Value Engineering Study

I-64 WESTBOUND TO I-264 WESTBOUND RAMP IMPROVEMENTS

JEFFERSON COUNTY, KENTUCKY

ITEM NUMBER 5-159.00
VE STUDY NUMBER 201203

Study Date: April 2-6, 2012

Kentucky Transportation Cabinet
Frankfort, Kentucky

URS

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VALUE ENGINEERING STUDY
for
Kentucky Transportation Cabinet
Frankfort, Kentucky

Study Date: April 2 - 6, 2012

Final Report

May 18, 2012

URS

EXECUTIVE SUMMARY

General
URS conducted a Value Engineering (VE) study of the I-64 westbound to I-264 westbound ramp improvements in Jefferson County, Kentucky. The Item Number is 5-159.00. The topic was the 30% design submission prepared by Parsons Brinckerhoff 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 $27,839,000 not including 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, 35 creative ideas were identified; eight of these ideas were developed into VE recommendations and 12 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 Project 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 two mutually exclusive scenarios to represent a range recommendations and potential cost savings. These scenarios are comprised of a combination of individual recommendations as shown in the Summary of VE Recommendation table. Scenario #1 - VE Team's Selected Combination represents an estimated potential cost savings of $15,835,000. Scenario #2 – Minor Conceptual Changes results in an estimated potential cost savings of $4,247,000. 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 Scenarios
VE-1	Improve signing and markings to clarify lane assignments on I-64 prior to I-264 exit	Comment	
VE-2	Utilize a zipper merge in lieu of a right-hand merge for the I-64 westbound to I-264 westbound flyover ramp	Comment	
VE-3	Widen the bridge over I-64 to add a second lane on the I-64 westbound to I-264 westbound flyover ramp as an interim solution	($633,000)	1*
VE-4	Restripe the I-64 westbound to I-264 westbound flyover ramp to maximize the amount of two lanes possible as an interim solution	Comment	
VE-5	Install speed detectors and advanced warning systems on I-64 to reduce the number of crashes	Comment	
VE-6	Install a removable gap in the barrier west of Browns Lane for emergency egress of the C-D lane	Comment	
VE-7	Retrofit the existing Browns Lane structure to move the piers in lieu of reconstruction of half of the structure	$1,140,000	
VE-8	Utilize accelerated bridge construction principles to reduce duration and maintenance of traffic	Comment	
VE-9	Utilize short-term closures to reduce the amount of temporary pavement during construction	Comment	
VE-10	Retrofit the existing Retaining Wall Number 3 in lieu of replacing with a new retaining wall	$137,000	2
VE-11	Utilize a mechanically stabilized earth (MSE) for Retaining Walls Number 3 and 6 in lieu of cast-in-place retaining walls	$66,000	
VE-12	Revise the traffic forecast due to current conditions in lieu of using the 2005 estimates	Comment	
VE-13	Conduct additional origin-destination analysis to determine the split between Ramp 9 traffic that goes to I-264 westbound and the traffic that exits at Breckenridge Lane	Comment	
VE-14	Reanalyze original design alternatives with the revised traffic information	Comment	
VE-15	Utilize a Michigan U-turn on Breckenridge Lane in lieu of traditional signalized intersections to improve flow	($2,000,000)	1
VE-16	Shift the alignment of the new I-264 C-D Road to Breckenridge Lane widening to the south to fit between the existing Browns Lane structure piers and miss the power poles, bridge pier, and reduce ROW takes	$4,110,000	2
VE-17	Restripe the far left inside lane on I-264 westbound to reduce the 14 ft wide lane to a 12 ft wide lane	Comment	
VE-18	Eliminate C-D Road No. 3 and the braided interchange and force westbound I-264 mainline traffic to exit at a modified partial cloverleaf interchange at Breckenridge Lane	$6,573,000	

SUMMARY OF VE RECOMMENDATIONS			
Rec #	Recommendation Title / Description	1st cost savings (or cost)	VE Scenarios
VE-19	Utilize one lane from C-D Road No. 1 in lieu of two lanes, eliminate the braided ramps, provide a two-lane flyover, and a two-lane exit at Breckenridge Lane northbound in lieu of the original design	$17,835,000	1
VE-20	Reevaluate a full tight diamond interchange at I-64 and Breckenridge Lane in lieu of the original design	Comment	

Scenario #1 - VE Team's Selected Combination: $15,835,000

Scenario # 2 - Minor Conceptual Changes: $4,247,000

* The work and cost of VE-3 is included in VE-19, so the additional cost of VE-3 has been omitted from the VE Scenario #1 savings.

Acknowledgments
A thank you is given to the staff members from the Kentucky Transportation Cabinet and Parsons Brinckerhoff for their participation. Special thanks are also extended to Mr. Brent Sweger for his assistance with this study.

Value Engineering Study Team

Name	Discipline / Role	Organization	Telephone
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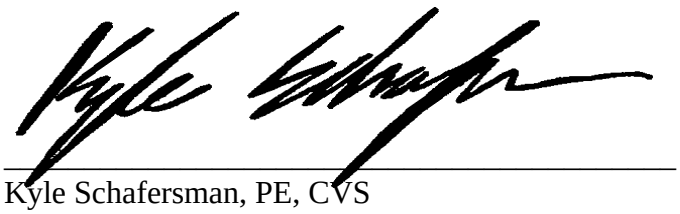
Craig Klusman, PE	Structural Engineer	URS	502-217-1502
Kyle Schafersman, PE, CVS	VE Team Leader	URS	913-344-1019
Paul Slone, PE, PTOE	Traffic Operations	URS	513-419-3456
Brent Sweger, PE, AVS	VE Coordinator	KYTC	502-564-3280

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

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Appendices

SECTION 1 - INTRODUCTION

This report documents the results of a value engineering study on the I-64 westbound to I-264 westbound ramp improvements in Jefferson County, Kentucky. The Item Number is 5-159.00. The study was held at the KYTC offices in Frankfort, KY on April 2-6, 2012. The study team was from URS 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

The purpose of this project is to improve traffic operations, reduce congestion, and improve safety on the I-64 westbound to I-264 westbound ramp in the vicinity of the I-64 / I-264 Interchange. Heavy daily traffic volumes commonly result in traffic delays and traffic backups on I-64 westbound and poor weaving conditions for motorists between the convergence of the I-64 westbound ramp, the I-264 westbound ramp, and the I-264 / KY 1932 (Breckenridge Lane) interchange. In 2005, traffic analysis indicated that both I-64 westbound and I-264 westbound within the project area were operating at level of service (LOS) F during both peak periods. Traffic analysis indicates LOS D for both peak periods at the I-264 westbound / Breckenridge Lane northbound ramp intersection and LOS F at the Breckenridge Lane / Dutchmans Lane intersection. Without the proposed improvements and with traffic volumes expected to grow substantially, traffic operations on the mainline interstate and intersections within the project area will worsen. A discussion of the originally proposed design follows for both initial and ultimate construction.

INITIAL CONSTRUCTION (COMPLETED IN 2010-2011)

The initial construction included the addition of an auxiliary lane along I-64 westbound approaching the I-64 / I-264 interchange and the extension of the northbound Breckenridge Lane left turn lanes onto Dutchmans Parkway. The estimated construction cost for the initial construction was approximately $2,000,000, and the work was completed in 2010-2011.

PROPOSED ULTIMATE CONSTRUCTION

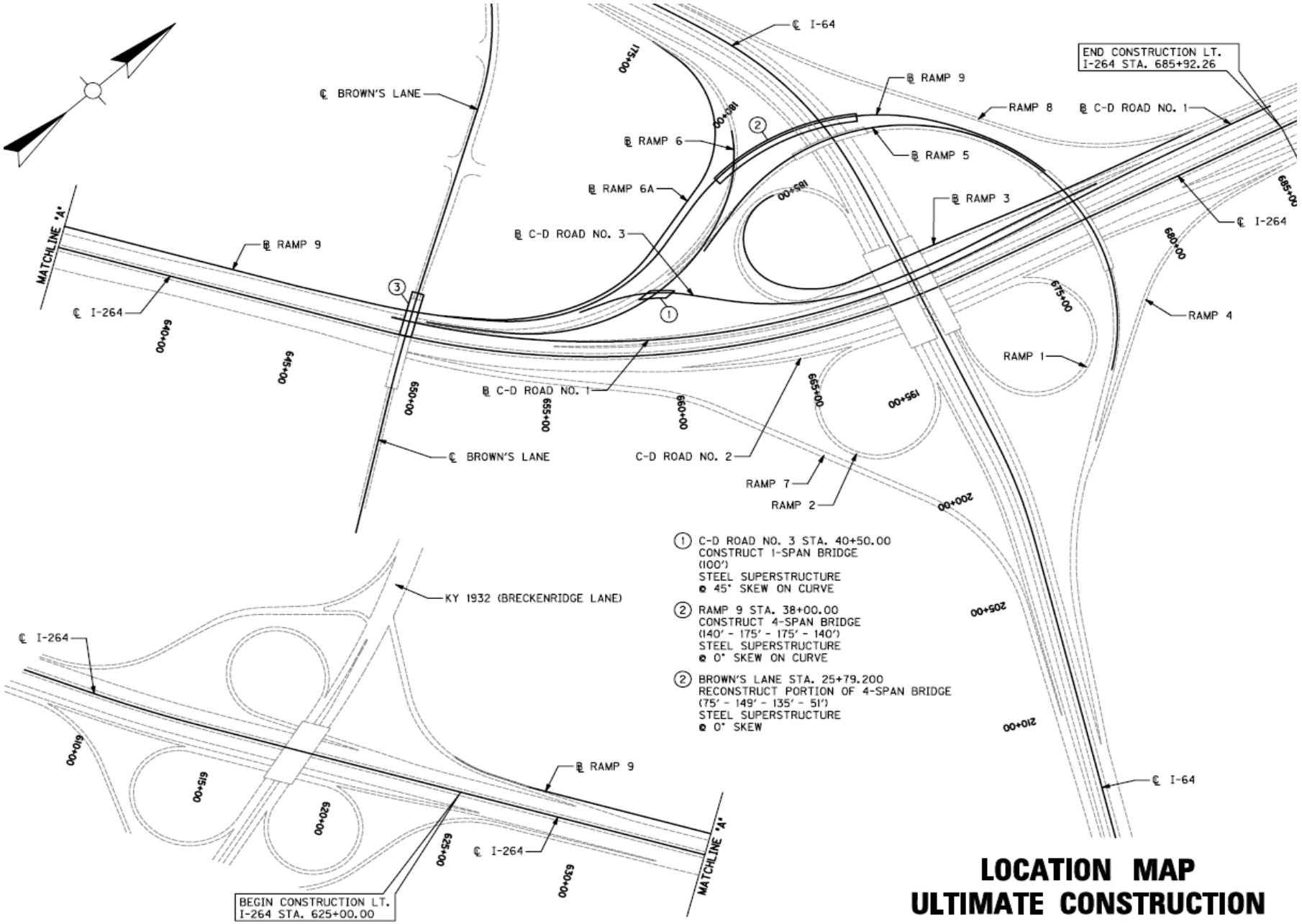
The ultimate construction provides for an additional ramp from the existing I-64 westbound to I-264 westbound ramp for northbound Breckenridge Lane traffic. I-264 westbound traffic going to northbound Breckenridge Lane will be signed to use the I-264 westbound collector-distributor (C-D) road and would exit to Breckenridge Lane prior to merging onto I-264. The ultimate construction essentially provides a braid of traffic bound for Breckenridge Lane across I-64 to I-264 westbound traffic, removing the conflicting weave and merge movements of those two traffic flows between the existing interchanges.

Two new structures are required: an additional flyover approximately 530 feet (ft) in length and a single-span bridge approximately 100 ft in length. At least partial reconstruction of the Browns Lane structure over I-264 is required. Except for some anticipated modifications to the permanent signing, the proposed initial construction will be compatible with the proposed ultimate construction.

Design for the ultimate construction includes allowing I-64 eastbound to I-264 westbound traffic the ability to exit onto northbound Breckenridge Lane. This movement is accommodated within the existing I-64 / I-264 interchange. The distances between successive gores do not meet AASHTO criteria. The estimated construction cost for this project is approximately $27,839,000 including right-of-way (ROW) and utility relocations.

