



**OHIO RIVER BRIDGES
SECTION 2 - DOWNTOWN BRIDGE
VALUE ENGINEERING STUDY REPORT**

Item Number 5-118.00

**Study Date: February 18 - 22, 2008
Report Date: March 7, 2008**



**OHIO RIVER BRIDGES
SECTION 2 – DOWNTOWN BRIDGE**

Item Number 5-118.00

**VALUE ENGINEERING STUDY
for
Kentucky Transportation Cabinet**

Study Date: February 18 - 22, 2008

Final Report

March 7, 2008

URS Corporation

EXECUTIVE SUMMARY

General

URS conducted a Value Engineering Study of the Louisville-Southern Indiana Ohio River Bridges, Section 2 – Downtown Bridge project. The topic was the 15% Design Development Submission prepared for the Kentucky Transportation Cabinet (KYTC) by Michael Baker, Jr., Inc.

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 construction cost estimate provided to the VE Team with the project documents indicates a total construction cost of \$276,665,059. This project is scheduled to be let as a design/bid/build project, thus the cost of construction will be determined on a contractor bid.

As a result of this value engineering study, should all of the VE Team's selected combination of recommendations be accepted for implementation, the total potential savings available to KYTC for this project is \$44,193,000. These potentials are based upon the VE Team's cost estimates of the individual recommendations selected by the VE Team as noted on the Summary of Recommendations table below. Total cost savings realized by KYTC will be based upon the final implementation status of these VE recommendations.

Summary of VE Study Results

During the speculation phase of this VE study, 23 creative ideas were identified. 19 of these ideas were developed into VE recommendations and design comments with cost implications where applicable. Many of the ideas represent changes in design approach, reconsideration of criteria, and in some cases, modification of the project scope. In general, the idea evaluation took into account the economic impact, other benefits obtained, and the effect on the overall project objectives.

The following table presents a summary of the ideas developed into recommendations and design comments with cost implications where applicable. Since cost is an important issue for comparison of VE proposals, the costs presented in this report are based upon original design quantities with unit rates obtained from the estimate as prepared by the design team and included in their submission to KYTC, 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 not only that the recommendations (and likewise their cost savings) are summarily additive, but also whether the cost savings or project improvement potential of the recommendations are worth the change to the project design.

SUMMARY OF RECOMMENDATIONS AND DESIGN COMMENTS			
Rec #	Recommendation Title / Description	1st cost savings (or cost)	VE Selected Combo
1	Maintain existing 5 spans on southbound I-65 on Indiana side in lieu of replacing with 3 spans	Comment	
2	Place pedestrian path on Big 4 Railroad Bridge in lieu of on the new northbound bridge	\$34,452,000	X
3	Utilize edge girders not integral with towers 3 and 5 in lieu of integral girders	Comment	X
4	Eliminate tower 5 and associated stay cables; reconfigure and extend approach spans on Indiana side (250-750-500 in lieu of 250-750-750-250)	\$15,852,000	
5	Reconfigure span lengths of proposed cable stayed bridge for more efficiency in design (315-715-715-315 in lieu of 250-750-750-250)	\$9,741,000	X
6	Relocate pier 8 closer to Riverside Drive to eliminate potential for barge impact	Comment	X
7	Move tower 3 closer to edge of primary navigation channel	Comment	X
8	Shape of tower with triangular edge requires custom forming full height; simplify tower cross section	Comment	X
9	Utilize plate girders on Indiana approach spans	Comment	X
10	Utilize 4 feet shoulders in lieu of 12 feet on new northbound bridge	\$15,840,000	
11	Utilize minimal enhancements to the transition between span 1 and the cable stayed span 2 in lieu of creating expensive aesthetic transition	Comment	X
12	Utilize similar design criteria for pedestrian cage on the new Downtown Bridge and the East End Bridge	Comment	X
13	Utilize vacated ROW from reconstructed Kennedy interchange project for construction staging	Comment	X
14	Allow storm water to run off of new bridge into the river in lieu of capturing the storm water	Comment	X
15	Coordinate Section 2 and 5 to design appropriate concrete barriers	Comment	X
16	Place northbound span 1 into Section 1 contract	Comment	X
17	Construct crossover on embankment in lieu of on the temporary bridge	Comment	X
18	Develop conceptual plans to connect new bridge to existing roadways in case Sections 1 and/or 3 lag behind Section 2	Comment	X
19	Utilize existing JFK Bridge median barrier during construction of superelevation transition	Comment	X

