WEST RICHMOND

SMALL URBAN AREA STUDY

Madison County

Final Report | April 2024

TEAM KENTUCKY®
TRANSPORTATION CABINET

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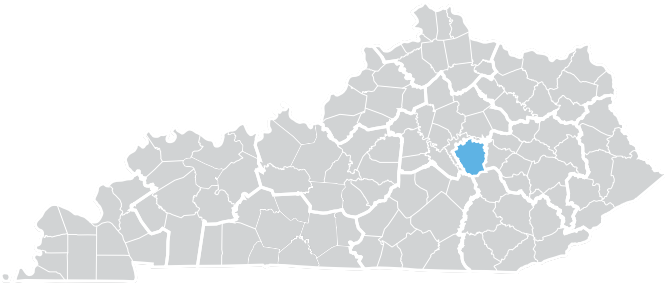

Executive Summary

The *West Richmond Small Urban Area (SUA) Study* was initiated by the Kentucky Transportation Cabinet (KYTC) to identify and analyze concepts to improve safety and congestion in the area west of I-75 in Madison County, Kentucky.

Existing Conditions

The West Richmond SUA study area, shown in **Figure ES-1**, includes areas west of I-75 including Barnes Mill Road (KY 876), Tates Creek Road (KY 169), Goggins Lane (CS 1574), and Crutcher Pike (CR 1354), among other roadways. The majority of Richmond, including downtown Richmond, Eastern Kentucky University (EKU), and most of the incorporated city, is located east of I-75 between Exits 87 and 90. In the last 20 years, development has expanded to the west, especially along KY 876 at Exit 87. This commercial section of KY 876 extends west to Goggins Lane, where it transitions to a more rural corridor with farmland and less dense residential neighborhoods. Goggins Lane provides the most direct north-south connection in the study area, paralleling I-75 to connect KY 876 to KY 169 and Jacks Creek Pike (KY 1156) to the north.

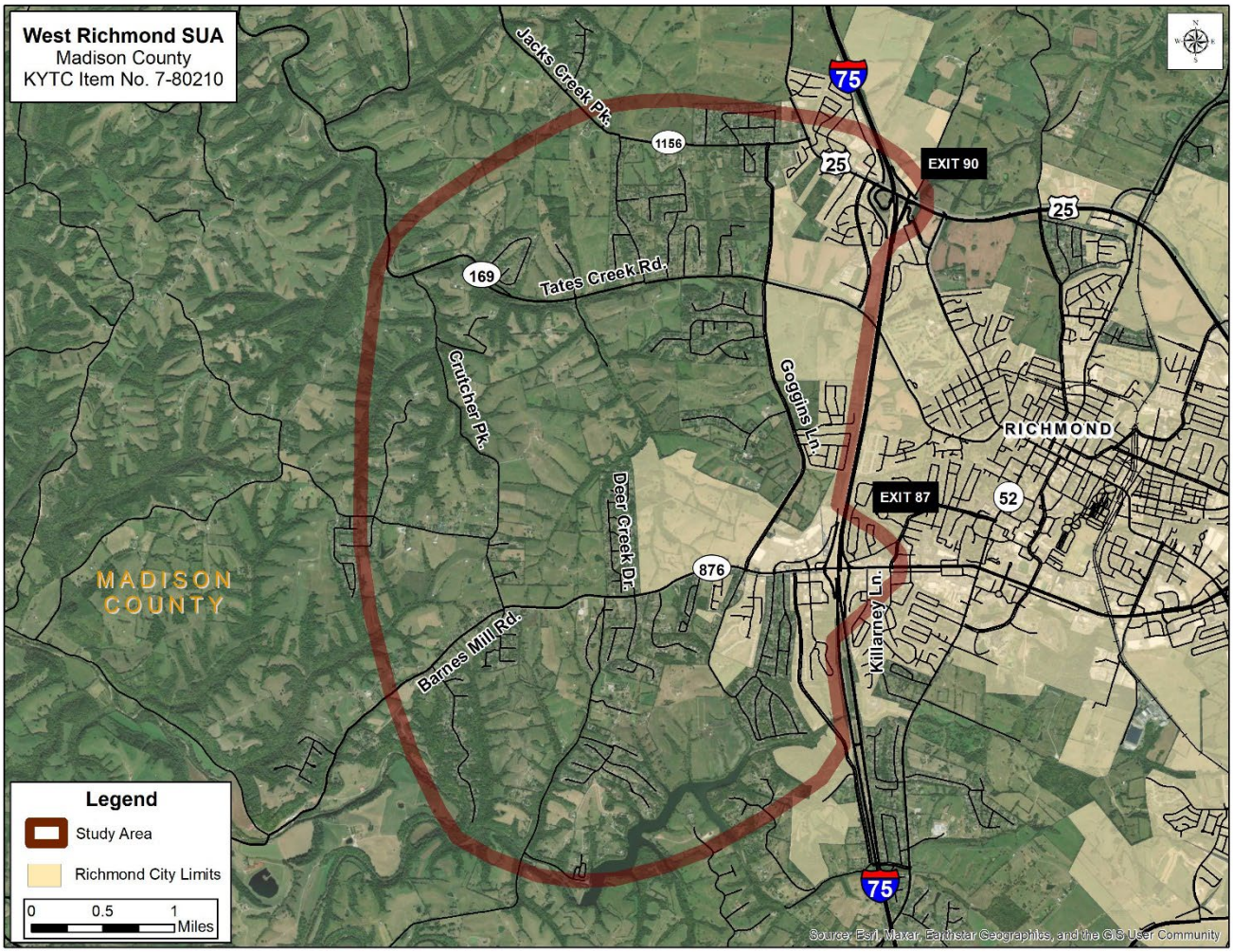

Figure ES-1: West Richmond Study Area

Daily traffic on KY 876 is heaviest just east of I-75, at 29,600 vehicles per day (VPD), and drops to 12,750 VPD west of the interchange. This decrease in traffic continues to the west, where KY 876 carries 4,100 VPD west of Deer Creek Drive (CR 1389A) and 1,700 VPD west of Crutcher Pike. KY 169 experiences a similar drop in daily traffic to the west, with 5,700 VPD east of Goggins Lane and 1,750 VPD to the west. AM and PM peak hour microsimulation models were developed for the KY 876 corridor between Goggins Lane and Killarney Lane, including the I-75 interchange. Results from the existing simulation model analysis show that all study area intersections operate at an acceptable level of service (LOS) D or better during the AM and PM peak hours.

Crash data were collected on study area roads for the five-year period between 2018 – 2022. Over the course of the five years, a total of 1,472 crashes were reported on study area roads (excluding mainline I-75), one of which resulted in a fatality (0.1 percent) and 254 resulted in one or more injuries (17.2 percent). The fatal crash was a head on collision on wet pavement on KY 169. The most common crash types were rear end (45 percent) and angle (23 percent) collisions, most of which occurred on the more congested routes near Exits 87 and 90. Single vehicle collisions (11 percent) were more common on the rural roadways to the west.

Future Conditions

Based on population projections from the Kentucky State Data Center (KSDC), Madison County has grown over the past 20 years and is expected to continue to grow, around 0.8 percent per year between 2020 and 2050.

Early in the study process, the project team met with local officials and stakeholders to solicit feedback on areas of concern and potential developments. Congestion was identified as the highest transportation concern, especially along the KY 876 corridor and at the I-75 interchange. This congestion is expected to increase as the study area continues to develop. A map depicting 11 anticipated developments in and around the study area is shown in **Figure ES-2**. The socioeconomic data in the Lexington Area Metropolitan Organization (LAMPO) Regional Travel Demand Model was updated to include these developments and 2045 daily model traffic assignments were compared to existing assignments to estimate growth patterns in the study area.

Future growth scenarios were developed based on historical traffic trends, regional population trends, anticipated developments, and output from the updated LAMPO Regional Travel Demand Model. The following annual growth rates were proposed to develop future year traffic volumes:

- Goggins Lane: two percent (2017 – 2023), five percent (2023 – 2035), two percent (2035 – 2045)
- West of I-75: two percent
- East of I-75: 0.8 percent
- I-75 Mainline: one percent

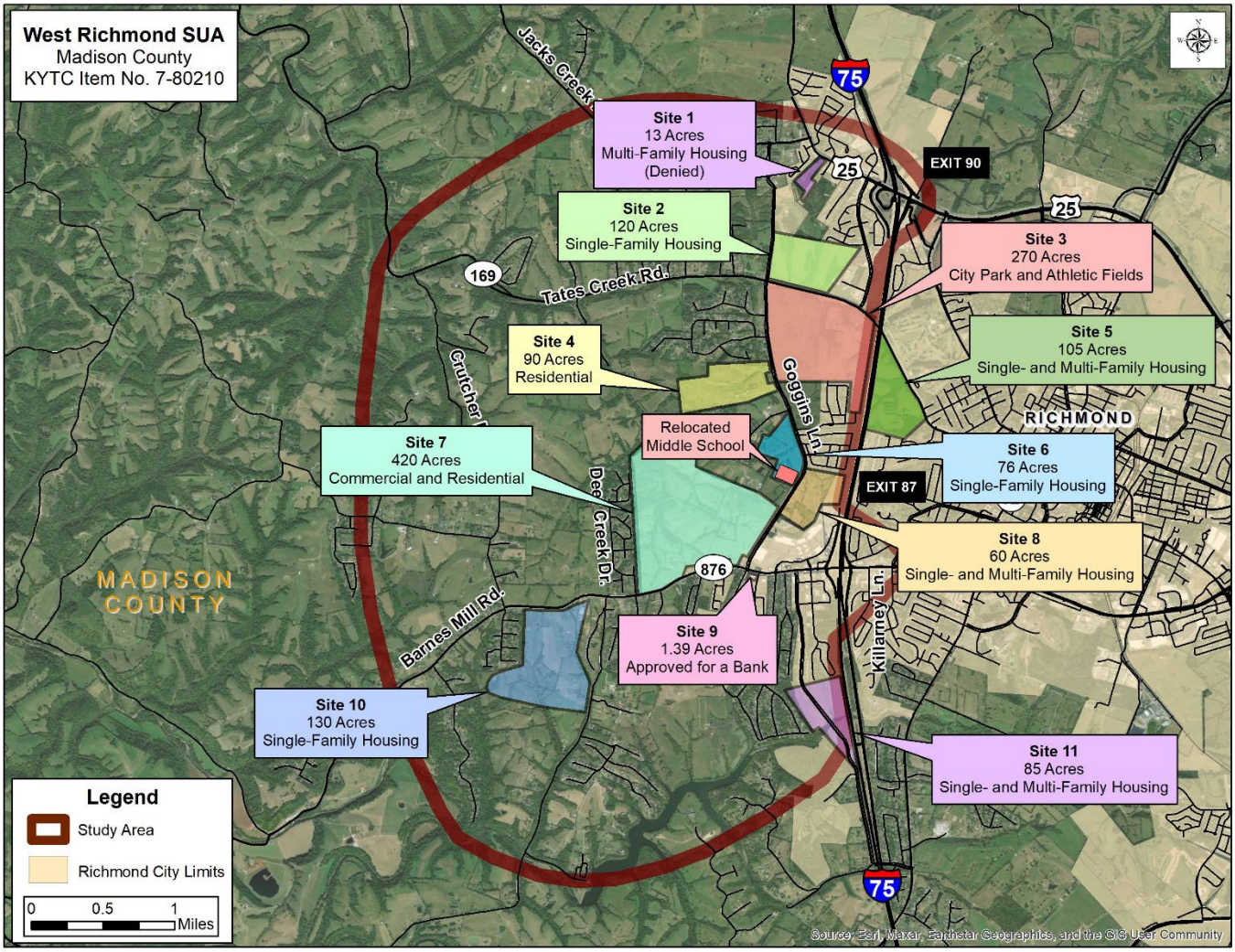

Figure ES-2: Anticipated Study Area Developments

These annual growth rates were then applied to the latest KYTC daily traffic counts (excluding counts from 2020) to develop 2045 daily traffic forecasts. KY 876 is expected to carry 35,800 VPD east of I-75 and 22,200 VPD to the east in 2045 while Goggins Lane is expected to carry 18,500 VPD.

Improvement Concept Development

Improvement concepts were developed based on a combination of input from the project team, a review of the existing conditions, traffic analyses, safety analyses, field reconnaissance, and input from the local officials and stakeholders. The improvement concepts were categorized as follows:

- **Short-Term:** The short-term concepts are typically lower-cost improvements that can be implemented in the near future. These types of improvements should require little or no right-of-way to construct and, in some cases, could be implemented by the KYTC Division of Maintenance as part of regular activities.

- **Long-Term:** The long-term concepts are higher-cost improvements that will require more significant resources to implement. These types of improvements will generally require additional right-of-way to construct and will need to be funded through a future Kentucky Six-Year Highway Plan.
- **Local Concepts:** The local concepts are not located on the state-maintained system and would likely need to be funded by the City of Richmond or Madison County. A private developer may also take on this responsibility.

Seven short-term and nine long-term concepts were initially developed. One of the short-term concepts and three of the long-term concepts were re-categorized as local concepts.

Over the course of the study, three Local Officials/Stakeholder meetings were held to coordinate on key issues. The first meeting included a discussion of the existing conditions and a survey to solicit feedback on areas of concern within the study area, potential growth areas, and potential improvement concepts. At the second meeting, local officials and stakeholders were asked to provide feedback on preliminary improvement concepts. The revised concepts, discussed below, were presented to the local officials at the final meeting.

Conclusions

The objective of the West Richmond Small Urban Area (SUA) Study was to examine existing safety and operational conditions and to recommend a list of transportation improvement concepts to address existing and long-term transportation needs for the area west of I-75 in Madison County, Kentucky. The concepts were prioritized based on results from the traffic analysis, local official feedback, and the Benefit-to-Cost Analysis (BCA), which was conducted based on crash savings and time travel savings, as discussed in Section 8.1 in the main report. The following presents a summary of the prioritized improvement concepts with cost estimates in 2023 dollars. Utility cost estimates assume all utilities in the project area will be impacted. More detailed estimates should be developed during the design phase to determine actual impacts.

Short-Term Improvement Concepts: the short-term improvement concepts were categorized as high, medium, or low priority, as shown in **Table ES-1** and **Figure ES-3**.

Table ES-1: Short-Term Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
A	KY 876 at Lantern Ridge Dr. / Amberly Way	Restripe Lantern Ridge Dr. & Amberly Way Approaches	$400,000	2.13	High
B	I-75 Southbound Off-Ramp	Construct Dual Right-Turn Lanes with Receiving Lane on KY 876	$1,080,000	0.97	High
C	KY 876 at Goggins Ln.	Construct Eastbound Goggins Ln. Left-Turn Lane	$970,000	0.72	High
D	KY 169 West of Goggins Ln.	Update Signage	$50,000	5.40	Medium
E	KY 876 West of Goggins Ln.	Construct Turn Lanes at Intersections	$3,090,000	0.29	Low

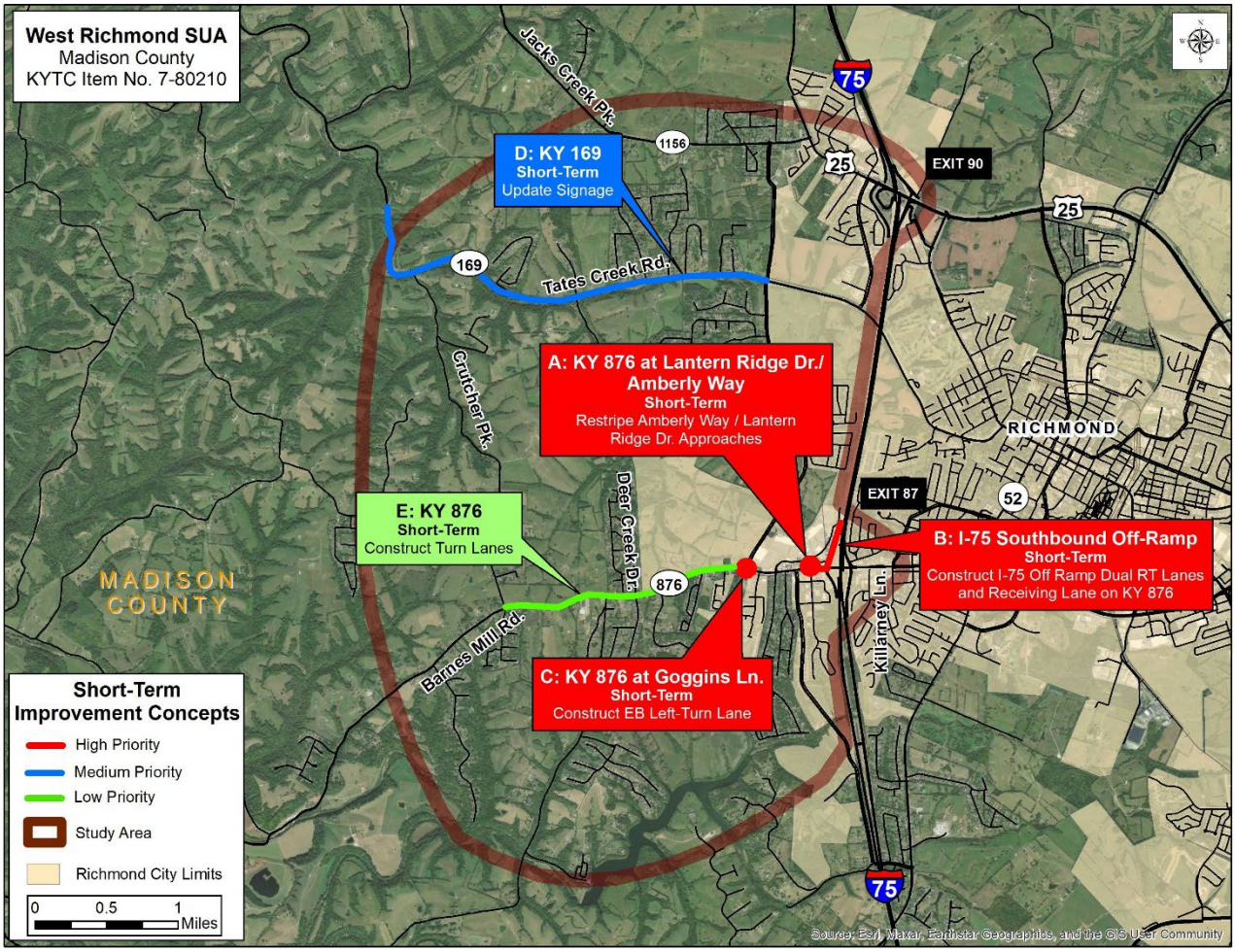

Figure ES-3: Short-Term Improvement Concepts

Long-Term Improvement Concepts: the long-term improvement concepts were categorized as high, medium, or low priority as shown in **Table ES-2** and **Figure ES-4**.

Table ES-2: Long-Term Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
F1	KY 876 Corridor & Goggins Ln. Intersection	Option 1: Install Raised Median, Shared Use-Path &Construct Single-Lane Roundabout	$5,780,000	0.90	High
F2		Option 2: Extend 4-Lane Section, Construct Shared-Use Path + Sidewalk & Construct Dual-Lane Roundabout	$12,360,000	0.71	
G	I-75 Interchange	Construct Single-Point Urban Interchange (SPUI)	$23,950,000	2.30	High
H	KY 169 at Goggins Ln.	Construct Single-Lane Roundabout	$2,580,000	0.39	High
I	KY 169 East of Goggins Ln.	Construct Shared-Use Path	$4,460,000	0.00	Low
J	KY 876 West of Goggins Ln.	Construct Two-Way Left-Turn Lane (TWLTL)	$7,830,000	0.00	Medium
K	KY 876 West of Goggins Ln.	Construct Shared-Use Path	$2,890,000	0.00	
L	KY 169 West of Goggins Ln.	2' Shoulder Widening on Both Sides of KY 169	$5,600,000	1.70	Medium

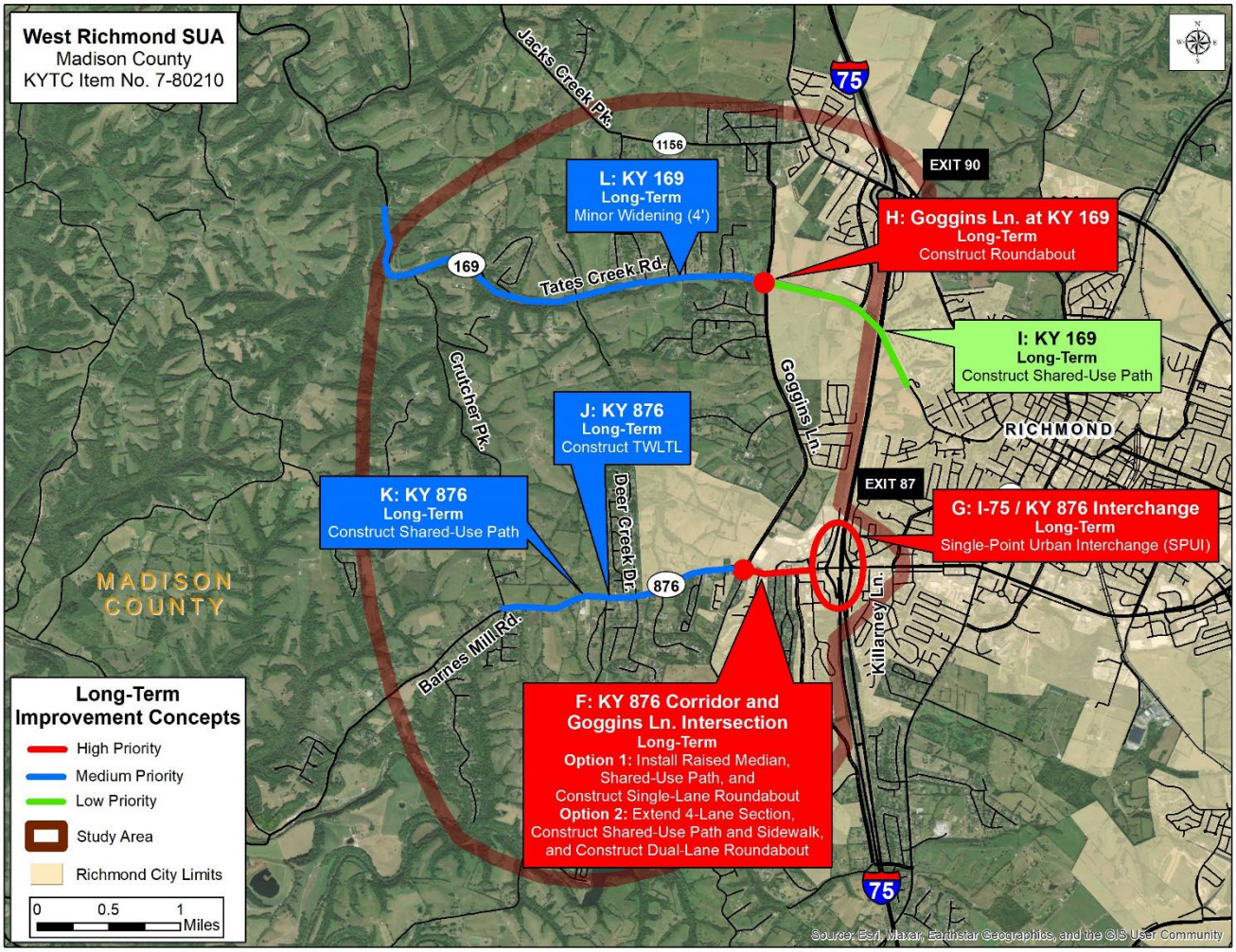

Figure ES-4: Long-Term Improvement Concepts

Local Improvement Concepts: the local improvement concepts were categorized as high, medium, or low priority and are shown in **Figure ES-5** and summarized in **Table ES-3**. Private developers, local planning staff, and local officials play a role in implementing these recommendations from the West Richmond Small Urban Area (SUA) Study. The proposed location and recommended typical section of the new roadways in Concept N and Concept O should be considered, along with commitments for general alignment or additional right-of-way, for rezoning applications, development plan applications, and plats. The future road connections identified are necessary as future development occurs to allow for additional routes and prevent high levels of congestion on the existing roads. As the larger area continues to develop over time, these connections will be critical in providing connectivity as well as alternative routes.

More detailed descriptions of all recommended concepts are included on the following pages.

Table ES-3: Local Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
M	Crutcher Pike	Improved Signage Widen Areas for Vehicles to Pull Over	$260,000	0.12	Low
N	New Routes (KY 876 to KY 1156)	Construct New Routes	N/A[1]	N/A	Medium
O	Victory Blvd. & Goggins Lane North of KY 169	Extend Victory Blvd. to Goggins Lane & Widen Goggins Ln. North of KY 169	$6,560,000	N/A	High
P	Goggins Ln. between KY 876 & KY 169	Construct Shared-Use Path	$2,970,000	0.00	Medium

[1] Cost is expected to be addressed by developers as the adjacent land develops.

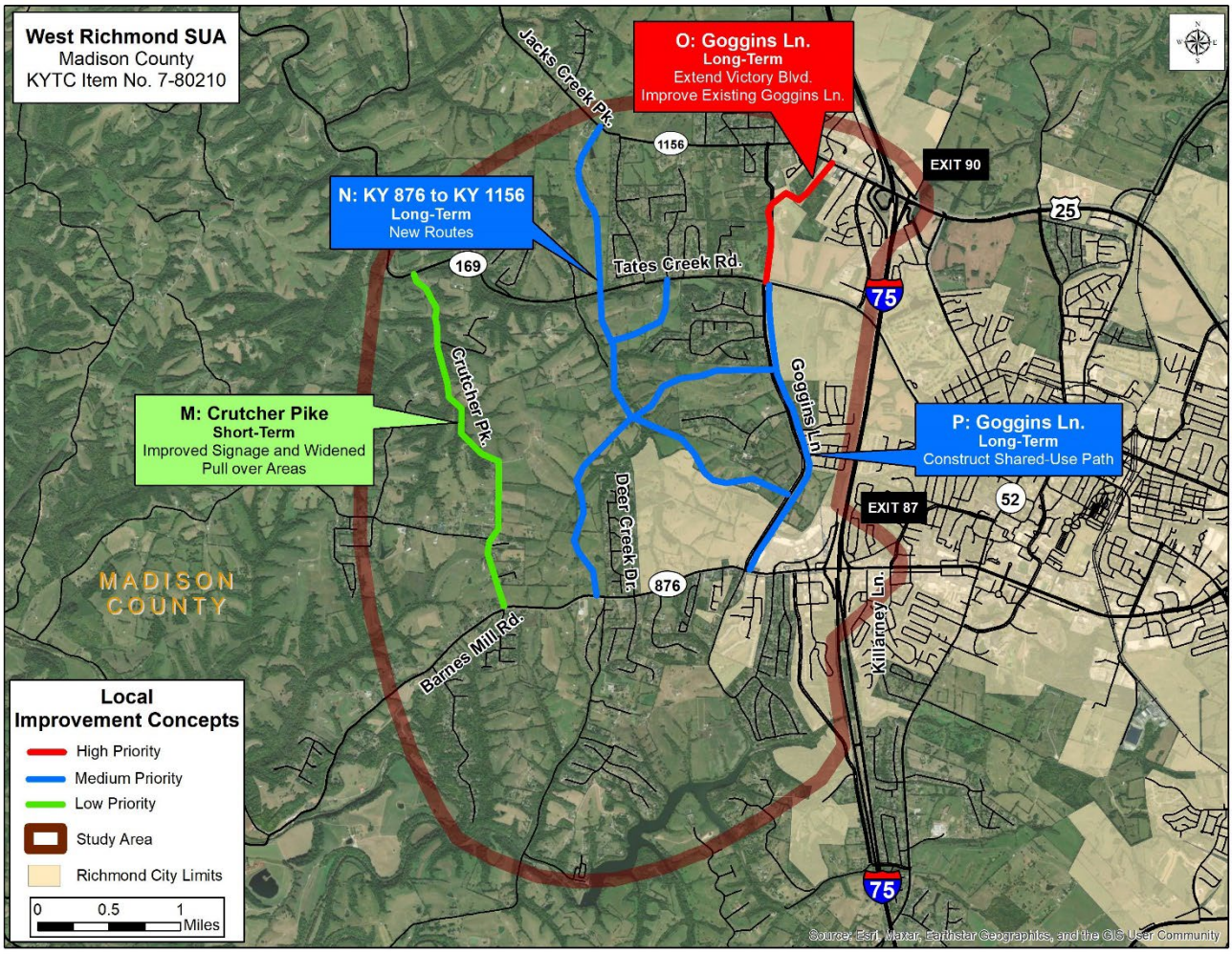

Figure ES-5: Local Improvement Concepts

Final Report

West Richmond
Small Urban Area Study

Kentucky Transportation Cabinet Central Office, Division of Planning Highway District 7, Lexington

In partnership with:

April 2024

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1.0 INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated the *West Richmond Small Urban Area (SUA) Study* in Madison County to improve safety and congestion in the area west of I-75 in and around Richmond, Kentucky. Madison County is part of KYTC District 7, as shown in **Figure 1.**

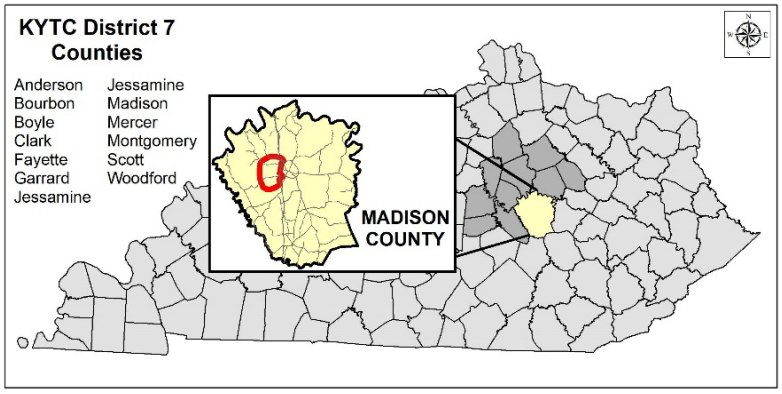


Figure 1: KYTC District 7 Map

1.1 STUDY AREA

The West Richmond SUA study area, shown in **Figure 2**, includes areas west of I- 75 in Richmond, Kentucky, including I-75 Exit 87, Barnes Mill Road (KY 876), Tates Creek Road (KY 169), Goggins Lane (CS 1574), and Crutcher Pike (CR 1354), among other roadways. I-75 Exit 90 was included in the study area and considered during the existing and future conditions analyses, however, improvements were not considered at Exit 90 or on mainline I-75 as part of the study.

Richmond is the seventh largest city in the state of Kentucky, with a 2020 census population of 34,594[1]. Centrally located in the state, much of Richmond, including downtown Richmond, Eastern Kentucky University (EKU) with a Fall 2022 enrollment of 12,072[2], and most of the incorporated city, is currently located east of I-75 between Exits 87 and 90. In the last 20 years, development has expanded to the west, especially along KY 876 at Exit 87, where Richmond Centre is home to a variety of restaurants and businesses. KY 876 also provides access to several residential neighborhoods, restaurants, and hotels. This commercial section of KY 876 extends west to Goggins Lane, where it transitions to a more rural corridor with farmland and less dense residential neighborhoods. Goggins Lane provides the most direct north-south connection in the study area, connecting KY 876 to KY 169 Tates Creek Road and Jacks Creek Pike (KY 1156) to the north.

