

US 41A KINGDOM HALL ROAD TO KY 670

Hopkins & Webster
Counties, KY

SCOPING STUDY



ITEM NUMBER 2-8303.00



FINAL REPORT

MAY 2012

PREPARED BY:



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TABLE OF CONTENTS

Executive Summary.....	ES-1
Chapter 1.....	1
1.1 Introduction	1
Chapter 2.....	1
2.1 Purpose and Need	1
Chapter 3.....	1
3.1 Study Area	1
3.2 Other Existing Roadways	4
3.3 Other Relevant KYTC Projects	5
3.4 Rail Transportation	5
3.5 General Corridor Issues	6
Chapter 4.....	9
4.1 Traffic.....	9
4.2 Levels of Service (LOS)	9
4.3 Intersection LOS, Capacity and Turn Lane Warrants	10
4.4 Volume to Capacity Ratios (V/C)	12
4.5 Vertical and Horizontal Deficiencies	12
4.6 Adequacy Ratings.....	14
4.7 Crashes	14
4.8 Structures.....	16
4.9 Access Management.....	16
4.10 Coal Mining	16
Chapter 5.....	20
5.1 Environmental Overview	20
5.2 Socioeconomic Considerations.....	20
5.2.1 Land Use	20
5.2.2 Environmental Justice	20
5.3 Archaeological Resources.....	22
5.4 Architectural Review	23
5.5 UST/HAZMat.....	23

TABLE OF CONTENTS (continued)

5.6	Known Utilities.....	24
5.7	Wetlands/Streams and Floodplains.....	24
5.8	Wild and Scenic Rivers.....	27
5.9	Threatened and Endangered Species	27
5.10	Noise.....	28
5.11	Air	28
5.12	Agricultural Districts	28
5.13	Community.....	28
Chapter 6	28
6.1	Early Project Team Input.....	28
6.2	Early Stakeholder Input.....	29
6.3	Agency Coordination	29
6.4	Other Correspondence Received	32
Chapter 7	33
7.1	Alternatives Considered.....	33
7.2	Alternatives Discussions.....	35
Chapter 8	53
8.1	Final Recommendations.....	53

FIGURES

Figure ES-1 - Project Location.....	ES-2
Figure ES-2 – Medium and Long Term Recommendations.....	ES-6
Figure 1 - Project Location.....	2
Figure 2 - Study Area.....	3
Figure 3 - Sight Distance Issues.....	6
Figure 4 - Narrow Lanes and Shoulders.....	6
Figure 5 - Manitou.....	7
Figure 6 - Nebo	7
Figure 7 - Providence.....	7
Figure 8 – CSX Railroad Parallel to US 41A near Industrial Road	7
Figure 9 – Active Coal Mines.....	7
Figure 10 – Large Coal Trucks along Corridor	7
Figure 11 – Potential Historic House near Nebo	8
Figure 12 – Nebo Cemetery between Manitou and Nebo	8
Figure 13 – Substation along the Corridor.....	8

TABLE OF CONTENTS (continued)

FIGURES (continued)

Figure 14 – Underground Storage Tanks.....	8
Figure 15 – Providence Golf and Country Club	8
Figure 16 – Development entering Providence	8
Figure 17 - Existing and Future Traffic, LOS and V/C Ratios	11
Figure 18 - Crash Data and Vertical and Horizontal Deficiencies.....	13
Figure 19 - Coal Haul and Extended Weight.....	17
Figure 20 - Active and Abandoned Coal Seams.....	19
Figure 21 - Environmental Footprint.....	21
Figure 22 - Bradford L. Porter House.....	23
Figure 23 - Known Utilities.....	25
Figure 24 – TransCanada pipeline.....	26
Figure 25 – Medium and Long Term Recommendations.....	54

TABLES

Table ES-1 – Traffic Characteristics.....	ES-3
Table ES-2 – Intersection Delay.....	ES-3
Table 1 – Traffic Characteristics.....	9
Table 2 – Grades.....	12
Table 3 – Curves.....	12
Table 4– Adequacy Ratings	14
Table 5 - Structures	16
Table 6 - Coal Haul	18

APPENDICES (see CD sleeve in back of report)

Appendix A	Route Data from HIS and KY State Police, Capacity Analyses and Traffic Data
Appendix B	Access Points Inventory
Appendix C	Environmental Justice Report
Appendix D	Architectural Overview
Appendix E	UST and HAZMAT First Search Report
Appendix F	Agency Coordination
Appendix G	Hopkins and Webster Counties Threatened and Endangered Species
Appendix H	Project Team Meeting Minutes
Appendix I	Stakeholders’ Meetings
Appendix J	Shared Four Lane Brochure

Executive Summary

The defined limits for this **US 41A** study extend from Kingdom Hall Road (MP 3.426) just west of Madisonville in Hopkins County to KY 670 (MP 1.324) in Webster County, a distance of 11.176 miles (Figure ES-1). For practical reasons detailed in the full report, this study also included the 800-foot section from Kingdom Hall Road east to Industrial Road. KYTC's **purpose of this project** was to:

- Provide an improved connector for Webster County to Madisonville
- Improve access to the Pennyrile / Breathitt Parkway
- Provide access to Future I-69

US 41A between Madisonville and Providence is a two-lane Rural Minor Arterial roadway; it is included on the National Truck Network but not on the National Highway System. **Work, shopping, freight shipments, higher education, and recreation trips** constitute much of the travel on this route.

Issues along the study corridor include **sight distance restrictions; narrow lanes and shoulders;** curve and grade deficiencies; the communities of Manitou, Nebo, and Providence where **development is close to the road**; the CSX railroad which closely parallels US 41A in the east end of the study area, limiting roadway improvement options in that portion of the study area; abandoned and active coal mines, resulting in large and fully loaded **coal trucks in the traffic stream**; potential historic structures and archaeology sites; several large substations; overhead utilities, businesses with active or inactive underground storage tanks; a golf course; numerous residences and scattered churches and businesses.

Current and future year **Levels-of-Service** (LOS) and **volume-to-capacity ratios** (v/c) were calculated from HIS data supplemented with additional turning movement counts as shown in Table ES-1. Current and future year AM and PM peak hour **intersection delays** were also estimated and are shown in Table ES-2.

East of KY 630 South in Manitou, **nearly one million tons of coal are shipped annually**. Between KY 630 South and Providence, approximately 200,000 tons of coal are shipped annually.

There are **five high crash locations**:

- 0.1-mile spot in Nebo - Vehicles turning left from US 41A onto KY 502 are the predominant crash type at this location.

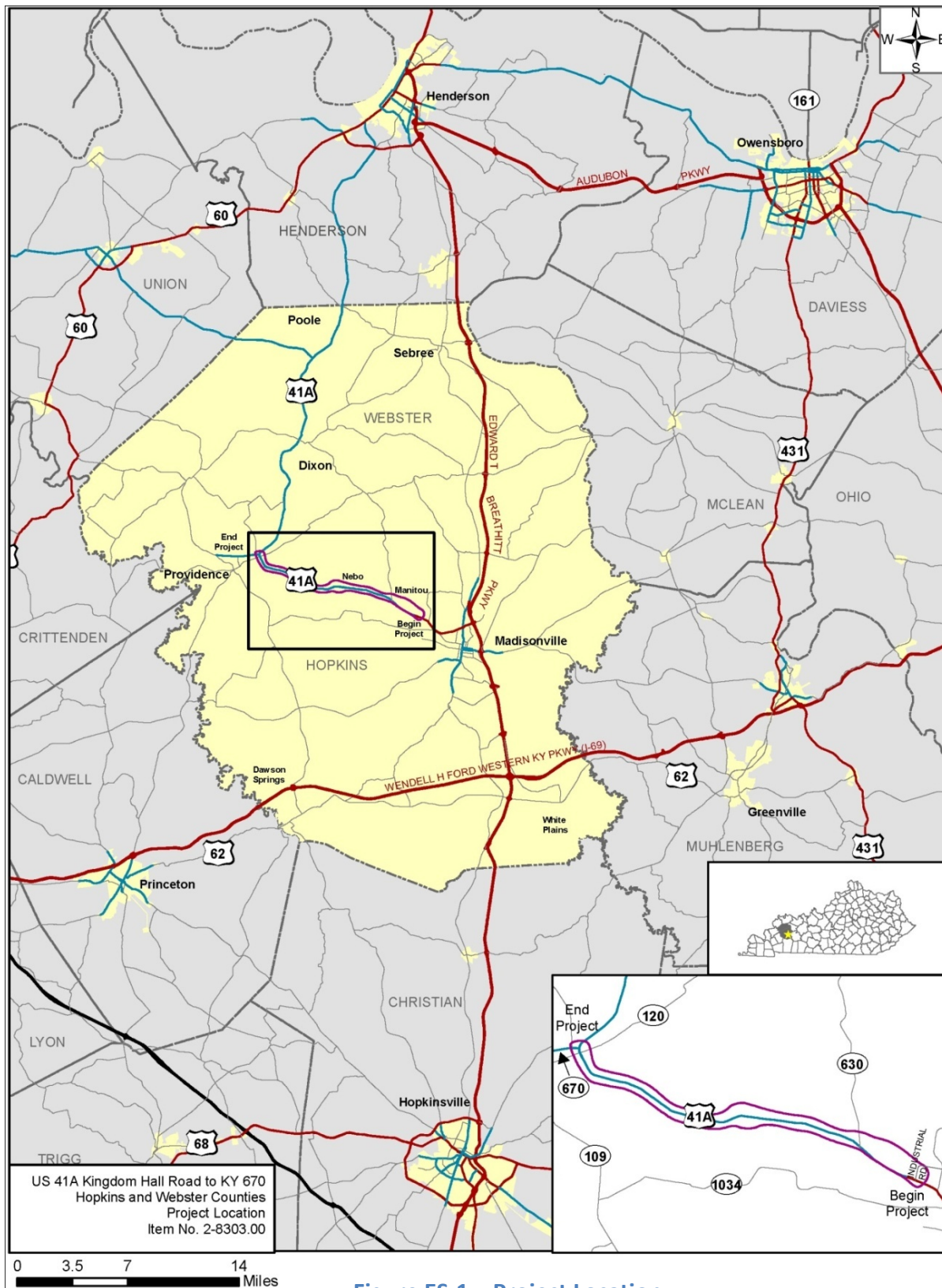


Figure ES-1 – Project Location

Table ES-1- Traffic Characteristics

Traffic Characteristics																
County and Segment Length (miles)	Beg Mpt Description	End Mpt Description	2011 ADT	2035 ADT	Truck %	# of Lanes	Lane Width	Shoulder Width	POPSD	Functional Class	K Factor	Speed Limit (mph)	2011 LOS	2011 V/C Ratio	2035 LOS	2035 V/C Ratio
Hopkins (1.735)	Industrial Road	KY 630	12300	15600	10.0	2	10	2	35%	RMA	9.0%	55	E	0.44	E	0.55
Hopkins (4.675)	KY 630	KY 1089	6400	8100	4.4	2	10	2	45%	RMA	9.0%	55	D	0.23	D	0.29
Hopkins (4.063)	KY 1089	KY 814	5100	6500	8.9	2	9	2	45%	RMA	9.0%	55	C	0.19	D	0.24
Webster (0.724)	KY 814	KY 120	5500	7000	8.9	2	10	3	25%	RMA	9.0%	45	C	0.20	C	0.25
Webster (0.130)	KY 120	KY 670	7500	9500	8.9	2	13	3	15%	RMA	9.0%	35	C	0.27	D	0.34

- 0.1-mile spot, just west of Nebo – Eighty percent of crashes are single vehicle, run-off-the-road crashes.
- 0.1-mile and 0.3-mile spots, between KY 120 and KY 670 in Providence - Rear-end and angle crashes are the predominant type.
- 0.3-mile spot in Hopkins County between Manitou and Nebo – Crashes involving deer characterize crashes at this location.

A KYTC Project Team provided guidance and a Stakeholders' Group provided input in the conduct of this study. Prior to the development of specific alternative improvement concepts, the Project Team directed that any individual critical projects that **address concerns such as high crash locations and vertical and horizontal deficiencies** should fit into **overall corridor improvements** while being sensitive to community cohesion in Manitou and Nebo, and to historic properties along the corridor. Project Stakeholders stressed the **economic dependence**

Table ES-2 Intersection Delay

	2011		2035	
	AM PEAK	PM PEAK	AM PEAK	PM PEAK
Industrial Road	47.4	50.6	48.4	53.8
KY 630 North	11.4	14.6	18.1	19.0
KY 502	11.9	12.7	13.6	14.2
KY 120	11.1	11.4	11.6	12.0
KY 670	10.6	11.0	11.2	11.8

of **Providence on Madisonville**, and expressed a strong preference for a four-lane route, preferably on new alignment including bypasses of Manitou and Nebo, but not Providence.

Alternative improvement concepts were developed and presented to the Project Team:

- **“Do-Nothing” Alternative** This alternative would have no construction disruption or cost except for routine maintenance.
- **Alternative 1A - “Super 2”** (two 12-foot lanes, 12-foot shoulders {10 feet of which are paved}) essentially along the existing alignment
- **Alternative 2 - Four lanes** with a 40-foot wide depressed median along the existing alignment
- **Alternative 3 - Four lanes** with a 40-foot wide depressed median principally along the existing alignment, except for bypasses around Manitou and Nebo and a new alignment approaching Providence
- **Alternative 4 - “Super 2”** that further provides two sets of passing lanes: one near Manitou and the other between Nebo and Providence, and includes a bypass to the north of Manitou
- **Alternative 5 - Spot improvements** at six locations - Spots A, B, C and 1, 2, and 3 address sight distance issues resulting from horizontal and vertical deficiencies.
 - **Spot A** Improved 2-lane alignment near MP 11.2 just west of the US 41A/KY 2280 intersection.
 - **Spot B** Improved 2-lane alignment between KY 630 north at Manitou and the intersection with KY 2320
 - **Spot C** Improved 2-lane alignment near the intersection with KY 814 just east of Providence
 - **Spots 1, 2, and 3** were grouped together as the deficiencies were so close together, it seemed logical to provide an improved 2-lane alignment for the section as a whole. These spots are located between Nebo and the intersection with KY 2280
- **Alternative 6 - Shared 4-lane** cross-section essentially along existing alignment, which consists of an additional lane, alternating between sides of a conventional two-lane

highway, to provide motorists a chance to pass without having to find gaps in the oncoming traffic

- Alternative 7 - **“Super 2”** principally along the existing alignment, except for bypasses around Manitou and Nebo, and approaching Providence
- Alternative 7A - **“Super 2”** from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 7 focusing on a priority section
- Alternative 8 - **Shared 4-lanes** principally along the existing alignment, except for bypasses around Manitou and Nebo, and approaching Providence

Based on Project Team Guidance, these additional alternative improvement concepts were also presented to the Project Stakeholders.

- Alternative 1B - **“Super 2”** along existing alignment from Industrial Road to KY 630 North in Manitou: This alternative is a subset of Alternative 1A focusing on a priority section.
- Alternative 3A - **Four lanes** with a 40-foot wide depressed median from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 3 focusing on a priority section.
- Alternative 8A - **Shared 4-lanes** from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 8 focusing on a priority section.
- Alternative 9 - **Acceleration lane** eastbound from KY 630 South in Manitou a distance of 1500 feet

Based on these discussions and additional analysis, two additional alternative improvement concepts were developed for discussion with the Project Team:

- Spot D - **access management** between KY 120 and KY 670 in Webster County.
- Alternative 10 - Slight realignment of US 41A in Nebo to provide for **left-turn lanes** onto KY 502 north and south

At its final meeting, the Project Team recommended the following program of projects (Figure ES-2):

- **Short-Term (1-2 years): Do Nothing**
- **Medium-Term (5-10 years): Alternatives 5D, 9, and 10**
- **Long-Term (20 years): Alternative 5 (spot improvements A, B, C, 1, 2, and 3)**

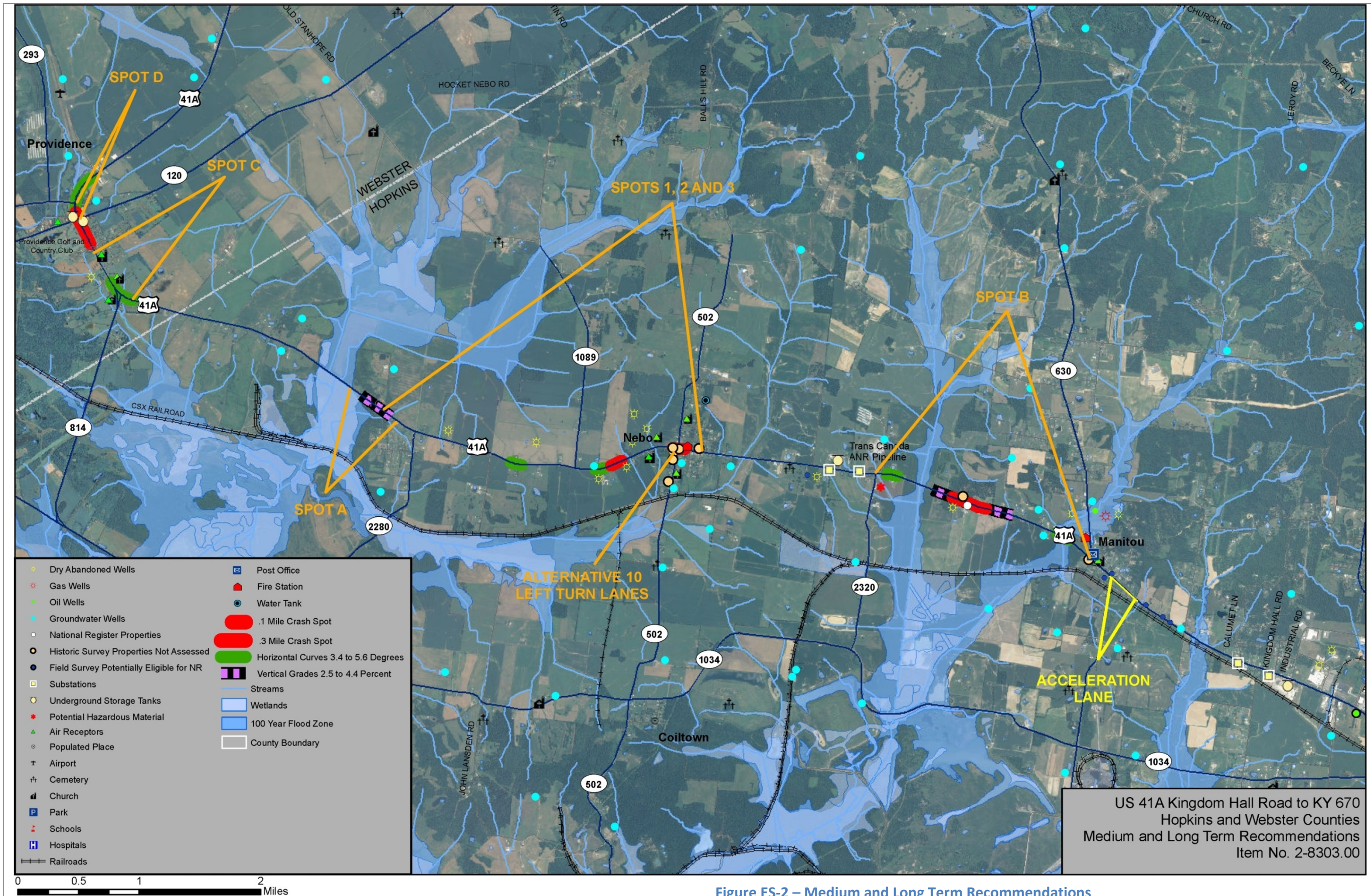


Figure ES-2 – Medium and Long Term Recommendations

Chapter 1

1.1 Introduction

The Kentucky Transportation Cabinet (KYTC) initiated three studies for US 41A in Hopkins and Webster Counties. The defined limits for this US 41A study begin at Kingdom Hall Road just west of Madisonville in Hopkins County at MP 3.426 to MP 1.324 (KY 670) in Webster County for a length of 11.176 miles. In the Year 2000, a Scoping Study was completed from Providence to Poole, and in January 2006 a Pre-Design Scoping Study (identified in the KYTC's Highway Plan as Item No. 2-137.00), was performed to widen from North Main Street (US 41) to Kingdom Hall Road in Madisonville. Due to budget constraints, the latter project (in design at the time of this study), was scaled back to end at Industrial Drive as a three-lane initial rural typical section that can be converted to a five-lane urban ultimate typical section.

This study is the third study and serves to fill in the missing gap (Figures 1 and 2) between the 2000 and 2006 studies. This Scoping Study was a part of the 2009 Garvee Economic Development Bond Series authorization.

Although this study title states this project begins at Kingdom Hall Road the Project Team did not want to leave a small gap (Kingdom Hall Road to Industrial Road) with dated data, therefore this study includes the 800-foot section and terminates at the Providence Bypass (KY 670) for a project length of approximately 11.3 miles. The

purpose of this project as outlined by KYTC is to:

- Provide an improved connector for Webster County to Madisonville,
- Improve access to the Pennyryle / Breathitt Parkway,
- Provide access to Future I-69.

This project crosses two counties – Hopkins and Webster, and two Area Development Districts (ADDs) – the Pennyryle (Hopkins County) and Green River (Webster County).

Chapter 2

2.1 Purpose and Need

The purpose of this project is to improve safety and connectivity between Providence and Madisonville, including the Pennyryle (Edward T. Breathitt) Parkway, and Future I-69. The need for these improvements results from narrow 9 and 10-foot lanes and two-foot shoulders for the entire project length, a large number of loaded coal trucks utilizing the roadway, horizontal and vertical deficiencies, and forecasted traffic volumes, which produce Levels of Service E in the design year for several segments of US 41A. A Crash Analysis has also identified five spots that have a Critical Crash Rate Factor > 0.98 along the corridor.

Chapter 3

3.1 Study Area

US 41A is located in western Kentucky in Hopkins and Webster Counties (Figure 1)

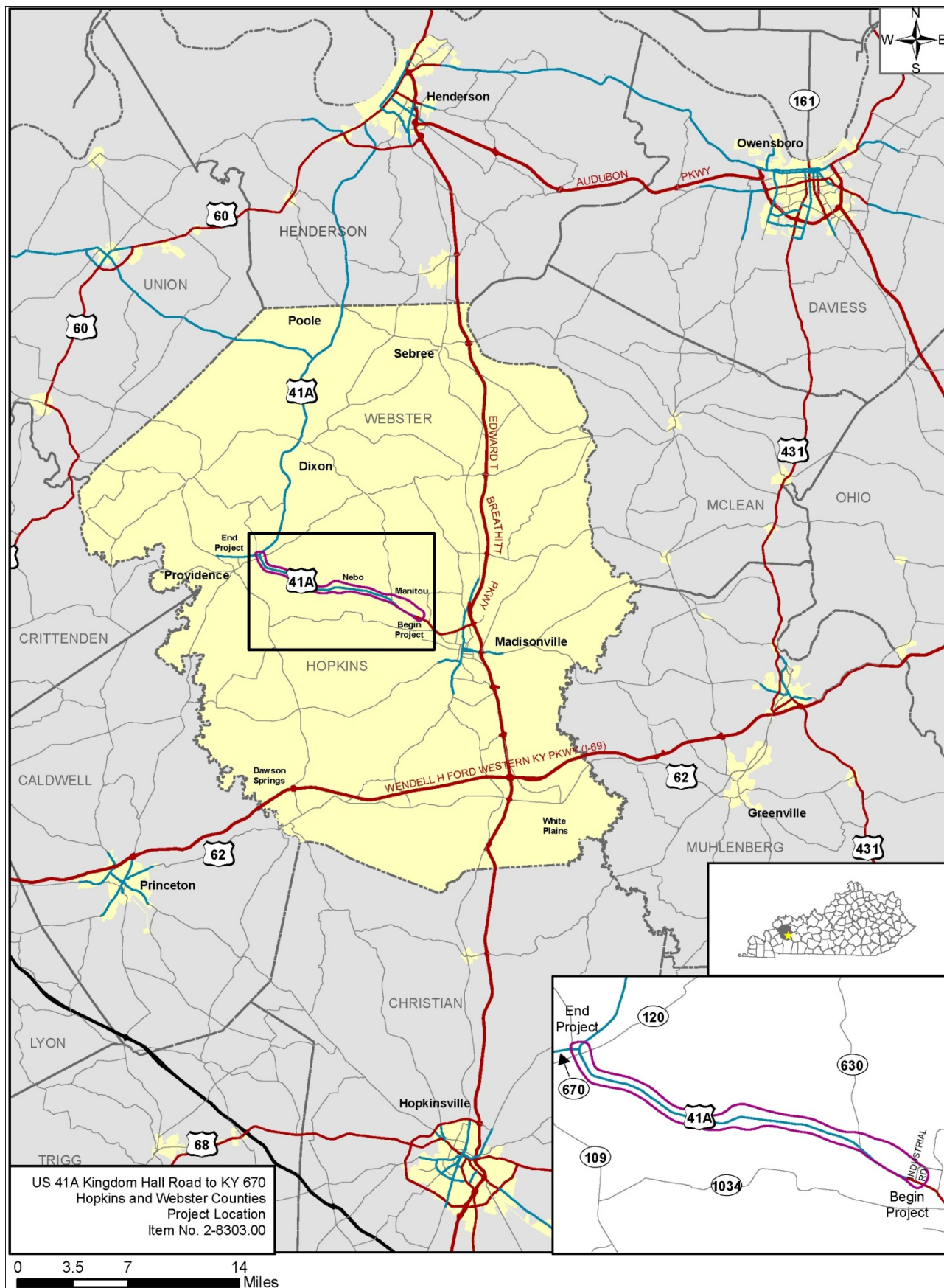


Figure 1 - Project Location



Figure 2 - Study Area

just northwest of Madisonville, south of Henderson and north of Hopkinsville. It begins at US 41 and provides a northwest route to Henderson via Manitou, Nebo, Providence, Dixon, Poole, Tunnel Hill, Cairo and Rock Springs.

