

# Executive Summary US 31W / KY 446 Study Warren County, KY

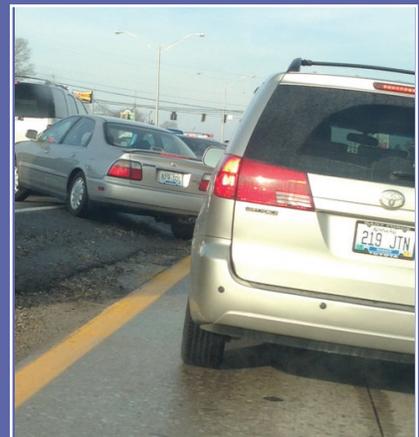


*Old Porter Pike to KY 957  
(Plum Springs Loop)*



*Groundbreaking by Design.*

*October 2016*



## EXECUTIVE SUMMARY

### INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated a scoping study to examine the US 31W corridor (**ES Figure 3**) from Old Porter Pike to KY 957 (Plum Springs Road) and KY 446 toward I-65. The study's main focus was the US 31W/KY 446 interchange, which was built in the 1950s as part of a road meant to serve as a connector between I-65 and the city of Bowling Green. Since then the area has built up with a mixture of major developments, including the Corvette manufacturing plant, museum, and tourism-related developments. US 31W and KY 446 now serve as access to these developments and a gateway to Bowling Green instead of connector roads. Consequently, the interchange is no longer fitting.

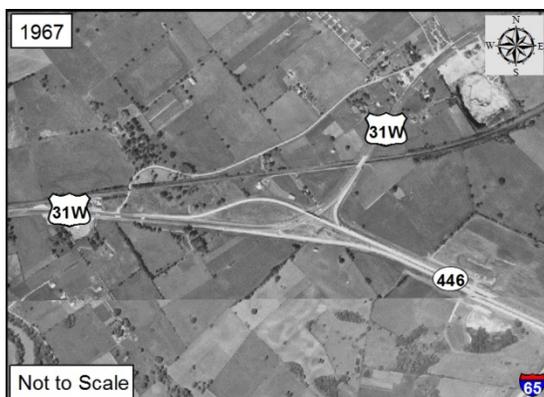
As summarized below, this study process documented existing conditions, identified a Purpose and Need Statement, developed a traffic model to simulate future conditions, and identified and recommended short-, medium-, and long-term solutions.

### PROJECT PURPOSE AND NEED

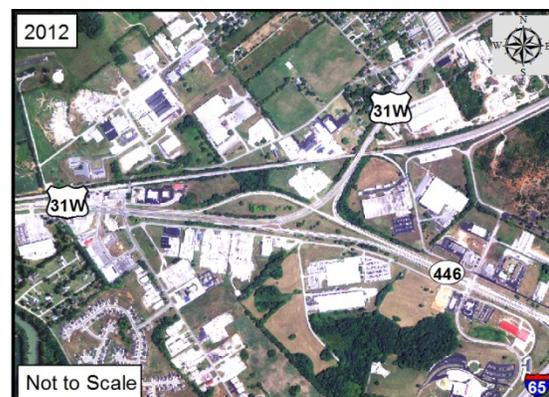
The **Purpose** for the proposed project is to (1) make the transportation network in the study area functional for the existing mixed urban land uses—which include regional tourist attractions and major industries—rather than for the rural landscape that existed when the road was built, (2) improve traffic operations, which are congested and forecasted to worsen, and (3) improve safety in an effort to reduce high crash rates.

The **Needs** to be addressed are based on the following issues that support the three elements of the project's Purpose:

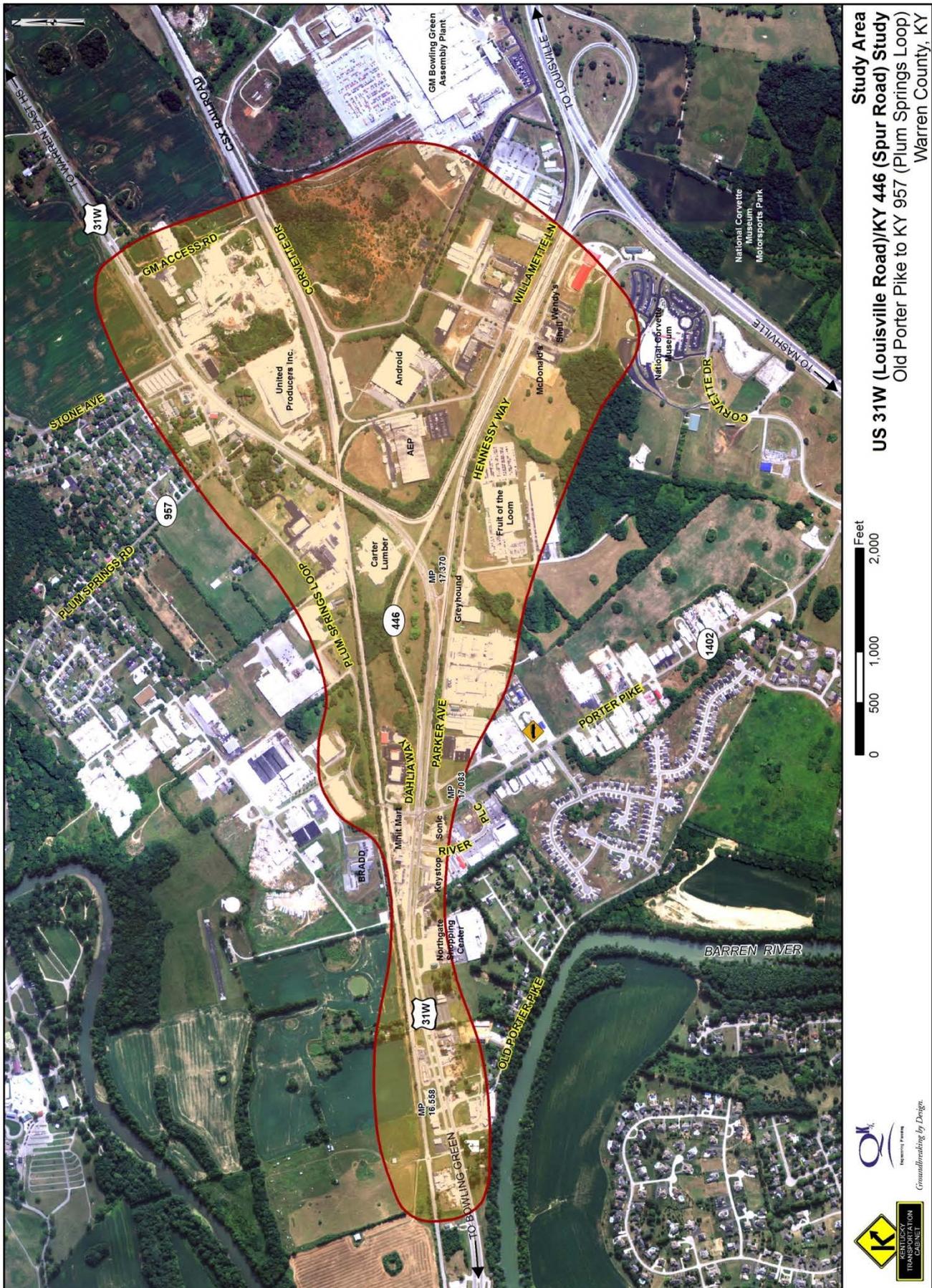
1. US 31W and KY 446 are arterials in Bowling Green, providing a gateway for southbound motorists from I-65 to access the GM Assembly Plant, the National Corvette Museum (NCM), the NCM Motorsports Park, Beech Bend Park, and downtown Bowling Green. Nearly 50 years ago, the roadway was constructed as a **rural** four-lane facility with a grassy median and partially controlled access, and it traversed farmland (**ES Figure 1**). The US 31W corridor still includes a high-speed, **rural-type interchange** with the KY 446 connection to I-65. However, increased commercial, residential, industrial, and tourism development in this area has changed the setting from rural to urban. Since the construction, Bowling Green has annexed the land and it has become a major economic development corridor (**ES Figure 2**).