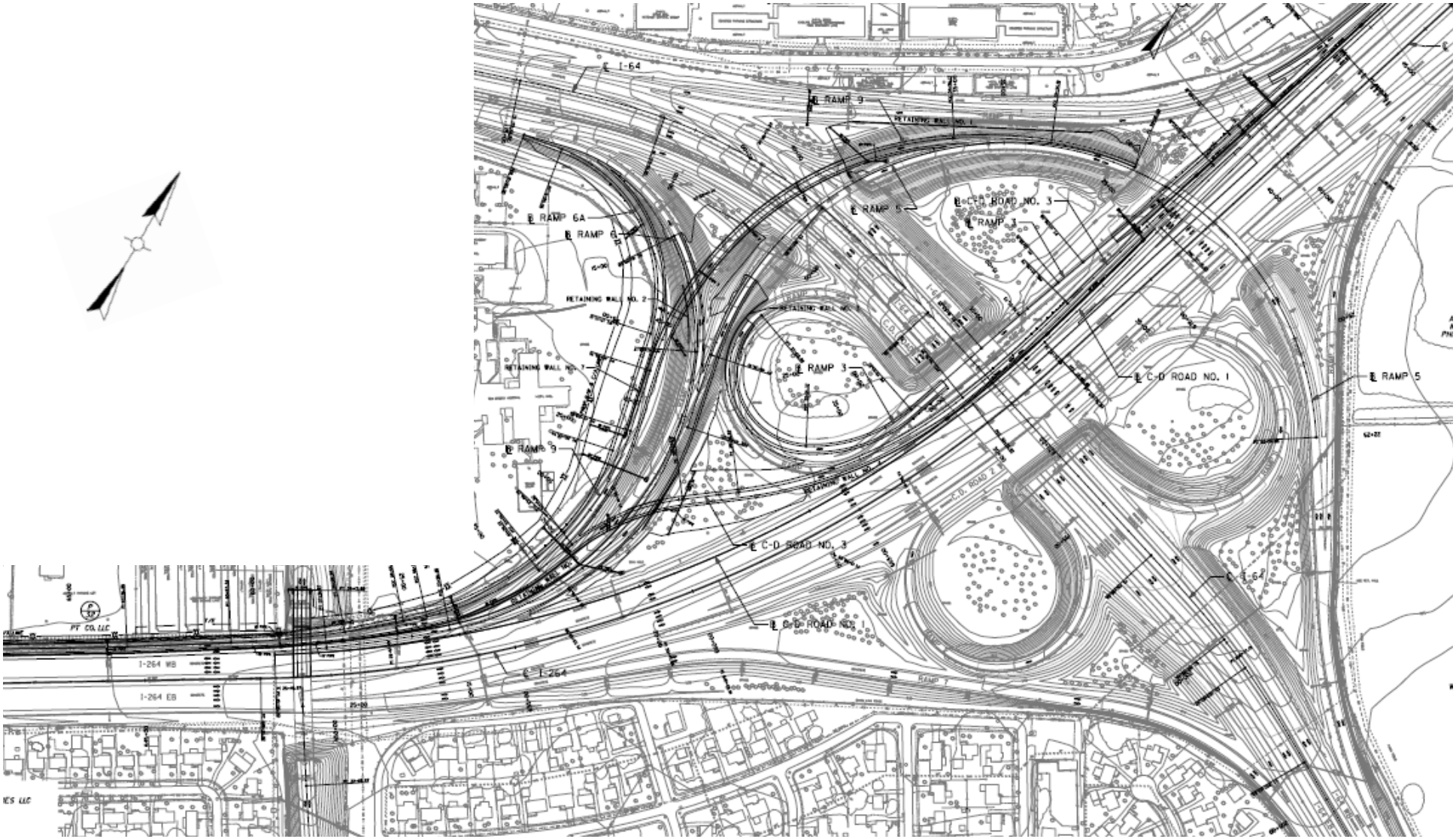
Map of Project Location

Manuscript Plan

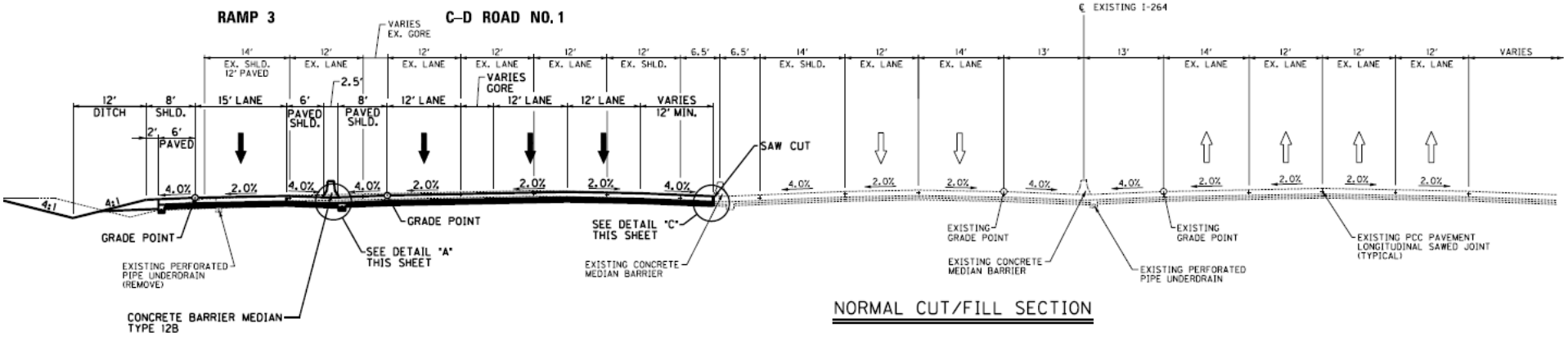


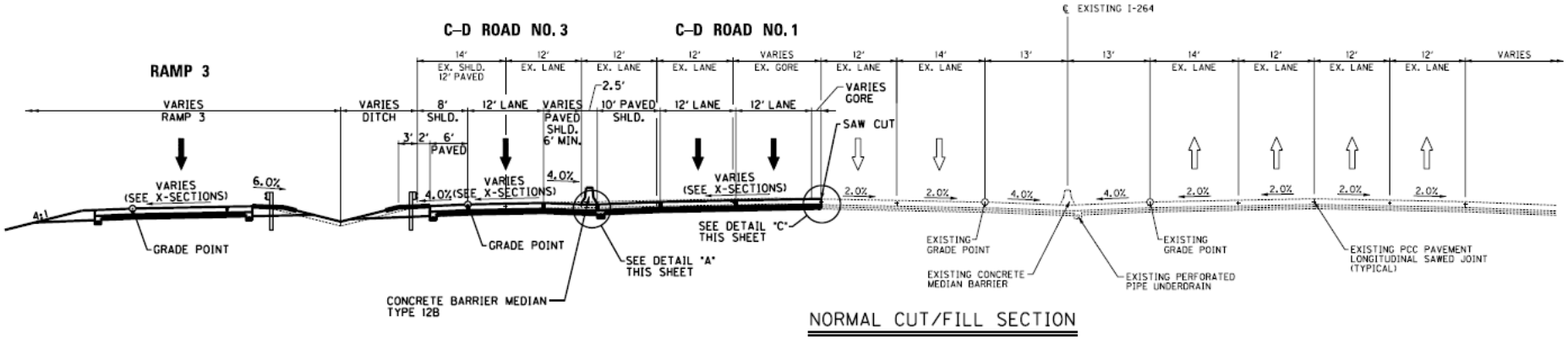
LOCATION MAP
ULTIMATE CONSTRUCTION

Manuscript Plan



Typical Sections for Mainline I-264





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 Project 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 Project Team in some way.

VALUE ENGINEERING DESIGN COMMENT # VE-1

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Improve signing and markings to clarify lane assignments on I-64 prior to I-264 exit.

COMMENTARY:

Through the information the VE Team gathered, it appears that there is an issue of major lane volume imbalance of those exiting to I-264 WB from I-64. Currently, there are two lanes that exit I-64. The outside lane is a shared EB and WB exit. The inside exit lane is for the WB direction only. Drivers overwhelmingly choose to use the inside exit lane resulting in large queues, sometimes stretching close to two miles. Review of video footage also showed that the outside exit lane and I-64 through lanes to travel at significantly higher speeds on either side, resulting in large speed differentials and potential crashes for those that may decide to depart from the "slow" exit lane.

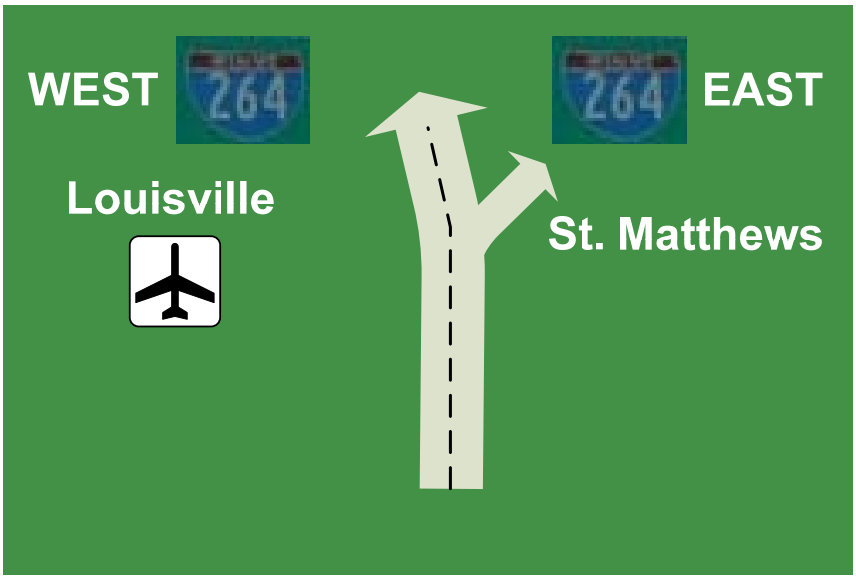
It is unclear why drivers show preference to the inside WB exit lane. It may be that they are unclear that they could use the outermost lane. It also may because they are trying to avoid the possibility of getting stuck at the point where the right exit lane must merge over to the left. The VE Team believes that there may be several opportunities to modify the current traffic markings and signing.

First, the current signage does not indicate which lane a driver must occupy to travel either west or east on I-264.

Current Signs on I-64

DISCUSSION CONTINUED

The VE Team recommends that that some of the signing be redesigned. The first recommendation is to use a diagrammatic sign after the gore area of the exit so drivers know which lanes are allowed. This will mean moving the existing truss that currently is located past the gore of the split of the I-264 ramps 500 ft to the east.



Conceptual Overhead Sign Indicating Lane Assignment Options

Additional destination signs should be ground mounted along the auxiliary exit lanes on I-64 to alert motorists that they can use both exit lanes to go to I-264 WB.

Conceptual Destination Sign

VALUE ENGINEERING DESIGN COMMENT # VE-1

DISCUSSION CONTINUED

Second, to help supplement the additional overhead signs, the VE Team recommends the use of pavement markings called pavement tattoos. This would allow drivers that miss the sign to see the lane assignment options on the pavement as they are driving. This technique has been done successfully in many areas including Columbus, Atlanta, and northern Kentucky. The rightmost exit lane should indicate that drivers can go east or west on I-264.

Pavement Tattoos

VALUE ENGINEERING DESIGN COMMENT # VE-2

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Utilize a zipper merge in lieu of a right-hand merge for the I-64 westbound to I-264 westbound flyover ramp.

COMMENTARY:
One of the perceived operational issues is that drivers choose to occupy the leftmost exit lane because of the merge on the ramp. The current signing calls for the rightmost lane to merge into the left lane. Ideally, each lane would have equal "merging power," therefore encouraging drivers to use both exit lanes. This would result in a more equal lane balance on the auxiliary exit lanes along I-64 and therefore result in smaller queues before the gore of the I-264 exit. One way to potentially address this issue is to simply change the sign from a right lane merge condition to a zipper merge condition. Research by the Connecticut DOT indicates favorable results using a zipper merge sign. Minnesota has also successfully used this concept (without the sign) in work zones. The zipper merge would work best in conjunction with improved lane assignment signs and markings before this location. This sign is currently not adopted into the Manual on Uniform Traffic Control Devices (MUTCD), so this would have to be approved as an experimental sign from FHWA.

Existing right lane merge sign

Use of the experimental zipper merge sign

✓ VE Selected
Scenario #1

VALUE ENGINEERING RECOMMENDATION # VE-3

DESCRIPTIVE TITLE OF RECOMMENDATION:
Widen the bridge over I-64 to add a second lane on the I-64 westbound to I-264 westbound flyover ramp as an interim solution

ORIGINAL DESIGN:
The original design specifies reconstructing the I-264/I-64 interchange to provide a long term solution to the traffic operation.

RECOMMENDED CHANGE:
The VE Team recommends that in addition to providing long term solutions, interim solutions should be explored. The VE Team recommends an interim solution of restriping/widening the I-64 WB to I-264 WB flyover ramp (Ramp 5) to two lanes from Sta. 26+00 to Sta. 46+00, approximately 2,000 ft.

ADVANTAGES:
- Provides additional storage/merge distance for I-64 WB to I-264 WB traffic
- Makes an incremental improvement to the daily congestion problem instead of waiting for the ultimate fix
- Removes 2,000 ft of stopped traffic on I-64 mainline

DISADVANTAGES:
- Is not compatible with the ultimate construction

ASSUMPTIONS:
- Existing flyover bridge over I-64 is 300 ft long. Widening 12 ft X 300 ft equals 3,600 SF. Based on the Project Team's estimate; $150/SF is used for bridge construction. Cost is $150/SF X 3600 SF equals $540,000.
- Additional pavement will be required. However, from Sta. 26+00 to Sta. 39+00 the exiting roadway can be re-striped to accommodate two lanes. The bridge is from Sta. 39+00 to Sta. 42+00. New pavement will be required from Sta. 42+00 to Sta. 46+00 at $80/SY. Therefore, the area of new pavement will be 400 ft X 12 ft (lane) = 4,800 SF/9 = 533 SY X $80/SY = $42,640

VALUE ENGINEERING RECOMMENDATION # VE-3

DISCUSSION CONTINUED

JUSTIFICATION:
The VE Team recommends in addition to providing long term solutions, interim solutions should be explored. This approach is prudent for projects which are not expected to be funded for several years. The current estimate for this project is outside the biennium budget, so a definitive construction schedule cannot be predicted. Given the high crash history and potential long wait for funding, exploring interim solutions make sense on this project as demonstrated with the previous I-64 construction in 2010/2011.

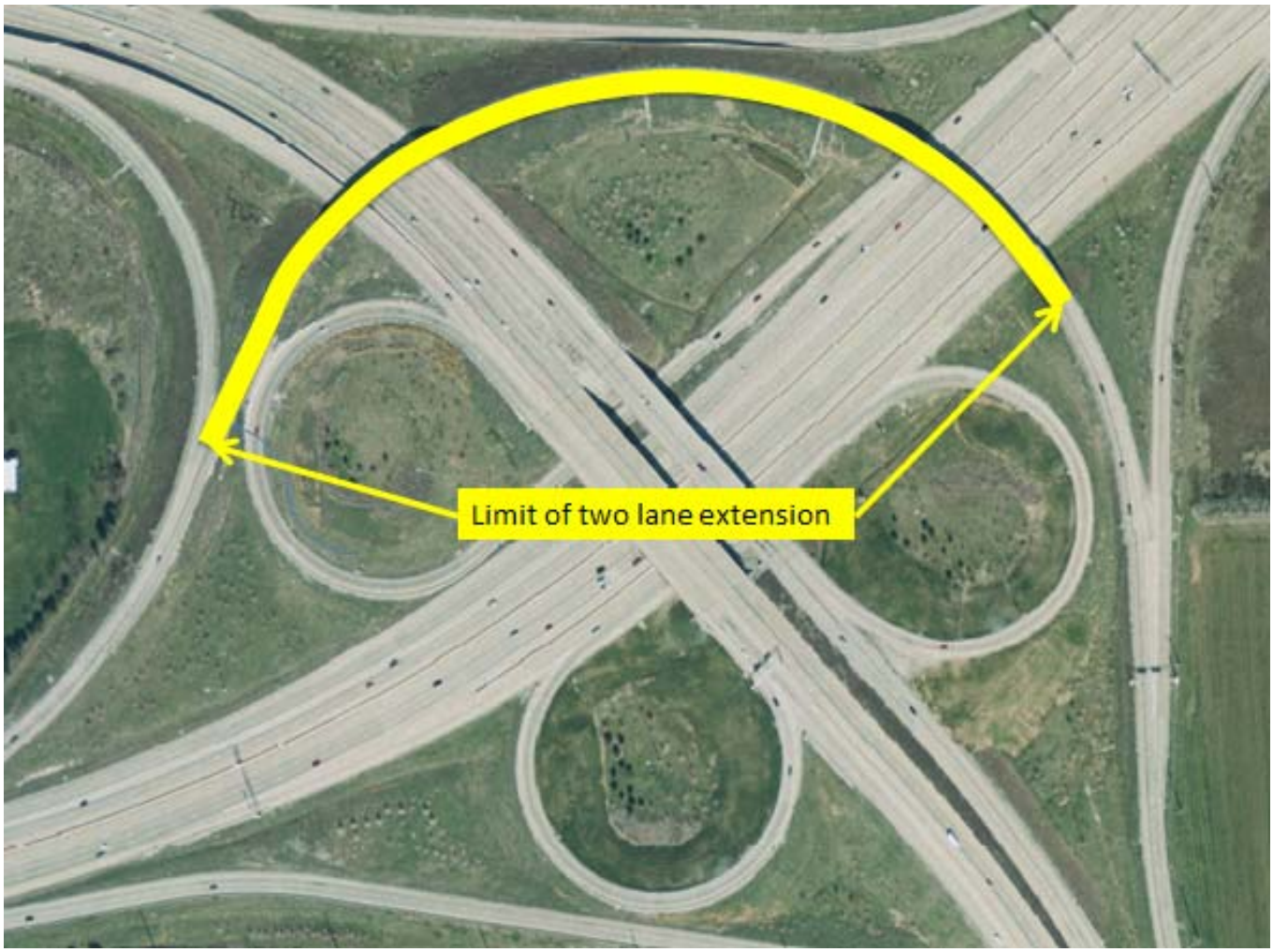
Widening Ramp 5 would increase the distance to store vehicles during peak traffic times thus removing them from the mainline I-64 which has high speed differentials. It could also help with the issue of lane utilization so the traffic is more distributed on I-64 WB and the exit lanes leading to Ramp 5.

