

# Abbreviated Interchange Justification Study

for

## I-24 at KY 107

KYTC Item No.: 2-8702.00  
Christian County, Kentucky

DECEMBER 2014



*Prepared for:*

*Prepared by:*



Division of Planning  
and  
District 2



Qk4, Inc.

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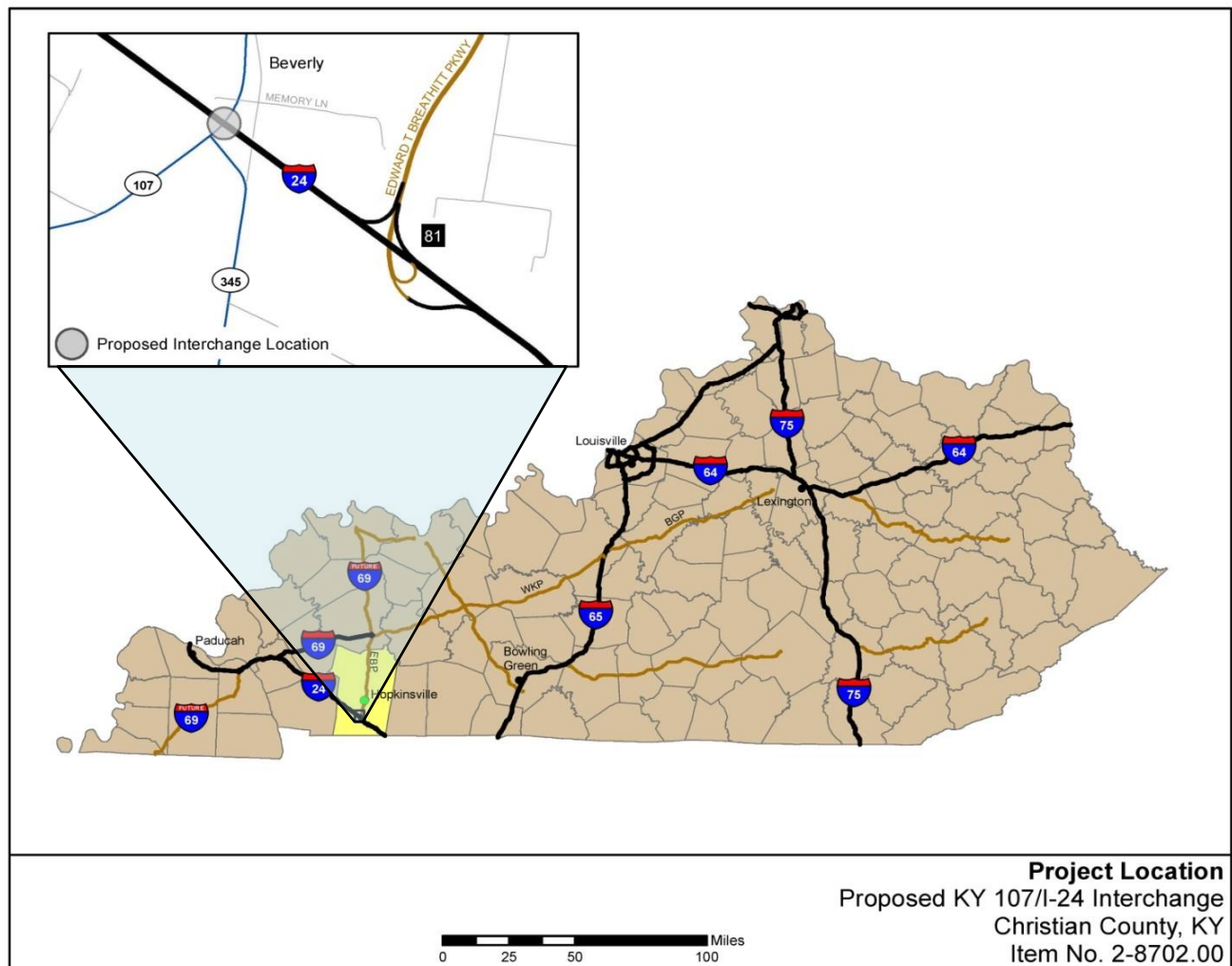
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# EXECUTIVE SUMMARY

## EXECUTIVE SUMMARY

Kentucky's FY 2012-FY 2018 Highway Plan included a scoping study of a connection from KY 107 to the I-24 interchange with the Edward T. Breathitt Parkway (EBP) in Christian County. This Abbreviated Interchange Justification Study (AIJS) considers provision of that connection by a proposed full interchange with I-24 at KY 107 southwest of Hopkinsville (see Figure ES1) and performs a cursory review of other alternatives, including non-transportation alternatives. This AIJS represents only the first step of a potential two-step process for securing Federal Highway Administration (FHWA) approval for this project and addresses operational and engineering acceptability. The second step would require a detailed environmental analysis in accordance with NEPA that is beyond the scope of the current study and is therefore not presented in this report. The traditional KYTC environmental overview approach was utilized and depicted in an environmental footprint for this study. The second step necessary for final FHWA approval would require more detailed environmental analyses than those discussed in this study.



**Figure ES 1: Location Map**

Tasks in this analysis include:

- Identify the proposed project's purpose after consultation with project stakeholders and evaluate the project's need.

- Analyze projected traffic operations along I-24 in the vicinity of an interchange at KY 107 considering the policies of FHWA and the American Association of State Highway and Transportation Officials (AASHTO), and use that analysis to estimate projected traffic operations at other potential locations for a new I-24 interchange.
- Identify and discuss an overview of environmental issues in the project area.
- Develop a conceptual signing schematic for the KY 107 interchange.
- Determine the approximate cost and impacts for a preliminary interchange design.
- Coordinate with FHWA-KY Division Office.

During a meeting with local officials and other project stakeholders, issues and concerns included:

- Reducing travel times from Herndon to I-24 for emergency vehicles;
- Access to southwest Christian County;
- Property impacts;
- Drainage issues;
- Need for improvements to KY 107;
- Farm traffic;
- Impacts to historic Beverly School, and
- Potential impacts to Amish community and their buggy travel patterns along KY 107.

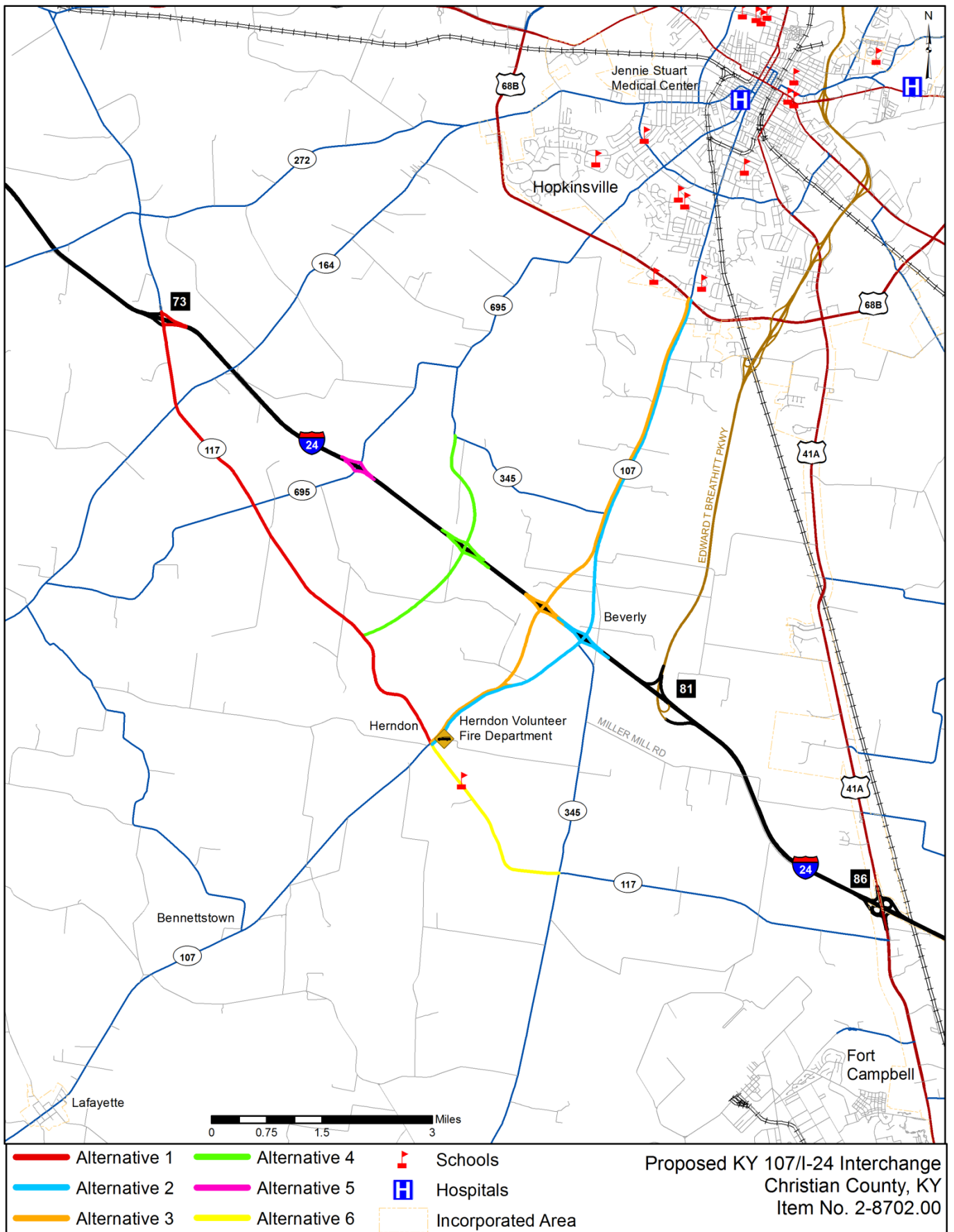
The issues of reducing travel times, access, and the estimated cost of improving KY 107 from KY 117 to US 68B are addressed in this report. Detailed assessments of property impacts, drainage issues, farm traffic, and the potential impacts to the historic Beverly School and the Amish community are beyond the scope of this report and would need to be addressed during subsequent project phases.

Two (2) primary project goals were identified by local officials:

- Reducing response times to I-24 for emergency vehicles, and
- Providing a transportation link to southwest Christian County.

The purpose of the project is to improve connectivity and reduce travel and emergency response time between I-24 and southwest Christian County, including the communities of Herndon and Beverly (see Figure ES2, p. ES3). Current travel times to the I-24/EBP interchange for emergency responders based in Herndon are at least 13 minutes.

The Traffic Forecast prepared by the Kentucky Transportation Cabinet (KYTC) showed 2,400 vehicles a day (vpd) would initially use an I-24 interchange at KY 107, and usage would grow to 3,200 vpd by the year 2040. Capacity analyses showed I-24 would operate at a Level of Service (LOS) B or higher for the design year 2040 in the vicinity of an interchange at KY 107 (see Figure ES3, p. ES4). Estimates of the usage of other potential I-24 interchanges were based on the I-24/KY107 forecast.



**Figure ES 2: Region Surrounding Proposed Project and Alternatives Considered**





Figure ES 3: 2040 Traffic Densities

The environmental overview identified areas, such as proximity impacts to homes and potential community and environmental justice impacts, which may require further analysis and possible mitigation in subsequent project development phases.

Improving connectivity and reducing travel time from Herndon to I-24 could be achieved by several transportation alternatives.

- Improve KY 117 from Herndon to I-24 at Exit 73; Make improvements to 2 ramps at Exit 73
- Construct a diamond interchange with I-24 at KY 107; improve KY 107 from KY 117 to US 68B

These two alternatives were considered early in the study process and were discussed with project stakeholders. Four (4) additional alternatives were suggested by KYTC for conceptual development, review, and analysis as part of their comments on a draft of this report:

- Construct a diamond interchange with I-24 at a location approximately 2 miles west of EBP; relocate 2.1 miles of KY 107 to connect to interchange; improve balance of KY 107 from KY 117 to US 68B. This location was chosen so that connecting roadways back to KY 107 would not need to cross the Little River
- Construct a Diamond Interchange with I-24 at a location approximately 3 miles west of EBP; connect to existing roads
- Construct a diamond interchange with I-24 at KY 695
- Improve KY 117 from Herndon to US 41A

None of these four additional alternatives have been evaluated to the same level of detail as Alternatives 1 and 2.

Reconstruction of the I-24 interchange at Exit 81 and extending the EBP south to KY 117 was discounted by KYTC early in the study. The No Build Alternative is also included in the alternatives analysis and compares quite favorably with all of the Build Alternatives.

A proposed I-24 diamond interchange at KY 107, with an estimated cost of more than \$20 million (see Table ES1, p. ES6), would reduce emergency response times to I-24 from Herndon more efficiently than other transportation development alternatives. However, non-transportation alternatives could also reduce emergency response times at lower costs by relocating the location from which emergency response vehicles destined for I-24 originate.

Based on the analysis presented in this report, a proposed interchange at KY 107 would result in no significant degradation to the operation of I-24, due to the low forecasted usage of the interchange. Conversely, that low forecasted usage indicates that system connectivity would not be significantly enhanced by that interchange. Further, an interchange at KY 107 would not meet the desired separation of three miles from the adjacent EBP interchange as recommended in AASHTO's *A Policy on Design Standards Interstate System, 2005*.

In summary, an I-24/KY 107 interchange:

- Satisfies the project goal of reducing response time from Herndon to I-24 for emergency vehicles;

**Table ES1: Comparison of Alternatives**

Alternatives	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 73	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 86	Travel Time/Distance from Herndon to I-24 @ EBP via New Interchange	Travel Time/Distance from Fire Station at US68B/EBP to I-24 @ EBP	Cost Estimate, Transportation Solution	Cost Estimate, Non-Transportation Solution	Cost per Mile Shortened	Cost per Minute Savings
<b>Existing/No Transportation Build</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	N/A	6 min / 5.8 miles	N/A	\$2,000,000	\$345,000	\$333,000
<b>Alternative 1 – Improve KY 117 from Herndon to I-24 @ Exit 73</b>	17.0 min / 15.6 miles	13.6 min / 12.3 miles	N/A	N/A	\$16,750,000	N/A	No reduction in distance	\$9,850,000
<b>Alternative 2 – Construct new I-24 Interchange at KY 107. Improve KY 107 from KY 117 to US 68B</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	3.9 min / 3.8 miles	N/A	\$20,300,000	N/A	\$2,388,000	\$2,100,000
<b>Alternative 3 – Construct new I-24 interchange near MP 79.2. Construct 2.1 miles of connector roads north and south back over to KY 107. Improve balance of KY 107 from KY 117 to US 68B.</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	5.5 min / 5.3 miles	N/A	\$30,700,000	N/A	\$4,385,000	\$3,790,000
<b>Alternative 4 – Construct new I-24 interchange near MP 78.2. Construct connector roads north and south of interchange</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	7.2 min / 7.0 miles	N/A	\$34,600,000	N/A	\$6,530,000	\$5,410,000
<b>Alternative 5 – Construct new I-24 Interchange at KY 695. Improve KY 695 from KY 117 to US 68B</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	11 min / 10.8 miles	N/A	\$18,500,000	N/A	\$12,333,000	\$7,115,000
<b>Alternative 6 – Improve KY 117 from Herndon to KY 345</b>	18.7 min / 15.6 miles	13.1 min / 12.3 miles	N/A	N/A	\$6,350,000	N/A	No reduction in distance	\$12,700,000

\*Costs for Alternative 2 are based on a new bridge just slightly (approximately 50 feet) west of the existing structure to address sight distance issues that would be present at the ramp terminals at the current overpass location, and to assist in maintenance of traffic during construction.

- Provides additional access to I-24 at acceptable Levels of Service; but fails to significantly enhance system connectivity to due to the low forecasted usage;
- Could be signed according to current standards;
- Does not diminish levels of service on the crossroads in the study area;
- May have undesirable impacts to the community of Beverly;
- Would require reconstruction of the KY 107 structure over I-24 to meet sight distance requirements;
- Provides access to a public road while accommodating all traffic movements on that road;
- Does not meet the desired spacing separation of three miles from the adjacent EBP Parkway interchange;
- Has not been demonstrated to be needed to serve a significant volume of projected traffic.

# Abbreviated Interchange Justification Study

# 1.0 INTRODUCTION

Kentucky's FY 2012-FY 2018 Highway Plan included a scoping study of a connection from KY 107 to the I-24 interchange with the Edward T. Breathitt Parkway (EBP) in Christian County. This Abbreviated Interchange Justification Study (AIJS) considers provision of that connection by a proposed full interchange with I-24 at KY 107 southwest of Hopkinsville (see Figure 1) and performs a cursory review of other alternatives.

