VALUE ENGINEERING STUDY

OF

LOUISVILLE – SOUTHERN INDIANA
OHIO RIVER BRIDGES
SECTION I

ITEM NO. 5-118.18 & 118.19

JEFFERSON COUNTY, KENTUCKY

MAY 15 – 18, 2006

Prepared by:
VE GROUP, L.L.C.

In Association With:

KENTUCKY TRANSPORTATION CABINET

VALUE ENGINEERING STUDY
TEAM LEADER

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C.V.S. Registration No. 20010901

DATE

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering Study performed by VE Group for the Kentucky Transportation Cabinet. The study was performed during the week of May 15-18, 2006.

The subject of the study was the I-65 Accelerated Section of the Louisville – Southern Indiana Ohio River Bridges Project (LSIORB).

PROJECT DESCRIPTION

The project is located in downtown Louisville, Kentucky about a mile south of the Ohio River. This is an accelerated section of the Kennedy Interchange (Spaghetti Junction to local motorists), which is an interchange for I-64, I-65, and I-71 on the southern bank of the Ohio River.

The I-65 Accelerated Section Project consists of an improvement to the horizontal alignment which will require jacking the existing NB I-65 bridge over Gray Street to match the new profile, replacing the bridge over Chestnut Street, replacing the bridge over Brooks Street – E Muhammad Ali Boulevard, replacing the bridge over Floyd Street, replacing the bridge over Liberty Street, replacing the bridge for the SB on ramp over E Muhammad Ali Boulevard, and replacing the existing pavement within the 0.501 mile project limits.

Also included in the project are landscaping, lighting, signalization, and incorporation of Intelligent Transportation System (ITS) facilities within the project limits.

I. EXECUTIVE SUMMARY

METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:

1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Presentation
6. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:

- Traffic Control
- Construction Time
- Aesthetics
- Service Life
- Future Maintenance Cost
- Construction Cost
- Utility Impacts

I. EXECUTIVE SUMMARY

RESULTS – AREAS OF FOCUS

The following areas of focus were analyzed by the Value Engineering team and from these areas the following Value Engineering alternatives were developed and are recommended for Implementation:

Recommendation Number 1: PAVEMENT

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs asphalt pavement for the length of the project.

If this recommendation can be implemented, there is a possible savings of ***$361,074.***

Recommendation Number 2: RETAINING WALLS- BROOK STREET RETAINING WALL

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative keeps the existing retaining wall on Brook Street.

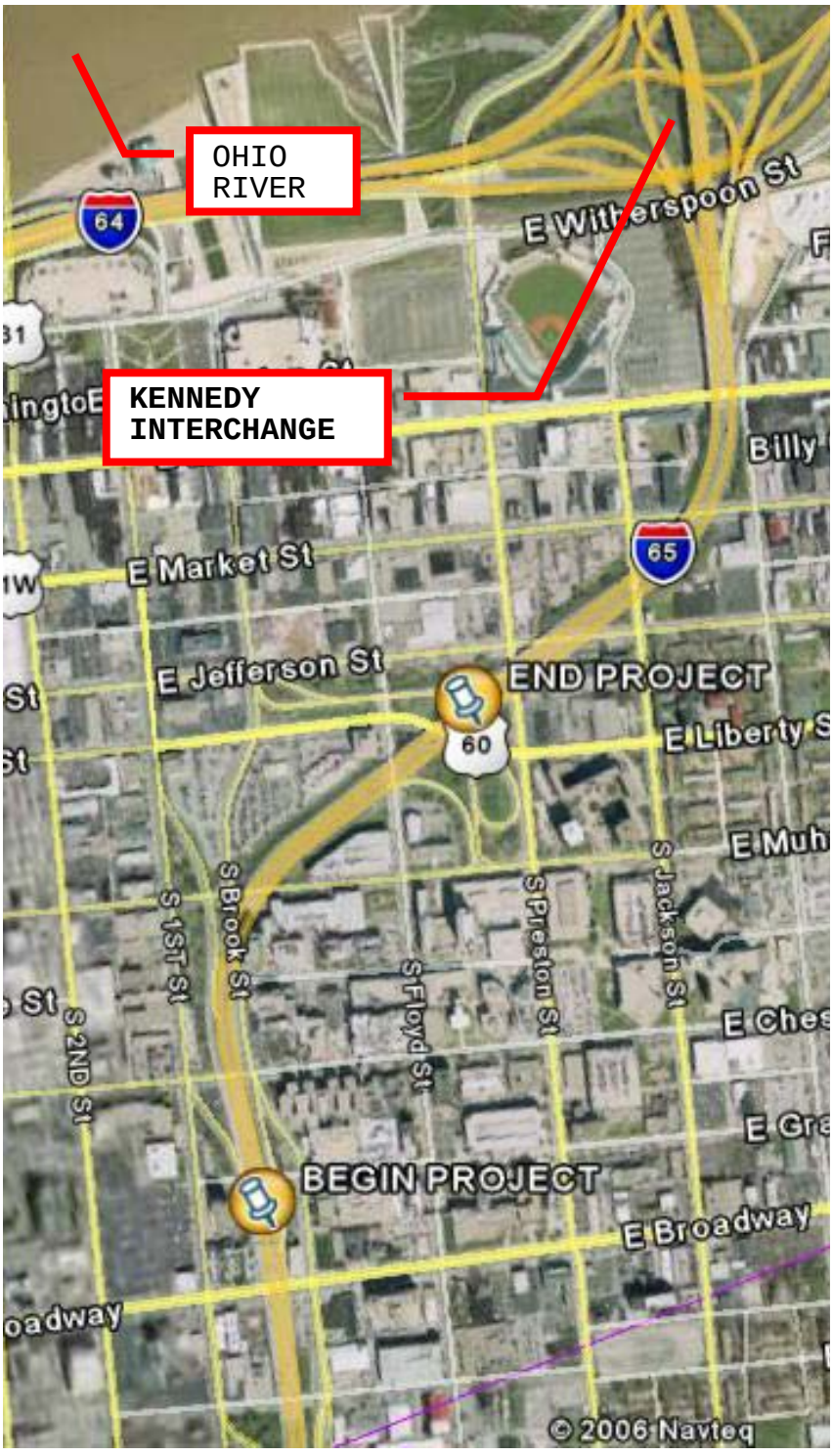
If this recommendation can be implemented, there is a possible savings of ***$509,191.***

Recommendation Number 3: RETAINING WALLS-TOE WALLS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates Toe Walls TW65 – 1 & 3.