Apart from the KY 876 commercial corridor and the area near Exit 90, the remainder of the study area is mostly rural, with pockets of residential development. Based on data from the Kentucky State Data Center (KSDC), Madison County's population has grown over the last 20 years and continued growth is expected. Much of this growth is expected to occur in the undeveloped areas within the study area.

[1] https://www.census.gov/quickfacts/fact/table/richmondcitykentucky/PST045222
[2] https://www.usnews.com/best-colleges/eastern-kentucky-university-1963#:~:text=It%20has%20a%20total%20undergraduate,is%20National%20Universities%2C%20%23352.

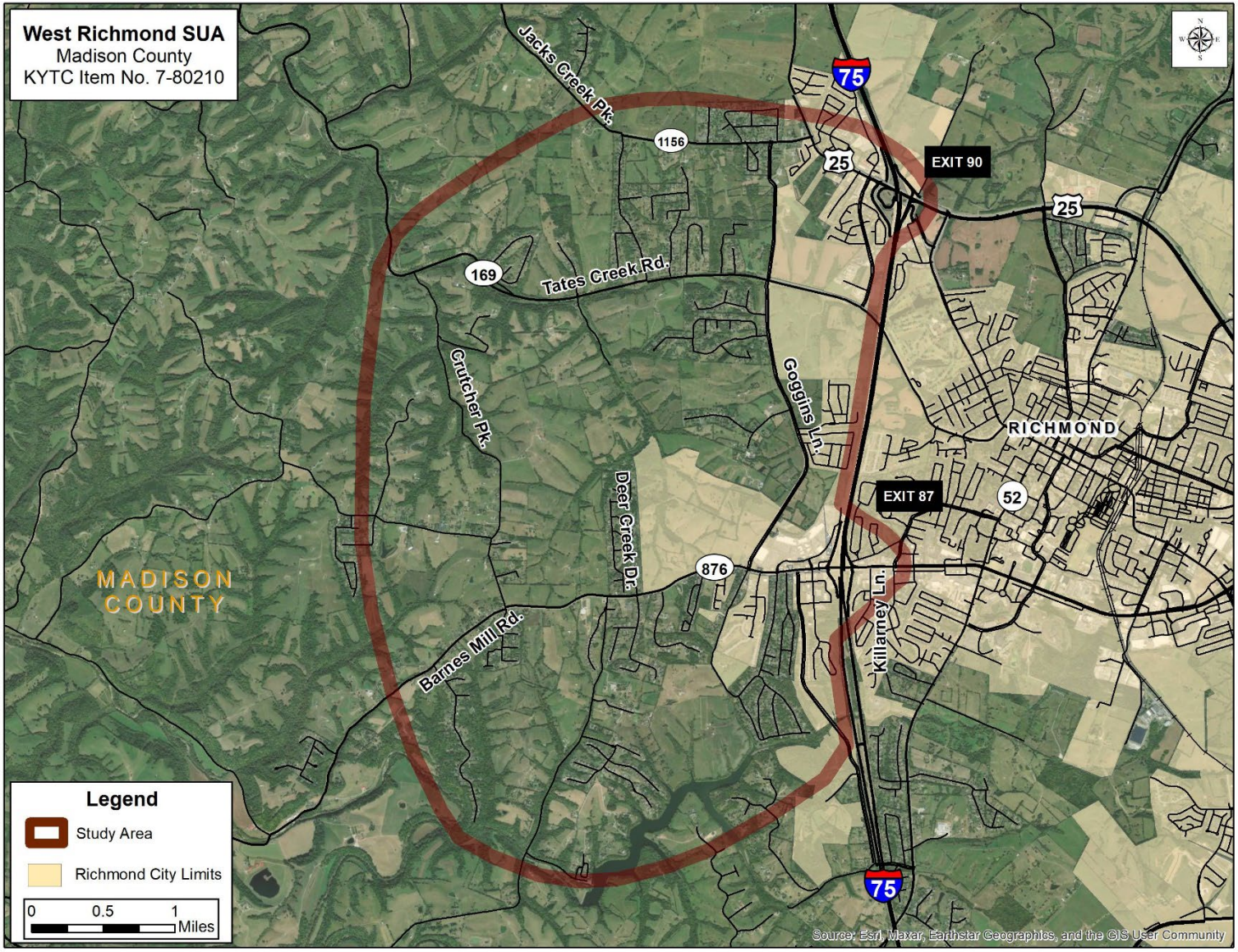


Figure 2: West Richmond SUA Study Area

1.2 STUDY GOALS

The study examined existing and future transportation conditions in terms of safety and traffic operations. Following the analysis of these characteristics, the study recommends a list of transportation improvement concepts to address existing and long-term transportation needs for this area of Richmond and Madison County. The basic work items accomplished under the transportation study included the following:

- Identify and examine transportation issues related to safety and congestion in the City of Richmond and unincorporated areas of Madison County identified in the study area.
- Develop short- and long-term recommendations for KY 876 to improve congestion and safety from the I-75 interchange westward.
- Identify improvements to Goggins Lane, KY 169, and other existing roadways (including bicycle and pedestrian improvements).
- Identify new routes to support a redundant network of roadways to support ongoing and future development within the study area.
- Recommend and implement a strategy for local planning and zoning to preserve the corridors for new routes.

1.3 PLANNED AND COMMITTED PROJECTS

There are no active projects in the study area listed in *Kentucky's 2022-2028 Enacted Highway Plan*.

2.0 EXISTING CONDITIONS

Conditions of the existing transportation network were examined and are shown in the following sections. The information compiled includes roadway facilities and geometrics, crash history, and traffic volumes within the study area. Data for this section were collected from KYTC's Highway Information System (HIS) database, KYTC's Traffic Count Reporting System, aerial photography, and field inspection.

2.1 FUNCTIONAL CLASSIFICATION

Functional classification is the process of grouping streets and highways according to the character of travel service they provide. The functional classifications of the study area and adjacent routes are shown in **Figure 3.** KY 876 is classified as a principal arterial east of I-75 and a major collector to the west. US 25 is the only other arterial, just inside the northeast boundary of the study area. The remaining state-maintained roads in the study area are classified as collectors.

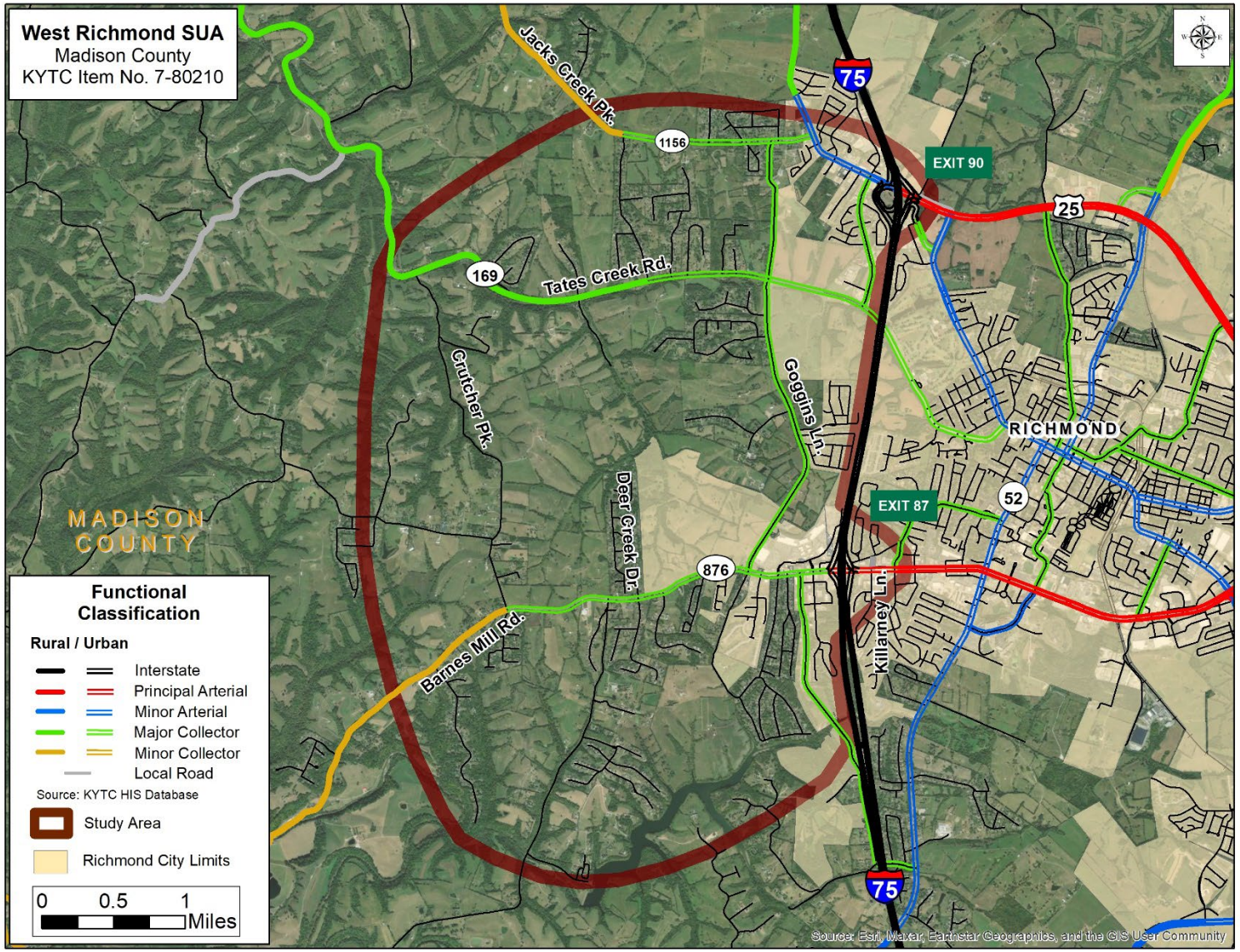
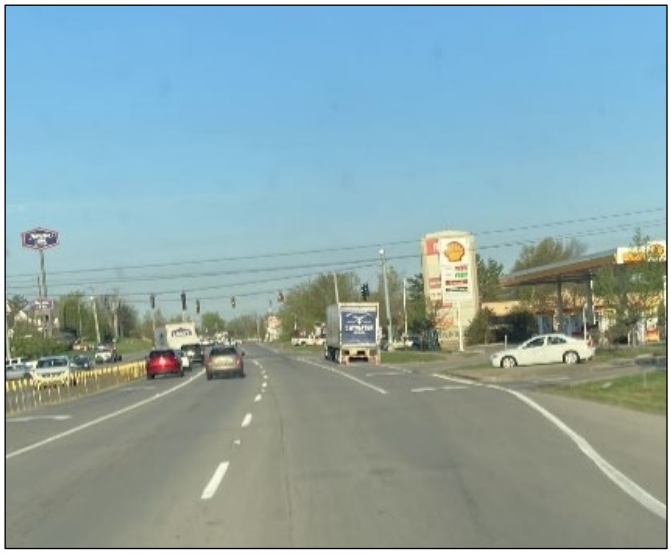


Figure 3: Functional Classification

2.2 ROADWAY GEOMETRY

KYTC's HIS database was used to identify roadway geometry. The current number of lanes and estimated lane widths within the study area are shown in **Figure 4**. Except for the commercial sections of KY 876 and US 25 near I-75, which include four 11-foot lanes, all study area roadways are listed in the HIS database as two-lane roads. Goggins Lane has a center two-way left-turn lane between KY 876 and KY 169. KY 169, KY 1156, and Goggins Lane north of KY 169 have lane widths less than 11 feet.



Commercial Section of KY 876 West of I-75

The shoulder widths for each roadway within the study area are shown in **Figure 5**. Sections of KY 876, KY 169, and US 25 near I-75 have ten-foot shoulders. The shoulder widths narrow in the more rural areas. Goggins Lane maintains curb and gutter between KY 876 and KY 169.

2.3 SPEED LIMIT

Posted speed limits for roadways within the study area are shown in **Figure 6**. KY 876 and the developed section of Goggins Lane have posted speed limits of 45 miles per hour (mph) in the study area, with KY 876 increasing to 55 mph to the west. KY 169 maintains a 55 mph speed limit throughout the study area.

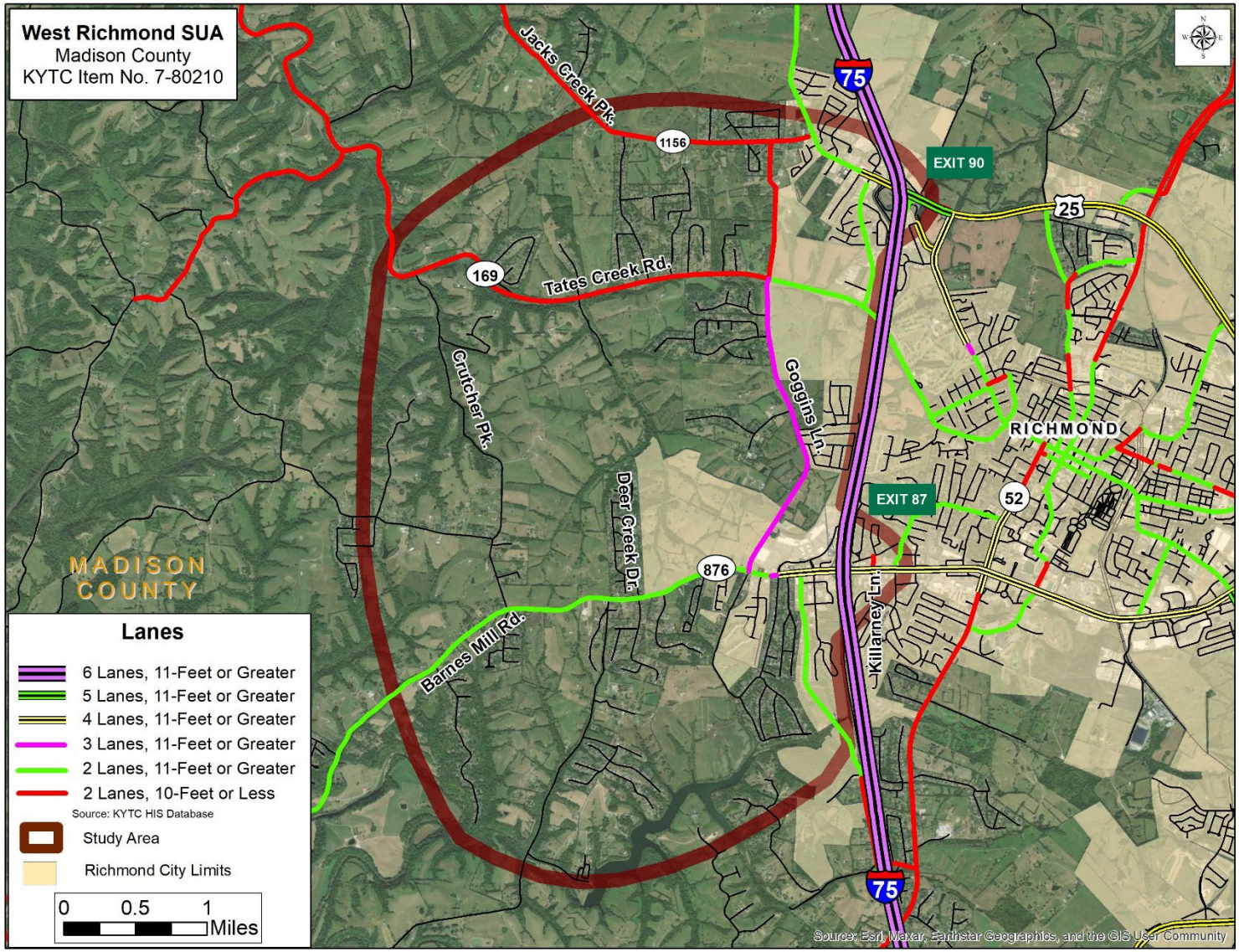


Figure 4: Number of Lanes and Lane Widths

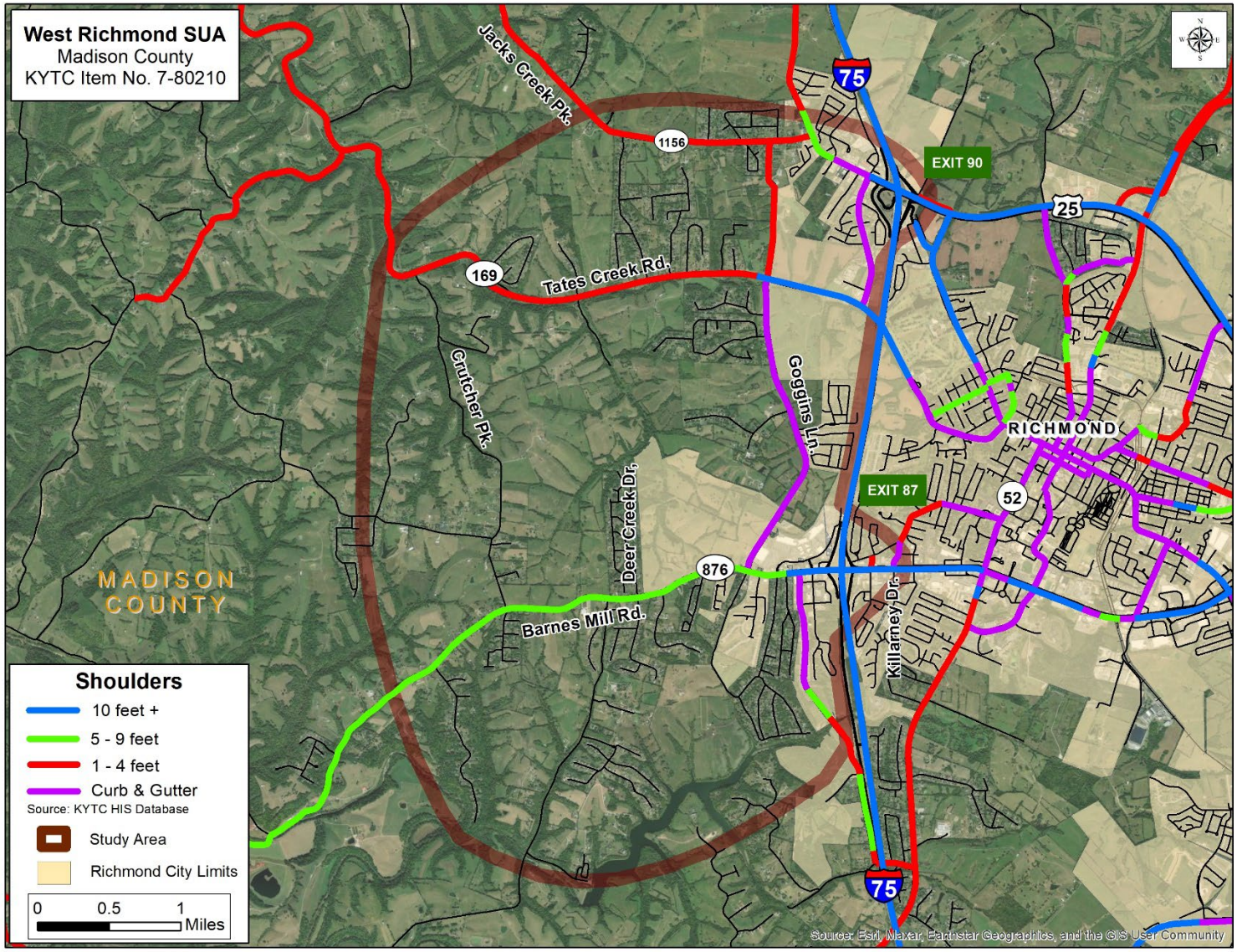


Figure 5: Shoulder Width

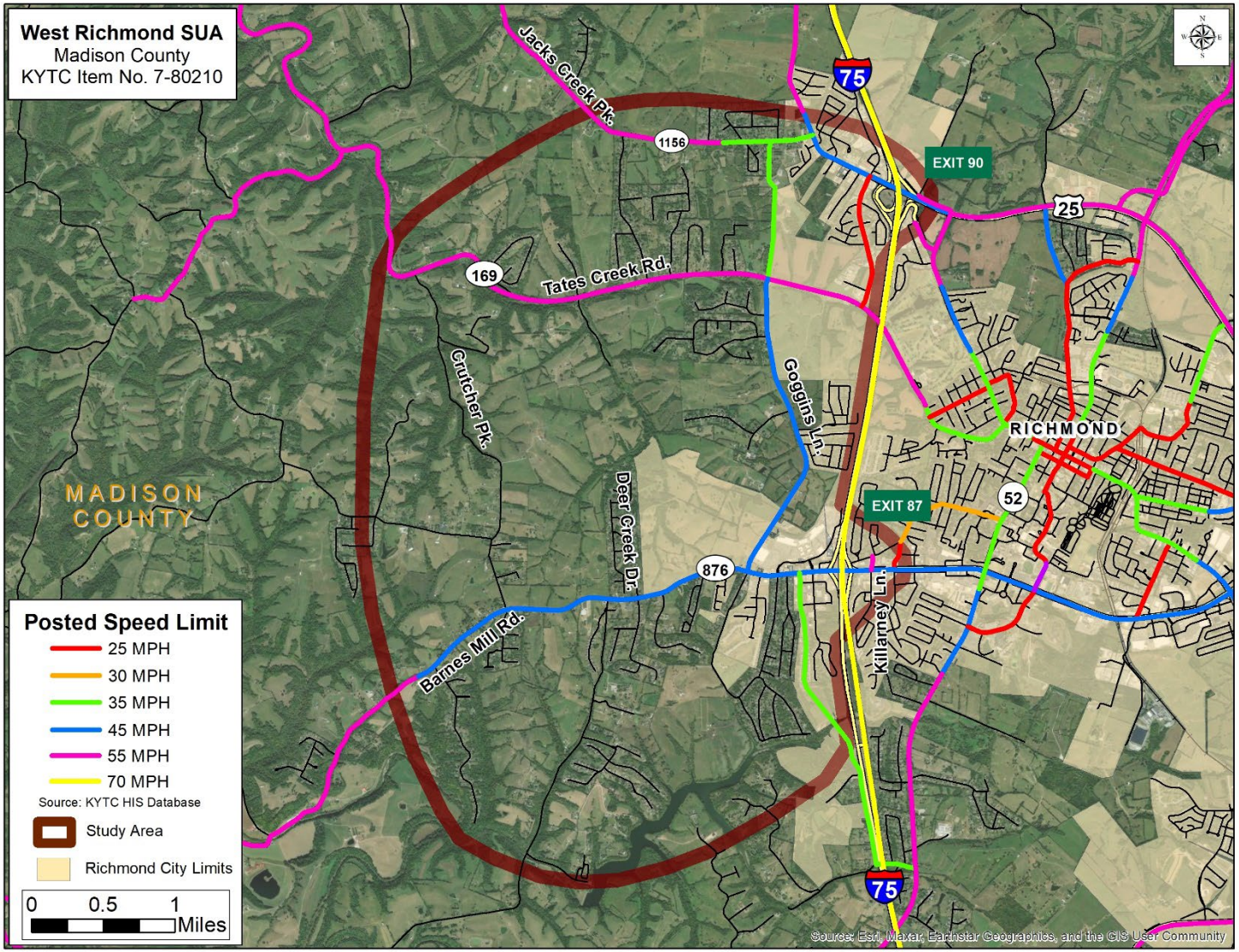


Figure 6: Speed Limit

2.4 EXISTING TRAFFIC ANALYSIS

Existing traffic volumes were analyzed for study area roadways. The most current average daily traffic (ADT) volumes from KYTC's traffic count stations are shown in **Figure 7.** Daily traffic on KY 876 is heaviest just east of I-75, at 29,600 vehicles per day (VPD), and drops to 12,750 VPD west of the interchange. This decrease in traffic continues to the west, where KY 876 carries 4,100 VPD west of Deer Creek Drive (CR 1389A) and 1,700 VPD west of Crutcher Pike. KY 169 experiences a similar drop in daily traffic to the west, with 5,700 VPD east of Goggins Lane and 1,750 VPD to the west. Goggins Lane currently carries 7,500 VPD between KY 876 and KY 169.

Peak hour turning movement counts were collected on March 8 and 9, 2023 at the following intersections:

- KY 876 at Killarney Lane
- KY 876 at I-75 NB Ramps
- KY 876 at I-75 SB Ramps
- KY 876 at Amberly Way
- KY 876 at Frankie Drive
- KY 876 at Goggins Lane

A site visit was performed on April 13, 2023 to observe traffic conditions and collect spot (15-minute) turning movement counts at driveways where turning movement counts were not collected. Traffic on KY 876 was heavy, especially during the PM peak, but was able to flow smoothly between Goggins Lane and I-75. During the site visit, queuing was noted on the I-75 southbound off-ramp during both the AM and PM peak periods.

2.4.1 2023 No-Build Traffic Microsimulation Model

2023 No-Build AM and PM peak hour microsimulation model scenarios were developed for existing conditions on the KY 876 corridor between Deer Creek Drive and Killarney Lane, including the I-75 interchange, using TransModeler, as shown in **Figure 8.**

The 2023 No-Build models, developed with turning movement counts collected in March 2023 and traffic signal timings provided by KYTC District 7, were calibrated to existing conditions, including volumes, queuing, and speeds, using recognized industry standards. A more detailed discussion of simulation model development and calibration statistics can be found in **Appendix A**.

Level of service (LOS), a qualitative measure describing operational conditions, was used to evaluate the adequacy of the existing roadway. In rural areas, LOS C or better is desirable and in urban areas, LOS D or better is desirable. Results from the 2023 No-Build simulation model analysis show that all study area intersections operate at an acceptable LOS D or better during the AM and PM peak hours. While the overall intersection operates at LOS D, the southbound I-75 off-ramp operates at LOS E during the PM peak. **Table 1** presents the 2023 No-Build traffic operations at the I-75 ramp terminal intersections, the most critical intersections in the study area.

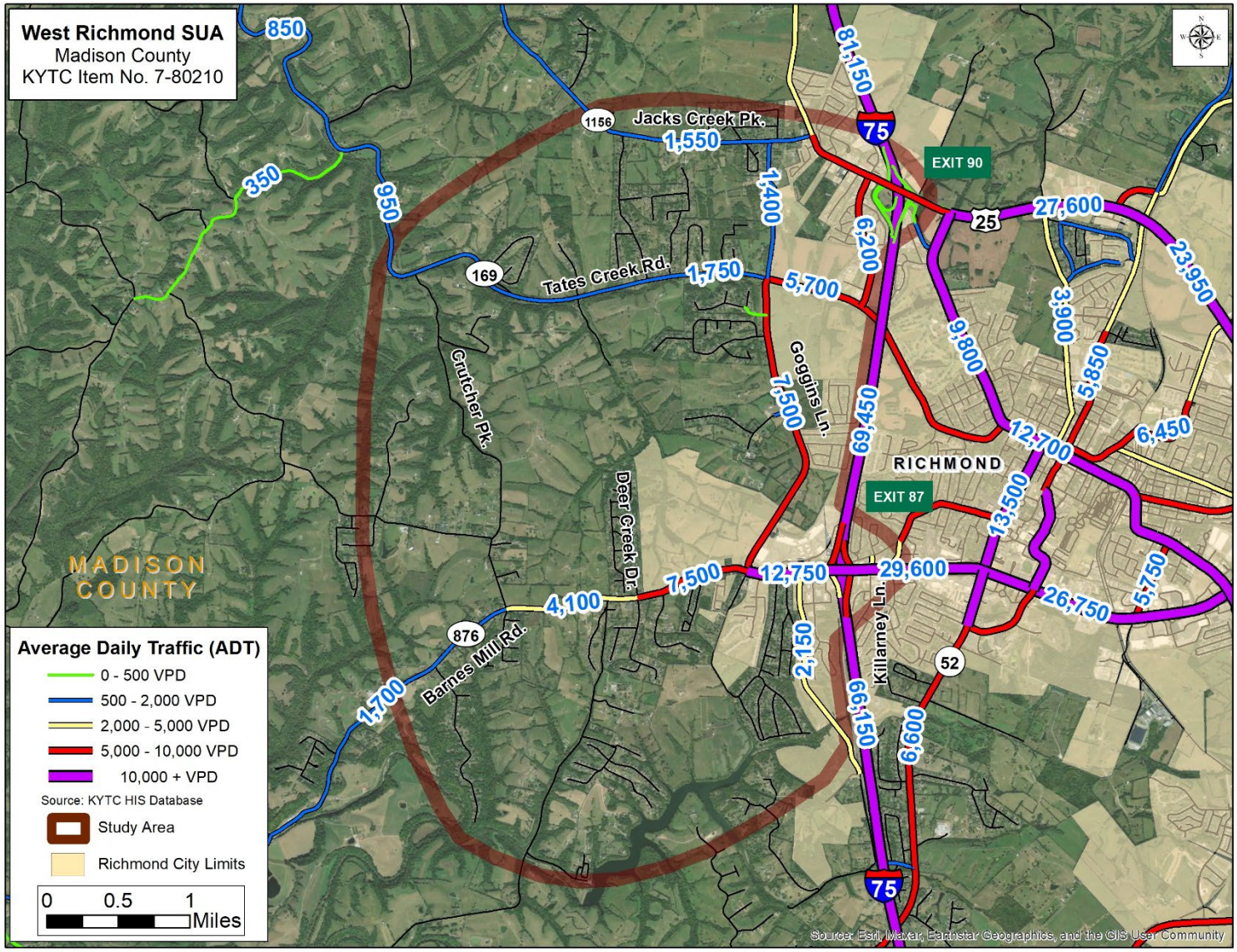


Figure 7: Average Daily Traffic (ADT)

Figure 8: Traffic Microsimulation Network

Table 1: 2023 No-Build Microsimulation Model Summary

Intersection	Approach	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
KY 876 at I-75 NB Ramps	EB KY 876	B	11.8	B	17.1
	WB KY 876	B	14.5	C	21.6
	NB Ramp	D	36.5	D	47.7
	Total	**B**	**18.5**	**C**	**25.9**
KY 876 at I-75 SB Ramps	EB KY 876	B	16.0	C	28.6
	WB KY 876	B	10.6	C	33.2
	SB Ramp	C	31.1	E	57.1
	Total	**B**	**17.8**	**D**	**37.9**

2.5 CRASH HISTORY

Crash data were collected on study area roads for the five-year period between 2018 – 2022. Over the course of the five years, a total of 1,472 crashes were reported on study area roads (not including mainline I-75). The crash records are included in **Appendix B**.

Of the 1,472 crashes, one resulted in a fatality (0.1 percent), 254 resulted in one or more injuries (17.2 percent), and 1,217 resulted in property damage only. The fatal crash was a head on collision on wet pavement on KY 169.

The most common crash types were rear end (45 percent) and angle (23 percent) collisions, most of which occurred on the more congested routes near Exits 87 and 90. Single vehicle collisions (11 percent) were more common on the rural roadways to the west.

2.5.1 I-75 Interchange (Exit 87)

Between 2018 and 2022, there were 201 reported crashes at the I-75 interchange with KY 876 (Exit 87), 34 (17 percent) of which resulted in an injury. The most common crash type was rear end collisions (80 percent), as shown in **Figure 9**, indicating that congestion may be a contributing factor. All 13 of the collisions reported on the I-75 southbound off-ramp were rear end collisions.

The Crash Data Analysis Tool (CDAT), developed by the Kentucky Transportation Center (KTC), was used to perform an Excess Expected Crash (EEC) analysis. EEC is a measure of the crash frequency at a given site compared to what is expected based on current conditions (geometrics, traffic, etc.). A positive EEC indicates more crashes are occurring than should be expected. Results from the safety analysis show the northbound I-75 ramp intersection has an EEC of three crashes per year and the southbound ramp intersection has an EEC of one crash per year.