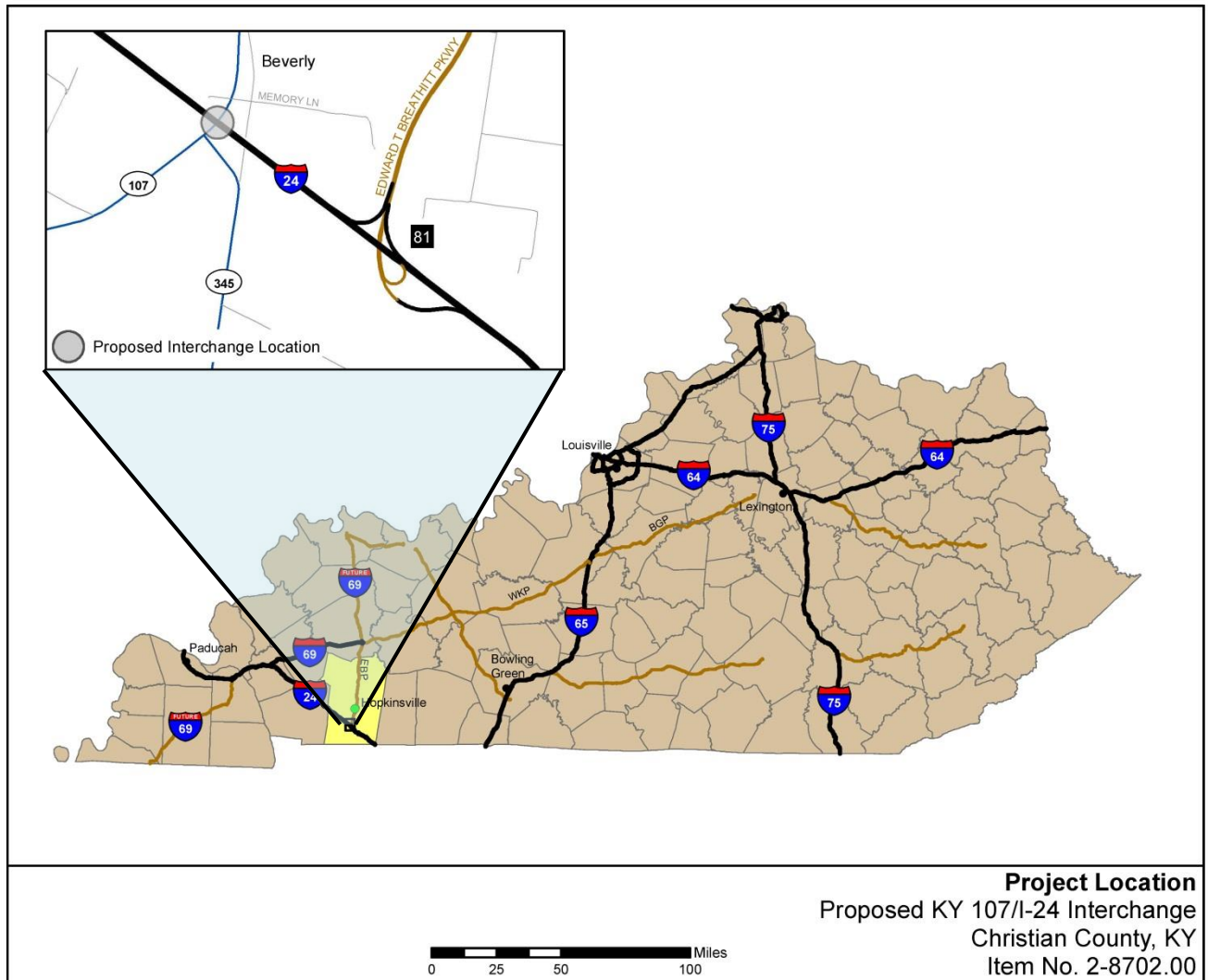


Figure 1: Location Map

## 1.1 Purpose and Scope of the Study

The Federal Highway Administration (FHWA) has authority and responsibility for approving new access to the interstate highway network. Such approval is gained through a positive review of an Interchange Justification Study (IJS) submitted to FHWA by a state highway agency. The most recent FHWA IJS guidance is the *Interstate System Access Informational Guide (Guide)* dated August 2010, which details eight policy requirements that States must follow when seeking IJS approval.

Each of the eight IJS policy requirements is addressed in this report. On page 8 of the *Guide*, it is stated: "...access approval may be a two-step process to help the State manage risk and provide flexibility....The first step is a finding of operational and engineering acceptability".... The *Guide* further states: "The second step is the final FHWA approval which constitutes a Federal Action and, as such, requires that the National Environmental Policy Act (NEPA) procedures are followed. Compliance with the NEPA procedures need not precede the determination of engineering and operational acceptability; however, final approval of access cannot precede the completion of NEPA."

The purpose of this study is to document that first step, i.e. determine if an interchange at this location can be designed and constructed to meet the engineering and operational requirements of FHWA. Completion of the second step, i.e. the required NEPA procedures necessary for KYTC to seek final FHWA approval, was not included in the scope of the current study and is therefore, not presented in this report.

The scope of work for the AIJS included these tasks:

- Conduct an inventory and analyze existing conditions, including an Environmental Overview,
- Define preliminary project purpose,
- Meet with local stakeholders to refine the project purpose,
- Forecast future traffic volumes,
- Determine the operational and engineering acceptability of a new KY 107/I-24 interchange considering the policies of FHWA and of the American Association of State Highway and Transportation Officials (AASHTO).
- Estimate project costs,
- Evaluate and discuss the project need,
- Develop a conceptual signing scheme for the interchange,
- Summarize findings in a project report without making a recommendation, and
- Coordinate with FHWA-KY Division Office.

A proposed I-24 interchange at KY 107 would be located in a rural area, between the existing I-24/EBP and the I-24/KY 117 interchanges. The distance between the two interchanges of EBP and KY 117 is 8.6 miles. With a proposed interchange at KY 107, the crossroad-to-crossroad distance would be 1.3 miles from KY 107 to the I-24/EBP interchange and 7.3 miles from KY 107 to the I-24/KY 117 interchange. The desirable spacing between interchanges is at least three miles in rural areas and one mile in urban areas according to the January 2005 AASHTO *Policy on Design Standards Interstate System*. The proposed new interchange does not meet this desired spacing. Other conceptual alternatives developed and discussed in Chapter 4 meet the desired spacing requirements between the two existing interchanges.

In accordance with the FHWA *Guide*, "Early coordination between the State DOT and FHWA Division Office is recommended to refine the scope of the required analysis and to make a determination if the project is reasonable." A "scope verification" meeting between the Kentucky Transportation Cabinet (KYTC) and the FHWA Division Office for Kentucky was held September 30, 2013 (see **Appendix A**). At that meeting, FHWA supported the KYTC recommendation to use the flexibility provided in the *Guide* to divide the IJS process into this abbreviated stage to address

operational and engineering acceptability (Step 1) and, following positive review by FHWA, a future stage to address the remaining NEPA policy requirements (Step 2).

FHWA made the following additional comments in regard to the current study:

- The KY 117/I-24 interchange was a significant distance away (over 7 miles) from KY 107 and would not have an impact on an interchange at KY 107.
- The area of traffic influence (see Figure 2, p.4) should be defined as:
  - KY 117/KY 695 intersection to the west
  - EBP/I-24 interchange to the east
  - KY 107/KY 117 intersection to the south
  - US 68B/EBP interchange to the north
- Any improvements to KY 107 constructed in association with a new interchange with I-24 should be carried north to Memory Lane.
- A weaving analysis should be performed on I-24 between the current entrance ramp to I-24 westbound from southbound EBP and the first exit ramp from I-24 to a proposed interchange at KY 107.

The remainder of this AIJS addresses these elements.

## **1.2 Project Setting and History**

Hopkinsville (2012 population estimate of 32,966) is the 6th largest city in Kentucky, and the county seat of Christian County (2012 population estimate of 75,427). Regionally, Hopkinsville is served by I-24 to the south and west, by the EBP to the north and (now) south, and by US 68 to the east and west. To the south is the Fort Campbell military base (see Figure 3, p.5). I-24 West connects Christian County to the Lake Barkley and Kentucky Lake recreation areas, commonly referred to as “Land Between the Lakes”, approximately 50 miles to the west, while I-24 East provides access to the Nashville Metropolitan Area approximately 60 miles to the south.

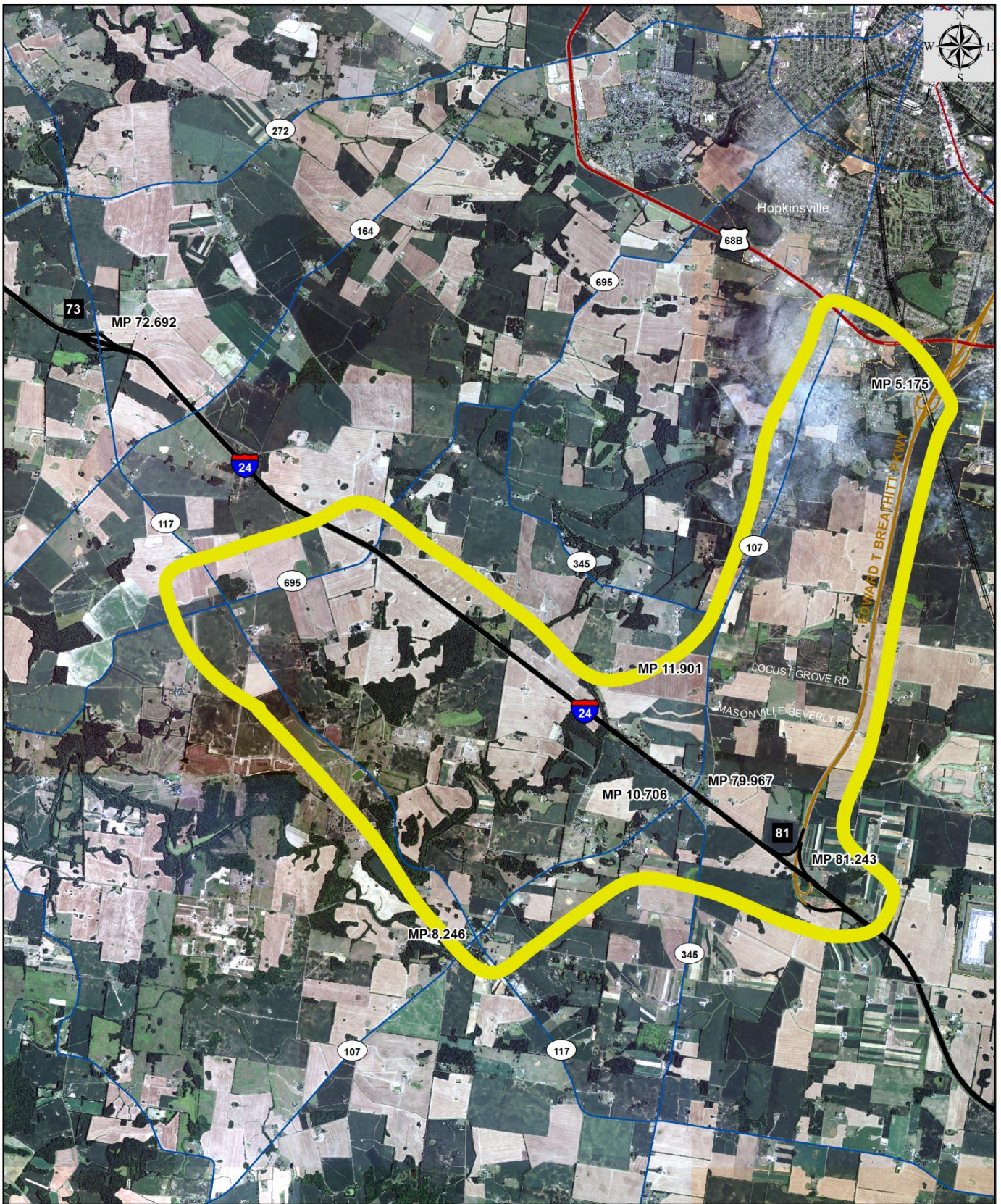
KY 107, sometimes referred to as Lafayette Road, begins as a state-maintained highway just south of the community of Lafayette (south of that point the roadway is on, and is maintained by, the Fort Campbell military base) and passes through Lafayette, Bennettstown, and Herndon, before crossing over I-24 near the Beverly community. KY 107 continues to and through downtown Hopkinsville to the northeast as Greenville Road before continuing into Todd County.

Average daily traffic (ADT) volumes on KY 107 are approximately 900 vehicles per day (vpd) south of the intersection with KY 345 East (Palmyra Road) and 2,100 vpd north of the intersection with KY 345 West (Huffman Mill Road).

## **1.3 Stakeholder Involvement**

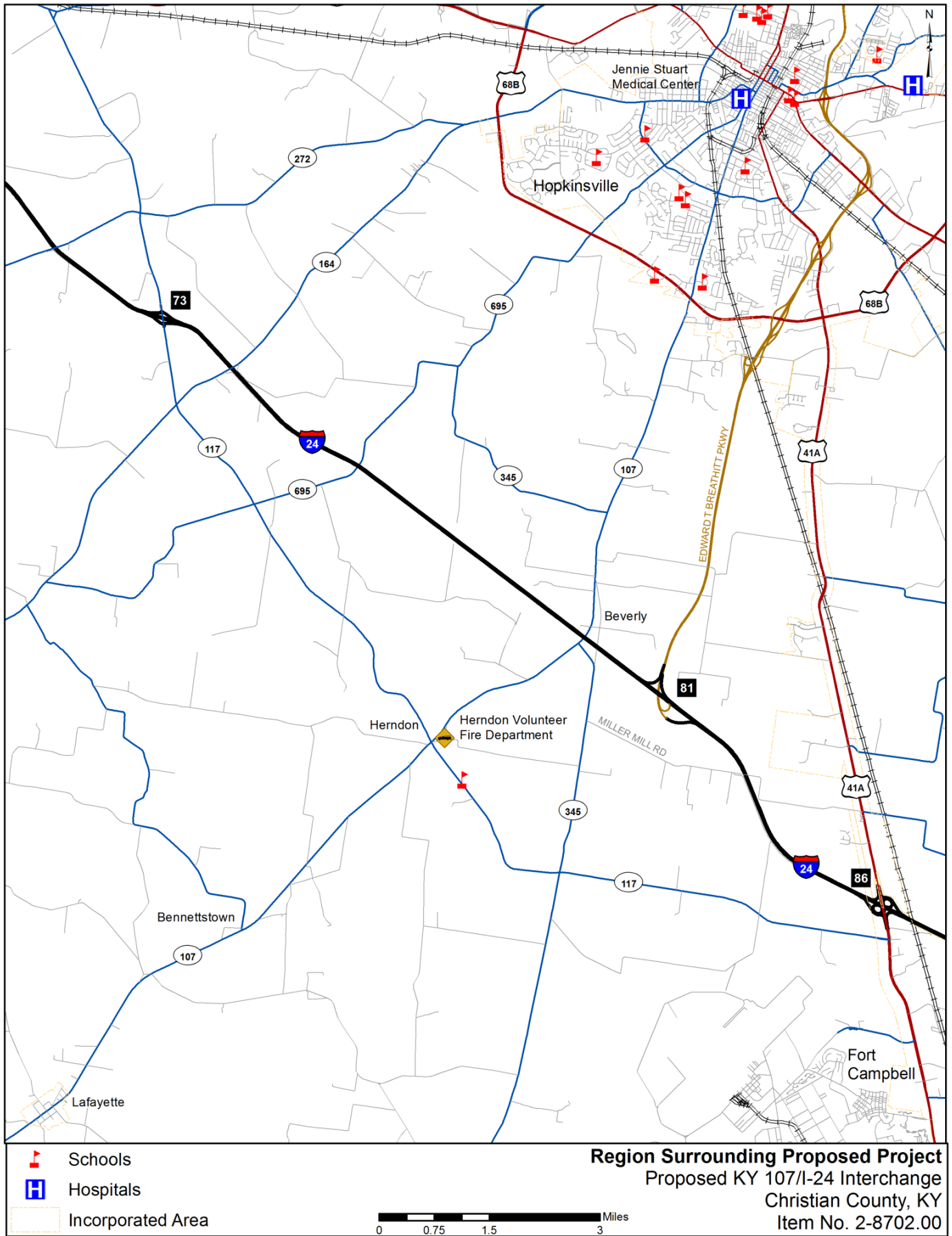
On October 30, 2013, a meeting with local officials and other project stakeholders was held at the Pennyriple Area Development District office. Representatives of the City of Hopkinsville, Christian County, Fort Campbell, and the local Chamber of Commerce were present. A full summary of that discussion is contained in **Appendix A**.





**Area of Traffic Influence**  
 Proposed KY 107/I-24 Interchange  
 Christian County, KY  
 Item No. 2-8702.00

**Figure 2: Area of Traffic Influence**  
 Abbreviated IJS for I-24 at KY 107



**Figure 3: Region Surrounding Proposed Project**  
 Abbreviated IJS for I-24 at KY 107

The issues of most concern to attendees with respect to the purpose of, and need for, this project included:

- Reducing travel times for emergency vehicles based at Herndon; and
- Access to southwest Christian County

Other concerns expressed by attendees included:

- Property impacts;
- Drainage issues;
- Need for improvements to KY 107;
- Farm traffic;
- Impacts to the historic Beverly School and the overall Beverly community (see Figure 4, p.7); and
- Potential impacts to Amish community and their buggy travel patterns along KY 107

The issues of reducing travel times, improving access, and the estimated cost of improving KY 107 from Herndon to US 68B are addressed in this report. Detailed assessments of property impacts, drainage issues, farm traffic, and the potential impacts to the historic Beverly School and the Amish community are beyond the scope of this study and would be addressed during subsequent project phases.

Following the stakeholders meeting, KYTC received these concerns from Fort Campbell representatives:

- A new I-24 interchange at KY 107 would likely funnel additional traffic onto rear Fort Campbell area roads.
- The locations and type of street lighting that might be installed needs to be designed to minimize extraneous light that could interfere with aircraft operations.
- Local development along KY 345 might be inconsistent with ongoing open space/farmland preservation efforts and could result in future land use conflicts with military training operations.
- Belief that this particular interchange would not provide any major benefits to Fort Campbell.

