

Value Engineering Study

KY338 RECONSTRUCTION PROJECT AT I-71/I-75 BOONE COUNTY, KENTUCKY

ITEM NUMBER 6-18.00

VE STUDY NUMBER 201206



Study Date: August 13-17, 2012



Kentucky Transportation Cabinet
Frankfort, Kentucky



**KY338 RECONSTRUCTION PROJECT AT I-71/75
BOONE COUNTY, KENTUCKY**

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**VALUE ENGINEERING STUDY
for
Kentucky Transportation Cabinet
Frankfort, Kentucky**

Study Date: August 13-17, 2012

Draft Report

August 22, 2012



EXECUTIVE SUMMARY

General

URS conducted a value engineering (VE) study of the KY338 Reconstruction Project at I-71/I-75 in Boone County, Kentucky. The Item Number (No.) is 6-18.00. The topic was the 30% design submission prepared by the Florence & Hutcheson Design Team (Design Team) for the Kentucky Transportation Cabinet (KYTC).

The VE Team undertook the task assignment using the value engineering work plan and approach. The ideas generated from this process and chosen for full development as VE Team Recommendations are presented in Section 3 of this report. These recommendations are presented to all project stakeholders for judgment as to whether they should be implemented.

Estimate of Construction Costs and Budget

The preliminary construction cost estimate provided to the VE Team with the project documents indicates a total construction cost of \$70,994,000 including utility relocations and right-of-way (ROW). This project is scheduled to be developed as a traditional design/bid/build project, thus the cost of construction will be determined on a contractor bid.

Summary of VE Study Results

During the speculation phase of this VE study, 37 creative ideas were identified; 12 of these ideas were developed into VE recommendations and 17 were developed into design comments with cost implications where applicable. Many of the ideas represent changes in design approach, reconsideration of criteria, and in some cases, modification of the project scope. In general, the idea evaluation took into account the economic impact, other benefits obtained, and the effect on the overall project objectives.

The following table presents a summary of the ideas developed into recommendations and design comments with cost implications where applicable. Since cost is an important issue for comparison of VE proposals, the costs presented in this report are based upon original design quantities with unit rates obtained from the estimate as prepared by the Design Team and included in their submission, published cost databases, and VE Team member experience.

The table also identifies the recommendations and alternatives that, in the opinion of the VE Team, are the best combination of all the VE recommendations. This selection takes into account that the cost savings of these recommendations can be added together (summarily additive), and it also considers whether the cost savings or project improvement potential are worth the change to the project design.

For this project, the VE Team selected a mutually exclusive scenario to represent a range recommendations and potential cost savings. This scenario comprised a combination of individual recommendations as shown in the Summary of VE Recommendation table. The VE Team's Selected Combination represents an estimated potential cost savings of \$14,338,000. Total cost savings realized will be based upon the final implementation status of these VE recommendations.

SUMMARY OF VE RECOMMENDATIONS

Rec #	Recommendation Title / Description	1st Cost Savings (or Cost)	VE Selected Combo
VE-1	Relocate Frogtown Connector to meet Paddock Drive just north of the strip mall in lieu of connecting south of the strip mall	Comment	X
VE-2	Reduce the number of lanes on Triple Crown Boulevard at KY338	Comment	X
VE-3	Construct a roundabout at KY338 and Triple Crown Boulevard in lieu of a new signalized intersection	\$21,000	X
VE-4	Terminate the backage road between the Huntington Bank and BP gas station in lieu of continuing road to the storage facility	\$742,000	
VE-5	Terminate the backage road between Wendy's and BP gas station in lieu of continuing road	\$949,000	X
VE-6	Shift the northbound I-71/I-75 exit ramp westward and construct only one right turn lane to reduce the retaining wall and pavement costs	\$428,000	X
VE-7	Utilize two westbound lanes through the DCD interchange in lieu of only one westbound lane	Comment	X
VE-8	Utilize properly sized entrance and exit ramps in lieu of continuous auxiliary lanes on I-71/I-75 north of KY338 and long ramps to the south of KY338	\$4,723,000	X
VE-9	Install a ramp meter on the I-71/I-75 northbound on-ramp	Comment	
VE-10	Put shared use path through the center span of the I-71/I-75 underpass between the eastbound and westbound traffic in lieu of original design	\$564,000	X
VE-11	Defer US25 improvements in lieu of widening roadway to five lanes	\$20,989,000	
VE-12	Reduce the number of lanes that pass under the railroad to 3 lanes in lieu of 5 lanes	\$789,000	
VE-13	Investigate top-down construction of the railroad bridge overpass to eliminate the need for temporary retaining walls	Comment	X
VE-14	Utilize an improved at-grade intersection at KY338 and US25 with an at-grade railroad crossing on existing KY338 alignment in lieu of constructing a SPUI	\$16,240,000	
VE-15	Utilize a depressed at-grade intersection at KY338 and US25 with a smaller footprint than alternative E-3 and left turn access from KY338 to businesses in lieu of SPUI	\$7,653,000	X
VE-16	Utilize roundabout at US25 and KY338 with left turn access from KY338 to businesses in lieu of a SPUI	\$7,614,000	
VE-17	Utilize jughandle connections from KY338 to a grade separated US25 (PSUI - Paul Slone Urban Interchange) in lieu of a SPUI	\$7,456,000	
VE-18	Utilize 2 lanes on northbound Paddock Drive in lieu of 3 lanes	Comment	

SUMMARY OF VE RECOMMENDATIONS

Rec #	Recommendation Title / Description	1st Cost Savings (or Cost)	VE Selected Combo
VE-19	Eliminate the right turn in lanes from KY338 into Huntington Bank and the BP gas station	Comment	
VE-20	Reduce radii on DCD off-ramps to calm traffic approaching the interchange	Comment	
VE-21	Provide pedestrian connections to business from the shared use path	Comment	
VE-22	Utilize one sidewalk in lieu of two sidewalks on KY338 east of US25	Comment	
VE-23	Close KY338 during construction just west of US25 in lieu of maintaining traffic during construction	Comment	
VE-24	Revise the service road connections between Winning Colors Drive and Old Richwood Road in lieu of rebuilding Best Pal Drive	Comment	
VE-25	Verify railroad siding area, connection to US25, and associated earthwork are including in the project documents	Comment	
VE-26	Eliminate the kink in the end bents of the SPUI to ease construction	Comment	
VE-27	Utilize Frogtown Road Connector for left turns out of north side development area on KY338	Comment	
VE-28	Utilize only one lane for the I-75 southbound on-ramp	Comment	
VE-29	Utilize Shorland Drive as an alternative access to industrial park	Comment	

VE Team's Selected Combination: \$14,338,000

Acknowledgments

A thank you is given to the staff members from the Kentucky Transportation Cabinet, Kentucky Transportation Center (KTC), and the Florence & Hutcheson Design Team for their participation. Special thanks are also extended to Mr. Brent Sweger for his assistance with this study.

Value Engineering Study Team

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Certification

This is to verify that the Value Engineering study was conducted in accordance with standard value engineering principles and practices.



Kyle Schafersman, PE, CVS
Value Engineering Program Manager

TABLE OF CONTENTS

<i>Section and Title</i>	<i>Page Number</i>
1. Introduction.....	1
2. Project Description	2
3. VE Recommendations & Design Comments	7

Appendices

A. Study Participants	A-2
B. Cost Information	A-6
C. Function Analysis	A-8
D. Creative Idea List and Evaluation	A-10
E. VE Punch List.....	A-13
F. Rejected Recommendations.....	A-17

SECTION 1 - INTRODUCTION

This report documents the results of a value engineering study on the KY338 Reconstruction Project at I-71/I-75 in Boone County, Kentucky. The Item Number (No.) is 6-18.00. The study was held at the KYTC offices in Frankfort, KY on August 13-17, 2012. The study team was from URS, KTC, and KYTC. Kyle Schafersman, a Certified Value Specialist (CVS), Professional Engineer (PE), and team leader from URS, facilitated the study. The names and telephone numbers of all participants in the study are listed in Appendix A.

The Job Plan

This study followed the value engineering methodology as endorsed by SAVE International, the professional organization of value engineering. This report does not include any detailed explanations of the value engineering / value analysis processes used during the workshop in development of the results presented herein. This would greatly expand the size of the report. The sole purpose of this report is to document the results of the study. Additional information regarding the processes used during the study can be obtained by contacting the Certified Value Specialist team leader that facilitated the study.

Ideas, Recommendations, and Design Comments

Part of the value engineering methodology is to generate as many ideas as is practical, evaluate each idea, and then select as candidates for further development only those ideas that offer added value to the project. If an idea thus selected, turns out to work in the manner expected, that idea is put forth as a formal value engineering recommendation. Recommendations represent only those ideas that are proven to the VE Team's satisfaction. Some ideas that did not make the selection for development as recommendations, were, nevertheless judged worthy of further consideration. These ideas have been written up as Design Comments and are included in Section 3 with the recommendations.

Level of Development

Value analysis studies are working sessions for the purpose of developing and recommending alternative approaches to a given project. As such, the results and recommendations presented are of a conceptual nature, and are not intended as a final design. Detailed feasibility assessment and final design development of any of the recommendations presented herein, should they be accepted, remain the responsibility of the owner. VE Team members have not and will not sign or seal any recommendations and comments contained in this report as certifiable engineering or architectural design. These value analysis alternatives have been developed by individual VE Team members and may not reflect the entire VE Team's opinion.

Organization of the Report

The report is organized in the following outline.

- A. Introductory Information
 - Section 1- Introduction
 - Section 2- Project Description
- B. Primary Body of Results
 - Section 3- Recommendations and Design Comments
- C. Supporting Documentation
 - Appendices

SECTION 2 – PROJECT DESCRIPTION

KYTC proposes the reconstruction of Kentucky Highway 338 (KY338, Richwood Road) at the Interstate-71/Interstate-75 (I-71/I-75) interchange including the KY338/US Highway 25 (US25) intersection to the east in Boone County, Kentucky.

Purpose and Need

The KYTC completed an Interchange Justification Study (2010), which identified converting the existing KY338 diamond interchange at I-71/I-75 to a double crossover diamond as the preferred design approach to meet the project need. The purpose of this project is to increase safety, improve functionality, and reduce traffic delays experienced at and within the immediate vicinity of the I-71/I-75 and KY338 interchange, and thereby enhancing the viability of I-71/I-75 as a major transportation corridor.

The KY338 Interchange Justification Study documented that the KY338 (Richwood Road) interchange with I-71/I-75 is currently congested and carries substantial (up to 33%) truck traffic due to the truck stops at the interchange and the industrial park immediately east of US25. Rapid growth of 2% to 5% per year along the KY338 interchange is anticipated to continue for the foreseeable future given its proximity to Cincinnati, availability of land, interstate and airport access, and national prominence of I-75 as a major truck route. Also, the Norfolk Southern Rail, which runs parallel to US25, supports 28 to 36 trains per day, which adds to the traffic delays and presents safety hazards from two at-grade railroad crossings within the study area. Twelve crashes, including three injuries, have occurred in the last five years at the two intersections leading to or from the at-grade railroad crossings.

The average daily traffic (ADT) on Richwood Road is approximately 10,300 immediately west of the I-71/I-75 interchange to approximately 15,500 immediately east of the I-71/I-75 interchange. The ADT for I-71/I-75 varies from approximately 74,100 south of the Richwood Road interchange to approximately 104,000 immediately north of the Mt. Zion Road interchange.

As part of the KY338 Interchange Justification Study, crash rates were calculated for the roadways within the study area for the three year period from 2004 to 2006. Crash data obtained from the Collision Report Analysis for Safer Highways (CRASH) database were used to calculate the crash rates for sections of I-71/I-75 and KY338. The crash rates were compared to the critical crash rates for the similar roadways within the state, and the ratio of the two values was determined to obtain the Critical Rate Factor (CRF). A CRF that exceeded 1.0 was considered a high crash location. I-71/I-75 is classified as an urban interstate within the study area, and does not exceed the statewide average crash rate ($CRF < 1$). KY338 is classified as a three-lane urban arterial. The table below summarizes the crash data for KY338 within the study area. The overall CRF for KY338 (Richwood Road) substantially exceeds one. On KY338, the entire segment from US25 to the Frogtown Road Connector has a CRF in excess of one, with the highest CRF being exhibited between the I-71/I-75 underpass and the southbound ramps. The CRF in this area is 2.56. The CRF drops to below one west of the Frogtown Road Connector. The most frequent type of crash was rear-end crash with 37%, followed by angle crashes at 26%. Overall, 82% of the crashes on KY338 in the study area occurred during the day and 79% under dry conditions. For KY338, property damage only crashes were the most frequently occurring, followed by injury crashes. There were no fatal crashes on KY338 within the study area from 2004 to 2006.

2004-2006 Average Crash Rate for KY 338

Study Area Section	Statewide Average (100 MVM)	Project Average Crash Rate (100 MVM)	Statewide Critical Crash Rate (100 MVM)	Critical Crash Rate Factor
KY 338 (Richwood Road)	256	1,703.2	566.3	3.01

MVM – Crashes per 100 million vehicle miles

Project Location and Description

The approximately 307-acre study area is located at the KY338 interchange at I-71/I-75 (Exit 175), near the community of Richwood, Kentucky. The study area extends approximately 0.8 mile south and 1.2 miles north of the I-71/I-75 and KY338 interchange to accommodate interstate lane widening.

To the west of the interchange, the study area extends along KY338 from the interstate to approximately 1,000 feet west of Triple Crown Boulevard and north to Frogtown Connector Road. Construction in this area will consist of lane widening and tie-ins to existing roads used to access the commercial developments in the area. To the east of the interchange, the study area consists of the KY338/US25 intersection area, which will be reconstructed and reconfigured.

The project includes improvements to:

- The I-71/I-75 interchange at KY338/Richwood Road,
- I-71/I-75 between the Frogtown Road underpass and the KY338/Richwood Road interchange,
- The Richwood Road intersection with US25/Dixie Highway, and
- Richwood Road between I-71/I-75 and Triple Crown Boulevard.

I-71/I-75 and KY338 Interchange and I-71/I-75 Auxiliary Lanes

The existing KY338 diamond interchange will be converted to a double crossover diamond (DCD) interchange. The DCD interchange takes the traffic that is heading westbound (which is normally on the north side of a road) and crosses it over to the south side of the road. It does the opposite for the eastbound traffic, taking them from the south side of the road to the north side. Once through the interchange, the lanes crossover again and return to a traditional configuration. By crossing over the travel lanes within the interchange, the left turn movements do not conflict with oncoming traffic.

On I-71/I-75, auxiliary lanes will be added to the north of the interchange to increase capacity and improve geometrics to facilitate passenger and truck traffic entering and exiting I-71/I-75. In the southbound direction, an auxiliary lane will be added to I-71/75 south of the existing bridge over Frogtown Road and will become an exit only lane at the KY338 off-ramp. The northbound entrance ramp from KY338 will be extended as an auxiliary lane, becoming an exit-only lane to the rest area north of Frogtown Road.

Preferred Eastern Alternative (E-1)

The project includes improvements to KY338 east of its interchange with I-71/I-75 including access management measures, grade-separation or closure of the two at-grade railroad crossings, and modifications to the intersection with US25/Dixie Highway. The preferred eastern alternative (E-1) is discussed below.

This alternative converts the intersection of KY338 and US25 (Dixie Highway) into a Single Point Urban Interchange (SPUI). Both KY338 and US25 will be widened to two lanes in each direction within the

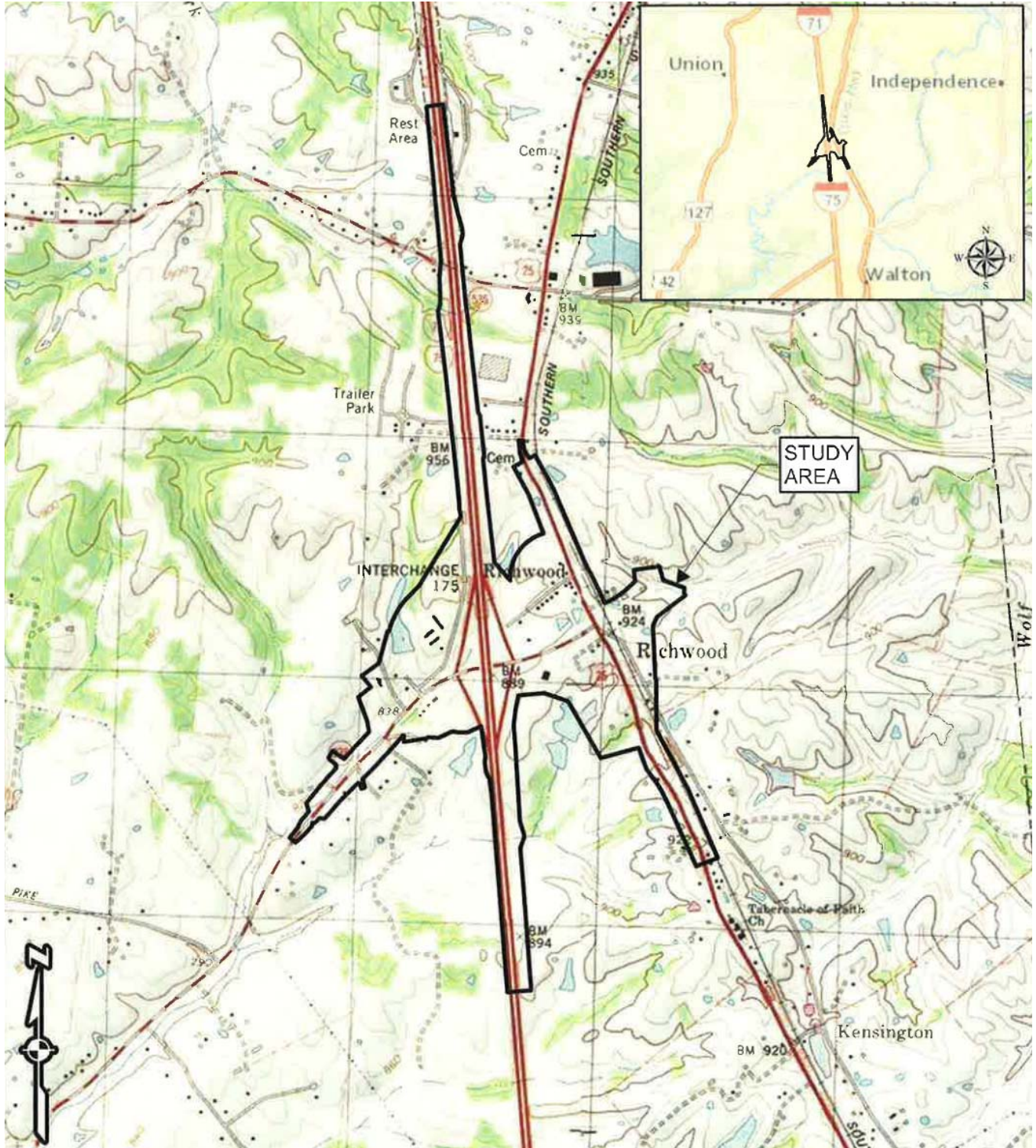
project limits. KY338 will be routed under US25 and the Norfolk Southern Railroad, which will remain at roughly their existing elevations. US25 will be reconstructed from approximately Logistics Boulevard to Duffel Lane, with two lanes in each direction. The Shorland Drive at-grade railroad crossing will be closed. A signal will be added at the Best Pal Drive intersection with KY338, and Best Pal Drive will be extended to connect with Old Richwood Road; the Old Richwood Road intersection with US25 will be closed due to its proximity to the new SPUI.

