

APPENDIX L

PROJECT TEAM MEETINGS

PROJECT TEAM MEETING 1



Groundbreaking by Design.

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



KENTUCKY
TRANSPORTATION
CABINET

PROJECT TEAM MEETING 1

Item No. N/A

Warren County

8:30 AM CST - District 3 – Bowling Green Highway District Office

February 27, 2015

Project: US 31W/KY 446 Scoping Study
Old Porter Pike to KY 957 (Plum Springs Loop)

Purpose: Project Team Meeting #1 (8:30 AM CST)

Place: KYTC District 3 – Bowling Green

Meeting Date: February 27, 2015

Prepared By: Annette Coffey

Attendees:

Greg Meredith	KYTC D3 CDE	Greg.Meredith@ky.gov
Jeff Moore	KYTC D3	Jeff.Moore@ky.gov
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Steve Ross	KYTC CO Planning	Steve.Ross@ky.gov
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Tom Clouse	QK4, Inc.	tclouse@qk4.com

This meeting was rescheduled from February 17, 2015 due to inclement weather. The following summarizes the first Project Team Meeting, using the agenda items as topics.

1. **Introductions.** Jeff Moore, KYTC Project Manager, began the meeting at 8:35 AM with introductions. Following introductions, Mr. Moore described the project area as a 1960's rural high speed design. The area has experienced much growth, and has since transitioned to urban characteristics, leaving a rural high speed interchange in the middle of an urban area. With growth, there is increased traffic, many access points, and crashes. This study examines the US 31W/KY 446 corridor from Old Porter Pike to KY 957 (Plum Springs Loop). This study will look at issues and concerns, document existing conditions, provide a traffic model that simulates existing and future conditions, and recommend potential short term or "quick wins" and long term solutions. This meeting is to present existing conditions in the study area. The second Project Team Meeting will examine information gathered from the first Local Officials/Public meetings. Following the project introduction, the meeting was turned over to Annette Coffey, Qk4's Project Manager.
2. **Study Area and Purpose of the Project.** As stated above, this study examines the US 31W/KY 446 corridor from Old Porter Pike to KY 957 (Plum Springs Loop). To summarize the Purpose and Need for the project is: *US 31W (Louisville Road) is a major urban and regional connection in Bowling Green, providing a gateway for southbound motorists entering Bowling Green from I-65 to access the Corvette Plant activities center, Beech Bend Park, and downtown Bowling Green. Nearly 50 years ago, this roadway was originally constructed as a rural four lane facility with a grassy median and partially controlled access. The corridor includes a high speed rural type interchange with the KY 446 connection to I-65.*

With the increased commercial, residential, and industrial development in this area, the interchange with KY 446 and several signalized intersections and access points along this section of US 31W from Old Porter Pike to KY 957 (Plum Springs Loop) create safety and mobility issues.

This project would aim to address those issues.

Additional considerations in the project area are the following:

- The crest curve at the Old Porter Pike intersection with US 31W
 - Pedestrian/bicycle facilities
 - Improvements to, reconfiguration or reconstruction of the existing "interchange" at KY 446 with improved access to Hennessy Way and the businesses between US 31W and the Railroad (liquor store, bank, Subway, etc.)
 - More effective access control just south of Porter Pike
 - Drainage issue just across from the Keystop gas station
 - The National Corvette Museum Motorsports Park has one access point on Porter Pike. Special events are anticipated to generate traffic impacts within the study area.
 - Narrow underpass at Plum Springs Loop near its intersection with US 31W
3. **Existing Conditions.** US 31W is part of both the US 68 Heritage and Duncan Hines Scenic Byway Corridors. KY 446 and US 31W north of KY 446 are posted with a 55 miles per hour (mph) speed limit. US 31W from Old Porter Pike to KY 446 is posted 45 mph. Between Old Porter Pike and Porter Pike there are 14 median openings and 22 access points. The US 31W median in the project area changes width approximately five times in 2.1 miles. There are no bicycle or pedestrian facilities within the study area. The adequacy rating from Old Porter Pike to KY 446 is 66.76, meaning that approximately 34% of the similar roadways in Kentucky operate better than this roadway. This is due largely to congestion.

a. Projects in the Study Area. There are four projects in the study area:

- Item Number 3-16.00 – I-65/US 31W Connector
- Item 3-200.00 – Realign US 31W/Moorman Lane/Bristow Road and provide for a signal.
- Item Number 3- 8632.00 – Construction of a new access point on KY 446 near the Fruit of the Loom Facility.
- Unscheduled Needs List project (03 114 D1402 1.00) – addresses improvements of KY 1402 (Porter Pike) from US 31W to Grimes Road that includes the realignment of Parker Avenue to provide for more queuing length for Parker Avenue and Porter Pike.

b. Environmental Considerations. The known environmental issues are summarized as follows:

- Karst terrain dominates the project area with many caves which are likely interconnected through underground streams. The subsurface water within the groundwater basins of the sinkhole plain is highly susceptible to pollution carried by runoff.
- One historic resource is listed in the National Register of Historic Places (NRHP), 2 additional resources are eligible for the NRHP (one just north of the study area). All 3 are located north of the railroad.
- Six potential noise receptor sites
- One water well
- Nineteen potential HAZMat/UST sites
- One gas well
- Two dry well (several more stated by Fruit of the Loom within their site)
- Approximately three potential wetlands
- One fire station
- Two subdivisions on the periphery of the study area
- Greyhound bus station
- One church (one additional just north of the study area)

c. Structures. There are three structures in the study area:

- **KY 446 over US 31W.** This bridge is functionally obsolete due to the superstructure. It also has curbs on the structure and the guardrail connections to the bridge that are no longer KYTC standard practice. An initial structural evaluation recommended leaving this structure as is.
- **KY 446 over the CSX Railroad to US 31W North.** This structure has an insufficient merge lane length directly south of the bridge. Any attempt to lengthen the merge lane would require widening the existing bridge over the CSX railroad. This widening would be accomplished with either pre-stressed, box beams or I-girders rather than the haunched, cast-in-place reinforced concrete beams that currently exist. Although a less expensive option, if aesthetics is an issue, widening the bridge to provide for the lengthened merge may not be the best option because of the visual appearance of two different beam types on the widened CSX bridge. Since the age of the bridge is 60 years old, KYTC may want to consider replacing it as an option rather than any widening.

- **Plum Springs Underpass.** The Plum Springs Loop underpass is approximately 18.4 feet wide. Preliminary indications are that this bridge can be widened. The longer the span, the deeper the beams will have to be, in turn reducing the amount of vertical clearance over Plum Springs Loop. Due to the number of trains per day (20-30) the CSX railroad will most likely not be able to be taken offline and will require a detour (railroad runaround).
- d. **Crash Analysis.** The majority of crashes in the study area are either angle or rear end collisions, with the exception of the crashes located on KY 957 just southwest of where it intersects with US 31W. Those crashes are primarily single vehicle crashes. A crash analysis by direction indicated there are seven areas where the Critical Crash Rate Factor is greater than 1.0 indicating that crashes may not be occurring randomly. Those were calculated by direction and are as follows:
 - **KY 446 at Corvette Drive. Westbound,** crashes were predominantly rear end and sideswipe. Over half involved failure of one vehicle to comply with a red signal. **Eastbound,** many crashes involved either one unit-rear-ending another at a red signal, often a left-turn red, or one vehicle accelerating during the signal change to green faster than the car in front of them.
 - **US 31W at KY 1402 (Porter Pike). Eastbound,** included the intersections with both River Place Avenue and Porter Pike, as well as two access points to development on the south side of US 31W located near the intersection with River Place Avenue. Vehicles entering or exiting the development were frequently cited by the investigating officer, as well as improper driver behavior at the KY 1402 signal. **Westbound,** this segment included the intersection with Porter Pike, as well as the unchannelized access to development on the north side of US 31W located west of KY 1402. Vehicles entering or exiting development, or changing lanes in an attempt to access development, were frequently cited by the investigating officer, as well as improper driver behavior at the KY 1402 signal. There was also an exceptionally high percentage of wet roadway crashes.
 - **US 31W approaching Porter Pike Westbound.** This segment includes the entrance ramp from KY 446 to US 31W westbound, as well as the approach to the signal at KY 1402. Improper merging, sudden lane changes, and failure to slow for traffic stopped at signal were frequently cited by the investigating officer. There was also an exceptionally high percentage of wet roadway crashes.
 - **KY 1402 (Old Porter Pike).** The closely spaced intersections with Parker Avenue and with River Place and congestion at the US 31W signal contributed to a high number of rear-end and angle crashes. There is also a high percentage of crashes involving either alcohol or drug involvement or drowsy or distracted driving involvement.
 - **KY 957.** Just southwest of where KY 957 intersects with US 31W in the northern part of the study area. Intersection crashes were often caused or partially caused by vehicle malfunction, driver inattention, and/or wet pavement.

Additional discussion at the Project Team Meeting recommended a second look at this spot due to the low number of crashes, and the above cited crash causation factors. Further discussed should this spot be considered for removal by the Project Team as a crash concern. Qk4 will provide the District 3 HSIP Coordinator, Deneatra Henderson, with additional details to obtain her concurrence.

Two additional crash spots have Critical Crash Rate Factors (CCRFs) approaching 1.0 and may become issues. The spots are as follows:

- **US 31W approaching Northgate Shopping Center Signal Westbound.** Crashes at this spot are mainly rear-end collisions. It should be noted that 58% of the crashes were identified as having alcohol or drug involvement or drowsy or distracted driving involvement.
 - **US 31W Northbound.** This spot included rear-end crashes of vehicles attempting to merge onto northbound US 31W from the KY 446 ramp frequently cited by investigating officer. There was a high percentage of injury crashes and those involving an impaired driver, although there was no obvious correlation between those two factors.
- e. **Geometric Review.** US 31W appears to meet current 55 mph criteria for horizontal, and meets for vertical except for two vertical curves immediately south of Old Porter Pike. However, they both meet 45 mph design speed. The US 31W/Old Porter Pike intersection does not meet sight distance for 55 mph and meets 45 mph only for passenger cars.

The US 31W/KY 446 interchange. Ramp A (from US 31W North toward I-65) meets 55 MPH design speed for both horizontal and vertical alignment. On the archived plans for Ramp B (KY 446 from I-65 to US 31W southbound), one horizontal curve has a design speed listed as 50 mph and another curve is listed as 60 mph; superelevation was designed based on e-max 10% tables so existing superelevation (9.3 & 10%) is greater than we normally use. Both will meet current design standards for 50 mph radii. The existing vertical alignment meets current standards for 50 mph. Ramp D (KY 446 WB to US 31W NB) plans have a 35 mph design speed. The radius and superelevation will not meet criteria for current standards of 35 mph. The existing plans do not have vertical alignment for this ramp, just an elevation development sheet. The elevations on this plan sheet were used to approximate curves for a rough analysis; based on this approximation the sag near tie-in to US31W will not meet headlight sight distance for 35 mph.

In regard to merge tapers for Ramps B and Ramp D, existing merge lengths are insufficient based on Green Book standards for free-flow entrance ramps. Currently, both movements are signed as a YIELD condition; which appears to be appropriate based on the insufficient taper length.

Ramp C (US 31W southbound to KY 446 eastbound) is not really a “ramp.” However, the turning radius is 65 feet and is considered less than desirable.

f. **Bicycle and Pedestrian Review.** The study area does not have bicycle or pedestrian facilities. Neither are part of the Greenbelt System Master Plan Warren County and Bowling Green. The Metro Transportation Plan 2010-2035 indicates a possible interest on US 31W as a “future idea” for either pedestrian or bicycle facilities. According to the review of the corridor by KYTC’s Bicycle/Pedestrian Coordinator, the Bicyclists Comfort Index is E (the lowest). The following is recommended:

- **Best:** 10-foot shared use path along southeastern section
- **Good:** 8-foot or wider shoulder with 10-foot gap space in rumble strip/every 40 feet plus sidewalk
- **Fair:** 8-foot or wider shoulder and provide 10-foot gap space in rumble strip/every 40 feet

Rachel Hetzler with the MPO will check for any additional projects that may include consideration of bicycle or pedestrian facilities through the study area.

g. **Socioeconomic Review.** Brittany Fisher with the Barren River Area Development District (BRADD) gave a brief presentation on environmental justice issues as they relate to the study area. According to the 2013 Census Bureau American Community Survey, there are three different Census Tract/Block Groups in the study area. Table 1 summarizes the preliminary findings; however a report has not been finalized. Therefore, these results may vary.

Table 1: Socioeconomic Summary

Category	Block Group/Tract	Higher than State Average	Higher than the Warren County Average
Minority	2/113	✓	
	3/113	✓	
Poverty Level	1/113	✓	✓
	3/113	✓	✓
Median Income	2/113	✓	✓
	3/113	✓	✓
Population Over 65 years old	1/113		✓
	3/116		✓
	3/114.01	✓	✓
English Speaking Proficiency Less Than Very Well	1/113	✓	
	2/113	✓	✓
	3/114.01	✓	

- h. PVA Information.** Qk4 obtained PVA information for determination of existing and future land use and any right of way estimates.
- i. Major Utilities.** Qk4 identified major known utilities in the study area. Those utilities included water, sewer, overhead utilities and light poles.

4. Traffic

- a. Data Collected.** Qk4 collected tube counts and Miovision (camera) intersection counts in the study area to assess the existing capacity of the study area. This information was used to also develop a microsimulation model of the existing corridor.
- b. Industry Interviews Summary.** Qk4 conducted separate interviews with five industries/major traffic generators: Magna, National Corvette Museum, Greyhound, Fruit of the Loom, and the GM Assembly Plant. The following were themes of the interviews.
 - Corvette Drive/KY 446 is the worst congested intersection
 - PM Peak is the worst time for congestion
 - GM employees are backed up for over 15 minutes in PM
 - Expansions for both GM and Corvette Museum are possible
 - GM trucks travel to Android/AEP first before exiting to I-65
 - GM trucks sometimes turn at the wrong location and then have to make a U-turn.
 - Magna will use I-65/US 31W Connector when it is open to traffic.
 - Need the parking lot at the liquor store channelized on Hennessy Way
 - McDonald's needs a pull off for trucks
 - Possible connection to Williamette Lane from the new signal would be advantageous
 - Greyhound has 6 buses/day
 - Porter Pike / Parker Avenue need more storage space for vehicles on Porter Pike.
 - Development will occur as a result of the National Corvette Museum's Motorsports Park. It is anticipated that annual visitation will eventually reach 200,000.
- c. Meeting with Division of Planning Multimodal Branch.** Qk4 attended a meeting with the Division of Planning Multimodal Branch on February 13, 2015 to present the traffic simulation model developed by Qk4 for the project study area. KYTC provided Qk4 with speed and acceleration data to enhance the model.
- d. Capacity Analysis.** Existing traffic volumes were provided in the presentation. US 31W volumes range from 25,100 to 26,300 vehicles per day (vpd) with KY 446 at 24,500 vpd. The following intersections currently operate at Level of Service (LOS) E or F.
 - KY 446/Corvette Drive
 - US 31W/Porter Pike
 - US 31W/Old Porter Pike

Corvette Drive was considered the worst congested intersection by the industry representatives. When Fruit of the Loom and the GM Assembly Plant release at the close of the business day, it takes as long as 15-20 minutes to clear the employees each work day. Vehicles sometimes wait on Hennessy Way for four to five signal cycles. Also, motorists “cut through” the liquor store parking lot to get to Corvette Drive which adds to the frustration of workers. At Porter Pike, motorists backup on Parker Avenue and cannot exit to Porter Pike and then to US 31W because of the close proximity of Parker Avenue intersection to the intersection with US 31W.

Daniel Hulker, Division of Planning, relayed that the preliminary future growth rate for the study area will be approximately 1%. Scott Thompson stated that the US 31W/I-65 Connector (Item Number 3-16.00), will remove traffic from the study area once the project is open to traffic. Mr. Moore would like to be able to reference the range of growth around Bowling Green especially for the future public meetings. Ms. Henderson suggested showing growth rates for a couple of spots for reference. Mr. Hulker stated that south of Bowling Green has an approximate 1.3% growth rate.

Until recently, the Bowling Green traffic model has been in development and was delivered to KYTC the week of this meeting. According to Mr. Thomson, a final growth rate will be made available to Qk4 and the project managers by March 13th or earlier that week if at all possible. That growth rate will be used to analyze future year (2040) no build and build traffic in the study area. A visualization model will also be developed for each of the interchange alternatives. Mr. Moore emphasized that the consultant needs growth rates as soon as possible as not to affect the schedule further. POST MEETING NOTE: The above approximate growth rate was adjusted from 1.0% to 0.5% via email from Mr. Hulker March 19, 2015.

Mr. Hulker will examine the traffic model to determine if socioeconomic numbers in the National Corvette Museum zone match what is actually planned there.

- e. **Visualization.** Qk4 presented a VISSIM simulation model and video of the existing conditions of the study area. The Project Team agreed that the simulation replicated the existing conditions in the study area. This visualization will be used at the public meeting at the end of March. A corridor “no build” visualization model and three “build” model visualizations will be created for each of the interchange alternatives.

5. Purpose and Need Review. At this stage, the Purpose and Need has remained the same from the onset of this project and is stated in #2 of these minutes. Mr. Meredith reminded the Project Team that the US 31W/KY 446 interchange should still be the main focus of project study and not to get distracted by the access management, drainage issues, or improved Hennessy Way access. He stated that many of the other issues stem from a high speed rural interchange within an urban context.

6. Design Considerations. A discussion of the design considerations used to develop build alternatives ensued. The following summarizes those discussions.

- a. **Geotechnical Issues.** An early geotechnical overview was performed as part of this study. As was stated, Karst terrain will be a factor in the development of alternatives within the study area. The geotechnical issues to be considered when developing alternatives and subsequent cost estimates are:
- embankment and subgrade soils,
 - filled or capped sinkholes that are not used for drainage areas:
 - structures that will likely be designed for nonyielding foundations or with H piles on bedrock,
 - proper management of surface water, and
 - roadway embankments and cut slopes should be 2H:1V or flatter due to the presence of Ste. Genevieve and St. Louis Limestone,
- b. **Multimodal Considerations.** The Project Team discussed consideration of bicycle/pedestrian facilities in the study area. In the study area, safety was expressed as a concern for bicyclists due to the high traffic volumes; however, the project team hopes to gain more insight through online and paper surveys at the first public meeting. Sidewalks should be a consideration possibly on the eastern side of US 31W from Old Porter Pike to Porter Pike.
- c. **Typical Sections.** A presentation of alternative concepts for the reconfiguration of the existing interchange will follow quickly after this team meeting and upcoming public meeting; therefore typical sections were discussed in preparation for the second team meeting to be held in mid-April. Mr. Meredith reiterated that the context of the interchange really needs to change. The following should be used:
- 45 MPH - Interchange
 - 25 MPH – roundabout
 - Access Management between Old Porter Pike and Porter Pike – provide a rural typical section with three median openings and opportunities for “bulb-outs” and U turns. The median should stay depressed. There will also be a curb and gutter option with an 8-foot sidewalk on the eastern side of US 31W. Qk4 will confirm that the 8-foot sidewalk is the best option with their subject matter experts. The access management should also consider the drainage issue across from Keystop gas station where inlets have been paved over where the area does not drain properly and therefore is prone to flooding.

Options discussed among the team included the possibility of adding another signal south of Northgate Shopping Center to provide for two left turn locations that would be operated from one controller to eliminate one signal phase. Eliminating this signal and providing for a U-turn at this location was also discussed.

The Project Team added an alternative that would evaluate closing the Plum Springs Loop underpass completely and to direct traffic to use the existing US 31W / KY 957 (Plum Springs Loop) intersection. The northernmost US 31WKY 957 intersection may need to be realigned as part of this improvement option.

7. Public Involvement. Due to the weather, this team meeting was delayed by 10 days, and the final growth rate will not be available as early as originally expected. Therefore, the project timeline was adjusted by two weeks. The new date proposed for the public meeting was decided as March 31, 2015.

- a. Local Officials Meeting Discussion and List.** This meeting will be held early on March 31, 2015 at the BRADD. The displays will be setup early in the day for this meeting for an early discussion of the project with local officials.
- b. Venues/Format.** The public meeting will be held at the BRADD from 4:00 PM to 7:00 PM on March 31, 2015. It will be an open house format with a presentation, display boards, a paper and on-line survey which will go live the day of the meeting.
- c. Presentation and Exhibits.** Qk4 will provide the following as displays or other information for the local officials and public meetings. There will be two sets of displays with the following information:

Display Boards

- Draft Purpose and Need
- Study Area Map with Colored Aerial
- Crash data and High Crash Locations
- Environmental Concerns Map and Existing ADTs

Additional information will be provided by Qk4 and are as follows:

- Project Flyer - electronically and hard copy
- Project Survey – hard copy
- Survey monkey containing Project Survey
- Enlarged study area maps will be placed on the tables for attendees to either highlight or place stickers on to illustrate their most important concerns.
- A formal presentation will be made a specified time(s) during the meeting, and then the formal presentation will loop via PowerPoint projection following the formal presentation.
- Project Survey will be available both printed and on line
- Project Flyer to leave at businesses to advertise the public meeting

The KYTC District 3 staff will be responsible for the following:

- Newspaper article
- Morning Show interviews
- Radio interviews
- Variable Message Boards – 2 to 3
- Call to Action Video
- Provide Your Turn link to all documents and survey monkey
- Setup of room at the BRADD the day of the meeting

- Ensure that the appropriate local officials are invited to the meeting including the Mayor of Plum Springs.
- Copies of Project Flyer distribution

8. Schedule and Next Steps. The milestone dates were adjusted from the original schedule. The below schedule assumes KYTC will provide Qk4 a finalized growth rate by March 13, 2015.

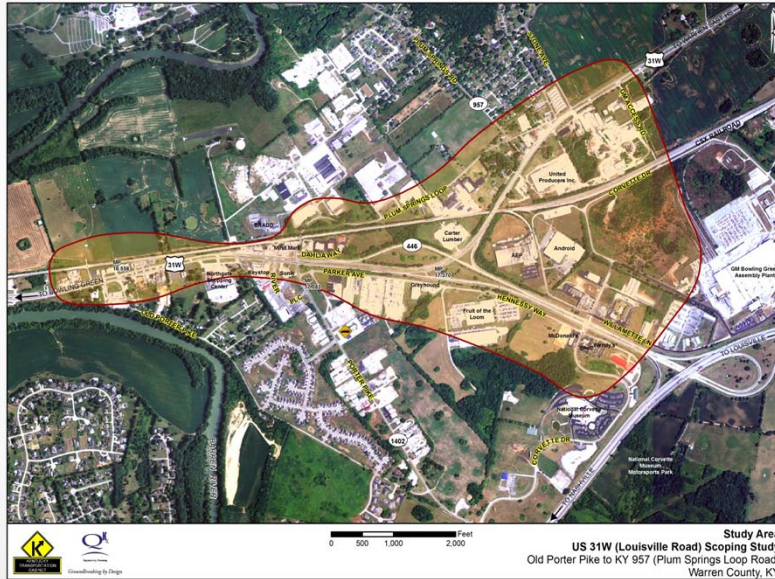
a. Meetings

- Local Officials and Public Meeting 1:** March 31, 2015 – Existing Conditions
- Project Team Meeting 2** – April 15, 2015 – Preliminary Alternatives Presentation, a resource agency mailing will be performed (approximately June 30, 2015). There will also be an internal meeting with District 3 staff to discuss the feasibility of alternatives prior to Project Team Meeting 3.
- Project Team Meeting 3** – Week of August 15, 2015 - Review Alternatives prior to Public Meeting 2
- Local Officials and Public Meetings 2** – Week of September 15, 2015
- Project Team Meeting 4** – Week of February 1, 2016 – Determine Final Recommendations

b. Draft Report – March 30, 2016

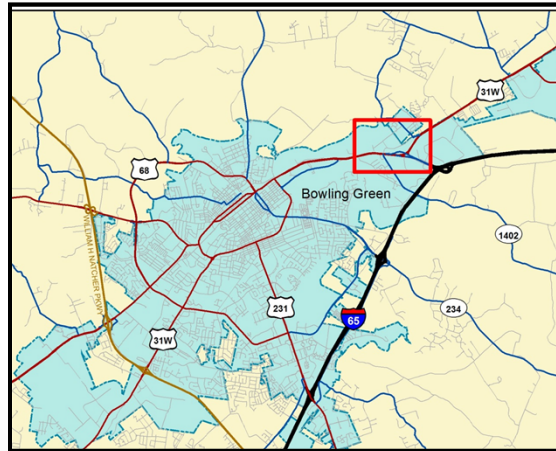
c. Final Report – May 15, 2016

US 31W CORRIDOR
FROM OLD PORTER PIKE TO PLUM SPRINGS LOOP
ROAD INCLUDING KY 446 RAMPS
WARREN COUNTY



STUDY AREA AND
PURPOSE OF THE
PROJECT

How this Project fits in Bowling Green



Project Purpose and Need



US 31W is a major urban and regional connection in Bowling Green, providing a gateway for southbound motorists from I-65 to access the Corvette Plant activities Beech Bend Park, Western Kentucky University, and downtown Bowling Green. With the increased commercial, residential, and industrial development in this area, the interchange with KY 446 and several signalized intersections and access points in the study area create safety and mobility issues.

- o Rural, high speed design but has transitioned to more urban characteristics
- o Multiple traffic signals
- o New development has led to access issues
- o Growth has traffic and crashes on the rise.

Additional Considerations

- The crest curve at Old Porter Pike
- Pedestrian/bicycle facilities
- Improvements to, reconfiguration or reconstruction of the existing “interchange” at KY 446 with improved access to Hennessey Way and the businesses between US 31W and the Railroad (liquor store, bank, Subway, etc.)
- More effective access control just south of Porter Pike
- Drainage issue just across from the Keystop gas station
- The National Corvette Museum Motorsports Park has one access point on Porter Pike. Special events are anticipated to generate traffic impacts within the study area.
- Narrow underpass at Plum Springs Loop that is an issue

Crest Curve at Old Porter Pike

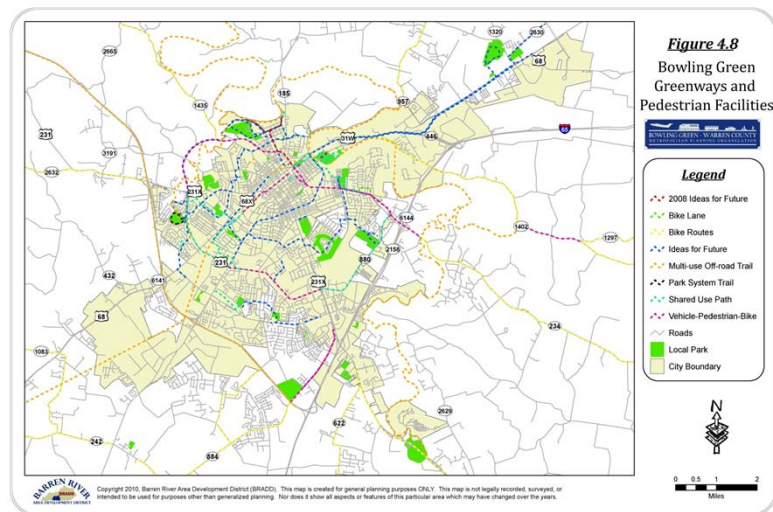


Old Porter Pike traveling south

Old Porter Pike Intersection



Pedestrian Facilities



Interchange Improvements

Improvements to, reconfiguration or re-construction of the existing “interchange” at KY 446 with improved access to Hennessey Way and the businesses between US 31W and the Railroad (liquor store, bank, Subway, etc.).



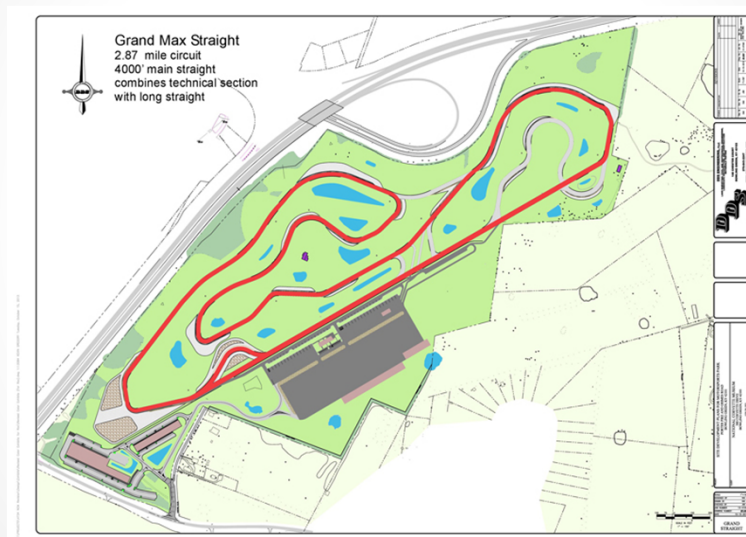
Effective Access Control just South of Porter Pike



Drainage Issue across from Keystop



The National Corvette Museum Motorsports Park

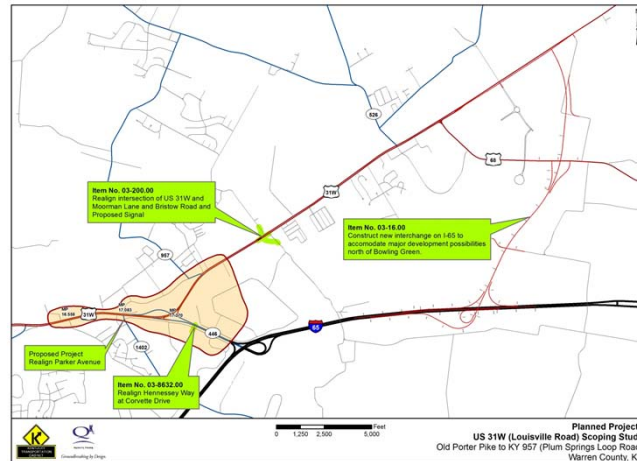


Narrow Underpass at Plum Springs Loop



EXISTING CONDITIONS

Projects in the Study Area



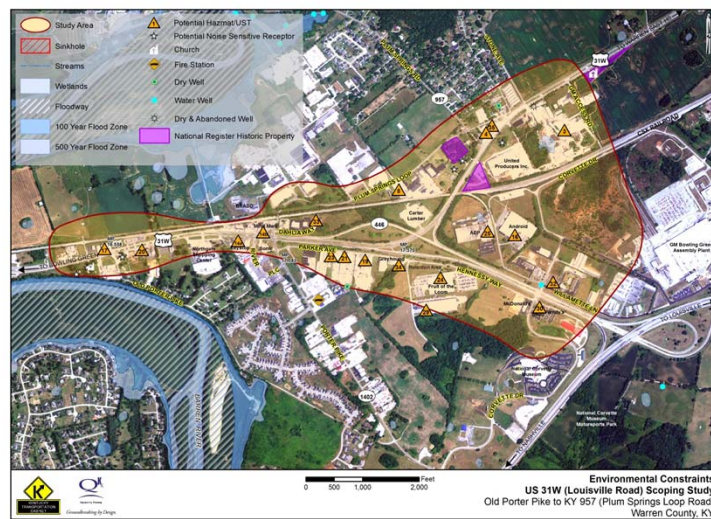
General Information from Inventory

- Scenic Byways
 - o Part of the US 68 Heritage Corridor
 - o Part of the Duncan Hines
- Access Points
 - o Between Old Porter Pike and Plum Springs Road
 - 14 median openings
 - 22 access points
 - In the Peak Hour – vehicles at Sonic opening – 27 lefts (AM)
 - In the Peak Hour – 33 lefts (PM) out of River Place Avenue
 - All openings – approximately 80 in each peak hour
- KY 446 is posted 55 mph
- US 31W 55 mph north of KY 446
- US 31W – 45 mph from Old Porter Pike to KY 446
- Median changes 5 times in 2.1 miles
- No bicycle or pedestrian facilities
- Adequacy Rating from Old Porter Pike to KY 446 is 66.76 (VSF)

Environmental Concerns

- **Ste. Genevieve Limestone**
- **Watershed**
 - o Karst
 - o Caves
 - o Pollution
- HAZMAT
- Historic Resources
- Noise and Air
- Community

Environmental Concerns



Historic

- o Site 56: William Gossom House
812 Plum Springs Loop Rd



- o Site 57: Gossom-Roberts Cemetery
(WA-449), Louisville Road



- o Site 58: Mt. Hebrew Cumberland Presbyterian Church and Cemetery
(WA-450), Louisville Road



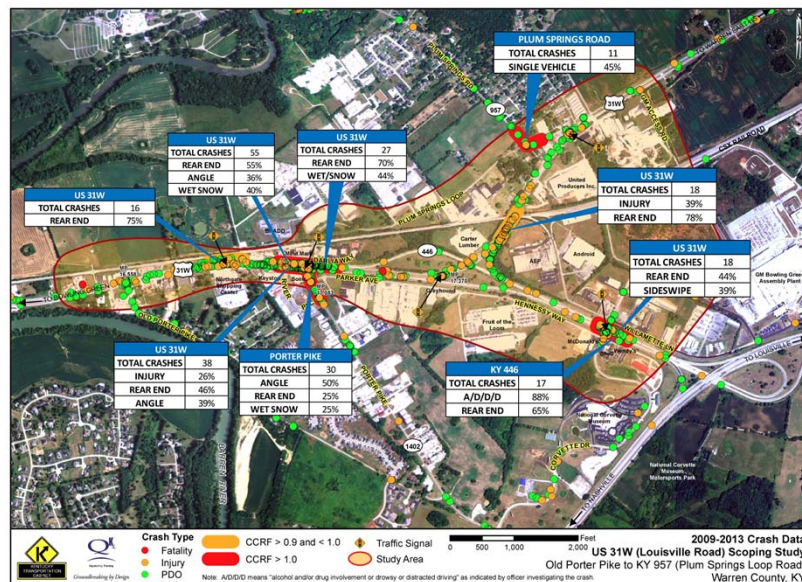
Structures

- KY 446 over US 31W
 - o 1 Functionally Obsolete (superstructure)
 - o Curbed ramp with guardrail connections that are non-standard by today's standards.
- KY 446 US 31W North
 - o Tight merge from the KY 446 ramp north
- Plum Springs RR overpass
 - o Narrow underpass – roadway width 18.4 feet

Structures Evaluation

- US 31W North
 - o **Vertical Clearance** - It appears there is enough vertical clearance to add more beam lines, so widening is possible.
 - o **Railroad** – need to allow time for dealing with the railroad
 - o **Widening** - would use either prestressed box beams or I-girders not the haunched cast-in-place reinforced concrete beams that are currently there. So if aesthetics is an issue widening may not be the best option
 - o **Age of the bridge** - 60 years old, may want to consider replacing it
- KY 446 over US 31W
 - o Unless you have to make changes because of roadway design leave it alone.
 - o There are bridge connections and curbs that are not typical given today's standards.
- Plum Springs Loop Railroad Overpass
 - o It can be widened.
 - o The longer the span the deeper the beams will have to be and the less the vertical clearance. If the RR above cannot be taken offline may have to will have to have a railroad detour.

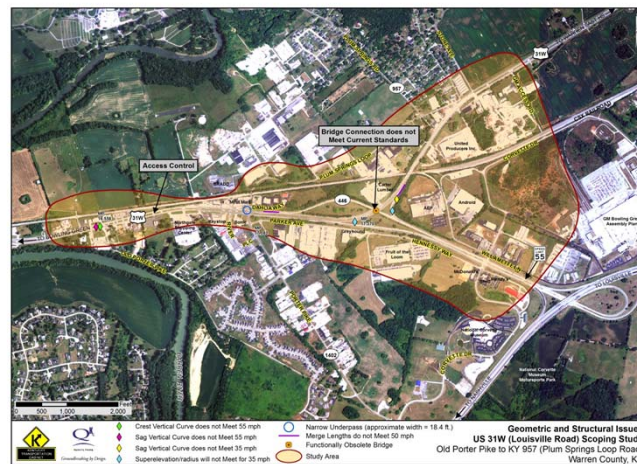
Crashes



Crash Summary

Route	Beg MP	End MP	Direction	CCRF	Total Crashes	Summary of Most Prominent Officer Comments
US 31W	16.8	16.9	West/South	0.93	16	(Few actual reports at this location)
US 31W	17	17.1	Eastbound	1.99	38	This segment included the intersections with both River Place and Porter Pike, as well as two access points to development on the south side of US 31W located near the intersection with River Place. Vehicles entering or existing development frequently cited by investigating officer, as well improper driver behavior at KY 1402 signal .
US 31W	17	17.1	Westbound	3.46	55	This segment included the intersection with Porter Pike, as well as unchannelized access to development on the north side of US 31W located west of KY 1402. Vehicles entering or existing development, or changing lanes in an attempt to access development , frequently cited by investigating officer, as well improper driver behavior at KY 1402 signal. Exceptionally high percentage of wet roadway crashes .
US 31W	17.1	17.2	Westbound	1.67	27	This segment includes the entrance ramp from KY 446 to US 31W westbound, as well as the approach to the signal at KY 1402. Improper merging, sudden lane changes, and failure to slow for traffic stopped at signal frequently cited by investigating officer. Exceptionally high percentage of wet roadway crashes .
US 31W	17.7	17.8	Northbound	0.94	18	Rear-end crashes of vehicles attempting to merge onto northbound US 31W from KY 446 ramp frequently cited by investigating officer. High percentage of injury crashes and those involving an impaired driver , though no obvious correlation between those two factors.
KY 446	0.6	0.7	Northeast	1.12	17	Many crashes involved either one unit-rear-ending another at a red signal, often a left-turn red, or one vehicle accelerating on change to green faster than car in front .
KY 446	0.6	0.7	Southwest	1.40	18	No real dominant pattern; about half involved failure of one vehicle to comply with red signal .
KY 957	0.1	0.2	Both	1.85	11	Intersection crashes, often caused or partially caused by vehicle malfunction, driver inattention, and/or wet pavement . This location is technically within the study area boundary as shown on mapping, but crashes @ Plum Springs Road and Plum Springs Loop seem outside the intended scope of this study.
KY 1402	0	0.1	Both	4.34	30	Closely spaced intersections with Parker Avenue and with River Place and congestion at US 31W signal contribute to high number of rear-end and angle crashes. High percentage of A/D/D/D involvement.

