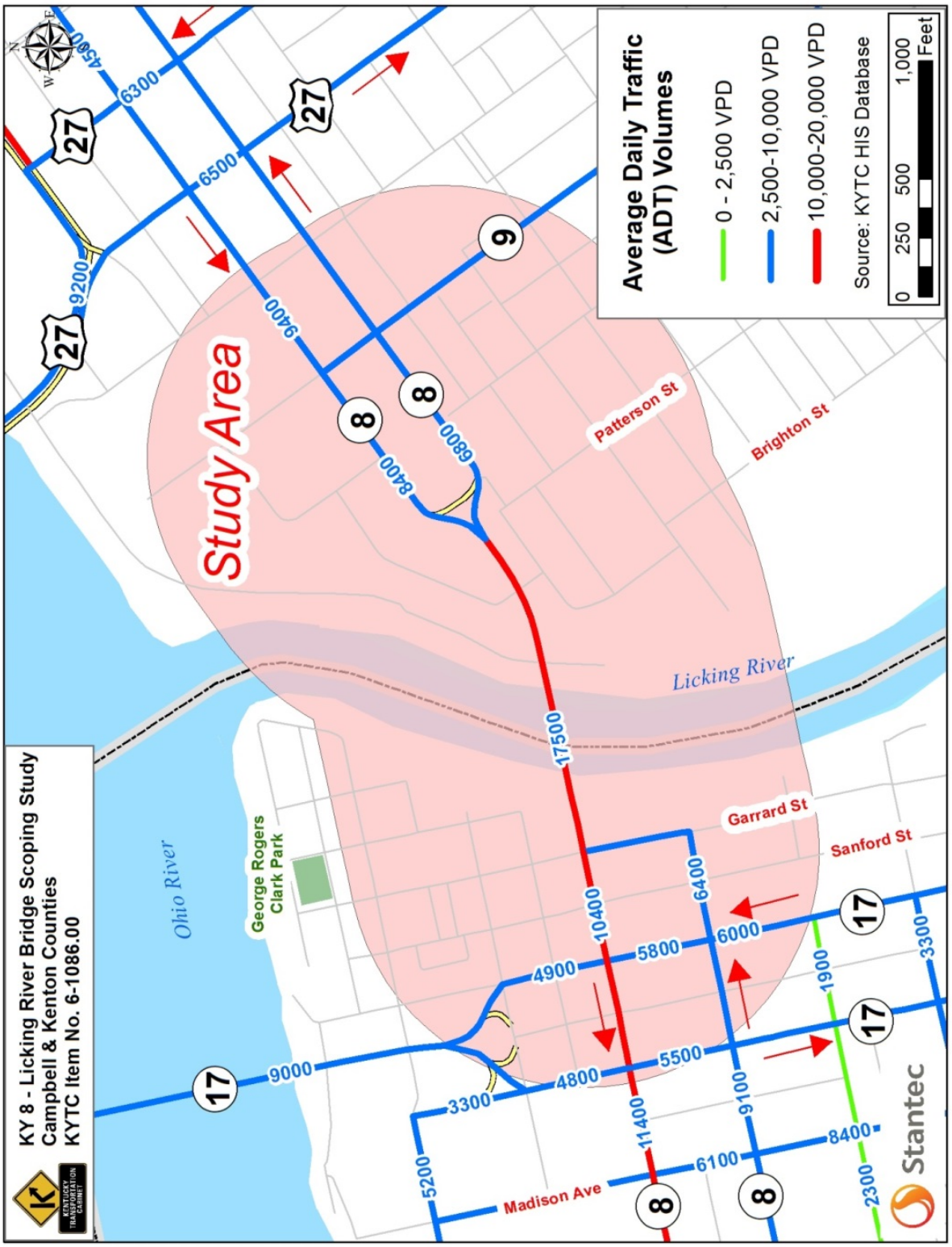

Figure 10: Existing Average Daily Traffic (ADT) Volumes

3.6 CRASH HISTORY

To quantify safety concerns, a crash analysis was performed for the study portion of KY 8: Kenton County from KY 17 (MP 7.321) to the Campbell County line (MP 7.662) and Campbell County from the Kenton County line (MP 0.00) to Columbia Street (MP 0.455).

Historical crash data from the Kentucky State Police collision database were collected along these study area routes for a three-year period between January 1, 2012. and December 31, 2014. Over the analysis period, there were 140 reported crashes. The crash records and locations are included in **Appendix B**.

3.6.1 Crash Type

To help better understand the crash records along the study portion of KY 8, the crash type was examined. Angle crashes were the most commonly reported crash type (49 crashes, 35 percent). Other significant crash types included sideswipe (34 crashes, 24 percent), single vehicle (27 crashes, 19 percent), and rear ends (24 crashes, 17 percent). **Figure 11** demonstrate the distribution of crashes by crash type. **Figure 12** presents a map of the crash history on KY 8 in the study area based on type of crash.

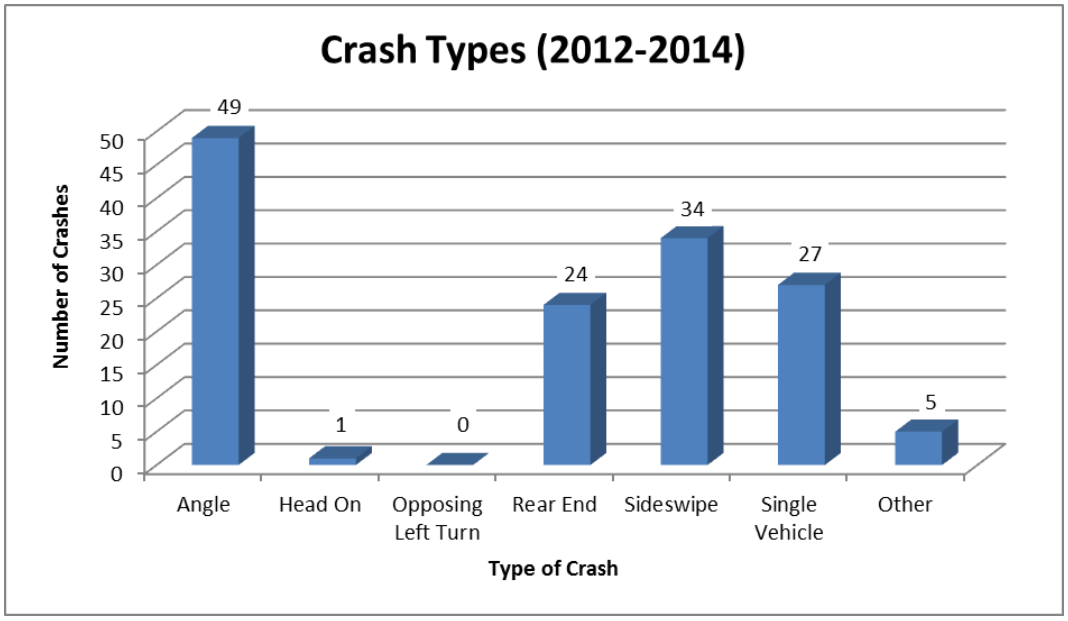

Figure 11: Distribution of Crashes by Type

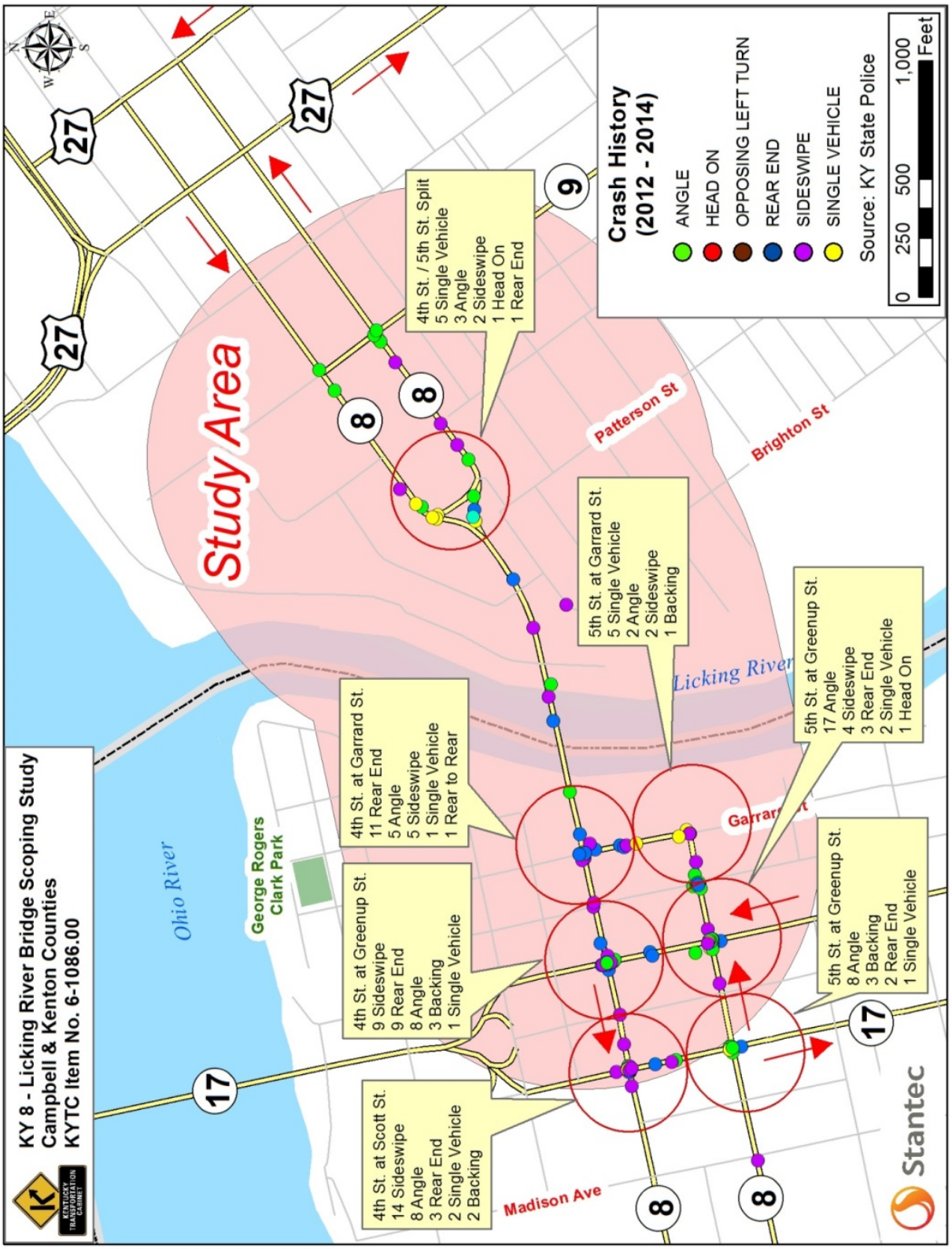

Figure 12: Distribution of Crash Type by Location

3.6.2 Crash Severity

Over the analysis period, there were 140 reported crashes along the study portion of KY 8. Of these, no crashes resulted in fatalities and 27 (19 percent) resulted in injuries. **Figure 13** summarizes the distribution of crashes by crash severity. 81 percent (113 crashes) of the total number of crashes were property damage only collisions.