If this recommendation can be implemented, there is a possible savings of ***$261,424.***

II. LOCATION OF PROJECT



PROJECT LOCATION – LOUISVILLE, KY

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
Tom Hartley, P.E., C.V.S.	VE Group	Team Leader	850/627-3900
Mary Wade, P.E.	KYTC	Estimator	502/564-4555
Rob Harris, P.E.	KYTC – D5	Construction	502/367-6411
Nasby R. Stroop, P.E.	KYTC – C.O. Construction	Structures/Construction	502/564-4780
Jim Grider, P.E.	KYTC	Design	502/564-3210
Robert Semones	KYTC	VE Coordinator	502/564-4550
Dexter Newman	KYTC	Pavement	502/564-4550

PROJECT DESCRIPTION

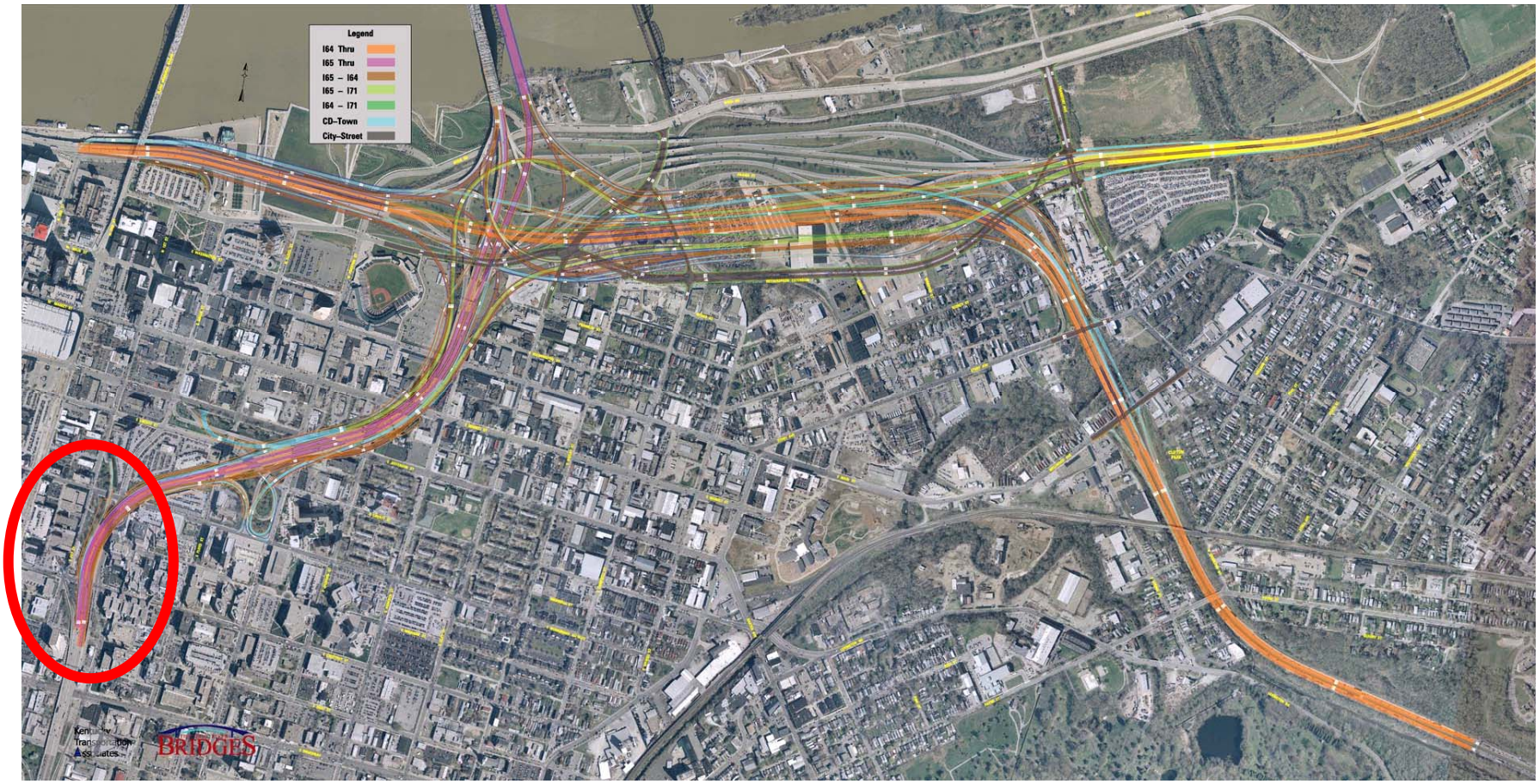
The project is located in downtown Louisville, Kentucky about a mile south of the Ohio River. This is a part of an overall plan to add two crossings of the Ohio River and to make operational improvements to the Kennedy Interchange (Spaghetti Junction to local motorists), which is an interchange for I-64, I-65, and I-71, on the southern bank of the Ohio River. This project is an accelerated construction project to the overall project in that it will make improvements and construct the planned southern approach to the Kennedy Interchange.

The I-65 Accelerated Section Project consists of an improvement to the horizontal alignment which will require jacking the existing NB I-65 bridge over Gray Street to match the new profile, replacing the bridge over Chestnut Street, replacing the bridge over Brooks Street – E Muhammad Ali Boulevard, replacing the bridge over Floyd Street to accommodate a new CD ramp, replacing the bridge over Liberty Street to accommodate a new CD ramp, replacing the bridge for the SB on ramp over E Muhammad Ali Boulevard, and replacing the existing pavement within the 0.501 mile project limits.

Also included in the project are landscaping, lighting, signalization, and incorporation of Intelligent Transportation System (ITS) facilities within the project limits.

III. TEAM MEMBERS AND PROJECT DESCRIPTION

LOUISVILLE – SOUTHERN INDIANA OHIO RIVER BRIDGE PROJECT
SECTION 1 (ACCELERATED) PROJECT LOCATION



IV. INVESTIGATION PHASE

VALUE ENGINEERING STUDY BRIEFING

LOUISVILLE – SOUTHERN INDIANA OHIO RIVER BRIDGES Sec. 1 *MAY 15, 2006*		
NAME	**AFFILIATION**	**PHONE**
Thomas A. Hartley, P.E., C.V.S.	VE Group	850/627-3900
Mary Wade	KYTC	502/564-4555
Rob Harris	KYTC – D5	502/367-6411
Nasby R. Stroop	KYTC – C.O. Construction	502/564-4780
Jim Grider	KYTC	502/564-3210
Stephen C Hoefler	CTS – G&C	502/394-3854
Robert Semones	KYTC Program Performance	502/564-4550
Dexter Newman	KYTC Program Performance	502/564-4550
Alex Semones	KYTC Program Performance	502/564-4550
Dan Byers	WMB Inc.	859/299-5226
Glenn Kelley	QK4	502/564-2222

IV. INVESTIGATION PHASE

STUDY RESOURCES

LOUISVILLE – SOUTHERN INDIANA OHIO RIVER BRIDGES Sec. 1 *MAY 15-17, 2006*		
NAME	**AFFILIATION**	**PHONE**
Al Frank, P.E.	KYTC Bridge Design	502-564-4560
Steve Waddle	KYTC Construction Div.	502-564-4780
David Faulkner	Faulkner Construction	502-456-1943
Anita Rummage	KYTC D-10	606-666-8841