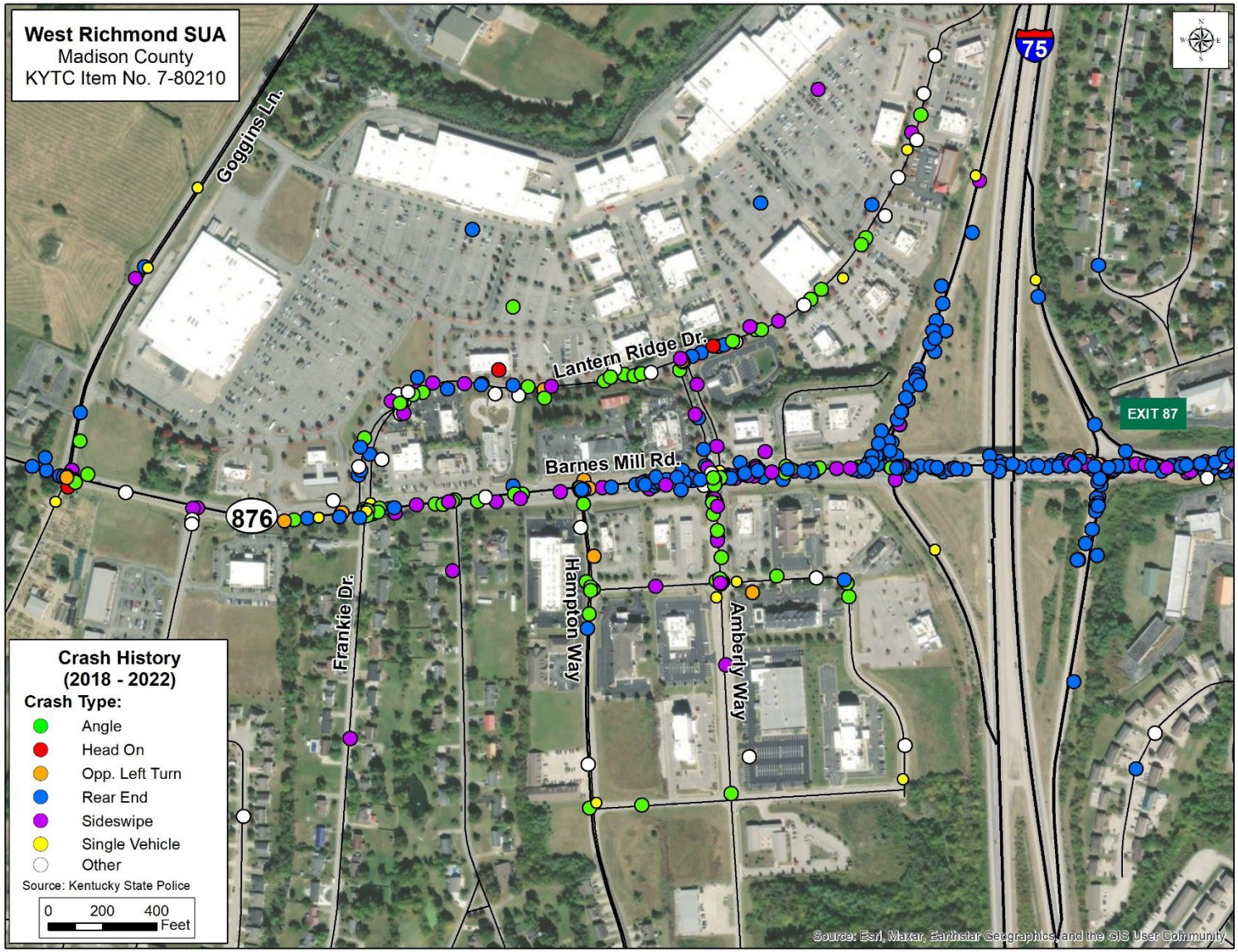


Figure 9: Crash Type (I-75 Exit 87)

2.5.2 KY 876 Between I-75 and Goggins Lane

West of the I-75 interchange, the KY 876 corridor serves commercial and residential areas with numerous access points and peak hour congestion. Over the five-year crash period, there were 248 reported crashes on the 0.56-mile section of KY 876 between the I-75 interchange and Goggins Lane. Of those crashes, 84 percent were rear end, angle, or sideswipe collisions, indicating that congestion and access management may be contributing factors. This portion of KY 876 has an EEC of seven crashes per year.

Goggins Lane intersects KY 876 at the western end of the existing commercial section. Between 2018 and 2022, there were 26 reported crashes at the intersection, 46 percent of which were rear end collisions and 27 percent were angle collisions.

2.5.3 KY 876 Between Goggins Lane and Crutcher Pike

Between Crutcher Pike and Goggins Lane, KY 876 serves mostly rural and residential areas. There are currently no signalized intersections and no turn lanes on this section of KY 876. Over the five-year period, there were 34 reported crashes, 12 (35 percent) of which resulted in an injury. Of the 34 crashes, the most common crash type was rear end collisions with 15, mostly clustered at the unsignalized intersections, as shown in **Figure 10**.

2.5.4 KY 169 Between Goggins Lane and Crutcher Pike

Between 2018 and 2022, there were 56 reported crashes on this 2.7-mile stretch of KY 169, one of which resulted in a fatality and ten of which resulted in an injury. The fatal collision was a head on crash that occurred on wet pavement near milepoint 4.2, as shown in **Figure 11**. Results from the safety analysis show this section of KY 169 has an EEC of 1.5 crashes per year. The Highway Safety Improvement Program (HSIP) District 7 Roadway Departure Study identified KY 169 as a corridor that could benefit from updated signage.

The intersection of KY 169 and Goggins Lane is currently a signalized intersection with left-turn lanes at all four approaches. Over the past five years, there were 24 reported crashes at this intersection, six (25 percent) of which resulted in an injury. Of the reported collisions, 83 percent were angle or rear end collisions.

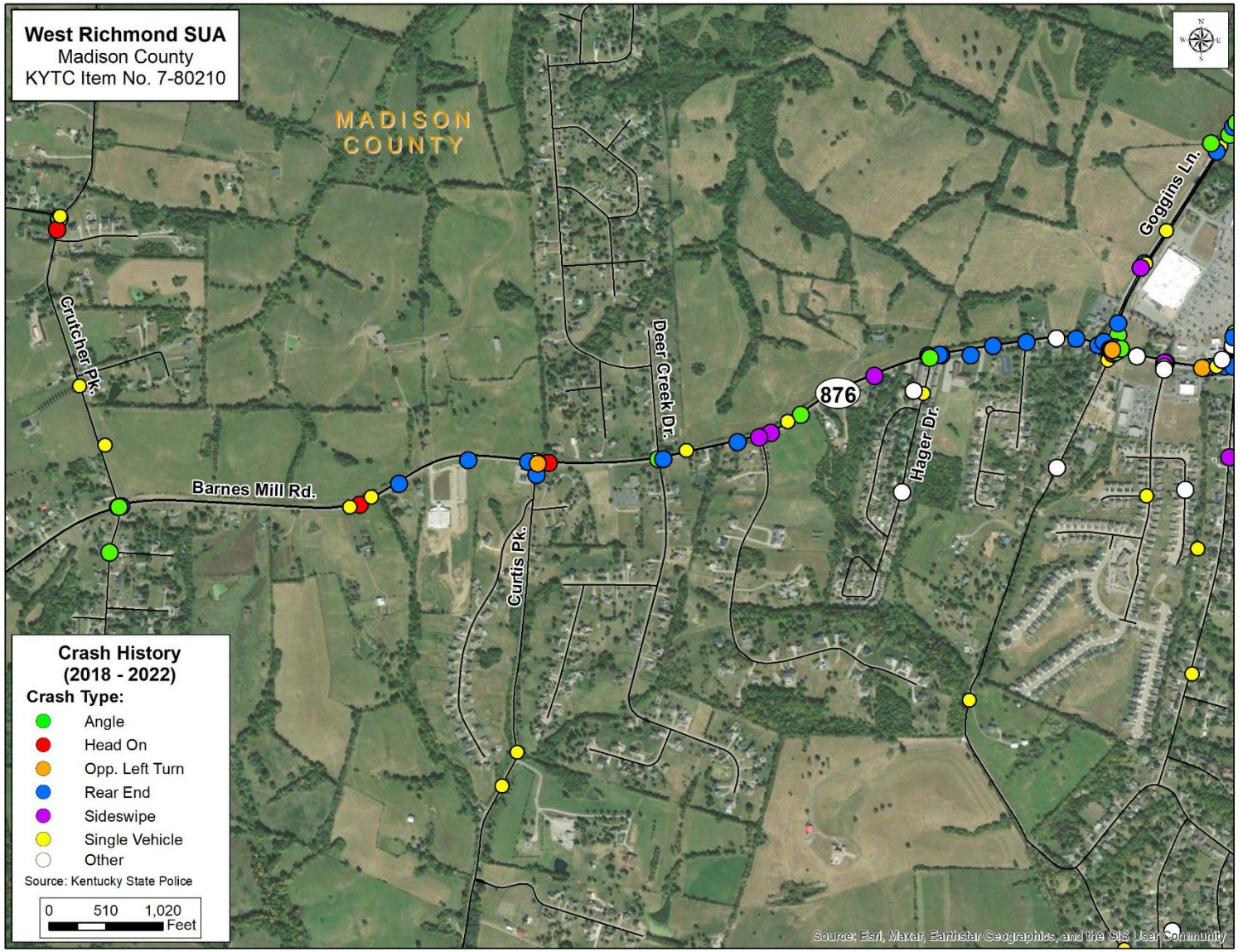


Figure 10: Crash Type (KY 876 West of Goggins Ln.)

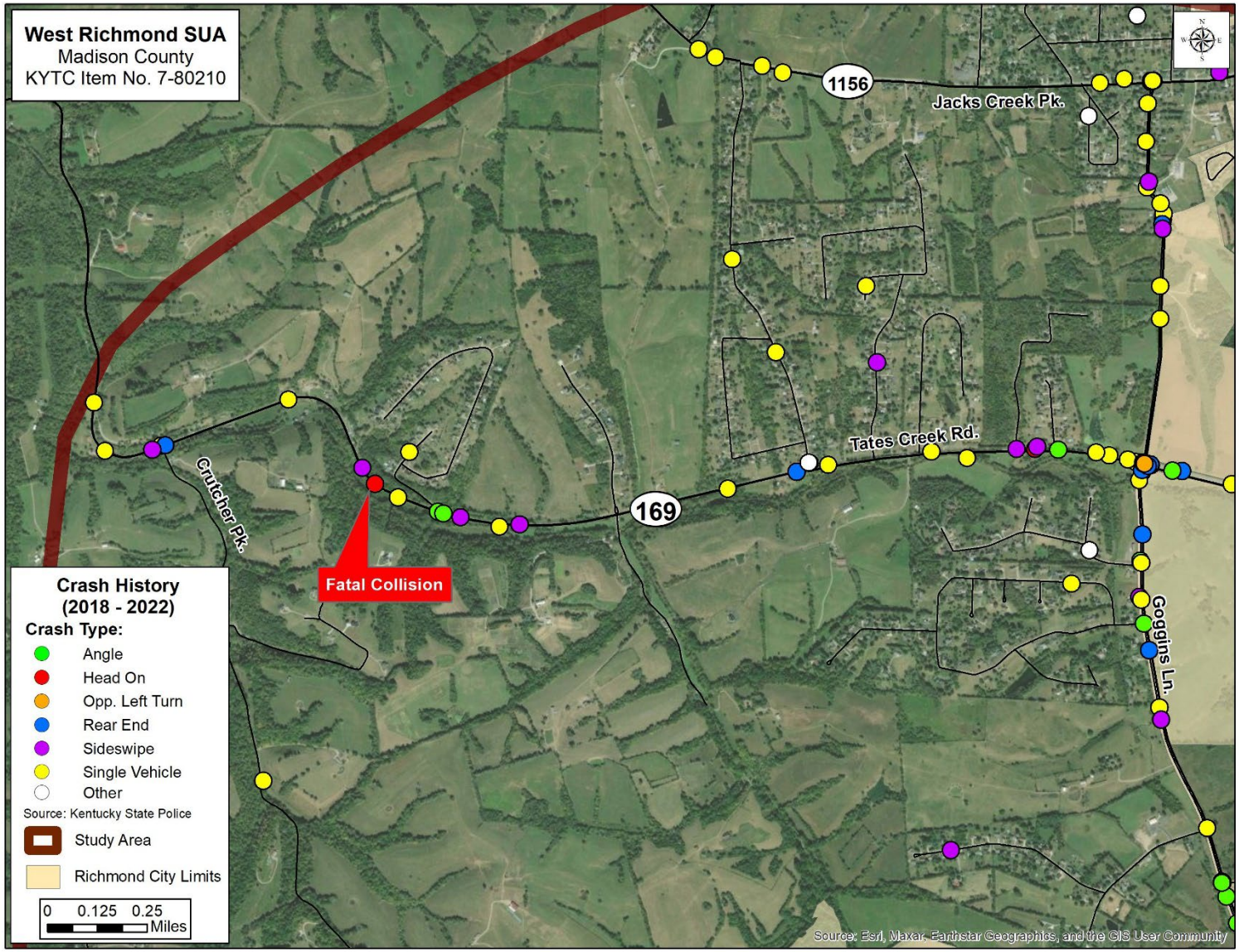


Figure 11: Crash Type (KY 169)

3.0 ENVIRONMENTAL OVERVIEW

An Environmental Overview (EO) was developed to identify known natural and human features which occur within the study area. These features were considered during the development and advancement of improvement concepts along with avoidance or minimization of impacts to the environment. The complete document is included in **Appendix C**.

3.1 NATURAL ENVIRONMENT

There are 175 National Wetland Inventory (NWI) and 37 National Hydrography Dataset (NHD) streams mapped within the study area, along with two 100-year floodplains. **Figure 12** summarizes these features within the central portion of the study area, and the rest of the study area is summarized in **Appendix C**. These floodplains are located along Tate Creek, which runs parallel to KY 169, and Taylor Fork south of KY 876.

A review of available data revealed 139 water wells within the study area, 130 of which are listed as monitoring wells and eight are domestic use wells. There are no federal wells identified within the study area. Most of the study area is underlain by carbonate rocks and has a high likelihood of karst features, however there are no records of caves or sinkholes.

According to U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC), there are seven federally listed endangered species, one federally listed threatened species, and one federally listed candidate potentially living in the study area.

Approximately 45 percent of the study area is classified as "Prime Farmland" or "Farmlands of Statewide Importance." These classifications are located within all parts of the study area, as shown in **Figure 13**.

3.2 HUMAN ENVIRONMENT

An overview of the human environment in and around the central portion of the study area is shown in **Figure 14**, with the rest of the study area summarized in **Appendix C.** Based on the review of National Register of Historic Places (NRHP), there are 15 registered historic places located within the study area vicinity. Community resources and sensitive noise receptors in the study area include several residential neighborhoods and houses, at least 16 houses of worship, one elementary school (Whitehall Elementary), one school under construction (Madison County Middle School), four childcare centers, and 15 public services.

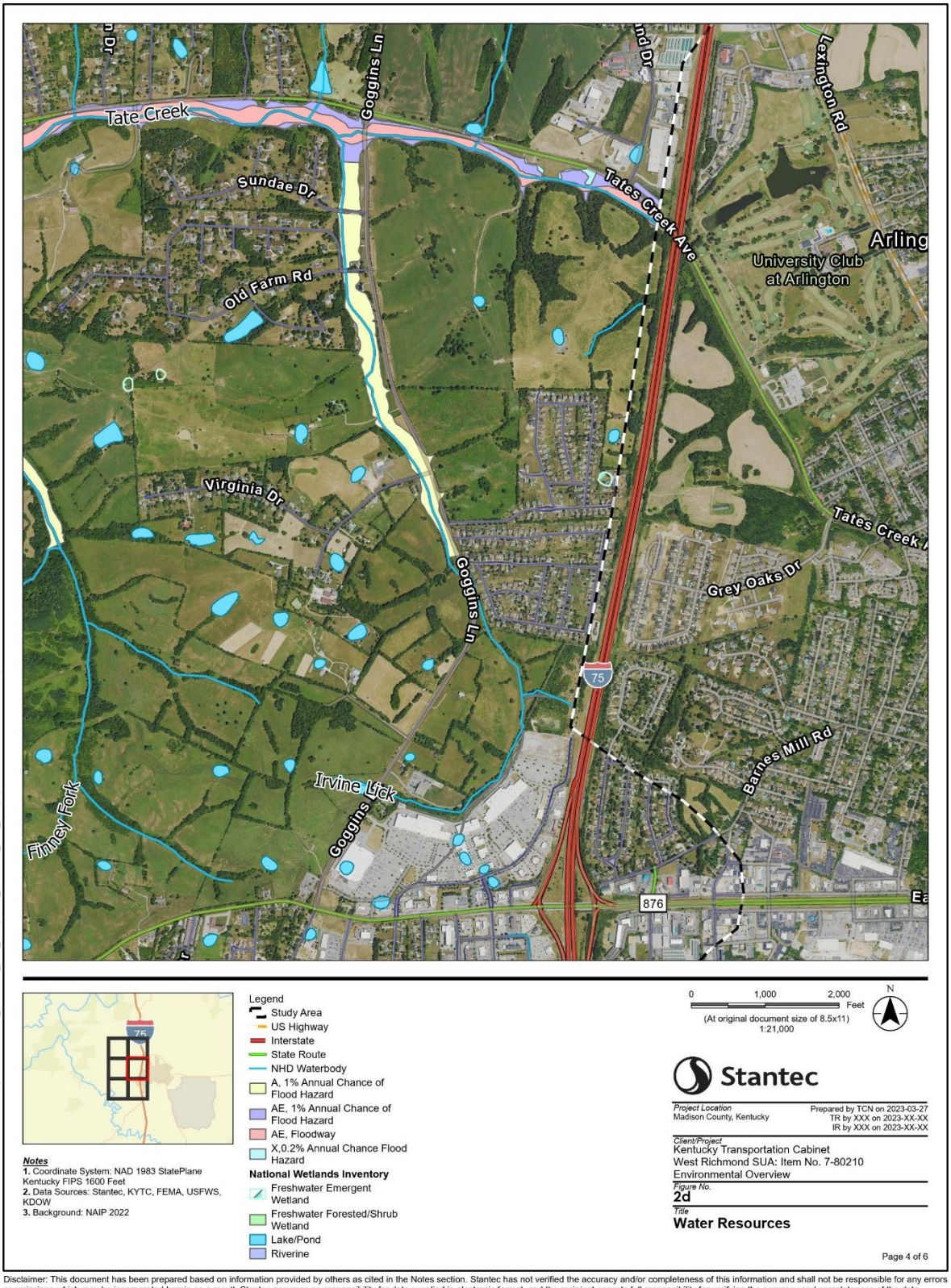


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Figure 12: Water Resources within Central Portion of Study Area

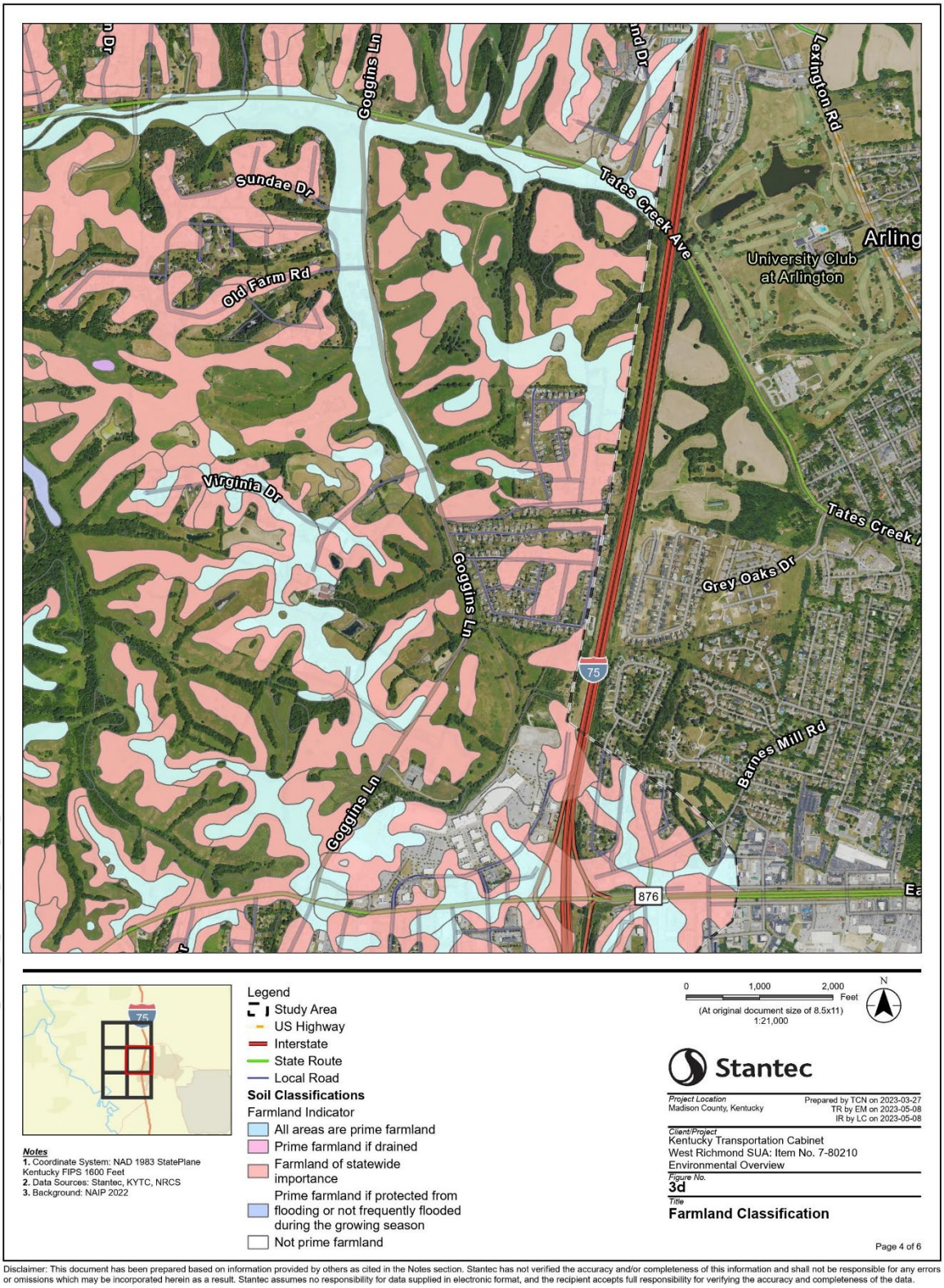

Figure 13: Farmland Classification within Central Portion of Study Area

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Figure 14: Human Environment within Central Portion of Study Area

There is the potential for private or family cemeteries in the study area that have not been previously mapped or located, including at the intersection of KY 876 and Goggins Lane.

3.3 SOCIOECONOMIC STUDY

The Kentucky Transportation Cabinet (KYTC) Division of Planning conducted a Socioeconomic Study for the study area. A complete copy of the report is found in **Appendix D.** The information in this report outlines 2016 – 2020 American Community Survey (ACS) statistics in and near the study area using tables, charts, and maps. The data presented in this document is intended to highlight areas of concern that will require additional analysis should any project be advanced to future phases.

This information is intended to aid in making informed and prudent transportation decisions, especially regarding the requirements of *Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Poverty status, Populations* (signed February 11, 1994). Statistics are provided for minority, elderly, poverty status, limited English proficiency (LEP), and disabled populations for the nation, state, and county in **Table 2**.

Table 2: Socioeconomic Summary

Category	United States	Kentucky	Madison County	West Richmond Study Area
Percent Hispanic or Latino	19.1%	4.2%	2.7%	0.0% - 7.8%
Percent Below Poverty Line	12.5%	16.6%	15.4%	1.4% - 30.5%
Percent of Adults over 65	17.9%	17.5%	14.3%	12.1% - 23.7%
Percent of Adults with a Disability	15.6%	21.1%	18.0%	8.9% - 23.7%
Percent with Limited English Proficiency	4.9%	2.4%	1.0%	0.0% - 0.7%

Overall, most of the study area has low rates of minority representation and is on par with the national and statewide poverty rates. The census tracts just east of I-75, which overlaps a small portion of the study area, have higher rates of Hispanic population, individuals below the poverty line, adults over 65, and adults with a disability. Alternative transportation options, including sidewalks and shared-use paths, were considered and recommended to provide connections across I-75.

During future phases of project development, a more detailed and robust analysis would be required for the National Environmental Policy Act (NEPA) documentation when assessing the potential for adverse and disproportionate impacts to those with disabilities, poverty status, and minority populations.

4.0 LOCAL OFFICIALS MEETING NO. 1

Over the course of the study, the project team met with local officials and stakeholders to coordinate on key issues. Agencies represented included the City of Richmond, Madison County, the Kentucky General Assembly, Madison County Schools, Madison County Fire Department, Richmond Fire Department, and the Madison County Sheriff's Office.

The project team included representatives from KYTC Central Office, KYTC District 7, and the consultants Taylor Siefker Williams (TSW) Design Group and Stantec. Detailed summaries of each meeting are presented in **Appendix E**.

The first Local Officials / Stakeholder Meeting was held at the Madison County Public Library and on May 10, 2023. The purpose of the meeting was to discuss results from the existing conditions analysis and to solicit feedback from the local officials and stakeholders on areas of concern, possible growth, and potential improvement concepts.

- Projects from Vision Richmond 2040 were discussed, including extending Victory Boulevard, a connection from Goggins Lane to Lexington Road, and widening Willis Branch Road from Goggins Lane to Lakeshore Drive, including drainage improvements.
- The Madison County Comprehensive Plan identifies most of the study area as a location of future single-family residences. Most of the area is not served by the municipal sewer system. Without sewer utility systems, single-family residential areas are limited to one unit per acre.
- The local officials and stakeholders were then invited to participate in a group mapping exercise. Large, plotted maps were made available for participants to identify problem spots related to safety, congestion, locations of growth, and potential transportation improvements. All 12 attendees participated in the exercise.

  Attendees were first asked to identify areas of concern related to safety and congestion. No areas of concern related to safety were identified. **Figure 15** presents the identified areas of concern related to congestion. Locations one, two, and three are related to congestion around the I-75 interchange and the KY 876 corridor. There is not currently congestion at location four, however there are concerns that traffic will divert to the Old Town Branch Tunnel to avoid congestion on KY 876.

  Attendees were then asked to identify areas where growth is likely to occur. A map of known developments was presented based on previous conversations with local officials and stakeholders, which identified 11 anticipated development sites in the study area. This map was updated based on comments from the local officials and is discussed in the Future Conditions section of this report (Section 5.0).

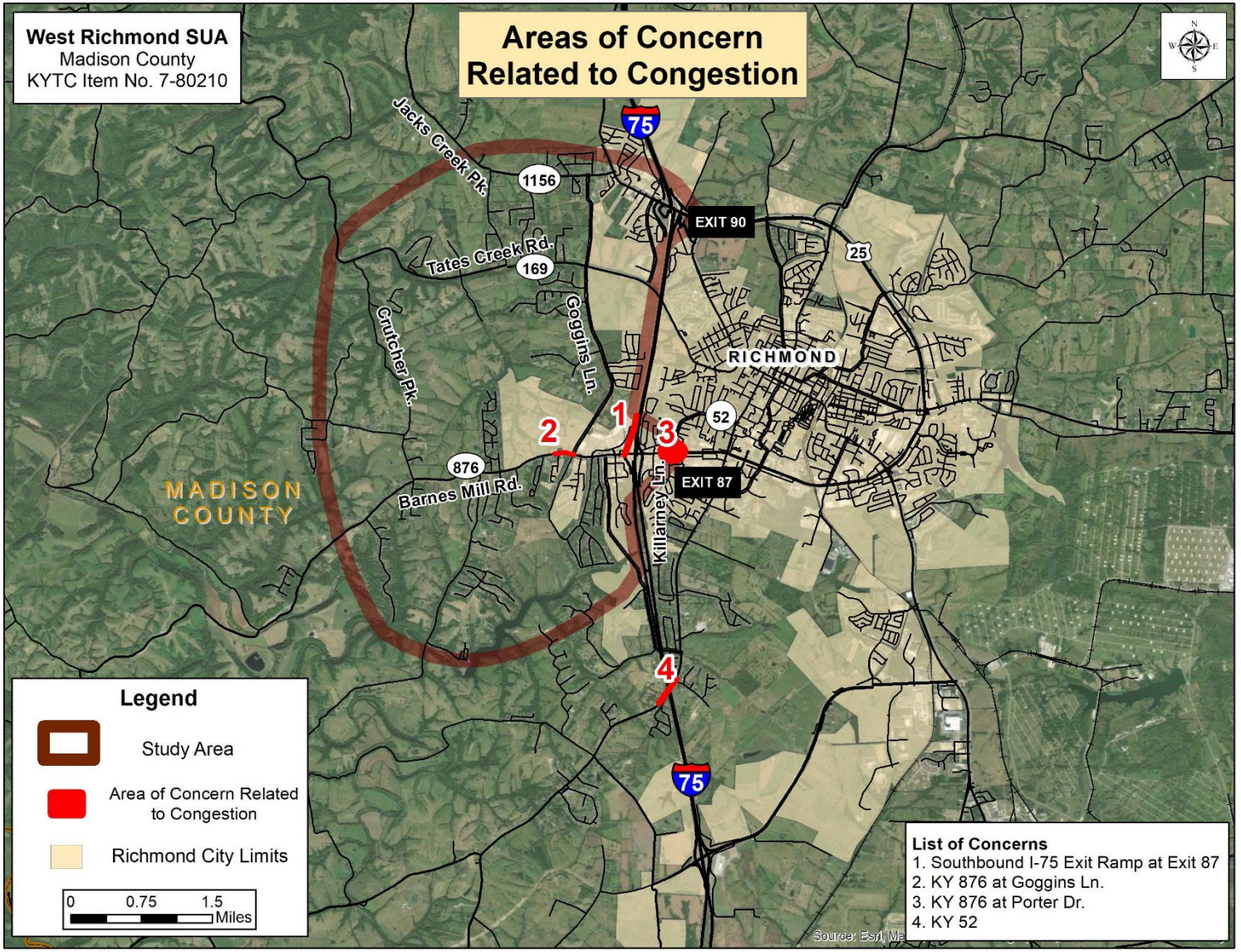


Figure 15: Local Officials / Stakeholder Survey No. 1 – Areas of Concern Related to Congestion

Attendees were asked to identify locations of potential transportation improvements. Several improvements were identified, as shown in **Figure 16.**

1) Construct a new route between KY 876 and KY 169.
2) Construct a new route between Old Town Branch and KY 52 west of I-75.
3) Construct a new route between KY 876 and Duncannon Lane.
4) Widen and improve existing KY 169.
5) Widen and improve existing Crutcher Pike.
6) Extend Victory Boulevard to KY 169.

5.0 FUTURE CONDITIONS

To determine the need for and purpose of potential transportation improvement options, it is necessary to estimate future conditions. This chapter summarizes the anticipated future conditions within the study area.

5.1 POPULATION TRENDS

Population data, including data from the 2020 Census, were obtained from the Kentucky State Data Center (KSDC) at the University of Louisville, Kentucky's official clearinghouse for Census data. Population estimates and projections for the state of Kentucky, Madison County, and Richmond are summarized in **Table 3**.