Summary of VE Team Selected Combination \$44,193,000

Acknowledgments

A thank you is given to the staff members from the Kentucky Transportation Cabinet and the design team members from Michael Baker, Jr., Inc. Special thanks are also extended to Mr. Robert Semones for his assistance with the setting up of this study.

Value Engineering Study - Core Team

<u>Name</u>	<u>Discipline / Role</u>	<u>Organization</u>	<u>Telephone</u>
Stephen Curless, PE	Roadway/MOT	URS	513-419-3504
Greg Groves, PE	Roadway Design	URS	502-217-1509
David Jeakle, PE	Bridge Expert	URS	813-636-2467
Lauren Mudd	VE Technical Recorder	URS	502-569-2301
Norman Roush, PE, PS	Geometrics Expert	URS	304-757-6642
Kyle Schafersman, EIT, CVS	VE Team Leader	URS	913-344-1019

Certification

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



Kyle Schafersman, EIT, CVS
Value Engineering Program Manager

TABLE OF CONTENTS

<i>Section and Title</i>	<i>Page No.</i>
1. Introduction.....	1
2. Project Description	2
3. VE Recommendations & Design Comments	5

Appendices

A. Study Participants.....	A-2
B. Cost Information	A-5
C. Function Analysis.....	A-10
D. Creative Idea List and Evaluation.....	A-12

SECTION 1 - INTRODUCTION

This report documents the results of a value engineering study on the Ohio River Bridge, Section 2 – Downtown Bridge. The study workshop was held at the URS offices in Louisville, KY on February 18 - 22, 2008. The study team was from URS. Kyle Schafersman, a Certified Value Specialist (CVS) 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 and Recommendations

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.

Design Comments

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 after the recommendations.

Level of Development

Value Engineering 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 designer.

Organization of the Report

The report is organized in the following outline.

1. Introductory Information
 - a. Section 1- Introduction
 - b. Section 2- Project Description
2. Primary body of results.....Section 3- Recommendations and Design Comments
4. Supporting documentation.....Appendices

SECTION 2 – PROJECT DESCRIPTION

The Ohio River Bridges Project (Project) is comprised of six primary sections including: 1) reconstruction/relocation of the Interstates and ramp systems to the south of the existing Kennedy Interchange (“Spaghetti Junction”); 2) a new Downtown Bridge just east of the existing Kennedy Bridge; 3) a new Indiana approach to the (new) bridge and ramps systems in Jeffersonville; 4) a new connection linking the new East End Bridge to the existing Gene Snyder Freeway (KY 841); 5) an East End Bridge approximately eight miles from downtown Louisville; and 6) a new Indiana connection linking the Lee Hamilton Highway (I-265) to the new East End Bridge.

This portion of the entire project involves the addition of a new structure to serve northbound traffic on Interstate 65 over the Ohio River between downtown Louisville, KY and Jeffersonville, IN. The Final Environmental Impact Statement for this project was signed March 26, 2003 and the project is authorized by the Federal Highway Administration’s Record of Decision signed September 6, 2003. This project will improve cross-river mobility between Jefferson County, Kentucky and Clark County, Indiana.

The new Downtown Bridge will be located just upstream and nearly parallel to the existing John F. Kennedy Bridge. The new Downtown Bridge will contain six northbound lanes as well as a pedestrian/bicycle path. It connects to the Kennedy Interchange (Section 1) to the south and the Downtown Indiana approaches (Section 3). Approach spans will flank both sides of the main cable-stayed bridge. On the south approach, the bridge connects with new elevated Kennedy Interchange Bridges. On the north approach, approach spans will be needed to span over part of the river and local streets, ending to the north of Market Street. The existing Kennedy Bridge will then become six lanes southbound. The site context of the Downtown Bridge has a unique setting. The new bridge will cross both Waterfront Park in Kentucky and Riverfront Park in Indiana. The bridge will also be adjacent to the Old Jeffersonville Historic District.