IV. INVESTIGATION PHASE

FUNCTIONAL ANALYSIS WORKSHEET

LOUISVILLE – SOUTHERN INDIANA OHIO RIVER BRIDGES SECTION I

MAY 15-17, 2006

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Brook St/Muhammad Ali Bridge	**SEPARATE** **SUPPORT**	**TRAFFIC** **TRAFFIC**	**B** **B**	**$9,271,000**	**$6,000,000**	**1.6**
Chestnut St Bridge	SEPARATE SUPPORT	TRAFFIC TRAFFIC	B B	$4,595,000	$4,595,000	1.0
Floyd St Bridge	SEPARATE SUPPORT	TRAFFIC TRAFFIC	B B	$2,343,000	$2,343,000	1.0
Pavement	**SEPARATE** **SUPPORT**	**TRAFFIC** **TRAFFIC**	**B** **B**	**$2,200,000**	**$1,600,000**	**1.4**
Liberty St Bridge	SEPARATE SUPPORT	TRAFFIC TRAFFIC	B B	$2,189,000	$2,189,000	1
Retaining Wall	**CONTAIN**	**EARTH**	**B**	**$3,000,000**	**$2,000,000**	**1.5**
Mot	MOVE	TRAFFIC	B	$1,400,000	$1,400,000	1
Bridge Removal	CLEAR	SITE	B	$1,400,000	$1,400,000	1
Gray St Bridge	SEPARATE SUPPORT	TRAFFIC TRAFFIC	B B	$390,000	$390,000	1
Ramp Bridge	**SEPARATE** **SUPPORT**	**TRAFFIC** **TRAFFIC**	**B** **B**	**$390,000**	**$0**	∞

***B – Basic S - Secondary**

** Note: This worksheet is a tool of the Value Engineering process and is only used for determining the areas that the Value Engineering team should focus on for possible alternatives. The column for COST indicates the approximate amount of the cost as shown in the cost estimate. The column for WORTH is an estimated cost for the lowest possible alternative that would provide the FUNCTION shown. Many times the lowest cost alternatives are not considered implementable but are used only to establish a worth for a function. A value index greater than 1.00 indicates the Value Engineering team intends to focus on this area of the project.

IV. INVESTIGATION PHASE

The following areas have a value index greater than 1.00 on the proceeding Functional Analysis Worksheet and therefore have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD

B. PAVEMENT

C. RETAINING WALLS

D. RAMP BRIDGE OVER E MUHAMMAD ALI BLVD

V. SPECULATION PHASE

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD

- Continuous bridge from Gray Street to north of Muhammad Ali Blvd.
- Square off the ends of the bridge.
- Use drill shaft piles.
- Use auger cast piles.
- Use Exodermic pre-cast deck panels with AAHPC concrete and a "Quiet Ride" wearing surface.

B. PAVEMENT

- Use Asphaltic concrete.
- Rosphalt ™ pavement.

C. RETAINING WALLS

- Reface existing retaining wall along Brook Street.
- Use cast in place walls.
- Soil nail wall.
- Pile lagging wall.
- Eliminate toe walls.

D. RAMP BRIDGE OVER E MUHAMMAD ALI BLVD

- Keep existing bridge.

VI. EVALUATION PHASE

A. ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD

1. Bridge horizontal configuration:

   a. Value Engineering Alternative Number 1*: Extend the Chestnut Street Bridge to north of E Muhammad Ali Blvd.*

   b. Value Engineering Alternative Number 2*: Square off the ends of the Brook St.–E Muhammad Ali Blvd Bridge*.

2. Bridge substructure:

   a. Value Engineering Alternative Number 1: *Use drilled shaft piles for foundations*

   b. Value Engineering Alternative Number 2: *Use displace auger cast piles for foundations*

3. Bridge superstructure:

   a. Value Engineering Alternative: *Use Exodermic deck with AAHPC concrete overlay and a "Quiet Ride" wearing surface.*

B. PAVEMENT

a. Value Engineering Alternative Number 1: *Construct Pavement with Asphalt.*

b. Value Engineering Alternative Number 2: *Construct Pavement with Rosphalt ™.*

C. RETAINING WALLS

1. Brook Street Retaining Wall:

   a. Value Engineering Alternative: *Reface existing retaining wall along Brook St.*

2. Toe Walls:

   a. Value Engineering Alternative: *Eliminate toe walls.*

D. RAMP BRIDGE OVER E MUHAMMAD ALI BLVD

a1. Value Engineering Alternative: *Eliminate replacing ramp bridge over E Muhammad Ali Blvd.*

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the "As Proposed".

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD.

1. BRIDGE HORIZONTAL CONFIGURATION

"As Proposed": The Chestnut Street Bridge spans all the way from Gray Street to the north side of Chestnut Street using concrete tub girders. I-65 transitions to embankment until reaching the retaining wall along Brook Street where the roadway will be supported by a bridge constructed with steel tub girders. The north end of the bridge is parallel to E Muhammad Blvd.

Advantages

- Low construction cost for Chestnut Street Bridge.
- Utilizes much of the existing bridge foundations.

Disadvantages

- High construction cost for the Brook Street – E Muhammad Ali Blvd Bridge.
- Large skews on both ends of the Brook Street – E Muhammad Ali Blvd Bridge.
- Difficult construction of the Brook Street – E Muhammad Ali Blvd Bridge.
- Requires retaining walls.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD. *(continued)*

1. BRIDGE HORIZONTAL CONFIGURATION *(continued)*

Value Engineering Alternative Number 1: *Extend the Chestnut Street Bridge to north of E Muhammad Ali Blvd.*

Advantages

- Eliminates skews on the Brook Street – E Muhammad Ali Blvd Bridge.
- Provides more parking for Jewish Hospital.
- Reduces maintenance costs (joint sealing length).
- Reduces amount of retaining wall.

Disadvantages

- Higher overall bridge cost because of steel tub girder and additional length of structure.
- Added expense of excavating and disposing of existing embankment.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

Value Engineering Alternative Number 2: *Square off the ends of the Brook Street – E Muhammad Ali Blvd Bridge.*

Advantages

- Reduces maintenance cost.
- Simpler construction.

Disadvantages

- Added cost of excavation and disposal.
- Increased bridge costs.
- Possible utility conflicts.
- Loss of service life of foundations.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD. ***(continued)***

2. BRIDGE SUBSTRUCTURE

"As Proposed": Use Steel HP 14 X 73 piles for the southbound Bridge.

Advantages

- Quick construction.
- Inexpensive.

Disadvantages

- Require pile driving in Hospital Zone.

Conclusion
Carry forward for further evaluation.

Value Engineering Alternative Number 1: *Use drilled shaft piles for foundations.*

Advantages

- No pile driving in Hospital Zone.
- Fewer piles required.

Disadvantages

- Higher construction Cost.

Conclusion
DROPPED FROM FURTHER CONSIDERATION.

Value Engineering Alternative Number 2: *Use "Displaced Auger Cast" piles for foundations.*

Advantages

- No pile driving in Hospital Zone.
- Fewer piles required.

Disadvantages

- Higher construction Cost.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD. ***(continued)***

3. BRIDGE SUPERSTRUCTURE

"As Proposed": Cast in place deck.

Advantages

- Conventional construction.
- Adaptable to unusual geometry.