Geometric Issues



Geometric Review

- US 31W
 - o 2 VERTICAL CURVES APPROACHING OLD PORTER PIKE DO NOT MEET 55 MPH
 - o BOTH MEET 45 MPH

US 31W	Sag or Crest	Stopping Sight Distance Required (feet)	Existing Headlight Sight Distance (feet)	Existing Stopping Sight Distance (feet)
MP 16.388	S	495	423	
MP 16.492	C	495		473

US 31W/Old Porter Pike Intersection Sight Distance

Time Gap (seconds/vehicle)	PASSENGER CARS	SU TRUCKS
Table 9-13	5.5	6.5
Adjustment for Multilane	1.0	1.4
Total	6.5	7.9
Median Width – 24 feet		

Sight Distance from Original Plans (1953) on As-built Vertical Revision - 473 feet	PASSENGER CARS		SINGLE UNIT TRUCKS	
	45 mph	55 mph	45 mph	55 mph
Required Intersection Sight Distance (ft) - 55 mph		526		639
Required Intersection Sight Distance (ft) - 45 mph	430		523	
Scenarios				
3 Driving Lanes - 2 Driving Lanes + either Right or 1/2 Median (ft)	430	526	523	639
4 Driving Lanes - 2 Driving Lanes + either Right & 1/2 Median or Full Median (ft)	463	566	569	695
5 Driving Lanes - 2 Driving Lanes + Right + Full Median (ft)	496	606	615	752

Interchange Deficiencies

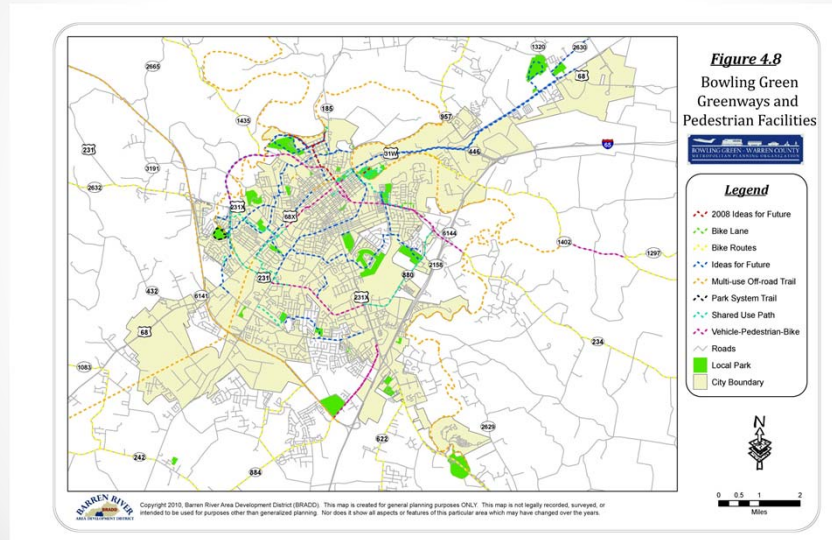
- Ramp A is exit ramp from US31W (north) toward I-65
- Ramp B is segment (including flyover bridge) of connector (KY 446) from I65 to US31W SB
- Ramp C is short turn from US 31W SB to KY 446 E toward the interstate
- Ramp D is short ramp from KY 446 WB (Ramp B) to US31W NB

Ramp	Design Speed (mph)	Required Taper / Merge Green Book Exhibit 10-69 (feet)	Existing Taper/Merge (feet)	emax	Horizontal Curvature Required	Existing Horizontal Curvature	Required Vertical Curve (Sight Distance) (feet)	Existing Vertical Curve (Sight Distance) (feet)
Ramp B	50	900	500	10%	758	955	Meets	Meets
Ramp D	35	1,100	360	>emax	314	230	250	143
Ramp A	55	MEETS						
Ramp C	BASICALLY A LEFT TURN AT 65 FEET RADIUS							

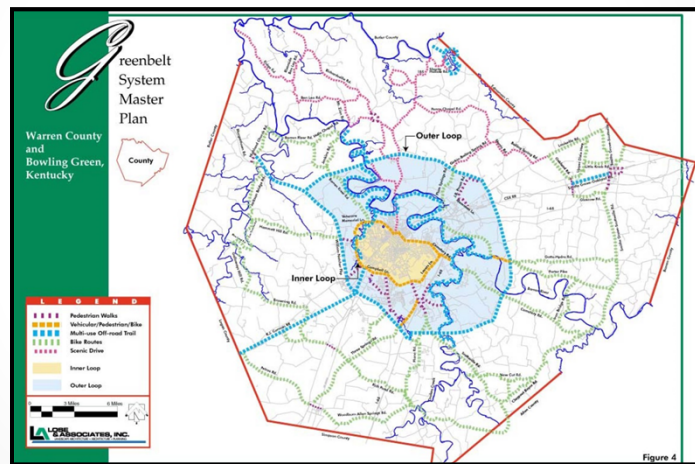
Bicycle and Pedestrian Review

- No shoulder space except for 0.3 of a mile near Old Porter Pike
- Bicyclists Comfort Index is E (the lowest)
- Recommendations –
 - o **Best:** 10-foot shared use path along southeastern section
 - o **Good** – 8-foot or wider shoulder with 10-foot gap space in rumble strip/every 40 feet plus sidewalk
 - o **Fair:** 8-foot or wider shoulder and provide 10-foot gap space in rumble strip/every 40 feet

Metro Transportation Plan 2010-2035

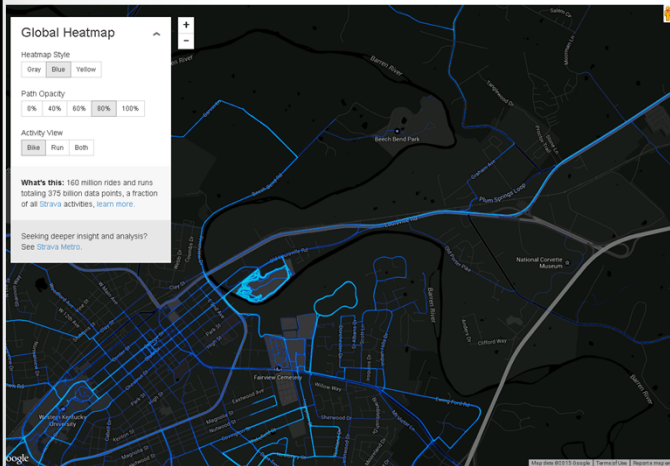


Greenbelt System Master Plan



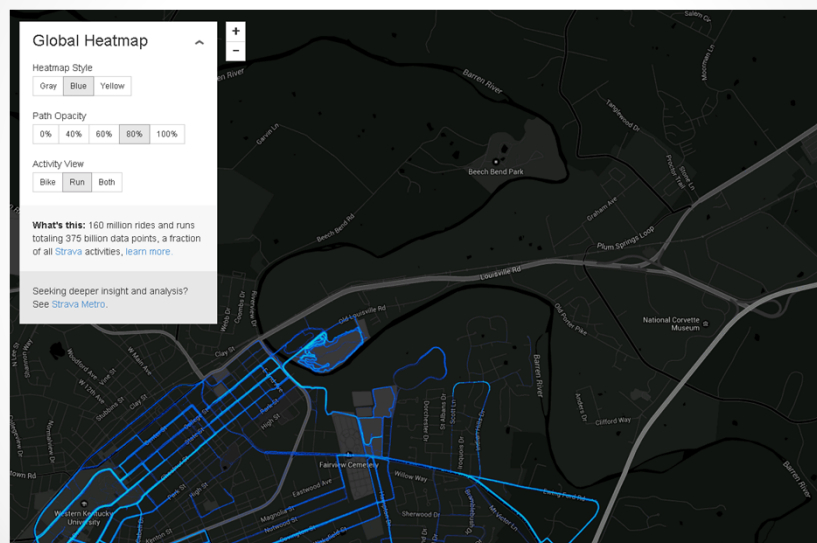
Additional

Bike Heat Map



- go BG Transit route does not come out to the study area
- <http://labs.strava.com/heatmap/#14/-86.40936/37.00968/blue/bike>

Run

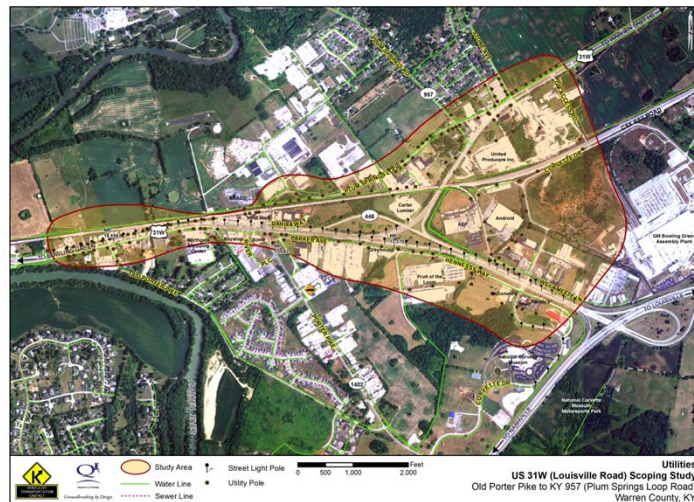


Socioeconomic Review

- Under construction



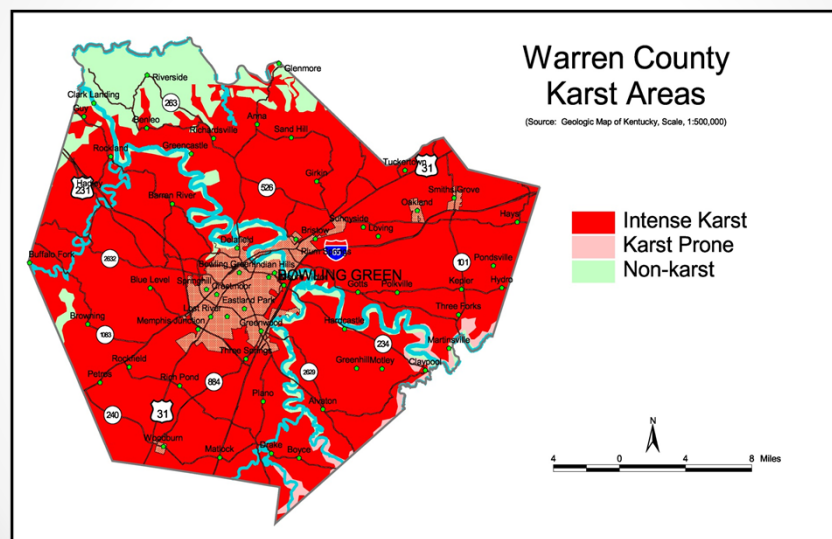
Known Utilities



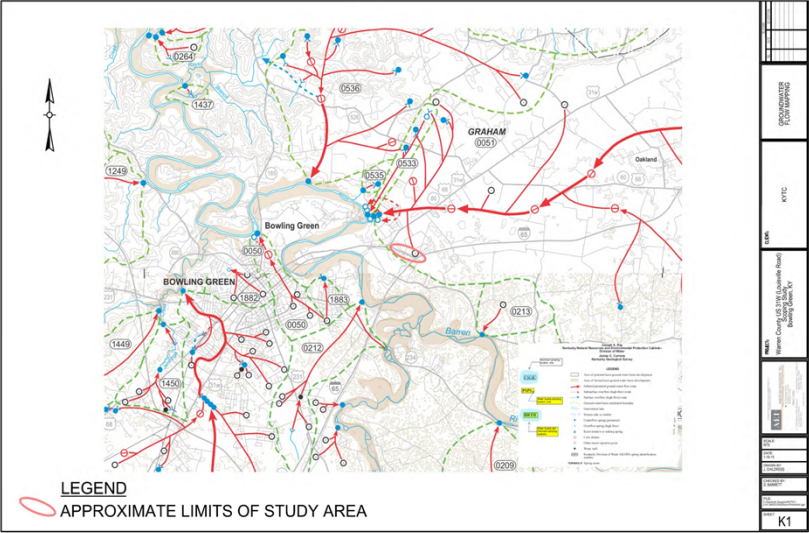
Geotechnical Overview

- **Karst terrain** - likely be the most detrimental factor to any new construction. Much of the study area is also highly developed which can mask the existence of karst features such as sinkholes and surface depressions.
- **Subsurface groundwater** - mapping indicates inflow from both the south and the north toward the study area and the Barren River which is another indication of the likely presence of karst features in the soluble limestone which underlies the area.
- **Site -Specific Geotechnical Investigation** - will provide critical information with regard to karst potential, problematic soils and other pertinent information for design.

Karst Potential



Water Flow



TRAFFIC



Data Collected

Industry Interviews Summary



FRUIT OF THE LOOM®



Themes

- Corvette Drive/KY 446 the worst
- PM Peak is the worst
- GM employees are backed up for over 15 minutes in PM
- Expansions for both GM and Corvette Museum are possible
- GM trucks travel to Android/AEP first before exiting to I-65
- GM trucks sometimes turn at the wrong location and then have to make a U-turn.
- Magna will use I-65/US 31W Connector when it is open to traffic.
- Need Liquor store channelized on Hennessy Way
- McDonald's needs a pull off for trucks
- Possible connection to Williamette from the new signal would be advantageous
- Greyhound 6 buses/day
- Porter Pike / Parker Avenue needs more storage space for vehicles on Porter Pike

National Corvette Museum



- Major traffic generator but one access
- More industry to come
- 150 vehicles weekdays; 300 (weekends) mid March to mid November
- Hope for 200,000 visitors



Liquor Store Cut-Through

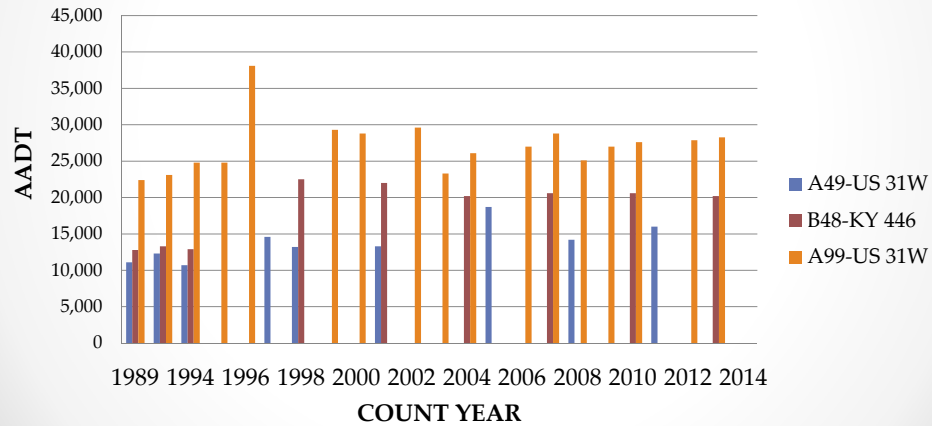


Meeting with Multimodal Branch

- Review of VISSIM visualization
- Provided data to Qk4 for the model
- Growth Rate discussion

Traffic Summary

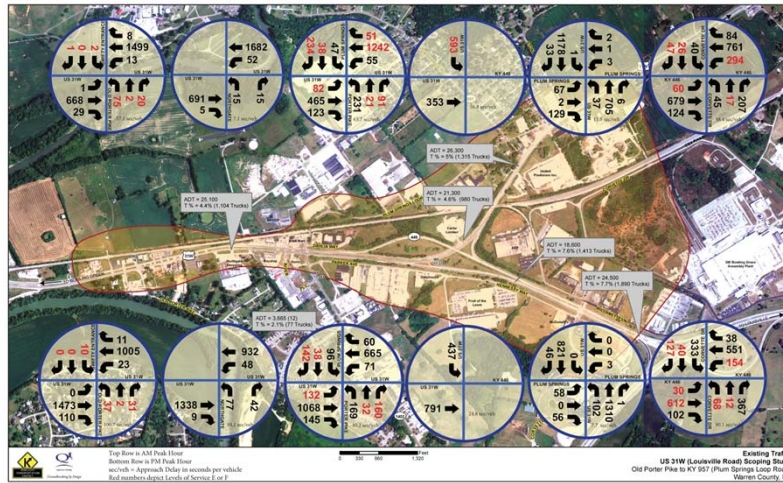
Historical Traffic Volume Summary for Project Count Stations



Capacity Analysis (Existing)

INTERSECTION	AM LOS	INTERSECTION DELAY (SEC/VEHICLE)	PM LOS	INTERSECTION DELAY (SEC/VEHICLE)
US 31W/PORTER PIKE	E	63.7	D	40.2
KY 446/CORVETTE DR	D	48.4	F	90.1
US 31W/PLUM SPRINGS	B	11.5	A	7.7
US 31W SB TO KY 446 EB	D	47.6	C	28.5
US 31W/OLD PORTER PIKE	F	57.1 (LTR)	F	100.7 (LTR)
US 31W/NORTHGATE	A	7.1	B	10.1

Existing Traffic



Visualization

PURPOSE AND NEED REVIEW

Purpose and Need

US 31W (Louisville Road) is a major urban and regional connection in Bowling Green, providing a gateway for southbound motorists entering Bowling Green from I-65 to access the Corvette Plant activities center, Beech Bend Park, and downtown Bowling Green. Nearly 50 years ago, this roadway was originally constructed as a rural four lane facility with a grassy median and partially controlled access.

The corridor includes a high speed rural type interchange with the KY 446 connection to I-65. With the increased commercial, residential, and industrial development in this area, the interchange with KY 446 and several signalized intersections and access points along this section of US 31W from Old Porter Pike to Plum Springs Loop create safety and mobility issues. This project would address those issues.

Potential Improvements

- o **Interchange Options for US 31W / KY 446 Interchange**
 - New interchange design
 - At grade intersection
 - Roundabout
 - Improvements to existing interchange:
 - o Calming measures to slow motorists down such as striping, signage, rumble strips.
 - o An extended merge of the KY 446 WB ramp to NB US 31W widening the existing bridge over the CSX railroad.
 - o Extend WB through KY 446 ramp lane through the intersection at Porter Pike to reduce crashes.
- o **Spot Improvements such as:**
 - Provide improved travel in and out of the industry on the south side of KY 446
 - Improve sight distance at Old Porter Pike.
 - Improve drainage issue across from the Keystop gas station
 - Widen CSX railroad bridge on Plum Springs Road
 - Consider pedestrian and/or bicycles

DESIGN CONSIDERATIONS

Alternative Concept Considerations

- GEOTECHNICAL ISSUES
- MULTIMODAL CONSIDERATIONS
 - Sidewalk
 - Shared Use path
 - Shared lane/sidewalk
 - Widths?
 - What would be the limits?
 - Agree it be different for various scenarios? E.g. at-grade intersection vs. interchange reconstruction. Let's define
- TYPICAL SECTIONS
 - o 45 mph
- ALTERNATIVES TO CONSIDER
- ACCESS MANAGEMENT DISCUSSION
 - o C & G between Porter Pike and Old Porter Pike
 - o So little traffic, it would make the most sense to close the median openings
 - Right/in right outs
 - C&G would allow you to possibly channelize and eliminate some of the entrances.
- KEYSTOP

PUBLIC INVOLVEMENT

Public Involvement

- FORMAT
- STAKEHOLDER DISCUSSION AND LIST
- VENUES/FORMAT
- SURVEY
- PRESENTATION AND EXHIBITS

Survey Questions

Please rank your **level of concern** in the study area from 1-5. 1 would be your least concern and 5 your most concern (*please circle*).

Questions/Topics		Your Rank				
a.	Safety/Number of crashes	1	2	3	4	5
b.	Congestion (long delays)	1	2	3	4	5
c.	Flooding or standing water on the road	1	2	3	4	5
d.	Lack of pedestrian and bike connections (sidewalks)	1	2	3	4	5
e.	Multiple entrances and median crossovers on US 31W	1	2	3	4	5
f.	Access to transit (Go BG)	1	2	3	4	5
g.	Other	1	2	3	4	5

Please rank the **level of difficulty** you have in making these maneuvers. 1 would be the least difficult and 5 would be the most difficult (*please circle*).

Level of Difficulty for the Following		Your Rank				
a.	KY 446/US 31W interchange	1	2	3	4	5
	i. Ramp from KY 446 to Northbound US 31W (toward Warren East High School)	1	2	3	4	5
	ii. Ramp from KY 446 to Southbound US 31W (toward downtown)	1	2	3	4	5
	iii. Ramp from US 31W Southbound to KY 446 (toward I-65 interchange)	1	2	3	4	5
	iv. Ramp from US 31W Northbound to KY 446 (toward I-65 interchange)	1	2	3	4	5
b.	Corvette Drive & KY 446	1	2	3	4	5
c.	Porter Pike (KY 1402) & US 31W	1	2	3	4	5
d.	Old Porter Pike & US 31W (flashing beacon)	1	2	3	4	5
e.	Narrow railroad underpass at Plum Springs Loop & US 31W	1	2	3	4	5
f.	KY 957 (Plum Springs Loop) and US 31W	1	2	3	4	5
g.	Other	1	2	3	4	5

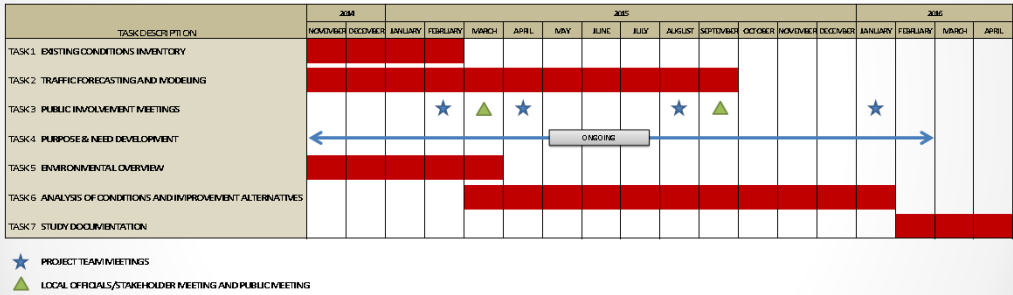
Survey Questions cont.

Please rank the level of environmental concern in the study area. 1 would be the least concern and 5 would be the most concern (*please circle*).

	Environmental Considerations	Your Rank				
a.	Sinkholes/Groundwater	1	2	3	4	5
b.	Historic Resources (cemeteries, old homes, etc.)	1	2	3	4	5
c.	Business Impacts	1	2	3	4	5
d.	Hazardous Materials/Underground Storage Tanks	1	2	3	4	5
e.	Residential Impacts	1	2	3	4	5
f.	Noise	1	2	3	4	5
g.	Landscaping	1	2	3	4	5
h.	Other	1	2	3	4	5

SCHEDULE

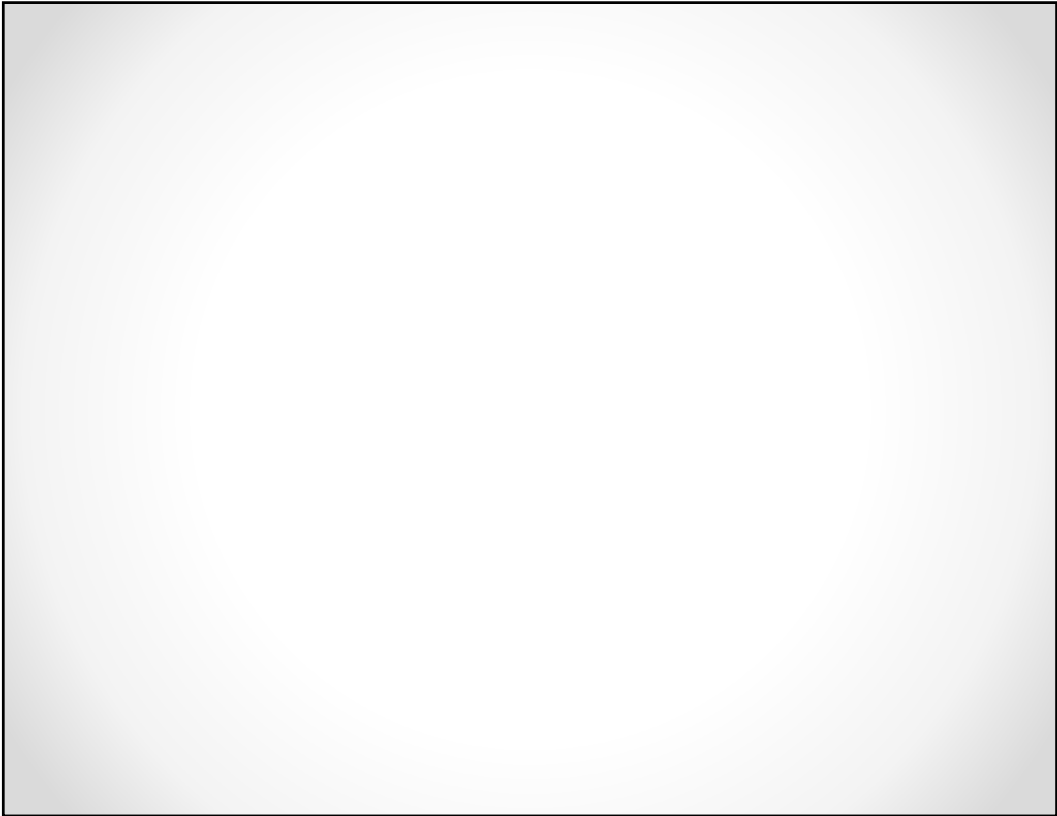
Schedule



NEXT STEPS

Next Steps

- Growth Rate from KYTC
- Traffic Projections
- Preliminary Alternatives Development



Interchange Ramps

RAMP A is exit ramp from US31W (north) toward I-65
 Ramp B is segment (including flyover bridge) of connector (KY 446) from I65 to US31W SB
 Ramp D is short ramp from KY 446 WB (Ramp B) to US31W NB

RAMP B :

Existing Entrance taper/merge to US31W = 500'

Required (Green Book Exhibit 10-69):

Lg (min) =	300
remaining	
taper for	
12' @ 50:1	
=	600
Total min.	
taper/merge req'd =	900

Existing does not meet minimum required.

RAMP D :

Existing Entrance taper/merge to US31W = ~360' (scaled from plans)

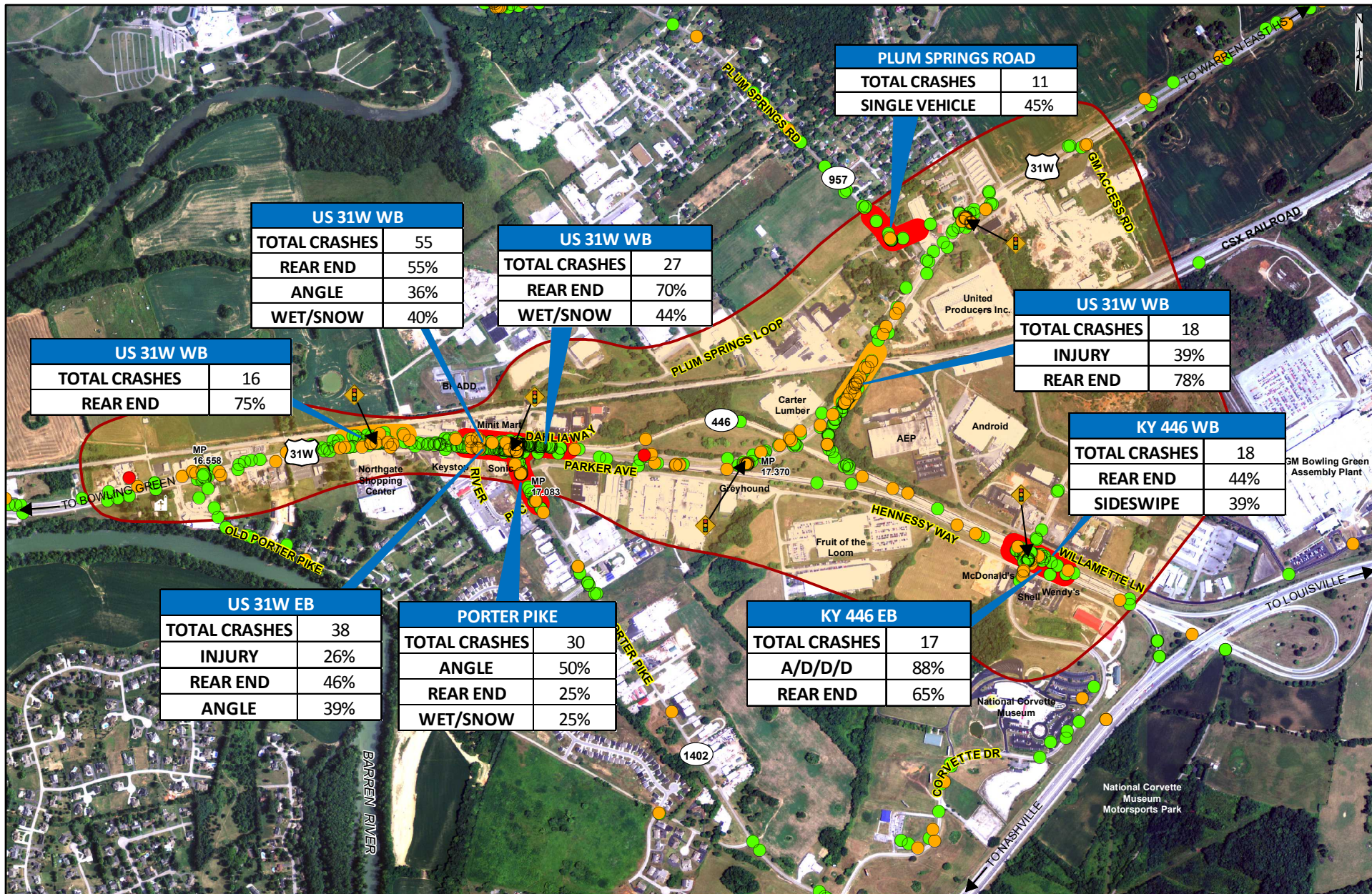
Required (Green Book Exhibit 10-69):

Lg (min) =	500
remaining	
taper for	
12' @ 50:1	
=	600
Total min.	
taper/merge req'd =	1100

Existing does not meet minimum required.

PROJECT TEAM MEETING 1

HANDOUTS



Crash Type

- Fatality
- Injury
- PDO

● CCRF > 0.9 and < 1.0

● CCRF > 1.0

● Traffic Signal

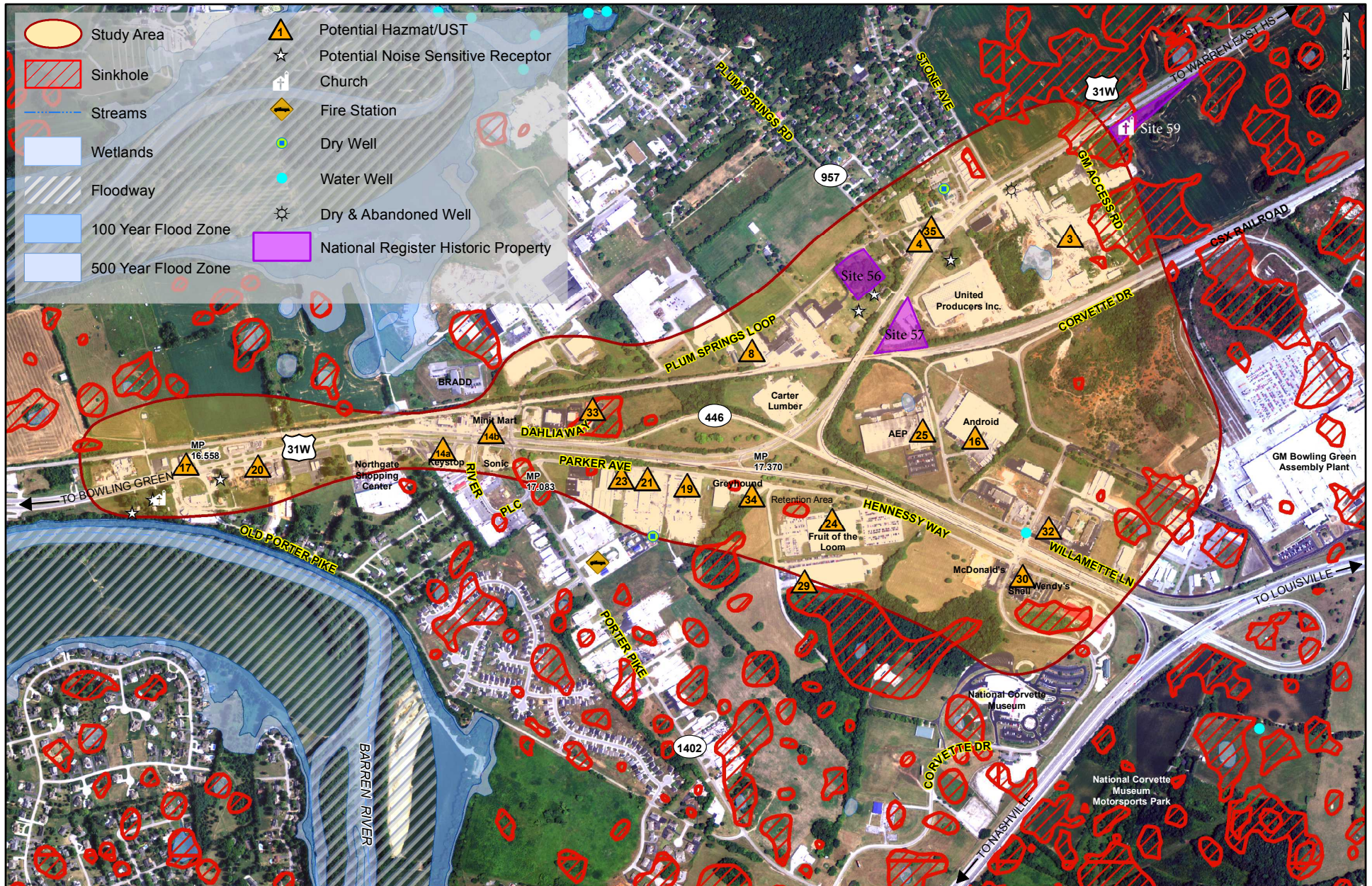
● Study Area

0 500 1,000 2,000 Feet

Note: CCRF (Critical Crash Rate Factor) = calculated statistic of potential crash problem.

A/D/D/D means "alcohol and/or drug involvement or drowsy or distracted driving" as indicated by officer investigating the crash.

2009-2013 Crash Data
US 31W (Louisville Road) Scoping Study
 Old Porter Pike to KY 957 (Plum Springs Loop Road)
 Warren County, KY





◆

◆

◆

◆

Crest Vertical Curve does not Meet 55 mph

Sag Vertical Curve does not Meet 55 mph

Sag Vertical Curve does not Meet 35 mph

Superelevation/radius will not Meet for 35 mph

○

●

○

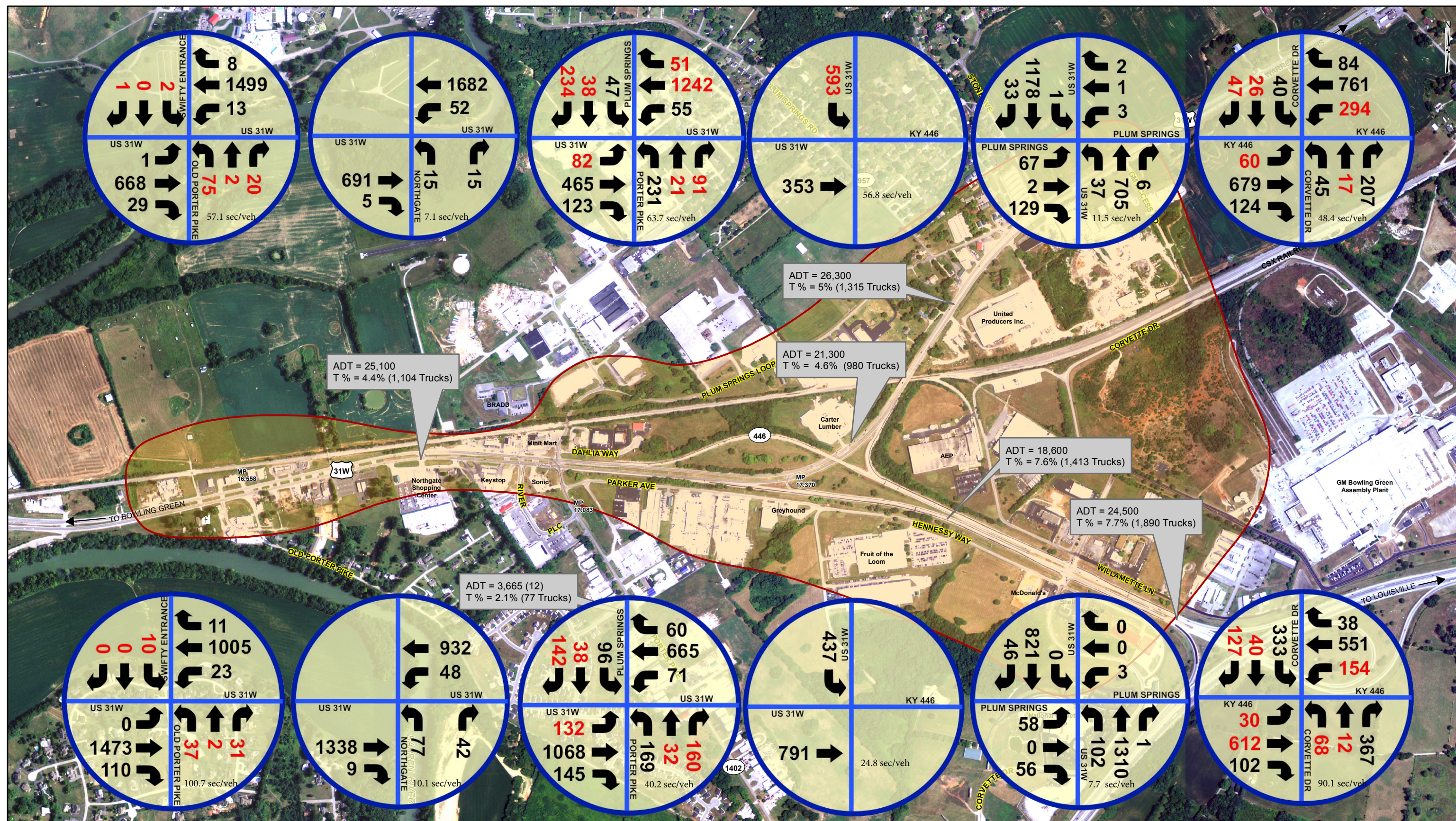
Narrow Underpass (approximate width = 18.4 ft.)

