KY 1286 & KY 998 PLANNING STUDY

KYTC Item No. 1-153.00

McCracken County, Kentucky

April 2014

Final Report

KY 1286 & KY 998 Planning Study

McCracken County, Kentucky

KY 1286 (Friendship Road) & KY 998 (Olivet Church Road)
Between US 45 and US 60

KYTC Item No. 1-153.00

Final Report

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Submitted to:
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KY 1286 & KY 998 Planning Study
Executive Summary

US 45 to US 62 in Paducah, McCracken County, Kentucky
KYTC Item No. 1-153.00

The Kentucky Transportation Cabinet (KYTC), in partnership with CDM Smith, undertook a planning study for two state highways: KY 1286 (Friendship Road) from US 45 (Lone Oak Road, MP 3.639) to KY 998 (Olivet Church Road, MP 6.916) and KY 998 from KY 1286 (MP 1.718) to US 60 (Hinkleville Road, MP 2.314) in Paducah, Kentucky.

Existing Conditions

KY 1286 is classified as an Urban Minor Arterial with posted speed limits of 35 to 45 mph in the study area. It is a two lane facility with 9 to 11 foot lanes and 2 to 8 foot shoulders. KY 998 has the same functional classification and a posted speed limit of 45 mph in the study area. It is a two lane facility with 9 to 12 foot lanes and 2 to 10 foot shoulders. The routes provide access to residential neighborhoods, several schools, churches, and cemeteries.

Existing traffic volumes range from 4,600 to 10,400 vehicles per day, with the heavier volumes in the southeast portion approaching the intersection with US 45. Peak direction volume-to-capacity ranges from 0.92 to 0.21 for the 30th highest design hour, largely controlled by signalized intersections.

The segment of the corridor nearest US 45 also has the highest crash frequencies; in four years from October 31, 2008 to October 31, 2012, 121 total reported crashes occurred along KY 1286 between US 45 and US 62. This equates to a Critical Rate Factor of 1.80, indicating crashes are happening more often than can be attributed to random occurrence. Several 0.10-mile long spots along the route also exhibit above average crash rates.

A review of existing plans identified deficient horizontal curves, a deficient vertical curve that limits headlight sight distance, and several sections where the cross-section does not meet current standards.

Purpose & Need

The purpose of the proposed KY 1286/KY 998 project is to improve safety and traffic operations along this route between US 45 and US 60. The need is expressed through above average crash rates, substandard geometric features, and congested traffic operations.

Other project goals include minimizing impacts to the environment, accommodating bicyclists and pedestrians, and ensuring any improvement can handle traffic from other planned improvements.

Alternates Considered

To improve safety and traffic operations, the project team considered a selection of potential alternates:

- No Build Alternate.
- Short-term Spot Improvement options.
- The Improve Two-Lane Alternate, which would reconstruct the route with wider lanes and shoulders.
- The Three-Lane Widening Alternate, which would reconstruct the route with wider lanes, shoulders, and a two way left turn lane (TWLTL).

Throughout the study, the project team met with local officials, stakeholders, and the public to discuss alternates and understand local perspectives on improvement concepts.

Generally, feedback received indicated strong public support for the proposed project:

- 21 of 21 surveys indicated the route should be improved.
- 14 of 21 surveys preferred the Three-Lane Widening Alternate to the Improve Two-Lane Alternate.
- Segment 1 (US 45 to US 62) was seen as the highest priority need.

Recommendations

In light of technical analyses and local input, the project team recommends seven priority improvements advance for future project development phases. The following summary outlines the list of projects and their priority with **#1 being the top priority and #7 being the lowest priority.**

1. Segment 1: Both Alternate 1F and Alternate 1G should be considered with a 35 to 45 mph design speed. Given the number of cross streets and business and residential driveways along the segment, an urban three lane typical section is recommended. Bicycle and pedestrian facilities are recommended and should be studied further in the next phase of the project. Connection to Lone Oak Elementary School should be emphasized. To address poor LOS at the US 45 intersection, additional capacity at this intersection should be considered as part of the overall segment improvement.

2. Combine Spot Improvement B and Spot Improvement C into one project; fix the deficient horizontal curve between Deerhaven Lane and New Holt Road and add left turn lanes at the KY 1286/New Holt Road intersection.

3. Spot Improvement F: Add turn lanes on KY 1286 for Lone Oak Elementary School. This improvement was recommended in the *2002 Paducah-McCracken County Transportation Study*. If Segment 1 is widened to three lanes, this project should be implemented as part of the larger widening project. Otherwise, it should be implemented as a standalone improvement.

4. Segment 2: Alternate 2B with a 45 mph design speed and improved curves near Buckner Lane, including a potential new alignment which removes the reverse curves. A rural two lane typical section is recommended based on the preliminary traffic analysis but a three lane typical section should also be considered, particularly given the driveway density and number of side streets along the segment. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. A spot improvement to add turn lanes at the New Holt Road intersection is included as an independent, higher priority proposed project. If Spot Improvement C has not been completed, it should be implemented as part of this larger widening project.

5. Segment 3: Alternate 3C with a 45 mph design speed and an improved curve near New Holt Road. A rural two lane typical section is recommended based on the preliminary traffic analysis but a three lane typical section should also be considered. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. Spot improvements at this location are included as independent, higher priority proposed projects. If Spot Improvements A, B, and C have not been completed, it should be implemented as part of this larger widening project.

6. Segment 4: Alternate 4A with a 45 mph design speed. A rural two lane typical section is recommended based on the

preliminary traffic analysis but a three lane typical section should also be considered. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project.

7. Spot Improvement A: Although existing traffic does not justify turn lanes at this time, this should be looked at as a future improvement as traffic grows. If Segments 3 or 4 are widened, this project should be implemented as part of the larger widening projects. Otherwise, it should be implemented as a standalone improvement.

Table S-1 provides summary information about costs and recommendations for these priority improvements. **Figure S-1** shows these recommended priorities on a map of the area.

Table S-1: Planning Level Costs by Phase for Recommendations

Priority	Project	Cost by Phase	Total Cost
1	Widen KY 1286 to three lanes, US 45 to US 62 (Alternate 1F or 1G)	Alternate 1F: Design = $1.3 million ROW = $8.0 million Utilities = $3.0 million Construction = $10.8 million Alternate 1G: Design = $1.1 million ROW = $6.3 million Utilities = $2.4 million Construction = $8.6 million	$23.1 million $18.4 million
2	Intersection Improvements near New Holt Road; fix curve and add turn lanes. (Spot B and Spot C)	Design = $0.3 million ROW = $1.5 million Utilities = $0.6 million Construction = $2.1 million	$4.5 million
3	Add turn Lanes to Lone Oak School (Spot F)	Design = $0.2 million ROW = $0.8 million Utilities = $0.3 million Construction = $1.1 million	$2.4 million
4	Widen KY 1286, US 62 to New Holt Road (Alternate 2B)	Design = $1.0 million ROW = $5.7 million Utilities = $1.9 million Construction = $8.4 million	$17.0 million
5	Widen KY 1286, New Holt Road to KY 998 (Alternate 3C)	Design = $0.5 million ROW = $2.7 million Utilities = $0.9 million Construction = $3.9 million	$8.0 million
6	Widen KY 998, KY 1286 to Village Square Drive (Alternate 4A)	Design = $0.3 million ROW = $1.6 million Utilities = $0.6 million Construction = $2.4 million	$4.9 million
7	Add turn Lanes at KY 1286/KY 998 (Spot A)	Design = $0.2 million ROW = $1.2 million Utilities = $0.5 million Construction = $1.7 million	$3.6 million

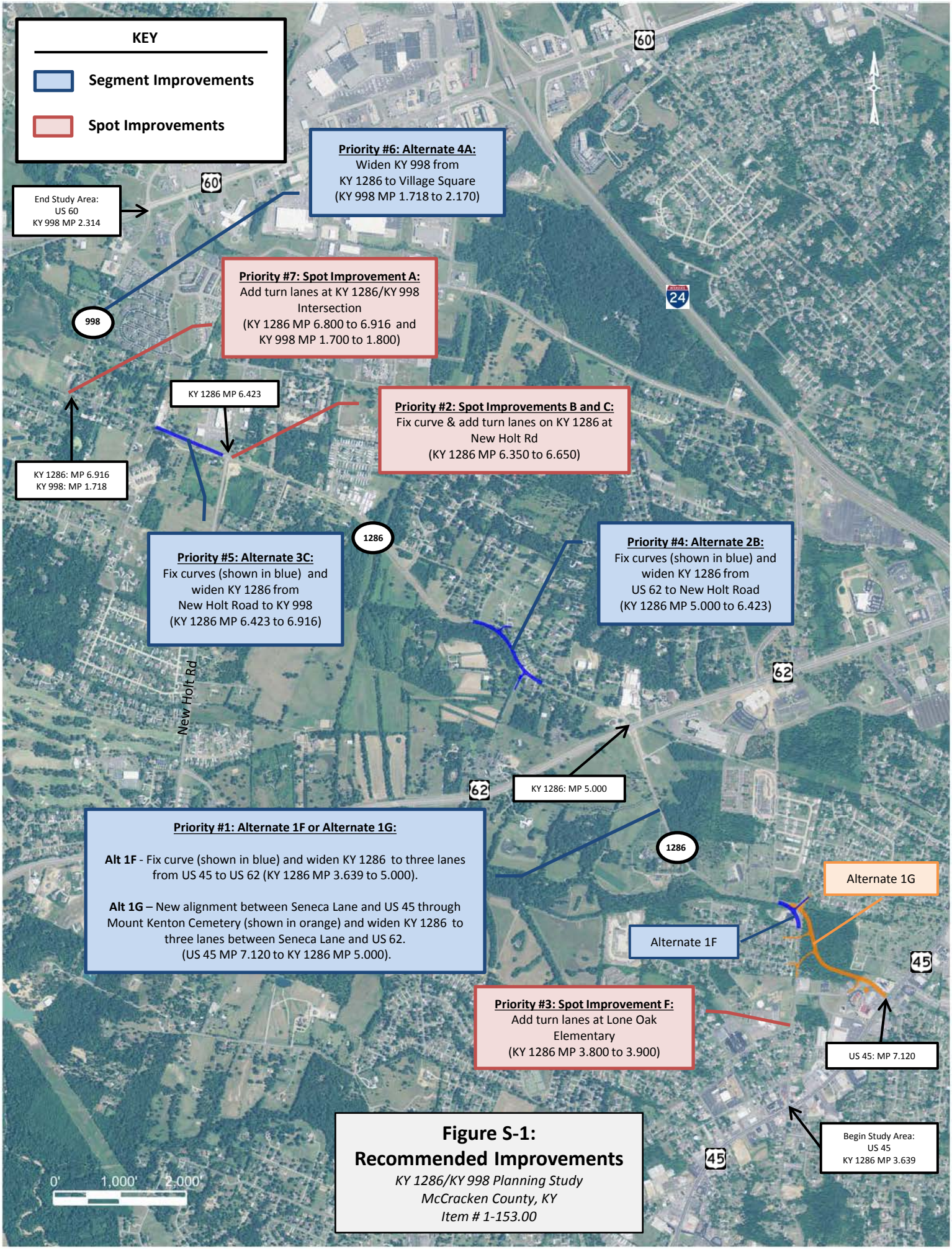

Figure S-1:
Recommended Improvements
KY 1286/KY 998 Planning Study
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Section 1
Introduction

The Kentucky Transportation Cabinet (KYTC), in partnership with CDM Smith, met in February 2013 to kick off a planning study for the KY 1286 corridor to discuss the project purpose and history, the scope of work, the preliminary data collected, relevant project issues, and public input strategies. The study examines two state highways: KY 1286 (Friendship Road) from US 45 (Lone Oak Road) to KY 998 (Olivet Church Road) and KY 998 from KY 1286 to US 60 (Hinkleville Road).

The purpose of this study is to:

- Identify known issues, concerns, and constraints, including safety, traffic, social, environmental, and geotechnical considerations;
- Develop preliminary "purpose and need" and goals for the proposed project;
- Listen to and share information with local officials, government agencies, other interested parties, and the public;
- Develop and evaluate improvement concepts for the KY 1286/KY 998 corridor into alternatives based on project purpose and need, including short-term "spot" improvements along the existing route; and
- Make project recommendations and provide phased cost estimates.

A. Background

The project has been identified in the Purchase Area Development District's transportation plan since 2001. The project is KYTC Item Number 1-153.00 as identified in the Kentucky's *FY 2012 – FY 2018 Highway Plan* dated May 2012. In the Plan, design phase "SPP" funding is identified in year 2014 for $1,000,000. At this time, no funding has been committed for any future project development phase activities.

B. Project Location

This project is located west of Paducah, in McCracken County, Kentucky. The total project length is approximately 3.9 miles. Numerous driveways and cross streets intersect with the route along this primarily residential corridor which carries 4,600 to 10,400 vehicles per day. KY 1286 & KY 998 are used as a cut through route between US 45, US 62, and US 60. The study corridor provides access to the new consolidated McCracken County High School located on US 60 just west of KY 998. Kentucky Oaks Mall and a number of other commercial establishments are also adjacent to US 60, near New Holt Road. The corridor also provides direct access to Lone Oak Elementary School and indirect access for several other schools in the area; including Lone Oak Middle School and the old Lone Oak High School.

C. Previous Studies

The need for an improved KY 1286 corridor has been identified in a number of previous planning documents. Specifically, the *2002 Paducah-McCracken County Transportation Study* assesses the existing countywide transportation system and projects future needs based on anticipated growth.

The study includes three recommended spot improvements along the corridor: adding left turn lanes at US 45, adding left turn lanes at US 62, and adding a right turn lane for Lone Oak Elementary School traffic. As a long term improvement, the study identifies upgrading KY 1286 between New Holt Road and US 62 (improving curves, widening to three lanes) as a third tier priority project, to meet future demands, with an estimated cost of $9.9 million. The study ranks priorities from one to three with the third tier being the lowest priority. The study also identifies a need to "accommodate a bikeway that would provide safer biker access from US 45 to US 60" with access to parks, although the KY 1286 corridor is not identified specifically.

The city's 2007 comprehensive plan, *Choices 2025*, formally adopts the transportation elements identified in the 2002 transportation study.

The new McCracken County Consolidated High School opened to traffic for the Fall 2013 semester. The building is located off US 60, northwest of the project area. The KY 1286 intersection with US 62 is evaluated in the 2010 traffic impact study for the school; some school traffic is likely to use the KY 1286 corridor to access the property.

Section 2
Existing Conditions

The following sections discuss the existing roadway conditions, traffic operations, and roadway safety.

A. Roadway Characteristics

KY 1286 is functionally classified as an Urban Minor Arterial with posted speed limits of 35 to 45 mph in the study area. It is a two lane facility with 9 to 11 foot lanes and 2 to 8 foot shoulders in the study area. KY 998 has the same functional classification and a posted speed limit of 45 mph in the study area. It is a two lane facility with 9 to 12 foot lanes and 2 to 10 foot shoulders along the study area.

As part of this study, analysts studied the route in the field and compared the KY 1286 as-built plans to current American Association of State Highway Transportation Officials (AASHTO) design standards to identify deficient elements. These elements are shown in **Figure 2-1**. This analysis identified five deficient horizontal curves, one deficient vertical curve that limits headlight sight distance, and several sections where the cross-section (lanes and shoulders) does not meet current standards.

B. Other Modal Users

One bus route operated by the Paducah Area Transit System (PATS) travels through the study portion of KY 1286; the Red Line crosses KY 1286 while traveling along US 45 but the closest bus stop is 0.5 miles from KY 1286. PATS runs Monday through Saturday, 8:00 AM to 5:20 PM.

KY 998 through the study area lies along the Ramblin' River Bike Tour, a state designated bike route, which travels along the northern border of Kentucky from Hickman on the Mississippi River in far southwestern Kentucky to South Shore on the Ohio River in northeastern Kentucky.

Because KY 1286 between US 45 and US 62 provides direct access to Lone Oak Elementary School and indirect access to several other schools in the area; including Lone Oak Middle School and the old Lone Oak High School, children are frequently seen walking along KY 1286 to get to school.

C. Bridges

One structure, Bridge 073B00167 over Perkins Creek, lies along KY 1286 at mile point 5.9. The single span, pre-stressed concrete girder bridge was constructed in 2007 and was rated in Very Good condition during its June 2013 inspection. The structure is neither structurally deficient nor functionally obsolete. A summary of the inspection is included as **Appendix A**.

D. Existing & Future Traffic Operations

Existing (2013) traffic volumes for KY 1286, shown in **Figure 2-2**, were collected from recent traffic counts conducted by KYTC. Along the study corridor, annual average daily traffic (AADT) volumes range from 4,600 to 10,400 vehicles per day (vpd). Intersection or "turning movement" counts were collected during peak traffic periods at key intersections during March 2013. Turning movement volumes during the AM and PM peak hours are also presented in **Figure 2-2**.