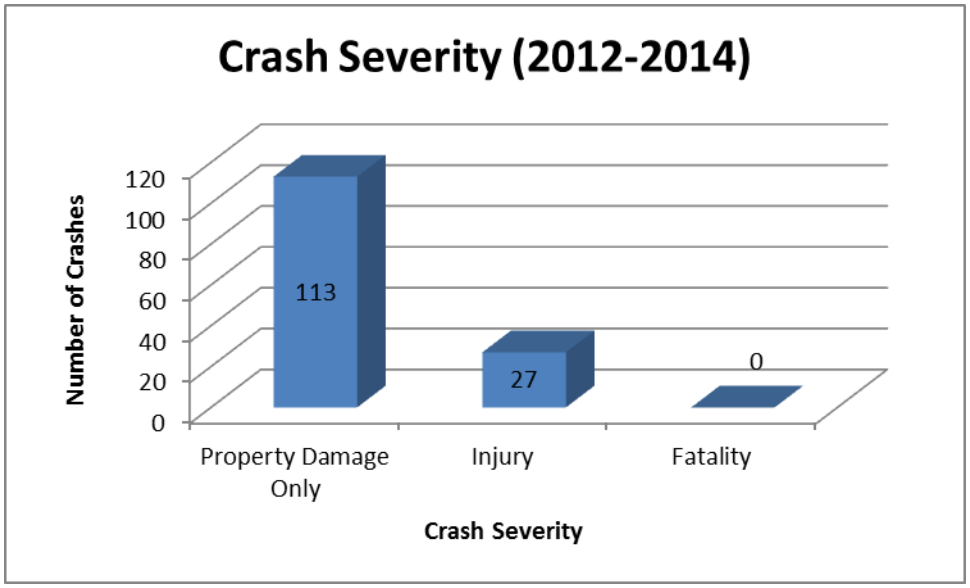

Figure 13: Distribution of Crashes by Severity

3.6.3 Critical Crash Rate Factor

Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above average crash rates. The methodology is defined in the Kentucky Transportation Center research report Analysis of Traffic Crash Data in Kentucky (2010-2014). As defined in the methodology report, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each segment, analysts looked at the number of crashes, traffic volume, rural/urban, number of lanes, and segment length to determine the critical rate factor (CRF). The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the location compared to the critical crash rate for similar roadways throughout the state. If the CRF is 1.00 or greater, it is assumed that crashes cannot likely be attributed to random occurrence.

Table 2 presents the historical crash data with three segments having CRF's greater than 1.00. As KY 8 comprises a one-way couplet on each side of the river (4th Street and 5th Street), the segment CRF analysis was performed using one-way segment crash rates provided by the Kentucky Transportation Research Center. Spot analysis was not feasible since average spot crash rates are not available for one-way streets.

Roadway Number	Roadway Name	Begin Intersection	Begin MP	End Intersection	End MP	AADT	Number of Crashes	Section Crash Rate (per 100 MVM)	Operation Type and Functional Class	Critical Crash Rate Factor (CCRF)
KY 8	5th Street	KY 17	7.321	Garrard St	7.492	6,400	35	2921	One-Way Urban Principal Arterial	2.31
KY 8	4th Street	KY 17	7.244	Garrard St	7.414	8,600	40	2499	One-Way Urban Principal Arterial	2.11
KY 8	Garrard Street	5th Street	7.492	4th Street	7.570	6,400	9	1646	Two-Way Urban Principal Arterial	1.42
KY 8	KY 8 Bridge	Garrard Street	7.57 -7.662	4th / 5th Street	0 - 0.193	16,200	14	277	Two-Way Urban Principal Arterial	0.41
KY 8	5th Street	KY 8	0.193	Columbia Street	0.455	6,200	19	1068	One-Way Urban Principal Arterial	0.92
KY 8	4th Street	KY 8	0.193	Columbia Street	0.455	9,400	23	853	One-Way Urban Principal Arterial	0.80

Table 2: Historical Crash Data

The segment of KY 8 over the Licking has a CRF of 0.41 with a total of 14 crashes during the three-year period between January 1, 2012, and December 31, 2014. A majority of the 14 crashes occur at the Garrard Street intersection in Covington and the 4th/5th Street intersection in Newport, not on the KY 8 Licking River Bridge itself. Of the 14 crashes, no crashes resulted in fatalities and two resulted in injuries. Rear end crashes were the most commonly reported crash type (six crashes, 44 percent). Other crash types included sideswipe (two crashes, 14 percent), single vehicle (two crashes, 14 percent), angle (two crashes, 14 percent), rear to rear (one crash, 7 percent), and backing (one crash, 7 percent). Although not a high crash segment, this project will look at ways to reduce crashes on the KY 8 Licking River Bridge and its approaches (e.g. increase shoulder widths, add bicycle facilities, add a second eastbound driving lane, and improve connections back to the existing roadway).

4.0 ENVIRONMENTAL OVERVIEW

An environmental overview was performed to identify environmental resources of significance, potential jurisdictional features, and other environmental areas of concern that should be considered during project development. Natural and human environment resources within the study area were identified from a literature/database review, as well as a windshield survey. The KY 8 study area includes the existing KY 8 corridor in Kenton County from KY 17 to the Campbell County line and in Campbell County from the Kenton County line to US 27. The study area

includes a 2,000-foot wide corridor centered on KY 8. The complete document is included in **Appendix C**.

More detailed environmental studies may be required as the project is further developed. If a future project is federally-funded, the National Environmental Policy Act (NEPA) requires that potential environmental impacts with regard to jurisdictional wetlands, archaeological sites, cultural historic sites, and federally endangered species must be avoided if at all possible. If not, then minimization efforts are required. Mitigation for the impacts, if unavoidable, may also be necessary.

4.1 NATURAL ENVIRONMENT

Natural environment resources include: surface streams, floodplains, wetlands, ponds, groundwater, threatened, endangered, and special concern species and habitat, woodland and terrestrial areas, and parks. Through a literature/database review and field reconnaissance, potentially sensitive resources that affect the natural environment were identified in the study area and are discussed in the following sections and presented in **Figure 14**.

4.1.1 USGS Streams

The Licking River (approximately 2,300 linear feet of channel) is the only United States Geological Survey (USGS) stream located within the study area. The Licking River is not classified as Special Use Waters within the study area as defined by the Kentucky Division of Water (KDOW). It is designated as fully supporting warm water aquatic habitat (WAH) and drinking water supply (DWS), while partially supporting primary contact recreation (PCR). Watersheds in the study area include Licking and Middle Ohio-Laughery.

The study area is within a Zone III Source Water Assessment and Protection Program (SWAPP; KDOW, 2013) area, associated with the Northern Kentucky Water District and the Licking River basin.

4.1.2 Other Streams

No additional surface streams are mapped or evident in the study area due to the highly developed, urban nature of the project area vicinity.

4.1.3 Wetlands

With the exception of the Licking River (designated L1UBH -lacustrine, limnetic, unconsolidated bottom), no National Wetland Inventory (NWI) wetlands are mapped in the study area or vicinity.

No mapped hydric soils occur in the study area or vicinity.