Disadvantages

- Forming time.
- Form removal.
- Longer construction time.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Use Exodermic deck with AAHPC concrete overlay and a "Quiet Ride" wearing surface.*

Advantages

- No forming.
- Quick construction.
- Not susceptible to low temperature.

Disadvantages

- Not well adapted to unusual geometry.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

B. PAVEMENT

"As Proposed": Construct pavement with JPC Concrete.

Advantages

- Long service life.
- Low initial maintenance.

Disadvantages

- High construction cost.
- Expensive rehabilitation.
- Rough ride.
- Is not efficiently constructed in short sections.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative Number 1: *Construct pavement with asphalt.*

Advantages

- Low construction cost.
- Good ride.
- Easy rehabilitation.
- Easily repaired.
- Not affected by short construction runs.
- Immediate traffic load upon construction.

Disadvantages

- Low service life.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

B. PAVEMENT *(continued)*

Value Engineering Alternative Number 2: *Construct pavement with Rosphalt ™.*

Advantages

- Water proof wearing surface course.
- Rut resistant.
- Used on bridges or roadway.
- Ease of maintenance.

Disadvantages

- High construction cost.
- Proprietary product.
- Limited state experience.
- Has not been tested.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

C. RETAINING WALLS

1. BROOK STREET RETAINING WALL:

"As Proposed": Demolish existing wall, construct a new wall to match I-65 alignment. At base of new wall, a 2' – 8' wide landscaping planter will be constructed with a toe wall.

Advantages

- Provides landscaping opportunity.

Disadvantages

- Loss of service life of existing wall.
- Will require sheeting.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Reface existing retaining wall along Brook Street.*

Advantages

- Retains service life of existing wall.
- Lower construction cost.
- Wider shoulder.

Disadvantages

- No opportunity for landscaping.
- Non uniform shoulder.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

C. RETAINING WALLS *(continued)*

2. TOE WALLS

"As Proposed": Construct 6’ high toe walls at toe of the existing slope.

Advantages

- Provides for a landscaping planter at the base.

Disadvantages

- High construction cost.
- Difficult construction.
- Difficult maintenance access.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Eliminate toe walls.*

Advantages

- Lower construction cost.
- Eliminates work.
- Easier access for maintenance.

Disadvantages

- Does not allow for landscape planter.

Conclusion

Carry forward for further evaluation.

VI. EVALUATION PHASE

B. ADVANTAGES AND DISADVANTAGES *(continued)*

D. RAMP BRIDGE OVER E. MUHAMMAD ALI BLVD.

"As Proposed": Reconstruct the existing bridge with concrete tub girders on a horizontal alignment shifted to the west and on an increased profile grade.

Advantages

- Ties in with existing horizontal and vertical geometry of I-65.
- Consistent with project Aesthetic Design Guidelines.

Disadvantages

- High construction cost.

Conclusion

Carry forward for further evaluation.

Value Engineering Alternative: *Keep existing Ramp Bridge over E Muhammad Ali Blvd.*

Advantages

- Retain service life of existing bridge.
- Lower construction cost.

Disadvantages

- Is not compatible with I –65 vertical and horizontal geometry.
- Is not within project Aesthetic Design Guidelines.

Conclusion

DROPPED FROM FURTHER CONSIDERATION.

VII. DEVELOPMENT PHASE

A. BRIDGE OVER BROOK STREET – E MUHAMMAD ALI BLVD.

DROPPED FROM FURTHER CONSIDERATION IN THE EVALUATION PHASE

B. PAVEMENT

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

C.2 RETAINING WALLS: TOE WALLS

(1) AS PROPOSED
(2) VALUE ENGINEERING ALTERNATIVE

D. RAMP BRIDGE OVER E. MUHAMMAD ALI BLVD.

DROPPED FROM FURTHER CONSIDERATION IN THE EVALUATION PHASE

E. DESIGN COMMENTS

VII. DEVELOPMENT PHASE

B. PAVEMENT

1. "As Proposed"

A final pavement design has not been approved, therefore the Value Engineering Team assumed a pavement design with JPC Concrete. The assumed pavement design was generated by the KYTC Pavement Design Catalog Ver. 5.0 using the maximum ESAL, which resulted in a JPC Pavement consisting of:

1. 12" of JPC
2. 4" JPC Drainage Blanket
3. 4" DGA

VII. DEVELOPMENT PHASE

B. PAVEMENT

2. Value Engineering Alternative Number 1

The Value Engineering Team recommends using the Maximum Asphalt Design generated by the KYTC Pavement Design Catalog Ver. 5.0 and consisted of:

1. 1.5” Surface course
2. 16.25” of asphalt
3. 4” Drainage Blanket
4. 4” DGA

Slip forming this project will be inefficient because it is only 0.501 miles with 4 bridges. The JPC will have to be formed by hand to accommodate the short runs with large skews at the bridges.

In addition, the Life Cycle Cost comparison also favors the asphalt alternative for this particular application.

PAVEMENT TYPE
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
JPC	SY	$60.22	15,004	$903,541	0	$0
MAXIMUM ASPHALT	SY	$40.41	0	$0	15,004	$606,312
SUBTOTAL				**$903,541**		**$606,312**
MOBILIZATION (THIS IS SUB + CONTIN x %=)	4%			$40,479		$27,163
TRAFFIC CONTROL/MOT	5%			$45,177		$30,316
CONTINGENCY	12%			$108,425		$72,757
GRAND TOTAL				**$1,097,622**		**$736,548**

POSSIBLE SAVINGS: $361,074

LIFE CYCLE COST COMPARISON

Maximum Asphalt Design			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	660,241	1.00	660,241	1.00	660,241	1.00	660,241	1.00	660,241	1.00	660,241	1.00	660,241
15	(MILL 1.5" & OVERLAY 1.5")	60,573	1.00	60,573	0.74	45,007	0.56	33,634	0.42	25,275	0.32	19,095	0.24	14,501
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.5" & OVERLAY 3.5")	112,787	1.00	112,787	0.55	62,266	0.31	34,774	0.17	19,637	0.10	11,208	0.06	6,464
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05	0	0.02	0
	PW Total Cost	833,601		833,601		767,514		728,650		705,154		690,545		681,206
	% Cost Difference													
	vs. Maximum Aggregate			-4.71%		-8.16%		-10.34%		-11.68%		-12.49%		-12.99%
	vs. JPC			-28.30%		-30.91%		-32.55%		-33.62%		-34.35%		-34.89%

Maximum Aggregate Design			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	751,713	1.00	751,713	1.00	751,713	1.00	751,713	1.00	751,713	1.00	751,713	1.00	751,713
15	(MILL 1.5" & OVERLAY 1.5")	60,573	1.00	60,573	0.74	45,007	0.56	33,634	0.42	25,275	0.32	19,095	0.24	14,501
20	N/A	0	1.00	0	0.67	0	0.46	0	0.31	0	0.21	0	0.15	0
30	(MILL 1.5" & OVERLAY 3.5")	60,573	1.00	60,573	0.55	33,441	0.31	18,676	0.17	10,546	0.10	6,020	0.06	3,471
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05	0	0.02	0
	PW Total Cost	872,859		872,859		830,160		804,023		787,535		776,828		769,685
	% Cost Difference													
	vs. Maximum Asphalt			4.50%		7.55%		9.37%		10.46%		11.11%		11.50%
	vs. JPC			-22.53%		-21.03%		-20.12%		-19.64%		-19.43%		-19.38%