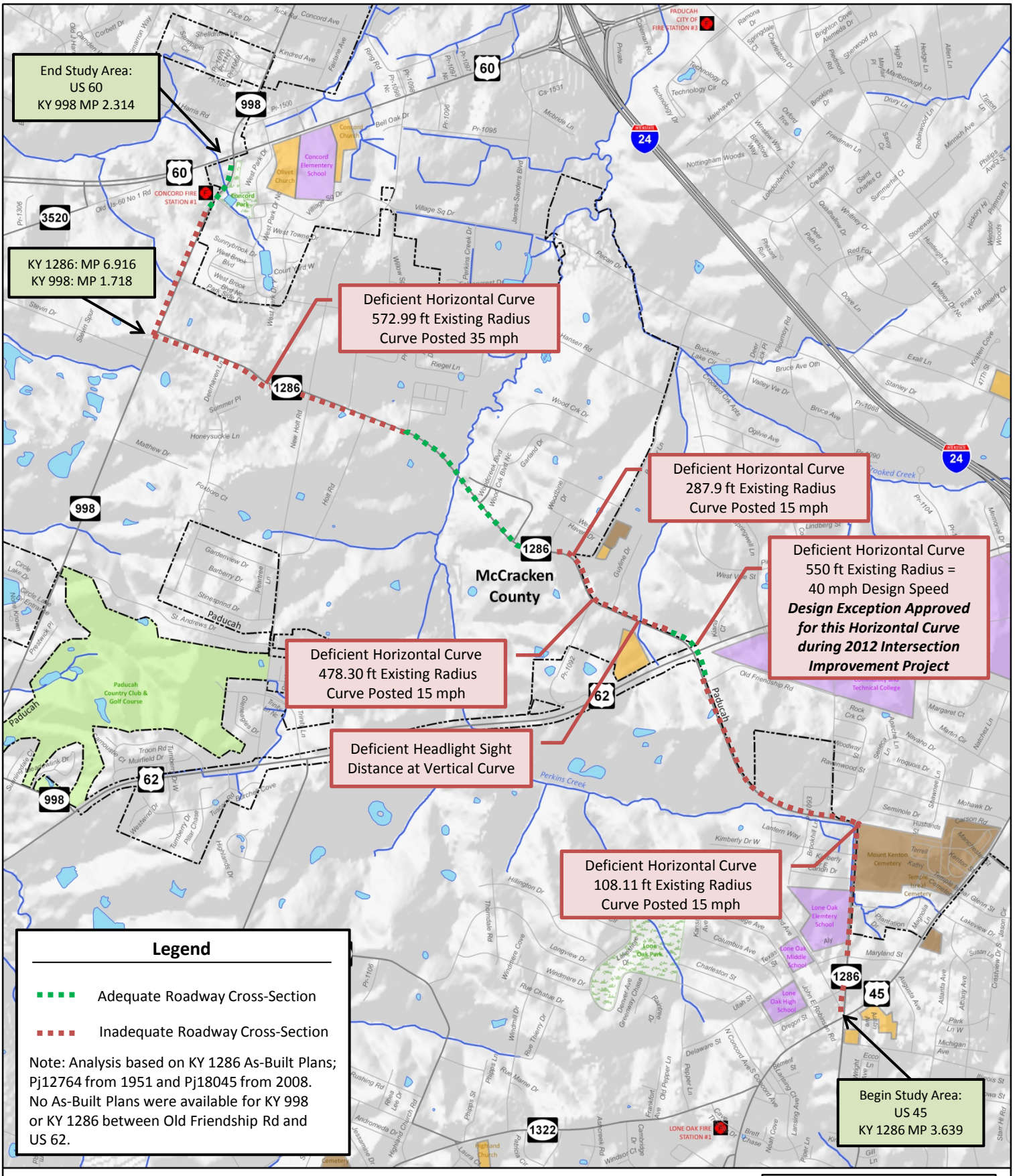

Figure 2-1: Deficient Roadway Geometrics

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CDM Smith

N

0 500 1,000 Feet

0 0.1 0.2 Miles

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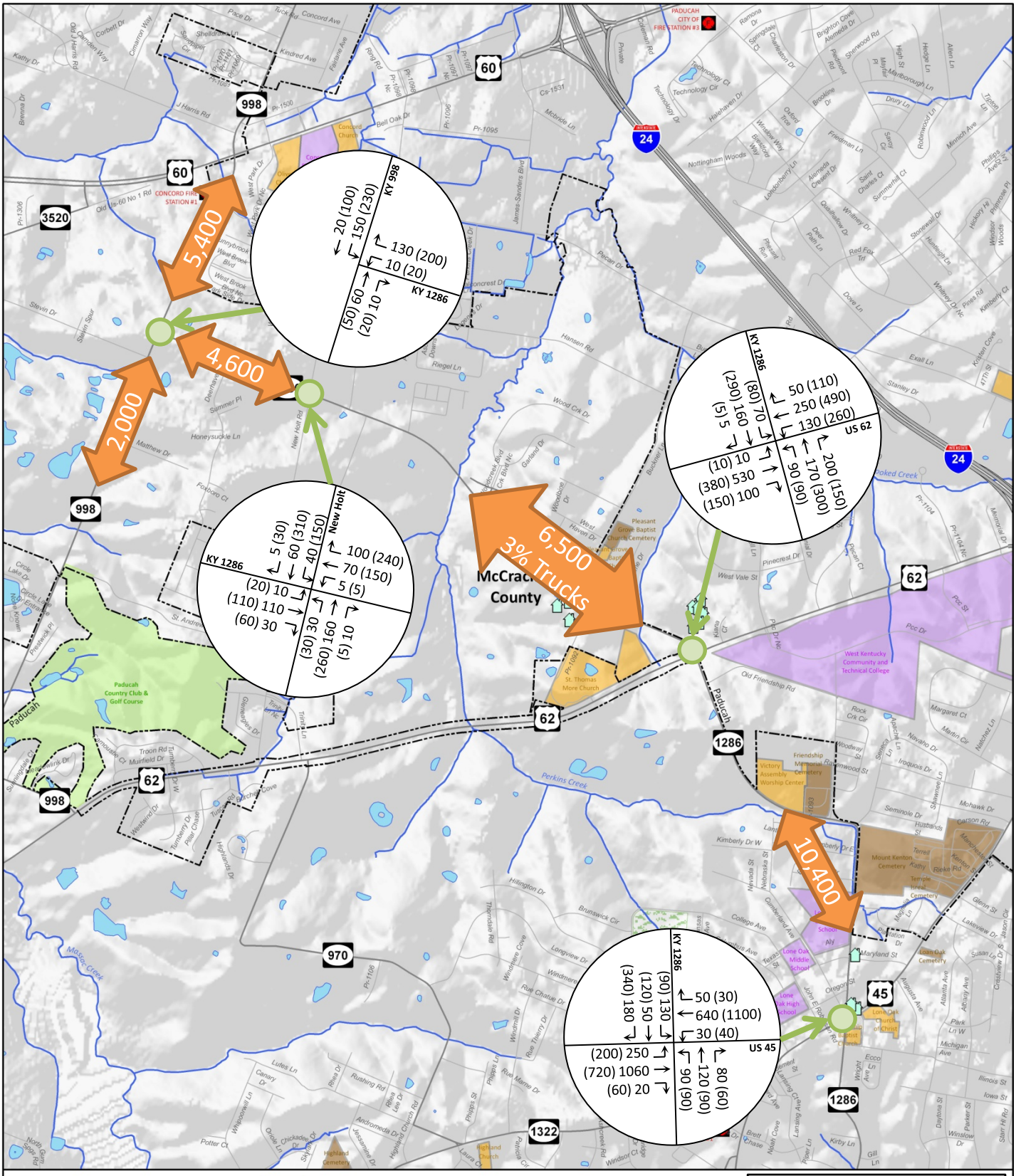

Annual Average Daily Traffic

AM (PM) Peak Hour Volume

N

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 2-2:
2013 Traffic Volumes
KY 1286/KY 998 Planning Study
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Passenger cars, motorcycles, and pickup trucks account for approximately 97% of the year 2013 daily traffic volume using the corridor. Buses and commercial trucks make up the remaining 3% of the daily traffic volume. Classification and volume data were derived based on counts conducted by KYTC during October 2012 and March 2013.

Operational Analysis

Level of Service (LOS) is a qualitative measure of highway traffic conditions, as identified in the 2010 *Highway Capacity Manual* (HCM). Individual levels of service characterize conditions in terms of speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined and given letter designations from A to F, with LOS A representing free flow conditions, and LOS F representing severe congestion and/or time delays. Typically, a minimum LOS D is considered acceptable in urban areas and LOS C is considered acceptable in rural areas.

LOS was calculated for each of the four study intersections along the corridor, based on the existing lane configuration, traffic controls, and peak hour volumes. **Table 2-1** presents LOS for each intersection as well as the individual approaches to each. Overall, all intersections operate at acceptable service levels.

Table 2-1: 2013 LOS during AM (PM) Peak Hour at Key Intersections

Intersection	LOS	Approach	LOS
KY 1286 at US 45	D (D)	Northbound KY 1286	F (D)
		Southbound KY 1286	C (D)
		Eastbound US 45	D (C)
		Westbound US 45	C (D)
KY 1286 at US 62	C (C)	Northbound KY 1286	C (C)
		Southbound KY 1286	C (C)
		Eastbound US 62	C (C)
		Westbound US 62	B (C)
KY 1286 at New Holt Road	A (B)	Northbound New Holt Road	A (B)
		Southbound New Holt Road	A (B)
		Eastbound KY 1286	A (B)
		Westbound KY 1286	A (B)
KY 1286 at KY 998	unsignalized	Westbound KY 1286	A (B)

2013 daily volumes were derived from existing tube counts. The tube counts were adjusted based on observed trends in turning movement counts collected by KYTC in March 2013, truck data, and seasonal adjustment factors. To transition between a daily and hourly forecast volume, analysts must apply two specific conversion factors. The K-factor describes what percentage of the weekday traffic volume is accounted for during the 30th highest hour during a typical year. The D-factor describes what percentage of the total traffic on a link is traveling in the peak direction.

- K-factors by segment varied from 7 to 8% during the AM peak and from 9 to 10% during the PM peak. For the 30th highest hour, a K-factor of 10% was selected, which is comparable with the statewide average rate for urban minor arterials (9.8%).

- Based on tube counts provided by KYTC, the D-factor is 54%, which matches the statewide average for urban minor arterials. The peak flow travels towards downtown Paducah in the morning (westbound along the study corridor) and away from downtown in the afternoon (eastbound along the study corridor).

As an alternative to LOS Methodology, 2013 design hour volumes were compared to the road's theoretical capacity. A volume-to-capacity ratio (V/C) represents the number of vehicles using the road in a specific time period (i.e. design hour volume) compared to the number of vehicles the road was designed to be able to handle during that period. The target V/C ratio is 0.9 for rural areas and 1.0 for urban areas. A V/C greater than this indicates the road is congested, i.e. operating above its design capacity. For urban areas, such as the study area, signal timing is factored into the theoretical capacity.

Table 2-2 presents the V/C for each segment along the corridor based on an ideal directional capacity of 1,900 vehicles per hour and the actual percent green time for KY 1286 movements approaching signalized intersections. V/C during the 30th highest design hour ranges from 0.21 to 0.92 for individual segments of the study corridor. The segment between US 45 and US 62 (1.36 miles), has a V/C of 0.92, indicating it is approaching capacity, but this is primarily due to the lower percent green time KY 1286 receives compared to US 45. Motorists dot not experiences this capacity constraint along the entire KY 1286 section from US 45 to US 62, only as they approach the signalized endpoints. For example, two lane analysis (which does not consider green time) indicates the segment of KY 1286 from US 45 to US 62 has a V/C of 0.39, but when the methodology which factors in green time is used, the V/C increases to 0.92.

Table 2-2: 2013 Peak Direction Volume-to-Capacity for Corridor Segments

Highway Segment	Design Hour Volume (Peak Direction)	V/C
KY 1286, US 45 to US 62	560	0.92
KY 1286, US 62 to New Holt Road	350	0.52
KY 1286, New Holt Road to KY 998	250	0.31
KY 998, KY 1286 to US 60	290	0.21

Future No-Build Volumes

To project future traffic volumes along the study corridor, analysts examined a number of available sources: historic traffic volumes along KY 1286 and KY 998, population and employment forecasts from the Kentucky State Data Center and Woods & Poole's 2012 *Complete Economic and Demographic Data Source*, and previous transportation studies in the vicinity. A variety of annual growth rates were identified, ranging from negative population growth through 3.0% annual traffic growth. To be conservative, an annual exponential growth rate of 1.5% was applied to forecast future traffic volumes. This growth rate accounts for background traffic growth (i.e. population forecasts, employment forecasts, etc.) and anticipated traffic growth associated with the operation of the new McCracken County Consolidated High School, located immediately north of the study area.

Appendix B includes the Traffic Forecast Report which provides additional detail on the traffic forecast assumptions and findings.

The growth rate, K- and D-factors were applied to the 2013 AADT volumes to forecast future no build volumes in analysis year 2040. No Build 2040 AADT and turning movement volumes during the future AM and PM peak hours are presented in **Figure 2-3**.

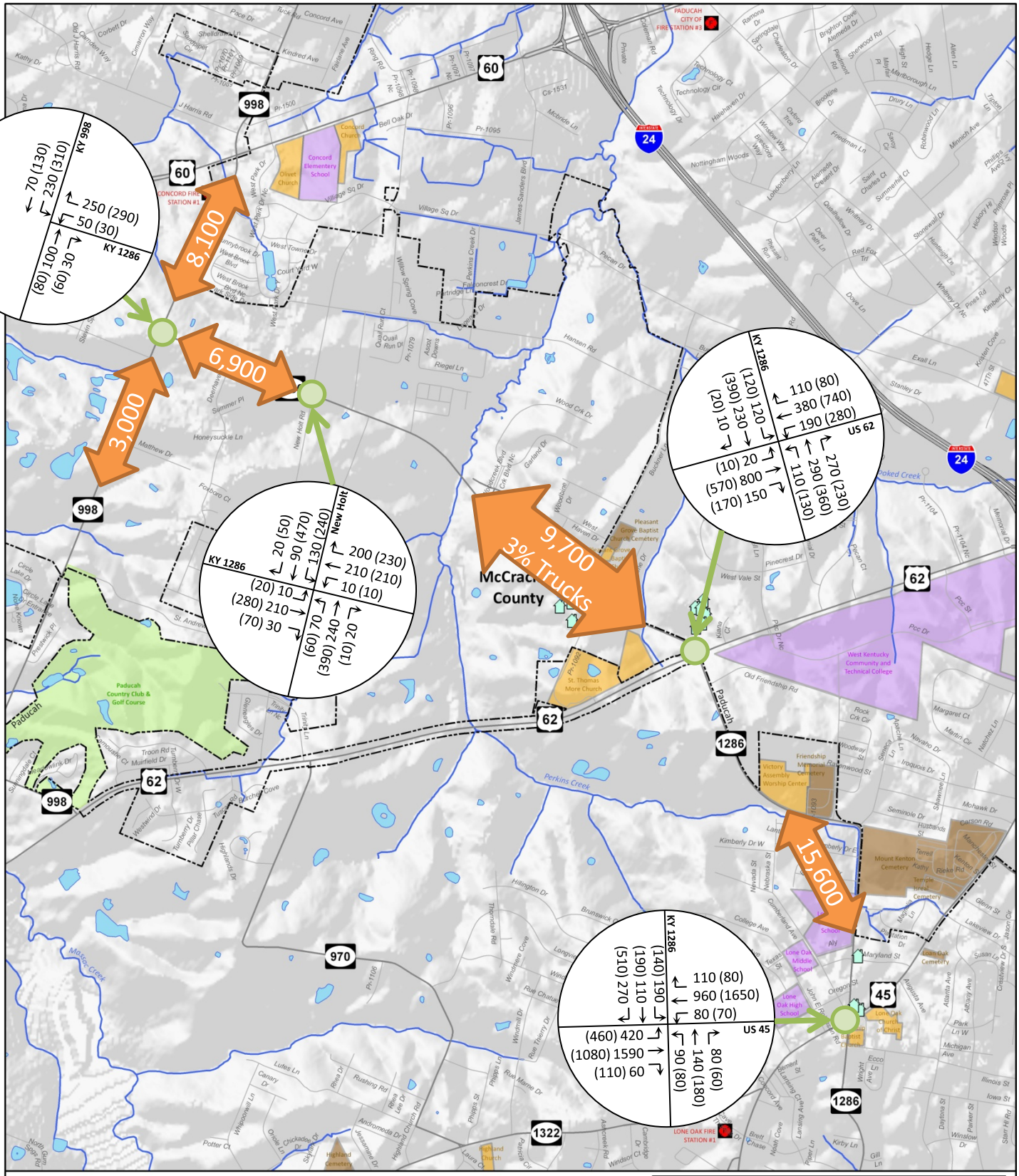
With the increase in traffic in 2040, traffic operations are expected to degrade during the peak hours. **Table 2-3** presents LOS for the 2040 No Build scenario. As shown, operations at the KY 1286/US 45 intersection degrade to LOS F during both peak periods. Some approaches at the KY 1286/US 62 intersection are also starting to experience delay from increased congestion. **Table 2-4** presents V/C for each segment for the 2040 No Build scenario, which have also increased compared to the existing conditions. As with the existing condition, the most significant constraint to capacity occurs at signalized intersections. The segment between US 45 and US 62 (1.36 miles), has a V/C of 1.54, indicating it is above capacity, but this is primarily due to the lower percent green time KY 1286 receives compared to US 45. Motorists dot not experiences this capacity constraint along the entire KY 1286 section from US 45 to US 62, only as they approach the signalized endpoints.

Table 2-3: 2040 No Build LOS during AM (PM) Peak Hour at Key Intersections

Intersection	LOS	Approach	LOS
KY 1286 at US 45	F (F)	Northbound KY 1286	F (F)
		Southbound KY 1286	F (F)
		Eastbound US 45	E (F)
		Westbound US 45	E (F)
KY 1286 at US 62	C (D)	Northbound KY 1286	C (C)
		Southbound KY 1286	C (D)
		Eastbound US 62	D (C)
		Westbound US 62	C (E)
KY 1286 at New Holt Road	B (B)	Northbound New Holt Road	B (B)
		Southbound New Holt Road	B (C)
		Eastbound KY 1286	A (B)
		Westbound KY 1286	B (C)
KY 1286 at KY 998	unsignalized	Westbound KY 1286	B (B)

Table 2-4: 2040 No Build Peak Direction Volume-to-Capacity for Corridor Segments

Highway Segment	Design Hour Volume (Peak Direction)	V/C
KY 1286, US 45 to US 62	840	1.54
KY 1286, US 62 to New Holt Road	530	0.68
KY 1286, New Holt Road to KY 998	370	0.51
KY 998, KY 1286 to US 60	440	0.31



Annual Average Daily Traffic

AM (PM) Design Hour Volume

N

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 2-3:
2040 No Build Traffic Volumes

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E. Roadway Safety

To quantify safety concerns, a crash analysis was performed for KY 1286 and KY 998. Crash records were collected from KYTC over a four-year period (October 31, 2008 through October 31, 2012) and are shown in **Appendix C**. Crashes were geospatially referenced and compared to statewide data to identify locations experiencing above average crash rates. The methodology used is defined in the KYTC research report *Analysis of Traffic Crash Data in Kentucky* (Kentucky Transportation Center, 2011).

Segment Analysis

As defined in the methodology report, segments vary in length and are divided along roadways where geometry or traffic volumes change. For each section, analysts looked at the number and severity of crashes to determine the critical rate factor (CRF). The CRF is one measure of the safety of a road, expressed as a ratio of the crash rate at the location compared to the average crash rate for roadways of the same functional classification throughout the state. CRF also takes into account traffic volume, area type (rural/urban), and the number of lanes. If the CRF is 1.00 or greater, it may indicate that crashes are occurring due to circumstances that cannot be attributed to random occurrence.

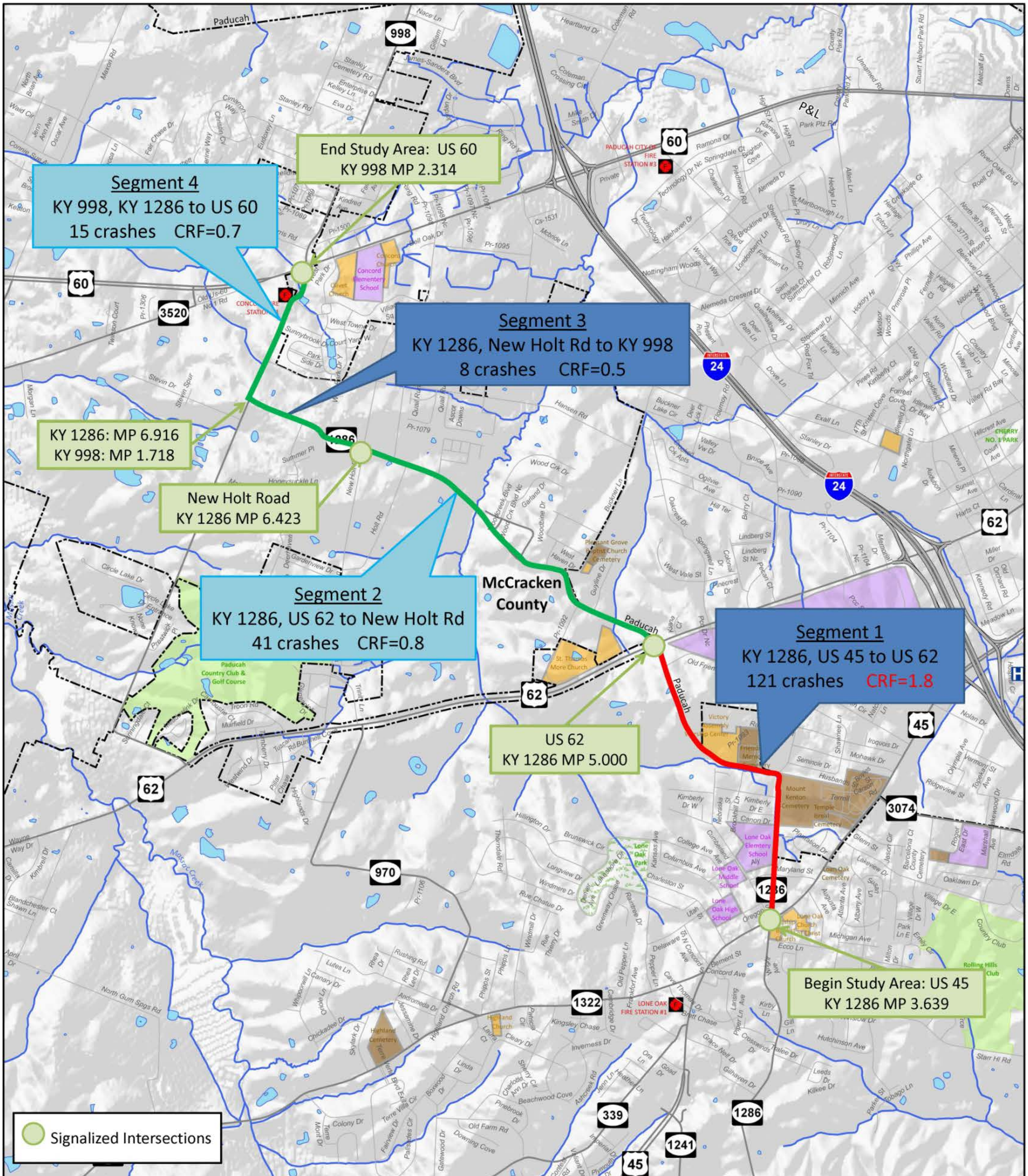
Figure 2-4 and **Figure 2-5** show the result of the segment analysis with statistics on each segment. CRFs along the study corridor range from 0.54 to 1.80. One segment of the study route was found to have a CRF over 1.00; the segment between US 45 and US 62 (1.36 miles) has a CRF of 1.80. During the four year analysis period, in this high crash segment, there were 121 crashes including 32 crashes resulting in injuries (no fatal crashes). Rear end collisions were the predominant crash type (43%), followed by single vehicle collisions (30%) and turning/angle collisions (19%). Crash trends for the entire route are discussed further in the following section.

General Crash Trends

Due to the number of crashes during the analysis periods, analysts examined the severity and type of incidents to identify general trends.

Severity. Of the 185 reported total crashes along the study routes during the four-year analysis period, there were zero crashes that resulted in fatalities. During the same period, there were 47 crashes that resulted in injuries (25.4%). The remaining 138 crashes (74.6%) only resulted in property damage.

Type. Analysts also considered the type of crashes to determine potential causation trends. Seven categories were represented: angle, backing, head on, opposing left turn, rear end, sideswipes, and single vehicle collisions. **Figure 2-6** shows the division by crash type of the 185 crashes on the study route during the four-year analysis period.