Merge Lengths do not Meet 50 mph

Functionally Obsolete Bridge

Study Area

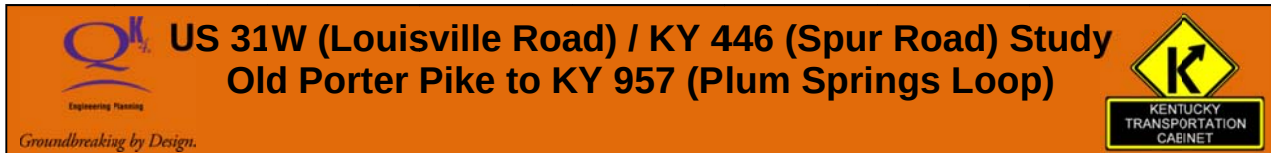
Geometric and Structural Issues
US 31W (Louisville Road) Scoping Study
 Old Porter Pike to KY 957 (Plum Springs Loop Road)
 Warren County, KY



Top Row is AM Peak Hour
 Bottom Row is PM Peak Hour
 sec/veh = Approach Delay in seconds per vehicle
 Red numbers depict Levels of Service E or F

Existing Traffic
US 31W (Louisville Road) Scoping Study
 Old Porter Pike to KY 957 (Plum Springs Loop Road)
 Warren County, KY

PROJECT TEAM MEETING 2



PROJECT TEAM MEETING 2

Item No. N/A

Warren County

8:30 AM CST - District 3 – Bowling Green Highway District Office

April 16, 2015

Project: US 31W/KY 446 Scoping Study
Old Porter Pike to KY 957 (Plum Springs Loop)

Purpose: Project Team Meeting #2 (9:00 AM CST)

Place: KYTC District 3 – Bowling Green

Meeting Date: April 16, 2015

Prepared By: Annette Coffey

Attendees:

Greg Meredith	KYTC D3 CDE	Greg.Meredith@ky.gov
Daryl Price	KYTC D3	Daryl.Price@ky.gov
Tim Sharp	KYTC D3	Tim.Sharp@ky.gov
Wes Watt	KYTC D3	Wes.Watt@ky.gov
Jeff Moore	KYTC D3 Planning	Jeff.Moore@ky.gov
Deneatra Henderson	KYTC D3 Planning	Deneatra.Henderson@ky.gov
Daniel Hulker	KYTC CO Planning	Daniel.Hulker@ky.gov
Shane McKenzie	KYTC CO Planning	Shane.McKenzie@ky.gov
Mikael Pelfrey	KYTC CO Planning	Mikael.Pelfrey@ky.gov
Travis Carrico	KYTC CO Design	Travis.Carrico@ky.gov
Renee Slaughter	KYTC D3 Env. Coord.	Renee.Slaughter@ky.gov
Brittany Fisher	BRADD	bfisher@bradd.org
Rachel Hetzler	BG/WC MPO	Rachel.Hetzler@bgky.org
Joe Plunk	KYTC D3	Joseph.Plunk@ky.gov
Jeremy Lukat	Qk4, Inc.	jlukat@qk4.com
Annette Coffey	Qk4, Inc.	acoffey@qk4.com
Cody Humble	Qk4, Inc.	chumble@qk4.com
Andy Gilley	Qk4, Inc.	agilley@qk4.com

Jeff Moore, Project Manager for District 3, opened the meeting with introductions. He presented a brief project introduction and meeting goals. He stated that the purpose of the meeting was to present options to improve safety and mobility in the project study area and narrow the options presented to a total of five (5) from among the following: intersection, roundabout, interchange, access management, and Plum Springs Improvements. The real focus of this meeting was the US 31W/KY 446 connection improvement options: roundabout, 3-way intersection, 4-way intersection and a modified interchange. The meeting was turned over to Annette Coffey, Project Manager for Qk4.

Local Officials/Public Meeting 1. Annette summarized the results of the Local Officials meeting and Public Meeting (see attached). There was a total of 61 surveys received (9 from the internet). Ninety percent of the respondents were from Warren County, most used the study area to travel to work, and nearly one-half traveled the study area several times a day. Safety (61%) and Congestion (72.4%) were the greatest concerns in the study area. When asked which maneuver gives the greatest level of difficulty, the reply was the ramp from KY 446 westbound to northbound US 31W. The second movement that provided concern was the narrow underpass at the rail crossing of Plum Springs Loop. Sinkholes/Groundwater ranked as the greatest concern in the environmental area with business impacts placing second.

In addition, the local officials and the public meeting attendees placed red and yellow dots on the table maps indicating their areas of greatest concern (red) and then their secondary concerns (yellow). Each participant received two red and two yellow dots for a total of four. The public meeting attendees identified the overwhelming problem area was the US 31W/KY 446 interchange area with a total of 50 dots with 30 for the movement from westbound KY 446 to northbound US 31W. Ranking of problem areas by the public were as follows:

- US 31W/KY 446 interchange (KY 446 westbound to US 31W northbound most prevalent)
- US 31W/Corvette Drive intersection
- US 31W/Porter Pike intersection
- Plum Springs Loop road underpass at rail crossing

There were open-ended questions on both the internet (Survey Monkey) and paper surveys. Those comments were captured at the public meeting and summarized as an attachment. Where appropriate, these comments will be taken into consideration as the study progresses.

In summary, Jeff stated that these public forums validated the existing conditions found and presented at the first project team meeting. For the project file, Qk4 provided five Public Meeting Notebooks to KYTC summarizing the public meeting held on March 31, 2015.

Alternatives Presentation. The remainder of the meeting consisted of a presentation of proposed improvement options prepared by Qk4. As previously mentioned, initially there were to be 4

improvement options for the US 31W/KY 446 connection to be examined: a roundabout, a 3-way intersection, a modified interchange and a new interchange. However, during the course of the alternatives development, other options appeared to have merit e.g. a 4-way intersection with Hennessy Way providing the fourth leg of the intersection. Consequently an option also was provided for a 4-legged roundabout. In addition, with the 3-way intersection option one could either tee KY 446 into US 31W or tee US 31W into KY 446. Therefore, the option list expanded beyond the initial four (4).

The options studied are summarized as follows and depicted in attached exhibits (not to scale).

Option 1 – 4-way Intersection

- Only one westbound through lane from I65 to US 31W southbound
- Uses existing infrastructure for bypass lanes
- Free flow through movements are:
 - o US 31W south to US 31W toward Bowling Green
 - o KY 446 westbound to US 31W northbound
 - o US 31W from Bowling Green to Hennessy Way
- Removes access to Parker Avenue
- Removes access to Hennessey Way
- Carter Lumber right in/right out
- 2040 Traffic Operations result in a LOS E in the PM Peak hour

Discussion:

- Several intersection movements fail in terms of capacity (see attached intersection Capacity Summary)
- Access to Carter Lumber should be right in / right out
- Easy to maintain traffic during construction
- Everyone agreed this option was not the most desirable due to the 2040 traffic operations.
- Sight distance issues on US 31W coming SB on the sweeping curve may be an issue with all options. It also may be an issue with adding a signal.

Option 2 - 4-way Intersection

- Two through lanes westbound from -I65 to US 31W south
- Removes access to Parker Avenue
- Removes access to Hennessey Way
- No access to Carter Lumber
- 2040 traffic operations are improved over Option 1 however, the southbound lefts and through movements will operate at LOS E in the 2040 PM peak hour.

Discussion:

- Better 2040 traffic operations than the Option 1
- Carter Lumber would have to be purchased or a long frontage road built to Plum Springs Loop

- May be issues with access between the liquor store and the Shell station near Corvette Drive.
- Restricting access to the corner liquor store is unlikely near Corvette Drive
- Sight distance issues on US 31W coming SB on the sweeping curve may be an issue with all options. It also may be an issue with adding a signal.

Option 3 - 4-way Intersection (3-Way Intersection in intersection Capacity Summary)

- Takes advantage of the existing infrastructure
- US 31W is the through movement
- Provides full access to Carter Lumber
- Provides for a connector to Willamette Lane
- The 2040 traffic operations result in an intersection LOS C

Discussion:

- May be able to raise the grade, however, it would likely require the purchase of Carter Lumber.
- Sight distance issues on US 31W coming SB on the sweeping curve. The current speed limit on US 31W southbound is 55 mph and the intersection would be 45 mph (the speed differential and sight distance may be an issue with all options)
- This intersection could be relocated to the south and add a different entrance to Carter Lumber.

Option 4 - Continuous Green Tee (3-way intersection in Capacity Summary)

- US 31W is the through movement
- An acceleration lane is provided for westbound motorists from KY 446 turning southbound onto US 31W
- Provides modified access to US 31W for Carter Lumber closer to Porter Pike
- Provides modified connection to Dahlia Way from US 31W
- The 2040 traffic operations result in an intersection LOS C.

Discussion:

- Southbound US 31W does not stop. This will help with sight distance issues.
- New access point for Plum Springs / Dahlia Way may need to be right in / right out.
- All intersection alternatives may have issues with trucks going northbound on US 31W. Trucks on westbound KY 446 traveling northbound on US 31W will be starting from a stop condition at the US 31W/KY 446 intersection and going uphill towards the railroad underpass. An acceleration lane should be considered at this location.
- Access to Carter Lumber needs to be a right in / right out intersection.

Option 5 - Continuous Green Tee (3 way intersection in intersection Capacity Summary)

- Takes advantage of existing infrastructure

- KY 446 is the through movement
- Provides for US 31W southbound free flow movement utilizing the existing infrastructure
- Only one through lane for KY 446 westbound from I-65
- Provides full access to Carter Lumber
- 2040 traffic operations are projected to be LOS E and F for this option.

Discussion:

- Sight distance issues on US 31W travelling southbound on the sweeping curve from the bridge over the railroad. The current speed limit on US 31W southbound is 55 mph and the intersection would be 45 mph (the speed differential and sight distance may be an issue with all options).
- Carter Lumber in this scenario needs to be a right in / right out. If access management "bulb-outs" were constructed, left turns could be made via the Porter Pike intersection U-turn.
- For all options investigate an acceleration lane for KY 446 NB ramp or turn onto US 31W North with merge. It may be better for trucks not to come to a stop before climbing hill. Also there will be more traffic making this move if the Plum Springs underpass is closed. A comment was made that the I-65 / US 31W Connector will remove some trucks making this move.

Option 8 – Flyover (4-Way KY 446 Flyover on Intersection Capacity Summary)

- KY 446 flyover ramp then connection to Porter Pike with a 4-way intersection
- US 31W through movement
- Loop road access to Hennessy Way
- The 2040 traffic operations of this intersection are expected to operate at LOS D in the AM peak hour and C in the PM peak hour. The left turns to and from US 31W are expected to both operate at LOS E.

Discussion:

- 2040 intersection traffic operations are less than desirable.

Option 6 – Interchange

- Removes US 31W southbound to KY 446 eastbound short ramp and provides 25 mph loop
- Provides over 900 feet as opposed to 200 feet at present for the movement from SB US 31W to turn left at Porter Pike and eliminates the merge to US 31W southbound.
- One lane northbound from Bowling Green to northbound US 31W to remove the merge issue near the bridge over the railroad on US 31W north
- Tightens KY 446 flyover ramp to US 31W southbound to allow more merge room for southbound vehicles
- Maintains access to Carter Lumber
- All ramps will require only one lane for the projected 2040 traffic.

Discussion:

- 25 mph loop ramp may be an issue
- Joe Plunk stated that the ramp realignment for KY 446 WB to US 31W southbound may not be cost effective for the benefits gained.
- There may be issues for motorists traveling toward I-65 with weaving between Porter Pike and I-65 of motorists having adequate distance to choose the appropriate lane for I-65. This option does provide less room for that maneuver.
- Sight distance issues on US 31W travelling southbound on the sweeping curve could be an issue with all options.

Option 7 - Interchange

- Removes southbound US 31W to eastbound KY 446 short ramp and provides loop
- Removes the KY 446 to US 31W southbound flyover ramp and replaces it with a loop
- Provides right in right out for Hennessy Way
- All ramps will require only one lane for the projected 2040 traffic.

Discussion:

- 900' weave between the two loop ramps may be issue.
- The loop ramp from KY446 to US 31W SB may be a problem with trucks turning over.

Urban Access Control Option

- Shared use path on east side of US 31W
- Sidewalk on west side of US 31W
- Offset left turn on US 31W at Old Porter Pike
- Reduces the median openings to three
- Provides for 3 U-turn areas
 - o Old Porter Pike
 - o Porter Pike
 - o Northgate Shopping Center
 - o Bulb out at Northgate Shopping Center had to be adjusted due to the railroad

Discussion:

- Offset left turn at Old Porter Pike interferes with stop bars at Old Porter Pike. (Same for all bulb-outs).
- Old Porter Pike would most likely have to be signalized to allow U-turns.
- Would need to add left turn phasing to Northgate Shopping Center
- Issue with turning right from Old Porter Pike onto northbound US 31W. That movement may need to prohibit right turns on red because of the proposed stop bar location.

General Roundabout Options

- The location of the roundabout circle is for conceptual illustration only and will be moved around during the design phase to provide for maintenance of traffic.
- 3 legged or 4 legged
- Right Turns - Either utilizing non-yielding full bypass lanes pulled away from the roundabout and possibly using existing infrastructure or via slip lanes pulled closer to the circulating traffic with reduced speeds. Both require a downstream merge or add lane. Options also exist for partial bypass lanes where right turn traffic yields to conflicting exiting vehicles for all legs except US 31W SB.
- 1 option shows carrying the right turn lane from Porter Pike toward I-65 to the roundabout or not
- Components of each roundabout are transferrable to several options
- Each option provides for realignment of Parker Avenue at Porter Pike to allow more queuing of vehicles

Roundabout Option 1 – 3-legged roundabout

- 3-legged roundabout option using the existing infrastructure with full bypass lanes
- With bypass lanes this option pushes movements a little closer to the adjacent intersections.
- This option has only two lanes on US 31W approaching the roundabout circle from Porter Pike
- Interchange removed with the exception of the US 31W Southbound Ramp
- 2040 traffic operations result in LOS A in both the AM and PM peak hours.

Discussion:

- Doesn't address Fruit of the Loom and Corvette Drive
- Merge point is improved on US 31W WB before Porter Pike. The merge point on US 31W NB before railroad bridge is the same as existing. Merge point on KY 446 EB towards the interstate is worse than existing.
- Issues with Carter Lumber access
- Joe Plunk mentioned the differences in speed - slower traffic in the circle, higher speed on the bypasses / triangle.
- Sight distance issues on US 31W coming southbound on the sweeping curve (could be an issue with all options)

Roundabout Option 2 – 3-legged roundabout

- Pulls right turn lanes of each approach leg in adjacent to the circulating movements
- Utilizes free flow slip lanes for right turn movements. This design also allows for the US 31W EB approach and KY 446 WB approach right turns to be considered as yielding partial bypass lanes in later planning/design phases.
- Provides potential access/regress for Fruit of the Loom

- Since everything is tighter, there is a greater distance between decision points such as intersections and before the US 31W northbound bridge over the CSX railroad.
- Two lanes on US 31W from Porter Pike approaching the roundabout circle
- Prohibits Parker Avenue access to Hennessy Way
- 2040 traffic operations result in an intersection of LOS A in the AM and PM peak hours. If the free flow slip lane from US 31W EB is modified to a yielding right turn slip lane the LOS becomes a B in the PM peak hour.

Discussion

- Reduces the right turn speeds by bringing the curvature in adjacent with the circulating approaches
- Potential issues with motorist traveling from Fruit of the Loom to Bowling Green from the proposed regress location because they must cross three lanes of traffic in a short distance to get into proper lane before the roundabout.

Roundabout Option 3 – 4-legged roundabout

- Utilizes non-yielding slip lanes for US 31W SB to US 31W WB and KY 446 EB to US 31W NB. Utilizes partial right turn slip lanes for US 31W EB to Proposed Entrance and from Proposed Entrance to KY 446 where traffic yields to conflicting exiting traffic.
- Potential to address right turn vehicles from KY 446 to US 31W NB via a yielding double
- Provides for three lanes on US 31W from Porter Pike to the roundabout.
- Prohibits Parker Avenue access to Hennessy Way
- 2040 traffic operations result in an intersection LOS A in the AM peak hour and LOS B in the PM peak hour.

Discussion

- Carter Lumber access may require modification.
- Jeff thought this option would provide excellent access for the expected visitation at the new motor sport park off Porter Pike.
- Has three-lane section in one quadrant of roundabout from US 31W EB approach in front of Proposed Entrance approach. Could be a difficult move in peak hour for left turn and through vehicles to find gaps from Proposed Entrance approach into roundabout.

General roundabout Discussion

- Option 2 & 3 reduces speeds of right turn vehicles by bringing them in adjacent to the left turn and through movement approaches
- Joe and Greg suggested checking the queue and backup of vehicles toward the roundabout. This will be performed as part of the visualization task between now and August.
- Plum Springs rail crossing underpass closure on all options
- Realign Parker Avenue with all options.
- New Plum Springs Loop/KY 957 realignment on options

Options Discussion. The following are the selected options to advance to the next study phase and presentation to the public as a result of the presentation and discussions. Options 1, 2, and 5 were eliminated based upon the 2040 traffic operations analysis. Interchange Option 6 was selected to move forward due to the ease of construction and improvement of its connection to US 31W southbound at Porter Pike (a high crash location). Option 8 was also eliminated from further consideration due to the 2040 traffic operations of the left turns from US 31W northbound and US 31W southbound. Roundabout Option 3 (four legs) was selected to move forward because it provides a future connection to Porter Pike south, 2040 traffic performance, and it achieves the objective of slowing motorists down.

The following provides components for the options that will move forward to the next phase of the project study.

- **Plum Springs Loop Closure at US 31W across from Porter Pike**
 - Show this on every board (for the next public meeting) and concept
 - This option could be standalone project.
 - The Plum Springs Loop / KY 957 T-intersection should ensure consideration of trucks that currently use it and may need to provide additional turn storage space.
- **Realignment of KY 957/Plum Springs Loop intersection with US 31W**
 - Show on all selected options and ensure there is enough storage for trucks.
- **Access Control on US 31W between Old Porter Pike and Porter Pike**
 - Present as a separate project and on every concept board
 - This option could also be a standalone project.
- **Pedestrian / Bicycle Accommodations**
 - Pedestrian / bicycle accommodations from Old Porter Pike to interchange, intersection or roundabout.
 - Bicycle and pedestrian considerations will be clarified with the Bicycle / Pedestrian Coordinator however; team discussion stated that a sidewalk should be provided on the east side of US 31W from Old Porter Pike to Porter Pike to either the new roundabout, new t-intersection or interchange project.
- **4-Way Intersection**
 - Option 3 was selected to move forward based on the team discussions
 - Joe Plunk suggested adding a merge / acceleration lane from KY 446 to 31W North for all intersection options.
 - Provide for pedestrian facilities from Old Porter Pike up to the roundabout – 5' sidewalk
- **3-Way Intersection**
 - Option 4 was selected to move forward based on the team discussions.
 - Joe Plunk suggested adding a merge / acceleration lane from KY 446 to 31W north for all intersection options.

- **Interchange Reconstruction**
 - Option 6 with improved access to Fruit of the Loom - perhaps a right in / right out
 - Hennessy right in/ right out
 - Improved traffic flow on Corvette Drive ("Merry Go Round")
- **Roundabout**
 - Option #3
 - New Porter Pike Connection to the south
 - Access Control Option
- **Corvette Drive reconfiguration referred to as the "Merry-Go-Round"**
 - Add to interchange Option 6
- **All Options will have the following:**
 - Maintain the connection to Porter Pike in Option 8 that provides for additional access to Porter Pike
 - Parker Avenue realignment
 - Bicycle & Pedestrian Considerations
 - Add sidewalk from Porter Pike to Bus Station utilizing the existing roadbed
 - There was quite a bit of discussion on how to carry a sidewalk from US 31W / Porter Pike intersection to the roundabout.

Discussion also ensued regarding a change in the US 31W profile to improve sight distance at Old Porter Pike. Qk4 will discuss options to ensure sight distance is met at this intersection at the next meeting. It was stated that it would be nice to have roundabouts at US 31W intersections (Corvette Drive, KY 446, Porter Pike and Old Porter Pike. Everyone agreed that this was beyond the scope of this study.

Schedule and Next Steps. Qk4 will take the information provided today, and model and analyze the selected build alternatives (two intersections, interchange and roundabout) with a new 4 way intersection connection to Porter Pike. Assumptions will be made to add traffic to the 4th southern leg of Porter Pike for traffic analysis so that a narrative can be provided to explain what would happen if a connection to Porter Pike was made sometime in the future.

A Resource Agency mailing will take place the second week in May allowing for 30-day comment period. There will be a short internet survey and packets compiled, and a summary of responses provided by Qk4. All 11x17 exhibits and purpose and need should be marked as draft and accompanied by a cover letter (Jeff to provide). Description boxes will be added to the roundabout option exhibits and also the details added at this meeting.

- Cover letter,
- Draft Purpose and Need,
- Project History,

- Maps 4 concepts with descriptions,
- Study Area, and, Existing Conditions Map
- 30 days to respond.

Project Team Meeting #3 will be held in mid-August to review alternatives and Resource Agency responses prior to the second Local Officials Meeting and Public Meeting. The below schedule provides the remaining project milestones.

- **Project Team Meeting 3** – Week of August 15, 2015 - Review Alternatives prior to Public Meeting 2
- **Local Officials and Public Meetings 2** – Week of September 15, 2015
- **Project Team Meeting 4** – Week of February 1, 2016 – Determine Final Recommendations
- **Draft Report** – March 30, 2016
- **Final Report** – May 15, 2016

The meeting concluded at 12:20 CST.

PROJECT TEAM MEETING 2

HANDOUTS



Groundbreaking by Design

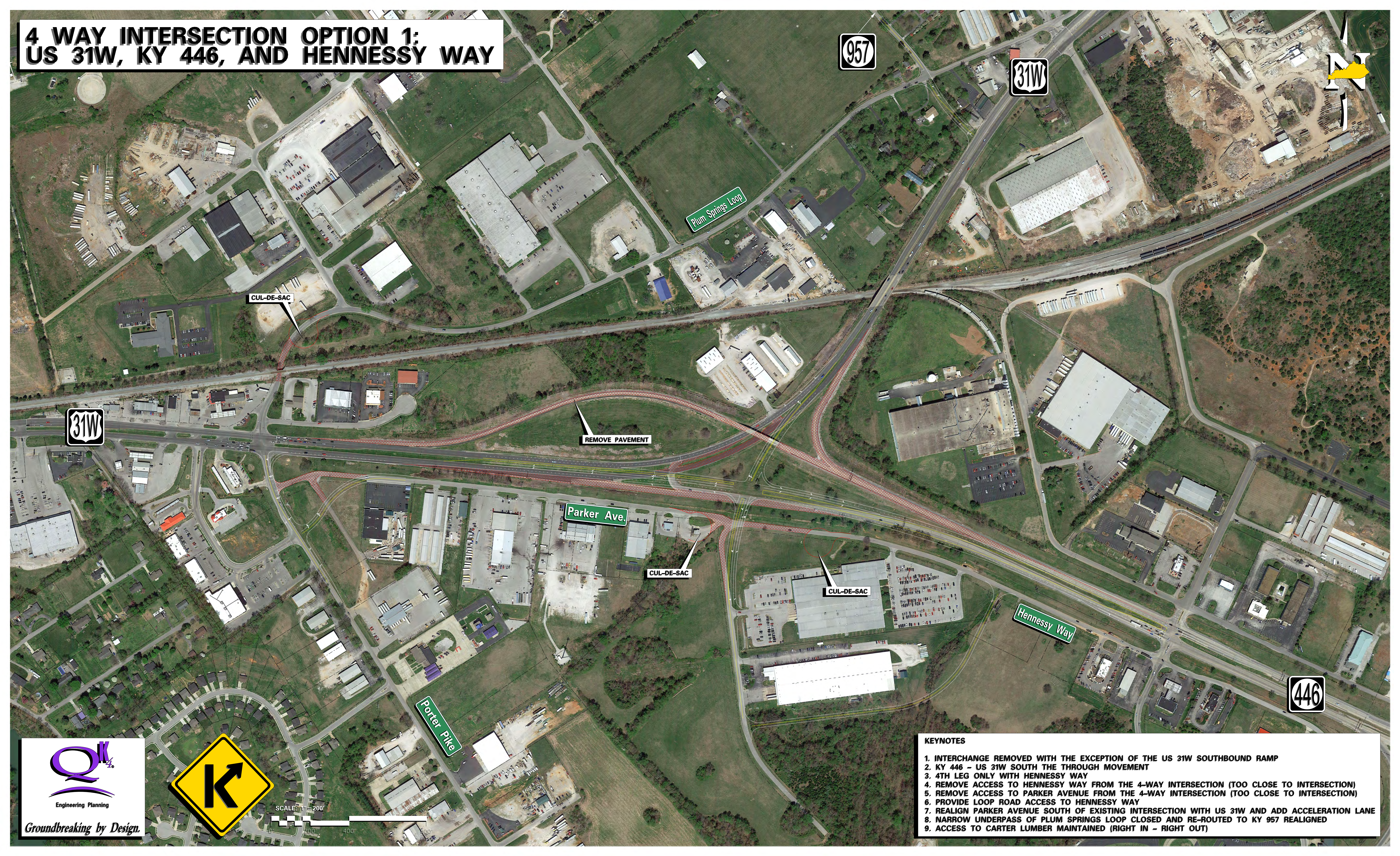
**US 31W (Louisville Road) / KY 446 (Spur Road) Study
Old Porter Pike to KY 957 (Plum Springs Loop)**



**PROJECT MEETING #2
Item No. N/A
Warren County
District 3 – Bowling Green Office
April 16, 2015 – 9:00 AM Central Time
AGENDA**

1. Local Officials Meeting #1 Review – March 31, 2015
2. Public Meeting Review – March 31, 2015
3. Survey Responses Summary
4. Preliminary Improvement Options
 - A. Interchange
 - B. Intersection
 - C. Roundabout
 - D. Access Management
 - E. Hennessy Way
 - F. Plum Springs Loop
 - G. Other
5. Schedule
6. Next Steps

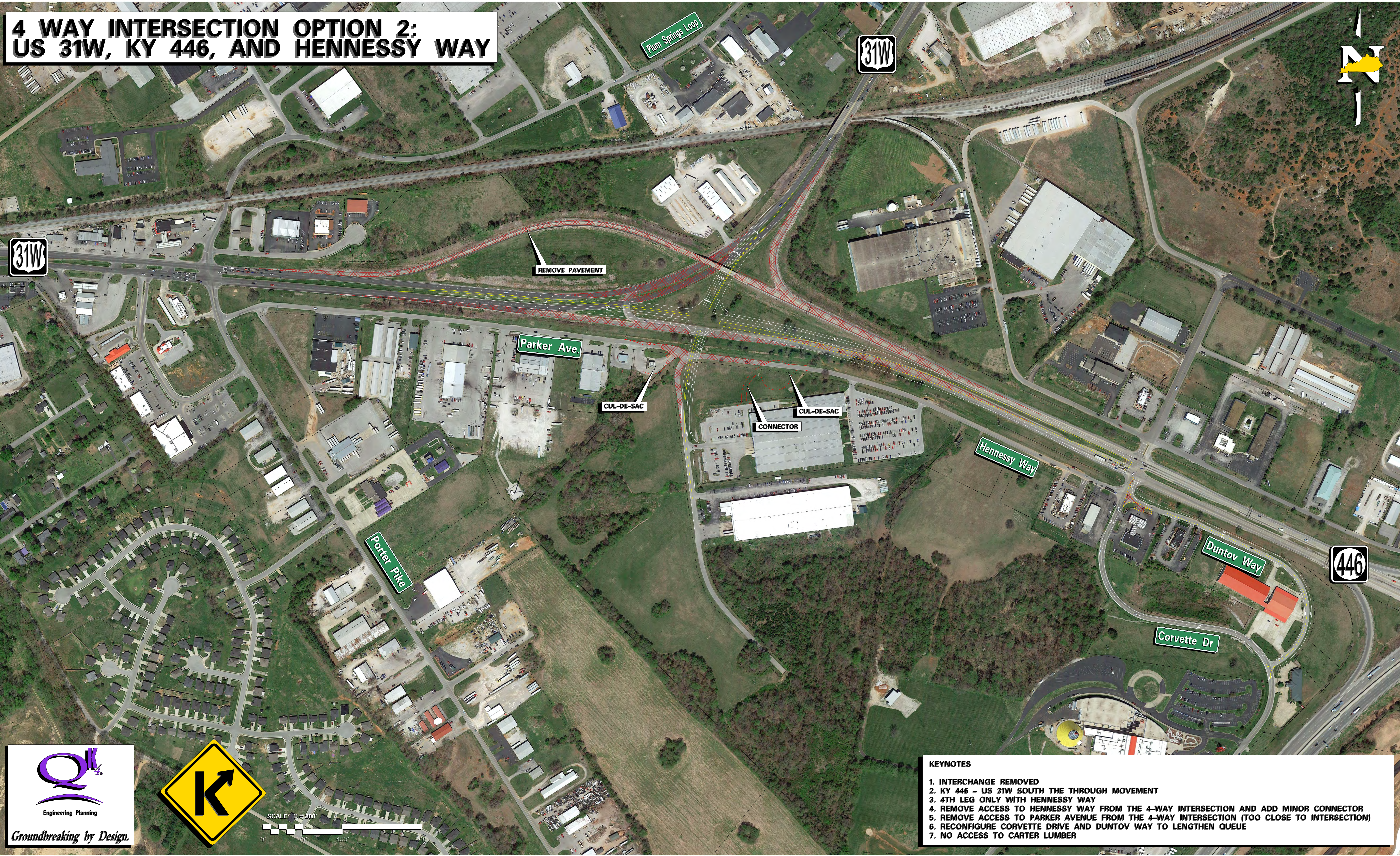
4 WAY INTERSECTION OPTION 1: US 31W, KY 446, AND HENNESSY WAY



SCALE: 1" = 200'

- KEYNOTES**
1. INTERCHANGE REMOVED WITH THE EXCEPTION OF THE US 31W SOUTHBOUND RAMP
 2. KY 446 - US 31W SOUTH THE THROUGH MOVEMENT
 3. 4TH LEG ONLY WITH HENNESSY WAY
 4. REMOVE ACCESS TO HENNESSY WAY FROM THE 4-WAY INTERSECTION (TOO CLOSE TO INTERSECTION)
 5. REMOVE ACCESS TO PARKER AVENUE FROM THE 4-WAY INTERSECTION (TOO CLOSE TO INTERSECTION)
 6. PROVIDE LOOP ROAD ACCESS TO HENNESSY WAY
 7. REALIGN PARKER AVENUE SOUTH OF EXISTING INTERSECTION WITH US 31W AND ADD ACCELERATION LANE
 8. NARROW UNDERPASS OF PLUM SPRINGS LOOP CLOSED AND RE-ROUTED TO KY 957 REALIGNED
 9. ACCESS TO CARTER LUMBER MAINTAINED (RIGHT IN - RIGHT OUT)

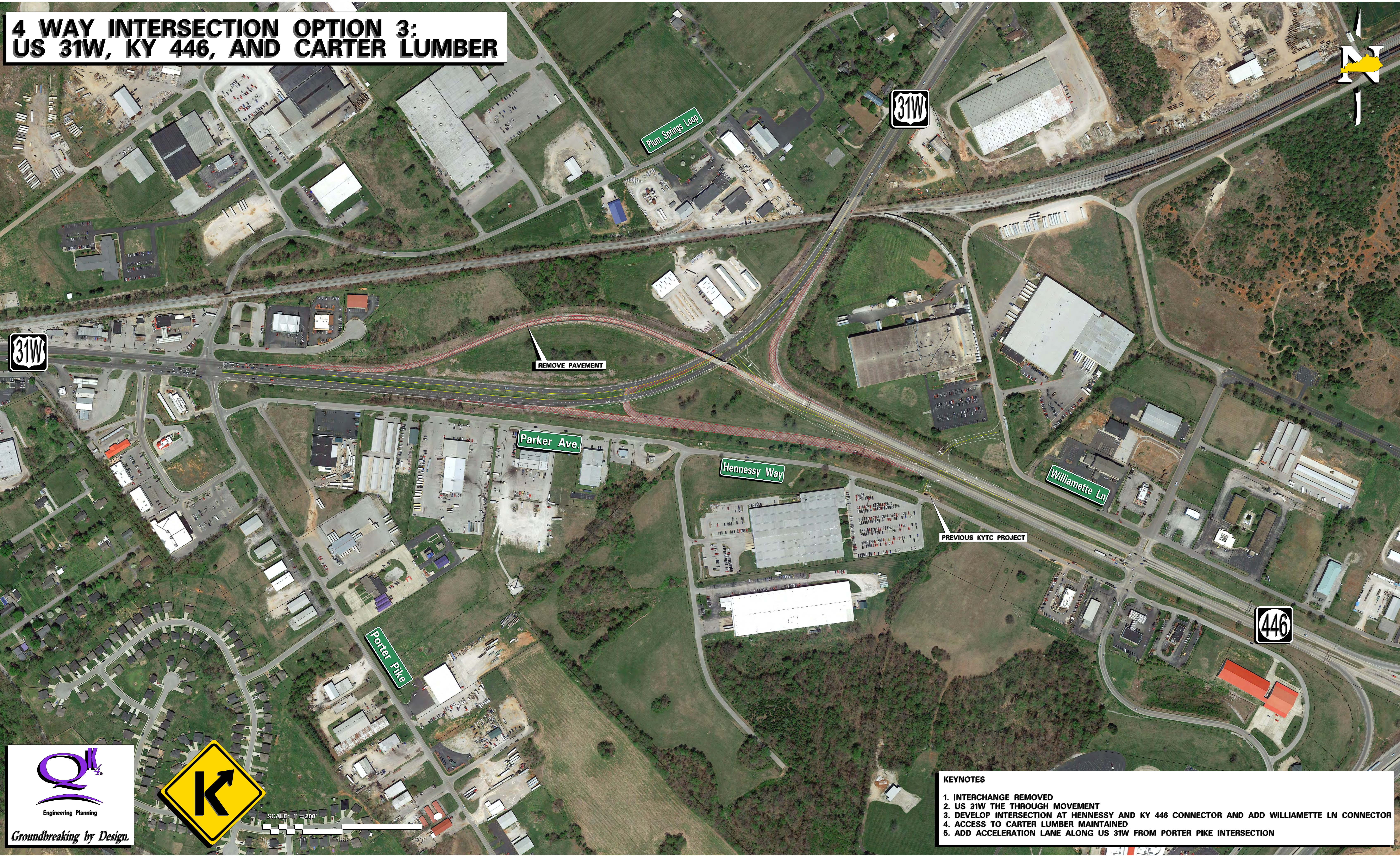
4 WAY INTERSECTION OPTION 2: US 31W, KY 446, AND HENNESSY WAY



SCALE: 1"=200'

- KEYNOTES**
1. INTERCHANGE REMOVED
 2. KY 446 - US 31W SOUTH THE THROUGH MOVEMENT
 3. 4TH LEG ONLY WITH HENNESSY WAY
 4. REMOVE ACCESS TO HENNESSY WAY FROM THE 4-WAY INTERSECTION AND ADD MINOR CONNECTOR
 5. REMOVE ACCESS TO PARKER AVENUE FROM THE 4-WAY INTERSECTION (TOO CLOSE TO INTERSECTION)
 6. RECONFIGURE CORVETTE DRIVE AND DUNTOV WAY TO LENGTHEN QUEUE
 7. NO ACCESS TO CARTER LUMBER

4 WAY INTERSECTION OPTION 3: US 31W, KY 446, AND CARTER LUMBER



- KEYNOTES**
- 1. INTERCHANGE REMOVED
 - 2. US 31W THE THROUGH MOVEMENT
 - 3. DEVELOP INTERSECTION AT HENNESSY AND KY 446 CONNECTOR AND ADD WILLIAMETTE LN CONNECTOR
 - 4. ACCESS TO CARTER LUMBER MAINTAINED
 - 5. ADD ACCELERATION LANE ALONG US 31W FROM PORTER PIKE INTERSECTION

CONTINUOUS GREEN T INTERSECTION OPTION 4



Plum Springs Loop

Parker Ave.