JPC Design			Discount Rate											
			0		2		4		6		8		10	
YEAR		COST	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW	P/F	PW
0	PW OF CONSTRUCTION	903,525	1.00	903,525	1.00	903,525	1.00	903,525	1.00	903,525	1.00	903,525	1.00	903,525
25	JPC REPAIR & DIAMOND GRIND	166,015	1.00	166,015	0.61	101,191	0.38	62,275	0.23	38,681	0.15	24,241	0.09	15,323
30	N/A	0	1.00	0	0.55	0	0.31	0	0.17	0	0.10	0	0.06	0
40	PW OF SALVAGE	0	1.00	0	0.45	0	0.21	0	0.10	0	0.05		0.02	0
	PW Total Cost	1,069,539		1,069,539		1,004,716		965,800		942,206		927,766		918,847
	% Cost Difference													
	vs. Maximum Asphalt			22.06%		23.61%		24.55%		25.16%		25.57%		25.86%
	vs. Maximum Aggregate			18.39%		17.37%		16.75%		16.42%		16.27%		16.23%

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

1. "As Proposed"

The existing structure, located between Chestnut Street and Muhammad Ali Blvd. at Station 626+32, is a 25' high cast-in-place retaining wall.

The proposed structure design involves removing the existing structure and constructing a new retaining wall. The proposed roadway alignment shifts slightly away from the existing wall. The proposed wall (W65-2), built 3 feet west of the existing wall, follows the alignment shift; this allows for a consistent shoulder on the roadway.

The proposed structure design incorporates a 2 to 8 foot variable width planter box that is positioned 3 feet above the sidewalk level and runs the entire 265' length of the wall. Fill material for this landscaping area will be held in place by constructing a gravity toe wall (TW65-2).

The design team provided plans and cost estimates for two alternatives: a cast-in-place reinforced concrete wall and a mechanically stabilized earth wall. The approximate cost of each alternative is $500,000.00.