Based on reported crashes from October 31, 2008 to October 31, 2012

Critical Rate Factor

- 0.0 - 0.9
- 0.9 - 1.0
- Above 1.0

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 2-4:
Crash Segments

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Figure 2-5:
Crash Statistics by Segment

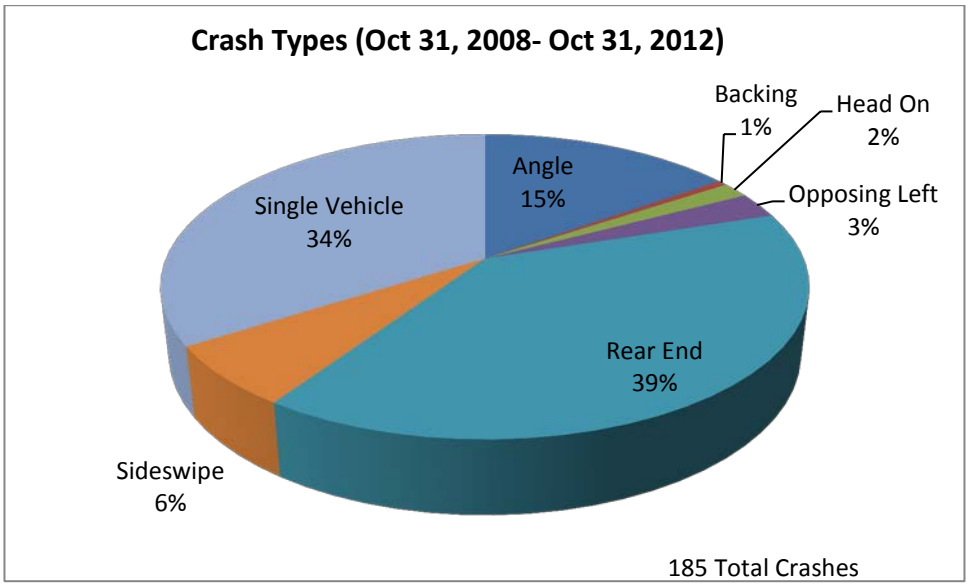
Based on reported crashes from October 31, 2008 to October 31, 2012

Segment 1: KY 1286	Segment 2: KY 1286
121 crashes (32 injury)	41 crashes (7 injury)
Length 1.36 miles	Length 1.42 miles
CRF = **1.80**	CRF = 0.82
By Type:	By Type:
Angle = 23	Angle = 3
Backing = 0	Backing = 0
Head On = 2	Head On = 0
Rear End = 52	Rear End = 16
Sideswipe = 7	Sideswipe = 3
Single Vehicle = 37	Single Vehicle = 19

Segment 3: KY 1286	Segment 4: KY 998
8 crashes (4 injury)	15 crashes (4 injury)
Length 0.49 miles	Length 0.60 miles
CRF = 0.54	CRF = 0.70
By Type:	By Type:
Angle = 2	Angle = 5
Backing = 0	Backing = 1
Head On = 1	Head On = 0
Rear End = 2	Rear End = 3
Sideswipe = 0	Sideswipe = 2
Single Vehicle = 3	Single Vehicle = 4

The analysis looks at varying length "Segments" where crashes occur and assigns a Critical Rate Factor (CRF). A CRF greater than 1.0 (noted in red above) indicates a possible safety concern.

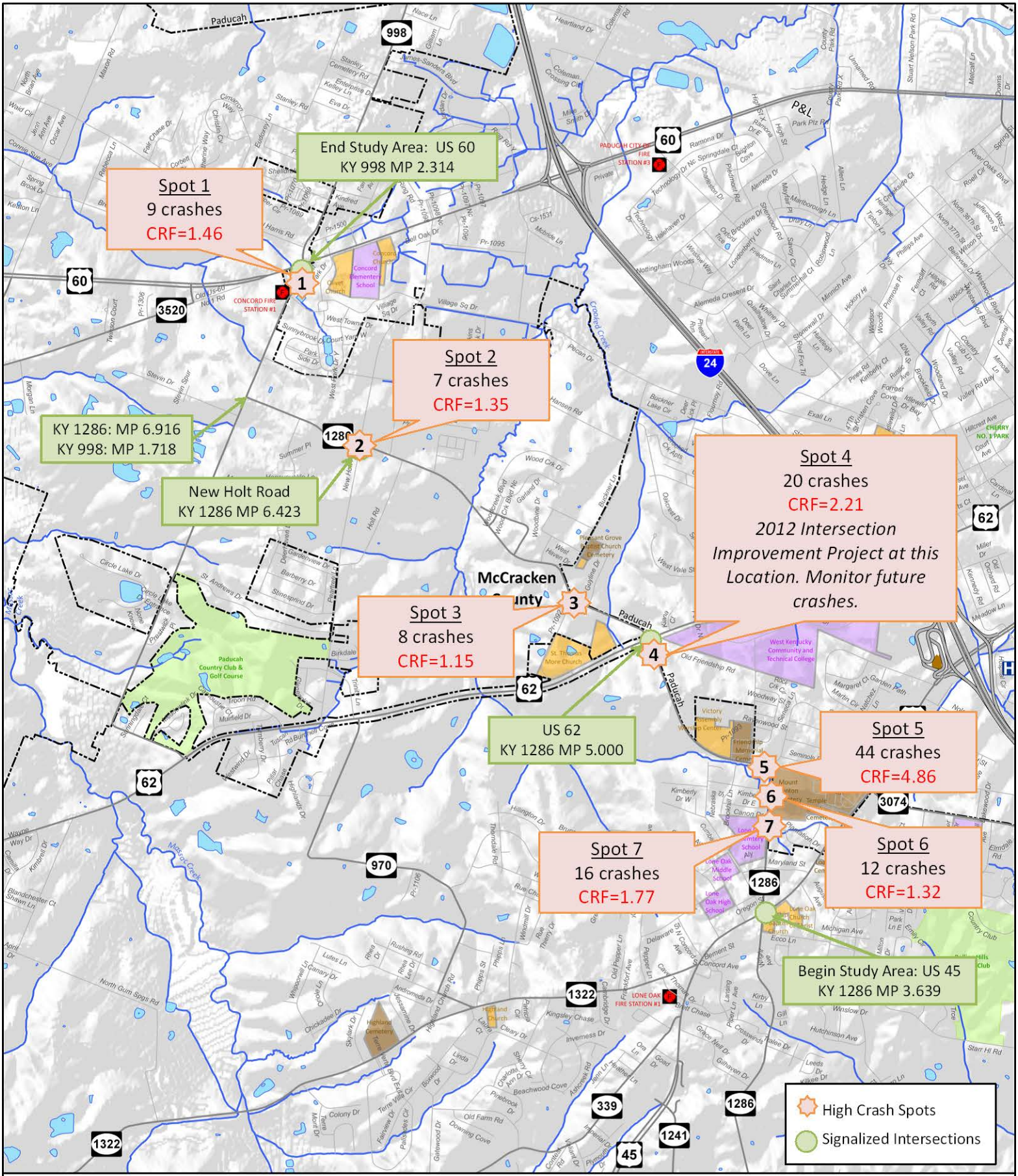
Figure 2-6: Type of Crashes on Study Route



Spot Analysis

Analysts also conducted a "spot" crash analysis along the study route. Spots were defined by examining crash data to identify 0.1 mile sections where crashes were concentrated. Crashes were again geospatially referenced and compared to statewide data to identify spot locations experiencing above average crash rates. The methodology is defined in the KYTC research report *Analysis of Traffic Crash Data in Kentucky* (Kentucky Transportation Center, 2011).

Along the study corridor, seven spots were found to have a CRF greater than 1.00, as shown in **Figure 2-7** and **Figure 2-8**. For spots, CRFs ranged from 1.15 to 4.86. The highest CRF spot was at the sharp curve near the Seneca Lane intersection (44 crashes, CRF 4.86).



Based on reported crashes from October 31, 2008 to October 31, 2012

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 2-7:
Crash Spots
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Figure 2-8:
Crash Statistics by Spot

Based on reported crashes from October 31, 2008 to October 31, 2012

Spot 7: CRF = **1.77**
16 crashes (4 injury)

By Type:
Angle = 4
Backing = 0
Head On = 0
Rear End = 9
Sideswipe = 1
Single Vehicle = 2

Spot 6: CRF = **1.32**
12 crashes (3 injury)

By Type:
Angle = 0
Backing = 0
Head On = 1
Rear End = 9
Sideswipe = 1
Single Vehicle = 1

Spot 5: CRF = **4.86**
44 crashes (15 injury)

By Type:
Angle = 6
Backing = 0
Head On = 1
Rear End = 3
Sideswipe = 3
Single Vehicle = 31

Spot 4: CRF = **2.21**
20 crashes (5 injury)

By Type:
Angle = 2
Backing = 0
Head On = 0
Rear End = 17
Sideswipe = 1
Single Vehicle = 0

Spot 3: CRF = **1.15**
8 crashes (1 injury)

By Type:
Angle = 0
Backing = 0
Head On = 0
Rear End = 2
Sideswipe = 0
Single Vehicle = 6

Spot 2: CRF = **1.35**
7 crashes (3 injury)

By Type:
Angle = 2
Backing = 0
Head On = 1
Rear End = 2
Sideswipe = 0
Single Vehicle = 2

Spot 1: CRF = **1.46**
9 crashes (2 injury)

By Type:
Angle = 3
Backing = 1
Head On = 0
Rear End = 2
Sideswipe = 2
Single Vehicle = 1

Section 3
Environmental Overview

The following sections provide an overview of the existing human and natural environment, based on information from readily available sources. Alternates should be developed to minimize impacts to the environment, particularly sensitive resources such as schools, parks, cemeteries, and homes adjacent to the corridor.

A. Socioeconomic and Community Resources

A number of community resources lie along the corridor, shown in **Figure 3-1**. The corridor provides direct access to Lone Oak Elementary School and indirect access for several other schools in the area. The new consolidated high school, McCracken County High School, is located nearby on US 60 and opened in Fall 2013. The new school brought together three existing McCracken County high schools with anticipated enrollment of 1,650-1,800 students. A number of these students use the study corridor to get to the new high school.

There are also numerous churches, a small park, and one fire station along the route. Two cemeteries lie in the vicinity, one of which (Mount Kenton Cemetery) abuts the roadway.

Demographics

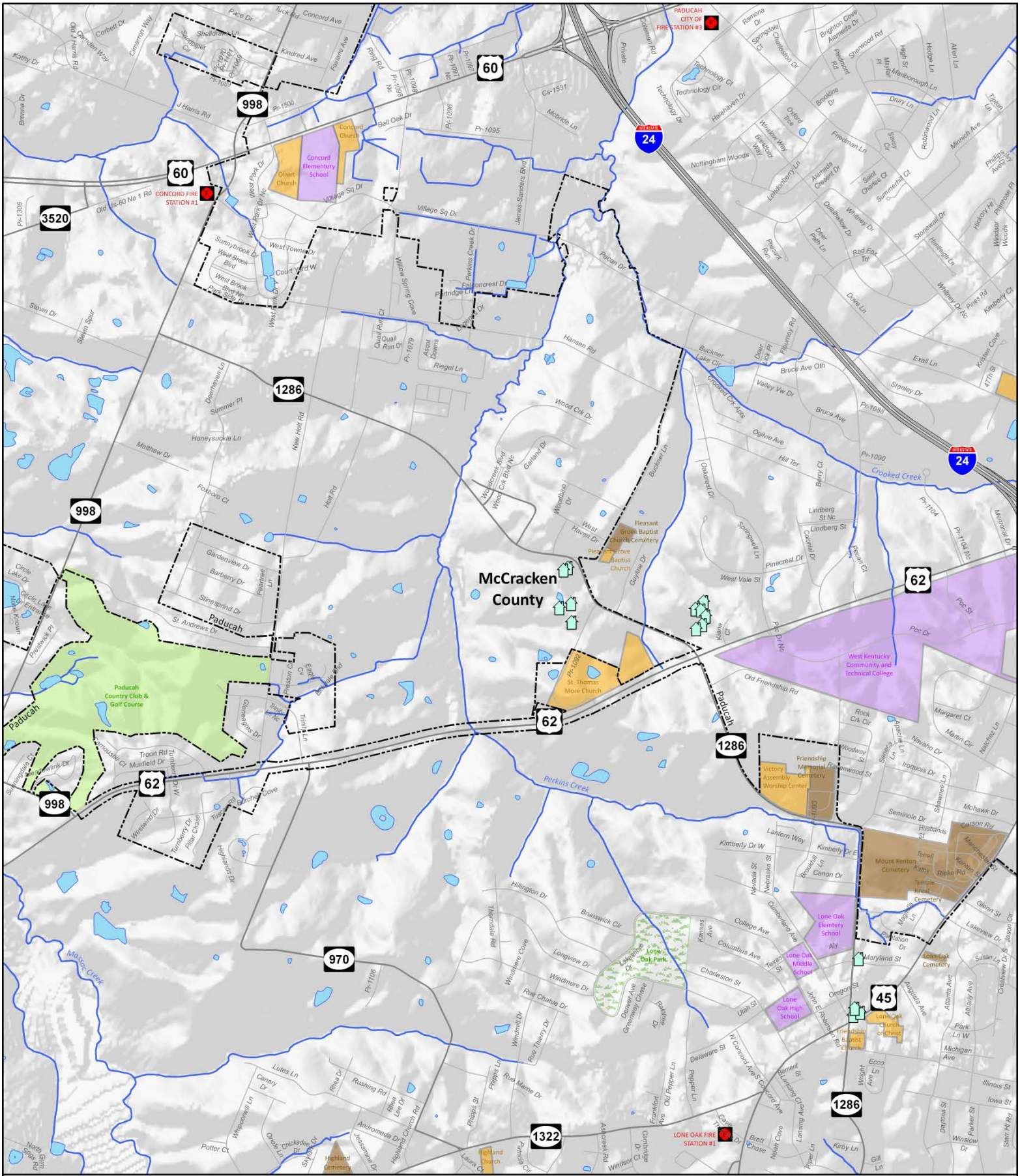
The Purchase Area Development District assembled an overview of select socioeconomic characteristics to determine the potential for the project to impact environmental justice populations; the Environmental Justice Review is presented as **Appendix D** and summarized in this section. Census data was assembled for two Census tracts containing the project (shown in **Figure 3-2**), McCracken County, the state of Kentucky, and the US. It should be noted that the tracts, particularly Tract 314, cover a much larger area than the study area.

The demographic data collected, summarized in **Table 3-1**, shows that minority and low-income populations for each tract are below national, state, and county averages. Concentrations of persons over age 65 are slightly higher that national, state, or county averages for Tract 314. Both study area tracts exhibit concentrations of persons with disabilities below statewide and county averages.

Table 3-1: Demographic Summary Data for Selected Geographies

Geography	Minority Population[1]	Population over Age 65[2]	Population Below Poverty Level[3]	Disabled Population[4]
United States	35.8%	12.9%	14.3%	31.7%
Kentucky	13.4%	13.2%	18.1%	41.7%
McCracken Co.	15.8%	16.6%	14.6%	39.5%
Tract 313.01	9.7%	16.0%	7.4%	30.9%
Tract 314	10.3%	20.9%	9.5%	33.2%

[1] Table B03002 from 2007-2011 ACS estimates
[2] Table S0101 from 2007-2011 ACS estimates
[3] Table S1701 from 2007-2011 ACS estimates
[4] Table P041 from Census 2000 Summary File 3.



Fire Department

Potentially Historic Properties

Church

Cemetery

Schools

Local Parks

Country Clubs/Golf Courses

N

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 3-1:
Community Resources

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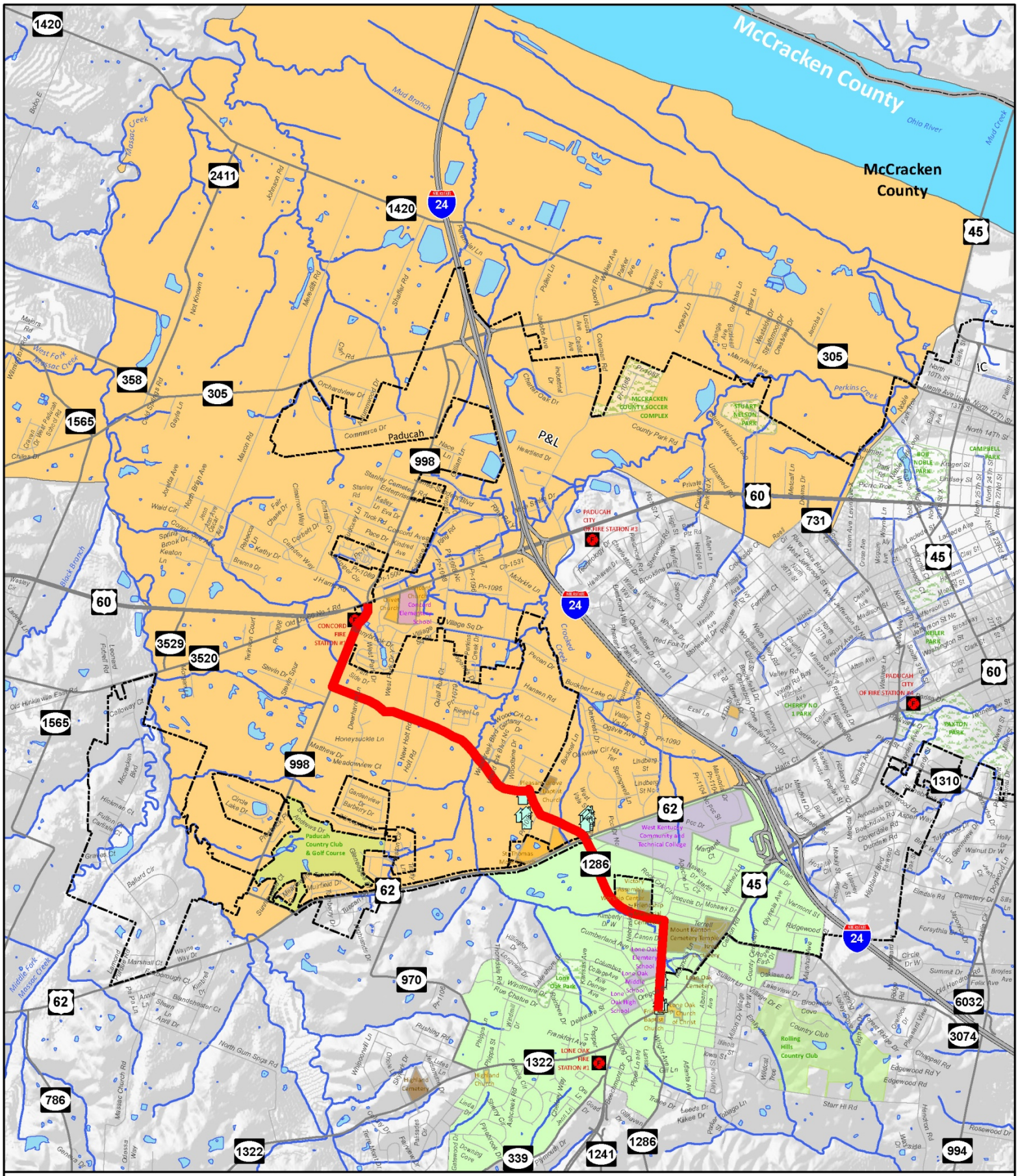

Figure 3-2:
Census Track Boundaries
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The only potential environmental justice concern identified is the elevated concentration of elderly persons in Tract 314. Although age is not a protected group under the Federal EJ Regulations it is standard KYTC Practice to consider this group in the EJ evaluation process. It is unclear whether this population is concentrated into a small location or dispersed throughout the tract. As needed, field visits and local coordination should be conducted as part of any future project phases to determine if environmental justice populations would be adversely and disproportionately impacted.

B. Aquatic & Terrestrial Resources

The corridor is in an urban setting; however, there are limited forested fragments along the route that could provide habitat for terrestrial species.

Early coordination with the US Fish & Wildlife Service (USFWS) and Kentucky Department of Fish & Wildlife Resources (KDFWR) identified a list of federally endangered or threatened species that could occur in the vicinity. These species are presented in **Table 3-2**. Agency coordination letters are included as **Appendix E** to this report.

Table 3-2: Federally Listed Species in Vicinity

Group	Species	Common Name	Legal Status
Mammals	*Myotis sodalist*	Indiana bat	Endangered
Mussels	*Pleurobema clava*	clubshell	Endangered
Mussels	*Cyprogenia stegaria*	fanshell	Endangered
Mussels	*Potamilus capax*	fat pocketbook	Endangered
Mussels	*Plethobasus cooperianus*	orange pimpleback	Endangered
Mussels	*Obovaria retusa*	ring pink	Endangered
Mussels	*Lampsilis abrupta*	pink mucket	Endangered
Mussels	*Plethobasus cyphyus*	sheepnose	Endangered
Mussels	*Pleurobema plenum*	rough pigtoe	Endangered
Mussels	*Cumberlandia monodonta*	Spectaclecase	Endangered
Mussels	*Quadrula c. cylindrical*	Rabbitsfoot	Proposed Threatened
Birds	*Sternula antillarum athalassos**	Interior Least Tern	Endangered

** Noted in KDFWR records but not USFWS*

KDFWR records also identify a number of state-listed species in the vicinity: Backman's Sparrow (Aimophila aestivalis), Dark-eyed Junco (Junco hyemalis), Green Treefrog (Hyla cinerea), and Northern Crawfish Frog (Rana areolata circulosa). USFWS records indicate that the project area falls within the home range of a known Indiana bat maternity colony. Because the forested habitat within the range of the maternity colony is already relatively low and sensitive, USFWS recommends the project should eliminate/reduce impacts to trees or address potential impacts to the Indiana bat through adherence to the 2012 Indiana bat Programmatic Agreement. KDFWR recommends surveying for potential Interior Least Tern nesting habitat as well.

