FINAL REPORT

KY 90 Corridor Study

TEAM KENTUCKY
TRANSPORTATION CABINET

Kentucky Transportation Cabinet
Central Office, Division of Planning
Highway District 8, Monticello

In partnership with:

Stantec

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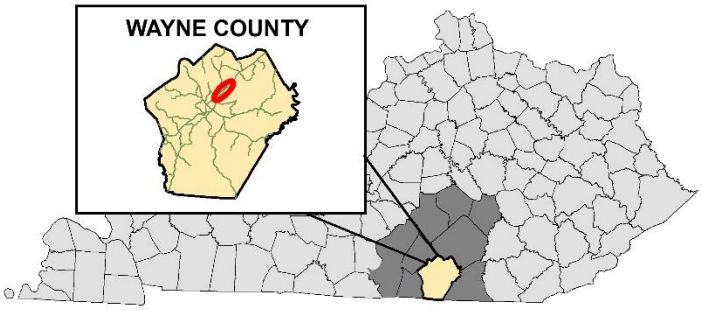
1.0 INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) began the *KY 90 Corridor Study* in Wayne County to identify and evaluate the need for and scope of potential options to improve safety, mobility, and capacity along approximately 2.7 miles of KY 90.

This project is state funded with State Priority Project (SPP) funds. It is listed in *Kentucky's FY 2022 – FY 2028 Enacted Highway Plan* as 08-80105.00 and has $6.078 million listed for Right-of-Way (2023), $2.92 million for Utilities (2025), and $22.143 million for Construction (2026).



1.1 STUDY AREA

The study focused on issues, needs, and candidate improvement concepts along KY 90 from KY 90X / KY 1275 to KY 3106, as highlighted in red in **Figure 1**.

KY 90 begins at Cave City in Barren County and stretches east to the Cumberland Falls Highway in Whitley City, extending through much of southern Kentucky. KY 90 is one of the only arterials in Wayne County and serves as a regional connection for southeastern Kentucky. Within the study corridor vicinity, KY 90 is also used by recreational travelers to reach Lake Cumberland and local drivers who live and work in Wayne County.

With an area of 459 square miles, Wayne County is the 19th largest county in Kentucky. Based on an analysis by the Kentucky State Data Center (KSDC), Wayne County is expected to experience a decrease in population with a projected annual growth rate of -0.47 percent between 2020 and 2040. Population projections are not available for most individual cities, but Monticello's 2020 Census estimate of 5,753 shows a 3.8 percent decrease in population (0.19 percent annually) compared to the 2000 Census of 5,981.

1.2 PLANNED AND COMMITTED PROJECTS

This study is listed in Kentucky's FY 2022 – 2028 Highway Plan as **Item No. 8-80105.00** and was previously logged in KYTC's Continuous Highway Analysis Framework (CHAF):

- **IP20080505**: Reduce congestion and improve safety, capacity, and mobility of KY 90 between KY 90X / KY 1275 and KY 3106. (MP 12.93 – 15.62)

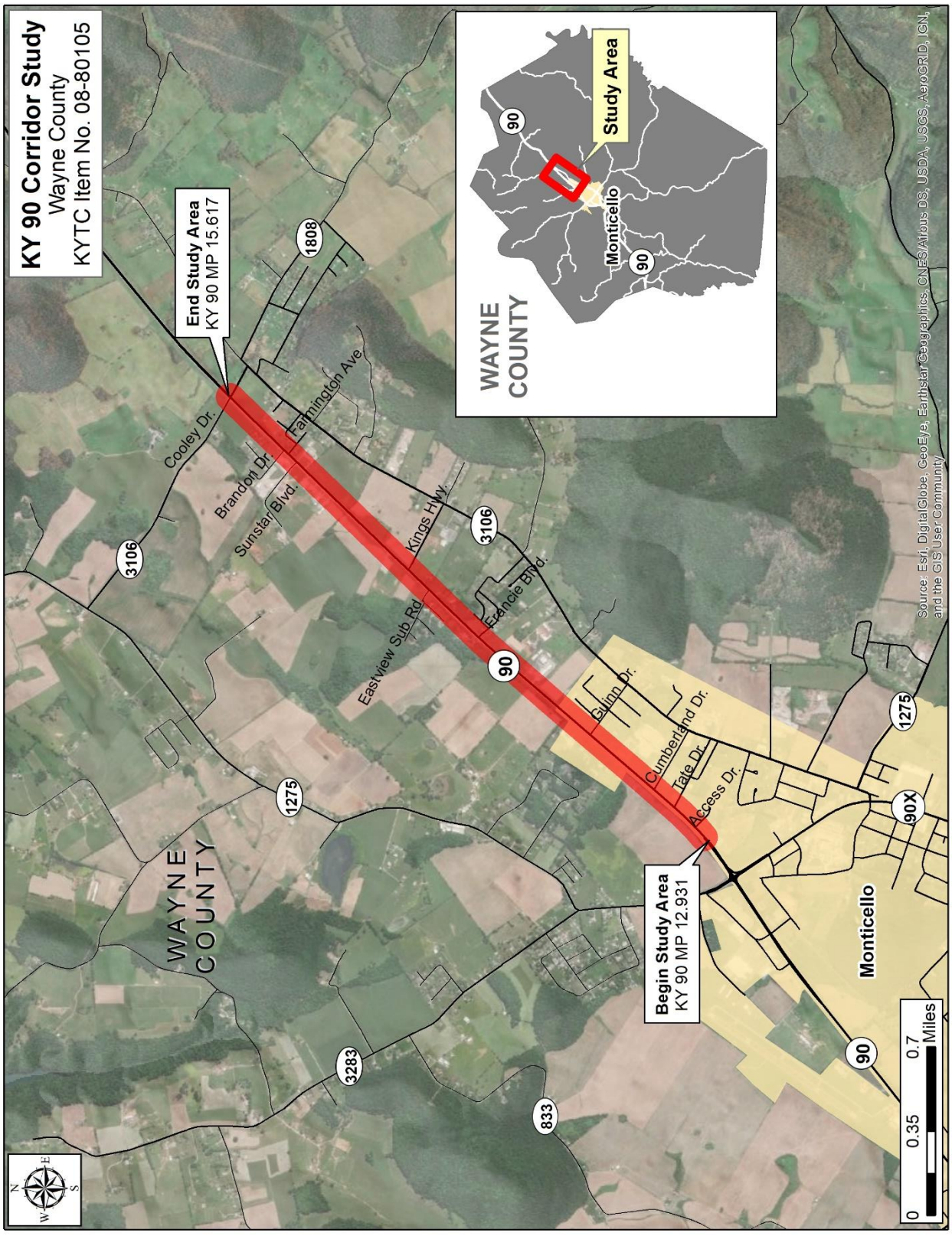


Figure 1: KY 90 Study Area

There is one KY 90 project to the east of the study area listed in previous versions of Kentucky's Highway Plan:

- **KYTC Item No. 08-109.10** Improve KY 90 from Old Mill Springs Road to the bridge at MP 19.5 (R = $2.6 million, U = $7.7 million, C = $9.1 million). This project includes minor realignment, minor widening, construction of right and left turn lanes, and drainage improvements. This project is currently under construction.

There are nine additional CHAF projects in the area of influence and include:

- **IP20080506** – Reduce congestion and improve safety, capacity, and mobility of KY 90 between KY 1275/KY 1619 and KY 1568. (MP 19.27 – 23.08)
- **IP20080504** – Address future congestion and economic development issues on KY 90. Improve Level of Service and safety on KY 90 from KY 90X/KY3284 to KY 90X/KY 1275. (MP 9.60 – 12.72)
- **IP20070239** – Improve safety and mobility along KY 1275 between Bell Lane at Monticello and KY 1765 near Conley Bottom Boat Dock Road. (MP 4.48 – 10.63)
- **IP20070240** – Improve safety and mobility along KY 1275 between KY 1765 and KY 90 near Touristville. (MP 10.63 – 14.37)
- **IP20080507** – Reduce congestion and improve safety, capacity, and mobility of KY 90 between KY 1568 in Wayne County and the Wayne/Pulaski County Line. (MP 23.08 – 25.24)
- **IP20090015** – New construction connecting Monticello to the Louie B. Nunn Parkway in Pulaski County, including a new bridge across Lake Cumberland. (MP 0.00 – 1.71)
- **IP20150306** – Improve safety and reduce congestion along KY 90 from Old Mill Springs Road to bridge at MP 19.5. (MP 17.69 – 19.5)
- **IP20180035** – Reduce congestion and improve safety, capacity, and mobility along KY 1275, including sidewalks, from KY 90 to Bell Lane. (MP 4.00 – 4.48)
- **IP20180042** – Improve curve on KY 1275 at KY 833/Rogers Grove Road and resurface KY 1275 from Bell Lane to KY 833/Rogers Grove Road. (MP 4.55 – 4.75)

2.0 EXISTING CONDITIONS

The existing conditions of the transportation network were examined and are shown in the following sections. The sections will include functional classifications, roadway facilities and geometrics, 2021 daily traffic estimates, turning lane evaluations, and crash history within the study area. Data for this section were collected from KYTC's Highway Information System (HIS) database, Kentucky State Police Collision Data, KYTC's Traffic Count Reporting System, aerial photography, and field inspection.

2.1 FUNCTIONAL CLASSIFICATION

The functional classification of the roadways within the study area are shown in **Figure 2**. The KY 90 study corridor is classified as an urban minor arterial, meant to provide access to surrounding collector and local roadways. Collectors, shown in green and yellow, facilitate trips between local roads and the arterial network[1]. KY 90 and KY 90X are the only arterials in the area and are classified as minor arterials. KY 3106 is classified as a major collector between KY 90X and KY 90 and is classified as a minor collector between KY 90 and KY 1275. KY 1275 is classified as a major collector between MP 3.3 and 4.3 and is classified as a minor collector to the east of OP Link Road and North of Bell Lane.

2.2 ROADWAY GEOMETRY

KYTC's HIS database was used to identify roadway geometry. The current number of lanes and estimated lane widths along study area roadways are shown in **Figure 3**. Just northeast of the KY 90X intersection, the 0.25-mile section of KY 90 has 12-foot lanes and 10-foot paved shoulders. East of Access Drive, the 10-foot paved shoulders on KY 90 transition to a combination of two-foot paved and eight-foot gravel shoulders.

2.3 EXISTING TRAFFIC

Existing traffic volumes were analyzed on the study portion of KY 90 and surrounding roadways.

2.3.1 Historical KYTC Daily Traffic Counts

The most recent KYTC daily traffic count on the study portion of KY 90 showed a 2021 average daily traffic (ADT) volume of 9,600 vehicles per day (VPD). Historical traffic counts indicate that daily traffic volumes on KY 90 (Sta. 116A68) have declined slightly since 2001, as shown in **Figure 4** and **Figure 5**. Counts from adjacent routes, KY 90X and KY 3106 show similar declines.

2.3.2 2021 Peak Hour Turning Movement Counts

On October 27th of 2021, Stantec collected turning movement counts along the KY 90 corridor at Access Drive, Tate Drive, Cumberland Drive, Guinn Drive, Francie Boulevard, Eastview Sub Road, Kings Highway, Sunstar Boulevard, Farmington Road, Industry Drive, and Cooley Lane. Turning movements were collected from 7:00 am to 7:00 pm.

[1] *Highway Functional Classification Concepts, Criteria and Procedures*. U.S. Department of Transportation/Federal Highway Administration. https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm#Toc336872985