Porter Pike

Hennessy Way

REMOVE PAVEMENT

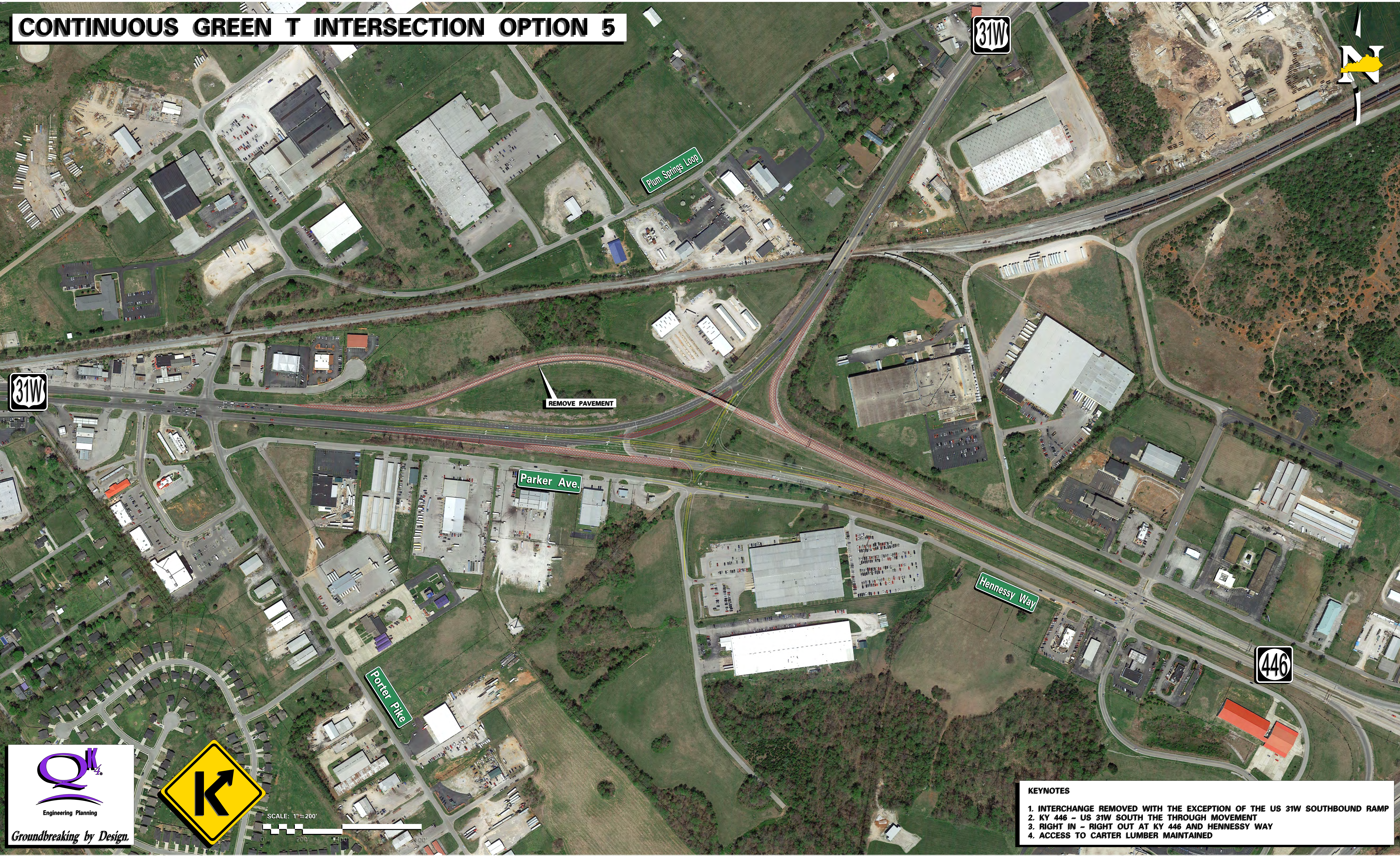


SCALE: 1"=200'



- KEYNOTES**
- 1. INTERCHANGE REMOVED
 - 2. US 31W THE THROUGH MOVEMENT WITH SOUTHBOUND CONTINUOUS
 - 3. ADD FRONTAGE ROAD TO PROVIDE BUSINESSES ACCESS TO US 31W
 - 4. ADD ACCELERATION LANE FOR PORTER PIKE RIGHT TURN ONTO US 31W NORTH
 - 5. WIDEN PLUM SPRINGS LOOP AND RAILROAD BRIDGE AT INTERSECTION WITH US 31W

CONTINUOUS GREEN T INTERSECTION OPTION 5





Engineering Planning

Groundbreaking by Design.



- KEYNOTES**
- 1. INTERCHANGE REMOVED WITH THE EXCEPTION OF THE US 31W SOUTHBOUND RAMP
 - 2. KY 446 - US 31W SOUTH THE THROUGH MOVEMENT
 - 3. RIGHT IN - RIGHT OUT AT KY 446 AND HENNESSY WAY
 - 4. ACCESS TO CARTER LUMBER MAINTAINED

INTERCHANGE OPTION 6



Plum Springs Loop

REMOVE PAVEMENT

Parker Ave.

Hennessy Way

Porter Pike



SCALE: 1"=200'

- KEYNOTES**
- 1. US 31W - 1 LANE OF UNINTERRUPTED FLOW (BOTH DIRECTIONS) THROUGH THE INTERSECTION
 - 2. LANE WILL DROP AND ADD AT EACH OF THE FOUR INTERSECTING RAMPS TO MINIMIZE WEAVING
 - 3. CARTER LUMBER ACCESS MAINTAINED

INTERCHANGE OPTION 7



Plum Springs Loop

Parker Ave.

Hennessy Way

Porter Pike

REMOVE PAVEMENT



SCALE: 1"=200'



- KEYNOTES**
- 1. NEW RAMP CONFIGURATION PROVIDES AN 885' LONG WEAVING SECTION
 - 2. NO ACCESS FOR CARTER LUMBER NEEDED
 - 3. RIGHT IN - RIGHT OUT AT HENNESSY WAY AND KY 446 WITH LENGTHEN QUEUE

KY 446 FLYOVER OPTION 8



Porter Pike



Parker Ave

DESIGN
SPEED
35

Pain Springs Loop

CUL-DE-SAC

DESIGN
SPEED
45



Hennessy Way



TERMINATE AT NEW RACEWAY



SCALE: 1"=200'



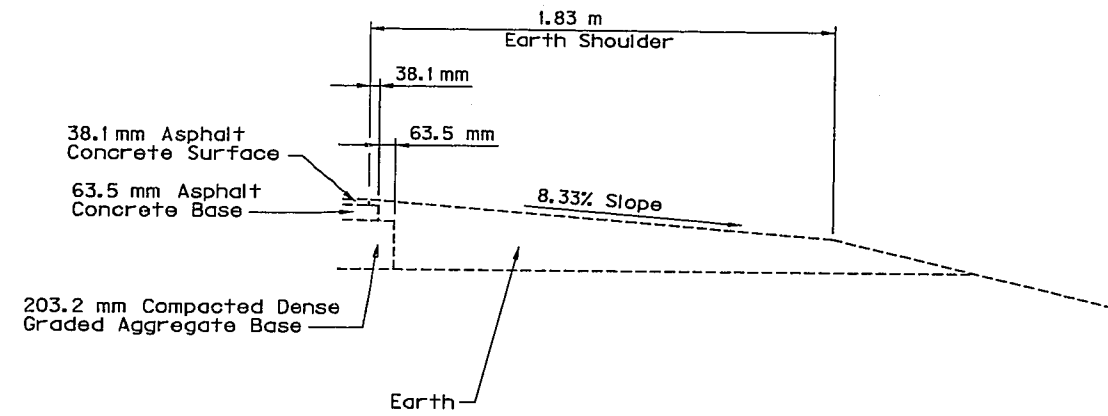
- KEYNOTES
- 1. INTERCHANGE REMOVED
 - 2. US 31W THE THROUGH MOVEMENT
 - 3. 4TH LEG WITH HENNESSY WAY AND KY 446
 - 4. PROVIDE LOOP ROAD ACCESS TO HENNESSY WAY
 - 5. PROVIDE A LESS CONGESTED ACCESS TO NEW CORVETTE PARK

REVISED PLANS DATE			
COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
WARREN	2000	2B	310

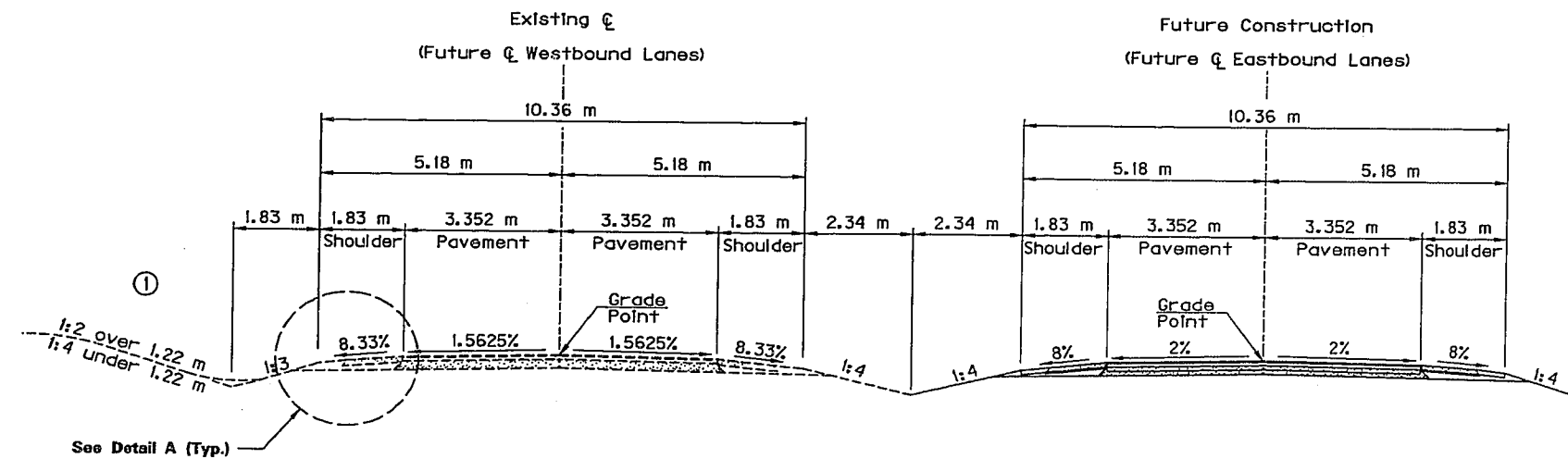
ITEM Nos. 3-5.00 & 3-5.01

TYPICAL SECTIONS **Porter Road (KY 1402)**

RURAL MINOR COLLECTOR CLASS ROADWAY
80 km/hr DESIGN SPEED
ROLLING TERRAIN
Control of Access by Permit

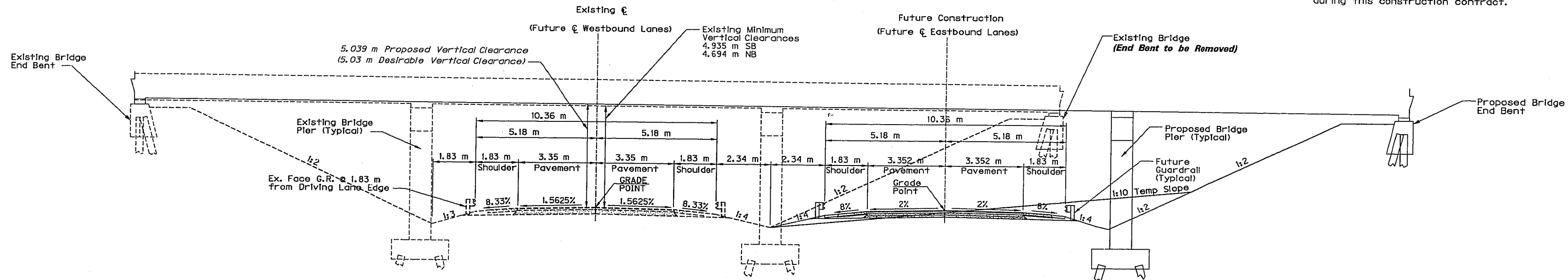


DETAIL A
Scale: 1:20



NORMAL SECTION
Scale: 1:100

- ① See cross-sections for slopes outside the limits of the shoulder.
- ② Existing pavement composition copied from I-65 - I(14)22 Surfacing Plans, dated 1965.
- ③ Porter Rd. pavement is to remain as it is during this construction contract.



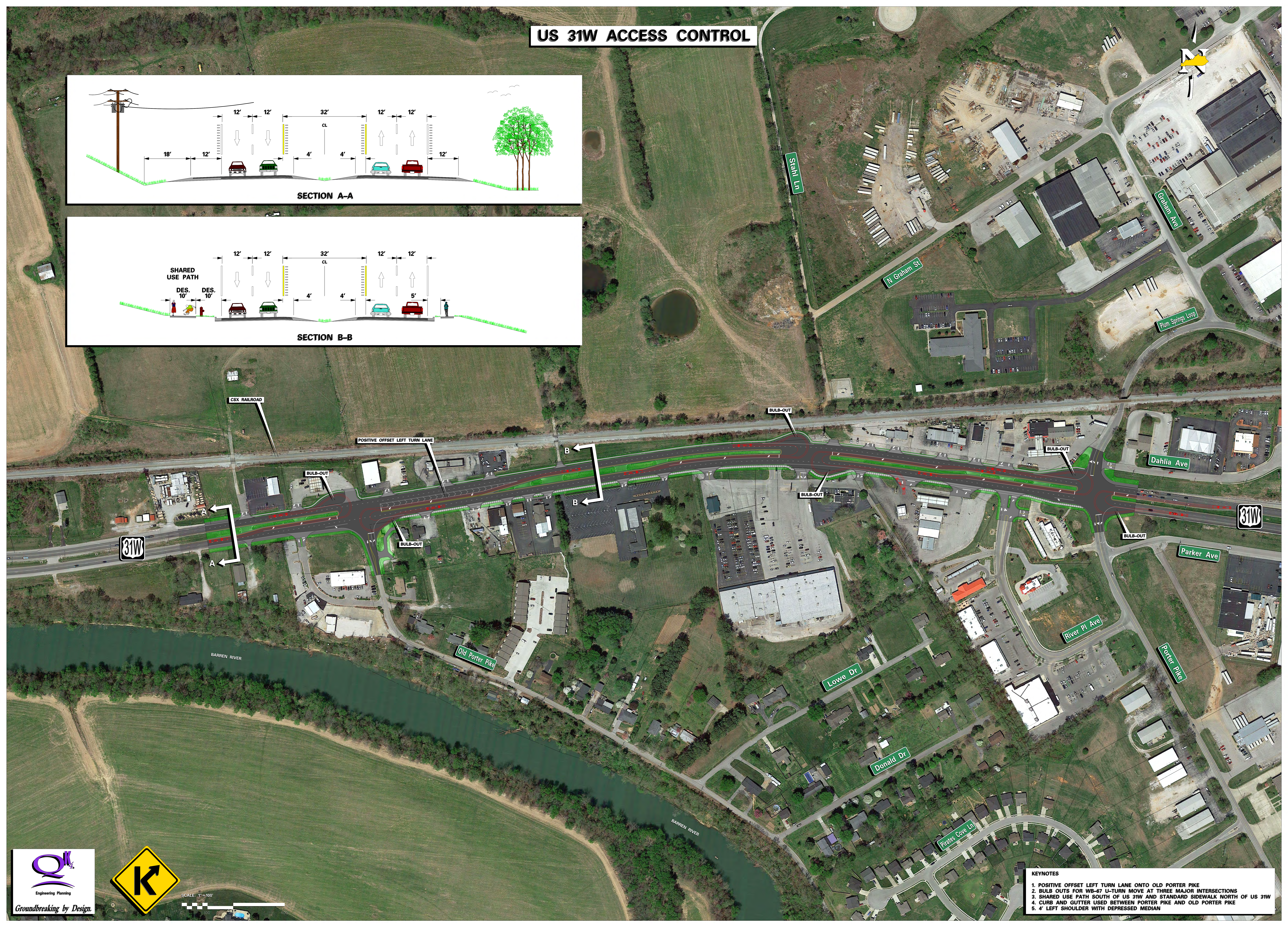
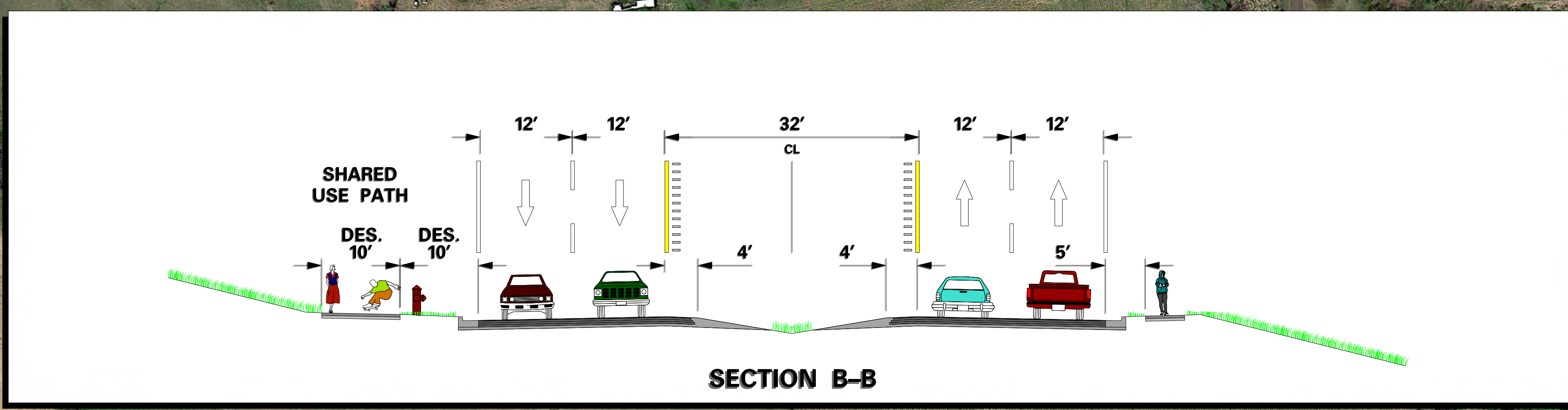
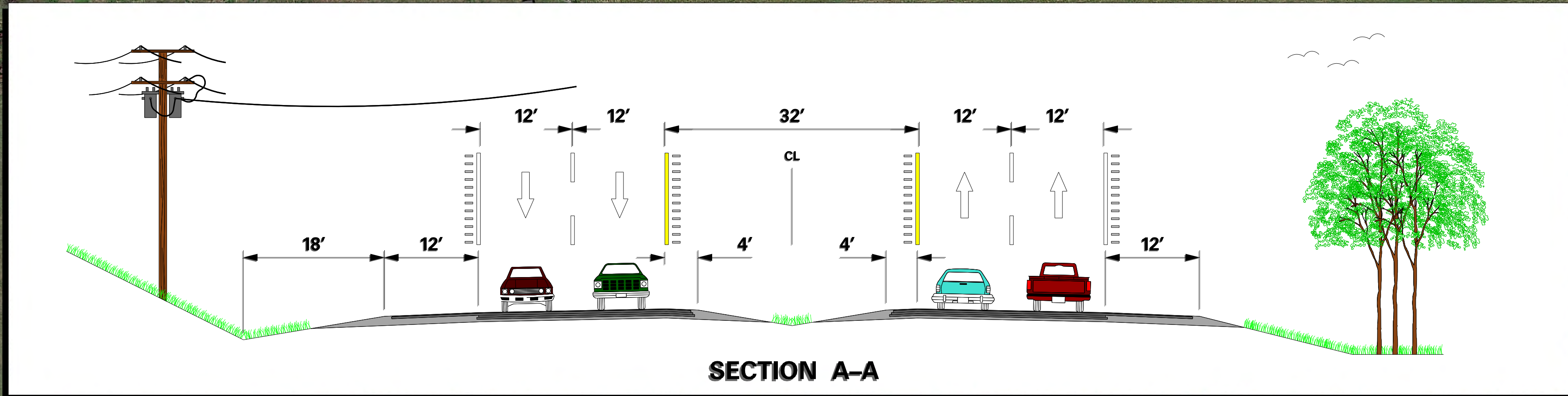
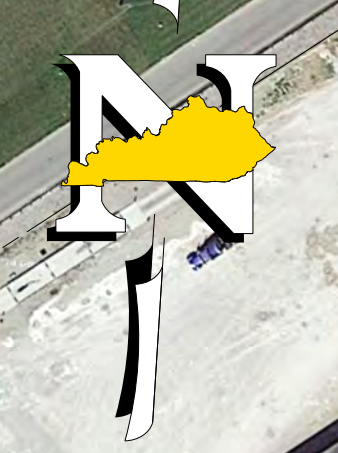
SECTION THROUGH I-65 BRIDGE
Scale: 1:100

SKEES
ENGINEERING, INC.
LOUISVILLE, KENTUCKY

PREPARED BY _____ DATE _____
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____

Cell Library: mroadway.cel
Cell Names: sp
JUNE 22, 2000
qt: J069701\plans\sh02b.dgn

US 31W ACCESS CONTROL



- KEYNOTES
- 1. POSITIVE OFFSET LEFT TURN LANE ONTO OLD PORTER PIKE
 - 2. BULB OUTS FOR WB-67 U-TURN MOVE AT THREE MAJOR INTERSECTIONS
 - 3. SHARED USE PATH SOUTH OF US 31W AND STANDARD SIDEWALK NORTH OF US 31W
 - 4. CURB AND GUTTER USED BETWEEN PORTER PIKE AND OLD PORTER PIKE
 - 5. 4' LEFT SHOULDER WITH DEPRESSED MEDIAN

**3 WAY ROUNDABOUT OPTION 1:
US 31W & KY 446**



Plum Springs Loop

Parker Ave

Hennessy Way

Porter Pike

CUL-DE-SAC

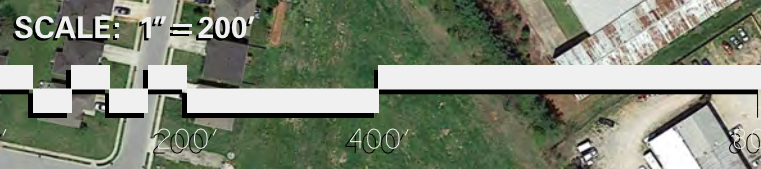
REMOVE PAVEMENT

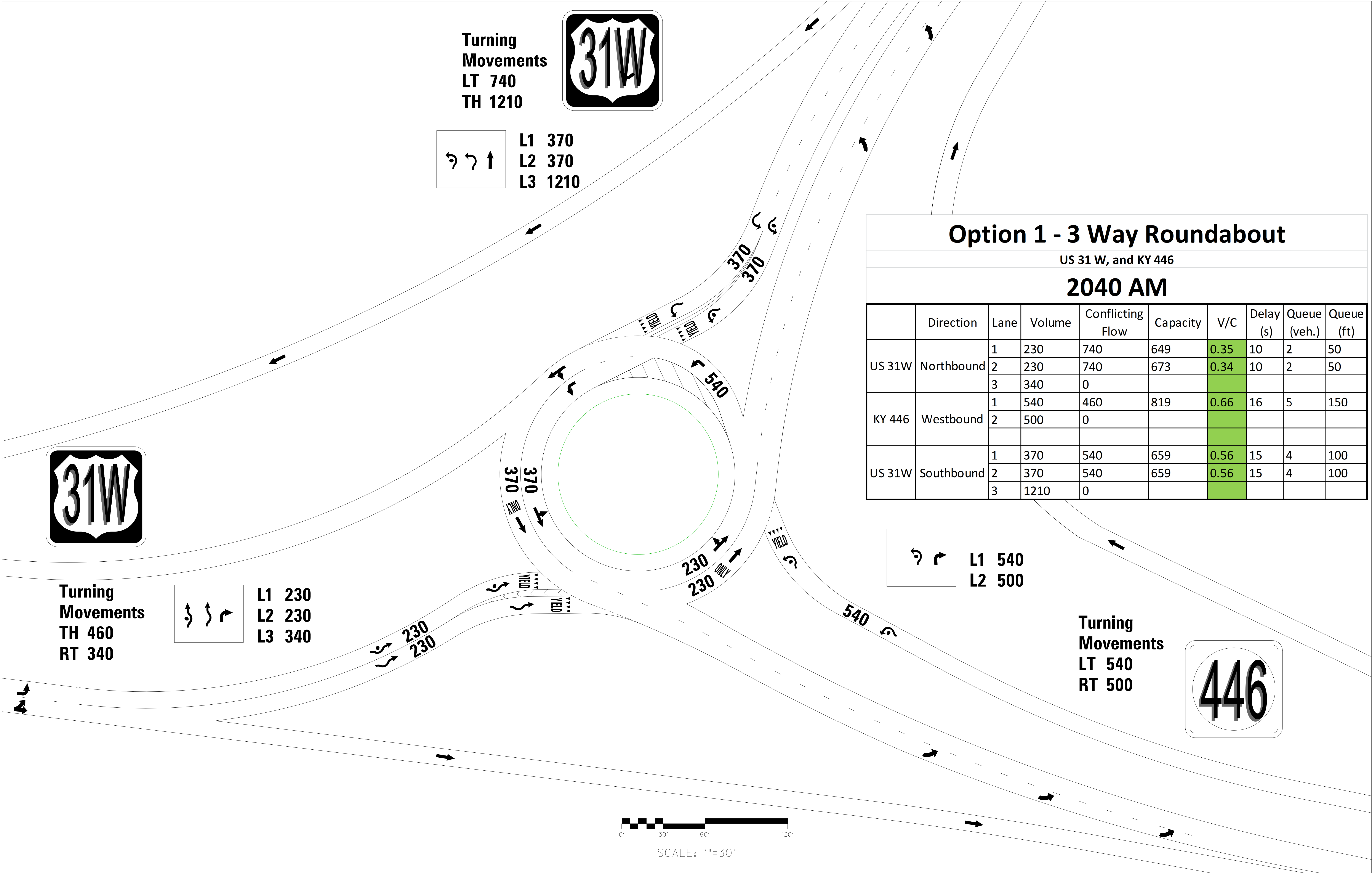


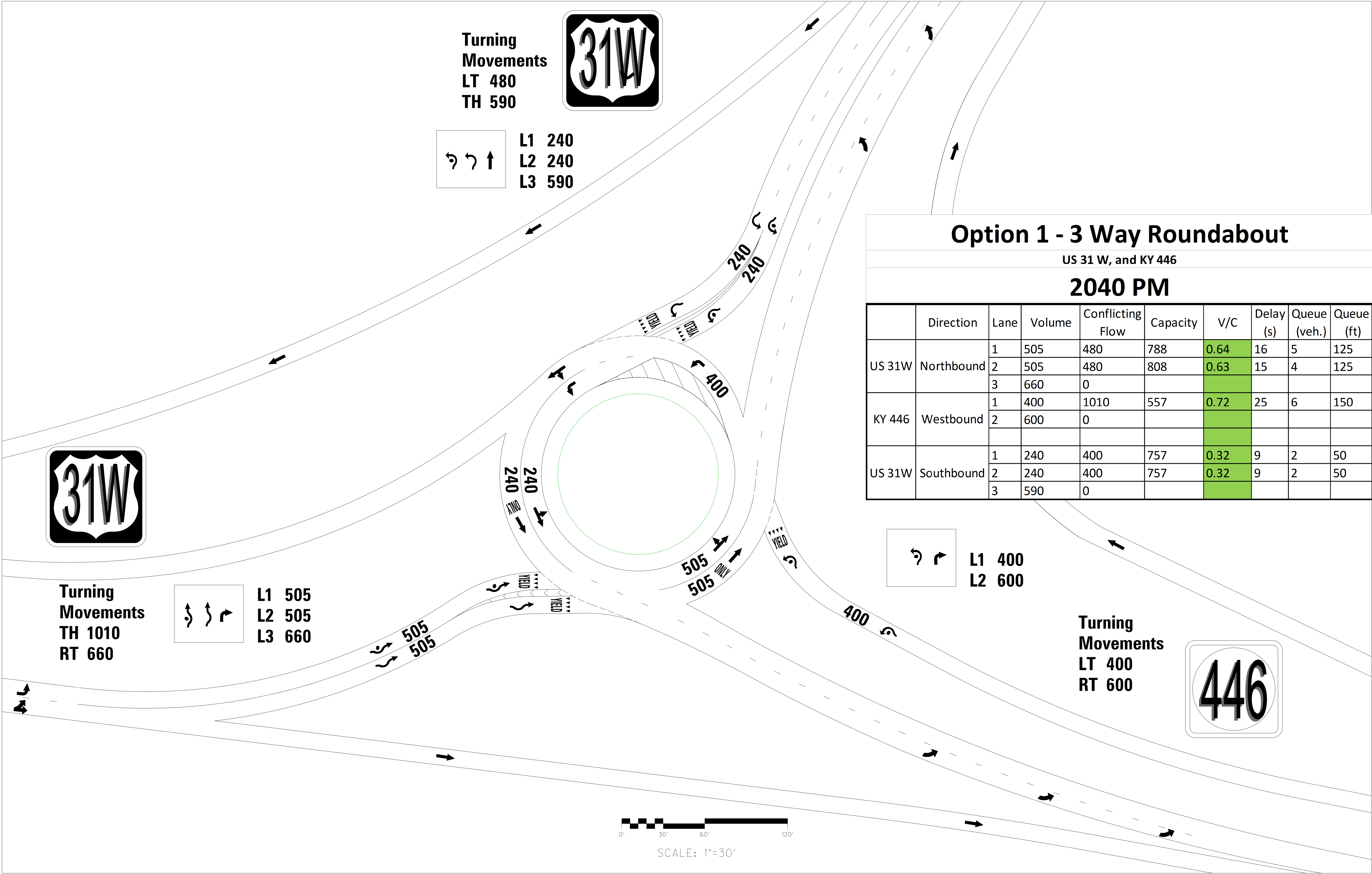


Engineering Planning

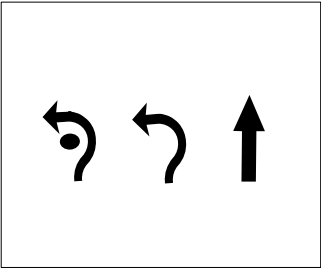
Groundbreaking by Design.







Turning
Movements
LT 480
TH 590



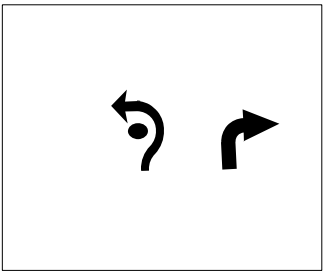
L1 240
L2 240
L3 590

Option 1 - 3 Way Roundabout

US 31 W, and KY 446

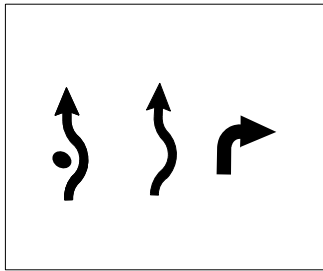
2040 PM

	Direction	Lane	Volume	Conflicting Flow	Capacity	V/C	Delay (s)	Queue (veh.)	Queue (ft)
US 31W	Northbound	1	505	480	788	0.64	16	5	125
		2	505	480	808	0.63	15	4	125
		3	660	0					
KY 446	Westbound	1	400	1010	557	0.72	25	6	150
		2	600	0					
US 31W	Southbound	1	240	400	757	0.32	9	2	50
		2	240	400	757	0.32	9	2	50
		3	590	0					



L1 400
L2 600

Turning
Movements
TH 1010
RT 660



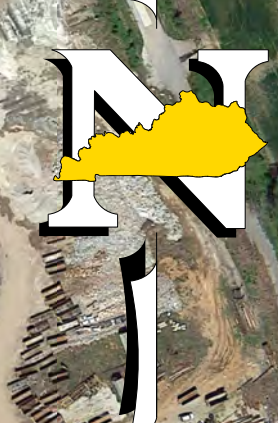
L1 505
L2 505
L3 660

Turning
Movements
LT 400
RT 600



SCALE: 1"=30'

3 WAY ROUNDABOUT OPTION 2: US 31W AND KY 446



Plum Springs Loop

Parker Ave

Hennessy Way

Porter Pike

CUL-DE-SAC

CUL-DE-SAC

REMOVE PAVEMENT



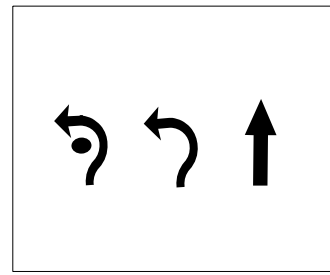
SCALE: 1" = 200'



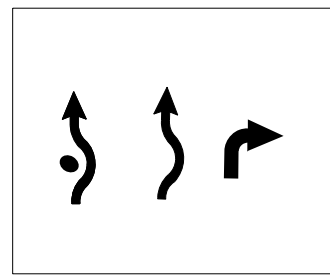
Turning
Movements
LT 740
TH 1210



L1 370
L2 370
L3 1210



Turning
Movements
TH 460
RT 340



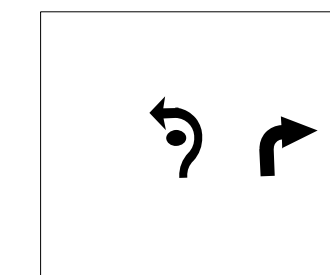
L1 230
L2 230
L3 340

Option 2 - 3 Way Roundabout

US 31 W, and KY 446

2040 AM

	Direction	Lane	Volume	Conflicting Flow	Capacity	v/C	Delay (s)	Queue (veh.)	Queue (ft)
US 31W	Northbound	1	230	740	649	0.35	10	2	50
		2	230	740	673	0.34	10	2	50
		3	340	740	673	0.51	13	3	75
KY 446	Westbound	1	540	460	819	0.66	16	5	150
		2	500	0					
US 31W	Southbound	1	370	540	659	0.56	15	4	100
		2	370	540	659	0.56	15	4	100
		3	1210	0					

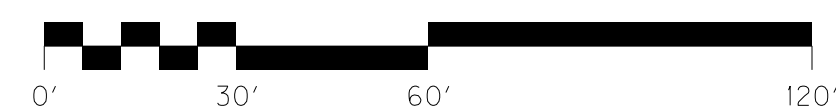


L1 540
L2 500

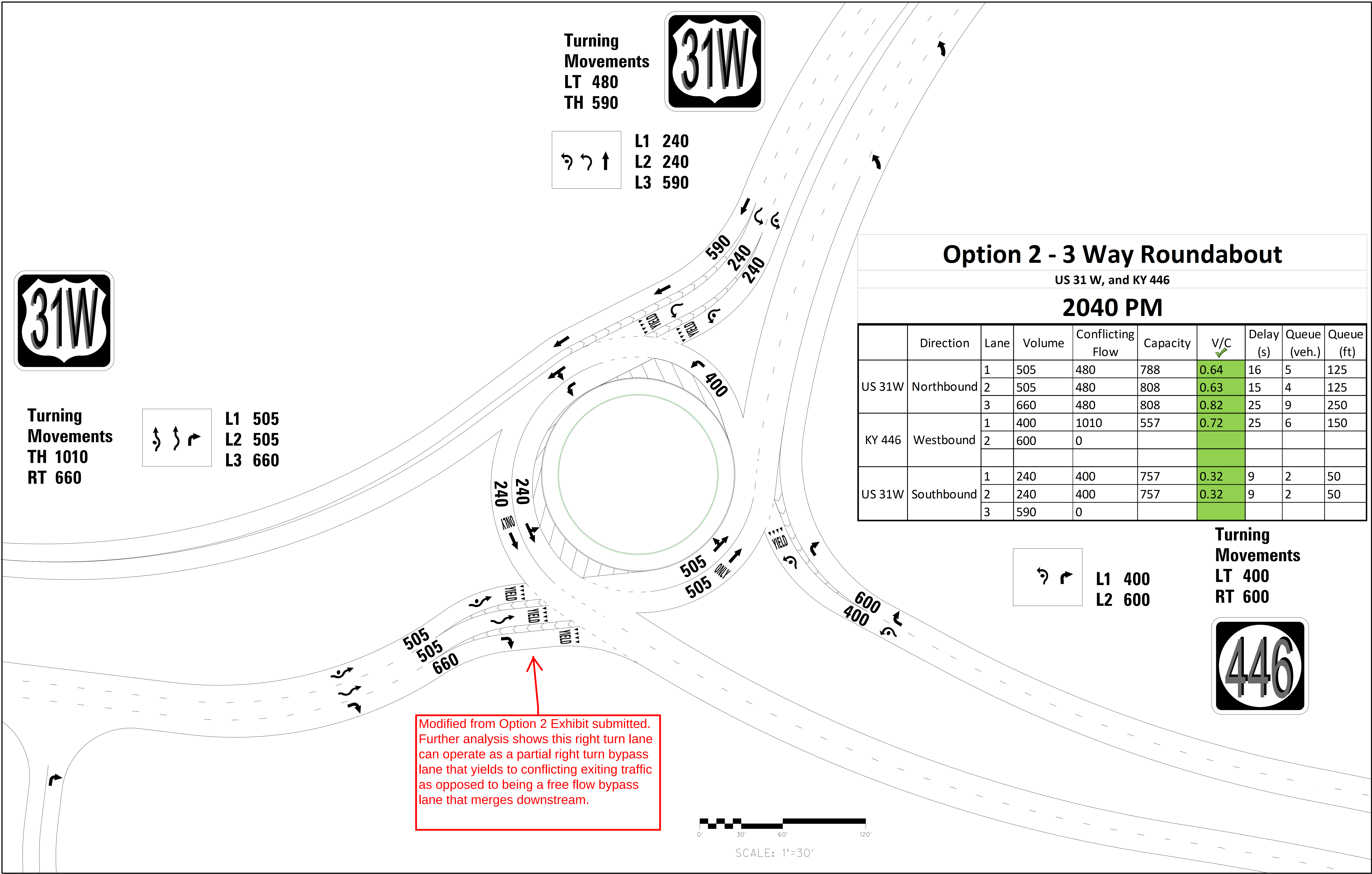
Turning
Movements
LT 540
RT 500



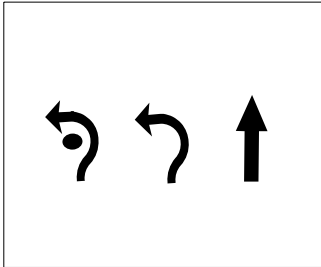
Modified from Option 2 Exhibit submitted.
Further analysis shows this right turn lane
can operate as a partial right turn bypass
lane that yields to conflicting exiting traffic as
opposed to being a free flow bypass lane
that merges downstream.