Preferred Western Alternative (W-7)

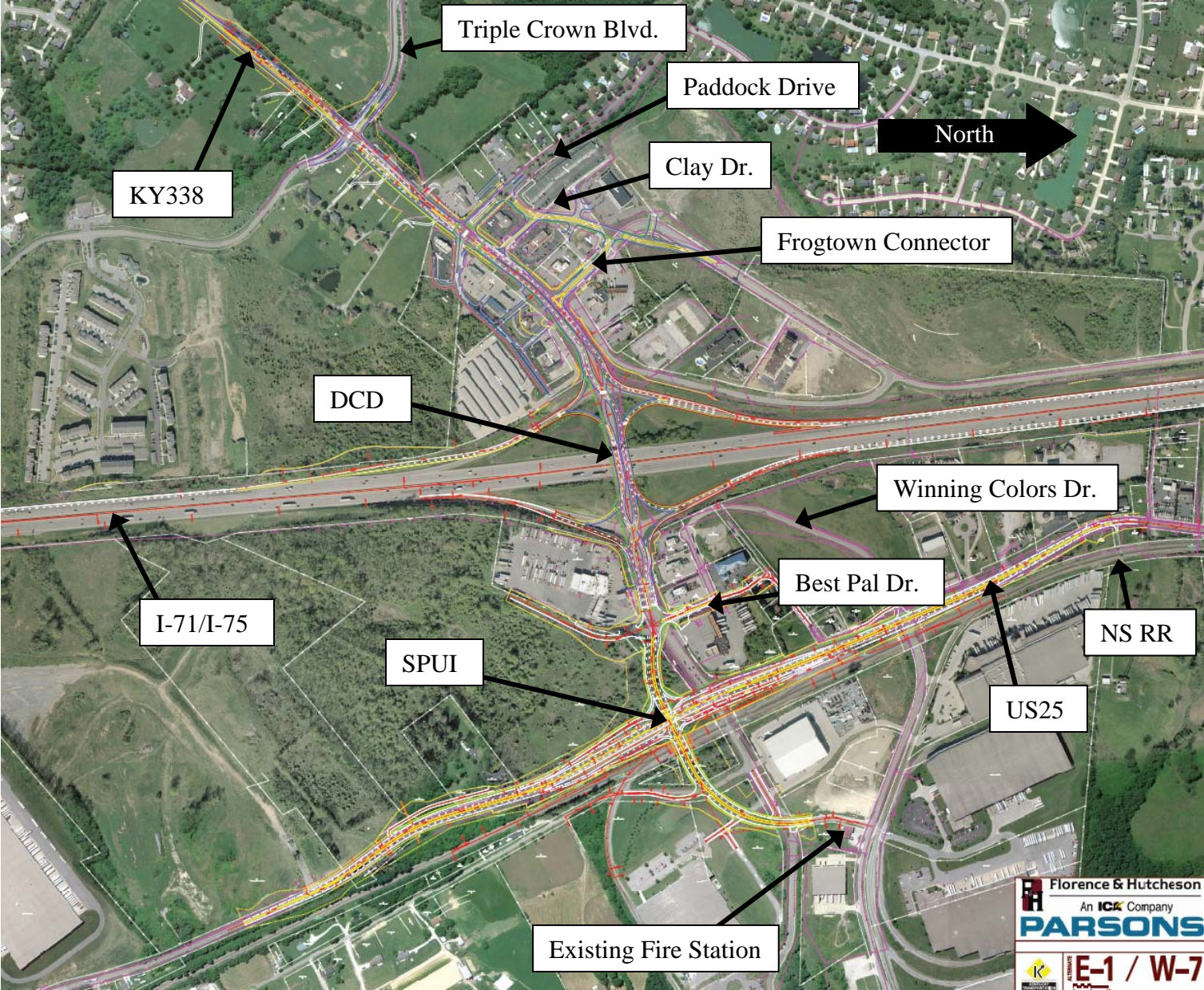
To ensure that the KY338 interchange with I-71/I-75 continues to meet operational requirements, access management measures are required within the commercial district west of the interchange. These alternatives begin at the ramp intersections and continue to approximately 1,000 feet west of Triple Crown Boulevard. For purposes of this study, the disturbance limits of the preferred western alternative (W-7) were combined with the disturbance limits of the I-71/I-75 and KY338 interchange and I-71/I-75 auxiliary lanes to create two western alternative disturbance limits. The connection of the eastern and western alternatives is approximately 800 feet east of the KY338 and I-71/I-75 interchange on KY338.

KY338 will be widened to two lanes in each direction from the interchange to 1,000 feet west of Triple Crown Boulevard. The Paddock Drive and Triple Crown Boulevard intersections will be signalized. The existing Frogtown Connector and Clay Drive intersections will become right-in/right-out only. All direct business drives onto KY338 in the area will be closed. The Paddock Drive intersection will become the primary access point for commercial businesses in the area. South of KY338, a new access road will be constructed behind the businesses fronting on KY338 terminating at the access drive to the storage facility. North of KY338, Frogtown Connector will be realigned (“New Frogtown Connector”) to terminate at Paddock Drive, where a new signal will be installed. West of Triple Crown Boulevard, KY338 transitions back to its existing two lane configuration.

Map of Project Location



Manuscript Plan of Original Design



SECTION 3 - VE RECOMMENDATIONS & DESIGN COMMENTS

Organization of Recommendations

This section contains the complete documentation of all recommendations that have resulted from this study. Each recommendation has been marked by a unique identification number.

The parent idea, or ideas from which the recommendation began, can be determined from the Creative Idea List and Evaluation located in Appendix D of this report.

Each recommendation is documented by a separate write-up that includes:

- a description of both the original design and recommended change,
- a list of advantages and disadvantages,
- sketches where appropriate,
- calculations,
- estimate of initial or first cost,
- the economic impact of the recommendation on the first cost (i.e., amount of dollars saved or added),
- and where applicable, the life cycle (LC) cost.

The economic impact is shown in terms of savings or added cost.

Acceptance of VE Recommendations

The Summary of VE Recommendations table presented in the Executive Summary of this report identifies the recommendations that, in the opinion of the VE Team, are the best combination of all the VE recommendations. This selection takes into account not only that the recommendations, and likewise their cost savings, are summarily additive (can be added together), but also the likelihood and ease of implementing the recommendations.

However, this report also includes other recommendations that could enhance the value of this project. These recommendations are either mutually exclusive of the recommendations selected by the VE Team (i.e., implementing one immediately precludes the implementation of another) or they require additional design and/or evaluation prior to implementation. These recommendations should be evaluated individually to determine whether they are worthy of implementation or not. Consideration should be given to the areas within a recommendation that are acceptable and implement those parts only. Any recommendation can be accepted in whole or in part as the owner and Design Team see fit.

Design Comments

Design Comments are ideas that in the opinion of the VE Team were good ideas, but for any number of reasons were not selected for development as VE recommendations. Design Comments can be notes to the owner or designer, a documentation of various thoughts that come up during the course of the study, a reference to possible problems, suggested items that might need further study, or questions that the owner and designer might want to explore. These comments may have implications on project cost, but due to time constraints, the VE Team did not develop cost savings estimates for Design Comments. Some comments might relate to things of which the owner or designer is already aware. Because the study is done on a design in progress and as an independent team, the VE Team may not be aware of everything intended by the owner and designer. The following comments are presented with the intent that they may aid the Design Team in some way.

VALUE ENGINEERING DESIGN COMMENT # VE-1

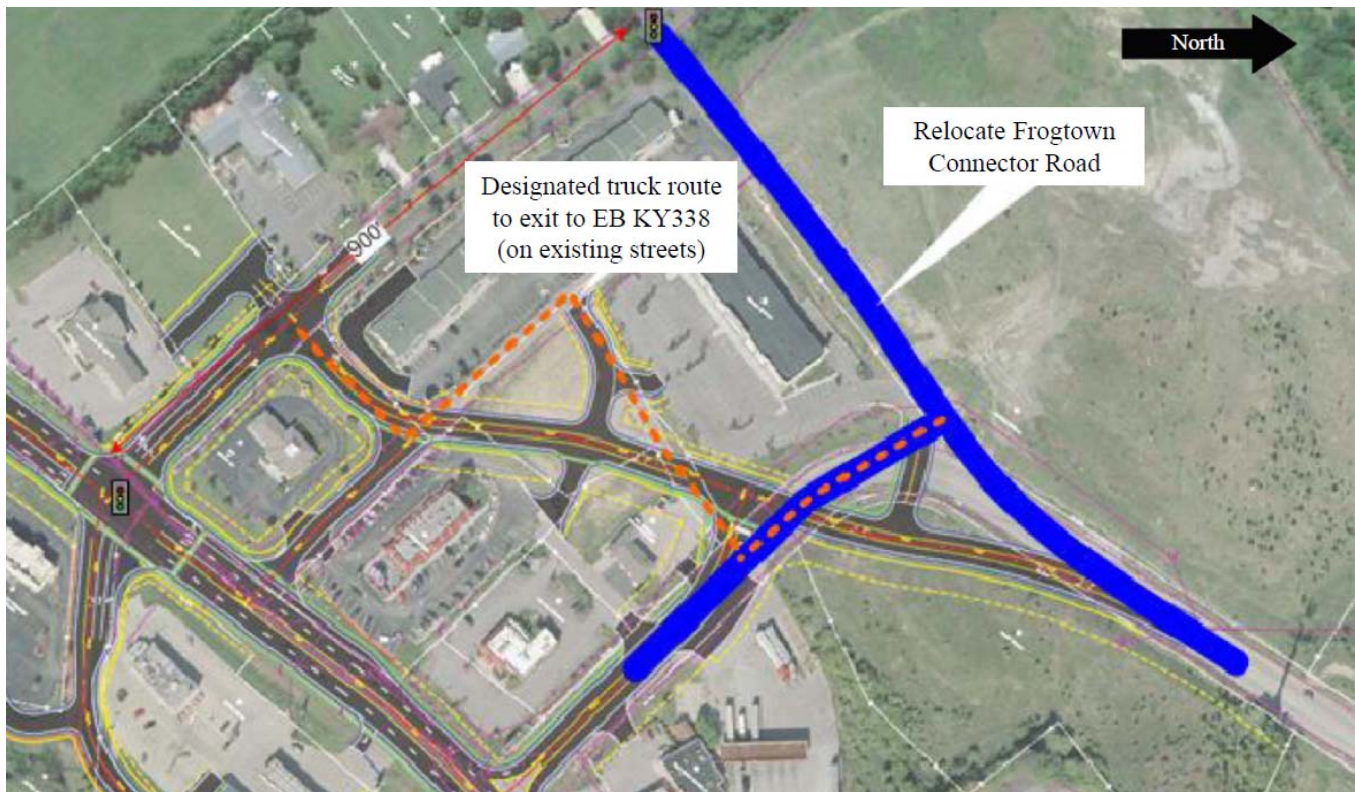
DESCRIPTIVE TITLE OF DESIGN COMMENT:

Relocate Frogtown Connector to meet Paddock Drive to just north of the strip mall in lieu of connecting south of the strip mall.

COMMENTARY:

There is concern that during the peak hours there will be long queues on Paddock Drive waiting to turn left, thus causing traffic operational problems at the proposed intersection of Paddock Drive and relocated Frogtown Connector Road. As proposed, there is only 250 feet of space between the two intersections. To help avoid future queuing conflicts, Frogtown Connector Road can be connected to Paddock Drive on the opposite side of the shopping center, approximately 900 feet from KY338.

To accommodate trucks and avoid trucks running through the residential area, upgrades to the existing access road system can be made. This would entail reworking the radii of corners to account for needed tracking during turns. An alternate to this would be to send the trucks back to KY338 and provide a U-turn location to the west, possibly with a roundabout at Triple Crown Boulevard.



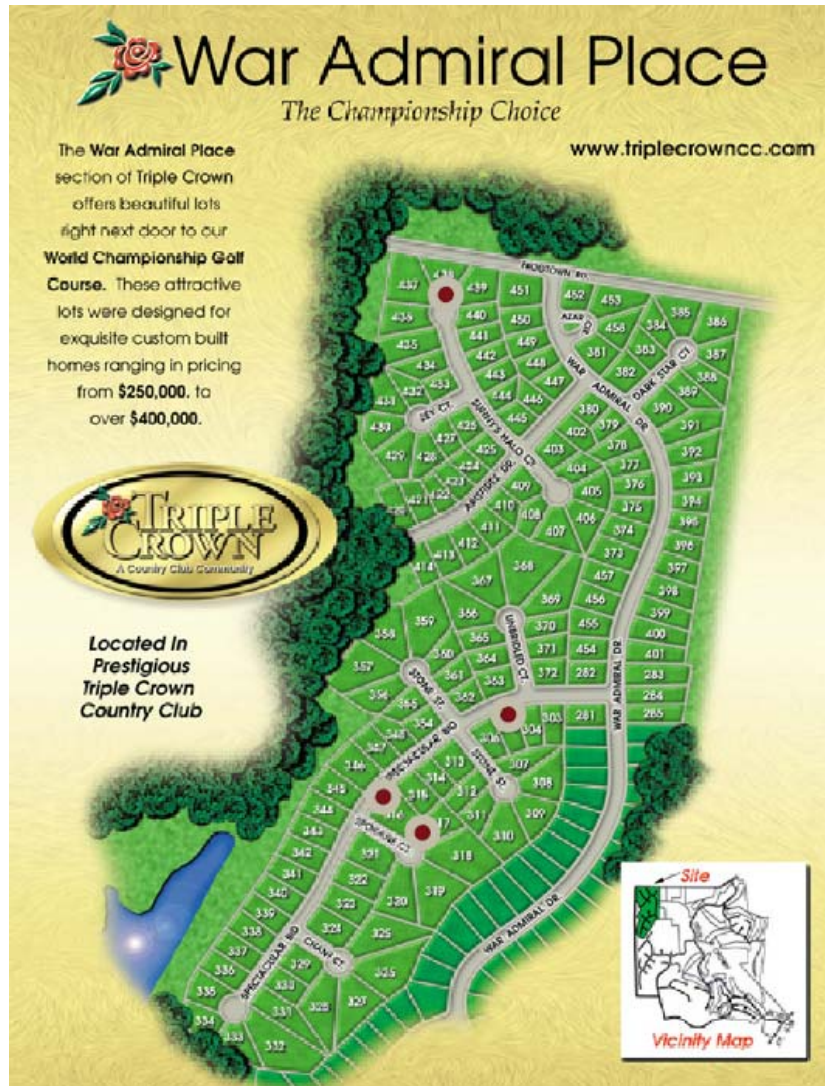
VALUE ENGINEERING DESIGN COMMENT # VE-2

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Reduce the number of lanes on Triple Crown Boulevard at KY338.

COMMENTARY:

The proposed forecast for residential areas within Triple Crown, National Boulevard and Paddock Road assume a 2 percent annual growth rate to the design year. However, review of the existing subdivisions indicates that little developable land exists (e.g., Triple Crown currently has only 60 lots available for purchase). Utilizing the lower volumes to/from Triple Crown Boulevard may allow for acceptable operations without the need for the dual left turn lanes exiting Triple Crown. It is proposed that the existing entrance be maintained. However, the final design should accommodate future widening at the entrance if needed by providing proper alignment with a dual left turn lane from Triple Crown. This recommendation will reduce the amount of work on the landscaped entrance to Trip Crown and reducing construction costs. Furthermore, the single left turn egress from Triple Crown Boulevard will facilitate permitted left turn movements on the side streets, improving capacity and operations at the overall intersection.



VALUE ENGINEERING RECOMMENDATION # VE-3

DESCRIPTIVE TITLE OF RECOMMENDATION:

Construct a roundabout at KY338 and Triple Crown Boulevard in lieu of a new signalized intersection.

ORIGINAL DESIGN:

The original design specifies a signalized intersection at KY338 and Triple Crown Boulevard.

RECOMMENDED CHANGE:

The VE Team recommends changing the intersection type to a roundabout.

ADVANTAGES:

- Allows for safe and efficient traffic movement
- Allows U-turns for trucks that miss turn into commercial area
- Transition between rural high speed road to urban, commercial zone
- Attractive design

DISADVANTAGES:

- None apparent

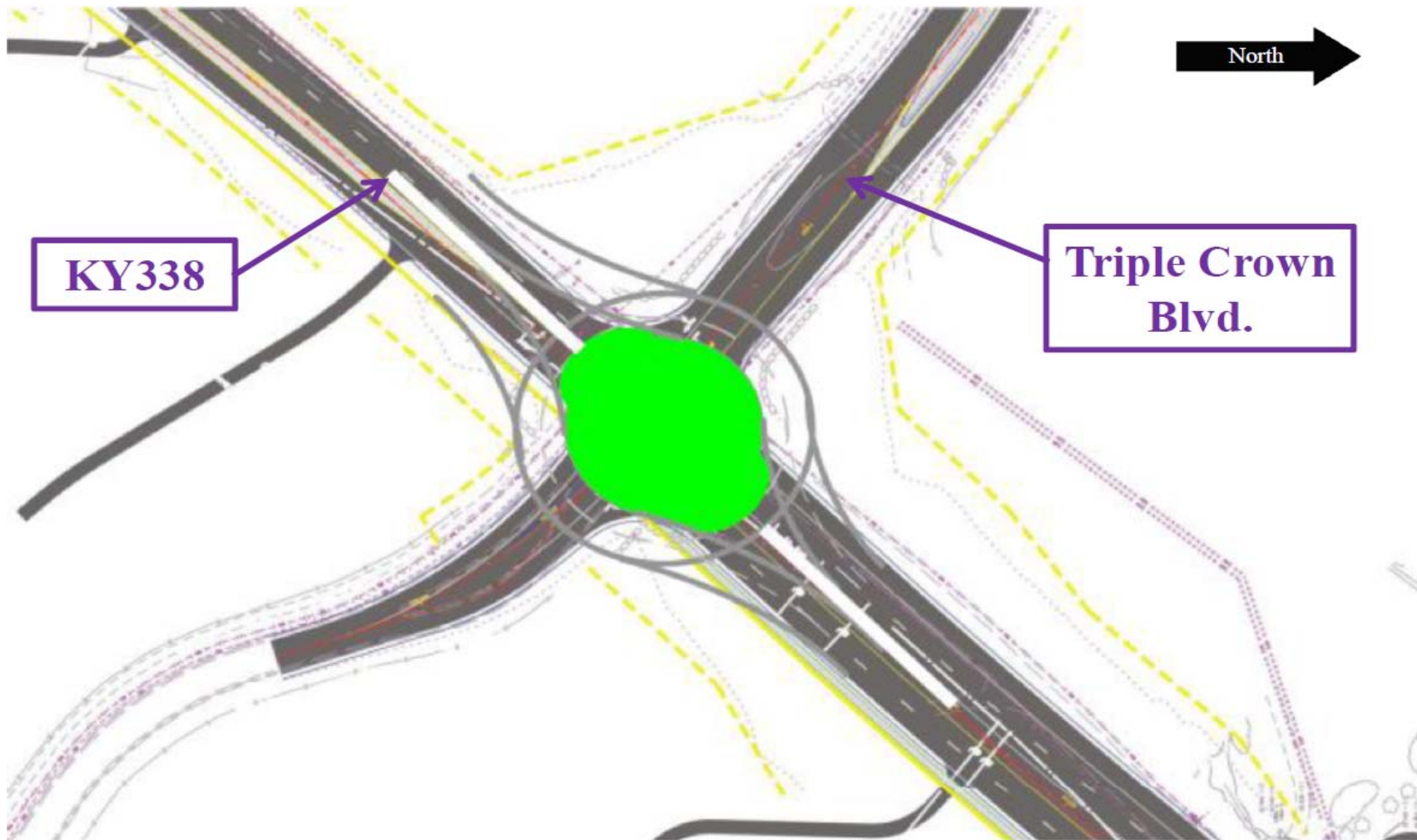
JUSTIFICATION:

The VE Team explored the feasibility of this alternative using the Intersection Decision Analysis Tool (IDAT) developed by the Kentucky Transportation Center and FHWA CAP-X program. Analyzing using the 2030 volumes, both programs indicated that a roundabout is feasible during both AM and PM peak design hours. Using the HCM 2010, it appears that overall LOS is C. To accommodate the turning movements, two lane entries on the east and west legs would be needed and one lane entries on the south and north legs.

One advantage to the roundabout is that the transition from two lanes to one lane heading west could be accomplished in a shorter distance compared to the original design due to the exiting vehicular speed.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$86,000	\$0	\$86,000
RECOMMENDED DESIGN	\$65,000	\$0	\$65,000
ESTIMATED SAVINGS OR (COST)	\$21,000	\$0	\$21,000

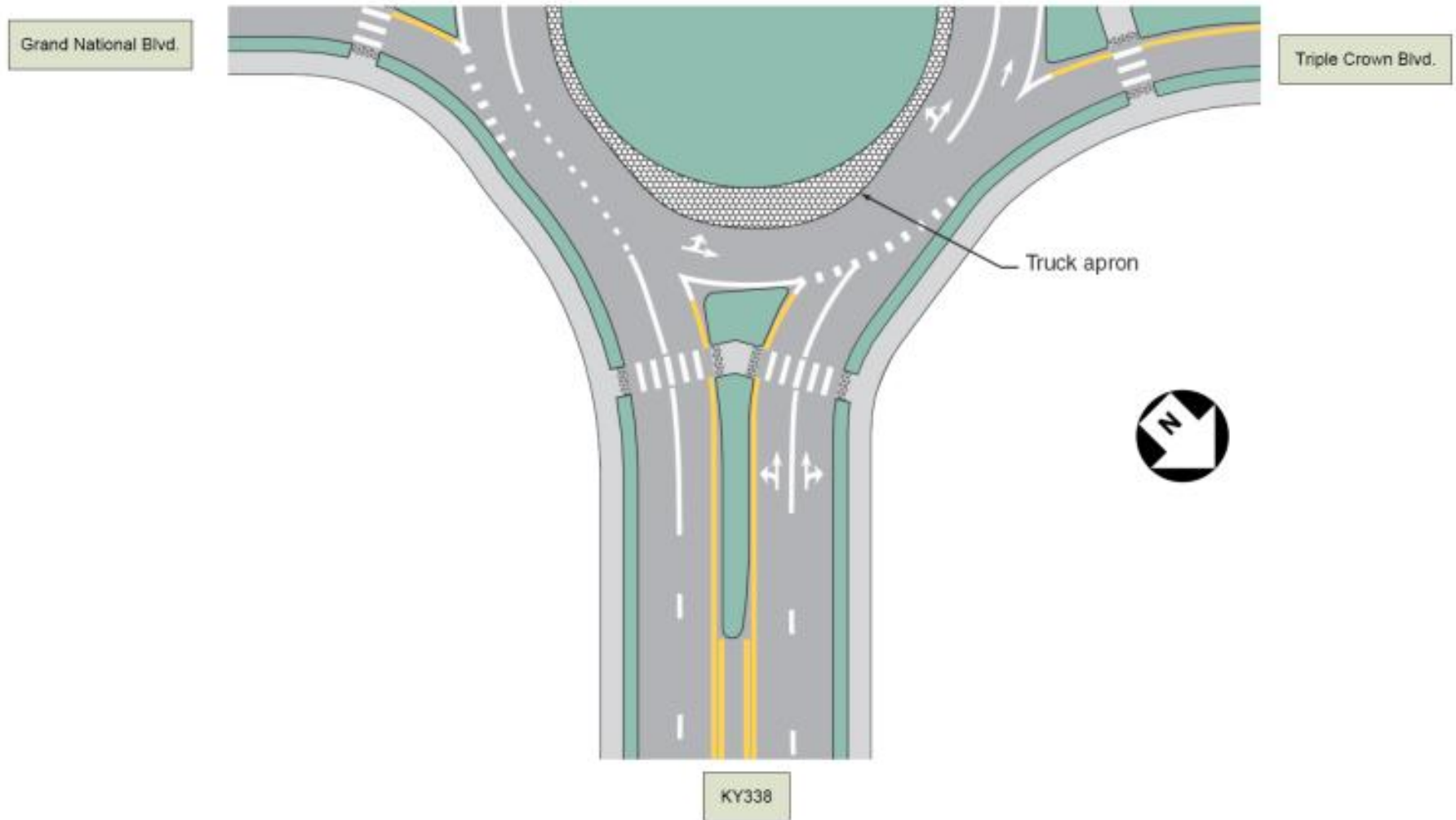
VALUE ENGINEERING RECOMMENDATION # VE-3
SKETCH OF RECOMMENDED DESIGN



Approximate footprint of a roundabout at KY338 and Triple Crown Boulevard

VALUE ENGINEERING RECOMMENDATION # VE-3

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-3

COST ESTIMATE - FIRST COST

Cost Item	Units	\$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total \$	Num of Units	Total \$
Pavement	SY	\$90.00	1,2	800	\$72,000		
Curb and Gutter	LF	\$14.14	2			800	\$11,312
Concrete Truck Apron	SY	\$28.80	2			450	\$12,960
Box Inlet	EA	\$3,000	2			4	\$12,000
Pipe	LF	\$60.00	2			300	\$18,000
Subtotal					\$72,000		\$54,272
Contingency	@	20%			\$14,400		\$10,854
Total					\$86,400		\$65,126

SOURCE CODE: 1 Project Cost Estimate 4 Means Estimating Manual 7 Professional Experience
 2 KYTC Average Bid 5 National Construction Estimator (List job if applicable)
 3 CACES Data Base 6 Vendor Lit or Quote 8 Other Sources (specify)
 (list name / details)

VALUE ENGINEERING RECOMMENDATION # VE-4

DESCRIPTIVE TITLE OF RECOMMENDATION:

Terminate the backage road between the Huntington Bank and BP gas station in lieu of continuing road to the storage facility.