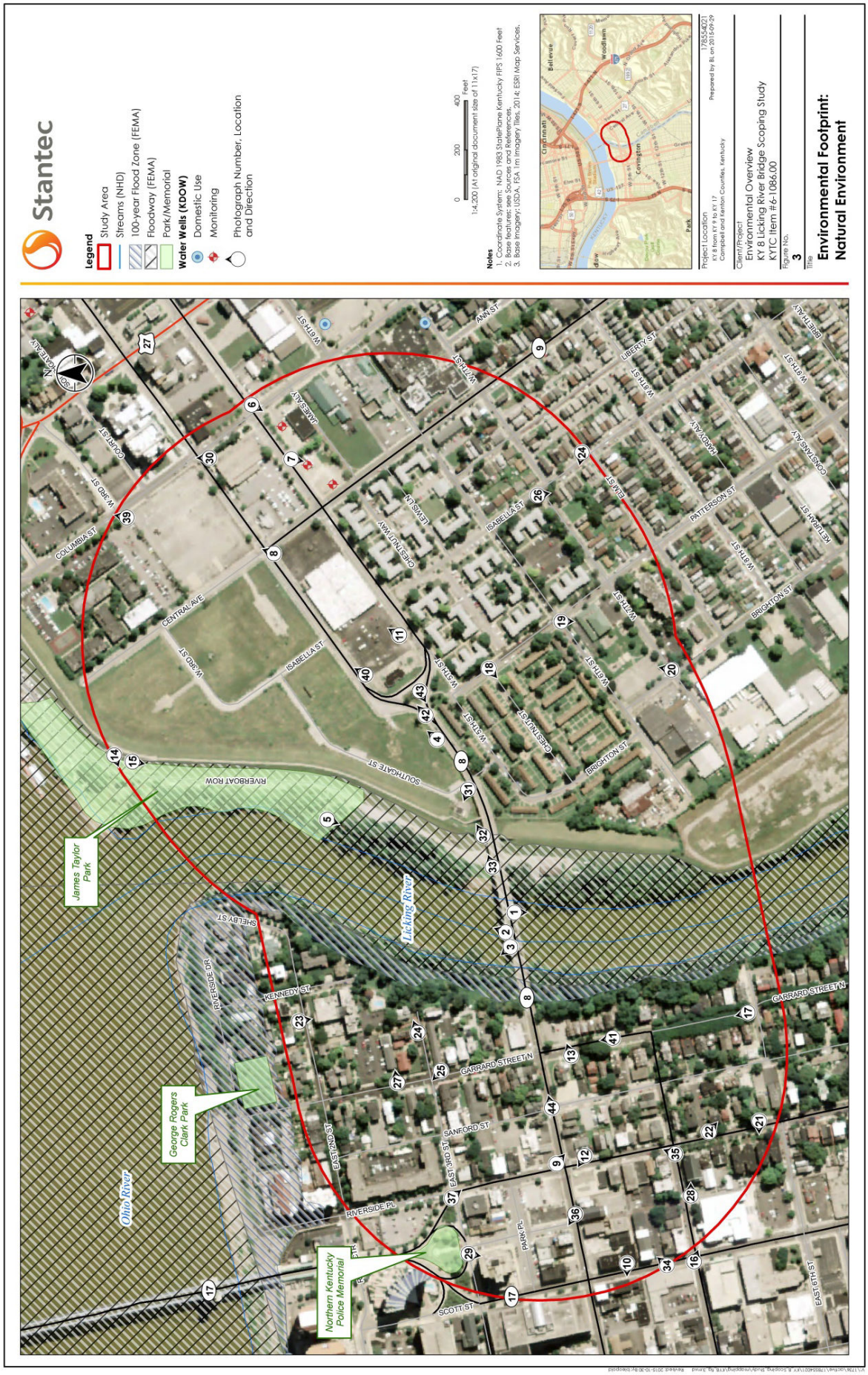

Figure 14: Natural Environment

4.1.4 Ponds

No ponds occur within the study area due to the highly developed, urban nature of the study area vicinity.

4.1.5 USFWS Species List

Review of the US Fish and Wildlife Service (USFWS) Threatened and Endangered Species (T&E) list suggests the possibility for several listed species to be found in Kenton and Campbell County. Indiana bat (endangered), gray bat (endangered), and northern long-eared bat (threatened) have the potential to occur in both counties. Nine endangered mussels have the potential to occur in the study area including clubshell, fanshell, northern riffleshell, orangefoot pimpleback, pink mucket, purple cat's paw, ring pink, rough pigtoe and sheepnose. Running buffalo clover (endangered) has the potential to occur in the study area.

Potential summer roost and foraging habitat for Indiana bat and northern long-eared bat (riparian woodlands) are confined to the narrow riparian corridor along both banks of the Licking River. No Priority Swarming or Maternity Sites for Indiana bat or mapped northern long-eared bat habitat occur in the study area or vicinity.

All nine federally-listed mussel species have the potential to occur in the study area as the Licking River may provide suitable habitat for these medium to large river species.

Habitat for running buffalo clover may be present in the study area along the banks of the Licking River and associated footpaths.

4.1.6 KDFWR Species List

The Kentucky Department of Fish and Wildlife Resources (KDFWR) lists 42 additional (beyond the 11 species listed by USFWS, above) State and Federal Threatened, Endangered, and Special Concern Species as occurring (either recently or historically) in Campbell and Kenton Counties. These include:

- The federal and state endangered snuffbox and spectaclecase mussels
- The federal and state threatened rabbitsfoot mussel
- 14 state endangered species (two fish, one amphibian, eight birds, and three mussels)
- 11 state threatened species (six birds, two mussels, two insects, and one reptile)
- 13 state special concern species (two fish, two amphibians, seven birds, one gastropod, and one mammal)
- One historical record of the state listed American Bittern (heron)

The spectaclecase mussel has the potential to occur in the study area (Licking River). The snuffbox and rabbitsfoot are typically found in smaller streams which are not present. Due to the highly developed nature of the study area, no suitable habitat for the other listed species would be expected to be present.

4.1.7 KSNPC Species Database

There are 26 records of federal or state endangered, threatened, or special concern-listed species within one mile of the study area. These include:

- 16 mussels (15 federal-endangered, one federal-threatened)
- Two aquatic snails (historical records)
- Two fishes
- One each: vascular plant, insect, amphibian, breeding bird, and mammal

The Kentucky State Nature Preserves Commission (KSNPC) data response specifically highlights in the project vicinity (one-mile) a historical record for Eastern Hellbender and recent records for Peregrine Falcon, in addition to records within ten miles for Indiana bat (acoustical record only) and Barn Owl.

4.1.8 Groundwater

Six (6) water wells occur within the study area, all listed as monitoring wells and associated with two properties along 5th Street, between Central Avenue and Columbia Street in Newport. No wellhead protection areas or mapped karst areas occur in the study area.

4.1.9 Karst

The project area is underlain by bedrock with limited or no potential for karst development, with bedrock with moderate potential located in the immediate vicinity. No sinkholes, indicative of karst bedrock, are mapped in the study area or vicinity.

4.1.10 Floodplain

Federal Emergency Management Agency (FEMA) 100-Year floodplain occurs along the Licking River and the Ohio River west (downstream) of the Licking River confluence.

4.1.11 Floodway

FEMA designated floodway is present along the Licking River extending from the base of the levee in Campbell County to the top of the bank in Kenton County.

4.1.12 Farmland

No soils identified as "prime farmland" or "farmland of statewide importance" are present in the study area or vicinity. In addition, there are no active farms in the study area.

4.1.13 Section 4(f)

James Taylor Park, located at the confluence of Licking and Ohio Rivers in Newport (Campbell County) is the only public park and Section 4(f) resource located in the study area. Bernadette Watkins Park, shown on mapping at 6th Street and Patterson in Newport, is no longer present and has been redeveloped as the Northern Kentucky Scholar House, a housing and education project.

The Northern Kentucky Police Memorial at the entrance to the John A. Roebling Suspension Bridge in Covington is located within the study area. It is considered a not-likely Section 4(f) resource as the site is a dedicated memorial, but it could be designated a Section 4(f) resource under the broader term of a park or recreation area.

4.1.14 Section 6(f)

Based on current Land and Water Conservation Fund (LWCF) records, the only LWCF property in the study area was the Bernadette Watkins Park (6th Street and Brighton, Newport). However, this park has been recently developed for housing and education use as the Northern Kentucky Scholar House. Therefore, there are no Section 6(f) resources in the study area.

4.1.15 Air Quality

The study area is in a non-attainment area for 8-hour ozone (2008 standard) and a maintenance area for PM 2.5 (1997 standard) for the transportation-related criteria pollutants for which the EPA has established National Ambient Air Quality Standards (NAAQS). Portions of Campbell County adjacent to the study area are in a non-attainment area for sulfur dioxide (2010 standard). There are no project level concerns for air quality as the project will not increase roadway capacity (other than an additional lane on the bridge). Two US Environmental Protection Agency (USEPA) air emissions facilities are located within the study area.

4.1.16 Noise

Noise sensitive land use areas are located throughout the study area, including Activity Category "B" and "C" land uses – consisting of numerous single and multi-family residences, two churches, one school, one park, and one public library.

The study area is urbanized and contains high-density residential areas, which include a mixture of single and multi-family residential housing units, low-income apartment complexes in Newport and apartment, condominium, and townhome complexes in Covington.

4.2 HUMAN ENVIRONMENT

Human environment is defined as what we live in and around and what we have built. Through a literature/database review and field reconnaissance, potentially sensitive resources that affect the human environment were identified in the study area and are discussed in the following sections and presented in **Figure 15** and **Figure 16**. The complete document is included in **Appendix B**.

4.2.1 Hazardous Materials

A review of database records reveals 24 sites of potential concern occur within the study area, including two state hazardous waste (SHWS) records, three Brownfields records, six RCRA records and 13 underground storage tank (UST) records (one active). An additional 56 records are mapped within 0.25 miles of the study area including three Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and 10 State Hazardous Waste Site (SHWS) records.

Field survey indicated four additional potential hazardous materials concern sites including two manufacturing and two automotive service businesses, all located around 6th Street, 7th Street, and Brighton Street in Newport.

Aerial photography, topographic mapping, and field survey indicate 28 potential hazardous materials sites are in or immediately adjacent to the study area, including 13 UST sites, eight Resource Conservation and Recovery (RCRA) sites, three Brownfields sites, and several additional sites of potential concern (including historical auto stations, KY SHWS records, historical cleaners, Non-National Priority List (NPL) CERCLIS records, auto salvage).

4.2.2 Socioeconomic Study

Socioeconomic issues pertaining to minority, elderly, disability, and low income (persons living in poverty) populations in the project study area were evaluated and documented by the Northern Kentucky Area Development District (NKADD) in a Socioeconomic Study completed in June 2015. A copy of the report is found in **Appendix D**. The study area includes portions of Census Tracts 670 in Kenton County, and 501 and 532 in Campbell County. Block Groups 1 and 2 of Census Tract 501 and Block Group 1 of Tract 532 have significantly higher low income populations and higher minority populations than both the country and state.

Overall, approximately 28.8 percent of the study area population is minority and approximately 23.4 percent of the population is low income. These percentages are greater than both the county and state percentages for minority and low income populations. During future phases of project development, a more detailed and robust analysis is required for NEPA documentation when assessing the potential for adverse and disproportionate impacts to low income and minority populations.