Four distinct bridges make up Section 2 and are described as follows:

- NB I-65 KY Approach Span (Span 1)
- NB I-65 Main Span Bridge (Spans 2-5)
- NB I-65 IN Approach Spans (Spans 6-10)
- SB I-65 JFK Approach Spans

The estimated cost for the entire Section 2 recommended structures is \$276,665,059.

NB I-65 KY APPROACH SPAN (SPAN 1)

Approach Span

The horizontal alignment for the approach span combines horizontal curves for Ramp 32 and NB I-65 and becomes tangent near the Main Span Bridge. The out-to-out width of the approach span varies from 147’-5 ¼” where Ramp 32 and I-65 NB merge down to 117’-5” at the Main Span Bridge. The recommended structure for the approach span will consist of a single 200’-0” span with a 0° skew to the centerline of the Main Span Bridge at the piers. In order to meet AASHTO girder spacing guidelines, nine 84”-deep steel tub girders will be used at spacing varying from 16’-5” at the merging of I-65 NB (Sta. 224+43.05) and Ramp 32 to 12’-8” at the

River Crossing Bridge (Sta. 226+43.05). The tub girders were chosen to match the superstructure used on Section 1. These girders will also have variable curvature to account for the radii of Ramp 32 and I-65 NB.

Pier 1 for the bridge will have four columns and supports Bridges B65-15 and BS-8, as well as, the approach span (Span 1) to the River Crossing Bridge. Pier 2 will have 3 columns and will support the approach span (Span 1) and the end of the cable stayed bridge (Span 2). The estimated cost for the recommended structure is \$12,904,956, with a cost per square foot of \$506.71.

NB I-65 MAIN SPAN BRIDGE (SPANS 2-5)

After the public involvement process, a three tower – four span cable stayed bridge was selected by the executive selection committee of the Ohio River Bridges project. This cable stayed bridge has a span arrangement of 250'-750'-750'-250' for a total length of 2000'. All of the towers and piers supporting the cable stayed spans are perpendicular to the alignment.

The towers of the bridge are unbraced above the deck level. Below the deck there will be a lower strut wall at the water level and an upper cross strut just below the floor system. The main and side towers are approximately 300' and 210' respectively, above normal pool elevation. Two planes of 46 parallel cables support the bridge deck.

The Bridge deck will be comprised of precast deck panels supported on a floorbeam and stringer system. Floorbeams and stringers will be composite with cast in place infill strips between the precast deck panels. The floorbeams will frame into composite steel edge girders which are connected directly to the cable stays.

The minimum horizontal clearance of the JFK Bridge (680') is being maintained by aligning the south face of Tower / Pier 4 with the current navigation channel. Tower / Pier 3 is set back approximately 50' from the navigation channel to minimize encroachment into the channel during construction. The minimum vertical clearance for vessels in the primary and secondary channels is approximately 74', which exceeds the required clearance of 71'. The estimated cost for the recommended structure is \$ 147.3 million, with a cost per square foot of \$578.61.

NB I-65 IN APPROACH SPANS (SPANS 6-10)

The portion of the proposed northbound structure that extends from the end of the cable stayed bridge to the forward abutment is 1106.3' in length, measured along the centerline of I-65 Northbound. This portion of the structure will be divided into 5 spans with lengths of 198', 235', 240', 240', and 193.3' (Spans 6 through 10). The orientation of all of the proposed piers will be perpendicular to the centerline of I-65 Northbound. The proposed forward abutment will be oriented at a skew of 23.28 degrees relative to the centerline of I-65 Northbound.

The recommended structure type for spans 6 through 10 is a trapezoidal steel box girder superstructure supporting a 9 3/4" thick Class AA concrete deck. The cross section consists of six 83" deep box girders in spans 6 through 8 with an additional box girder added in spans 9 and 10 to allow for widening occurring at the Court Avenue exit ramp. The minimum vertical clearance of the recommended structure is 26.40', occurring over Market Street. The estimated cost of the recommended structure is \$47.4 million.