It is worth noting that if the Project Team implements specific VE recommendations in this study, the widening of Ramp 5 could be incorporated into the ultimate configuration proposed by the VE Team.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$0	$0	$0
RECOMMENDED DESIGN	$633,000	$0	$633,000
ESTIMATED SAVINGS OR (COST)	($633,000)	$0	($633,000)

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 $
Widen flyover bridge over I-64	SF	$150	1			3,600	$540,000
Pavement	SY	$80	1			533	$42,640
Miscellaneous (MOT/Signing/ Markings)	LS	$50,000	7			1	$50,000
Total					$0		$632,640

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

VALUE ENGINEERING DESIGN COMMENT # VE-4

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Restripe the I-64 westbound to I-264 westbound flyover ramp to maximize the amount of two lanes possible as an interim solution.

COMMENTARY:
The VE Team believes interim solutions should be considered on this project since funding is not yet secured and the reconstruction is not expected to be completed for several years. One interim solution would be to extend the two lanes on the I-64 WB flyover ramp to I-264 WB (Ramp 5). Currently, the two lanes transition to one lane prior to the bridge over I-264 (near Sta. 26+00 ~ Ramp 5).

The VE Team recommends extending the lanes further around the ramp and transition from two lanes to one lane prior to the bridge over I-64 (near Sta. 38+00 ~ Ramp 5). This would allow for an additional 1,200 ft of storage on the ramp, thereby reducing 1,200 ft of queued traffic on mainline I-64. The queued traffic on I-64 is a bigger concern given the speed differential on the adjacent I-64 lanes and high crash history at this location. It should be noted that this recommendation is similar to the original 1991 design. Those plans carried the two lane ramp farther around the flyover ramp, but were changed on the I-64 improvement constructed in 2010/2011. See image below:

VALUE ENGINEERING DESIGN COMMENT # VE-5

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Install speed detectors and advanced warning systems on I-64 to reduce the number of crashes.

COMMENTARY:
Currently, during peak travel times, it is common for long traffic queues to form on the leftmost exit lane from I-64 WB to I-264 WB. This often happens while the I-64 through lanes and even the I-264 EB exit ramp have free-flow travel speeds. This large speed differential between lanes and having slow moving traffic in the one exit lane has led to many crashes.

One way to address this problem is to install an intelligent transportation system (ITS) that detects when there is a significant queuing of vehicles and warns drivers approaching the queue to slow down. This should be designed for the specific site with speed detection at regular intervals (~1/4 mile) between the I-264 exit and Hurstbourne Lane in the westbound direction. Software algorithms would then determine the difference in travel speeds between the detectors and determine how far the end of the queue is in advance of the warning sign and adjust the message accordingly. This system should also be tied into the TRIMARC system to alert operators of any issues in this vicinity. There would be an additional cost for this system.

VALUE ENGINEERING DESIGN COMMENT # VE-6

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Install a removable gap in the barrier west of Browns Lane for emergency egress of the C-D lane.

COMMENTARY:
In the event that there is a crash along the C-D lane, it may be difficult for emergency vehicles to the access the crash site. In addition, a serious crash may take a long time to be cleared which could result in queuing all the way back to I-64 causing greater potential for secondary crashes. Providing a gate that could open would allow emergency vehicles to access the site, as well as means to dissipate the traffic queue while workers clear the crash. It is expected that there would be an insignificant increase in cost to the project. The gate should be located as far east as possible on the C-D lane, likely near the Browns Lane structure.

Example of a Moveable Barrier Wall Gate

VALUE ENGINEERING RECOMMENDATION # VE-7

DESCRIPTIVE TITLE OF RECOMMENDATION:
Retrofit the existing Browns Lane structure to move the piers in lieu of reconstruction of half of the structure.

ORIGINAL DESIGN:
The original design describes reconstructing a portion of the 4-span bridge to accommodate the I-264 interstate widening. This reconstruction would include construction of a new pier, abutment, and superstructure on the north side of I-264. The span length arrangement of the original design is 75 ft-149 ft-135 ft-51 ft.

RECOMMENDED CHANGE:
The VE Team recommends relocating Pier 3 and maintaining the existing continuous steel girders and concrete slab. The revised span length would be approximately 75 ft-149 ft-120 ft-37 ft (total length of 381 ft is unchanged). The VE Team recommends utilizing a MSE wall to support the embankment, which is being removed as part of the original design for construction of the roadway widening.

ADVANTAGES:
- Reuses the existing superstructure
- Traffic can use the bridge during construction
- Less bridge to maintain
- Original design may be challenging for a continuous span structure

DISADVANTAGES:
- Potential uplift at abutment
- Piling options limited
- Original piers must be checked to whether they can withstand new loads based on span length changes

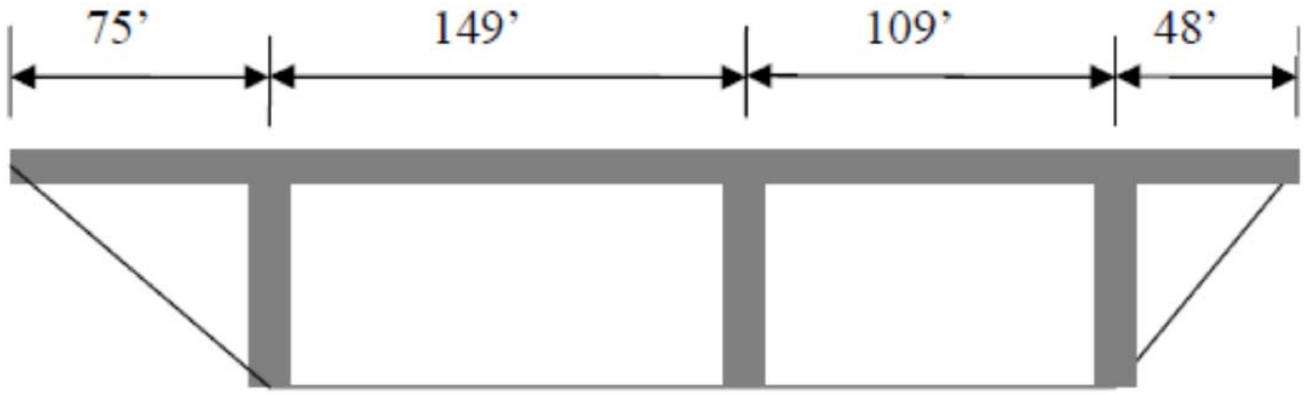
JUSTIFICATION:
The relocation of Pier 3 allows for a significant cost savings by utilizing the existing superstructure. A structural analysis will be necessary to verify that the existing girders are adequate for the proposed configuration; however, should be capable since the proposed 120 ft span over the Westbound I-264 lane will be shorter that the existing 149 ft span over the Eastbound I-264 lanes. It may be necessary to account for uplift at Abutment 2 under the new configuration. Piling for new bridge pier could be constructed by either removing a portion of the deck or by piling which can be driven with limited vertical clearance, such as micropiles.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$1,423,000	$0	$1,423,000
RECOMMENDED DESIGN	$283,000	$0	$283,000
ESTIMATED SAVINGS OR (COST)	$1,140,000	$0	$1,140,000

VALUE ENGINEERING RECOMMENDATION # VE-7

PHOTOGRAPH AND SKETCH OF EXISTING CONDITIONS

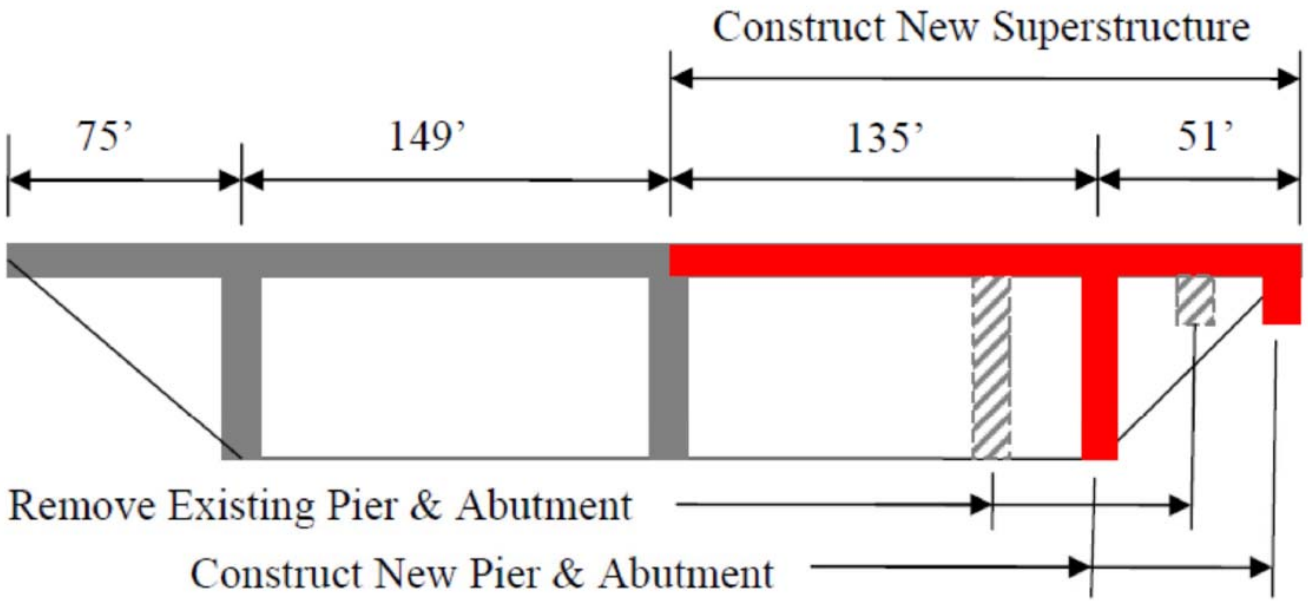
Looking West at the Existing Browns Lane Structure



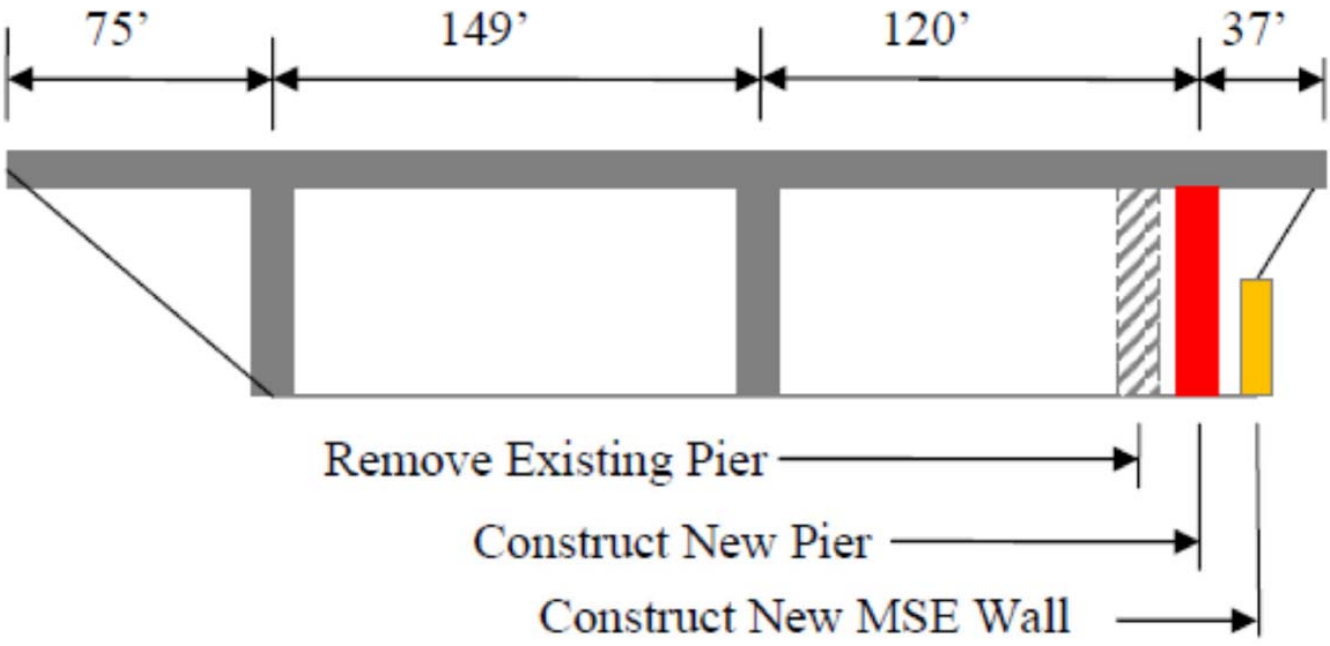
Existing Browns Lane Structure

VALUE ENGINEERING RECOMMENDATION # VE-7

SKETCH OF ORIGINAL AND RECOMMENDED DESIGN



Sketch of Original Design



Sketch of Recommended Design

VALUE ENGINEERING RECOMMENDATION # VE-7

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Browns Lane Structure	SF	$150.00	1	9,486	$1,422,900		
Retaining Wall (MSE)	SF	$40.00	1			1,000	$40,000
Remove Existing Pier	LS	$10,000	7			1	$10,000
Concrete, Class A	CY	$400.00	2			80	$32,000
Steel Reinforcement	LBS	$0.90	2			12,000	$10,800
Micropiles	LF	$100.00	2			1,200	$120,000
Retrofit - Miscellaneous	LS	$40,000	7			1	$40,000
Temporary Jacking	LS	$30,000	7			1	$30,000
Total					$1,422,900		$282,800

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

VALUE ENGINEERING DESIGN COMMENT # VE-8

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Utilize accelerated bridge construction principles to reduce duration and maintenance of traffic.

COMMENTARY:
Utilize accelerated bridge construction (ABC) techniques to utilize innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce onsite construction time. ABC will help reduce traffic impacts, which increases safety of the travelling public and traffic delay. Additional information regarding ABC can be found on the Federal Highway Administration's (FHWA) website: *http://www.fhwa.dot.gov/bridge/abc/*.

VALUE ENGINEERING DESIGN COMMENT # VE-9

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Utilize short-term closures to reduce the amount of temporary pavement during construction.

COMMENTARY:
District 5 and the Louisville Metro government have been very receptive in the past to short term roadway closures to accelerate construction schedules and reduce traffic impact durations. Though this may not be feasible for the temporary pavement along Ramp 6 (I-64 WB to I-264 WB) due to the high traffic volumes, the closure of the lesser utilized Ramp 5 (I-64 EB to I-264 WB) may be an option.

✓ VE Selected
Scenario #2

VALUE ENGINEERING RECOMMENDATION # VE-10

DESCRIPTIVE TITLE OF RECOMMENDATION:
Retrofit the existing Retaining Wall Number 3 in lieu of replacing with a new retaining wall.