Between 2000 and 2020, Madison County and Richmond grew at a faster rate than the state average, at rates of 1.35 percent per year and 1.22 percent per year, respectively. This growth is expected to continue in Madison County over the next 30 years. Population projections are not available for cities.

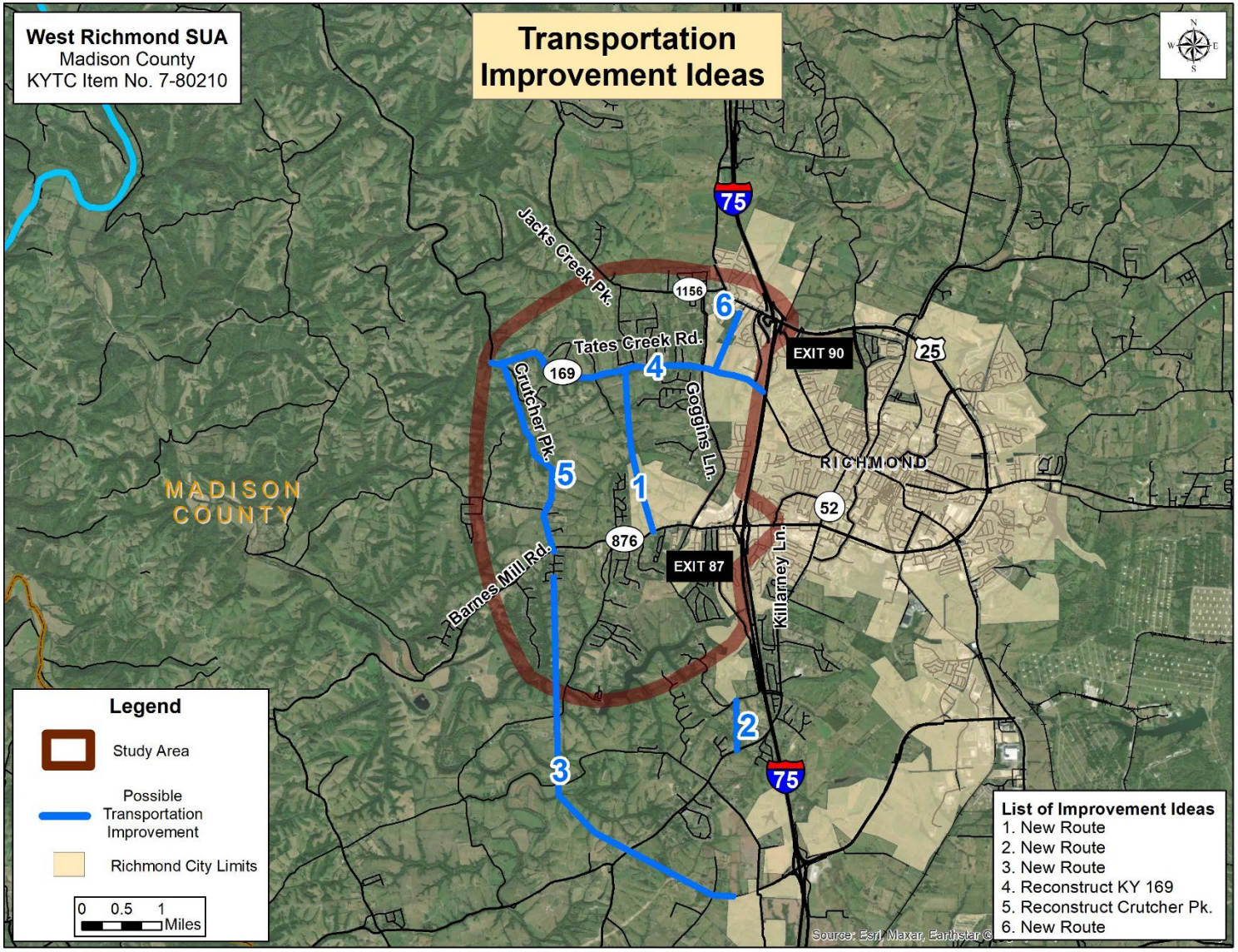


Figure 16: Local Officials / Stakeholder Survey No. 1 – Potential Improvement Concepts

Table 3: Population Estimates & Projections

Area	Census Estimates			Annual Growth	Projection	Annual Growth
	2000	2010	2020	2000 - 2020	2050	2020 - 2050
Kentucky	4,041,769	4,339,367	4,505,836	0.54%	4,785,233	0.20%
Madison County	70,872	82,916	92,701	1.35%	116,156	0.75%
Richmond	27,152	31,364	34,594	1.22%	N/A	

5.2 HISTORICAL TRAFFIC COUNTS

Historical average daily traffic volumes and annual growth rates, between 2008 and 2022, for KYTC count stations in the study area are summarized in **Table 4** and mapped in **Figure 17**. The red text in Table 4 represents traffic counts from 2020 which was not an accurate representation of recent traffic patterns due to COVID shutdowns and was not used to calculate the historical growth rates. Traffic stations on KY 169, KY 876, Goggins Lane, and KY 1156 show increasing ADT volumes, ranging from 0.14 to 5.36 percent per year. The traffic station on KY 169 west of Goggins Lane show a declining ADT volume of 6.92 percent per year.

Table 4: Historical KYTC Traffic Counts

Year	KY 169 (West)	KY 169 (East)	KY 876 (West)	KY 876 (Central)	KY 876 (East)	Goggins Lane N	Goggins Lane S	KY 1156
	Sta. 076799	Sta. 076A82	Sta. 076576	Sta. 076635	Sta. 076A03	Sta. 076825	Sta. 076762	Sta. 076781
2008	3,380	4,650	3,310	6,520	11,600			
2009				8,100				
2010		5,470		7,190				1,620
2011								
2012	2,685					1,158	6,429	
2013		5,330	5,338			1,111	6,682	1,580
2014	2,514		5,112		16,957	1,120	6,662	
2015								
2016		5,433		7,511				1,595
2017	1,772		4,111		12,731	1,389	7,506	
2018								
2019		5,678		7,502				1,551
2020	1,374		4,548		11,791	1,323	6,757	
2021								
2022		5,587	6,876	7,208				1,648
Medium term % CAGR	-6.92%	0.18%	5.36%	0.47%	1.04%	3.70%	3.15%	0.14%

Source: Kentucky Transportation Cabinet (KYTC)
*2020 counts not used in growth rate calculations

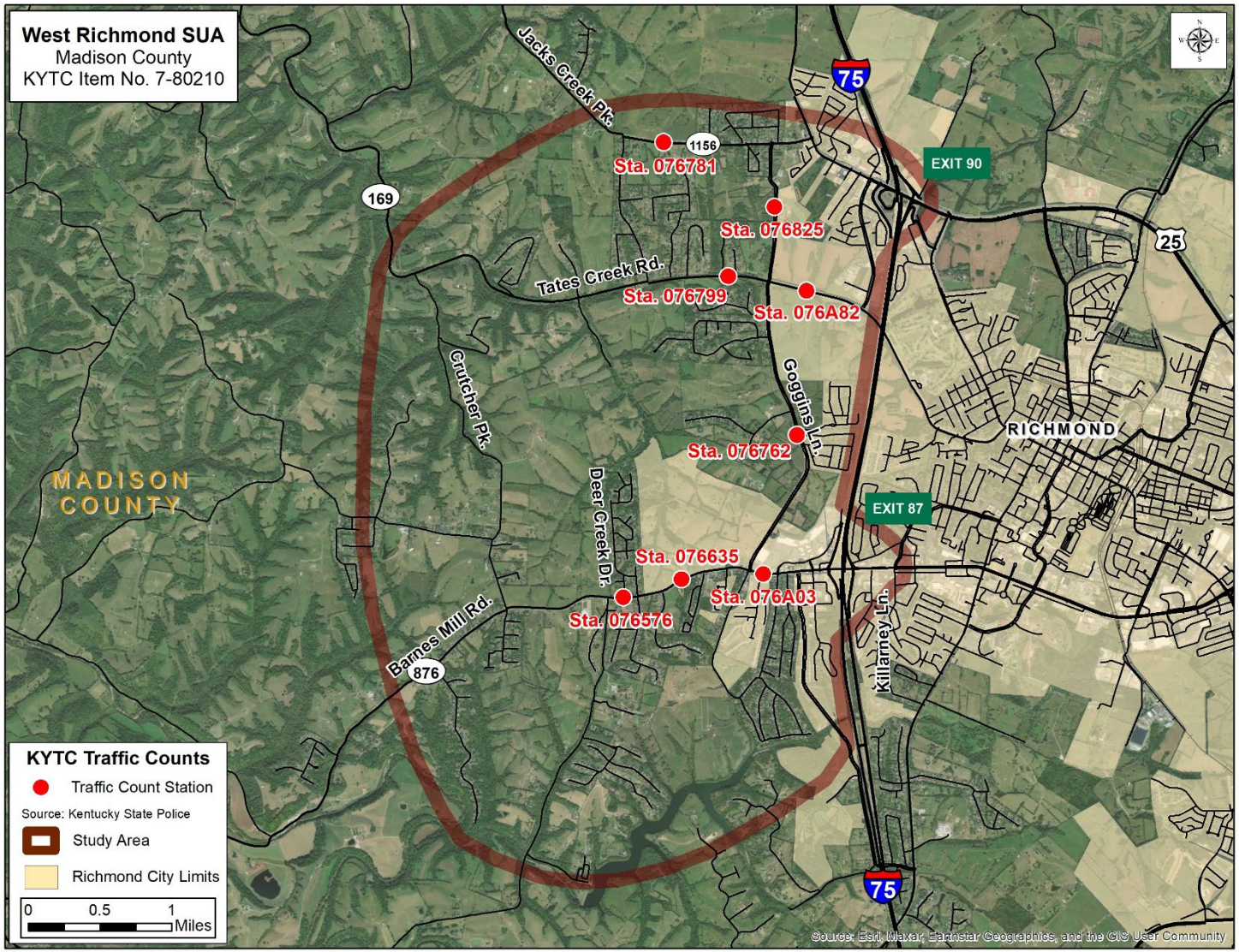


Figure 17: KYTC Traffic Count Stations

Medium-term Compound Annual Growth Rate (CAGR) refers to the annual growth over roughly a 15-year period. Daily traffic in the study area has generally increased over the past 15 years, with only one of the eight traffic stations showing negative growth.

5.3 LAMPO TRAVEL DEMAND MODEL

The Lexington Area Metropolitan Planning Organization (LAMPO) regional travel demand model was updated to better reflect existing and future land use. The first step in this process was to update the existing model to reflect current conditions, including speed limits, roadway geometrics, and centroid connector locations. The future model was then updated to better reflect anticipated socioeconomic conditions, including employment and number of households. A complete discussion of model updates can be found in the Traffic Forecasting Technical Memorandum in **Appendix F**.

5.3.1 Anticipated Study Area Developments

Over the course of the study, the project team-maintained communication with key stakeholders to both gather and disseminate information on anticipated developments in the study area. Based on conversations with local officials and stakeholders, there are a total of 11 developments within the study area in various stages of development, as shown in **Figure 18**. These developments include public park facilities, single family housing, multi-family housing, and commercial businesses that will attract varying levels of traffic.

Construction on Goggins Lane

The 2045 socioeconomic data in the LAMPO regional travel demand model was updated to reflect these anticipated developments within the study area, and 2045 daily model traffic assignments were compared to daily assignments from the updated existing model to determine estimated growth patterns in and around the study area. Annual growth rates from the updated LAMPO model were lowest on KY 876 east of I-75 at 0.8 percent per year. Annual growth rates ranged from 1.5 percent to two percent on KY 876 west of I-75 and on KY 169. The highest growth, with annual rates around five percent per year, are expected on Goggins Lane.

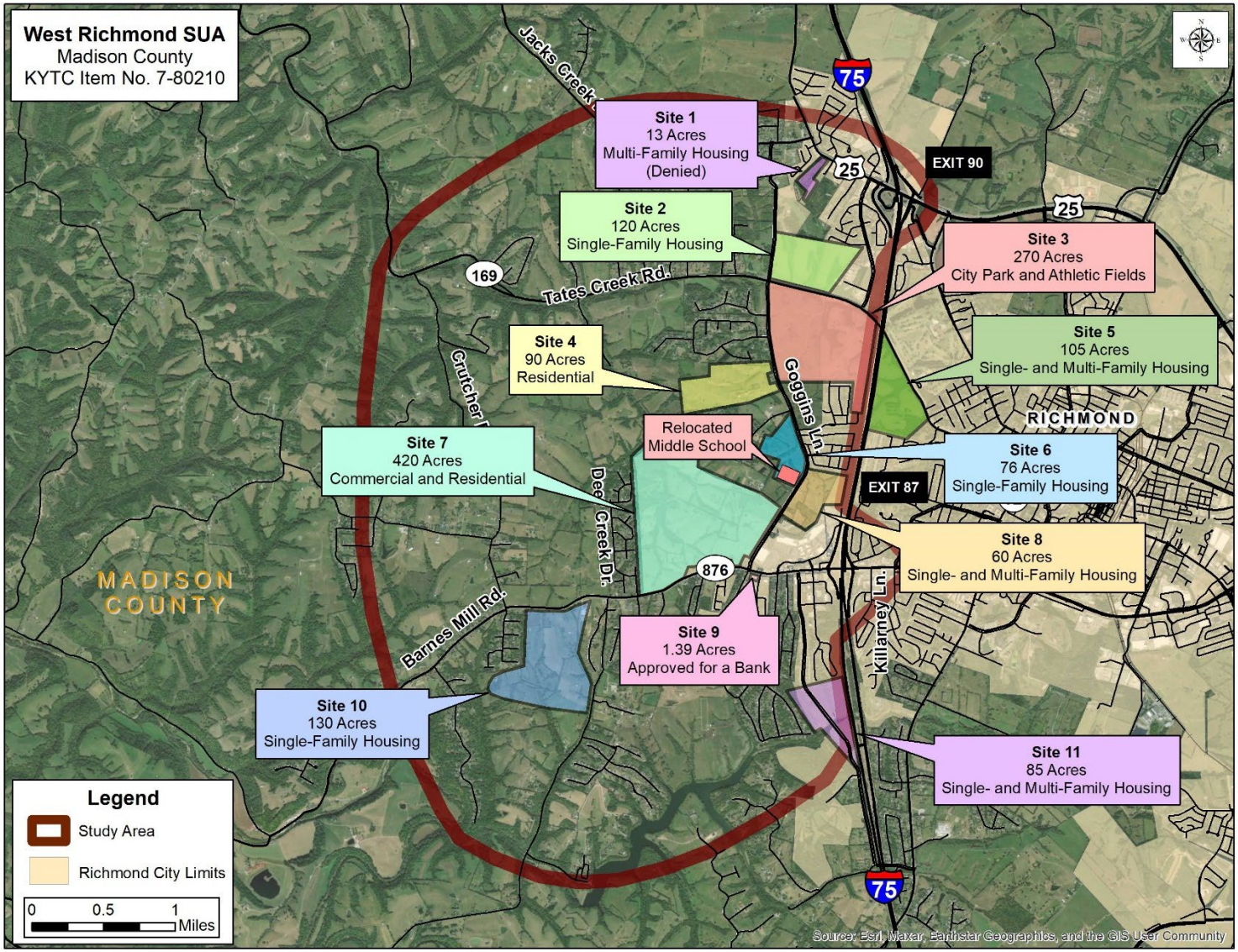


Figure 18: Anticipated Study Area Developments

5.4 TRAFFIC FORECASTS

Future growth scenarios were then developed based on historical traffic trends, regional population trends, expected developments, and output from the updated LAMPO Regional Travel Demand Model. The following annual growth rates were proposed to develop future year traffic volumes:

- Goggins Lane: two percent (2017 – 2023), five percent (2023 – 2035), two percent (2035 – 2045)
- KY-876: West of I-75: two percent
- KY-876: East of I-75: 0.8 percent
- I-75 Mainline: one percent

These annual growth rates were then applied to the latest KYTC daily traffic counts (excluding 2020) to develop 2045 daily traffic forecasts. The 2045 daily forecasts are shown in **Figure 19**. The complete Traffic Forecasting Technical Memorandum can be found in **Appendix F**.

5.5 2035 NO-BUILD TRAFFIC MICROSIMULATION MODEL

Future year (2035) No-Build peak hour microsimulation model scenarios were developed using the existing simulation model network. During the AM peak hour, all study area intersections operate at LOS D or better. However, several intersection approaches are expected to fail, including the following:

- KY 876 at I-75 northbound I-75 ramp terminal intersection – the northbound exit ramp approach operates at LOS F
- KY 876 at Goggins Lane – the eastbound KY 876 and southbound Goggins Lane approaches operate at LOS F.

During the PM peak, the KY 876 intersections with Killarney Lane, the I-75 interchange, and Amberly Way are all expected to operate at LOS E or worse.

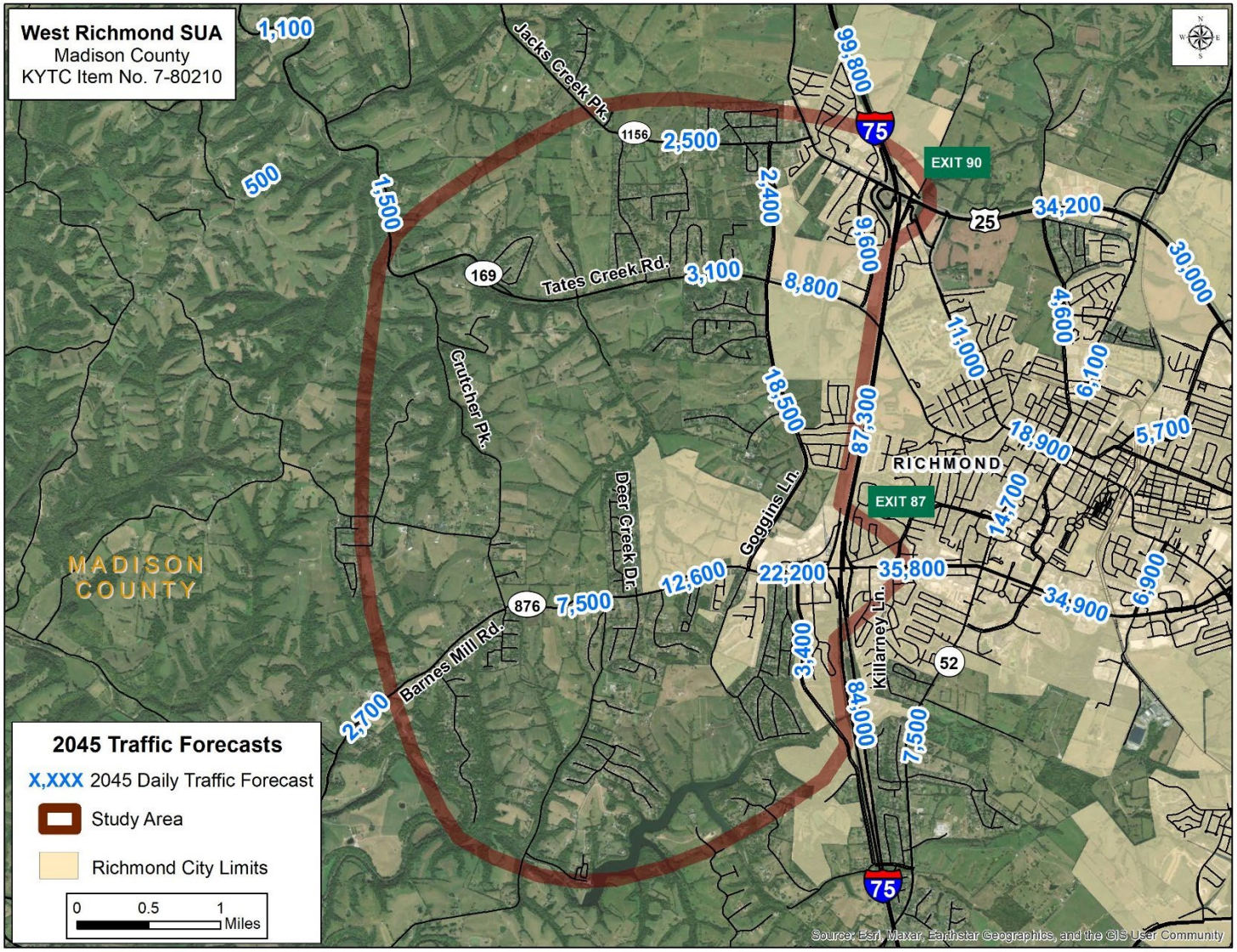


Figure 19: 2045 Daily Traffic Forecasts

6.0 PROJECT TEAM MEETING DESIGN CHARRETTE

The first Project Team Meeting was held at the KYTC District 7 Office and virtually via Microsoft Teams on June 8, 2023. The meeting used a charrette format, where attendees brainstormed and discussed ideas for potential transportation improvement concepts.

6.1 INITIAL IMPROVEMENT CONCEPTS

After a brief presentation on existing and future conditions in the study area and results from the first local officials / stakeholder survey, the project team split into two groups to discuss potential transportation improvements. Handouts and plots of the study area were made available to both groups. The purpose of the group exercise was to develop a list of potential road improvements, ideas for new routes (including bicycle and pedestrian facilities), and future land-use ideas. The following items were noted during the project team discussion:

- During the first meeting, Local officials expressed interest in increasing walkability along the KY 876 corridor.
- There is a current project to relocate KY 52 south of the study area. This project was included in all LAMPO travel demand model runs.
- There is an electrical substation on Goggins Lane north of KY 169 that should be avoided, if possible.

The resulting improvement concepts are shown in **Figure 20** and discussed below.

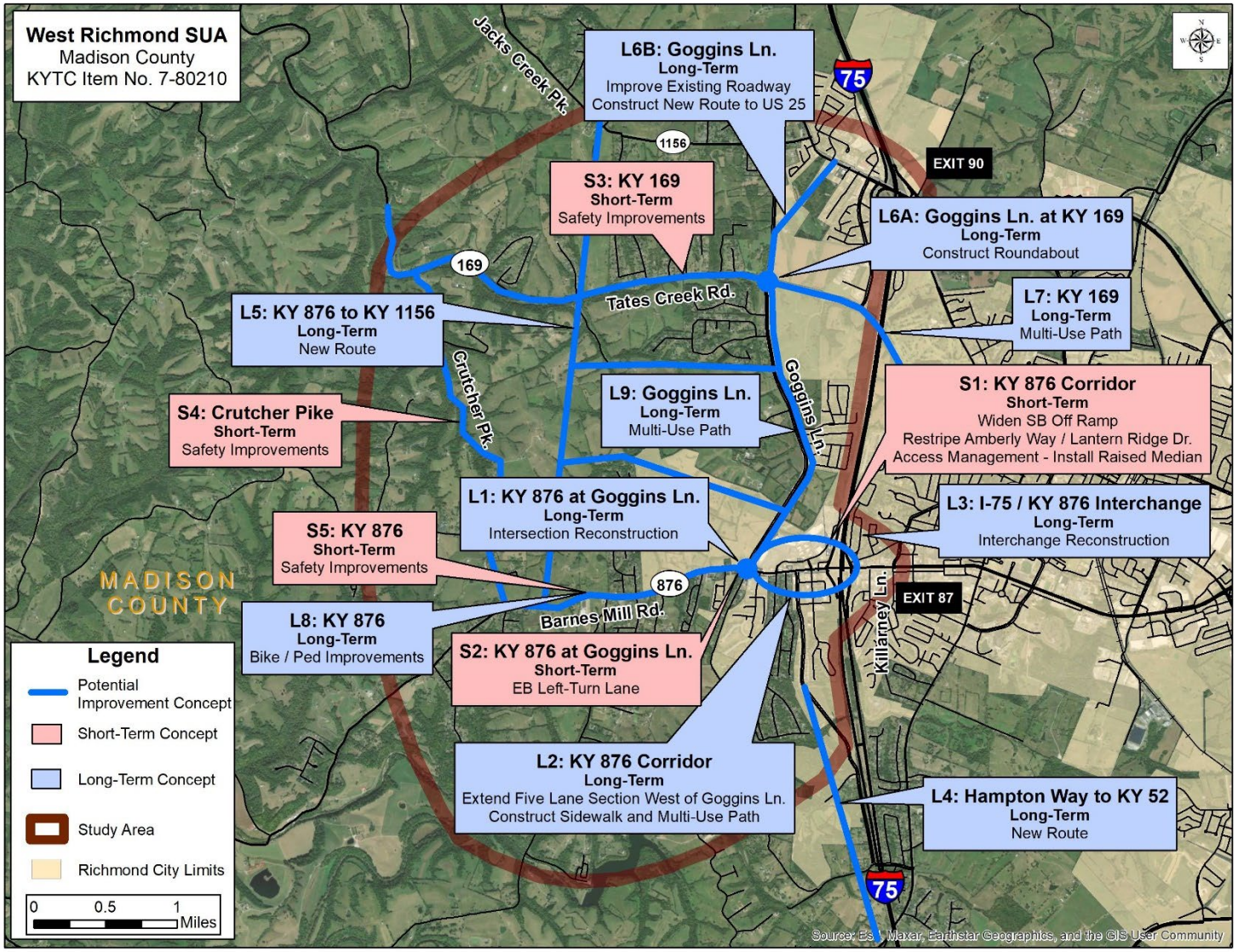


Figure 20: Preliminary Improvement Concepts

6.1.1 Short-Term Concepts

Short-term improvement concepts include less resource intensive, quick-win type projects that KYTC, the City of Richmond, or Madison County can pursue for further project development and implementation. These types of improvements require little or no right-of-way to construct and, in some cases, may be implemented by the KYTC Division of Maintenance.

6.1.1.1 Short-Term Concept S1 (I-75 Interchange & KY 876 Corridor)

Over the five-year period between 2018 and 2022, there were 201 reported crashes at the I-75 interchange with KY 876, 34 (17 percent) of which resulted in an injury. The most common crash type was rear end collisions (80 percent), indicating that congestion may be a contributing factor. Based on results from the safety analysis, the northbound I-75 ramp intersection has an Excess Expected Crashes (EEC) of three crashes per year and the southbound ramp intersection has an EEC of one crash per year, indicating KY 876 is experiencing more crashes than other roadways with similar roadway characteristics. West of the interchange, the KY 876 corridor serves commercial and residential areas with numerous access points and peak hour congestion. Over the past five years, there were 248 reported crashes on KY 876 between the I-75 interchange and Goggins Lane. Of those crashes, 84 percent were rear end, angle, or sideswipe collisions, indicating that congestion and access management may be contributing factors. This portion of KY 876 has an EEC of seven crashes per year.

West of I-75, KY 876 currently carries 12,750 VPD and is expected to experience significant growth over the next 20 years, up to 22,200 VPD in 2045, as the area near Goggins Lane develops. During the PM peak hour, traffic on the southbound I-75 off-ramp queues significantly and there is some unmet demand.

An option to improve congestion in the short-term is to restripe the intersection immediately west of the interchange, KY 876 at Lantern Ridge Drive / Amberly Way, to allow for dual entry of the side streets and provide more green time for KY 876. The northbound approach would be restriped to include dedicated left, right, and through lanes, as shown in **Figure 21,** and the southbound approach would be restriped to include dual left-turn lanes and shared thru / right-turn lane. An additional short-term option is to widen the southbound I-75 exit ramp to include dual right-turn lanes.

6.1.1.2 Short-Term Concept S2 (KY 876 at Goggins Lane Intersection)

Goggins Lane intersects KY 876 at the western end of the existing commercial section. Over the past five years, there were 26 reported crashes at the intersection of KY 876 and Goggins Lane. Of these crashes, 46 percent were rear end collisions and seven were angle collisions. The northwest quadrant of the intersection, along with other areas along Goggins Lane, are expected to be developed over the next 20 years. These developments are potential traffic generators and include commercial, residential, recreational, and educational concepts. Based on a future traffic analysis, KY 876 is expected to carry 22,200 VPD east of Goggins

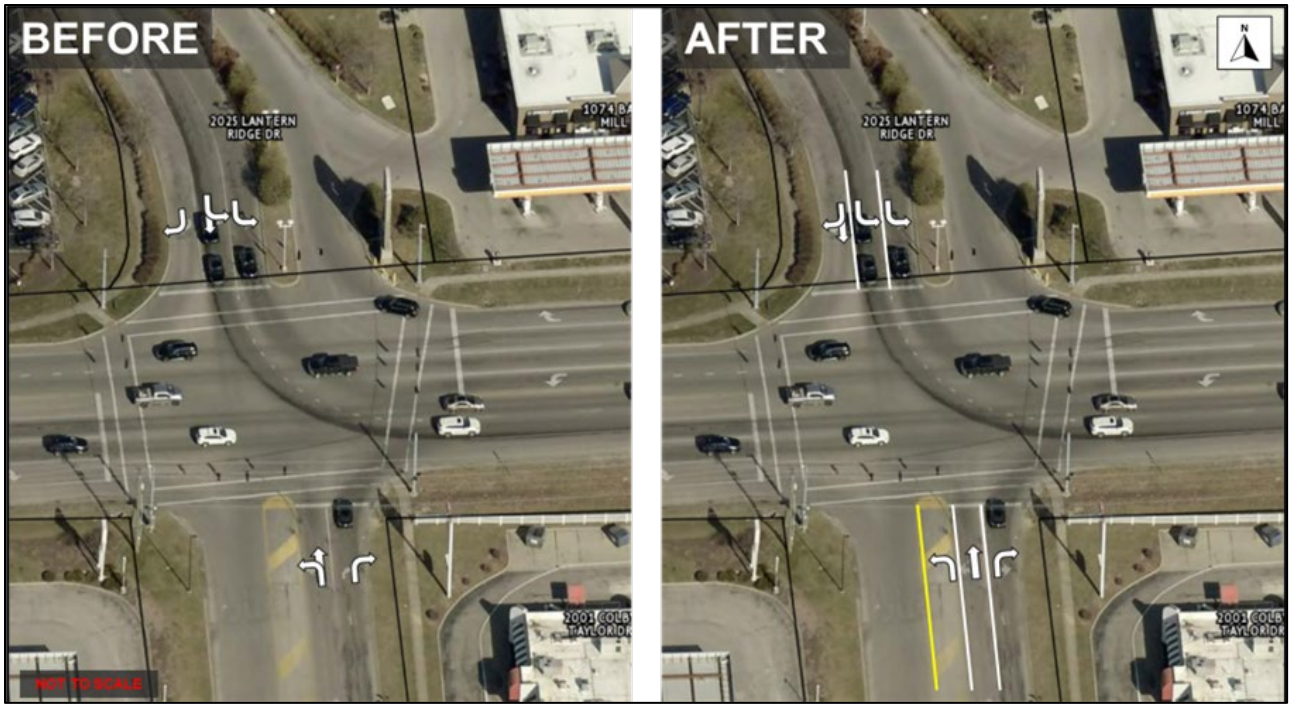


Figure 21: Short-Term Concept S1 (KY 876 at Lantern Ridge Drive / Amberly Way)

Lane and 12,600 VPD to the west in 2045. Goggins Lane is expected to see a significant increase in traffic, from 7,500 VPD currently to 18,500 VPD in 2045. This intersection is a potential choke point as it will be used heavily by traffic accessing the expected developments.

An option to improve traffic flow in the short-term is to widen the eastbound KY 876 approach to include a dedicated left-turn lane. As the land along KY 876 and Goggins Lane develops, there will be an increase in both the eastbound through and left turning traffic. Providing a dedicated turn lane will remove the left turning vehicles from the through lane and allow traffic to flow more smoothly.