Hopkins County refers to itself as “the best county in the coalfield”¹, and is located at the intersection of two of Kentucky's Parkways – the designated routes for Interstates 66 and 69. US 41 in Madisonville and US 41A from Main Street in Madisonville to the Webster County line are the only other arterial highways in the county.

Madisonville and Hopkins County are at the center of a workforce population in excess of 225,000². Major employers³ include the Carhartt Customer Service Center, GE Aircraft Division⁴, International Automotive Components Group⁴, Borden Dairy Products, Land-o-Frost⁴, and Ahlstrom Filtration.

Webster County was named in honor of the famed orator Daniel Webster. Like the city of Providence, it was formed in 1860. Webster County's geographic configuration is unique. Its six widely dispersed incorporated communities and other population clusters pose connectivity challenges both for travel destined within the county and for outbound work, shopping, higher education, and recreation

trips. It is these latter trip types that constitute much of the travel on US 41A in the study area. As in Hopkins County, unemployment levels in Webster County have been lower than both state and national averages during recent economic downturns.

The Hopkins County Comprehensive Plan was updated in 2010. The Joint Hopkins County Planning Commission addresses planning issues in Hopkins County. Such issues are addressed within the city of Providence by the Providence Planning and Zoning Commission. There is no countywide planning and zoning in Webster County.

US 41A provides the primary route from Madisonville to Providence. US 41A is a two-lane roadway functionally classified as a Rural Minor Arterial and is on the National Truck Network.

Appendix A contains a summary of existing information available about US 41A from the Kentucky Transportation Cabinet's Highway Information System (HIS) and Kentucky State Police crash information that was utilized early in this study to develop a draft Purpose and Need for US 41A.

3.2 Other Existing Roadways

The Edward T. Breathitt Parkway, US 41, US 41A, KY 630, KY 502, KY 120, and KY 670, serve the cities of Madisonville and Providence. **Edward T. Breathitt Parkway** is the Rural Principal Arterial connecting I-24 south of Hopkinsville in Christian County,

¹ Source: <http://www.hopkinscounty.ky.gov>

² Source: <http://www.madisonville-hopkinschamber.com>

³ Source: <http://www.thinkkentucky.com>

⁴ Located just east of project study area

through Hopkinsville, Morton's Gap, Madisonville, and Henderson providing a connection to I-164 and then I-64 in southern Indiana. It is a fully controlled access roadway with a prevailing speed limit of 70 mph.

US 41 begins at the Tennessee State Line near Guthrie in Todd County traversing northwest through Trenton, and Hopkinsville, turning north through Crofton, Mannington, Nortonville, Mortons Gap, through Madisonville, Sebree, then north through Henderson to the Ohio River providing access to I-64 and I-164 in southern Indiana. US 41 is functionally classified as a Rural Major Collector transitioning to a Minor Arterial through Hopkinsville, Madisonville, and Henderson. **KY 670** in Webster County is classified as a Rural Minor Arterial and provides for a bypass north of Providence connecting US 41A to KY 109 and northwest to Sturgis (Union County).

Between Nebo and Manitou, there are additional routes that provide short connections from local roads: **KY 2230, KY 1089, KY 502, and KY 630**. The first three are local roads, and KY 630 is classified as a Rural Minor Collector.

Industrial Road provides access to major industry located off US 41A. The industry along this road serves as a major traffic generator.

More detailed information regarding route systems can be found in Appendix A.

3.3 Other Relevant KYTC Projects

There are two additional projects in the area that should be considered with this project:

- New Route in Dixon, Webster County, north of the project area (Item Number 2-143.00).
- Widening of US 41 from US 41A south in Madisonville for 0.6 mile (Item Number 2-8305.00) in Hopkins County.

3.4 Rail Transportation

Rail service first came to the area in 1870 with the opening of a branch of the St. Louis and Southern Railroad between Henderson and Earlington. This later became part of a major trunk line of the Louisville and Nashville (L&N) Railroad, and remains so today operated by L&N's successor organization (CSX).

A branch of this line runs westward from the north side of Madisonville closely parallel to the study segment of US 41A. The CSX operation ends at a coal terminal west of Lisman in Webster County. According to the most recent Kentucky State Rail Plan (KSRP), short-line operator Western Kentucky Railway (WKRL) then operates a segment from Lisman into Union County. Between five and 20 million gross ton-miles per mile characterize this CSX operation according to the KSRP.

While no rail/highway crossings occur on the study segment, the presence of rail

terminals at both Lisman in Webster County and near KY 630 south of Manitou has the potential to impact the volume of coal traffic on the study segment of US 41A. If either or both of these terminals cease operation, more coal shipments may occur on US 41A. Conversely, a shift of coal shipments from highway to rail would have the opposite effect.

3.5 General Corridor Issues

Throughout the study corridor, there are many issues. Some are captured in the following photos. There are sight distance issues, narrow lanes and shoulders (Figures 3 and 4), and the communities of Manitou, Nebo and Providence for which development is close to the road in many places (Figures 5, 6, and 7). Near Industrial Road, the CSX railroad runs parallel with US 41A limiting improvement options in that area without necessitating a railroad detour (Figure 8).

Throughout the corridor, there are abandoned and active coal mines as in Figure 9. This equates to large, fully loaded trucks that travel the roadway (Figures 9 and 10).

The corridor is sprinkled with potential historic structure sites shown in Figure 11, and archaeological sites. One potentially historic site is Nebo Cemetery, which sits very close to the existing roadway (Figure 12).

Along US 41A, there are several large substations (Figure 13), overhead utilities

and gas stations that have underground storage tanks (Figure 14).

Entering the city of Providence, there is the Providence Golf and Country Club on the south side of US 41A (Figure 15), two churches, houses, and a bank on the other side (Figure 16). Just inside the city, before KY 670, there is dense development with the need for access control (Figure 7).



Figure 3 - Sight Distance Issues



Figure 4 - Narrow Lanes and Shoulders



Figure 5 - Manitou



Figure 8 – CSX Railroad Parallel to US 41A
near Industrial Road



Figure 6 - Nebo



Figure 9 – Active Coal Mines



Figure 7 - Providence



Figure 10 – Large Coal Trucks along
Corridor



Figure 11 – Potential Historic House near Nebo



Figure 14 – Underground Storage Tanks



Figure 12 – Nebo Cemetery between Manitou and Nebo



Figure 15 – Providence Golf and Country Club



Figure 13 – Substation along the Corridor



Figure 16 – Development entering Providence

Chapter 4

4.1 Traffic

The traffic data presented in this study (Table 1) is based on current HIS data supplemented with additional turning movement counts performed by Qk4 in July 2011 for the following intersections with US 41A:

- Industrial Drive
- KY 120
- KY 502
- KY 630 North
- KY 670

Growth analysis performed on historical data from KYTC count stations 540760, 540A15, 117A15, 117A12 and 117A11 show traffic volumes that have been growing at a rate ranging from -3.8% to +0.8% annually over the last 20 years. Coal truck traffic has

been steady along this route.

The population of Hopkins County is expected to grow at a rate of 0.3% annually, while the population of Webster County is expected to grow at a rate of 0.2% annually⁵. Based upon these observations, a growth rate of 1.0% was used to forecast future year traffic volumes on all roadways for the study.

The use of such a generous growth rate means the forecasted future traffic volumes are at the high end of a range of potential values. As a practical matter, this means that if forecasted future volumes do not warrant a four-lane solution, then one is not needed based solely on traffic volumes. Turning movement forecasts are located in Appendix A.

4.2 Levels of Service (LOS)

Utilizing the 2010 Highway Capacity Manual, US 41A from west of Madisonville to just east of Providence is considered a

Table 1 – Traffic Characteristics

Traffic Characteristics																
County and Segment Length (miles)	Beg Mpt Description	End Mpt Description	2011 ADT	2035 ADT	Truck %	# of Lanes	Lane Width	Shoulder Width	POPSD	Functional Class	K Factor	Speed Limit (mph)	2011 LOS	2011 V/C Ratio	2035 LOS	2035 V/C Ratio
Hopkins (1.735)	Industrial Road	KY 630	12300	15600	10.0	2	10	2	35%	RMA	9.0%	55	E	0.44	E	0.55
Hopkins (4.675)	KY 630	KY 1089	6400	8100	4.4	2	10	2	45%	RMA	9.0%	55	D	0.23	D	0.29
Hopkins (4.063)	KY 1089	KY 814	5100	6500	8.9	2	9	2	45%	RMA	9.0%	55	C	0.19	D	0.24
Webster (0.724)	KY 814	KY 120	5500	7000	8.9	2	10	3	25%	RMA	9.0%	45	C	0.20	C	0.25
Webster (0.130)	KY 120	KY 670	7500	9500	8.9	2	13	3	15%	RMA	9.0%	35	C	0.27	D	0.34

⁵ Source: Kentucky Traffic Forecasting Report – 2008
Research Report KTC-07-06/PL14-07-01F

Class I two-lane highway. By definition, a Class I two-lane highway is where motorists expect to travel at relatively high speeds. They are major intercity routes, primary connectors of major traffic generators, daily commuter routes, or major links in state or national highway networks. They serve mostly long-distance trips or provide connections between facilities that serve long-distance trips. According to Chapter 15 of the Highway Capacity Manual 2010; the LOS for Class I two-lane roadways is based on average travel speed and percent time spent following or the ability to pass. They are defined as follows:

- **ATS**—*Average Travel Speed*- Segment length divided by the average travel time taken by vehicles to traverse it during a designated time interval
- **PTSF**—*Percent Time Spent Following*- Average percentage of time that vehicles must travel in platoons behind slower vehicles due to the inability to pass.

From Industrial Road to KY 630N, the current Average Travel Speed is just under 50 mph resulting in a LOS C, but the percent time spent following (84%) reduces the LOS to a LOS E.

From KY 630N to KY 1089 the calculated LOS given the above measures for 2011 is LOS D as shown in Table 1 and Figure 17. The LOS analyses, summaries, and assumptions, are located in Appendix A.

Bill Sampson, PE, Director of McTrans Center, University of Florida and considered

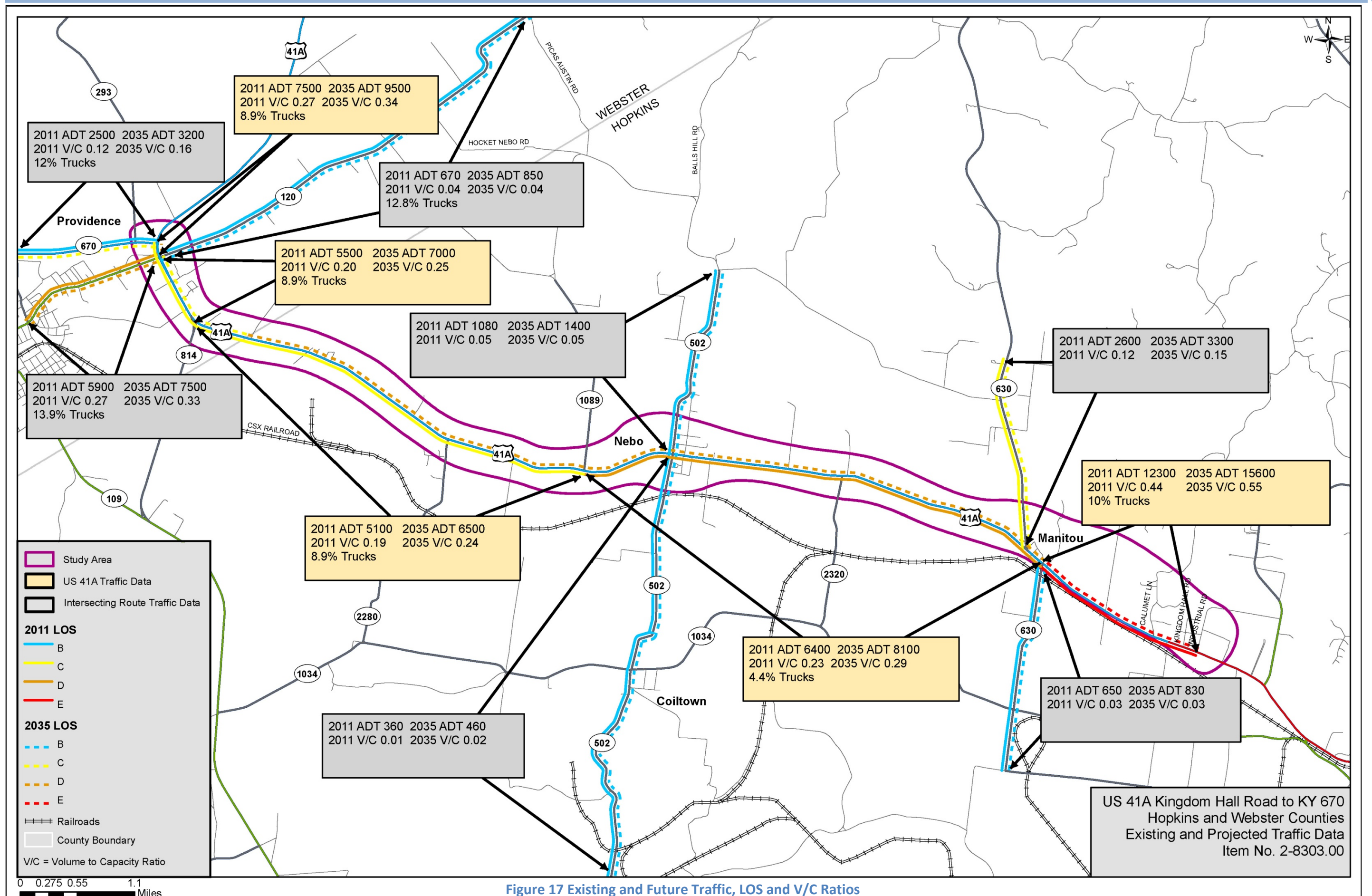
a national expert on Highway Capacity Analysis, advised when given the US 41A conditions and description of the area, recommended US 41A into Providence be analyzed as a Class III highway which is based on PFFS (*Percent of free-flow speed*) or the ability of vehicles to travel at or near the posted speed limit. The results are illustrated in Table 1 and Figure 17.

4.3 Intersection LOS, Capacity and Turn Lane Warrants

Utilizing the 2010 Highway Capacity Software, the following signalized and unsignalized intersections with US 41A were analyzed for both 2011 and 2035 Existing AM and PM peak hours:

- Industrial Drive
- KY 120
- KY 502
- KY 630 North
- KY 670

These calculations are shown in Appendix A. Year 2011 intersection delay for both signalized intersections (Industrial Road and KY 120) ranged from 4.7 to 10.5 seconds in the AM Peak, and 7.2 to 10.8 seconds in the PM Peak. The unsignalized intersection delay (KY 502, KY 630 North and KY 670) ranged from 9.7 to 11.9 seconds in the AM Peak and 10.1 to 14.6 seconds in the PM Peak.



For the Design Year 2035, intersection delay for both signalized intersections (Industrial Road and KY 120) ranged from 6.3 to 10.9 seconds in the AM Peak, and 9.4 to 11.3 seconds in the PM Peak. The unsignalized intersection delay (KY 502, KY 630 North and KY 670) ranged from 10.1 to 18.1 seconds in the AM Peak and 10.7 to 19.0 seconds in the PM Peak.

Turn lane warrants were completed for the aforementioned intersections. Any additional left or right turn lanes for US 41A were not warranted. Those calculations are also located in Appendix A.

4.4 Volume to Capacity Ratios (V/C)

The HCS Software was utilized to calculate V/C for roadway types other than multi-lane. Capacity was calculated for four lane alternative sections based on the equation $[Capacity = 1000 + 20(FFS)]$ in the Design Memorandum No. 03-11 Traffic Engineering Analysis. The Free Flow Speed (FFS) was calculated from the capacity analysis runs. The peak hour directional volume was divided by twice the calculated capacity (since it is per lane) to come up with the V/C ratio for four-lane sections. V/C calculations are shown in Appendix A and appear in Figure 17.

4.5 Vertical and Horizontal Deficiencies

Four vertical grades and horizontal curves appear to warrant attention. One spot is just west of Manitou where these grades correspond with a high crash spot location, and another is near KY 814 where the

horizontal curve also coincides with a high crash location. These deficiencies are located on Figure 18 and also Tables 2 and 3 and were obtained from KYTC's HIS.

Table 2 – Grades

GRADES			
BEGIN MP	END MP	GRADE CLASS	GRADE DIRECTION
5.973	6.273	C	+
6.373	6.673	C	-
11.273	11.473	C	+
11.473	11.573	C	-
C = 2.5 - 4.4%			

Table 3 – Curves

CURVES		
BEGIN MP	END MP	DEGREE of CURVE
5.464	5.579	3.4
6.97	7.07	4.2
9.434	9.513	5.6
10.118	10.217	4.1
11.064	11.173	3.5
0.364	0.498	3.4
0.498	0.607	3.8
1.222	1.579	3.9

4.6 Adequacy Ratings

The Composite Adequacy Rating Percentile shown in the last column of Table 4, is a method originally developed by the Federal Highway Administration (FHWA) and subsequently refined by KYTC to assess a roadway's condition. The ratings are calculated by individual functional class and based upon three roadway components: safety, congestion, and pavement condition-with each component comprised of several measures. The rating scores 100 as a perfect, or near perfect, highway. The Adequacy Percentile ranks a particular roadway section compared to other Kentucky roads in the same functional class into a percentile. For example, a road section with a Composite Adequacy Percentile of 75.0 means that 25% of similar roads are rated better. As seen in Table 4,

most of the US 41A project corridor is rated better than 40-50% of other roadways of similar types.

4.7 Crashes

Abbreviated crash records (located in Appendix A and depicted in Figure 18) from the Kentucky State Police website were reviewed to see if crash patterns for the problem spots and segments in the study area deviated from the common metrics of crashes on similar roadway types. The Critical Crash Rate is the maximum crash rate expected to occur on a roadway section, given the statewide average crash rate for that functional road class, the Average Daily Traffic (ADT) volume, and the roadway section length. If the actual Crash Rate exceeds the Critical Rate (i.e., the CCRF is greater than 1.0), then that roadway section has more crashes than is statistically probable to be occurring randomly.

Table 4 – Adequacy Ratings

ADEQUACY RATINGS							
BEGIN MP	END MP	COUNTY	CONDITION INDEX	SAFETY INDEX	SERVICE INDEX	COMPOSITE INDEX	PERCENTILE
3.58	5.01	Hopkins	30.00	32.80	19.00	81.80	55.95
5.01	9.69	Hopkins	30.00	30.80	20.00	80.80	53.74
9.69	13.28	Hopkins	30.00	31.80	20.00	81.80	55.95
0.00	0.47	Webster	30.00	32.80	20.00	82.80	61.36
0.47	1.32	Webster	30.00	30.80	19.00	79.80	48.52

There are five high crash locations according to the 2008-2010 crash data. There are three in Hopkins County (two 0.1-mile spots and one 0.3-mile spot) and two spots (one 0.1-mile spot and one 0.3-mile spot) that are adjacent in Webster County. These spots are described below and can be seen in Figure 18.

weather, daytime crashes are occurring with rear-end and angle crashes being the predominant type.

- **0.1-mile Spot, Hopkins County in Nebo** - crashes are occurring on mostly dry pavement near the intersection with KY 502. Vehicles turning left from US 41A onto KY 502 are the predominant crash type at this location.
- **0.1-mile Spot, Hopkins County just west of Nebo** – eighty percent of crashes are single vehicle, run-off-the-road crashes. Dry roadway conditions and darkness characterize crashes at this location.
- **0.1-mile Spot, Webster County between KY 120 and KY 670** – dry weather, daytime crashes are occurring with rear-end and angle crashes being the predominant type.
- **0.3-mile spot in Hopkins County between Manitou and Nebo** – crashes are dry weather, though split between daytime and darkness. Crashes involving deer (including two additional crashes in 2011) characterize crashes at this location.
- **0.3-mile spot in Webster County between KY 120 and KY 670** – dry

4.8 Structures

There are four structures in the project corridor in Hopkins County and all have a sufficiency rating of 95 or higher and are open with no restrictions (shown in Table 5).

4.9 Access Management

Access Management⁶ is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. Its purpose is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system. An effective access management program can reduce crashes by as much as 50 percent, increase roadway capacity by as much as 45 percent, and reduce travel time by as much as 60 percent. Access spacing standards and design guidelines are applied to a variety of

roadway situations, including corner clearances, turning lanes, and provisions for alternative access⁷.

The application of access management techniques retroactively to existing roadway conditions does not have a rich history in Kentucky. However, recent research at the Kentucky Transportation Center has documented that annual cost savings greater than \$200 per person could accrue from such applications. US 41A corridor along the project corridor has many access points. Any improvements to the corridor, should consider combining some of those access points as to not create so much side friction. A list of access points is contained in Appendix B.

4.10 Coal Mining

US 41A is presently classified a Coal Haul Route (Figure 19), and is on the Extended Weight Coal or Coal-By-Products Haul Road System as 50,000 tons or greater of coal or coal by-products were reported to have

Table 5 - Structures

STRUCTURES													
MILEPOINT	FEATURE INTERSECTED	LOCATION	YEAR BUILT	SKEW	LENGTH OF MAXIMUM SPAN (FT)	LENGTH (FT)	HORIZONTAL CLEARANCE (FT)	BRIDGE ROADWAY WIDTH CURB TO CURB	DECK WIDTH OUT TO OUT	APPROACH ROADWAY WIDTH (W/SHOULDERS)	DESIGN LOAD	SUFFICIENCY RATING	INVENTORY RATING
5.520	Pond Creek	0.25 Mile West of KY 630	1985	0	65	67.9	40	40	43.6	27	HS 20	98.1	37.0 Tons
8.250	Rose Creek	.35 Mile East of Jct. KY 502	1984	0	12.1	24.0	40.0	40	41.5	28	HS 20	95.9	31.7 Tons
6.770	Pond Creek	0.14 Mile West of KY 630	1990	0	57.1	62.0	43.9	44	47.3	44	HS 25	99.1	45 Tons
11.900	Weirs Creek	2.3 Miles West of Jct. KY 1089	1986	0	48.9	51.8	40	40	43.3	32.7	HS 20	99.3	43.0 Tons

⁶ Source: *Access Management Manual*, Transportation Research Board, Washington, DC (2003)

⁷ Source: *Access Management for Kentucky*, Stamatiadis, House, et al, Kentucky Transportation Center, University of Kentucky (2004)

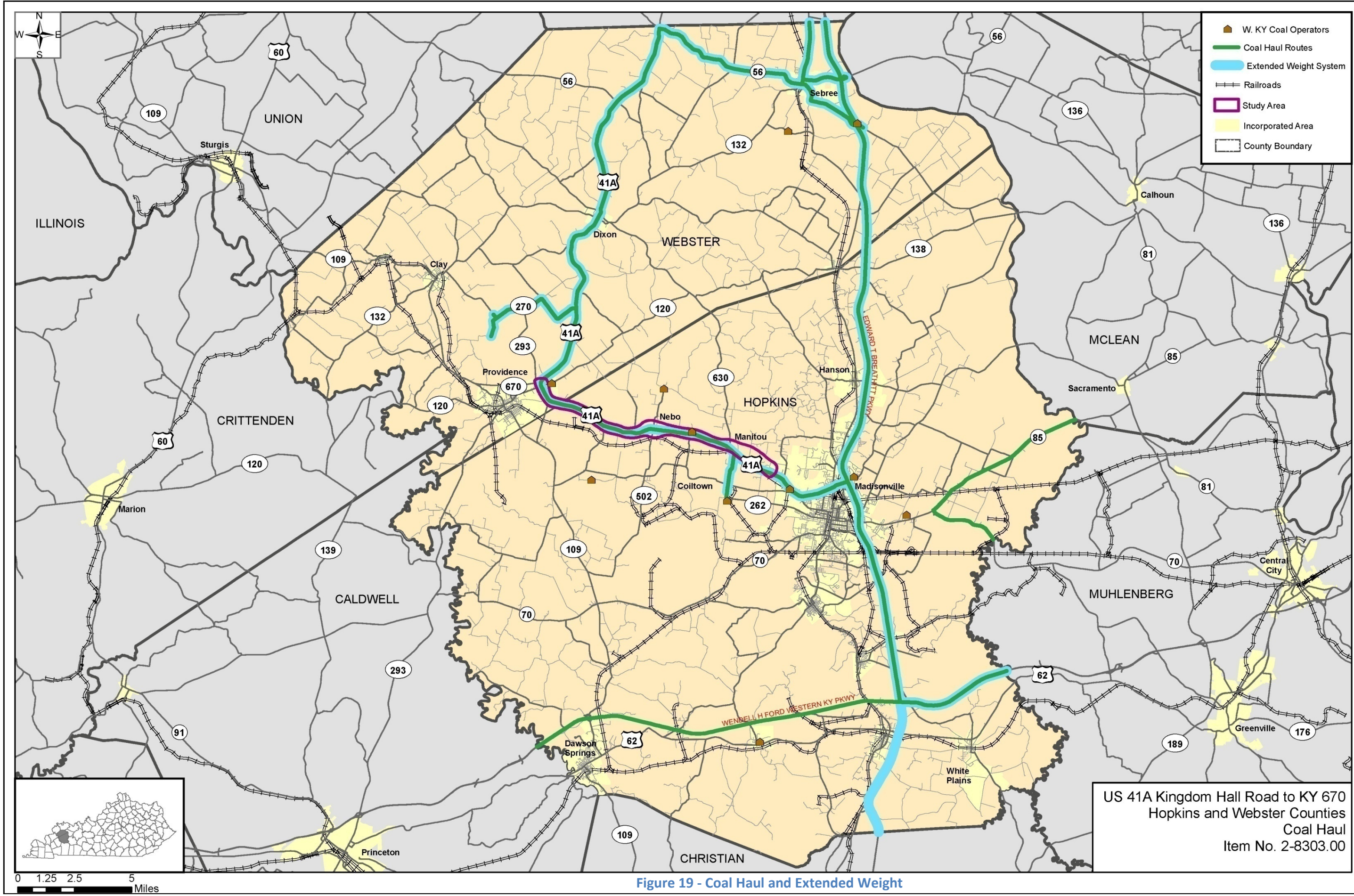


Figure 19 - Coal Haul and Extended Weight

been transported over US 41A in calendar year 2010. It also is designated AAA with a weight limit of 80,000 pounds. US 41A from KY 630 South east to Madisonville is reported to carry over 970,000 tons annually. From Providence to KY 630 South, US 41A carries approximately 200,000 tons⁸ of coal annually (Table 6). The entire project study area is underlain with coal either mined out or yet to be mined as shown in Figure 20.