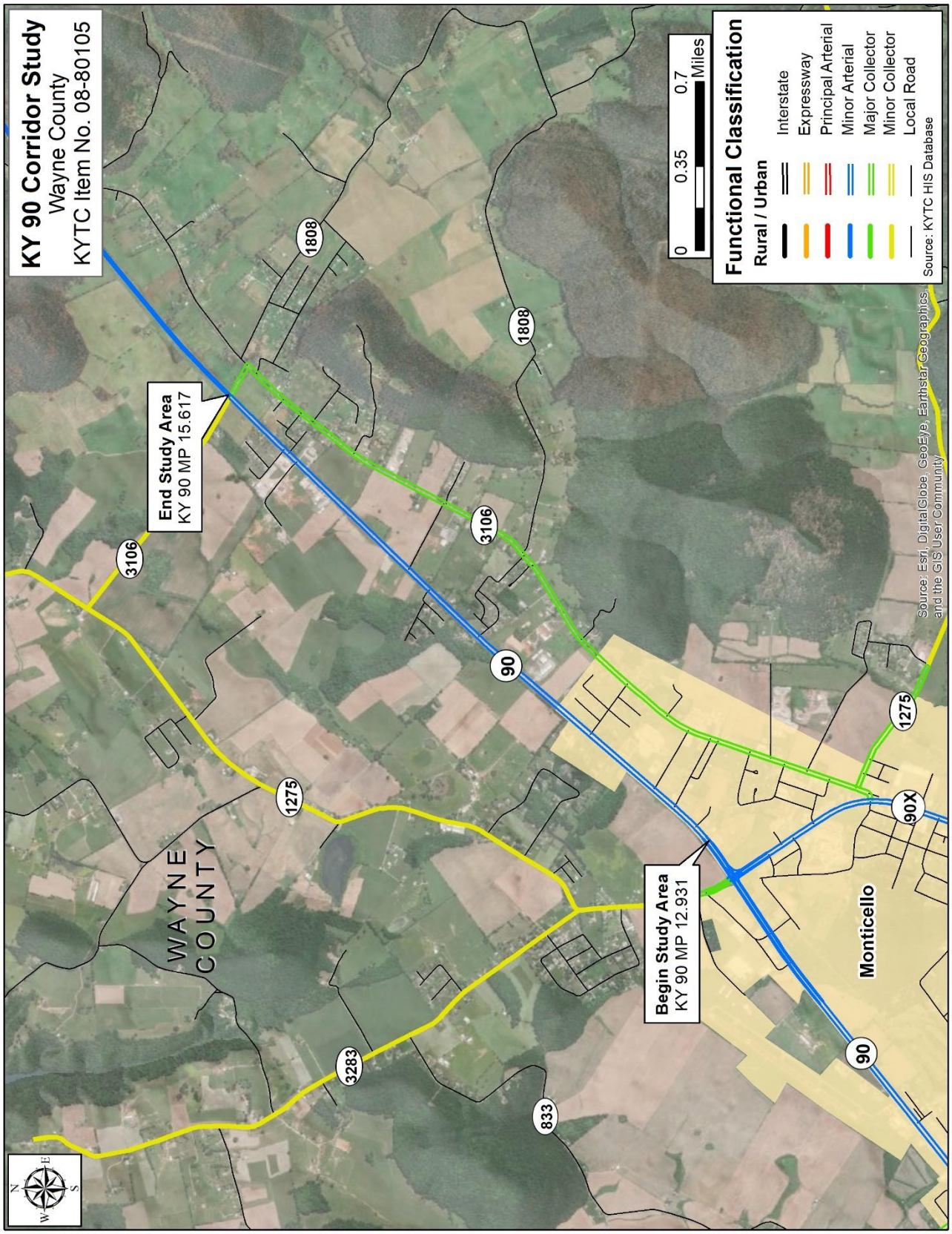


Figure 2: Functional Classification

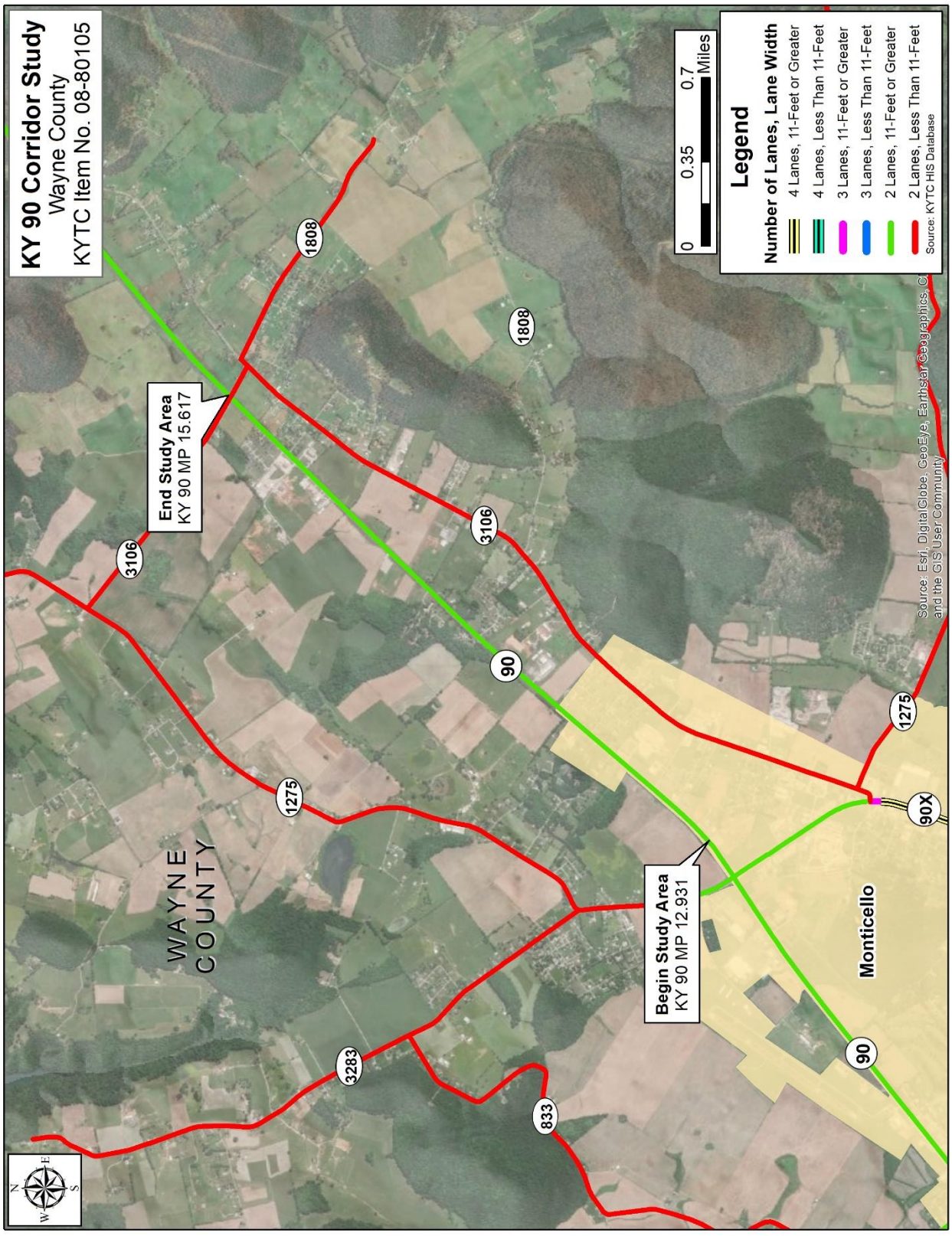


Figure 3: Number of Lanes and Lane Width

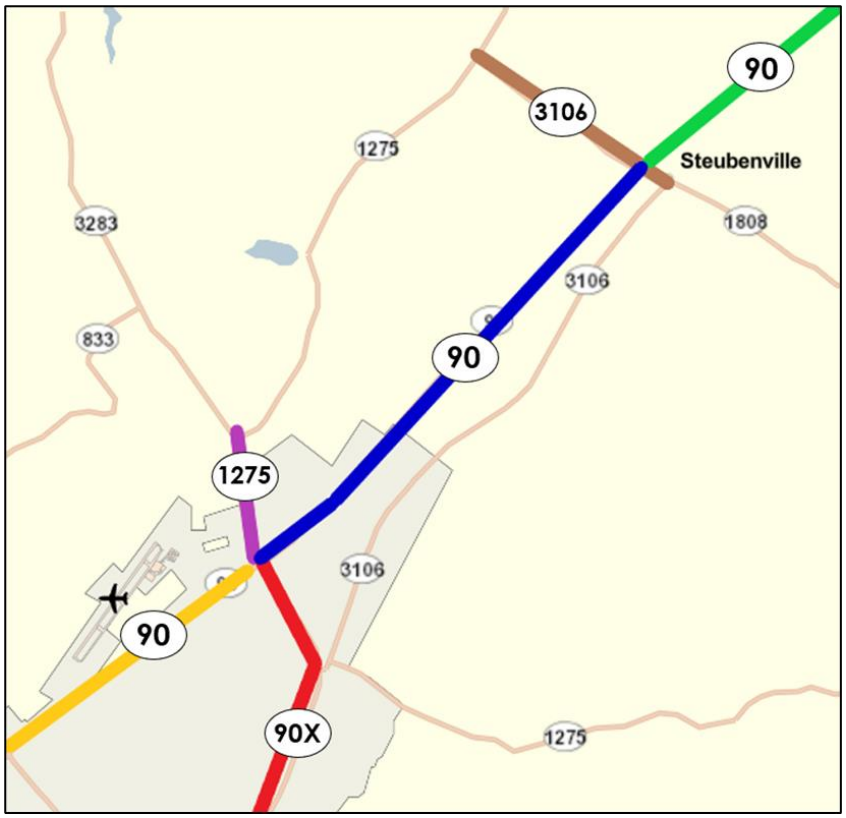


Figure 4: KYTC Traffic Count Station Map

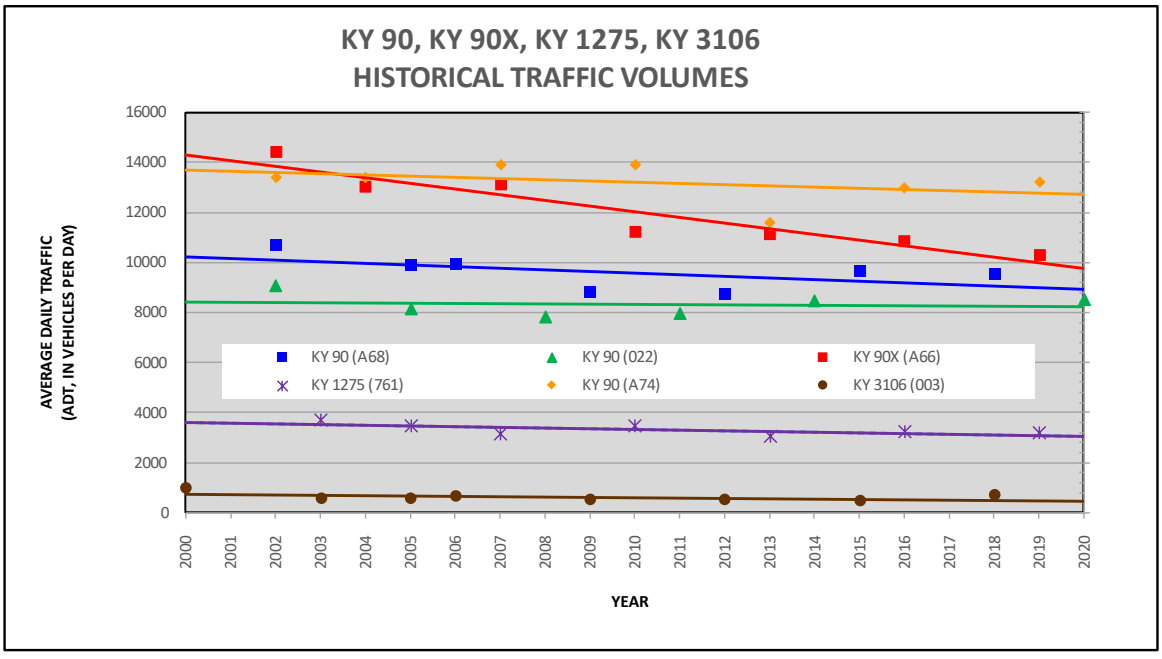


Figure 5: Historical KYTC Traffic Counts

2.3.3 Existing (2021) HCS Analysis

Level of service (LOS), a qualitative measure describing operational conditions, was used to evaluate the adequacy of the existing roadway. In urban areas such as this, LOS D or better is acceptable. Results from a Highway Capacity Software (HCS) analysis revealed that the corridor operates at a LOS B during the AM peak and a LOS C during the PM peak hour, as shown in **Table 1**. The average demand-to-capacity (D/C) ratios are also shown, which is a measure of capacity sufficiency for a roadway. A D/C under 1.0 indicates that a roadway has less demand than capacity. Results from the analysis indicate that KY 90 is operating under capacity and does not need to be widened at this time.

Table 1: KY 90 Corridor Capacity Analysis

Peak Hour	Direction	Avg. LOS	Avg. D/C
AM	NB	B	0.22
	SB	B	0.22
PM	NB	C	0.29
	SB	C	0.32

HCS was also used to analyze the study area intersections, as shown in **Table 2**. All intersections operate at LOS B or better during the AM peak hour, and at LOS C or better during the PM peak hour.

Table 2: KY 90 Intersection Capacity Analysis

Intersection	Approach	AM Peak		PM Peak	
		LOS	Delay (sec)	LOS	Delay (sec)
KY 90 at Access Dr.	Access Dr.	B	12.2	B	14.8
KY 90 at Tate Dr.	EB Tate Dr.	B	13.1	C	15.7
	WB Tate Dr.	B	10.8	C	18.4
KY 90 at Cumberland Dr.	Cumberland Dr.	B	12.6	C	18.7
KY 90 at Guinn Dr.	Guinn Dr.	B	13.3	B	12.1
KY 90 at Francie Blvd.	Francie Blvd.	B	12.6	B	10.5
KY 90 at Eastview Sub Rd.	Eastview Sub Rd.	B	13.1	B	14.3
KY 90 at Kings Hwy.	Kings Hwy.	A	9.2	B	13.6
KY 90 at Sunstar Blvd.	Sunstar Blvd.	A	8.9	B	11.2
KY 90 at Farmington Ave.	Farmington Ave.	B	11.7	A	9.5
KY 90 at Brandon Dr.	Brandon Dr.	B	12.3	B	14.9
KY 90 at KY 3106 (Cooley Ln.)	EB Cooley Ln.	B	10.5	B	12.0
	WB Cooley Ln.	B	13.8	C	18.0

2.4 TURN LANE EVALUATIONS

Turn lane evaluations were performed using the 2021 turning movement counts for the 11 intersections as shown in **Figure 6** by utilizing the KYTC Lane Warrant Spreadsheet. This spreadsheet uses the guidelines from the Highway Design Manual (Sections HD-902.11.3 and HD-92.12) to determine if turn lanes are warranted. The spreadsheet plots the intersection of the advancing and opposing volumes as well as a line (L%) corresponding to the percent of left turns of advancing traffic. If the point of intersection of advancing and opposing volumes is located to the right of line (L%), then there is a greater than 1% chance of an advancing vehicle arriving at the intersection while it is blocked by a turning vehicle, indicating the value of providing a left turn lane. Based on results from the analysis, none of the intersections currently warrant a left or right turn lane, as shown in **Table 3**.