Figure 3-3 shows water resources within the study area. As shown, Perkins Creek passes through the study area. Portions of the study route fall within the creek's floodplain, which is known to be susceptible to flash flooding. There are no Outstanding State Resource Waters, Wild Rivers, or known Exceptional Waters within the study area. Perkins Creek has been determined to support aquatic life use and, based on coordination with the US Army Corps of Engineers, may represent a jurisdictional waterway requiring a Section 404 permit. There are also scattered wetlands along the corridor.

C. Air Quality

Pursuant to the Clean Air Act, the United States Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six principal pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), inhalable particulate matter (PM10), fine particulate matter (PM2.5), ozone (O3), sulfur dioxide (SO2), and lead. The study area is located within unincorporated areas of McCracken County. There are no existing violations of CO in the project area; no hotspot analysis will be required because of the low traffic volumes. The area is in attainment for NO2, O3, SO2, particulate matter, and lead. The proposed project is expected to have a low potential Mobile Source Air Toxics (MSAT) effect as it serves to improve operations of highway and freight without adding substantial new capacity.

D. Noise

To determine if road noise levels are compatible with various land uses, the Federal Highway Administration (FHWA) has developed noise abatement criteria (NAC) and procedures to be used in the planning and design of highways. These abatement criteria and procedures are in accordance with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise. A summary of the FHWA NAC for various land uses is presented in **Table 3-3**.

Table 3-3: Noise Abatement Criteria Hourly A-Weighted Sound Level in Decibels

Activity Category	Activity $L_{eq}(h)$ (dBA)	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[1]	67	Exterior	Residential
C[1]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[1]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	NA	NA	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing.
G	NA	NA	Undeveloped lands that are not permitted for development.

Source: 23 CFR Part 772
Note: 1 Includes undeveloped lands permitted for this activity category

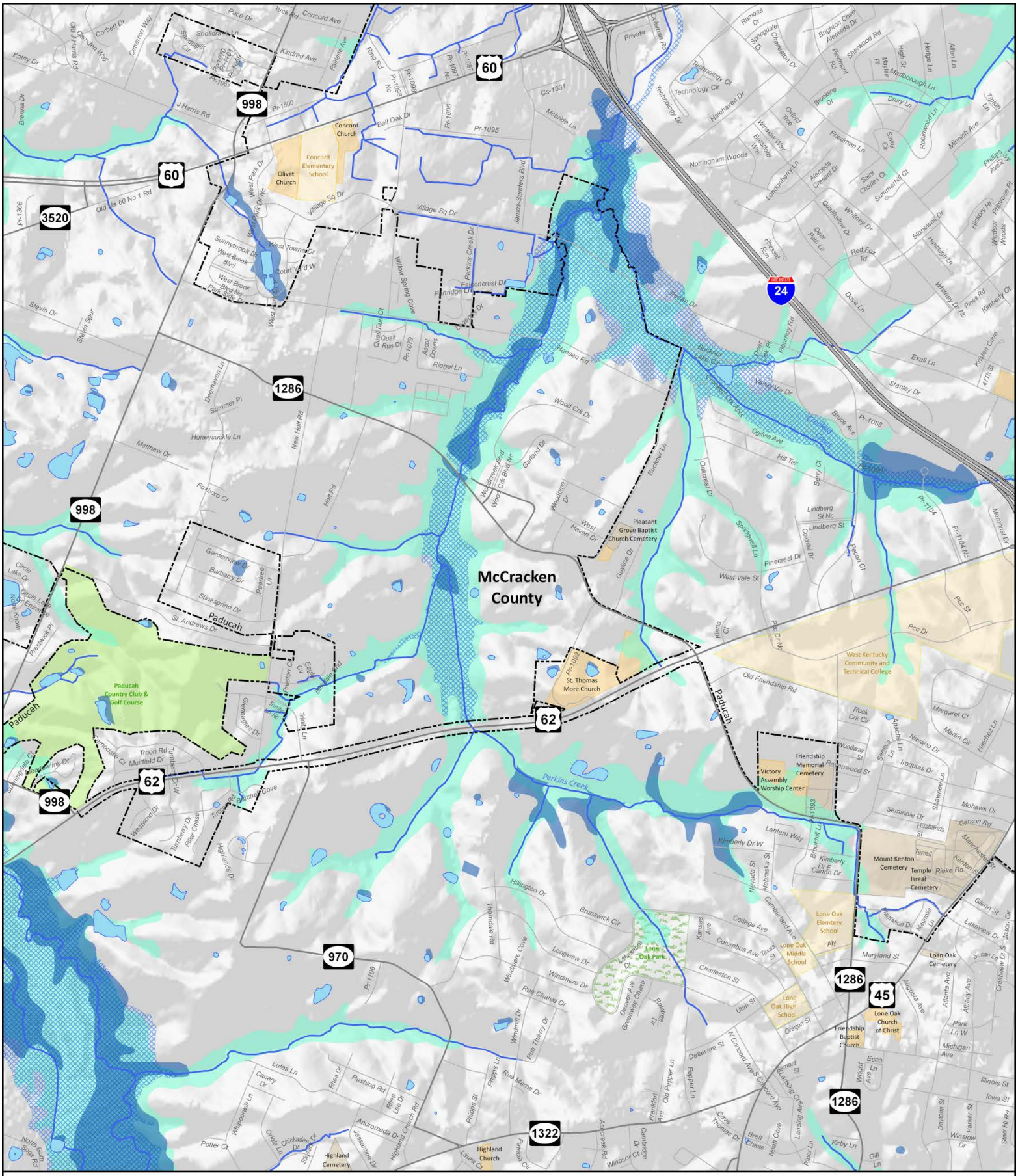

Figure 3-3:
Water Resources
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A receptor is defined as a discrete or representative location of a noise sensitive area(s), for any of the land uses listed in **Table 3-3**. Receptors are impacted if noise levels increase over the NAC as defined by FHWA and KYTC. The study area is located in a mostly residential area with some religious institutions and schools. These receptors are classified as categories B or C by FHWA with a NAC of 67 dBA.

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area. For the areas where impacts are identified, methods of noise abatement will be evaluated to determine the feasibility and reasonableness of their implementation. The evaluation is based on many factors, some of which include constructability, cost, height of wall, amount of land use, and whether changes in existing land use are expected.

This project is a Type I project as designated in FHWA Regulation 23 CFR Part 772 and, in any future project development phases, a detailed noise analysis should follow the FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise and the Kentucky Transportation Cabinet Noise Analysis and Abatement Policy (July 13, 2011).

E. Hazardous Materials

GIS data from the US Environmental Protection Agency include a few permitted facilities/monitored sites along the corridor, particularly at intersections with US highways. These are shown in **Figure 3-4**.

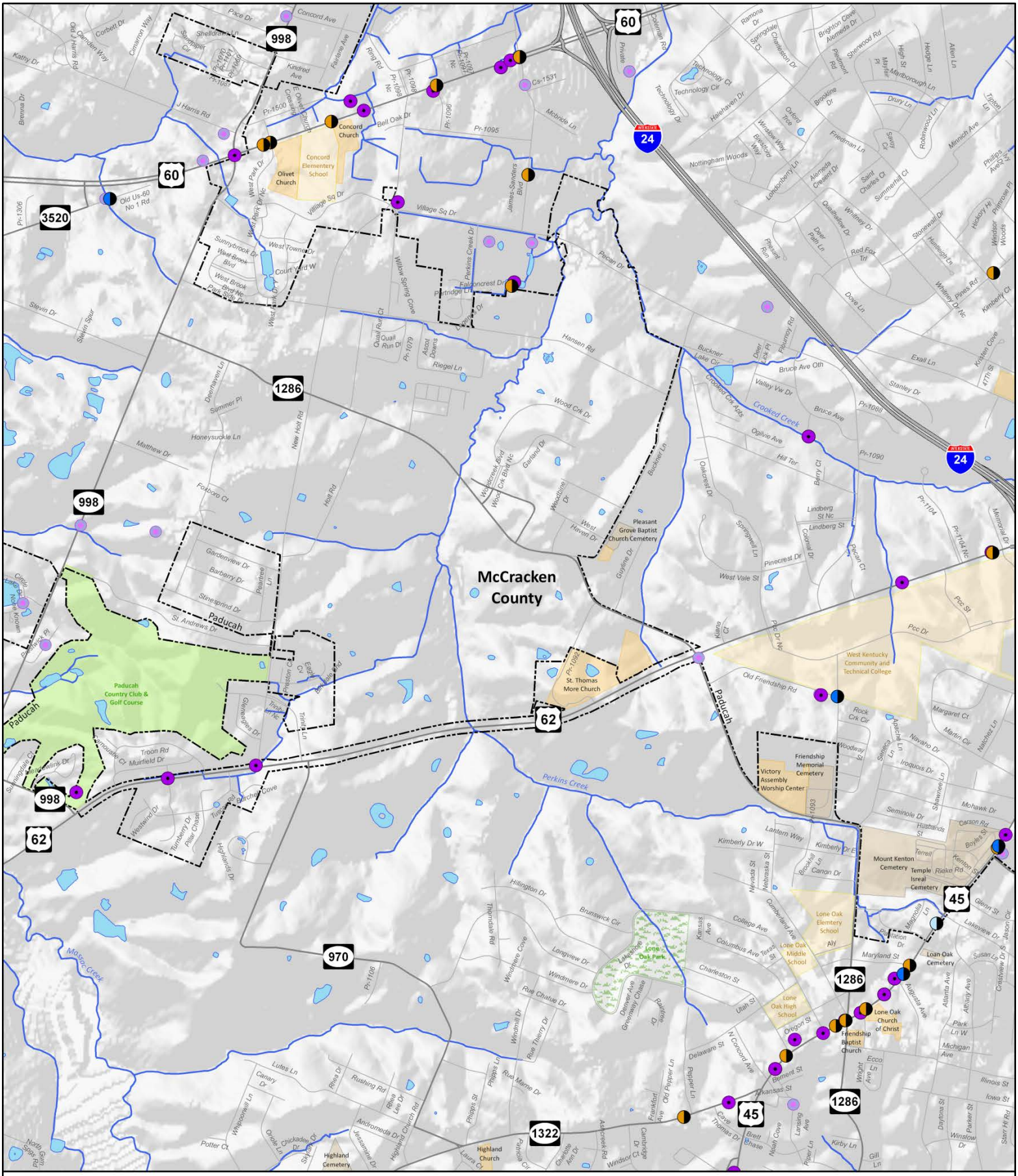
F. Cultural & Historic Resources

In February 2013, a records check was conducted at the Kentucky Heritage Council and at the Kentucky Office of State Archaeology. Records showed numerous above ground resources have been surveyed, primarily along the US 45 corridor at Lone Oak, but, the National Register status had not been determined. These locations are noted in **Figure 3-1**. No previously identified archaeological sites have been identified within 0.5 mile of the corridor.

The project team's historian completed a field visit in April 2013 to identify any existing structures adjacent to the corridor that could meet the criteria to qualify as eligible for the National Register of Historic Places (NRHP). Based on preliminary field inspections, several buildings in the vicinity are over 50 years in age but none exhibit distinguishing architectural features. In reaction to early coordination efforts, the the Kentucky Heritage Council recommended an archaeological and cultural historic survey of the project area to identify project-related impacts and to ensure compliance with Section 106 of the National Historic Preservation Act.

G. Geotechnical Overview

The Kentucky Transportation Cabinets Division of Geotechnical Engineering completed a preliminary geotechnical assessment of the study area which is provided as **Appendix F** and summarized here. The study area is located in the Paducah West Geologic Quadrangle in the Mississippian Embayment or Jackson Purchase Physiographic Region. Because most of the Cretaceous, Tertiary and Quaternary deposits are unconsolidated sediment instead of rock, they are easily eroded, and, consequently, this part of Kentucky is relatively flat lying, with numerous lakes, ponds, sloughs, and swamps. Local relief is generally less than 100 feet. A fault line runs through the northwest portion of the area.



- EPA Site [AIRS-AFS] Air Emissions
- EPA Site [PCS] Water Discharger
- EPA Site [RCRA] Hazardous Waste
- Underground Storage Tank [UST]
- Permitted Facility

N

0 500 1,000 Feet

0 0.1 0.2 Miles

Figure 3-4:
Monitored Sites
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Mapping also indicates that bank gravel has been mined in numerous places in the area. Glauconite outcrops and boulders in excess of 3 feet in dimension could be encountered in the area of the alignment. The mapping indicates the material in the area consists of alluvium, loess, Porters Creek Clay, Wilcox Formation (clay), and Continenal Deposits. Clays in this area, most notably of the Porters Creek Formation, are known to be expansive.

From a construction perspective, site specific geotechnical investigations are critical in this region prior to design. Foundations for bridges are typically founded on deep foundations such as steel or concrete friction piles. Culverts and walls are typically supported on shallow foundations. Soils in the area are generally suitable for embankment construction; suitable rock for embankment construction and rock roadbed is also readily available in this area of the state. Soils in the area are considered erodible. California Bearing Ratio values used in pavement design generally range from 2 to 5 for soils subgrades. Chemical modification of subgrade is sometimes used. Wet areas could require undercutting and replacement of soils.

Section 4
Purpose & Need Statement

The purpose and need statement establishes why KYTC is proposing to advance a transportation improvement and drives the process for improvement alternate consideration, analysis, and selection.

A. Purpose and Need

The purpose of the proposed KY 1286 and KY 998 project is to improve safety and traffic operations along this route between US 45 and US 60. The following needs have been identified:

Improve Safety

From October 31, 2008 through October 31, 2012, 185 total crashes were recorded by State Police along the study route. Of those, 47 crashes resulted in injuries but there were no fatalities.

Vehicle crashes appear more frequently along this route than on other similar type facilities. Crash analysis identified a 1.36-mile "high crash segment" of KY 1286 between US 45 and US 62 with a critical rate factor (CRF) of 1.80, indicating crashes occurred too often to be attributed to random circumstances. "High crash segments" are any section of road with a CRF over 1.0. CRF compares the number of crashes along the road of interest to that of similar facilities in Kentucky.

The crash analysis also identified seven 0.10-mile long "high crash spots" along the corridor that exhibit a CRF greater than 1.0. The highest crash spot, at the Seneca Lane intersection, has a CRF of 4.86.

The existing geometry along KY 1286 (i.e., narrow lanes, deficient curves, substandard shoulders) compromises the safety and operational characteristics along the roadway. A review of as-built highway plans and visual inspection of the roadway identified five deficient horizontal curves, one deficient vertical curve that limits headlight sight distance, and several sections where the existing cross-section does not meet current standards as discussed previously and shown in **Figure 2-1**. Four curves along the route are posted with a lower speed limit.

The most common types of crashes were rear end collisions (39%), which are common along high volume roadways that experience stop-and-go conditions. The high number of access points also contributes to this trend. Additional information regarding crash types and statistics are discussed in **Section 2** and shown in **Figures 2-4** through **2-8**.

Improve Traffic Operations

Based on the 2013 traffic volumes, the corridor experiences congestion during both the AM and PM peak hours at the US 45/KY 1286 intersection. As traffic volumes continue to increase in the future, operations are expected to deteriorate. The segment between US 45 and US 62 exhibits a volume-to-capacity ratio of 0.92, indicating it is approaching capacity, particularly at each signalized intersection. By 2040, the V/C ratio for this segment is expected to increase to 1.54.

KY 1286 and KY 998 are used as a cut through route between US 45, US 62, and US 60. The study corridor provides access to Kentucky Oaks Mall and a number of other commercial establishments

adjacent to US 60, near New Holt Road. The new consolidated McCracken County High School, which opened in Fall 2013 with an estimated 1,650 student enrollment, is located along the US 60 corridor west of KY 998.

B. Additional Goals

Beyond the project purpose, a number of secondary goals were identified. These include:

- **Minimize Impacts to the Human & Natural Environment**. Alternates should be developed to minimize impacts to the environment, particularly sensitive resources such as schools, parks, cemeteries, and homes adjacent to the corridor.
- **Accommodate Bicyclists and Pedestrians where appropriate**. Mobility and safety for all modes of transportation is an important consideration, including bicycles and pedestrians. According to the KYTC's Pedestrian and Bicycle Travel Policy (July 2002), accommodation of pedestrians and bicyclists will be considered on all new or reconstructed state-maintained roadways. The need to consider bicycle/pedestrian facilities was emphasized at the April 2013 project meeting with stakeholders. The *2002 Paducah-McCracken County Transportation Study* identifies the need to "accommodate a bikeway that would provide safer biker access from US 45 to US 60" with access to parks, although the KY 1286 corridor is not identified specifically. The 2007 Comprehensive Plan also identifies the need for an improved system of bicycle corridors throughout the city.
- **Ensure any improvement can handle the traffic from other planned improvements**, such as the newly consolidated High School and Paducah Outer Loop.

C. Summary Purpose and Need Statement

The purpose of the proposed KY 1286 and KY 998 project is to improve safety and traffic operations along this route between US 45 and US 60. The need is expressed through above average crash rates, substandard geometric features, and congested traffic operations.

Section 5
Initial Stakeholder Coordination

Over the course of the study, the project team (consisting of KYTC District 1, KYTC Central Office, and CDM Smith) held three in-person meetings at the KYTC District 1 Office to coordinate on key issues; meeting summaries are presented in **Appendix G**. In addition, the project team reached out to stakeholders/local officials, the public, and resources agencies. These efforts are described in the following sections and detailed summaries of each are presented in **Appendix H**.

The project team reached out to a number of local government representatives and other community groups early in the planning process. The following organizations were invited to participate as key stakeholders in the KY 1286 Planning Study:

- County Judge Executive
- Paducah Mayor
- Chamber of Commerce
- Purchase Area Development District
- Greater Paducah Economic Development Council
- Regional Transportation Committee
- Paducah Area Transit Systems
- McCracken County Public Schools
- Local Government: Departments of Public Works, Police, Sheriff's, & Emergency Management

The project team first met with key stakeholders and local officials on April 22, 2013. In addition to the project team, the Judge Executive attended along with representatives from the regional transportation committee, the Paducah Department of Planning, the public school system, the riverport, and the police. During the meeting, the project team shared existing conditions information collected to date and solicited feedback. Among other comments, attendees identified a number of spot improvements for consideration, including: adding guardrail at the Seneca curve, adding bicycle/pedestrian facilities, realigning the curve through the unutilized portion of the Mount Kenton Cemetery, and realigning the US 45 intersection. A second stakeholder meeting is discussed later in **Section 8**.

Section 6
Alternate Development

The following sections outline the process by which potential improvement alternates were developed. Alternates were developed based on the existing conditions analysis (traffic, crash, and environmental), previous studies, and input received from the project team and stakeholders/local officials. Initially, four alternates were considered: No Build, Spot Improvements, Improve Two-Lane, and Three-Lane Widening.

The *2010 Highway Safety Manual* provides guidance on quantitative safety analyses to estimate the impacts of proposed safety improvements. This guidance was considered as improvements were proposed and evaluated.

- Widening lanes from 9-foot to 11-foot results in an estimated 30% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways. Widening from 10-foot to 11-foot results in an estimated 13% reduction in the same crash types.
- Widening shoulders from 2-foot to 8-foot results in an estimated 33% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways.
- Improving the horizontal alignment also results in safety improvements, proportional to the curve length and radius.
- Adding a two way left turn lane results in an estimated 17% reduction in "driveway-related left-turn crashes" along two lane rural highways with high densities of intersecting driveways.
- Installing new signage warning motorists of upcoming horizontal curves and advisory speed limits results in an estimated 13% reduction in injury collisions.

Although the **No Build Alternate** does not meet the project purpose and need, it was carried forward as a baseline for comparison between other alternates.

The **Spot Improvement Alternates** generally include relatively lower cost improvements that could be implemented individually as short-term solutions to address existing safety issues and congestions issues. A number of locations were identified for potential spot improvement projects, as shown in **Figure 6-1**.

- Spot A: Add left turn lanes at the KY 1286/KY 998 intersection. Although existing traffic does not justify the turn lanes at this time, the project team recommended this spot improvement as a future improvement as traffic grows, especially due to the anticipated increase in traffic from the consolidated McCracken County High School. Crash rates at this intersection are below statewide averages.
- Spot B: Fix the deficient horizontal curve between Deerhaven Lane and New Holt Road. There are two proposed options at this spot: improve the existing curve, which has a 35 mph design speed, to operate at a 45 mph design speed; or removing the curve to create a straight segment, which would also operate at a 45 mph design speed.