A full copy of Fort Campbell's letter to KYTC is included in **Appendix B**.

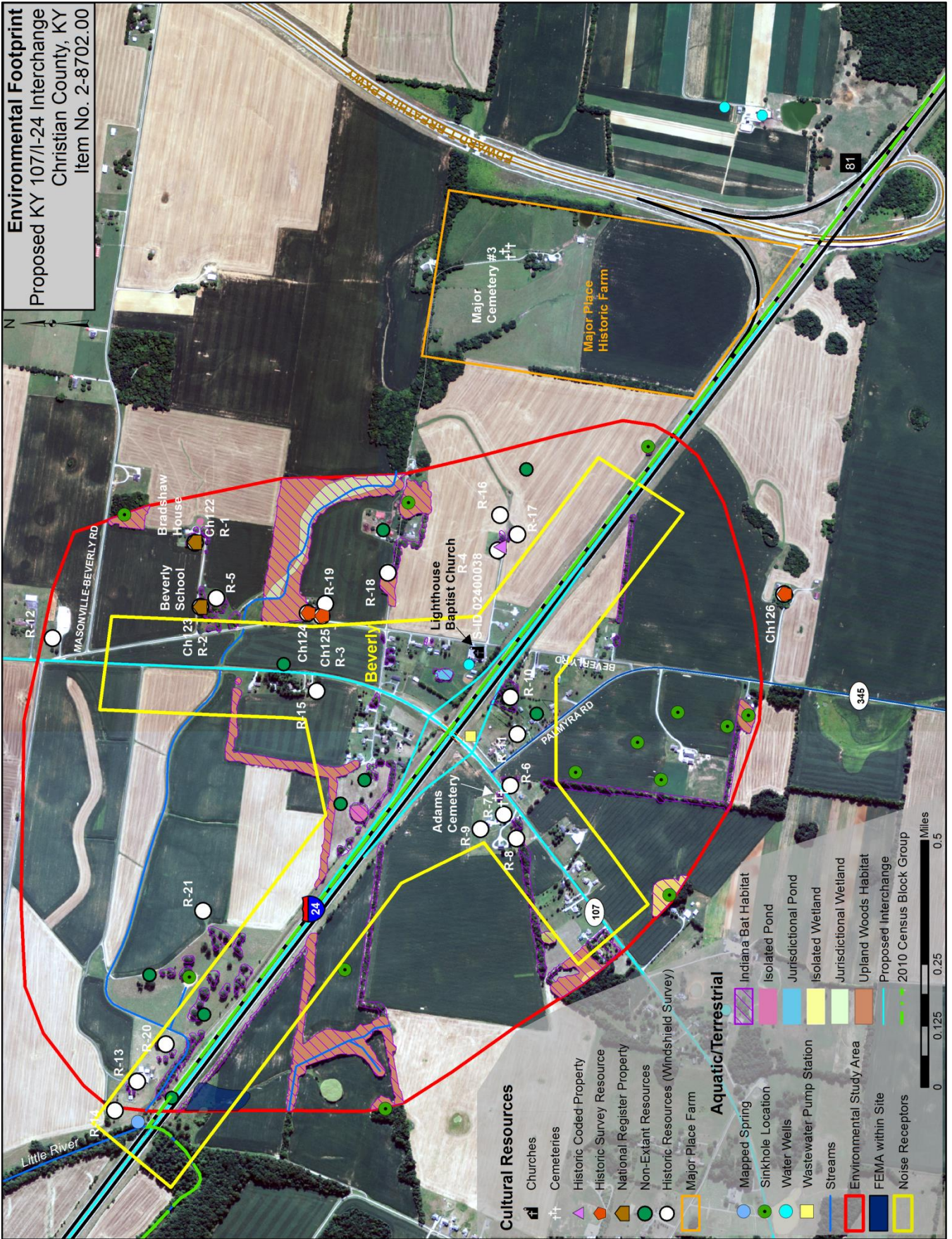
## **2.0 PROJECT PURPOSE**

The purpose statement for this project was refined during the stakeholders meeting. Two (2) goals for this project were identified by stakeholders:

1. Reducing response times to I-24 for emergency vehicles; and
2. Providing a system link to southwest Christian County

The purpose of the project is to improve connectivity and reduce travel and emergency response time between I-24 and southwest Christian County, including the communities of Herndon and

**Environmental Footprint**  
 Proposed KY 107/I-24 Interchange  
 Christian County, KY  
 Item No. 2-8702.00



**Figure 4: Environmental Footprint**

Beverly. Current travel times to the I-24/EBP interchange for emergency responders based in Herndon are at least 13 minutes.

Project stakeholders preferred that emergency response to incidents at the I-24/EBP interchange be the responsibility of the Herndon Volunteer Fire Department. As shown in Chapter 4, access time from Herndon to those incidents would be reduced by nearly nine minutes if an I-24 interchange were located at I-24 and KY 107.

Chapter 6 includes a discussion of the project’s need.

### 3.0 EXISTING CONDITIONS

#### 3.1 Highway Characteristics

The state-maintained roadways in the study area are I-24, the EBP (EB 9004), KY 107, KY 117, KY 345, and KY 695. Roadway characteristics for the state-maintained roads are shown in Table 1.

**Table 1: Roadway Characteristics for State Maintained Roads**

Route	Beginning Mile Point (Description)	Ending Mile Point (Description)	ADT (Year)	Critical Crash Rate Factor (CCRF)	Composite Adequacy Rating Percentile
I-24	72.69 (KY 117 Overpass)	79.00	20,000 (2013)	0.35	100.00
	79.00	81.24 (EBP Underpass)		0.42	
EBP	0.00 (I-24)	0.418	8,000 (2013)	0.44	43.12
KY 107	9.86 (Striped Bridge Road)	10.71 (KY 345E)	930 (2012)	0.24	41.02
	10.71 (KY 345E)	12.57 (KY 345W)	1480 (2011)		
KY 117	4.59 (KY 345)	7.30 (KY 107)	785 (2011)	0.62	N/A
	7.30 (KY 107)	11.502 (KY 695)	409 (2012)	0.72	N/A
KY 345	6.92 (Beverly Road)	7.28 (KY 107S)	550 (2011)	0.37	N/A
	7.28 (KY 107N)	Approx. 8.4 (Little River)	200 (2010)	0.35	N/A

ADT= Average Daily Traffic; CCRF= A ratio that, when it approaches, equals, and/or is greater than 1.0, indicates crashes do not appear to be occurring at random and are considered a high crash location; Composite Adequacy Rating Percentile shows how a roadway segment compares with similar roadways statewide.

The characteristics of these roads are summarized below:

- I-24 is a (Rural) Interstate and a State Primary maintenance route.
- EBP is functionally classified as a (Rural) Principal Arterial (Other Freeways and Expressways) between I-24 (MP 0.000) and Lovers Lane (MP 5.180) and a State Primary maintenance route.
- KY 107 is a (Rural) Major Collector between KY 117 at Herndon (MP 8.250) and Jerry Claiborne Way (MP 15.350), and a State Secondary maintenance route between KY 117 and the junction with US 41/US 68 in Hopkinsville (MP 18.834). The KY 107 overpass of I-24, located approximately 6,730 feet (1.300 miles) west of the EBP overpass of I-24, is characterized by two 12-foot-wide driving lanes and 8-foot-wide shoulders. Field measurements indicated 12-foot-wide driving lanes on KY 107 north of the I-24 overpass with paved shoulders less than 2 feet wide. South of I-24, driving lanes are 9 feet wide, but paved shoulders are also less than 2 feet wide. The speed limit is 55 mph.
- KY 117 and KY 345 are functionally classified as (Rural) Minor Collectors and are Rural Secondary routes for maintenance classification purposes. Between KY 107 and I-24 at Exit 73, KY 117 has 9-foot-wide driving lanes and 5-foot-wide shoulders. From KY 345 to KY 107, KY 117 has 10-foot-wide driving lane and 5-foot-wide shoulders. The portion of KY 345 (Palmyra Road) east of KY 107 has 9-foot-wide driving lanes and 6-foot-wide shoulders, while the portion of KY 345 west of KY 107 (Huffman Mill Road) has 8-foot-wide driving lanes and 4-foot-wide shoulders.

### **3.2 Characteristics of Adjacent Interchanges**

As part of the overview of current conditions, available existing plans for the current I-24 interchanges adjacent to KY 107 were reviewed. This evaluation of existing adjacent interchanges was conducted to determine any deficiencies, or whether their presence could serve the purpose of the proposed interchange at KY 107. The following constitutes a summary of that evaluation.

#### **3.2.1 I-24/EBP INTERCHANGE**

To the east 1.3 miles from the KY 107 overpass, the I-24 interchange with the EBP extension was opened to traffic in March 2011. The following interchange characteristics were noted:

- The EBP was generally designed as a 70 mph parkway facility with free flow movements at the I-24 interchange, but
- Because of the relatively low volume of projected traffic and the high cost associated with constructing a flyover ramp for traffic traveling from I-24 EB to EBP NB, a 35 mph loop ramp was constructed instead.
- The flyover ramp from EBP SB to I-24 EB transitions from 70 mph on the parkway to 50 mph on the ramp then to 70 mph on I-24. The ramp meets all current design standards.
- The EBP SB to I-24 WB ramp meets all current design standards.
- The I-24 WB to EBP NB ramp meets all current design standards.

#### **3.2.2 I-24/KY 117 INTERCHANGE**

The I-24 interchange with KY 117 is located 7.3 miles west of the KY 107 overpass. The following characteristics were noted:

- Existing plans were incomplete for the interchange, but the KY 117 interchange and underpass at I-24 provide adequate driver comfort approaching from the south.
- I-24 WB exit ramp:
  - Deceleration length appears acceptable based on the divergence angle in the plans.
  - The existing interchange has 150 feet from the gore to the Point of Curvature (P.C.) of the first curve; the current design standard is 200 feet.
  - The typical section for this ramp meets current standards.
  - No information was available for review of the existing horizontal or vertical geometry.
  - Access control for the ramp (495 feet) meets current standards of 300 feet for a rural area.
- I-24 EB entrance ramp:
  - The gore width of 6 feet and the ramp width of 12 feet at the gore do not conform to Exhibit 900-02 of the KYTC Highway Design Manual, which calls for widths of 7 feet and 17 feet, respectively.
  - No information was available for review of the existing horizontal and vertical geometry and acceleration lengths / tapers with I-24.
  - The typical section for the ramp meets current standards.
  - Access control for the ramp (1300 feet) meets current standards of 300 feet for a rural area.
- I-24 EB exit ramp:
  - Deceleration length appears acceptable based on the divergence angle in the plans.
  - The existing interchange has 150 feet from the gore to the P.C. of the first curve; the current design standard is 200 feet.
  - The typical section for the ramp meets current standards.
  - The intersection with KY 117 is at a 60 degree skew, which meets current standards.
  - The horizontal curves are based on a 10% maximum superelevation table. The current design standard is to use the 8% maximum superelevation table on interstates.
  - The vertical sight distance for the crest curve closest to KY 117 has a sight distance of 359 feet. Because of the transition from 50 mph to a stop condition at KY 117 this distance is likely acceptable.
  - Access control for the ramp (650 feet) meets current standards of 300 feet for a rural area.
- I-24 WB entrance ramp:
  - The gore width of 6 feet and the ramp width of 12 feet at the gore do not conform to Exhibit 900-02 of the KYTC Highway Design Manual, which calls for widths of 7 feet and 17 feet, respectively.

- No information was available for review of the existing horizontal and vertical geometry and acceleration lengths / tapers with I-24.
- The typical section for the ramp meets current standards.
- Access control for the ramp (360 feet) meets current standards of 300 feet for a rural area.

(Note that references to access control refers to KYTC's Highway Design Manual stating that full control of access shall extend along the intersecting crossroad a minimum of 300 feet (desirable 600 feet) in rural areas. The point of measurement shall be from the intersection of the edge of normal roadway and the ramp terminal).

### **3.2.3 CRASH HISTORY**

The Critical Crash Rate Factor (CCRF) is a measure of the statistical significance of crash history developed by the Kentucky Transportation Center (KTC); a CCRF equal to or greater than 1.0 indicates a statistical probability that crashes are not occurring randomly. Manner of crash history in the project area is shown in Figure 5 (p.12), while severity of crash history is shown in Figure 6 (p.14). Of the 48 crashes on I-24 between the KY 117 and EBP interchanges in the years 2010-2012, nearly half (22) of the type of crashes were collisions with animals. Even including these 9 animal-related crashes, the CCRF for that portion of I-24 was only 0.40. Cable median barriers are being installed on this section of I-24 which should further reduce median crossover crashes.

I-24 in the vicinity of the proposed new interchange (MP 79–81) shows a CCRF of 0.42. KY 107 from Striped Bridge Road at MP 9.86 to KY 345 West (Huffman Mill Road) at MP 12.57 shows a CCRF of 0.24 for that same time period. Crash metrics for other significant state-maintained roadway segments in the vicinity are as follows:

- EBP in the vicinity of I-24 (MP 0.0–0.418): CCRF=0.44
- KY 117 from Herndon to KY 695 (MP 7.3–11.5): CCRF=0.72
- KY 345 near KY 107 south of I-24 (MP 6.9–7.3): CCRF = 0.37

Even though the initial KTC data indicated a potential safety concern with the EBP where it connects with I-24, latitude-longitude location data in the Kentucky State Police (KSP) database and a review of crash records both indicate that some of the crashes being read into the KTC program are mislocated and not at or near the current MP 0.0. As discussed above, the true CCRF at that location is estimated to be 0.44.

### **3.3 Environmental Overview**

The information presented herein serves merely as an environmental overview or baseline. It was obtained by conducting field visits and literature searches, and by researching data records of resource agencies. Key environmental concerns identified in the study area are summarized and illustrated on Figures 4 and 7 (pp. 7 and 14). The environmental overview did not address the areas encompassed by the other transportation alternatives.