ORIGINAL DESIGN:

The original design in W-7 specifies a backage road providing access for the BP, Huntington Bank, Shell, Wendy's and storage unit on the south side of KY338. The backage road includes 3 access points, one in between each business, and extends to connect to the Smart Stop self-storage access road. Construction of the access road will require construction of approximately 900 feet of retaining wall to the east side of the access road.

RECOMMENDED CHANGE:

The VE Team recommends bringing the access road to the front of the businesses in between the BP station and Huntington Bank, then continuing the access road in front of the Huntington Bank and Shell station, finally connecting to the existing road for Smart Stop.

ADVANTAGES:

- Eliminates the retaining wall adjacent to Smart Stop self-storage
- Maintains intersection at paddock
- Provides adequate access to businesses

DISADVANTAGES:

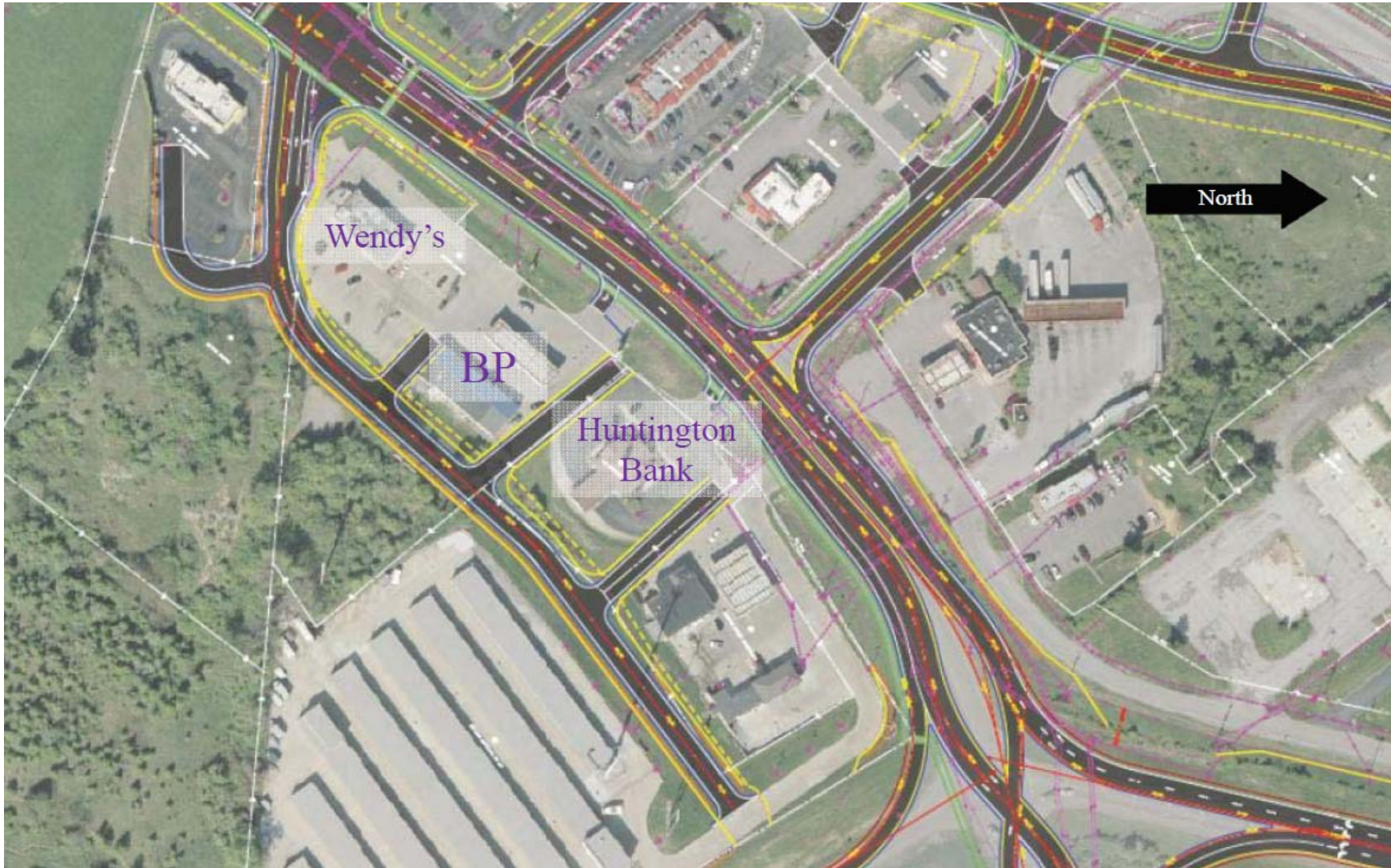
- Businesses may not prefer access road in front
- Access road will require multiple curves

JUSTIFICATION:

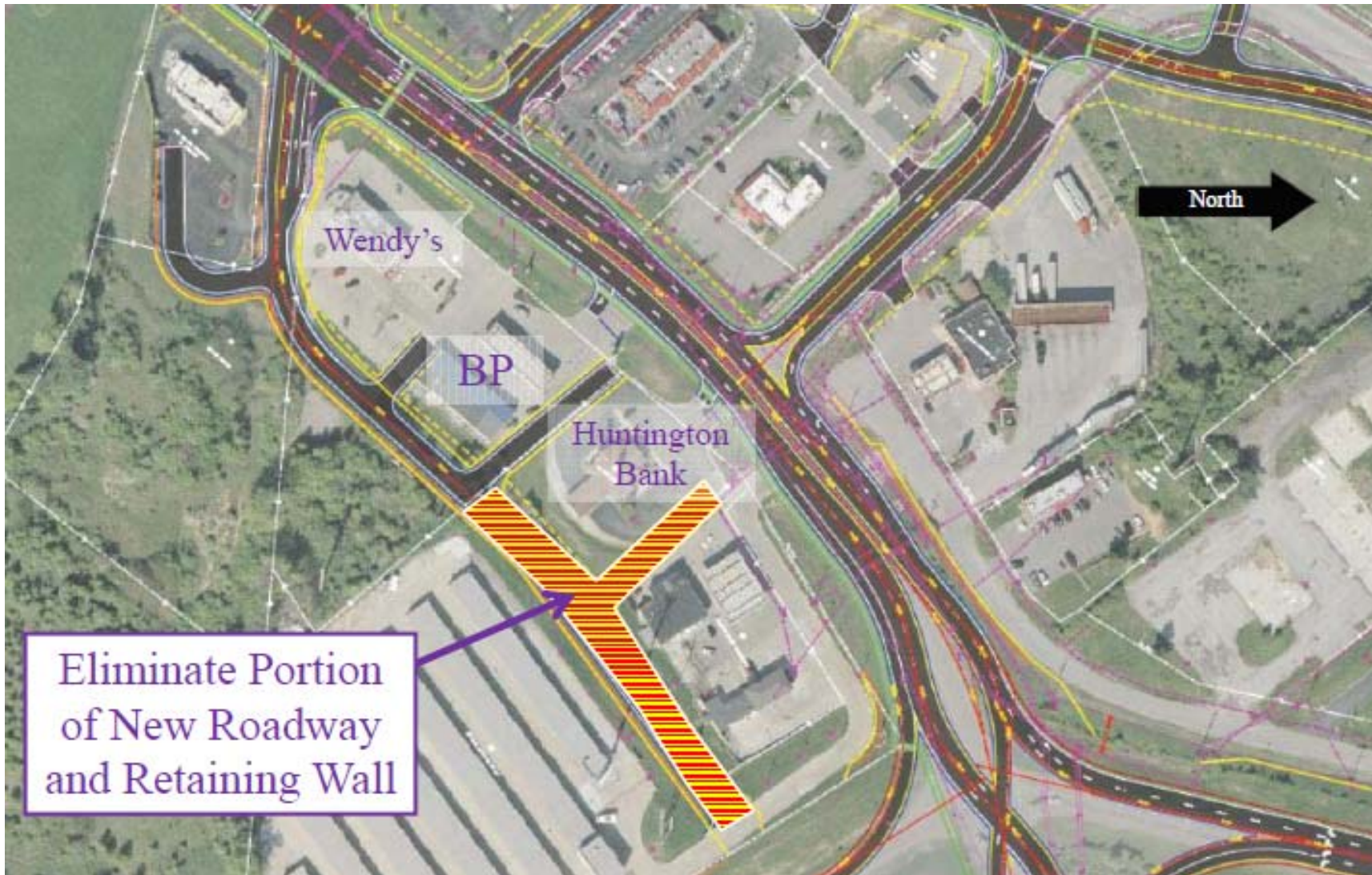
The addition of the backage road requires an approximate 900 feet of retaining wall. By bringing the access road from behind the businesses to the front, the required retaining wall could be reduced to approximately 450 feet and will avoid constructing a wall adjacent to the existing Smart Stop self-storage facility.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$802,000	\$0	\$802,000
RECOMMENDED DESIGN	\$60,000	\$0	\$60,000
ESTIMATED SAVINGS OR (COST)	\$742,000	\$0	\$742,000

VALUE ENGINEERING RECOMMENDATION # VE-4
SKETCH OF ORIGINAL DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-4
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-5

DESCRIPTIVE TITLE OF RECOMMENDATION:

Terminate the backage road at between Wendy’s and BP gas station in lieu of continuing road.

ORIGINAL DESIGN:

The original design specifies the construction of a backage road from opposite of Paddock Road to the Smart Stop Storage access road. This backage road will provide access to the Wendy’s, BP, Huntington Bank and Shell gas station from behind the properties. It also provides access to the Smart Stop Storage property.

RECOMMENDED CHANGE:

The VE Team recommends starting the backage road at Paddock Drive as in the original design but ending it between the Wendy’s and BP Gas Station. Access to the remaining parcels would utilize the existing pavement in front of the properties with modifications as required. This would include purchasing either right-of-way or access easements along the front of the Huntington Bank and Shell gas station.

ADVANTAGES:

- Eliminates the need to construct a 20’ (average) retaining wall between the Shell Gas station and Smart Stop storage
- Eliminates excavation for the retaining wall construction
- Eliminates the construction of approximately 1,000’ of road construction

DISADVANTAGES:

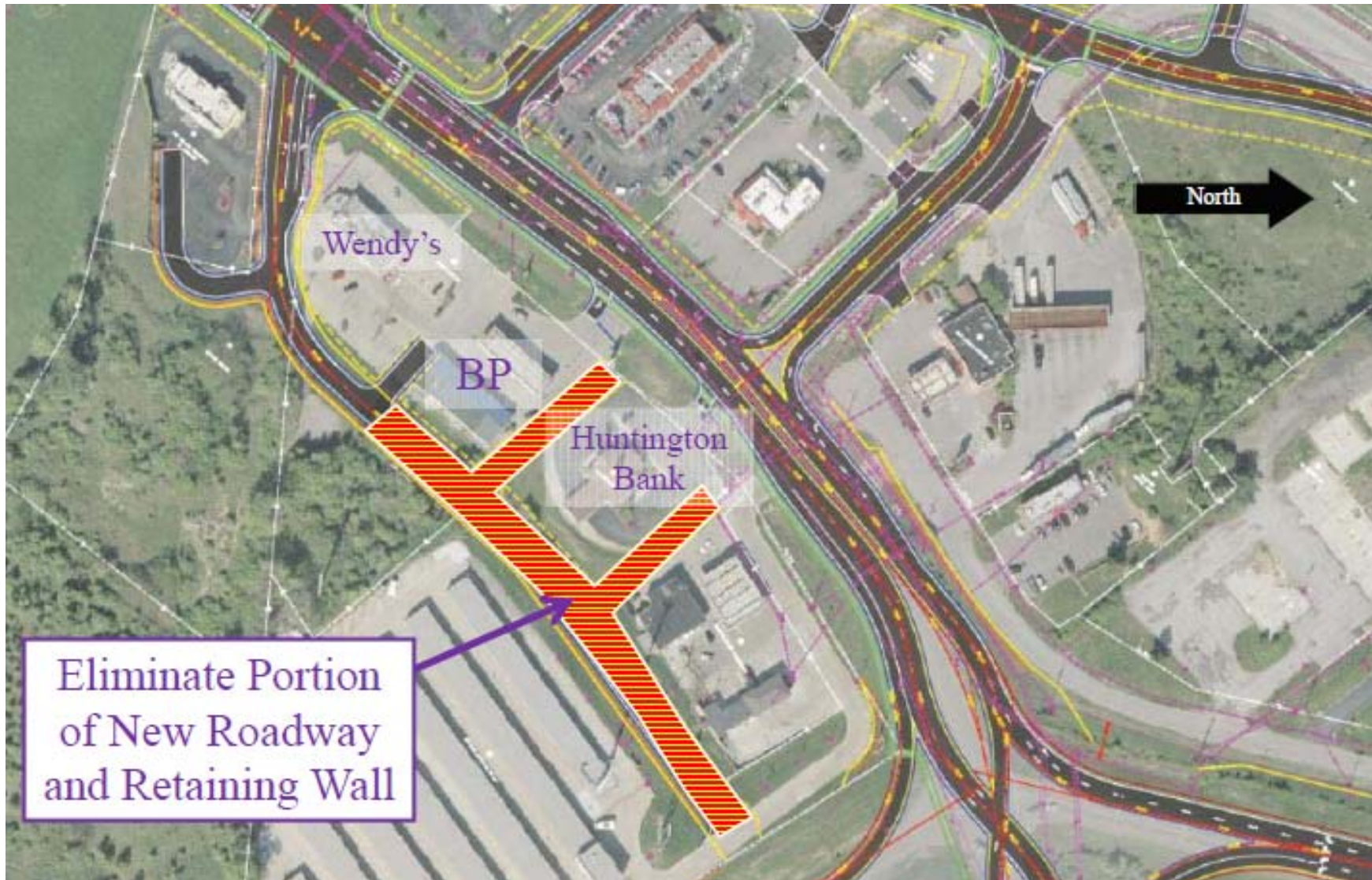
- Will require modification to the front of the existing access to BP, Huntington Bank and Shell Gas Station
- Could be confusing to drivers heading to the storage units

JUSTIFICATION:

This recommendation is justified as it provides access to the same properties as the original design yet eliminates the need for a retaining wall and additional pavement for the backage road. The original design required right-of-way to construct the backage road. While the recommendation reduces the amount of right-of-way needed to provide access it will not be completely eliminated in the VE recommendation. For this study we considered this as an even exchange with no net change in cost.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$1,069,000	\$0	\$1,069,000
RECOMMENDED DESIGN	\$120,000	\$0	\$120,000
ESTIMATED SAVINGS OR (COST)	\$949,000	\$0	\$949,000

VALUE ENGINEERING RECOMMENDATION # VE-5
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-5

CALCULATIONS

SY = Square yard, SF = Square feet

Savings ~ Pavement: $1,000' \text{ (length)} \times 24' \text{ (width)} / 9 = 2667 \text{ SY} \times \$90/\text{SY} = \$240,030$

Savings ~ Retaining Wall: $600' \text{ (length)} \times 20' \text{ (average height)} = 12,000 \text{ SF} \times \$52/\text{SF} = \$624,000$

Savings ~ Excavation: Based on the cross section an estimate of 9,500 CY will be reduced.
 $9,500 \text{ CY} \times \$2.86 = \$27,170$

VALUE ENGINEERING RECOMMENDATION # VE-6

DESCRIPTIVE TITLE OF RECOMMENDATION:

Shift the northbound I-71/I-75 exit ramp westward and construct only one right turn lane to reduce the retaining wall and pavement costs.

ORIGINAL DESIGN:

The original design specifies the northbound I-71/I-75 off-ramp to KY338 to be located on the east side of the existing ramp with dual right turn lanes to eastbound KY338.

RECOMMENDED CHANGE:

The VE Team recommends shifting the ramp widening to the west of the existing ramp to avoid the need for a retaining wall. The current layout helps with the maintenance of traffic operation but requires the construction of a 15 feet high retaining wall next to the Travel Centers of America truck stop. This would require a reconfiguration of the ramp terminus with the KY338 thereby modifying the layout of the Double Crossover Diamond interchange. The other recommendation would eliminate one of the right turn lanes from northbound I-71/I-75 to eastbound KY338.

ADVANTAGES:

- Reduces the amount of construction material to build the retaining wall
- Less construction time
- Less perpetual maintenance on the wall
- Reduces pavement

DISADVANTAGES:

- Could make maintenance of traffic more challenging
- May require right-of-way or easement on Travel Centers of American parcel
- Could shorten the storage between the signals of the double crossover diamond once it is reconfigured

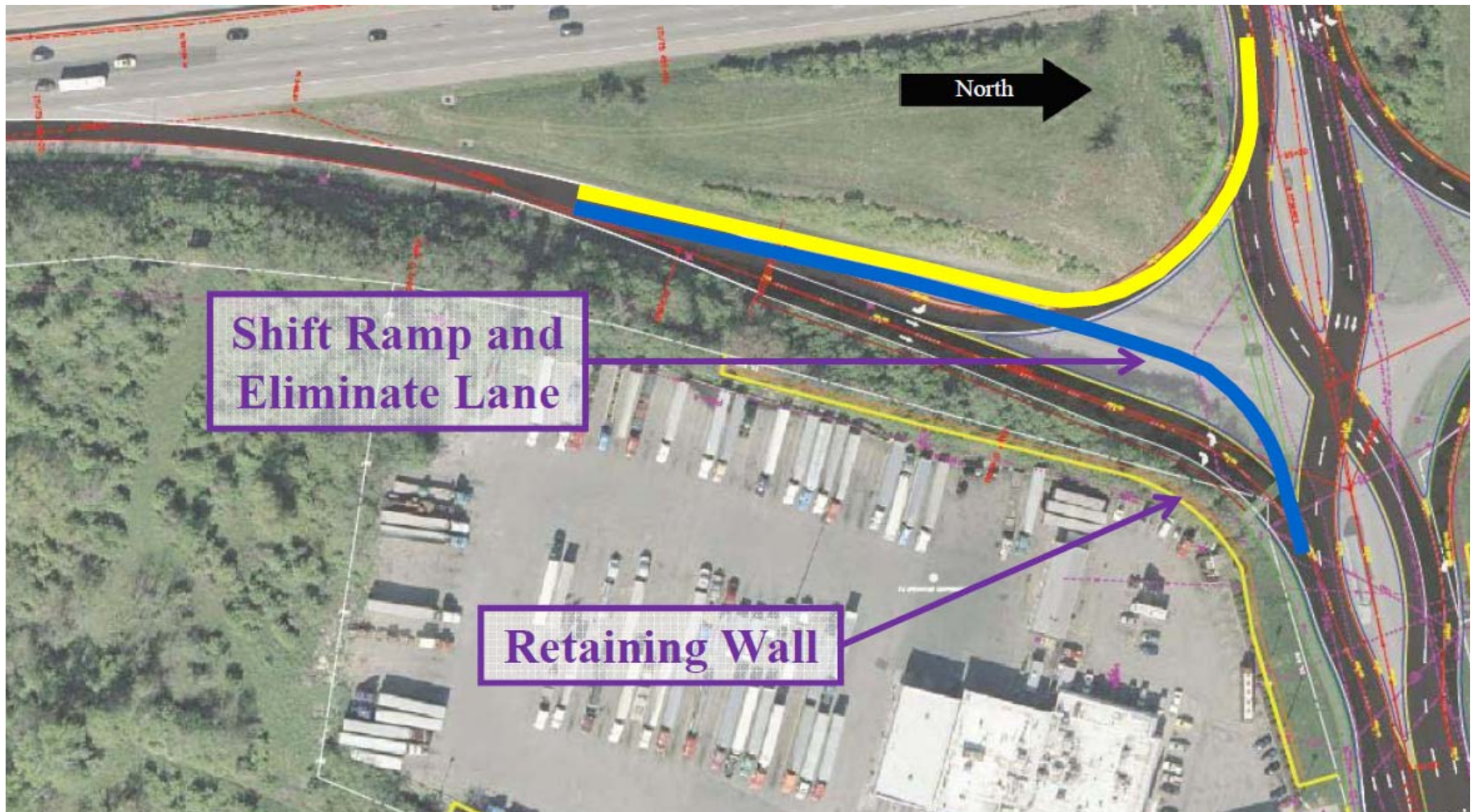
JUSTIFICATION:

The recommended change is justified as it still meets the purpose and need of the project and provides the same level of service for the interchange. The ramp shift to the west could make the maintenance of traffic (MOT) more difficult however the construction phasing could be developed to make it work. Another option for the MOT could be to close the ramp during off peak times to construct the new ramp. The feasibility of eliminating the wall will need to be judged against the need for additional right-of-way in the southeast quadrant of the interchange where the Travel Center of America truck stop is located.