**ES Figure 1: Study Area in 1967**



**ES Figure 2: Study Area in 2012**



**Study Area**  
**US 31W (Louisville Road)/KY 446 (Spur Road) Study**  
Old Porter Pike to KY 957 (Plum Springs Loop)  
Warren County, KY

ES Figure 3: Study Area

- Over the years commercial buildings and centers have developed along US 31W, which was originally built as a rural four-lane partially controlled access corridor with grassy medians that separate opposing traffic. On US 31W between Porter Pike and Old Porter Pike, for example, 14 median openings, one intersection with a flashing beacon and two signalized intersections exist along a 0.5-mile section (**ES Figure 4**). These access points contribute to congestion, crashes, and confusion for motorists. The result is a less-than-efficient roadway network.



**ES Figure 4: Median Openings Along US 31W**

At the end of the business day for Fruit of The Loom (FOTL), the GM Assembly Plant, and other major industries, traffic queues at the KY 446/Corvette Drive, US 31W/Porter Pike, and Porter Pike/Parker Avenue intersections, sometimes takes 25 minutes to clear. Adding to the congestion, the National Corvette Museum (NCM) schedules over 250 events each year, while in 2015 alone, the NCM Motorsports Park had over 56,000 visitors.

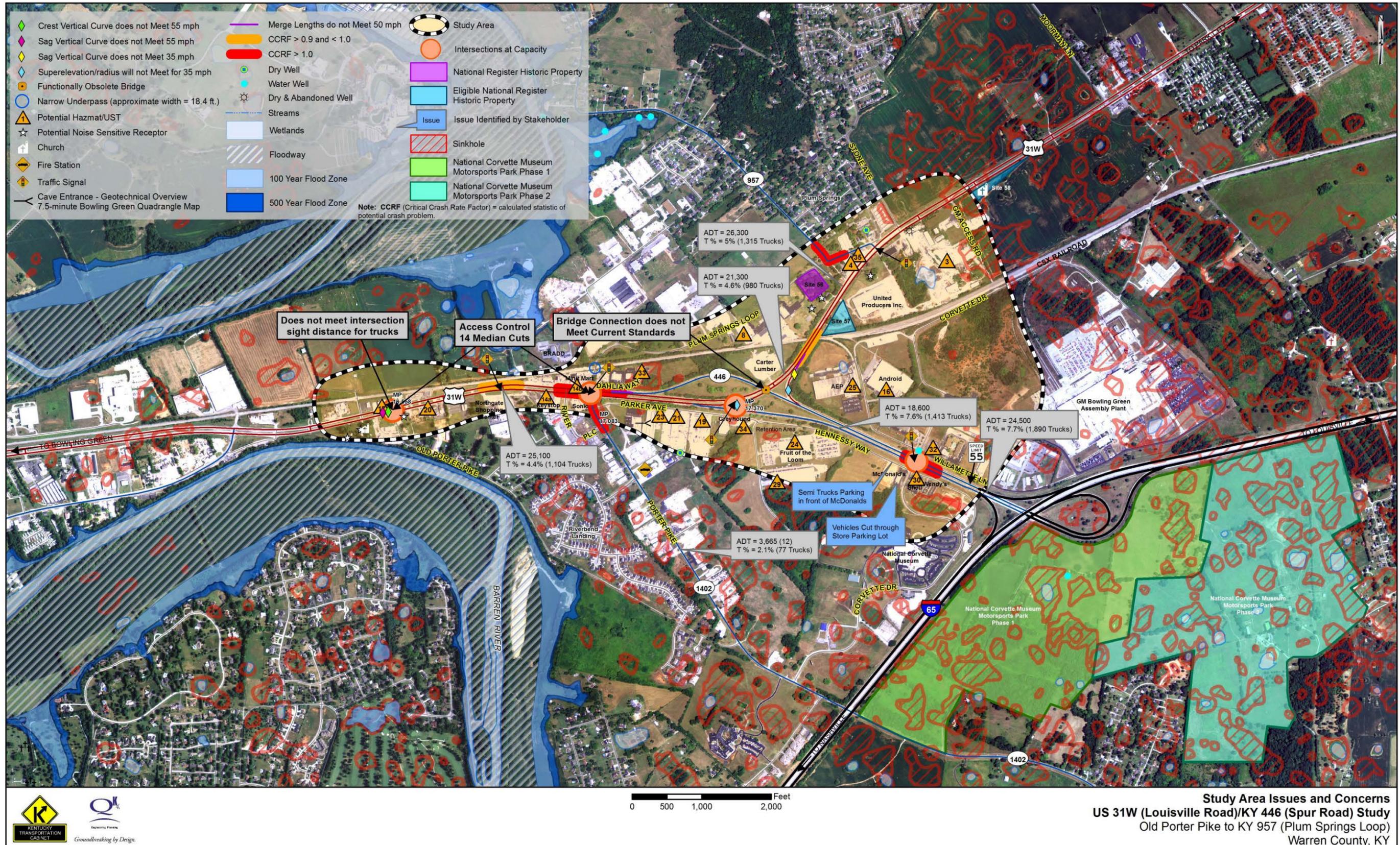
Existing average daily traffic (ADT) volumes on US 31W range from 25,100 to 26,300 vehicles per day (vpd) and traffic on KY 446 is approximately 24,500 vpd. Currently the intersections of KY 446/Corvette Drive, US 31W/Old Porter Pike, and US 31W/Porter Pike, and US 31W southbound to KY 446 eastbound have movements that are either level of service (LOS) E or F. Using a 0.5% annual growth rate established by KYTC, the 2040 forecasted traffic will increase and congestion will continue to worsen.