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

1. "As Proposed" *(continued)*

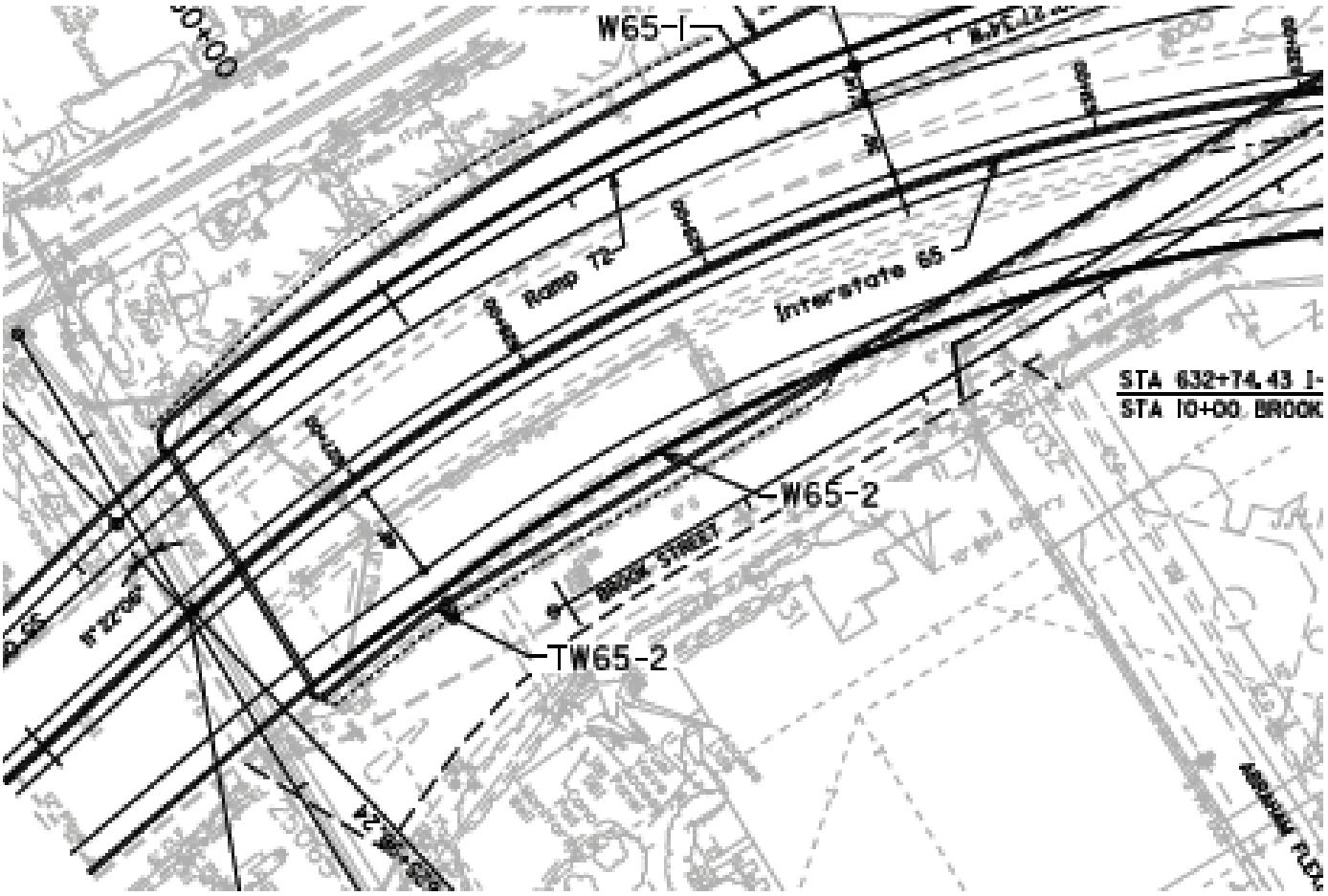
CONCEPTUAL DRAWING OF NEW WALL

VIEW LOOKING NORTH ALONG WALL

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

1. "As Proposed" *(continued)*

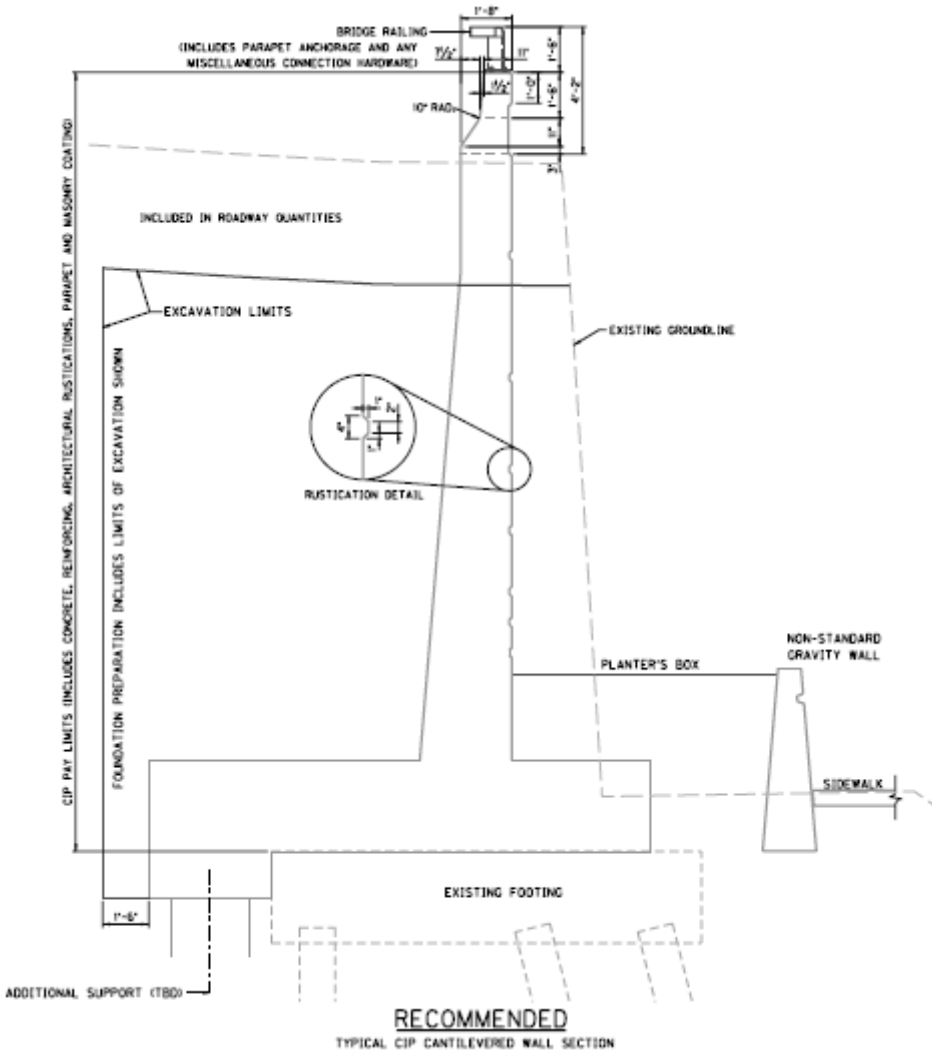


LOCATION OF TW65-2 & W65-2

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

1. "As Proposed" *(continued)*



AS PROPOSED RETAINING WALL AND TOE WALL

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

2. Value Engineering Alternative

The Value Engineering Team recommends leaving the existing structure in place and providing aesthetic enhancements.

Assumptions:

- The existing structure is structurally sound.
- Removal of the existing structure could require extensive shoring for stability.

Suggestions for aesthetic enhancements to the existing retaining wall include:

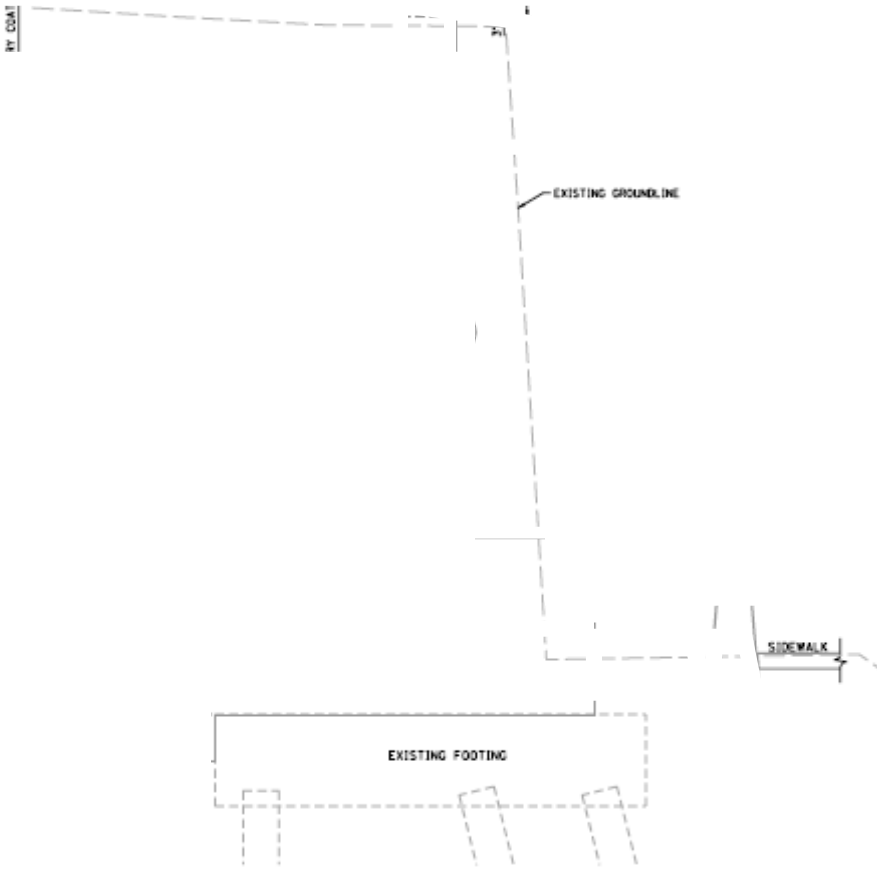
- Veneers – hide existing cracks or defects.
- Etching patterns.
- Pre-cast panels - match other structures.
- Community art project – public involvement with project.
- Mural – hire artist.

Leaving the existing wall in place results in a 3 to 6 foot shelf area outside the proposed roadway that could be utilized as a variable width shoulder.

VII. DEVELOPMENT PHASE

C.1 RETAINING WALLS: BROOK STREET RETAINING WALL

2. Value Engineering Alternative (continued)



VALUE ENGINEERING ALTERNATIVE – LEAVE EXISTING

BROOK STREET RETAINING WALL
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
WALL W65-2	SF	$74.09	7,288.0	$539,968	0.0	$0
TOE WALL TW65-2	SF	$24.48	1,590.0	$38,923	0.0	$0
FILL	CY	$9.00	353.3	$3,180	0.0	$0
DECORATIVE FACIA	SF	$10.00	0	$0	7,288	$72,880
SUBTOTAL				**$582,071**		**$72,880**
MOBILIZATION (THIS IS SUB + CONTIN x %=)	0%			$0		$0
TRAFFIC CONTROL/MOT	0%			$0		$0
CONTINGENCY	0%			$0		$0
GRAND TOTAL				**$582,071**		**$72,880**