Additionally, eliminating one of the right turn lanes would not adversely impact the level of service of the ramp. The original design had a v/c=0.42 with dual right turn lanes while the single right turn lane has a v/c=0.46.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$428,000	\$0	\$428,000
RECOMMENDED DESIGN	\$0	\$0	\$0
ESTIMATED SAVINGS OR (COST)	\$428,000	\$0	\$428,000

VALUE ENGINEERING RECOMMENDATION # VE-6
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING DESIGN COMMENT # VE-7

DESCRIPTIVE TITLE OF DESIGN COMMENT:

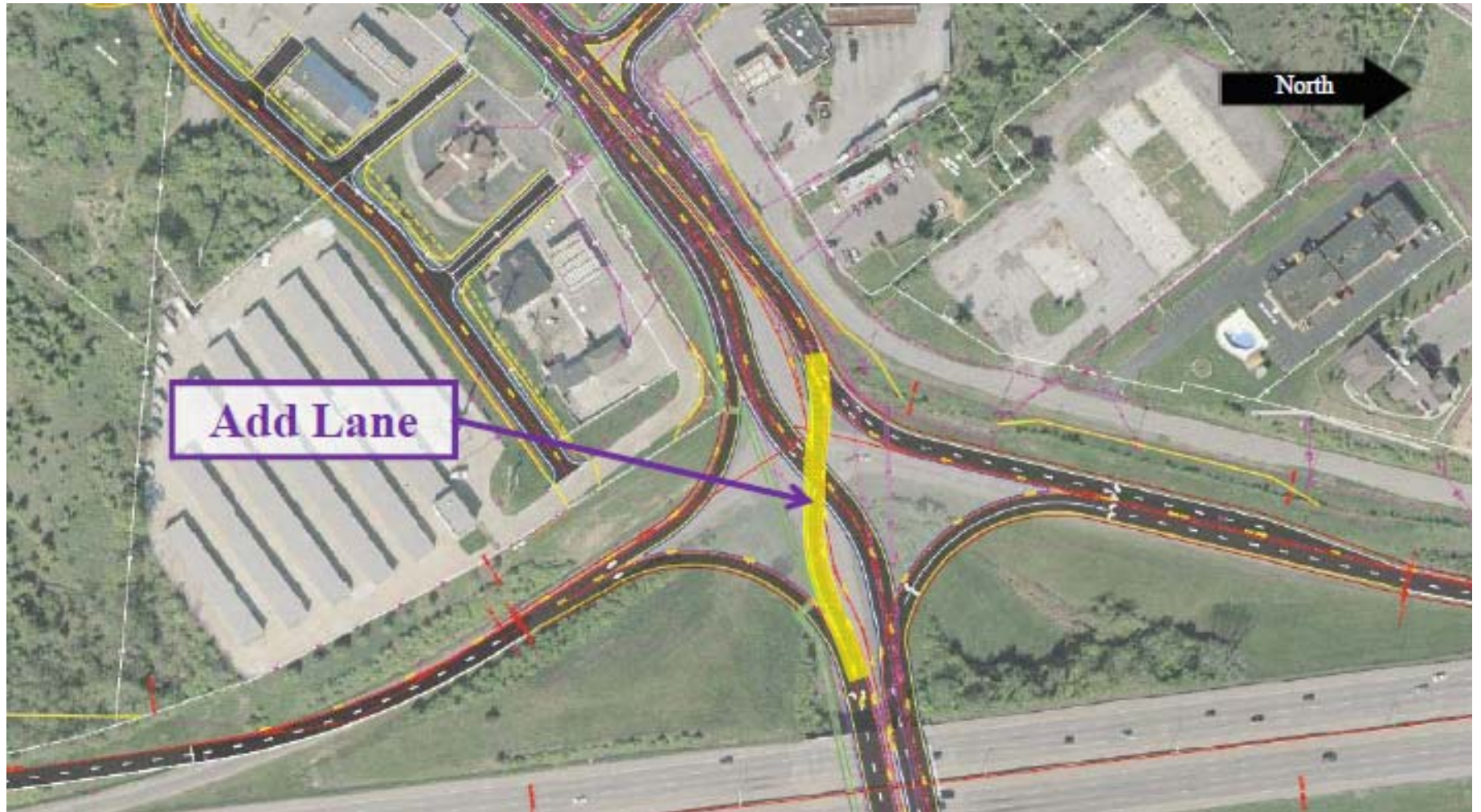
Utilize two westbound lanes through the DCD interchange in lieu of only one westbound lane.

COMMENTARY:

The proposed configuration utilizes 2 westbound through lanes approaching the interchange; at the interchange the outer lane is dropper as a left turn lane and a single lane continues through the interchange. While this design meets capacity requirements for all movements, it does not provide a continuous basic number of lanes through the interchange and will cause a merging point within the DCD. This will also complicate signing on the approach of the DCD to warn drivers of the lane drop. The short maneuvering distance between the DCD and the Best Pal Drive and US25 interchanges will also make it difficult for vehicles to merge into the appropriate lane.

It is proposed to carry the outer westbound lane through the interchange, which will serve both left turn and through traffic. This configuration will eliminate the need for the upstream merge approaching the interchange while still providing more than adequate capacity for the westbound to southbound left turn movements. In addition, providing 2 westbound through lanes at the southbound ramp terminus will reduce the critical volume at the intersection, improving operations.

VALUE ENGINEERING DESIGN COMMENT # VE-7
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-8

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize properly sized entrance and exit ramps in lieu of continuous auxiliary lanes on I-71/I-75 north of KY338 and long ramps to the south of KY338.

ORIGINAL DESIGN:

The original design specifies the use of:

- An auxiliary southbound lane on I-71/I-75 from the Southbound Rest Area/Welcome Center to KY338
- An auxiliary northbound lane on I-71/I-75 from KY338 to the Northbound Rest Area/Welcome Center
- A two lane ramp with extended merge area and acceleration length on the southbound on-ramp to I-71/I-75

RECOMMENDED CHANGE:

The VE Team recommends:

- Deferring the southbound auxiliary lane improvement to a later date and providing a reduced length (2,500 ft) of auxiliary lane approaching the KY338 southbound exit consistent with figure 10-53B1 of the AASHTO Green Book (see page 10-78)
- Deferring the northbound auxiliary lane improvement to a later date and providing a reduced auxiliary lane length of 2500 ft north of KY338 consistent with Figure 10-53A2 of the AASHTO Green Book (see page 20-78)
- Maintains existing design for southbound I-71/I-75 On-Ramp

ADVANTAGES:

- Reduced construction material and labor
- Elimination of drop lane at low volume rest area exit for northbound on-ramp
- Eliminate need for improved structures at Frogtown Road
- Meets and/or exceeds capacity needs for design year

DISADVANTAGES:

- Maintains existing merge for Southbound rest area on-ramp

JUSTIFICATION:

Review of the IJS and capacity analysis indicates that a reduced length of the auxiliary lane length will more than adequately meet the on-off ramp requirements. The HCS analysis presented in the IJS report prepared by HNTB assumed only a 1,000 foot deceleration/acceleration length ($L_{A1} = 500$; $L_{A2} = 500$) for the northbound on/off-ramps and reports a LOS C for all merge/diverge areas. Shortening the auxiliary lanes or deferring their implementation until a later date will save considerable cost by reducing 50 percent of the auxiliary turn lane length and eliminating the need for improvements of the Frogtown Road underpass.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$8,172,000	\$0	\$8,172,000
RECOMMENDED DESIGN	\$3,449,000	\$0	\$3,449,000
ESTIMATED SAVINGS OR (COST)	\$4,723,000	\$0	\$4,723,000

VALUE ENGINEERING RECOMMENDATION # VE-8

ADDITIONAL INFORMATION

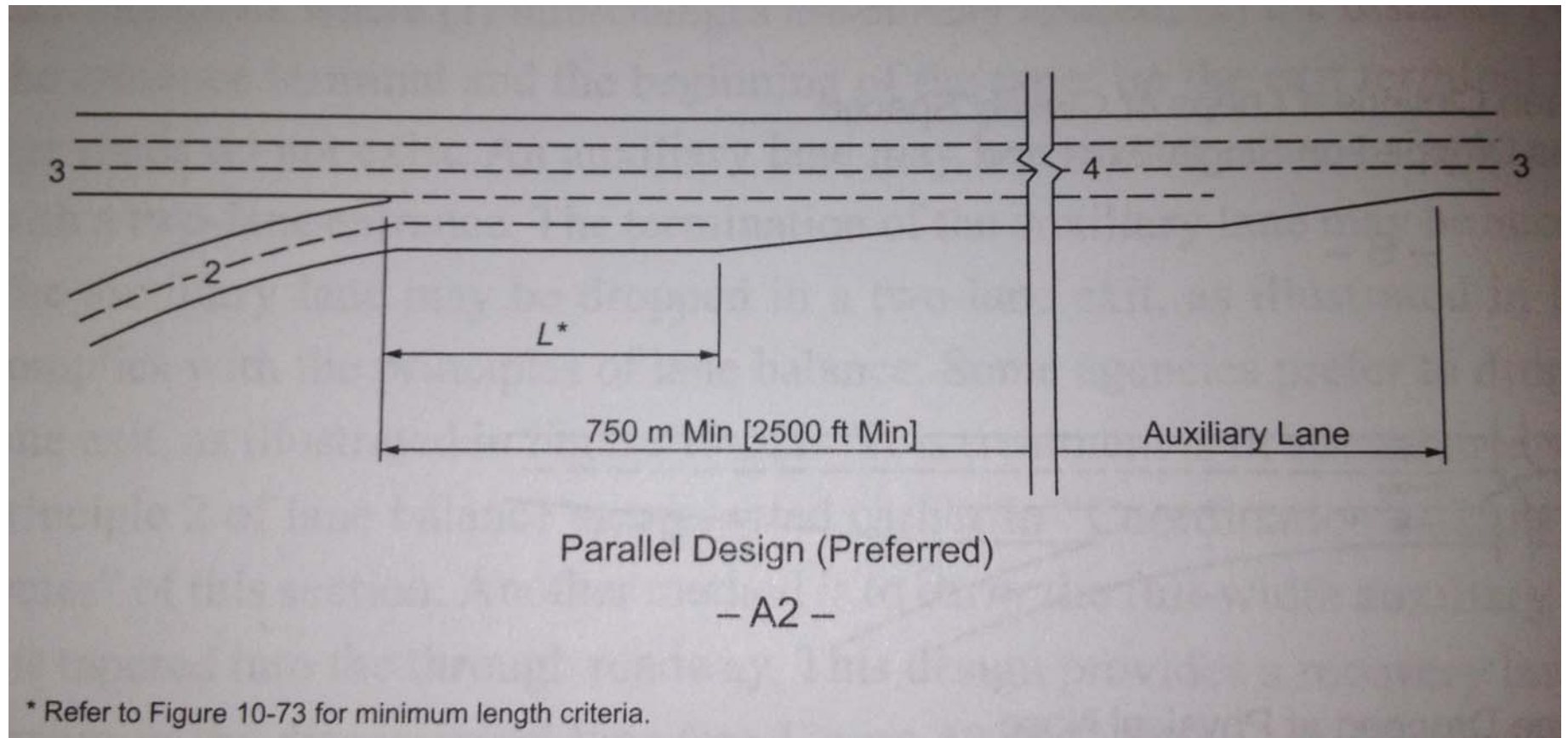


Figure 10-53A2 of the AASHTO Green Book (see page 20-78)

VALUE ENGINEERING DESIGN COMMENT # VE-9

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Install a ramp meter on the I-71/I-75 northbound on-ramp.

COMMENTARY:

The new design of the interchange, as proposed, allows for a greater number of vehicles to enter the northbound ramp per hour. The 2011 baseline from the traffic forecast says there are approximately 1200 vehicles on the northbound ramp in the AM peak hour. The 2030 forecast shows a large increase, with 1800 vehicles (30 vehicles per minute or 2.0 second average headways) on that ramp. This volume must merge from two ramp lanes to one ramp lane and then onto the interstate mainline. This large volume entering in platoons (due to signalization on KY338) has the potential to cause major interruption (turbulence) into mainline flow and capacity during the peak hours.

Ramp metering is the use of a traffic signal(s) deployed on a ramp to control the rate at which vehicles enter a freeway facility. By controlling the rate at which vehicles are allowed to enter a freeway, the flow of traffic onto the freeway facility becomes more consistent, smoothing the flow of traffic on the mainline and allowing more efficient use of existing freeway capacity. Ramp metering can be an effective tool to address congestion and safety concerns that occur at a specific point or along a stretch of freeway.

Arizona's Ramp Metering Manual contains various warrants for ramp metering at an interchange. The seventh warrant category is the total volume which is the total mainline plus total ramp volumes categorized by number of lanes. For this project, because there are four through lanes on the mainline, ramp meters would be warranted if the total volume exceeds 5,850 VPH. The 2010 data shows that the mainline volume is approximately 5,520 VPH (based on a 92,000 ADT 2010 computer estimate and assuming $D=60\%$, $K=10\%$), making the total 6,720 VPH, indicating a ramp meter would be warranted under current conditions.

If used, design should account for adequate storage of vehicle queues at the base of the ramp prior to the ramp meter signal. The needed storage length is determined based on the projected peak hour volumes, number of lanes on the ramp, and metering rate. If not metered now as part of the construction project, it is advised that base infrastructure and storage distance be incorporated into this design to easily allow ramp metering to be installed later.



VALUE ENGINEERING RECOMMENDATION # VE-10

DESCRIPTIVE TITLE OF RECOMMENDATION:

Put shared use path through the center span of the I-71/I-75 underpass between the eastbound and westbound traffic in lieu of original design.

ORIGINAL DESIGN:

The original design specifies the construction of a retaining wall underneath both the south and north I-71/I-75 bridge spans. The northern wall will accommodate space for the eastbound travel lanes. The southern wall will accommodate space for a shared use path.

RECOMMENDED CHANGE:

The VE Team recommends shifting the westbound travel lanes to the south underneath the central span so that the shared use path can then be added adjacent to the travel lanes.

ADVANTAGES:

- Allows for protected pedestrian crossings at the interchange signals
- Shorter travel distances for pedestrians/bikes
- Reduced construction material and labor

DISADVANTAGES:

- Pedestrian signalization at the ramps

JUSTIFICATION:

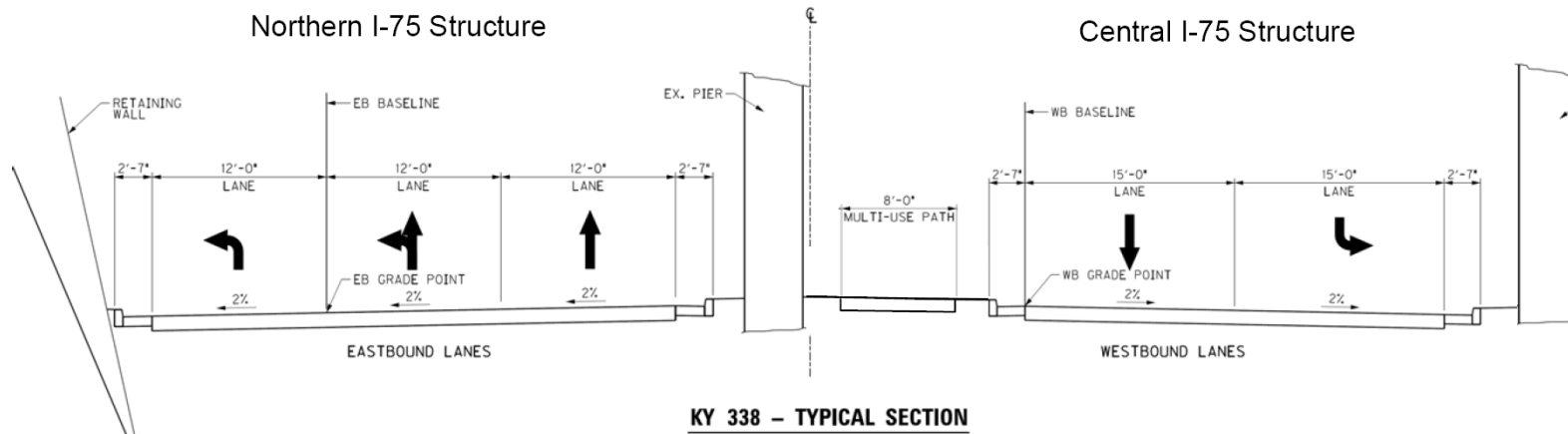
The original design requires excavation and a retaining wall under the south span to allow for the shared use path. There are two primary benefits to this modification. First, there is a cost savings because there would be no need to do any construction under the south span. Second, by putting the path in the center between the eastbound and westbound lanes, crossings can occur at the interchange signals, thus allowing pedestrian and bike facilities on both sides of the road just past the signals. Pedestrians can then travel shorter distances to their destinations instead of traveling to the first signalized intersection to make the crossing legally. This is especially helpful on the west side of the interchange where the preferred alternate's first signal is a quarter mile away from the interchange.

Pedestrian signalization is recommended at the four ramp crossings. Due to relatively low expected pedestrian volumes and short crossing distances, effects on traffic operations (delays, queues) should be minimal.

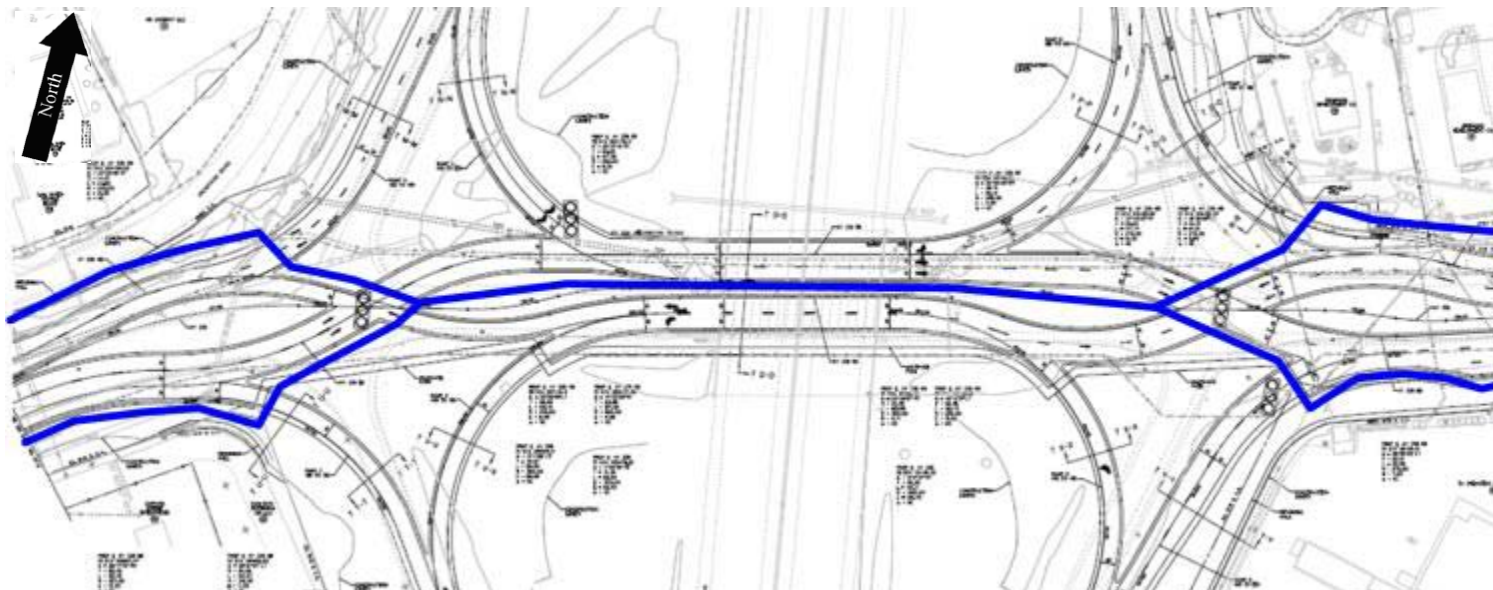
SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$600,000	\$0	\$600,000
RECOMMENDED DESIGN	\$36,000	\$0	\$36,000
ESTIMATED SAVINGS OR (COST)	\$564,000	\$0	\$564,000

VALUE ENGINEERING RECOMMENDATION # VE-10

SKETCH OF RECOMMENDED DESIGN



Locating the path with the central structure



Pedestrian routes and crossing with relocated path

VALUE ENGINEERING RECOMMENDATION # VE-11

DESCRIPTIVE TITLE OF RECOMMENDATION:

Defer US25 improvements in lieu of widening roadway to five lanes.