ORIGINAL DESIGN:
The original design specifies that Retaining Wall Number 3 adjacent to Ramp 3 be removed and replaced.

RECOMMENDED CHANGE:
The VE Team recommends that this wall remain in service by either allowing slopes steeper than 2:1 or by extending the height of the wall.

ADVANTAGES:

- Eliminates construction of a new retaining wall

DISADVANTAGES:

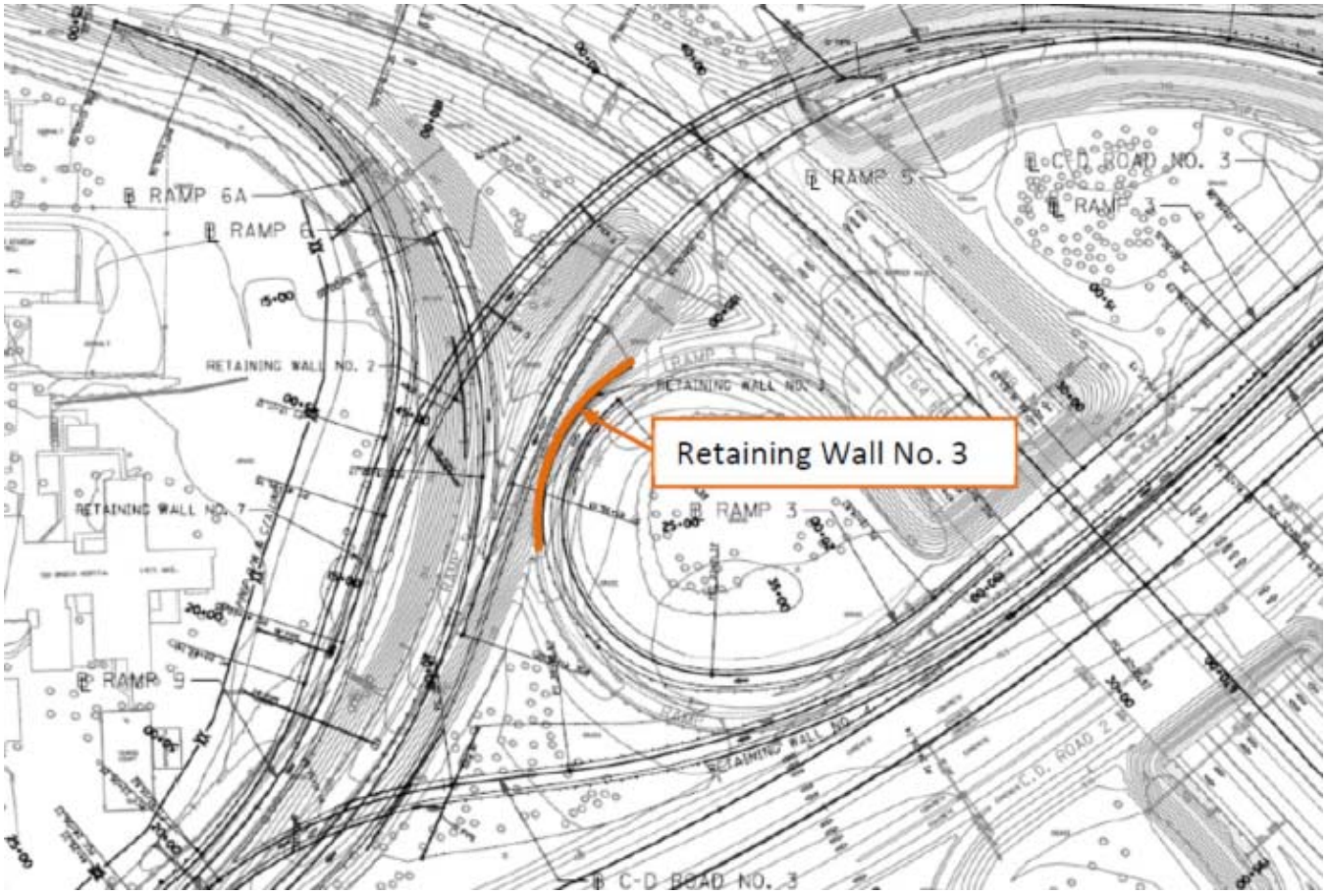
- Requires additional design

JUSTIFICATION:
The additional embankment necessary to construct Ramp 5 does not exceed any higher than two feet above the existing embankment in the vicinity of the retaining wall. If the geotechnical recommendations allows, the slope could be steeper to utilize the existing wall without modification. If steeper slopes are not feasible, a structural analysis will likely indicate the existing retaining wall can be heightened to accommodate the additional embankment. It is not anticipated that this will overstress the existing wall or foundation since the typical drawings for these walls also allow an optional top mounted barrier wall; and therefore, the walls likely have excess capacity as they should have been designed to also resist impact loads (this existing retaining wall does not have a top mounted barrier).

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$152,000	$0	$152,000
RECOMMENDED DESIGN	$15,000	$0	$15,000
ESTIMATED SAVINGS OR (COST)	$137,000	$0	$137,000

VALUE ENGINEERING RECOMMENDATION # VE-10

SKETCH OF LOCATION MAP

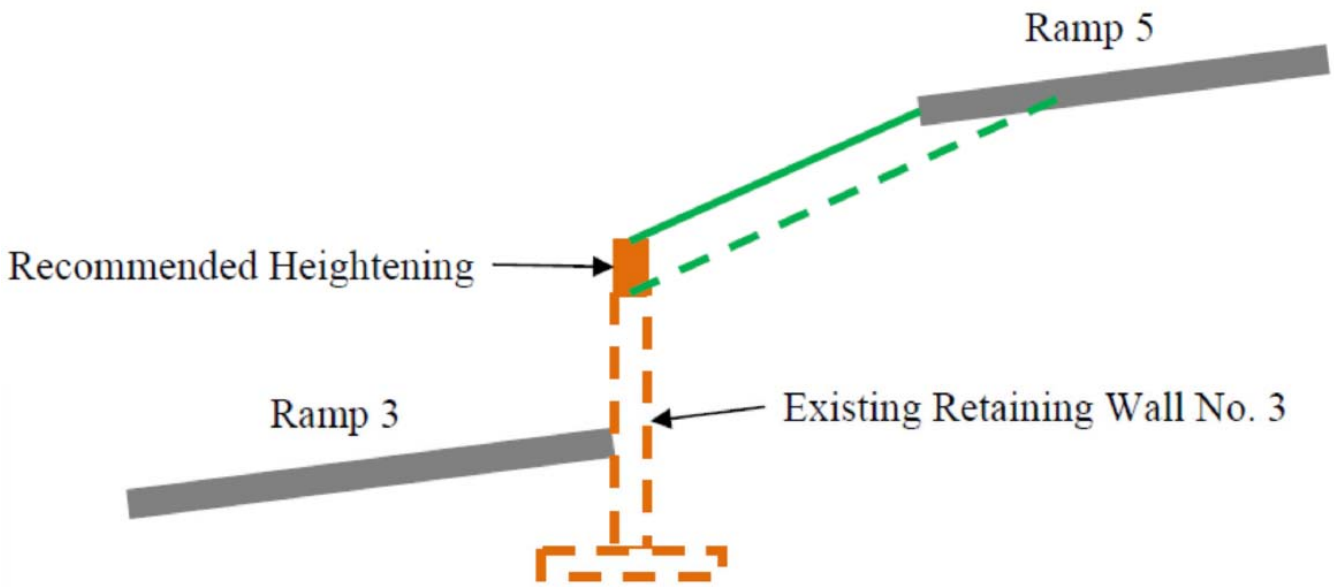


VALUE ENGINEERING RECOMMENDATION # VE-10

PHOTOGRAPH OF EXISTING CONDITION

VALUE ENGINEERING RECOMMENDATION # VE-10

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-10

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Retaining Wall No. 3	SF	$50.00	1	3,030	$151,500		
Concrete, Class A	CY	$400.00	2			30	$12,000
Steel reinforcement	LBS	$0.90	2			3,000	$2,700
Total					$151,500		$14,700

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

VALUE ENGINEERING RECOMMENDATION # VE-11

DESCRIPTIVE TITLE OF RECOMMENDATION:
Utilize a mechanically stabilized earth (MSE) for Retaining Walls Number 3 and 6 in lieu of cast-in-place retaining walls.

ORIGINAL DESIGN:
The original design specifies cast-in-place retaining walls for Retaining Walls Number 3 and 6.

RECOMMENDED CHANGE:
The VE Team recommends utilizing mechanical stabilized earth (MSE) or modular block walls in lieu of cast-in-place concrete walls for Retaining Walls Number 3 and 6. The VE Team recommends still using concrete headwalls at the box culverts in Retaining Wall Number 6 to prevent a joint directly adjacent to the culverts.

ADVANTAGES:

- Less expensive per KYTC average bid prices

DISADVANTAGES:

- Requires joint between box culvert headwalls and MSE walls

JUSTIFICATION:
MSE walls or modular block walls are generally more economical to construct than cast-in-place concrete retaining walls. Additionally, MSE walls are already specified on the project. Therefore, there will be some "economy of scale." These walls can be used in "wet" conditions. Therefore, the proximity to Weicher Creek does not preclude there use in Retaining Wall Number 6.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$356,000	$0	$356,000
RECOMMENDED DESIGN	$290,000	$0	$290,000
ESTIMATED SAVINGS OR (COST)	$66,000	$0	$66,000

VALUE ENGINEERING RECOMMENDATION # VE-11

SKETCH OF LOCATION MAP

VALUE ENGINEERING RECOMMENDATION # VE-11

SKETCH OF RECOMMENDED DESIGN

Photograph of a modular block retaining wall in combination with concrete headwall. Note the cost savings for this recommendation are based on a MSE retaining wall.

VALUE ENGINEERING RECOMMENDATION # VE-11

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Retaining Wall No. 3 (CIP)	SF	$50.00	1	3,030	$151,500		
Retaining Wall No. 6 (CIP)	SF	$50.00	1	4,082	$204,100		
Retaining Wall No. 3 (MSE)	SF	$40.00	1			3,030	$121,200
Retaining Wall No. 6 (MSE)	SF	$40.00	1			3,842	$153,680
Concrete Class "A"	CY	$400.00	2			30	$12,000
Steel reinforcement	LBS	$0.90	2			4,000	$3,600
Total					$355,600		$290,480

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

VALUE ENGINEERING DESIGN COMMENT # VE-12

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Revise the traffic forecast due to current conditions in lieu of using the 2005 estimates.

COMMENTARY:
Upon review of recent traffic counts, the VE Team believes that a new 20 year traffic forecast should be developed. Traffic counts on Breckenridge Lane north of the I-264 interchange show a significant drop from 2004 (66,700 ADT) to 2009 (59,700 ADT) [source: KYTC traffic count system]. Also, the, the northbound exit ramp from I-264 WB shows an actual daily count in 2010 of 7,280 vehicles compared to the 2010 forecast of 10,000 vehicles, 27% less. Finally, 2010 intersection turning volumes measured at Breckenridge Lane and Dutchmans Lane and I-264 ramp are up to 40% lower than what was forecast for the year 2010.

Segment Number	Road	Forecast ADT 2010	Actual ADT 2010	Difference
1	I-64 WB prior to I-264 exit	72,300	65,700	-9%
5	I-264 WB Mainline west of I-64	72,700	59,000	-18%
10	I-264 WB to Breckenridge Lane NB	10,000	7,280	-27%
12	I-264 WB between I-64 and Breckenridge La.	92,200	74,100	-20%

A cursory review of the area served by the interchange shows that it is close to a full build out so it may be reasonable to assume a much lower growth rate than what was originally used in the 2005 forecast (1.75%). The reason it is critical to revise this estimate is to help in reviewing the proposed design and possibly reviewing some of the alternates that had been discarded due to poor performance. It is likely the new forecasts will show significantly lower numbers and that some of the alternates for ramp designs and Breckenridge Lane designs will work better than originally calculated.

VALUE ENGINEERING DESIGN COMMENT # VE-13

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Conduct additional origin-destination analysis to determine the split between Ramp 9 traffic that goes to I-264 westbound and traffic that exits at Breckenridge Lane.

COMMENTARY:
The VE Team believes that it would be worthwhile to conduct additional investigation to better determine the amount of traffic volume that comes from I-64 WB ramp (Ramp 9) and exits at Breckenridge Lane. The original design calls for a dedicated new ramp to be built adjacent to the existing ramp to serve only vehicles exiting to Breckenridge Lane NB. If the exiting volumes are lower than was originally projected, there will be an uneven distribution of traffic on the two ramps and the ramp serving I-264 WB may remain over capacity in the future. This has the potential to have major, negative impacts on the future ramp queuing onto I-64 WB.

One way to conduct a defensible investigation is by using Bluetooth readers to identify vehicles on the Ramp 9 and those exiting at Breckenridge Lane NB. From that data, a percentage of total ramp traffic can be estimated and then, a total volume of traffic exiting at Breckenridge Lane can be calculated.

VALUE ENGINEERING DESIGN COMMENT # VE-14

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Reanalyze original design alternatives with the revised traffic information.

COMMENTARY:

If the Project Team decides to accept VE-12 and/or VE-13, it would be worthwhile to reanalyze some or all of the original alternates. Some of the original alternates were eliminated because they were projected to have little or no traffic operational benefits. With updated traffic forecasts that are expected to be lower, this conclusion will likely change. The VE Team also recommends including the additional alternates that were a part of the VE Study in this analysis.

✓ VE Selected
Scenario #1

VALUE ENGINEERING RECOMMENDATION # VE-15

DESCRIPTIVE TITLE OF RECOMMENDATION:
Utilize a Michigan U-turn on Breckenridge Lane in lieu of traditional signalized intersections to improve flow.

ORIGINAL DESIGN:
The original design specifies no modifications to Breckenridge Lane beyond the interim dual left turn storage improvements to the northbound left turn at Dutchmans Parkway.

RECOMMENDED CHANGE:
The VE Team recommends removing left turns from Breckenridge Lane at the intersection of Dutchmans Parkway. The recommendation consists of constructing a full roundabout at Breckenridge Lane and the I-264 westbound ramps and a "teardrop" shaped roundabout at Breckenridge Lane and the shopping center entrances south of Beargrass Creek.

ADVANTAGES:
- Brings intersection to capacity
- Reduces number of signal phases
- Reduces required cycle length
- Reduces intersection delay
- Can break out as separate project
- Removes traffic signal from Breckenridge Lane at I-264 westbound ramps
- Ample ROW exists or can be acquired at roundabout locations

DISADVANTAGES:
- Added construction to project
- Longer travel for Breckenridge Lane northbound left turns to westbound Dutchmans Parkway

JUSTIFICATION:
This intersection is one of the most heavily traveled intersections in the Louisville Metro Area. Removing phases is more cost effective than adding lanes to Breckenridge Lane. LOS was tested and found that the 2025 results are as good as or better than current LOS.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$0	$0	$0
RECOMMENDED DESIGN	$2,000,000	$0	$2,000,000
ESTIMATED SAVINGS OR (COST)	($2,000,000)	$0	($2,000,000)

VALUE ENGINEERING RECOMMENDATION # VE-15

SKETCH OF RECOMMENDED DESIGN

VALUE ENGINEERING RECOMMENDATION # VE-15

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Construct Roundabouts	EA	$1,000,000	7			2	$2,000,000
Total					$0		$2,000,000

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

✓ VE Selected
Scenario #2

VALUE ENGINEERING RECOMMENDATION # VE-16

DESCRIPTIVE TITLE OF RECOMMENDATION:
Shift the alignment of the new I-264 C-D Road to Breckenridge Lane widening to the south to fit between the existing Browns Lane structure piers and miss the power poles, bridge pier, and reduce ROW takes.