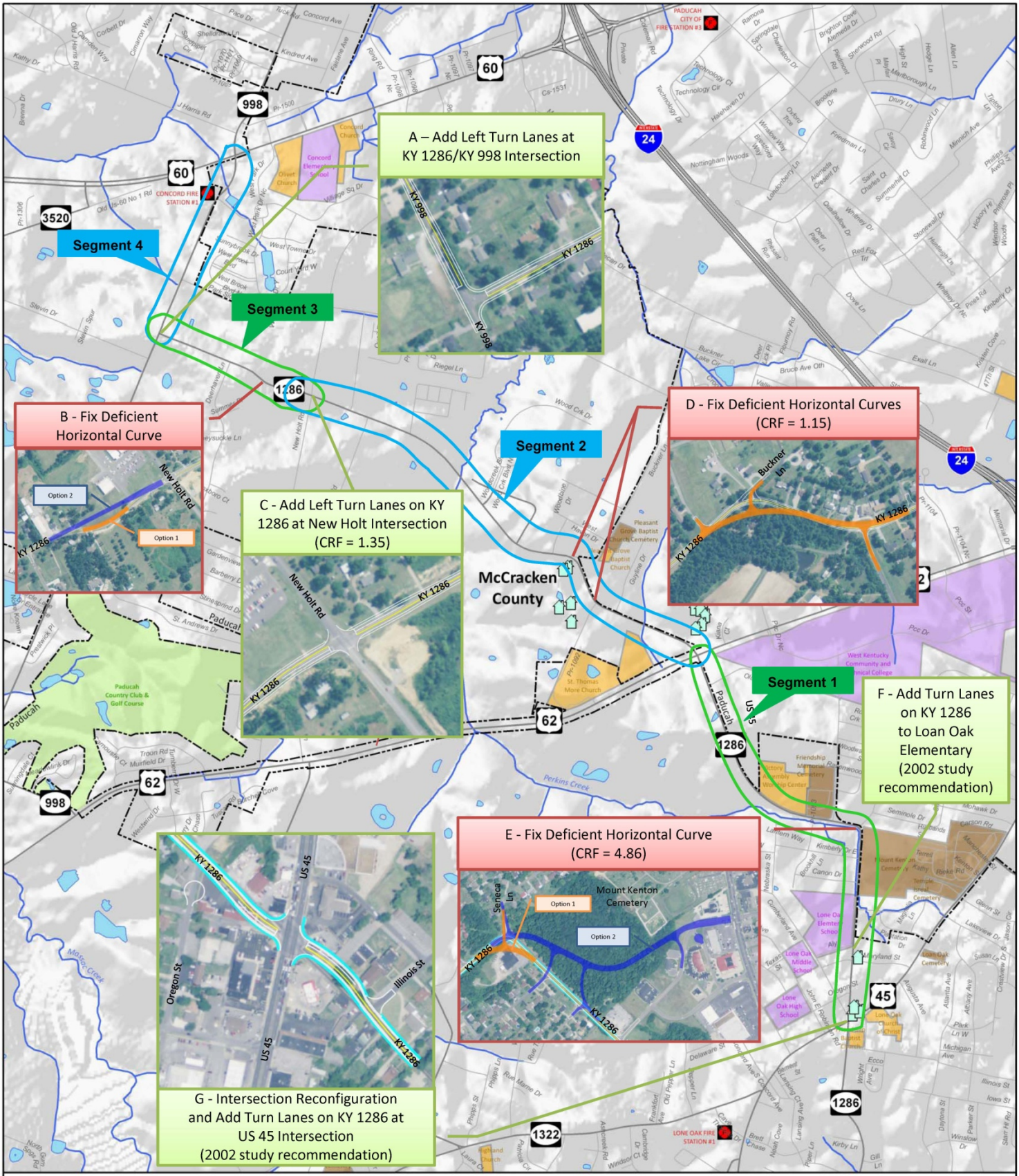

Figure 6-1:
Proposed Spot Improvements
KY 1286/KY 998 Planning Study
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- Spot C: Add left turn lanes at the KY 1286/New Holt Road intersection. Based on reported crashes, which are primarily angle or rear end collisions, this intersection has a CRF of 1.35, most of which are angle or rear end collisions.
- Spot D: Fix the deficient horizontal curves near Buckner Lane. The existing 15 mph curves would be improved on new alignment to increase the design speed to 45 mph. Based on reported crashes (including 75% single vehicle collisions), a portion of this location has a CRF of 1.15.
- Spot E: Fix the deficient horizontal curve near Seneca Lane. There are two options available at this spot: 1) improve the existing curve, which has a 15 mph design speed, to operate at a 35 mph design speed or 2) create a new link to US 45, which would operate at a 35 mph design speed. Based on reported crashes (which show 70% being single vehicle collisions), this location has a CRF of 4.86.
- Spot F: Add turn lanes on KY 1286 for Lone Oak Elementary School. KY 1286 experiences congestion during peak times at the school entrance and the segment has a CRF of 1.80. Turn lanes into Lone Oak Elementary School are recommended to improve safety and help channelize school traffic during peak periods. This improvement was also recommended in the *2002 Paducah-McCracken County Transportation Study*.
- Spot G: Reconfigure the KY 1286/US 45 intersection and add turn lanes. This intersection experiences congestion during peak periods. Operations at the KY 1286/US 45 intersection are currently at a LOS D but degrade to a LOS F during both peak periods by 2040. The KY 1286 segment has a CRF of 1.80 although the intersection itself does not show up as a high CRF spot. This improvement was recommended in the *2002 Paducah-McCracken County Transportation Study*.

The **Improve Two-Lane Alternate** would result in the reconstruction of KY 1286 and KY 998 as a two lane rural highway from US 62 to US 60, providing one 11 to 12-foot wide travel lane per direction with an 8-foot shoulder, and including 4 feet of the shoulder striped as a bike lane. From US 45 to US 62, KY 1286 would be reconstructed as a two lane urban highway, providing one 11 to 12-foot wide travel lane per direction with a 5-foot bike lane, curb and gutter, and paved sidewalks along both sides. Some or all of the spot improvements listed above would be incorporated into the reconstruction to address geometric deficiencies and provide turn lanes where needed.

As mentioned previously, based on the *2010 Highway Safety Manual*; widening lanes from 9-foot to 11-foot results in an estimated 30% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways, widening shoulders from 2-foot to 8-foot results in an estimated 33% reduction in run-off-road, head-on, and sideswipe crashes for two lane rural highways, and improving the horizontal alignment results in safety improvements, proportional to the curve length and radius.

The **Three-Lane Widening Alternate** would reconstruct KY 1286 and KY 998 as a three lane rural highway from US 62 to US 60, providing one 11-foot wide travel lane per direction and a 13-foot wide two-way left turn lane along the entire route. The route would include 8-foot shoulders, with 4 feet of the shoulder striped as a bike lane. From US 45 to US 62, where there are a lot of driveways, access points, angle collisions, and rear end collisions, KY 1286 would be constructed as a three lane urban highway, providing one 11 to 12 foot wide travel lane per direction plus a 13-foot wide two-way left turn lane along the entire route. The route would include 5-foot bike lane, curb and gutter, and paved

sidewalks would run along both sides of KY 1286. Some or all of the spot improvements listed above would be incorporated into the reconstruction to fix geometric deficiencies and add turn lanes where needed.

As cited previously, based on the *2010 Highway Safety Manual*; adding a two way left turn lane results in an estimated 17% reduction in "driveway-related left-turn crashes" along two lane rural highways with high densities of intersecting driveways.

Multiple options were developed for the Improve Two-Lane Widening Alternate and Three-Lane Widening Alternate. They included; improve the roadway cross-section but maintain the existing roadway alignment or improve the roadway cross section and improve the roadway alignment/deficient horizontal curves. Multiple alignments were considered to improve the deficient horizontal curves, all of which mimic the options shown in the Spot Improvements. Rural and urban typical sections were also considered, as well as typical sections with and without bicycle and pedestrian facilities. **Figures 6-2** through **6-7** show the conceptual alignments for the Improve Two-Lane and Three-Lane Widening Alternates.

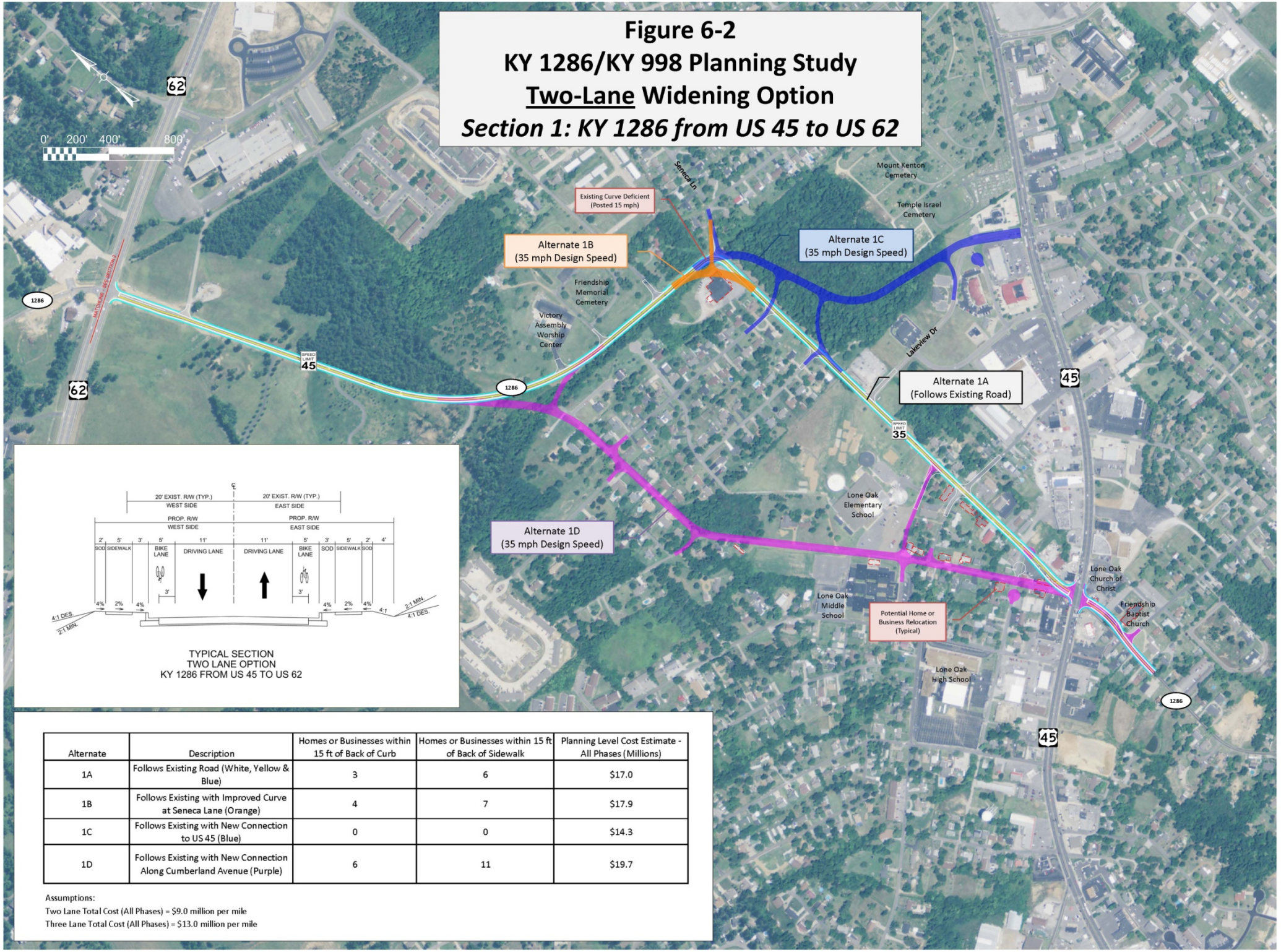
A. Future Build Traffic Scenarios

None of the proposed build alternates are anticipated to increase traffic volumes along the corridor. Therefore, the future no build volumes described in Section 2.D apply to the future build scenarios as well. The one exception is Alternate 1G, which is a new link between Seneca Lane and US 45 that passes through Mount Kenton Cemetery and ties into US 45 at Lakeview Drive. This alternate was developed after the existing traffic data had been collected. Therefore there was not enough information to accurately estimate traffic conditions on the new segment and US 45. Thus, additional data collection and traffic forecasting is required for Alternate 1G in the next phase to determine the impacts to Segment 1 and the intersections at US 45/Lakeview Drive and US 45/KY 1286.

There is not a commonly accepted methodology for calculating the increased capacity for a three lane roadway compared to a two lane roadway, but it is accepted among the industry that there are capacity and mobility gains with the addition of a center turn lane. As a result, the volume-to-capacity ratio would theoretically be lower for the Three-Lane Widening Alternate compared to the No Build and the Improve Two-Lane Alternate.

At the KY 1286/US 45 intersection, future build alternates assume improvements to the KY 1286 approaches, including the construction of a westbound right turn lane with adequate storage length, mirroring the existing KY 1286 on the opposite approach. The combination of signal phasing and additional turn lane capacity reduces overall delay; however, the intersection continues to operate at LOS F. Residual delay is due to left turning traffic from northbound US 45. While not directly addressed in the Build alternates, this delay can be decreased if and when improvements to US 45 are made, such as adding dual left turn lanes.

Figure 6-2
KY 1286/KY 998 Planning Study
Two-Lane Widening Option
Section 1: KY 1286 from US 45 to US 62

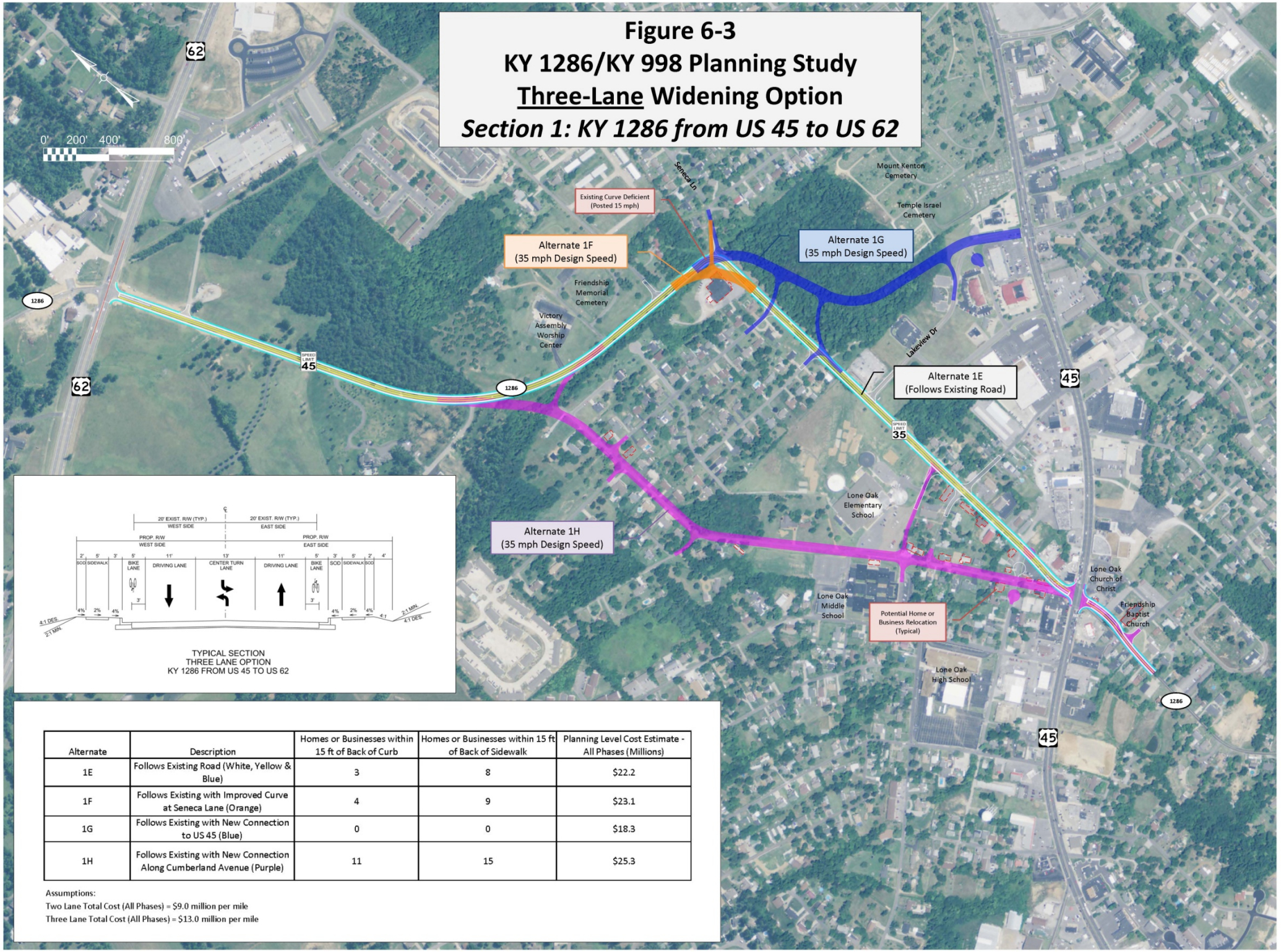


TYPICAL SECTION
TWO LANE OPTION
KY 1286 FROM US 45 TO US 62

Alternate	Description	Homes or Businesses within 15 ft of Back of Curb	Homes or Businesses within 15 ft of Back of Sidewalk	Planning Level Cost Estimate - All Phases (Millions)
1A	Follows Existing Road (White, Yellow & Blue)	3	6	$17.0
1B	Follows Existing with Improved Curve at Seneca Lane (Orange)	4	7	$17.9
1C	Follows Existing with New Connection to US 45 (Blue)	0	0	$14.3
1D	Follows Existing with New Connection Along Cumberland Avenue (Purple)	6	11	$19.7

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

Figure 6-3
KY 1286/KY 998 Planning Study
Three-Lane Widening Option
Section 1: KY 1286 from US 45 to US 62

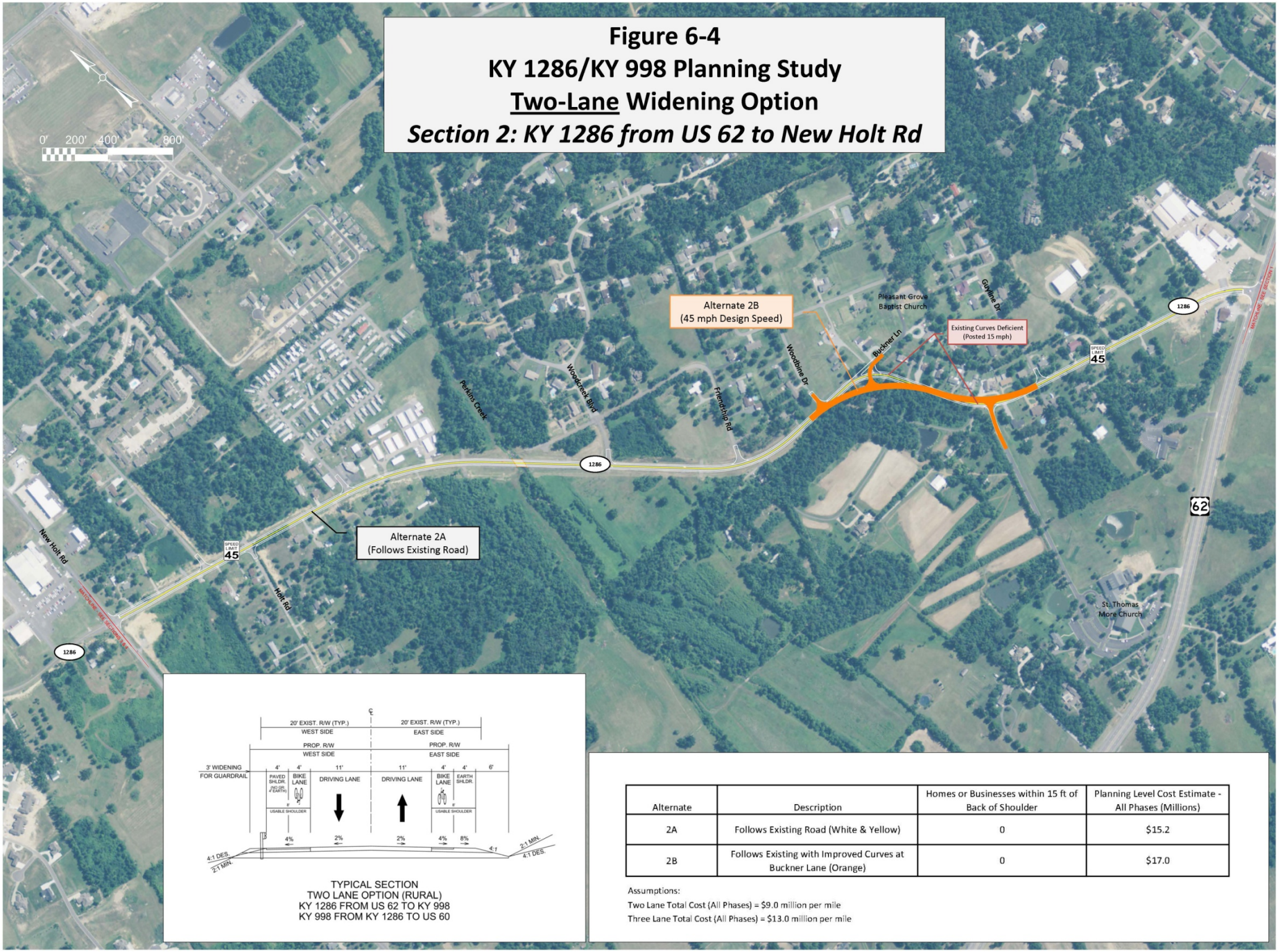


TYPICAL SECTION
THREE LANE OPTION
KY 1286 FROM US 45 TO US 62

Alternate	Description	Homes or Businesses within 15 ft of Back of Curb	Homes or Businesses within 15 ft of Back of Sidewalk	Planning Level Cost Estimate - All Phases (Millions)
1E	Follows Existing Road (White, Yellow & Blue)	3	8	$22.2
1F	Follows Existing with Improved Curve at Seneca Lane (Orange)	4	9	$23.1
1G	Follows Existing with New Connection to US 45 (Blue)	0	0	$18.3
1H	Follows Existing with New Connection Along Cumberland Avenue (Purple)	11	15	$25.3