ORIGINAL DESIGN:

The original design specifies that US25 improvements be constructed as part of this project. Included with US25 is its intersection/interchange with KY338, the KY338 railroad grade separation, and various associated local road connections.

RECOMMENDED CHANGE:

The VE Team recommends that US25 and associated improvements be separated from this construction project and placed into its own construction project and deferred. More specifically, portions separated would include KY338 east of Best Pal Drive, all of US25, all railroad work, all historic preservation, and all local access roads east of Best Pal Drive, north of Winning Colors Drive, and south along Truck Stops of America (TSA).

The current KY338 project with its I75 interchange would extend eastward to Best Pal Drive / TSA and then transition to meet existing KY338 just west of its existing intersection with US25. Best Pal Drive would meet existing at Winning Colors Drive.

ADVANTAGES:

- More affordable
- Earlier construction
- No railroad involvement
- No historic involvement

DISADVANTAGES:

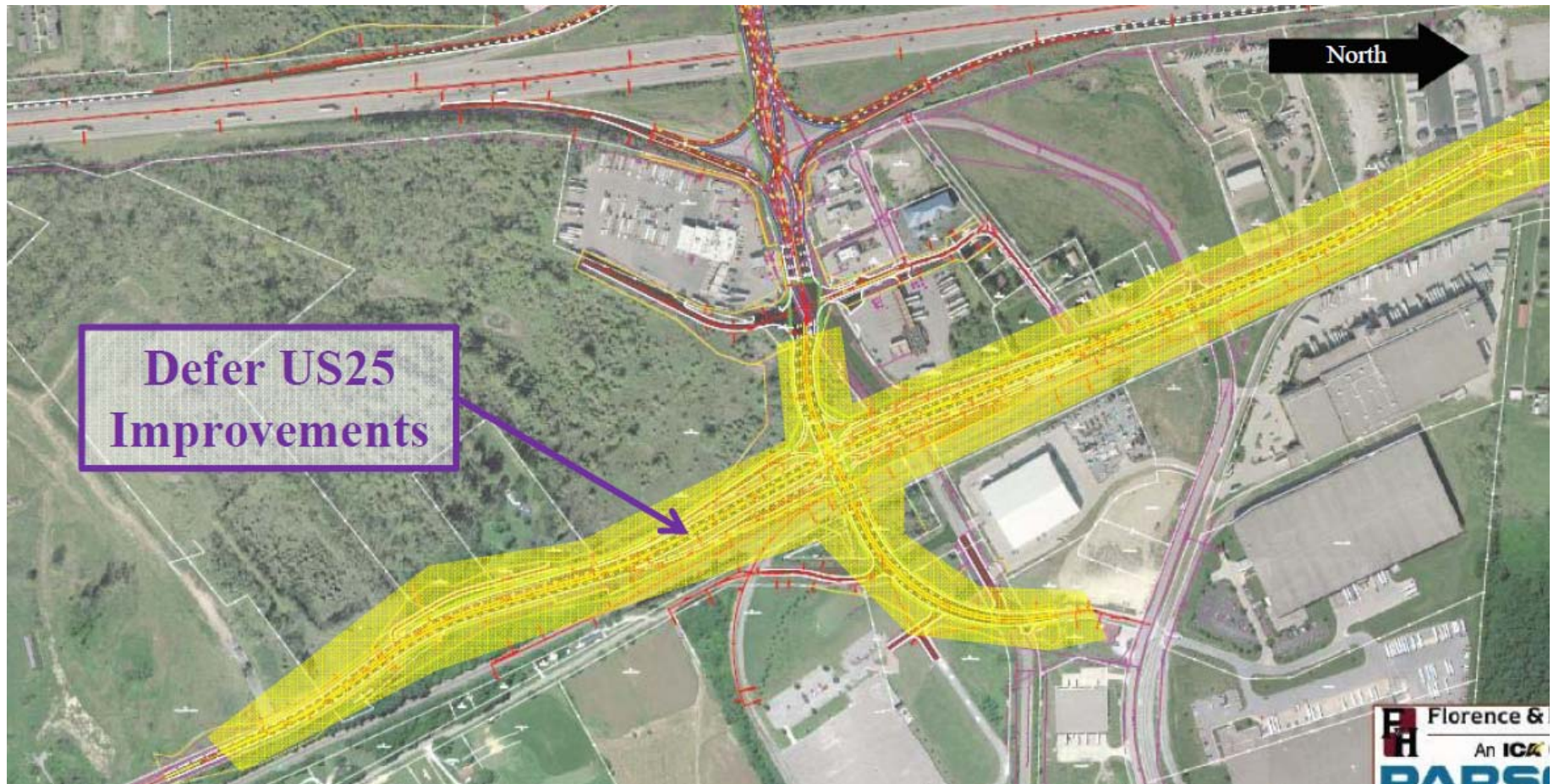
- New east-end connection eventually would be modified by the separated project

JUSTIFICATION:

While it is understood that US25 improvements have their own set of benefits, funding for the complete project might not be available for a very long time. Breaking the project into parts would allow more urgent portion(s) to be constructed sooner.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$28,777,000	\$0	\$28,777,000
RECOMMENDED DESIGN	\$7,788,000	\$0	\$7,788,000
ESTIMATED SAVINGS OR (COST)	\$20,989,000	\$0	\$20,989,000

VALUE ENGINEERING RECOMMENDATION # VE-11
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-12

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reduce the number of lanes that pass under the railroad to 3 lanes in lieu of 5 lanes.

ORIGINAL DESIGN:

The original design specifies a total of 5 lanes on KY338 east of Best Pal Drive under the SPUI and NS railroad. The lane configuration includes 2 westbound lanes, 2 eastbound lanes, a center turn lane required for the SPUI interchange, and a sidewalk on both sides of KY338.

RECOMMENDED CHANGE:

The VE Team recommends reducing the number of lanes on KY338 east of Best Pal Drive. The number of lanes could be reduced from 5 lanes to 3 lanes. The recommended configuration would consist of one through lane in each direction and a center turn lane required for the SPUI interchange. The lane reduction would decrease the bridge span length of KY 25 over KY338 as well as the span of the NS railroad over KY338 by approximately 24', while also reducing the amount of pavement required.

ADVANTAGES:

- Reduces bridge span of KY 25 over KY38 by 24'
- Reduces bridge span of NS railroad over KY338 by 24'
- Reduces amount of pavement required by approximately 24,000 SF
- Reduces amount of right-of-way required

DISADVANTAGES:

- KY 25 southbound exit ramp connection to KY338 at the SPUI interchange may still require adding the second lane
- Assumes no future extension of KY338 through the SPUI or NS railroad

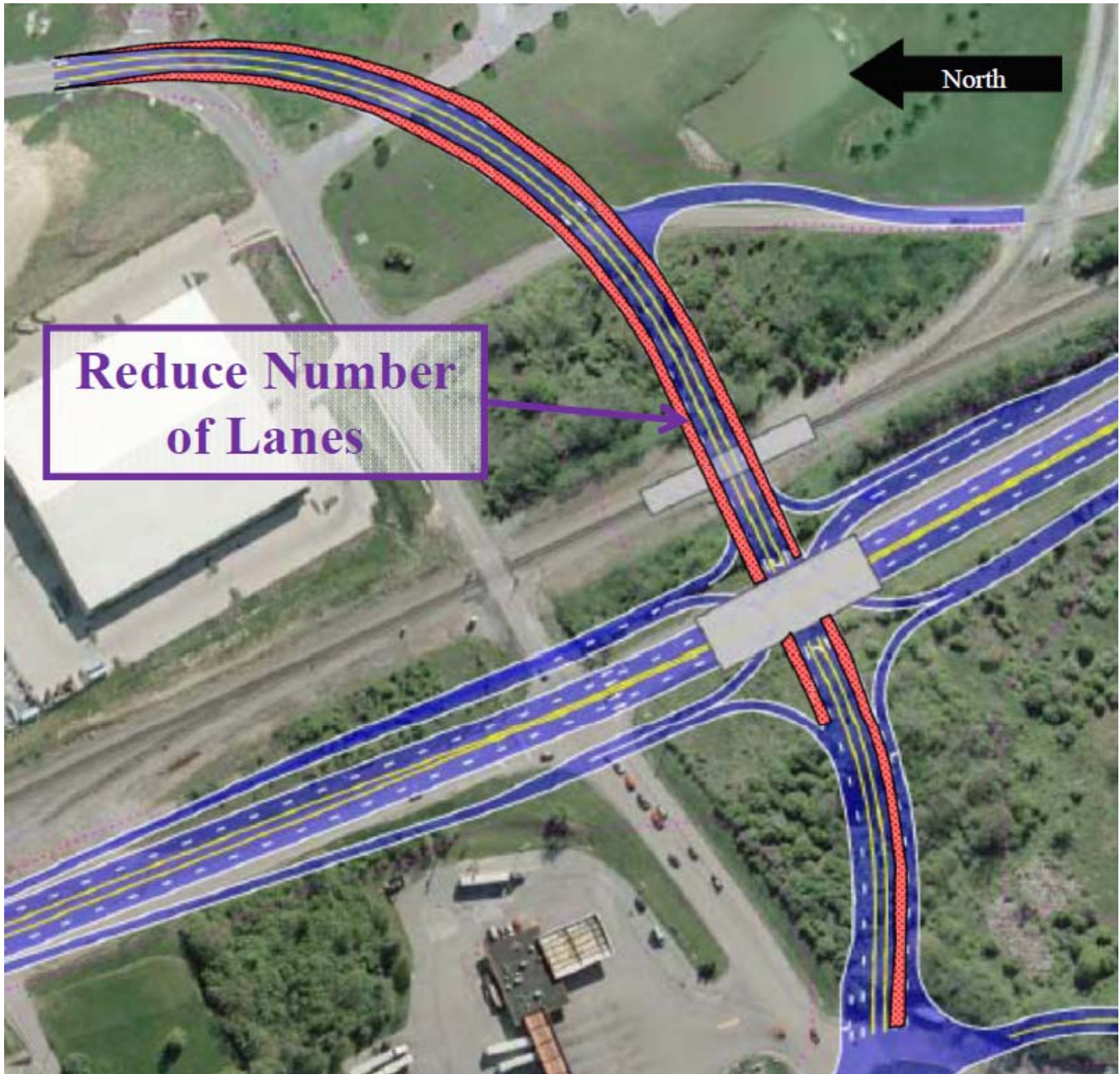
JUSTIFICATION:

The recommended change of reducing the number of lanes on KY338 east of Best Pal Drive provides adequate vehicular capacity in the proposed design year.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$12,780,000	\$0	\$12,780,000
RECOMMENDED DESIGN	\$11,991,000	\$0	\$11,991,000
ESTIMATED SAVINGS OR (COST)	\$789,000	\$0	\$789,000

VALUE ENGINEERING RECOMMENDATION # VE-12

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING DESIGN COMMENT # VE-13

DESCRIPTIVE TITLE OF DESIGN COMMENT:

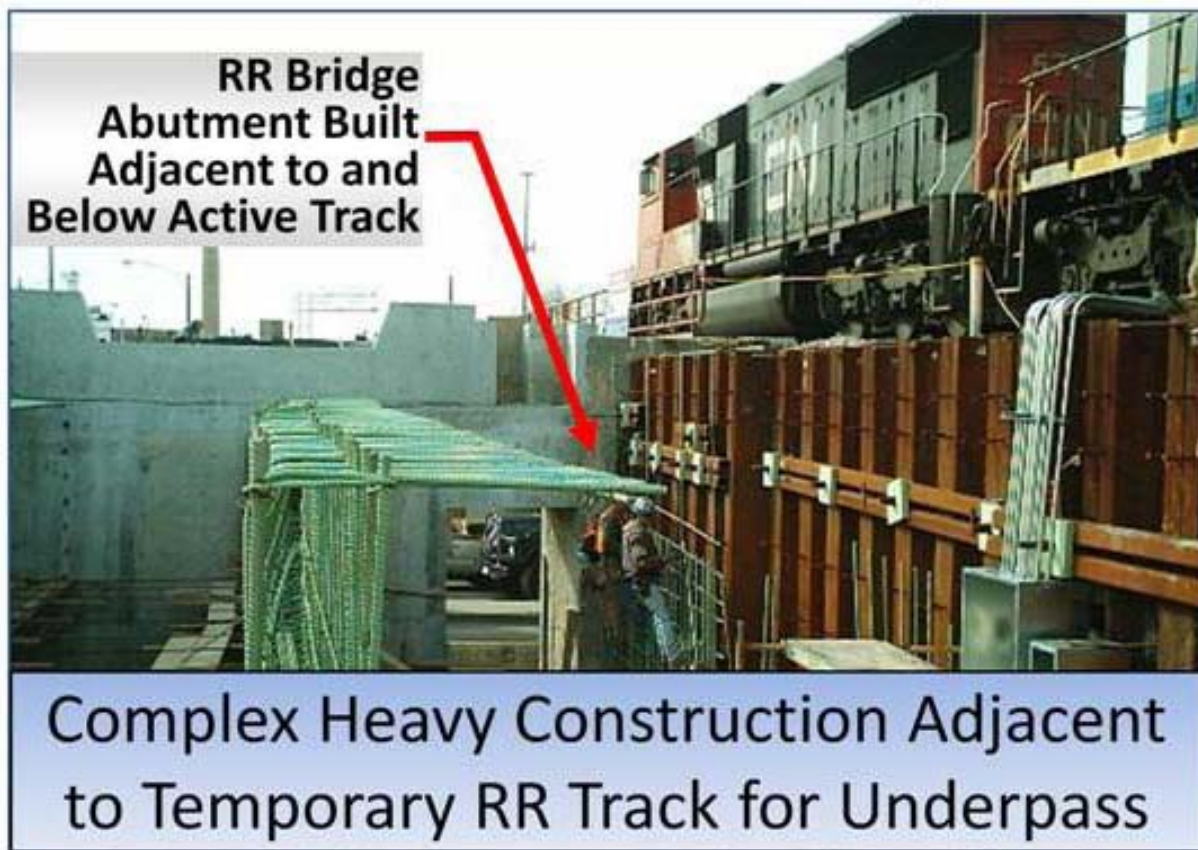
Investigate top-down construction of the railroad bridge overpass to eliminate the need for temporary retaining walls.

COMMENTARY:

Construction of the grade separation at KY338 and the NS railroad will subsequently require construction of a detour track to maintain rail traffic. Grade separation at this intersection involves constructing a cut to allow KY338 under the railroad while maintaining the adjacent rail profile. A tied back sheet pile wall is a common solution to achieve the required grade separation (see figure below). The VE Team recommends investigating a “top down” construction solution to that would eliminate use of the sheet pile wall.

Construction sequence would begin by excavating between abutments to an elevation just below the anticipated bottom of pier cap. Construction of stub abutments would then begin. Construction of the piers begins with installation of oversized casings at the pier column locations. Removal of the soil within the casing takes place to the top of drilled shaft elevation. The drilled shaft and pier column are then constructed within the oversized casing. Finally, pier caps are installed above ground level along with the remaining superstructure.

When rail traffic is shifted back to the permanent alignment and the temporary track is removed, final excavation can take place to the proposed KY338 grade. This construction method could eliminate the need for a costly sheet pile wall to support heavy rail traffic on the NS Railroad.



VALUE ENGINEERING RECOMMENDATION # VE-14

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize an improved at-grade intersection at KY338 and US25 with an at-grade railroad crossing on existing KY338 alignment in lieu of constructing a SPUI.

ORIGINAL DESIGN:

The original design specifies that an improved five-lane KY338 pass under an improved US25 and under the Norfolk Southern Railway approximately 300 feet south of existing KY338. US25 work includes a SPUI with structure, retaining walls, and ramps. Railroad work includes a temporary run-around and a permanent three-track substructure and retaining walls.

RECOMMENDED CHANGE:

The VE Team recommends that improved KY338 have an at-grade intersection with improved US25 at the same elevation as the track and meet existing two-lane KY338 at the existing Norfolk Southern grade crossing. This recommendation would eliminate the SPUI & railroad structures and walls, eliminate interchange ramps, eliminate maintenance of rail traffic, and eliminate work in the industrial park. Access roads at Best Pal Drive northward and TSA southward would be included. The plan view would appear more as Alternative E-3 than Alternative E-1.

ADVANTAGES:

- Minimize impacts to historic property
- Reduces right-of-way
- Reduces construction materials and labor

DISADVANTAGES:

- No improvements to fire protection mobility
- Steeper KY338 profile
- Reduced level of service

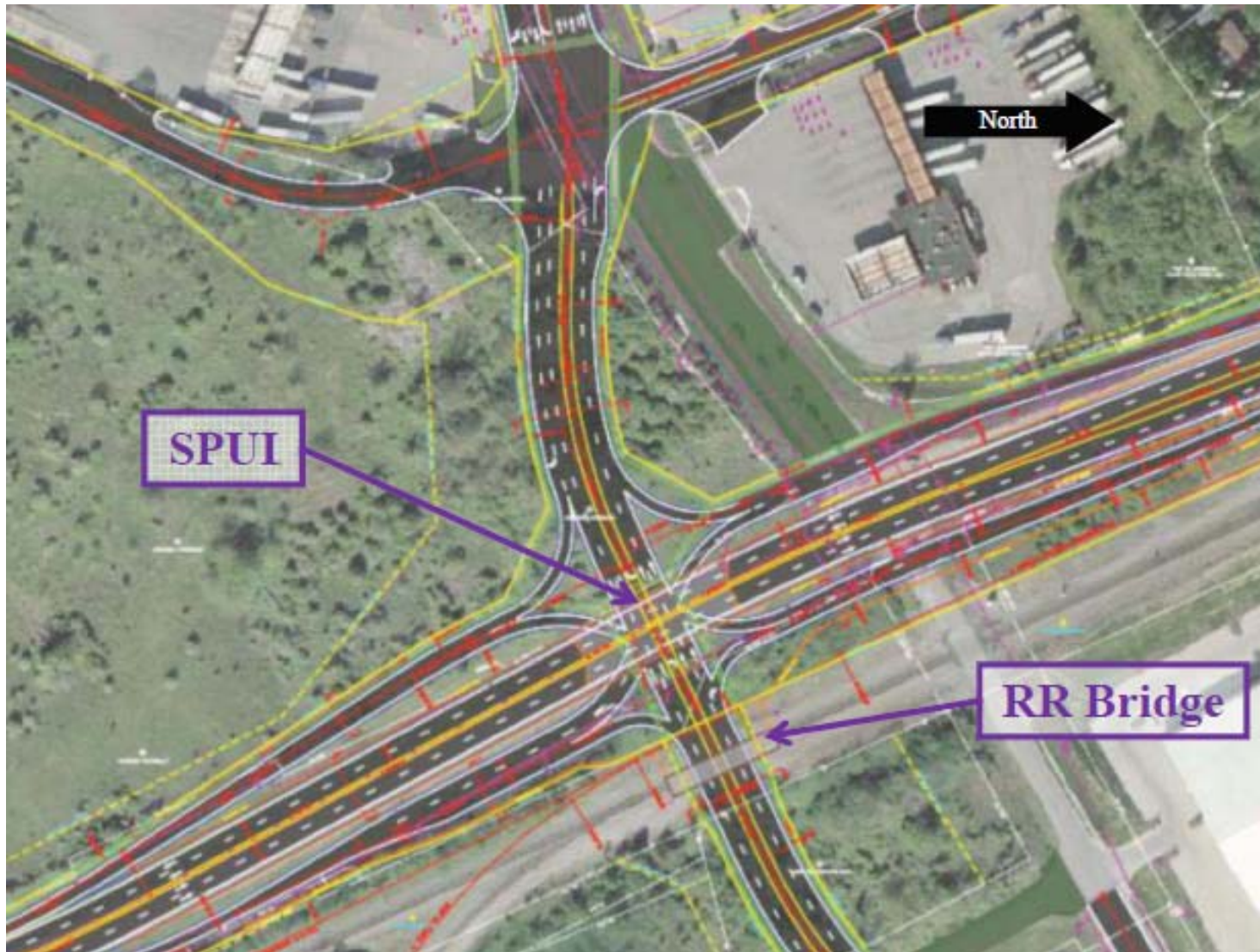
JUSTIFICATION:

While it is understood that US25 improvements and a railroad grade separation have notable benefits, funding likely will be critical. Reducing the total cost could encourage project funding.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$32,376,000	\$0	\$32,376,000
RECOMMENDED DESIGN	\$16,136,000	\$0	\$16,136,000
ESTIMATED SAVINGS OR (COST)	\$16,240,000	\$0	\$16,240,000