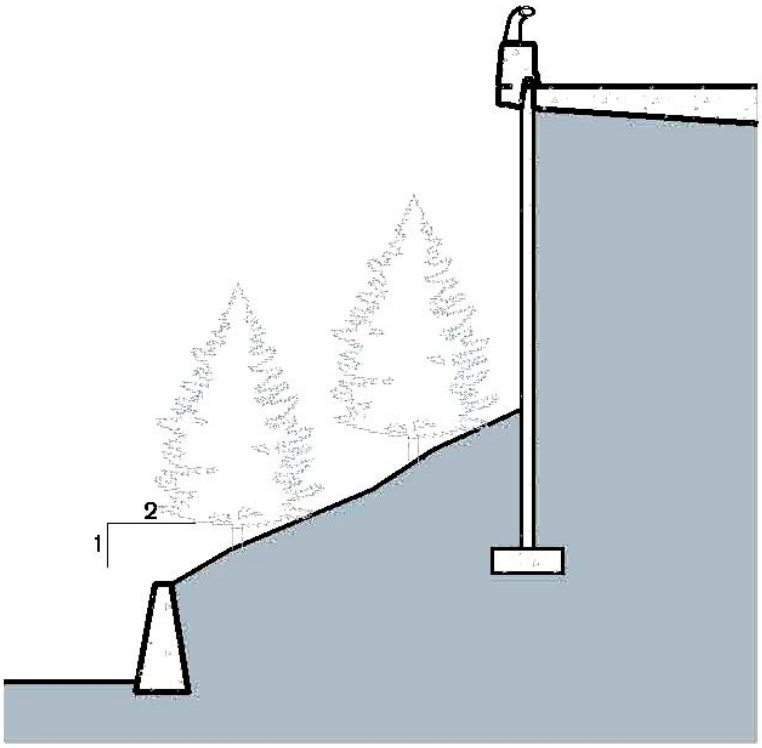
POSSIBLE SAVINGS: $509,191

VII. DEVELOPMENT PHASE

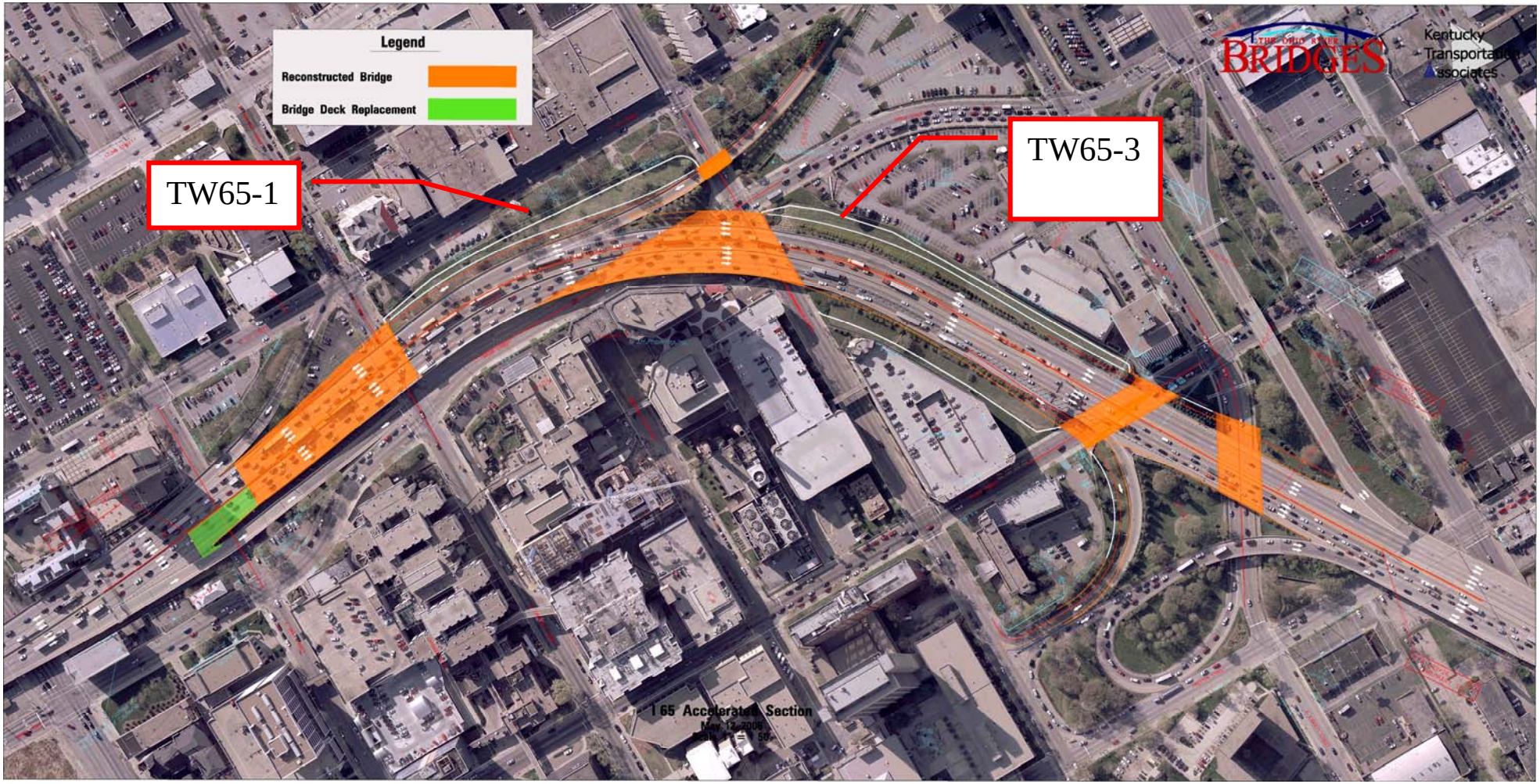
C.2 RETAINING WALLS: TOE WALLS

1. "As Proposed"

The proposed design calls for constructing a 6' high toe wall as shown below for retaining walls TW65-1 & 3.



Ⓐ MODULAR PRECAST WALL PANEL, SECTION



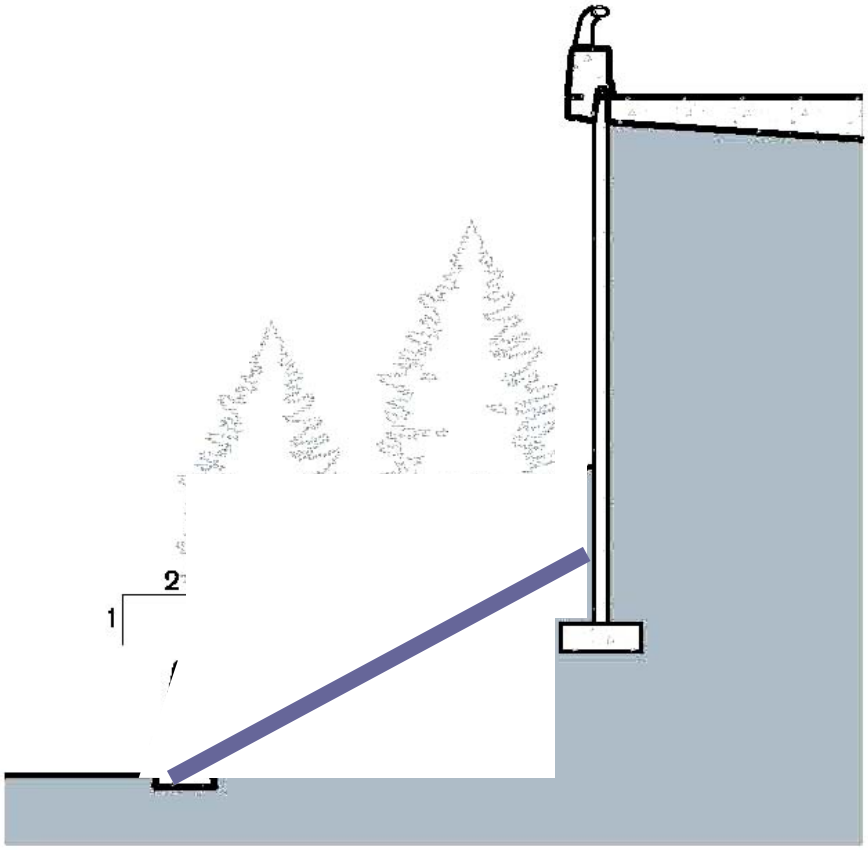
AS PROPOSED LOCATION OF TOE WALLS TW65-1 & 3