SCALE: 1"=30'



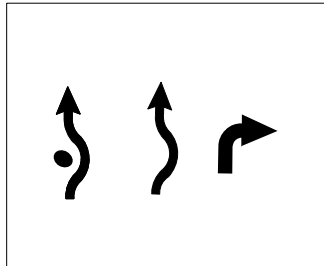
Turning
Movements
LT 480
TH 590



L1 240
L2 240
L3 590



Turning
Movements
TH 1010
RT 660



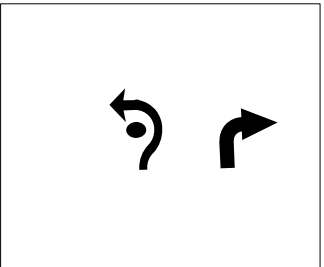
L1 505
L2 505
L3 660

Option 2 - 3 Way Roundabout

US 31 W, and KY 446

2040 PM

	Direction	Lane	Volume	Conflicting Flow	Capacity	V/C	Delay (s)	Queue (veh.)	Queue (ft)
US 31W	Northbound	1	505	480	788	0.64	16	5	125
		2	505	480	808	0.63	15	4	125
		3	660	480	808	0.82	25	9	250
KY 446	Westbound	1	400	1010	557	0.72	25	6	150
		2	600	0					
US 31W	Southbound	1	240	400	757	0.32	9	2	50
		2	240	400	757	0.32	9	2	50
		3	590	0					

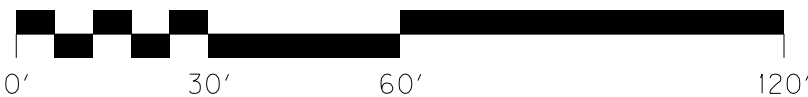


L1 400
L2 600

Turning
Movements
LT 400
RT 600



Modified from Option 2 Exhibit submitted. Further analysis shows this right turn lane can operate as a partial right turn bypass lane that yields to conflicting exiting traffic as opposed to being a free flow bypass lane that merges downstream.



SCALE: 1"=30'

**4 WAY ROUNDABOUT OPTION 3:
US 31W, KY 446, AND HENNESSY WAY**



Plum Springs Loop

Parker Ave

Hennessy Way

Porter Pike

CUL-DE-SAC

REMOVE PAVEMENT

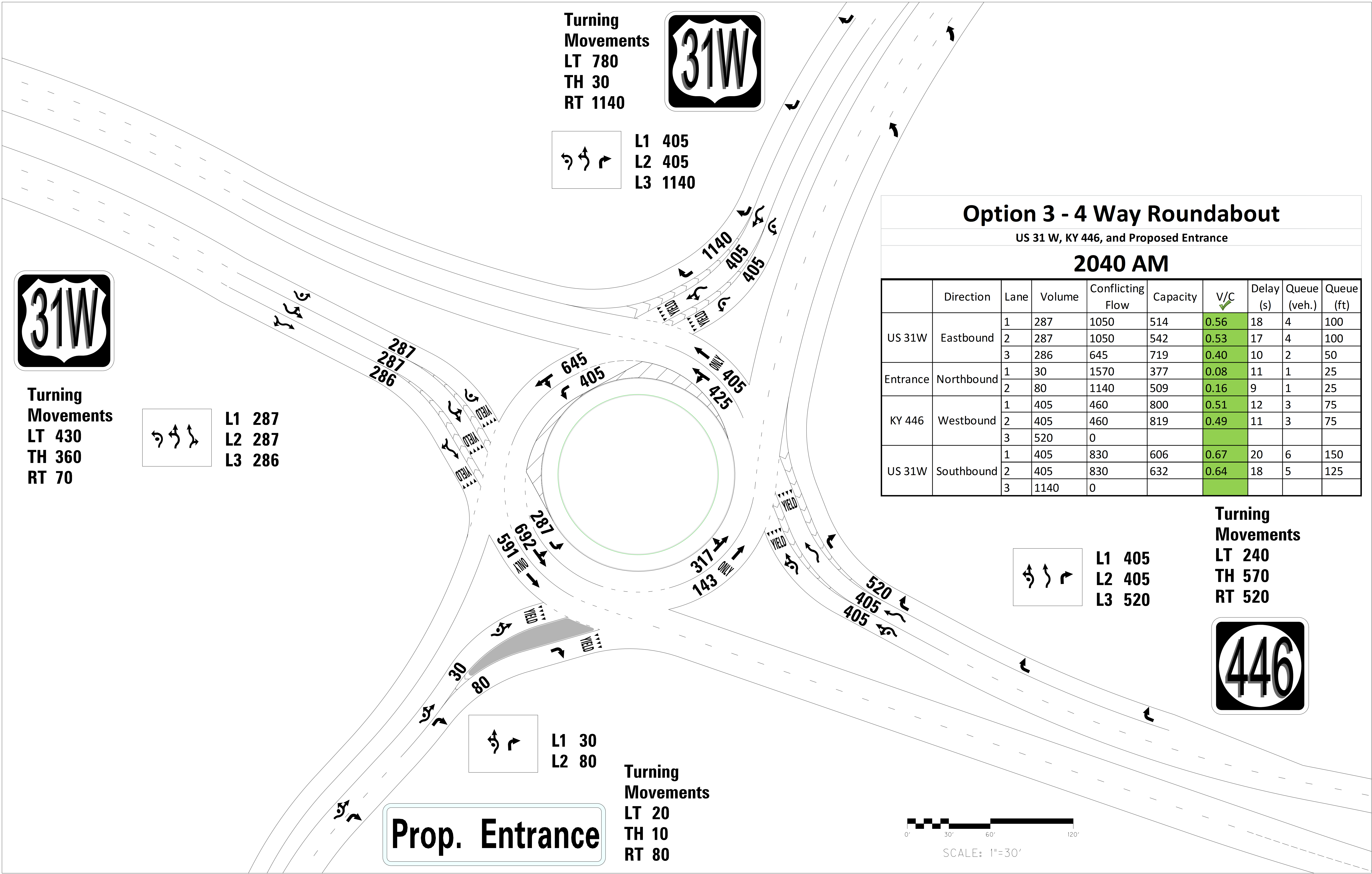
CUL-DE-SAC

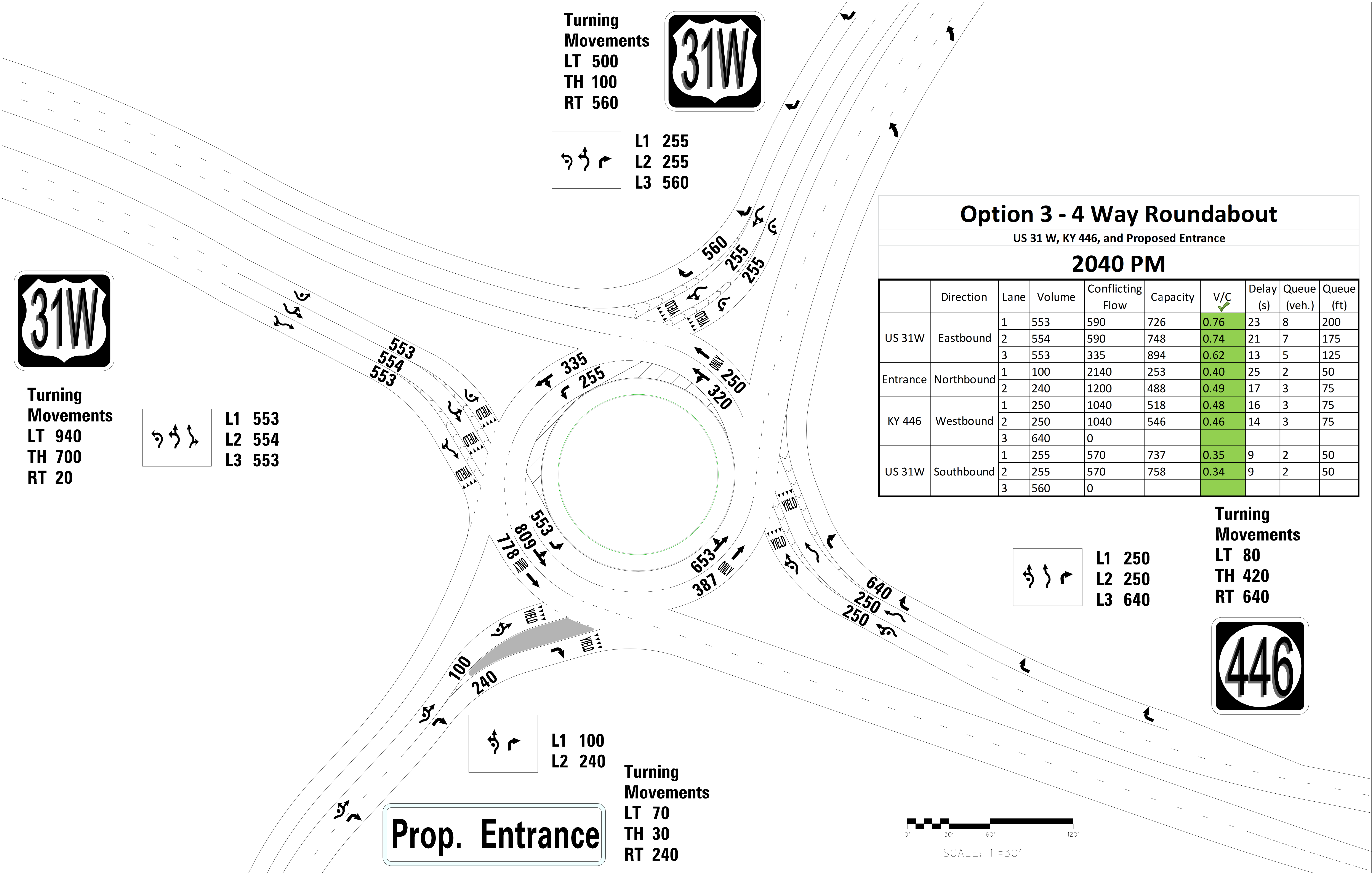
CUL-DE-SAC



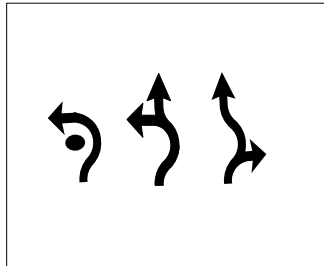
SCALE: 1" = 200'





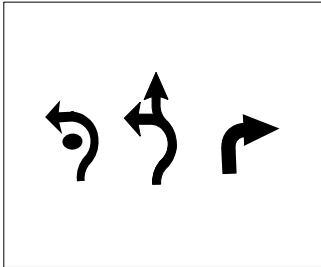


Turning Movements
LT 940
TH 700
RT 20



L1 553
L2 554
L3 553

Turning Movements
LT 500
TH 100
RT 560



L1 255
L2 255
L3 560

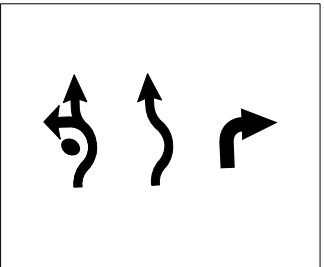
Option 3 - 4 Way Roundabout

US 31 W, KY 446, and Proposed Entrance

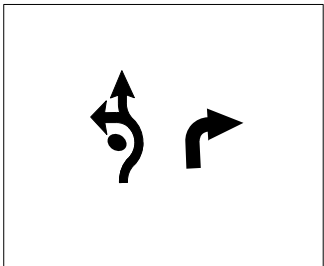
2040 PM

	Direction	Lane	Volume	Conflicting Flow	Capacity	V/C	Delay (s)	Queue (veh.)	Queue (ft)
US 31W	Eastbound	1	553	590	726	0.76	23	8	200
		2	554	590	748	0.74	21	7	175
		3	553	335	894	0.62	13	5	125
Entrance	Northbound	1	100	2140	253	0.40	25	2	50
		2	240	1200	488	0.49	17	3	75
KY 446	Westbound	1	250	1040	518	0.48	16	3	75
		2	250	1040	546	0.46	14	3	75
		3	640	0					
US 31W	Southbound	1	255	570	737	0.35	9	2	50
		2	255	570	758	0.34	9	2	50
		3	560	0					

Turning Movements
LT 80
TH 420
RT 640



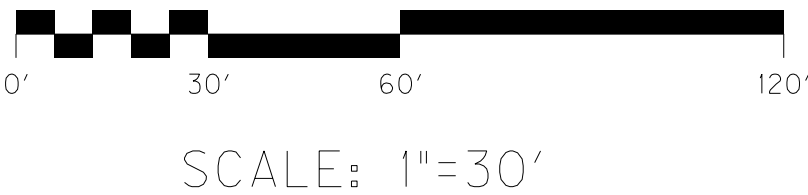
L1 250
L2 250
L3 640



L1 100
L2 240

Turning Movements
LT 70
TH 30
RT 240

Prop. Entrance



INTERSECTION CAPACITY SUMMARY

Alternative		Peak Hour	Lane Group	ALT 1 (vph)	v/c ratio	Total Delay (sec/vehicle)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Signal Delay (sec/veh)	Intersection Capacity Utilization (%)	LOS		Peak Hour	ALT 1 (vph)	v/c ratio	Total Delay (sec/veh)	LOS	Approach Delay (sec/veh)	Approach LOS	Intersection Signal Delay (sec/veh)	Intersection Capacity Utilization (%)	LOS											
4 - WAY INTERSECTION WITH US 31W BYPASS LANE ONLY 1 LANE EAST TOWARD BOWLING GREEN	ALT 1	AM	EBL	430	0.90	63.3	E	44.2	D	44.8	81.3	D		PM	940	1.03	87.9	F	62.5	E	66	97.4	E											
			EBT	360	0.36	29.7	C								700	0.48	30.4	C																
			EBR	70	0.13	1.5	A								20	0.03	0.1	A																
			WBL	240	0.75	51.5	D	36.6	D						80	0.62	83.9	F	59.6	E														
			WBT	570	0.94	55.9	E								420	1.02	102.4	F																
			WBR	520	0.65	8.7	A								640	0.89	28.4	C																
			NBL	20	0.18	47.7	D	18.5	B						70	0.53	77.7	E	45.6	D														
			NBT	10	0.10	45.3	D								30	0.22	65.6	E																
			NBR	80	0.38	7.7	A								240	0.81	33.8	C																
			SBL	780	0.93	63	E	62.2	E						500	1.04	101.4	F	84.8	F														
			SBT	30	0.92	61.5	E								10	1.04	72.8	E																
			SBR												560																			
4 - WAY INTERSECTION	ALT 2	AM	EBL	430	0.80	43.5	D	34.7	C	24.3	69.0	C		PM	940	0.96	49.6	D	36.9	D	32.6	C	C											
			EBT	360	0.51	30.2	C								700	0.51	20.9	C																
			EBR	70	0.18	3.8	A								20	0.03	0.1	A																
			WBL	240	0.79	48.9	D	26.8	C						80	0.48	45.4	D	30.3	C														
			WBT	570	0.74	34.5	C								420	0.68	37.9	D																
			WBR	520	0.70	8.1	A								640	0.90	23.5	C																
			NBL	20	0.15	35.5	D	16.7	B						70	0.37	38.9	D	21.7	C														
			NBT	10	0.07	33.9	C								30	0.15	34.1	C																
			NBR	80	0.37	9.8	A								240	0.66	15.1	B																
			SBL	780	0.80	37.9	D	18.5	B						500	0.86	60.9	E	31.8	C														
			SBT	30	0.80	37.3	D								10	0.86	60.4	E																
			SBR	1140	0.73	5	A								560	0.59	5.6	A																
			4-WAY KY 446 FLYOVER OPTION	ALT 8	AM	EBL	360	0.93	70.7						E	37.8	D	43.1	80.1	D					PM	240	0.73	51.4	D	30.7	C	28.1	67.5	C
						EBT	430	0.29	16.4						B											940	0.72	26.1	C					
EBR	70	0.09				0.2	A	20	0.03	0.1	A																							
WBL	30	0.34				50.5	D	43.8	D	10	0.13	45	D	20.3	C																			
WBT	1140	0.98				51.9	D			560	0.65	31.6	C																					
WBR	240	0.36				4.2	A			500	0.67	7.2	A																					
NBL	20	0.28				51	D	32.5	C	70	0.55	55.2	E	34.1	C																			
NBT	80	0.14				31.9	C			240	0.36	32.2	C																					
NBR	10	0.02				0.1	A			30	0.07	0.3	A																					
SBL	520	0.99				73.7	E	46.8	D	640	0.85	43	D	30.7	C																			
SBT	240	0.21				21.9	C			80	0.06	19	B																					
SBR	570	0.87				32.6	C			420	0.60	14.4	B																					
3-WAY INTERSECTION WITH US 31W THROUGH MOVEMENT ADDED LANE FROM PORTER PIKE TO KY 446 AND ACCESS TO CARTER LUMBER	ALT 3	AM	SEL	5	0.03			15.2	B	22.4	68.5	C		PM	5				16.1	B	26.9	78.4	C											
			SET	5		15.2	B								5	0.03	16.1	B																
			SER	5											5																			
			NWL	540	0.68	32.7	C	20.3	C						400	0.53	29.1	C	31.6	C														
			NWT	5	0.73	35.3	D								5	0.54	29.7	C																
			NWR	500	0.62	5.4	A								600	0.91	33.2	C																
			NEL	5	0.06	42.4	D	22.2	C						5	0.06	42.8	D	23.3	C														
			NET	460	0.59	33	C								1010	0.85	34.5	C																
			NER	340	0.56	7.3	A								660	0.7	6	A																
			SWL	740	0.82	35.3	D	23.6	C						480	0.85	49.2	D	28.2	C														
			SWT	1210	0.67	16.5	B								590	0.32	11.3	B																
			SWR	5	0.01	0	A								5	0.01	0	A																
3-WAY INTERSECTION US 31W THROUGH MOVEMENT ADDED LANE FROM PORTER PIKE TO KY 446 AND MODIFIED ACCESS TO CARTER LUMBER	ALT 4	AM	EBL					22.2	C	28.8	73.7	C		PM					23.4	C	28.6	73.8	C											
			EBT	460	0.69	32.9	C								1010	0.90	34.6	C																
			EBR	340	0.60	7.7	A								660	0.71	6.1	A																
			WBL	740	0.92	45.2	D								480	0.88	48.4	D																
			WBT				0																											
			WBR																															
			NBL	540	0.88	38.7	D	22.3	C						400	0.77	34	C	27.7	C														
			NBT																															
			NBR	500	0.58	4.5	A								600	0.86	23.5	C																
			SBL																															
			SBT																															
			SBR																															
3-WAY INTERSECTION KY 446 THROUGH MOVEMENT RIGHT IN /RIGHT OUT HENNESSY WAY	ALT 5	AM	EBL	430	1.05	98.6	F	52.8	D	73.4	95.5	E		PM	940	1.08	95.7	F	48.6	D	78.2	97.7	E											
			EBT	0																														
			EBR																															
			WBL																															
			WBT	570	1.07	93.6	F								420	1.05	102.4	F																
			WBR	520	0.66	7.9	A								640	0.81	13.2	B																
			NBL																															
			NBT																															
			NBR																															
			SBL	780	1.09	88.2	F	88.2	F						700	1.10	99.5	F	99.5	F														
			SBT																															
			SBR																															

ROUNDABOUT OPTIONS CAPACITY SUMMARY
 2040 AM

2040 PM

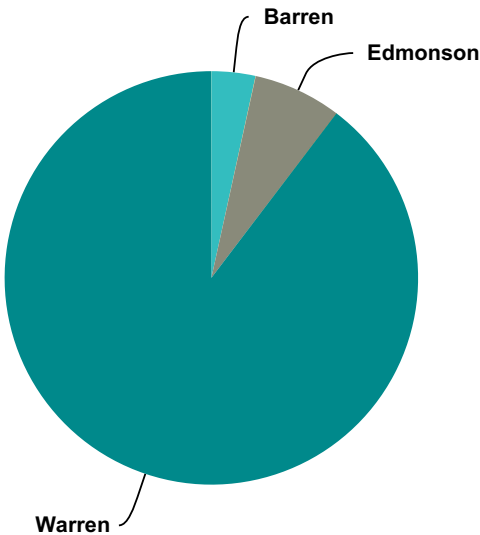
Alternative	Route	Direction	Lane	Volume	Conflicting Flow	Capacity	V/C	Delay (s)	Queue (veh.)	Queue (ft)	Delay per approach (s)	LOS per approach	Delay per Intersection (s)	LOS per Intersection	Lane	Volume	Conflicting Flow	Capacity	V/C	Delay (s)	Queue (veh.)	Queue (ft)	Delay per approach (s)	LOS per approach	Delay per Intersection (s)	LOS per Intersection	
OPTION 1 3-WAY	US 31W	Northbound	1	230	740	649	0.35	10	2	50	5.8	A	6.4	A	1	505	480	788	0.6	15.5	5	125	9.2	A	7.8	A	
			2	230	740	673	0.34	10	2	50					2	505	480	808	0.6	14.7	4	125					
			3	340	-			0							3	660	-			0.0							
	KY 446	Westbound	1	540	460	819	0.66	16	5	150	8.2	A			1	400	1,010	557	0.7	24.8	6	150	9.9	A			
			2	500	-			0							2	600	-			0.0							
	US 31W	Southbound	1	370	540	659	0.56	15	4	100	5.7	A			1	240	400	757	0.3	8.5	2	50	3.8	A			
			2	370	540	659	0.56	15	4	100					2	240	400	757	0.3	8.5	2	50					
			3	1,210	-			0							3	590	-			0.0							
OPTION 2 3-WAY*	US 31W	Northbound	1	230	740	649	0.35	10	2	50	11.4	B	7.6	A	1	505	480	788	0.6	15.5	5	125	19.1	C	12.3	B	
			2	230	740	673	0.34	10	2	50					2	505	480	808	0.6	14.7	4	125					
			3	340	740	673	0.51	13	3	75					3	660	480	808	0.8	25.1	9	250					
	KY 446	Westbound	1	540	460	819	0.66	16	5	150	8.2	A			1	400	1,010	557	0.7	24.8	6	150	9.9	A			
			2	500	-			0							2	600	-			0.0							
	US 31W	Southbound	1	370	540	659	0.56	15	4	100	5.7	A			1	240	400	757	0.3	8.5	2	50	3.8	A			
			2	370	540	659	0.56	15	4	100					2	240	400	757	0.3	8.5	2	50					
			3	1,210	-			0							3	590	-			0.0							
OPTION 3 4-WAY	US 31W	Eastbound	1	287	1,050	514	0.56	18	4	100	15.0	C	9.2	A	1	553	590	726	0.8	22.8	8	200	19.1	C	11.9	B	
			2	287	1,050	542	0.53	17	4	100					2	554	590	748	0.7	21.0	7	175					
			3	286	645	719	0.40	10	2	50					3	553	335	894	0.6	13.4	5	125					
	Entrance	Northbound	1	30	1,570	377	0.08	11	1	25	9.6	A			1	100	2,140	253	0.4	25.3	2	50	19.3	C			
			2	80	1,140	509	0.16	9	1	25					2	240	1,200	488	0.5	16.8	3	75					
	KY 446	Westbound	1	405	460	800	0.51	12	3	75	6.9	A			1	250	1,040	518	0.5	15.7	3	75	6.6	A			
			2	405	460	819	0.49	11	3	75					2	250	1,040	546	0.5	14.3	3	75					
			3	520	-			0							3	640	-			0.0							
	US 31W	Southbound	1	405	830	606	0.67	20	6	150	8.1	A			1	255	570	737	0.3	9.2	2	50	4.3	A			
			2	405	830	632	0.64	18	5	125					2	255	570	758	0.3	8.8	2	50					
			3	1,140	-			0							3	560	-			0.0							

*This Option 2 shows US 31 W NB Right turn as as a partial bypass lane that yields.

If that lane was to be a full bypass lane, this spreadsheet would be identical to Option 1

Q1 What is your county of residence?

Answered: 58 Skipped: 3

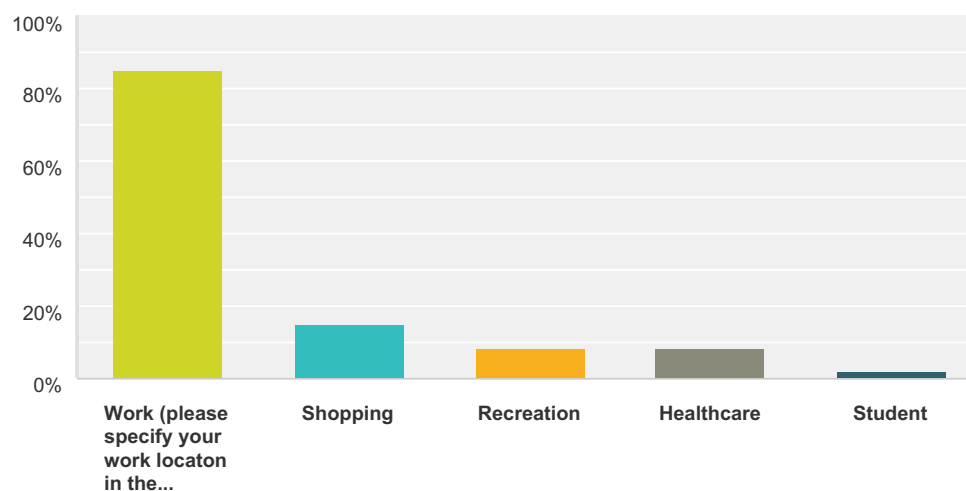


Answer Choices	Responses
Allen	0.00%0
Barren	3.45%2
Butler	0.00%0
Edmonson	6.90%4
Hart	0.00%0
Logan	0.00%0
Metcalf	0.00%0
Monroe	0.00%0
Simpson	0.00%0
Warren	89.66%52
Total	58

#	Other (please specify)	Date
1	Woodford	3/18/2015 11:41 AM

Q2 What is your primary reason for travel through the study area?

Answered: 47 Skipped: 14



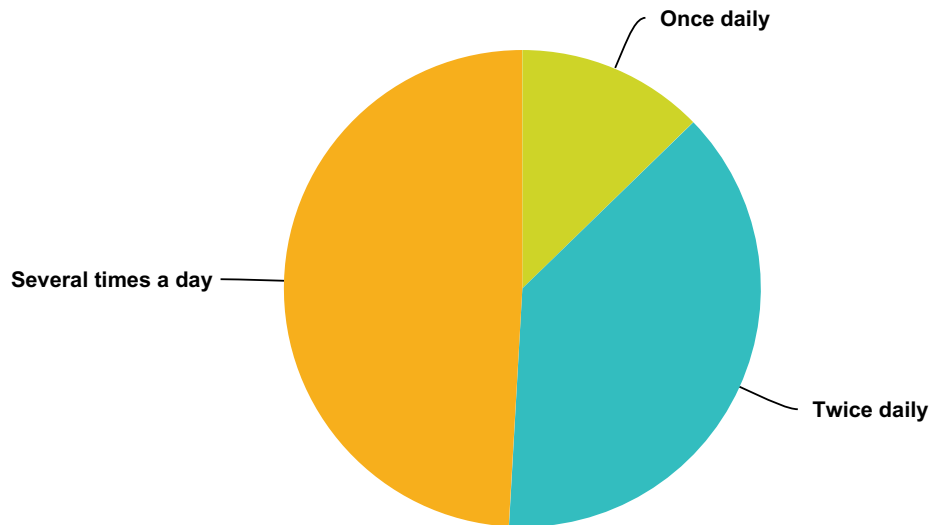
Answer Choices	Responses
Work (please specify your work location in the comment field)	85.11% 40
Shopping	14.89% 7
Recreation	8.51% 4
Healthcare	8.51% 4
Student	2.13% 1
Total Respondents: 47	

#	Other (please specify)	Date
1	Corvette Museum	4/13/2015 10:28 AM
2	X	4/13/2015 10:05 AM
3	residential	4/8/2015 10:24 AM
4	3 times wkly	4/8/2015 9:44 AM
5	Barren River Rd.	4/8/2015 9:42 AM
6	2 times a week	4/8/2015 9:33 AM
7	542 Plum Springs Loop, Southcentral Veterinary Services LLC	4/8/2015 8:16 AM
8	Resident / Farm	4/7/2015 4:36 PM
9	BG assembly plant / Corvette Museum	4/7/2015 4:32 PM
10	WKU	4/7/2015 4:26 PM
11	Live in area	4/7/2015 4:10 PM
12	Live in Plum springs	4/7/2015 4:04 PM
13	31W to Porter Pike	4/7/2015 3:06 PM

14	Fruit of the loom	4/7/2015 3:02 PM
15	Graham Ave.	4/7/2015 2:53 PM
16	State 57	4/7/2015 2:40 PM
17	WKU	4/7/2015 2:08 PM
18	31W to and from BG	4/7/2015 1:49 PM
19	Kelly Road	4/7/2015 12:47 PM
20	Kelly road	4/7/2015 11:06 AM
21	2 - 3 times a week	4/7/2015 10:51 AM
22	Corvette Assembly Plant	4/7/2015 10:19 AM
23	Live on Porter Pike	4/7/2015 10:07 AM
24	GM	4/7/2015 10:03 AM
25	BRADD office	4/7/2015 9:58 AM
26	BRADD	4/7/2015 9:27 AM
27	WKU Tower	4/7/2015 9:20 AM
28	BRADD	4/7/2015 9:12 AM
29	BRADD	4/7/2015 9:03 AM
30	BADA 759 Hennessy Way	4/7/2015 8:54 AM
31	and live here	4/6/2015 4:34 PM
32	Bluegrass Materials	4/6/2015 4:04 PM
33	I-65 Exit 22	4/6/2015 3:44 PM
34	BG Medical Ctr.	4/6/2015 3:00 PM
35	I-65 Access once per week	4/1/2015 1:09 PM
36	visiting with Fruit of the Loom- General Motors and Corvette Museum	4/1/2015 1:04 PM
37	County Government	4/1/2015 1:02 PM
38	City of Bowling Green	4/1/2015 1:00 PM
39	Other circled not specified though.	4/1/2015 12:57 PM
40	National Corvette Museum	3/31/2015 12:33 PM
41	National Corvette Museum	3/31/2015 11:21 AM
42	National Corvette Museum	3/31/2015 10:51 AM

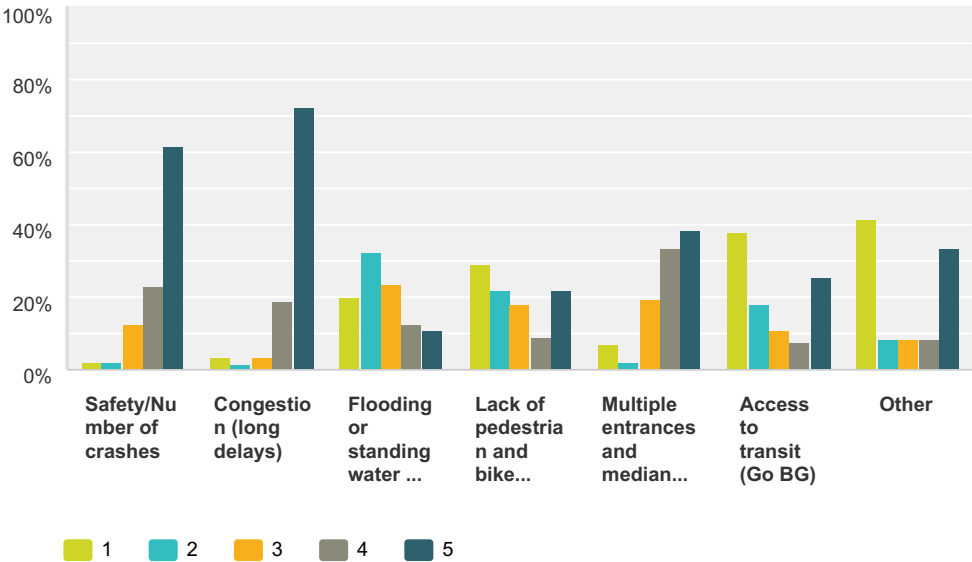
Q3 How often do you travel within the study area?

Answered: 55 Skipped: 6



Q4 Please rank, from 1 to 5, your level of concern regarding the following issues in the study area, with 1 being of least concern and 5 being of greatest concern.

Answered: 59
 Skipped: 2



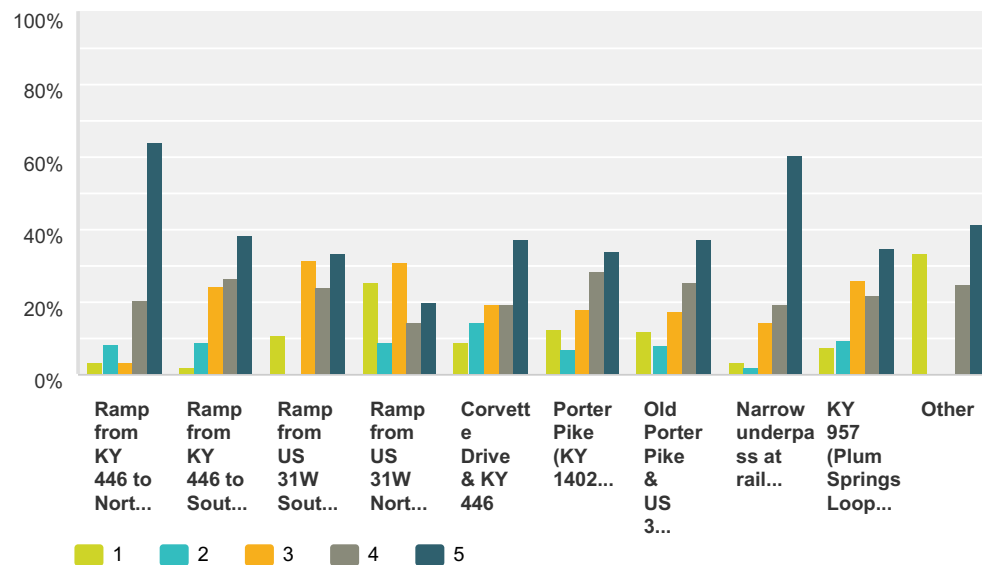
	1	2	3	4	5	Total	Weighted Average
Safety/Number of crashes	1.75% 1	1.75% 1	12.28% 7	22.81% 13	61.40% 35	57	4.40
Congestion (long delays)	3.45% 2	1.72% 1	3.45% 2	18.97% 11	72.41% 42	58	4.55
Flooding or standing water on the road	20.00% 11	32.73% 18	23.64% 13	12.73% 7	10.91% 6	55	2.62
Lack of pedestrian and bike connections (sidewalks)	29.09% 16	21.82% 12	18.18% 10	9.09% 5	21.82% 12	55	2.73
Multiple entrances and median crossovers on US 31W	7.02% 4	1.75% 1	19.30% 11	33.33% 19	38.60% 22	57	3.95
Access to transit (Go BG)	38.18% 21	18.18% 10	10.91% 6	7.27% 4	25.45% 14	55	2.64
Other	41.67% 5	8.33% 1	8.33% 1	8.33% 1	33.33% 4	12	2.83

#	Other (please specify)	Date
1	Very concerned about underpass at rail crossing!! A daily rush and rulet	4/8/2015 10:24 AM
2	We have no safe byways for pedestrian and bike paths. I see individuals riding bicycles to work each day.	4/8/2015 10:20 AM
3	Crosswalk by Shell, McDonalds and Hardee's	4/8/2015 9:42 AM
4	Congestion at access points and lack of visibility at some of those access points to 31-W is a big concern. More turning lanes at some of the intersections may help improve traffic flow. The railway over pass is major traffic concern from a congestion and safety standpoint.	4/8/2015 8:16 AM

5	Please address high crash count at 446 exit to N 31W. Please improve lighting at this interchange	4/7/2015 4:26 PM
6	Hard to get out from Dahlia Way to 31W	4/7/2015 3:59 PM
7	Only four bridges for traveling north and south in Warren co. I-65 Louisville Rd., Old Louisville Rd. and Richardsville Rd. Thus I-65 and 31W Main throughfares for North bound and south bound traffic in Warren County.	4/7/2015 2:08 PM
8	Semi's park in Corvette Drive north across from Hardee's impeding traffic. Semi's u turn in gate area of Corvette Plant hitting gates, protective posts, etc.	4/7/2015 10:19 AM
9	Frontage Roads are a problem on Hennessy road that needs to be addressed with backage roads asap before more development occurs.	4/7/2015 9:27 AM
10	This area has alot of congestion, too many cars on the road and roads can't handle.	4/7/2015 9:03 AM
11	Sight distances	4/1/2015 12:57 PM
12	Fruit of the Loom people have to wait long periods of time to get to turn left or right, people getting into and out of the Shell Station and or other business with no lanes marked just seem to not know what to do. People cutting through the liquor store lot as it has no posted drive and is wide open.	3/31/2015 12:33 PM

Q5 Please rank your level of difficulty making these maneuvers. 1 would be your least difficult and 5 would be the most difficult.