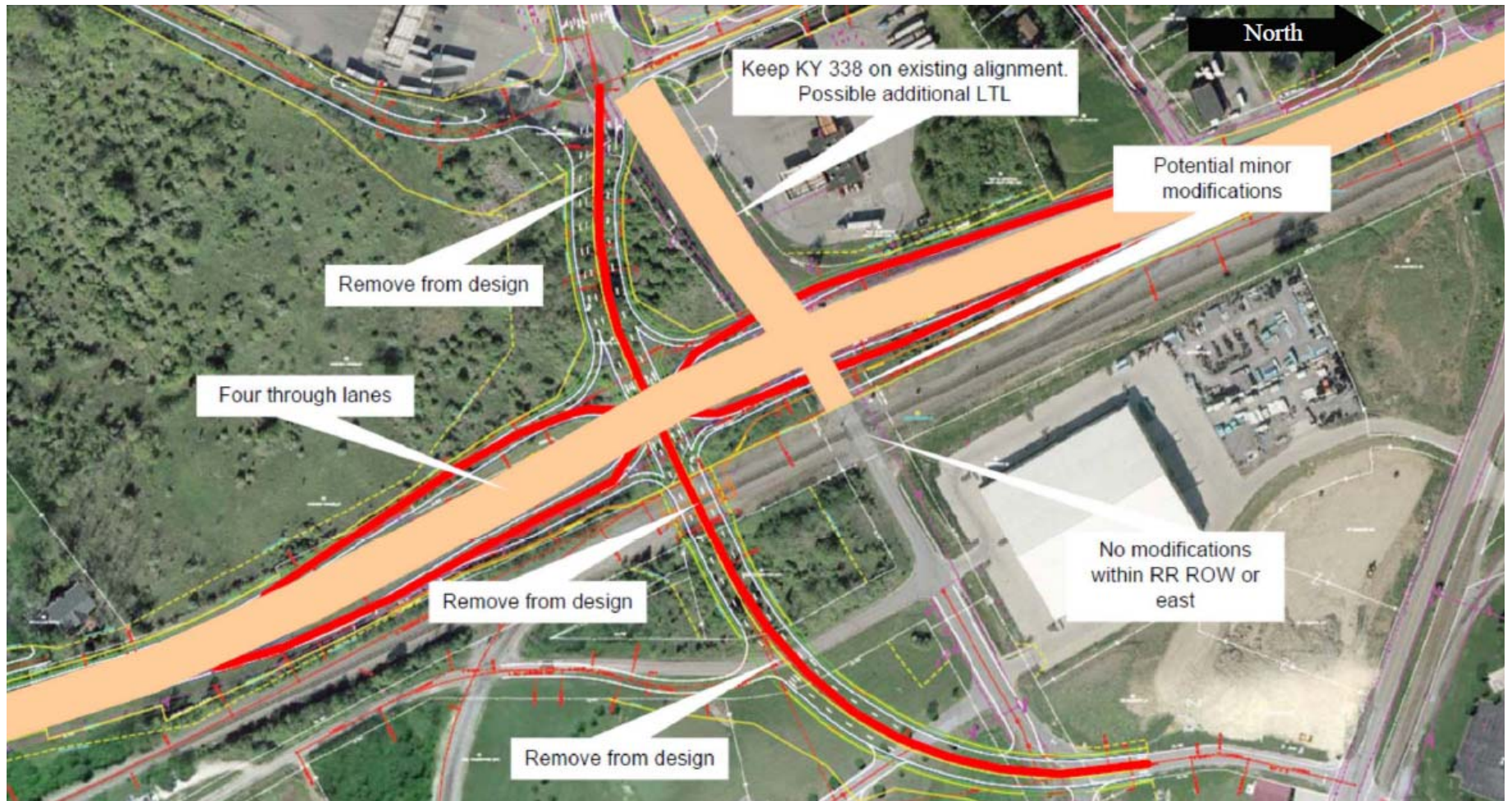
VALUE ENGINEERING RECOMMENDATION # VE-14

SKETCH OF ORIGINAL DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-14

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-15

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize a depressed at-grade intersection at KY338 and US25 with a smaller footprint than alternative E-3 and left turn access from KY338 to businesses in lieu of SPUI.

ORIGINAL DESIGN:

The original design specifies a large, depressed at-grade intersection at the intersection of KY338 and US25. The basic section for both roadways is four lanes with both right and left turn lanes. The northbound and westbound approaches have dual left turn lanes for peak hour demand.

RECOMMENDED CHANGE:

The VE Team recommends a reduction in the basic number of through lanes on westbound KY338 to one into the industrial park; on northbound US25 approaching the KY338 intersection; and also on the southbound US25 to the KY338 intersection.

ADVANTAGES:

- Smaller intersection footprint for shorter pedestrian
- Reduced pavement quantity
- Defers cost of widening US25
- No reduction in AM peak performance
- Maintains railroad grade separation
- Right-of-way and excavation reductions

DISADVANTAGES:

- Reduced PM peak performance

JUSTIFICATION:

There are multiple through lanes approaching this intersection that are not needed in the design year. This intersection predominantly facilitates turns to/from US25 to KY338 and I-71/I-75.

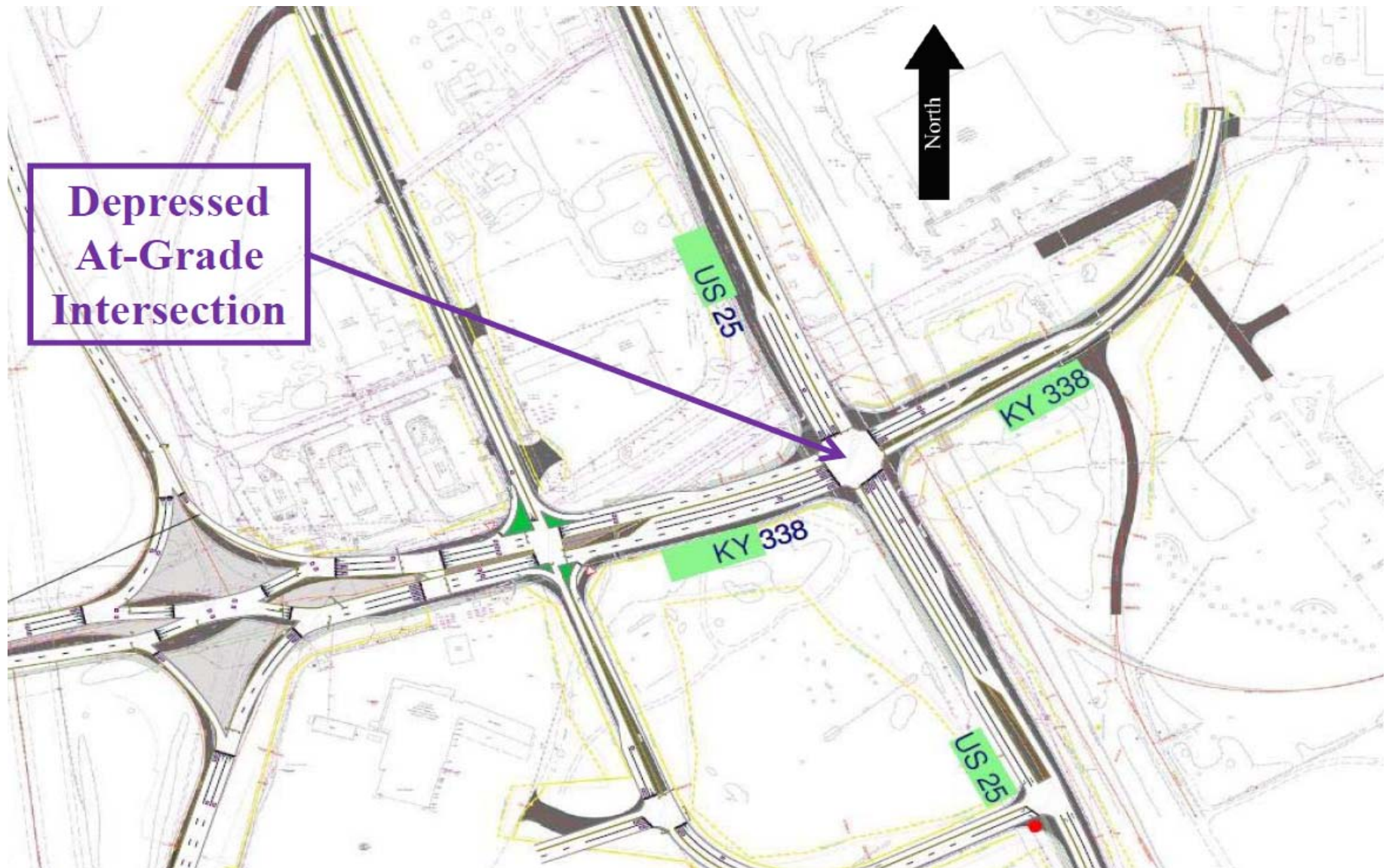
Intersection	LOS	Delay
E-3 2030 AM Proposed Design	D	47
E-3 2030 PM Proposed Design	D	53*
E-3.1 2030 AM VE Team	D	52
E-3.1 2030 PM VE Team	E	74*

*Worst delay on WB approach exiting the industrial park. All other approaches LOS D.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$25,176,000	\$0	\$25,176,000
RECOMMENDED DESIGN	\$17,523,000	\$0	\$17,523,000
ESTIMATED SAVINGS OR (COST)	\$7,653,000	\$0	\$7,653,000

VALUE ENGINEERING RECOMMENDATION # VE-15

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-16

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize roundabout at US25 and KY338 with left turn access from KY338 to businesses in lieu of a SPUI.

ORIGINAL DESIGN:

The original design specifies constructing a SPUI interchange at the intersection of US25 and KY338 which additionally allows for left turning movements at the truck stop facilities on KY338 East of I-71/I-75.

RECOMMENDED CHANGE:

The VE Team recommends using a roundabout design feature at this intersection in place of the SPUI design. The railroad underpass component of the original design would remain as one of the roundabout legs shifted slightly to the North. Access to the truck stop facilities on KY338 would be limited to right in / right out with the exception of a left turn provided for the truck stop to the north.

ADVANTAGES:

- Reduce construction material and labor
- Eliminate traffic signal
- Fewer conflict points
- Safer shared use path crossing
- Allow U-turn movement for trucks – more efficient access to interstate

DISADVANTAGES:

- Increased truck volumes at intersection

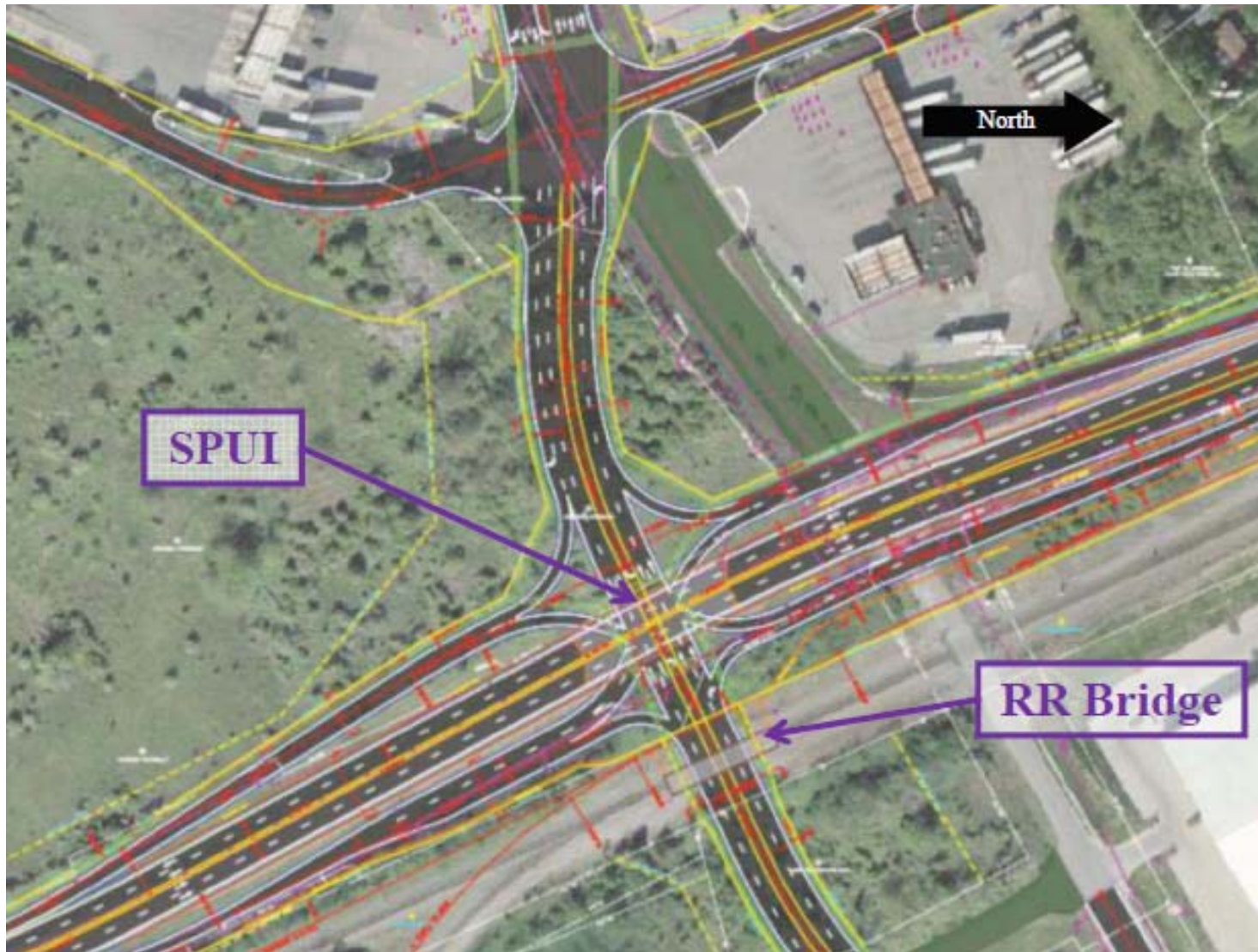
JUSTIFICATION:

The recommendation results in a significant cost savings for the project as detailed below. Despite the potential for increased truck volumes in the US25/KY338 intersection, enhancement in efficiency of the overall transportation system would be realized. Also, the long term operational/maintenance costs of the signal and SPUI bridge would be eliminated. Safety would be enhanced with fewer conflict points in the intersection as well as pedestrian and/or bike crossings.

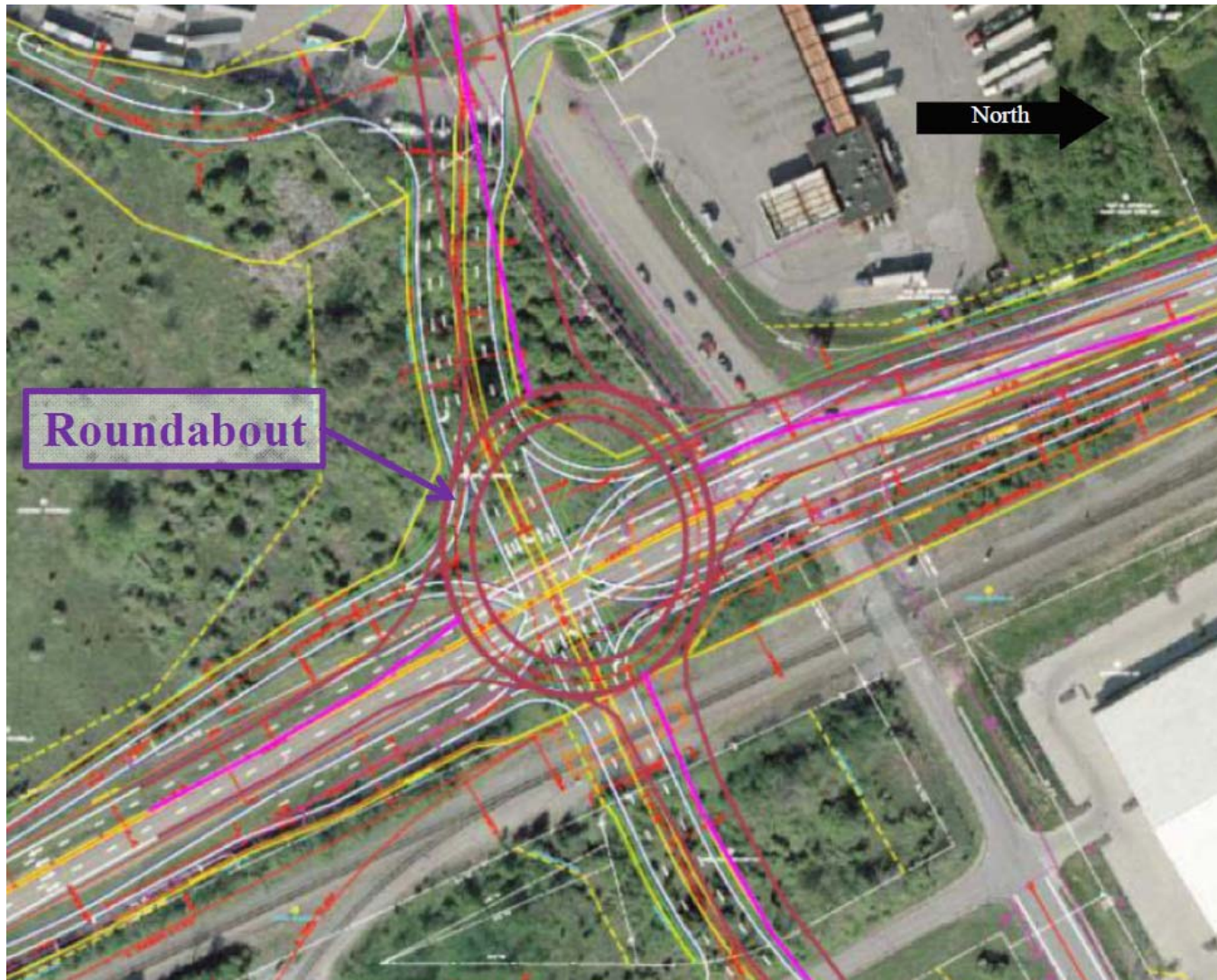
SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$22,064,000	\$0	\$22,064,000
RECOMMENDED DESIGN	\$14,450,000	\$0	\$14,450,000
ESTIMATED SAVINGS OR (COST)	\$7,614,000	\$0	\$7,614,000

VALUE ENGINEERING RECOMMENDATION # VE-16

SKETCH OF ORIGINAL DESIGN



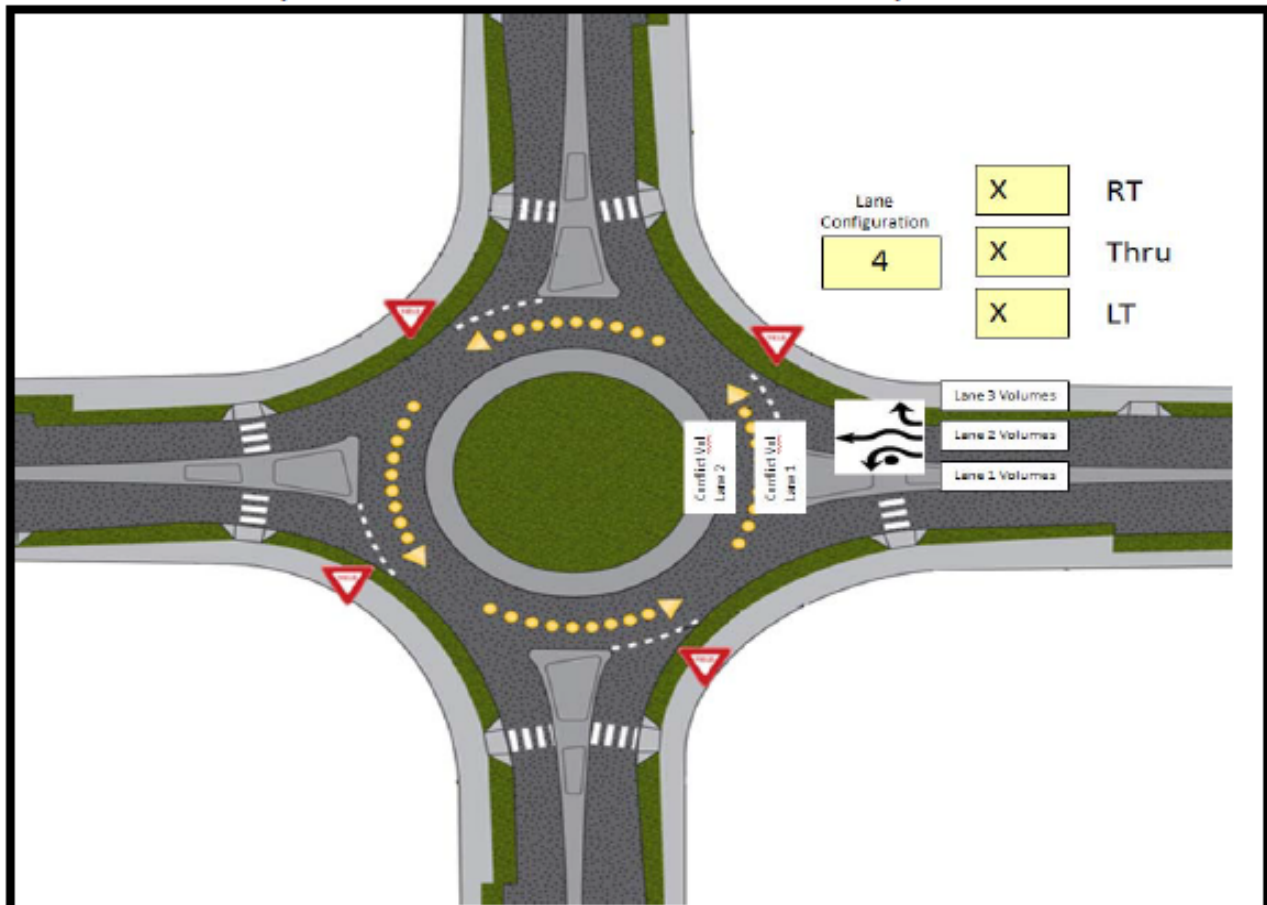
VALUE ENGINEERING RECOMMENDATION # VE-16
SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-16

CALCULATIONS

Roundabout Analysis: US 25 at KY 338; 2030 PM Peak Analysis



OUTPUT

Approach	Lane	Volume	Capacity	V/C	Delay (s)	Queue
Eastbound	1	321	693.6537	0.462767	5.468995	25
	2	321	693.6537	0.462767	5.468995	25
	3	0	693.6537	0	5.189909	0
Westbound	1	416	501.6852	0.829205	9.294795	25
	2	416	501.6852	0.829205	9.294795	25
	3	0	501.6852	0	7.175814	0
Northbound	1	610	819.7283	0.744149	5.184575	25
	2	487	819.7283	0.594099	4.792566	25
	3	0	819.7283	0	4.391699	0
Southbound	1	73	469.4083	0.155515	7.757479	25
	2	275	469.4083	0.585844	8.344812	25
	3	0	469.4083	0	7.66923	0

VALUE ENGINEERING RECOMMENDATION # VE-17

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize jughandle connections from KY338 to a grade separated US25 (Paul Slone Urban Interchange - PSUI) in lieu of a SPUI.