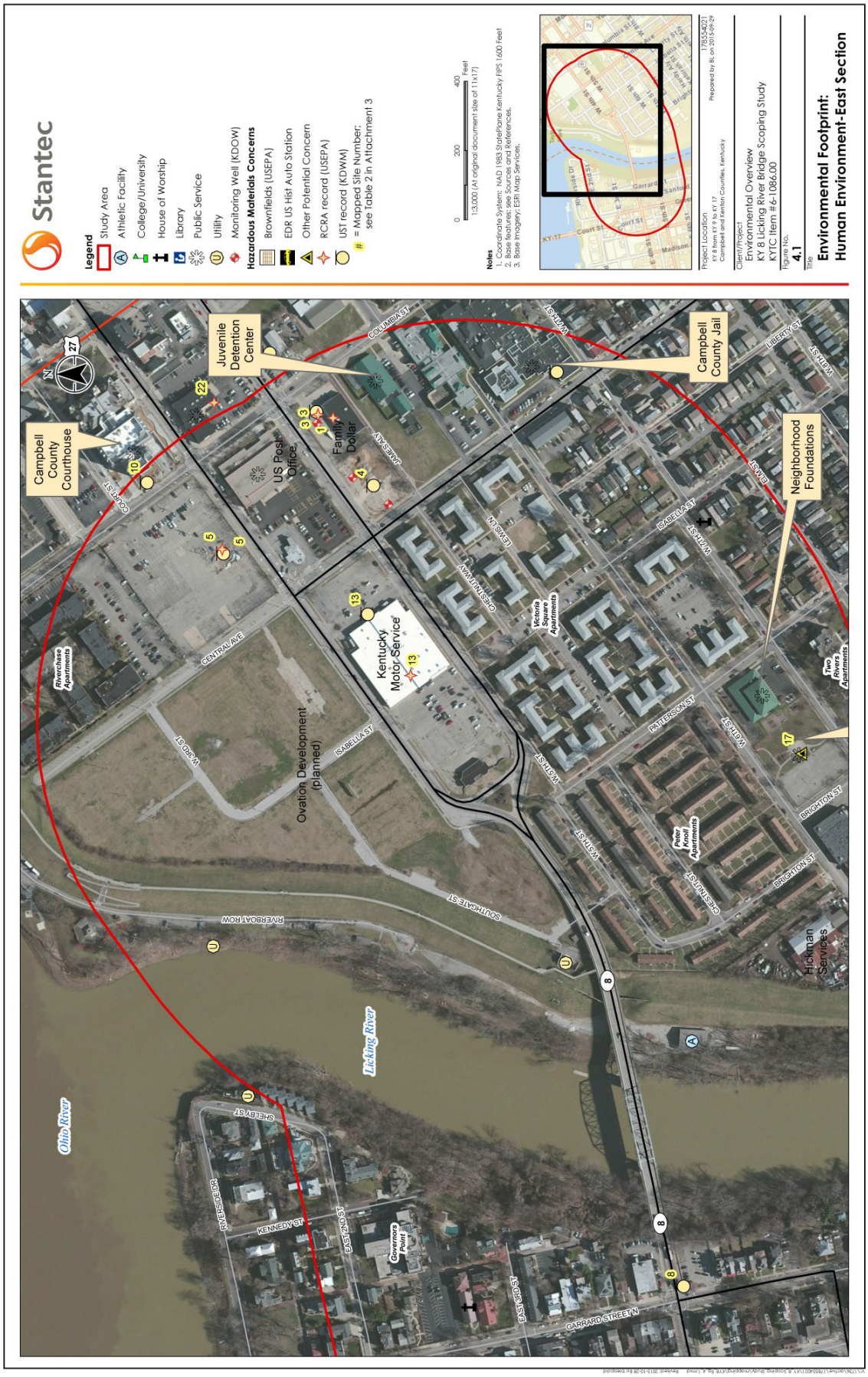

Figure 15: Human Environment Part 1 (East)

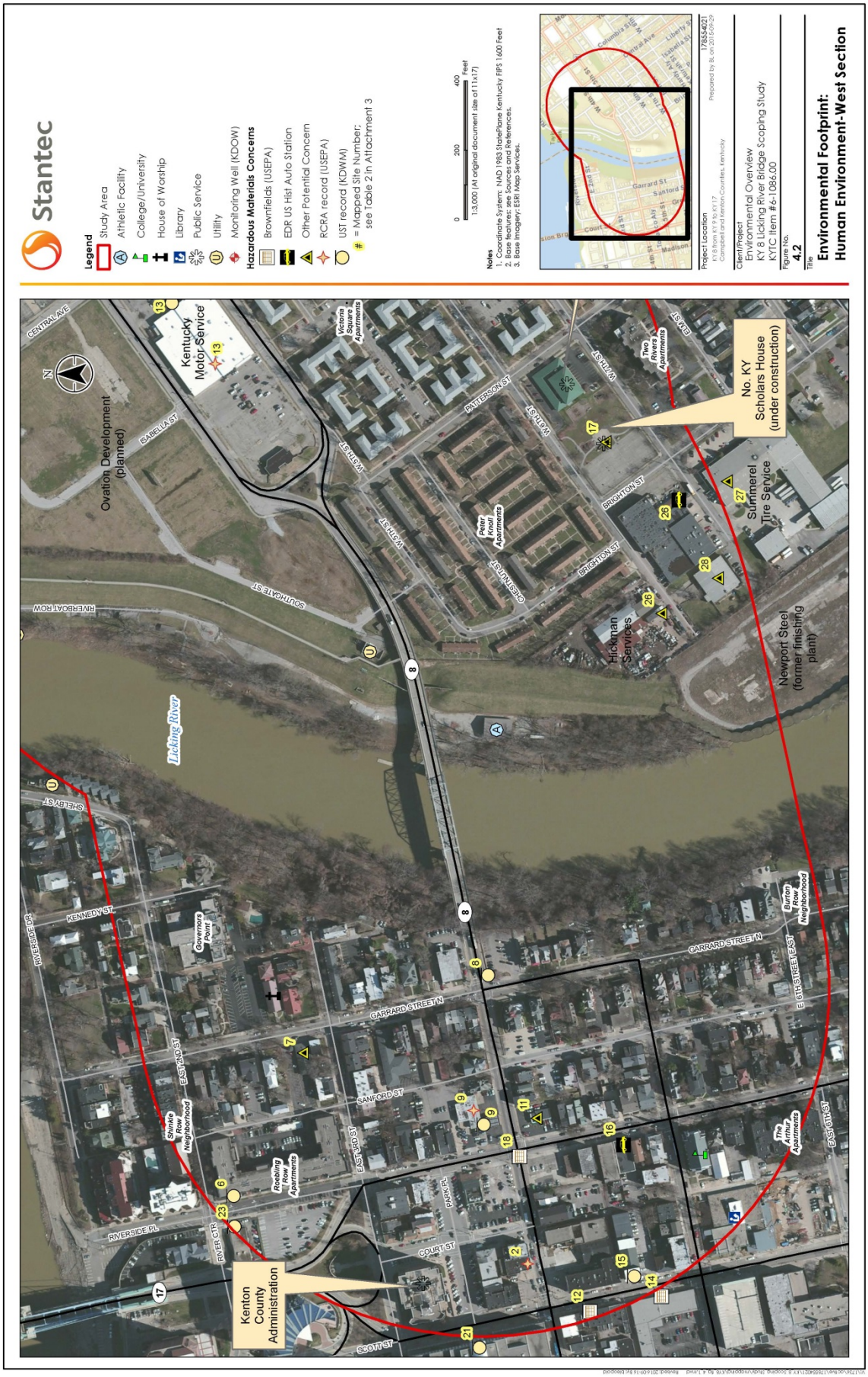

Figure 16: Human Environment Part 2 (West)

4.2.3 Archaeology

Based on a review of National Register of Historic Places (NRHP) and Office of State Archaeology (OSA) records, it was determined that there are no archaeological sites currently listed on the NRHP within the current study area. However, previous surveys have identified six recorded archaeological sites within and/or adjacent to the current study area. Of the six sites, three were recommended for NRHP inclusion, one was not evaluated for NRHP listing, and two were considered to be ineligible for NRHP. In addition, based on a review of historic maps, the current study area has the potential for additional historic archaeological sites. Due to the heavily modified nature of the soils within the study area, the potential for intact buried prehistoric archaeological deposits is reduced, unless they consist of deeply buried cultural horizons. However, it is likely that house lots, industrial or commercial lots, or other areas contain intact historic features, deposits, or midden.

4.2.4 Historic

Based on a review of Kentucky Heritage Council (KHC) records and a windshield survey of the project area, the following resources were identified:

- The Veterans Memorial Bridge was built in 1936 and is considered eligible for the National Register of Historic Places (NRHP).
- Campbell County: one (1) historic district (the Newport Courthouse Square Historic District) currently listed on the (NRHP) located within the study area.
- Kenton County: three (3) historic districts – Licking Riverside Historic District, Ohio Riverside Historic District, and Covington Downtown Commercial Historic District; and a total of twenty eight (28) previously surveyed individual sites, including: the Hearne House, which is listed individually in the NRHP; the Dan Carter Beard House, which is designated a National Historic Landmark (NHL); twenty three (23) individually surveyed sites that contribute to the three (3) historic districts; two (2) sites, which may potentially contribute to the Downtown Commercial Historic District; and one (1) site which may potentially contribute to the Ohio Riverside Historic District.

4.2.5 Churches

There are two churches located within the study area: West 7th Street First Church of God (7th and Isabella) in Newport and Garrard Street Church of Christ (218 Garrard Street) in Covington.

4.2.6 Schools

There are no primary or secondary schools located within the study area. Gateway Community & Technical College (higher education) has its North Central Area Health Education Center at 501 Greenup Street in Covington.

4.2.7 Cemeteries

There are no cemeteries located within the study area.

4.2.8 Public Services

There are multiple public service and utility facilities located within the study area including the following:

- Campbell County: County Courthouse, County Detention Center (Jail), Regional Juvenile Detention Center, Kentucky Probation & Parole Office, Northern Kentucky Scholar House (housing assistance), Neighborhood Foundations (The Housing Authority of Newport), Newport Floodwall along Licking River, and Sanitation District 1 Fourth Street Flood Structure

- Kenton County: County Administration Building and County Public Library

4.2.9 Residences and Businesses

Residential land use in the study area includes a mixture of single and multi-family urban residential housing units, low-income apartment complexes in Newport and apartment, condominium, and townhome complexes in Covington. Most of the residential neighborhoods have recently been or are currently experiencing redevelopment activities. The study area includes a portion of the Covington Central Business District (three blocks plus) in addition to retail businesses in Newport along 5th Street and an industrial area adjacent to the Licking River between 6th and 7th Streets.