Table 6 – Coal Haul

COAL HAUL			
County	Beg MP Description	End MP Description	Annual Tons Non-Cardinal
Hopkins	US 41	KY 630 South	973333
Hopkins	KY 630 South	Webster Co. Line	201370
Webster	Hopkins County Line	KY 270	201370

Alliance Coal's Dotiki Mine, which began operations in Webster County more than 45 years ago has moved steadily southward into Hopkins County, is one of the biggest coal producers and longest-operating underground mines in Kentucky.

Alliance Resource Partners LP subsidiary, Warrior Coal, LLC (Warrior), operates an underground mining complex located near the city of Madisonville in Hopkins County,

Kentucky. Warrior utilizes continuous mining units employing room-and-pillar mining techniques to produce high-sulfur coal. Warrior's preparation plant has throughput capacity of 1,200 tons of raw coal an hour. Warrior's production can be shipped via the CSX railroad and by truck on highways directly to customers or to various transloading facilities, for sale to customers capable of receiving barge deliveries.

The Hopkins complex is located west of the city of Madisonville in Hopkins County, Kentucky. It is operated by the subsidiary, **Hopkins County Coal, LLC**. Coal produced from the Elk Creek mine is processed and shipped through Hopkins County Coal's preparation plant, which has throughput capacity of 1,200 tons of raw coal an hour. Elk Creek's production can be shipped, through the CSX railroad and by truck on United States and state highways to customers or to various transloading facilities for sale to customers capable of receiving barge deliveries.

⁸ Source: KYTC -Highway Information System (HIS)
<http://transportation.ky.gov/Planning/Pages/Roadway-Information-and-Data.aspx>

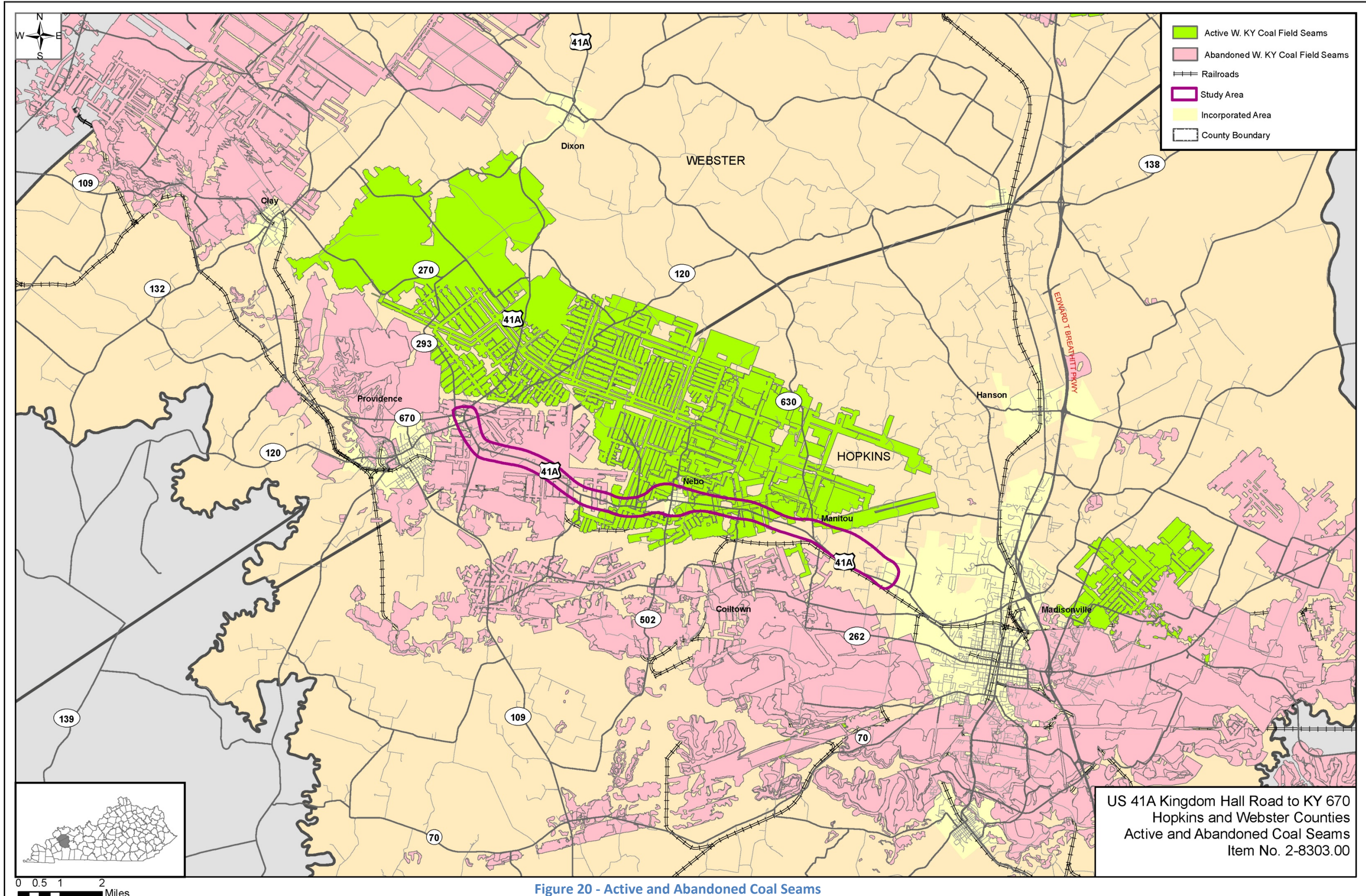


Figure 20 - Active and Abandoned Coal Seams

Chapter 5

5.1 Environmental Overview

Due to limited funding, only an abbreviated overview was conducted and is summarized in the following sections. In most cases, this was research from readily available sources only. Environmental issues will be studied more in-depth if project(s) from this study progress to future phases.

5.2 Socioeconomic Considerations

5.2.1 Land Use

The project corridor is mostly rural in nature with the exception of small communities of Manitou, Nebo and Providence (Figure 21). There are approximately 24 small businesses scattered throughout the corridor. These businesses range in size and are as small as a home-based dog grooming business to a large natural gas company (TransCanada ANR).

Beginning near Madisonville, there are several businesses located in and around Industrial Road. Travelling northwest from Industrial Road to KY 630, there are mainly single unit family residences with an occasional business such as a small post office, a small maintenance garage, and a restaurant.

The community of Manitou has a larger concentration of houses and a few businesses, a fire station, and a church.

Nebo has one operating car repair/gas station, a telecommunications office, and what appears to be a closed peddler's shop, all of which sit close to the road. There are also two churches and a Masonic Lodge.

Northwest from Nebo to Providence, again there are scattered single-family residences, small, home businesses, a rather larger cemetery, and several churches.

Entering Providence, there is mixed development with a concentration of businesses such as a bank, church, grocery, restaurants, and other small businesses including a golf course. Depending upon the alternative pursued, there could be impacts to the community resources especially around Nebo, Manitou, and Providence.

5.2.2 Environmental Justice

An environmental justice analysis of the study area, by the Green River Area Development District, indicated Block Group CT 9604 BG 1, which comprises the northeastern portion of the city of Providence in Webster County, may require further evaluation depending on the scope of the improvements planned for the corridor. It has two of the target populations with significantly higher percentages than Kentucky: Minority, persons 65 and older, and the population below poverty were slightly higher than Kentucky's percentage.

The total population of Block Group CT 9604 BG 1 is 962 persons. The minority

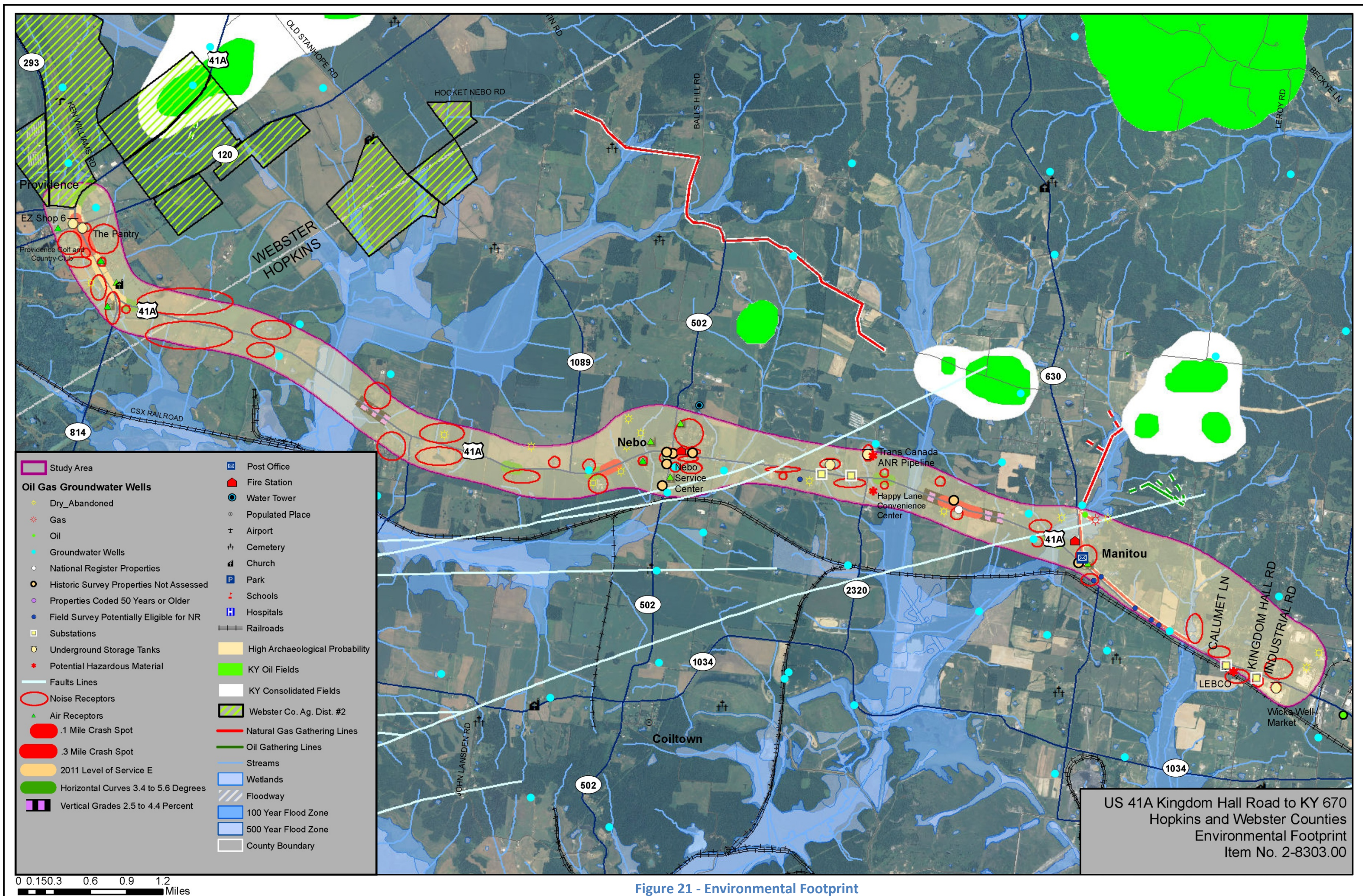


Figure 21 - Environmental Footprint

population in this Block Group is 429 or 46.33%. The total population of persons age 65 and older is 167 (18.03%). This BG also has a slightly higher percentage of its population below the poverty level with 164 (17.71%) below poverty, which is slightly higher than Kentucky's threshold poverty percentage (15.37%). One other Block Group that comprises the northwestern portion of Madisonville on the North side of US 41A (CT 9703 BG 2) needs additional discussion. It has a population of 718 persons. The total number of the persons 65 and older in this BG is 355 persons (49.44%), which is significantly higher than Kentucky's threshold percentage (12.46%). The other target populations studied in this report were below the State threshold for this BG. The full study is located in Appendix C.

A windshield survey revealed that in addition, perhaps there might be scattered low income and elderly throughout the corridor. Therefore, a more in-depth analysis may be required if future improvements are implemented.

These preliminary findings will require validation as study alternatives progress through the next phase.

5.3 Archaeological Resources

The archaeological overview (located in KYTC's Division of Planning) performed by AMEC, summarizes the results of archaeological resource researches based on available archival literature located at the Office of State Archaeology (OSA) in

Lexington, Kentucky. In addition, a study of archival material, including historic maps was completed to gain a better comprehension of the corridor development and potential for sites of historic significance. The overview was prepared for planning purposes only. It does not provide a detailed analysis or assessment of any potential impacts to archaeological resources. Moreover, it must be stressed that the information presented in this overview report does not meet the requirements of Section 106 of the National Historic Preservation Act (NHPA) of 1966 (36 CFR 400.4, as amended) or other Federal and State regulations. Consultation is required between the Kentucky Heritage Council and the Kentucky Transportation Cabinet to determine the level of additional investigations necessary to fully comply with Section 106 regulations. To meet these requirements, a Phase I archaeological survey and architectural assessment must be conducted.

According to the Office of State Archaeology site file and database AMEC archaeologists conducted an archaeological and background overview for the US 41A corridor in Hopkins and Webster Counties, Kentucky. There are previously recorded archaeological sites that were documented within the proposed study area. Of the previously recorded archaeological sites some are considered not eligible for nomination to the NRHP; however there are others that have not been assessed for NRHP nomination.

If future projects are developed in the study area, a Phase I archaeological survey must be conducted when federal funds or a federal permit is involved. The Phase I survey will identify archaeological sites and help determine whether a site is eligible for listing on the NRHP. Section 4(f) evaluation must be conducted and avoidance options considered if the right of way overlaps any NRHP listed or eligible for listing archaeological site requiring preservation in place.

5.4 Architectural Review

This overview was prepared for planning purposes only. It does not provide a detailed analysis or assessment of any potential impacts and does not meet the requirements of Section 106 of the National Historic Preservation Act of 1966 (36 CFR 400.4, as amended).

In summary, AMEC architectural historians conducted an architectural and background overview (located in Appendix D) for the US 41A study area. One NRHP listed property, the Bradford L. Porter House (Figure 22) was identified, seven previously recorded historic buildings, and seven additional historic resources were identified through a windshield survey. None of the previously recorded sites or the newly discovered historic resources has been assessed for NRHP eligibility. Since US 41A is a historic transportation route, there is a high probability for potentially eligible historic buildings occurring within the study area.



Figure 22 - Bradford L. Porter House

5.5 UST/HAZMat

A government database search was conducted on June 8, 2011 to identify potential constraints from possible environmental contamination within the US 41A study area. A linear search was conducted along US 41A within 0.25 mile of the roadway centerline to identify potential hazardous sites. There were seven potential hazardous sites identified along the project corridor (one of which consisted of both an underground storage tank (UST) and a hazardous waste generator) consisting of: five USTs, one landfill/recycling facility; and two hazardous materials generating sites. These sites were also confirmed with a windshield survey. Each site is identified and detailed in the government database search in Appendix E. They are listed below and located on Figure 21.

1. Wick's Well Market and Deli, 3605 Nebo Road - active underground storage tank

2. LEBCO Inc., 3685 Nebo Road - conditionally exempt generator of hazardous materials
3. Happy Lane Convenience Center, 84 Happy Lane - permitted operating landfill and recycling facility
4. ANR Pipeline Company, 7500 Nebo Road - active underground storage tank and generator of hazardous materials
5. Nebo Service Center, 8865 Nebo Road - active underground storage tank
6. The Pantry, 121 US 41A - inactive underground storage tank
7. EZ Shop 6, 100 US 41A - active underground storage tank

5.6 Known Utilities

Known water and gas lines are located along US 41A for the length of the corridor. Overhead utilities begin at Industrial Road, and are mostly on both sides of the road until west of KY 1089. At that point, utilities stay mainly on the north side of US 41A until near KY 814 then transfer to the south side of US 41A. Sewer lines are located at both ends of the corridor. Gas lines as shown in Figure 23 and 24 are just indicators of gas markers. Gas line information is not readily available GIS information. However, research into TransCanada ANR shows a major gas line may cross the corridor. A coordination letter was sent from Highway District 2

Madisonville Office to TransCanada, however, no response has been received as of the date of this study. Figure 24 shows the possible gas line. Depending on size, this gas line could affect the cost of any alternative that crosses it. Transcontinental lines tend to be large, and may not be very deep. If one is located near the TransCanada Office, then a dry bridge may be required to cross it. Many of these lines will not allow for added weight.

5.7 Wetlands/Streams and Floodplains

According to the Federal Emergency Management Agency's (FEMA) Q3 digital flood data there are at least two wetlands, approximately 32 streams and the 100-year floodplain in three areas traversing the corridor. These are shown in Figure 21. There is also the concern of mine subsidence due to coal mining both active and inactive mining along the corridor.

KDFWR recommended the US Army Corps of Engineers and the Kentucky Division of Water be contacted prior to any work within the waterways or wetland habitats. KDFWR recommended the following for the portions of the project that impact streams (letter is located in Appendix F).

- Avoid impacts to intermittent and perennial streams if feasible. Channel changes located should incorporate natural stream channel design.

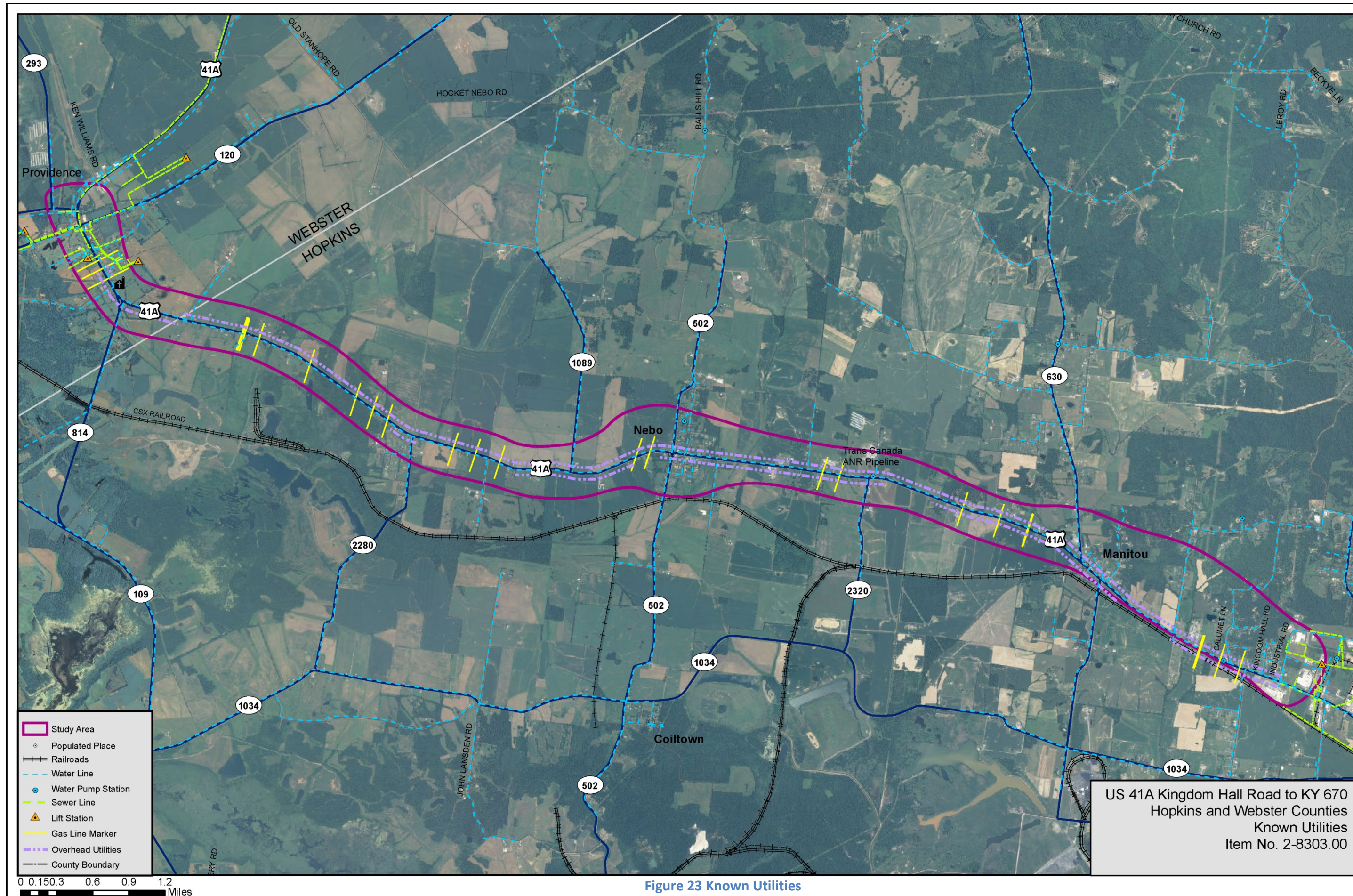
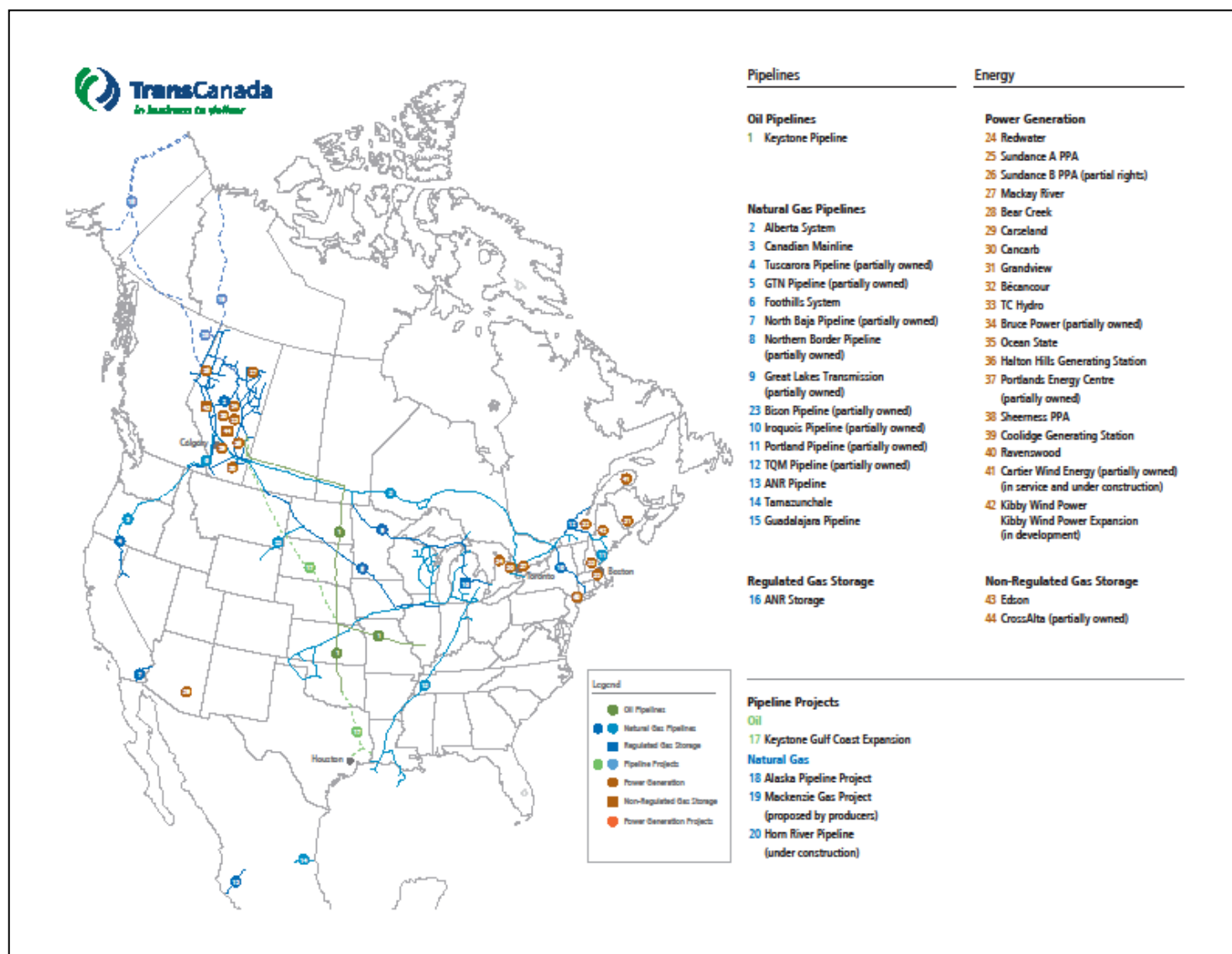


Figure 23 Known Utilities

Figure 24 – TransCanada pipeline



- If culverts are used, they should be designed to allow the passage of aquatic organisms and so that degradation upstream and downstream of the culvert does not occur
- Development/excavation during low flow period to minimize disturbances.
- Proper placement of erosion control structures below highly disturbed areas to minimize entry of silt into area streams.
- Replanting of disturbed areas after construction, including stream banks, with native vegetation for soil stabilization and enhancement of fish and wildlife populations. They recommend a 100-foot forested buffer along each stream bank.
- Return all disturbed instream habitat to a stable condition upon completion of construction in the area.
- Preservation of any tree canopy overhanging any streams within the project area.