6.1.1.3 Short-Term Concept S3 (KY 169 Between Crutcher Pike and Goggins Lane)

West of Goggins Lane, KY 169 has two ten-foot lanes with one-foot shoulders, serving mostly rural and residential areas. This section of KY 169 carries 1,750 VPD and is expected to carry 3,100 VPD in 2045. Over the past five years, there were 56 reported crashes on this 2.7-mile stretch of KY 169, one of which resulted in a fatality and ten of which resulted in an injury. The EEC is 1.5 crashes per year, indicating KY 169 is experiencing more crashes than what is expected based on roadway characteristics.

An option to improve safety is to widen the lanes to 11 feet and the shoulders to four feet. This would provide enough pavement to add a centerline and edge line rumble stripes. Additionally, updating the signage along KY 169 would provide drivers better visibility of curve warning signs.

6.1.1.4 Short-Term Concept S4 (Crutcher Pike)

Crutcher Pike (CR 1354) is a north-south county route that connects KY 876 to KY 169 in the western section of the study area, approximately two miles west of Goggins Lane. To the south near KY 876, Crutcher Pike has two ten-foot lanes with no shoulders, while to the north near KY 169 Crutcher Pike has approximately 12 feet of total pavement. Over the past five years, there were eight reported crashes, five of which were single vehicle collisions.

During the first Local Officials / Stakeholder Meeting, Crutcher Pike was identified as a potential "outer loop" for the study area, potentially providing a north-south connection to relieve congestion on Goggins Lane. A LAMPO travel demand model run was performed with Crutcher Pike upgraded to 11-foot lanes and a 55 mph speed limit to determine the daily traffic impacts. Based on results from the model, an improved Crutcher Pike would carry less than 1,000 VPD and would not significantly reduce traffic on Goggins Lane. The long-term option to reconstruct Crutcher Pike was therefore not carried forward and a concept at this time. Reconstruction of Crutcher Pike may be considered if development in the study area expands farther west.

An option to improve safety on the narrow section to the north in the short-term is to construct short sections of wider pavement for vehicles to pull over and allow oncoming traffic to pass. Additionally, the signs on Crutcher Pike can be updated to provide drivers improved visibility and safety warnings.

6.1.1.5 Short-Term Concept S5 (KY 876 Between Crutcher Pike and Goggins Lane)

Between Crutcher Pike and Goggins Lane, KY 876 serves mostly rural and residential areas. There are currently no signalized intersections and no turn lanes on this section of KY 876. Over the past five years, there were 34 reported crashes, 12 (35 percent) of which resulted in an injury. Of the 34 crashes, the most common crash type was rear end collisions with 15, mostly clustered at the unsignalized intersections. Over the next 20 years, daily traffic is expected to increase from 7,200 VPD (2021) to 12,600 VPD (2045). Developments in this area with anticipated access points on KY 876 will not only increase the traffic volume, but also the number of turning vehicles.

An option to improve safety and traffic conditions is to provide turn lanes at the major unsignalized intersections, including Crutcher Pike (westbound left- and right-turn lanes), Curtis Pike (westbound left-turn lane), Deer Creek Drive (westbound left- and right-turn lanes), and Hager Drive (westbound left-turn lane). Providing dedicated turn lanes would remove the left turning vehicles from the through lane, which will improve safety and allow traffic to flow smoother. As development occurs, turning movement counts should be collected to determine if warrants are met.

6.1.2 Long-Term Concepts

Long-term improvement concepts are higher cost projects that will require more significant resources to implement. These types of improvements will require additional right-of-way to construct and will likely need to be funded through the KYTC Six Year Plan (SYP) process.

6.1.2.1 Long-Term Concept L1 (KY 876 at Goggins Lane Intersection)

A long-term option to improve safety and traffic conditions at this intersection is to construct a roundabout. Based on results from the traffic analysis, a single-lane roundabout is sufficient for traffic volumes in 2035, with a dual-lane roundabout needed by 2045.

6.1.2.2 Long-Term Concept L2 (KY 876 Between Goggins Lane and I-75)

A long-term option to improve safety and traffic conditions on this section of KY 876 is to construct a raised median to restrict left turns from minor approaches at unsignalized intersections. Initially, the two lanes in each direction are sufficient on KY 876 between Lantern Ridge Drive / Frankie Drive and I-75. As the area develops, KY 876 will need to be widened between Goggins Lane and Frankie Drive to accommodate the traffic growth. Additionally, a shared-use path and sidewalk could be constructed on KY 876 from Goggins Lane to the I-75 interchange. The project team then discussed potential roadway designs of KY 876, including the following typical section:

- Two 11-foot through lanes each direction
- An 11-foot right-turn lane at intersections
- 12-foot grass median
- Curb and gutter
- Six-foot grass buffer with trees
- 10-foot multi-use path
- Five-foot sidewalk

6.1.2.3 Long-Term Concept L3 (I-75 Interchange with KY 876)

Based on results from the 2035 No-Build traffic analysis, the KY 876 intersections with Killarney Lane and the northbound I-75 ramps are expected to operate at LOS F during the PM peak hour and the Lantern Ridge Drive / Amberly Way intersection is expected to operate at LOS E.

A long-term option to improve safety and traffic conditions is to reconstruct the interchange. One option is to construct a double crossover diamond (DCD), as shown in **Figure 22**, which improves safety by reducing the number of conflict points and reduces congestion by decreasing the number of signal phases.

Another option is to construct a single-point urban interchange (SPUI), as shown in **Figure 23**. This type of interchange would relocate the KY 876 and I-75 ramp approaches to a single intersection, reducing conflict points and providing more spacing between adjacent intersections.

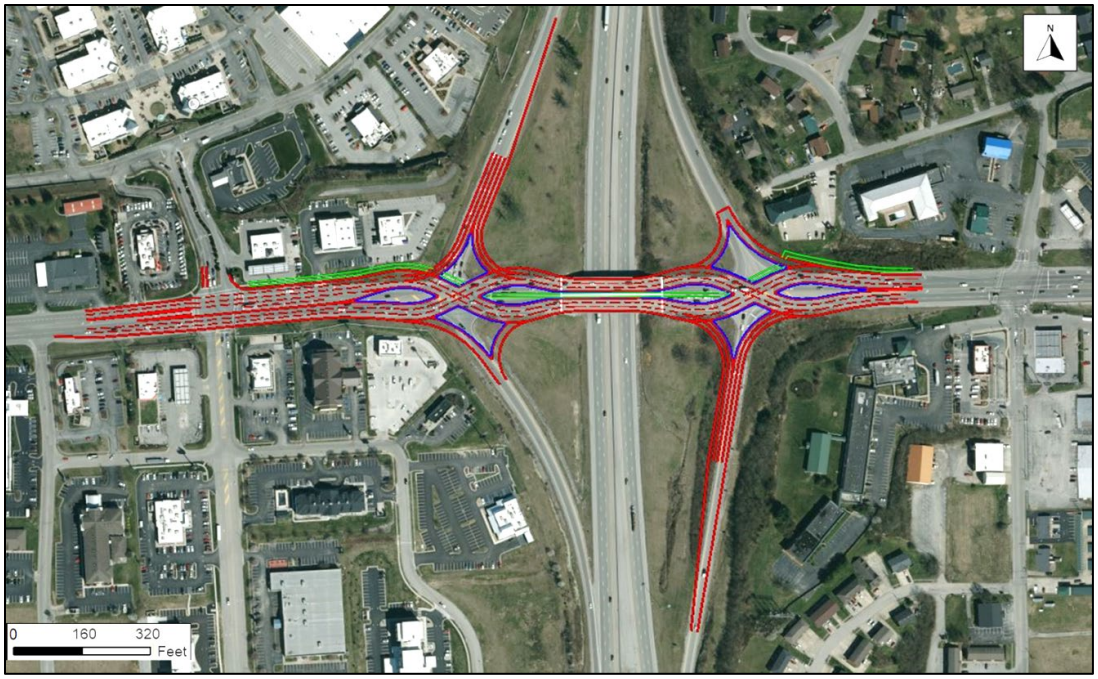


Figure 22: Double Crossover Diamond (DCD) Concept

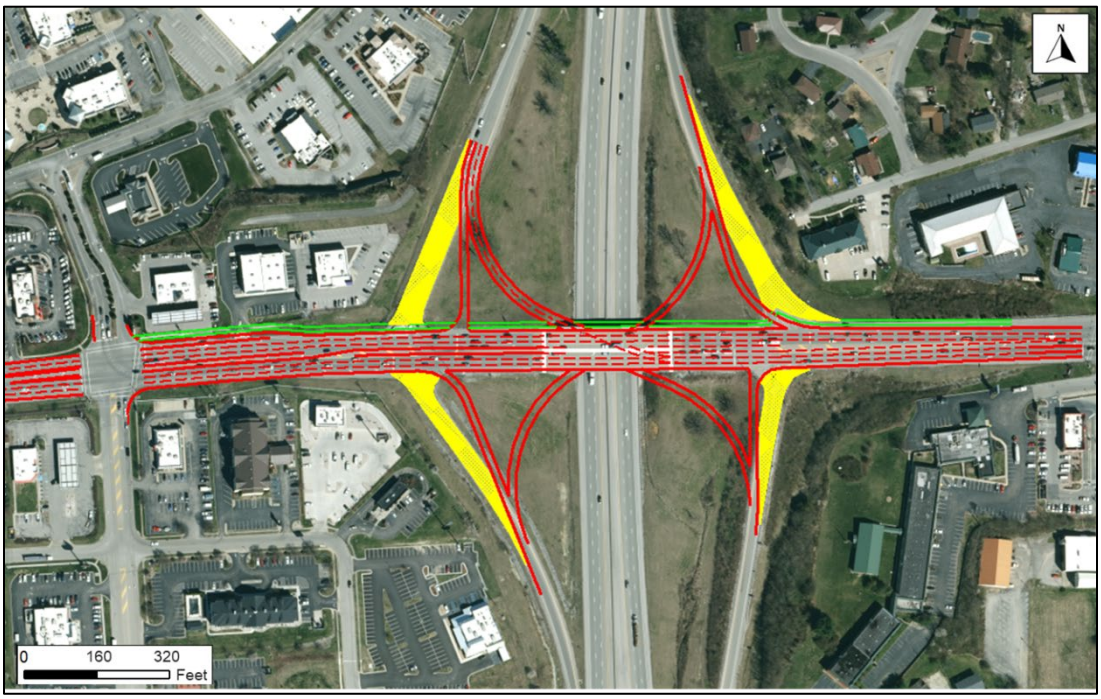


Figure 23: Single-Point Urban Interchange (SPUI) Concept

Based on results from the traffic microsimulation model, both interchange options provide adequate traffic operations in 2035, with all intersections operating at LOS D or better during the peak periods. By 2045, however, for the DCD concept, traffic is expected to queue on the I-75 exit ramps and at the Amberly Way intersection, causing the intersections to fail.

All intersections are still expected to operate at LOS D or better in 2045 for the SPUI concept. The SPUI concept was therefore moved forward for further evaluation. Bicycle and pedestrian accommodations to connect the development on each side of the Interstate were included as part of this concept.

6.1.2.4 Long-Term Concept L4 (New Route Between Hampton Way and KY 52)

South of KY 876, Hampton Way provides a north-south connection to KY 52 via Old Town Branch Road. This connection requires traveling under I-75 via a one-lane tunnel. An option to provide a better connection to the south is to construct a new route from Hampton Way to KY 52. Based on results from the Lexington Area MPO (LAMPO) travel demand model, this new route is expected to carry 7,600 VPD in 2045. This new route would increase traffic on both Hampton Way and KY 876 but would slightly decrease traffic on I-75.

6.1.2.5 Long-Term Concept L5 (New Route Between KY 876 an KY 1156)

Based on traffic forecasts, Goggins Lane is expected to carry 18,500 VPD in 2045. As the land adjacent to Goggins Lane develops, providing alternative routes for vehicles accessing the commercial and residential areas will become imperative. A long-term option to improve traffic patterns surrounding the expected developments is to construct a new route from KY 876 to KY 1156 with connections to the developments and to Goggins Lane, as shown in **Figure 24**. This route could be constructed in sections as developments occur. Potential typical sections were considered assuming 60 feet of right-of-way. The first potential typical section includes:

- One 12-foot lane in each direction
- Four-foot paved median to allow for passing of emergency vehicles.
- Curb and gutter
- Six-foot grass buffer with trees
- 10-foot multi-use path
- Five-foot sidewalk

A second potential typical section includes:

- One 12-foot lane in each direction

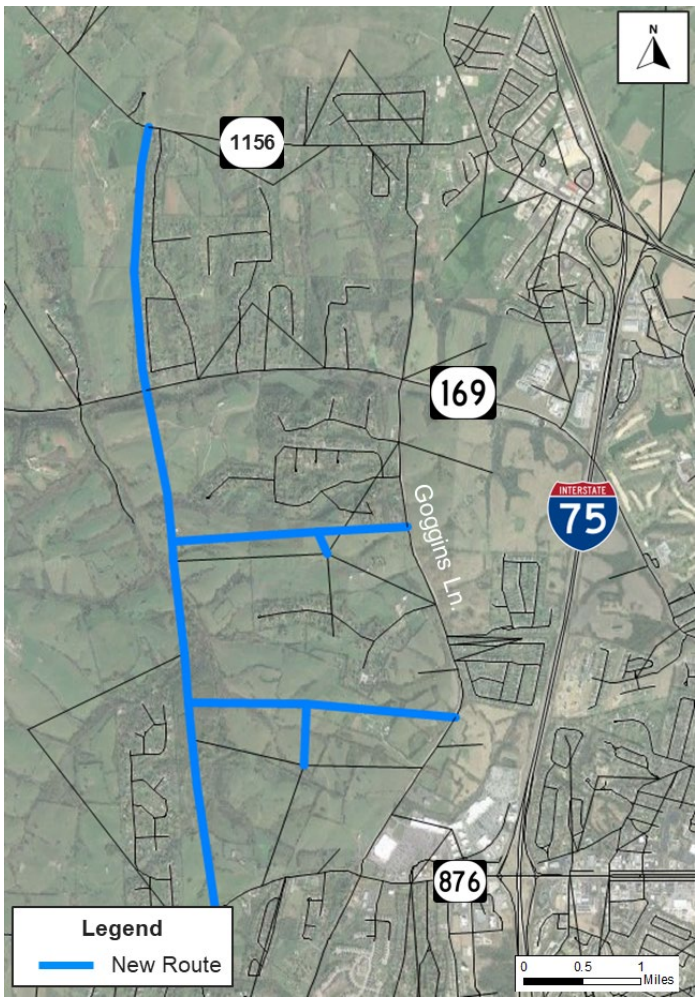


Figure 24: Long-Term Concept L5

- 12-foot grass median
- Curb and gutter
- Four-foot grass buffer
- 10-foot multi-use path
- Five-foot sidewalk

6.1.2.6 Long Term Concept L6A (KY 169 at Goggins Lane Intersection)

As peak hour traffic-generating developments occur along Goggins Lane and KY 169, the intersection of the two routes has the potential to become a traffic chokepoint. An option to improve safety and reduce congestion is to construct a roundabout. The initial roundabout would be single lane, with the potential to construct additional lanes if necessary.

6.1.2.7 Long-Term Concept L6B (New Route Between Goggins Lane and US 25)

An option to provide alternative access to expected developments along KY 169 is to construct a new route between Goggins Lane and US 25, as shown in **Figure 25**. This concept would require improvements to the Goggins Lane / KY 169 intersection, as shown in Concept L6B, before construction could begin. The section of Goggins Lane between KY 169 and the new route would require widening to match the typical section of the new route.

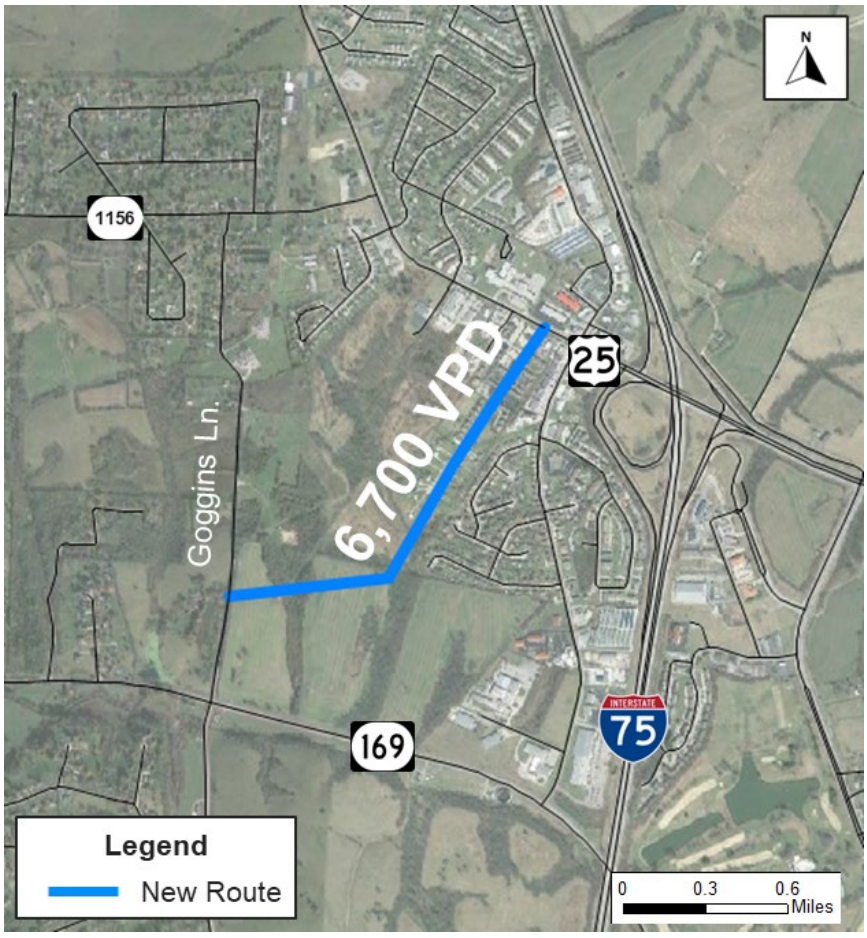


Figure 25: Long-Term Concept L6B

6.1.2.8 Long-Term Concept L7 (KY 169 East of Goggins Lane)

East of Goggins Lane, there are several expected developments along KY 169. A residential development is proposed to the north and a city park with recreational fields is planned to the south.

An option to improve multi-modal travel in the area is to construct a shared-use path on KY 169 from Goggins Lane to Kit Carson Elementary, crossing underneath the I-75 overpass.

6.1.2.9 Long-Term Concept L8 (KY 876 Between Crutcher Pike and Goggins Lane)

A long-term option to improve safety and reduce congestion on KY 876 is to construct a two-way left-turn lane (TWLTL) between Crutcher Pike and Goggins Lane. The number of vehicles turning onto, and off KY 876 is expected to increase as the rural portions of KY 876 continue to develop. Providing a consistent turn lane will remove the left turning vehicles from the through traffic and reduce the number of conflicts. Bicycle and pedestrian accommodations will be considered as part of this option.

KY 876 West of Goggins Lane

6.1.2.10 Long-Term Concept L9 (Goggins Lane Between KY 876 and KY 169)

The current ADT on Goggins Lane is 7,500 VPD, with an increase to 18,500 VPD expected by 2045 due to several developments expected along the corridor. Over the past five years, there were 38 reported crashes on Goggins Lane between KY 876 and KY 169, none of which involved a bicycle or pedestrian.

As developments occur, a long-term concept is to construct a shared-use path on the east side of Goggins Lane to provide multi-modal access to the developing residential areas.

6.2 POTENTIAL STRATEGIES FOR LOCAL PLANNING AND ZONING

The City of Richmond and Madison County are already taking steps to ensure future development does not negatively impact the transportation network. Both jurisdictions have recently completed significant updates to their comprehensive plans. These plans identify goals and objectives related to transportation as well as long-term projects that are needed to support future growth and development. Madison County also completed an overhaul of their land development ordinances in 2023. Through zoning and subdivision regulations, both the city and county have standards related to new roads, rights-of-way, and pedestrian facilities (such as sidewalks or trails), including the standards outlined in **Table 5**.

Table 5: Madison County & Richmond Land-Use Regulations

	Madison County Land Development & Subdivision Regulations (9/12/2023)	City of Richmond Development Ordinance (6/18/2018)
Bicycle and Pedestrian Facility Requirements		
Sidewalks in Residential Subdivisions	• Required on both sides of roads if lot width is less than 100 feet. • Required on one side of roads if lot width is 100-200 feet. • Not required if lot width is greater than 200 feet. (*Article 5.08(b)*)	• Required on both sides of roads for all residential subdivisions. (*Appx Q, Ch 10.4*)
Bicycle Facilities and Paths	• Bicycle paths, lanes, or routes may be required instead of a sidewalk in areas with high bicycle traffic. (*Article 5.08(b)*)	• Complete street facilities should be considered on all roads. (*Appx Q, Ch 10.4*)
Dedication of Right-of-Way Requirements		
Right-of-Way Width within Subdivision	• Adequate right-of-way width required for new roads must be dedicated based on road classification (varies from 50' to 100'). (*Article 5.08.(a)(iii)*)	• Adequate right-of-way width required for new roads must be dedicated based on road classification. (*Appx Q, Ch 10.2*)
New Road Location and Design within Subdivision	• Must conform to the recommendations of the Comprehensive Plan and Access Management Ordinance. (*Article 5.08.(a)(v)*)	• Must conform to the recommendations of the Comprehensive Plan and Access Management Ordinance. (*Article 513.3*)
Dedication Abutting County/State Road	• Must dedicate additional right-of-way as needed to meet all adopted county policies and plans. (*Article 3.04(e) & Article 5.08.(a)(vii)E)*	• New road location and design within a subdivision must conform to the recommendations of the Comprehensive Plan and Access Management Ordinance. (*Ch 9.11*)
Required Connections to Adjacent Sites		
Site Connections	• Must provide adequate pedestrian and vehicular circulation to adjacent properties. (*Article 2.02.(b)(iv)*)	• Required between adjacent sites. (*Appx Q, Ch 7*)
Extension of Right-of-Way	• Dedicated right-of-way must extend to the parcel boundary. (*Article 5.08.(a)(vii)F)*	• Dedicated right-of-way must extend to the parcel boundary. (*Article 7.3*)
Landscaping and Visual Buffer Requirements		
Plantings in Right-of-Way	• Not permitted. (*Article 4.06(d)(ii)*)	• Permitted based on Road Classification and/or with Approval. (*Appx Q, Ch10.4*)
Perimeter Plantings / Screening	• Required adjacent to the right-of-way within non-residential and multi-family districts. • Specific uses, parking lots require landscaping/screening between the use and road. (*Article 4.06(f) – (h)*)	• Landscape buffers are required adjacent to the right-of-way for parcels within the Transportation Corridor. (*Article 4.06*)

The foundation is in place with the local zoning and subdivision regulations. However, additional tools can further coordinate land use and the transportation network. Moving forward, the City of Richmond and Madison County should consider promoting awareness of the proposed new routes and typical sections from this study to ensure future development supports this plan in addition to coordinating with KYTC on implementing the plan. Additionally, developing and/or updating an Access Management Plan would provide more detailed guidance for curb cuts, consolidated driveways, and frontage roads, among others.

7.0 LOCAL OFFICIALS MEETING NO. 2

Following the development of the initial improvement concepts, the project team met with the local officials and stakeholders for a second time at the Madison County Public Library on August 24, 2023. The purpose of the meeting was to provide updates on the study and to solicit feedback from the local officials and stakeholders on preliminary improvement concepts.

Attendees were asked to fill out a survey to provide input on the preliminary improvement concepts. Eleven local officials / stakeholders filled out the survey, ten of which live or work in the study area. Six of the respondents indicated they drive through the study area daily and the remaining five drive through it weekly.

Respondents were then asked to rank their top three short-term improvement concepts, with a ranking of one being the top priority and receiving three points, two being the second priority and receiving two points, and three being the third priority and receiving one point. Concepts S1 and S2, improving the I-75 interchange and the KY 876 corridor, were ranked as the highest priorities, as shown in **Figure 26**.

Respondents were then asked to rank their top three long-term improvement concepts. Once again, improvements to the I-75 interchange with KY 876 (Concept L3) and the KY 876 corridor (Concept L2) were ranked as the highest priorities, as shown in **Figure 27**.

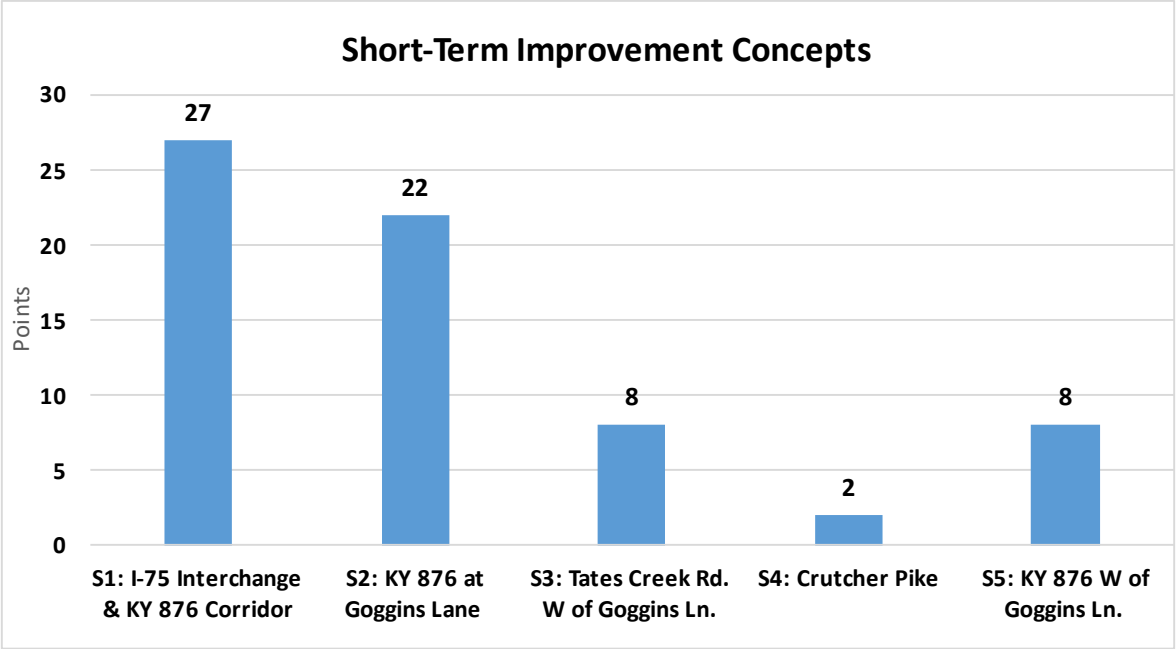


Figure 26: Local Official / Stakeholder Survey No. 2 – Ranking Short-Term Concepts

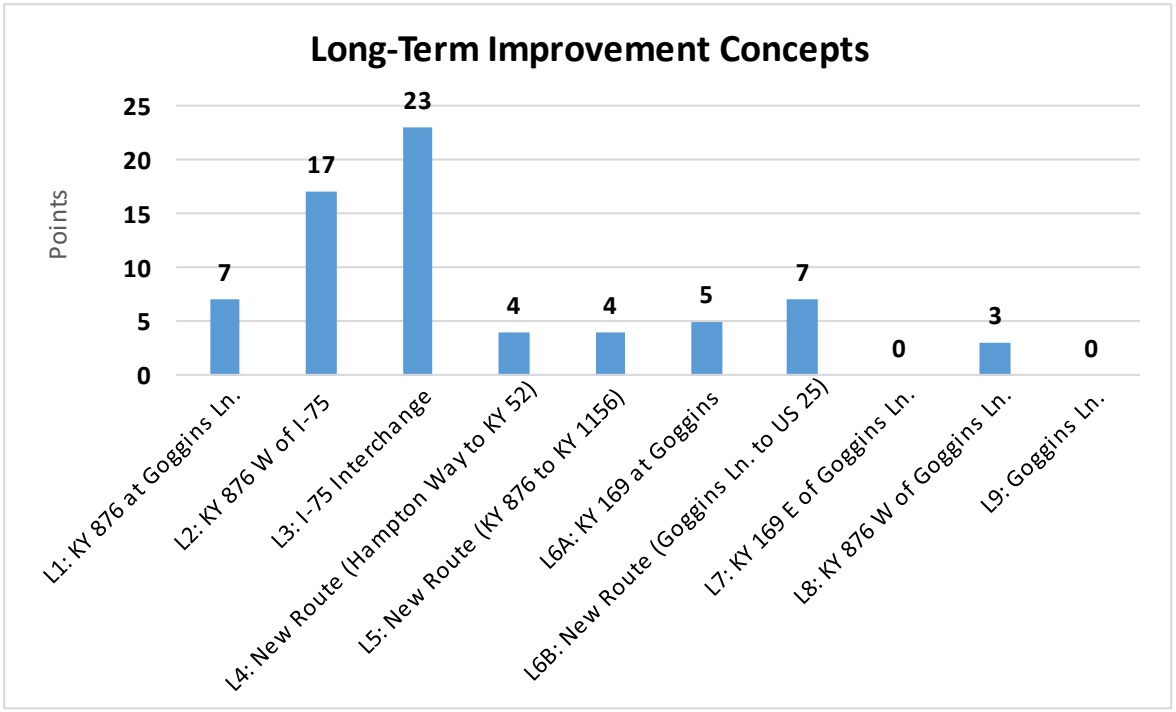


Figure 27: Local Official / Stakeholder Survey – Ranking Long-Term Concepts

8.0 PROJECT TEAM MEETING NO. 2

After the second round of local official / stakeholder involvement, the Project Team met for a second time at the KYTC District 7 office in Lexington, Kentucky on August 29th, 2023. The purpose of the meeting was to share feedback from the local officials and stakeholders on preliminary improvement concepts and to prioritize the concepts.

- The preliminary improvement concepts were categorized as short-term, long-term, or local and reorganized alphabetically, A through P.
- Long-term Concept L6B (New route between Goggins Lane and US 25) was shifted from Brandy Lane to Victory Boulevard.
- Long-Term Concepts L1 (KY 876 at Goggins Lane) and L2 (KY 876 west of I-75) were combined into one concept.
- Short-Term Concept L3 was re-categorized as a long-term concept. Moving forward, this concept will include two-foot shoulder widening on both sides of the roadway.
- Concepts S4 (Crutcher Pike), L5 (New route from KY 876 to KY 1156), L6B (Victory Blvd. extension), and L9 (Goggins Lane) were categorized as Local Concepts.
- Concept L4 (New route from Hampton Way to KY 52) was removed from further consideration because it will likely increase traffic on KY 876.

8.1 INITIAL CONCEPT PRIORITIZATION

The preliminary improvement concepts were prioritized based on results from the traffic analysis, safety analysis, Benefit-to-Cost Analysis (BCA), and local official feedback. The BCA provided a means for determining which improvements have the greatest benefit relative to the cost. The BCA was conducted based on crash savings and travel time savings.

Improvement concepts which could be evaluated using the traffic simulation model (along KY 876) were assigned a 10-year congestion relief savings based on the vehicle hours traveled (VHT) saved and the 2022 average hourly wage in Madison County of $21.38[3]. Crash modification factors (CMFs) were used to quantify crash reduction savings by estimating the number of crashes that would be reduced by implementing the improvement concept. The total benefit was then divided by the cost to produce a benefit-cost ratio (BCR). A BCR greater than 1.0 indicates the benefits outweigh the costs. **Table 6** presents a summary of the initial improvement concept priorities and BCRs.