4.3 GEOTECHNICAL OVERVIEW

A geotechnical overview for the study area was completed based upon research of available published data and experience with highway design and construction within the region as well as a site visit in October 2015. The purpose of this overview was to provide a general summary of the bedrock, soil, and geomorphic features likely to be encountered within the proposed study areas; and to identify geotechnical features or conditions that may have an adverse impact on the replacement bridge. The complete document is included in **Appendix E**. The overview concluded:

- Prior to and during construction of the replacement bridge over the Licking River, a preconstruction survey and vibration monitoring should be performed to protect the public and existing historic structures in the immediate vicinity.

- The existing piers, abutments, and retaining walls of the existing KY 8 Bridge over the Licking River should be instrumented and monitored during construction of the replacement bridge to detect unacceptable movement or strains within the structure.

- It is possible that the foundations of the existing bridge could be used to support the replacement bridge. Significant geotechnical investigations and analyses will be required, as well as interaction with the structural engineer to establish the adequacy of the existing foundations.
- If embankment for the replacement bridge is constructed below the 100-year storm elevation, it should be armored against scour below the 100-year elevation.
- To avoid potential environmental issues and delays during construction due to high water events, it is recommended that the main span of the replacement bridge span the river and bear on piers constructed in the dry on the riverbank.

5.0 ALTERNATIVE DEVELOPMENT

The following section outlines the process by which the preliminary alternatives were developed. Alternatives were developed based on the existing conditions analysis (bridge characteristics, multimodal considerations, traffic analysis, crash analysis, and environmental and geotechnical overviews), previous studies, roadway alignment, and input received from the project team.

5.1 TRAFFIC FORECAST

The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) maintains a travel demand model that replicates existing travel patterns and forecasts future traffic volumes on roadways throughout the region. The OKI provided model outputs to assist in developing the traffic forecast volumes for a horizon scenario in the year 2040. The complete Traffic Forecast Memorandum document is included in **Appendix F**. A summary of the output (in vehicles per day) is provided in **Figure 17**. Values from the OKI model included in Figure 17 include the 2010 base year assignment, the 2040 future assigned volume assuming a three-lane bridge replacement with two lanes in the westbound direction and a single lane in the eastbound direction, and the 2040 future assigned volume assuming a four-lane bridge replacement with two lanes in the westbound direction and two lanes in the eastbound direction. The 2040 volumes include the OKI Existing plus Committed network, which includes the replacement of the Brent Spence Bridge carrying I-71 and I-75 over the Ohio River, a project that would affect the traffic demand within the study area.

The bridge over the Licking River has a 2015 Average Daily Traffic (ADT) volume of 17,500 vehicles per day with 10 percent trucks. Based on outputs from the OKI Regional Travel Model, the corridor is not expected to see significant traffic growth through 2040. After performing a capacity analysis of the 2040 future assigned volume assuming a three-lane bridge replacement, all roadway segments operate at less than capacity with an eastbound one lane V/C ratio of 0.85 and westbound two lane V/C ratio of 0.67. The results of this analysis suggest the current lane configuration can adequately accommodate the future traffic demand

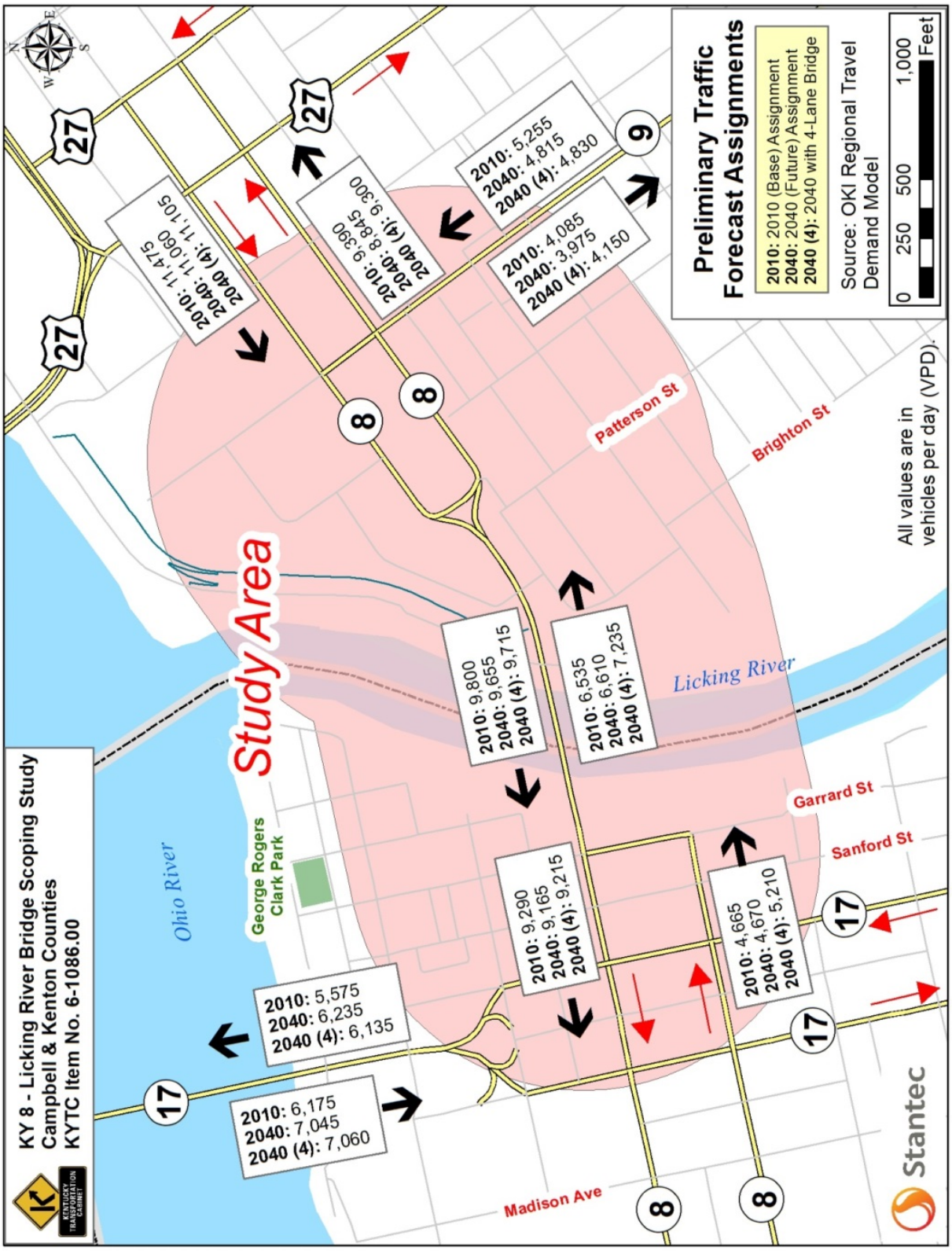

Figure 17: OKI Daily Traffic Forecast Volumes

through 2040. However, potential development could require the need for an additional eastbound lane on the bridge.

The potential for development in Covington and Newport, while not completely quantifiable in the OKI model, is very much expected. One example, shown on **Figure 18**, is the new Ovation development which is directly adjacent to the eastern side of the bridge. The development is a large, mixed-use site which will provide an estimated 1.1 million square feet of office space in five separate buildings. This development was not accounted for in the OKI model. Another significant redevelopment opportunity is the Internal Revenue Service (IRS) Service Center site located north of KY 8 immediately west of the study area. The IRS announced in September 2016, that the 450,000 square foot facility, also shown on Figure 17, will close by 2019.[7] With its convenient location and availability of 23 acres, there "has long been interest by private developers to redevelop this site and to allow expansion of the Northern Kentucky Convention Center which is currently landlocked by the IRS."[8] Development of sites such as these can have a dramatic effect on travel demand through the KY 8 corridor.

Figure 18: Ovation and IRS Service Center Site

[7] http://www.cincinnati.com/story/news/politics/2016/09/14/irs-cutting-some-covington-jobs-2019/90362560/
[8] http://www.rcnky.com/articles/2016/09/14/covington-prepares-adjust-eyes-opportunity-closure-irs-building

Another example is the realignment of KY 9 along the Licking River to meet KY 8 in Newport, Kentucky (KYTC Item No. 6-8101). The realignment is located on the eastern side of the KY 8 Licking River Bridge. Construction is scheduled to begin in 2017. The road expansion will have a dramatic impact on the redevelopment of the area and future land uses along the Licking River.

While the traffic forecasts developed for the project do not warrant the immediate need for a four-lane bridge, the potential for development within the vicinity of the study area could have a significant impact on future traffic volumes. With known development sites such as Ovation east of the Licking River Bridge and the possibility of redevelopment of the IRS Service Center west of the study area, combined with the desire for any newly constructed bridge to accommodate traffic demand over its entire design life (50 to 100 years), a four-lane bridge is recommended for consideration in future project phases.

5.2 ROADWAY ALIGNMENT

Within the project study area, several factors influenced the roadway alignment. In Kenton County, on the western side of the Veterans Memorial Bridge, there are two historic districts: the Ohio Riverside Historic District and the Licking Riverside Historic District. The boundaries of these historic districts can be seen in **Figure 19.** In Campbell County, on the eastern side of the bridge, KYTC District 6 is working to realign KY 9 through Newport (KYTC Item No. 6-8101). A five-legged roundabout is being constructed east of the Licking River Bridge at the relocated KY 8 intersection with KY 9. The project location can be seen in Figure 19. All alternatives hold the existing curb line on the north side of the bridge and widen to the south. This will create the least amount of impacts to adjacent properties and the historic districts to the west. Widening to the south will directly impact an existing rock wall and an adjacent parking lot. The parking lot is for the Kentucky Workforce Development Cabinet's building (located on the south side of 4th Street), which is currently vacant.