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

Figure 6-4
KY 1286/KY 998 Planning Study
Two-Lane Widening Option
Section 2: KY 1286 from US 62 to New Holt Rd

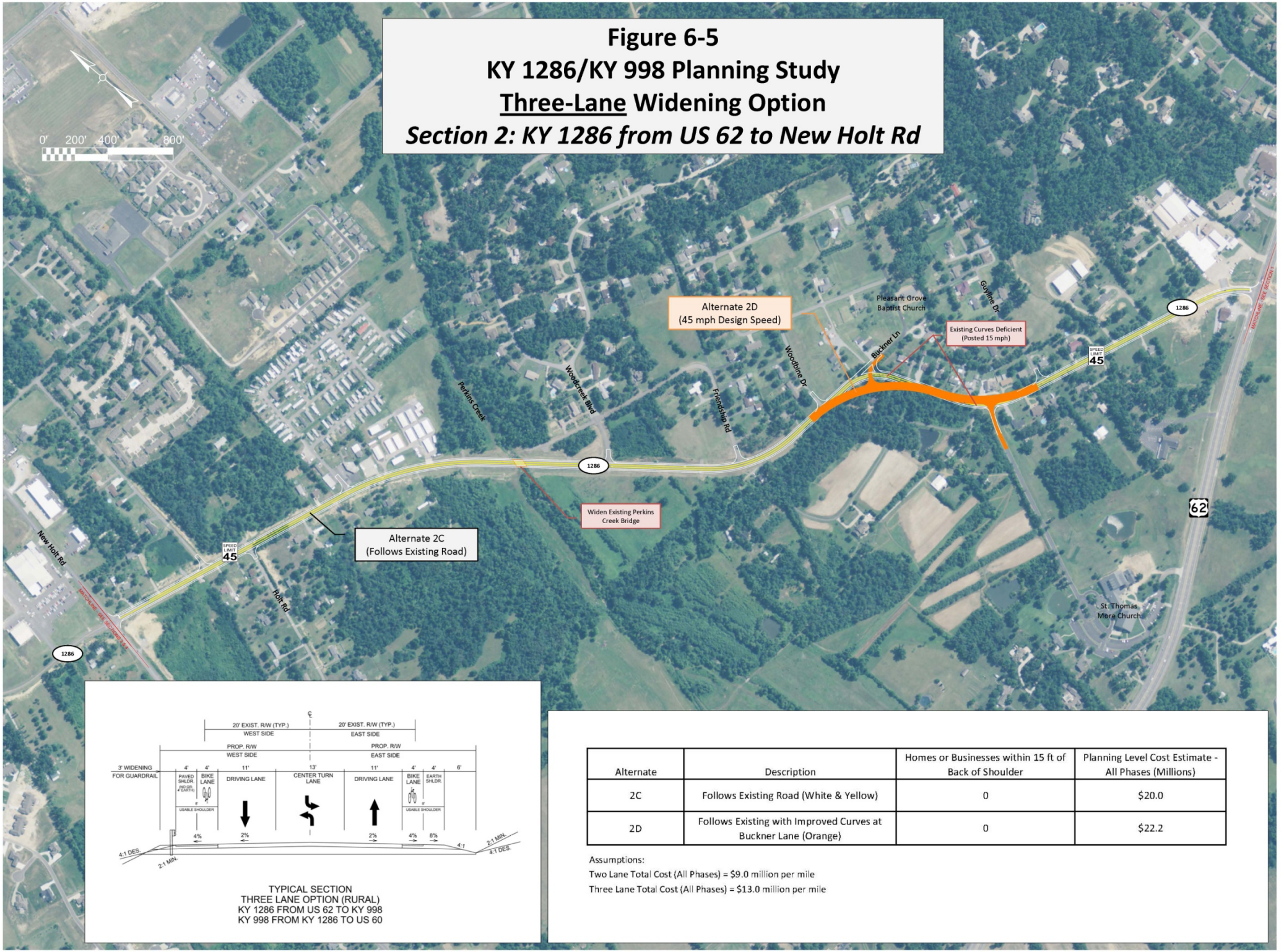


TYPICAL SECTION
TWO LANE OPTION (RURAL)
KY 1286 FROM US 62 TO KY 998
KY 998 FROM KY 1286 TO US 60

Alternate	Description	Homes or Businesses within 15 ft of Back of Shoulder	Planning Level Cost Estimate - All Phases (Millions)
2A	Follows Existing Road (White & Yellow)	0	$15.2
2B	Follows Existing with Improved Curves at Buckner Lane (Orange)	0	$17.0

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

Figure 6-5
KY 1286/KY 998 Planning Study
Three-Lane Widening Option
Section 2: KY 1286 from US 62 to New Holt Rd

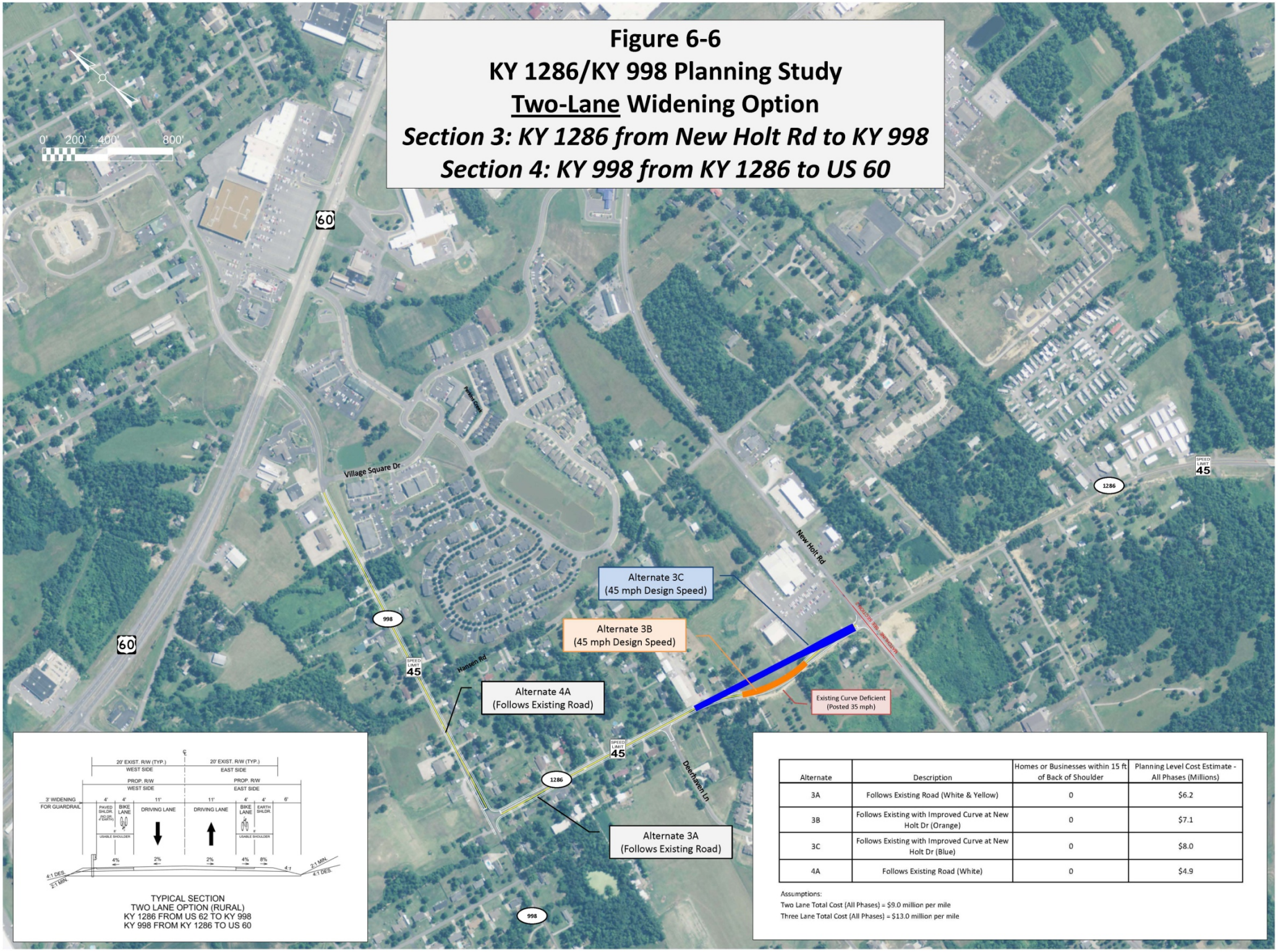


TYPICAL SECTION
THREE LANE OPTION (RURAL)
KY 1286 FROM US 62 TO KY 998
KY 998 FROM KY 1286 TO US 60

Alternate	Description	Homes or Businesses within 15 ft of Back of Shoulder	Planning Level Cost Estimate - All Phases (Millions)
2C	Follows Existing Road (White & Yellow)	0	$20.0
2D	Follows Existing with Improved Curves at Buckner Lane (Orange)	0	$22.2

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

Figure 6-6
KY 1286/KY 998 Planning Study
Two-Lane Widening Option
Section 3: KY 1286 from New Holt Rd to KY 998
Section 4: KY 998 from KY 1286 to US 60

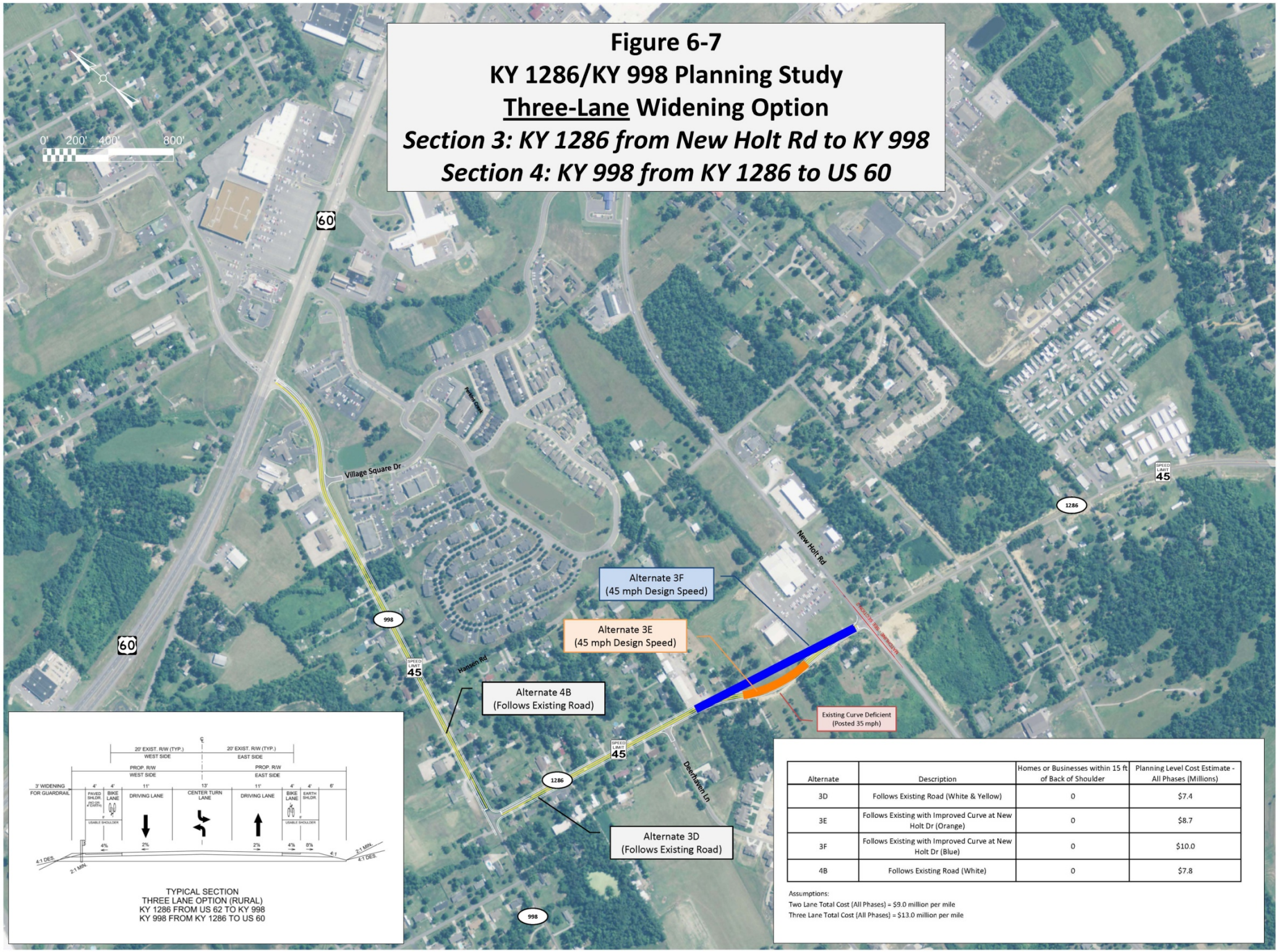


TYPICAL SECTION
TWO LANE OPTION (RURAL)
KY 1286 FROM US 62 TO KY 998
KY 998 FROM KY 1286 TO US 60

Alternate	Description	Homes or Businesses within 15 ft of Back of Shoulder	Planning Level Cost Estimate - All Phases (Millions)
3A	Follows Existing Road (White & Yellow)	0	$6.2
3B	Follows Existing with Improved Curve at New Holt Dr (Orange)	0	$7.1
3C	Follows Existing with Improved Curve at New Holt Dr (Blue)	0	$8.0
4A	Follows Existing Road (White)	0	$4.9

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

Figure 6-7
KY 1286/KY 998 Planning Study
Three-Lane Widening Option
Section 3: KY 1286 from New Holt Rd to KY 998
Section 4: KY 998 from KY 1286 to US 60



TYPICAL SECTION
THREE LANE OPTION (RURAL)
KY 1286 FROM US 62 TO KY 998
KY 998 FROM KY 1286 TO US 60

Alternate	Description	Homes or Businesses within 15 ft of Back of Shoulder	Planning Level Cost Estimate - All Phases (Millions)
3D	Follows Existing Road (White & Yellow)	0	$7.4
3E	Follows Existing with Improved Curve at New Holt Dr (Orange)	0	$8.7
3F	Follows Existing with Improved Curve at New Holt Dr (Blue)	0	$10.0
4B	Follows Existing Road (White)	0	$7.8

Assumptions:
Two Lane Total Cost (All Phases) = $9.0 million per mile
Three Lane Total Cost (All Phases) = $13.0 million per mile

B. Comparison of Costs & Impacts

Based on the conceptual alignments, **Table 6-1** presents a comparison of costs and potential relocation impacts for each alternate. The number of potential relocations is not the number of homes or businesses that would be relocated; it is a measure of the potential impacts. The 15 foot buffer also provides room for potential utility relocations. In reality, homes or businesses outside the 15 foot buffer may need to be relocated. Cost estimates are based on an estimated per-mile cost provided by KYTC Highway District 1 and include Design, Right-of-Way, Utilities, and Construction.

Table 6-1: Comparison of Alternate Costs and Relocations

Alternate	Homes & Businesses within 15 feet of project footprint	Cost Estimate (Millions)
No Build	0	0
Spot Improvements	TBD	TBD
Improve Two-Lane	0-7	$40.6-$47.8
Three-Lane Widening	0-9	$53.5-$63.1

Other potential impacts of widening the road are listed below. The portion of KY 1286 between US 45 and US 62 is of particular concern because of the number of homes, businesses, utilities, and community resources along this section of the road.

- **Utilities** – Most of the corridor has underground waterlines as well as above ground power, cable, and telephone lines that lie just off the existing road. Avoiding and/or relocating these utilities will be a major factor during the design process and in future phases of project development, especially on KY 1286 between US 45 and US 62.
- **Bridges and Culverts** - One structure lies along KY 1286 within the project area: Bridge 073B00167 over Perkins Creek. The bridge will likely need to be widened or replaced if a three lane typical section is selected in this segment.
- **Cemeteries and Churches** – Two cemeteries lie in the vicinity of KY 1286, one of which (Mount Kenton Cemetery) abuts the roadway. There are also numerous churches along KY 1286.
- **Floodplain Encroachment** - Perkins Creek passes through the study area. Portions of the study route fall within the creek's floodplain, which is known to be susceptible to flash flooding; significant drainage issues will need to be addressed. Perkins Creek has been determined to support aquatic life use and, based on coordination with the US Army Corps of Engineers, may represent a jurisdictional waterway requiring a Section 404 permit. There are scattered wetlands along the corridor. Any effected wetlands should be delineated; impacts may require permits from the US Army Corps of Engineers and/or the Kentucky Division of Water.
- **Schools** - The corridor provides direct access to Lone Oak Elementary School; several other schools are also located in the vicinity and rely on KY 1286 for indirect access. The new consolidated High School is located nearby on US 60.
- **Hazardous Materials/Underground Storage Tank Sites** – GIS data from the US Environmental Protection Agency include a few permitted facilities/monitored sites along the corridor, particularly at the US highways. Solid wastes generated by any future construction activities must be disposed of at a permitted facility.

The project team met again in April 2013 to review the proposed alternates prior to presenting them to the public. A summary of the meeting is included in **Appendix G**. Each of the four alternates was presented to stakeholders, agencies, and the public during summer 2013. These efforts are described in **Section 7**.

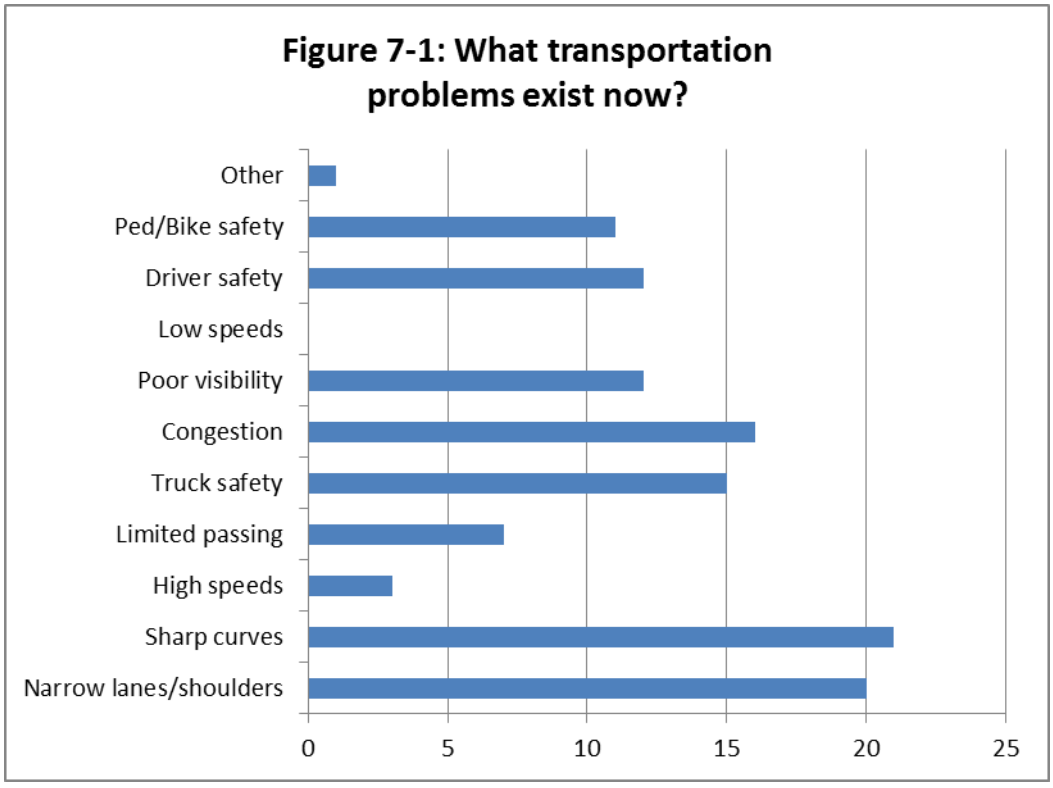
Section 7
Final Agency & Public Coordination

Following the development of alternates, the project team contacted resource agencies and met with stakeholders and interested members of the public. At these coordination points, alternates were presented and each group was asked to provide feedback regarding their concerns and/or preferences.