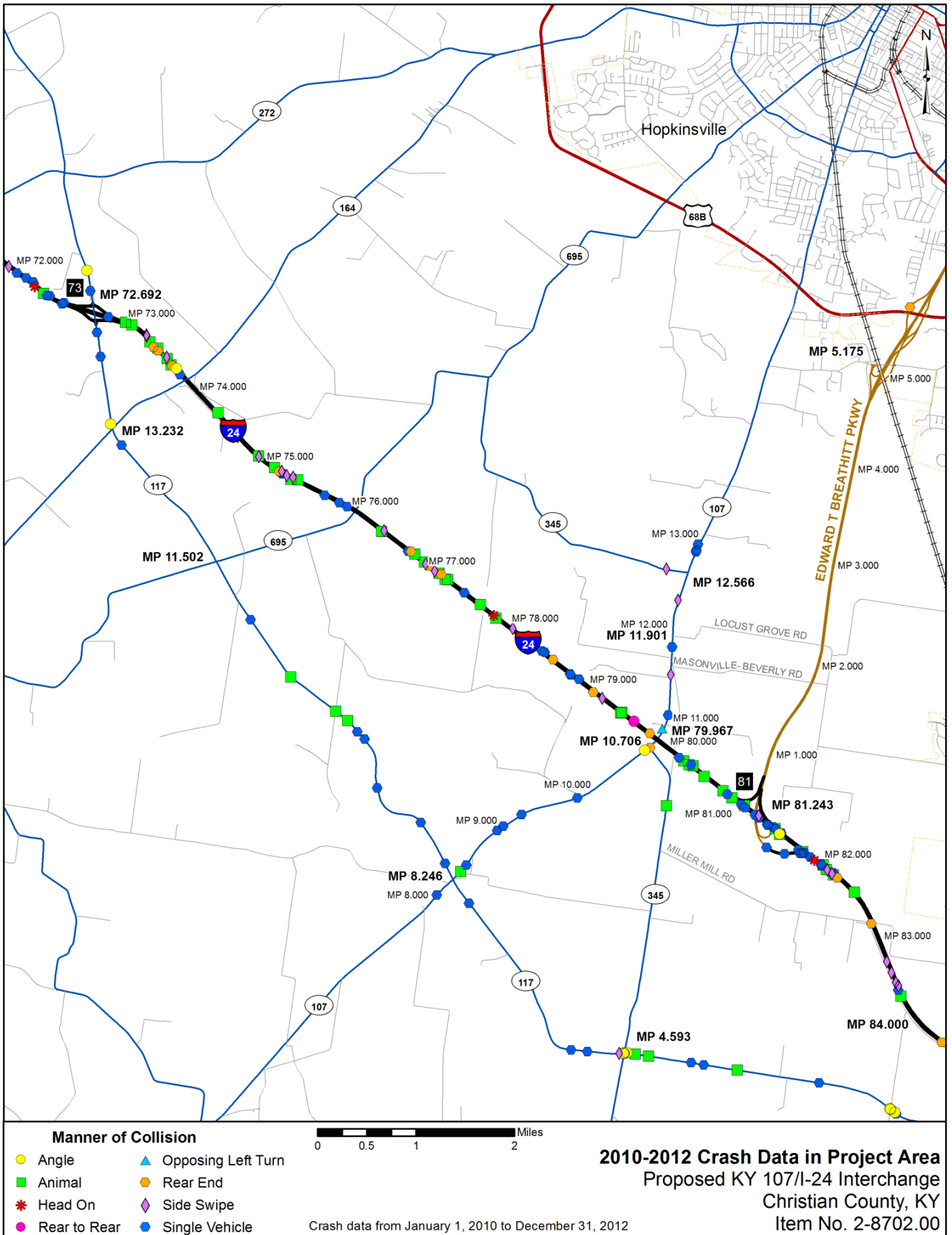
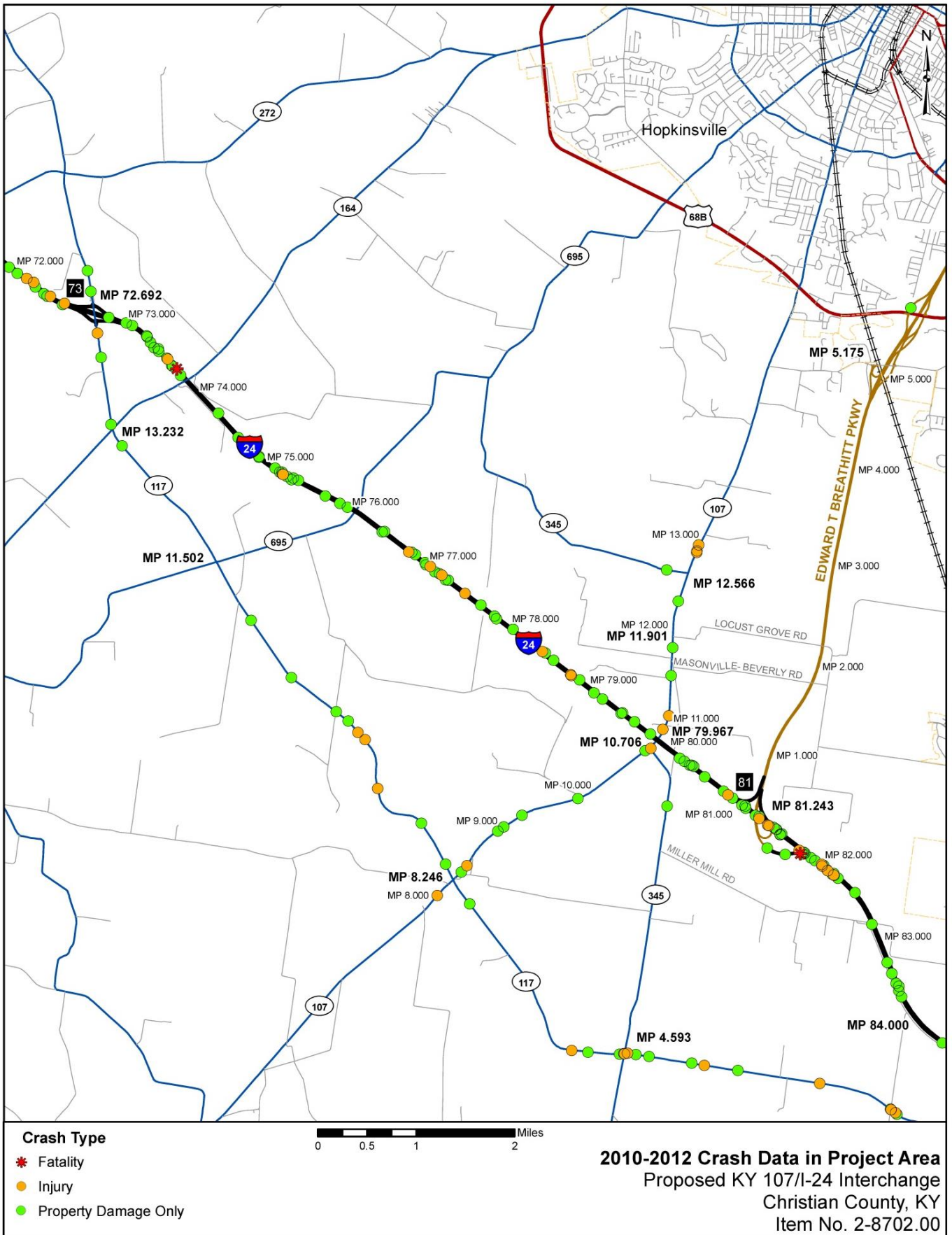


Figure 5: 2010-2012 Manner of Crash Collision Data in Project Area



Proposed KY 107/I-24 Interchange  
 Christian County, KY  
 Item No. 2-8702.00

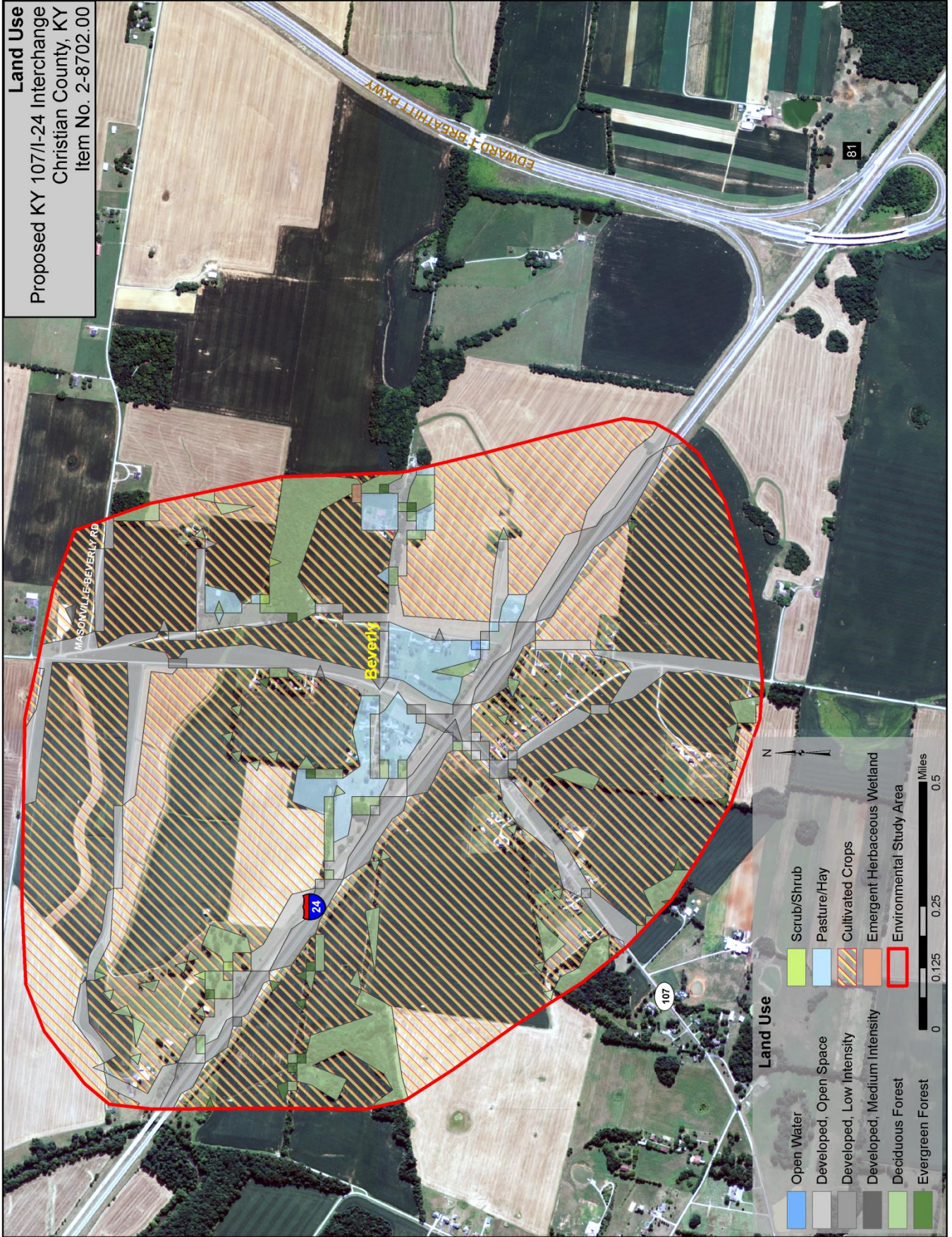


Figure 7: Land Use Map

A new interchange on an Interstate constitutes a Federal Action; therefore, federal environmental laws (NEPA) must be followed, including ultimate FHWA approval of an environmental document. This current report represents only the first step of a two-step process that KYTC has chosen to pursue, as defined on page 8 of the FHWA *Guide*. The second step would require a detailed environmental analysis in accordance with NEPA that is beyond the scope of this initial report.

### 3.3.1 RELOCATIONS, PROXIMITY IMPACTS TO HOMES AND COMMUNITY IMPACTS

Minimizing the number of residential relocations and commercial/institutional displacements is important in evaluating alignment options. The following are located in the immediate vicinity of the KY 107 bridge over I-24:

- Northwest Quadrant: 9 residences and several outbuildings.
- Northeast Quadrant: 9 residences, several outbuildings, and the Lighthouse Baptist Church.
- Southeast Quadrant: 12 residences, several outbuildings, and a wastewater pumping station owned by the Hopkinsville Water Environmental Authority.
- Southwest Quadrant: 2 residences, several outbuildings, and Adams Cemetery.

Agricultural fields surround all of the features within the quadrants. Community impacts are most likely to occur through direct or proximity impacts to clusters of homes and land use mixes. The predominant land use surrounding the area of a proposed KY 107 interchange is farmland (cropland). There are a few residences in the immediate vicinity of the proposed interchange, and relocation of several of those could potentially impact the remaining residents' community structure. A new interchange could potentially disrupt the sense of community of Beverly and the travel patterns of its residents. A small Amish community exists near Miller Mill Road off KY 345 East (Palmyra Road) south of the study area. Amish buggies travel north from that community to KY 345 West (Huffman Mill Road), mostly on Sundays for worship. That travel pattern includes the portion of KY 107 near I-24.

### 3.3.2 LAND USE AND FARMLAND IMPACTS

Cultivated cropland comprises nearly three-fourths (74%) of the environmental study area (see Figure 7, p.14). Soybeans and corn constitute the primary crops. Developed land constitutes only about one-sixth of that acreage. Forested areas, pasturelands, and open water or wetlands comprise the remainder.

- **Agricultural Census**—Historically, Christian County has been an agricultural community. The U.S. Department of Agriculture (USDA) Census of Agriculture is conducted every five years. The most current census available is that of 2012. That census shows the county had 1,179 farms covering 360,276 acres. Total gross income from farm-related sources was just over \$2.5 million.
- **Prime Farmland**—USDA oversees the Farmland Protection Policy Act of 1981 (FPPA). The FPPA establishes the protocol and criteria to be used by federal agencies to (a) identify and take into account the adverse effects of their programs on the preservation of farmland, (b) consider alternative actions, as appropriate, that could lessen adverse effects, and (c) ensure that their programs are compatible with state and local units of government as well

as private programs and policies to protect farmland. This project should be developed in compliance with the FPPA and in accordance with the state and federal regulations concerning farmland protection.

- **Agricultural Districts**—Kentucky’s Agricultural District Law provides a means by which agricultural land may be protected and enhanced. However, there are no known Agricultural Districts in the project area.
- **Parks and Wildlife Refuges**—There are no publicly owned parks or wildlife refuges in the vicinity of the proposed KY 107 interchange.

### 3.3.3 CULTURAL RESOURCES

The area outlined in Figure 4 (p.7) was assessed for prehistoric and historic archaeological resources through a file search at the Kentucky Office of State Archaeology and field observations. Four (4) prehistoric archaeological sites have been identified within the study area, one of which has previously been destroyed. Within a 1.25-mile buffer area surrounding the study area, 26 additional archaeological sites have been identified. (Archaeological sites are not shown on Figure 4 (p.7), but have been furnished to KYTC.)

Five (5) historic properties are recorded by the Kentucky Heritage Council within the environmental study area. Two of these are listed on the National Register of Historic Places (NRHP):

- The Bradshaw House; and
- The Beverly School.

Properties recorded as Historic Survey Resources, i.e. recorded on a Kentucky Historic Resource Inventory Form, include the Willis/Word House and the Beverly Store. One additional property is unnamed and recorded as a Historic Coded Property, i.e. coded on a map by without a completed inventory form. Field inspection observed that the site is a residential house/farmstead. Based on the concept-level plans conducted for this AIJS, none of these five sites would be impacted by a KY 107 interchange. However, this issue would need to be addressed in more detail during the subsequent NEPA phase of the project.

Through a windshield survey, 18 additional historic resources (greater than 50 years of age) were identified as potentially eligible for the NRHP. Should any of these properties that are subsequently determined eligible for listing on the NRHP be impacted by a KY 107 interchange project, a Section 4(f) evaluation and determination would need to occur. The only known potential site where Section 4(f) involvement is likely to occur is R-10 (see Figure 4, p.7), a cross-gabled, story-and-a-half, bungalow-plan house with integral porch. The concept-level plans conducted for this A IJS indicate that only a minor amount of land would be needed from this site, possibly resulting in a No Adverse Effect determination to this historic property. If so, then the *de minimis* rule would be used and no further Section 4(f) analysis would be warranted. If, however, it is determined by FHWA that that an Adverse Effect would occur to this site, then a more rigorous Section 4(f) evaluation would need to occur during the subsequent NEPA phase of the project.

Records indicate that Adams Cemetery contains at least seven (7) individual interments. Detailed information regarding the cultural resources assessment of the study area is contained in **Appendix C**.

### 3.3.4 SECTION 6(F) RESOURCES

The Land and Water Conservation Fund (LWCF) Act of 1965 established grants-in-aid funding to assist states in the planning, acquisition, and development of outdoor recreational land and water area facilities. Section 6(f) of the Act prohibits the conversion of any property acquired or developed with any assistance of the fund to anything other than public outdoor recreation use without the approval of the National Park Service (NPS) on behalf of the Secretary of the Interior. Land that has benefited from LWCF funds may not be later converted to other purposes without substitution of equivalent land. The National Park Service and the Kentucky Department for Local Government (DLG) administer these funds to local jurisdictions.

There are no outdoor recreational lands and/or water area facilities in the project area; therefore, there is no Section 6(f) involvement associated with this project.

### 3.3.5 AQUATIC AND TERRESTRIAL RESOURCES

The study area is dominated by cultivated cropland, with some rural residential development and highway rights-of-way also present. Upland woods habitat is present in a few scattered woodlots, wooded drains and sinkholes, and fencerows. The Environmental Overview area includes approximately 11,310 linear feet of ephemeral streams, six (6) potential wetlands, four (4) ponds, and numerous sinkholes. The Little River and one mapped spring are located just outside the western boundary of the study area. No caves or rock shelters were observed during field reconnaissance of the area, but these features may be present due to the karst geology underlying the area.

**Federally or State Protected Species**—Kentucky Department of Fish and Wildlife Resources (KDFWR) lists three (3) species observed in Christian County that are federally and state threatened, endangered, or (state only) species of special concern, as indicated in Table 2. To determine specific impacts or the potential for impacts to these species would require detailed analysis during the second step of the IJS process as referenced in the FHWA *Guide*.

**Table 2: Threatened or Endangered Species and Species of Special Concern**

Scientific Name	Common Name	Federal Status	KY Status
<i>Myotis grisescens</i>	Gray Bat	Listed Endangered	Threatened
<i>Myotis sodalis</i>	Indiana Bat	Listed Endangered	Endangered
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Water Snake	Partial Status* - Listed Threatened	Special Concern
* Partial status indicates the status applies only to a portion of the species' range. Source <a href="http://fw.ky.gov/kfwis/speciesInfo/">http://fw.ky.gov/kfwis/speciesInfo/</a>			

Detailed information regarding the ecological assessment of the study area is contained in **Appendix D**.

### 3.3.6 HAZMAT/UST SITES

Information was obtained from various federal, state, and local databases regarding facilities or individuals that generate, transport, treat, store, or dispose of hazardous materials, including underground storage tanks (USTs). However, the information provided from records searches identified in Underground Storage Tanks & Hazardous Materials Overview (see **Appendix E**) revealed no hazardous materials sites or USTs identified or mapped within the project area. Data sources queried are discussed in Section 6.0 on page 6 of the above referenced overview.

In accordance with the abbreviated environmental scope of the current project, a limited site reconnaissance based on a visual assessment from major roadways was conducted. Full details of this assessment may be found in **Appendix E**. Brief highlights of that assessment are summarized below.

- The Beverly Store (R3, CH 125), located at 7875 Old Palmyra Road (just north of Memory Lane), may have had past fueling operations with underground storage tanks (USTs) though records searches did not identify this site as a UST location.
- An old sign indicating Lovelady Welding was observed along KY 107 just south of the I-24 crossing. Welding locations have been known to contain hazardous materials even though records searches did not identify this site as a potential for hazardous materials.
- What appeared to be a sawmill located on Memory Lane has aboveground storage tanks (ASTs) that most likely contain diesel fuel for equipment.