5.3 BRIDGE ALIGNMENT

The US Coast Guard (USCG) requires certain vertical and horizontal clearances for navigable waterways such as the Licking River. The USCG determined in a response letter dated January 14, 2016, that a new bridge at the existing location shall meet or exceed the existing horizontal and vertical clearance of the 12th Street Bridge (Licking Valley Girl Scout Bridge). The horizontal clearance is 276.4 feet and the vertical clearance is 64.19 feet above normal pool at the Licking Valley Girl Scout Bridge.

Chart 115A of the Ohio River Navigation Charts produced by the US Army Corps of Engineers, Louisville District, provides river information. Normal pool for the Licking River at the KY 8 Licking River Bridge is at Elevation 455 feet. Low steel elevation for the bridge is Elevation 519.25 feet, providing a vertical clearance at pool stage of 64.25 feet. The existing horizontal navigation clearance between the KY 8 Licking River Bridge piers is 240 feet.

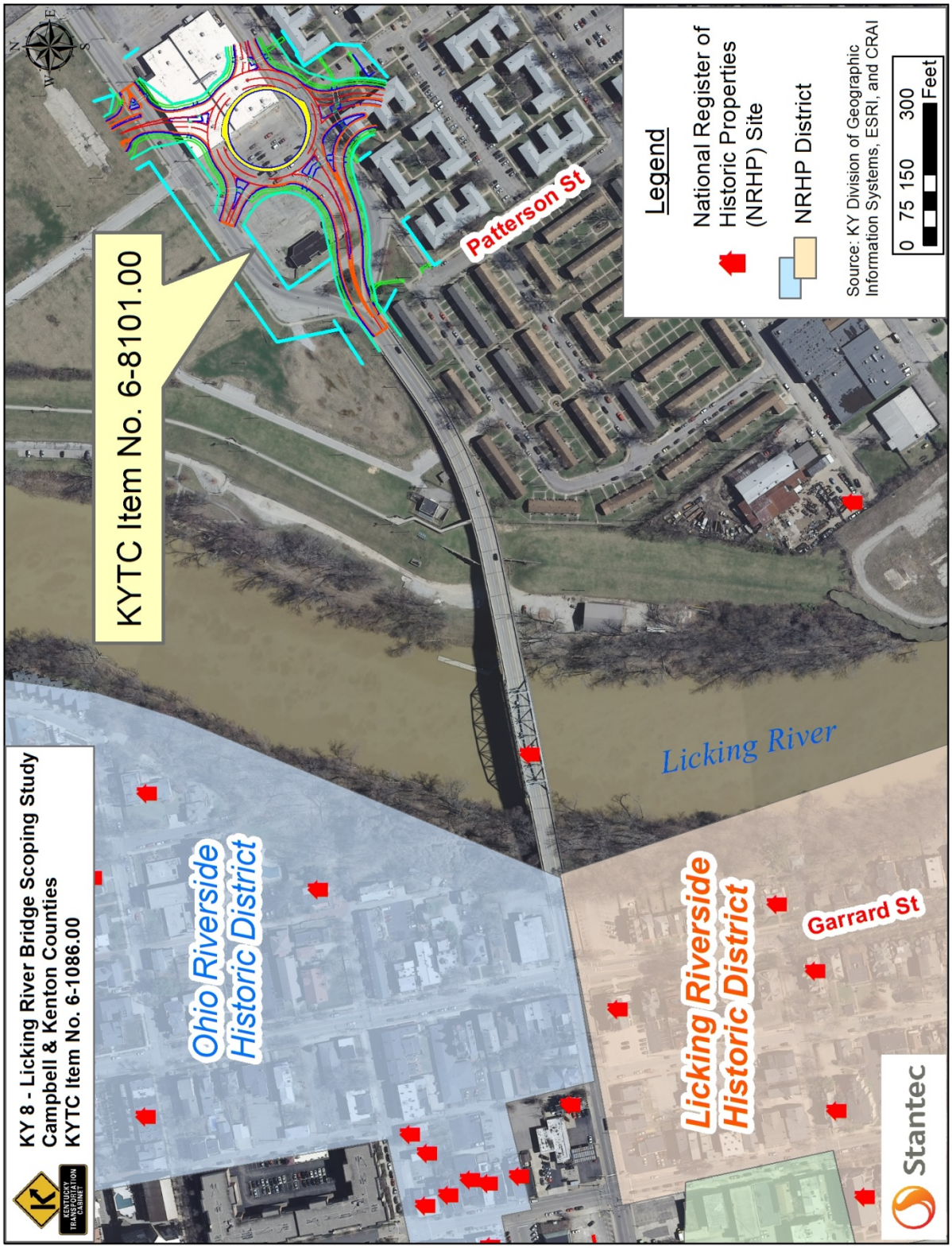

Figure 19: Roadway Alignment Considerations

5.4 INITIAL CONCEPTS

A range of concepts was developed based on the existing conditions analysis, input from the USCG, and input received from the project team. Preliminary concepts were identified that improve efficiency, connectivity, and safety for vehicles, bicycles, and pedestrians. In addition to the No-Build alternative and the Major Rehabilitation concepts, this study examined four initial concepts for bridge replacement: (1) a Truss Bridge, (2) a Plate Girder Vehicular Bridge with a Signature Pedestrian Bridge, (3) a Stage-Constructed Plate Girder Bridge, and (4) a Signature Extradosed Bridge.

5.4.1 No-Build

Although the No-Build Alternative does not meet the project purpose, it was carried forward as a baseline for comparison between other alternatives.

5.4.2 Major Rehabilitation

The major bridge rehabilitation option was evaluated based on the results of previous bridge inspections, the most recent KYTC load rating results, and acknowledgment of major bridge rehabilitation activities that would be required to significantly extend the service life of the existing structure, while also increasing its load capacity to an inventory rating of HS-25. A rehabilitation base target of HS-25 Inventory Rating was chosen to ensure the structure will function safely throughout the extended service life while carrying modern vehicular loading. The major rehabilitation would include full replacement of the deck truss approach spans flanking the main navigation span, replacing the concrete deck and floor system (stringers and floorbeams) on the main span, replacing the latex overlay of the concrete approach spans, replacing the cantilevered sidewalks, steel repairs and strengthening of various elements of the main span, and painting the main navigation span steel truss.

Due to the bridge being at the end of its original design life, the major rehabilitation option would require a fatigue life evaluation of the thru-truss span to determine if any significant strengthening or member replacement would be required. If a fatigue life evaluation indicates that the thru-truss could remain in service long-term, the major rehabilitation would likely extend the service life of the bridge by 25 years, at which point the bridge would require full replacement. Under this alternative, the structure will remain functionally obsolete due to the narrow one-foot shoulder widths and would not provide improved pedestrian accommodations or dedicated bicycle accommodations.

5.4.3 Truss Bridge

A new truss bridge would have a similar look to the existing bridge. The proposed bridge could maintain grades similar to the existing bridge and still meet USCG vertical clearance requirements. To meet USCG horizontal clearance requirements, the river piers will be placed on the banks thereby increasing the truss span. Under this concept, the footprint would remain

minimal due to the shared-use paths and sidewalks being located on the bridge. This concept could take a full construction season to build. Vehicular traffic would be detoured during construction. Pedestrians would also be detoured unless a temporary pedestrian bridge was built.

5.4.4 Plate Girder Vehicular Bridge and Signature Pedestrian Bridge

This bridge is similar to the existing 12th Street Bridge (Licking Valley Girl Scout Bridge) over the Licking River between Covington and Newport. This concept provides the most straightforward and least expensive construction for the roadway structure, but would require an increase in the profile grade (approximately six feet) to maintain minimum USCG vertical clearance requirements. The separate pedestrian structure could be constructed first to accommodate bicyclists and pedestrians throughout the construction of the roadway bridge, resulting in more right-of-way needs and creating a separate facility to maintain. This concept could take a full construction season to build. Vehicular traffic would be detoured during construction.

5.4.5 Stage-Constructed Plate Girder Bridge

Stage-construction would maintain traffic and better provide for bicycle and pedestrian accommodations throughout construction. The staged construction would require a shift in alignment and additional widening into the Licking Riverside Historic District. This would also introduce a lane shift in the alignment of the KY 8 through lanes across the Garrard Street intersection. An increase in the profile grade would be needed to maintain minimum USCG vertical clearance requirements.

5.4.6 Signature Extradosed Bridge

The Extradosed Bridge is a hybrid of a cable stay and deck girder bridge. It has the highest cost of the concepts, but it would not require as high of a raised vertical as the plate girder bridge options. Disadvantages include the possible need for a temporary pedestrian bridge, significant disruption to vehicular traffic, and more complex construction.

6.0 PROJECT TEAM MEETING #1

Over the course of the study, the project team held three meetings to coordinate on key issues. Project team meeting summaries are presented in **Appendix G**. The project team consisted of representatives from KYTC Central Office Planning, KYTC Central Office Design, District 6 staff, Northern Kentucky Area Development District (NKADD), Ohio-Kentucky-Indiana Regional Council of Governments, and the consultant.

Staff from the KYTC Central Office, KYTC District 6 Office, and consultant firm met at the District 6 office in Covington, Kentucky on November 13, 2015. The purpose of the meeting was to present the results of the existing conditions analysis and begin the process of developing improvement

alternatives for the KY 8 Licking River Bridge Scoping Study. Key discussion items included the following:

- The draft purpose and need statement was revised to add "…*ensure the bridge is structurally safe*."
- The OKI Regional Bicycle Plan details location of bike lanes, bike racks, shared-use paths, etc. The KY 8 River Path was given priority consideration in the plan with shared-use paths and existing roadway improvements recommended.
- As part of KYTC Item No. 6-8101.00 in Campbell County, KY 9 is to be rerouted and a roundabout will be constructed near the confluence of 4th Street and 5th Street (just east of the Licking River Bridge). It was confirmed that even though the roundabout has been designed for one lane on the eastbound approach, it can be configured to accommodate an additional lane from the bridge.
- A temporary pedestrian bridge would add considerable cost to the project. As an alternative, transit or taxi vouchers could be offered to pedestrians while the bridge is closed during construction.
- The project team eliminated the signature Extradosed Bridge and the plate girder vehicular bridge with the signature pedestrian bridge from further consideration.
- In addition to the No-Build alternative and the Major Rehabilitation alternative, the project team decided to advance the Truss Bridge and the Stage-Constructed Plate Girder Bridge forward for a more detailed evaluation.
- The project team decided to use a four-lane bridge typical section. Accommodations for pedestrians and bicycles were to be considered with each concept. Subsequent to the meeting, typical sections were developed to include eight-foot wide sidewalks on each side of the bridge.
- Alternatives should show profile differences from the existing bridge.