2.5 CRASH HISTORY

Crash data were collected along the study portion of KY 90 for a five-year period between January 1, 2016, and December 31, 2020. Over the course of the five-year period, there were 56 collisions, as shown in **Figure 7**. The crash records and locations are included in **Appendix A**. Of the 56 crashes, 19 (34 percent) were injury and 37 (66 percent) were property damage only collisions. The most common crash types over the five-year period were rear end (59 percent) and single vehicle (18 percent). A crash heat map was also developed to determine areas with high concentrations of crashes, as shown in **Figure 8**. The areas near Access Drive, Tate Drive, and the Valero gas station are shown in red, indicating a high crash density.

A more detailed analysis was performed for the injury collisions. While 39 percent of all crashes occurred on wet pavement, 58 percent of injury crashes occurred on wet pavement. Time of day did not seem to impact the number of crashes. For the most part, injury crashes were evenly distributed throughout the day.

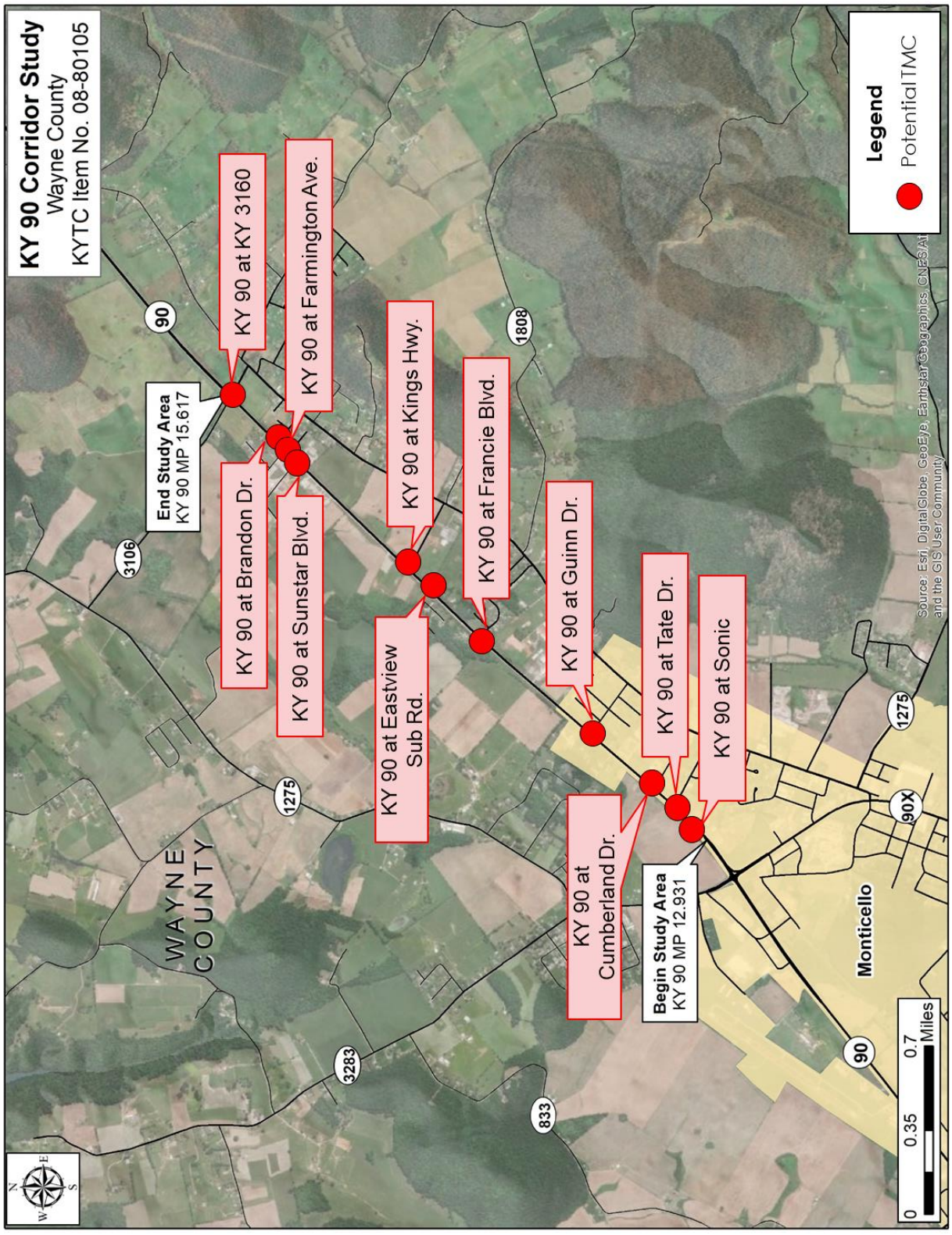


Figure 6: Turning Movement Count Locations

Table 3: KY 90 Hourly Left Turn Evaluations

Intersection	Direction	Advancing (L+T+R)	Lefts	Percent Lefts	Opposing (L+T+R)	Graphs intersect on right side of L% Line?
KY 90 at Access Dr.	Northbound	448	NA	NA	456	N/A
	Southbound	456	10	2.2%	448	N
KY 90 at Tate Dr.	Northbound	447	0	0.0%	455	N
	Southbound	455	2	0.4%	447	N
KY 90 at Cumberland Dr.	Northbound	445	NA	NA	439	N/A
	Southbound	439	5	1.1%	445	N
KY 90 at Guinn Dr.	Northbound	425	NA	NA	432	N/A
	Southbound	432	6	1.4%	425	N
KY 90 at Francie Blvd.	Northbound	431	NA	NA	437	N/A
	Southbound	437	9	2.1%	431	N
KY 90 at Eastview Sub. Rd.	Northbound	400	4	1.0%	429	N
	Southbound	429	NA	NA	400	N/A
KY 90 at Kings Highway	Northbound	399	NA	NA	432	N/A
	Southbound	432	12	2.8%	399	N
KY 90 at Sunstar Blvd.	Northbound	381	4	1.0%	421	N
	Southbound	421	NA	NA	381	N/A
KY 90 at Farmington Ave.	Northbound	373	NA	NA	420	N/A
	Southbound	420	1	0.2%	373	N
KY 90 at Brandon Dr.	Northbound	368	5	1.4%	419	N
	Southbound	419	NA	NA	368	N/A
KY 90 at KY 3106 (Cooley Ln.)	Northbound	379	12	3.2%	428	N
	Southbound	428	6	1.4%	379	N

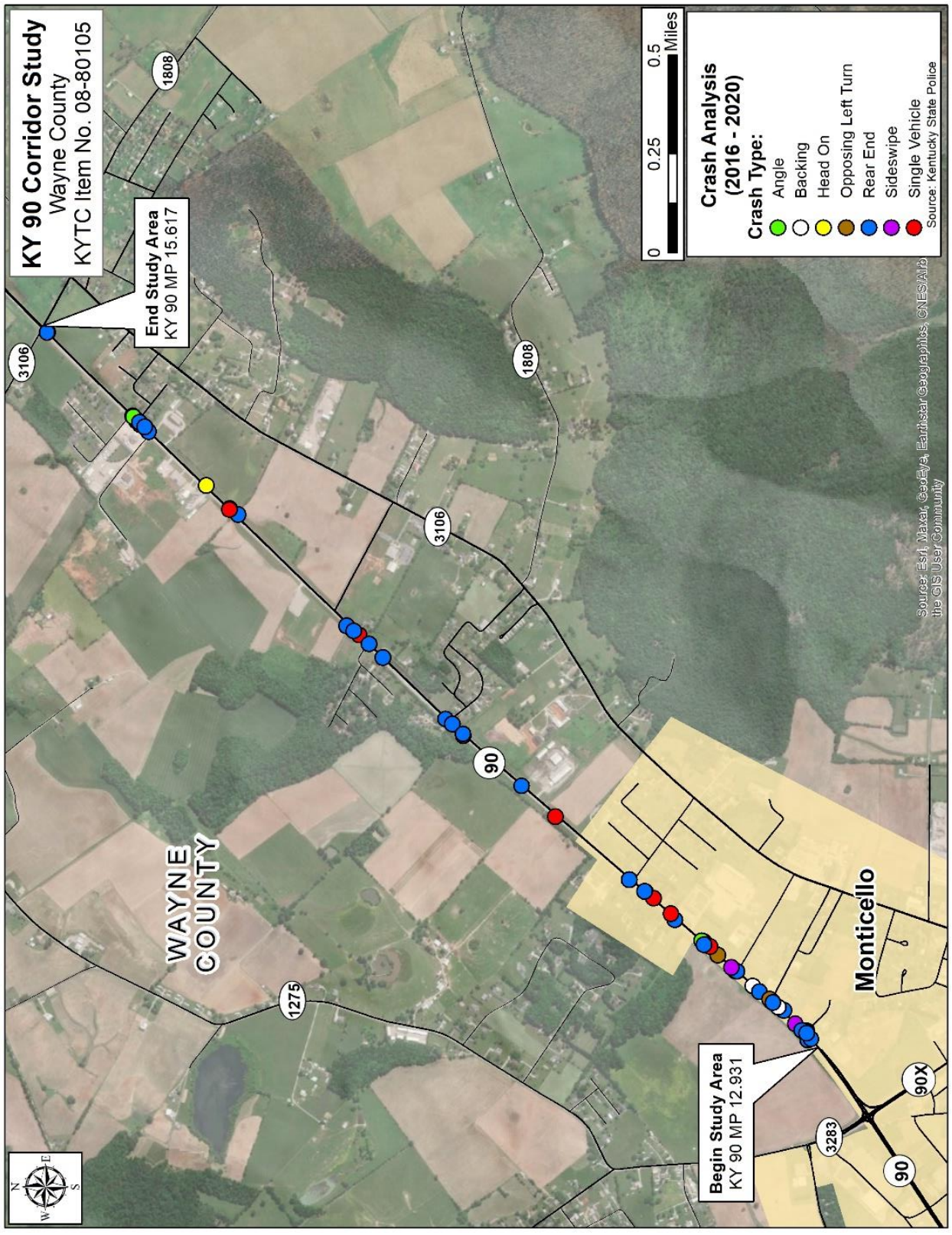


Figure 7: Crash Type (2016 – 2020)

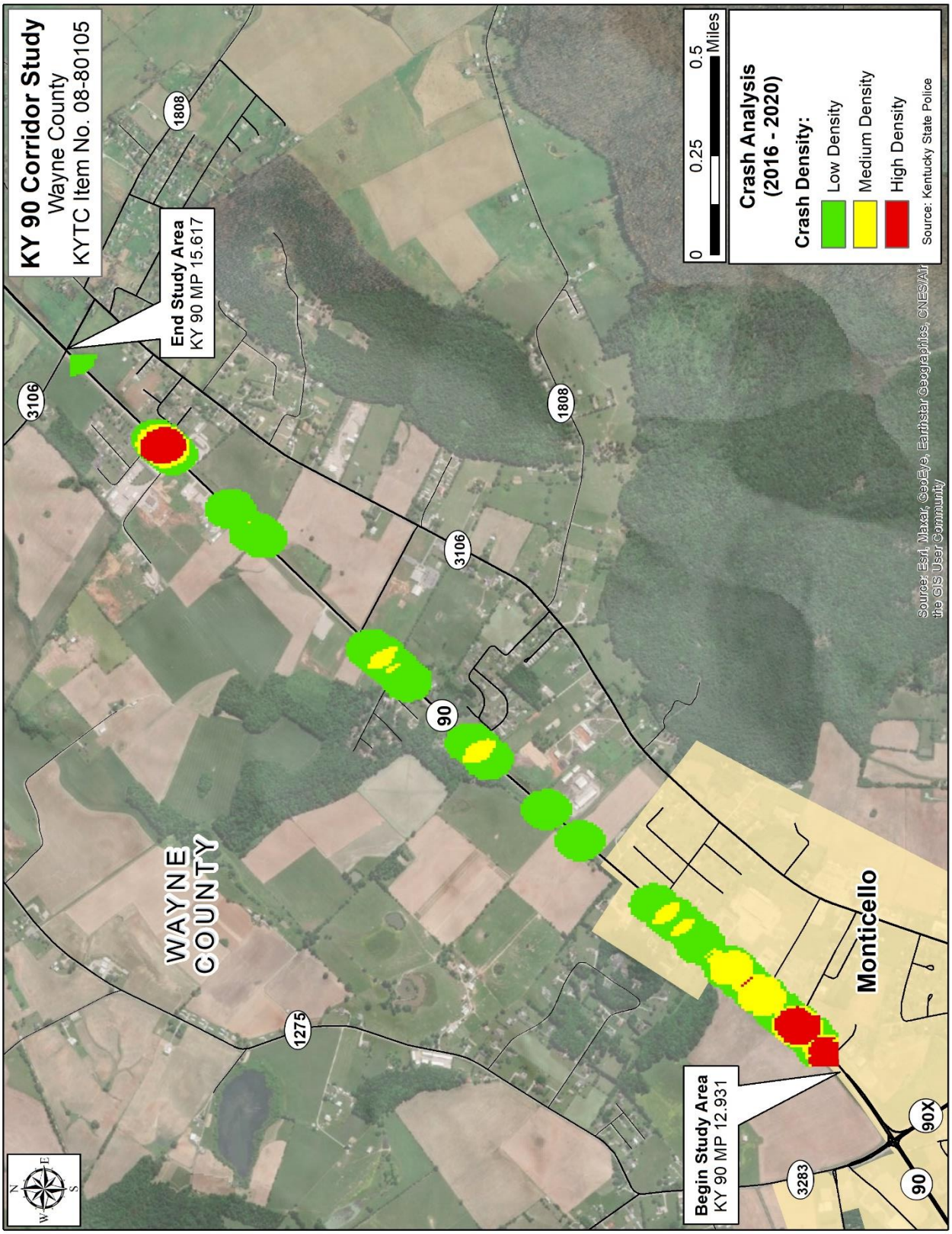


Figure 8: KY 90 Crash Heat Map

Excess expected crashes (EEC) were calculated for the KY 90 roadway segments using the Crash Data Access Tool (CDAT) and intersection EECs were provided by the Kentucky Transportation Center (KTC). EEC is a measure of 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. There are several KY 90 study area intersections with positive EECs, including Access Drive, Tate Drive, Cumberland Drive, Francie Boulevard, Sunstar Boulevard, Farmington Avenue, and Cooley Lane, as shown in **Table 4**. Additionally, most of the study portion of KY 90 has a negative segment EEC, except for the segment marked from MP 13.38 to 13.57, as shown in **Table 5** and **Figure 9**.