### 3.3.7 ENVIRONMENTAL JUSTICE

Title VI of the 1964 Civil Rights Act requires each federal agency to ensure that “no person, on the grounds of race, color or national origin, be excluded from participating in, denied the benefits of, or subjected to discrimination under” any program or activity receiving Federal Aid. Title VI implications on the transportation planning process were further refined on February 11, 1994, in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The Executive Order requires each federal department and agency to “identify and address disproportionately high and adverse human health or environmental effects of their policies, programs and activities on minority populations or low income populations.” On April 15, 1997, the U.S. Department of Transportation (USDOT) published DOT Order 5680-1 as a component of the June 29, 1995, Federal Highway Administration’s *Environmental Justice Strategy*. The Order describes the process USDOT implemented to incorporate Environmental Justice principles into existing programs, policies, and activities. On May 2, 2012, the FHWA issued DOT Order 5610.2(a), *Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

In accordance with this policy and guidance, there are two (2) key criteria for determining whether an action will cause a disproportionately high and adverse effect on minority and/or low income populations:

- 1) An adverse effect that is predominantly borne by a minority or low income population, or
- 2) An adverse effect that will be suffered by a minority or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority or non-low-income population.

Table 3 provides 2010 U.S. Census data on population by race in Kentucky, Christian County, and the two Block Groups in Census Tract 2014 (see Figure 4, p.7 and **Appendix F**).

A review of American Community Survey (ACS) 2010 data indicates that approximately 2% of the population of Block Group 1, and 23% of the population of Block Group 2, has income below the poverty level. These figures compare to a Kentucky statewide poverty rate of 17% and a Christian County poverty rate of 16%.

Due to the size of the Block Groups, a more detailed survey of the environmental project area would be necessary during the second step of this IJS to investigate more specific impacts, particularly in regard to Asians in Block Group 1 and Native Americans and those living below poverty in Block Group 2. The Pennyrile Area Development District also provided an Environmental Justice evaluation of the study area which is located in **Appendix F**.

**Table 3: Population by Race and Income—Kentucky, County, and Study Area**

	Kentucky	Christian County	Study Area Census Tract 2014	
			BG 1	BG 2
<b>Total:</b>	<b>4,339,367</b>	<b>73,955</b>	<b>1,417</b>	<b>1,400</b>
Population of One Race:	4,264,159 (98.3%)	71,549 (96.7%)	1,400 (98.8%)	1,379 (98.5%)
White alone	3,809,537 (89.8%)	52,896 (71.5%)	1,270 (89.6%)	1,298 (92.7%)
Black or African American alone	337,520 (7.78%)	15,707 (21.2%)	71 (5.0%)	51 (3.6%)
American Indian and Alaska Native alone	10,120 (0.2%)	429 (0.6%)	0	11 (0.8%)
Asian alone	48,930 (1.1%)	754 (1.0%)	51 (3.6%)	10 (0.7%)
Native Hawaiian and Other Pacific Islander alone	2,501 (0.05%)	291 (0.4%)	0	1 (0.07%)
Some Other Race alone	55,551 (1.3%)	1,472 (2.0%)	8 (0.6%)	8 (0.6%)
Population of Two or More Races	75,208 (1.7%)	2,406 (3.3%)	17 (1.2%)	21 (1.5%)
Hispanic Population	132,836 (0.3%)	4,541 (6.1%)	17 (1.2%)	27 (1.9%)
Population Below Poverty	16%	16%	2%	23%

% = percent of State, County, or Block Group total population

% below poverty refers only to those persons reporting income

### 3.3.8 NOISE

Figure 4 (p.7) outlines the area within which any land use, e.g. residence, church, cemetery, would be a potential noise receptor.



### 3.3.9 AIR QUALITY

Pursuant to the 1990 Clean Air Act (CAA) Amendments and NEPA, all areas of Kentucky are in attainment for lead, nitrogen dioxide, sulfur dioxide, and particulate matter. Christian County is in attainment for carbon monoxide (CO) and ozone (8-hour).

### 3.3.10 INDIRECT AND CUMULATIVE IMPACTS

While no specific developments are currently planned as a result of building this interchange, it is reasonably foreseeable that future highway-orientated type businesses—such as gas stations, hotels, or restaurants—could occur within proximity of the interchange, should it be constructed. In anticipation of that, the Hopkinsville-Christian County Planning Commission should consider appropriate planning and zoning to guide any such development to be compatible with the community. Planning Commission staff has been involved as a stakeholder during this planning process and should remain a stakeholder. During the preliminary engineering and environmental phases, KYTC would advise the local officials of the details of the project to assist in their planning efforts.

## 4.0 ALTERNATIVES

Improving connectivity and reducing travel time from Herndon to I-24 could be achieved by several alternatives discussed below. The No-Build Alternative is also included in the alternatives analysis to provide baseline conditions for comparison of the impacts and benefits of the Build Alternatives.

### 4.1 *No Build Alternatives*

Reducing the travel time for emergency vehicles to access the I-24/EBP interchange can be achieved without any improvements to the transportation network for less cost than any of the transportation improvement alternatives discussed below. One option would be a formal interagency service agreement, if necessary, with the City of Oak Grove Fire Department to serve incidents on I-24 near the EBP interchange. The Oak Grove Fire Department is located 7.7 miles and approximately 8 minutes from the I-24/EBP interchange, while the Herndon FD is located 12.3 miles and 13.3 minutes away from that interchange. Thus, emergency service times to that interchange could be reduced by five minutes if served by the Oak Grove FD. Another alternative would be to construct a new fire station near either the KY 1613 (Lovers Lane) or US 68B (Eagle Way) interchanges, located respectively on the EBP at MP 5.2 and MP 5.8. Service times from those locations to the I-24/EBP interchange would be approximately 5.5 or 6 minutes respectively. These service times would be at least seven minutes quicker than current service from Herndon. It is estimated that a 4-bay fire station with administrative office space could be constructed for less than \$2 million.

### 4.2 *Improvements to I-24 Exit 81 and Extend EBP South to KY 117*

One method for improving access times to Exit 81 from south of I-24 would be to construct a southern extension of the EBP (likely as a 2-lane facility without limited access) to KY 117. The Hopkinsville-Christian County Comprehensive Plan-Land Use Element (*Land Use Plan*) adopted in 2005 by the Hopkinsville-Christian County Planning Commission, includes this extension. This concept would also likely include improvements to KY 117 between that extension and KY 107. The I-24/EBP interchange, which has only been open to traffic since 2011, would also have to be reconstructed to accommodate this additional movement. Construction of these improvements would likely exceed \$25 million. KYTC discounted this option as part of the current study, due to the

relatively recent opening (2011) of the current interchange, costs associated with such an alternative, the fact that I-24 is a logical terminus for EBP, and impacts that would occur to the Amish community located along Miller Mill Road; thus it is not further examined herein.

#### **4.3 *Alternative 1: Improve KY 117 from Herndon to I-24 at Exit 73; Make Improvements to 2 Ramps at Exit 73***

Improvements to KY 117 from Exit 73 to Herndon would encompass widening driving lanes to 11-feet with 2-foot paved and 4-foot unpaved shoulders for seven miles of roadway, as well as widening the I-24 overpass structure. Geometric improvements to and restriping of the westbound I-24 exit ramp and the entrance ramp to eastbound I-24 would also be needed. The estimated travel time savings of less than 2 minutes are based on these improvements allowing a higher average travel speed along KY 117. Phase cost estimates are shown in Table 4 (p. 22).

#### **4.4 *Alternative 2: Construct a Diamond Interchange with I-24 at KY 107; Improve KY 107 from KY 117 to US 68B***

A new I-24 interchange at KY 107 is included in Kentucky's 2014-2000 Highway Plan; the design phase is scheduled for FY 2016 with priority state funding of \$1 million. The cost estimates for Alternative 2 as shown in Table 4 (p. 22) include a noise wall, replacing a pump station, replacing 0.9 miles of water and sewer lines, and replacing twelve power poles. Right of Way cost estimates were developed utilizing information obtained from the Property Valuation Administrator (PVA) in Christian County. The estimated travel time savings of nearly 10 minutes are based on reducing the travel distance from Herndon to the I-24/EBP interchange by 8.5 miles. As was noted in Chapter 1.3 (p.3), representatives of Ft. Campbell indicated Alternative 2 would not provide any major benefit to the military installation.

Four (4) additional alternatives were suggested by KYTC for conceptual development, review and analysis as part of their comments on a draft of this report. These four additional alternatives are discussed below. None of these additional alternatives have been evaluated to the same level of detail as Alternatives 1 and 2.

#### **4.5 *Alternative 3: Construct a Diamond Interchange with I-24 at a Location approximately 2 Miles West of EBP; Relocate 2.1 Miles of KY 107 to Connect to Interchange; Improve Balance of KY 107 from KY 117 to US 68B.***

A new interchange near MP 79.2 would be two miles west of the I-24/EBP interchange and just east of the I-24 bridge over the Little River. Relocating KY 107 to connect to this location would reduce the impacts on the Beverly community, but would necessitate reconstructing approximately 2.1 miles of KY 107 on new alignment. This interchange would not meet the three-mile separation guideline for rural interchanges as it would be only 2 miles from the I-24/EBP interchange. The estimated travel time savings of approximately 8 minutes are based on reducing the travel distance from Herndon to the I-24/EBP interchange by 7 miles. The estimated cost of this alternative, based on a per-mile method and including right-of-way and utilities, is \$30.7 million. Phase cost estimates are shown in Table 4 (p.22).

#### **4.6 *Alternative 4: Construct a Diamond Interchange with I-24 at a Location approximately 3 Miles West of EBP Connect to Existing Roads***

A new interchange near MP 78.2 would be three miles west of the I-24/EBP interchange but west of the I-24 bridge over the Little River. This alternative would require the construction of new

**Table 4: Summary of Alternatives**

Alternatives	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 73	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 86	Travel Time/Distance from Herndon to I-24 @ EBP via New Interchange	Cost Estimate		
				Design	RW and Utilities	Construction
Existing/No Transportation Build	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	N/A	N/A	N/A	N/A
Alternative 1 – Improve KY 117 from Herndon to I-24 @ Exit 73	17.0 min/ 15.6 miles	13.6 min/ 12.3 miles	N/A	\$7,350,000	\$8,550,000	\$16,750,000
Alternative 2 – Construct new I-24 Interchange at KY 107. Improve KY 107 from KY 117 to US 68B	18.7 min/ 15.6 miles	13.6 min/ 12.3 miles	3.9 min/ 3.8 miles	\$1,200,000	\$6,800,000	\$20,300,000*
Alternative 3 – Construct new I-24 interchange near MP 79.2. Construct 2.1 miles of connector roads north and south back over to KY 107. Improve balance of KY 107 from KY 117 to US 68B.	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	5.5 min/ 5.3 miles	\$1,600,000	\$6,900,000	\$30,700,000
Alternative 4 – Construct new I-24 interchange near MP 78.2. Construct connector roads north and south of interchange	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	7.2 min / 7.0 miles	\$1,600,000	\$3,500,000	\$29,500,000
Alternative 5 – Construct new I-24 Interchange at KY 695. Improve KY 695 from KY 117 to US 68B	18.7 min / 15.6 miles	13.6 min / 12.3 miles	11 min/ 10.8 miles	\$1,000,000	\$6,800,000	\$18,500,000
Alternative 6 – Improve KY 117 from Herndon to KY 345	18.7 min / 15.6 miles	13.1 min/ 12.3 miles	N/A	\$450,000	\$2,800,000	\$6,350,000

\*Costs for Alternative 2 are based on a new bridge just slightly (approximately 50 feet) west of the existing structure to address sight distance issues that would be present at the ramp terminals at the current overpass location, and to assist in maintenance of traffic during construction.

connecting roadways to KY 117 to the south and (likely) to KY 345 to the north, but these connecting roads would not bridge the Little River. This interchange would meet the three-mile separation guidelines from the I-24/EBP interchange. The estimated travel time savings of approximately 6 minutes are based on reducing the travel distance from Herndon to the I-24/EBP interchange by 5.3 miles. The estimated cost of this alternative, including connector roads to KY 117 and KY 345, based on a per-mile method and including right-of-way and utilities, is \$34.6 million. Phase cost estimates are shown in Table 4 (p.22).

#### **4.7 Alternative 5: Construct a Diamond Interchange with I-24 at KY 695**

A new interchange at KY 695 is included in the 2005 *Land Use Plan*; however it is not included in the KYTC Unscheduled Project List nor has a Project Information Form (PIF) been developed for it. Such an interchange would be 5.1 miles west of the I-24/EBP interchange and 3.5 miles east of the I-24/KY 117 interchange, thus meeting the three-mile separation guidelines from those two existing interchanges. Alternatives 4 and 5 are mutually exclusive with respect to meeting the three-mile separation guidelines from both current interchanges. The estimated travel time savings of less than 3 minutes are based on reducing the travel distance from Herndon to the I-24/EBP interchange by 1.5 miles. The estimated cost of this alternative, based on a per-mile method and including right-of-way and utilities, is \$18.5 million. Phase cost estimates are shown in Table 4 (p.22).

#### **4.8 Alternative 6: Improve KY 117 from Herndon to US 41A**

Improvements to KY 117 from Herndon to US 41A would encompass widening driving lanes to 11-feet between KY 345 and KY 107, a distance of 2.7 miles. Estimated travel time savings, based on these improvements allowing a higher average travel speed for 2.7 miles along KY 117, are 0.5 minutes. The estimated cost of this alternative, based on a per-mile method and including right-of-way and utilities, is \$6.35 million. Phase cost estimates are shown in Table 4 (p.22).

Table 5 (p.24) compares the alternatives described above using metrics representing the project purpose and costs. The alternatives described above are summarized in Table 4 (p.22). Alternatives 1 and 2 are illustrated in Figure 8 (p.25). Alternatives 3 and 4 are illustrated in Figure 9 (p.26). Alternatives 5 and 6 are illustrated in Figure 10 (p.27).

As mentioned previously, a more robust examination of the potential environmental issues would be a part of the second phase of this IJS.

## **5.0 TRAFFIC ANALYSIS**

### **5.1 Traffic Forecast for Alternative 2 and for the No-Build Alternative**

The KYTC traffic forecast for this project considered only the No-Build Alternative and Alternative 2 (pp.20-21). However, projections from the No-Build Alternative are also applicable to Alternatives 1 and 6 since neither of these alternatives would likely result in significant changes in traffic volumes on KY 117, despite the slightly improved travel times, or on I-24

The traffic forecast did not reflect Alternatives 3, 4, or 5. The estimated traffic volumes at the new interchanges described in Alternatives 3, 4, and 5 are based on percentage reductions from the traffic forecast developed for Alternative 2. These estimates were derived based on I-24 distance from the interchange location in Alternative 2, and are shown in Table 6 (p.28). A capacity analysis

**Table 5: Comparative Metrics of Alternatives**

Alternatives	Improve Connectivity to I-24	Cost to Implement	Acceptable Level of Service Maintained on I-24	Travel time savings from Herndon to I-24 @ EBP	
				Compared to Exit 73 (KY 117)	Compared to Exit 86 (US 41A)
<b>Existing/No Transportation Build</b>	No	\$0	Yes	0	0
<b>Alternative 1 – Improve KY 117 from Herndon to I-24 @ Exit 73</b>	No reduction in travel mileage	\$16.75 million	Yes	Less than 2 minutes	0
<b>Alternative 2 – Construct new I-24 Interchange at KY 107 (MP 79). Improve KY 107 from KY 117 to US 68B</b>	11.8 miles closer	\$20.3 million	Yes	More than 14 minutes	Nearly 10 minutes
<b>Alternative 3 – Construct new I-24 interchange near MP 79.2. Construct 2.1 miles of new KY 107 to interchange north and south of I-24. Improve balance of KY 107 from KY 117 to US 68B.</b>	10.3 miles closer	\$30.7 million	Yes	More than 13 minutes	About 8 minutes
<b>Alternative 4 – Construct new I-24 interchange near MP 78.2. Construct connector roads to interchange.</b>	8.6 miles closer	\$34.6 million	Yes	Less than 12 minutes	Less than 7 minutes
<b>Alternative 5 – Construct new I-24 Interchange at KY 695 (MP76); improve KY 695 from KY 117 to US 68B</b>	1.5 miles closer	\$18.5 million	Yes	Less than 8 minutes	Less than 3 minutes
<b>Alternative 6 – Improve KY 117 from Herndon to KY 345</b>	No reduction in travel mileage	\$6.35 million	Yes	0	Less than one minute