7.0 PROJECT TEAM MEETING #2

The project team met at the KYTC District 6 Office on February 10, 2016. The purpose of the meeting was to present the preliminary alternatives and get feedback from the project team on changes that should be considered. A detailed summary of the meeting is included in **Appendix G**. Key discussion items included the following:

- The decision was made at the first project team meeting to focus on two bridge types for which renderings and cost estimates were to be developed. The project team decided to advance a Truss Bridge Alternative and a Stage-Constructed Plate Girder Bridge Alternative. Typical sections and profiles were developed showing differences from the existing bridge.

- The bridge should accommodate bicycles and four-lanes of traffic. With an average of 729 pedestrians using the sidewalks on the bridge daily, a single shared-use path would not be ideal. The typical section will be revised to include bike lanes in addition to the eight-foot wide sidewalks that were shown. This will require additional widening and an increased turning radius at Garrard Street.

- Both preliminary alternatives hold the existing curb line on the north side of the bridge and tie back to the existing sidewalk. This will create the least amount of impacts to adjacent properties and the historic districts.

- A new truss bridge would have a similar look to the existing bridge. The proposed bridge could maintain grades similar to the existing bridge and still meet USCG vertical clearance requirements. To meet USCG horizontal clearance requirements the river piers will be placed on the banks thereby increasing the truss span.

- As discussed previously, the steel plate girder bridge concept provides the most straightforward and least expensive construction for the roadway structure, but would require a grade increase of approximately six feet to maintain minimum USCG vertical clearance requirements. Stage-construction would maintain traffic and better provide for bicycle and pedestrian accommodations throughout construction. The staged construction would require a shift in alignment and additional widening into the Licking Riverside Historic District. This would also introduce a lane shift in the alignment of the westbound KY 8 through lanes across the Garrard Street intersection. Eliminating the staged construction would remove the shift in alignment and reduce impacts to the historic district. To reduce impacts, the project team decided to move forward with the plate girder bridge alternative without the staged construction.

8.0 REVISED ALTERNATIVES

In addition to the No-Build alternative and the Major Rehabilitation alternative, the project team advanced two alternatives for bridge replacement for further evaluation: a Truss Bridge Alternative and a Steel Plate Girder Bridge Alternative.

8.1 TYPICAL SECTIONS

The existing typical section on the KY 8 Licking River Bridge has three 11-foot lanes, with two lanes in the westbound direction, and a single lane in the eastbound direction.

The project team considered several possible typical sections, understanding that the typical section will ultimately be decided during the design phase of the project. Considering the potential for development in Covington and Newport, and the desire for the newly constructed bridge to accommodate traffic demand over its entire design life (50 to 100 years), the project team decided to use a four-lane bridge for this study. The typical section includes four 11-foot

lanes, a one-foot bicycle buffer (consisting of two four-inch wide white stripes with a four-inch gap), five-foot wide bike lanes, and 8.5-foot wide sidewalks. The roadway typical section is shown in **Figure 20**, the truss bridge typical section is shown in **Figure 21**, and the steel plate girder bridge typical section is shown in **Figure 22**.

Southbank Partners is a community/economic development organization that helps coordinate activities between the area Kentucky communities along the Ohio River. As part of their efforts, Southbank Partners is working with other agencies to promote and advance the Licking River Greenway, discussed in detail in **Chapter 1.2 - Previous Studies**. Representatives from the project team consulted with Southbank Partners in September 2016, to discuss the proposed typical section and its impact on the development of the greenway. A representative from Southbank Partners indicated the proposed typical section for the bridge and approaches, with its enhanced bicycle and pedestrian accommodations, would meet the needs of the trail in connecting the greenway trail segments across the Licking River. With this typical section, no additional bridge would be required to complete the greenway connection between Covington and Newport.