In addition, just north of US 31W, Plum Springs Loop narrows to a 19-foot width to pass under the CSX Railroad (**ES Figure 5**). The narrow passageway discourages a passenger car and a tractor-trailer to pass through the underpass simultaneously and leads to traffic backups into the US 31W/Plum Springs Loop intersection.



**ES Figure 5: Plum Springs Loop**

- The study area has a history of high crash rates. Contributing elements include areas where the stopping sight distance is hindered, substandard curves, and drainage problems. A road originally built for higher speeds now has numerous access points and six traffic signals. The results of these conditions, coupled with notable congestion, are higher than average crash rates. Crash records were analyzed for a five-year period from January 1, 2009, to December 31, 2013. The analysis identified seven areas where the Critical Crash Rate Factor (CCRF) is greater than 1.0 and two additional spots that have CCRFs approaching 1.0. A CCRF of 1.0 or above indicates crashes may not be occurring randomly as they are more frequent than statewide averages for similar roads. The high crash spots and other areas of concern are identified in **ES Figure 6**.



ES Figure 6: Study Area Issues and Concerns

Existing conditions that support these needs and other elements considered during the planning process are illustrated on **ES Figure 6**.

### **OTHER TRANSPORTATION PROJECTS**

Identified during the planning process, two current roadway projects have an effect on traffic in the study area:

- KYTC Project Item No. 03-16.00 will be a new I-65 interchange and 2.3-mile connecting road to US 31W, about three miles north of KY 446. It will open to traffic in 2017 and is expected to divert traffic from the US 31W/KY 446 interchange area. (This was taken into account in the traffic model for the study area.)
- KYTC Project Item No. 03-8632.00 is a new signalized, full access point constructed on KY 446 near the Fruit of the Loom (FOTL) facility. This project opened to traffic in early summer of 2015 and was considered temporary for purposes of this study.

### **ALTERNATIVES DEVELOPMENT**

The alternatives development and screening process was evolutionary and the recommendations include phased priorities. To arrive at these decisions, four project team, two local officials, and two public meetings were held over the course of the study to review, present and receive input on existing conditions and proposed alternatives/options.

The first local officials and public meetings were held to present existing conditions and gauge issues and concerns. Congestion (72%) and Safety (61%) were the greatest concerns expressed. In addition, the interchange movements from US 31W Southbound to Bowling Green and KY 446 Westbound to US 31W North were identified as concerns.

The purpose of the second project team meeting was to review a broad-range of initial improvement options that included: three 4-way intersections; two continuous Green “T” intersections; two modified interchanges; one flyover; three roundabouts; and improved access management on US 31W between Old Porter Pike and Porter Pike by reducing median openings from 14 to three, as well as other improvement options. Based on initial intersection capacity analysis performance and geometrics, the Project Team selected four build alternative concepts and four improvement options, as well as the No-Build option, to move forward.