Table 4: KY 90 Intersection Excess Expected Crashes (EEC)

Intersection	Annual EEC
Access Dr.	0.26
Tate Dr.	0.44
Cumberland Dr.	0.44
Guinn Dr.	-0.14
Francie Blvd.	0.06
Eastview Sub Rd.	-0.14
Kings Hwy.	-0.32
Sunstar Blvd.	0.06
Farmington Ave.	0.32
Industry Dr.	0.00
KY 3106 (Cooley Ln.)	0.16

Table 5: KY 90 Segment Excess Expected Crashes (EEC)

County	Route	BMP	EMP	Annual EEC
Wayne	KY 90	12.931	12.986	-0.24
		12.986	13.379	-0.3
		13.379	13.57	0.14
		13.57	15.617	-8.62

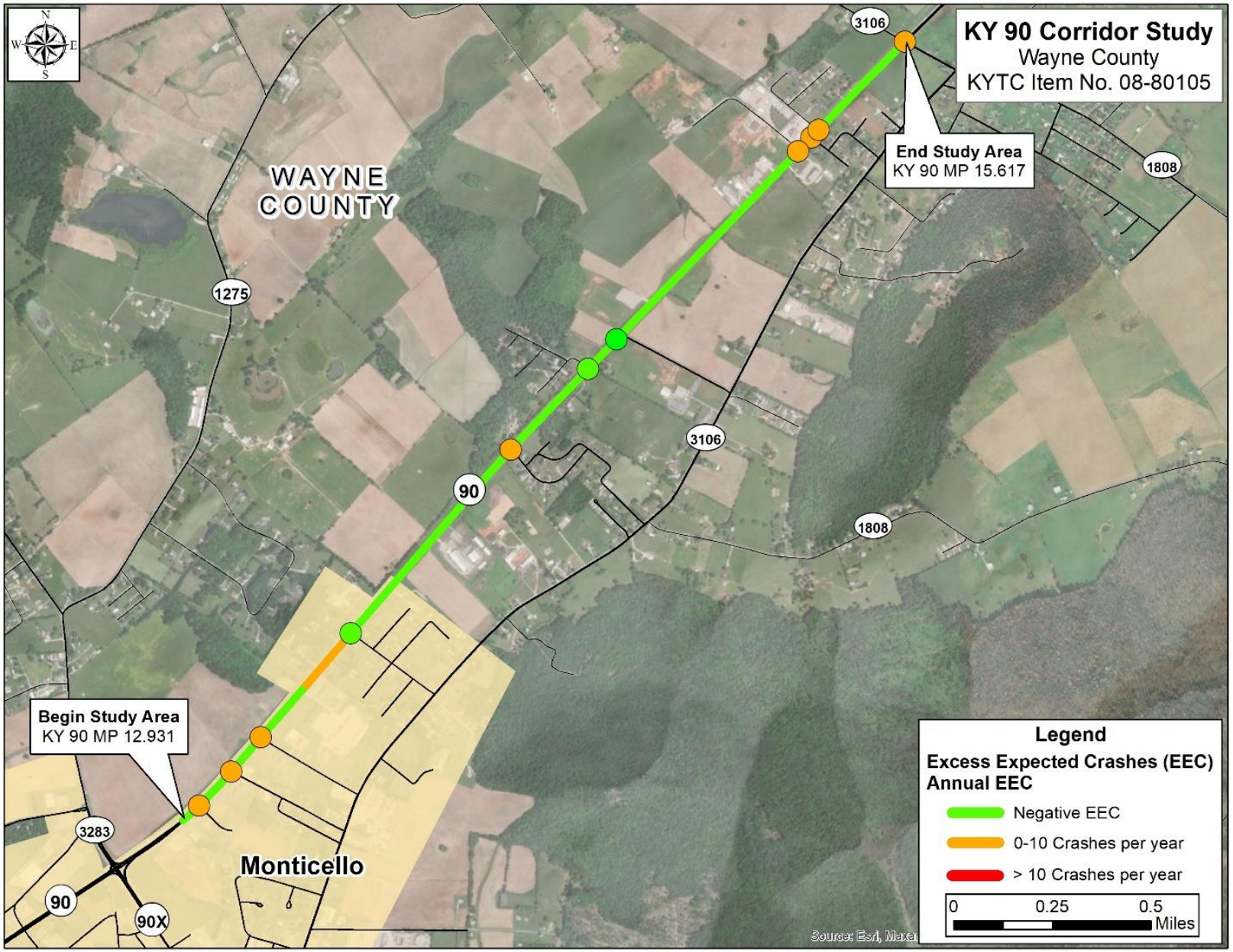


Figure 9: KY 90 Excess Expected Crashes (EEC)

3.0 STUDY GOALS

KY 90 is one of the few arterials in Wayne County and serves as a regional connection for southeastern Kentucky. Within the KY 90 study corridor vicinity, KY 90 is also used by local drivers who live and work in Wayne County.

The goal of the KY 90 Corridor Study is to identify and evaluate the need for and scope of potential improvement options to improve the safety, mobility, and capacity of KY 90 from KY 90X / KY 1275 to KY 3106.

4.0 FUTURE CONDITIONS

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

4.1 POPULATION TRENDS

Between 2000 and 2020, Wayne County experienced a slight decrease in population at a rate of 0.09 percent per year, as shown in **Table 6**. Based on projections from the Kentucky State Data Center, growth in Wayne County is expected to continue to decrease, with an annual growth rate of -0.47 percent between 2020 and 2040. This is significantly lower than the state average population growth rate of 0.41 percent per year.

Table 6: Population Estimates and Projections

Area	Census			Annual Growth	Projection		Annual Growth
	2000	2010	2020	2000 - 2020	2030	2040	2020 - 2040
Kentucky	4,041,769	4,339,367	4,505,836	0.54%	4,726,382	4,886,381	0.41%
Wayne County	19,923	20,813	19,555	-0.09%	19,246	17,800	-0.47%
Monticello	5,981	6,188	5,753	-0.19%	N/A		

4.2 KYSTM GROWTH RATES

KYTC provided an updated version of the Kentucky Statewide Travel Demand Model (KYSTMv19) with a scenario year 2019. The updated scenario year model was run, and daily network assignments were compared to future-year (2045) daily network assignments for each link. Annual growth rates were calculated for each link on KY 90, as shown in **Figure 10**, and range from 0.2 – 0.3 percent per year.

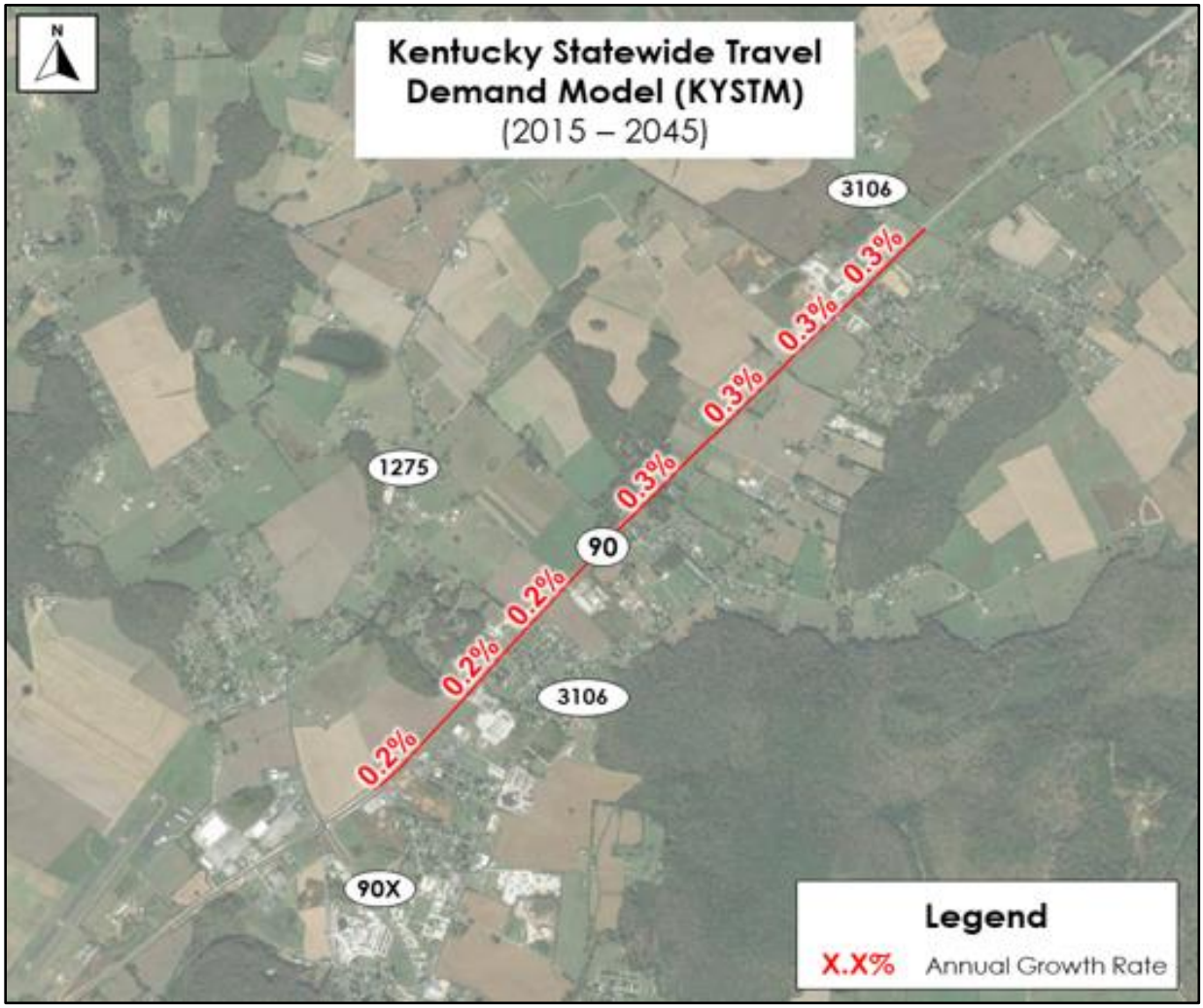


Figure 10: KYSTM Growth Rates

4.3 STUDY AREA GROWTH RATE

Based on Wayne County population projections from the KY State Data Center, historical KYTC traffic counts, and KYSTM growth rates, an annual growth rate of 0.3 percent per year was developed for study area roadways. Although Wayne County population is slightly declining, KY 90 is used as a regional connection and is expected to slightly grow to the year 2040. A more detailed discussion of the development of the growth rate and the traffic forecasts can be found in **Appendix B**.

4.4 2021 DAILY TRAFFIC ESTIMATES

2021 estimated ADT volumes were developed by applying the 0.3 percent per year growth rate to the most recent counts from KYTC count stations, as shown in **Figure 11**. KY 90 has the highest traffic volumes in the area, with daily traffic along the study corridor around 9,600 VPD. Traffic volumes on KY 3106 range from 700 to 3,400 VPD while volumes on the section of KY 1275 north of KY 90 range from 1,300 to 3,200 VPD.

4.5 2045 DAILY TRAFFIC FORECASTS

The annual growth rate was then used to forecast the estimates for the future year 2045, as shown in **Figure 12**. 2045 turning movement forecasts were also developed and are discussed in Appendix B.