To minimize indirect impacts to aquatic resources, strict erosion control measures should be developed and implemented prior to construction to minimize siltation into streams and storm water drainage systems located within the project area.

5.8 Wild and Scenic Rivers

There are no Special Waters as designated by the Kentucky Division of Water.

5.9 Threatened and Endangered Species

Because of limited funds for the project, the scope did not include an overview to identify the known locations of any of those species within the corridor however, there are eight rare plant species identified for Hopkins and Webster Counties by the Kentucky State Nature Preserves Commission (KSNPC), as well as the Blackhawk Kentucky Champion Tree. That list is located in Appendix G.

Kentucky Fish and Wildlife Resources (KDFWR) lists 56 threatened and endangered species for Hopkins and Webster Counties (refer to Appendix G). However, a letter from the Kentucky Department of Fish & Wildlife Resources stated that the Kentucky Fish and Wildlife Information System indicates that no federally or state-listed threatened and endangered species are known to occur with the study area of the project. The federally threatened Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) is known to occur within close proximity of the proposed project site. It is not federally listed in Kentucky because of a previous conservation agreement between state and federal agencies and private interest that implemented actions to conserve wetland habitat in this region. However, this agreement has not been

renewed and is not currently in effect leaving this species unprotected through the Endangered Species Act. Known populations exist in 15 counties in Kentucky, all within or near the Western Coal Field region. KYFWR cautioned that their database is a dynamic one that only represents their current knowledge of various species distributions. That list is may be found in Appendix G. This list has not been field-checked for presence within the corridor. Also, the Indiana and Gray bat, and Bald Eagle are considered US protected species.

5.10 Noise

The study area is mixed use, mostly rural in nature, with more urban areas at each end. Several churches and one known cemetery are located within the study area. There are three communities where development along the roadway is dense. If US 41A improvements are implemented, traffic noise may be an issue depending on the alternative chosen. There are 47 potential noise receptor sites in the corridor. These sites are depicted on Figure 21.

5.11 Air

According to KYTC's Division of Planning, Hopkins and Webster Counties are in attainment for all monitored pollutants. There are six potential air receptor sites in the corridor. Those sites are shown on the Environmental Footprint, Figure 21. This project is not expected to adversely impact air quality in the region.

5.12 Agricultural Districts

There are three agricultural districts in the project vicinity with only one, 117-12, being adjacent to the intersection of KY 670 and US 41A in Providence. None are present along the project corridor in Hopkins County. There are no PACE conservation easements near the project area in either county.

5.13 Community

The definition of a community in a remote area is notably different than within incorporated cities and denser developments. While the density of houses may be low, the sense of belonging to the area and relationships with other residents is hard to judge at this time. There are the mapped and named communities of Manitou, Nebo and Providence. As the project develops, care should be taken to minimize not only residential and institutional relocations, but connectivity of the people to each other and existing establishments.

Chapter 6

6.1 Early Project Team Input

A Project Team Meeting was held on July 8, 2011 where an existing conditions presentation (much of what was discussed previously in this report in Chapters 3-5) was given. The minutes are located in Appendix H. At the conclusion of the presentation, a discussion ensued regarding possible alternatives given the existing

conditions findings. The Project Team concluded that an overall corridor improvement should be developed with the ability to divide the corridor into smaller critical projects that will address concerns such as high crash locations and vertical and horizontal deficiencies. The towns of Nebo and Manitou will present challenges due to the historic nature, and development. Those areas may have to have options that “go around” those towns. West of Manitou, there is a house listed on the National Register. Between Manitou and Nebo is Nebo Cemetery, which should be avoided, as it appears eligible for listing on the National Register.

6.2 Early Stakeholder Input

An initial Stakeholder’s Meeting was held on July 27, 2011 at the Madisonville Economic Development Center (Appendix I). Members of the three communities together with the coal industry and industry along the route, and underserved population leaders were invited to attend. After a short presentation, stakeholder comments are summarized as:

Concerned about economic development, Providence officials stressed the importance of the need for a four-lane roadway from Madisonville to Providence, preferably on new alignment. If the existing alignment was used, they recognized that a four-lane roadway through Nebo and Manitou would be detrimental to the towns indicating a bypass of each was preferable. A request was made to study an alignment on the

south side of Nebo near the railroad tracks so as not to “wipe out” the town of Nebo. A concern regarding access roads and side traffic was stated.

It was stressed that Providence is considered a bedroom community to Madisonville and local leaders conveyed that it cannot survive without Madisonville. The ambulance service and work force of Providence travels to Madisonville.

A business representative expressed concerns over the businesses impacted by a bypass or reconstruction.

6.3 Agency Coordination

An agency coordination letter was sent to over 100 agencies. Attached to the letter was extensive information about the corridor and maps of proposed alternatives. The initial letter and all responses are found in Appendix F of this study.

According to Jerry Weisenfluh, **Kentucky Geologic Survey**, the geologic faults shown in Figure 21 that underlie the project area, are not expected to be an impediment to construction because there are not likely to be any sizable road cuts. None of the faults, to the best of KGS’s knowledge, are seismically active. KGS cautions that the area is a very active mining region. Both active and abandoned underground mines underlie the western half of the project area. Because this region has a history of mine subsidence issues, available mine maps at minemaps.ky.gov should be consulted to avoid, to the extent possible,

areas of underground mining. Figure 20 illustrates the current active and abandoned mines of the area. Warrior and Alliance Coal both were active stakeholders at Stakeholder meetings.

Mine subsidence occurs when large areas of coal are mined and the resulting settlement of roof material into the void results in the surface subsiding over the affected area. This may cause damage to such items as roads, and pipelines, and structures, including houses⁹.

The **United States Department of Agriculture, Forest Supervisor** correspondence states that the project site is nearly 200 miles to the west of national forest system lands, and the watershed where the proposal is centered does not flow onto national forest system lands. Therefore, there was no objection to a proposed project on US 41A.

Kentucky State Police Post 2 responded to a coordination letter with the following:

- The levee overflows and the roadway floods about one and one-half mile south of the Webster County line.
- There is a blind hill with a curve approximately one mile north of Manitou, just south of Warrior Coal. It is a blind spot during sunset.

- There is poor visibility at the intersections in Nebo and Manitou.
- There is heavy commercial traffic at the intersection of KY 630 and US 41A.
- There are dangerous curves north of Nebo.
- A four-lane roadway with wide shoulders is preferred, especially near Manitou and Nebo.

Kentucky State Police in Frankfort did not perceive any problems as it pertains to commercial vehicle enforcement.

The **Cabinet for Economic Development** did not have any input at this time.

Energy and Environment Cabinet (EEC), Department for Natural Resources and the Division of Mine Reclamation and Enforcement (DMRE) responded with information regarding active ground and surface water monitoring points, Underground mines for Coal Seams #14, #13, #11, #9, and a location of Subsidence Investigation (CRI 10-01-0027) just west of Nebo and a Fault System that are of concern.

The **Superfund Branch of the Division of Wastewater Management** noted two active sites on the list: AI 1869 and 1881. The ANR Pipeline site had a clean closure related to mercury on the site. The mercury was removed by excavation with clean confirmatory samples. This site is now considered closed. The General Electric site

⁹ Source:
<http://www.slideshare.net/sankarsulimella/subsidence-in-coal-mines>

had no report to document any releases or any concerns related to the Superfund Branch. All issues are Hazardous waste for being a generator. There were no incidents that could be confirmed.

The Division of Waste Management, Madisonville Regional Office stated that they are not aware of any other facilities that were not already addressed.

According to the **EEC Underground Storage Tank Branch**, there are three gas stations in Nebo, and a fourth in the Pantry #720 in Providence. Even though the correspondence states that there are “three” gas stations, all at the intersection of US 41A and Bernard Street it is important to note, that of the three USTs noted in Nebo, only one is active.

The **KYTC’s Geotechnical Branch’s** evaluation of the study stated the following geotechnical concerns:

- The project is situated within the Lisman Formation consisting of shale, siltstone, sandstone, limestone, and coal. Alluvium and lake deposits are commonly found along the stream valleys. The deposits (composed of unconsolidated clay, silt, sand and gravel) range in thickness from zero to 60 feet.
- Two faults are trending southwest to northeast between KY 1089 and KY 630. Associated with faults are slight folding, dipping and highly

fractured rock. Alignments for the roadway should cross perpendicular to the orientation of a fault to reduce negative impacts. Any proposed structures should not be placed on top of or directly adjacent to a fault.

- WKY # 9, 11, 13, and 14 coal seams have been extensively underground mined within the study area. Subsidence related to underground mining can be reduced by limiting the number of crossings over mined out areas.
- A database search does not identify any landslide or maintenance projects near the study area.

The **Natural Resources Conservation Service** (NRCS) does not anticipate the proposed roadway improvements will negatively impact Wetland Reserve Program (WRP), Grassland Reserve Program (GRP) or PL-566 watershed structures. If federal dollars are to be used to convert wetlands or important prime farmlands from agricultural uses to non-agricultural uses, a Form AD-10006 must be submitted to the local NRCS office.

Energy and Environment Cabinet (EEC), Division of Waste Management, Solid Waste Branch, Closure Section commented that there was nothing in their database close to the route of the proposed improvements.

The Tourism, Arts and Heritage Cabinet, Kentucky Heritage Council responded with compliance instructions.

The Kentucky Transportation Cabinet's Division of Environmental Analysis evaluated the corridor for environmental challenges that would need to be addressed during the early design stage. They had the following comments:

A detailed Noise study with regard to noise impacts will be required if the project advances.

Impacts to streams, small ponds, and wetlands appear to be present throughout the area, impacts to these areas should be avoided. Avoidance and/or minimization during the design process is recommended.

Socio-economic concerns should be assessed such as potential relocation impacts, potential for environmental justice, potential for prime farmland impacts, including agricultural chemical runoff into sinkholes and drainage concerns could be substantial if the existing land use should change.

Impacts to potential archaeological sites within the project area should be avoided or minimized.

Potential Section 4(f) and 106 issues exist. Several National Register sites including possible historic districts will require additional documentation and are located within the project corridor; impacts to these resources should be avoided or minimized.

United States Fish and Wildlife Services (USFWS) coordination for endangered species will be required early in the design process.

The Energy and Environment Cabinet, Division of Water had the following comments: 1) the project would not impact known exceptional quality water resources. Impaired waters, Pond Creek and Weirs Creek, could potentially be further degraded. Stormwater collection basins may be required for all alternatives to reduce impacts to these impaired waters. 2) Any monitoring wells or water wells that are located in the construction zone will need to be properly abandoned by a KY Certified Water Well or Monitoring Well Driller. 3) The Division of Enforcement does not object to the proposed project. 4) Utilize alternatively fueled equipment, 5) utilize other emission controls that are applicable to your equipment, 6) reduce idling time on equipment 7) all solid waste generated by this project must be disposed at a permitted facility. If underground storage tanks are encountered, they must be properly addressed. If asbestos, lead paint or other contaminants are encountered during this project, they must be properly addressed.

6.4 Other Correspondence Received

A letter was received supporting a four-lane roadway from Madisonville to Providence expressing frustration of the length of the drive due to "heavy traffic, farm equipment,

coal trucks, etc.” This letter is located in Appendix F.

Chapter 7

7.1 Alternatives Considered

With early stakeholder and Project Team input, alternatives were developed taking into consideration information to date. The alternatives are described below and illustrated and defined in more detail beginning on page 36:

- **“Do-Nothing” Alternative** This alternative would have no construction disruption or cost except for routine maintenance.
- **Alternative 1A - “Super 2”** (two 12-foot lanes, 12-foot shoulders {10 feet of which are paved}) essentially along the existing alignment
- **Alternative 1B - “Super 2”** along existing alignment from Industrial Road to KY 630 North in Manitou: This alternative is a subset of Alternative 1A focusing on a priority section.
- **Alternative 2 - Four lanes** with a 40-foot wide depressed median along the existing alignment
- **Alternative 3 - Four lanes** with a 40-foot wide depressed median principally along the existing alignment, except for bypasses around Manitou and Nebo and a

new alignment approaching Providence

- **Alternative 3A - Four lanes** with a 40-foot wide depressed median from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 3 focusing on a priority section.
- **Alternative 4 - “Super 2”** (like Alternative 1A) that also provides two sets of passing lanes: one near Manitou and the other between Nebo and Providence, and includes a bypass to the north of Manitou
- **Alternative 5 - Spot Improvements:** at seven locations. Spots A, B, C and 1, 2, and 3 address sight distance issues both horizontally and vertically. US 41A was built mainly between 1930 and 1940, and the as-built plans are almost unreadable. Therefore, these specific “spots” had either a crash issue, or field-observed vertical and horizontal deficiencies. Improvement options were estimated utilizing a “Super 2” typical section to fit into an overall scheme of corridor improvements. However, each spot could be advanced with a lesser typical section to reduce costs.
 - **Spot A** near MP 11.2 just west of the US 41A/KY 2280 intersection.

- **Spot B** between KY 630 north at Manitou and the intersection with KY 2320
 - **Spot C** near the intersection with KY 814 just east of Providence
 - **Spots 1, 2, and 3** were grouped together as the deficiencies were so close together, it seemed logical to improve the section as a group. These spots are located between Nebo and the intersection with KY 2280
 - **Spot D** provides for access management between KY 120 and KY 670 in Webster County.
 - **Alternative 6** - Shared 4-lane cross-section essentially along existing alignment, which consists of an additional lane, added to one side of a conventional two-lane highway to provide motorists a chance to pass without having to find gaps in the oncoming traffic. The passing lane alternates between east and westbound lanes giving motorists from both directions ample opportunity to pass. Originating in Europe, this concept has been adopted in the United States in several states including Missouri. Appendix J includes an informative, detailed brochure to assist the reader in the concept.
 - **Alternative 7** - “Super 2” principally along the existing alignment, except for bypasses around Manitou and Nebo and a new alignment approaching Providence
 - **Alternative 7A** - “Super 2” from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 7 focusing on a priority section.
 - **Alternative 8** - Shared 4-lanes principally along the existing alignment, except for bypasses around Manitou and Nebo and a new alignment approaching Providence
 - **Alternative 8A** - Shared 4-lanes from Industrial Road to a point west of a Manitou Bypass: This alternative is a subset of Alternative 8 focusing on a priority section.
 - **Alternative 9** - Acceleration lane eastbound from KY 630 South in Manitou a distance of 1500 feet
 - **Alternative 10** - Slight realignment of US 41A in Nebo to provide for left-turn lanes onto KY 502 north and south
- A preliminary evaluation matrix was developed to compare alternatives. That matrix is summarized on each Project Sheet beginning on page 36. It should be noted that if partial control of access is desired for any alternative less than four lanes, it will

cost approximately \$10 million dollars more per alternative for frontage roads.

approximately 4 miles. The mine is located on KY 270 northeast of Providence.

7.2 Alternatives Discussions

At a second Project Team meeting, held on November 1, 2011 (see Appendix H), Alternatives 1A, 2, 3, 4, 5 (except for Spot D), 6, 7, and 8 and the 'Do Nothing' alternative as discussed in Section 7.1 above were presented and discussed. Based on that discussion, Alternatives 1B, 3A, 8A, and 9 were developed for presentation to the Project Stakeholders.

At a second Project Stakeholders meeting, held on December 7, 2011 (see Appendix I), concern was expressed about the shared four-lane alternatives (6, 8, 8A). In addition, a Providence locally elected official indicated he felt a new alignment was not needed for the approach into Providence. Possibly a transition to three-lanes near KY 120 would better serve the needs of the community. He also conceded that a narrower four-lane improvement footprint was acceptable and off the existing roadway was preferable due to the inconvenience of construction.

A business owner adjacent to US 41A expressed concern over any improvement to US 41A that would restrict or control access into his business.

A locally elected official from Providence indicated that the truck and vehicular traffic may get worse with a Dotiki mine opening up a new seam at Dotiki Mine 2 (D-2). D-2 is located off KY 270 northwest past Lisman

POTENTIAL RESOURCES AFFECTED	DO NOTHING ALTERNATIVE
PROPERTIES	0
POTENTIAL AFFECTED BUSINESSES	0
EJ	N/A
RAILROAD INVOLVEMENT	0
1 HOUSE ON THE NATIONAL REGISTER OF HIS-	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG-	0
4(f) - GOLF COURSE	0
FAULT LINES CROSSED	0
UST/HAZMAT	N/A
SUBSTATIONS	0
HIGH ARCHAEOLOGY PROBABILITY	NO
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	0
WETLANDS (acres)	0
100-YEAR FLOODPLAIN	N/A
ACCESS CONTROL	N/A
MAJOR GAS LINES NEAR TRANSCANADA ANR	N/A
GAS LINES CROSSED	N/A
OTHER EXISTING UTILITIES	N/A
POTENTIAL CRASH REDUCTION	0
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	C-E
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.24-0.55
OTHER COMMENTS	



COST	DESIGN	\$0
	R/W	\$0
	UTILITIES	\$0
	CONSTRUCTION	\$0
	TOTAL	\$0

DO NOTHING ALTERNATIVE

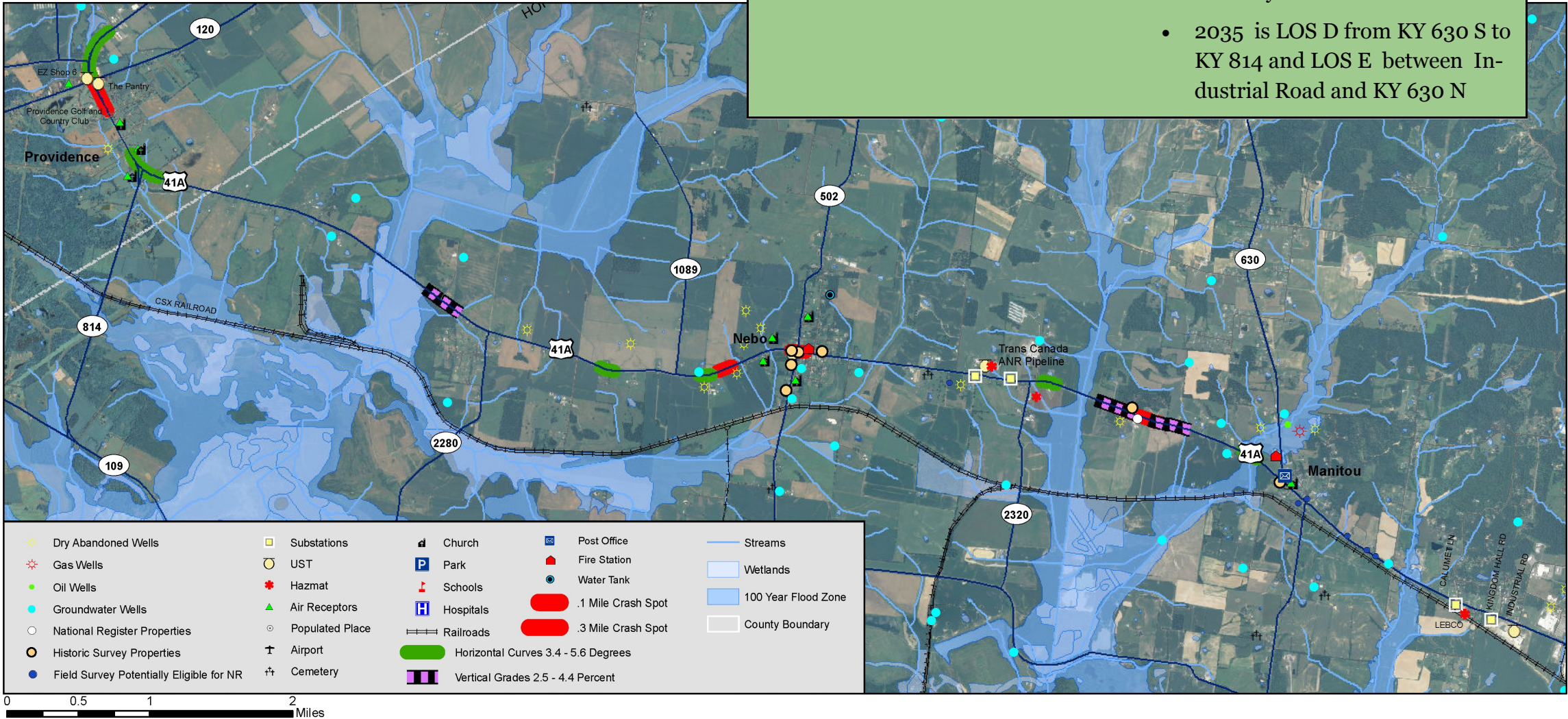
Leave the existing US 41A as –is with no improvements made. The only associated costs would be for routine maintenance.