The trapezoidal box design addresses a number of issues which have been raised, including:

- Reduced clutter and cleaner appearance of framing under the bridge (cross frames will be hidden inside the girders)
- Reduced pigeon roosts due to closed framing
- Sloped webs admit more sunlight under the bridge (a particular concern expressed for the spans over and adjacent to the park)

In addition to these issues, trapezoidal box structures have been recommended for span 1 and for the bridges in SDC 1 immediately adjacent to span 1. Providing a similar structure type in spans 6 through 10 will allow for a consistent structure type and appearance for the approaches and similar transition treatments between each approach and the cable stayed spans.

SB I-65 JFK APPROACH SPANS

The portion of the existing JFK Bridge extending from the northern end of the existing truss to the forward abutment will be replaced as a part of this project.

Justification for replacing the existing structure includes the following considerations:

- Upgrading the SB approach to fully comply with LRFD HL-93 for code compliance and compatibility with all other structures within Section 2
- Additional costs that may be incurred with the superstructure only replacement as a result of substructure components which may not rate for HL-93. For example, the three northern piers are founded on wood piles.
- Footing deficiencies or conflicts such as the batter of existing piles conflicting with new piles required to widen the existing piers
- Compatibility with span arrangement, structure type and pier type of NB approach
- Reduction from six piers to two piers in keeping with public comments to move piers away from streets and further open spans under the approach
- Accommodation of upgraded geometry, i.e. widening to accommodate upgraded on-ramp

Full replacement of the SB approach was approved by the Bi-State Management Team. The proposed replacement structure is 659' in length, measured along the centerline of I-65 Southbound. This structure will be divided into 3 spans with lengths of 210', 255', and 194'. The orientation of the proposed piers will be perpendicular to the centerline of I-65 Southbound. The proposed forward abutment will be oriented at a skew of 20.64 degrees relative to the centerline of I-65 Southbound.

The recommended structure type is a trapezoidal steel box girder superstructure supporting a 9" thick Class AA concrete deck. The cross section consists of six 83" deep box girders in span 1 with an additional box girder added in spans 2 and 3 to allow for widening occurring at the Court Avenue entrance ramp. The minimum vertical clearance of the recommended structure is 20.09', occurring over Market Street. The estimated cost of the recommended structure is \$22.2 million.

SECTION 3 - VE RECOMMENDATIONS & DESIGN COMMENTS

Organization of Recommendations

This section contains the complete documentation of all recommendations to result 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 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, cost estimate, and the economic impact of the recommendation on the first cost, and where applicable, the life cycle cost. The economic impact is shown in terms of savings or added cost.

Acceptance of VE Recommendations

The Summary of 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, but also the likelihood and ease of implementing the recommendations.

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

Design Comments

Design Comments are ideas that in the opinion of the 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. Some comments might relate to things of which the owner or designer is already aware. Because the study is done on a design in progress and as an independent team, the VE Team may not be aware of everything intended by the owner and designer. The following comments are presented with the intent that they may aid the design team in some way.

VALUE ENGINEERING DESIGN COMMENT # 1

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Improve existing 5 spans on southbound I-65 on Indiana side in lieu of replacing with 3 new spans.

COMMENTARY:

The VE team suggests taking a more detailed and quantitative examination of what it would cost to make the necessary upgrades to the existing facility. The VE team assumes the cost has not been estimated to rehabilitate and improve the existing 5 spans. The improvements would include but not be limited to the addition of piers to support the new on-ramp, correcting footing deficiencies to meet LRFD HL-93, and improving the existing roadway geometries. This quantitative evaluation needs to take into account long term maintenance requirements. Aesthetics of improving the existing structure will not be as visually stimulating as a new bridge.

The Advanced Situation Folder for the I-65 southbound portion of the existing JFK Bridge extending from the northern end of the existing truss to the forward abutment will be replaced as a part of this project. The recommended structure type is a trapezoidal steel box girder superstructure supporting a 9" thick concrete deck. The cross section consists of six 83" deep box girders in span 1 with an additional box girder added in spans 2 and 3 to allow for widening occurring at the Court Avenue entrance ramp. The estimated cost of the recommended structure is \$22.2 million. The Advanced situation folder also suggested a steel plate girder alternative for \$18.2 million or a spliced prestressed concrete superstructure for \$18.5 million.