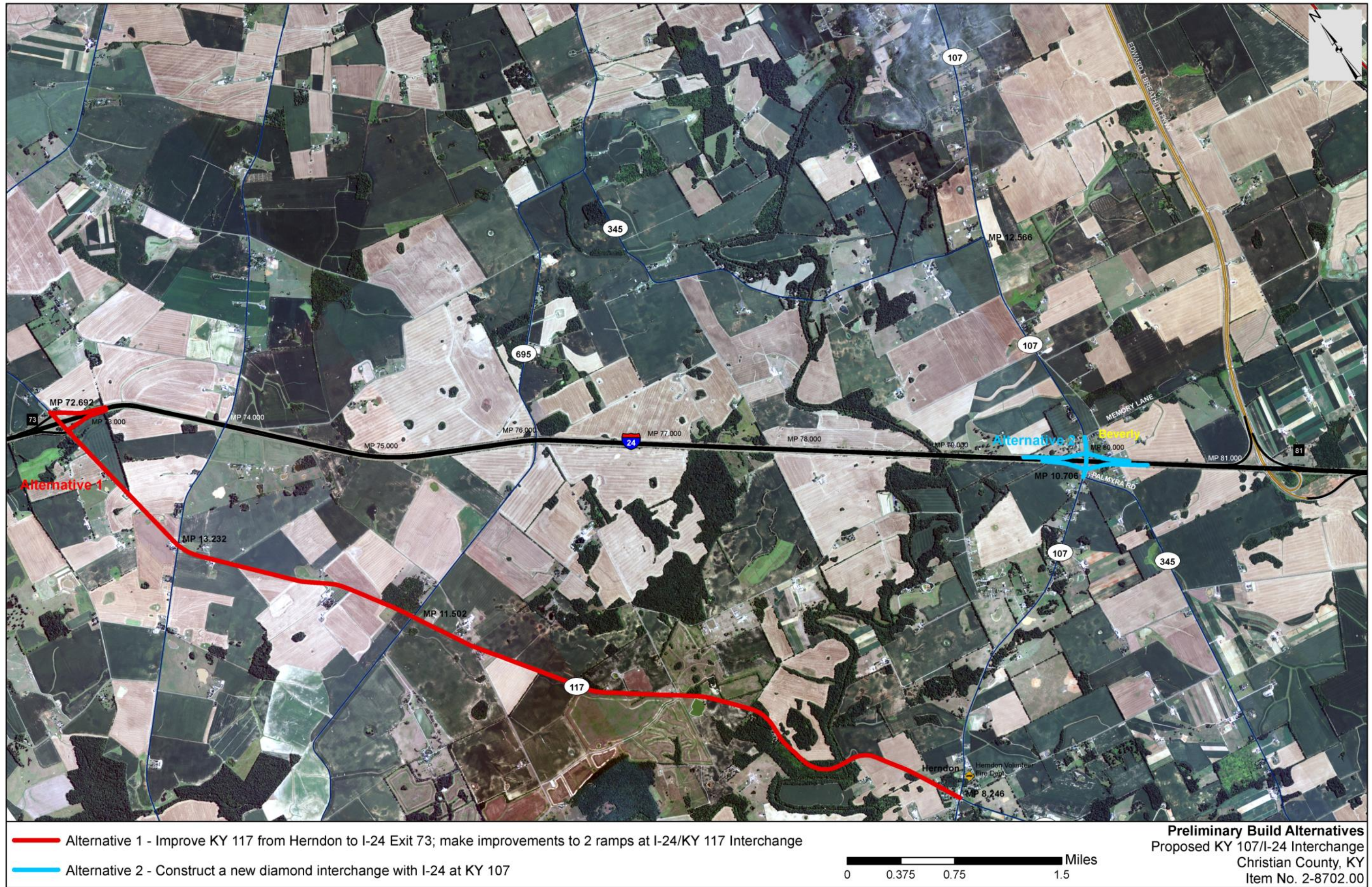


Figure 8: Preliminary Build Alternatives 1 and 2

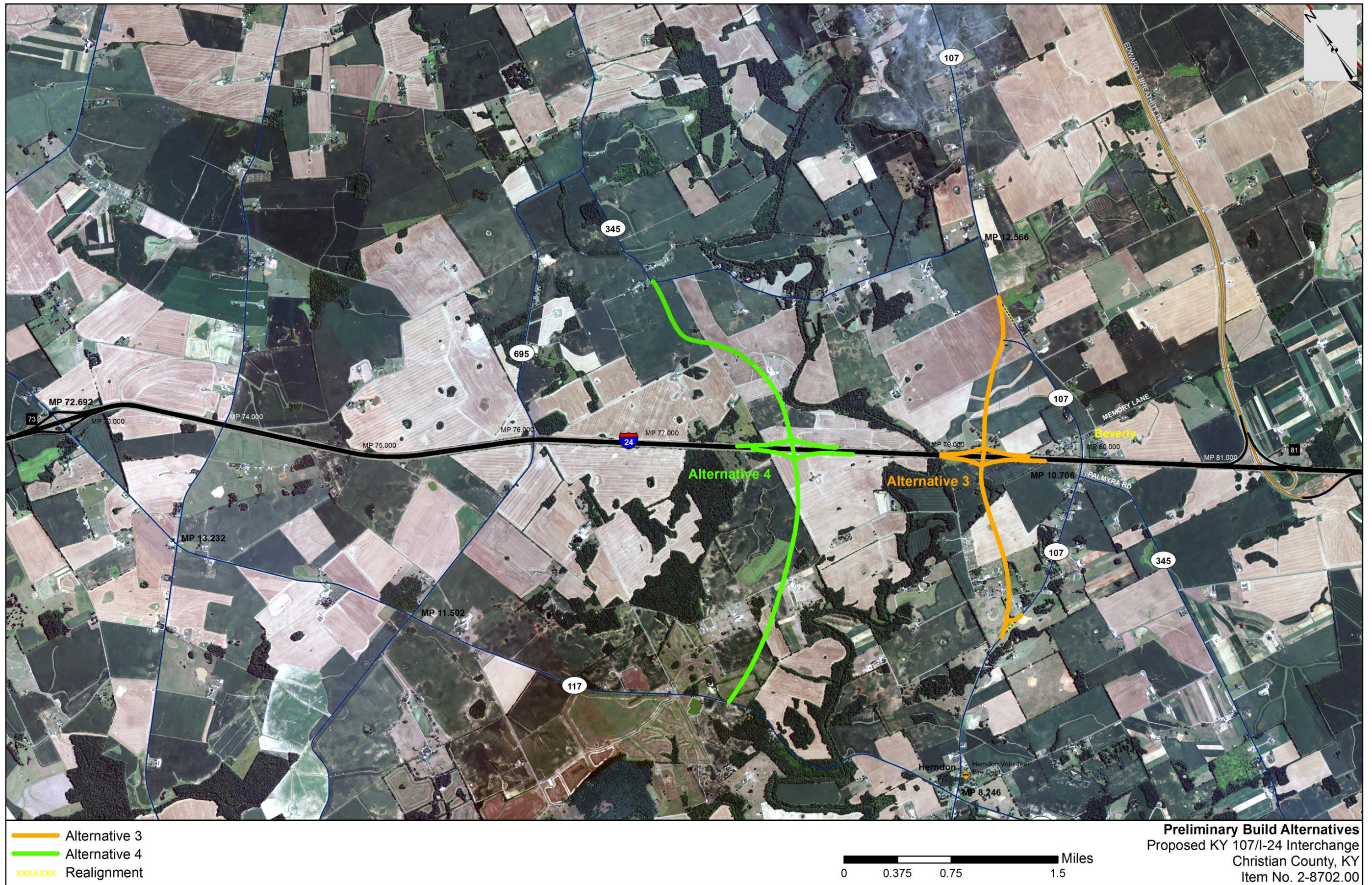
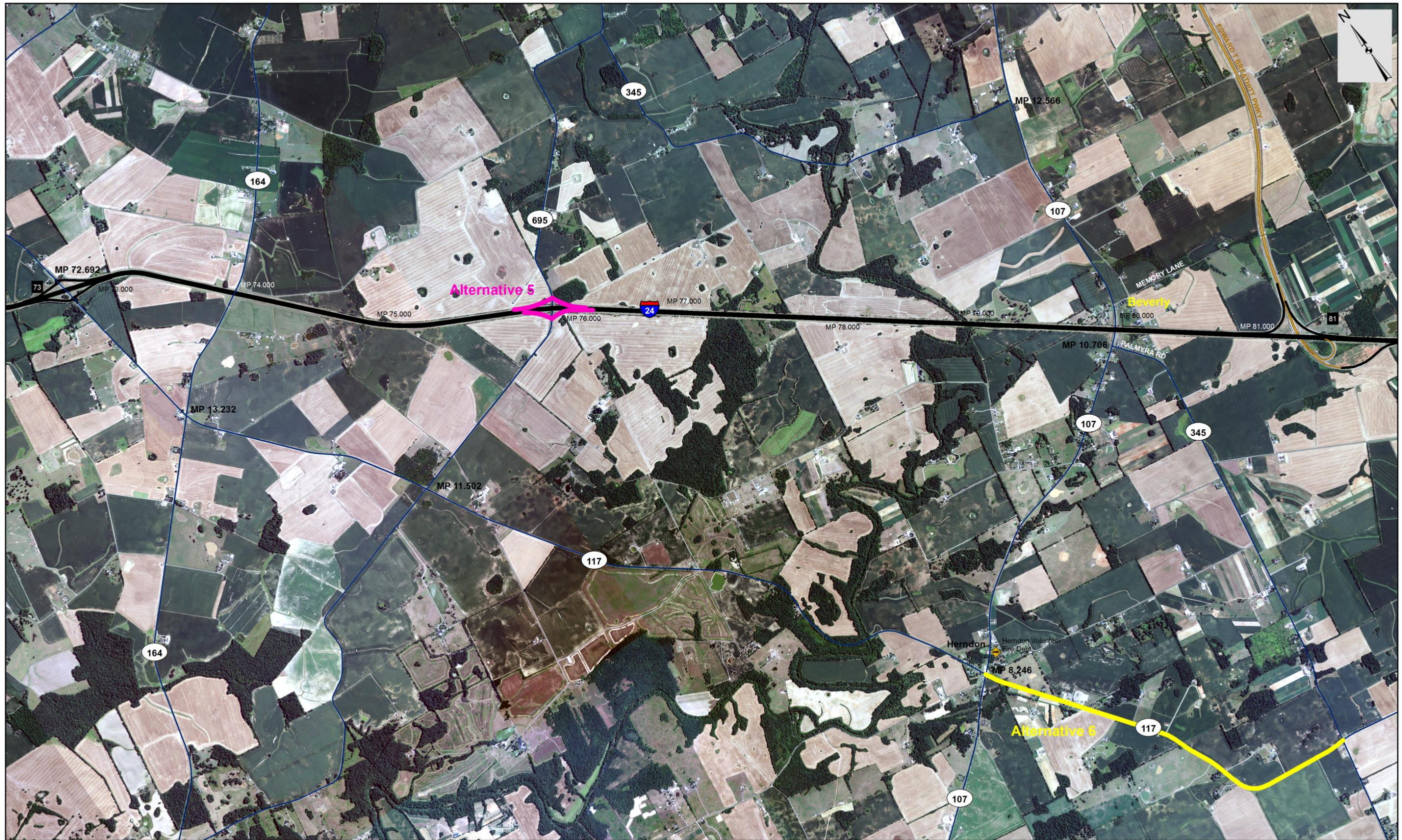


Figure 9: Preliminary Build Alternatives 3 and 4



— Alternative 5  
— Alternative 6

**Preliminary Build Alternatives**  
 Proposed KY 107/I-24 Interchange  
 Christian County, KY  
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Figure 10: Preliminary Build Alternatives 5 and 6



was performed for Alternative 2 as that alternative was the one with critical separation distance and traffic volume issues. No capacity analysis was performed for Alternatives 3, 4, or 5 given the more favorable separation and equal (Alternative 3) or lower (Alternatives 4 and 5) traffic volumes expected to use a new I-24 interchange.

**Table 6: Estimated Interchange Traffic for Several New I-24 Interchange Locations**

Alternative	Estimated ADT 2013/2040			
	Eastbound Exit Ramp	Eastbound Entrance Ramp	Westbound Exit Ramp	Westbound Entrance Ramp
Alternative 2	200/300	1000/1300	1000/1300	200/300
Alternative 3	200/300	1000/1300	1000/1300	200/300
Alternative 4	180/270	900/1100	900/1100	180/270
Alternative 5	160/240	800/1000	800/1000	160/240

KYTC first forecasted future traffic for roadways in the project study area for the current (2013) and future design year (2040) with and without an I-24 interchange at KY 107 (see Figure 11, p. 29 and **Appendix G**). The KYTC Statewide Travel Demand Model was used for this forecast since a planned update of the KYTC Christian County model was not expected to be ready for use by the date of this study. The consultant then analyzed the traffic operations on I-24 and KY 107 to ascertain whether a proposed I-24 interchange at KY 107 would have a significant adverse impact on the safety and operation of I-24 and KY 107.

Existing daily and peak-hour traffic volumes for the study area were determined from traffic counts conducted by KYTC. Future year traffic volumes were forecasted by KYTC using growth rates for area roadways. All traffic volumes in the KYTC Traffic Forecast are significant to two digits. Comparing the traffic volumes between the No-Build and Build scenarios depicts the changes that would occur both currently and in the forecast horizon year (2040) on roadway segments in the project area, such as:

**2013**

- If an I-24 interchange at KY 107 were to open today, 2,400 vpd would use it. 83% of this usage would come from or travel to I-24 east of the interchange.
- 75% of the new traffic on I-24 east of KY 107 would originate, or be destined for, I-24 east of the EBP. The remaining 25% would originate, or be destined for, the EBP north of I-24.
- More traffic exiting from I-24 at the KY 107 interchange would be destined southbound on KY 107 rather than northbound.
- The truck percentage on I-24 would be 22% with or without a KY 107 interchange.
- 9% of the vehicles using the KY 107 interchange would be trucks.

**2040**

- Usage of the I-24 interchange at KY 107 would increase by a third, to 3,200 vpd. Traffic to and from I-24 east of KY 107 would increase by 30%, while traffic to and from I-24 west of KY 107 would increase by 50%.
- More traffic exiting from I-24 at the KY 107 interchange would still be destined southbound rather than northbound on KY 107.
- The truck percentage on I-24 would increase to 25% with or without a KY 107 interchange.
- 10% of the vehicles using the KY 107 interchange would be trucks.



Figure 11: 2013/2040 Average Daily Traffic Volumes

## 5.2 Operational Analysis

Overall interstate operational function is measured by level of service (LOS) and, in some cases, volume to capacity ratio (v/c). Level of service is defined as a qualitative measure of operational conditions and the perception of these conditions by motorists. These conditions are usually defined in terms of factors such as speed and travel time, maneuverability, delay, and safety. There are six levels of service, which are designated by the letters “A” through “F.” Level of service “A” represents the best operating conditions, while level of service “F” defines the worst.

## 5.3 Capacity Analysis Methodology

Capacity analyses were performed on I-24 mainline sections as well as for the merge and diverge location between EBP and KY 107 for existing conditions, the No-Build Alternative, and for Alternative 2 for both the AM and PM peak hours in both the current and forecast horizon years.

### 5.3.1 I-24 MAINLINE LOS ANALYSIS

Level of service was determined by density (passenger cars per mile per lane) for both I-24 mainline and the merge/diverge analyses. For both these analyses, the density (k) is found by dividing the flow rate (q) by the space mean speed ( $u_s$ ).

$$k = q / u_s$$

k = density: passenger cars per mile per lane  
 q = flow rate: passenger cars per hour  
 $u_s$  = speed: miles per hour

LOS is then determined by comparing the resultant density with criteria found in the 2010 version of the HCM. Table 7 summarizes these criteria for mainline Interstate highways.

**Table 7: Interstate Mainline LOS as a Function of Density**

LOS	Density
A	≤11
B	>11-18
C	>18-26
D	>26-35
E	>35-45
F	>45

### 5.3.2 I-24 MERGE/DIVERGE AND RAMP LOS ANALYSIS

The LOS for merge and diverge segments is found in much the same way as that for mainline interstates, except LOS F occurs when the v/c ratio exceeds 1.0 regardless of density. Otherwise, LOS for these areas is also based on density. The v/c is a measure that reflects mobility and quality of travel of a facility or a section of a facility. It compares roadway demand (vehicle volumes) with roadway supply (carrying capacity); i.e., a v/c greater than of 1.0 indicates the roadway facility is operating above its theoretical capacity. As seen in Table 8, the LOS thresholds for merge and diverge segments differ slightly from those used for mainline analysis.

**Table 8: Merge/Diverge LOS as a Function of Density**

LOS	Density
A	≤10
B	>10-20
C	>20-28
D	>28-35
E	>35
F	v/c > 1.0

### 5.3.3 KY 107

The LOS for a two-lane Class II road is based on the average travel speed and the percent time spent following another vehicle (until the roadway’s v/c ratio exceeds 1.0; then the LOS is F regardless of the

**Table 9: Two-Lane Class II Road LOS**

LOS	Average Travel Speed	Percentage of Time Spent Following
A	>55	≤40
B	>50-55	>40-55
C	>45-50	>55-70
D	>40-45	>70-85
E	≤40	>85
F	v/c>1.0	v/c>1.0

travel speed or percent time spent following). Table 9 shows the LOS criteria associated with these two measures of roadway performance. The LOS is the lesser value that results from these two independent roadway variables. For capacity analysis purposes, a Class II highway is one that often serves relatively short trips to access higher classification routes, and is a route where motorists do not necessarily expect to travel at high speeds. HCM states that "...most collectors and local roads are considered to be Class II or Class III highways". KY 107 is functionally classified as a Rural Major Collector. Thus, KY 107 was analyzed as a Class II highway for analysis purposes since it meets both elements of the HCM definition of a Class II highway.

**5.3.4 KY 107 INTERSECTIONS WITH MEMORY LANE AND KY 345 EAST**

The LOS for each leg of an unsignalized intersection is based on the delay encountered on that leg during the time period under examination. Table 10 shows the LOS criteria associated with various ranges of seconds of delay. Delay was calculated for each leg with the maximum delay used to characterize the intersection LOS.

**Table 10: LOS Criteria Associated with Various Ranges of Seconds of Delay at Intersections**

LOS	Seconds of Delay
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Capacity analyses were performed for AM and PM peak hours for Alternative 2. Figures 12 and 13 (pp. 32-33) respectively summarize these peak-hour analyses for 2013 and 2040 for I-24, the EBP ramps with I-24, and the KY 107 intersections with Memory Lane and Palmyra Road (KY 345 East). Figures 14 and 15 (pp. 34-35) respectively summarize these peak-hour analyses for the KY 107 interchange entrance and exit ramps and for critical turning movements on KY 107 at the proposed interchange.