A. Public Meeting

An open house public meeting was held on June 17, 2013 at the Lone Oak Elementary School in Paducah. The meeting summary is included in **Appendix H**. The purpose of the meeting was to present project findings, solicit input, and give the public an opportunity to ask questions of the project team. Display boards provided information about key roadway characteristics, existing traffic conditions and crashes, environmental features, and proposed alternates. Excluding the project team, 35 individuals attended the meeting.

Attendees were asked to complete a survey to indicate their concerns with the existing route and preferences regarding proposed alternates. Of the 21 completed surveys returned, all respondents indicated the corridor should be improved. When asked to identify existing transportation problems, respondents indicated that sharp curves and narrow lanes/shoulders were their top concerns. **Figure 7-1** presents other responses to this question.



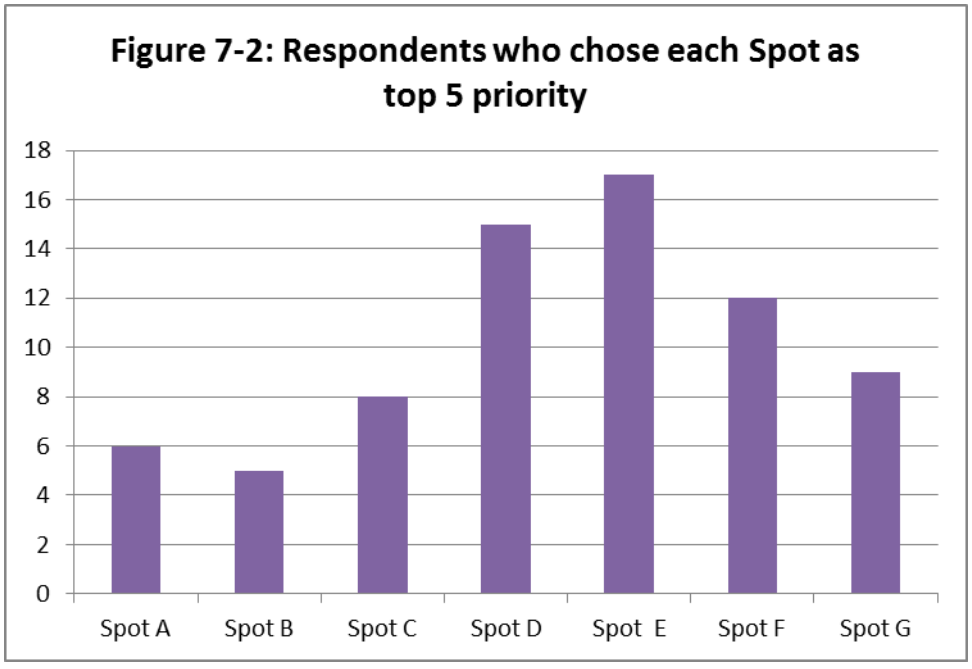
The Three-Lane Widening Alternate was preferred by most respondents: 14 individuals preferred this alternate as a long term solution while 7 preferred the Two-Lane Widening Alternate. No one indicated that the No Build or Spot Improvement Only scenario was their preferred option.

When asked which segment most needed improvement, respondents indicated that Segment 1, US 45 to US 62, was the highest priority need, followed by Segment 2, 3, then 4.

When asked whether bicycle and pedestrians should be accommodated along the corridor, the majority (67%) of respondents indicated that they should not. The remaining 33% were in favor of providing bicycle and pedestrian facilities along the corridor.

Participants were asked to identify their top 5 priority Spot Improvements (shown in **Figure 6-1**). Spots D, E, and F were the most often selected priority spots; **Figure 7-2** presents other rankings from this question. For spot improvement locations with multiple options, respondents were asked to indicate their preference:

- For Spot B, respondents were divided whether they preferred improving the curve to operate at a 45 mph design speed or removing the curve to create a straight segment, which would also operate at a 45 mph design speed.
- For Spot D (curve at Buckner Lane), the majority (15) of respondents preferred improving the curve on new alignment to increase the design speed to 45 mph.
- For Spot E (curve at Seneca Lane), respondents were evenly split whether they preferred improving the curve to operate at a 35 mph design speed or creating a new link to US 45, which would operate at a 35 mph design speed.



B. Agency Coordination

The project team sent letters to 52 federal, state, and local resource agencies/organizations and 3 elected officials on August 16, 2013. The letter, included as part of **Appendix E**, requested agency comments on the proposed improvement alternates, the draft Purpose and Need statement, significant issues or concerns in the study area, conservation or development plans, sensitive environmental resources, and mitigation strategies.

Twenty-one written responses were received, which have been included in **Appendix E**. Specific comments have been incorporated throughout this report. Two agencies offered specific alternate preferences:

- The Paducah Police Department prefers a two lane widening option with a new link to US 45 through the cemetery, realignment of the Buckner Lane reverse curves, and realignment of the curve west of New Holt Road.
- The Paducah Transit Authority prefers the Three-Lane Widening Alternate, with Segment 1 being the highest priority for funding. The agency also suggested that consideration be given to bicycle and pedestrian access.

Section 8
Conclusions & Recommendations

This chapter provides recommendations for improvements to KY 1286 (Friendship Road) and KY 998 (Olivet Church Road) between US 45 and US 60.

A. Final Project Team Meeting

The project team met for the final time on August 26, 2013 at the KYTC District 1 Office in Paducah, Kentucky. The purpose of the meeting was to discuss the input from the resource agencies and public meeting; and to discuss the spot improvement and long term improvement recommendations that would be presented at Stakeholder Meeting #2 later that day. Detailed discussion of Agency Coordination and the Public Meeting can be found in **Section 7**. A detailed summary of the final project team meeting is included in **Appendix G**.

After detailed discussion, the following projects were recommended to advance to future phases of project development.

- Segment 1: Both Alternate 1F and Alternate 1G should be considered.
- Combine Spot Improvement B and Spot Improvement C into one project.
- Spot Improvement F
- Segment 2: Alternate 2B with improved curves near Buckner Lane including a potential new alignment which removes the reverse curves.
- Segment 3: Alternate 3B with an improved curve near Hew Holt Road.
- Segment 4: Alternate 4A
- Spot Improvement A

In addition, the project team recommended Spot Improvements D, E, and G (shown in **Figure 6-1**) be removed as standalone projects. It was decided that these improvements should be made in conjunction with the segment improvements discussed above. The project team also removed all segment alternates that maintain the existing roadway alignment. The project team felt improving the roadway alignment/deficient horizontal curves was needed to meet the purpose of the project. Finally, Segment Option 1D was removed from consideration due to the high cost and the high number of potential home and business relocations relative to the other alternates in Segment 1.

B. Stakeholder Meeting #2

A second stakeholder meeting was held after the final project team meeting on Monday, August 26, 2013 at the KYTC District 1 Office in Paducah. A copy of the meeting summary is included in **Appendix H**. The purpose of the meeting was to discuss the project findings and get input from the stakeholders on the project team recommendations for the study corridor. The stakeholders agreed with the project team recommendations discussed in **Section 8.A**. Key comments from attendees are summarized below; alternates can be reviewed graphically in **Figures 6-1** through **6-7**:

- Right turn lanes on US 62 should be considered. (Note: Analyzing this suggestion is outside the scope of this planning effort.)
- It would be better to widen Segment 1 due to its high traffic volumes, rather than to only implement spot improvements.
- This project is a good opportunity to add bike lanes and possibly sidewalks between Lone Oak and the Kentucky Oaks Mall.
- A three lane typical section is preferred for the entire study area.
- Segment 1 is the top priority along the corridor.
- Options 1F (improving curve at Seneca to 35-45 mph design speed) and 1G (new link to US 45 through Kenton Cemetery) were both recommended for consideration in future phases.
- Option 2D (improving curves at Buckner Lane) was recommended for consideration in future phases.

C. Recommended Improvements

In light of the input received and the analysis detailed in this report, seven projects are recommended to advance to future phases of project development. The following summary outlines the list of projects and their priority with #**1 being the top priority and #7 being the lowest priority**.

1. Segment 1: Both Alternate 1F and Alternate 1G (shown in **Figure 6-3**) should be considered with a 35 to 45 mph design speed. Given the number of cross streets and business and residential driveways along the segment, an urban three lane typical section is recommended. Bicycle and pedestrian facilities are recommended and should be studied further in the next phase of the project. Connection to Lone Oak Elementary School should be emphasized. To address poor LOS at the US 45 intersection, additional capacity at this intersection should be considered as part of the overall segment improvement.
2. Combine Spot Improvement B and Spot Improvement C into one project; fix the deficient horizontal curve between Deerhaven Lane and New Holt Road and add left turn lanes at the KY 1286/New Holt Road intersection.
3. Spot Improvement F: Add turn lanes on KY 1286 for Lone Oak Elementary School. This improvement was recommended in the 2002 Paducah-McCracken County Transportation Study. If Segment 1 is widened to three lanes, this project should be implemented as part of the larger widening project. Otherwise, it should be implemented as a standalone improvement.
4. Segment 2: Alternate 2B (shown in **Figure 6-4**) with a 45 mph design speed and improved curves near Buckner Lane, including a potential new alignment which removes the reverse curves. A rural two lane typical section is recommended based on the preliminary traffic analysis but a three lane typical section should also be considered, particularly given the driveway density and number of side streets along the segment. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. A spot improvement to add turn lanes at the New Holt Road intersection is included as an independent, higher priority proposed project. If Spot Improvement C has not been completed, it should be implemented as part of this larger widening project.

5. Segment 3: Alternate 3C (shown in **Figure 6-6**) with a 45 mph design speed and an improved curve near Hew Holt Road. A rural two lane typical section is recommended based on the preliminary traffic analysis but a three lane typical section should also be considered. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. Spot improvements at this location are included as independent, higher priority proposed projects. If Spot Improvements A, B, and C have not been completed, it should be implemented as part of this larger widening project.

6. Segment 4: Alternate 4A (shown in **Figure 6-6**) with a 45 mph design speed. A rural two lane typical section is recommended based on the preliminary traffic analysis but a three lane typical section should also be considered. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project.

7. Spot Improvement A: Although existing traffic does not justify turn lanes at this time, this should be looked at as a future improvement as traffic grows. If Segments 3 or 4 are widened, this project should be implemented as part of the larger widening projects. Otherwise, it should be implemented as a standalone improvement.

Figures 8-1 through **8-7** (presented at the end of this section) show the seven recommended improvements including the priority, layout, and cost estimate information. **Table 8-1** provides summary cost information for each priority recommendation. Because the proposed layouts are planning level drawings, additional traffic analysis and design will be needed to determine the actual dimensions, alignment, and final cross-section. These elements will be determined in future project development phases.

Table 8-1: Planning Level Cost Estimates by Phase for Recommended Priorities

Priority	Project	Cost by Phase	Total Cost
1	Widen KY 1286 to three lanes, US 45 to US 62 (Alternate 1F or 1G)	<u>Alternate 1F:</u> Design = $1.3 million ROW = $8.0 million Utilities = $3.0 million Construction = $10.8 million <u>Alternate 1G:</u> Design = $1.1 million ROW = $6.3 million Utilities = $2.4 million Construction = $8.6 million	$23.1 million $18.4 million
2	Intersection Improvements near New Holt Road; fix curve and add turn lanes. (Spot B and Spot C)	Design = $0.3 million ROW = $1.5 million Utilities = $0.6 million Construction = $2.1 million	$4.5 million
3	Add turn Lanes to Lone Oak School (Spot F)	Design = $0.2 million ROW = $0.8 million Utilities = $0.3 million Construction = $1.1 million	$2.4 million
4	Widen KY 1286, US 62 to New Holt Road (Alternate 2B)	Design = $1.0 million ROW = $5.7 million Utilities = $1.9 million Construction = $8.4 million	$17.0 million
5	Widen KY 1286, New Holt Road to KY 998 (Alternate 3C)	Design = $0.5 million ROW = $2.7 million Utilities = $0.9 million Construction = $3.9 million	$8.0 million
6	Widen KY 998, KY 1286 to Village Square Drive (Alternate 4A)	Design = $0.3 million ROW = $1.6 million Utilities = $0.6 million Construction = $2.4 million	$4.9 million
7	Add turn Lanes at KY 1286/KY 998 (Spot A)	Design = $0.2 million ROW = $1.2 million Utilities = $0.5 million Construction = $1.7 million	$3.6 million

D. Construction and Environmental Considerations for Future Phases

Construction and environmental considerations identified throughout the study process are summarized here for further consideration in future project development phases:

- **Noise** – This project is a Type I project as designated in FHWA Regulation 23 CFR Part 772 and, in any future project development phases, a detailed noise analysis should follow the FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise and the Kentucky Transportation Cabinet Noise Analysis and Abatement Policy (July 13, 2011).
- **Waste Management** – Solid wastes occurring as part of the construction process must be disposed of at a permitted facility. Underground storage tanks and other contaminants should be properly addressed as they are encountered.
- **Traffic Operations** – Maintenance of traffic and residential access should be preserved throughout the construction process.
- **Geotechnical Considerations** – Site specific geotechnical investigations are critical in this region prior to design. Soils in the area are generally suitable for embankment construction; suitable rock for embankment construction and rock roadbed is also readily available in this area of the state. Soils in the area are considered erodible. Chemical modification of subgrade is sometimes used. Wet areas could require undercutting and replacement of soils.
- **Utilities** – Underground waterlines as well as above ground power, cable, and telephone lines lie just off the existing road for most of the corridor. Avoiding and/or relocating these utilities will be a major factor during the design process and in future phases of project development, especially in Segment 1 between US 45 and US 62. Consideration should also be given to the electrical substation located along this route.
- **Bridges and Culverts** - One structure lies along KY 1286 within the project area: Bridge 073B00167 over Perkins Creek. The bridge was constructed in 2007 and was rated in Very Good condition during its June 2013 inspection. The bridge will likely need to be widened or replaced if a three lane typical section is selected in Segment 2.
- **Erosion and Sediment Control** – Measures should be utilized to control erosion and sedimentation during and after the commencement of earth-disturbing activities. Consideration should be given to erosion control methods; a Best Management Practices for Construction Activities guide is available from the Kentucky Division of Conservation.
- **Cemeteries and Churches** – Two cemeteries lie in the vicinity of KY 1286, one of which (Mount Kenton Cemetery) abuts the roadway which will be impacted if Alternate 1C is selected. There are numerous churches along KY 1286.
- **Schools** - The corridor provides direct access to Lone Oak Elementary School; several other schools are also located in the vicinity and rely on KY 1286 for indirect access.
- **Threatened and Endangered Species** – The federally endangered Indiana bat, clubshell, fanshell, fat pocketbook, orange pimpleback, ring pink, pink mucket, sheepnose, rough pigtoe, Spectaclecase, Interior Least Tern, and the federally threatened Rabbitsfoot could be in the project area. In addition to the federally-listed species, numerous state-listed species are known to be located in the vicinity of the project area. If species are identified, a biological assessment will be required. In addition

USFWS records indicate that the project area falls within the home range of known maternity colony for the Indiana bat. USFWS recommends the project should eliminate/reduce impacts to trees or address potential impacts to the Indiana bat through adherence to the 2012 Indiana bat Programmatic Agreement. KDFWR recommends surveying for potential Interior Least Tern habitat as well.

- **Floodplain - Perkins Creek passes through the study area.** Portions of the study route fall within the creek's floodplain, which is known to be susceptible to flash flooding. Perkins Creek has been determined to support aquatic life use and, based on coordination with the US Army Corps of Engineers, may represent a jurisdictional waterway requiring a Section 404 permit. There are scattered wetlands along the corridor. Any effected wetlands should be delineated; impacts may require permits from the US Army Corps of Engineers and/or the Kentucky Division of Water. Consideration should be given to significant drainage issues.

- **Cultural & Historic Resources** - Based on preliminary field inspections, several buildings in the vicinity are over 50 years in age but none exhibit distinguishing architectural features. Early coordination with the Kentucky Heritage Council recommended an archaeological and cultural historic survey of the project area to identify project-related impacts and to ensure compliance with Section 106 of the National Historic Preservation Act.

- **Hazardous Materials** - GIS data from the US Environmental Protection Agency include a few permitted facilities/monitored sites along the corridor, particularly at the US highways. Solid wastes generated by any future construction activities must be disposed of at a permitted facility.

FIGURE 8-1
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #1: Widen Segment 1 to three lanes from US 45 to US 62

Description:

The existing two lane segment between US 45 and US 62 has 10-11 foot wide travel lanes with 3 foot wide stabilized shoulders. The speed limit is 35-45 mph. Today, the highway experiences congestion during peak periods and exhibits more frequent crashes than can be attributed to random occurrences, particularly at Seneca Lane where the CRF is 4.86.

Recommendation:

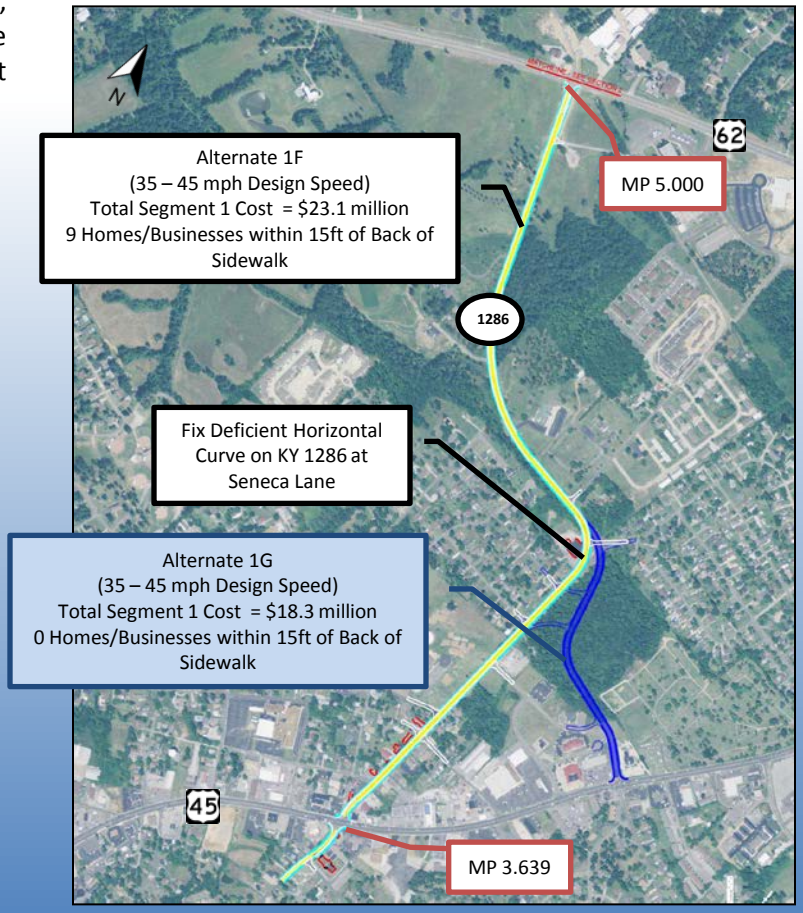
The corridor is recommended to be widened to three lanes with sidewalks, bike lanes, and curb/gutter. Two alternatives should be evaluated further: 1F to improve the existing alignment, including the curve at Seneca Lane, and 1G to create a new link between Seneca Lane and US 45 that passes through Mount Kenton Cemetery connecting to Lakeview Drive. Connection to Lone Oak Elementary School (LOES) should be emphasized. To address poor LOS at the US 45 intersection, additional capacity at this intersection should be considered as part of the overall segment improvement.

Purpose:

Improve capacity & safety

Looking north towards Seneca curve

Location	KY 1286 milepoints 3.639 – 5.000 Project Length = 1.4 miles
Traffic	10,400 AADT in 2013 15,600 AADT in 2040 Experiences congestion (V/C = 0.92)
Crashes	121 crashes (32 injury) during 2008-2012 Segment CRF = 1.80 Includes 4 high crash spots (CRF>1)
Existing Geometry	Substandard lane width Substandard shoulder width Substandard horizontal curve at Seneca Ln
2013 Cost Estimate Alt 1F (Alt 1G)	Design = $1.3 million ($1.1 million) ROW = $8.0 million ($6.3 million) Utilities = $3.0 million ($2.4 million) Construction = $10.8 million ($8.6 million) **Total Cost = $23.1 million ($18.4 million)**
Utilities	Electric, water, sewer along existing KY 1286



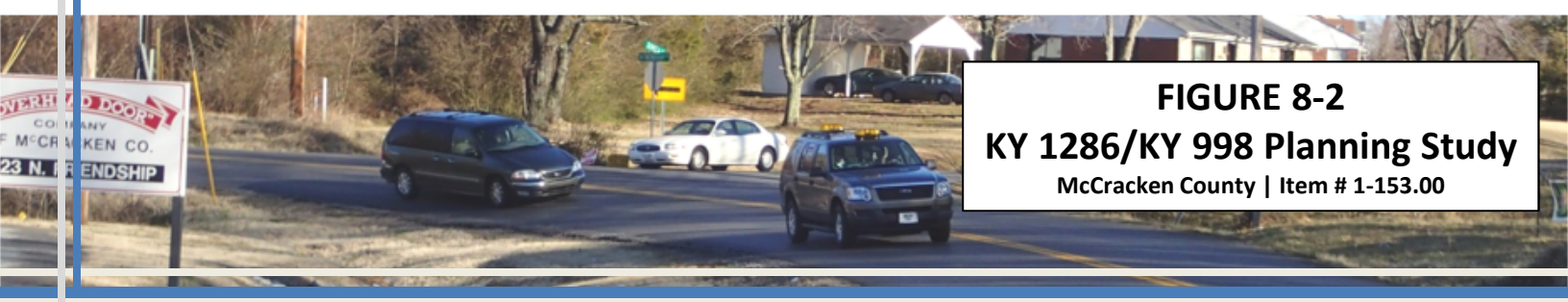


FIGURE 8-2
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #2: Alignment and Intersection Improvements near New Holt Road

Description:

The existing intersection of KY 1286 and New Holt Road is signalized with left turn bays on New Holt Road. KY 1286 has two 10 foot travel lanes with 3 foot wide stabilized shoulders. The speed limit is 45 mph. Today, the highway exhibits more frequent crashes at the New Holt Road/KY 1286 intersection than can be attributed to random occurrences. The CRF at this location is 1.35.