4.6 2045 HCS ANALYSIS

The HCS was again used to analyze future traffic conditions on KY 90. Based on results from the 2045 analysis, the corridor is expected to operate at LOS B during the AM peak and LOS C during the PM peak, as shown in **Table 7**. Based on the results, capacity is not expected to be an issue on KY 90 in 2045. It is estimated that an annual growth rate of 1.8 percent per year would be required for the study area corridor to operate at LOS D in 2045, and an annual growth rate of 3.1 percent would be required for the study area corridor to operate at LOS E.

All intersections are also expected to operate at LOS C or better during the peak hours, as shown in **Table 8**.

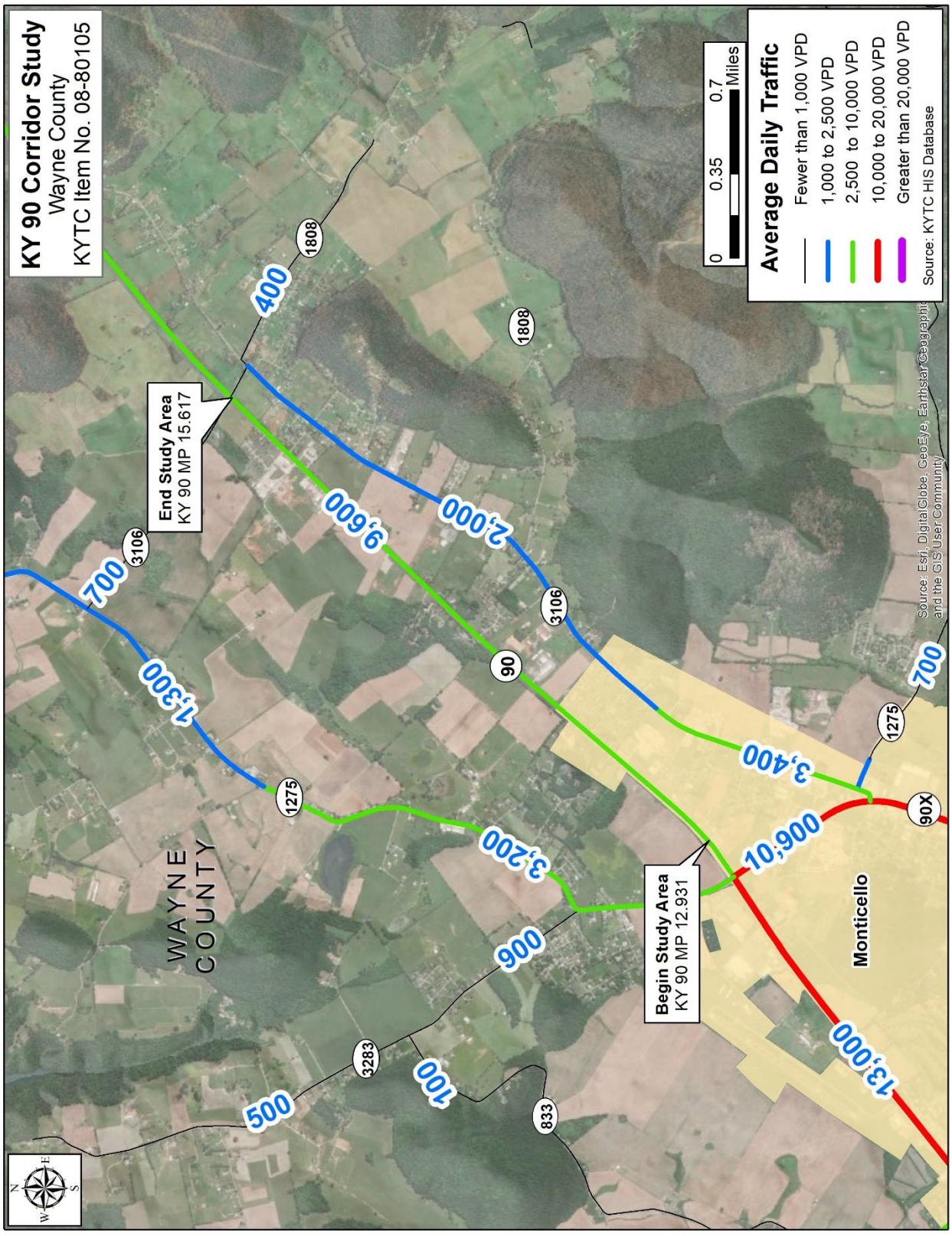


Figure 11: 2021 ADT Estimates

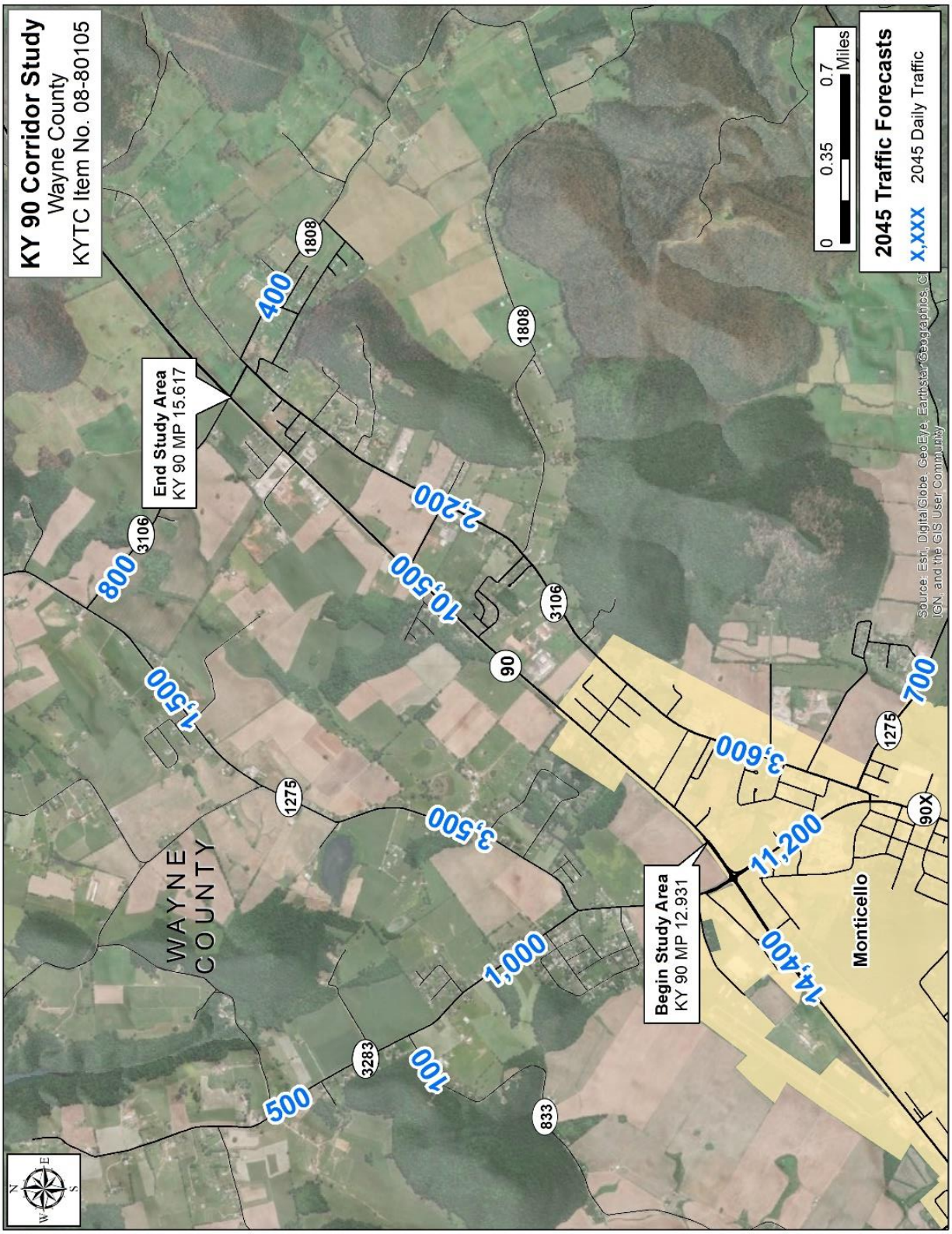


Figure 12: 2045 Daily Traffic Forecasts

Table 7: 2045 HCS KY 90 Corridor Analysis

Peak Hour	Direction	Avg. LOS	Avg. D/C
AM	NB	B	0.24
	SB	B	0.23
PM	NB	C	0.31
	SB	C	0.33

Table 8: 2045 HCS KY 90 Intersection Analysis

Intersection	Approach	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
KY 90 at Access Dr.	Access Dr.	B	12.8	C	17.3
KY 90 at Tate Dr.	EB Tate Dr.	B	13.9	C	16.4
	WB Tate Dr.	B	13.9	C	19.1
KY 90 at Cumberland Dr.	Cumberland Dr.	B	13.5	C	20.9
KY 90 at Guinn Dr.	Guinn Dr.	B	14.0	B	13.1
KY 90 at Francie Blvd.	Francie Blvd.	B	13.5	B	10.9
KY 90 at Eastview Sub Rd.	Eastview Sub Rd.	B	13.6	C	15.1
KY 90 at Kings Hwy.	Kings Hwy.	A	9.5	B	14.6
KY 90 at Sunstar Blvd.	Sunstar Blvd.	A	9.1	B	12.1
KY 90 at Farmington Ave.	Farmington Ave.	B	12.2	B	10.0
KY 90 at Industry Dr.	Industry Dr.	B	13.0	C	15.8
KY 90 at KY 3106 (Cooley Ln.)	EB Cooley Ln.	B	11.0	B	12.6
	WB Cooley Ln.	B	14.7	C	20.4

5.0 ENVIRONMENTAL RED FLAG ANALYSIS

As part of the Statewide Corridor Plan, an environmental red flag analysis was performed which included the study corridor. The environmental red flag analysis is displayed on **Figure 13.** As this study does not anticipate impacting areas outside of the existing right-of-way, a full environmental overview was not performed.

6.0 SOCIOECONOMIC STUDY

The Lake Cumberland Area Development District (LCADD) conducted a socioeconomic study for the study area. A complete copy of the report is found in **Appendix C**. The information in this report outlines data from the 2019 American Community Survey (ACS) statistics in the study area vicinity 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. Statistics are provided for minority, elderly, poverty status, limited English proficiency (LEP), and disabled populations for the nation, state, region, county, and census block groups located within the study area. The county data is the threshold for comparison for the block groups in the project corridor. **Table 9** presents key findings related to the socioeconomic characteristics of the study area.

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

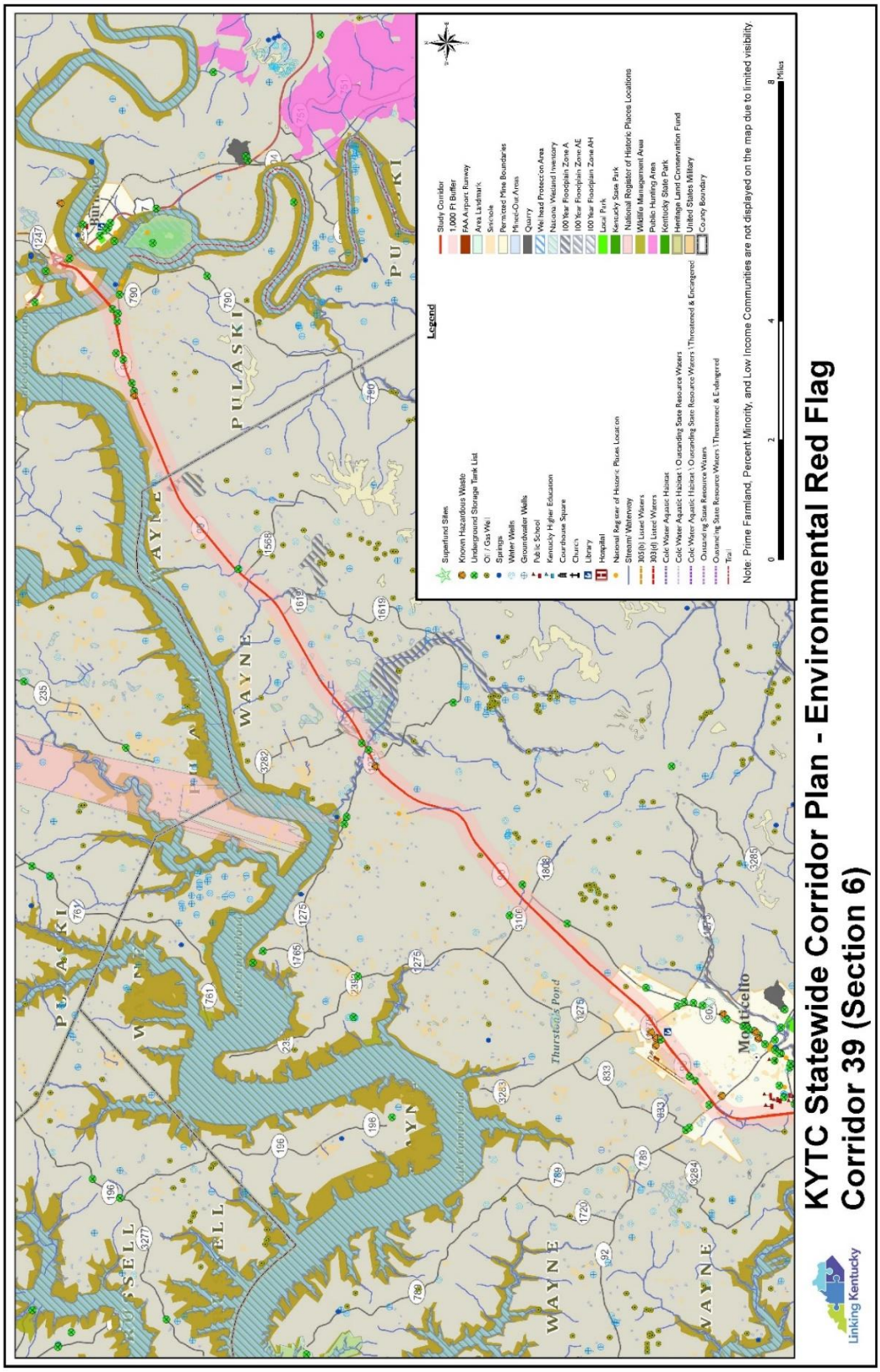


Figure 13: Environment Red Flag Map

Table 9: Socioeconomic Summary

Category	Kentucky	Wayne Co.	Block Group 02	Block Group 03	Block Group 04
Percent of Minority Population	15.8%	6.8%	3.2%	3.5%	2.3%
Percent Below the Poverty Line	16.3%	25.3%	11.4%	34.3%	24.4%
Percent of Adults over 65	16.5%	20.1%	18.6%	17.8%	29.9%
Percent of Adults with a Disability	21.6%	26.1%	31.2%	16.5%	31.9%
Percent with Limited English Proficiency	2.5%	0.6%	0.4%	0.0%	0.0%

7.0 INITIAL PROJECT TEAM AND STAKEHOLDER COORDINATION

Over the course of the study, the project team held three meetings to coordinate on key issues. The project team included representatives from KYTC Central Office, KYTC District 8, LCADD, and the consultant, Stantec. Detailed summaries of each meeting are presented in **Appendix D**.