Justification for replacing the existing structure includes the following considerations listed in the Advanced Situation Folder:

- Upgrading the SB approach to fully comply with LRFD HL-93 for code compliance and compatibility with all other structures within Section 2
- Additional costs that may be incurred with the superstructure only replacement as a result of substructure components which may not rate for HL-93. For example, the three northern piers are founded on wood piles.
- Footing deficiencies or conflicts such as the batter of existing piles conflicting with new piles required to widen the existing piers
- Compatibility with span arrangement, structure type and pier type of NB approach
- Reduction from six piers to two piers in keeping with public comments to move piers away from streets and further open spans under the approach
- Accommodation of upgraded geometry, i.e. widening to accommodate upgraded on-ramp

Full replacement of the SB approach was approved by the Bi-State Management Team. The proposed replacement structure is 659' in length, measured along the centerline of I-65 Southbound. This structure will be divided into 3 spans with lengths of 210', 255', and 194'. The orientation of the proposed piers will be perpendicular to the centerline of I-65 Southbound. The proposed forward abutment will be oriented at a skew of 20.64 degrees relative to the centerline of I-65 Southbound.

VALUE ENGINEERING RECOMMENDATION # 2

PROJECT: OHIO RIVER BRIDGES, SECTION 2 - DOWNTOWN BRIDGE
LOCATION: LOUISVILLE, KENTUCKY
STUDY DATE: FEBRUARY 18 - 22, 2008

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize pedestrian path on Big 4 Railroad Bridge in lieu of on the new northbound Downtown Bridge.

ORIGINAL DESIGN:

The original design specifies constructing a 17 feet wide bike path and sidewalk along the upstream side of the new northbound I-65 Ohio River Bridge. This path will require superstructure construction to achieve elevation difference from the ground level up to the bridge on both the Indiana and the Kentucky side of the river. The pedestrian path makes the bridge 17 feet wider, and it requires the installation of 72 inch tall pedestrian guardrail/cage for the entire length of the bridge. This path has been designed to hold the weight of traffic, so the snooper truck or emergency vehicles could utilize it if necessary.

RECOMMENDED CHANGE:

The VE team recommends utilizing a pedestrian path on Big 4 Railroad Bridge in lieu of on the new northbound Downtown Bridge. This will completely remove all associated pedestrian path elements from the new I-65 northbound bridge structure. The pedestrian path can utilize an earth embankment elevation or a structural ramp to reach the old railroad bridge. The Indiana side of the Big 4 Railroad Bridge will also need a ramp to the ground elevation. This project has already been designed and planned for construction.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$40,641,000		\$40,641,000
RECOMMENDED DESIGN	\$6,189,000		\$6,189,000
ESTIMATED SAVINGS OR (COST)	\$34,452,000	\$0	\$34,452,000

VALUE ENGINEERING RECOMMENDATION # 2

ADVANTAGES:

- Reduces width of new Downtown Bridge
- Allows more continuous flow of pedestrian traffic from the north side of River Road
- Allows easier future expansion of a bike path through new riverfront park area
- Eliminates pedestrians and bikers from high speed interstate facility
- Provides use for the currently unutilized structure
- Moves ramp away from the roadway construction area
- Separates railroad bridge ramp construction from bridge construction
- Allows the path to be usable, regardless of actual construction on new bridge
- Allows for easy expansion of the bike path east-west along River Road to access and future park area
- Railroad bridge could be rehabilitated substantially quicker than completion of the new Downtown Bridge

DISADVANTAGES:

- Utilizes an old structure which may require extra maintenance
- Path elevating to railroad bridge may reduce usable Riverfront Park area
- Requires rehabilitation to the old railroad bridge

JUSTIFICATION:

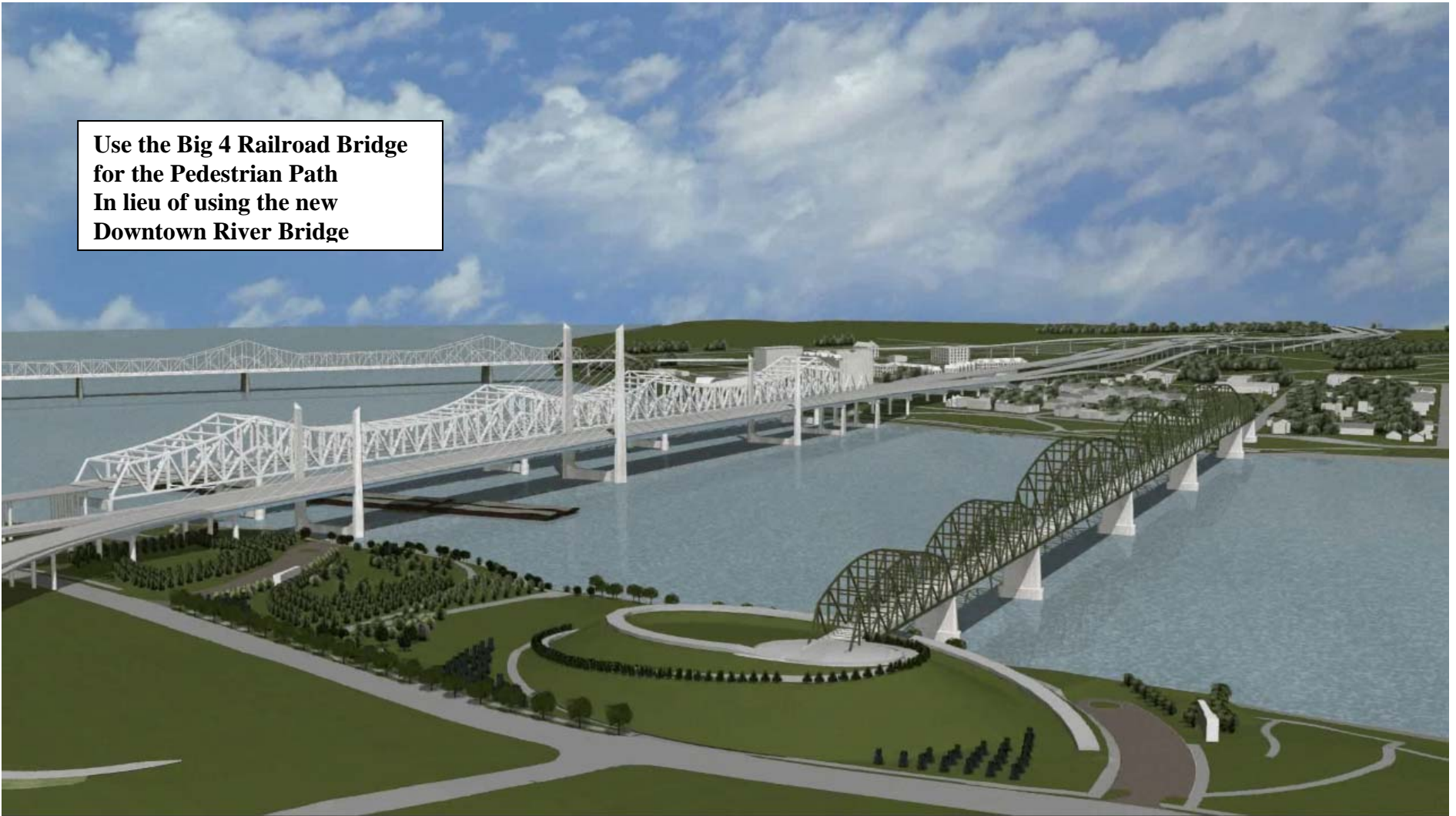
Constructing the pedestrian path on the old railroad bridge will open a cross river bike path much sooner than waiting for the new Downtown Bridge to be constructed. The existing railroad bridge is not currently being used, and plans for a pedestrian path have been considered already.

The estimated savings associated with implementing this recommendation are based on values developed by the VE Group, LLC Value Engineering Study Report, dated March 30, 2007. This recommendation substantially reduces the cost of the Downtown Bridge, provides a functionally similar river crossing path, for a lot less time and money.