Recommendation:

Two improvements are recommended in this location: 1) adding turn lanes at the New Holt intersection for both KY 1286 approaches and 2) improving the deficient horizontal curve west of the intersection. This location was identified as a priority from the public meeting surveys in June 2013.

Purpose:

Improve safety and traffic flow.

Location	KY 1286 milepoints 6.350-6.650 Project Length = 0.3 mile
Traffic	4,600 AADT in 2013 6,900 AADT in 2040 Adequate capacity
Crashes	Includes 1 high crash spot (CRF=1.35)
Existing Geometry	Substandard lane width Substandard shoulder width Substandard horizontal curve
2013 Cost Estimate	Design = $0.3 million, ROW = $1.5 million, Utilities = $0.6 million, Construction = $2.1 million. **Total Cost = $4.5 million**
Utilities	Water along existing KY 1286

Right: Looking east along KY 1286 to New Holt Road intersection

FIGURE 8-3
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #3: Add Turn Lanes to Lone Oak Elementary School

Description:

The existing two lane segment at Lone Oak Elementary School (LOES) has 10 foot wide travel lanes with 3 foot wide stabilized shoulders. The speed limit is 35 mph. Today, the highway experiences congestion during peak periods and the segment exhibits more frequent crashes than can be attributed to random occurrences. The CRF along this segment of KY 1286 is 1.80.

Recommendation:

Turn lanes into LOES are recommended to improve safety and help channelize school traffic during peak periods. This improvement was identified as a Group III priority in the 2002 *Paducah-McCracken County Transportation Study*. If segment 1 (US 45 to US 62) is widened to three lanes, this project should be implemented as part of the larger widening project. Otherwise, it should be implemented as a stand-alone improvement. This location was identified as priority #5 from the public meeting surveys.

Purpose:

Improve traffic flow & safety

Location	KY 1286 milepoints 3.800-3.900 Project Length = 0.1 mile
Traffic	10,400 AADT in 2013 15,600 AADT in 2040 Experiences congestion (V/C = 0.92)
Crashes	In high crash segment (CRF = 1.80) Adjacent to high crash spot (CRF=1.77)
Existing Geometry	Substandard lane width Substandard shoulder width
2013 Cost Estimate	Design = $0.2 million, ROW = $0.8 million, Utilities = $0.3 million, Construction = $1.1 million. **Total Cost = $2.4 million**
Utilities	Electric, water, sewer along existing KY 1286

Top: Looking north along KY 1286 at LOES
Bottom: Looking south along KY 1286 at LOES

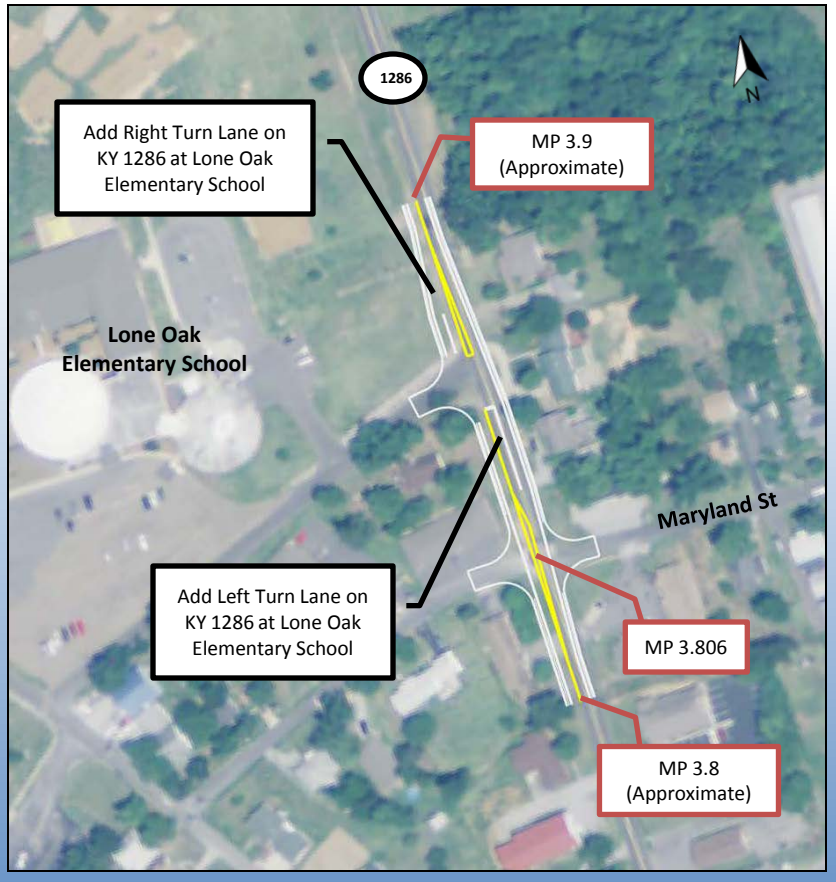


FIGURE 8-4
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #4: Widen Segment 2 from US 62 to New Holt Road

Description:

The existing two lane segment between US 62 and New Holt Road has 10-11 foot wide travel lanes with 3 foot wide stabilized shoulders. The speed limit is 45 mph. The highway exhibits more frequent crashes at the curve south of Buckner Lane than can be attributed to random occurrences. The CRF at this location is 1.15.

Recommendation:

Two alternatives should be evaluated further: (1) the corridor widened to include two 11 foot lanes with striped bike lanes on 8 foot shoulders and (2) widening the corridor to three lanes. The three lane widening alternative should be considered because the high number of driveways in this segment. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. Widening for both alternatives should generally follow the existing alignment but should improve the reverse curves at Buckner Lane to address safety. A spot improvement to add turn lanes at the New Holt Road intersection is included as an independent, higher priority proposed project. If Spot Improvement C has not be completed, it should be implemented as part of this larger widening project.

Purpose:

Improve level of service & safety

Location	KY 1286 milepoints 5.000 – 6.423 Project Length = 1.4 miles
Traffic	6,500 AADT in 2013 9,700 AADT in 2040
Crashes	41 crashes (7 injury) during 2008-2012 Segment CRF = 0.82 Includes 2 high crash spots (CRF>1)
Existing Geometry	Substandard lane width Substandard shoulder width Two substandard horizontal curves One substandard headlight sight distance
2013 Cost Estimate	Design = $1.0 million, ROW = $5.7 million, Utilities = $1.9 million, Construction = $8.4 million. **Total Cost = $17.0 million**
Utilities	Water and sewer along existing KY 1286

Looking east along KY 1286 at Buckner Lane

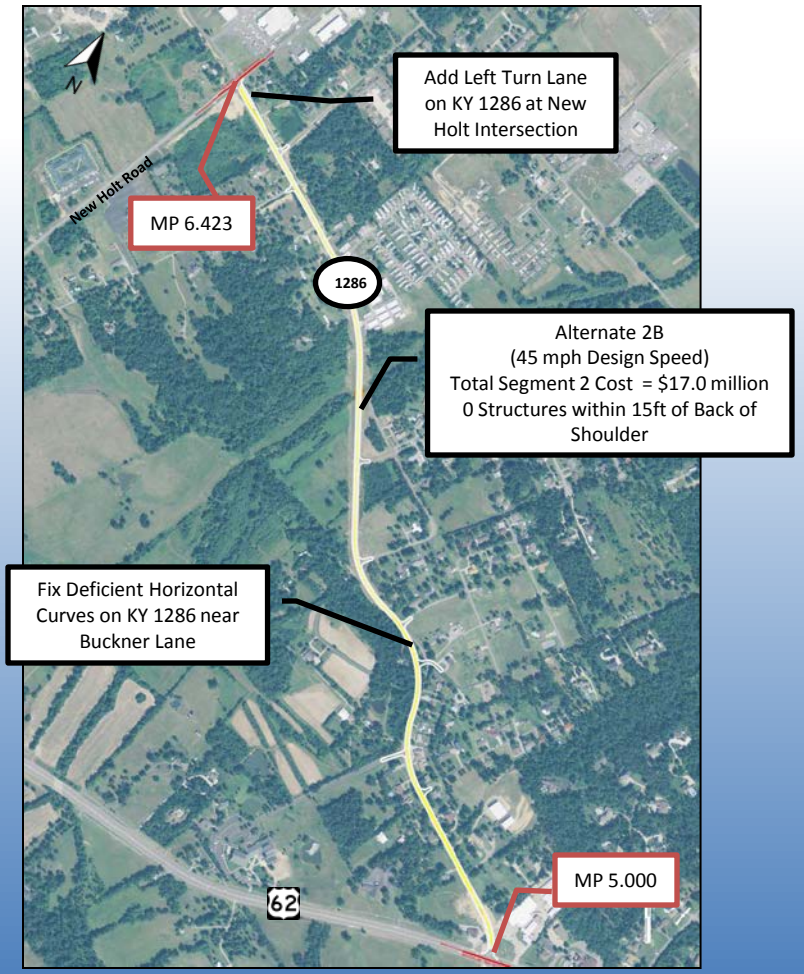


FIGURE 8-5
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #5: Widen Segment 3 from New Holt Road to KY 998

Description:

The existing two lane segment between New Holt Road and KY 998 has 10-11 foot wide travel lanes with 3 foot wide stabilized shoulders. The speed limit is 45 mph. The highway exhibits more frequent crashes at the New Holt intersection than can be attributed to random occurrences. The CRF at this intersection is 1.35.

Recommendation:

Two alternatives should be evaluated further: (1) the corridor widened to include two 11 foot lanes with striped bike lanes on 8 foot shoulders and (2) widening the corridor to three lanes. The three lane widening alternative should be considered because of the high number of driveways in this segment. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. Widening should generally follow the existing alignment but should improve the substandard curve west of New Holt Road to address safety. Spot improvements at this location are included as independent, higher priority proposed projects. If Spot Improvements A, B, and C have not been completed, it should be implemented as part of this larger widening project.

Purpose:

Improve level of service & safety

Location	KY 1286 milepoints 6.423 – 6.916 Project Length = 0.5 mile
Traffic	4,600 AADT in 2013 6,900 AADT in 2040 Adequate capacity
Crashes	8 crashes (4 injury) during 2008-2012 Segment CRF = 0.5 Includes 1 high crash spot (CRF=1.35)
Existing Geometry	Substandard lane width Substandard shoulder width One substandard horizontal curve
2013 Cost Estimate	Design = $0.5 million, ROW = $2.7 million, Utilities = $0.9 million, Construction = $3.9 million. **Total Cost = $8.0 million**
Utilities	Water along existing KY 1286

Top: Looking east along KY 1286 to New Holt Road
Bottom: Looking west along KY 1286 to KY 998

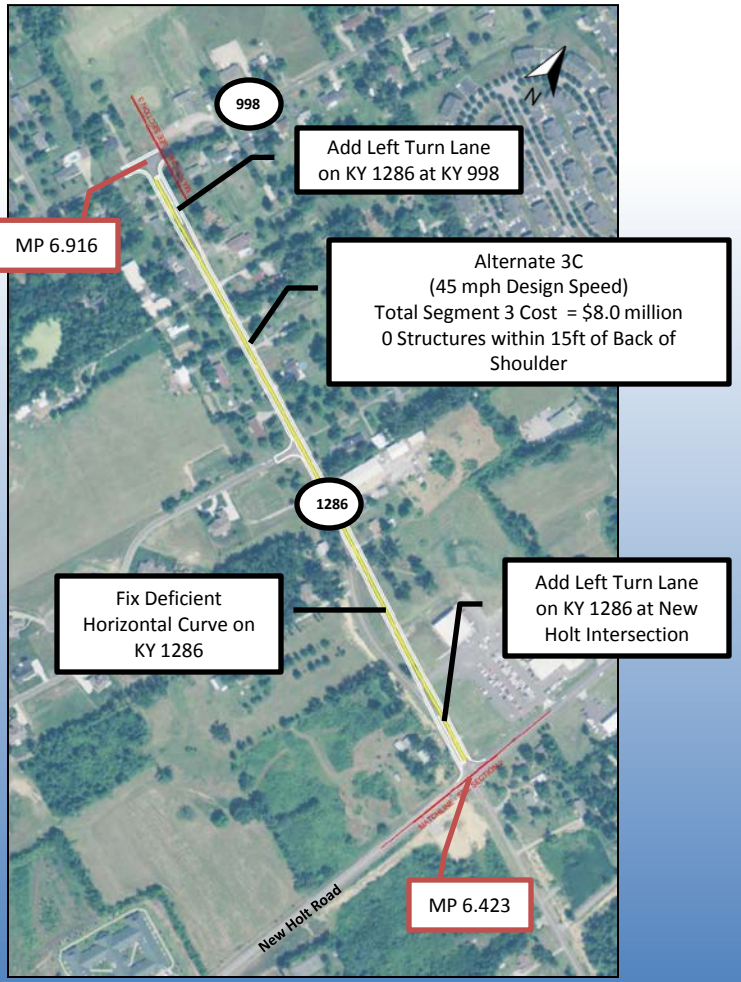


FIGURE 8-6
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #6: Widen Segment 4 from KY 1286 to Village Square Drive

Description:

The existing two lane segment of KY 998 between KY 1286 and US 60 has 9-12 foot wide travel lanes with 2-10 foot wide shoulders. The speed limit is 45 mph. The KY 998 southern approach to the US 60 intersection was recently improved to Village Square Drive, providing 12 foot travel lanes and a left turn lane.

Recommendation:

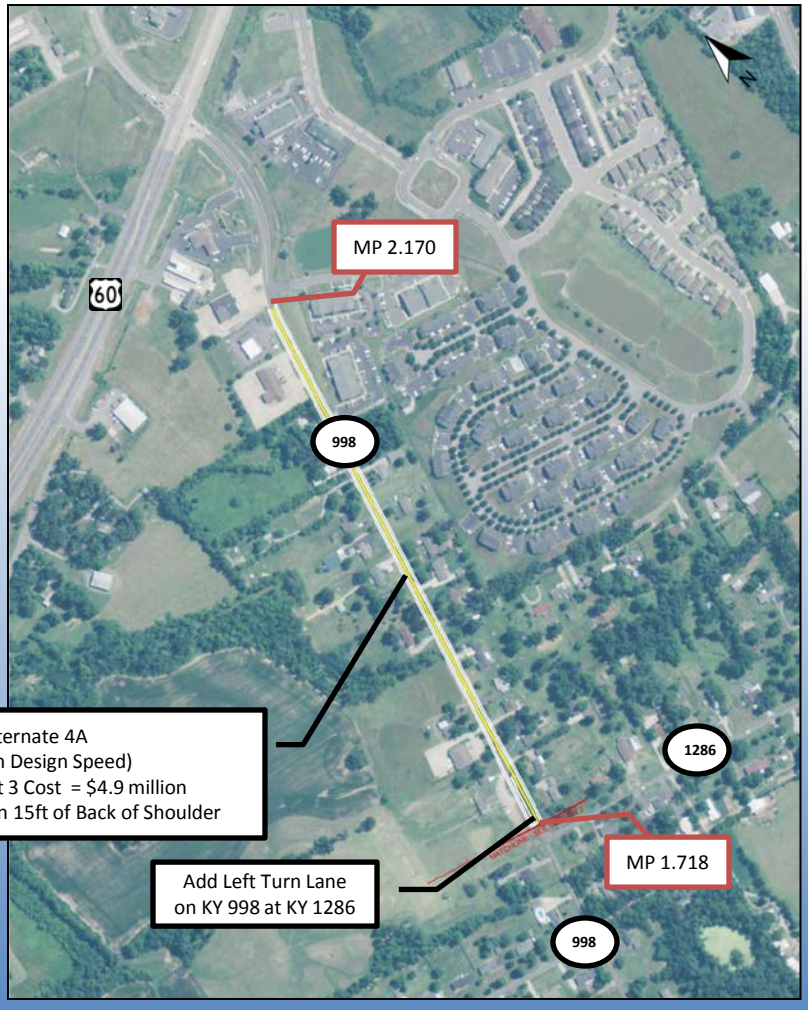
Two alternatives should be evaluated further: (1) the corridor widened to include two 11 foot lanes with striped bike lanes on 8 foot shoulders and (2) widening the corridor to three lanes. The three lane widening alternative should be considered because the high number of driveways in this segment. At a minimum bicycle facilities are recommended, but pedestrian facilities should also be considered in the next phase of the project. Widening should generally follow the existing alignment and tie into the improved section at the US 60 intersection.

Purpose:

Improve level of service and safety

Above: Looking north along KY 998 from KY 1286

Location	KY 998 milepoints 1.718 – 2.170 Project Length = 0.5 mile
Traffic	5,400 AADT in 2013 8,100 AADT in 2040 Adequate capacity
Crashes	15 crashes (4 injury) during 2008-2012 Segment CRF = 0.7
Existing Geometry	Substandard lane width Substandard shoulder width
2013 Cost Estimate	Design = $0.3 million, ROW = $1.6 million, Utilities = $0.6 million, Construction = $2.4 million. **Total Cost = $4.9 million**
Utilities	Electric, water, sewer along existing KY 1286



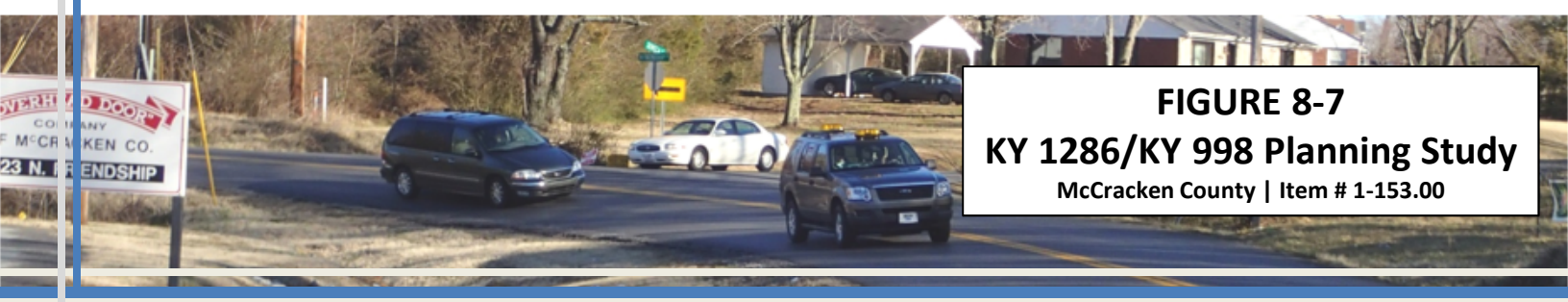


FIGURE 8-7
KY 1286/KY 998 Planning Study
McCracken County | Item # 1-153.00

Priority #7: Add turn lanes at KY 1286/KY 998 Intersection

Description:

At the existing intersection, KY 1286 ends at KY 998 with a stop sign. North-south movements along KY 998 do not stop. Lanes on each approach are 9-10 feet wide with narrow shoulders.

Recommendation:

Although existing traffic and safety data do not justify adding turn lanes at this time, this improvement should be considered as traffic volumes grow along the corridor. If Segments 3 or 4 are widened, this project should be implemented as part of the larger widening projects. Otherwise, it should be implemented as a standalone improvement. This location was identified as priority 7 from the public surveys.

Purpose:

Improve traffic flow and safety

Location	KY 1286 milepoint 6.8 to 6.916 KY 998 milepoint 1.7 to 1.8 Project Length = 0.2 mile
Traffic	4,600-5,400 AADT in 2013 6,900-8,100 AADT in 2040 Adequate capacity
Crashes	No high crash segments or spots
Existing Geometry	Substandard lane width Substandard shoulder width
2013 Cost Estimate	Design = $0.2 million, ROW = $1.2 million, Utilities = $0.5 million, Construction = $1.7 million. **Total Cost = $3.6 million**
Utilities	Water along existing KY 1286

Near Right: Looking west along KY 1286 to KY 998

Far Right: Looking north along KY 998 from KY 1286