Alternatives and Improvement Options were examined in more depth and low-cost options were developed. A traffic simulation model was developed for each alternative to determine how traffic would interact with adjacent intersections. Each alternative provided improvements at two known high crash areas.

### **Project Team Recommendations/Decisions**

Summaries of the alternatives and improvement options screening process and decisions are provided in **ES Tables 1 and 2**.

**ES Table 1: Alternative Screening Process Summary**

Alternative		1	2	3	4	4a
	No Build	Reconstruct Existing Interchange	Continuous Green "T" Intersection*	4-Way Intersection	Roundabout	Roundabout with Porter Pike Extension
<b>Recommendation</b>	Eliminated in lieu of "Quick Win"	Eliminated	Eliminated	Recommended as "Quick Win" along with a new Signal System (Short-Term Priority 1)	Eliminated	Recommended as Long-Term Priority
<b>Reasons for Decision</b>	Maintenance (i.e. pavement rehabilitation) of ramps is more expensive than Alternative 3.	Does not meet Purpose and Need for urban context.	Does not perform as well as Alts 4 and 4a, has geometric considerations, and not as preferred by the public.	Meets drivers' expectations, fitting for urban context, cost-effective solution and could be phased to the long term roundabout recommendation.	Less desirable than Alternative 4a	Preferred by public, performs well, provides additional access to development along Porter Pike, and may eliminate the need to improve existing Porter Pike.
<b>Decision Point</b>	PTM 3	PTM 3	PTM 4	PTM 3	PTM 4	PTM 4
<b>Rank by Travel Time</b>	4	3	5	6	1	2
<b>Rank by Delay</b>	3	4	5	6	1	2
<b>Conflict Points (US 31W/KY 446)</b>	10	10	15	41	26	26
<b>Delay in Minutes (2040 PM Peak Hour)</b>	5,979	6,557	10,490	11,275	5,160	5,316
<b>Travel Time in minutes (2040 PM Peak Hour)</b>	12,062	11,327	16,274	17,119	10,225	10,391
<b>Cost (\$ million)</b>	\$0.00	\$7.51	\$7.62	\$6.01	\$13.76	\$21.24
<b>High Crash Spots Eliminated (2 possible)</b>	0	2	2	2	2	2

Delay = total network delay (from model)

Travel Time = total network travel time at posted speed limit (from model)

\*Heaviest movement US 31W southbound is a continuous flow.

Conflict Points = the number of times vehicles cross paths

PTM = Project Team Meeting

Note: Pink selected for next project phase by the Project Team

**ES Table 2: Improvement Options Summary**

		A	B	C	D	Low-Cost Improvements**	
<b>Improvement Options</b>	<b>No Build</b>	<b>Access Management from Old Porter Pike to Porter Pike</b>	<b>Realign KY 957 Intersection with US 31W*</b>	<b>Parker Avenue Realignment</b>	<b>Reconfiguration of Corvette Drive/ Duntov Way</b>	<b>Raise the Grade of US 31W near Old Porter Pike</b>	<b>Construct a Sidewalk Along Parker Avenue</b>
<b>Recommendation</b>	Future Option	Short-Term Priority 4	Short-Term Priority 2	Short-Term Priority 3 (Local Project)	Eliminated	Short-Term Priority 5	Short-Term Priority 6 (Local Project)
<b>Reasons for Decision</b>		Reduces conflicts, expected to reduce crashes and improve traffic flow, and supported by the public.	Supported by public (the component to close the Plum Springs Loop Underpass was eliminated because it was opposed by the public).	Provides for additional traffic storage on Porter Pike between US 31W and Parker Avenue.	Opposition by Local Stakeholders.	Improves intersection sight distance for southbound left-turning vehicles onto Old Porter Pike.	Provides connection from Porter Pike to the Greyhound Bus Station
<b>Decision Point</b>	PTM 4	PTM 4	PTM 4	PTM 4	PTM 4	PTM 4	PTM 4
<b>Cost (\$ million)</b>	\$0.00	\$7.23	\$2.28	\$2.56	\$1.38	\$1.01***	\$0.15***

\* “Close Plum Springs Loop Underpass” component was eliminated and option renamed “Realign KY 957 Intersection with US 31W.”