ORIGINAL DESIGN:
The original design specifies the construction of Ramp 9 from approximately the I-64 flyover ramp thru the Brown Lane structure to Breckinridge Lane. As the typical section shows, the existing Browns Lane structure will be required to be reconstructed and both ROW and utilities are impacted along I-264 from the bridge to Breckenridge Lane. The typical section as proposed has full standards with no design exceptions for lane or shoulder widths.

RECOMMENDED CHANGE:
The VE Team recommends reducing the typical section width to fit within the existing Browns Lane piers. The total width available is 105 ft from pier face to pier face. There are several ways to reduce the proposed typical section to achieve a smaller footprint thru the bridge piers. The VE Team recommends maintaining the 12 ft lanes and making the adjustments in the shoulder width. This would require a design exception.

The option keeps the 12 ft driving lanes (6 lanes), the 4 ft minimum inside shoulder width on Ramp 9, and the width for the barriers walls (2.5 ft + 1.5 ft = 4 ft), thus using 80 ft (72 ft + 4 ft + 4 ft = 80 ft). The total available width between the piers is 105 ft therefore, leaving a balance of 25 ft for the two shoulders on I-264 mainline and one outside shoulder on Ramp 9. Splitting equally would allow for 8 ft-4 in shoulders at each location.

ADVANTAGES:
- Eliminates impacts to the electric transmission lines
- Eliminates the need to modify the Brown Lane structure
- Reduces the amount of new pavement needed
- Reduces the amount of new ROW needed
- Reduces the amount of embankment needed

DISADVANTAGES:
- Requires a design exception for shoulder width
- Reduces the available shoulder area for emergency use
- The lane stripes and concrete joints may be line up

VALUE ENGINEERING RECOMMENDATION # VE-16

DISCUSSION CONTINUED

ASSUMPTIONS

- Browns Lane structure – the Project Team's estimate for the bridge is $1,400,000.
- LG&E Transmission Relocation – the Project Team's estimate for the electric transmission line is $1,060,000 plus the 25% for engineering and contingencies. Total is $1,325,000.
- ROW – the Project Team's estimate for R/W is $20/square foot. Approximately 8 ft less ROW is needed from the Browns Lane structure to Breckenridge Lane, approximately 2,000 ft length. Thus, 8 ft X 2,000 ft = 16,000 SF X $20/SF = $320,000 savings.
- Parking loss – the Project Team estimated $1,970,000 cost for lost parking impacts for Parcels 31-35. Given the level of detail needed to fully understand the reduced cost impacts to the parking with the VE recommendation, it is estimated to be 50% less.
- Pavement – the Project Team's estimate was used as a basis to develop a unit cost for pavement at $80/square yard. The shoulder reduction only effect new construction for Ramp 9. Therefore we assumed a 4 ft reduction along the 2,250 ft of pavement = 9,000 SF / 9 = 1,000 SY reduction

JUSTIFICATION:

The recommendation provides for the same design intent but with less shoulder area which will require a design exception. However, the change still provides space for emergency vehicles while keeping the full width travel lanes. The change will lessen the impacts to the adjoining property owners and the high potential for condemnation in this business area especially with the owner of the storage units.

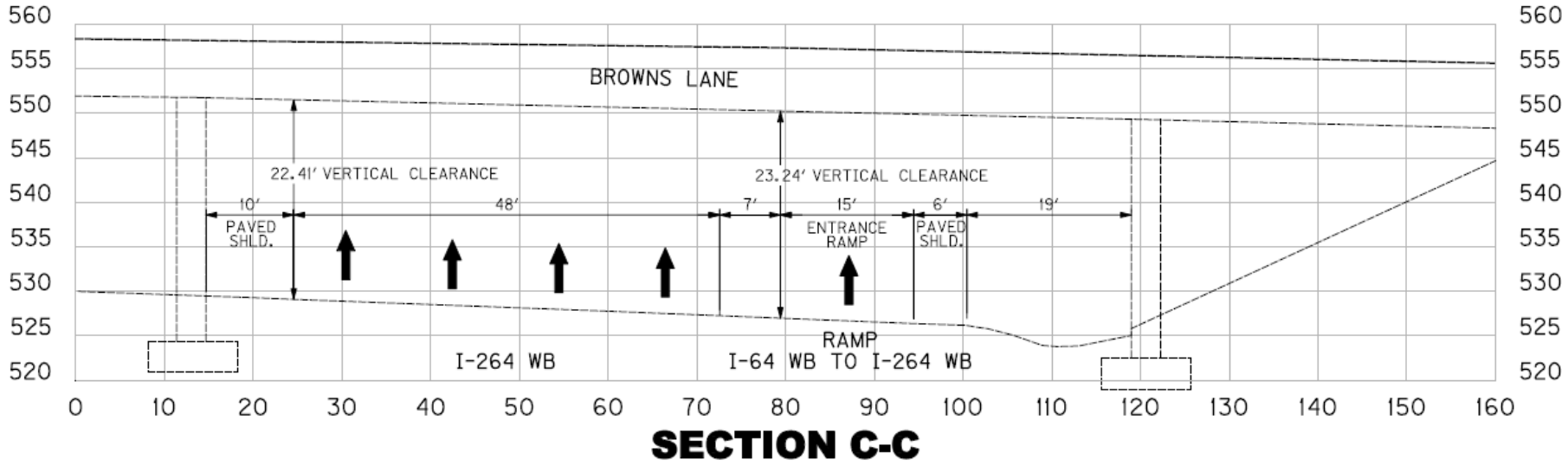
Avoiding the LG&E transmission, which is on a private easement, will eliminate the need to reimburse the utility company and allow for better control of the schedule as the transmission line poles have long lead times. Additionally, while not a cost borne by KYTC, the change also avoids the AT&T fiber optic line that runs parallel to I-264. Fiber optic relocation can have a significant effect of the project schedule.

Fitting the typical section between the piers will not require reconstructing the Browns Lane structure. This eliminates the impacts to the traveling public on the Brown Lane structure which is a major route to the hospitals and residential neighborhoods. The reduced typical will change the location of the pavement strip which may not coincide with the existing longitude concrete joints; however, since this is in a tangent section, this does not appear to be a significant issue.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$5,095,000	$0	$5,095,000
RECOMMENDED DESIGN	$985,000	$0	$985,000
ESTIMATED SAVINGS OR (COST)	$4,110,000	$0	$4,110,000

VALUE ENGINEERING RECOMMENDATION # VE-16

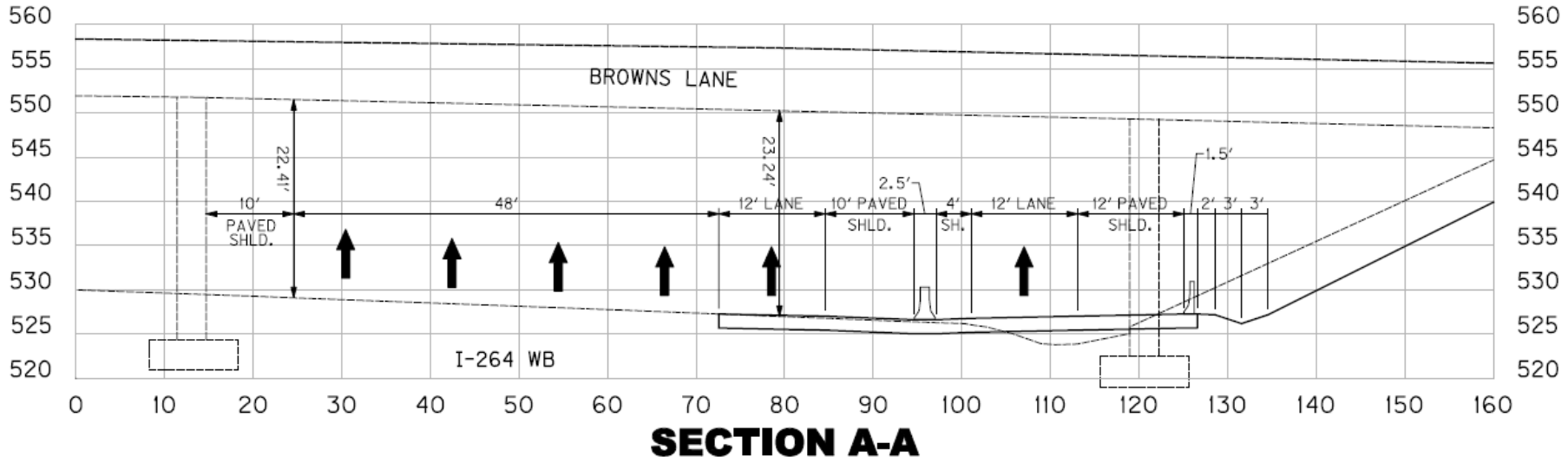
SKETCH OF EXISTING CONDITION



Existing Section at the Browns Lane Structure

VALUE ENGINEERING RECOMMENDATION # VE-16

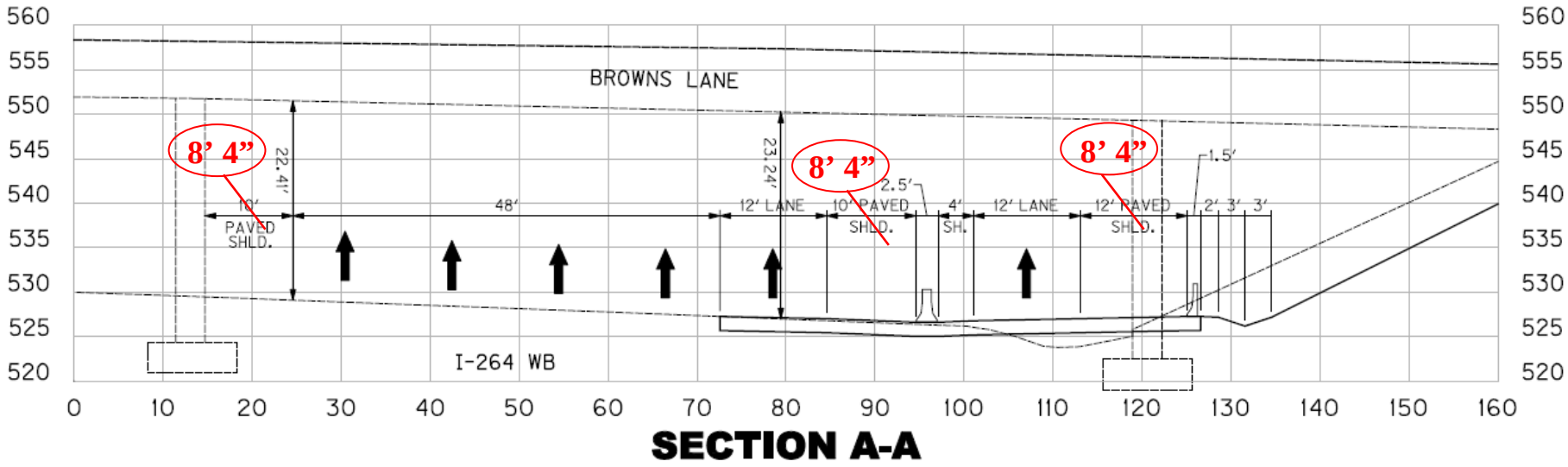
SKETCH OF ORIGINAL DESIGN



Typical section for the project at the Browns Lane structure

VALUE ENGINEERING RECOMMENDATION # VE-16

SKETCH OF RECOMMENDED DESIGN



SECTION A-A

Reduced Shoulders to Fit Roadway within Existing Piers

VALUE ENGINEERING RECOMMENDATION # VE-16

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Browns Lane structure	LS	$1,400,000	1	1	$1,400,000		
LG&E Relocation	LS	$1,325,000	1	1	$1,325,000		
ROW Taking	SF	$20.00	1	16,000	$320,000		
Parking Loss (P31-35)	LS	$1,970,000	1	1	$1,970,000	0.5	$985,000
Shoulder Pavement	SY	$80.00	1	1,000	$80,000		
Total					$5,095,000		$985,000

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

VALUE ENGINEERING DESIGN COMMENT # VE-17

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Restripe the far left inside lane on I-264 westbound to reduce the 14 ft wide lane to a 12 ft wide lane.

COMMENTARY:

The inside lane of I-264 throughout the length on this project has a 14 ft lane width. This was designed as 14 ft with the intent of utilizing high occupancy vehicles (HOV) lanes during the I-264 redesign in the 1980s. However, there are no current plans to install HOW lanes anywhere within the metropolitan area.

With that in mind, the VE Team thinks it would be reasonable to reallocate the available width within the existing corridor and change the lane width to 12 ft instead of 14 ft. This would gain an additional 2 ft of pavement and correspondingly eliminate the need for 2 ft of new pavement and the items associated with obtaining it such as ROW, utilities, drainage and earthwork.

VALUE ENGINEERING RECOMMENDATION # VE-18

DESCRIPTIVE TITLE OF RECOMMENDATION:
Eliminate C-D Road 3 and the braided interchange and force westbound I-264 mainline traffic to exit at a modified partial cloverleaf interchange at Breckenridge Lane.

ORIGINAL DESIGN:
The original design specifies that C-D Road No. 3 be constructed to carry traffic WB from C-D Road No. 1 to Ramp 9 WB exit to Breckenridge Lane NB. C-D Road No. 3 begins as a lane drop from C-D Road No. 1, continues between C-D Road Nos. 1 and Ramp 3 to pass over Ramp 5, and then merges with Ramp 9 just east of Browns Lane. A bridge carries C-D Road Nos. 3 over Ramp 5. C-D Road No. 1 continues westward to connect with I-264 WB which also connects with Breckenridge Lane SB.

C-D Road 1 begins with 4 lanes. One lane drops to I-64 EB & WB, one lane drops to C-D Road No. 3, and two lanes merge with I-264 WB. Traffic from I-264 WB and Shelbyville Road would use C-D Road No. 3 and Ramp 9 to get to Breckenridge Lane NB (in place of existing "Exit 18B").

The original design specifies no changes to Breckenridge Lane at the I-264 westbound ramps.

RECOMMENDED CHANGE:
The VE Team recommends the elimination of C-D Road No. 3, which also removes the need to modify Ramp 3 and retaining wall 3 at the I-64 interchange.

The team also recommends having only one lane exit C-D Road 1 onto the mainline I-264. Volume from C-D Road No. 1 to I-264 is only expected to be less than 1,400 VPH in the AM peak, far lower than a single lane freeway capacity. This allows for Ramps 5, 6, 6A and 9 to match I-264 mainline lanes further to the south thereby eliminating the need to move the northern pier of Browns Lane. Also eliminated is the need to relocate the high voltage transmission line along the northern Right-of-Way line.