VALUE ENGINEERING RECOMMENDATION # 2

SKETCH OF RECOMMENDED DESIGN

**Use the Big 4 Railroad Bridge
for the Pedestrian Path
In lieu of using the new
Downtown River Bridge**



VALUE ENGINEERING DESIGN COMMENT # 3

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize edge girders that are not integral with Towers 3 and 5 in lieu of integral connections.

COMMENTARY:

Currently the text contained in the Bridge Type Selection report indicates that the steel edge girders are proposed as integral connections with all three towers. It is recommended to not provide integral connections between the edge girder and tower legs at Towers 3 and 5. With integral connections at Towers 3 and 5 the movements due to temperature variation will lead to very large foundation forces due to the fact that the towers below deck will be very stiff and the shallow depth to rock allows for no flexibility in the foundation. In lieu of the integral connection the edge girders can be locally deviated around the tower legs.

VALUE ENGINEERING RECOMMENDATION # 4

PROJECT: OHIO RIVER BRIDGES, SECTION 2 - DOWNTOWN BRIDGE
LOCATION: LOUISVILLE, KENTUCKY
STUDY DATE: FEBRUARY 18 - 22, 2008

DESCRIPTIVE TITLE OF RECOMMENDATION:

Eliminate Tower 5 and associated stay cables; reconfigure and extend approach spans on Indiana side (250-750-500 in lieu of 250-750-750-250).

ORIGINAL DESIGN:

Original design consists of a 4-span, three tower cable-stayed bridge with span lengths of 250'-750'-750'-250'. This four span arrangement provides a 750' clearance for the primary navigational channel and 750' clearance for the secondary navigational channel. The proposed Tower 4 is aligned with the existing JFK Bridge Pier 3; whereas, the proposed Tower 5 is not aligned with the existing JFK Bridge Pier 4 and is offset by 250'. The existing JFK Bridge provides a horizontal clearance of 680' for the primary navigational channel and 480' for the secondary navigational channel.

RECOMMENDED CHANGE:

It is recommended to develop a more traditional 3-span, two tower cable stayed bridge in lieu of the 4-span cable stayed bridge. This 3-span bridge would be the most cost effective cable stayed arrangement that meets the functional requirements and will serve as a baseline for evaluating the cost premium associated with the current design.

For a traditional three span cable stayed bridge configuration, each of the towers has cables that go from the top of the tower to the anchor piers at both ends of the bridge. These back stay cables are generally large cables and act to stabilize the top of the tower from moving during vehicular loading on the mainspan. With the four span configuration shown in the Bridge Type Selection Report, the central tower does not have any back stays that can extend from the top of the tower to an anchor pier. All of the cables on both sides of this central tower are attached to a very flexible deck system. With this lack of backstays the top of the tower is not restrained which has several effects. First, the longitudinal moments in the central tower and foundations become large and require additional concrete, reinforcement and foundations to accommodate the forces. Second, the superstructure in the spans adjacent to this central tower may also experience additional deflections and demands due to live load.

Additionally, the four span arrangement provides a horizontal clearance that is much greater than the clearance provided by the adjacent JFK Bridge over the secondary navigational channel. It is recommended to consider a three span arrangement with span lengths of 250'-750'-500'. The 500' for Span 3 allows the new anchor pier to align with the existing JFK Bridge Pier 4 and maintains the same secondary navigational channel. The major advantage for the three span configuration is that both towers now have backstays that connect the top of the tower to anchor piers, thus providing stability and minimizing the flexural demand on both the tower and foundation. Second, the length of cable stayed bridge is reduced by 500' and replaced with simpler and more economical approach span structure.