ADVANTAGES

- No expenditure of funds
- Minimal impacts to the corridor, and Manitou, Nebo and Providence
- No disruption due to construction

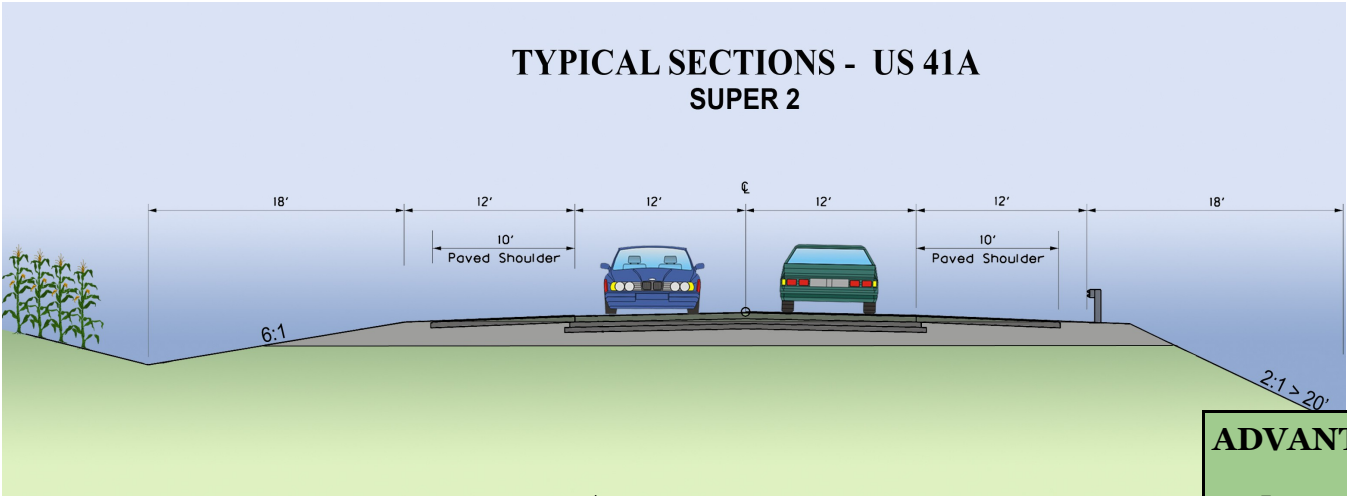
DISADVANTAGES

- No crash reduction
- Narrow lanes
- Narrow shoulders
- Deficient horizontal and vertical alignment in several locations.
- Does not meet the purpose of the project
- Large trucks dominate the lanes
- Motorists have no shoulders for recovery
- 2035 is LOS D from KY 630 S to KY 814 and LOS E between Industrial Road and KY 630 N



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 1A SUPER 2 ALONG EXISTING ALIGN- MENT STA 171+12 - STA 776+50
PROPERTIES	43
POTENTIAL AFFECTED BUSINESSES	22
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HISTORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER SITES	6
4(f) - GOLF COURSE	YES
FAULT LINES CROSSED	3
UST/HAZMAT	4
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	1
STREAM CROSSINGS (total feet)	17 (4036')
WETLANDS (acres)	3.0
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	B-E
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.25-0.55
OTHER COMMENTS	

ALTERNATIVE 1A Super 2 roadway along the existing route for the length of the project

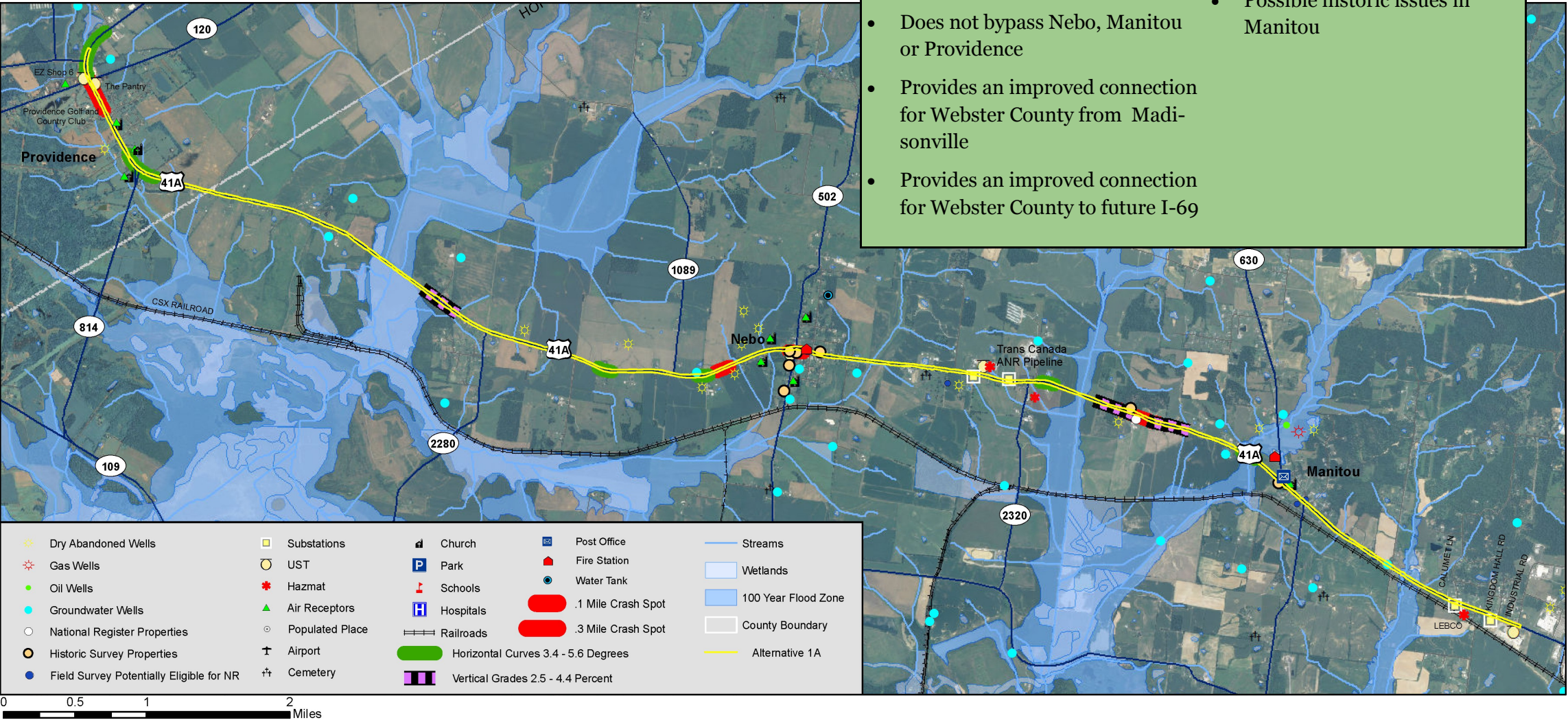


Length—11.5 miles

COST

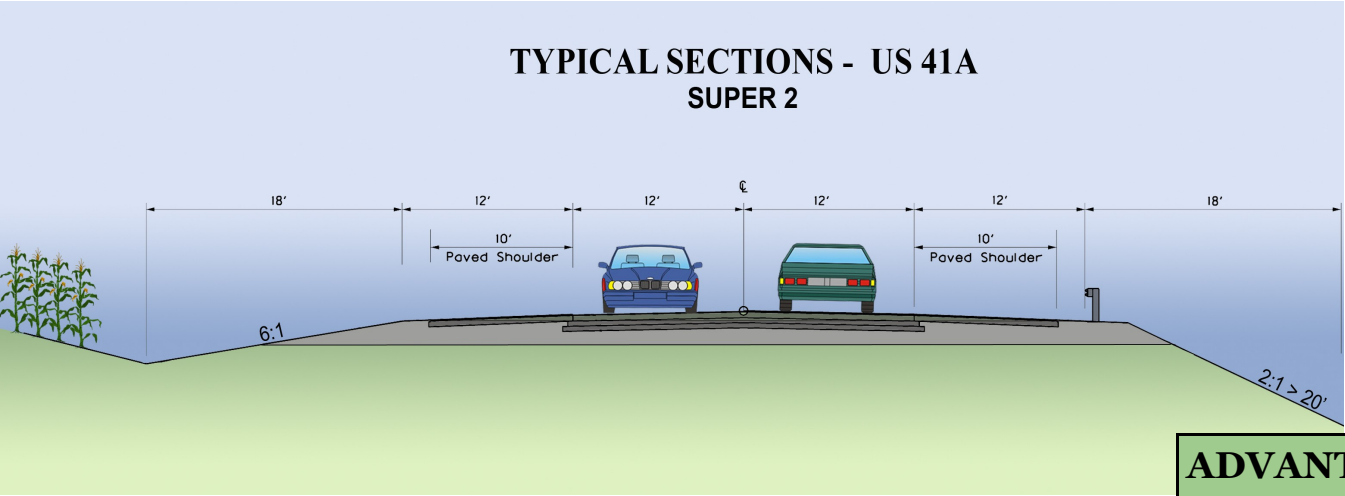
DESIGN	\$ 2,100,000
R/W	\$ 2,750,000
UTILITIES	\$13,800,000
CONSTRUCTION	\$31,000,000
TOTAL	\$49,650,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyReduces crashesImproves LOS from KY 1089 to KY 120Lower costMinimizes impactsDoes not bypass Nebo, Manitou or ProvidenceProvides an improved connection for Webster County from MadisonvilleProvides an improved connection for Webster County to future I-69	<ul style="list-style-type: none">No change in LOS from Industrial Road to KY 1089Not desired by stakeholdersTypical section may have to be reduced through Manitou, Nebo and ProvidencePossible historic issues in Manitou



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 1B SUPER 2 ALONG EXISTING ALIGN- MENT MP 3.275-MP 5.01
PROPERTIES	36
POTENTIAL AFFECTED BUSINESSES	8
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	1
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	1
SUBSTATIONS	1
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	3 (969')
WETLANDS (acres)	0.0
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	3
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	E
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.55
OTHER COMMENTS	

ALTERNATIVE 1B Super 2 along the existing roadway to KY 630 N

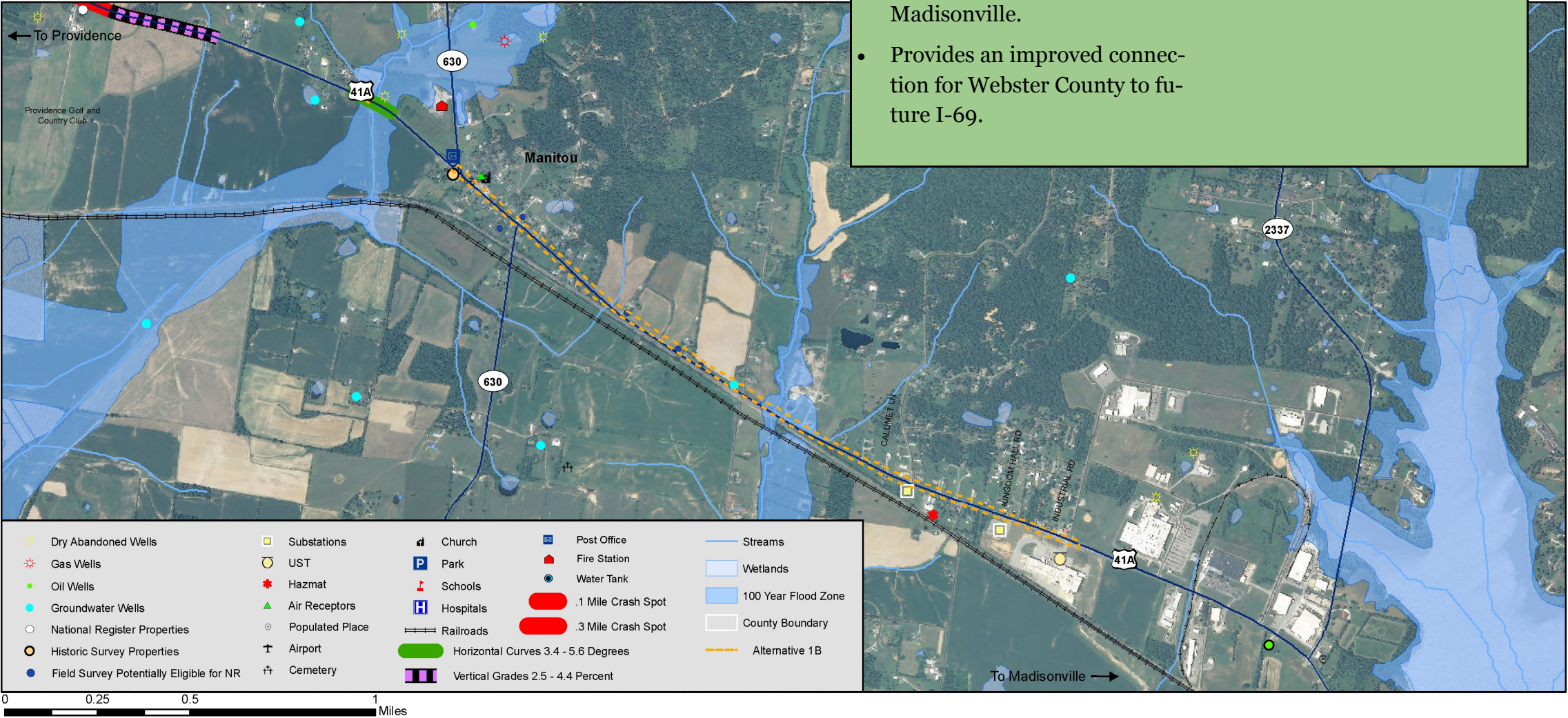


Length—1.9 miles

COST

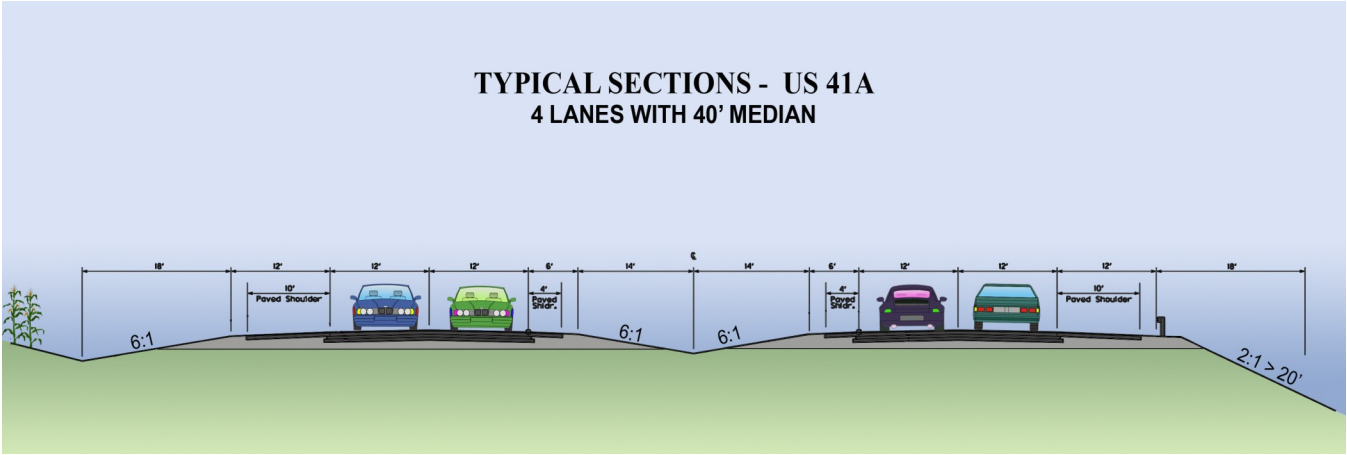
DESIGN	\$ 400,000
R/W	\$ 1,650,000
UTILITIES	\$ 2,280,000
CONSTRUCTION	\$ 5,000,000
TOTAL	\$ 9,330,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyReduces crashesLower costMinimizes impactsProvides an improved connection for Webster County from Madisonville.Provides an improved connection for Webster County to future I-69.	<ul style="list-style-type: none">No change in LOSLOS ENot desired by stakeholdersPossible historic issues in Manitou



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 2 4 LANES WITH 40' DEPRESSED MEDIAN ALONG EXISTING ALIGNMENT STA 171+12 to STA 776+50
PROPERTIES	67
POTENTIAL AFFECTED BUSINESSES	32
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	7
4(f) - GOLF COURSE	YES
FAULT LINES CROSSED	3
UST/HAZMAT	4
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	1
STREAM CROSSINGS (total feet)	17 (5475')
WETLANDS (acres)	5.2
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PARTIAL
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	A
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.08-0.20
OTHER COMMENTS	

ALTERNATIVE 2 - 4 lanes with 40' depressed median along the existing alignment for the length of the project

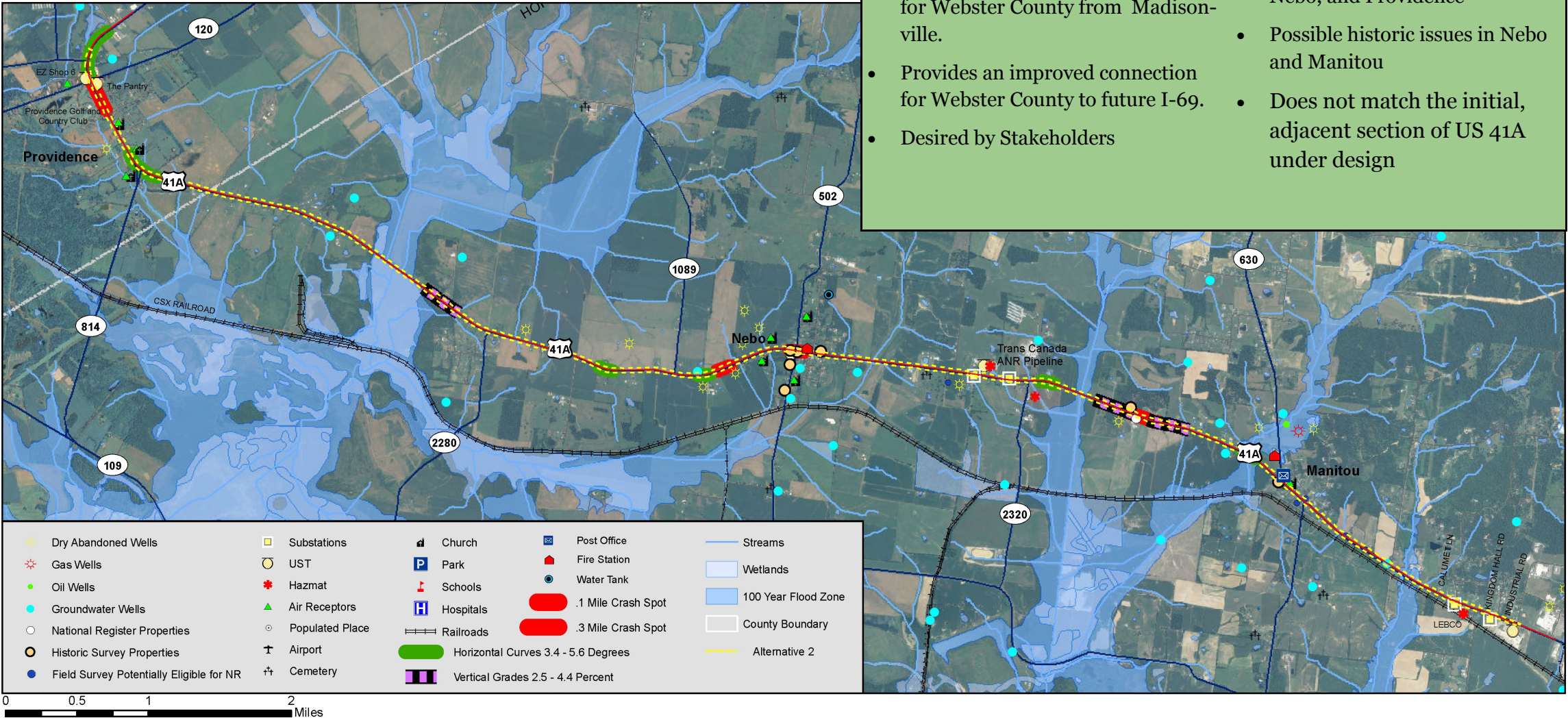


Length—11.5 miles

COST

DESIGN	\$ 3,500,000
R/W	\$ 5,500,000
UTILITIES	\$ 18,000,000
CONSTRUCTION	\$ 56,800,000
TOTAL	\$83,800,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyReduces crashesImproves LOS for the entire routeImproves V/C for the entire routeProvides an improved connection for Webster County from Madisonville.Provides an improved connection for Webster County to future I-69.Desired by Stakeholders	<ul style="list-style-type: none">High costMany affected businesses and propertiesWetland and stream impactsCommunity impacts to Manitou, Nebo, and ProvidencePossible historic issues in Nebo and ManitouDoes not match the initial, adjacent section of US 41A under design

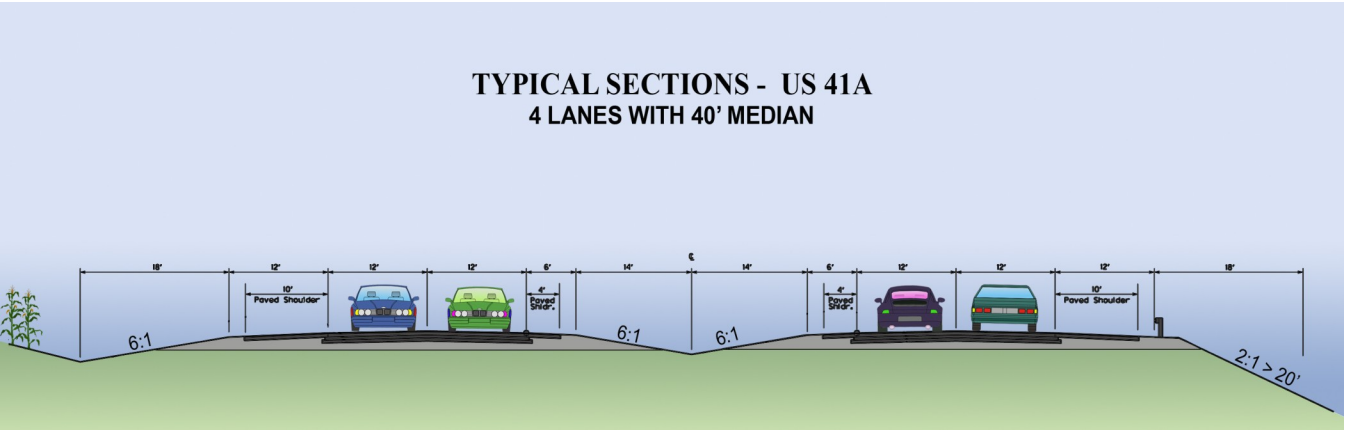


ALTERNATIVE 3 - 4 lanes with 40' depressed median for the length of the project with bypasses

around Manitou, Nebo and Providence

Length—11.6 miles

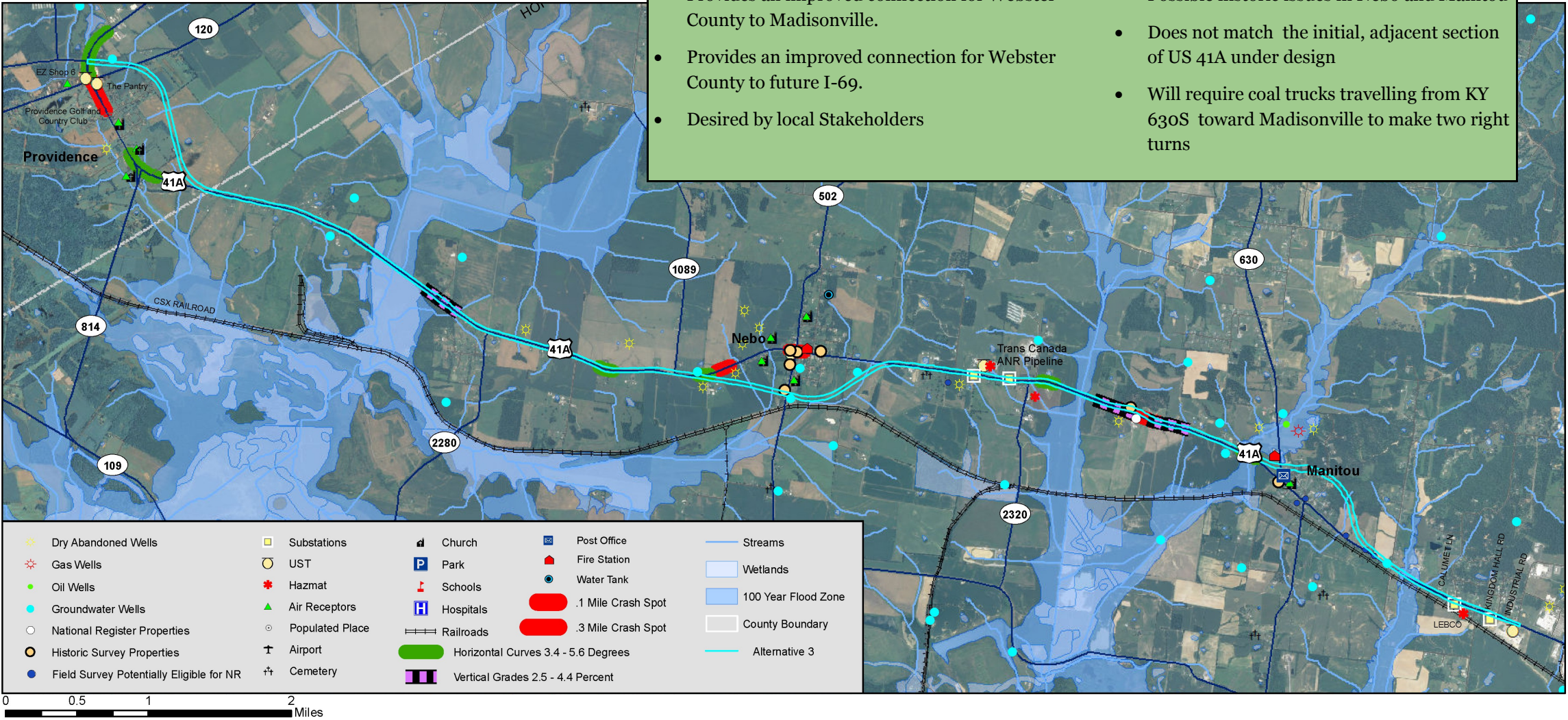
POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 3 4 LANES WITH 40' DEPRESSED MEDIAN AROUND NEBO, MANITOU AND PROVIDENCE STA 171+12 to STA 782+09
PROPERTIES	47
POTENTIAL AFFECTED BUSINESSES	18
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	4
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	3
UST/HAZMAT	1
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	1
STREAM CROSSINGS (total feet)	15 (4210')
WETLANDS (acres)	4.8
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PARTIAL
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	A (RESIDUAL A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.03-0.20 (residual 0.07-0.23)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN



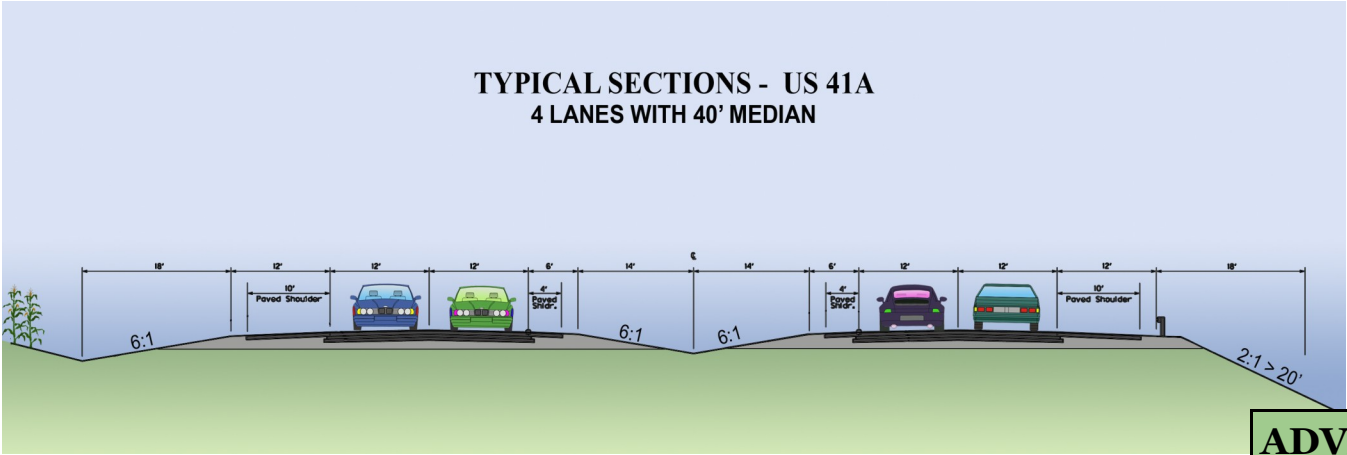
COST

DESIGN	\$ 4,000,000
R/W	\$ 2, 750,000
UTILITIES	\$ 12,000,000
CONSTRUCTION	\$ 58,360,000
TOTAL	\$ 77,110,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyReduces crashesImproves LOS for the entire routeImproves V/C for the entire routeFewer property impacts in Manitou, Nebo and ProvidenceProvides an improved connection for Webster County to Madisonville.Provides an improved connection for Webster County to future I-69.Desired by local Stakeholders	<ul style="list-style-type: none">High costMany affected businesses and propertiesWetland and stream impactsMore mileage to maintainPossible impacts to existing businesses in the small bypassed communitiesPossible historic issues in Nebo and ManitouDoes not match the initial, adjacent section of US 41A under designWill require coal trucks travelling from KY 630S toward Madisonville to make two right turns



ALTERNATIVE 3A - 4 lanes with 40' depressed median from Industrial Road around Manitou



Length—2.3 miles

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 3 A 4 LANES WITH 40' DEPRESSED MEDIAN AROUND MANITOU STA 171+12 to STA 295+00
PROPERTIES	20
POTENTIAL AFFECTED BUSINESSES	3
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HISTORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER SITES	0
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	1
SUBSTATIONS	1
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	4 (1327')
WETLANDS (acres)	<1.0
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PARTIAL
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	3
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	A (RESIDUAL A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.10-0.20 (residual 0.07-0.21)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN

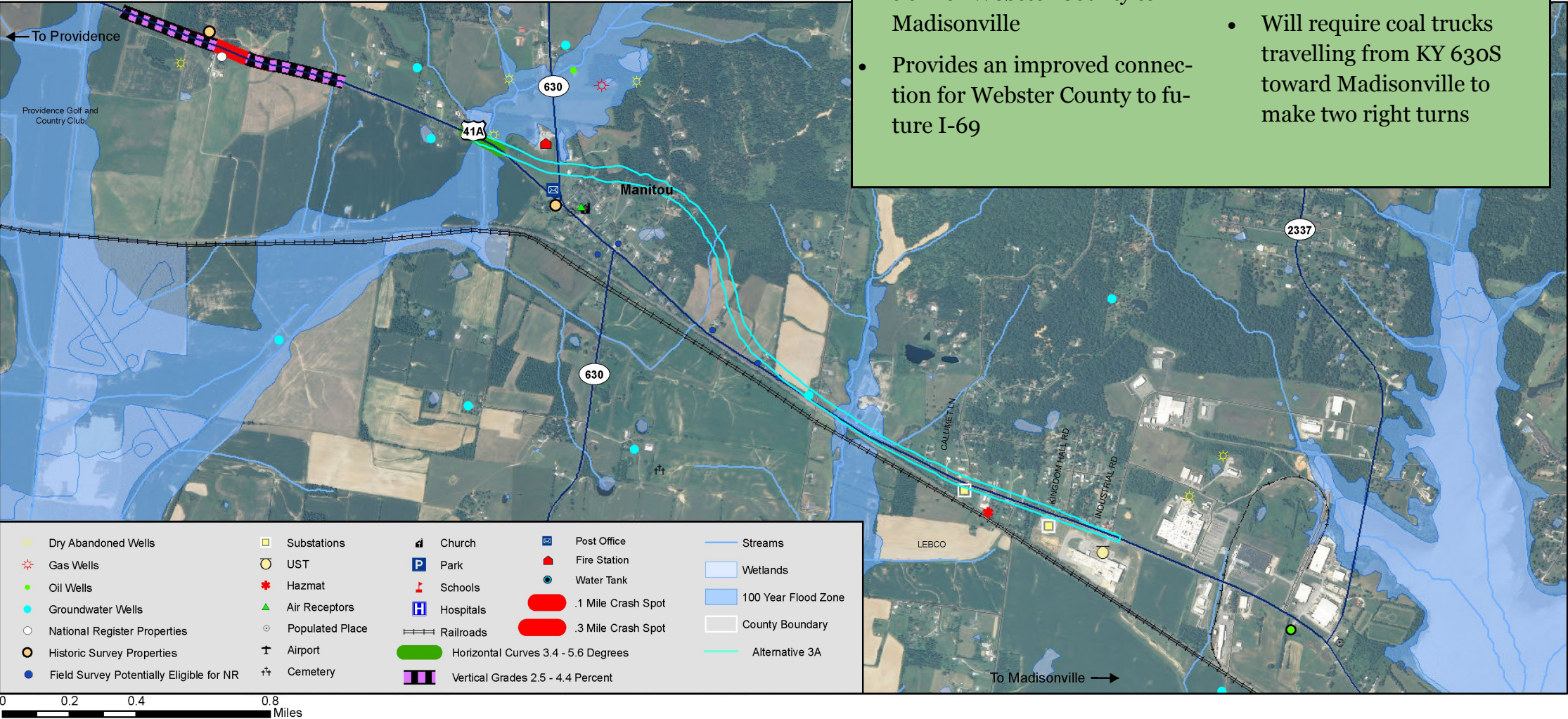
COST	DESIGN	\$ 800,000
	R/W	\$ 550,000
	UTILITIES	\$ 800,000
	CONSTRUCTION	\$ 11,900,000
	TOTAL	\$ 14,050,000

ADVANTAGES

- Improves safety
- Reduces crashes
- Improves LOS & V/C from Industrial Road to KY 630 N
- Less property impacts in Manitou
- Provides an improved connection for Webster County to Madisonville
- Provides an improved connection for Webster County to future I-69

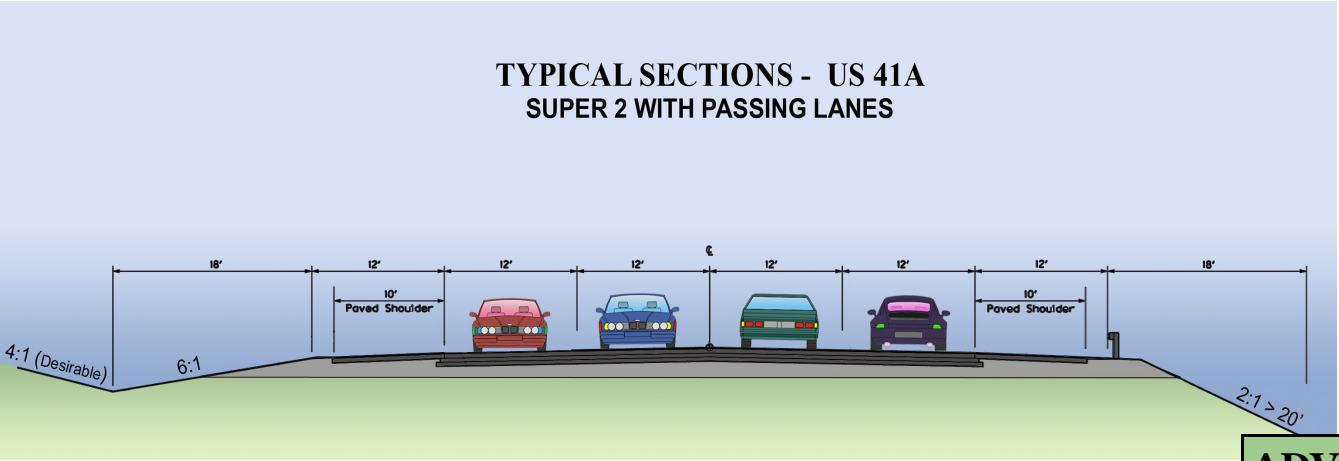
DISADVANTAGES

- More mileage to maintain
- V/C acceptable before improvements
- Possible impacts to existing businesses in Manitou
- Does not match the initial, adjacent section of US 41A under design
- Will require coal trucks travelling from KY 630S toward Madisonville to make two right turns



ALTERNATIVE 4 - Super 2 for the length of the project with a Manitou Bypass and two sets of passing lanes

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 4 SUPER 2 WITH TWO SETS OF PASSING LANES STA 243+00 to STA 288+00 STA 514+00 to STA 559+00
PROPERTIES	35
POTENTIAL AFFECTED BUSINESSES	17
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HISTORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER SITES	6
4(f) - GOLF COURSE	YES
FAULT LINES CROSSED	3
UST/HAZMAT	4
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	1
STREAM CROSSINGS (total feet)	17 (4270')
WETLANDS (acres)	3.5
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	B-E (RESIDUAL A-B)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.24-0.55 (residual 0.07-0.22)
OTHER COMMENTS	



Length—11.5 miles

COST

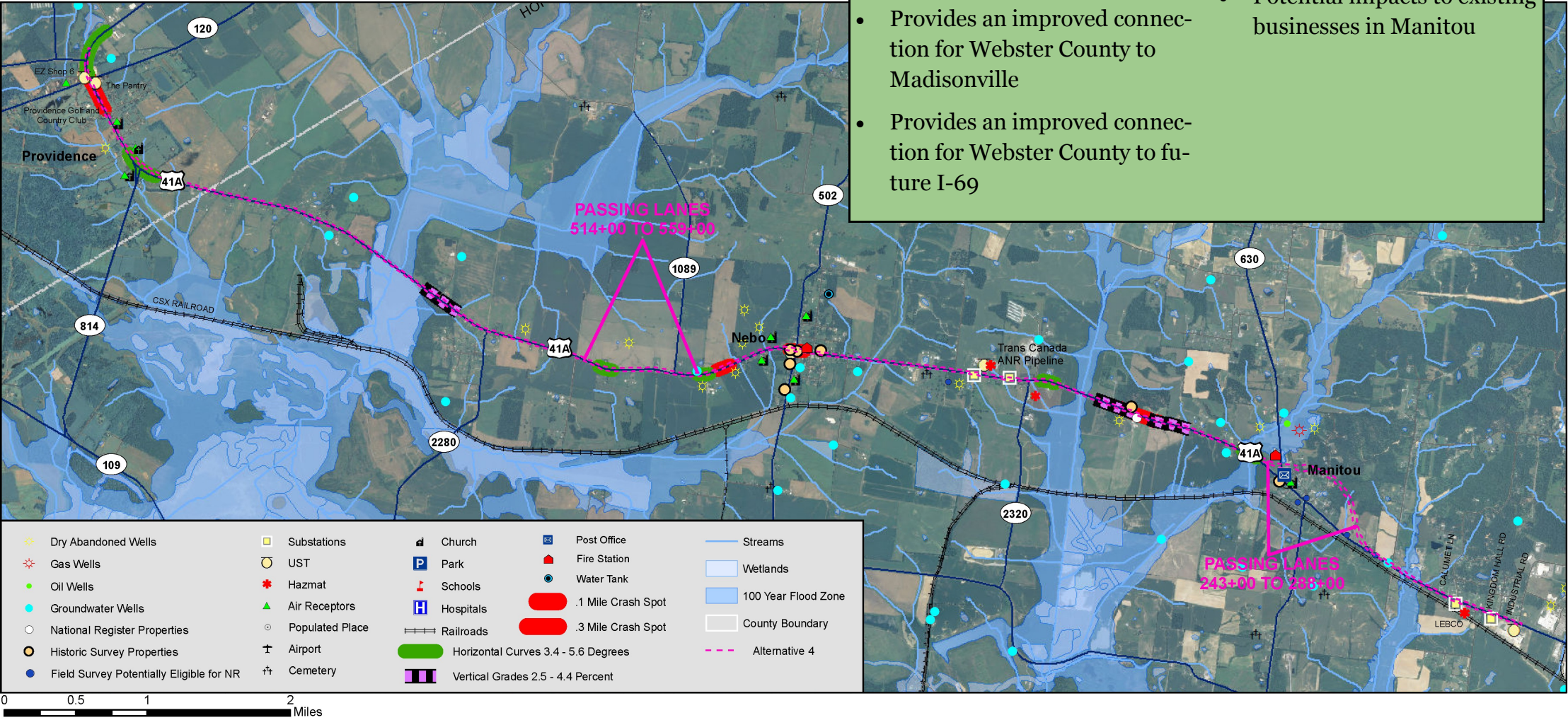
DESIGN	\$ 1,750,000
R/W	\$ 1,650,000
UTILITIES	\$ 13,800,000
CONSTRUCTION	\$ 35,000,000
TOTAL	\$ 52,000,000

ADVANTAGES

DISADVANTAGES

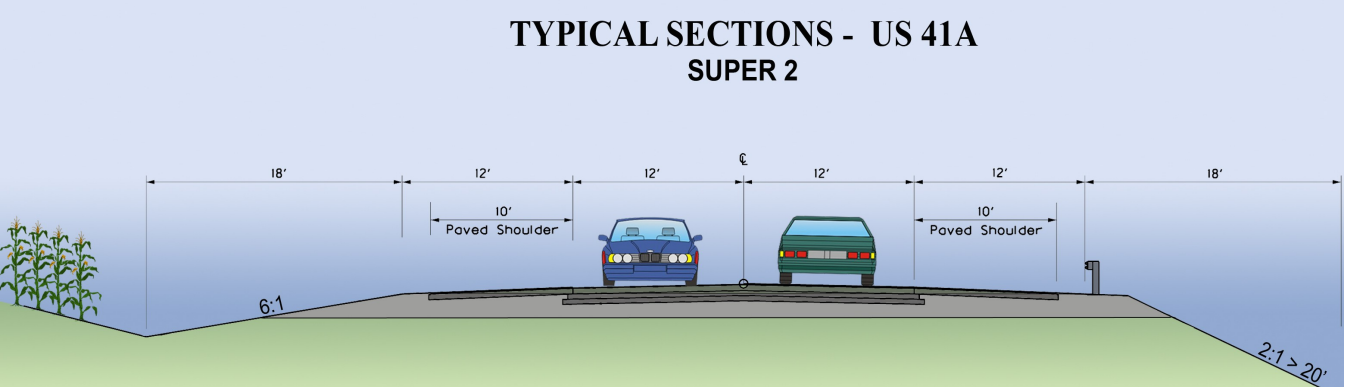
- Improves safety
- Improves LOS around Manitou where there is passing
- Lower cost
- Reduces crashes
- Less property impacts in Manitou
- Provides an improved connection for Webster County to Madisonville
- Provides an improved connection for Webster County to future I-69

- More mileage to maintain
- Will require coal trucks travelling from KY 630S toward Madisonville to make two right turns
- Potential impacts to historic properties in Nebo
- Potential impacts to existing businesses in Manitou



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 5 SUPER 2 SPOTS STA 592+00 to STA 612+00 (A) STA 275+50 to STA 377+00 (B) STA 718+00 to STA 746+00 (C) STA 770+00 to STA 775+00 (D)	ALTERNATIVE 5 SPOTS 1, 2 and 3 STA 454+00 to STA 597+50
PROPERTIES	5/10/11/3	20
POTENTIAL AFFECTED BUSINESSES	0/1/0/6	8
EJ	YES	YES
RAILROAD INVOLVEMENT	NO/YES/NO/NO	NO
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	NO/YES/NO/NO	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	0/2/0/0	4
4(f) - GOLF COURSE	NO	NO
FAULT LINES CROSSED	0/1/0/0	0
UST/HAZMAT	0/0/0/2	1
SUBSTATIONS	0/0/0/0	0
HIGH ARCHAEOLOGY PROBABILITY	YES	YES
ARCHAEOLOGY SITES	0/1/0/0	0
STREAM CROSSINGS (total feet)	1 (98')/3 (409')/1 (138')/0	5 (526')
WETLANDS (acres)	All < 1.0	< 1.0
100-YEAR FLOODPLAIN	YES/YES/NO/NO	YES
ACCESS CONTROL	PERMIT	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO	NO
GAS LINES CROSSED	1/3/3/0	5
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER (D ONLY)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25-35%	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	C/D/C/D	C-D
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.24/0.29/0.25/0.34	0.24-0.29
OTHER COMMENTS		

ALTERNATIVE 5 - Spots Improvements A, B, C , D, 1, 2, and 3



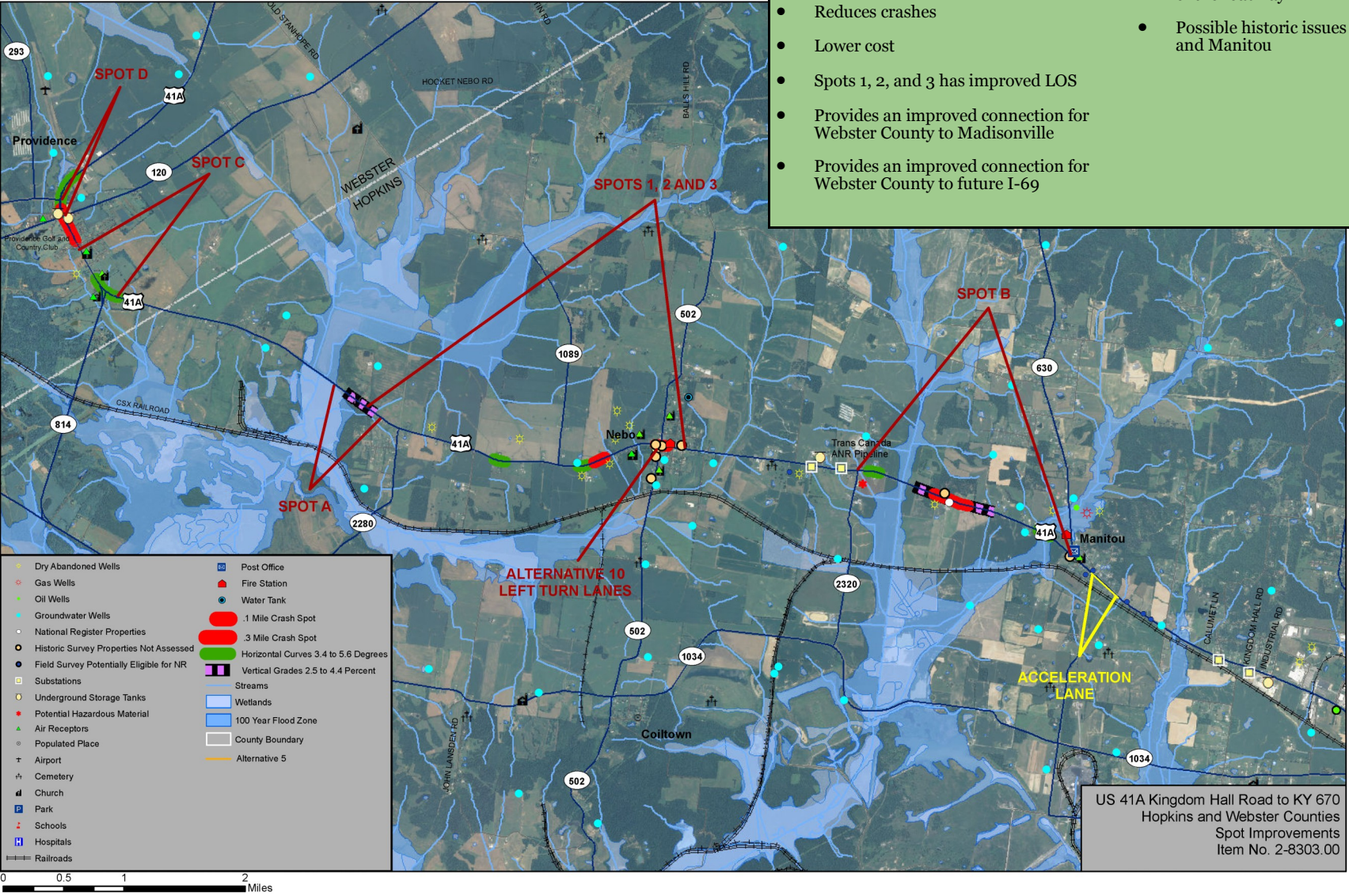
Total Length—
5.6 miles

COST

SPOTS	A	B	C	D	1, 2,3
DESIGN	\$ 300,000	\$ 625,000	\$ 250,000	\$ 150,000	\$ 500,000
R/W	\$ 125,000	\$ 415,000	\$ 285,000	\$ 200,000	\$ 550,000
UTILITIES	\$ 280,000	\$1, 400,000	\$ 420,000	\$ 1,200,000	\$ 630,000
CONSTRUCTION	\$ 920,000	\$ 6,664,000	\$ 1,440,000	\$ 1,186,000	\$ 6,109,000
TOTAL	\$ 1,625,000	\$ 9,104,000	\$ 2,395,000	\$ 2,736,000	\$ 7, 789,000

NOTE: More detail regarding improvements are located in Chapter 7 of this study

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyReduces crashesLower costSpots 1, 2, and 3 has improved LOSProvides an improved connection for Webster County to MadisonvilleProvides an improved connection for Webster County to future I-69	<ul style="list-style-type: none">May confuse driver expectations of the roadwayPossible historic issues in Nebo and Manitou

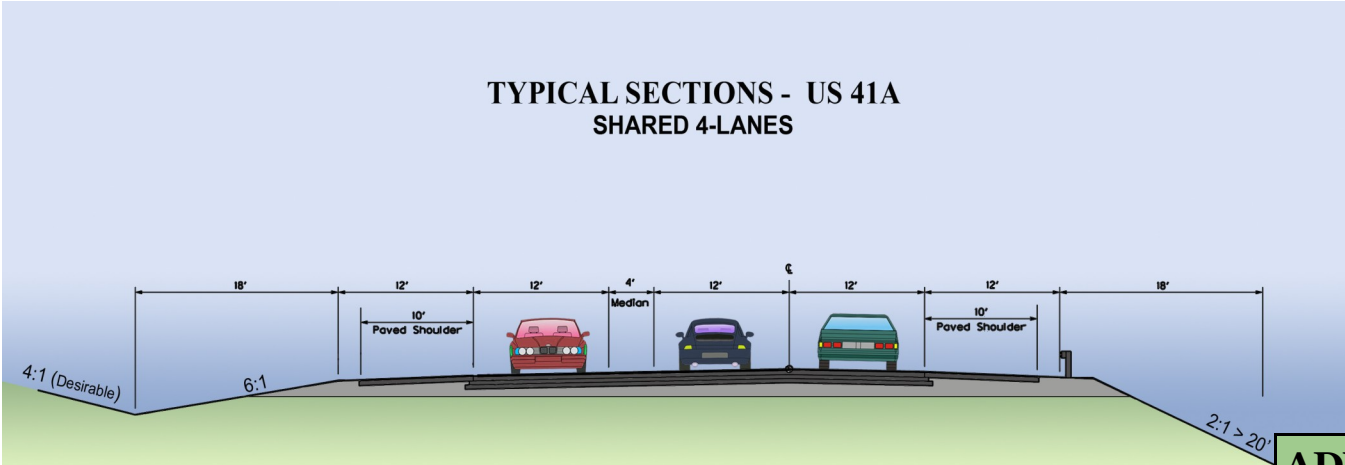


ALTERNATIVE 5
SPOT D IN PROVIDENCE



ALTERNATIVE 6 - Shared 4 lanes along the existing alignment for the length of the project

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 6 SHARED 4-LANES ALONG EXIST- ING ALIGNMENT
PROPERTIES	67
POTENTIAL AFFECTED BUSINESSES	32
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	3
4(f) - GOLF COURSE	YES
FAULT LINES CROSSED	3
UST/HAZMAT	4
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	1
STREAM CROSSINGS (total feet)	18 (4448')
WETLANDS (acres)	3.6
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	B-D
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.24-0.55
OTHER COMMENTS	