C-D Road 1 would begin with four lanes east of I-64. One lane each would drop to I-64 WB and to I-64 EB. The two remaining lanes would merge into one, prior to joining I-264 WB (three lanes total). Traffic from I-264 WB and Shelbyville Road would use I-264 WB to get to Breckenridge Lane NB via modification to the existing loop ramp ("Exit 18A"), then, traffic would turn left onto Breckenridge Lane NB. Traffic coming from both directions of I-64 and exiting at Breckenridge Lane would use Original Design Ramp 9.

VALUE ENGINEERING RECOMMENDATION # VE-18

DISCUSSION CONTINUED

ADVANTAGES:

- Significantly reduces bridges and embankment
- Significantly reduces utility relocation
- Simpler to understand and meets normal driver expectations
- Does not require ROW along C-D Road No. 1 to Breckenridge Lane
- Significant cost savings realized for rerouting one minor exit movement to Breckenridge Lane
- Does not require Ramp 3 modification
- Does not require moving Browns Lane pier

DISADVANTAGES:

- Less direct exit path
- Additional Breckenridge Lane signal phase

JUSTIFICATION:

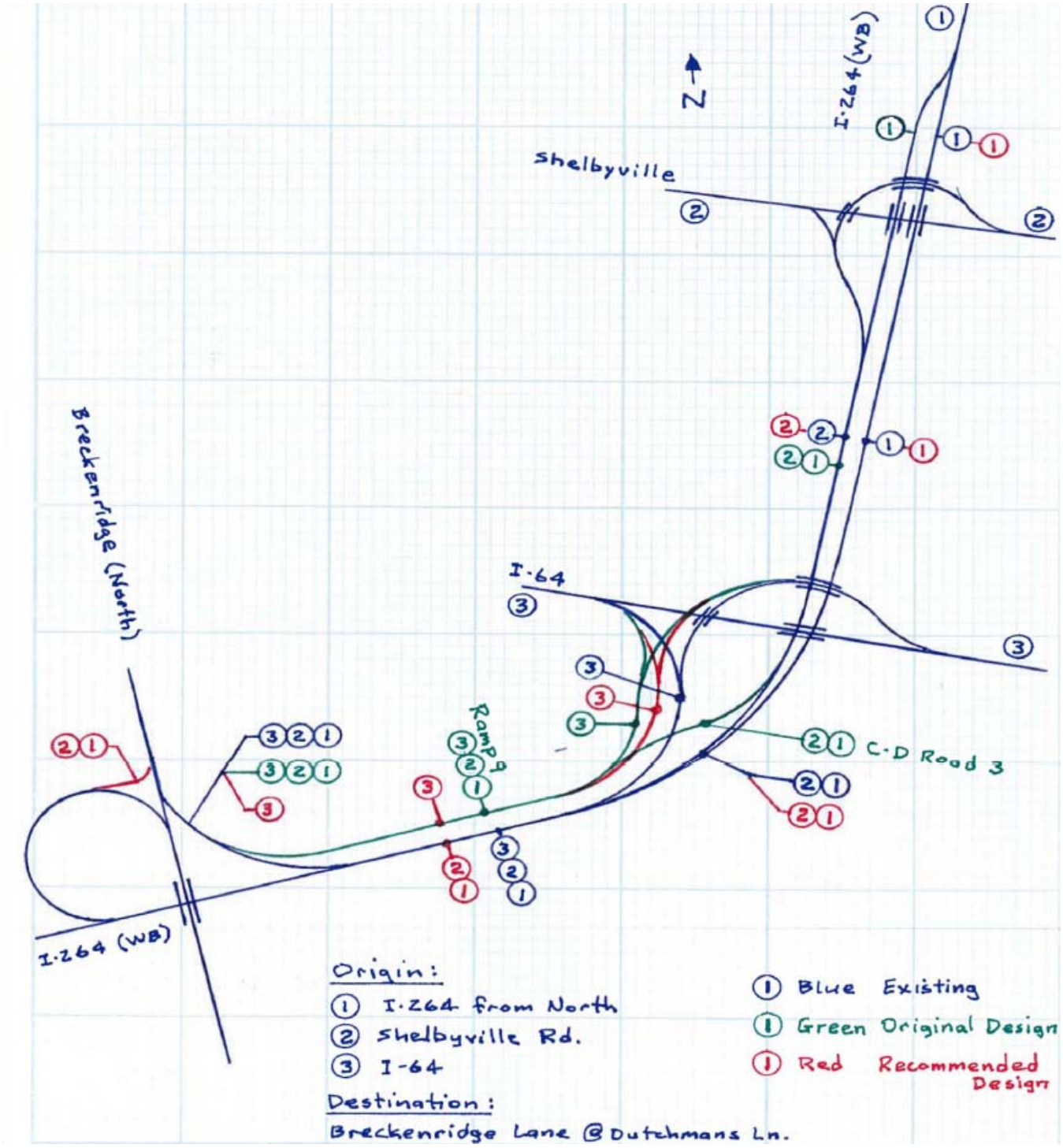
In the original design, two miles prior to Breckenridge Lane, I-264 WB drivers wanting to go north on Breckenridge Lane must exit onto C-D Road No. 3, but drivers wanting Breckenridge south must stay on the mainline. Because many drivers will not know (whether they are going north or going south), then, likely many will either use Breckenridge south and turn around or use Taylorsville Road and try to return, or just go elsewhere. The recommended design allows drivers from I-264 WB and Shelbyville Road traffic to intuitively make the decisions when actually reaching Breckenridge Lane.

A preliminary review and sketch level revision of the forecasted traffic numbers shows that this simpler, lower cost alternative to work well. Weave analysis between Ramp 9 and the Breckenridge Lane exit shows a LOS D.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$7,062,000	$0	$7,062,000
RECOMMENDED DESIGN	$489,000	$0	$489,000
ESTIMATED SAVINGS OR (COST)	$6,573,000	$0	$6,573,000

VALUE ENGINEERING RECOMMENDATION # VE-18

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-18

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Ramps 3 and 8 (no modification of Ramp 3)	LS	$1,369,686	1	1	$1,369,686		
Ramps 3 and 8 (no modification of Ramp 3)	LS	$386,500	1			1	$386,500
Remove C-D Road No. 3	LS	$2,944,651	1	1	$2,944,651		
Delete Browns Lane Modifications	LS	$1,422,900	1	1	$1,422,900		
Delete Electric Relocation	LS	$1,325,000	1	1	$1,325,000		
Add Spur to Breckenridge Ramp 8	LS	$102,000	7			1	$102,000
Total					$7,062,237		$488,500

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

✓ VE Selected
Scenario #1

VALUE ENGINEERING RECOMMENDATION # VE-19

DESCRIPTIVE TITLE OF RECOMMENDATION:
Utilize one lane from C-D Road No. 1 in lieu of two lanes, eliminate the braided ramps, provide a two-lane flyover, and a two-lane exit at Breckenridge Lane northbound in lieu of the original design.

ORIGINAL DESIGN:
The original design specifies that Ramp 6A, Ramp 9, and C-D Road No. 3 be constructed (from I-64 EB, from I-64 WB, and from C-D Road No. 1, respectively) and braided, to connect with and become Ramp 9. Ramp 9 is to be barrier-separated from I-264 WB mainline and is to be the only WB exit onto Breckenridge Lane NB ("Exit 18B"). Also, modifications are to be made to Ramp 6, Ramp 5, and Ramp 3.

RECOMMENDED CHANGE:
The VE Team recommends that the braided ramps and Ramp 9 be eliminated and that the existing I-264 WB exit ramp (Exit 18B") not be barrier-separated from I-264 WB mainline. Most interchange alignments would remain unchanged, but with some revisions to number of lanes.

C-D Road No. 1 would begin with 4 lanes east of I-64. One lane each would drop to I-64 WB and to I-64 EB. The two remaining lanes would merge into one, prior to joining I-264 WB (three lanes total). Ramp 5 from I-64 WB would carry two lanes all the way to I-264 WB which would become a 5-lane section (four mainline and one auxiliary) without a merge condition.

Approaching Breckenridge Lane, I-264 WB mainline would have four lanes; and at Breckenridge Lane, a 2-lane exit would be provided to Breckenridge Lane NB ("Exit 18B") where traffic would turn right onto Breckenridge Lane NB. "Exit 18A" to Breckenridge Lane SB would remain.

VALUE ENGINEERING RECOMMENDATION # VE-19

DISCUSSION CONTINUED

ADVANTAGES:

- Reduces construction labor, materials, and duration
- Adequate capacity for I-64 WB to I-264 WB
- Adequate capacity for I-264 WB "Exit 18"
- Simpler to understand for drivers
- Improves traffic volume balance between flyover ramp lanes

DISADVANTAGES:

- Maintains the existing open weave

JUSTIFICATION:

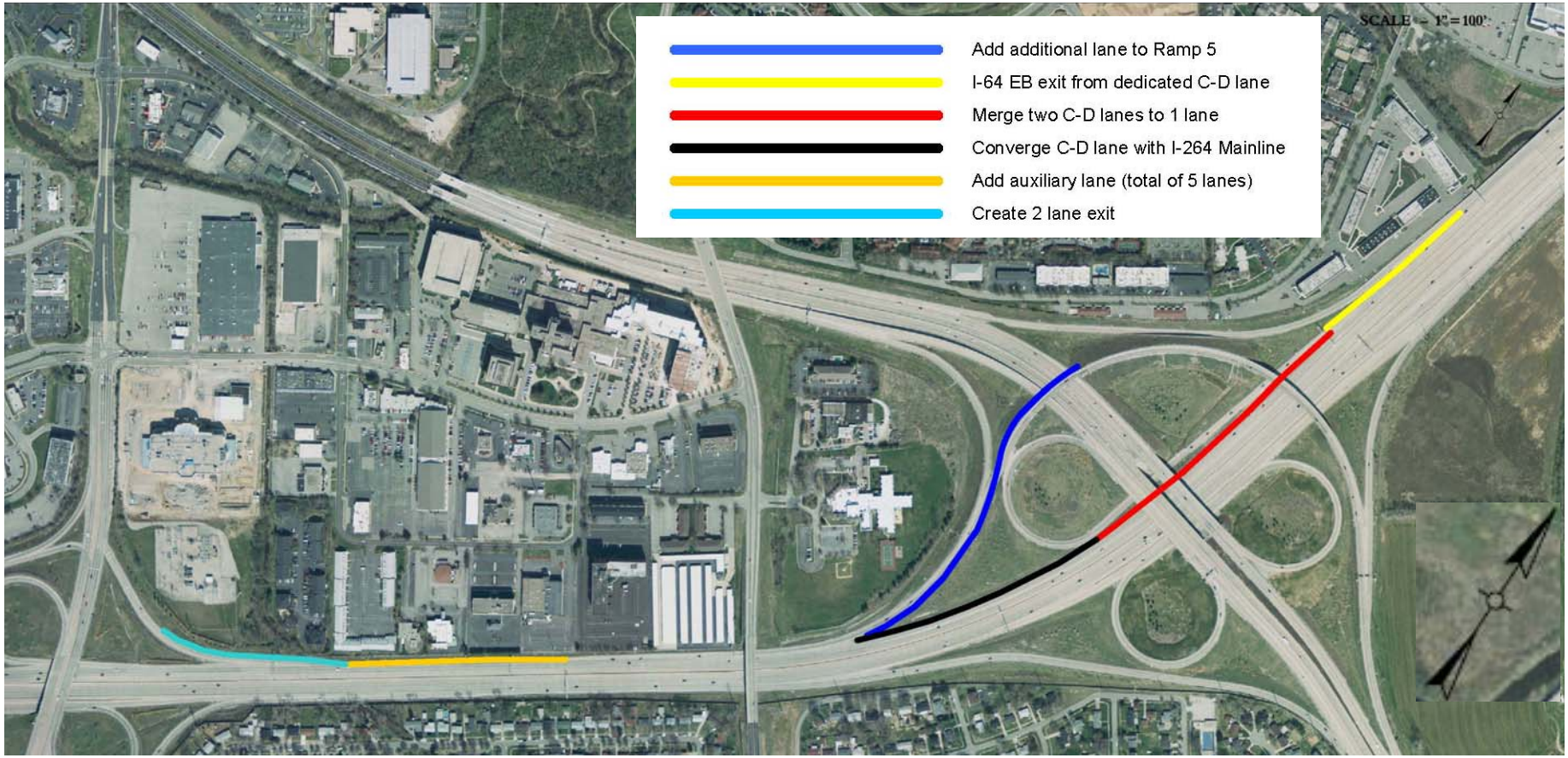
The greatest single problem is insufficient capacity from I-64 WB to I-264 WB primarily at the lane reduction just west of Ramp 4, I-64 WB to I-264 EB, which can be resolved by providing a continuous two-lane ramp from I-64 WB to I-264 WB, and by providing an auxiliary lane between the two-lane entrance at I-264 and Breckenridge Lane NB exit, and by providing the exit with two lanes. C-D Road No. 1 can function properly with only a one-lane entrance to I-264 WB since volume from C-D Road No. 1 to I-264 is expected to be less than 1,400 VPH, far lower than a single lane freeway capacity. The elimination of merges and modification to C-D Road No. 1 simplifies decision-making for drivers which will allow for smoother traffic flow; it also reduces conflicts that potentially will reduce the crash rate.