Answered: 60 Skipped: 1

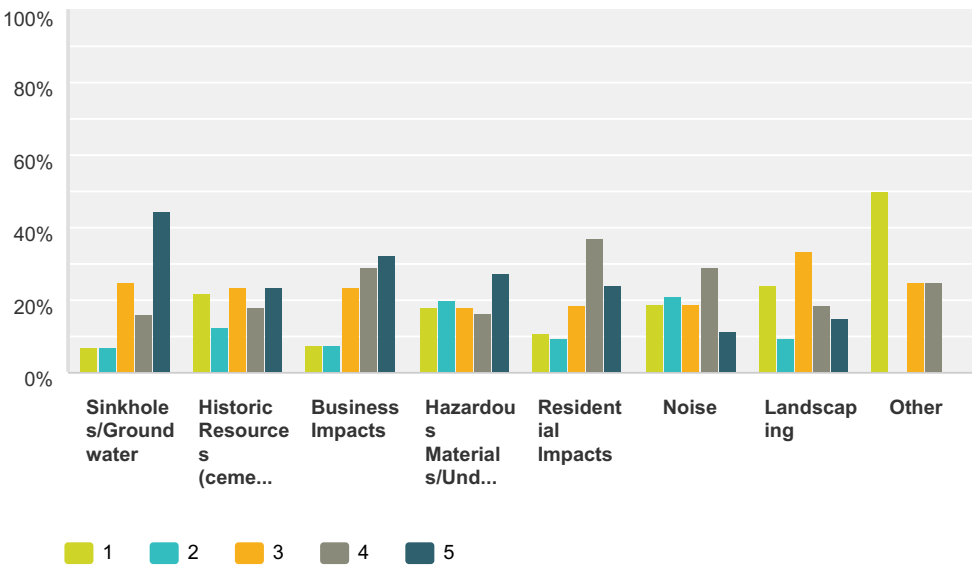


#	Other (please specify)	Date
1	Other Corvette Drive and Porter Pike	4/13/2015 10:28 AM
2	*KY 446/US 31W Interchange: I. Ramp from KY 446 to Northbound US 31W (toward Warren East High School) *Old Porter Pike & US 31W (flashing beacon) Moorman Lane Exit left onto 31W North - Most difficult	4/13/2015 10:13 AM
3	Not to remove, only reduce the number of speed bumps on north Graham and Easton circle.	4/8/2015 10:24 AM
4	Extend the problem area to turn off - east 68 - 80 to Smith's Grove and Glasgow. 526 is the only connecting highway that does not have a right turn lane entrance onto 31W south. Traffic is backed up on 526 most mornings past Fairview Methodist Church (Fairview Boiling Springs Road) - Road has traffic from Ephram White Park, Warren east, soccer, football, basketball, softball, baseball event, and track plus all traffic delivering students to and from east HS. and Middle school and employees from north side of B.G. Going to work at 31W north area.	4/8/2015 10:20 AM
5	The frontage road and the parking lot to the Minit Mart at the south intersection of 31W and Plum Springs Loop. The north intersection of Plum Springs Loop and 31W also poses some problems due to the alignment of Plum Springs Loop and intersection of side streets so close to the 31W intersection.	4/8/2015 8:16 AM
6	b. Corvette Drive and KY 446 needs smart lights improve road from corvette plant parking	4/7/2015 4:40 PM
7	Correct ramp to 446 southbound 31W backs up into traffic. Improve lighting, access road to Chuck's & S.C. Bank off Plum Springs Loop is impossible to get out of, need improvement.	4/7/2015 4:26 PM
8	Trying to come off of Old Porter Pike onto 31W is always tricky and sometimes almost impossible.	4/7/2015 4:14 PM
9	Dahlia Way exit	4/7/2015 3:59 PM
10	Hennessy Drive - extend Fay Street for another connection to Porter Pike	4/7/2015 3:37 PM
11	Stone Avenue onto 31W. Recycle trucks need room too and so when they travel south bound to merge, use median to build up speed, but thru is the traffic light @ Plum Springs Rd. and 31W. It turning onto Stone Ave. from 31W median most likely will be congested.	4/7/2015 2:08 PM

12	Ramp from KY 446 to Northbound US 31W (toward Warren East High School) Narrow underpass at rail crossing on Plum Springs Loop near South intersection with US 31W	4/7/2015 1:49 PM
13	Dont use this road often	4/7/2015 10:51 AM
14	Ramp from KY 446 to Southbound US 31W (toward downtown) is more issue with congestion. Merging from KY 446 onto US 31W is difficult during morning commute.	4/7/2015 9:58 AM
15	Coming off of 446 heading to WEHS is a problem area. If traffic is coming through, its very dangerous merging onto 31W.	4/7/2015 9:03 AM
16	Paint center line especially at underpass. People think there is not enough room for cars to pass through at same time. Lines at edge of road would be nice too. Need a green arrow to turn left at liquor store into Plum Springs Loop and Proctor Trail. Flashing yellow just isnt adequate for the volume of traffic. Why not try a different pattern signal at New Porter Pike, 31W and Plum Springs Loop. The sensor idea just doesnt seem to work. Possibly like the signal at 31W bypass and Broadway.	4/6/2015 4:34 PM
17	Parker Avenue access Road to Porter Pike	4/1/2015 12:57 PM

Q6 Please rank the level of environmental concern in the study area: 1 would be the least concern and 5 would be the greatest concern.

Answered: 58 Skipped: 3



	1	2	3	4	5	Total	Weighted Average
Sinkholes/Groundwater	7.14% 4	7.14% 4	25.00% 14	16.07% 9	44.64% 25	56	3.84
Historic Resources (cemeteries, old homes, etc.)	21.82% 12	12.73% 7	23.64% 13	18.18% 10	23.64% 13	55	3.09
Business Impacts	7.27% 4	7.27% 4	23.64% 13	29.09% 16	32.73% 18	55	3.73
Hazardous Materials/Underground Storage Tanks	18.18% 10	20.00% 11	18.18% 10	16.36% 9	27.27% 15	55	3.15
Residential Impacts	11.11% 6	9.26% 5	18.52% 10	37.04% 20	24.07% 13	54	3.54
Noise	19.23% 10	21.15% 11	19.23% 10	28.85% 15	11.54% 6	52	2.92
Landscaping	24.07% 13	9.26% 5	33.33% 18	18.52% 10	14.81% 8	54	2.91
Other	50.00% 2	0.00% 0	25.00% 1	25.00% 1	0.00% 0	4	2.25

#	Other (please specify)	Date
1	Subsurface ground water flow. I believe it flows to the north from the south.	4/7/2015 2:11 PM
2	Would like to see roundabout at interchange of Porter Pike and Plum springs Loop at 31W. Dahlia is a problem getting in and out	4/7/2015 9:31 AM
3	Good project, follow lead of neighbor and business owners. Curb, gutter and sidewal badly needed.	4/1/2015 1:10 PM

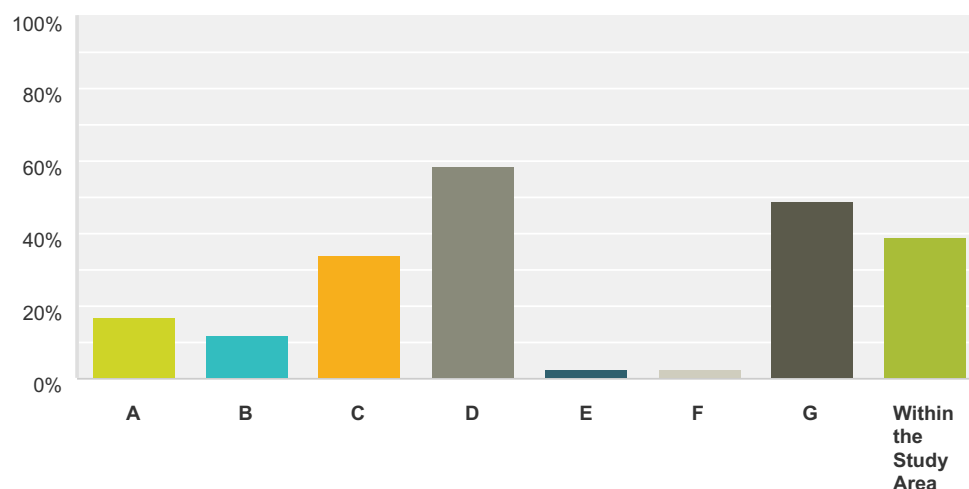
Q7 Additional Comments: Please use the space below to add anything else or explain rankings

Answered: 9 Skipped: 52

#	Responses	Date
1	Having Go BG transit pass out Louisville Rd. can really open doors for employment to those unable to drive. This can help address the employee shortage for industry and encourage new industry to come to BG.	4/8/2015 10:27 AM
2	Student crossing at Warren East High School. We are very, very lucky not to have had a fatality.	4/8/2015 10:20 AM
3	Reduce the number of traffic signals on 31W - they have multiplied too much over the past 20 years Traffic signals on 31W should have priority over side roads. no reason to be stopped when there is no cross or side road traffic.	4/7/2015 4:42 PM
4	This interchange needs complete overhaul to accommodate the heavy traffic and future tourism and industry	4/7/2015 4:28 PM
5	The congestion at the Porter Pike / 31W intersection is bad enough to make me avoid it altogether at peak traffic times.	4/7/2015 4:17 PM
6	Thank you for listening and making this a concern to us and yourself.	4/7/2015 2:11 PM
7	Thank you for addressing growing traffic concerns on the north side of Bowling Green. Great public meeting. Very good visuals!	4/7/2015 10:00 AM
8	Going through the train overpass is too narrow. When meeting others, especially cement trucks, its scary. Getting out at McDonalds intersection is difficult - need some traffic help.	4/7/2015 9:05 AM
9	We should check into access to Beach Bend better as well. I have seen when they have large events traffic backed up Louisville road from Beach Bend road until it went out of sight and backed up the By Pass for many many blocks.	3/31/2015 12:43 PM

Q8 Using the map above please select your usual route through the study area.

Answered: 41 Skipped: 20



Answer Choices	Responses
A	17.07% 7
B	12.20% 5
C	34.15% 14
D	58.54% 24
E	2.44% 1
F	2.44% 1
G	48.78% 20
Within the Study Area	39.02% 16
Total Respondents: 41	

#	Other (please specify)	Date
1	We travel 99% of study area for business (grocery, doctors, vet, recycle, restaurant, meetings, etc. on a monthly basis over different routes	4/8/2015 9:48 AM
2	Bad area in Plum Springs Loop Bad area and needs street lights at interchange	4/8/2015 9:38 AM
3	I normally travel I-65 to exit 28 and follow the 446 interchange to the south end of 31W. I normally access Plum Springs Loop at the Plum Springs Loop/Porter Pike/31W intersection. Due to work I utilize all of the routes listed but the intersection above is the one that I utilize the most.	4/8/2015 8:23 AM
4	Riverbend Landing	4/7/2015 4:21 PM
5	C to G and D	4/7/2015 12:51 PM
6	C to G D to E	4/7/2015 11:09 AM
7	Need right turn lane on Corvette Drive to I-65 Need right turn lane from GM to KY 446	4/7/2015 10:28 AM
8	C to within the study area	4/7/2015 10:09 AM

9	Within the study area to B	4/7/2015 9:22 AM
10	D to C	4/6/2015 3:51 PM
11	D to A and C	4/6/2015 3:40 PM
12	D to E	4/6/2015 3:15 PM
13	C to E	4/6/2015 3:02 PM

Q9 Please join our mailing list by providing the additional general information below.

Answered: 43 Skipped: 18

Answer Choices	Responses
Name	100.00% 43
Home Address (optional)	81.40% 35
Email Address (optional)	58.14% 25
Phone # (optional)	65.12% 28

#	Name	Date
1	Brenda Richards	4/13/2015 10:15 AM
2	Angelle' McDonald	4/13/2015 10:08 AM
3	Heath Ray	4/8/2015 10:30 AM
4	Edwin Moss	4/8/2015 10:21 AM
5	Connie Niccum	4/8/2015 9:49 AM
6	Ray Niccum	4/8/2015 9:39 AM
7	Eddy Grimes	4/8/2015 8:23 AM
8	John Beaver	4/7/2015 4:44 PM
9	Doug Johnson	4/7/2015 4:34 PM
10	Nita Rice	4/7/2015 4:29 PM
11	Jason D. wolfe	4/7/2015 4:22 PM
12	Charlie Capito	4/7/2015 4:12 PM
13	Charlie and Georgeanna Capito	4/7/2015 4:07 PM
14	Reeta Parelch	4/7/2015 4:00 PM
15	J. M. Yowell	4/7/2015 3:42 PM
16	Roy Tallent	4/7/2015 3:08 PM
17	Joe Morgan	4/7/2015 3:03 PM
18	David Stice	4/7/2015 2:52 PM
19	Kevin Cary	4/7/2015 2:17 PM
20	James L. Bond II	4/7/2015 1:49 PM
21	James Horschman	4/7/2015 1:42 PM
22	Mary Horschman	4/7/2015 1:12 PM
23	George Tarter	4/7/2015 12:54 PM
24	Eric D. Keown	4/7/2015 11:10 AM
25	Edward Whitehead	4/7/2015 10:45 AM
26	Jerry Potter	4/7/2015 10:10 AM

27	James Gleichauf	4/7/2015 10:05 AM
28	Leonard Dill	4/7/2015 9:22 AM
29	Kim Morrow	4/7/2015 9:18 AM
30	Phil Bourassa	4/7/2015 8:57 AM
31	Phil Mitchell	4/6/2015 4:34 PM
32	Randy Webb	4/6/2015 4:06 PM
33	Lloyd Ferguson	4/6/2015 4:02 PM
34	Cathy Rigdon	4/6/2015 3:52 PM
35	Michael D Jander	4/6/2015 3:41 PM
36	Sandra Finch	4/6/2015 3:17 PM
37	William Finch	4/6/2015 3:03 PM
38	Mary Horschman	4/6/2015 2:47 PM
39	Mike Buchanon	4/1/2015 1:08 PM
40	Bruce Wilkerson	4/1/2015 12:59 PM
41	Gary Cockriel	3/31/2015 12:43 PM
42	Vincent Perriello	3/31/2015 10:58 AM
43	Wendell Strode	3/31/2015 10:53 AM
#	Home Address (optional)	Date
1	5421 Louisville Road	4/13/2015 10:15 AM
2	1240 Huron Way	4/13/2015 10:08 AM
3	329 Easton Circle BG KY 42101	4/8/2015 10:30 AM
4	1891 Girkin - Boiling Spring Rd.	4/8/2015 9:49 AM
5	1891 Girkin Spring Rd	4/8/2015 9:39 AM
6	542 Plum Springs Loop	4/8/2015 8:23 AM
7	53 Treece Lane BG 42101	4/7/2015 4:44 PM
8	3348 Bow Dr. Bowling Green KY 42104	4/7/2015 4:34 PM
9	131 Northridge Dr. B.G. KY 42101	4/7/2015 4:29 PM
10	540 Coastal Avenue Bowling Green KY 42103	4/7/2015 4:22 PM
11	349 Plum Springs Rd. B.G.KY 42101	4/7/2015 4:12 PM
12	349 Plum Springs Rd.	4/7/2015 4:07 PM
13	3209 Steam Boat St B.G. KY 42103	4/7/2015 3:08 PM
14	400 Renfro Ray Rd. Smith Grove KY	4/7/2015 2:52 PM
15	120 Stone Mtn. Ct. B.G. KY 42101	4/7/2015 2:17 PM
16	2878 Glasgow Road Bowling Green KY 42101	4/7/2015 1:49 PM
17	126 Girkin Rd B.G.	4/7/2015 1:12 PM
18	2293 Chalybeate Rd Smith Grove 42171	4/7/2015 12:54 PM
19	2215 Garrett Hollow Road	4/7/2015 11:10 AM
20	1326 Lakemere Avenue Bowling Green KY 42103	4/7/2015 10:45 AM

21	3721 Porter Pike Bowling Green KY	4/7/2015 10:10 AM
22	1380 Calgary Way Bowling Green KY	4/7/2015 10:05 AM
23	316 Moorman Lane	4/7/2015 9:22 AM
24	304 Stone Ridge St Bowling Green KY 42101	4/7/2015 9:18 AM
25	564 proctor Trail Bowling Green, KY 42101	4/6/2015 4:34 PM
26	2317 Girkin Rd. Bowling Green KY 42101	4/6/2015 4:06 PM
27	1100 S. Park Dr. Bowling Green KY	4/6/2015 4:02 PM
28	5350 Louisville Rd. #19 Bowling Green KY 42101	4/6/2015 3:41 PM
29	176 Birch Ct. Bowling Green KY	4/6/2015 3:17 PM
30	176 Birch Ct. Bowling Green KY	4/6/2015 3:03 PM
31	126 Girkin Road	4/6/2015 2:47 PM
32	429 E. 10th Street, Bowling Green KY	4/1/2015 1:08 PM
33	1001 College Street - City of Bowling Green	4/1/2015 12:59 PM
34	250Huntrs Crossing Way	3/31/2015 12:43 PM
35	175 Talbott Dr Bowling Green 42103	3/31/2015 10:58 AM
#	Email Address (optional)	Date
1	heath.ray@fappes.wku.edu	4/8/2015 10:30 AM
2	edwinmoss18@msn.com	4/8/2015 10:21 AM
3	drgrimes@southcentralvet.com	4/8/2015 8:23 AM
4	jobeaver@hughes.net	4/7/2015 4:44 PM
5	doug.johnson@corvettemuseum.org	4/7/2015 4:34 PM
6	nita.rice@wku.edu	4/7/2015 4:29 PM
7	charileandgeorge@gmail.com	4/7/2015 4:07 PM
8	roytallent@yahoo.com	4/7/2015 3:08 PM
9	joe.morgan@fotline.com	4/7/2015 3:03 PM
10	dlstice52@hotmail.com	4/7/2015 2:52 PM
11	kevin.cary@wku.edu	4/7/2015 2:17 PM
12	ji.bond@twc.com	4/7/2015 1:49 PM
13	jimhorsch2000@yahoo.com	4/7/2015 1:42 PM
14	jerrypotter@twc.com	4/7/2015 10:10 AM
15	kmorrow@bradd.org	4/7/2015 9:18 AM
16	phil.bourassa@ammcoats.com	4/7/2015 8:57 AM
17	rwebb@bluegrassmaterials.com	4/6/2015 4:06 PM
18	cmrigdon@aol.com	4/6/2015 3:52 PM
19	Sandra.finch@edmons.kyschools.us	4/6/2015 3:17 PM
20	finchwe@att.net	4/6/2015 3:03 PM
21	mike.buchanon@ky.gov	4/1/2015 1:08 PM
22	bruce.wilkerson@bgky.org	4/1/2015 12:59 PM

23	gary @corvettemuseum.org	3/31/2015 12:43 PM
24	VPerriello@hotmail.com	3/31/2015 10:58 AM
25	strode@corvettemuseum.org	3/31/2015 10:53 AM
#	Phone # (optional)	Date
1	270-782-0430	4/13/2015 10:15 AM
2	Bowling Green KY 42101	4/13/2015 10:08 AM
3	270-999-1621	4/8/2015 10:30 AM
4	270-781-7221	4/8/2015 10:21 AM
5	270-842-9771	4/8/2015 9:39 AM
6	2702822564	4/8/2015 8:23 AM
7	270-991-6595	4/7/2015 4:44 PM
8	270-784-4716	4/7/2015 4:34 PM
9	270-875-3010	4/7/2015 4:29 PM
10	270-842-1974	4/7/2015 4:12 PM
11	270-842-1974	4/7/2015 4:07 PM
12	973-652-8558	4/7/2015 4:00 PM
13	270-843-3449	4/7/2015 3:08 PM
14	270-935-6887	4/7/2015 3:03 PM
15	270-303-6023	4/7/2015 2:17 PM
16	270-535-8053	4/7/2015 1:42 PM
17	270-996-5147	4/7/2015 12:54 PM
18	270-904-2536	4/7/2015 10:45 AM
19	270-202-5279	4/7/2015 10:10 AM
20	270-392-8959	4/7/2015 9:22 AM
21	270-792-0808	4/7/2015 9:18 AM
22	270-781-1013 x222	4/7/2015 8:57 AM
23	270-791-6324	4/6/2015 3:03 PM
24	779-6173	4/6/2015 2:47 PM
25	270-843-4146	4/1/2015 1:08 PM
26	270-392-0817	4/1/2015 12:59 PM
27	270-792-9140	3/31/2015 12:43 PM
28	270-393-9975	3/31/2015 10:58 AM

**BROUGHT UP AT PUBLIC MEETING HOWEVER ARE OUT OF THE STUDY AREA
OR BEYOND THE SCOPE OF THIS PROJECT:**

ISSUES ON EASEL BOARDS

- KY 526 @ US31W – near Warren East High School ~ issue
- Moorman hard to get out toward High School or either way.
- KY 526 & Girkin Road – crashes at Y and mailbox – maybe identified.
- Need turn lane to allow school visitors to turn in.
- Willamette Dr. Sharp curve doesn't allow car and truck to pass each other (heavy truck traffic Android)
- Right turn bad from Moorman Lane onto US 31W
- Need to improve back GM Access Rd.
- Need right turn from KY 526 to US 31W south
- Widen Porter-Pike
- The interchange at US 68/US 31W needs lighting (street lights)

ON MAPS THAT ARE OUTSIDE STUDY AREA

- Please remove speed bumps on road behind BRADD office and traverses to Plum Springs Road
- Need to reopen Corvette Drive to GM Access Road
- I-65 off ramp from the north onto KY 446 – 1 yellow dot
- On ramp to I-65 southbound – 1 yellow dot
- KY 526 does not have right turn lane onto US 31W – 1 red and 1 yellow dot
- School entrance – 1 yellow dot

**SUMMARY OF TABLE MAPS AND SURVEY COMMENTS AT
PUBLIC MEETING #1/LOCAL OFFICIALS MEETING/INTERNET SURVEY**

LOCATION	COMMENTS	RED	YELLOW	TOTAL RED	TOTAL YELLOW	TOTAL
CORVETTE DRIVE - SOUTH SIDE		10	9			
1	Intersection with Hennessy Way			10	9	19
2	Turning vehicles onto US 31W cross paths					
3	Cannot turn left onto Corvette Drive from McDonalds					
4	Signal needs to be programmed					
5	Pedestrians need Crosswalk in front of Shell					
6	Need right turn lane on Corvette Drive to I-65*					
7	New Alignment - one-way in on south side of McDonalds to connect to Corvette Drive behind the liquor store					
CORVETTE DRIVE - NORTH SIDE						
1	Semis park along it	2		2	0	2
2	Semis U turn at corner turning to GM Plant*					
3	Semis inhibit vehicle traffic					
4	need right turn lane from General Motors to KY 446					
US 31W/KY 446 Interchange						
1	KY 446 W to US 31W Northbound merge - people do not want to yield and guardrail is too high	26	4	36	14	50
2	US 31W SB to I-65 - Need better lighting	1				
3	US 31W SB to I-65 - too short		5			
4	KY 446 W to US 31W Southbound slamming on brakes					
5	Need lighting cannot see at night or when raining					
6	Roundabout					
7	KY 446 W to US 31W southbound slamming on brakes	9	5			
US 31W North / KY 957		3	4			
1	Only has flashing yellow no dedicated left turn signal			3	4	7
2	Lighting					
3	Put stop signs at KY 957 toward US 31W and road parallel to West of Stone Lane coming out to turn onto US 31W. There is confusion as to who has right of way					
US 31W/Stone Lane			4			
1	Dump trucks pull out in front of everyone			0	4	4
2	Stone Lane residential area folks going to school turning north conflict with dump trucks					
US 31W/Porter Pike		6	2			
1	Rear ends 1/week			7	7	14
2	Congestion no turn lanes on Porter Pike		2			
3	Dahlia Way Intersection - Cannot get to businesses, once you are in Dahlia Way you cannot get out. You also almost get rear-ended when turning left into Plum Springs then right into Dahlia Way.	1	1			
4	New Alignment - Connect Porter Pike south of subdivision to Old Porter Pike & widen Old Porter Pike so it is an alternate route during peak hours.					
5	New Alignment - Realign Parker Avenue to line up with River Place		2			
Plum Springs Loop Underpass		9	5	9	5	14
River Place/Porter Pike						
1	Cannot get onto US 31W because of backup	2		2	1	3
2	Extend River Place to realigned Parker Avenue to the South		1			
Old Porter Pike		4	3			
1	Blind intersection			7	4	11
2	Would signal improve it					
3	Narrow not really used much					
4	People try to cross and get onto US 31W nearly impossible					
5	Pulling out of businesses on the north side is a mess					
6	Hard to turn onto US 31W	3	1			
New Connection at FOL						
1	New Alignment - Extend the new connector over to between AEP & Android and provide merge toward I-65 and cul de sac Willamette Lane			2	2	4
2	New Alignment - Add leg to the north as in 1 above and add right turn lane.					
3	New Alignment - Behind FOL there is an industry that owns adjacent to lot that could be used to connect Hennessy to Porter Pike	2	2			
4	Sharp curve headed between AEP & Android					
Access Management		1	1			
	At Funeral Home			1	1	2

* from Survey at Public Meeting

Themes from Boards

Interchange

- Traffic into Bowling Green backs up to KY446 flyover and makes it dangerous to motorists coming into Bowling Green. Apparently, when the light turns red at the Minute Mart, traffic coming into Bowling Green backs up just shy of the flyover bridge. The bridge blocks the sight distance so that other cars coming in don't see the stopped traffic until they get passed the bridge. Then they have to slam on the brakes and swerve to avoid hitting the stopped cars.
- Flyover traffic backs up and sight distance inadequacies cause people to lock up before rear ending vehicle in front of them.
- The interchange at KY 446 / US 31W needs lighting (street lights) as well as US 68/US 31W
- Flyover merge lane is scary
- KY 446 to US 31W ramp is scary
- The interchange at KY 446 / US 31W needs lighting (street lights)
- US 31W to KY 446 short ramp is too steep for small trailers (Hangs semis)
- KY 446 to I-65 signage not clear, weaving / merging happens
- Bad sight angle KY 446 to US 31W North
- Widen Railroad Bridge to extend, merge lane

Plum Springs Loop

- Need right turn lane onto Plum Springs Loop from US 31W - 3
- Need dedicated left turn light at Plum Springs going North on US31W, currently flashing yellow left.

Corvette Drive / KY446

- Right turn signalization @ Corvette
- Hennessy connector all the way across to Corvette
- Semi's parking and turning around on north Corvette Drive
- Need a crosswalk on KY 446 at Corvette drive - lots of pedestrian traffic here daily
- Fruit of the Loom traffic bad at Porter Pike and Corvette Drive

Porter Pike

- No left turn phasing @ Porter Pike (north)
- Fruit of the Loom traffic bad at Porter Pike and Corvette Drive
- In favor of new alignment of Parker Avenue

Old Porter Pike

- Full signal at Old Porter Pike

KY 957/US 31W N

- Confusion north on US 31W at KY 957 people turning into KY 957 and Stone Lane from same turn lane.
- Traffic in AM KY 957 turning left or right difficult

Other

- Willamette Dr. Sharp curve doesn't allow car and truck to pass each other (heavy truck traffic Android)
- Traffic in AM KY 957 turning left or right difficult
- Reduce traffic signals on US 31W or make US 31W priority - 2
- Any surplus property could be used for park and ride facilities or public transit

US 31W/KY 446 Study – Warren County
Summary of Written Responses or E-mails:

Comments coordinated through Intergovernmental Agency Review:

- Division of Water: There are no Outstanding State Resource Waters, Wild Rivers or known Exceptional Waters within the project area. However, the site is underlain by karst and therefore located in a groundwater region that is highly sensitive to groundwater contamination from surface activities. There are sinkholes located within the footprint of the proposed construction/highway realignment and there are groundwater wells and springs within a one mile radius of site activities. There are activities associated with the project's construction and road realignment that will require a Groundwater Protection Plan so it is recommended that these specific activities be identified. A stream construction permit will not be required.
- Division of Waste Management: 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, and/or other contaminants are encountered during this project, they must be properly addressed.
- Division of Air Quality: Comply with KARs regarding fugitive emissions and open burning.
- Kentucky Heritage Council: Pro-forma response: No major issues based on preliminary review. (Though in a separate pro-forma response, they say "We are indeed concerned that the proposed undertaking will have impacts to historic resources, though the specific properties and the full scope and scale of those effects have not yet been determined.")

Independent Letters or e-mails:

- FAA: No anticipated impact on BG Airport
- Kentucky Airport Zoning Commission: All structures below the height of surrounding trees (overhead signs, traffic signals, non-high mast lighting) are exempt from KAZC permitting. Structures that do exceed the height of surrounding trees (high-mast lighting, construction cranes) must secure a KAZC permit.
- U.S. Fish and Wildlife Service: Provided a list of potential threatened or endangered species.
- Kentucky Department of Fish and Wildlife: Also listed T & E species, as well as pointing out issues with Karst topography.
- U. S. Coast Guard: No permit required.
- U.S Department of Agriculture-Natural Resources Conservation Service: Included a map of four areas within project study area that may still be considered farmland.
- No Comments: Kentuckians for Better Transportation; Kentucky Education Cabinet; Albert Mirus (formerly with Kentucky Household Goods Carrier Association);

PROJECT TEAM MEETING 3



Groundbreaking by Design.

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



PROJECT TEAM MEETING #3 MINUTES

Project: US 31W/KY 446 Scoping Study
Old Porter Pike to KY 957 (Plum Springs Loop)

Purpose: Project Team Meeting #3

Place: KYTC District 3 Office – Bowling Green

Meeting Date: August 20, 2015; 9:30 AM Central Time

Prepared By: Tom Springer

Attendees:

Greg Meredith	KYTC D3 CDE	Greg.Meredith@ky.gov
Joe Plunk	KYTC D3	Joseph.Plunk@ky.gov
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Introductions. Jeff Moore, KYTC Project Manager, provided a project overview, stating the objective of this meeting was to review the design options and to prepare for the upcoming public meeting. Following introductions, Annette provided an update of the study since Project Team Meeting 2. Since the last meeting Resource Agency Coordination letters and an online survey, produced mostly general information. A summary was provided to the Project Team.

Overview of Alternatives and Options. Annette provided a quick review of the "alternatives" for treating the interchange, and "options" such as access management and closing Plum Springs Loop, and other independent opportunities that could improve safety and mobility in the area, other than rebuilding the US 31W/KY446 interchange. None of the interchange alternatives included the newly installed traffic signal at Fruit of the Loom.

A. Alternatives

- i. **Alternative 1 - Reconstruct the Existing US 31W / KY 446 Interchange.** Provides a loop ramp for SB US 31W to EB KY 446 to I-65 movement, reconfigures the KY 446 WB to US 31W NB ramp to eliminate the merge onto NB US 31W, and redesigns the end of the KY 446 WB ramp to US 31W SB to provide more room to merge before the traffic light at Porter Pike.
- ii. **Alternative 2 - Continuous "Green-T".** US 31W SB movement is a continuous flow with two-lanes separate from the intersection. Each of the other movements has a stop condition, with exclusive right-turns. Jeff noted that this alternative addresses some of the comments provided by the public and resource agencies. This option provides a relocated access point to Carter Lumber toward Plum Springs Loop. The new traffic light on US 31W at Fruit of the Loom could physically remain in place with this alternative, but the traffic backups to this proposed US 31W / KY 446 intersection would need to be addressed.
- iii. **Alternative 3 – 4-Way Intersection.** With this option, all motorists encounter the stoplight, and Carter Lumber has direct access.
- iv. **Alternative 4 – Roundabout.** Qk4 examined several roundabout options, the Project Team decided to pursue the two lane roundabout with a third lane between US 31W and Northbound Hennessy Way. Due to the growth to the south along KY 1402 (Porter Pike), Alternative 4a includes an extension to the south to Porter Pike.

B. Improvement Options

- i. **Option A – Access Management Control.** Between Old Porter Pike and Porter Pike, there are numerous median curb cuts. This option would reduce the 14 median cuts to 3 and provide "bulb-outs" for U-turns. This option also includes a sidewalk on the west side of US 31W and a shared use path on the east side.
- ii. **Option B – Closing of Plum Springs Loop Underpass.** This underpass closing would realign Plum Springs Loop north of the railroad. The public has expressed several concerns about this option. Joe suggested realigning Graham Avenue and eliminating the proposed cul-de-sac to reduce costs and utility impacts. This option would improve congestion at the US 31W/Plum Springs Loop/Porter Pike intersection. Lack of redundancy was mentioned as a concern. Addressing redundancy for emergency access, Greg stated that the underpass could be closed with barricades and they could be moved when there is an emergency. All pros and cons should be listed with this alternative.
- iii. **Option C – Parker Avenue Realignment.** This option would provide more spacing at the Porter Pike/US 31W intersection. The right-of-way costs are high (\$1.2M), and may make the option not prudent. However, Greg noted that the landowners have

anticipated and support this project because it enhances their development potential. Therefore, it is anticipated there may be a right-of-way swap that could make this a viable option.

- iv. **Option D – Reconfiguration of Corvette Drive / Duntov Way.** This option would create a one-way in and one-way out alignment that would improve traffic flow reducing conflicts at the KY446 / Corvette Drive intersection with US 31W.

Jeff noted that each of these options could be implemented separately, or independently of the alternatives.

Costs. The cost estimates for alternatives and opinions are as follows:

C. Alternatives Costs

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 4A
\$7.5M	\$7.6M	\$6.0M	\$13.8M	\$22.5M

D. Options Costs

Option A	Option B	Option C	Option D
\$7.2M	\$2.3M	\$2.6M	\$1.4M

E. Qk4 presented some low-cost "quick win" improvements:

- Raise Grade of US 31W near Old Porter Pike (\$1M)
- Traffic Calming measures on the KY446 fly over ramp, such as striping and signage (\$20k)
- Extend the WB to NB merge distance to US 31W north over the railroad track (\$1.5M)
- Ramp extension of WB KY446 to SB US 31W through the US 31W / Porter Pike intersection (\$615k)

F. Traffic Simulations. Jeremy provided an overview of the traffic simulations. All simulations included the various "options" and the elimination of the new signal at Fruit of the Loom, and were for the PM peak hour, the worst case scenario. The No Build and each of the build options were for future (Year 2040) traffic.

G. Travel Time. Qk4 provided a travel time summary from the traffic model for key movements of each alternative to analyze the total travel time in minutes for the entire study area network, including key movements, delay per vehicle, and total delay in minutes. The summary in minutes for each alternatives are as follows:

No Build	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 4A
4,732	3,617	4,873	9,090	3,159	3,280

The delay is based on the posted speed limit. The roundabout results in the least overall delay, although it is the most expensive. However, safety is also a key element. Each alternative addressed known high crash areas and safety concerns, including sight distance and reduced conflict points.

Barry noted that it is possible to place a value on travel time (it is approximately \$17/hour). This could be translated into benefits. There is also cost per crash data that could be used to quantify the benefit of the alternatives. However these calculations are not in the original scope of work.

The planning study will discuss the improved safety element, and public comment, per alternative and option. Shane requested to include TRB safety reduction factors for Option 1 (access management). If possible a general statement regarding the number and reduction of conflict points, and number of feet of improved merging distance and sight distance will be documented.

H. Pavement Rehabilitation Project. Greg noted the concrete pavement on KY 446 is approximately 50 years old and needs to be replaced resulting in a major pavement rehabilitation project. Concurrently, I-65 including the ramps at Exit 28 and the US 31W / KY 446 interchange ramps has also received funding. The cost for rehabilitating the concrete pavement on the KY 446 WB to US 31W SB flyover ramp is significant, and it would be cheaper to remove the US 31W / KY 446 interchange and build the at-grade intersection instead (Alternative 3). This would save money, reduce crashes at two locations, but increase delay. The largest benefit is that the funds are available now. And if they are used to rehab the existing flyover ramp, and a different alternative is advanced, then the pavement at this location would be removed again.