Figure 12 (p.32) shows that construction of a new I-24 interchange at KY 107 would result in slightly modified densities on area roadways in both the AM and PM peak periods for the current year. None of these modified densities result in a change in LOS. Figure 13 (p.33) shows that, in the Year 2040, differences in densities between the No-Build and Build scenarios are also small, though the LOS at one location, i.e. westbound I-24 between the entrance ramp from EBP and the exit ramp to KY 107, would decline from "A" to "B" in the PM peak period. This location is important because it is one of the key points where the impact of a KY 107 interchange is measured. A LOS of B is acceptable for a rural Interstate according to Table 2-5 in the 2011 AASHTO *Green Book* (p. 2-67).

Figure 14 (p.34) focuses on the current year density, average travel speed, percent time spent following, delay, and the resulting LOS on KY 107, the KY 107 intersections with Memory Lane and with KY 345 East (Palmyra Road), and the KY 107 intersections with the I-24 entrance and exit ramps in the AM and PM peak periods. The LOS on KY 107 immediately north and south of I-24 shows no degradation between the No-Build and Build scenarios. Figure 15 (p.35) shows this same information for the Year 2040. The intersections of the eastbound and westbound I-24 exit ramps

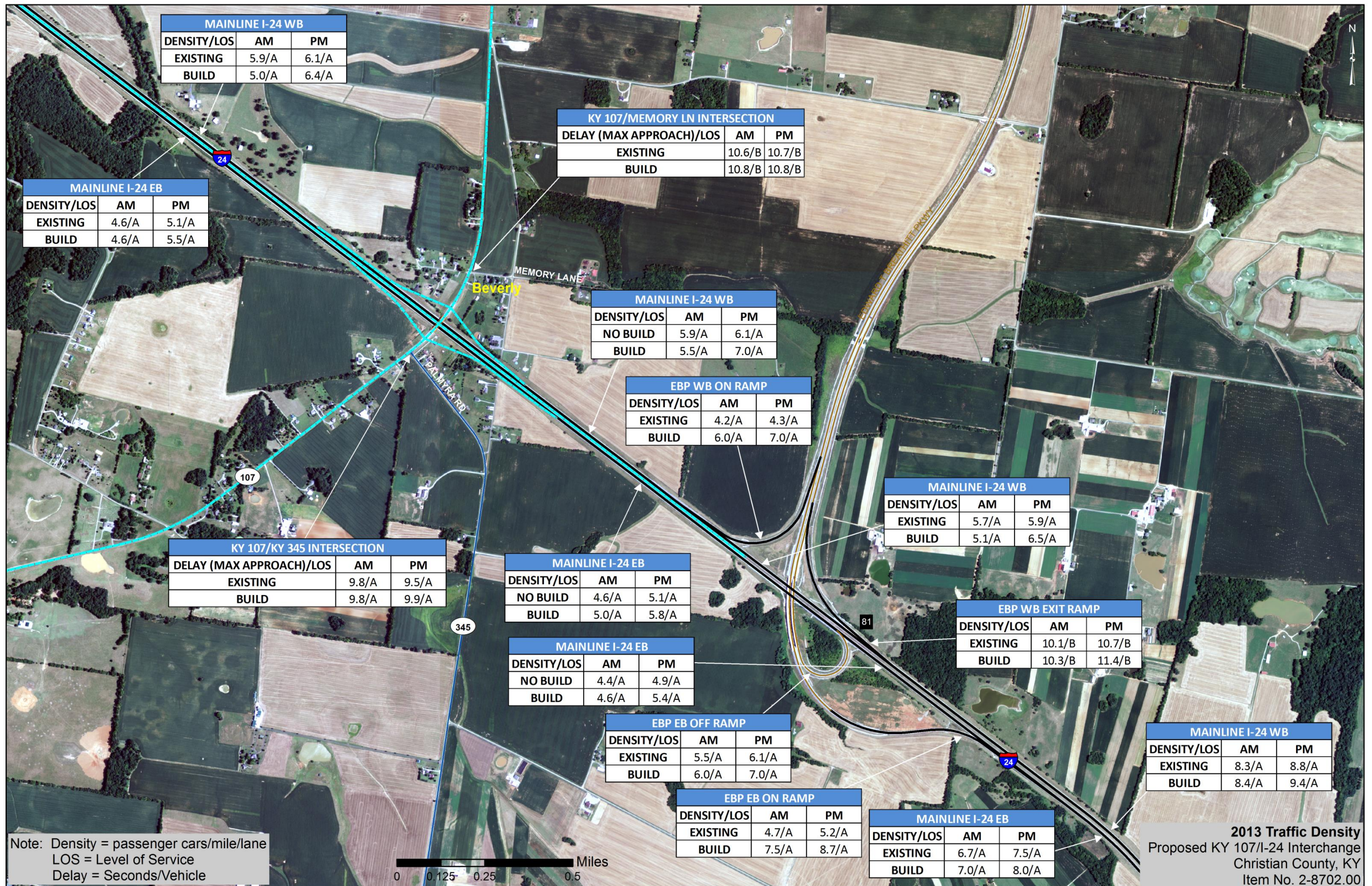


Figure 12: 2013 Traffic Densities



Figure 13: 2040 Traffic Densities

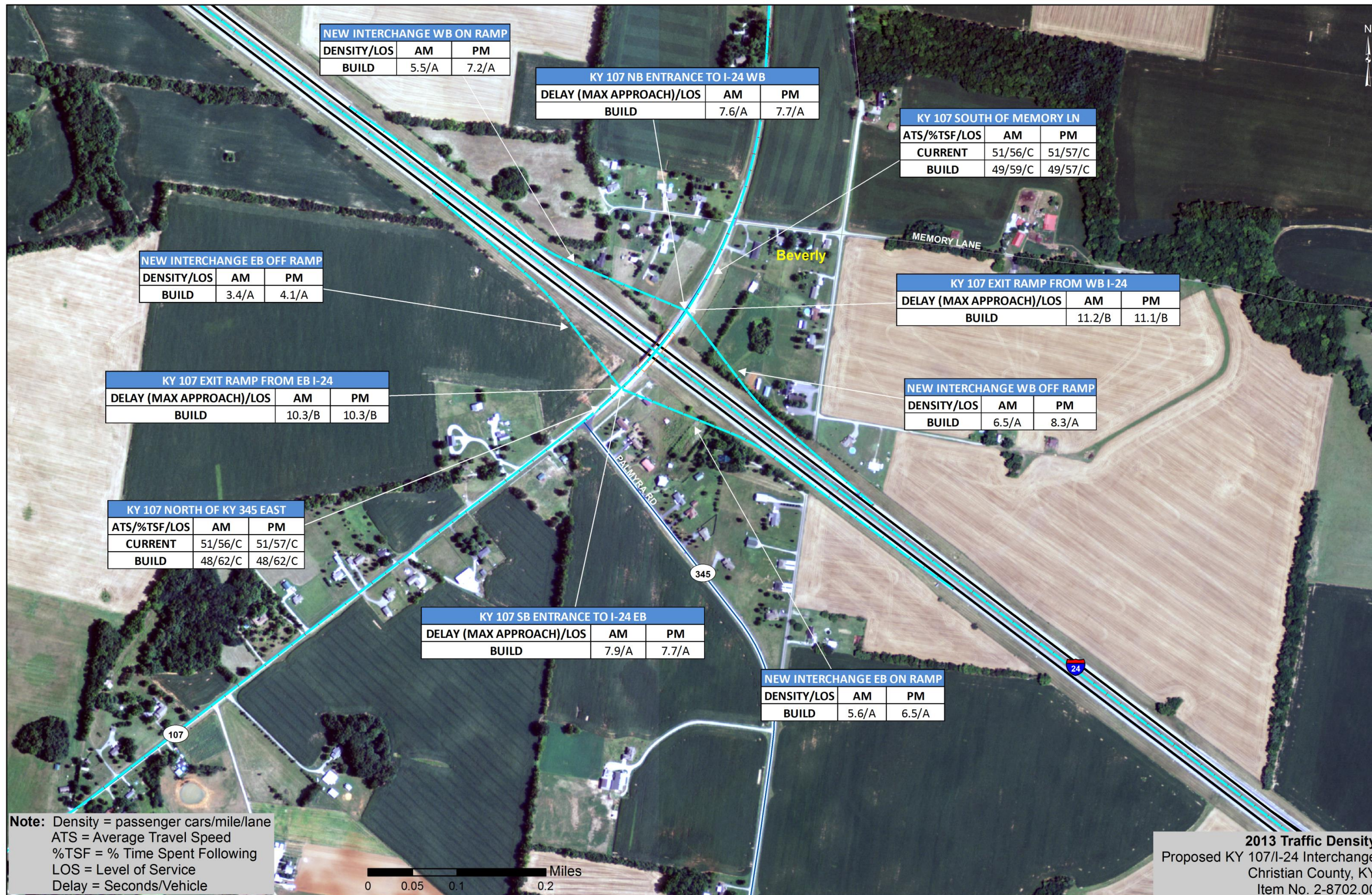


Figure 14: 2013 Traffic Densities

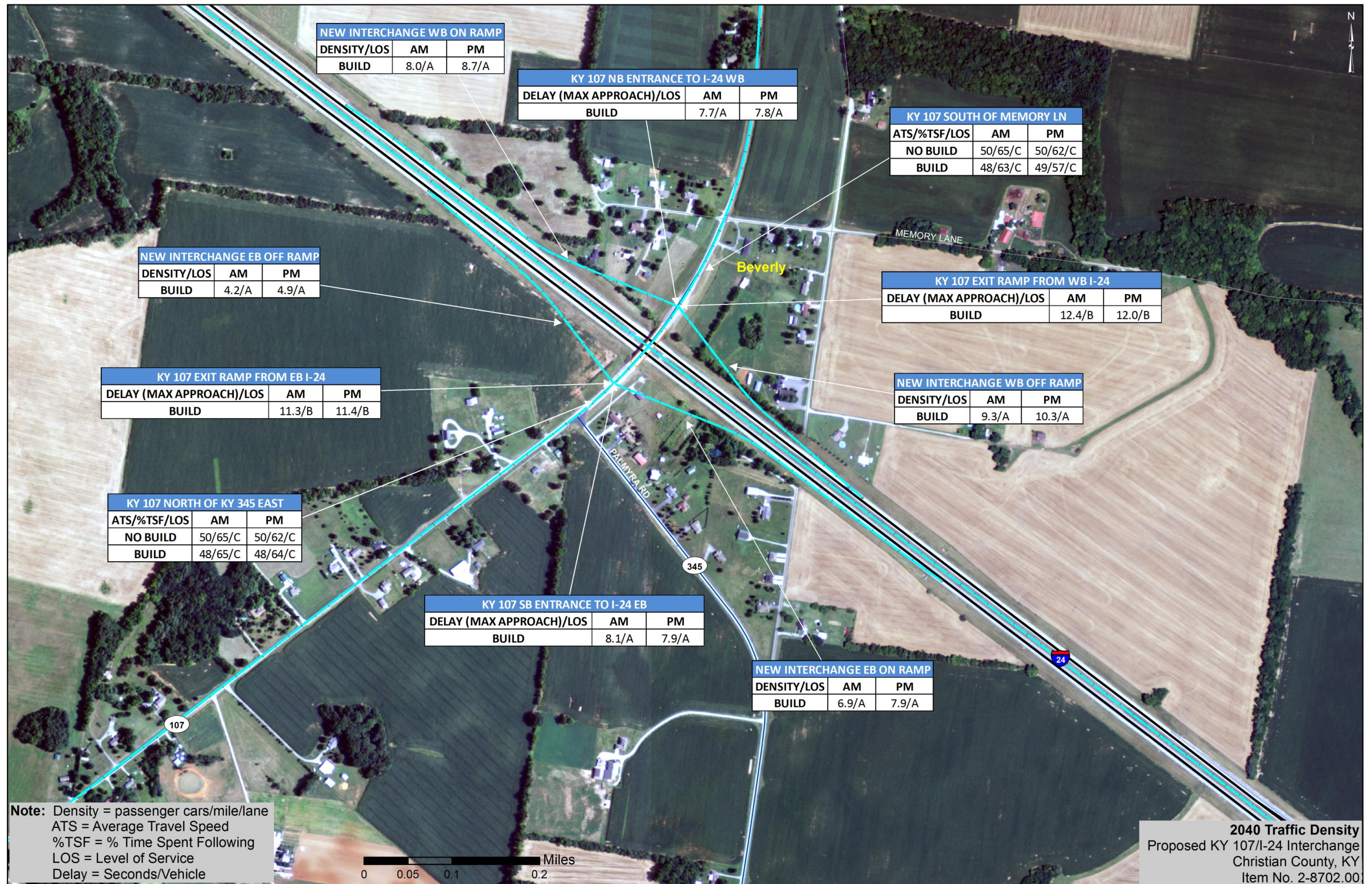


Figure 15: 2040 Traffic Densities



with KY 107 are projected to operate at LOS B in both the AM and PM peak periods. KY 107 immediately north and south of I-24 would operate at LOS C in both the AM and PM peak periods in the Year 2040 under the Build scenario. However, this is not a reduction in LOS from the Year 2040 LOS under the No-Build scenario.

#### **5.4 Current and Future Traffic Capacity Analyses**

These analyses showed that, with an interchange at KY 107, mainline I-24 westbound between the westbound on-ramp from the EBP and the westbound off-ramp to KY 107 would operate at LOS A with a density of 7.8 passenger cars per mile per lane (pc/mi/ln) in the AM peak hour and at a LOS B with a density of 10.3 pc/mi/ln in the PM peak hour with only a 1 mph reduction in average travel speed in the year 2040. These scenarios assumed that I-24 would remain as a 4-lane facility.

#### **5.5 Preliminary Signing Plan**

One of the issues posed by interchanges close together is the challenge to adequately provide signage for them along the interstate facility. Requirement #3 in the FHWA *Guide* states: "...each [IJS] request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative." As part of the AIJS, a preliminary signing plan has been developed for Alternative 2, and could be signed according to current standards, as illustrated in Figure 16 (p. 37). The designation of an I-24 interchange at KY 107 as "Exit 80" in Figure 16 is for illustrative purposes only. No signing plans were developed for Alternatives 3, 4, and 5.

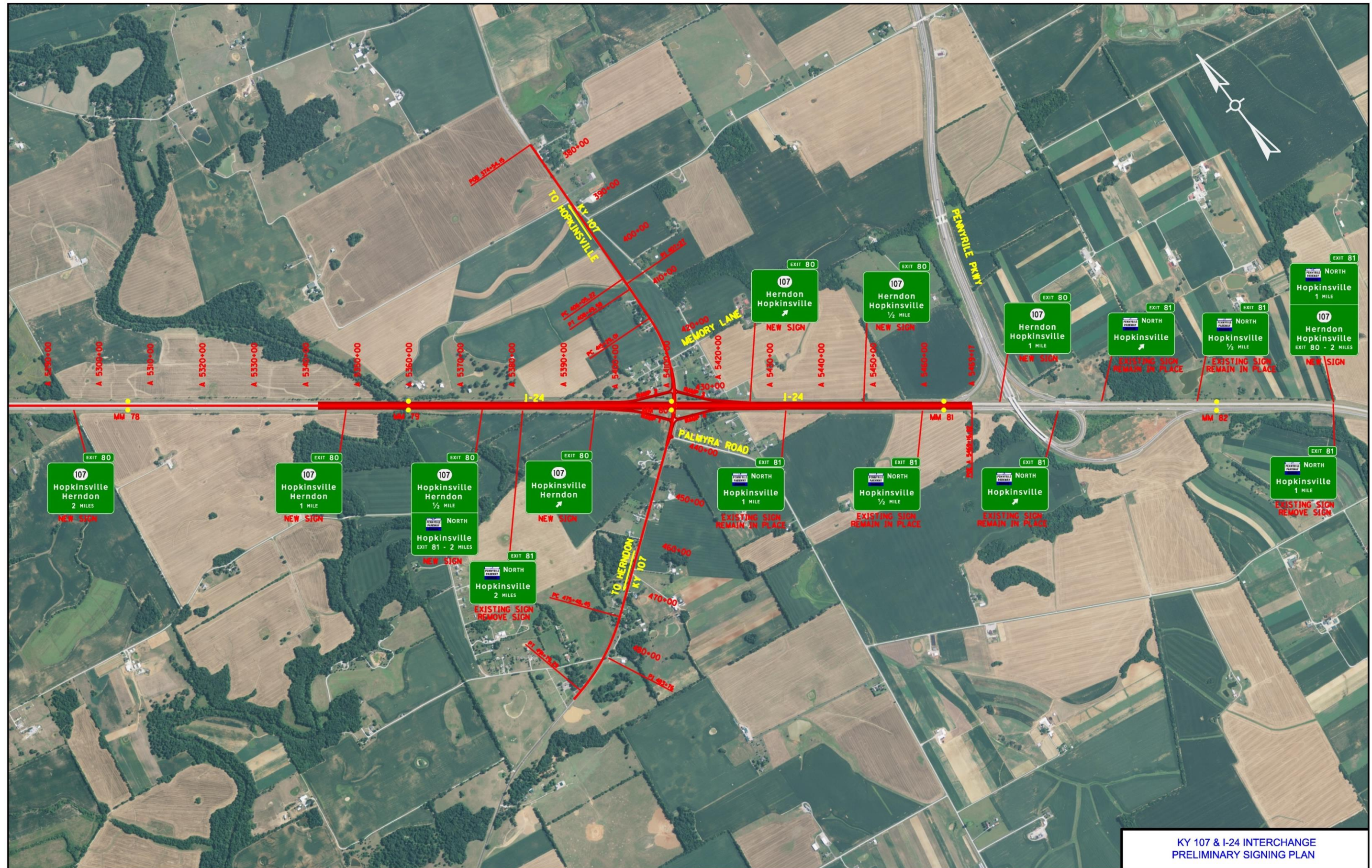
### **6.0 PROJECT NEED**

The project purpose was discussed earlier in Chapter 2.0 (p. 6). Discussion of project need was deferred until after forecasted traffic volumes were presented in Chapter 5 (p 23). Several alternatives were developed and discussed in Chapter 4, beginning on page 20. That discussion included cost estimates and projected time and distance savings from Herndon to the I-24/EBP interchange. The alternatives developed, including the No-Build Alternative, can be gauged by the relative cost effectiveness of achieving the project purposes discussed in Chapter 2 and the degree to which those purposes are achieved in terms of travel time and travel distance reductions. Table 11 (p. 38) displays these metrics for all of the alternatives

As shown in Table 11, one of the No Transportation Build options (Build a new fire station on EBP at US 68B) results in the lowest cost per mile shortened and cost per minute saved among the alternatives. Another No Transportation Build option (Build a new fire station on EBP at Lovers Lane) results in even greater time and distance savings for the same money. It is to be noted, however, that the transportation funding that would be used for each of the other transportation alternatives is not available to support the No Transportation Build option. Local funding from other sources would be used. However, based on the information shown in Table 11, the No Transportation Build option demonstrates comparative, even superior, value and cannot be dismissed from consideration.