A preliminary review and sketch level revision of the forecasted traffic numbers shows that this simpler, lower cost alternative to work well. Weave analysis between Ramp 9 and the Breckenridge Lane exit shows a LOS D.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$23,030,000	$0	$23,030,000
RECOMMENDED DESIGN	$5,195,000	$0	$5,195,000
ESTIMATED SAVINGS OR (COST)	$17,835,000	$0	$17,835,000

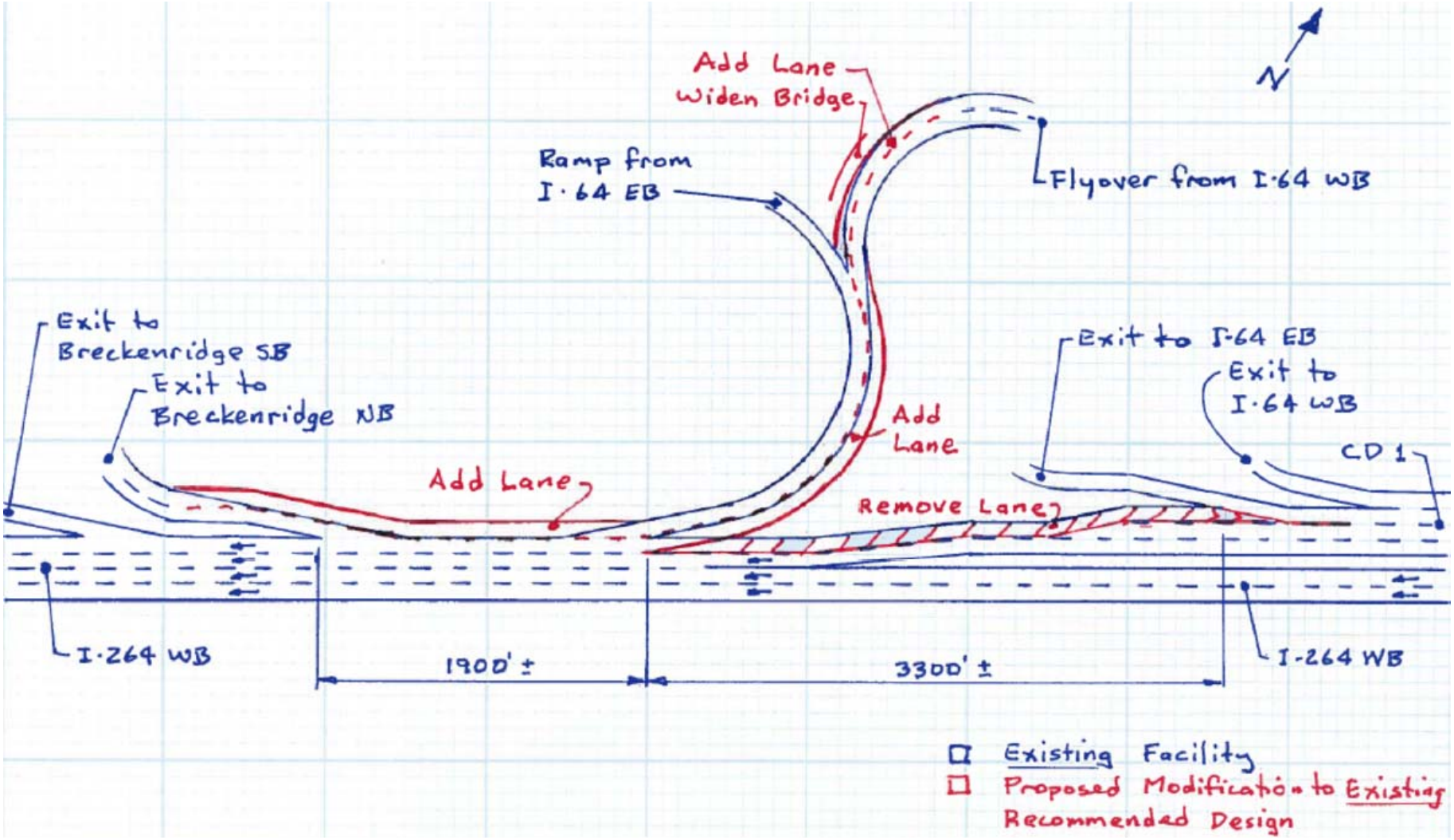
VALUE ENGINEERING RECOMMENDATION # VE-19

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-19

SKETCH OF RECOMMENDED DESIGN



VALUE ENGINEERING RECOMMENDATION # VE-19

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
Ramp 6A	LS	$1,533,170	1	1	$1,533,170		
Ramp 9	LS	$6,743,800	1	1	$6,743,800		
C-D Road No. 3	LS	$2,944,651	1	1	$2,944,651		
Ramps 5 and 6	LS	$1,436,667	1	1	$1,436,667	1.3	$1,867,667
Ramp 5 Bridge Widening	SF	$150	1			3,600	$540,000
Ramps 3 and 8	LS	$1,369,686	1	1	$1,369,686	0.3	$410,906
Browns Lane Modification	LS	$1,422,900	1	1	$1,422,900		
Electric Relocation	LS	$1,325,000	1	1	$1,325,000		
ROW	LS	$6,254,000	1	1	$6,254,000	0.3	$1,876,200
I-264 WB auxiliary and Exit 18B	LS	$500,000	7			1	$500,000
Total					$23,029,874		$5,194,773

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

VALUE ENGINEERING DESIGN COMMENT # VE-20

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Reevaluate a full tight diamond interchange at I-64 and Breckenridge Lane in lieu of the original design.

COMMENTARY:

As discussed in more detail in VE-12, the VE Team believes the traffic forecast should be revised to better reflect the current conditions and thereby reducing the design year traffic volumes. In correlation with that design comment, the VE Team recommends that the original Alternative 12 should be reevaluated with updated traffic volumes to determine if the LOS F indicated in the Final Report is still valid. Either a Single Point Urban Interchange (SPUI) or Tight Diamond configuration should be considered to minimize the amount of new ROW required to construct the interchange.

The main intent of this design comment is to ensure the original alternative dismissed in the earlier phase due to poor LOS is similarly dismissed with the revised traffic volumes. As mentioned in the in-briefing, a new interchange at I-64 and Breckenridge Lane may have independent utility and could be a stand-alone project. There is little doubt that adding another interstate access on I-64 will prove beneficial to the I-264 weave problem at the Breckenridge Lane interchange; however the extent of the improvement is a question that could be answered with a reevaluation using the new traffic forecast.

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

APPENDIX A
Study Participants

APPENDIX A – Study Participants

Workshop Attendance

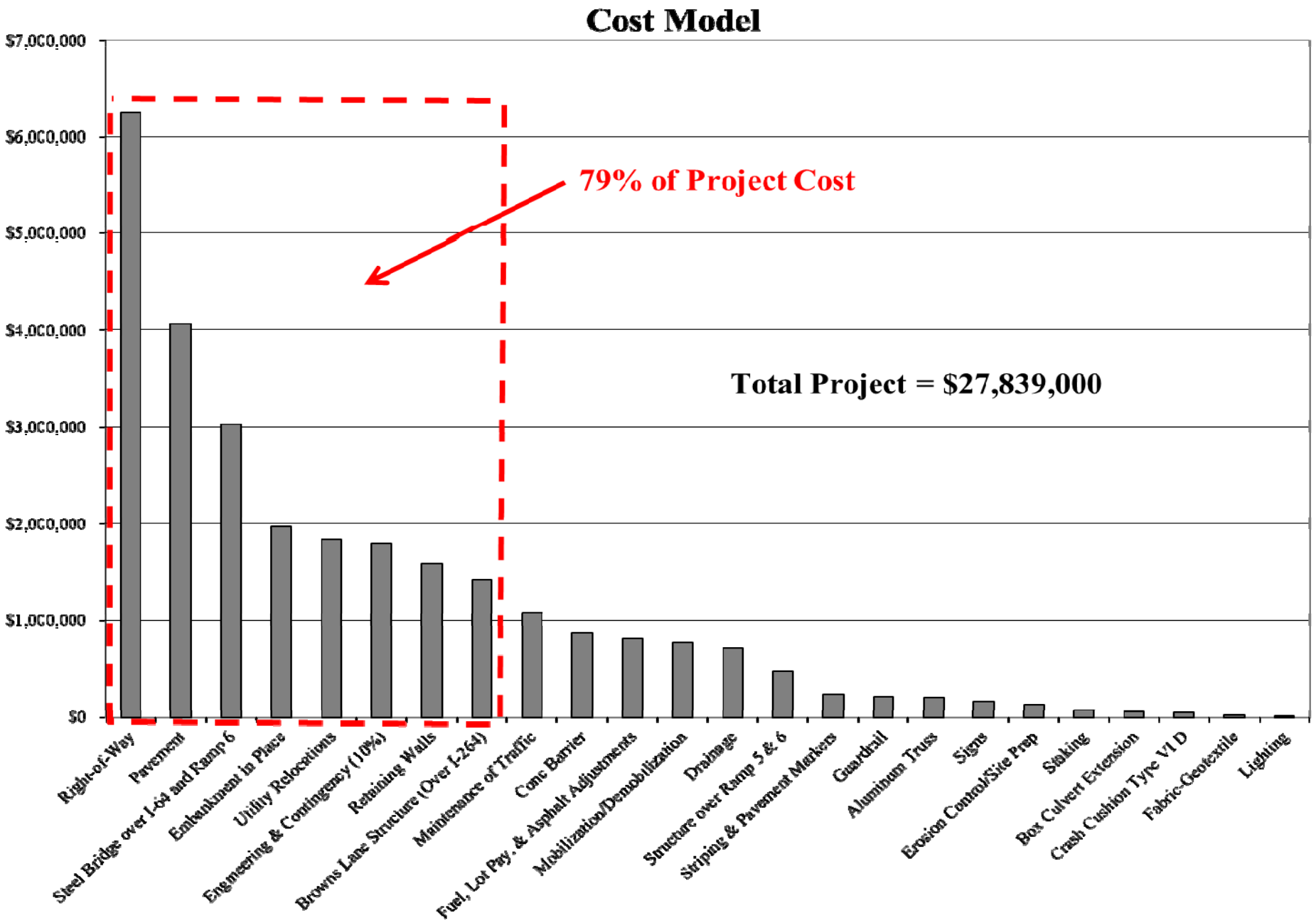
Name	Organization and Address (Organization first, with complete address underneath)	Tel # and Email (Tel first with Email underneath)	Role in Workshop	Participation						
				Meetings		Study Sessions				
				Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Matt Bullock	KYTC, District 5 8310 Westport Road Louisville, KY 40242	502-210-5400 Matt.Bullock@ky.gov	KYTC Project Management		X					
Stephen Curless	URS Corporation 36 East Seventh Street Cincinnati, OH 45202	513-419-3504 Steve.Curless@urs.com	VE Roadway Designer	X	X	X	X	X	X	X
Ceci Evans	FHWA 330 West Broadway Street Frankfort, KY 40601	859-492-5643	FHWA Representative		X					
Robert Farley	KYTC 200 Mero Street Frankfort, KY 40602	502-564-3280 Bob.Farley@ky.gov	KYTC Central Office Location Engineer	X						
Greg Groves	URS Corporation 325 W. Main Street, Suite 1200 Louisville, KY 40202	502-569-2301 Greg.Groves@urs.com	VE Highway Engineer	X	X	X	X	X	X	X
Craig Klusman	URS Corporation 325 W. Main Street, Suite 1200 Louisville, KY 40202	502-217-1502 Craig.Klusman@urs.com	VE Structural Engineer	X	X	X	X	X	X	X
Brian Meade	KYTC, District 5 8310 Westport Road Louisville, KY 40242	502-210-5400 Brian.Meade@ky.gov	KYTC Project Manager	X	X					
Mary Murray	FHWA 330 West Broadway Street Frankfort, KY 40601	502-233-6745	FHWA Representative		X					
Arlen Sandlin	Parsons Brinckerhoff 1792 Alysheba Way, Suite 230 Lexington, KY 40509	859-245-3867 Sandlin@pbworld.com	Project Team Project Manager	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

Workshop Attendance

				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**
Steve Slade	Parsons Brinckerhoff 1792 Alysheba Way, Suite 230 Lexington, KY 40509	859-245-3862 slade@pbworld.com	Project Team		X					
Paul Slone	URS Corporation 36 East Seventh Street Cincinnati, OH 45202	513-419-3456 Paul.Slone@urs.com	VE Traffic Operations	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
Scott Walker	Parsons Brinckerhoff 1792 Alysheba Way, Suite 230 Lexington, KY 40509	859-245-3873 Walkersc@pbworld.com	Project Team	X	X					

APPENDIX B
Cost Information

APPENDIX B - Cost Information


Cost Model
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$0
79% of Project Cost
Total Project = $27,839,000
Right-of-Way
Pavement
Steel Bridge over I-64 and Ramp 6
Embankment in Place
Utility Relocations
Engineering & Contingency (10%)
Retaining Walls
Browns Lane Structure (Over I-264)
Maintenance of Traffic
Conc Barrier
Fuel, Lot Pay. & Asphalt Adjustments
Mobilization/Demobilization
Drainage
Structure over Ramp 5 & 6
Striping & Pavement Markers
Guardrail
Aluminum Truss
Signs
Erosion Control/Site Prep
Staking
Box Culvert Extension
Crash Cushion Type VI D
Fabric-Geotextile
Lighting

APPENDIX C
Function Analysis

APPENDIX C - Function Analysis

Function Model

Item	Cost	Function
Total Project	$27,839,000	Improve flow Reduce queue Relieve bottleneck Improve accessibility to DuPont area Improve safety
Right-of-Way	$6,254,000	Accommodate widening of I-264 Accommodate I-64 to Breckenridge Exit Ramp
Pavement	$4,067,101	Support vehicles
Steel Bridge over I-64 and Ramp 6	$3,024,000	Accommodate new ramp Reduce volume of weave Flyover merge Increase capacity of I-64 WB to I-264 WB
Embankment in Place	$1,966,064	Avoid weave Flyover merge Meet elevated grades of new roadway
Utility Relocations	$1,835,000	Accommodate widening of I-264 Accommodate I-64 to Breckenridge Ramp
Engineering & Contingency (10%)	$1,793,252	Design project Account for unknowns
Retaining Walls	$1,588,738	Reduce ROW Retain earth Tighten configuration Reduce embankment
Browns Lane Structure (Over I-264)	$1,422,900	Accommodate widening of I-264 Accommodate I-64 to Breckenridge Exit Ramp
Maintenance of Traffic	$1,081,147	Maintain traffic Avoid detours Avoid extended closures
Concrete Barrier	$864,750	Separate traffic Contain vehicles
Fuel, Lot Pay, & Asphalt Adjustments	$809,539	Accommodate fluctuation in fuel cost
Mobilization/Demobilization	$772,213	Mobilize labor and equipment Setup contractor’s job site
Drainage	$714,026	Convey water Accommodate widening Protect manhole entrances
Structure over Ramp 5 & 6	$480,000	Accommodate new ramp Reduce volume of weave Flyover merge
Striping & Pavement Markers	$239,803	Delineate lanes Guide traffic
Guardrail	$213,259	Contain vehicles Control access

Item	Cost	Function
Signs & Supports	$360,769	Inform motorist Guide traffic
Erosion Control/Site Prep	$125,803	Control erosion Stabilize soil
Staking	$67,500	Locate alignment
Box Culvert Extension	$54,120	Accommodate widening
Crash Cushion Type VI D	$48,236	Absorb energy Protect driver and asset
Fabric-Geotextile	$22,689	Drain subgrade
Lighting	$9,867	Light roadway

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	Utilize 1 lane from C-D Road 1 in lieu of 2 lanes, eliminate the braided ramps, provide a 2-lane flyover, and a 2-lane exit at Breckenridge Lane northbound in lieu of the original design	1	S. Curless
2	Utilize 1 lane from C-D Road 1 in lieu of 2 lanes, eliminate the braided ramps, and provide a 2-lane flyover in lieu of the original design	4	
3	Widen the bridge over I-64 to add a second lane on the I-64 westbound to I-264 westbound flyover ramp as an interim solution	2	G. Groves
4	Restripe the far left inside lane on I-264 westbound to reduce the 14 ft wide lane to a 12 ft wide lane	2	G. Groves
5	Relocate Jewish Hospital in lieu of highway realignment	4	
6	Utilize a quadrant interchange concept in the northwest quadrant of Breckenridge Lane and Dutchmans Parkway in lieu a traditional signalized intersection	3	
7	Create direct access to Dutchmans Lane from the I-264 and Breckenridge Lane intersection and eliminate left turns from Breckenridge Lane to Dutchmans Parkway	2	P. Slone
8	Utilize a free flow right turn lane from I-264 ramp all the way to Dutchmans Lane along Breckenridge Lane in lieu of the signalized to enter Breckenridge Lane	2	G. Groves
9	Revisit preliminary alternative number 8 that connects Ramp 9 to Dutchmans Lane	4	
10	Revise the traffic forecast due to current conditions in lieu of using the 2005 estimates	DC	B. Sweger
11	Conduct additional origin-destination analysis to determine the split between Ramp 9 traffic that goes to I-264 westbound and the traffic that exits at Breckenridge Lane	DC	B. Sweger
12	Reanalyze original design alternatives with the revised traffic information	DC	B. Sweger
13	Utilize a Michigan U-turn on Breckenridge Lane in lieu of traditional signalized intersections	2	P. Slone
14	Retrofit the existing Browns Lane structure to move the piers in lieu of entirely reconstruction half of the structure	1	C. Klusman
15	Utilize accelerated bridge construction principles on the full rebuild of the Browns Lane structure to reduce duration and maintenance of traffic	DC	C. Klusman
16	Retrofit the existing retaining wall number 3 in lieu of replacing with a new retaining wall	1	C. Klusman
17	Utilize a mechanically stabilized earth (MSE) for retaining wall numbers 3 and 6 in lieu of cast-in-place retaining walls	1	C. Klusman
18	Install a removable gap in the barrier west of Browns Lane for emergency egress of the C-D lane	DC	B. Sweger
19	Eliminate C-D Road 3 and the braided interchange and force westbound I-264 mainline traffic to exit at a modified partial cloverleaf interchange at Breckenridge Lane	2	P. Slone & S. Curless
20	Utilize a slip ramp at Browns Lane to divert some of the traffic away from Breckenridge Lane	4	