ORIGINAL DESIGN:

The original design specifies continuing the KY338 into the industrial park, grade separating KY338 from US25 with a Single Point Urban Interchange (SPUI). Access to the Travel America to the south of KY338 and the Pilot Truck Stop and Fast Food restaurants is provided via a full signalized intersection at Best Pal Drive. KY338 and US25 maintain a 5-lane cross-section through the SPUI.

RECOMMENDED CHANGE:

The VE Team recommends that a quadrant interchange (access roads/Jug handles) be constructed north and south of KY338 at Best Pal Drive that ultimately connect to US25 via at-grade intersections approximately 600 feet north and south of the existing intersection of US25 and KY338. The southern jughandle intersection with US25 would utilize a 2-lane modern roundabout. The northern jughandle intersection may operate as either a roundabout or signalized intersection. Access to the Industrial Park would be provided by a two-lane extension of KY338 to the Industrial park, grade separated from US25 and the railroad. Primary access to US25 would be provided through the southern jughandle and roundabout at US25/KY338 jughandle.

Access to the Pilot Truck Stop and fast food restaurants off of Best Pal Drive would be provided by a redirected left turn from KY338. This traffic would continue through the intersection of KY338 and Best Pal Drive and turn left onto a frontage road in front of the Pilot Truck Stop.

ADVANTAGES:

- Reduced construction materials
- Reduced construction time
- Reduced number of basic lanes on US25 and KY338
- Maintains acceptable LOS on US25 and KY338
- Increases separation between DCD ramp terminal and major intersections
- Reduced number of signal phases at Best Pal Drive

DISADVANTAGES:

- Does not directly accommodate future US25 widening, however provisions could be made

VALUE ENGINEERING RECOMMENDATION # VE-17

DISCUSSION CONTINUED

JUSTIFICATION:

The close proximity of the railroad to the proposed SPUI requires a tight geometric design and the use of retaining walls to accommodate the grade separation of KY338 with US25 and the adjacent Railroad. Eliminating the need for ramps at the grade separation can significantly reduce retaining wall and structure costs associated with the design. Furthermore, the use of the jughandle/access road can provide direct access to the businesses on the north and south of the KY338 while handling the moderate volume of traffic traveling to/from US25. The implementation of the redirected left turns at Best Pal Drive provides the ability to operate the signal with only two phases, reducing associated delay at the intersection. The major movement to US25 can also operate as a continuous flow movement with minimal delay and queuing.

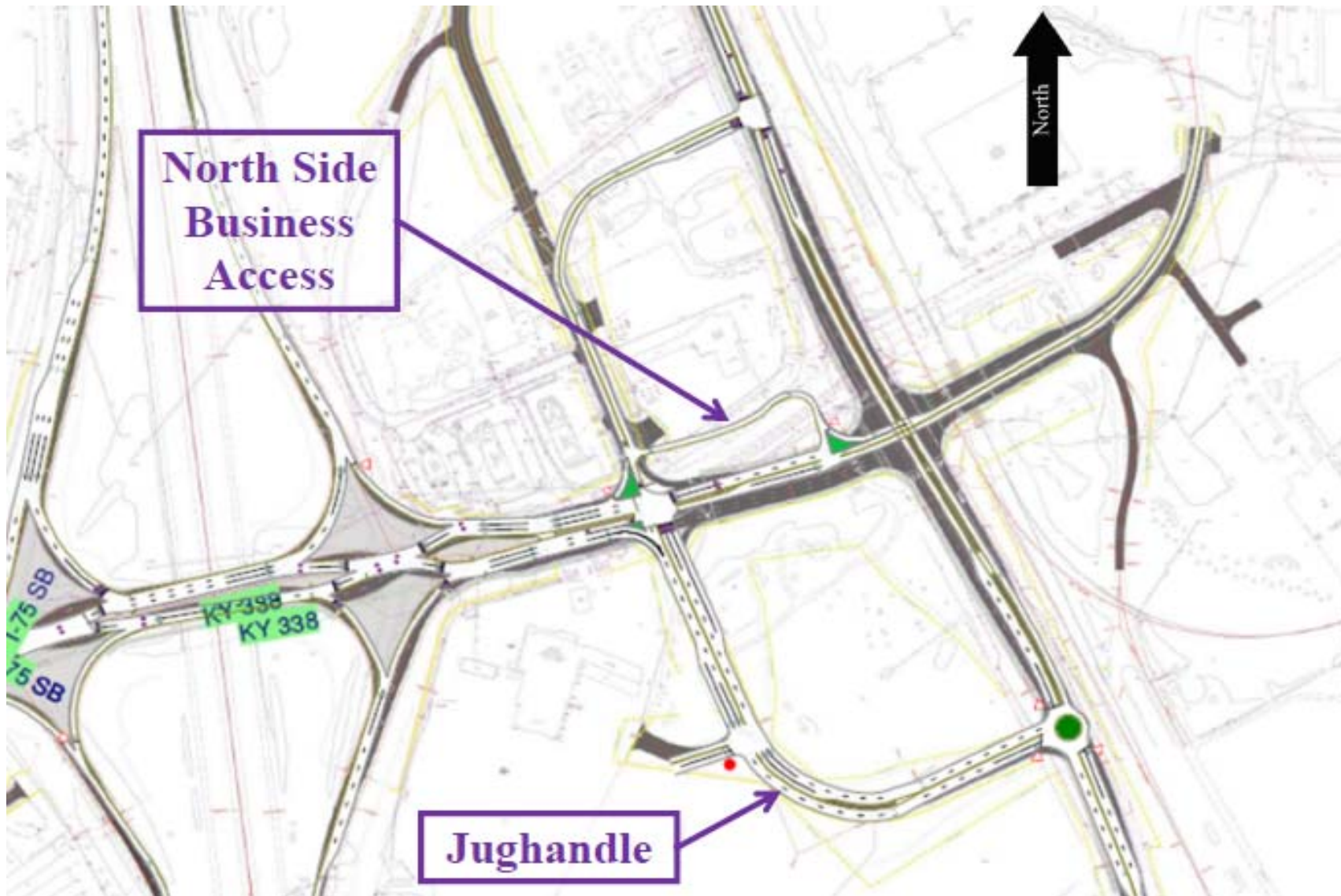
Table below summarizes the LOS for each intersection during the critical AM peak.

Intersection	LOS	Delay
North Jughandle Best Pal Drive at US25 (Signalized T-Intersection)	D	37
South Jughandle at US25 (Roundabout T-Intersection)	-----	*
*Delay at roundabout cannot be determined within timeframe of VE, however, preliminary hand calculations indicate it is feasible and worthy of more in depth analysis		

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$23,041,000	\$0	\$23,041,000
RECOMMENDED DESIGN	\$15,585,000	\$0	\$15,585,000
ESTIMATED SAVINGS OR (COST)	\$7,456,000	\$0	\$7,456,000

VALUE ENGINEERING RECOMMENDATION # VE-17

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING DESIGN COMMENT # VE-18

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize 2 lanes on northbound Paddock Drive in lieu of 3 lanes.

COMMENTARY:

Utilize a combination through/left turn lane in lieu of separate left and through lanes on northbound Paddock Drive (commercial side of intersection). The projected volumes for these movements are low and are recommended to be combined into a single lane to lower construction cost by reducing pavement width and improving intersection alignment.

VALUE ENGINEERING DESIGN COMMENT # VE-19

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Eliminate the right turn in lanes from KY338 into Huntington Bank and the BP gas station.

COMMENTARY:

The current design lane configuration for W-7 includes 2-right turn entrances from KY338 into the Huntington Bank and the BP gas station. The east right turn entrance for Huntington Bank as shown is near the begin taper for the DCD southbound on ramp lane which could interrupt some flow through the interchange. Although the businesses may prefer these entrances, the proposed backage road provides adequate access to the affected businesses. The VE Team recommends eliminating these right turn in lanes.

VALUE ENGINEERING DESIGN COMMENT # VE-20

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Reduce radii on DCD off-ramps to calm traffic approaching the interchange.

COMMENTARY:

Utilize a reduced radius on the I-71/I-75 off ramps to help reduce the operating speed before entering the KY338 roadway. The current design has tangents with relatively large radius that may cause drivers to keep their speeds higher than desired, especially given the unique nature of the Double Crossover Diamond interchange where most drivers will have little or no experience driving through this new type of interchange. The reduced radius and/or changes to the geometry will help keep speeds down and will help with pedestrians crossing through the interchange if the present sidewalks remain as planned.

VALUE ENGINEERING DESIGN COMMENT # VE-21

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Provide pedestrian connections to business from the shared use path.

COMMENTARY:

Current design calls for a five-foot sidewalk along KY338 and some of the local roads that will be reconstructed. For most of the properties along the corridor, there is not a convenient pedestrian connection to the businesses. By adding sidewalk connections, pedestrian conflicts with automobile traffic at entrances will be reduced and pedestrians will not have to walk through dirt and mud. The cost is relatively low for the benefit gained. This could be done for existing businesses that agree. The cost is approximately \$39 per square yard or \$17 per lineal foot of 4' wide sidewalk.



Example of pedestrian connection to business

VALUE ENGINEERING DESIGN COMMENT # VE-22

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize one sidewalk in lieu of two sidewalks on KY338 east of US25.

COMMENTARY:

The design plans indicated two sidewalks will be carried along KY338 through the proposed W-7 SPUI interchange and under the proposed NS Railroad overpass into the industrial park. Although providing pedestrian access is a project goal, pedestrian usage of a facility to enter the industrial park will likely remain low. The VE Team recommends providing one pedestrian sidewalk under the US25 interchange. Providing 1-sidewalk in lieu of 2 could reduce project costs by shortening the railroad overpass spans as well as the bridge over the SPUI interchange.

VALUE ENGINEERING DESIGN COMMENT # VE-23

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Close KY338 during construction just west of US25 in lieu of maintaining traffic during construction.

COMMENTARY:

The VE recommends closing Richwood Road just west of the US25 intersection during the construction phase in lieu of building the US25 interchange under traffic. This will expedite the construction of the interchange and enhance the safety for the workers and travelling public. A key component of this design comment will be the preparation of the Traffic Management Plan, particularly the public awareness campaign that will be required to get the word out to the businesses and public at large.

A signed detour route option could be KY338 to Frogtown Connector to access KY 536 and then turning right on US25 to gain access from the north. However, local traffic could access the east side of US25 by travelling on the existing roads immediately within the project area such as Best Pal Drive to Winning Colors Drive and then Shorland Drive.

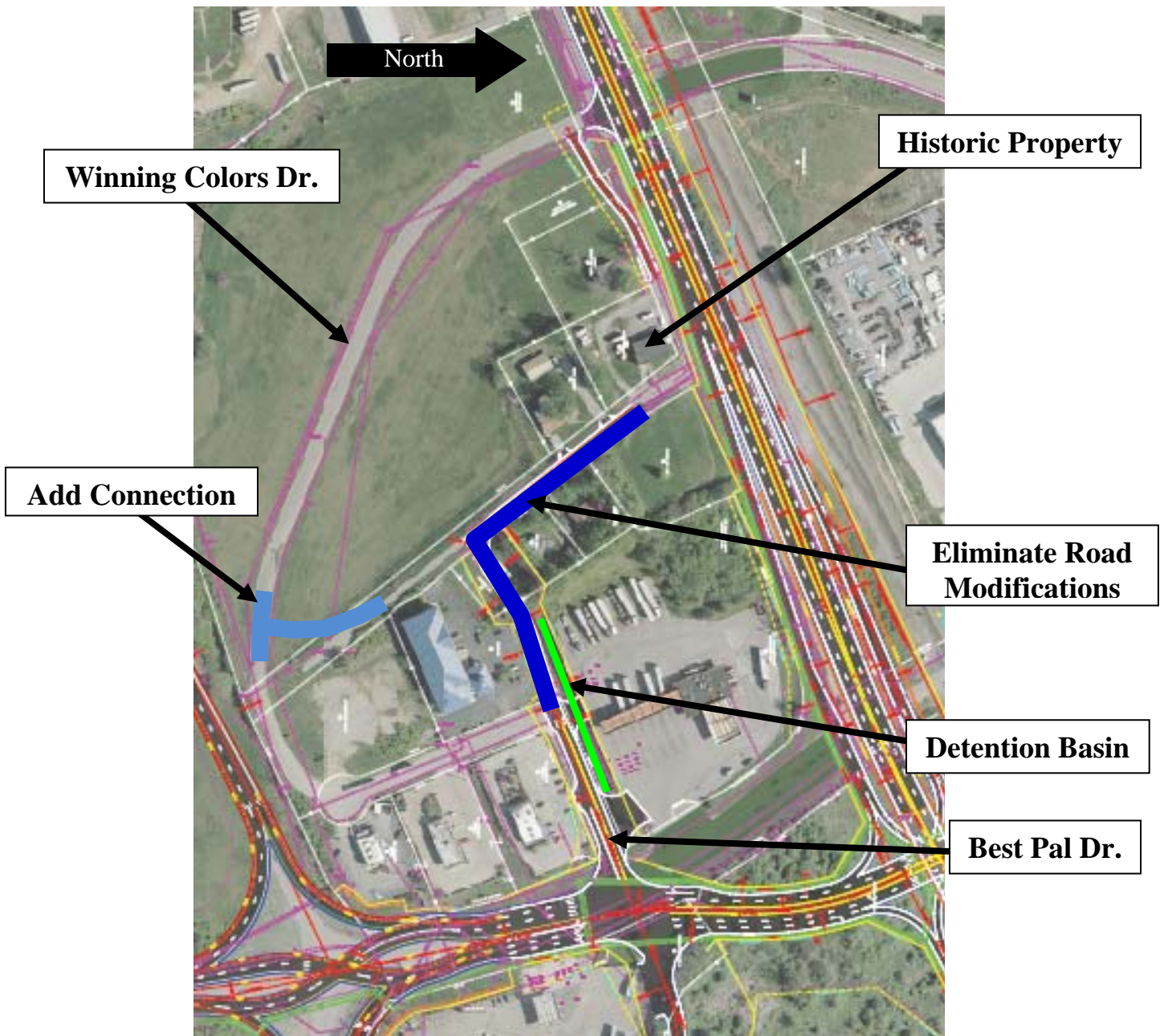
VALUE ENGINEERING DESIGN COMMENT # VE-24

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Revise the service road connections between Winning Colors Drive and Old Richwood Road in lieu of rebuilding Best Pal Drive.

COMMENTARY:

In lieu of constructing proposed Best Pal Drive all the way to the historic property at US25, construct Best Pal Drive to meet existing at or before Winning Colors Drive and connect the dead-end of Old Richwood Road to Winning Colors Drive. Benefits would include less right-of-way impacts (e.g. parking lots of the hotel and Pilot have different elevations) and less impact on the detention basin.



VALUE ENGINEERING DESIGN COMMENT # VE-25

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Verify railroad siding area, connection to US25, and associated earthwork are including in the project documents.

COMMENTARY:

Just north of KY338, the Norfolk Southern Railway has a spur siding that has access to US25. If this project requires the removal of the spur or of its access to US25, then verify that the associated right-of-way cost is included and/or that if the replacement is included with this project that appropriate details and cost are included.

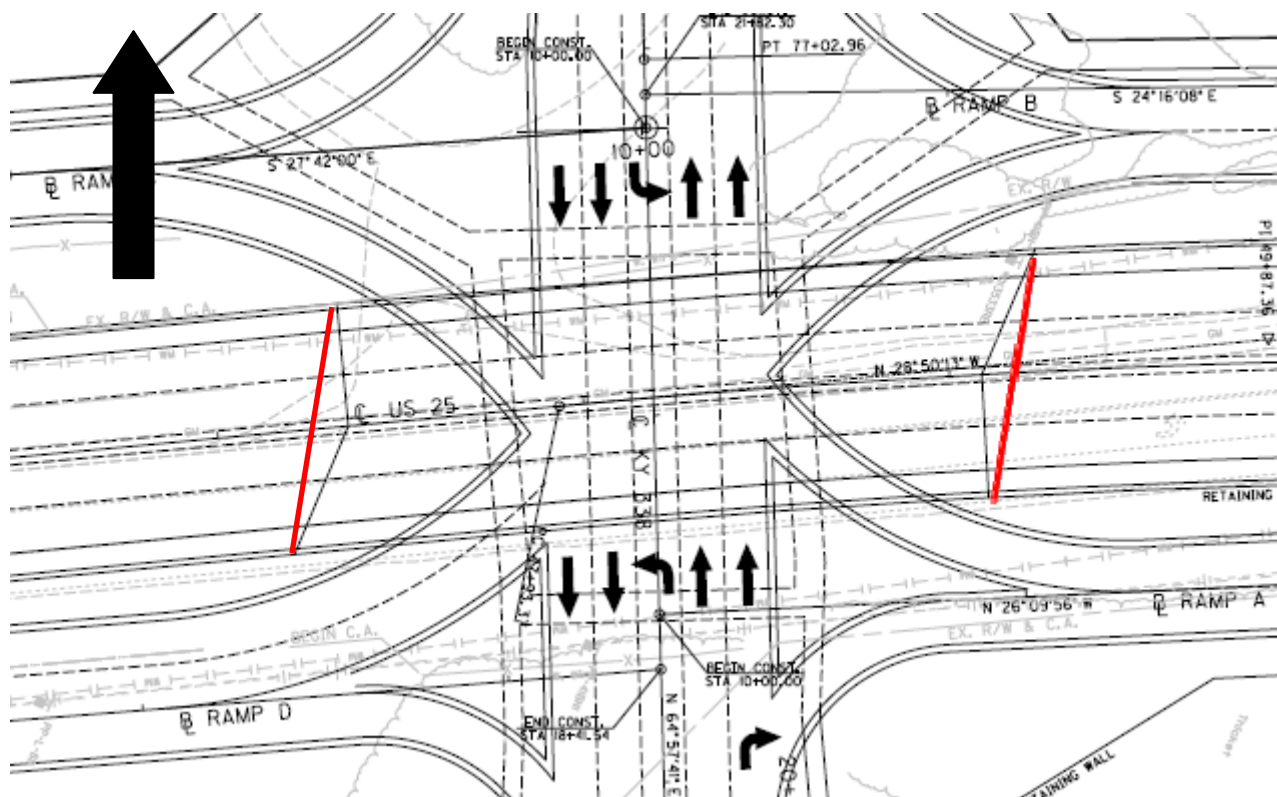
VALUE ENGINEERING DESIGN COMMENT # VE-26

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Eliminate the kink in the end bents of the SPUI to ease construction.

COMMENTARY:

Preliminary plans indicated the end bents at the proposed W-7 SPUI interchange would include a kinked abutment. The VE Team recommends consideration straightening this abutment for ease of construction.



VALUE ENGINEERING DESIGN COMMENT # VE-27

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize Frogtown Road Connector for left turns out of north side development area on KY338.

COMMENTARY:

Utilize a traffic signal at Frogtown Road to allow some traffic, especially trucks, to exit from the developed area around the western Pilot Truck Stop. Note that no left turn traffic into the north side developed area should be allowed. A full intersection is not being proposed as part of this design comment. The projected volumes being pushed to Paddock Drive will be too many for the proposed signal to adequately serve during peak periods. This will provide relief for exiting traffic and will keep trucks from traveling to a neighborhood street to exit. This will be a small cost addition to the project.

VALUE ENGINEERING DESIGN COMMENT # VE-28

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize only one lane for the I-75 southbound on-ramp.

COMMENTARY:

Reduce the proposed I-75 southbound on-ramp to one lane and retain existing alignment. Additional lane and length of lane is not needed for capacity. This design comment will eliminate new right-of-way needed for the ramp as well as embankment and pavement. A simple yield condition for the right turn movement where the right and left turns come together will adequately serve future demand. This design comment will result in a cost savings to the project. Not calculated due to time constraints.

VALUE ENGINEERING DESIGN COMMENT # VE-29

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize Shorland Drive as an alternative access to industrial park.

COMMENTARY:

While there is concern regarding train vs. truck crash history at this location, the VE Team recommends that this at grade railroad crossing remain open. In the event of a vehicular crash at the proposed E-1 or E-3 US25 at KY338 designs, an alternative access point may be desirable for employees and shipments to/from the industrial park. This design comment adds no cost to the project.

APPENDICES

The appendices in this report contain backup information supporting the body of the report, and the mechanics of the workshop. The following appendices are included.