7.1 PROJECT TEAM MEETING NO. 1

The first project team meeting was held via Microsoft Teams on January 27, 2022. This meeting included members from the KYTC District 8 Office, KYTC Central Office Division of Planning, and LCADD. The purpose of the meeting was to present the results from the existing conditions analysis and to get feedback from the project team on transportation issues in the study area. Key discussion items included the following:

- KYTC Item No. 08-109.10 to improve KY 90 from Old Mill Springs Road to the bridge is currently under construction.
- Traffic on KY 90 increases during the summer months due to travelers visiting Lake Cumberland.
- Based on the Highway Design Manual criteria, the KYTC criteria for left-turn lanes are not satisfied for any of the intersections on KY 90.
- The study portion of KY 90 has the potential for commercial development.
- There are more collisions on KY 90 involving vehicles traveling in the eastbound direction.

7.2 ADVISORY COMMITTEE MEETING NO. 1

The project team reached out to local government representatives and other community leaders early in the planning process, all together considered the "Advisory Committee." The first Advisory Committee Meeting for the subject project was held via Microsoft Teams on January 27, 2022. In addition to the project team, individuals/representatives from Wayne County Public

Schools, the Monticello Fire Department, the Kentucky Legislature, and the City of Monticello were in attendance. The purpose of the meeting was to present the results from the existing conditions analysis and to get feedback from the local officials/stakeholders on transportation issues and prioritize the transportation needs of the community members. Key discussion items from the meeting include:

- There is potential for development on the western section of the study area behind Don Franklin car dealership. Property was recently purchased there and will likely be developed into an industrial park, which will increase traffic at the KY 90 intersection with KY 1275 and the new entrance on KY 90 at Franklin Drive.
- A funeral home is being built on the study corridor which may increase traffic.
- The soccer field on KY 90 will no longer be used by Wayne County schools, however, it could be used for youth sporting events.

7.2.1 Advisory Committee Online Survey

A MetroQuest online survey was made available to local officials and stakeholders after the first Advisory Committee Meeting. The purpose of the survey was to solicit input on transportation issues in the study area. The results of the survey are as follows:

The survey asked participants to rank their top five transportation concerns along the KY 90 corridor. The top five concerns among the collective responses include: 1) lack of turn lanes, 2) safety issues (tied), 2) lack of passing opportunities (tied), 4) too many entrances/driveways, and 5) traffic congestion (tied), 5) excessive speeds (tied) as shown in **Figure 14**.

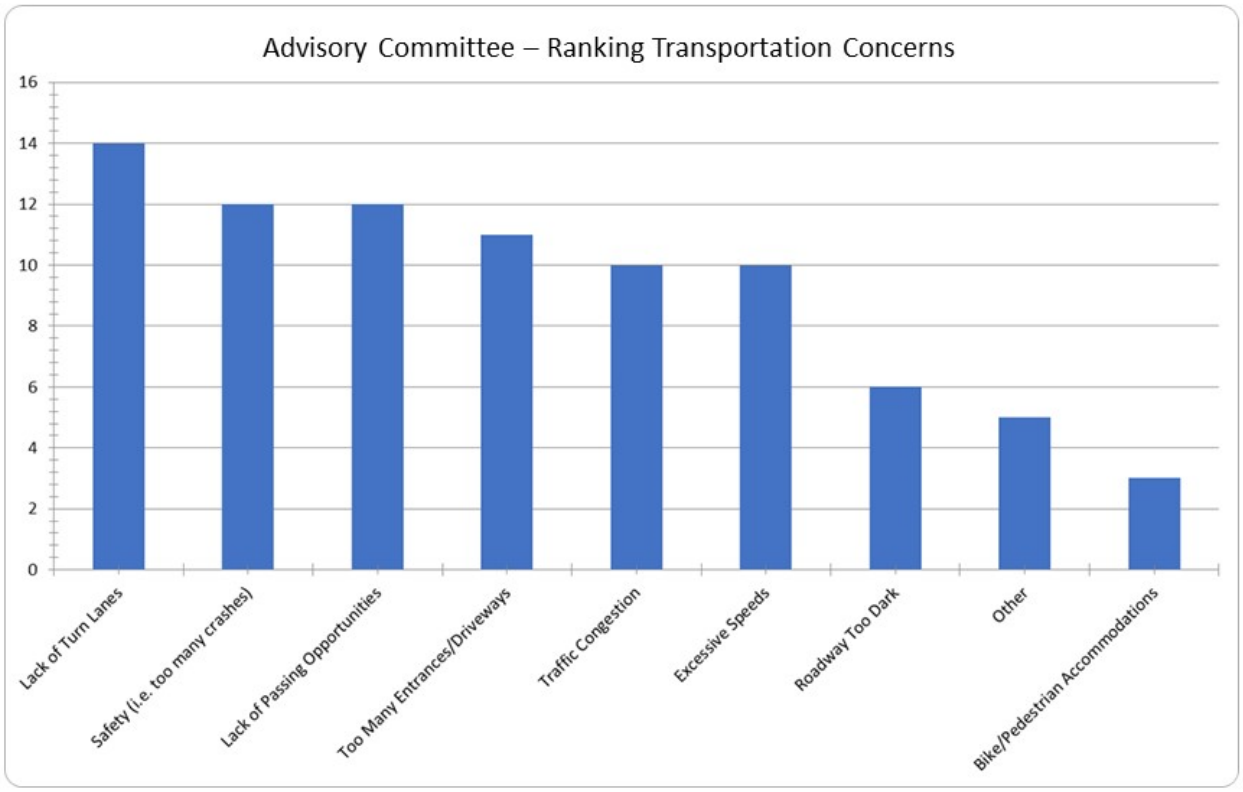


Figure 14: Advisory Committee Survey – Transportation Concerns

Respondents of the online survey were asked to indicate concerns and potential improvements related to safety and congestion along the corridor. **Figure 15** presents the locations of safety concerns along the corridor. Most of the intersections were highlighted as needing turn lanes and it was noted that it is difficult to enter/exit KY 90 at several of the intersections. **Figure 16** presents the locations of congestion concerns as noted by the Advisory Committee. Most of the congestion-related concerns were due to stopped (left-turning) vehicles blocking through traffic on KY 90 and from drivers that have trouble turning onto KY 90 from side streets.

The Advisory Committee was then asked to name potential improvement ideas along KY 90. **Figure 17** shows the locations of the identified improvements.

Results from the Advisory Committee survey revealed that most of the safety and congestion concerns along KY 90 are at the intersections. Drivers are particularly concerned with the lack of turning and passing opportunities, peak hour congestion, excessive speeds along the corridor, inadequate lighting, and difficulty exiting intersections onto KY 90. The key suggested improvements from the survey results are added turning lanes, paved shoulders to pass vehicles turning left, and more lighting at some intersections.