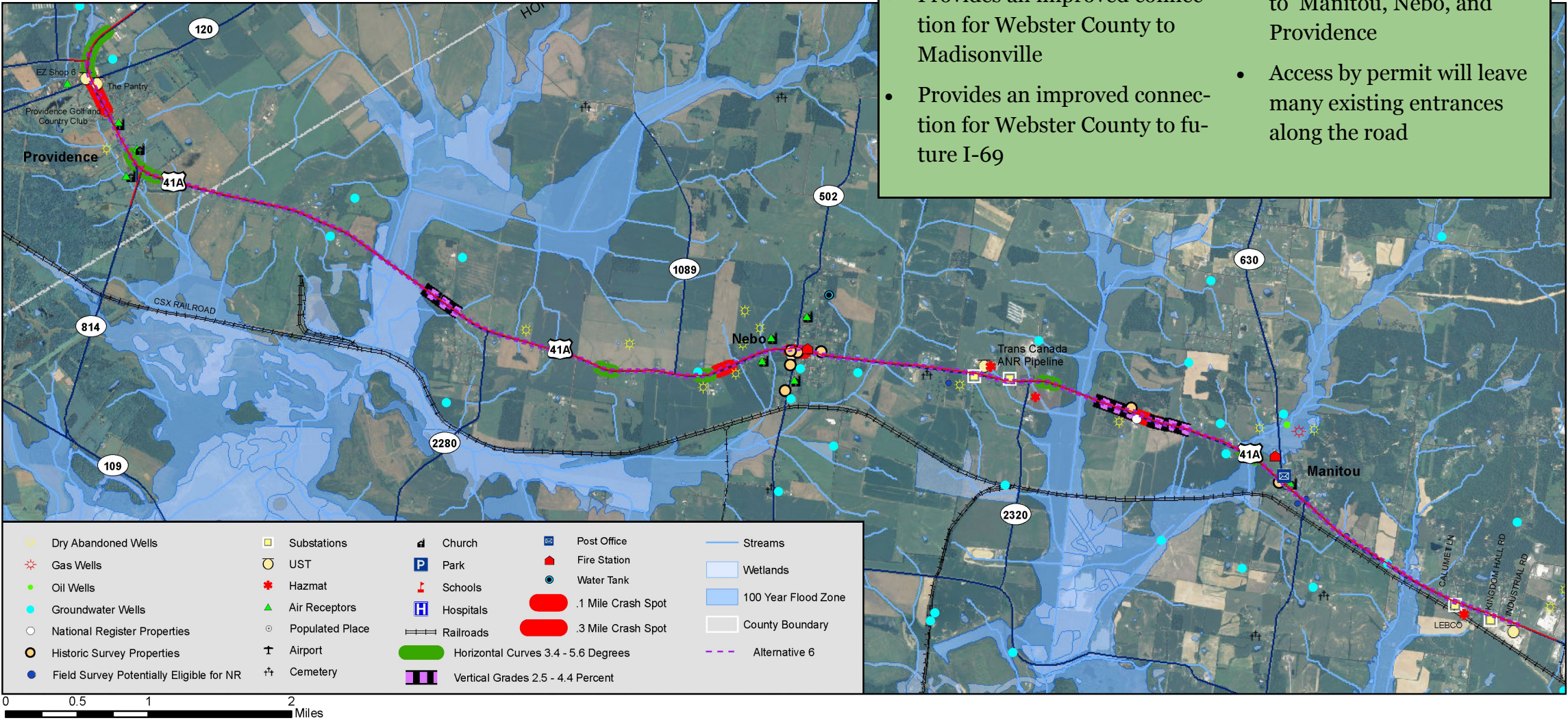


Length—11.5 miles

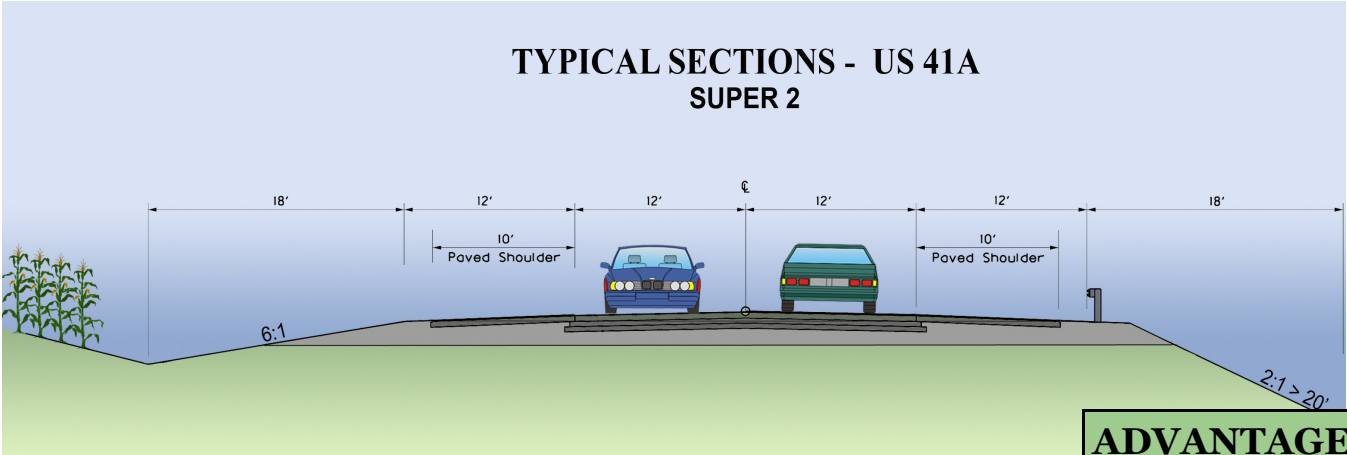
COST

DESIGN	\$ 2,750,000
R/W	\$ 5,500,000
UTILITIES	\$ 13,800,000
CONSTRUCTION	\$ 41,070,000
TOTAL	\$ 63,120,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyImproves LOS for the existing routeLesser cost than 4 lanesReduces crashesProvides an improved connection for Webster County to MadisonvilleProvides an improved connection for Webster County to future I-69	<ul style="list-style-type: none">New concept for motoristsIf partial control of access is desired, frontage roads will be necessary which increases costsPotential historic impacts to Manitou, Nebo, and ProvidenceAccess by permit will leave many existing entrances along the road



ALTERNATIVE 7 - Super 2 for the length of the project with bypasses around Nebo, Manitou, and Providence



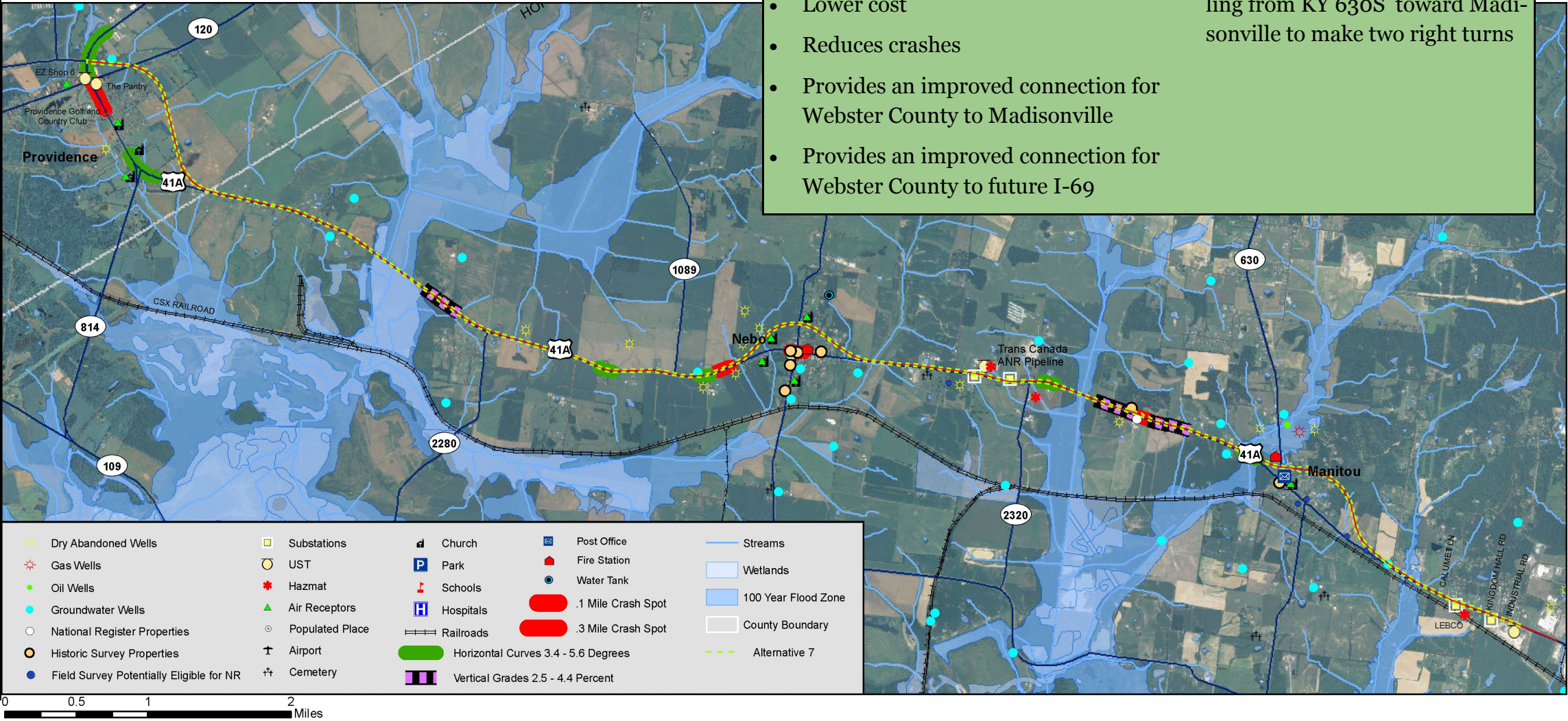
Length—11.5 miles

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 7 SUPER 2 AROUND NEBO, MANITOU AND PROVIDENCE STA 171+12 - STA 776+50
PROPERTIES	26
POTENTIAL AFFECTED BUSINESSES	17
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	3
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	3
UST/HAZMAT	1
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	2
STREAM CROSSINGS (total feet)	17 (3060')
WETLANDS (acres)	3.5
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER, SEWER
POTENTIAL CRASH REDUCTION	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	B-E (residual A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.08-0.55 (residual 0.07-0.23)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN

COST

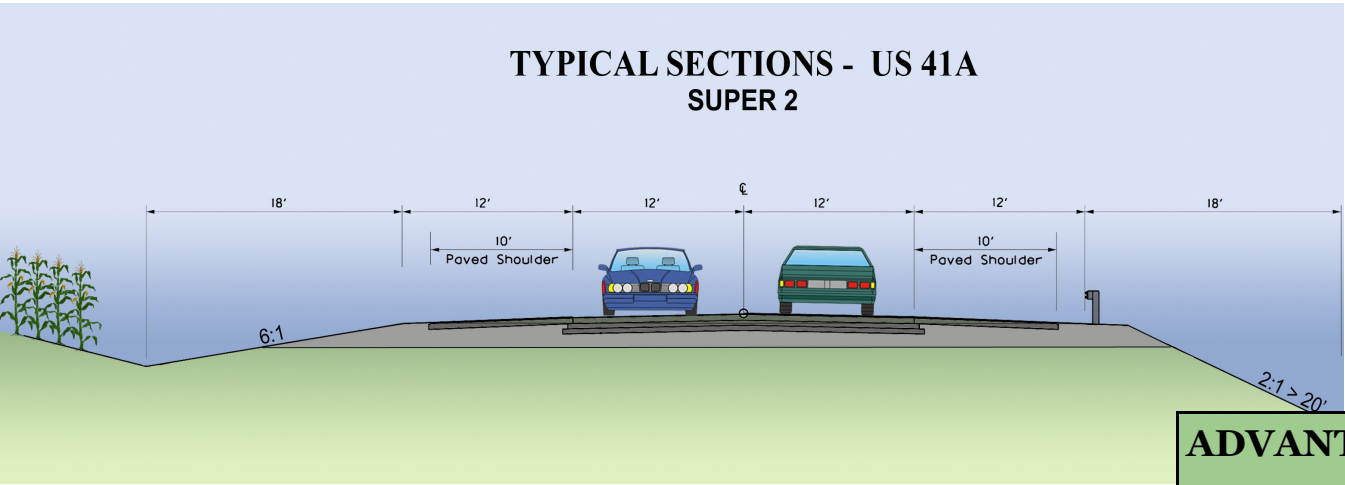
DESIGN	\$ 2,800,000
R/W	\$ 3,300,000
UTILITIES	\$ 12,000,000
CONSTRUCTION	\$ 31,830,000
TOTAL	\$ 49,930,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyImproved V/C for Manitou Bypass, and Nebo Bypass west to KY 670.Improves LOS from Manitou Bypass to the end of Nebo Bypass and around ProvidenceLower costReduces crashesProvides an improved connection for Webster County to MadisonvilleProvides an improved connection for Webster County to future I-69	<ul style="list-style-type: none">Additional mileage to maintainLow LOS for some sectionsPotential impacts to businesses in Manitou, Nebo and ProvidenceWill require coal trucks traveling from KY 630S toward Madisonville to make two right turns



ALTERNATIVE 7A - Super 2 around Manitou

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 7A SUPER 2 AROUND MANITOU STA 171+12 - STA 295+00
PROPERTIES	20
POTENTIAL AFFECTED BUSINESSES	3
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	0
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	1
SUBSTATIONS	1
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	4 (1131')
WETLANDS (acres)	0.0
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	3
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25-35%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	D-E (residual A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.34-0.55 (residual 0.07-0.21)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN

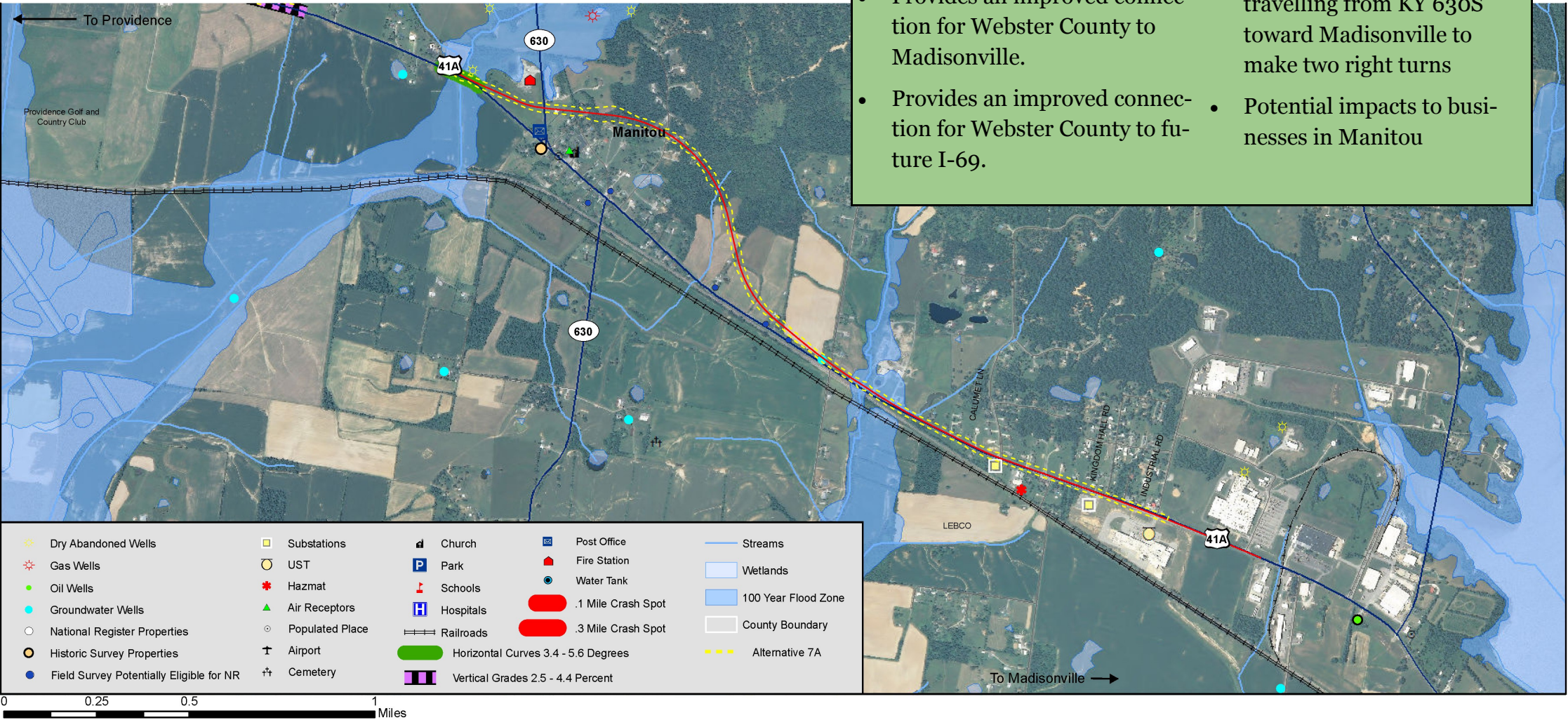


Length—2.4 miles

COST

DESIGN	\$ 600,000
R/W	\$ 550,000
UTILITIES	\$ 800,000
CONSTRUCTION	\$ 7,100,000
TOTAL	\$ 9,050,000

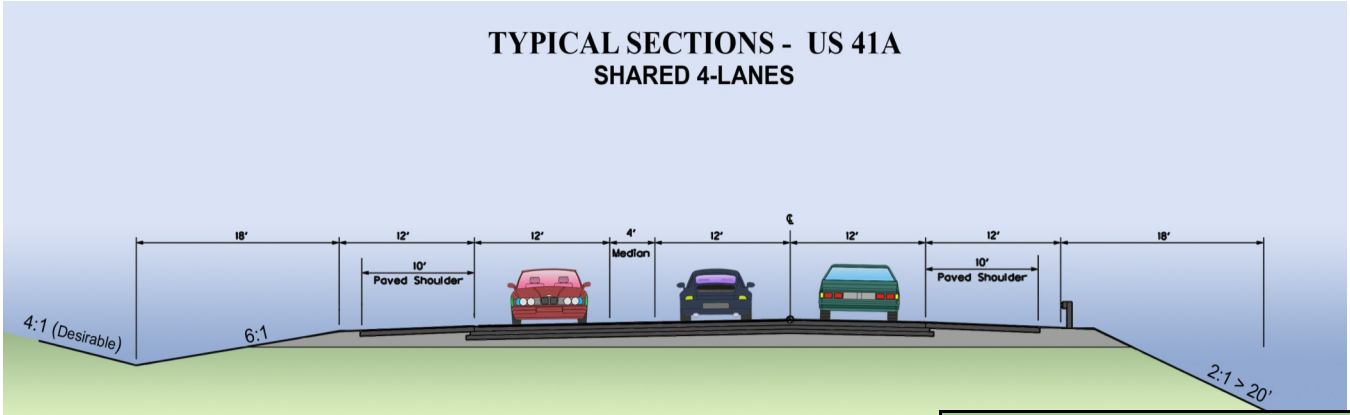
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyLower costReduces crashesImproves LOS with bypass of ManitouReduces crashesProvides an improved connection for Webster County to Madisonville.Provides an improved connection for Webster County to future I-69.	<ul style="list-style-type: none">V/C acceptable before improvementsAdditional mileage to maintainLow LOS from Industrial Road to KY 630NWill require coal trucks travelling from KY 630S toward Madisonville to make two right turnsPotential impacts to businesses in Manitou



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 8 ALTERNATE SHARED 4-LANES AROUND MANITOU, NEBO AND PROVIDENCE STA 171+12 - STA 776+50
PROPERTIES	43
POTENTIAL AFFECTED BUSINESSES	17
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	YES
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	1
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	3
UST/HAZMAT	1
SUBSTATIONS	3
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	2
STREAM CROSSINGS (total feet)	18 (3130')
WETLANDS (acres)	3.9
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	YES
GAS LINES CROSSED	25
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	B-D (residual A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.08-0.55 (residual 0.07-0.23)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN

ALTERNATIVE 8 - Shared 4 lanes for the length of the project with bypasses around Manitou, Nebo, and Providence

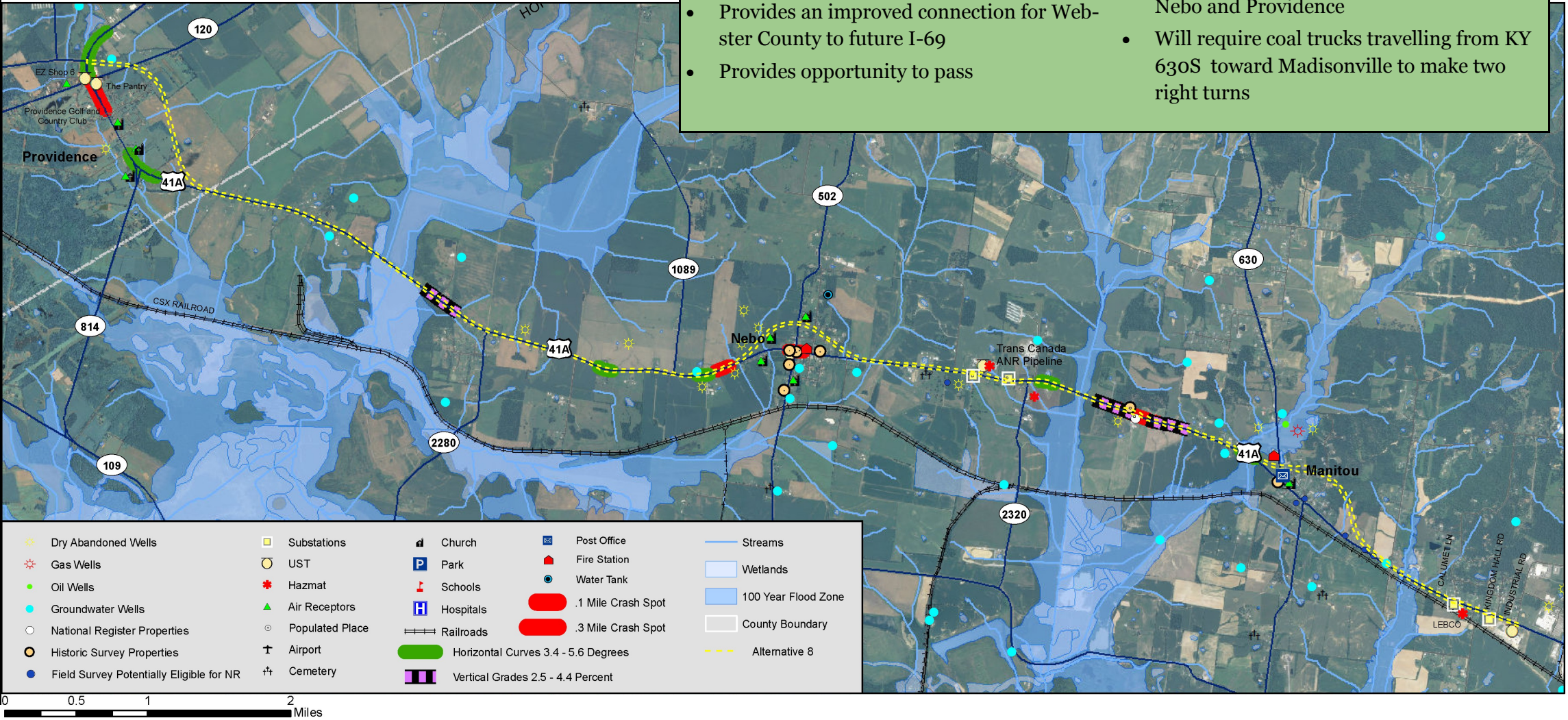
Length—11.5 miles



COST

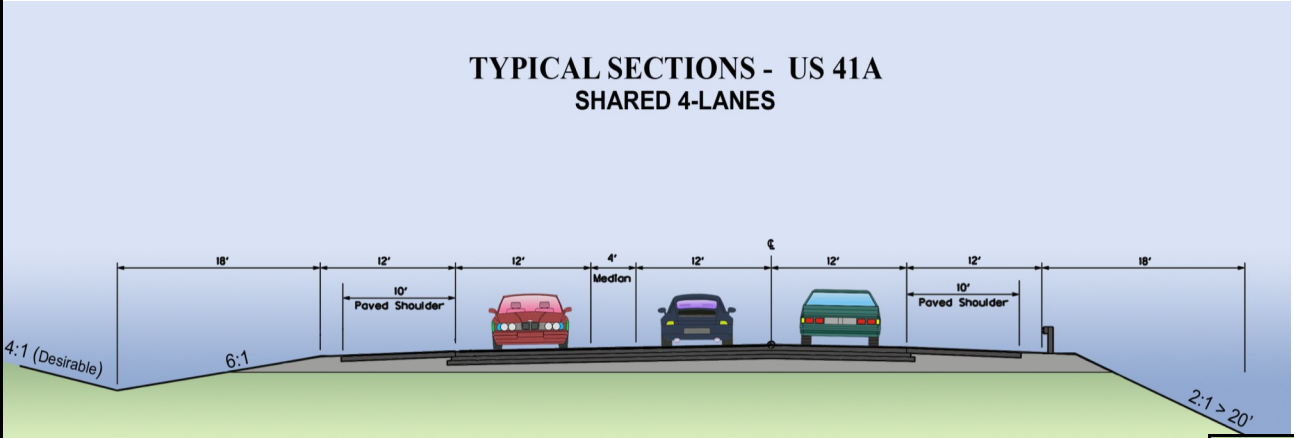
DESIGN	\$ 3,220,000
R/W	\$ 3,300,000
UTILITIES	\$ 13,800,000
CONSTRUCTION	\$ 42,330,000
TOTAL	\$ 62,650,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyLesser cost than 4 lanesReduces crashesImproves LOS for entire routeImproves V/C from Manitou Bypass west to Nebo Bypass and also Providence BypassProvides an improved connection for Webster County to MadisonvilleProvides an improved connection for Webster County to future I-69Provides opportunity to pass	<ul style="list-style-type: none">Additional mileage to maintainLow LOS for some sectionsIf partial control of access is desired, frontage roads will be necessary which increases costsNew to motoristsAdditional mileage to maintainPotential impacts to businesses in Manitou, Nebo and ProvidenceWill require coal trucks travelling from KY 630S toward Madisonville to make two right turns