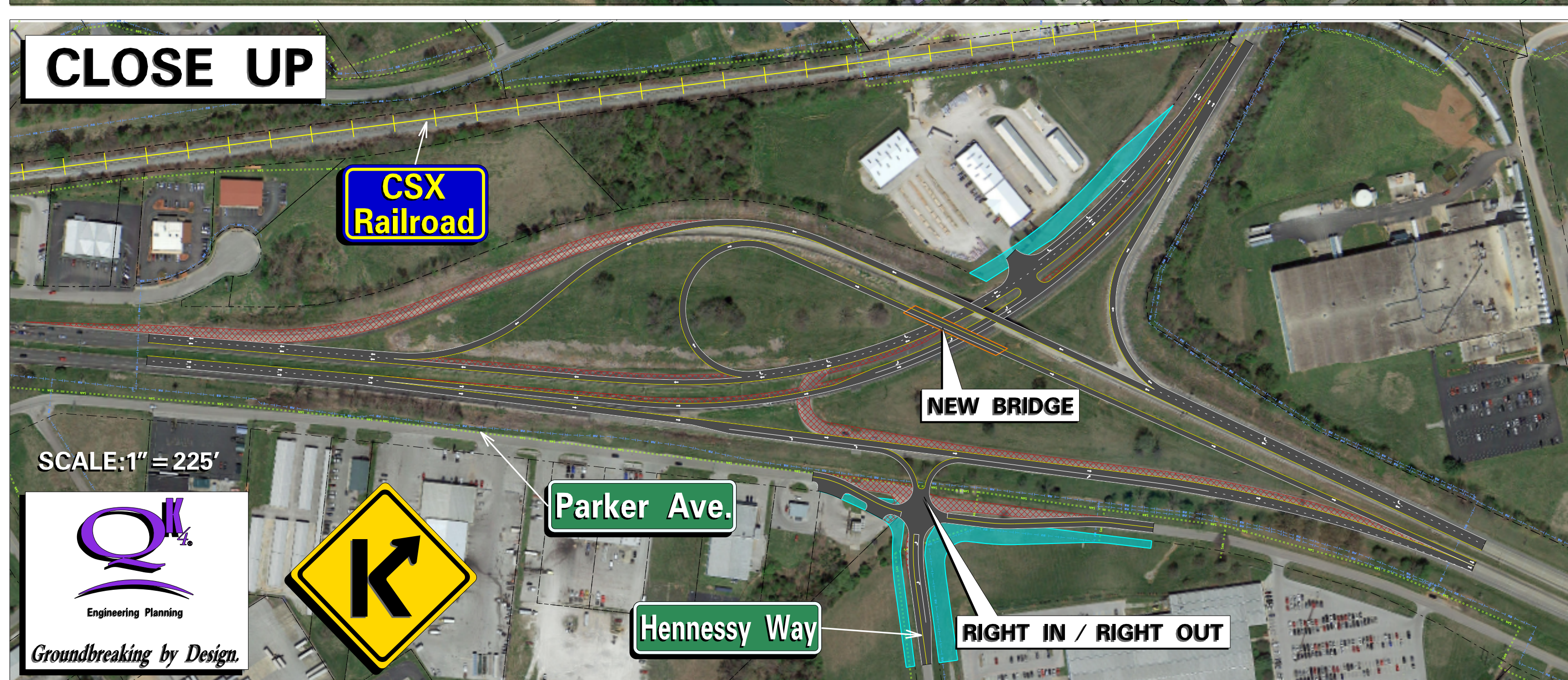
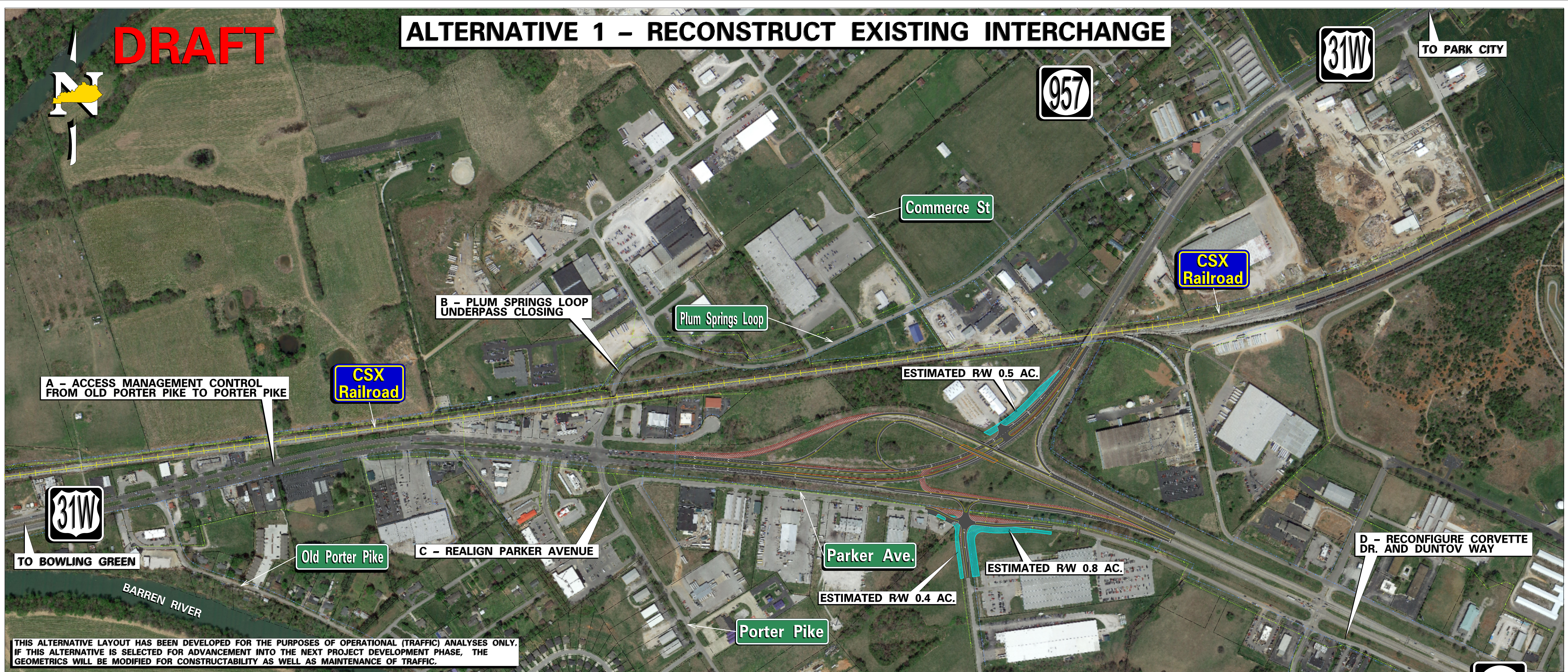
Discussion. After a considerable amount of discussion about the pavement rehabilitation project, it was decided to advance Alternative 3 immediately as a part of the rehab project, which would leave Alternatives 2, 4, and 4a as viable long term alternatives. Additionally Options A, B, C, and D would also remain viable. Barry recommended the remaining focus of the planning study should be to prioritize these four options.

Alternative 1 was eliminated from further consideration because it does not provide for an urban context and the interchange would be removed with the pavement rehabilitation project. It also does not meet driver expectation being located between two at-grade intersections.

The next scheduled public meeting is September 29, 2015. This meeting should inform the public that the pavement rehab with Alternative 3 project will be advanced. Their issues and concerns for the implementation of Alternative 3 and input / preference for the remaining future alternatives and options will be gathered.

PROJECT TEAM MEETING 3

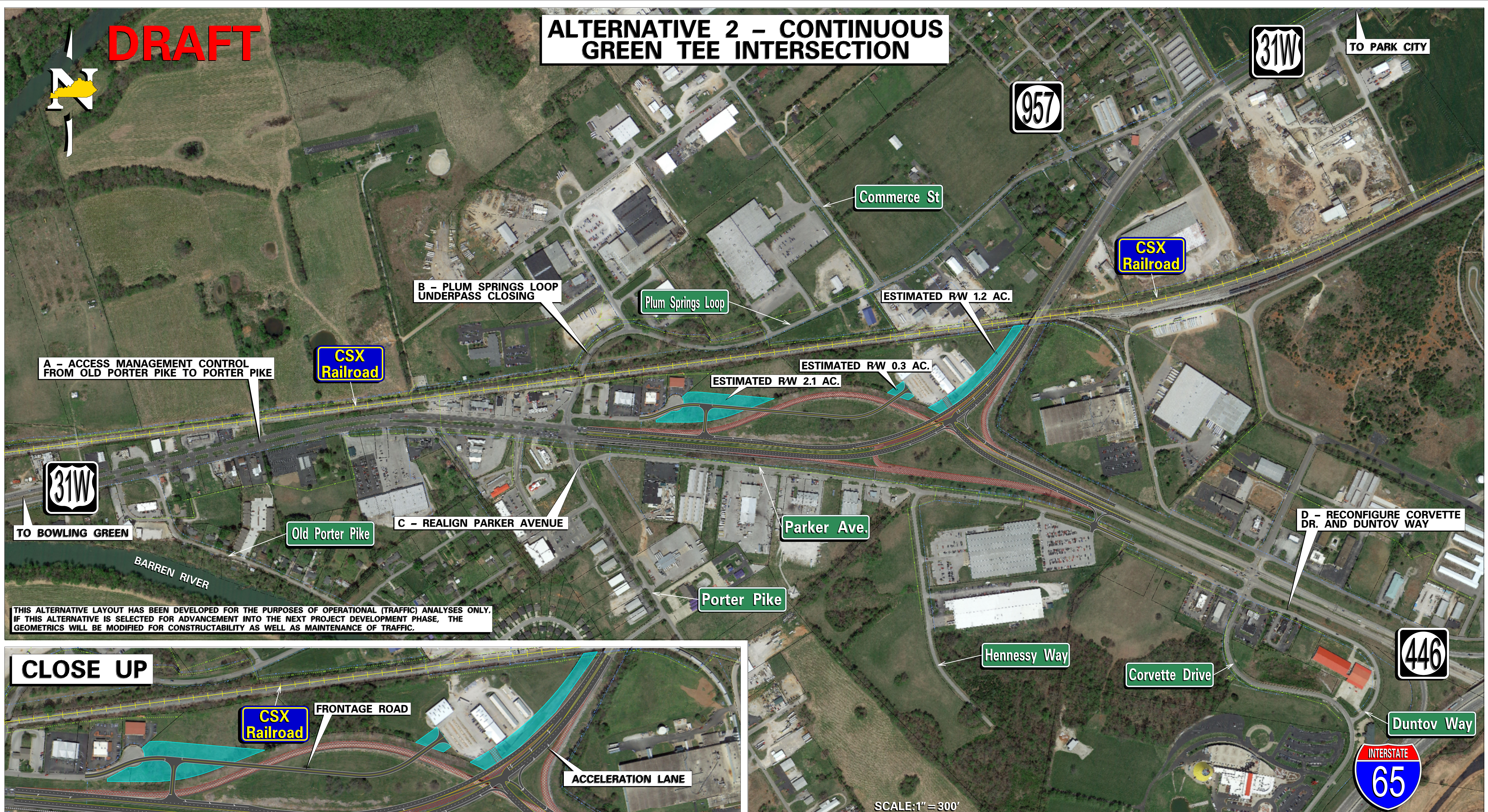
HANDOUTS



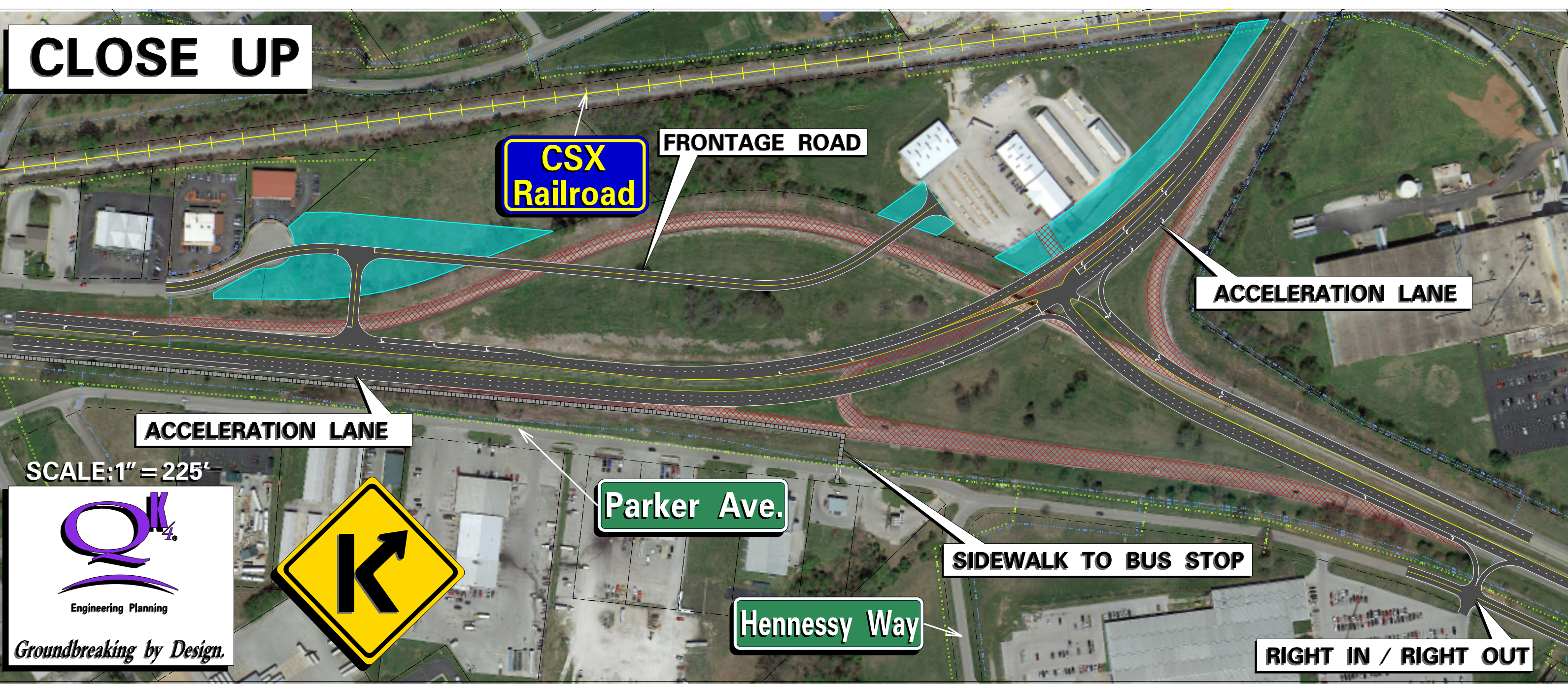
RED - NOT PREFERRED
YELLOW - SOMEWHAT PREFERRED
GREEN - PREFERRED

ALTERNATIVE 2 – CONTINUOUS GREEN TEE INTERSECTION

DRAFT



THIS ALTERNATIVE LAYOUT HAS BEEN DEVELOPED FOR THE PURPOSES OF OPERATIONAL (TRAFFIC) ANALYSES ONLY. IF THIS ALTERNATIVE IS SELECTED FOR ADVANCEMENT INTO THE NEXT PROJECT DEVELOPMENT PHASE, THE GEOMETRICS WILL BE MODIFIED FOR CONSTRUCTABILITY AS WELL AS MAINTENANCE OF TRAFFIC.

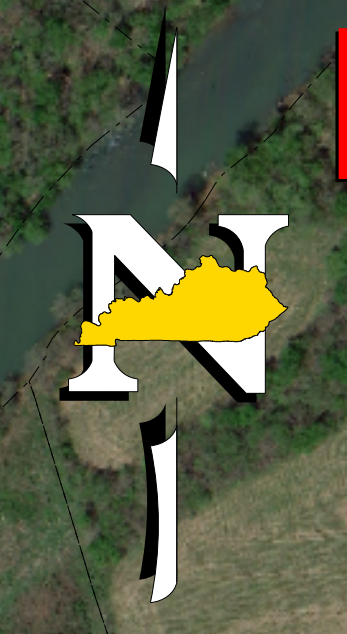


RED – NOT PREFERRED
YELLOW – SOMEWHAT PREFERRED
GREEN – PREFERRED



ALTERNATIVE 3 – 4-WAY INTERSECTION INCLUDING US 31W, KY 446, & CARTER LUMBER

DRAFT



TO PARK CITY



Commerce St

CSX
Railroad

B – PLUM SPRINGS LOOP
UNDERPASS CLOSING

Plum Springs Loop

ESTIMATED RW 1.2 AC.

A – ACCESS MANAGEMENT CONTROL
FROM OLD PORTER PIKE TO PORTER PIKE

CSX
Railroad



TO BOWLING GREEN

Old Porter Pike

C – REALIGN PARKER AVENUE

Parker Ave.

Porter Pike

D – RECONFIGURE CORVETTE
DR. AND DUNTOV WAY

THIS ALTERNATIVE LAYOUT HAS BEEN DEVELOPED FOR THE PURPOSES OF OPERATIONAL (TRAFFIC) ANALYSES ONLY.
IF THIS ALTERNATIVE IS SELECTED FOR ADVANCEMENT INTO THE NEXT PROJECT DEVELOPMENT PHASE, THE
GEOMETRICS WILL BE MODIFIED FOR CONSTRUCTABILITY AS WELL AS MAINTENANCE OF TRAFFIC.



Hennessy Way

Corvette Drive



Duntov Way

SCALE: 1" = 300'

CLOSE UP

CSX
Railroad

ACCELERATION LANE

SCALE: 1" = 225'

ACCELERATION LANE

Parker Ave.

Hennessy Way

SIDEWALK TO BUS STOP

RIGHT IN / RIGHT OUT



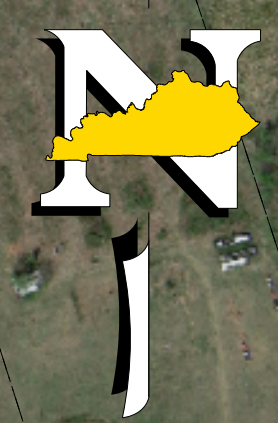
RED – NOT PREFERRED

YELLOW – SOMEWHAT PREFERRED

GREEN – PREFERRED

ALTERNATIVE 4 – ROUNDABOUT

DRAFT



A – ACCESS MANAGEMENT CONTROL FROM OLD PORTER PIKE TO PORTER PIKE

CSX Railroad

B – PLUM SPRINGS LOOP UNDERPASS CLOSING

Plum Springs Loop

ESTIMATED RW 0.43 AC.



TO BOWLING GREEN

C – REALIGN PARKER AVENUE

Parker Ave.

ESTIMATED RW 0.63 AC.

ESTIMATED RW 0.25 AC.

Old Porter Pike

BARREN RIVER

THIS ALTERNATIVE LAYOUT HAS BEEN DEVELOPED FOR THE PURPOSES OF OPERATIONAL (TRAFFIC) ANALYSES ONLY. IF THIS ALTERNATIVE IS SELECTED FOR ADVANCEMENT INTO THE NEXT PROJECT DEVELOPMENT PHASE, THE GEOMETRICS WILL BE MODIFIED FOR CONSTRUCTABILITY AS WELL AS MAINTENANCE OF TRAFFIC.

CLOSE UP

CSX Railroad

SIDEWALK TO BUS STOP

Parker Ave.

CUL-DE-SAC

Hennessy Way

CUL-DE-SAC

CONNECT TO HENNESSY WAY

SCALE:1" = 225'

RED – NOT PREFERRED

YELLOW – SOMEWHAT PREFERRED

GREEN – PREFERRED

ESTIMATED RW 6.24 AC.

Hennessy Way

Corvette Drive

Duntov Way

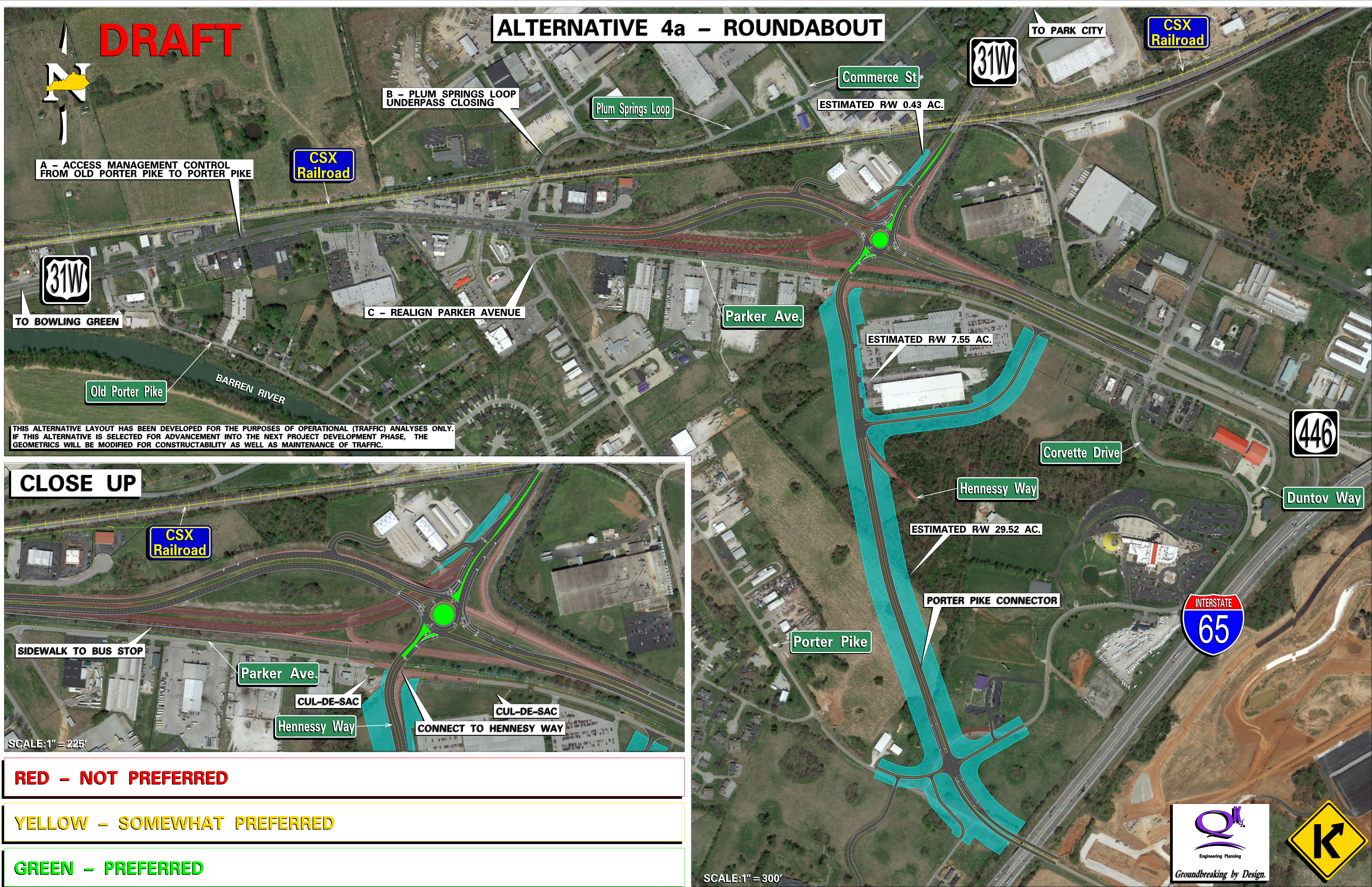
Porter Pike



SCALE:1" = 300'

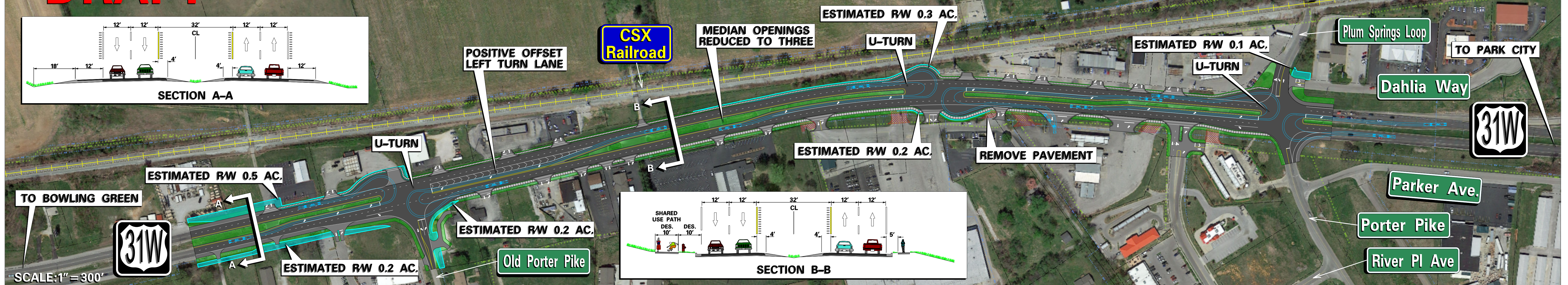


ALTERNATIVE 4a – ROUNDABOUT

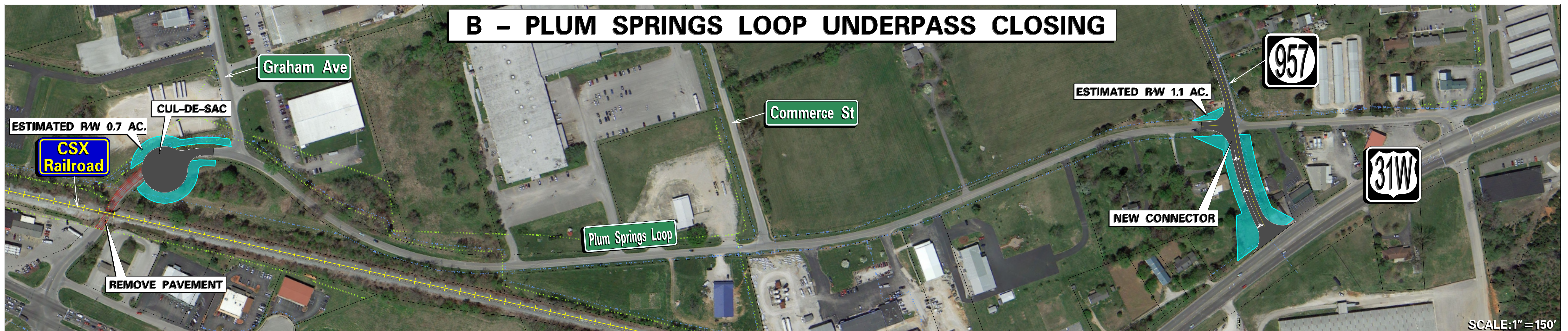


DRAFT

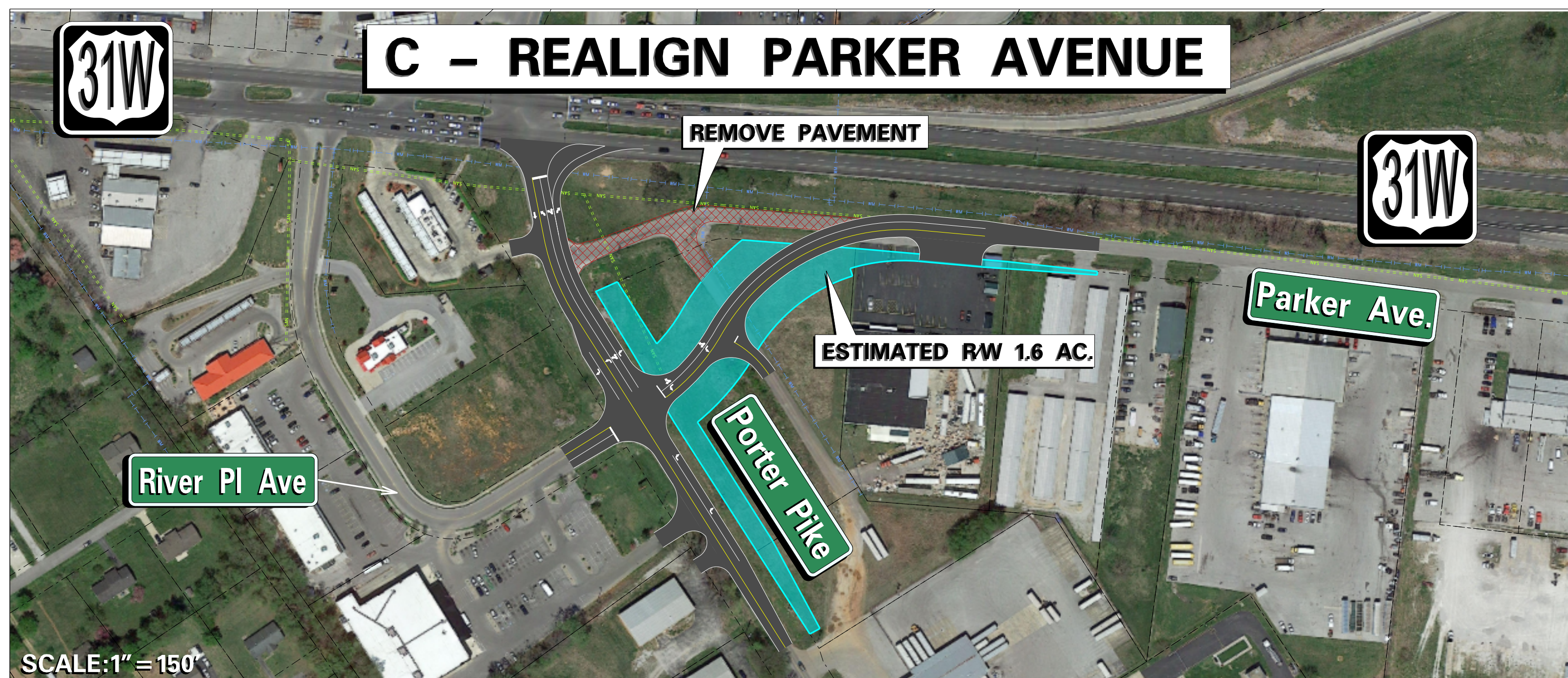
A – ACCESS MANAGEMENT CONTROL FROM OLD PORTER PIKE TO PORTER PIKE



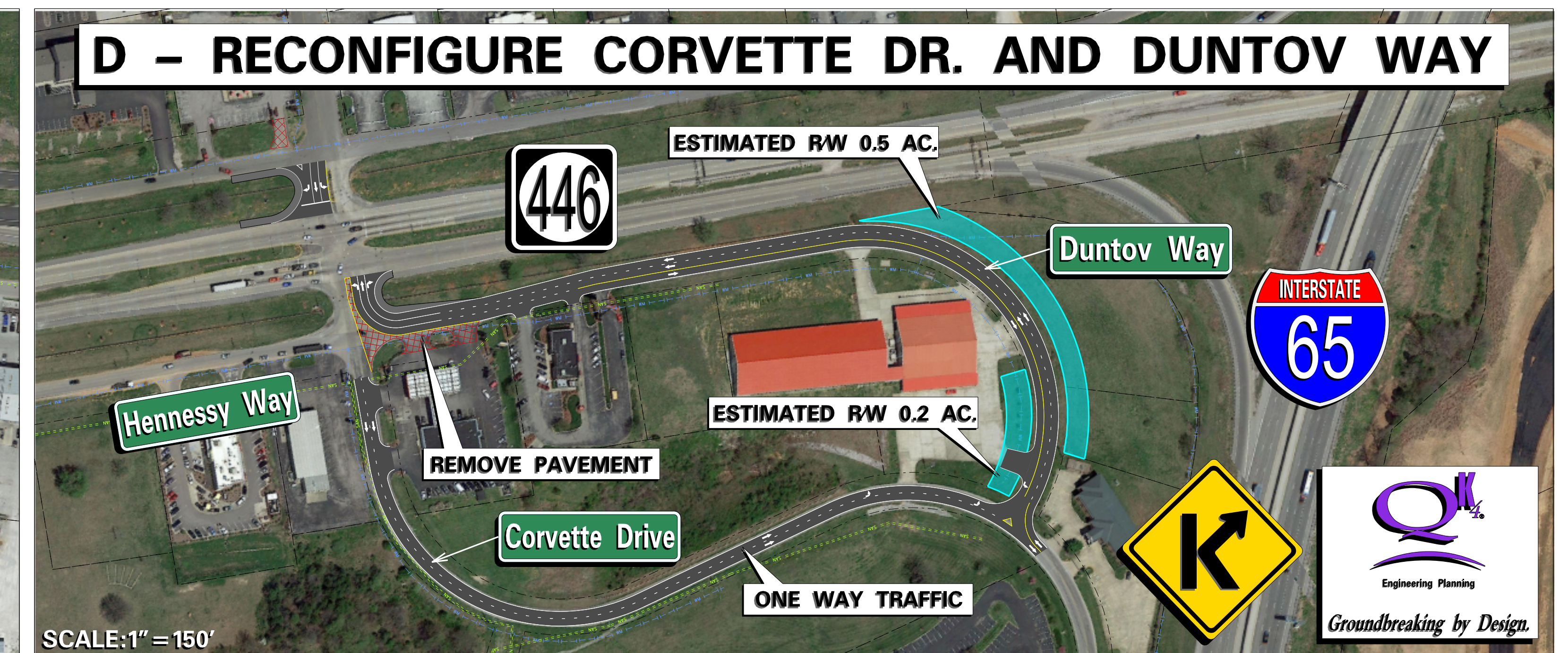
B – PLUM SPRINGS LOOP UNDERPASS CLOSING



C – REALIGN PARKER AVENUE



D – RECONFIGURE CORVETTE DR. AND DUNTOV WAY

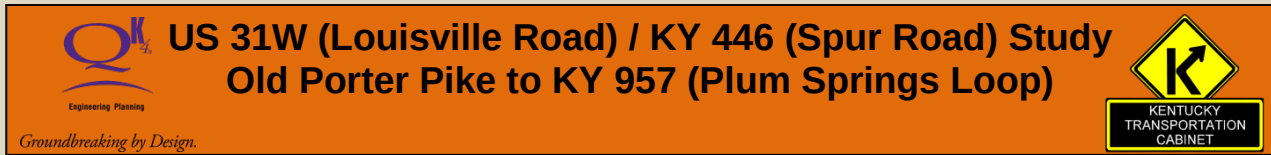


TRAVEL TIME SUMMARY
US 31W/KY 446 PLANNING STUDY
WARREN COUNTY

			Totals for All Moves						I 65 to River Place Dr					FOTL to I 65					River Place to Plum Springs (N)			
				Total Travel Time (min/vehicle)	Total Delay (min/ vehicle)	Total Travel Time (minutes)	Total Vehicle Delay (minutes)		198	vehicles				165	vehicles				782	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)
Scenario	Description	Total Cost (\$)	Ranking	Total Travel Time (min/vehicle)	Total Delay (min/ vehicle)	Total Travel Time (minutes)	Total Vehicle Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)
No Build	No Build	\$0	5	29.5	16.0	8,602.7	4,732.2		4.7	924.0	2.9	564.3		10.9	1,795.8	6.5	1,064.3		3.8	2,932.5	2.1	1,629.2
1	Reconstruct Existing Interchange	\$7,505,000	3	24.8	13.3	7,146.7	3,617.5		4.5	891.0	2.7	531.3		7.8	1,278.8	5.1	838.8		2.8	2,163.5	1.1	860.2
2	Continuous Green Tee Intersection	\$7,620,000	4	29.4	17.3	8,315.8	4,873.6		4.8	943.8	3.0	590.7		9.3	1,537.3	5.4	882.8		2.4	1,863.8	0.9	703.8
3	4-Way Intersection including US 31W, KY 446 & Carter Lumber	\$6,010,000	6	41.2	27.6	12,922.9	9,090.4		5.1	1,006.5	3.3	656.7		11.6	1,911.3	6.8	1,113.8		3.9	3,075.9	2.3	1,759.5
4	Alternative 4 Roundabout	\$13,760,000	1	20.8	11.5	6,323.2	3,159.7		4.4	864.6	2.3	458.7		4.9	800.3	4.4	723.3		2.6	2,046.2	1.0	769.0
4A	Alternative 4 Roundabout without Porter Pike Extension	\$21,235,000	2	21.4	11.9	6,472.0	3,280.3		4.4	861.3	2.3	455.4		4.8	783.8	4.3	712.3		2.7	2,085.3	1.0	808.1
	Only Closing Plum Springs Underpass			30.6	17.1	9,030.9	5,155.5		5.0	980.1	3.2	627.0		11.0	1,820.5	6.5	1,075.3		4.0	3,128.0	2.4	1,837.7

			Totals for All Moves						River Place to Corvette Dr					River Place to Corvette Museum					Plum Springs (N) to I 65			
				Total Travel Time (min/vehicle)	Total Delay (min/ vehicle)	Total Travel Time (minutes)	Total Vehicle Delay (minutes)		420	vehicles				40	vehicles				363	vehicles		
Scenario	Description	Total Cost (\$)	Ranking	Total Travel Time (min/vehicle)	Total Delay (min/ vehicle)	Total Travel Time (minutes)	Total Vehicle Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)		Travel Time (min/vehicle)	Total Travel Time (minutes)	Delay (min/vehicle)	Total Delay (minutes)
No Build	No Build	\$0	5	29.5	16.0	8,602.7	4,732.2		2.9	1,211.0	1.4	574.0		2.8	112.0	0.9	35.3		4.5	1,627.5	2.4	865.2
1	Reconstruct Existing Interchange	\$7,505,000	3	24.8	13.3	7,146.7	3,617.5		2.9	1,197.0	1.3	560.0		2.8	110.0	0.9	34.7		4.2	1,506.5	2.2	792.6
2	Continuous Green Tee Intersection	\$7,620,000	4	29.4	17.3	8,315.8	4,873.6		3.3	1,365.0	1.7	721.0		2.8	113.3	1.0	39.3		6.9	2,492.6	5.3	1,936.0
3	4-Way Intersection including US 31W, KY 446 & Carter Lumber	\$6,010,000	6	41.2	27.6	12,922.9	9,090.4		8.5	3,549.0	7.0	2,919.0		3.1	125.3	1.2	46.0		9.0	3,254.9	7.2	2,595.5
4	Alternative 4 Roundabout	\$13,760,000	1	20.8	11.5	6,323.2	3,159.7		2.7	1,134.0	1.3	553.0		2.5	98.7	0.8	32.7		3.8	1,379.4	1.7	623.2
4A	Alternative 4 Roundabout without Porter Pike Extension	\$21,235,000	2	21.4	11.9	6,472.0	3,280.3		2.7	1,148.0	1.4	595.0		2.8	111.3	1.0	38.0		4.1	1,482.3	1.9	671.6
	Only Closing Plum Springs Underpass			30.6	17.1	9,030.9	5,155.5		3.0	1,260.0	1.5	623.0		2.8	112.0	0.9	36.7		4.8	1,730.3	2.6	955.9

PROJECT TEAM MEETING 3
ALTERNATIVE DESCRIPTIONS
PROS AND CONS



Do Nothing – does not meet the Purpose and Need for urban context and leads to safety concerns.