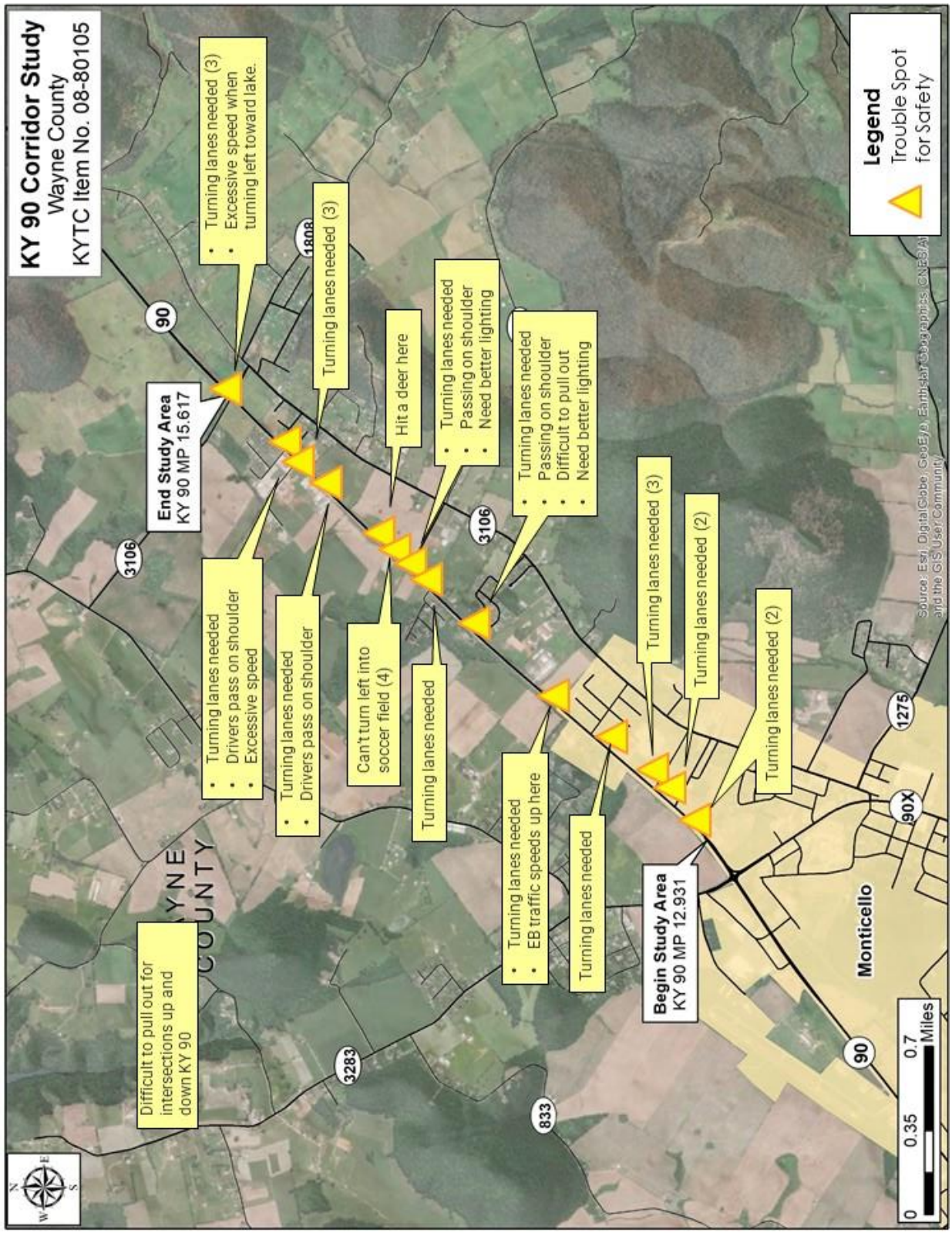


Figure 15: Advisory Committee Survey – Safety Concerns

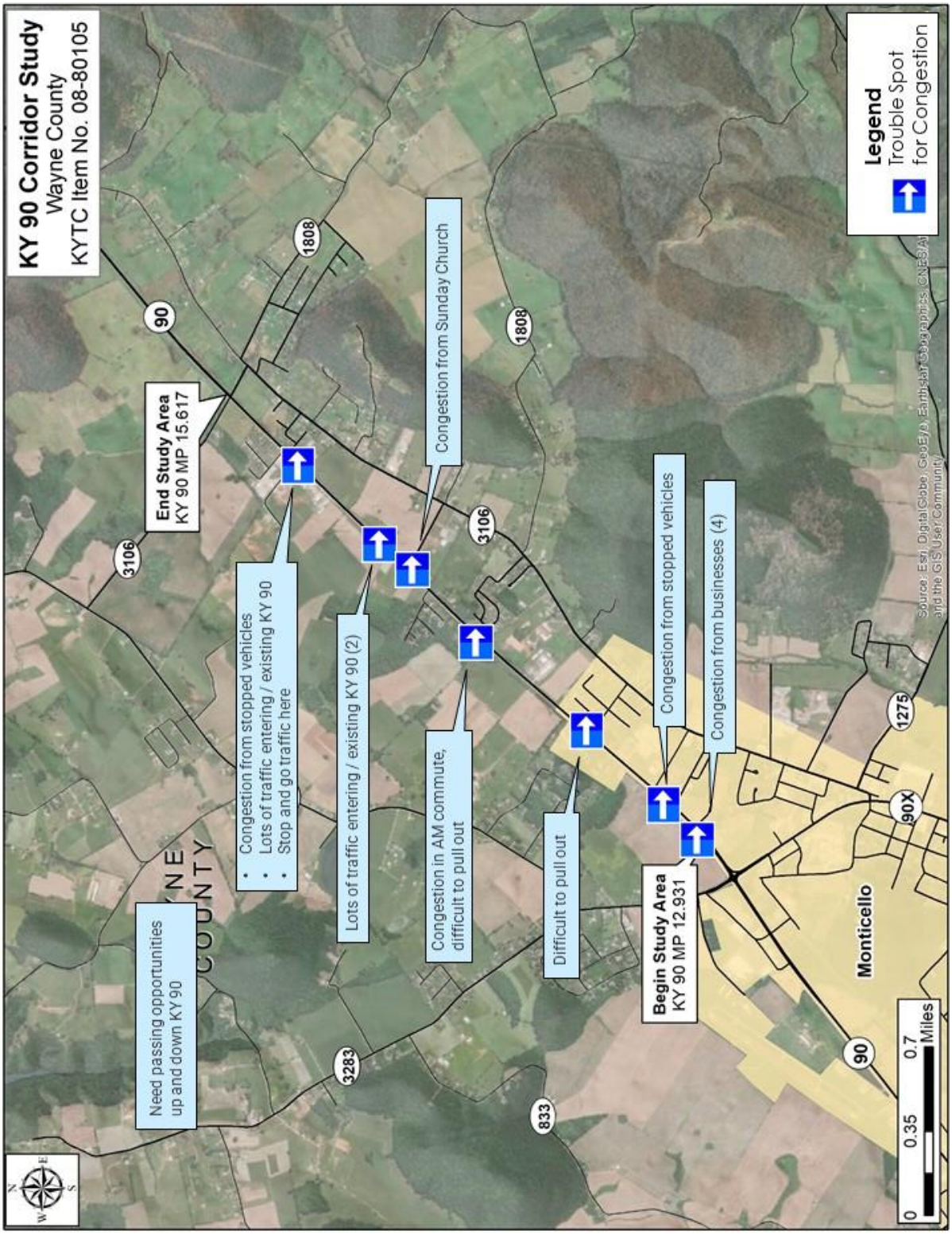


Figure 16: Advisory Committee Survey – Congestion Concerns

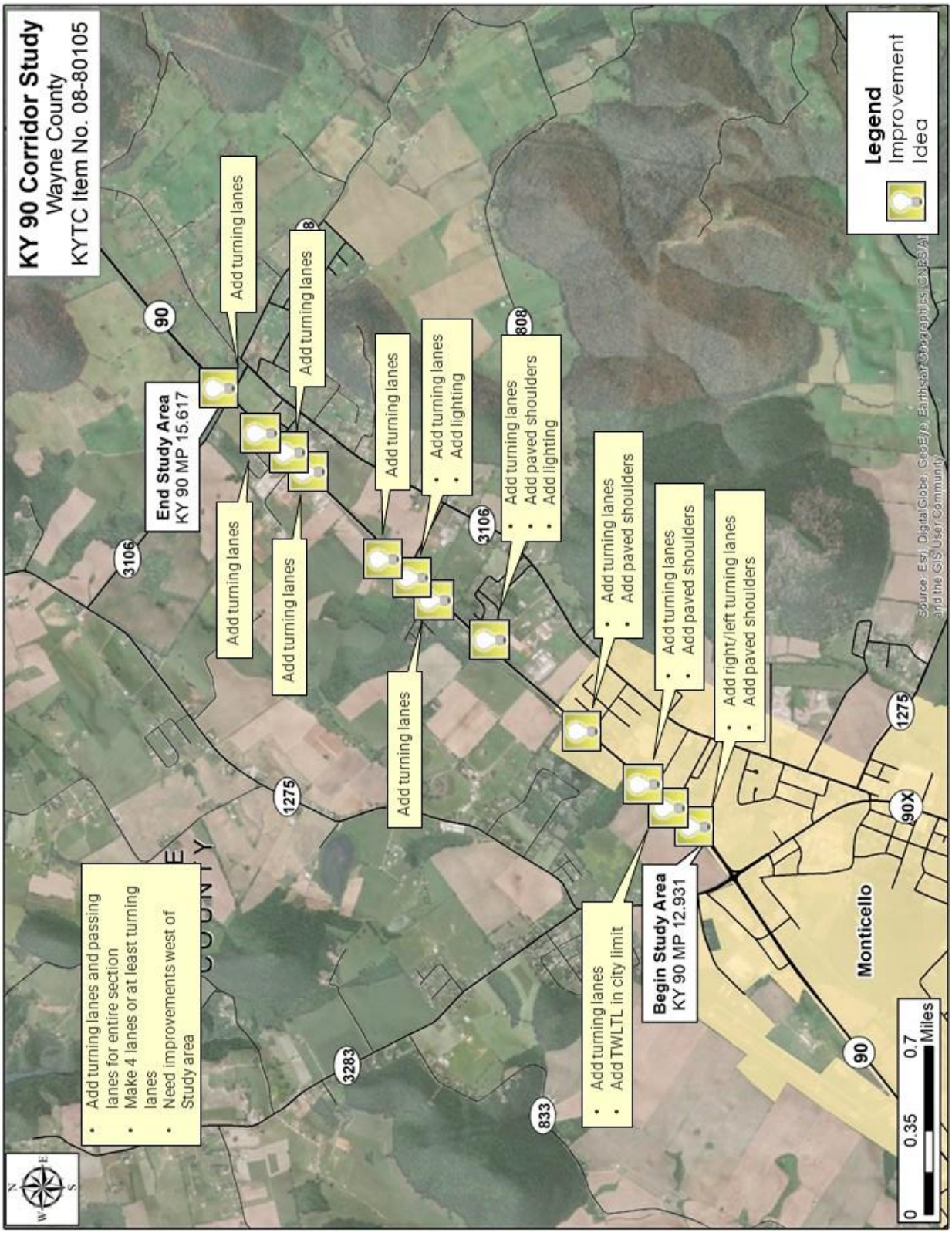


Figure 17: Advisory Committee Survey – Improvement Ideas

8.0 INITIAL IMPROVEMENT CONCEPTS

Improvement concepts were developed based on a combination of input from the project team, a review of existing conditions, Advisory Committee input, and field reconnaissance. Over the course of the study, the project team worked to determine which improvement concepts improved safety, and capacity on KY 90. Along with a "no-build" concept, this study initially examined several other improvements discussed below.

8.1 SHORT-TERM IMPROVEMENT CONCEPTS

8.1.1 Intersection Improvements

Side Road (MUTCD W2-1 and W2-2) signs could be installed at intersections along the study corridor to warn drivers of approaching access points and potential turning traffic, particularly at locations without intersection delineation lighting. It is recommended that the signs, 30" x 30", are placed 325 feet in advance of an intersection with supplemental street name plaques, as shown below. Possible intersections include Cooley Lane, Kings Highway, and Francie Boulevard.

8.1.2 Spot Improvements

Although left-turn lanes are not warranted based on current vehicular traffic, turn lanes could be considered as safety improvements. Based on results from the crash density heat map, there are two areas where the crash density is higher: the southern area between Access Drive and Tate Drive and the northern area near Sunstar Boulevard. An option to improve safety is to provide a center two-way left-turn lane (TWLTL) for a section of KY 90 at each of these locations. The proposed typical section is shown in **Figure 18**.

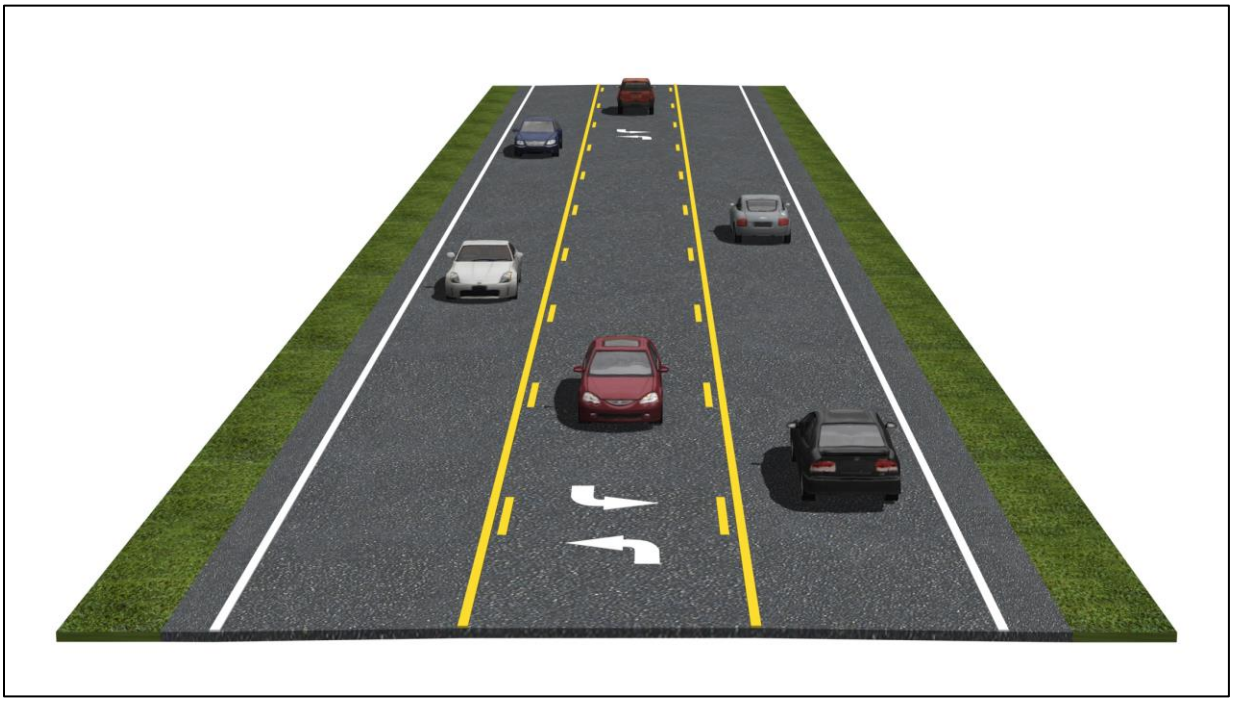


Figure 18: Proposed Typical Section for TWLTL

8.1.3 Transportation Systems Management and Operations (TSMO)

Driver Feedback Signs

Driver feedback signs are used to display the speed of motorists that are approaching the sign. The posted speed limit on KY 90 is 55 mph. Based on speed data from HERE, the 85th percentile on the study corridor of KY 90 is 56.6 mph during the AM peak, 56.9 mph during the PM peak, and 56.6 mph during the off-peak hours. Based on a review of the crash data, June had the highest number of crashes with nine crashes, while the months of May, August, September, and October had six crashes each. June is the beginning of tourism season in Wayne County as more people travel through the county to access Lake Cumberland. Because of the increased lake traffic, the month of June would be a likely candidate for consideration for temporary placement of a portable driver feedback sign.

Variable Speed Limit Signs and Variable Advisory Speed Limit Signs

A variable speed limit sign and a variable advisory speed limit sign are changeable message signs that are used to display speed limits that change based on ambient or operational conditions. Variable speed limits (regulatory) are currently not an option for use in Kentucky. Although not common, a variable advisory speed limit sign (warning) is a speed recommendation traffic control device for specified times. Based on a review of the crash data, 18 percent of crashes occur between 4 pm and 5 pm. Further analysis and discussion would be needed to decide if the application of this warning device would be considered as a potential countermeasure to reduce crashes when activated.

8.2 LONG-TERM IMPROVEMENT CONCEPTS

8.2.1 Construct TWLTL Along Entire KY 90 Corridor

A long-term concept to improve safety on KY 90 is to construct a center TWLTL along the entire study area.

9.0 SECOND PROJECT TEAM AND STAKEHOLDER MEETINGS

Following the development of the initial improvement concepts, the project team met for a second time. During the meeting, improvement concepts were presented, and attendees were asked to provide feedback regarding their concerns and priorities. Summaries for all meetings are found in **Appendix D**.