\*\*Identified after Project Team Meeting No. 2.

\*\*\* Right-of-Way and Utility estimates were provided by KYTC for alternatives and improvement options only.

PTM = Project Team Meeting

## PRIORITIZATION AND RECOMMENDATIONS

The following recommendations and priorities resulted from the fourth and final Project Team meeting:

- Construct a 4-way intersection in the immediate future, conceptually similar to Alternative 3. Additional public involvement should take place when the US 31W/KY 446 interchange is removed.
- Eliminate the component of Option B to "Close Plum Springs Loop Underpass" due to public opposition and advance only the component to "Realign KY 957 with Intersection of US 31W." Option B was renamed "Realign KY 957 with Intersection of US 31W."
- Remove Option D ("Reconfiguration of Corvette Drive/Duntov Way") due to opposition from stakeholders and the lack of notable support from the public.
- Recommend an Adaptive Signal Control system with the "Quick Win" (Alternative 3).

### A. Recommended Options (Short-Term) – Listed in Priority Order

1. Install and Calibrate Sub-Area Signal System: \$0.30 million
2. Option B – Realign KY 957 with Intersection of US 31W: \$2.28 million
3. Option C – Parker Avenue Realignment at Porter Pike: \$2.56 million
4. Option A – Implement Access Management Strategy on US 31W: \$7.23 million

### B. Medium-Term Priority – Re-evaluate the US 31W/KY 446 Intersection Following its Construction

### C. Long-Term Priority – Implement Alternative 4a

### D. Low-Cost Improvements

5. Raise the Grade at Old Porter Pike to Improve Intersection Sight Distance: \$1.01 million
6. Pedestrian accommodations were desired for Parker Avenue between Porter Pike and the Greyhound Bus Station with a construction cost of \$150,000. Since the project would be implemented by the city, the recommendation will be referred to the MPO for consideration.

All final recommended alternatives and options should be incorporated in the Unscheduled Needs List and also into the planning documents of the Bowling Green/Warren County MPO.

Phase costs and prioritized recommendations are shown in **ES Table 3** and illustrated in **ES Figure 7, ES Figure 8, and ES Figure 9**.