ALTERNATIVE 8A - Shared 4-lanes around Manitou and east to Industrial Road

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 8A ALTERNATE SHARED 4-LANES AROUND MANITOU STA 171+12 - STA 295+00
PROPERTIES	20
POTENTIAL AFFECTED BUSINESSES	3
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HISTORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REGISTER SITES	0
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	1
SUBSTATIONS	1
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	4 (1200')
WETLANDS (acres)	< 1.0
100-YEAR FLOODPLAIN	YES
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	3
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	C-D (residual A-C)
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.29-0.55 (residual .07-0.21)
OTHER COMMENTS	ADDITIONAL MILEAGE TO MAINTAIN



Length—2.3 miles

COST

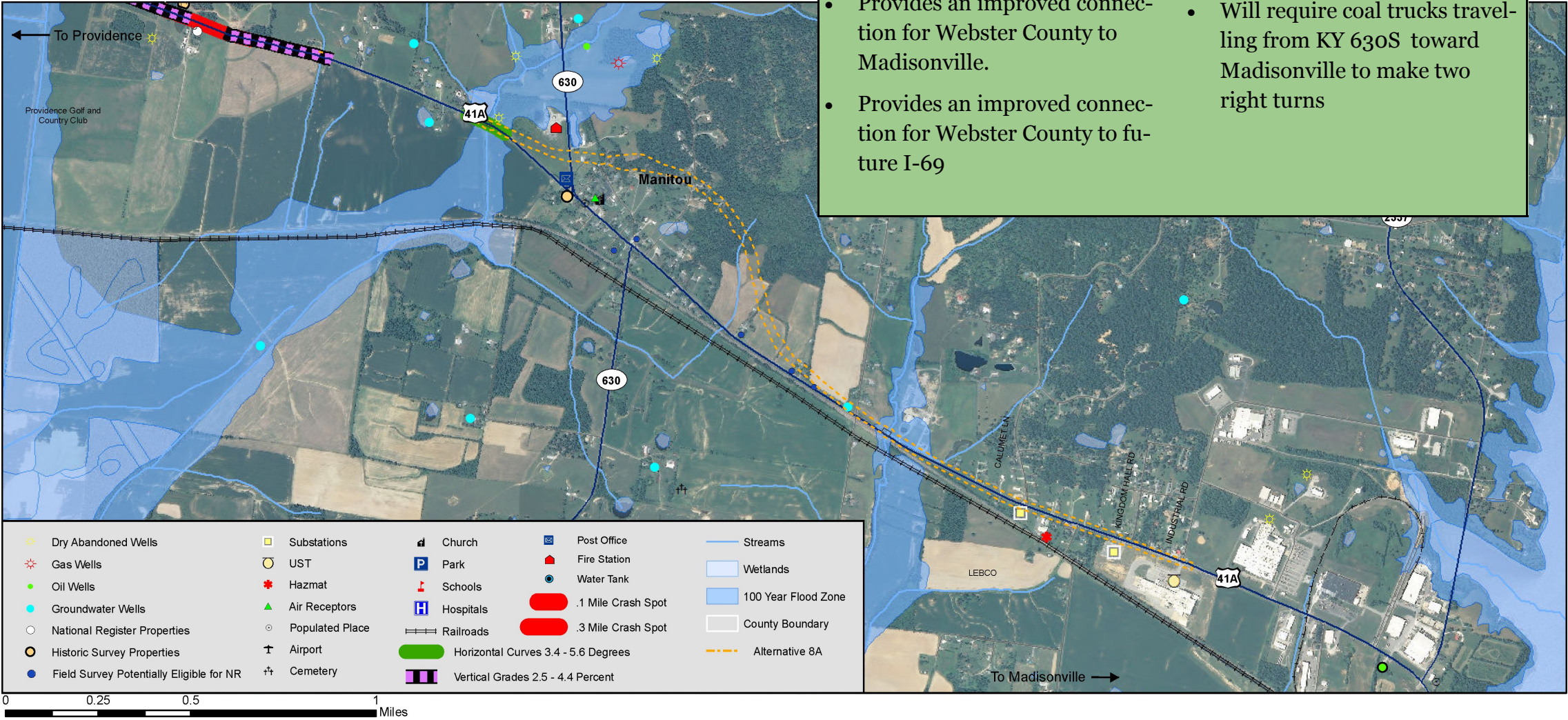
DESIGN	\$ 700,000
R/W	\$ 550,000
UTILITIES	\$ 800,000
CONSTRUCTION	\$ 9,300,000
TOTAL	\$ 11,350,000

ADVANTAGES

- Improves safety
- Improves LOS
- Improves V/C for Manitou Bypass
- Lower cost
- Reduces crashes
- Provides an improved connection for Webster County to Madisonville.
- Provides an improved connection for Webster County to future I-69

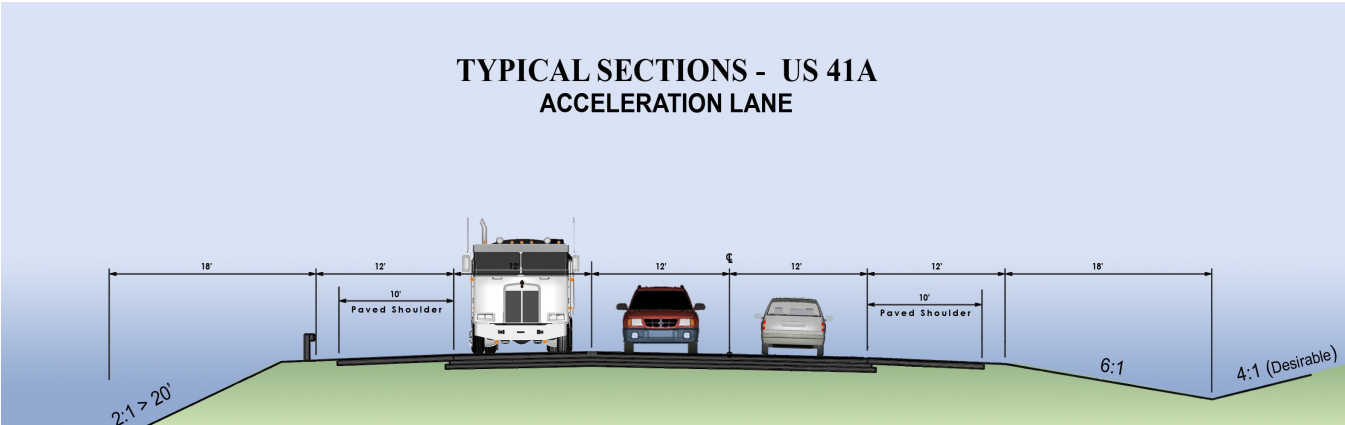
DISADVANTAGES

- Additional mileage to maintain
- If partial control of access is desired, frontage roads will be necessary which increases costs
- New to motorists
- Will require coal trucks traveling from KY 630S toward Madisonville to make two right turns



ALTERNATIVE 9 - Acceleration lane from KY 630S approximately 1500 feet to the east

POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 9 ACCELERATION LANE FROM KY 630 SOUTH APPROXIMATELY 4000 FEET TO THE EAST
PROPERTIES	8
POTENTIAL AFFECTED BUSINESSES	0
EJ	YES
RAILROAD INVOLVEMENT	YES
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	0
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	0
SUBSTATIONS	0
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	0 (0')
WETLANDS (acres)	0.0
100-YEAR FLOODPLAIN	NO
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	0
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	10%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	D
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.55
OTHER COMMENTS	ADDITIONAL LANE MILEAGE TO MAINTAIN

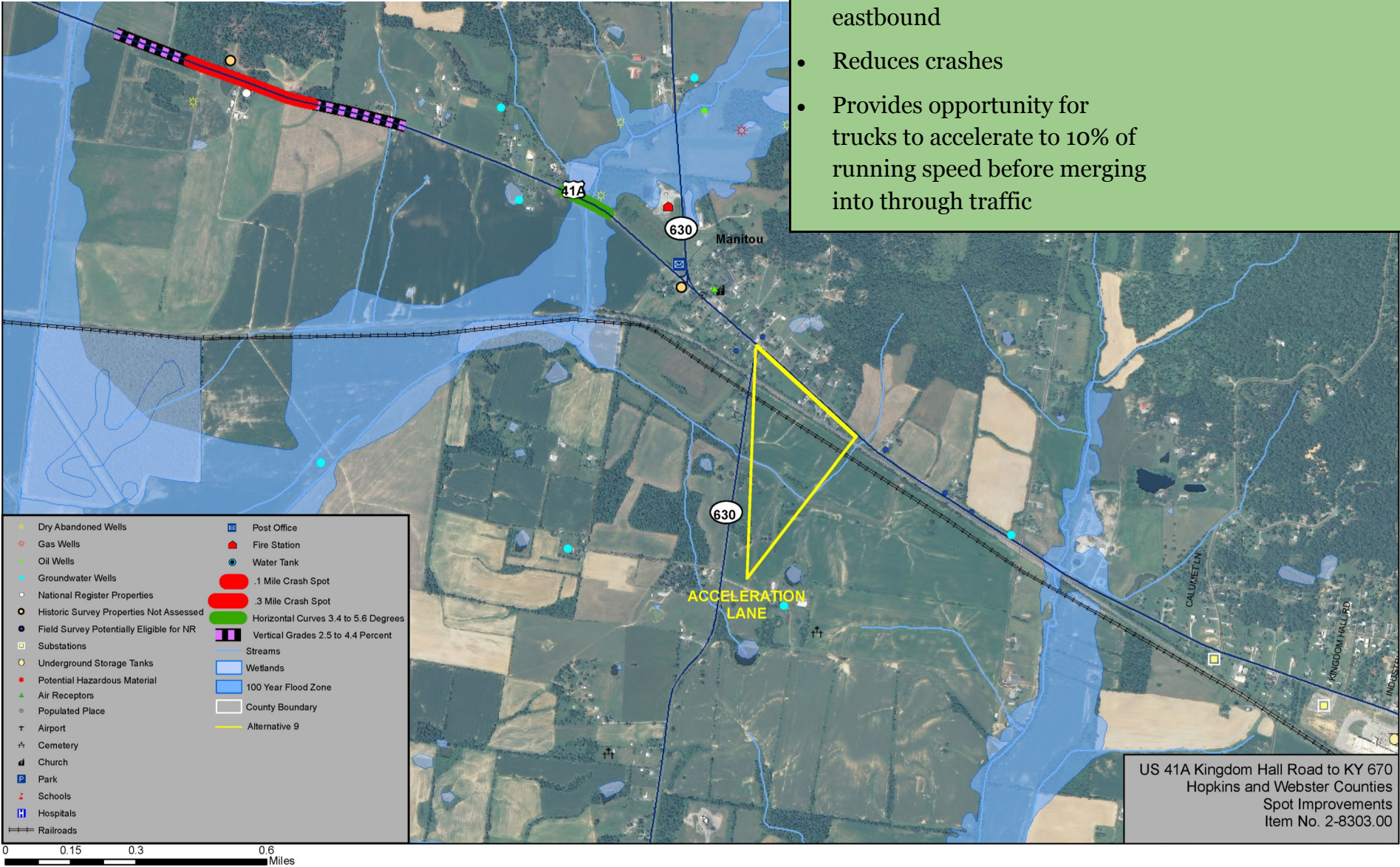


Length—0.3 mile

COST

DESIGN	\$ 200,000
R/W	\$ 275,000
UTILITIES	\$ 600,000
CONSTRUCTION	\$ 700,000
TOTAL	\$ 1,775,000

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyLow costImproves LOS from KY 630 eastboundReduces crashesProvides opportunity for trucks to accelerate to 10% of running speed before merging into through traffic	<ul style="list-style-type: none">Potential historic impacts in Manitou



POTENTIAL RESOURCES AFFECTED	ALTERNATIVE 10 LEFT TURN LANES AT KY 502 IN NEBO
PROPERTIES	4
POTENTIAL AFFECTED BUSINESSES	1
EJ	YES
RAILROAD INVOLVEMENT	NO
1 HOUSE ON THE NATIONAL REGISTER OF HIS- TORIC PLACES	NO
POTENTIALLY ELIGIBLE FOR THE NATIONAL REG- ISTER SITES	3
4(f) - GOLF COURSE	NO
FAULT LINES CROSSED	0
UST/HAZMAT	1
SUBSTATIONS	0
HIGH ARCHAEOLOGY PROBABILITY	YES
ARCHAEOLOGY SITES	0
STREAM CROSSINGS (total feet)	1 (150')
WETLANDS (acres)	0.0
100-YEAR FLOODPLAIN	NO
ACCESS CONTROL	PERMIT
MAJOR GAS LINES NEAR TRANSCANADA ANR	NO
GAS LINES CROSSED	0
OTHER EXISTING UTILITIES (WATER, SEWER, OVERHEAD)	OVERHEAD, WATER
POTENTIAL CRASH REDUCTION	25%
DESIGN YEAR (2035) LOS FOR US 41A MAINLINE	D
DESIGN YEAR (2035) V/C RATIO FOR US 41A MAINLINE	0.29
OTHER COMMENTS	

ALTERNATIVE 10 - Realignment of US 41A at KY 502 to add left turn lanes at KY 502 in Nebo

Length— 0.25 mile

COST

DESIGN	\$	50,000
R/W	\$	150,000
UTILITIES	\$	150,000
CONSTRUCTION	\$	450,000
TOTAL	\$	800,000

Sight Distance when stopped at the stop bar on KY 502 South looking east



On KY 502 South how far a motorist must pull forward to gain any sight distance



ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Improves safetyLower costReduces crashesRemoves turning vehicles from through traffic	<ul style="list-style-type: none">Impacts to 1 building, fire station and 1 businessHorizontal and vertical curve coming from Providence entering the intersectionPossible historic impacts in Nebo

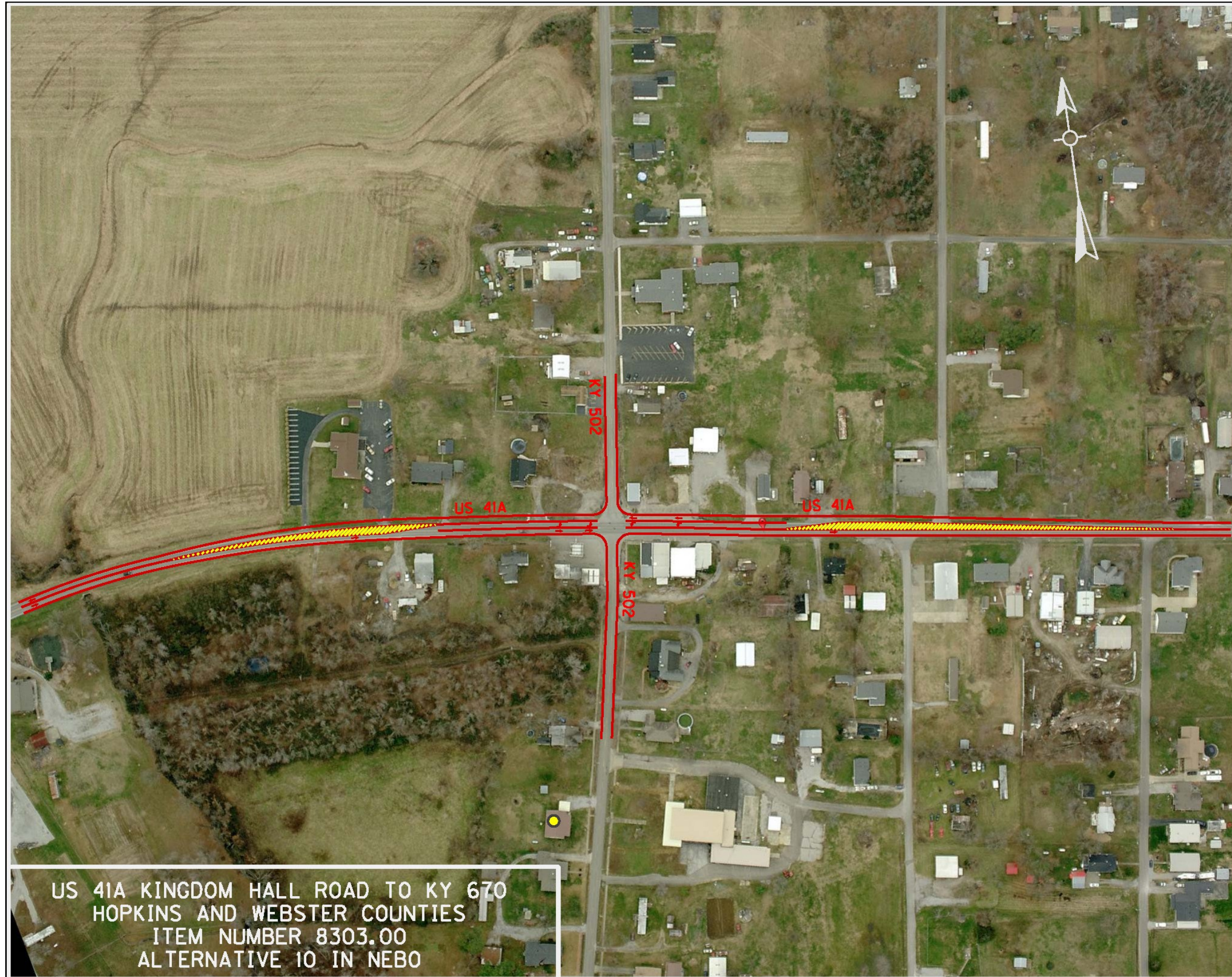


KY 502 South looking west toward Providence and lack of sight distance.



Approaching the KY 502 Intersection from Providence on US 41A

ALTERNATIVE 10—TURN LANES AT KY 502 in NEBO



Chapter 8

8.1 Final Recommendations

At a final Project Team meeting held on February 9, 2012 (see Appendix H), two additional alternatives (5D and 10 as described above) were presented for consideration. Comments included:

- Because of V/C ratio, LOS, traffic volumes, and other committed projects, no justification was perceived for any full four-lane alternatives.
- Due to the number of entrances along the route, concern was expressed about implementing any of the shared four-lane alternatives.
- Due to today's economic times, high costs for alternatives, and so many other higher priorities in this district, strong support was expressed for the "Do-Nothing" alternative.
- Support was expressed for alternatives that were low cost and had a benefit such as at high crash locations.

To follow-up with a concern expressed by the Mayor of Providence, Mr. Jon Boswell with Alliance Coal stated that their work will be done at Dotiki 4 (north of US 41A on KY 502) and 5 (north of US 41A off of KY 630 N) in Year 2013 or 2014. Presently, no coal is trucked in or out of either mine. Only delivery trucks travel to either place. There are approximately 400 employees that will

then move from Dotiki 4 and 5 and go to work at Dotiki 2. These workers are about equally split between Madisonville and Providence, therefore, there will be an increase along US 41A for one-half of the employees that are travelling to Providence, however, the other one-half of employees will go from Providence and travel north to Dotiki 2 (refer to Appendix H Project Team Meeting Minutes #3 for details).

Alliance Coal has not decided how they will transport the coal from Dotiki 2 as of yet. They may travel to Sebree, and the other alternative is to travel US 41A.

With the uncertainty of where the coal truck will travel, and the no net effect of employee travel, no changes were made to the traffic projections between the second Stakeholder's meeting and the final Project Team meeting.

After discussion, the Project Team recommended the following program of projects:

- **Short-Term (1-2 years):** Do Nothing
- **Medium-Term (5-10 years):** Alternatives 5D, 9, and 10
- **Long-Term(20 years):** Alternative 5 (spot improvements A, B, C, 1, 2, and 3)

The recommendations are illustrated on Figure 25.

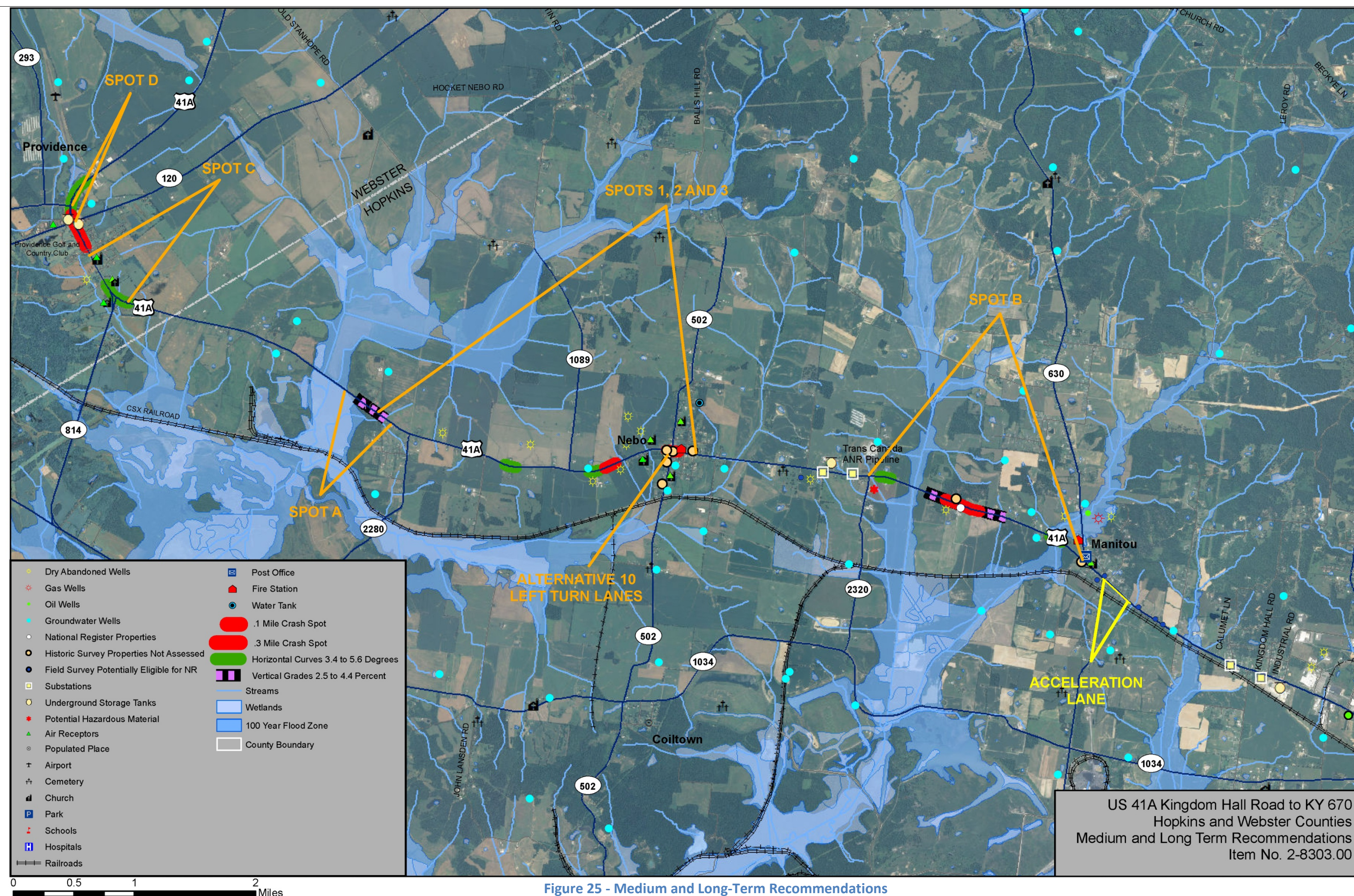


Figure 25 - Medium and Long-Term Recommendations



KENTUCKY
2225 LAWRENCEBURG ROAD
BUILDING C, SUITES 3 & 4
FRANKFORT, KENTUCKY 40601
PH. 502-352-2197

KENTUCKY – CORPORATE HEADQUARTERS
815 WEST MARKET STREET, SUITE 300
LOUISVILLE, KENTUCKY 40202
PH. 502-585-2222
FX. 502-581-0406
WWW.QK4.COM



US 41A Kingdom Hall Road to KY 670

Hopkins & Webster Counties, KY
Item Number 2-8303.00