Alternative 1 – Reconstruct the Existing Interchange

Description

- Removes US 31W southbound to KY 446 eastbound short ramp and provides 25 mph loop
- Provides over 600 feet of additional merge length for the movement from KY 446 WB to SB US 31W toward Bowling Green at the Porter Pike / US 31 W intersection.
- Eliminates the merge from KY446 WB to US 31W NB
- Eliminates signal at US 31W SB Ramp to KY 446 EB (or I-65)
- Provides right-in/right-out onto Hennessy Way with turn lane and acceleration lane and maintains connection of Hennessy Way and Parker Avenue

Benefits

- 600 feet of additional merge length for the movement from KY 446 WB to US 31W SB toward Bowling Green at the Porter Pike / US 31W intersection.
- Eliminates the merge from KY446 WB to US 31W NB
- Eliminates the merge from KY 446 WB to US 31W SB
- Eliminates signal at US 31W SB Ramp to KY 446 EB (or I-65) and provides a free-flow movement
- Provides direct access with turn lanes for Carter Lumber

Cons

- Backup of traffic on US 31W ramp toward Bowling Green in the PM peak hour
- Does not slow motorist down as much as other alternatives
- Does not provide for urban context.
- Does not meet driver expectation with an interchange between two at –grade intersections.
- Will require the new intersection that the Cabinet just constructed for Fruit of the Loom to be removed

Alternative 2 – Continuous Green Tee Intersection

Description

- Removes flyover ramp and becomes an At-Grade Intersection
- US 31W is the through movement
- An acceleration lane for motorists traveling WB on KY 446 to NB US 31W
- Modified access to US 31W for Carter Lumber closer to Porter Pike
- Modified connection to Dahlia Way from US 31W
- Carter Lumber may have right in / right out North of existing intersection

Benefits

- Provides urban context
- Slows motorist down
- US 31W SB to Bowling Green is continuous (heaviest movement)
- Continuous right turn from US 31W to KY446
- 330 feet of additional merge length for the movement from KY 446 WB to US 31W SB toward Bowling Green
- Improves the movement from KY446 WB to US 31W NB by providing a 180' long parallel acceleration / merge lane
- Less conflict points than a 4-way intersection (Alternative 3)
- Has less total delay than Alternative 3
- Eliminates two major safety concerns (merge from US 31W SB to Porter Pike and merge from KY 446 WB to US 31W NB)

Cons

- The continuous traffic flow along US 31W SB could potentially be moving at a higher rate of speed causing safety concerns for the KY 446 WB merging traffic
- KY 446 WB to US 31W SB (toward Bowling Green) is one of the highest volume movements the single left turn lane here would cause traffic to back up onto KY 446 prior to the signal
- NB 31W Traffic will still have a signal

Alternate 3 - 4-way intersection - Selected Alternative

Description

- Takes advantage of the existing infrastructure.

- US 31W is the through movement.
- Provides full access to Carter Lumber.
- Improves the movement from KY446 WB to US 31W NB by providing a 180' long parallel acceleration / merge lane
- Modifies existing right in / right out at Fruit of the Loom.

Benefits

- Least expensive
- Provides urban context
- Reduces speeds
- Consistent driver expectations
- Eliminates two major safety concern (merge from US 31W SB to Porter Pike and merge from KY 446 WB to US 31W NB)
- Fits in Pavement Rehab Project
- Exclusive right turn lanes for NB US 31W to KY 446 EB and KY 446 WB to US 31W NB
- Provides additional left turn storage from KY 446 WB to US 31W SB

Cons

- Most total delay
- Most conflict points

Alternate 4 - Roundabout

Description

- Utilizes continuous lanes for US 31W SB to US 31W WB and KY 446 EB to US 31W NB. Utilizes partial right turn slip lanes for US 31W EB to Proposed Entrance and from Proposed Entrance to KY 446 where traffic yields to conflicting exiting traffic.
- Provides for three lanes on US 31W from Porter Pike to the roundabout.
- Prohibits Parker Avenue access to Hennessy Way
- Carter Lumber access may require modification.
- Eliminates two major safety concerns (merge from US 31W SB to Porter Pike)

Benefits

- Least total delay of other options except Alternative 1
- Urban Context
- Keeps everyone moving
- Reduces speeds

Cons

- Complex and may be confusing to drivers
- Expensive
- Fruit of the Loom does back up in PM peak hour due to motorist “finding” gaps in traffic to head North on US 31W or South on US 31W toward Bowling Green. Therefore the newly installed signal may need to be left in place

Alternate 4a - Roundabout**Description**

- Utilizes continuous lanes for US 31W SB to US 31W WB and KY 446 EB to US 31W NB. Utilizes partial right turn slip lanes for US 31W EB to Proposed Entrance and from Proposed Entrance to KY 446 where traffic yields to conflicting exiting traffic.
- Provides for three lanes on US 31W from Porter Pike to the roundabout.
- Prohibits Parker Avenue access to Hennessy Way
- Carter Lumber access may require modification.
- Eliminates two major safety concerns (merge from US 31W SB to Porter Pike)
- Provides Extension to Porter Pike

Benefits

- Provides Extension to Porter Pike
- Least total delay of other options except Alternative 1 and 4
- Urban Context
- Keeps everyone moving
- Reduces speeds

Cons

- Complex and may be confusing to drivers
- Most expensive

- Fruit of the Loom does back up in PM peak hour due to motorist “finding” gaps in traffic to head North on US 31W or South on US 31W toward Bowling Green. Therefore the newly installed signal may need to be left in place

Option A – Access Management

Description

- Reduces 14 median openings to 3
- Provides for 3 U-turn areas
 - o Old Porter Pike
 - o Porter Pike
 - o Northgate Shopping Center
- Option to fix sight distance at Old Porter Pike (\$1,000,000 not including r/w and utility costs)
- Will most likely require signal at Old Porter Pike
- Dual left at Old Porter Pike
- Left turn offset on US 31 W at Old Porter Pike
- Shared use path on east side of US 31W
- Sidewalk on west side of US 31W

Pros

- Reduces conflicts
- Expected to reduce crashes 17%
- Improves sight distance at Old Porter Pike
- Channelizes some business access / parking lots
- Helps with drainage

Cons

- Changes driver expectation
- Removes median access to some businesses

Option B - Close Plum Springs Loop Underpass

Description

- Closes Plum Springs Loop Underpass
- Realigns KY 957 (PSL North)

Pros

- Relieves some congestion at US 31W / Porter Pike and Porter Pike / Dahlia Way intersections
- Eliminates cost of widening railroad bridge
- Realigns Plum Springs Loop and KY 957 at the US 31W North end

Cons

- Additional travel time for industry
- Additional travel time for emergency vehicles if a removable barricade is not used

Option C – Realign Parker Avenue**Description**

- Realigns Parker Avenue at US 31 W close space to provide for additional stacking / queuing space for motorists on Porter Pike at US 31W

Pros

- Additional 550 feet of queue length on Porter Pike Hennessy Way to Porter Pike
- Aligns Parker Avenue with River Place / Porter Pike intersection

Cons

- Expensive right of way costs

Option D – Reconfigure Corvette Drive and Duntov Way**Description**

- Reconfigure Corvette Drive and Duntov Way to one way from KY 446 (Spur Road) traffic

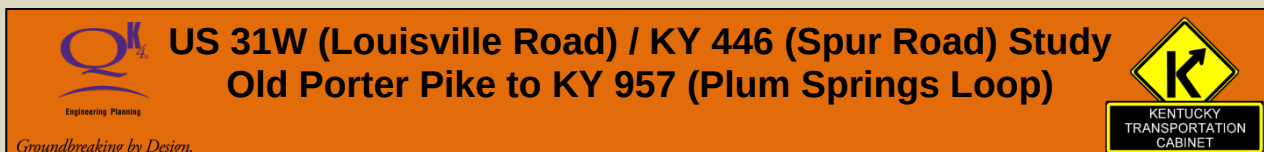
Pros

- Reduces conflicts from Hennessy Way and businesses very close to KY 446
- Channelizes business entrances
- Moves Shell entrance to Corvette Drive.
- Moves prior “Liquor Store” entrance to moved Hennessy Way”
- Improves travel flow at the KY 446 / Corvette Drive intersection.

Cons

- Additional travel for business patrons

PROJECT TEAM MEETING 4



PROJECT TEAM MEETING #4 MINUTES

Project: US 31W/KY 446 Study
Old Porter Pike to KY 957 (Plum Springs Loop)

Purpose: Project Team Meeting #4

Place: KYTC District 3 Office – Bowling Green

Meeting Date: December 10, 2015; 9:00 AM Central Time

Prepared By: Tom Springer

Attendees:

Greg Meredith	KYTC D3 CDE	greg.meredith@ky.gov
Joe Plunk	KYTC D3 Project Dev.	joseph.plunk@ky.gov
Jeff Moore	KYTC D3 Planning	jeff.moore@ky.gov
Shane McKenzie	KYTC CO Planning	shane.mckenzie@ky.gov
Andy Stewart	KYTC D3 Design	andrew.stewart@ky.gov
Wes Watt	KYTC D3 PIO	wes.watt@ky.gov
Deneatra Henderson	KYTC D3 Planning	deneatra.henderson@ky.gov
Renee Slaughter	KYTC D3 Env. Coord.	renee.slaughter@ky.gov
Sarah Payton	KYTC D3 Permits	sarah.payton@ky.gov
Daryl Price	KYTC D3 Engr. Support	daryl.price@ky.gov
Tim Sharp	KYTC D3 PDPI	tim.sharp@ky.gov
Karissa Lemon	BG/WC MPO	karissa.lemon@bgky.org
Brittany Fisher	BRADD	bfisher@bradd.org
Wendy Southworth	KYTC CO Highway Design	wendy.southworth@ky.gov
Barry House	KYTC CO Planning	barry.house@ky.gov
Mikael Pelfrey	KYTC CO Planning	mikael.pelfrey@ky.gov
Daniel Hulker	KYTC CO Planning	daniel.hulker@ky.gov
Tom Springer	Qk4, Inc.	tspringer@qk4.com
Jeremy Lukat	Qk4, Inc.	jlukat@qk4.com
Annette Coffey	Qk4, Inc.	acoffey@qk4.com
Andy Gilley	Qk4, Inc.	agilley@qk4.com

Overview and Introductions. Jeff Moore, KYTC Project Manager, provided a project overview, stating that KYTC will be advancing the pavement rehabilitation job that removes the westbound flyover ramp and remaining interchange ramps and realigns KY 446 to a 4-way signal with US 31W. Following introductions, Annette provided an overview of the future alternatives and improvement options, a discussion of the preferences from the Local Officials and Public Meeting #2, and a summary of the online survey results.

Among the alternatives considered, the roundabout option including the extension of Hennessey Way to Porter Pike (Alternative 4a) was the most preferred; the roundabout without that extension (Alternative 4) was somewhat preferred. Slightly more attendees opposed the continuous green T intersection (Alternative 2) than those who either preferred or somewhat preferred that major alternative.

The Option A - Access Management between Old Porter Pike and Porter Pike was the most preferred improvement option at the public meeting, receiving more green dots than all the others combined. Realignment Parker Avenue (Option C) was the second most preferred by attendees at the public meeting and slightly more preferred than Option A in the online survey. Reconfiguration of Corvette Drive/Duntov Way (Option D) and "Do Nothing" received both positive and negative reactions, while Option B closing the Plum Springs underpass was clearly opposed at the public meeting and received little interest in the online survey; however, the proposed realignment of KY 957 to US 31W North portion of Option B was looked upon favorably. See Attachment A, Pages 1-3 for more information.

Annette then presented some highlighted additional public comments for the project team and future design team to consider. See Attachment A, Pages 4-5.

A traffic comparison, summary of intersection delay and costs matrix was discussed and provided to the project team. See Attachment A, Page 6.

Recommendations. Qk4 provided Draft Recommendations for the KYTC Project Team to discuss and consider. See Attachment A, Page 7. After open discussion by the Project Team, it was agreed to make the following changes:

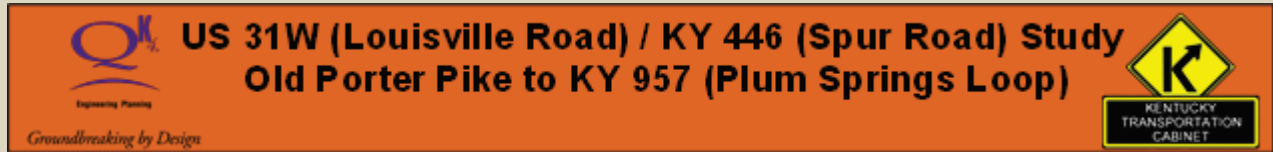
- Rename Short Term Priority #3, Option B to "Realign KY 957 with intersection of US 31W" and remove "Close Plum Springs Loop Underpass"

The Project Team noted that one option to improve the Plum Springs Loop Underpass is to lengthen the bridge; however, this is not recommended due to the high cost and low foreseen benefit. It is not a safety problem today and could see less usage in the future with the option to realign the KY 957 intersection. Also, Joe Plunk noted that with the pavement rehabilitation project, Dahlia Way is proposed to one day be connected to US 31W at a new signal, which could change the traffic volume at the underpass.

- Remove Short Term Priority #5, Option D to "Reconfigure Corvette Drive/Duntov Way Intersection" from the list of recommendations. This option is removed due to the noted opposition from stakeholders in the area, and the lack of notable support from the public.
- Long Term Priority 1, Alternative 4. The recommendation is to change the priority to Alternative 4a and generate a Project Identification Form (PIF) that includes the Roundabout and accommodates a future Porter Pike Extension. The Porter Pike realignment will remain a future project, as a separate PIF. The Porter Pike realignment would not be advanced without the Roundabout. Both PIFs should refer to one another.

The other recommendations remain as presented.

The Planning Study report will include a statement about the possibility of using an Adaptive Signal Control system, for the Quick Win implementation of the pavement rehabilitation project. However, it is understood that KYTC Traffic would make the ultimate decision, based on current policies.



PROJECT TEAM MEETING #4

Item No. N/A

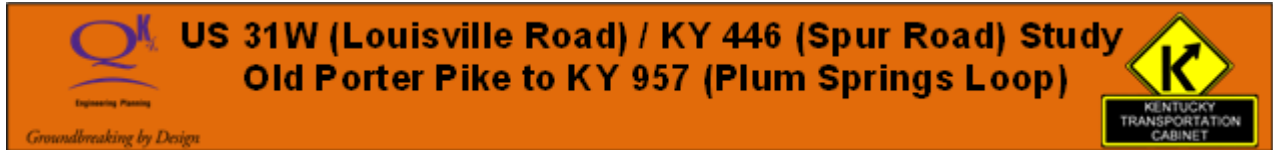
Warren County

KYTC District Office 3 – Bowling Green Office

Thursday, December 10, 2015 – 9:00 AM CST

AGENDA

1. Public Meetings / Local Officials Summary Discussion
2. Survey Summary
3. Public Meeting Summary
4. Future Alternatives & Options Priority Discussion
 - a. Do Nothing
 - b. Alternative 2 – Continuous Green Tee Intersection
 - c. Alternative 4 – Roundabout
 - d. Alternative 4a – Roundabout with Extension to Porter Pike
 - e. Options A, B, C, D
 - A: Access Management Control
 - B: Plum Springs Loop Closure & KY 957 Realignment
 - C: Realignment of Parker Avenue
 - D: Reconfiguration of Corvette Dr. & Duntov Way
5. Recommendations



Public Meeting # 2 – SUMMARY OF DOTS ON OVERSIZED EXHIBITS

Item No. N/A

Warren County

September 29, 2015, 4:00 to 6:00 PM CDT

National Corvette Museum Conference Center

350 Corvette Drive

Bowling Green, KY

ALTERNATIVE/ OPTIONS	PREFERRED	SOMEWHAT PREFERRED	NOT PREFERRED
ALTERNATIVES			
2 - Continuous Green Tee Intersection	4	6	12
4 - Roundabout	0	18	4
4a - Roundabout with Extension to Porter Pike	29	2	0
IMPROVEMENT OPTIONS			
A - Access Management Control from Old Porter Pike to Porter Pike	25	3	2
B - Plum Springs Loop Underpass Closing	0	3	30
C - Realign Parker Avenue	4	24	0
D - Reconfigure Corvette Drive and Duntov Way	8	4	8
Do Nothing	5	0	4

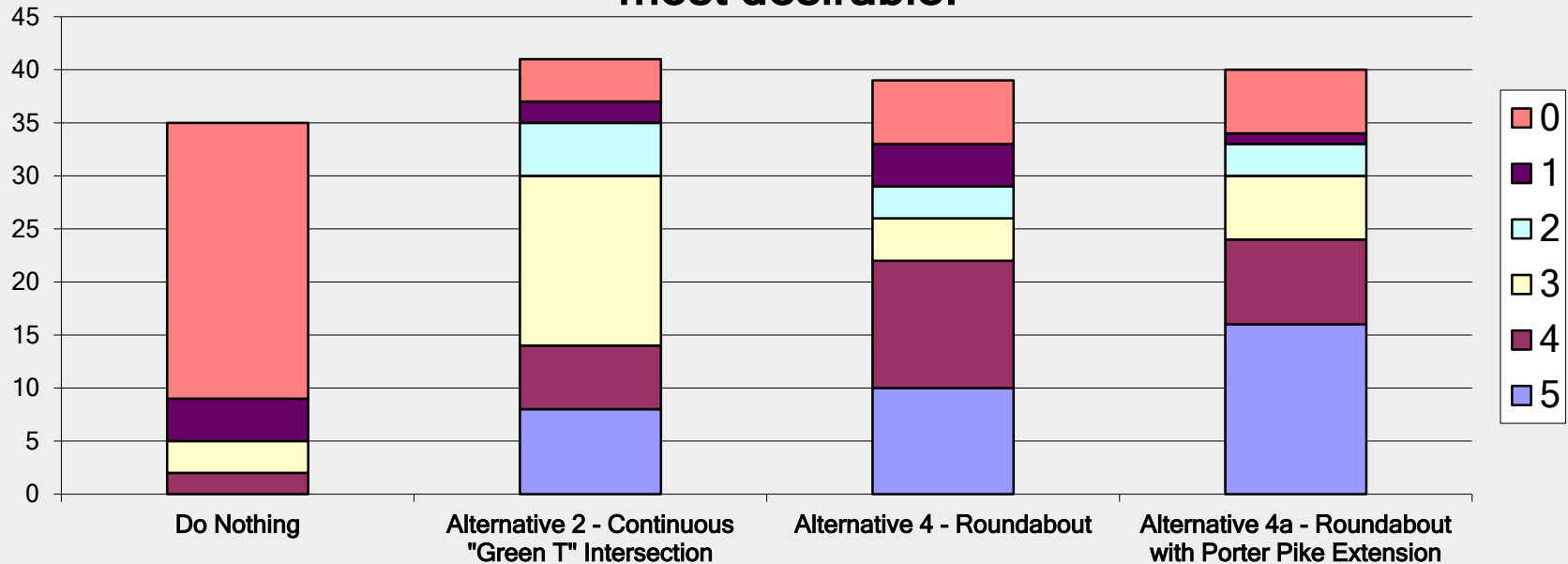
Among the alternatives considered the roundabout option including the extension of Hennessey Way to Porter Pike was the most preferred; the roundabout without that extension was somewhat preferred. Slightly more attendees opposed the continuous green T intersection than those who either preferred or somewhat preferred that major alternative.

The Option A - Access Management between Old Porter Pike and Porter Pike was the most preferred other option, receiving more green dots than all the others combined. Realigning Parker Avenue was somewhat preferred by nearly as many attendees. Reconfiguration of Corvette Drive/Duntov Way and "Do Nothing" received both positive and negative reactions, while closing the Plum Springs underpass was clearly opposed.

Summary of Survey Feedback

Preference for Future Alternatives

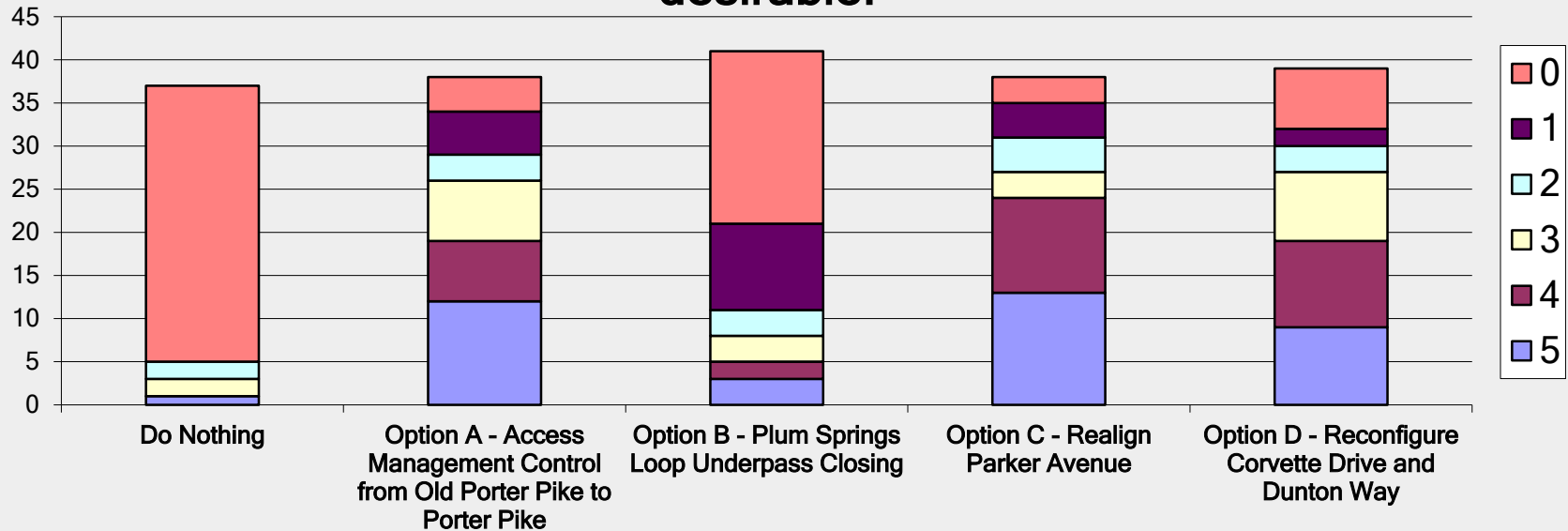
Please indicate your level of preference for the following future alternatives, 0 indicates least desirable and 5 being most desirable.



Summary of Survey Feedback

Preference for Future Options

Please indicate your preference for the following future options. 0 indicates least desirable and 5 being most desirable.



Summary of Survey Feedback

With Any Improvement

- KY 446 coming from I 65, trucks are slow so the cars get in the opposite lane and then cut over at the last minute to get in front of the truck. It causes back up in the opposite lane and is dangerous. This has become worse with the new intersection.
- Keep existing NB KY 446 to US 31W ramp and sign as “Truck Only Lane”.
- Sign corridor “Turn on Lights”
- Provide education video on texting, yielding, how to navigate roundabouts, and so on the public channel.
- Any changes should include features for pedestrian and bike safety.
- Concern of backup onto I-65
- **AEP and others** - concerned about an interruption of business during construction. AEP needs to ensure no access issues to our offsite warehouse on Scotty's Way
- Consider noise

Summary of Survey Feedback

Other

- Need full signal at Old Porter Pike
- Need sidewalk to and from bus station and local businesses - also for the area between old and new Porter Pike.
- On Option B - like Plum Springs realignment.
- Please change the signal at Plum Springs Loop and US 31W at the liquor store to a left-hand protected.
- Concern of access with Reconfigure Corvette Drive/Duntov Way
- The backlog of traffic exiting I-65 plus the ones exiting area businesses will be backed up past both of the existing traffic lights and will likely back up onto I-65 at times.

COMPARISON SUMMARY

	No Build	Reconstructed Interchange	Continuous Green Tee Intersection	4-Legged Intersection	Roundabout with no new connection to Porter Pike	Roundabout	No Build Except Closing Plum Springs Loop Underpass
Alternative #		1	2	3	4	4a	
Rank by Travel Time	4	3	6	7	1	2	5
Rank by Delay	3	4	6	7	1	2	5
Conflict Points (at US 31W/KY 446)	10	10	15	41	26	26	10
Delay in Minutes 2040 PM Peak Hour	5,979	6,557	10,490	11,275	5,160	5,316	7,171
Travel Time in minutes (2040 PM Peak Hour)	12,062	11,327	16,274	17,119	10,225	10,391	13,275
Estimated Cost (\$ million)	\$0.00	\$7.51	\$7.62	\$6.01	\$13.76	\$21.24	\$2.29
High Crash Spots Eliminated (2 possible)	0	2	2	2	2	2	0
Conflict Points (at US 31W/KY 446)	10	10	15	41	26	26	10

Delay = total network delay (from model)

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

SUMMARY OF INTERSECTION DELAY FOR EACH BUILD ALTERNATIVE

	US 31W/Northgate				US 31W/ Plum Springs				US 31W/Old Porter Pike*			
	AM	Delay	PM	Delay	AM	Delay	PM	Delay	AM	Delay	PM	Delay
2015	A	7	B	10	B	12	A	8	F	57	F	101
No Build 2040	B	19	B	13	B	18	B	10	F	356	F	815
Alternative 1	B	19	B	13	F	112	D	45	F	356	F	815
Alternative 2	B	19	B	13	F	112	D	45	F	356	F	815
Alternative 3	B	19	B	13	F	112	D	45	F	356	F	815
Alternative 4	B	19	B	13	F	112	D	45	F	356	F	815
Alternative 4a												
	KY 446/Corvette Drive				US 31W/ Porter Pike				US 31W/KY 446			
	AM	Delay	PM	Delay	AM	Delay	PM	Delay	AM	Delay	PM	Delay
2015	D	48	F	90	E	64	D	40	E	57	C	25
No Build 2040	C	31	F	95	F	116	D	41	F	123	C	29
Alternative 1	D	49	F	140	E	75	D	42				
Alternative 2	D	49	F	140	E	75	D	42	D	36	D	43
Alternative 3	D	49	F	140	E	75	D	42	F	245	F	152
Alternative 4	C	31	F	95	F	116	D	41	A	9	B	12
Alternative 4a												

Delay is seconds/vehicle

*LOS and Delay are for the northbound apporach only.

SUMMARY OF COSTS

	ALTERNATIVES					IMPROVEMENT OPTIONS				ADDITIONAL OPTIONS			
	1	2	3	4	4A	A	B	C	D	IMPROVEMENTS TO EXISTING INTERCHANGE			
Phases	Reconstruct Existing Interchange	“Green Tee” Intersection	Four-way Intersection	Roundabout	Roundabout with Hennessy to Porter Pike Connector	Access Management Control	Close Plum Springs Loop Underpass	Parker Avenue Realignment	Reconfigure Corvette Drive / Duntov Way	Raise Grade of US 31W Near Old Porter Pike	Calming Measures on Existing Flyover Ramp	Ramp Extension (KY 466 WB to NB US 31W)	Ramp Extension (KY 466 WB Ramp to SB US31W)
Design	\$560,000	\$500,000	\$420,000	\$1,720,000	\$2,100,000	\$320,000	\$100,000	\$100,000	\$100,000	\$100,000	\$1,800	\$132,000	\$75,000
R/W	\$800,000	\$1,850,000	\$825,000	\$2,100,000	\$3,600,000	\$1,475,000	\$375,000	\$1,175,000	\$275,000		\$0		
Utilities	\$545,000	\$370,000	\$565,000	\$1,340,000	\$1,835,000	\$2,240,000	\$1,180,000	\$550,000	\$500,000		\$0		
Construction	\$5,600,000	\$4,900,000	\$4,200,000	\$8,600,000	\$13,700,000	\$3,200,000	\$630,000	\$730,000	\$500,000	\$910,000	\$18,000	\$1,320,000	\$540,000
Total	\$7,505,000	\$7,620,000	\$6,010,000	\$13,760,000	\$21,235,000	\$7,235,000	\$2,285,000	\$2,555,000	\$1,375,000	\$1,010,000	\$19,800	\$1,452,000	\$615,000

US 31W/KY 446 Planning Study Recommendations

The following actions are recommended. These actions assume that a 4-legged intersection—conceptually similar to Alternative 3 -- will be constructed in the immediate future and that the new Fruit-of-the-Loom traffic signal will remain in place.

Short Term Priorities

1. Install and Calibrate Sub-Area Signal System: \$0.3 million – KYTC

This signal system should include the following individual traffic signals:

- a. US 31W/Corvette Drive
- b. US 31W/Fruit of the Loom
- c. US 31W/KY 446
- d. US 31W/KY 957
- e. US 31W/Porter Pike
- f. US 31W/Northgate Shopping Center

2. Option C – Realign Parker Avenue at Porter Pike: \$2.5 million - City

3. Option B – Close Plum Springs Loop Underpass: \$2.3 million - KYTC

4. Option A - Implement Access Management Strategy on US 31W: \$7.3 million - KYTC

5. Option D – Reconfigure Corvette Drive/Duntov Way Intersection: \$1.4 million - City

Medium Term Priority - KYTC

Reevaluate the US 31W/KY 446 Intersection - KYTC

Long Term Priority - KYTC

1. Alternative 4

- Improved LOS when compared to the 4-legged intersection.
- Improved LOS at the US 31W/Corvette Drive intersection during the AM peak period.
- Extension to Porter Pike provides very little improvement to LOS over the standalone roundabout
- The Fruit of the Loom signal will require additional study with this alternative.

Other Considerations

1. Extensive Public Involvement – Communication Plan – KYTC

2. Pedestrian Accommodations

Consider the installation of sidewalks along Parker Avenue near the Greyhound Bus Station and from Old Porter Pike to Porter Pike.

PROJECT TEAM MEETING 4

HANDOUTS



Groundbreaking by Design

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



PROJECT TEAM MEETING #4

Item No. N/A

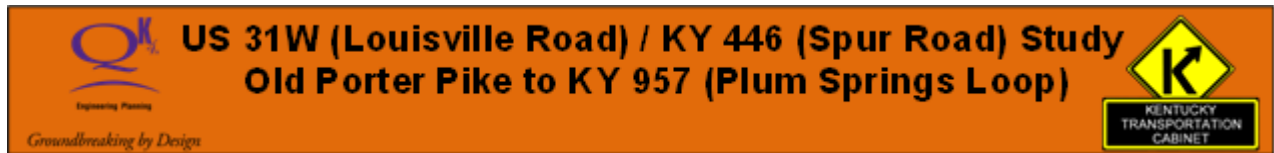
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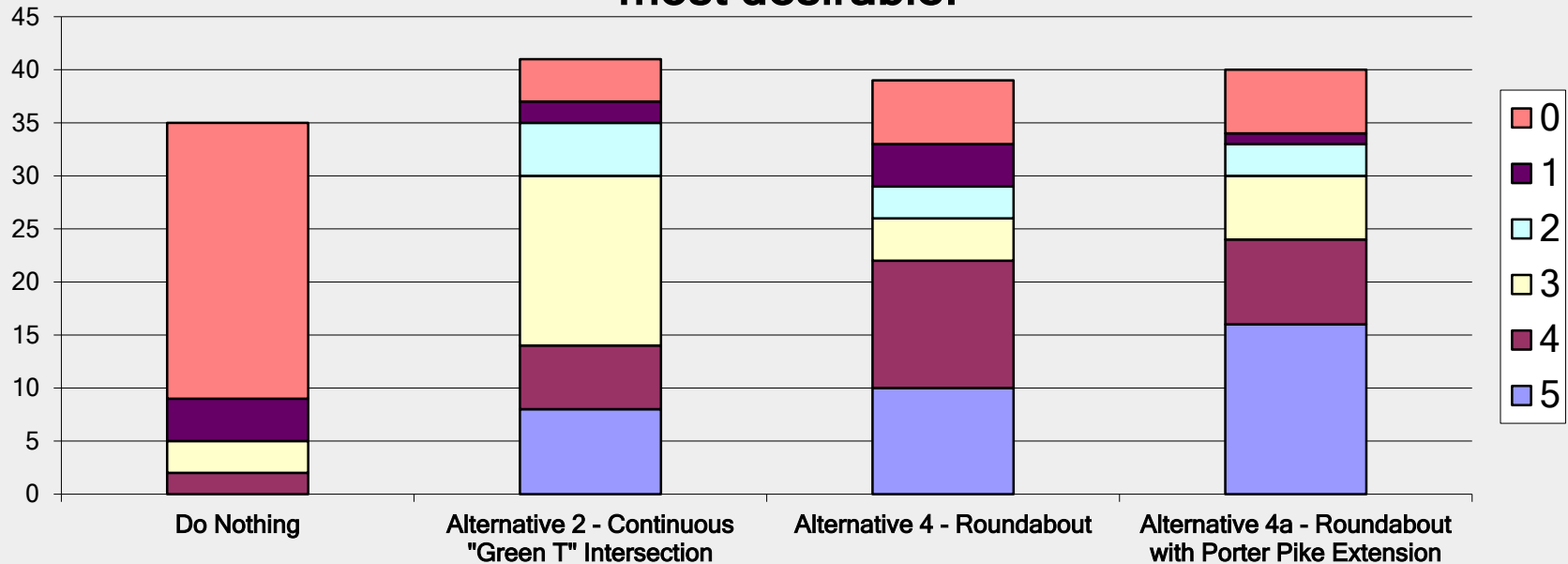
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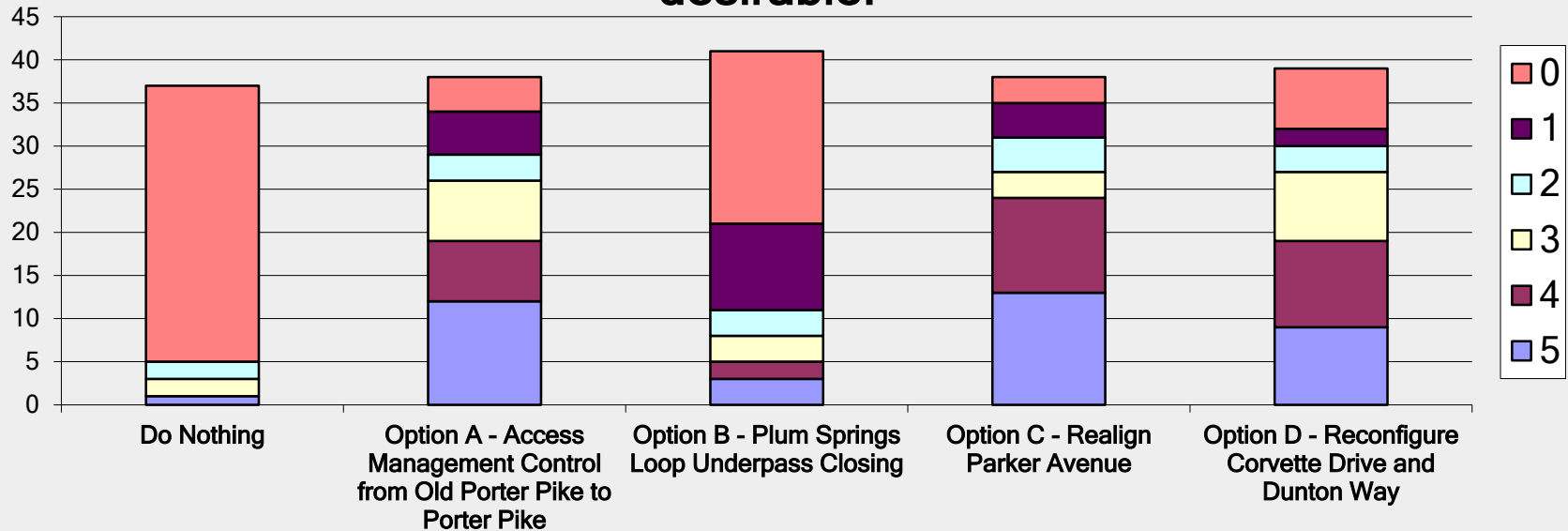
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SUMMARY OF COSTS

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R/W	\$800,000	\$1,850,000	\$825,000	\$2,100,000	\$3,600,000	\$1,475,000	\$375,000	\$1,175,000	\$275,000		\$0		
Utilities	\$545,000	\$370,000	\$565,000	\$1,340,000	\$1,835,000	\$2,240,000	\$1,180,000	\$550,000	\$500,000		\$0		
Construction	\$5,600,000	\$4,900,000	\$4,200,000	\$8,600,000	\$13,700,000	\$3,200,000	\$630,000	\$730,000	\$500,000	\$910,000	\$18,000	\$1,320,000	\$540,000
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US 31W/KY 446 Planning Study Recommendations

The following actions are recommended. These actions assume that a 4-legged intersection—conceptually similar to Alternative 3 -- will be constructed in the immediate future and that the new Fruit-of-the-Loom traffic signal will remain in place.

Short Term Priorities

1. Install and Calibrate Sub-Area Signal System: \$0.3 million – KYTC

This signal system should include the following individual traffic signals:

- a. US 31W/Corvette Drive
- b. US 31W/Fruit of the Loom
- c. US 31W/KY 446
- d. US 31W/KY 957
- e. US 31W/Porter Pike
- f. US 31W/Northgate Shopping Center

2. Option C – Realign Parker Avenue at Porter Pike: \$2.5 million - City

3. Option B – Close Plum Springs Loop Underpass: \$2.3 million - KYTC

4. Option A - Implement Access Management Strategy on US 31W: \$7.3 million - KYTC

5. Option D – Reconfigure Corvette Drive/Duntov Way Intersection: \$1.4 million - City

Medium Term Priority - KYTC

Reevaluate the US 31W/KY 446 Intersection - KYTC

Long Term Priority - KYTC

1. Alternative 4

- Improved LOS when compared to the 4-legged intersection.
- Improved LOS at the US 31W/Corvette Drive intersection during the AM peak period.
- Extension to Porter Pike provides very little improvement to LOS over the standalone roundabout
- The Fruit of the Loom signal will require additional study with this alternative.

Other Considerations

1. Extensive Public Involvement – Communication Plan – KYTC

2. Pedestrian Accommodations

Consider the installation of sidewalks along Parker Avenue near the Greyhound Bus Station and from Old Porter Pike to Porter Pike.