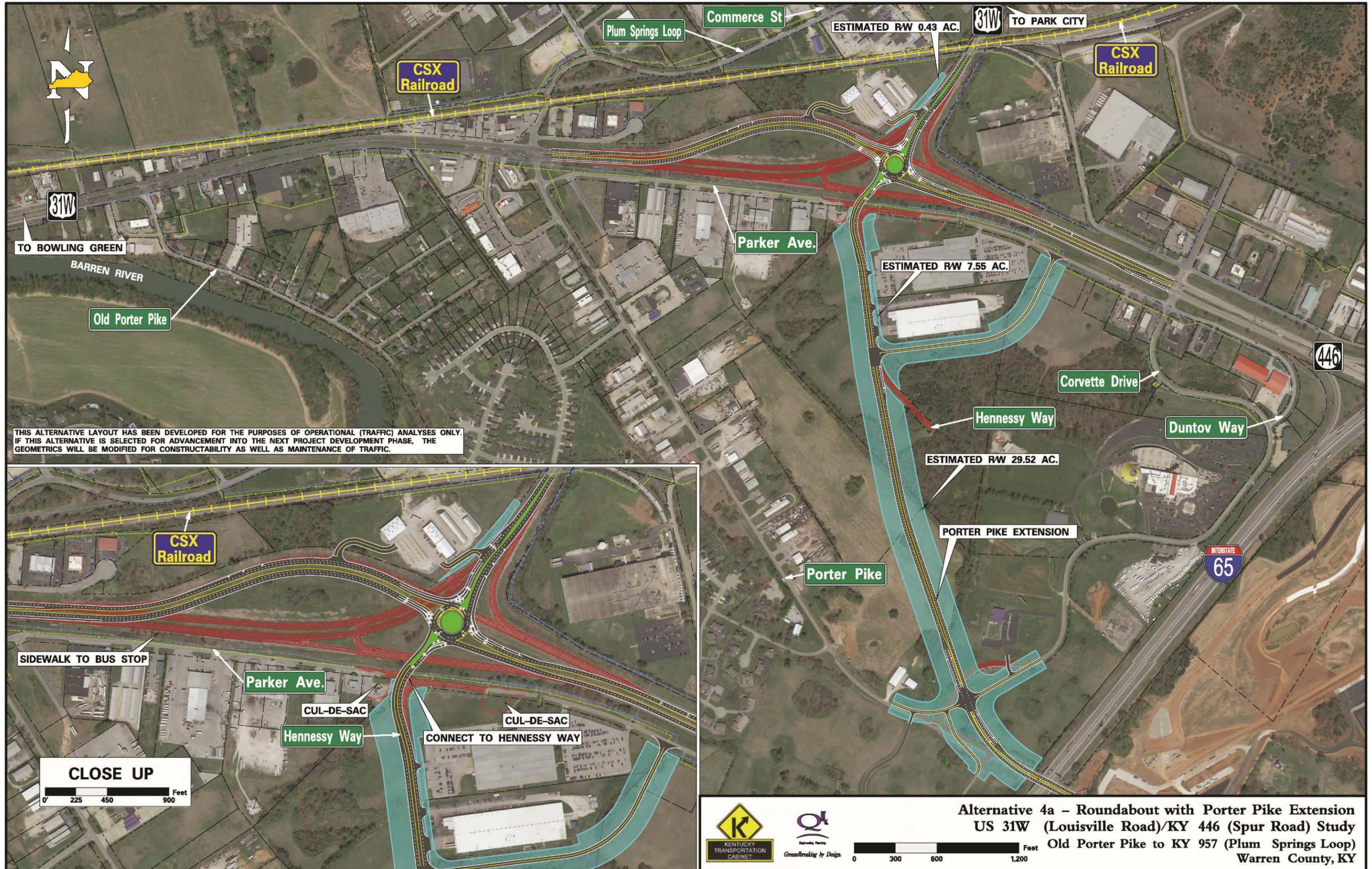
**ES Table 3: Summary of Recommendations and Cost Estimates**

	Alternatives		Improvement Options				Low-Cost Improvements	
	3	4a	Signal System	B	C	A	Raise Grade of US 31W	Construct a Sidewalk Along Parker Avenue
<b>Priority</b>	“Quick Win”	Long-Term	Short-Term 1	Short-Term 2	Short-Term 3	Short-Term 4	Short-Term 5	Short-Term 6
<b>Responsible</b>	KYTC	KYTC	KYTC	KYTC	Local	KYTC	KYTC	Local
<b>Short Description</b>	4-way Intersection	Roundabout with Porter Pike Extension	Signal System	Realign KY 957 with Intersection of US 31W	Parker Avenue Realignment	Access Management from Old Porter Pike to Porter Pike	Raise Grade of US 31W Near Old Porter Pike	From Porter Pike to the Greyhound Bus Station
<b>Design</b>	\$420,000	\$2,100,000	\$300,000	\$100,000	\$100,000	\$320,000	\$100,000	\$0
<b>Right-of-Way</b>	\$825,000	\$3,600,000	\$0	\$375,000	\$1,175,000	\$1,475,000	\$0	\$0
<b>Utilities</b>	\$565,000	\$1,835,000	\$0	\$1,180,000	\$550,000	\$2,240,000	\$0	\$0
<b>Construction</b>	\$4,200,000	\$13,700,000	\$0	\$630,000	\$730,000	\$3,200,000	\$910,000	\$0
<b>Total</b>	<b>\$6,010,000</b>	<b>\$21,235,000</b>	<b>\$300,000</b>	<b>\$2,285,000</b>	<b>\$2,555,000</b>	<b>\$7,235,000</b>	<b>\$1,010,000</b>	<b>\$150,000</b>

\*Right-of-Way and Utility estimates were provided by KYTC for alternatives and improvement options only.



ES Figure 7: Alternative 3 - 4-Way Intersection "Quick Win"



ES Figure 8: Alternative 4a - Roundabout With Porter Pike Extension (Long-Term)