### **7.0 FHWA IJS EIGHT POLICY REQUIREMENTS**

The FHWA *Guide* discussed in Chapter 1.1 (p. 1) contains eight policy requirements that FHWA must take into consideration before it will allow construction of a new interchange. This chapter first states each policy requirement, and then discusses it in the context of the current project. The



KY 107 & I-24 INTERCHANGE  
PRELIMINARY SIGNING PLAN

Figure 16: KY 107 and I-24 Interchange Preliminary Signing Plans

**Table 11: Comparison of Alternatives: Cost per Mile Shortened and Cost per Minute Saved**

Alternatives	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 73	Travel Time/Distance from Herndon to I-24 @ EBP via Exit 86	Travel Time/Distance from Herndon to I-24 @ EBP via New Interchange	Travel Time/Distance from Fire Station at US68B/EBP to I-24 @ EBP	Cost Estimate, Transportation Solution	Cost Estimate, Non-Transportation Solution	Cost per Mile Shortened	Cost per Minute Time Savings
<b>Existing/No Transportation Build</b>	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	N/A	6 min/5.8 miles	N/A	\$2,000,000	\$345,000	\$333,000
<b>Alternative 1 – Improve KY 117 from Herndon to I-24 @ Exit 73</b>	17.0 min/ 15.6 miles	13.6 min/ 12.3 miles	N/A	N/A	\$16,750,000	N/A	No reduction in distance	\$9,850,000
<b>Alternative 2 – Construct new I-24 Interchange at KY 107. Improve KY 107 from KY 117 to US 68B</b>	18.7 min/ 15.6 miles	13.6 min/ 12.3 miles	3.9 min/ 3.8 miles	N/A	\$20,300,000	N/A	\$2,388,000	\$2,100,000
<b>Alternative 3 – Construct new I-24 interchange near MP 79.2. Construct 2.1 miles of connector roads north and south back over to KY 107. Improve balance of KY 107 from KY 117 to US 68B.</b>	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	5.5 min/ 5.3 miles	N/A	\$30,700,000	N/A	\$4,385,000	\$3,790,000
<b>Alternative 4 – Construct new I-24 interchange near MP 78.2. Construct connector roads north and south of interchange</b>	18.7 min / 15.6 miles	13.6 min/ 12.3 miles	7.2 min / 7.0 miles	N/A	\$34,600,000	N/A	\$6,530,000	\$5,410,000
<b>Alternative 5 – Construct new I-24 Interchange at KY 695. Improve KY 695 from KY 117 to US 68B</b>	18.7 min / 15.6 miles	13.6 min / 12.3 miles	11 min/ 10.8 miles	N/A	\$18,500,000	N/A	\$12,333,000	\$7,115,000
<b>Alternative 6 – Improve KY 117 from Herndon to KY 345</b>	18.7 min / 15.6 miles	13.1 min/ 12.3 miles	N/A	N/A	\$6,350,000	N/A	No reduction in distance	\$12,700,000

scope of work for this study (**Appendix H**) included addressing only the first four policy points. However, policy points five through eight are also discussed in a general fashion.

### **Policy Requirement No. 1: Existing Facilities Capability**

*The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*

Chapter 4 (p.20) developed several transportation alternatives which addressed the project purpose as discussed in Chapter 2 (p.6). The need for this project was discussed in Chapter 6 (p.36). Expenditures necessary to achieve the insignificant travel time savings achieved in Alternatives 1 and 6 are not warranted. Transportation Alternatives 2, 3, 4, and 5 each reduced both travel distance and travel time, with Alternative 2 doing so most efficiently among those four options. However, the No Transportation Build Alternative has been shown to achieve the desired improvements in emergency vehicle response times using non-transportation infrastructure improvements. Thus, while the existing transportation facilities linkages cannot adequately satisfy the desire for improved emergency vehicle response times from Herndon, other options not involving transportation improvements have been shown to do so in an efficient manner by relocating the point from which such emergency service vehicles would originate. As stated above, the No Transportation Build option cannot be dismissed from consideration.

### **Policy Requirement No. 2: Transportation System Management**

*The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*

The development of a restricted gate entrance to I-24 eastbound somewhere near KY 107 accessible only to emergency vehicles is not desirable. There are no other opportunities to implement Transportation System Management (TSM) alternatives. Public transit in Christian County is provided by Pennyryle Allied Community Services (PACS). However, users of a proposed interchange would have at least one trip end on I-24, and this type of service is not efficiently provided by a local transit service. Furthermore, public transit would not address the proposed project's purpose, which is to improve connectivity and reduce access time to I-24, especially for emergency responders.

### **Policy Requirement No. 3: Operational Analysis**

*An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections.*

*The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2 (a), 655.603 (d) and 771.111 (f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2 (a) and 655.603 (d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and the local street network (23 CFR 625.2 (a) and 655.603 (d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109 (d) and 23 CFR 655.603 (d)).*

The critical transportation alternative to be evaluated in the context of this policy point is Alternative 2. If Alternative 2 can be shown to have no or insignificant adverse impact on the operation of I-24, then it can be concluded without detailed analysis that Alternatives 3, 4, and 5 would likewise have no or insignificant adverse impact.

The crossroad to crossroad spacing from the center of the I-24 interchange with KY 117 (Exit 73) to the center of its interchange with the EBP (Exit 81) is 8.6 miles. The proposed new interchange discussed in Alternative 2 would be centered approximately 1.3 miles west of Exit 81. The AASHTO *Policy on Interstate System Design Standards* calls for a desired separation of three miles between rural interchanges and one mile between urban interchanges. The proposed KY 107 interchange discussed in Alternative 2 does not satisfy this desired separation. The critical distance for operational analysis of Alternative 2 is the distance between the terminus of the entrance ramp to westbound I-24 from southbound EBP and the beginning of the exit ramp from I-24 westbound to the proposed interchange at KY 107. This distance is approximately 4,400 feet between ramp noses (see Figure 17, p. 41). The minimum required spacing is 2,000 feet.

According to the 2011 AASHTO *Green Book*, where the distance in which weaving occurs is relatively short in relation to the volume of weaving traffic, operations within the weaving section may become congested. "It is generally accepted that a reduction in operating speed of about 5 mph below that for which the highway as a whole operates can be considered a tolerable degree of congestion for weaving sections." AASHTO guidelines call for an LOS of at least "B" to be maintained in the weaving area.

As discussed in Chapter 5.3.2 (p. 30), a weave analysis using HCM 2010 with projected 2040 traffic volumes in the weave area on I-24 indicates LOS A in the AM peak hour and LOS B in the PM peak hour with only a 1 mph reduction in average travel speed. It also meets the minimum ramp terminal spacing criteria shown in Figure 10-68 in the 2011 AASHTO *Green Book*. Thus, an operational and safety analysis has concluded that a proposed I-24 interchange at KY 107 as described in Alternative 2 would not have a significant adverse impact on the safety and operation of the Interstate facility. It is also concluded, therefore, that Alternatives 3, 4, and 5 would likewise not have a significant adverse impact on I-24.

Proposed Interchange Spacing  
Proposed KY 107/I-24 Interchange  
Christian County, KY  
Item No. 2-8702.00

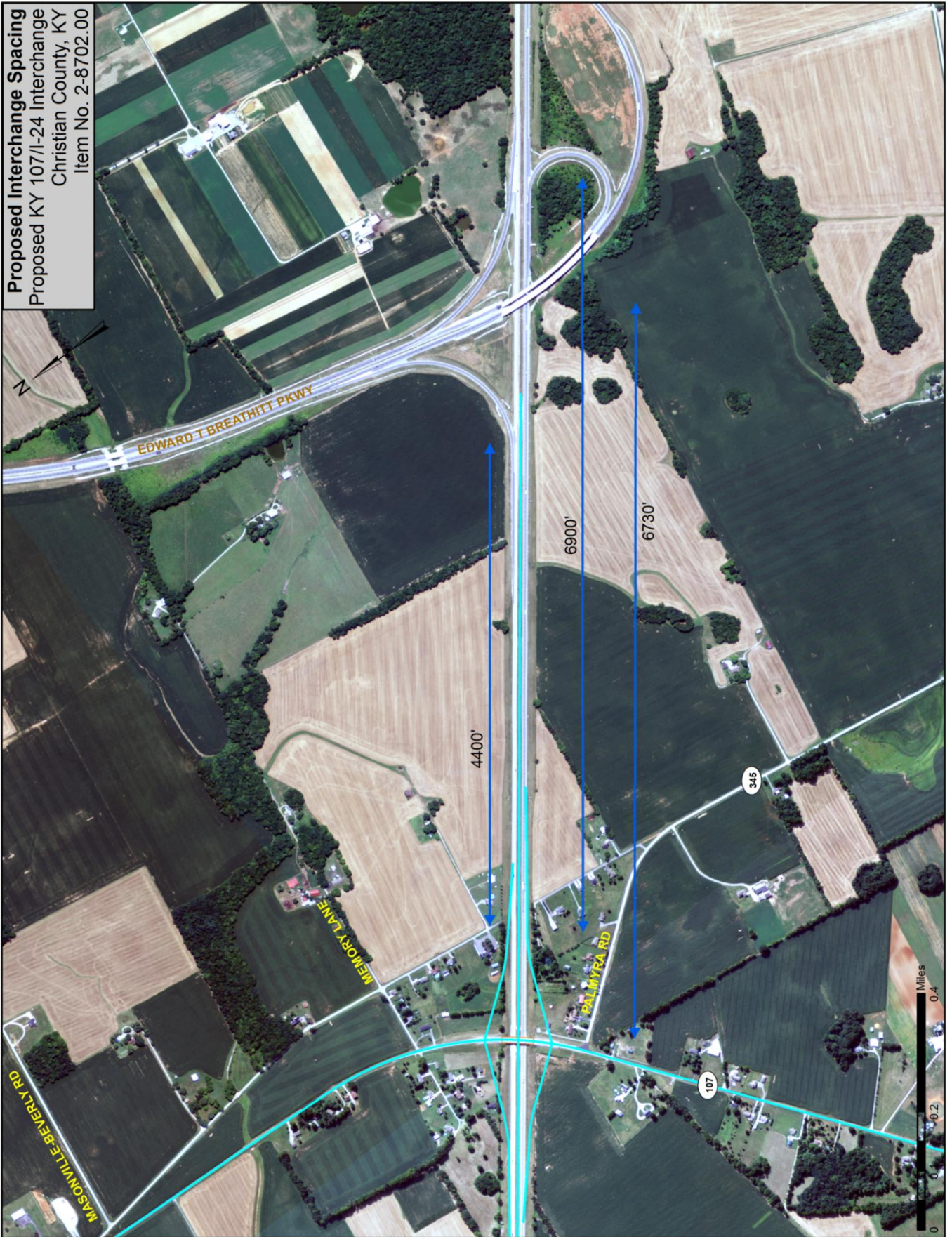


Figure 17: Spacing Between Proposed Ramps

#### **Policy Requirement No. 4: Access Connections and Design**

*The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.4 (a) (2), and 655.603 (d)).*

The proposed interchanges discussed in Alternatives 2, 3, 4, and 5 would each be a full interchange, would provide for all traffic movements, and would connect with state numbered routes north and south of the interchange. Each interchange, and any modifications or improvements to I-24 and/or the crossroad would be designed in accordance with current standards for Federal-Aid projects, and would meet KYTC highway design standards.

#### **Policy Requirement No. 5: Transportation and Land Use Plans**

*The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.*

Alternative 2 is included in the 2014 KYTC Highway Plan but not in the *Land Use Plan* or in the proposed FY 2015-2018 State Transportation Improvement Program (STIP). Alternative 5 is included in the *Land Use Plan* but not in the *Highway Plan* or the proposed STIP. As mentioned in Chapter 4.7 (p.23), Alternative 5 is not included in the KYTC Unscheduled Project List nor has a Project Information Form (PIF) been developed for it. Alternatives 1, 3, 4, and 6 are not included in either the *Land Use Plan*, the *Highway Plan*, or the proposed STIP.

#### **Policy Requirement No. 6: Comprehensive Interstate Network Study**

*In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109 (d), 23 CFR 625.2 (a), 655.603 (d), and 771.111).*

Multiple additional interchanges on I-24 between Exit 73 (KY 117) and Exit 81 (I-24) are not under active consideration. However, the *Land Use Plan* includes a new I-24 interchange at KY 695 as described in Alternative 5. KY 695 crosses I-24 approximately 3.8 miles west of KY 107. Thus, in the event that a new interchange were to be constructed at KY 695 as discussed in Alternative 5, it would meet the three-mile spacing guidelines. However, neither Alternative 2 nor 3 meets spacing guidelines with respect to the EBP interchange. Alternative 4 meets spacing guidelines with respect to the EBP interchange, but not with respect to Alternative 5. Given that Exits 73 and 81

are only 8.55 miles apart, there are no locations between them where two new interchanges could be constructed and strictly comply with spacing guidelines.

#### **Policy Requirement No. 7: Coordination with Transportation System Improvements**

*When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2 (a) and 655.603 (d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2 (a) and 655.603 (d)).*

The new interchanges being considered in Alternatives 2, 3, 4, or 5 are not due to one specific development with which coordination could occur or be warranted. Furthermore, one of the principal purposes of any of these interchanges is to reduce emergency response time to I-24. This proposal has been and would continue to be coordinated with local officials prior to and after FHWA approval and during future project development phases included in the KYTC Highway Plan and STIP.

#### **Policy Requirement No. 8: Status of Planning and NEPA**

*The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

This AIJS is being conducted only to address the operational and engineering acceptability of a proposed new interchange with I-24. The required environmental analysis and documentation would occur during later project development phases. In accordance with the project's scope of work (**Appendix H**), an abbreviated Environmental Overview has been conducted to identify potential critical environmental issues within the study area and is summarized in Chapter 3.3 (p. 11). The overview involved literature searches and field visits. The limited effort did not identify any critical environmental fatal flaws, or public controversy, that could not be mitigated through standard practices.

## **8.0 CONCLUSIONS**

One of the primary goals of this AJIS was to address FHWA policy requirement 3 (pp. 39-40). Based on the analysis conducted for this study, it is concluded that none of the possible new I-24 interchanges as described in Alternatives 2, 3, 4, or 5 would be expected to have an adverse effect on the engineering and operational acceptability of I-24 in the project area. However, neither Alternative 2 nor 3 meet the desirable three-mile separation from the EBP interchange. Alternatives 4 and 5 do meet this desired separation, but would provide less system connectivity with the communities on KY 107 and would result in less reduction in travel distance and time for emergency response vehicles stationed at Herndon. Policy requirement 3 is satisfied due to the expected low usage of any of the alternative new interchanges.

Alternatives 1 and 6 provide little improvement in travel time, and no reduction in travel distance, for emergency response vehicles stationed at Herndon. The No Transportation Build alternative would



include no improvements to transportation system connectivity, and hence its cost-effectiveness in reducing emergency vehicle response time is not a function of the low forecasted usage of any of the transportation system improvement alternatives. Local decision-making regarding non-transportation infrastructure investments would be necessary to achieve the desired benefits from that alternative.

The second step in this process would be compliance with NEPA and related environmental requirements. As referenced earlier, that second step is a necessary prerequisite for KYTC to seek final FHWA approval but was excluded by KYTC from the scope of the current study. The next step in the development process for this project would be to satisfy those requirements. While the specific level of this subsequent analysis cannot be articulated at this time, and an Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) could possibly be conducted, KYTC has indicated that a Categorical Exclusion will likely satisfy all requirements for the environmental issues posed by the A-IJS.

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## Abbreviated Interchange Justification Study *for I-24 at KY 107*