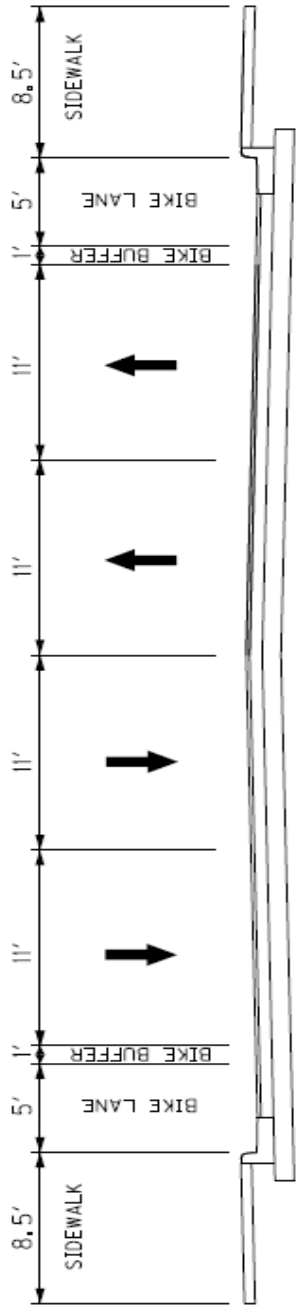

Figure 20: Typical Section for the Roadway

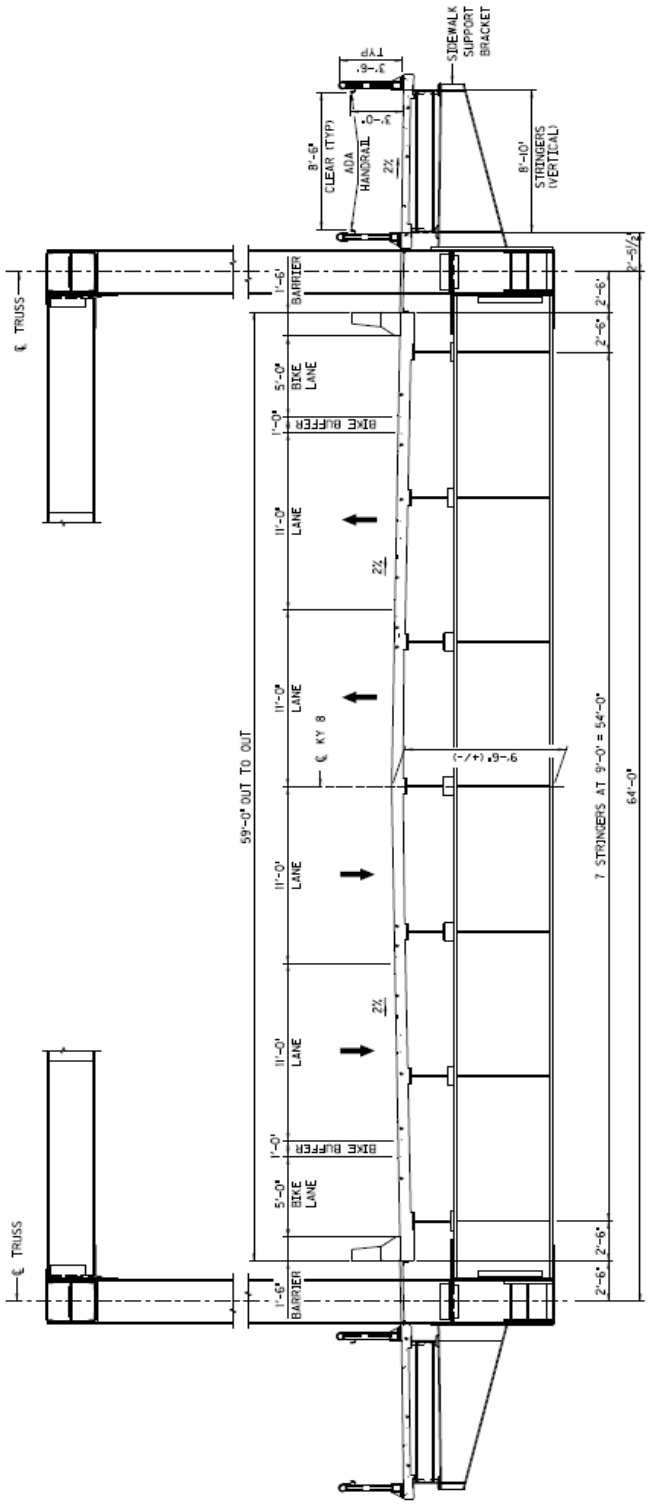

Figure 21: Typical Section for the Truss Span Alternative

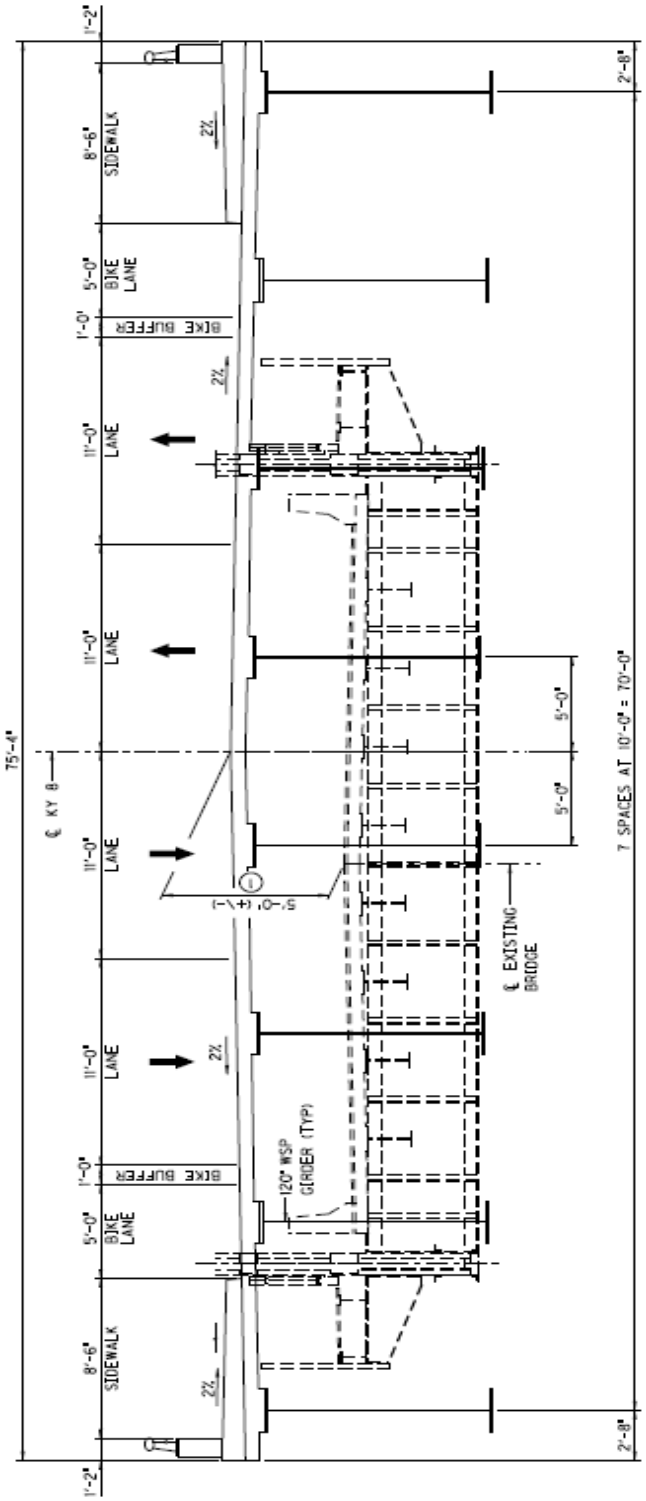

Figure 22: Typical Section of the Steel Plate Girder Alternative

8.2 COST ESTIMATES

Construction cost estimates were prepared for the major rehabilitation and the two bridge replacement alternatives, shown in **Table 3**. The estimated construction cost of the Major Rehabilitation alternative does not include any significant member strengthening or member replacement, which could be required after the completion of a fatigue life evaluation. KYTC District 6 provided approximate right-of-way and utility cost estimates. Cost estimates for all phases of the project are shown in **Table 4**. The truss bridge alternative is $4.7 million more expensive than the plate girder bridge alternative.

Alternative	Structure Unit	Construction Cost	Construction Total
Major Rehabilitation	N/A	$5,200,000	$5,200,000
Truss	Approach Units	$6,830,000	$20,800,000
	River Units	$11,320,000	
	Existing Bridge Demolition	$1,000,000	
	Roadway	$1,650,000	
Steel Plate Girder	Approach Units	$2,650,000	$16,500,000
	River Units	$11,210,000	
	Existing Bridge Demolition	$1,000,000	
	Roadway	$1,650,000	

Table 3: 2016 Construction Cost Estimates

Alternative	Design	Right-of-Way	Utilities	Construction	Total
Major Rehabilitation	$500,000	$0	$0	$5,200,000	$5,700,000
Truss	$2,100,000	$920,000	$1,000,000	$20,800,000	$24,820,000
Steel Plate Girder	$1,700,000	$920,000	$1,000,000	$16,500,000	$20,120,000

Table 4: 2016 Cost Estimates

9.0 CONCLUSIONS AND RECOMMENDATIONS

This section provides the recommendations for the KY 8 Licking River Bridge Scoping Study based on their ability to meet the purpose and need, the existing conditions analysis, the input received, and the alternative development process detailed in this report.

9.1 EVALUATION MATRIX

The project team produced an evaluation matrix, shown in **Figure 23**, for the revised alternatives discussed in **Chapter 8**. The Steel Truss Alternative is 86.6 feet wide, approximately 30 feet wider than the current bridge. This alternative would cost $24.82 million. The typical section for the Steel Plate Girder Alternative is 75.3 feet wide, approximately 20 feet wider than the original bridge. This alternative would cost $20.12 million.

9.2 FINAL PROJECT TEAM MEETING

The project team met for the final time on May 10, 2016. The purpose of the meeting was to discuss the revised alternatives and discuss the project team recommendations. A detailed summary of the final project team meeting is included in **Appendix G**. Key discussion items included the following:

- Since the second project team meeting, the Veterans Memorial Bridge was load rated for 17 tons. Signs have been posted at the bridge.
- At the previous meeting, three alternatives were presented: a steel truss, a stage-constructed steel plate girder, and a steel plate girder. The stage-constructed steel plate girder was dismissed and not updated. It was also decided at the last project team meeting that the bridge should accommodate bicycles and four-lanes of traffic. The revised typical sections are shown in Figures 19 – 21.

9.3 RECOMMENDATIONS

After more than 80 years, the bridge is nearing the end of its useful service life. The KY 8 Licking River Bridge is classified as functionally obsolete due to the narrow shoulder widths (one-foot) which do not meet current design standards. The bridge was load rated by KYTC Central Office staff in May 2016. After this load rating, the bridge was posted for 17 tons indicating that the bridge is also structurally deficient.

Alternative	Description	Representative Graphic	Satisfies Purpose and Need? (The purpose of this project is to provide a safe, modern, efficient, and multi-modal crossing of the Licking River within the existing corridor.)	Maintenance of Traffic Concerns	2016 Total Cost (All Phases)
NO-BUILD	Do nothing alternative.		No - does not improve efficiency, connectivity, or safety for any mode. The condition of the bridge and the recent reduction in load rating will result in on-going maintence costs. Trucks over 17 tons will have to use an alternate route.	N/A	$0
MAJOR REHABILITATION	Improvements to existing bridge to prolong structure life and increase load carrying capacity. Bridge was recently load rated for 17 tons.		No - would increases the load carrying capacity. Bridge would remain functionally obsolete with current (minimal) pedestrian accommodations and no dedicated bicycle accommodations.	Would likely require closure of the bridge for up to one construction season.	$5,700,000
STEEL TRUSS	Replace the existing bridge with a steel truss, similar in character to the existing bridge. Requires shifting the piers horizontally out of the river and minimal increase in roadway profile grade per U.S. Coast Guard requirements.		Yes - provides wide sidewalks and bicycle lanes as well as an additional travel lane for vehicles.	Would require closure of the bridge for one construction season.	$24,820,000
STEEL PLATE GIRDER	Replace the existing bridge with a steel plate girder bridge, similar in nature to the "Girl Scout Bridge" carrying 12th Street over the Licking River. Requires a significant increase in roadway profile (approximately 6').		Yes - provides wide sidewalks and bicycle lanes as well as an additional travel lane for vehicles.	Would require closure of the bridge for one construction season.	$20,120,000

Figure 23: Evaluation Matrix

The major rehabilitation alternative was dismissed from further consideration because it does not satisfy the purpose and need of the project and its cost would likely grow significantly after additional structural studies are performed. The major rehabilitation alternative would increase the load carrying capacity but the bridge would remain functionally obsolete with sidewalks that do not meet ADA requirements and shoulders that cause bicyclists to slow traffic over the bridge by blocking (impeding) a lane of travel.

The project team recommended the steel truss alternative and a steel plate girder alternative move forward for consideration in future project phases. While the traffic forecasts developed for the project do not warrant the immediate need for a four-lane bridge, the potential for development within the vicinity of the study area could have a significant impact on future traffic volumes. With known development sites such as Ovation east of the Licking River Bridge and the possibility of redevelopment of the IRS Service Center west of the study area, combined with the desire for any newly constructed bridge to accommodate traffic demand over its entire design life (50 to 100 years), a four-lane bridge is recommended for consideration in future project phases. The recommended typical section includes four 11-foot lanes, a one-foot bicycle buffer (consisting of two four-inch wide white stripes with a four-inch gap), five-foot wide bike lanes, and 8.5-foot wide sidewalks. Southbank Partners, advocates for the Licking River Greenway, support the proposed typical section for the bridge and approaches because the proposed enhanced bicycle and pedestrian accommodations would be suitable for use in connecting the greenway trail segments across the Licking River. This eliminates the need for constructing and maintaining a separate, dedicated river crossing for bicyclists and pedestrians.

A new truss bridge would have a similar look to the existing bridge, shown in **Figure 24**. The proposed bridge could maintain grades similar to the existing bridge and still meet USCG vertical clearance requirements. To meet USCG horizontal clearance requirements the river piers will be placed on the banks thereby increasing the truss span. The total cost estimate for this alternative is $24.82 million.

The steel plate girder bridge alternative, shown in **Figure 25**, provides the most straightforward and least expensive construction for the roadway structure, but would require an increase in the profile grade to maintain minimum USCG vertical clearance requirements. The total cost estimate for the plate girder bridge alternative is $20.12 million.

Regardless of which alternative is selected, a new truss bridge or a plate girder bridge, it will likely take a full construction season to build. A vehicular detour would be necessary during that time. Pedestrian and bicycle accommodations will also need to be considered.

Figure 24: Truss Alternative Layout

Figure 25: Steel Plate Girder Alternative Layout

9.4 NEXT STEPS

The next phase for the project would be Phase 1 Design (Preliminary Engineering and Environmental Analysis) to further evaluate the two options recommended for advancement. Further funding will be necessary to advance this project to the design phase.

10.0 CONTACTS/ADDITIONAL INFORMATION

Written requests for additional information should be sent to John Moore, Director, KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from the KYTC District 6 Project Manager, Carol Callan-Ramler, at (859) 341-2700 (email at carol.callan-ramler@ky.gov).