[3] https://www.bls.gov/oes/current/oes_2100003.htm

Table 6: Initial Concept Prioritization

Initial Concept ID	Updated Concept ID	Location	Description	Total Cost	Benefit-Cost Ratio	Initial Priority
S1	A	KY 876 at Lantern Ridge Dr. / Amberly Way	Restripe Lantern Ridge Dr. & Amberly Way Approaches	$400,000	2.13	High
	B	I-75 Southbound Off-Ramp	Construct Dual Right-Turn Lanes with Receiving Lane on KY 876	$1,080,000	0.97	High
S2	C	KY 876 at Goggins Ln.	Construct Eastbound Goggins Ln. Left-Turn Lane	$970,000	0.72	High
S3	D	KY 169 West of Goggins Ln.	Update Signage	$50,000	5.40	Medium
S5	E	KY 876 West of Goggins Ln.	Construct Turn Lanes at Intersections	$3,090,000	0.29	Low
L1	F	KY 876 Corridor & Goggins Ln. Intersection	Option 1: Install Raised Median, Shared Use-Path &Construct Single-Lane Roundabout	$5,780,000	0.90	High
			Option 2: Extend 4-Lane Section, Construct Shared-Use Path + Sidewalk & Construct Dual-Lane Roundabout	$12,360,000	0.71	
L2	G	I-75 Interchange	Construct Single-Point Urban Interchange (SPUI)	$23,950,000	2.30	High
L5A	H	KY 169 at Goggins Ln.	Construct Single-Lane Roundabout	$2,580,000	0.39	High
L6	I	KY 169 East of Goggins Ln.	Construct Shared-Use Path	$4,460,000	0.00	Low
L7	J	KY 876 West of Goggins Ln.	Construct Two-Way Left-Turn Lane (TWLTL)	$783,000	0.00	Medium
	K	KY 876 West of Goggins Ln.	Construct Shared-Use Path	$2,890,000	0.00	
L9	L	KY 169 West of Goggins Ln.	2' Shoulder Widening on Both Sides of KY 169	$5,600,000	1.70	Medium
S4	M	Crutcher Pike	Improved Signage	$260,000	0.12	Low
			Widen Areas for Vehicles to Pull Over			
L4	N	New Routes (KY 876 to KY 1156)	Construct New Routes	N/A[1]	N/A	Medium
L5B	O	Victory Blvd. & Goggins Lane North of KY 169	Extend Victory Blvd. to Goggins Lane & Widen Goggins Ln. North of KY 169	$6,560,000	N/A	High
L8	P	Goggins Ln. between KY 876 & KY 169	Construct Shared-Use Path	$3,030,000	0.00	Medium

[1] Cost is expected to be addressed by developers as the adjacent land develops.

9.0 LOCAL OFFICIALS / STAKEHOLDER MEETING NO. 3

After the second Project Team meeting, improvement concept priorities were presented to the local officials and stakeholders at a final meeting, held at the Madison County Public Library on November 20, 2023. Attendees were asked to fill out a survey to provide input on the initial improvement concept priorities. Of the nine local officials / stakeholders that filled out the survey, six indicated they disagree with the initial priorities for the Short-Term Concepts while three respondents agreed with the priorities.

- Of the respondents who disagreed with the initial priorities, two requested that centerline rumble strips be removed from Concept D (KY 169 west of Goggins Lane) due to the pavement width being less than 24 feet. The centerline rumble stripe was removed from Concept D.
- One respondent would like to see an additional receiving lane constructed on KY 876 for the second southbound right-turn lane from the I-75 ramp for Concept B (I-75 southbound off-ramp). Adding a receiving lane decreased the southbound ramp

delay by 11 seconds and the overall intersection delay by four seconds. An additional lane on KY 876 was added to Concept B.

- One respondent requested Concept C (KY 876 at Goggins) be listed above Concept B (I-75 SB exit ramp). Both concepts were listed has High Priorities. The concepts are not prioritized within each prioritization category (high, medium, low).
- One respondent would like Concept E (KY 876 W of Goggins) to be listed as Medium Priority and Concept D (KY 169) to be listed as Low Priority. Another requested Concept D be moved to Low Priority. The Highway Safety Improvement Program (HSIP) District 7 Roadway Departure Study identified Tates Creek Road (KY 169) as a corridor that could benefit from updated signage.

The second question asked respondents if they agreed or disagreed with the initial project priorities for the Long-Term Concepts. Six of the respondents agreed with the presented concepts, while three of the respondents disagreed.

- One respondent would like Concept G (I-75 Interchange) to be listed before Concept F (KY 876 Corridor and Goggins intersection) because it has a higher BCR. Both concepts were listed has High Priorities. The concepts are not prioritized within each prioritization category (high, medium, low).

Respondents were then asked if they agreed or disagreed with the initial priorities for the Local Concepts. Six of the respondents agreed with the local concepts, while three of the respondents disagreed with the local concepts.

- One respondent would like to change Concept N (New routes connecting Goggins to KY 169 and KY 1156) to High Priority and Concept O (New Victory Blvd. connection and reconstruction of Goggins Lane) to Medium Priority. While Concept N is dependent on continued development, Concept O would provide an additional connection to I-75 and is a viable project regardless of development. The priorities were unchanged.
- One respondent noted that KY 1156 cannot handle additional traffic and must be addressed before the final connection of Concept N (New routes connecting Goggins to KY 169 and KY 1156) can be constructed.

10.0 CONCLUSIONS

The objective of the West Richmond Small Urban Area (SUA) Study was to examine existing / future safety and operational conditions and to recommend a list of transportation improvement concepts to address existing and long-term transportation needs for the area west of I-75 in Madison County, Kentucky.

10.1 PRIORITIZATION

Improvement concepts were developed and prioritized based on a combination of input from the project team, a review of existing conditions, local official / stakeholder input, and field reconnaissance. Concepts were grouped into three categories: Short-Term, Long-Term, and Local. Benefit-cost ratios (BCR) were updated to include design, right-of-way, utility, and construction cost estimates. All estimates are based on 2023 average unit bid prices. Utility cost estimates assume all utilities in the project area will be impacted. More detailed estimates should be developed during the design phase to determine actual impacts. Detailed project sheets for the improvement concepts are included in Section 10.3.

10.1.1 Short-Term Improvement Concepts

The five short-term improvement concepts were categorized as high priority, medium priority, and low priority, as shown in **Table 7** and **Figure 28**.

Table 7: Short-Term Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
A	KY 876 at Lantern Ridge Dr. / Amberly Way	Restripe Lantern Ridge Dr. & Amberly Way Approaches	$400,000	2.13	High
B	I-75 Southbound Off-Ramp	Construct Dual Right-Turn Lanes with Receiving Lane on KY 876	$1,080,000	0.97	High
C	KY 876 at Goggins Ln.	Construct Eastbound Goggins Ln. Left-Turn Lane	$970,000	0.72	High
D	KY 169 West of Goggins Ln.	Update Signage	$50,000	5.40	Medium
E	KY 876 West of Goggins Ln.	Construct Turn Lanes at Intersections	$3,090,000	0.29	Low

10.1.1.1 High Priority Conceptual Improvements

Concept A (KY 876 at Lantern Ridge Drive / Amberly Way)

This concept includes restriping the intersection immediately west of the I-75 interchange, KY 876 at Lantern Ridge Drive / Amberly Way, to allow for dual entry of the side streets. This will increase the efficiency of the signal timing by reducing the number of phases and the total time needed for the side-street approaches, therefore allowing more green time for KY 876. The northbound approach would be restriped to include dedicated left, right, and through lanes and the southbound approach would be restriped to include dual left-turn lanes and shared thru / right-turn lane.

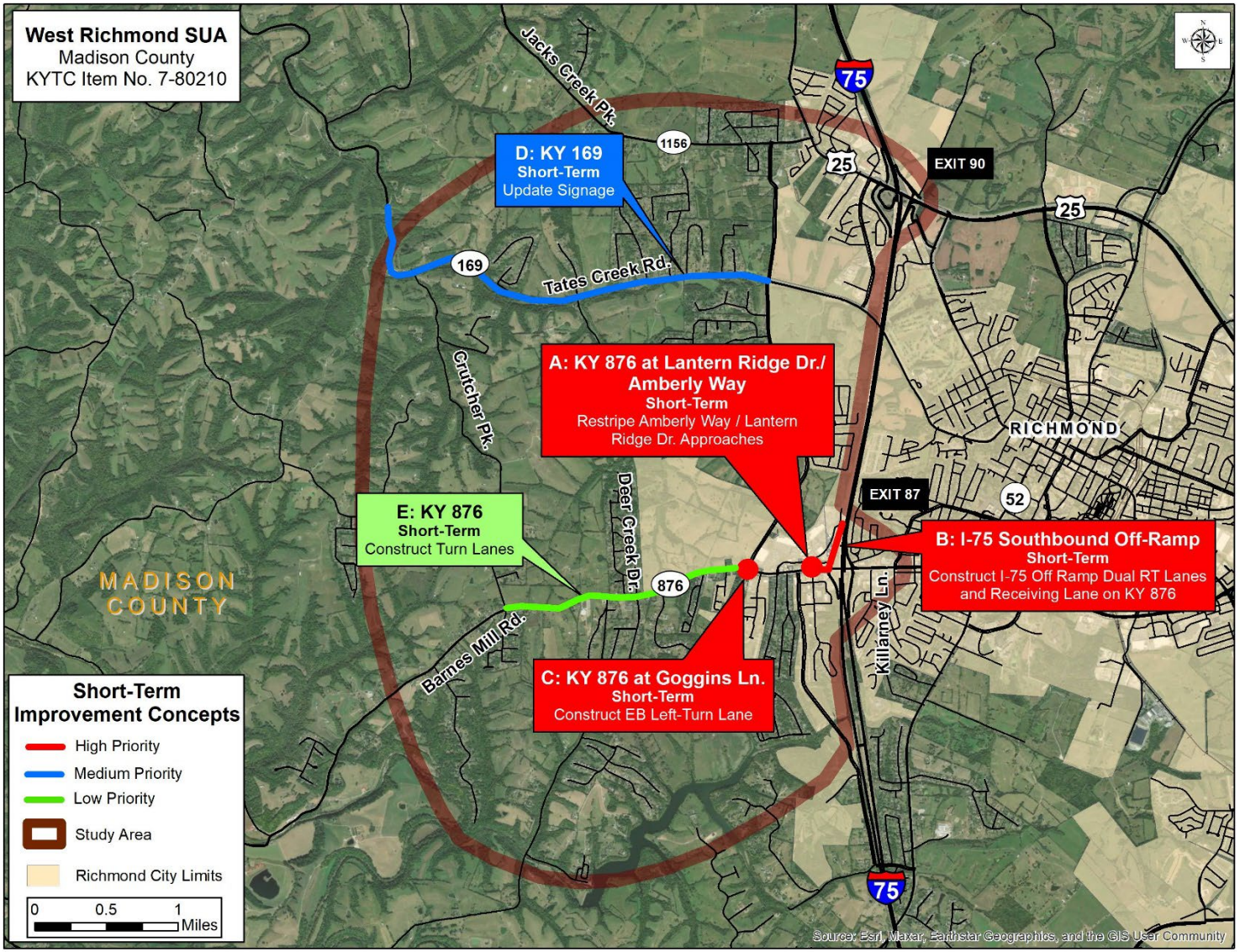


Figure 28: Short-Term Improvement Concepts

Concept B (I-75 Interchange Off-Ramp)

This concept includes widening the southbound I-75 off-ramp to include dual right-turn lanes and widening KY 876 to include a receiving lane that will feed into the right-turn lane at Lantern Ridge Drive. This concept can be constructed within existing right-of-way and will increase capacity on the ramp, reducing queues and providing needed storage for the southbound ramps.

Concept C (KY 876 at Goggins Lane)

This concept includes widening the eastbound KY 876 approach to include a dedicated left-turn lane. Providing a dedicated turn lane will remove the left turning vehicles from the through lane and allow the increased traffic from expected developments to flow smoother. This is especially important during the AM peak hour, which aligns with the start time for Madison County Middle School, located to the north on Goggins Lane. This concept is not needed if a roundabout is built as outlined in Long Term Concept F.

10.1.1.2 Medium Priority Conceptual Improvements

Concept D (KY 169 West of Goggins Lane)

This concept includes updating the signage along KY 169 to provide better visibility of curve warning signs.

10.1.1.3 Low Priority

Concept E (KY 876 West of Goggins Lane)

This concept includes providing turn lanes at the higher volume unsignalized intersections, including Crutcher Pike (westbound left- and right-turn lanes), Curtis Pike (westbound left-turn lane), Deer Creek Drive (westbound left- and right-turn lanes), and Hager Drive (westbound left-turn lane). Providing dedicated turn lanes would remove the left turning vehicles from the through lane, which will improve safety and allow traffic to flow smoother. As development occurs, turning movement counts should be collected to determine if warrants are met.

10.1.2 Long-Term Improvement Concepts

The seven long-term improvement concepts were categorized as high priority, medium priority, and low priority as shown in **Figure 29** and **Table 8**.

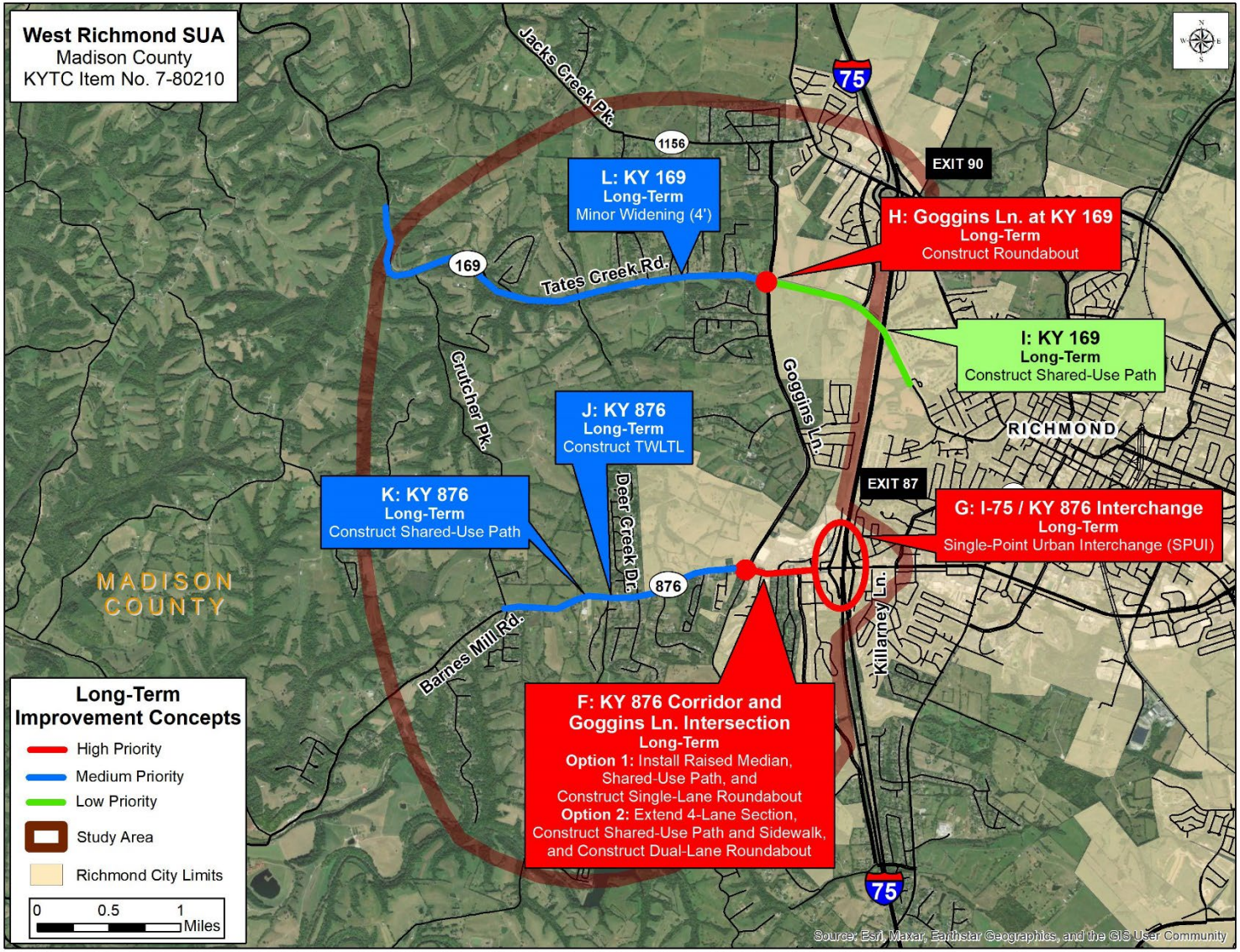


Figure 29: Long-Term Improvement Concepts

Table 8: Long-Term Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
F1	KY 876 Corridor & Goggins Ln. Intersection	Option 1: Install Raised Median, Shared Use-Path &Construct Single-Lane Roundabout	$5,780,000	0.90	High
F2		Option 2: Extend 4-Lane Section, Construct Shared-Use Path + Sidewalk & Construct Dual-Lane Roundabout	$12,360,000	0.71	
G	I-75 Interchange	Construct Single-Point Urban Interchange (SPUI)	$23,950,000	2.30	High
H	KY 169 at Goggins Ln.	Construct Single-Lane Roundabout	$2,580,000	0.39	High
I	KY 169 East of Goggins Ln.	Construct Shared-Use Path	$4,460,000	0.00	Low
J	KY 876 West of Goggins Ln.	Construct Two-Way Left-Turn Lane (TWLTL)	$7,830,000	0.00	Medium
K	KY 876 West of Goggins Ln.	Construct Shared-Use Path	$2,890,000	0.00	
L	KY 169 West of Goggins Ln.	2' Shoulder Widening on Both Sides of KY 169	$5,600,000	1.70	Medium

10.1.2.1 High Priority Conceptual Improvements

Concept F (KY 876 Corridor & Goggins Lane Intersection)

This concept includes two options to improve safety and operational conditions on KY 876 between I-75 and Goggins Lane:

- Option 1 – Install a raised median and sidewalk on KY 876 between I-75 and Goggins Lane and construct a single-lane roundabout at the Goggins Lane intersection. Based on results from the traffic analysis, a single-lane roundabout is sufficient for traffic volumes in 2035.
- Option 2 – Extend the four-lane section on KY 876 from Frankie Drive to Goggins Lane, construct a shared-use path and sidewalk, and construct a dual-lane roundabout at the Goggins Lane intersection. Based on results from the traffic analysis, a dual-lane roundabout is needed by 2045. **Figure 30** presents a potential typical section along KY 876 for Option 2, which requires 102 feet of right-of-way.

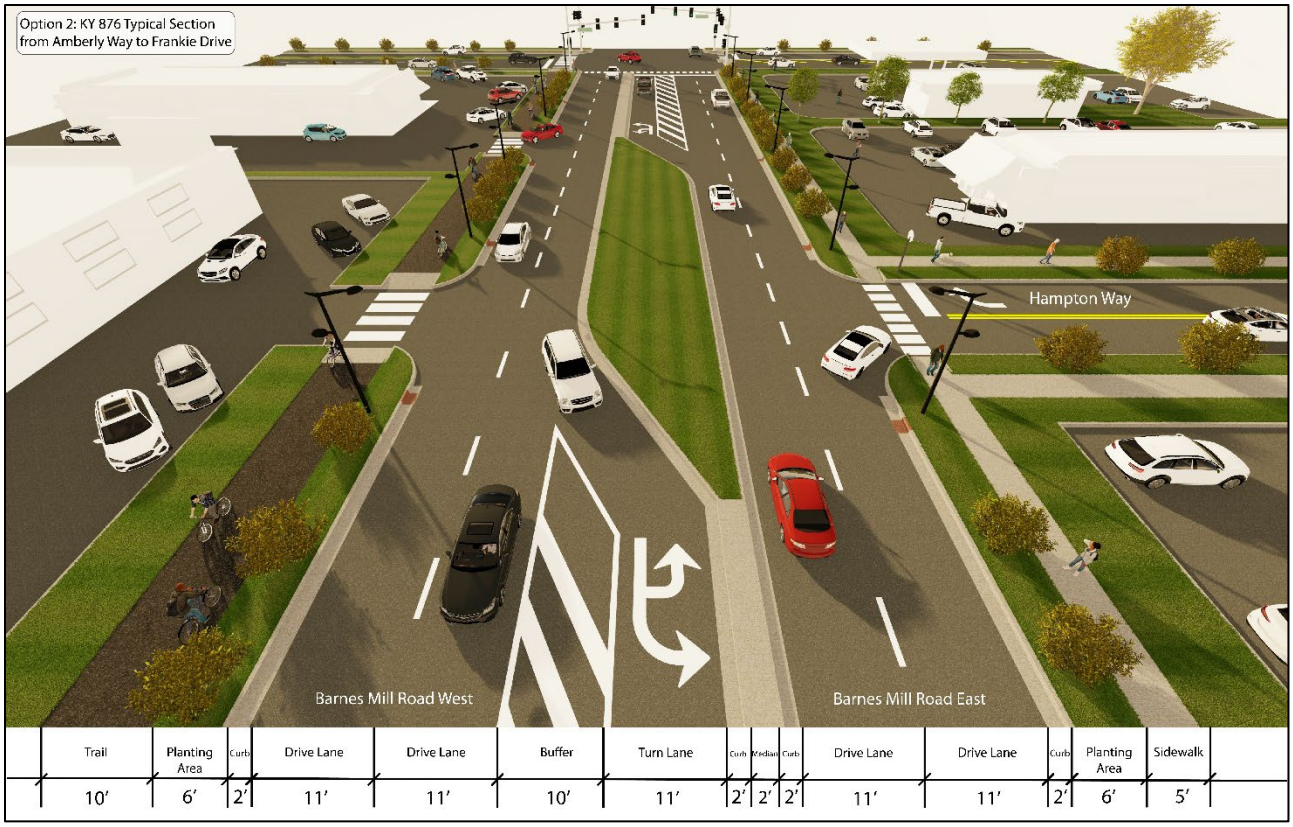


Figure 30: Potential Concept F (Option 2) Typical Section

Concept G (I-75 Interchange)

This concept includes constructing a single-point urban interchange (SPUI) at the I-75 interchange with KY 876. This type of interchange would relocate the KY 876 and I-75 ramp approaches to a single intersection, reducing conflict points and providing more spacing between adjacent intersections. Based on results from the traffic microsimulation model, the SPUI is expected to operate at LOS D or better in 2045. Modifications to the interchange should include bicycle and pedestrian accommodations to connect the development on each side of the interstate.

Concept H (KY 169 at Goggins Lane)

This concept includes constructing a single-lane roundabout at the KY 169 intersection with Goggins Lane. Construction of additional lanes at the intersection may be considered as the study area continues to develop.

10.1.2.2 Medium Priority Conceptual Improvements

Concept J (KY 876 West of Goggins Lane)

A long-term option to improve safety and reduce delays from turning vehicles on KY 876 is to construct a two-way left-turn lane (TWLTL) between Crutcher Pike and Goggins Lane. The

number of vehicles turning onto and off KY 876 is expected to increase as the rural portions of KY 876 develop. Providing a consistent turn lane will remove the left turning vehicles from the through traffic and reduce the number of conflicts.

Concept K (KY 876 West of Goggins Lane)

This concept includes constructing a shared-use path on KY 876 between Crutcher Pike and Goggins Lane to connect to the shared-use path proposed in Concept F (Option 2).

Concept L (KY 169 West of Goggins Lane)

This concept includes widening KY 169 to 11-foot lanes and four-foot shoulders from Goggins Lane to just west of Crutcher Pike.

10.1.2.3 Low Priority

Concept I (KY 169 East of Goggins Lane)

This concept includes constructing a shared-use path on KY 169 from Goggins Lane to Kit Carson Elementary, crossing underneath the I-75 overpass. This would provide connection to new neighborhoods and the new county park currently in construction.

10.1.3 Local Improvement Concepts.

The four local improvement concepts were categorized as high priority, medium priority, and low priority summarized in **Table 9** and shown in **Figure 31**.

Table 9: Local Improvement Concepts

Concept	Location	Description	Total Cost	Benefit-Cost Ratio	Priority
M	Crutcher Pike	Improved Signage Widen Areas for Vehicles to Pull Over	$260,000	0.12	Low
N	New Routes (KY 876 to KY 1156)	Construct New Routes	N/A[1]	N/A	Medium
O	Victory Blvd. & Goggins Lane North of KY 169	Extend Victory Blvd. to Goggins Lane & Widen Goggins Ln. North of KY 169	$6,560,000	N/A	High
P	Goggins Ln. between KY 876 & KY 169	Construct Shared-Use Path	$2,970,000	0.00	Medium

[1] Cost is expected to be addressed by developers as the adjacent land develops.

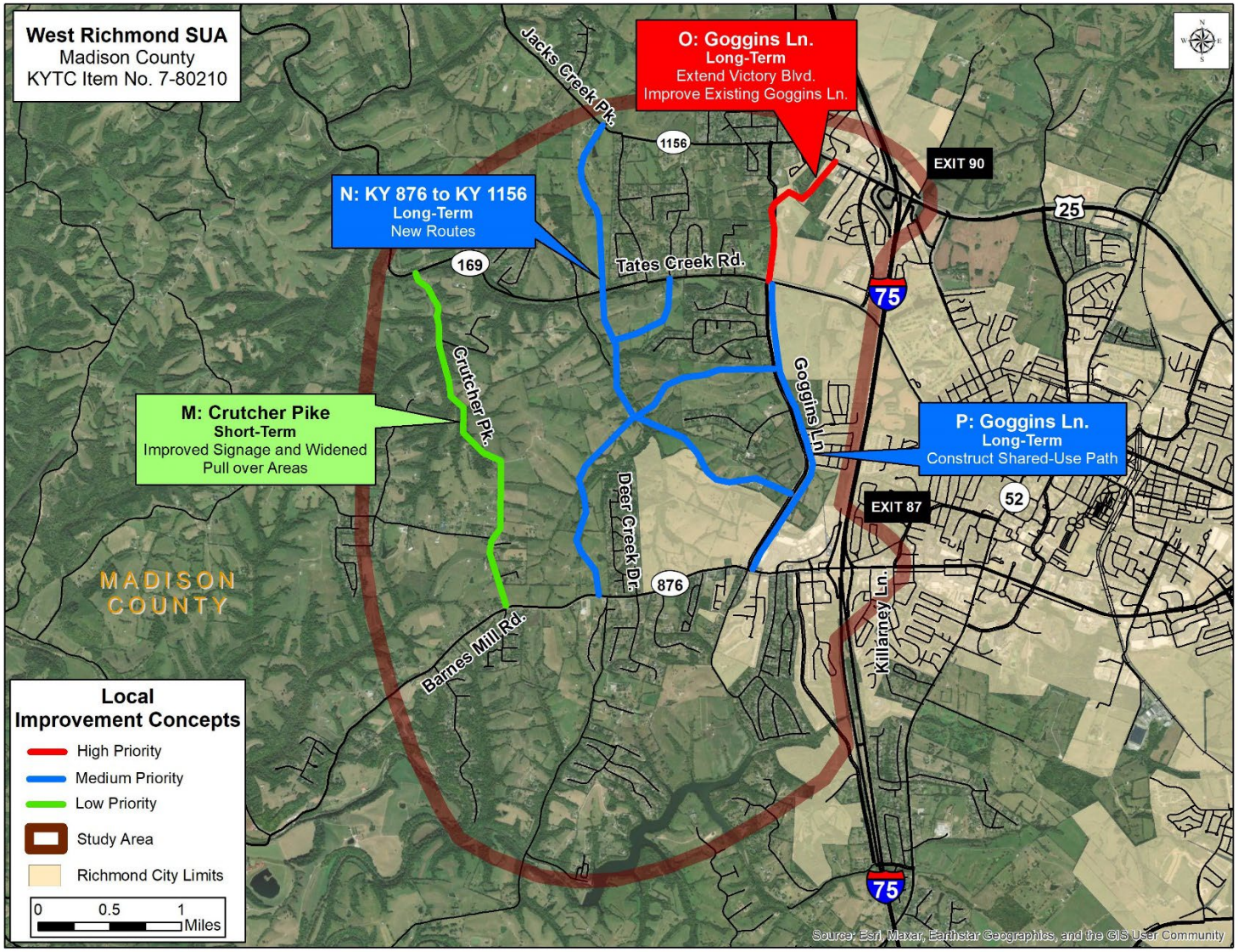


Figure 31: Local Improvement Concepts

10.1.3.1 High Priority Conceptual Improvements

Concept O (Victory Boulevard & Goggins Lane North of KY 169)

This concept includes constructing a new route between Goggins Lane and US 25 via Victory Boulevard. This concept would require improvements to the Goggins Lane / KY 169 intersection, as shown in Concept H. The section of Goggins Lane between KY 169 and the new route should be widened to match the typical section of the new route.

Proposed roadway alignments and endpoints were developed for Concept O and sent to the City of Richmond and Madison County to aid in the process of preserving right-of-way, as shown in **Figure 32**.

10.1.3.2 Medium Priority Conceptual Improvements

Concept N (New Route between KY 876 and KY 1156)

This concept includes constructing a new route from KY 876 to Jacks Creek Pike (KY 1156) with connections to the expected developments and to Goggins Lane. This route was developed a means of assisting the Planning Commission to have sections constructed in sections as developments occur and to ensure long-term accessibility in the heart of the study area. Proposed roadway alignments and endpoints, were developed for Concept N and sent to the City of Richmond and Madison County to aid in the process of preserving right-of-way, as shown in **Figure 33**. The recommended typical section assumes 60 feet of right-of-way and is shown in **Figure 34**.

Concept P (Goggins Lane)

This concept includes constructing a shared-use path on the east side of Goggins Lane to provide multi-modal access to the developing residential areas and the city park.

10.1.3.3 Low Priority Conceptual Improvements

Concept M (Crutcher Pike)

This concept includes constructing sections of wider pavement for vehicles to pull over and allow oncoming traffic to pass. This concept also includes updating the signs to provide improved visibility and safety warnings.

10.2 RECOMMENDED STRATEGIES FOR LOCAL PLANNING AND ZONING

Private developers, local planning staff, and local officials play a role in implementing the local recommendations from the *West Richmond Small Urban Area (SUA) Study*.