List of Creative Ideas			
ID #	**Name of Idea / Description**	**Develop Status**	**Team Member Responsible**
21	Add an I-64 east entrance ramp from Breckenridge Lane to improve traffic operations in the PM peak	3	
22	Install a wagon box in lieu of reconstructing the Browns Lane structure	4	
23	Shift the alignment of the new I-264 C-D to Breckenridge Lane widening approximately 10 ft to the south to miss the power poles, bridge pier, and reduce ROW takes	1	G. Groves
24	Utilize short term closures to reduce the amount of temporary pavement during construction	DC	C. Klusman
25	Utilize a dual-lane clover leaf for the I-264 and I-64 interchange in lieu of the original design	4	
26	Install a I-64 westbound to I-264 westbound clover leaf ramp and utilize the existing flyover to handle traffic exiting at Breckenridge Lane	4	
27	Utilize a double decker exit at Breckenridge Lane to increase storage capacity	4	
28	Improve the I-64 westbound exit ramp signing to improve the traffic operations as an interim solution	DC	B. Sweger
29	Install speed detectors and advanced warning systems on I-64 to reduce the number of accidents	DC	B. Sweger
30	Utilize thermoplastic tattoos of the interstate shields directly on the pavement of I-64 westbound to reduce driver lane confusion	DC	B. Sweger
31	Install new diagrammatic signage that indicates lane assignments on I-64 to reduce driver lane confusion	DC	B. Sweger
32	Reevaluate a full tight diamond interchange at I-64 and Breckenridge Lane in lieu of the original design	DC	G. Groves
33	Widen the I-64 westbound to I-264 westbound approach ramp to 3 lanes in lieu of 2 lanes between the gore areas to improve the traffic distribution	3	
34	Utilize a zipper merge in lieu of a right-hand merge for the I-64 westbound to I-264 westbound flyover ramp	DC	B. Sweger
35	Restripe the I-64 westbound to I-264 westbound flyover ramp to maximize the amount of two lane possible as an interim solution	DC	G. Groves

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 **5-159.00** PROJECT COUNTIES: **Jefferson** DATE OF STUDY: **4/2/2012 to 4/6/2012** **VE # 201203**

VE Alternative Number	VE Team Top Pick	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-15	✓-1	Utilize a Michigan U-turn on Breckenridge Lane in lieu of traditional signalized intersections to improve flow			$0	$2,000,000	($2,000,000)	NA	Saf, Ops	
VE-16	✓-2	Shift the alignment of the new I-264 C-D Road to Breckenridge Lane widening to the south to fit between the existing Browns Lane structure piers and miss the power poles, bridge pier, and reduce ROW takes			$5,095,000	$985,000	$4,110,000	NA	Env, Con	
VE-18		Eliminate C-D Road No. 3 and the braided interchange and force westbound I-264 mainline traffic to exit at a modified partial cloverleaf interchange at Breckenridge Lane			$7,062,000	$489,000	$6,573,000	NA	Env, Con, Ops	
VE-19	✓-1	Utilize one lane from C-D Road No. 1 in lieu of two lanes, eliminate the braided ramps, provide a two-lane flyover, and a two-lane exit at Breckenridge Lane northbound in lieu of the original design			$17,835,000	$0	$17,835,000	NA	Env, Con, Ops	
Structures										
VE-3	✓-1	Widen the bridge over I-64 to add a second lane on the I-64 westbound to I-264 westbound flyover ramp as an interim solution			$0	$633,000	($633,000)	NA	Saf, Ops	
VE-7		Retrofit the existing Browns Lane structure to move the piers in lieu of reconstruction of half of the structure			$1,423,000	$283,000	$1,140,000	NA	Con	

VALUE ENGINEERING PUNCH LIST

ITEM NOS **5-159.00** PROJECT COUNTIES: **Jefferson** DATE OF STUDY: **4/2/2012 to 4/6/2012** **VE # 201203**

VE Alternative Number	VE Team Top Pick	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-10	✓-2	Retrofit the existing Retaining Wall Number 3 in lieu of replacing with a new retaining wall			$152,000	$15,000	$137,000	NA	Con	
VE-11		Utilize a mechanically stabilized earth (MSE) for Retaining Wall Numbers 3 and 6 in lieu of cast-in-place retaining walls			$356,000	$290,000	$66,000	NA	Oth	
Other Design Comments										
VE-1		Improve signing and markings to clarify lane assignments on I-64 prior to I-264 exit			NA	NA	NA	NA	Saf, Ops	
VE-2		Utilize a zipper merge in lieu of a right-hand merge for the I-64 westbound to I-264 westbound flyover ramp			NA	NA	NA	NA	Saf, Ops	
VE-4		Restripe the I-64 westbound to I-264 westbound flyover ramp to maximize the amount of two lanes possible as an interim solution			NA	NA	NA	NA	Saf, Ops	
VE-5		Install speed detectors and advanced warning systems on I-64 to reduce the number of crashes			NA	NA	NA	NA	Saf, Ops	
VE-6		Install a removable gap in the barrier west of Browns Lane for emergency egress of the C-D lane			NA	NA	NA	NA	Saf, Ops	
VE-8		Utilize accelerated bridge construction principles to reduce duration and maintenance of traffic			NA	NA	NA	NA	Con	
VE-9		Utilize short-term closures to reduce the amount of temporary pavement during construction			NA	NA	NA	NA	Con	

VALUE ENGINEERING PUNCH LIST

ITEM NOS **5-159.00** PROJECT COUNTIES: **Jefferson** DATE OF STUDY: **4/2/2012 to 4/6/2012** **VE # 201203**

VE Alternative Number	VE Team Top Pick	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-12		Revise the traffic forecast due to current conditions in lieu of using the 2005 estimates			NA	NA	NA	NA	Ops	
VE-13		Conduct additional origin-destination analysis to determine the split between Ramp 9 traffic that goes to I-264 westbound and the traffic that exits at Breckenridge Lane			NA	NA	NA	NA	Ops	
VE-14		Reanalyze original design alternatives with the revised traffic information			NA	NA	NA	NA	Ops	
VE-17		Restripe the far left inside lane on I-264 westbound to reduce the 14 ft wide lane to a 12 ft wide lane			NA	NA	NA	NA	Env, Con	
VE-20		Reevaluate a full tight diamond interchange at I-64 and Breckenridge Lane in lieu of the original design			NA	NA	NA	NA	Ops	
					Saf 7 Ops 13 Env 4 Con 8 Oth 1					

* 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 Project 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.

REJECTED RECOMMENDATION # 1

DESCRIPTIVE TITLE OF RECOMMENDATION:
Create direct access to Dutchmans Lane rom the I-264 and Breckenridge Lane intersection and eliminate northbound left turns from the KY 1932 and Dutchmans Parkway intersection.

ORIGINAL DESIGN:
The original design specifies no changes to Breckenridge Lane interchange.

RECOMMENDED CHANGE:
The VE Team evaluated adding a connection from the KY 1932 / I-264 directly to Dutchmans Lane in an attempt to eliminate the northbound left turn at KY 1932 and Dutchmans Parkway. Removing this left turn will remove a dual left turn movement that consumes a significant portion of green time. Recovered green time can then be redistributed to remaining movements to reduce delays and improve intersection Level of Service.

ADVANTAGES:
- Increases connectivity between Breckenridge Lane, Dutchmans Lane and Dutchmans Parkway
- Removes high volume left turn from intersection of Breckenridge Lane and Dutchmans Parkway
- Improves Level of Service for Breckenridge Lane and Dutchmans Parkway

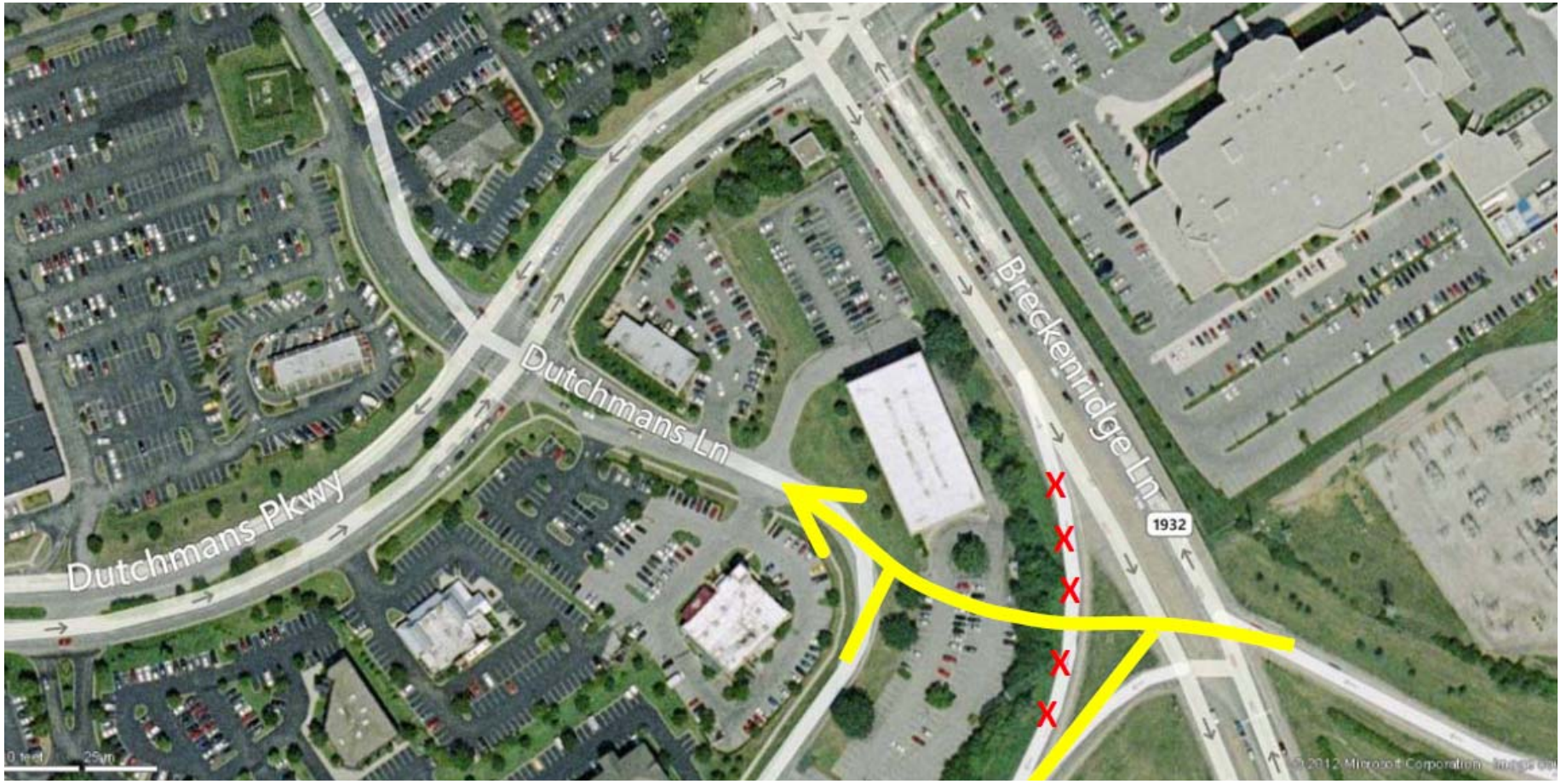
DISADVANTAGES:
- Makes I-264 WB ramp intersection more complex
- Requires modification of I-264 WB Ramp 7 at Breckenridge Lane
- ROW impacts to existing office building
- Motorist confusion
- Likely adds too much traffic to Dutchmans Lane
- Worsens level of service of Dutchmans Lane at Dutchmans Parkway
- Adds significant cost to project

JUSTIFICATION:
The project concept is not justified based on additional project costs and introduction of new problems on local streets.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	$0	$0	$0
RECOMMENDED DESIGN	$2,171,000	$0	$2,171,000
ESTIMATED SAVINGS OR (COST)	($2,171,000)	$0	($2,171,000)

REJECTED RECOMMENDATION # 1

SKETCH OF RECOMMENDED DESIGN



REJECTED RECOMMENDATION # 1

COST ESTIMATE - FIRST COST

Cost Item	Units	$/Unit	Source Code	Original Design		Recommended Design	
				Num of Units	Total $	Num of Units	Total $
ROW impacts to lot	LS	$2,000,000	7			1	$2,000,000
Embankment	CY	$8.00	7			400	$3,200
Pavement	SY	$80.00	1			1,800	$144,000
Pavement removal	SY	$14.00	2			1,700	$23,800
Total					$0		$2,171,000

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

REJECTED RECOMMENDATION # 2

DESCRIPTIVE TITLE OF DESIGN COMMENT:
Utilize a free flow right turn lane from I-264 ramp all the way to Dutchmans Lane along Breckenridge Lane in lieu of the signalized to enter Breckenridge Lane.

COMMENTARY:
The VE Team did a cursory review of this idea and eliminated it from our recommendation. Based on this review it was felt no appreciably improvement would be made to the traffic operation at the Breckenridge Lane ramp. The ramp DHV for current year is approximately 600 with 200 estimated to continue and turn right on Dutchmans Lane. This ramp has dual right turn lanes and therefore the suggested change would add more traffic to the left most right turn lane and could counter the improvements. Additionally, one of the three NB through lanes on Breckenridge Lane approaching the ramp would need to be eliminated to allow for the free flow right turn from the ramp. This would create additionally congestion on Breckenridge Lane and create a potential weave issue approaching Dutchmans Lane.

END OF REPORT

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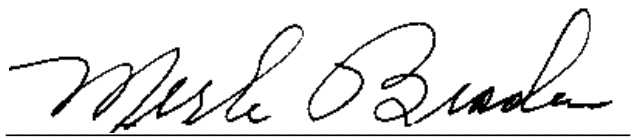

Approved by Merle Braden, PE, CVS-Life (URS)