VII. DEVELOPMENT PHASE

C.2 RETAINING WALLS: TOE WALLS

2. Value Engineering Alternative

Eliminate the toe walls.



VALUE ENGINEERING ALTERNATIVE

RETAINING WALL-TOE WALLS
VALUE ENGINEERING ALTERNATIVE
COST COMPARISON SHEET

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
TOE WALL TW65-1	SF	$24.51	3,873.0	$94,927	0.0	$0
TOE WALL TW65-3	SF	$24.51	5,313.0	$130,222	0.0	$0
FILL	CY	$9.00	4,030.6	$36,275	0.0	$0
SUBTOTAL				**$261,424**		**$0**
MOBILIZATION (THIS IS SUB + CONTIN x %=)	0%			$0		$0
TRAFFIC CONTROL/MOT	0%			$0		$0
CONTINGENCY	0%			$0		$0
GRAND TOTAL				**$261,424**		**$0**

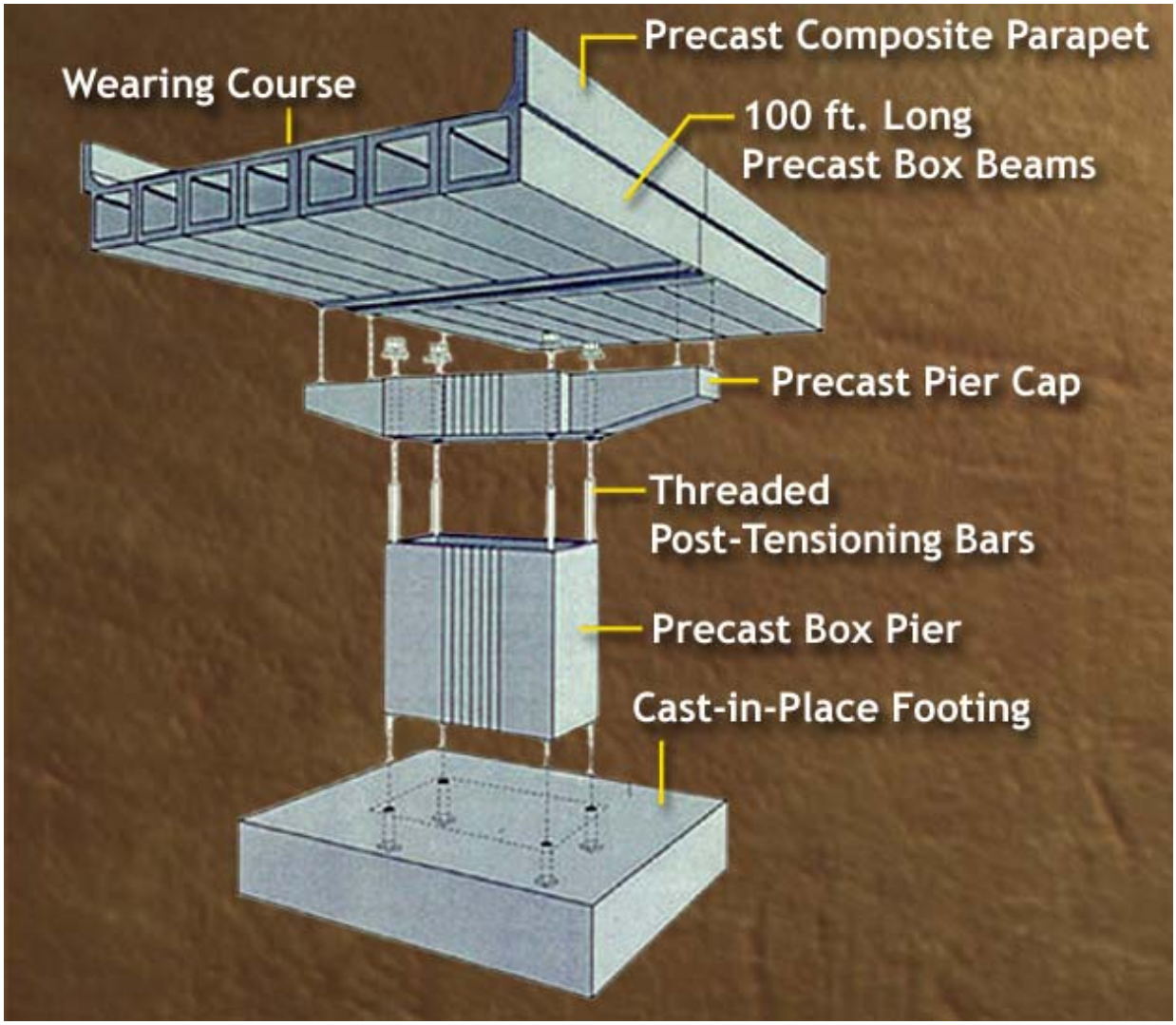
POSSIBLE SAVINGS: $261,424

VII. DEVELOPMENT PHASE

E. DESIGN COMMENTS

The Kentucky Derby is the major event for Louisville every year in early May. If at all possible, the construction timing should be set to allow 6 – lanes of traffic during the 2 – weeks of Derby Events. It appears it may be possible to open up the new SB lanes for the Derby. Careful scheduling and expedition of work will be required along with good weather.

One method of shortening the construction time for the structures would be to use pre-cast piers and columns as shown below**.**



This precast concept allows for a longer construction season in that cold weather is not a factor in constructing/erecting the piers.

VIII. SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for further development.

Recommendation Number 1: PAVEMENT

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative constructs asphalt pavement for the length of the project.

If this recommendation can be implemented, there is a possible savings of ***$361,074.***

Recommendation Number 2: RETAINING WALLS- BROOK STREET RETAINING WALL

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative keeps the existing retaining wall on Brook Street.

If this recommendation can be implemented, there is a possible savings of ***$509,191.***

Recommendation Number 3: RETAINING WALLS-TOE WALLS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates Toe Walls TW65 – 1 & 3.

If this recommendation can be implemented, there is a possible savings of ***$261,424.***

LOUISVILLE – SOUTHERN INDIANA OHIO RIVER BRIDGES SECTION I
VALUE ENGINEERING STUDY PRESENTATION
MAY 19, 2006

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