Figure 32: Concept O Proposed Alignment and Connection Points

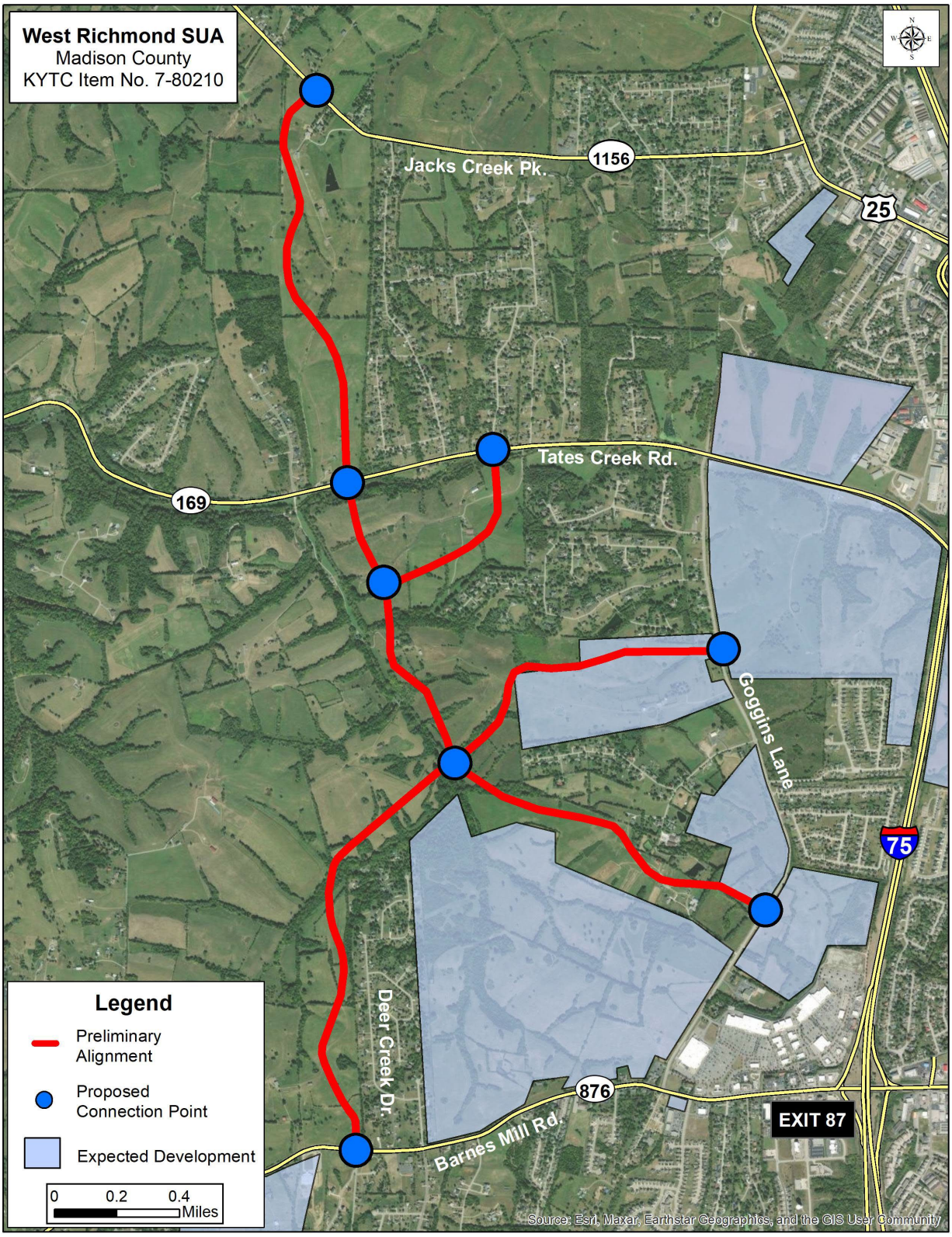


Figure 33: Concept N Proposed Alignment and Endpoints

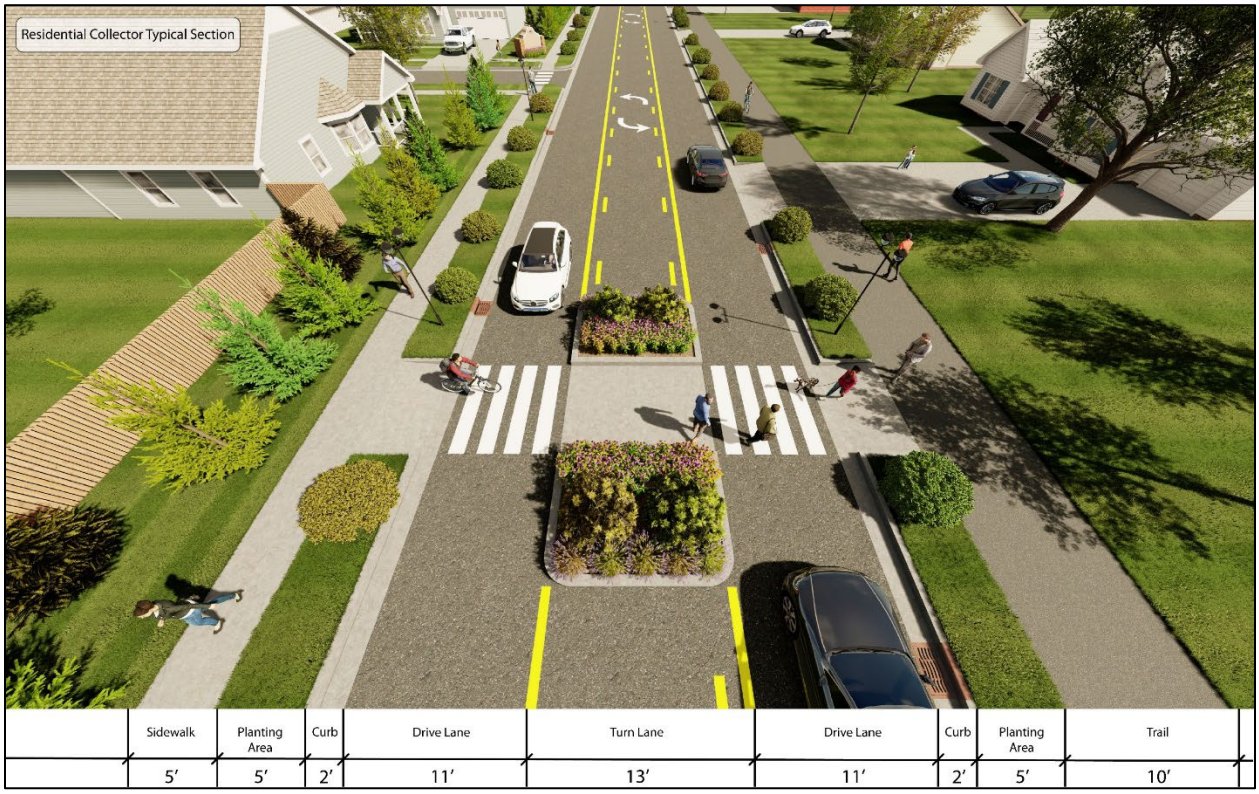


Figure 34: Recommended Typical Section for New Local Routes

The following recommendations include strategies that should be implemented by both the City of Richmond and Madison County to further support and implement this plan.

1. Amend the current comprehensive plans to include the *West Richmond Small Urban Area (SUA) Study* as an appendix and include the proposed roads in the transportation maps (Richmond: Future Transportation Improvements map on page 29. Madison County: Highway Plan Map on page 34).

2. Use the "cheat sheet" in **Appendix G** as a tool by local planners, officials, and developers on rezoning applications, plats, and development plan applications to incorporate the recommendations from this plan.

3. Update and/or create local access management ordinances to incorporate the recommendations of this plan. This includes subdivision road standards, which should include the typical section shown in **Figure 34**.

10.3 PROJECT SHEETS

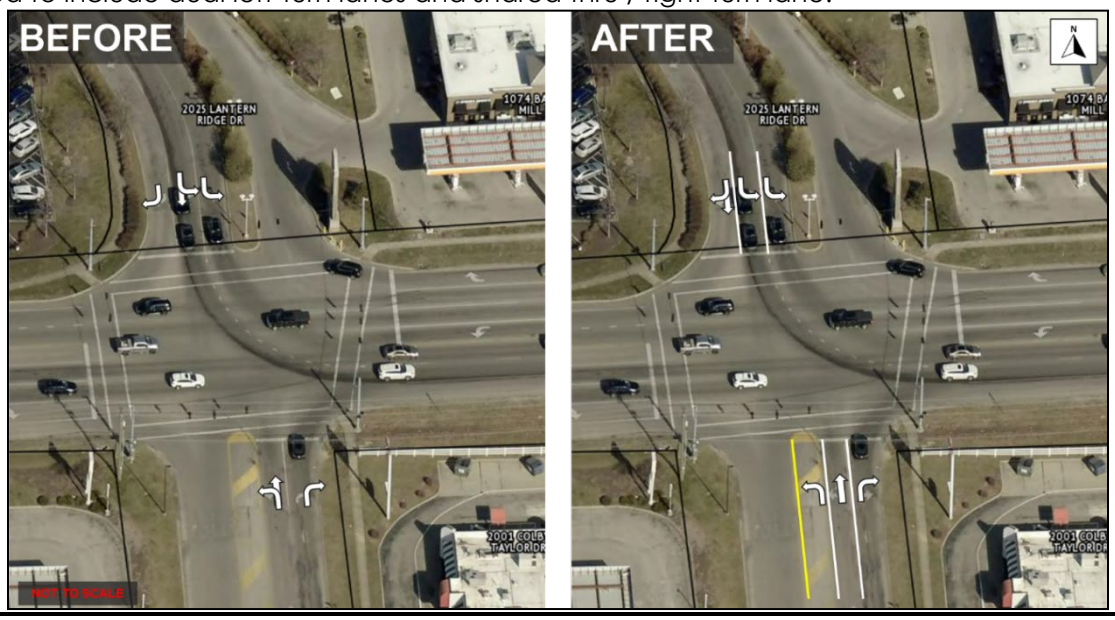
The following section presents the concept sheets for the short-term, long-term, and local improvement concepts. As previously mentioned, the utility cost estimates assume all utilities in the project area will be impacted and more detailed estimates should be developed during the design phase to determine actual impacts.

A **Short-Term**	**LOCATION** Barnes Mill Road (KY 876) at Lantern Ridge Drive / Amberly Way	**PROJECT PRIORITY:** High
DESCRIPTION Intersection improvements including: • Restriping the southbound Lantern Ridge Drive approach to include dual left-turn lanes and a shared thru/right turn lane. • Restriping the northbound Amberly Way approach to include dedicated left, thru, and right-turn lanes.		**2023 COST ESTIMATE** Design: $0 Right-of-Way: $0 Utility: $0 Construction: $400,000 **Total: $400,000**

Project Needs: The Lantern Ridge Drive / Amberly Way intersection is the first signalized intersection west of the I-75 interchange on Barnes Mill Road (KY 876) at Exit 87. This portion of KY 876 carries 12,750 vehicles per day (VPD) and serves commercial and residential areas with numerous access points and peak hour congestion. During the PM peak hour, queues from the westbound KY 876 approach back up to the I-75 southbound off-ramp. Based on results from the traffic analysis, this section of KY 876 is anticipated to experience significant growth, up to 22,000 VPD in 2045, in the next 20 years as the land near Goggins Lane develops

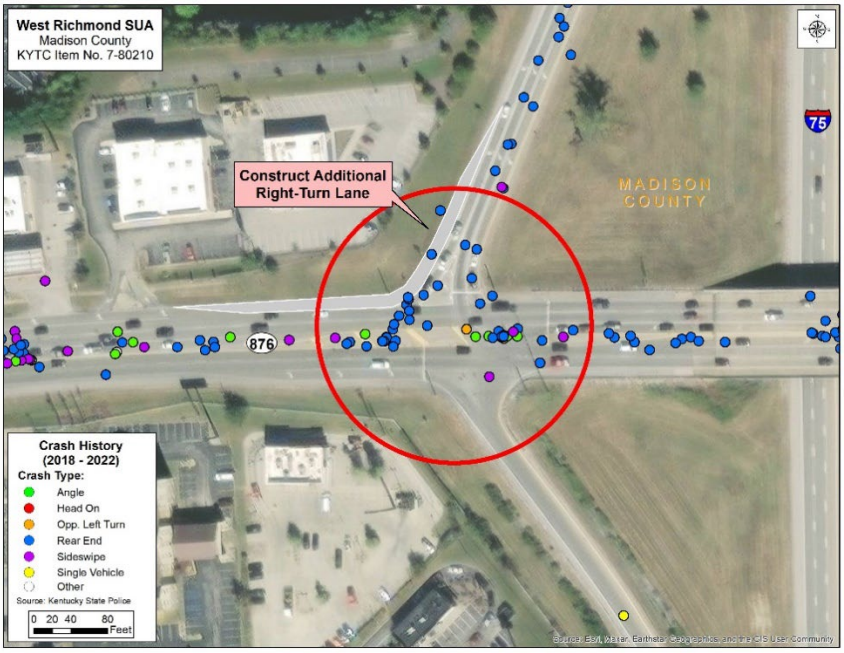
Over the five-year period between 2018 and 2022, there were 119 reported crashes at the KY 876 intersection with Lantern Ridge Drive / Amberly Way, 13 (11 percent) of which resulted in an injury. Of the reported crashes, 87 percent were rear end, angle, or sideswipe collisions, indicating that congestion and poor access management may be contributing factors.

Improvement Concept: An option to improve congestion in the short-term is to restripe the Lantern Ridge Drive / Amberly Way approaches to improve signal timing and provide more green time for KY 876 by allow dual entry of the minor approaches. The northbound approach would be restriped to include dedicated left, right, and through lanes and the southbound approach would be restriped to include dual left-turn lanes and shared thru / right-turn lane.



B **Short-Term**	**LOCATION** I-75 Southbound Exit Ramp at Barnes Mill Road (KY 876)	**PROJECT PRIORITY:** High
DESCRIPTION Construct dual right-turn lanes on the southbound I-75 exit ramp and a receiving lane on KY 876		**2023 COST ESTIMATE** Design: $180,000 Right-of-Way: $0 Utility: $0 Construction: $900,000 **Total: $1,080,000**

Project Needs: West of I-75 on Exit 87, Barnes Mill Road (KY 876) contains a variety of traffic generators. KY 876 currently carries 12,750 VPD in this area and is anticipated to experience significant growth over the next 20 years, up to 22,200 VPD in 2045, as the area near Goggins Lane develops. Turning movement counts collected in March 2023 revealed that 270 vehicles turned right onto KY 876 from the southbound I-75 off-ramp during the AM peak hour and 490 vehicles turned right during the PM peak. The number of right-turning vehicles is anticipated to increase as the areas to the west develop.

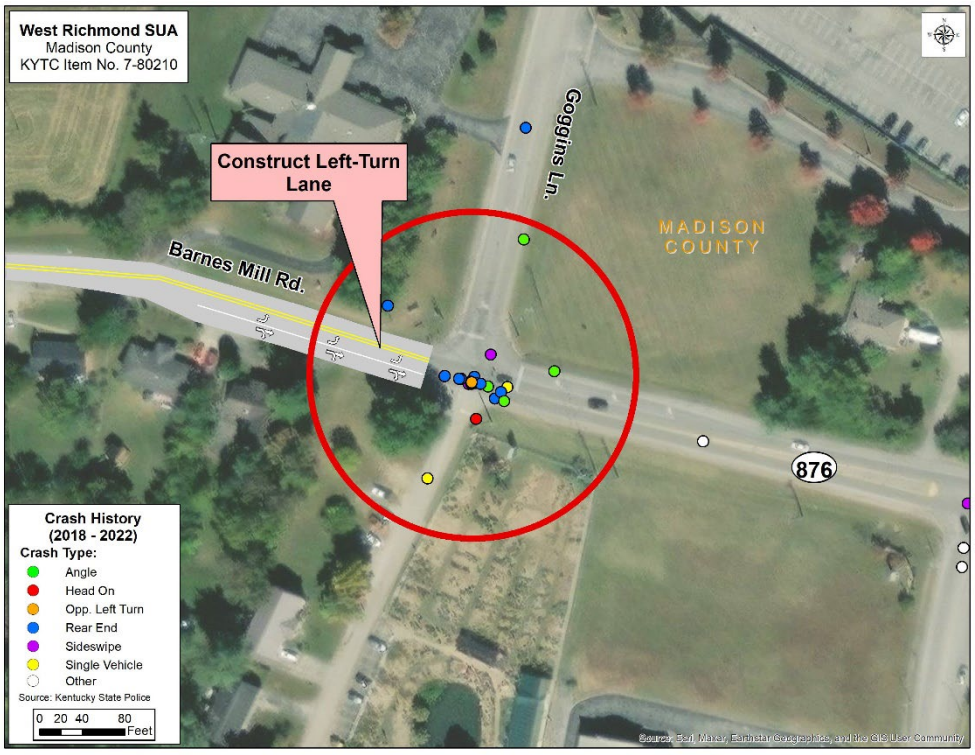


Based on results from the existing traffic analysis, traffic on the southbound I-75 off-ramp queues significantly and there is some unmet demand during the PM peak hour. This unmet demand can contribute to safety concerns. Over the five-year period between 2018 and 2022, there were 51 reported crashes at the KY 876 intersection with the I-75 southbound ramps, five (ten percent) of which resulted in an injury. The most common crash type was rear end collisions (75 percent), indicating that congestion may be a contributing factor. All 13 of the collisions reported on the I-75 southbound off-ramp were rear end collisions. Based on results from the safety analysis, the intersection has an Excess Expected Crashes (EEC) of 2.8 crashes per year, indicating more crashes occurred than expected.

Improvement Concept: This concept includes widening the southbound I-75 exit ramp to include dual right-turn lanes and widening KY 876 to include an additional westbound receiving lane that will feed into the right-turn lane at Lantern Ridge Drive. Signage will be added to notify drivers that the outside southbound right-turn lane will become a right-turn only lane at Lantern Ridge Drive. This concept can be constructed within existing right-of-way and will provide needed storage for the southbound ramp.

C **Short-Term**	**LOCATION** Barnes Mill Road (KY 876) at Goggins Lane	**PROJECT PRIORITY:** High
DESCRIPTION Construct eastbound left-turn lane from KY 876 onto Goggins Lane		**2023 COST ESTIMATE** Design: $120,000 Right-of-Way: $50,000 Utility: $200,000 Construction: $600,000 **Total: $970,000**

Project Needs: Goggins Lane intersects Barnes Mill Road (KY 876) at the western end of the existing commercial section. Over the past five years, there were 26 reported crashes at the intersection of KY 876 and Goggins Lane. Of these crashes, 46 percent were rear end collisions and 27 percent were angle collisions. The northwest quadrant of the intersection, along with other areas along Goggins Lane, are expected to be developed over the next 20 years. These developments are potential traffic generators and include commercial, residential, recreational, and educational concepts. Based on a future traffic analysis, KY 876 is expected to carry 22,200 VPD east of Goggins Lane and 11,400 VPD to the west in 2045. Goggins Lane is expected to see a significant increase in traffic, from 7,500 VPD currently to 18,500 VPD in 2045. This intersection is a potential choke point as it will be used heavily by traffic accessing the expected developments.

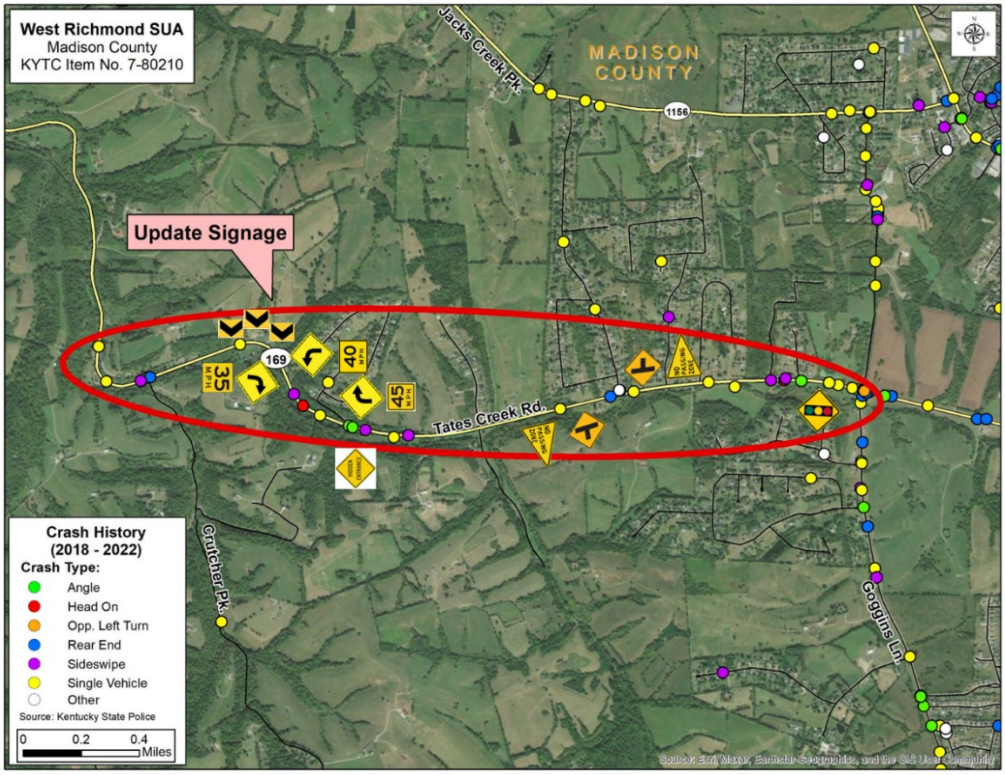


Improvement Concept: An option to improve traffic flow in the short-term is to widen the eastbound KY 876 approach to include a dedicated left-turn lane. As the land along KY 876 and Goggins Lane develops, there will be an increase in both the eastbound through and left turning traffic. Providing a dedicated turn lane will remove the left turning vehicles from the through lane allowing traffic to flow more smoothly.

D **Short-Term**	**LOCATION** Tates Creek Road (KY 169) west of Goggins Lane	**PROJECT PRIORITY:** Medium
DESCRIPTION Systemic signing updates.		**2023 COST ESTIMATE** Design: $0 Right-of-Way: $0 Utility: $0 Construction: $50,000 **Total: $50,000**

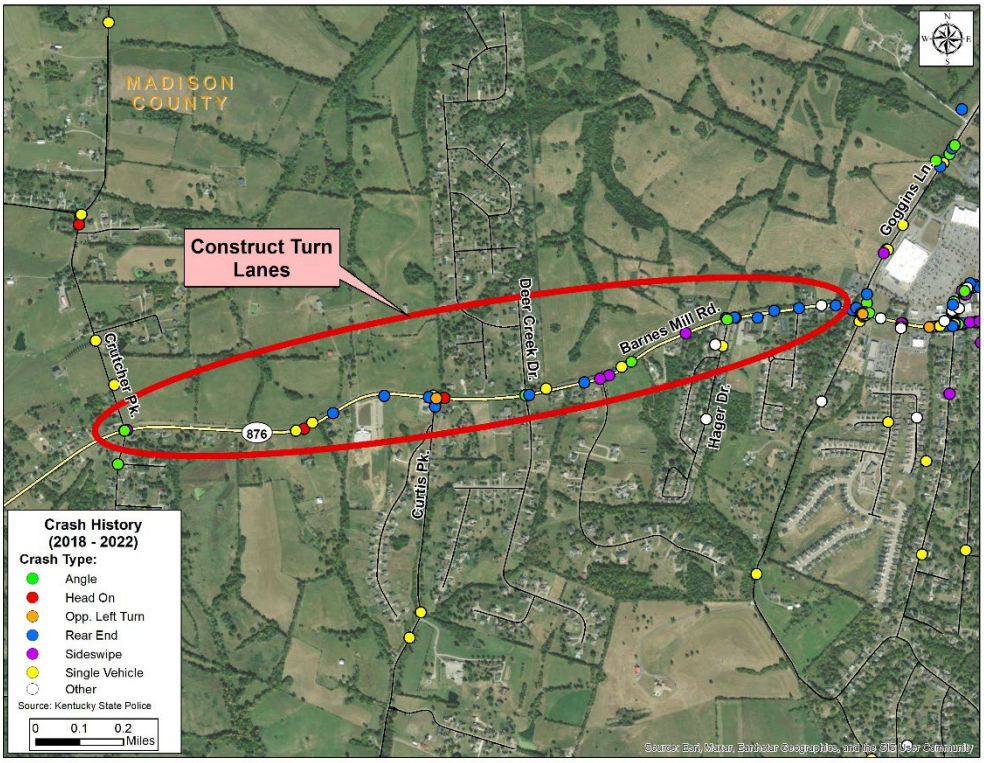
Project Needs: The Highway Safety Improvement Program (HSIP) District 7 Roadway Departure Study identified Tates Creek Road (KY 169) as a corridor that could benefit from updated signage. West of Goggins Lane, Tates Creek Road (KY 169) has two ten-foot lanes with one-foot shoulders, serving mostly rural and residential areas. This section carries 1,750 VPD and is expected to carry 3,100 VPD in 2045. Over the past five years, there were 56 reported crashes on this 2.7-mile stretch of KY 169, one of which resulted in a fatality and ten of which resulted in an injury. The EEC is 1.5 crashes per year, indicating KY 169 is experiencing more crashes than what is expected based on roadway characteristics.

Improvement Concept: An option to improve safety is to update the signage along KY 169 from Goggins Lane to just west of Crutcher Pike. This would provide drivers better visibility of curve warning signs.



E **Short-Term**	**LOCATION** Barnes Mill Road (KY 876) west of Goggins Lane	**PROJECT PRIORITY:** Medium
DESCRIPTION Construct turn lanes at intersections		**2023 COST ESTIMATE** Design: $360,000 Right-of-Way: $130,000 Utility: $800,000 Construction: $1,800,000 **Total: $3,090,000**

Project Needs: Between Crutcher Pike and Goggins Lane, Barnes Mill Road (KY 876) serves mostly rural and residential areas. There are currently no signalized intersections and no turn lanes on this section of KY 876. Over the past five years, there were 34 reported crashes, 12 (35 percent) of which resulted in an injury. Of the 34 crashes, the most common crash type was rear end collisions with 15, mostly clustered at the unsignalized intersections. Over the next 20 years, daily traffic is expected to increase from 7,200 VPD (2021) to 12,600 VPD (2045). Developments in this area with anticipated access points on KY 876 will not only increase the traffic volume, but also the number of potential conflict points.



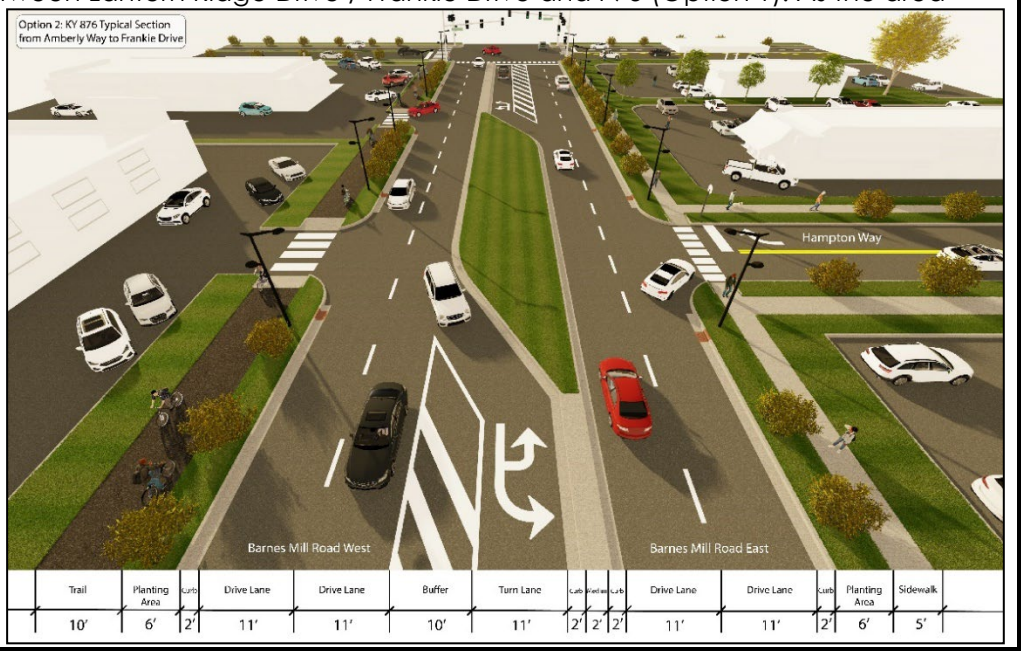
Improvement Concept: An option to improve safety and traffic conditions is to provide turn lanes at the major unsignalized intersections, including Crutcher Pike (westbound left- and right-turn lanes), Curtis Pike (westbound left-turn lane), Deer Creek Drive (westbound left- and right-turn lanes), and Hager Drive (westbound left-turn lane). Providing dedicated turn lanes would remove the left turning vehicles from the through lane, improving safety and allowing traffic to flow smoother. As development occurs, turning movement counts should be collected to determine if warrants are met.

F **Long-Term**	**LOCATION** Barnes Mill Road (KY 876) Corridor & Goggins Lane Intersection	**PROJECT PRIORITY:** High

DESCRIPTION	**OPTION 1 2023 COST ESTIMATE**	**OPTION 2 2023 COST ESTIMATE**
Option 1: Install Raised Median, Shared-Use Path, and Construct Single-Lane Roundabout Option 2: Extend Four-Lane Section, Construct Shared-Use Path and Sidewalk, and Construct Dual-Lane Roundabout	Design: $540,000 Right-of-Way: $40,000 Utility: $1,600,000 Construction: $3,600,000 **Total: $5,780,000**	Design: $1,380,000 Right-of-Way: $180,000 Utility: $1,600,000 Construction: $9,200,000 **Total: $12,360,000**

Project Needs: West of the I-75 interchange, the Barnes Mill Road (KY 876) corridor serves commercial and residential areas with numerous access points and peak hour congestion. Over the past five years, there were 248 reported crashes on KY 876 between the I-75 interchange and Goggins Lane. Of those crashes, 84 percent were rear end, angle, or sideswipe collisions, indicating that congestion and access management may be contributing factors. This portion of KY 876 has an EEC of seven crashes per year.

Improvement Concepts: A long-term option to improve safety and traffic conditions at this intersection is to construct a roundabout. Based on results from the traffic analysis, a single-lane roundabout is sufficient for traffic volumes in 2035 (Option 1), with a dual-lane roundabout needed by 2045 (Option 2). Additionally, a raised median could be constructed on KY 876 to restrict left turns from minor approaches at unsignalized intersections. Initially, the two lanes in each direction are sufficient on KY 876 between Lantern Ridge Drive / Frankie Drive and I-75 (Option 1). As the area develops, KY 876 will need to be widened between Goggins Lane and Frankie Drive to accommodate the traffic growth (Option 2). A shared-use path and sidewalk could be constructed on KY 876 from Goggins Lane to the I-75 interchange. Option 2 is shown in the graphic above.



G **Long-Term**	**LOCATION** I-75 Interchange with Barnes Mill Road (KY 876)	**PROJECT PRIORITY:** High

DESCRIPTION

Reconfigure as Single-Point Urban Interchange (SPUI)

2023 COST ESTIMATE

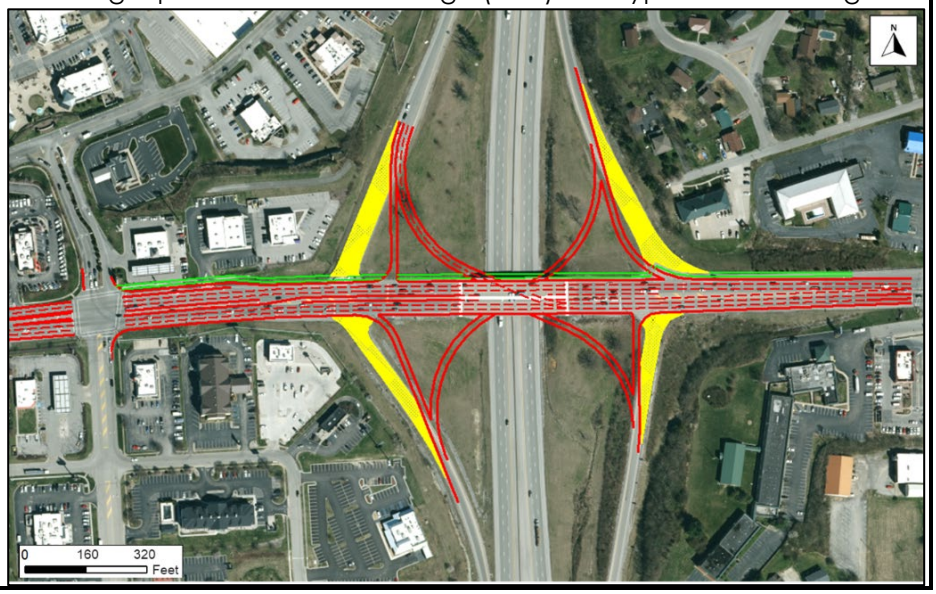
Design: $3,060,000
Right-of-Way: $70,000
Utility: $420,000
Construction: $20,400,000
Total: $23,950,000

Project Needs: Over the five-year period between 2018 and 2022, there were 201 reported crashes at the I-75 interchange with Barnes Mill Road (KY 876), 34 (17 percent) of which resulted in an injury. The most common crash type was rear end collisions (80 percent), indicating that congestion may be a contributing factor. Based on results from the safety analysis, the northbound I-75 ramp intersection has an Excess Expected Crashes (EEC) of three crashes per year and the southbound ramp intersection has an EEC of one crash per year, indicating KY 876 is experiencing more crashes than other roadways with roadway characteristics.