9.1 PROJECT TEAM MEETING NO. 2

The second project team meeting was held at the KYTC District 8 office in Somerset as well as via Microsoft Teams on May 24, 2022. The purpose of the meeting was to present the results from the first round of public involvement and solicit feedback on preliminary improvement concepts. Key discussion items included the following:

- Paving the shoulders would allow for more efficient passage of emergency vehicles. Currently, cars do not move to the gravel shoulders to allow emergency vehicles to pass.
- KYTC Division of Maintenance would prefer to eliminate the gravel shoulders from the KY 90 corridor.
- Of the 56 crashes on KY 90 over the five-year study period, only two were sideswipe collisions involving both vehicles moving in the same direction.
- It was noted that left-turn warrants were not evaluated with future traffic. Turning movement forecasts are rounded and do not supply enough precision for left turn warrant evaluations.
- There were concerns that drivers may use the TWLTL as a passing lane.
- A 2+1 concept would not work because the passing lane would also be used as a left-turn lane.
- It was determined that 12-hour turning movement counts would be collected on a busy lake weekend to quantify the increase in traffic.

9.2 SPECIAL EVENT TURNING MOVEMENT COUNTS

A follow-up project team meeting was held virtually via Microsoft Teams on July 18, 2022. The purpose of the meeting was to update the project team on the results of the weekend turning movement counts collected on June 17th and 18th during the Thunder Run special event weekend.

- The collected turning movement counts show an 11 percent increase in traffic on June 17th and a 13 percent decrease in traffic on June 18th when compared to the traffic counts collected in October 2021.
- Left-turn-lane warrants were met for two of the 12 hours at the Valero intersection and for two of the 12 hours at the KY 3106 intersection for the Friday counts.
- The project team determined that Stantec will provide construction costs and perform a benefit-cost analysis based on the potential for crash reduction.
- A four-lane improvement concept will not be considered. A four-lane improvement concept is only warranted with traffic volumes of 15,000 VPD – 20,000 VPD, and the 2045 estimate of traffic volume on the KY 90 corridor is 10,500 VPD.
- A paved shoulder concept will be considered.

9.3 ADVISORY COMMITTEE MEETING NO. 2

The second Advisory Committee Meeting was held at the UK Wayne County Cooperative Extension Office in Monticello, KY and virtually via Microsoft Teams on September 1, 2022. Representatives from the LCADD, KYTC District 8 Office, KYTC Central Planning Office, Wayne County Schools, and Kentucky House of Representatives were in attendance. The purpose in this meeting was to present the results from the MetroQuest Survey and get feedback from the local officials / stakeholders on improvement concepts. The traffic data including additional data collected on Thunder Run weekend was reviewed. Based on the discussion, the local officials concurred with the project team on several key issues included the following:

- Existing and future traffic analyses do not indicate a need to widen KY 90 to four lanes.
- Current turning movement volumes do not indicate a need to add a TWLTL for the entire length of the study.
- A TWLTL will be added to the section of KY 90 from the start of the project just south of Access Drive to just north of Cumberland Drive.
- Paved 10-foot shoulders will be added to the remainder of the study portion of KY 90 from a point north of Cumberland Drive to the end of the project at KY 3106 (Cooley Lane).

- A large cross has recently been installed near the KY 90 intersection with KY 3106. The cross illuminates at night and may provide delineation lighting for the intersection.
- It was noted that the Advisory Committee believes the 2020 census is low in Wayne County.

10.0 CONCLUSIONS

The goal of the *KY 90 Corridor Study* is to identify and evaluate the need for and scope of potential improvement options to improve safety, mobility, and capacity of KY 90 in the study area. KY 90 is used for regional through trips and locally by the people who live and work along the corridor. Several concepts were considered to improve conditions on KY 90.

10.1 FINAL PROJECT TEAM MEETING

The project team met for a final time at the UK Wayne County Cooperative Extension Office and virtually via Microsoft Teams on September 1, 2022. The purpose of the meeting was to get feedback from the project team on improvement concept prioritization. A detailed summary of the final project team meeting is included in **Appendix D**. Key discussion items included the following:

- To assist in prioritizing improvement concepts, the project team conducted a benefit-to-cost analysis (BCA). This analysis provided a means for determining which improvements have the greatest benefit and are the most economical. The BCA was conducted based on crash savings. Crash modification factors (CMFs) were used to quantify crash reduction savings by estimating the number crashes that would be reduced by implementing the improvement concept. The total benefit was then divided by the total cost to produce a benefit-to-cost (B/C) ratio as shown in **Table 10**.

Table 10: Benefit Cost Analysis

Improvement Concept	Project Length (miles)	2022 Construction Cost Estimate	20-Yr Crash Savings	B/C Ratio
TWLTL	0.33	$674,721	$1,590,000	2.36
Paved Shoulders	2.36	$4,825,279	$840,000	0.17

- As discussed in the second Advisory Committee Meeting, a TWLTL is not needed for the entire KY 90 study corridor. Instead, a short TWLTL section will be added on KY 90 from the start of the project just south of Access Drive to point just north of Cumberland Drive. Paved 10-foot shoulders will be added to the remainder of the project from a point north of Cumberland Drive to the end of the project at KY 3106 (Cooley Lane).
- The shoulders will be paved at full depth to accommodate the potential for adding left turning lanes in the future by restriping in the event that KYTC warrants are ultimately met.

- The initial lane and shoulder widths necessary to provide future TWLTL sections were discussed with options for the preferred typical section (11'-12' lanes, 12'-14' TWLTL, 2'-3' paved shoulder).
- The study section of KY 90 had preventative maintenance / resurfacing in 2021. It was not repaved.
- The short-term improvements were eliminated. KYTC typically places Side Road signs at locations with restricted sight distance and/or greater than expected number of crashes at the intersection, particularly angle, left-turn, and rear-end collisions. KYTC prefers local jurisdictions to properly sign for their routes using the Manual on Uniform Traffic Control Devices (MUTCD) standards before a road name plaque is added.
- Additional intersection lighting will not be recommended at this time.

10.2 PRIORITIZATION

The project team determined that the recommended improvement concept will include a TWLTL from south of Access Drive to Cumberland Drive and shoulder paving from Cumberland Drive to Cooley Lane (KY 3106). This includes 44 feet of full-depth pavement to accommodate the TWLTL section and future turn lanes as needed through the paved shoulder section. Archived plans show the existing full depth pavement on KY 90 is 24 feet wide and the total roadway width (including gravel shoulders) is 48 feet. The estimated construction cost of this project, including 44 feet of full-depth pavement, is $5.5 million. The improvements are not expected to require any utility relocations or additional right-of-way. The proposed typical sections on KY 90 are as follows:

- KY 90 from south of Access Drive to Cumberland Drive
    - Two 12-foot lanes, a 14-foot TWLTL, five-foot shoulders (three-foot paved), and edge-line rumble strips, as shown in **Figure 19**
- KY 90 from Cumberland Drive to Cooley Lane
    - Two 12-foot lanes, 12-foot shoulders (10-foot paved full depth), centerline rumble strips, and edge-line rumble strips, as shown in **Figure 20**

A project sheet has been included at the end of this report. As part of the next phase of this project, Phase 1 Design, consideration should be given to extending the full depth paved shoulders north of Cooley Lane approximately 1.8 miles to the end of the current construction project near Old Mill Springs Road. This would provide a consistent shoulder between Monticello and US 27 in Bronston.

Figure 19: TWLTL Typical Section

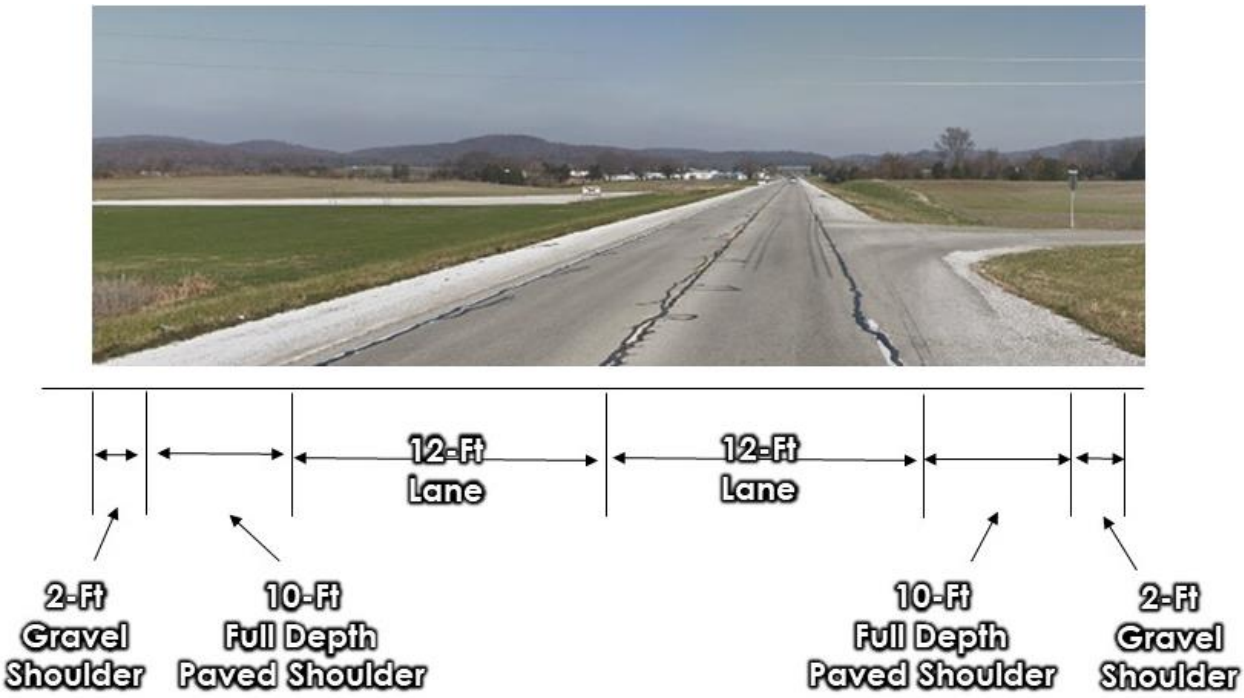


Figure 20: Paved Shoulder Typical Section

10.3 NEXT STEPS

The next step following this study for any potential improvements would be Phase 1 Design (Preliminary Engineering and Environmental Analysis). This project is listed in *Kentucky's FY 2022 – FY 2028 Highway Plan* as 08-80105.00 and has $6.078 million in Right-of-Way (2023), $2.92 million in Utilities (2025), and $22.143 million in Construction (2026).

CONTACTS/ADDITIONAL INFORMATION

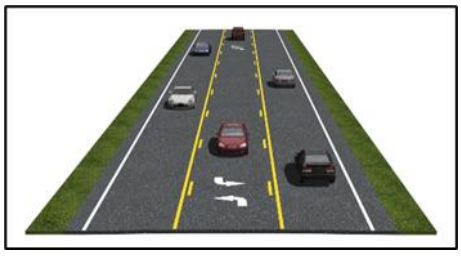
Written requests for more information should be sent to Mikael Pelfrey, Director, KYTC Division of Planning, 200 Mero Street, Frankfort, KY 40601. More information about this study can also be obtained from the KYTC District 8 Project Manager, Jeff Dick, at (502) 764-0331 (email at JeffD.Dick@ky.gov).

A **Long-Term**	**LOCATION** KY 90 (MP 12.931 – 15.617) in Wayne County, KY	**PROJECT PRIORITY:** High Priority

DESCRIPTION	**COST ESTIMATE**
The project will include 1) a Two Way Left Turn Lane (TWLTL) on KY 90 from a point south of Access Drive to Cumberland Drive and 2) full depth paved shoulders (10') from Cumberland Drive to KY 3106 (Cooley Lane).	Design: $400,000 Right-of-Way: $0 Utility: $0 Construction: $5.5 million **Total: $5.9 Million**

Project Needs: KY 90 is an urban minor arterial in Wayne County serving as a regional connection for southeastern Kentucky. Within the study corridor vicinity, KY 90 is also used by recreational travelers to reach Lake Cumberland and local drivers who live and work in Wayne County. KY 90 is a two-lane roadway with no left-turn lanes on the corridor within the study area. Over the five-year period between 2016 and 2020, there were 56 reported crashes on the study portion of KY 90, 19 of which involved an injury. Most of the crashes were rear end and single vehicle collisions. On this stretch of KY 90, the EEC was -4 crashes per year, indicating that the route is performing better than expected. A crash density heat map indicates a concentration of crashes on the south end of the project between Access Drive and Cumberland Drive as well as in the vicinity of the Valero gas station near Sunstar Boulevard. Traffic is expected to grow on KY 90 to 10,500 VPD by 2045.

Improvement Concept: The recommended improvement concept for the KY 90 corridor is to add a 0.33-mile TWLTL section from a point just south of Access Drive to Cumberland Drive. The TWLTL would provide a left-turn lane for the segment of KY 90 with the highest crash density. The typical section would be two 12-foot lanes, a 14-foot TWLTL, five-foot shoulders (three-foot paved) and edge-line rumble strips.



The recommended improvement concept for the 2.36-mile section from Cumberland Drive to KY 3106 (Cooley Lane) is to add 10' full depth paved shoulders. Paved shoulders would allow for more efficient passage of emergency vehicles, and KYTC Maintenance would prefer to eliminate gravel shoulders from the corridor. Edge-line rumble strips with width and depth per KYTC standards shall be installed to alert drivers when they leave the traveled way and discourage passing on the right. The typical section would be two 12-foot lanes, 12-foot shoulders (10-foot full depth paved), centerline rumble strips, and edge-line rumble strips. The 44 feet of full depth pavement would match the TWLTL section above so that a future TWLTL section or left turn lane could be added with striping.