CONTENTS

A. Study Participants	A-2
B. Cost Information	A-6
C. Function Analysis	A-8
D. Creative Idea List and Evaluation	A-10
E. VE Punch List	A-13
F. Rejected Recommendations.....	A-17

APPENDIX A
Study Participants

APPENDIX A – Study Participants

Workshop Attendance

Attendees				Participation						
				Meetings		Study Sessions				
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and Email (Tel first with Email underneath)	Role in Workshop	Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Dave Ayala	Parsons 101 West Ohio, Suite 2121 Indianapolis, IN 46204	317-616-1006 Dave.Ayala@parsons.com	Road/Traffic Designer	X						
Boday Borres	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Boday.Borres@ky.gov	KYTC Representative		X					
Joe Carter	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3020 Joe.L.Carter@ky.gov	KYTC Representative		X					
Lindsay Carter	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3020 Lindsay.Carter@ky.gov	KYTC Representative		X					
Jim Codell	URS Corporation	859-537-2901 James.Codell@urs.com	Observer		X					
Stephen Curless	URS Corporation 525 Vine Street, Suite 1800 Cincinnati, OH 45202	513-419-3504 Steve.Curless@urs.com	VE Roadway Designer	X	X	X	X	X	X	X
Kevin Damron	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3730 Kevin.Damron@ky.gov	KYTC Representative		X					
Greg Groves	URS Corporation 325 W. Main Street, Suite 1200 Louisville, KY 40206	502-217-1509 Greg.Groves@urs.com	VE Team Member	X	X	X	X	X	X	X
Bob Gustafson	Florence & Hutcheson 1510 Newton Pike, Suite 108 Lexington, KY 40511	859-455-8378 bgustafson@flohut.com	Design Team Roadway Designer	X	X					
Jeff Jasper	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Jeff.Jasper@ky.gov	KYTC Representative		X					

Workshop Attendance

Attendees				Participation						
				Meetings		Study Sessions				
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and Email (Tel first with Email underneath)	Role in Workshop	Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Adam Kirk	Kentucky Transportation Center 176 Raymond University of Kentucky Lexington, KY 40506	859-257-7310 Adam.Kirk@uky.edu	VE Traffic Engineering	X	X	X	X	X	X	X
Carol Callan-Ramler	KYTC, District 6 421 Buttermilk Pike Covington, KY 41017	859-341-2700x272 Carol.Callan-Ramler@ky.gov	KYTC Project Manager	X	X					
Brian Rhodes	URS Corporation 525 Vine Street, Suite 1800 Cincinnati, OH 45202	513-419-3500 Brian.Rhodes@urs.com	VE Structural Engineer	X	X	X	X	X	X	X
Kyle Schafersman	URS Corporation 8300 College Boulevard, Suite 200 Overland Park, KS 66210	913-344-1019 Kyle.Schafersman@urs.com	VE Team Leader	X	X	X	X	X	X	X
Jim Simpson	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Jim.Simpson@ky.gov	KYTC Project Team Member	X	X					
Paul Slone	URS Corporation 525 Vine Street, Suite 1800 Cincinnati, OH 45202	513-419-3456 Paul.Slone@urs.com	VE Traffic Engineer	X	X	X	X	X	X	X
Brent Sweger	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Brent.Sweger@ky.gov	KYTC VE Coordinator	X	X	X	X	X	X	X
Clay Johnson	Florence & Hutcheson 1510 Newton Pike, Suite 108 Lexington, KY 40511	859-455-8378 cjohnson@flohut.com	Design Team Roadway Designer	X						
Jonathan West	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Jonathan.West@ky.gov	KYTC Observer	X		X	½	½		½

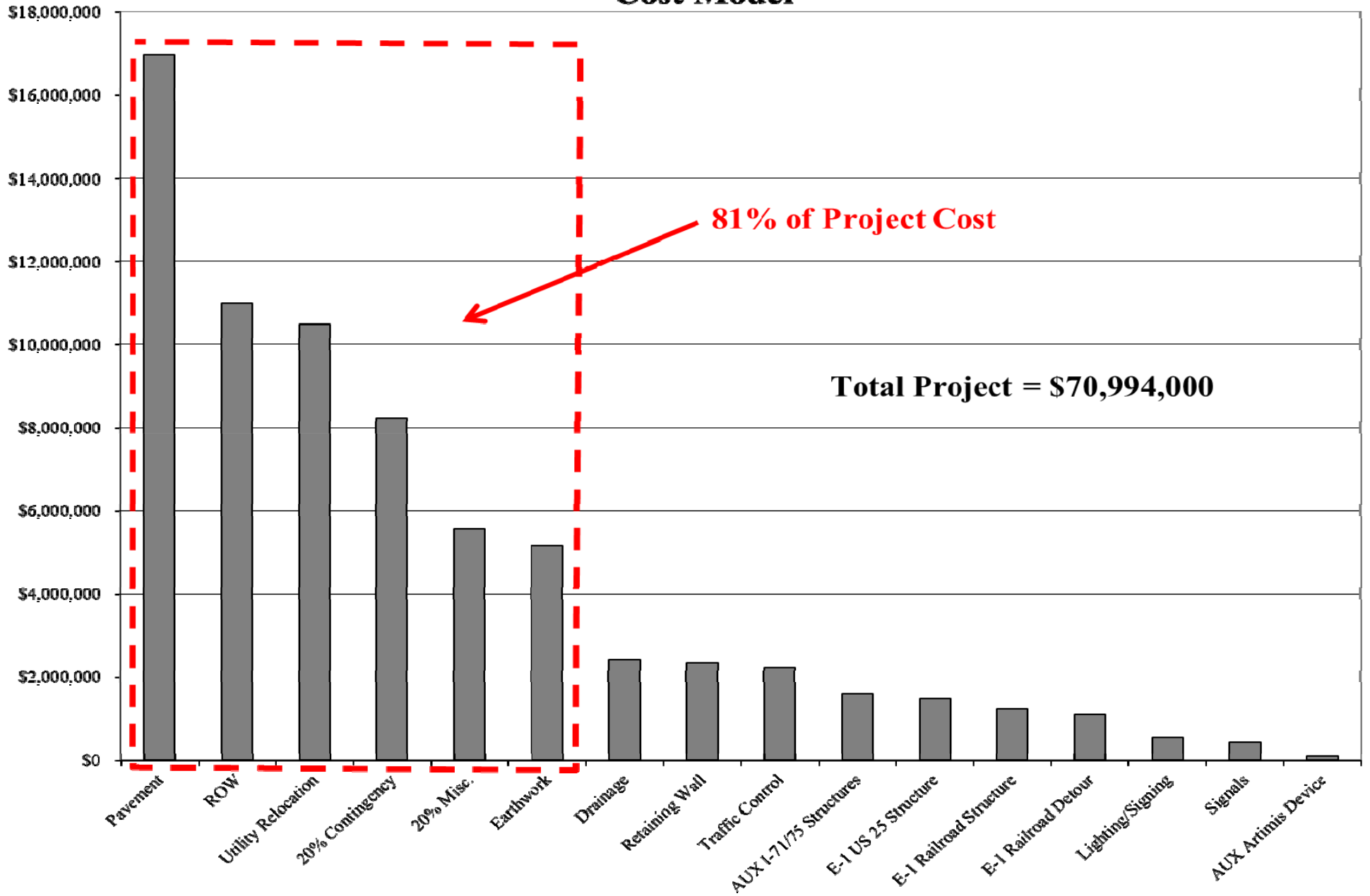
Workshop Attendance

Attendees				Participation						
				Meetings		Study Sessions				
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and Email (Tel first with Email underneath)	Role in Workshop	Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Todd White	Florence & Hutcheson 1510 Newton Pike, Suite 108 Lexington, KY 40511	859-455-8378 twhite@flohut.com	Design Team Roadway Designer	X						

APPENDIX B
Cost Information

APPENDIX B – Cost Information

Cost Model



APPENDIX C
Function Analysis

APPENDIX C – Function Analysis

Function Model

Item	Cost	Function
Total Construction	\$70,994,000	Reduce peak hour congestion Improve safety Improve access to industrial park Maintain access to businesses
Pavement	\$16,981,000	Support traffic Supply smooth surface Create riding surface Install curb & gutter Install multiuse trail
Right-of-way	\$11,000,000	Improve side roads Accommodate widened KY338 Accommodate realigned US25
Utility Relocation	\$10,500,000	Maintain service Relocate impacted utilities
20% Contingency	\$8,249,000	Account for unknowns
20% Misc.	\$5,560,000	Account for minor items
Earthwork	\$5,148,000	Separate grade Pass crossover under I-71/I-75
Drainage	\$2,426,000	Drain water Accept water from curb & gutter
Retaining Wall	\$2,358,000	Reduce right-of-way and easements Reduce adjacent structure impacts Reduce property takes Accommodate railroad separation Retain earth
Traffic Control	\$2,234,000	Maintain traffic during construction Maintain separation Discourage traffic Improve safety
AUX I-71/75 Structures	\$1,600,000	Support auxiliary lane Widen Frogtown Road structure Modify KY338 overpass
E-1 US25 Structure	\$1,487,000	Accommodate SPUI Separate grade
E-1 Railroad Structure	\$1,241,000	Separate grade Accommodate 3 railroad tracks
E-1 Railroad Detour	\$1,100,000	Maintain rail traffic during construction
Lighting/Signing	\$560,000	Illuminate road Inform drivers
Signals	\$450,000	Control traffic
AUX Artimis Device	\$100,000	Accommodate ramps Replace sign support

APPENDIX D
Creative Idea List and Evaluation

APPENDIX D – Creative Idea List and Evaluation

List of Creative Ideas

ID #	Name of Idea / Description	Develop Status	Team Member Responsible
1	Reduce the number of lanes on Triple Crown Boulevard at KY338	DC	A. Kirk & P. Slone
2	Shorten project length to end at Triple Crown Boulevard or Paddock Drive	4	
3	Construct a roundabout at KY338 and Triple Crown Boulevard in lieu of a new signalized intersection	2	B. Sweger
4	Utilize two westbound lanes through the DCD interchange in lieu of only one westbound lane	DC	A. Kirk
5	Utilize a depressed at-grade intersection at KY338 and US25 with a smaller footprint than alternative E-3 in lieu of SPUI	1	P. Slone
6	Utilize an improved at-grade intersection at KY338 and US25 with an at-grade railroad crossings on existing KY338 alignment in lieu of constructing a SPUI	2	S. Curless
7	Reduce the length of the southbound on-ramp	4	
8	Utilize properly sized entrance and exit ramps in lieu of continuous auxiliary lanes on I-71/I-75 north of KY338 and long ramps to the south of KY338	1	A. Kirk
9	Eliminate US25 improvements in lieu of widening roadway to five lanes	1	S. Curless
10	Defer US25 improvements outside of the limits of this project	w/ #9	
11	Terminate the backage road at the Huntington Bank and BP gas station in lieu of continuing road	1	B. Rhodes
12	Terminate the backage road at between Wendy's and BP gas station in lieu of continuing road	2	G. Groves
13	Eliminate the right-in turn lanes from KY338 into Wendy's and the BP gas station	DC	B. Rhodes
14	Close KY338 during construction just west of US25 in lieu of maintaining traffic during construction	DC	G. Groves
15	Install a ramp meter on the I-71/I-75 northbound on-ramp	DC	B. Sweger
16	Install a ramp meter on the I-71/I-75 southbound on-ramp	4	
17	Utilize one sidewalk in lieu of two sidewalks on KY338 east of US25	DC	B. Rhodes
18	Add sidewalks to the west side of US25 in lieu of no sidewalks	4	
19	Utilize jug-handle connections from KY338 to a grade separated US25 (Slone Interchange Design) in lieu of a SPUI	1	B. Sweger & P. Slone
20	Utilize 3 lanes on southbound Paddock Drive in lieu of 4 lanes	DC	P. Slone
21	Utilize alternative E-3 with a left turn access from KY338 to businesses in lieu of alternative E-1	w/ #5	P. Slone
22	Utilize roundabout at US25 and KY338 with a leg to the truck stop	2	J. West
23	Construct an additional firehouse on the west side of I-71/I-75	4	
24	Provide pedestrian connections to business from the shared use path	DC	B. Sweger

List of Creative Ideas			
ID #	Name of Idea / Description	Develop Status	Team Member Responsible
25	Shift the northbound I-71/I-75 exit ramp westward to reduce the retaining wall cost	1	G. Groves
26	Utilize a yield condition on the southbound I-71/I-75 entrance ramps to allow use of existing ramp in lieu of constructing an entirely new southbound on ramp	4	
27	Reduce the number of lanes that pass under the railroad in lieu of 5 lanes	1	B. Rhodes
28	Connect existing at-grade rail crossing near Duffel Lane to Paper Boulevard to provide a third access to the firehouse	3	
29	Shorten the access to KY338 from the TA truck stop parking lot	4	
30	Reduce radii on DCD off-ramps to calm traffic approaching the interchange	DC	G. Groves
31	Relocate Frogtown Connector to meet Paddock Drive to just north of the strip mall in lieu of connecting south of the strip mall	DC	B. Sweger
32	Revise driveway access to existing buildings in the industrial park	4	
33	Eliminate the kink in the end bents of the SPUI to ease construction	DC	B. Rhodes
34	Investigate top-down construction of the railroad bridge overpass to possibly eliminate the need for retaining walls	DC	B. Rhodes
35	Revise the service road connections between Winning Colors Drive and Old Richwood Road in lieu of rebuilding Best Pal Drive	DC	S. Curless
36	Verify railroad siding area, connection to US25, and associated earthwork are including in the project documents	DC	S. Curless
37	Put shared use path through the center span of the I-71/I-75 underpass between the eastbound and westbound traffic in lieu of original design	1	B. Sweger

Development Status Legend:

- 1: Idea is considered by the VE Team to be the best value enhancement possibility and is currently being developed as a VE recommendation
- 2: Idea is considered by the VE Team to be a good value enhancement possibility and will be developed as a VE recommendation after all the “1s” have been developed
- 3: Idea is considered by the VE Team to be of marginal value enhancement possibility and may be developed as a VE recommendation after all the “1s” and “2s” have been developed
- 4: Idea was not considered to enhance the value of the project and has been eliminated from further consideration by the VE Team
- DC: Idea is being developed as a Value Engineering Design Comment to the designers with no easily quantifiable cost associated

APPENDIX E
VE Punch List

APPENDIX E – VE Punch List

VALUE ENGINEERING PUNCH LIST

ITEM NOS. **6-18.00**

PROJECT COUNTIES: **Boone**

DATE OF STUDY: **8/13/2012 to 8/17/2012**

VE # **201206**

VE Alternative Number	VE Team Picks	Description	Activity* (Y, N, UC-Date)	Implemented Life Cycle Cost Savings	Original Cost	Alternative Cost	Initial Cost Saving	Life Cycle Cost Savings (Total Present Worth)	FHWA Categories	Remarks
Roadway										
VE-1	✓	Relocate Frogtown Connector to meet Paddock Drive just north of the strip mall in lieu of connecting south of the strip mall			NA	NA	NA	NA	Ops	
VE-2	✓	Reduce the number of lanes on Triple Crown Boulevard at KY338			NA	NA	NA	NA	Con, Oth	
VE-3	✓	Construct a roundabout at KY338 and Triple Crown Boulevard in lieu of a new signalized intersection			\$86,000	\$65,000	\$21,000	NA	Ops, Saf	
VE-4		Terminate the backage road between the Huntington Bank and BP gas station in lieu of continuing road to the storage facility			\$802,000	\$60,000	\$742,000	NA	Con, Oth	
VE-5	✓	Terminate the backage road between Wendy's and BP gas station in lieu of continuing road			\$1,069,000	\$120,000	\$949,000	NA	Con, Oth	
VE-6	✓	Shift the northbound I-71/I-75 exit ramp westward and construct only one right turn lane to reduce the retaining wall and pavement costs			\$428,000	\$0	\$428,000	NA	Saf, Con, Ops, Oth	
VE-7	✓	Utilize two westbound lanes through the DCD interchange in lieu of only one westbound lane			NA	NA	NA	NA	Saf, Ops	
VE-8	✓	Utilize properly sized entrance and exit ramps in lieu of continuous auxiliary lanes on I-71/I-75 north of KY338 and long ramps to the south of KY338			\$8,172,000	\$3,449,000	\$4,723,000	NA	Con, Oth	
VE-9		Install a ramp meter on the I-71/I-75 northbound on-ramp			NA	NA	NA	NA	Saf, Ops	
VE-11		Defer US25 improvements in lieu of widening roadway to five lanes			\$28,777,000	\$7,788,000	\$20,989,000	NA	Oth, Con	

VALUE ENGINEERING PUNCH LIST

ITEM NOS. **6-18.00**

PROJECT COUNTIES: **Boone**

DATE OF STUDY: **8/13/2012 to 8/17/2012**

VE # **201206**

VE Alternative Number	VE Team Picks	Description	Activity* (Y, N, UC-Date)	Implemented Life Cycle Cost Savings	Original Cost	Alternative Cost	Initial Cost Saving	Life Cycle Cost Savings (Total Present Worth)	FHWA Categories	Remarks
VE-14		Utilize an improved at-grade intersection at KY338 and US25 with an at-grade railroad crossing on existing KY338 alignment in lieu of constructing a SPUI			\$32,376,000	\$16,136,000	\$16,240,000	NA	Oth, Con, Saf, Env	
VE-15	✓	Utilize a depressed at-grade intersection at KY338 and US25 with a smaller footprint than alternative E-3 and left turn access from KY338 to businesses in lieu of SPUI			\$25,176,000	\$17,523,000	\$7,653,000	NA	Oth, Con, Saf, Env	
VE-16		Utilize roundabout at US25 and KY338 with left turn access from KY338 to businesses in lieu of a SPUI			\$22,064,000	\$14,450,000	\$7,614,000	NA	Ops, Con, Saf, Oth	
VE-17		Utilize jughandle connections from KY338 to a grade separated US25 (PSUI - Paul Slone Urban Interchange) in lieu of a SPUI			\$23,041,000	\$15,585,000	\$7,456,000	NA	Ops, Con, Saf, Oth	
Structures										
VE-10	✓	Put shared use path through the center span of the I-71/I-75 underpass between the eastbound and westbound traffic in lieu of original design			\$600,000	\$36,000	\$564,000	NA	Env, Con, Ops, Oth	
VE-12		Reduce the number of lanes that pass under the railroad to 3 lanes in lieu of 5 lanes			\$12,780,000	\$11,991,000	\$789,000	NA	Con, Oth, Env	
VE-13	✓	Investigate top-down construction of the railroad bridge overpass to eliminate the need for temporary retaining walls			NA	NA	NA	NA	Con	
Other Design Comments										
VE-18		Utilize 2 lanes on northbound Paddock Drive in lieu of 3 lanes			NA	NA	NA	NA	Con, Oth	

VALUE ENGINEERING PUNCH LIST

ITEM NOS. **6-18.00**

PROJECT COUNTIES: **Boone**

DATE OF STUDY: **8/13/2012 to 8/17/2012**

VE # **201206**

VE Alternative Number	VE Team Picks	Description	Activity* (Y, N, UC-Date)	Implemented Life Cycle Cost Savings	Original Cost	Alternative Cost	Initial Cost Saving	Life Cycle Cost Savings (Total Present Worth)	FHWA Categories	Remarks
VE-19		Eliminate the right turn in lanes from KY338 into Huntington Bank and the BP gas station			NA	NA	NA	NA	Saf, Ops	
VE-20		Reduce radii on DCD off-ramps to calm traffic approaching the interchange			NA	NA	NA	NA	Saf, Ops	
VE-21		Provide pedestrian connections to business from the shared use path			NA	NA	NA	NA	Ops, Oth	
VE-22		Utilize one sidewalk in lieu of two sidewalks on KY338 east of US25			NA	NA	NA	NA	Oth	
VE-23		Close KY338 during construction just west of US25 in lieu of maintaining traffic during construction			NA	NA	NA	NA	Con, Saf	
VE-24		Revise the service road connections between Winning Colors Drive and Old Richwood Road in lieu of rebuilding Best Pal Drive			NA	NA	NA	NA	Con, Oth, Env	
VE-25		Verify railroad siding area, connection to US25, and associated earthwork are including in the project documents			NA	NA	NA	NA	Con, Oth	
VE-26		Eliminate the kink in the end bents of the SPUI to ease construction			NA	NA	NA	NA	Con, Oth	
VE-27		Utilize Frogtown Road Connector for left turns out of north side development area on KY338			NA	NA	NA	NA	Ops, Saf	
VE-28		Utilize only one lane for the I-75 southbound on-ramp			NA	NA	NA	NA	Ops, Oth	
VE-29		Utilize Shorland Drive as an alternative access to industrial park			NA	NA	NA	NA	Ops	
					Saf 12	Ops 14	Env 5	Con 18	Oth 19	

* Y=yes, N=no, UC=under construction

APPENDIX F
Rejected Recommendations

APPENDIX F – Rejected Recommendations

Rejected Recommendations

Occasionally, an idea that was originally selected for development into a recommendation is found to not achieve the desired result or potential savings expected. During the development phase some items are found to have fatal flaws or other strong reasons for rejection. Since a portion of the development has already been completed, the VE Team would like to share this information with the owner and Design Team. If one of these ideas is proposed in the future, the analysis in this section can be referenced as justification for rejection. These additional two comments are presented for informational purposes only. The VE Team does not recommending these ideas.

Creative Idea Number: 2

Idea Description: Shorten project length to end at Triple Crown Boulevard or Paddock Drive

Status: Rejected

Discussion: The VE Team reviewed the traffic forecasts at Paddock Drive and Triple Crown Boulevard and made some minor adjustments. Supplemental traffic analyses were performed to test the assumptions made in this idea that the length of KY338 lane widening to the west could be reduced. Upon further analysis, this idea was deemed to not be feasible and is not recommended for presentation to the Design Team.

END OF REPORT

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