West of I-75, there are major traffic attractions including restaurants, grocery stores, and department stores, among others. KY 876 currently carries 12,750 VPD in this area and is anticipated to experience significant growth over the next 20 years, up to 22,200 VPD in 2045, as the area near Goggins Lane develops.

Based on results from the 2035 No-Build traffic analysis, the KY 876 intersections with Killarney Lane and the northbound I-75 ramps are expected to operate at LOS F during the PM peak hour and the Lantern Ridge Drive / Amberly Way intersection is expected to operate at LOS E.

Improvement Concept: A long-term option to improve safety and traffic flow is to reconstruct the existing diamond interchange to a single-point urban interchange (SPUI). This type of interchange would relocate the KY 876 and I-75 ramp approaches to a single intersection, reducing conflict points and providing more spacing between adjacent intersections. Based on results from the SPUI mircrosimulation model scenario, the I-75 interchange and adjacent intersections would operate at LOS D or better in 2035.

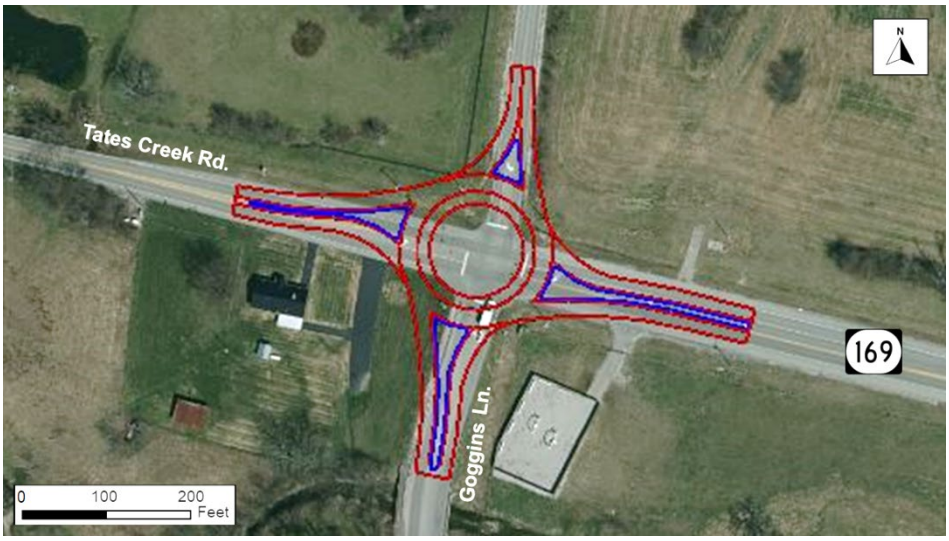


H **Long-Term**	**LOCATION** Tates Creek Road (KY 169) at Goggins Lane	**PROJECT PRIORITY:** High
DESCRIPTION Construct Single-Lane Roundabout		**2023 COST ESTIMATE** Design: $270,000 Right-of-Way: $10,000 Utility: $500,000 Construction: $1,800,000 **Total: $2,580,000**

Project Needs: The intersection of Goggins Lane and Tates Creek Road (KY 169) is currently a signalized intersection with left-turn lanes at all four approaches. Over the past five years, there were 24 reported crashes at this intersection, six (25 percent) of which resulted in an injury. Of the reported collisions, 83 percent were angle or rear end collisions.

East of Goggins Lane, KY 169 provides a connection under I-75 to Kit Carson Elementary School and the well-established residential areas surrounding downtown Richmond and is anticipated to carry 8,800 vehicles per day (VPD) in 2045. Goggins Lane currently carries 7,500 VPD and is expected to carry 18,500 VPD in 2045. As the land along Goggins Lane continues to develop, it is anticipated that this intersection will be more utilized in the future, especially to access the city park currently under construction.

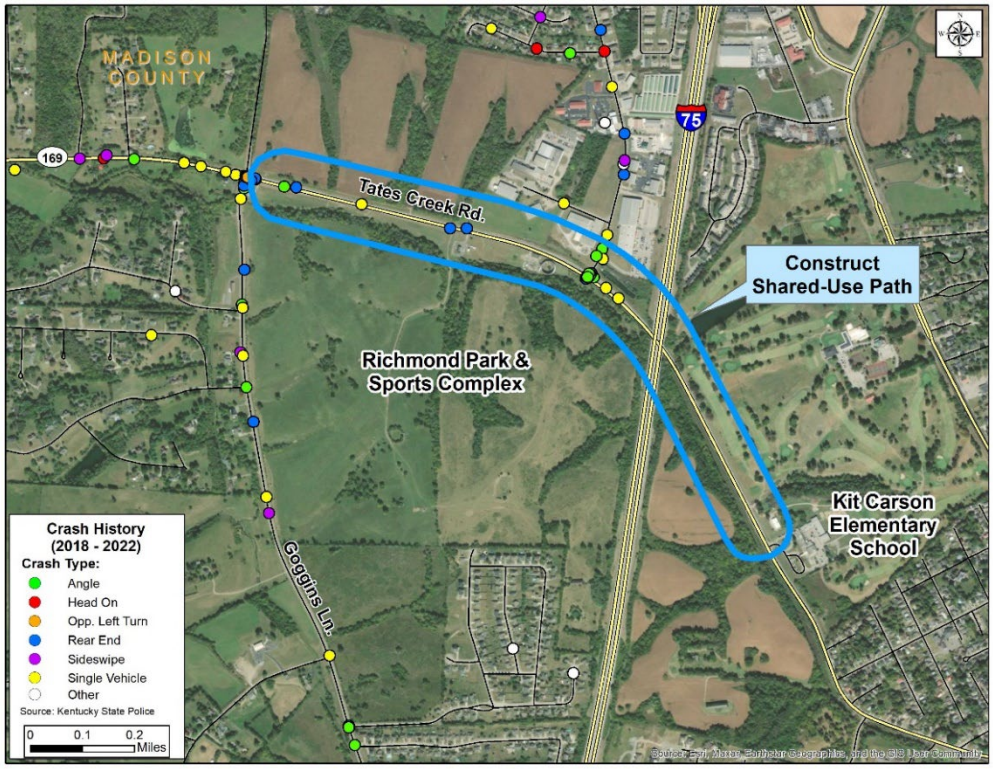
Improvement Concept: As peak hour traffic-generating developments occur along Goggins Lane and KY 169, the intersection of the two routes has the potential to become a traffic chokepoint. An option to improve safety and reduce congestion is to construct a roundabout. The initial roundabout would be single lane, with the potential to construct additional lanes if necessary.



I **Long-Term**	**LOCATION** Tates Creek Road (KY 169) East of Goggins Lane	**PROJECT PRIORITY:** Low
DESCRIPTION Construct Shared-Use Path		**2023 COST ESTIMATE** Design: $90,000 Right-of-Way: $360,000 Utility: $3,410,000 Construction: $600,000 **Total: $4,460,000**

Project Needs: East of Goggins Lane, Tates Creek Road (KY 169) provides a connection under I-75 to Kit Carson Elementary School and the well-established residential areas surrounding downtown Richmond and is anticipated to carry 8,800 vehicles per day (VPD) in 2045. There are several anticipated developments along KY 169 that will increase demand for bicycle and pedestrian mobility, including a residential development in the northeast quadrant of the KY 169 intersection with Goggins Lane and a city park with recreational fields in the southeast quadrant.

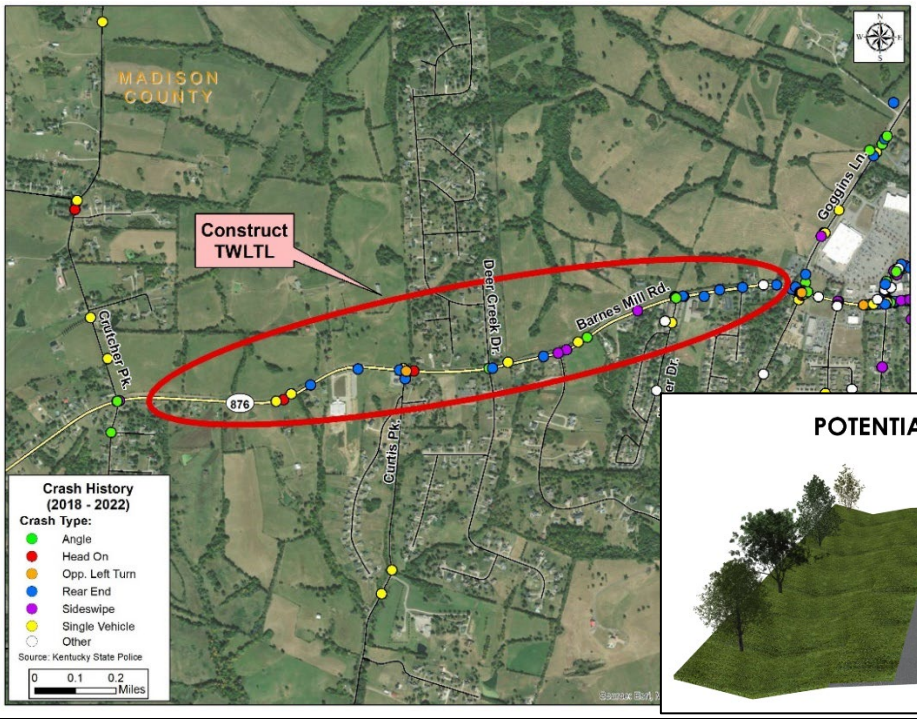
Improvement Concept: An option to improve multi-modal travel in the area is to construct a shared-use path on KY 169 from Goggins Lane to Kit Carson Elementary, crossing underneath the I-75 overpass.



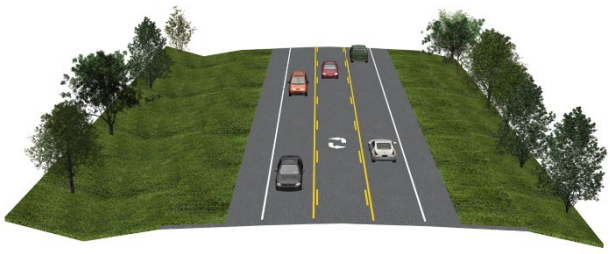
J **Long-Term**	**LOCATION** Barnes Mill Road (KY 876) West of Goggins Lane	**PROJECT PRIORITY:** Medium
DESCRIPTION Construct Two-Way Left-Turn Lane (TWLTL)		**2023 COST ESTIMATE** Design: $780,000 Right-of-Way: $340,000 Utility: $1,510,000 Construction: $5,200,000 **Total: $7,830,000**

Project Needs: Between Crutcher Pike and Goggins Lane, Barnes Mill Road (KY 876) serves mostly rural and residential areas. There are currently no signalized intersections and no turn lanes on this section of KY 876. Over the past five years, there were 34 reported crashes, 12 (35 percent) of which resulted in an injury. Of the 34 crashes, the most common crash type was rear end collisions with 15, mostly clustered at the unsignalized intersections. Over the next 20 years, daily traffic is expected to increase from 7,200 VPD (2021) to 12,600 VPD (2045). Developments in this area with anticipated access points on KY 876 will not only increase the traffic volume, but also the number of potential vehicle conflict points.

Improvement Concept: A long-term option to improve safety and reduce congestion on KY 876 is to construct a two-way left-turn lane (TWLTL) between Crutcher Pike and Goggins Lane. The number of vehicles turning onto, and off KY 876 is expected to increase as the rural portions of KY 876 continue to develop. Providing a consistent turn lane will remove the left turning vehicles from the through traffic and reduce the number of conflicts.



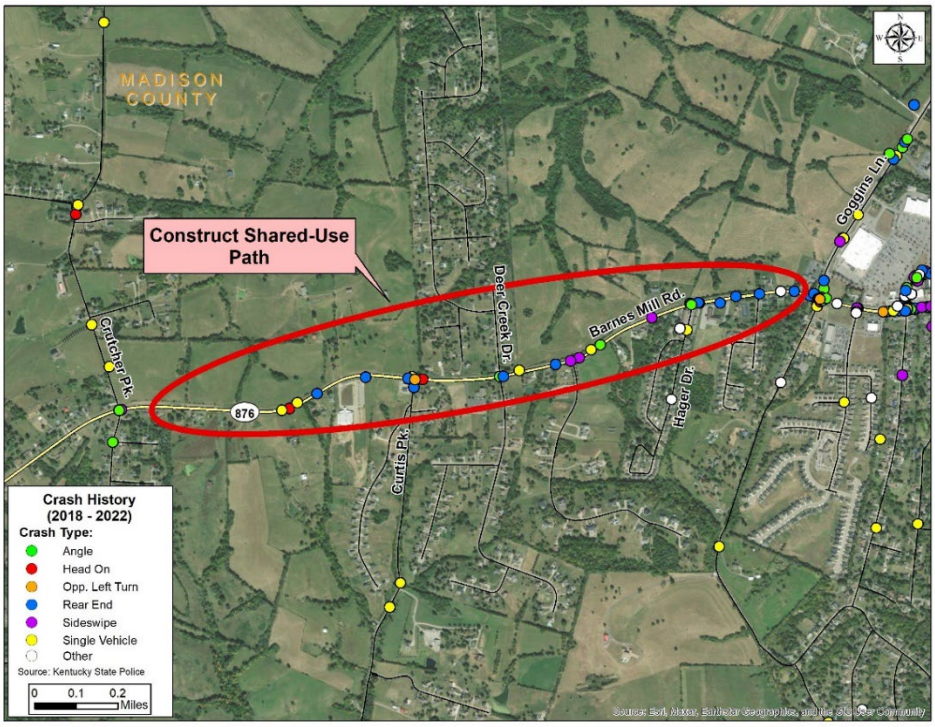
POTENTIAL TYPICAL SECTION



K **Long-Term**	**LOCATION** Barnes Mill Road (KY 876) West of Goggins Lane	**PROJECT PRIORITY:** Medium
DESCRIPTION Construct Shared-Use Path		**2023 COST ESTIMATE** Design: $120,000 Right-of-Way: $460,000 Utility: $1,510,000 Construction: $800,000 **Total: $2,890,000**

Project Needs: Between Crutcher Pike and Goggins Lane, KY 876 serves mostly rural and residential areas. There are currently no sidewalks or bicycle accommodations on this section of KY 876. Over the past five years, there were 34 reported crashes, 12 (35 percent) of which resulted in an injury. Of the 34 crashes, the most common crash type was rear end collisions with 15, mostly clustered at the unsignalized intersections. There were no reported bicycle or pedestrian collisions. Over the next 20 years, daily traffic is expected to increase from 7,200 VPD (2021) to 12,600 VPD (2045). As the residential and commercial development continues along Goggins Lane and KY 876, the need for multi-modal mobility will increase.

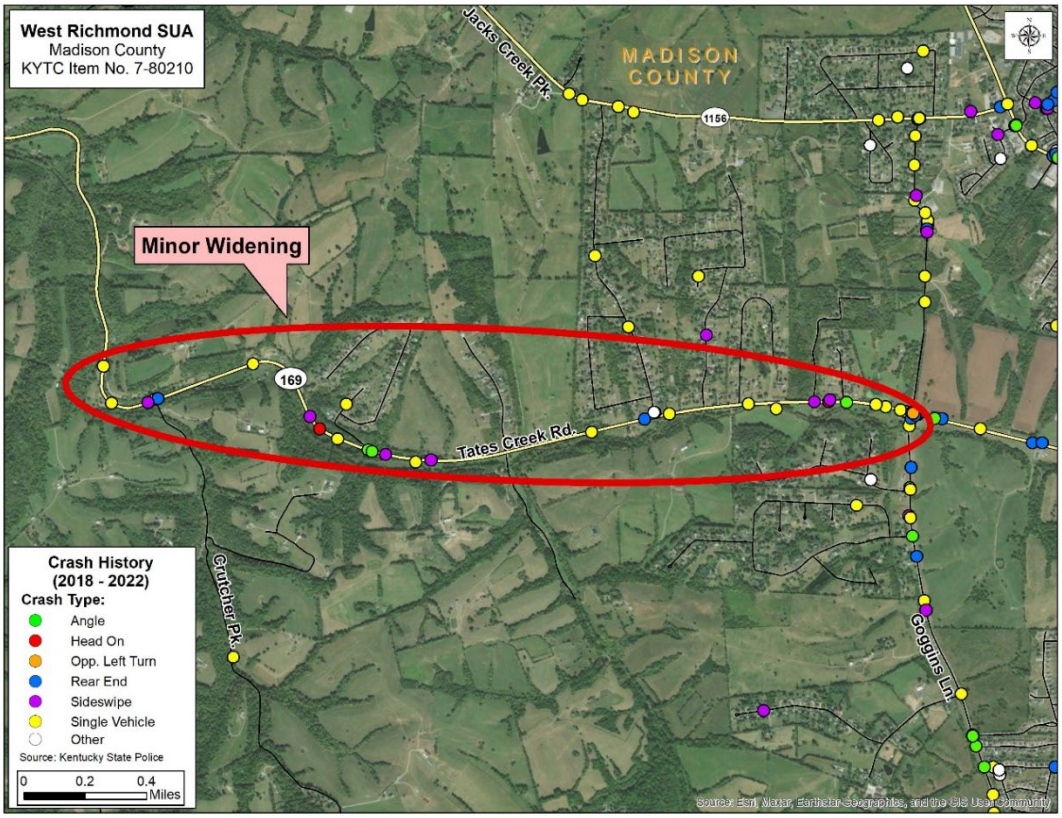
Improvement Concepts: An option to improve bicycle and pedestrian connectivity in the study area is to construct a shared-use path on KY 876 between Goggins Lane and Crutcher Pike. The intention is for this path to connect to the anticipated shared-use path on KY 876 east of Goggins Lane which will connect across I-75.



L **Long-Term**	**LOCATION** KY 169 West of Goggins Lane	**PROJECT PRIORITY:** Medium
DESCRIPTION Minor Widening (11-foot Lanes & 4-foot Shoulders)		**2023 COST ESTIMATE** Design: $380,000 Right-of-Way: $150,000 Utility: $2,570,000 Construction: $2,500,000 **Total: $5,600,000**

Project Needs: West of Goggins Lane, Tates Creek Road (KY 169) has two ten-foot lanes with one-foot shoulders, serving mostly rural and residential areas. This section of KY 169 carries 1,750 VPD and is expected to carry 3,100 VPD in 2045. Over the past five years, there were 56 reported crashes on this 2.7-mile stretch of KY 169, one of which resulted in a fatality and ten of which resulted in an injury. The EEC is 1.5 crashes per year, indicating KY 169 is experiencing more crashes than what is expected based on roadway characteristics.

Improvement Concept: An option to improve safety is to widen the lanes to 11 feet and the shoulders to four feet. This would provide enough pavement to add centerline and edge line rumble stripes and would decrease the likelihood of roadway departure collisions.

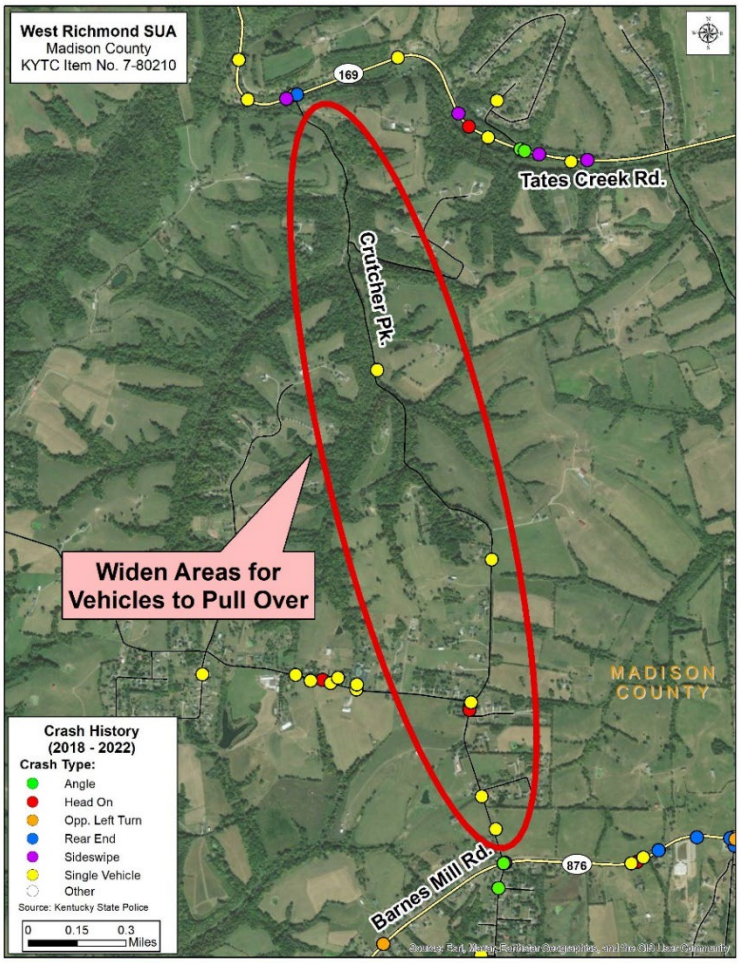


M **Local**	**LOCATION** Crutcher Pike between 0.000 and 2.642	**PROJECT PRIORITY:** Low

DESCRIPTION	**2023 COST ESTIMATE**
Widen Areas for Vehicles to Pull Over & Improve Signage	Design: $40,000 Right-of-Way: $0 Utility: $120,000 Construction: $100,000 **Total: $260,000**

Project Needs: Crutcher Pike (CR 1354) is a north-south county route that connects Barnes Mill Road (KY 876) to Tates Creek Road (KY 169) in the western section of the study area, approximately two miles west of Goggins Lane. To the south near KY 876, Crutcher Pike has two ten-foot lanes with no shoulders, while to the north near KY 169 Crutcher Pike has approximately 12 feet of total pavement. Over the past five years, there were eight reported crashes, five of which were single vehicle collisions.

The Lexington Area Metropolitan Organization (LAMPO) Regional Travel Demand Model was used to estimate changes in travel patterns if Crutcher Pike were upgraded to 11-foot lanes and a 55 mph speed limit. Based on results from the model, an improved Crutcher Pike would carry less than 1,000 VPD and would not significantly reduce traffic on Goggins Lane. Reconstruction of Crutcher Pike should be considered if development expands west.



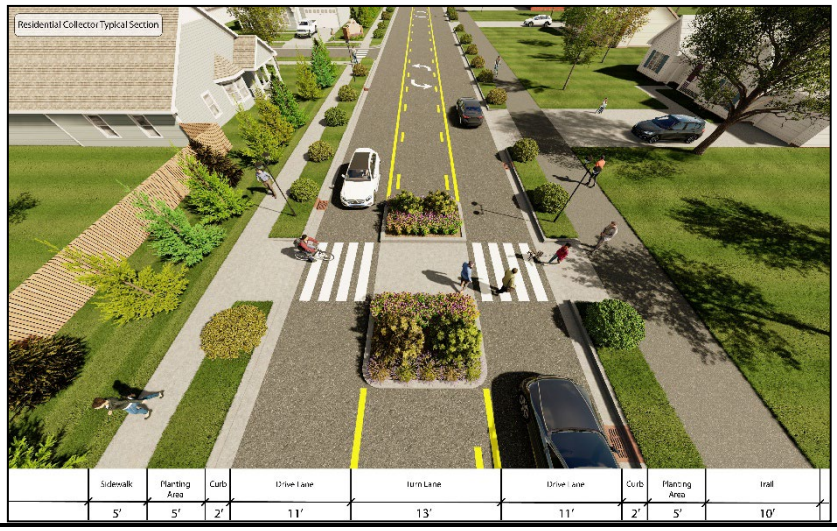
Improvement Concept: An option to improve safety to the north in the short-term is to construct sections of wider pavement for vehicles to pull over and allow oncoming traffic to pass. Additionally, the signs on Crutcher Pike can be updated to provide drivers improved visibility and safety warnings.

N **Local**	**LOCATION** New Route between Barnes Mill Road (KY 876) & Jacks Creek Pike (KY 1156)	**PROJECT PRIORITY:** Medium
DESCRIPTION Construct New Route		**2023 Cost Estimate** Cost is expected to be addressed by developers as the adjacent land develops

Project Needs: Goggins Lane is a north-south urban major collector with two 12-foot lanes in each direction and a center two-way left-turn lane (TWLTL). It connects Barnes Mill Road (KY 876) and Tates Creek Road (KY 169) and runs parallel to I-75 west of Richmond. Based on traffic forecasts, Goggins Lane is expected to carry 18,500 VPD in 2045. As the land adjacent to Goggins Lane develops, providing alternative routes for vehicles accessing the commercial and residential areas will become imperative.

Improvement Concept: A long-term option to improve travel options within expected developments is to construct a new route from KY 876 to Jacks Creek Pike with connections to the developments and to Goggins Lane. This route could be constructed in sections by developers as developments occur. Potential typical sections were considered assuming 60 feet of right-of-way. The recommended typical section includes:

- One 12-foot lane in each direction
- Center Two-Way Left-Turn Lane (TWLWL)
- Curb and gutter
- Six-foot grass buffer with trees
- 10-foot multi-use path
- Five-foot sidewalk
- Pedestrian refuge areas



O **Local**	**LOCATION** Victory Boulevard & Goggins Lane North of Tates Creek Road (KY 169)	**PROJECT PRIORITY:** High
DESCRIPTION Construct Extension of Victory Boulevard to Goggins Lane & Improve Goggins Lane North of KY 169		**2023 COST ESTIMATE** Design: $650,000 Right-of-Way: $350,000 Utility: $1,260,000 Construction: $4,300,000 **Total: $6,560,000**

Project Needs: East of Goggins Lane, Tates Creek Road (KY 169) provides a connection under I-75 to Kit Carson Elementary School and the well-established residential areas surrounding downtown Richmond, Kentucky and is anticipated to carry 8,800 vehicles per day (VPD) in 2045. Goggins Lane currently carries 7,500 VPD and is expected to carry 18,500 VPD in 2045. There is an anticipated residential development planned in the northeast quadrant of the KY 169 intersection with Goggins Lane and a city park with recreational fields currently under construction in the southeast quadrant. As the land along Goggins Lane continues to develop, access to US 25 and Goggins Lane will become more important.

Improvement Concept: An option to provide alternative access to anticipated developments along KY 169 is to construct a new route between Goggins Lane and US 25 via Victory Boulevard. This concept would require improvements to the Goggins Lane / KY 169 intersection, as shown in Concept H, before construction could begin. The section of Goggins Lane between KY 169 and the new route would require widening to match the typical section of the new route.

P **Local**	**LOCATION** Goggins Lane Between KY 876 and KY 169	**PROJECT PRIORITY:** Medium

DESCRIPTION

Construct Shared-Use Path

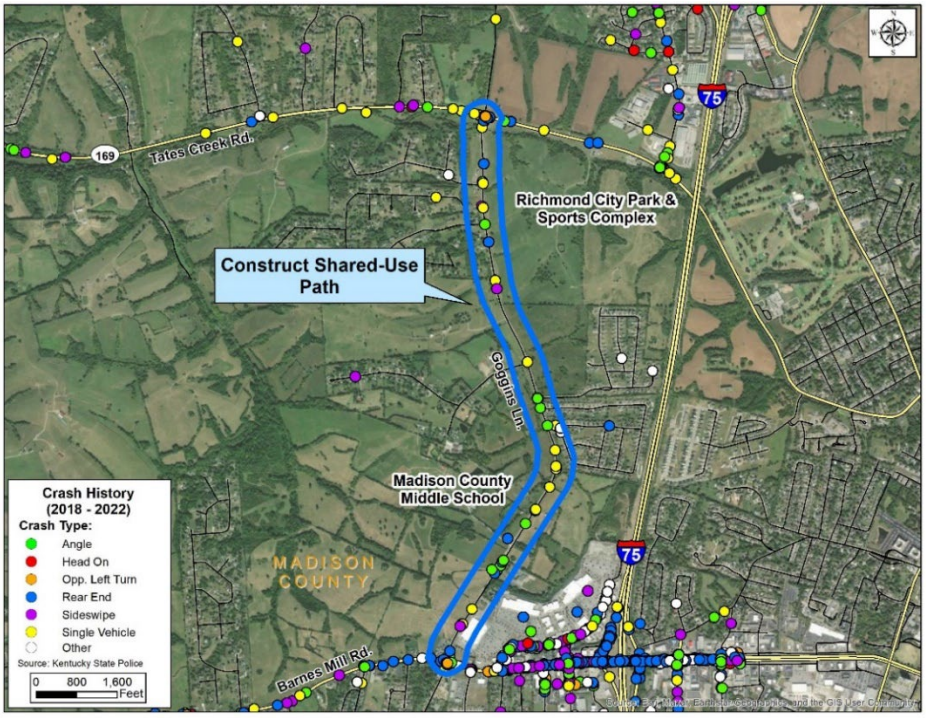
2023 COST ESTIMATE

Design: $170,000
Right-of-Way: $370,000
Utility: $1,330,000
Construction: $1,100,000
Total: $2,970,000

Project Needs: Goggins Lane is a north-south urban major collector with two 12-foot lanes in each direction, a center two-way left-turn lane (TWLTL), and a sidewalk on the west side. It connects Barnes Mill Road (KY 876) and Tates Creek Road (KY 169) and runs parallel to I-75. Over the past five years, there were 37 reported collisions on Goggins Lane, 11 of which resulted in an injury (30 percent). The most common crash type was single vehicle (41 percent) followed by angle collisions (30 percent). There were no reported collisions involving bicyclists or pedestrians.

Based on traffic forecasts, Goggins Lane is expected to carry 18,500 VPD in 2045. As the land adjacent to Goggins Lane develops, providing multi-modal transportation options to connect the growing residential areas to Madison County Middle School, the city park, and the commercial areas will become imperative.

Improvement Concepts: This concept includes constructing a shared-use path on one side of Goggins Lane to provide multi-modal access to the developing residential areas and the city park.



10.4 NEXT STEPS

The next step following this study for any potential improvements would be Phase 1 Design (Preliminary Engineering and Environmental Analysis). Further funding will be necessary to advance an improvement to the design phase as additional phases of this project are not funded in *Kentucky's FY 2022 – FY 2028 Highway Plan*.

CONTACTS/ADDITIONAL INFORMATION

Written requests for additional information should be sent to Mikael Pelfrey, Director, KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40622. Additional information regarding this study can also be obtained from the KYTC District 7 Project Manager, Casey Smith, at (859)246-2355 (email at Casey.Smith@ky.gov).