VALUE ENGINEERING RECOMMENDATION # 4

RECOMMENDED CHANGE (CONTINUED):

To accommodate the three span cable stayed bridge the approach spans on the Indiana side will need to be lengthened by 500' and the span lengths reconfigured slightly. The increase in approach span bridge length will add an additional pier in the water which must be designed for barge collision forces; however, these foundations should not get too large considering the rock layer is close to the surface as you approach the Indiana river bank.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$193,673,000		\$193,673,000
RECOMMENDED DESIGN	\$177,821,000		\$177,821,000
ESTIMATED SAVINGS OR (COST)	\$15,852,000	\$0	\$15,852,000

ADVANTAGES:

- The three span configuration is a traditional layout with a known structural behavior. The four span configuration, on the other hand, is rare, especially with grossly different tower heights and the expected behavior is unknown.
- Therefore, there is a risk of project costs escalating during the final design phase.
- The three span cable stayed bridge with increased length of approach span bridge will reduce construction costs by minimizing the length of expensive cable stayed bridge and replacing this with more cost effective approach span structure.
- Reducing the total length of cable stayed bridge will also reduce the long-term maintenance demand associated with cable stayed bridges.

VALUE ENGINEERING RECOMMENDATION # 4

DISADVANTAGES:

- With a shortened cable stayed bridge the length of approach bridges will need to be increased which will require the addition of an additional pier in the water that is subject to barge collision forces. However, the cost implications of barge collision forces should be relatively small considering the rock is close to the surface.
- The four span configuration contained in the Bridge Type Selection Report is symmetrical about the large central tower and provides a nice rhythm to complement the existing JFK Bridge. The three cable stayed configuration is not symmetric when viewed in elevation and will not have the same aesthetic appeal as the four span configuration.

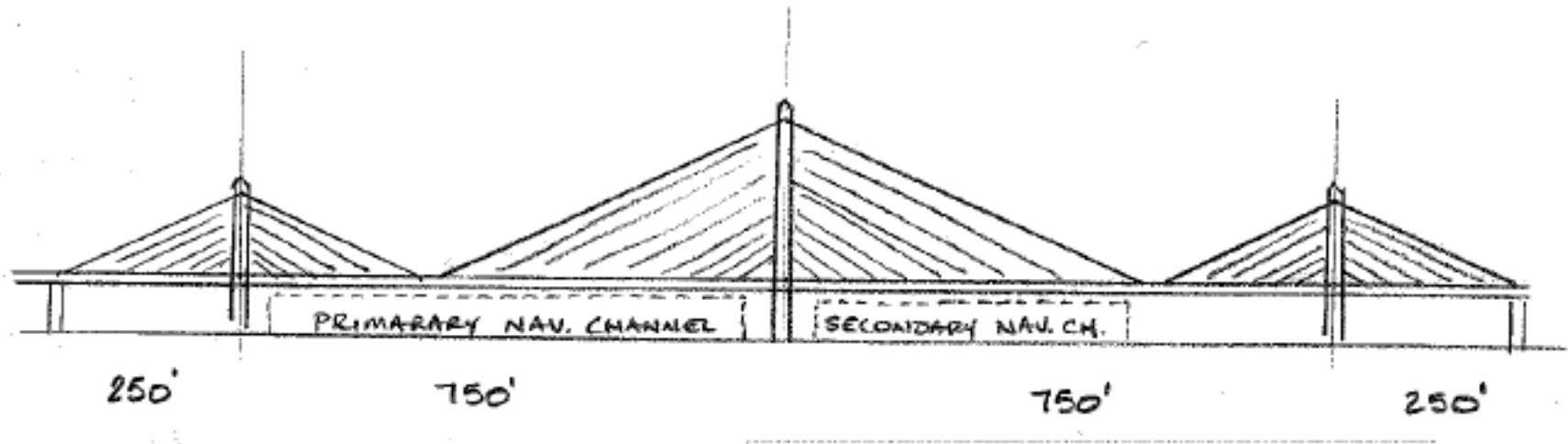
JUSTIFICATION:

The proposed four span, three tower cable-stayed bridge with varying height of towers is a unique structure type that has currently not been built in the United States and therefore has a higher level of risk for significant cost growth that may be realized during the design and/or construction phase. In addition, the four span system inherently will not behave structurally as well as a traditional three span configuration and this will lead to an increase in superstructure, tower and foundation quantities. The three span configuration meets all of the functional requirements of the project with respect to clearing the primary and secondary navigation channels.

VALUE ENGINEERING RECOMMENDATION # 4

SKETCH OF ORIGINAL DESIGN

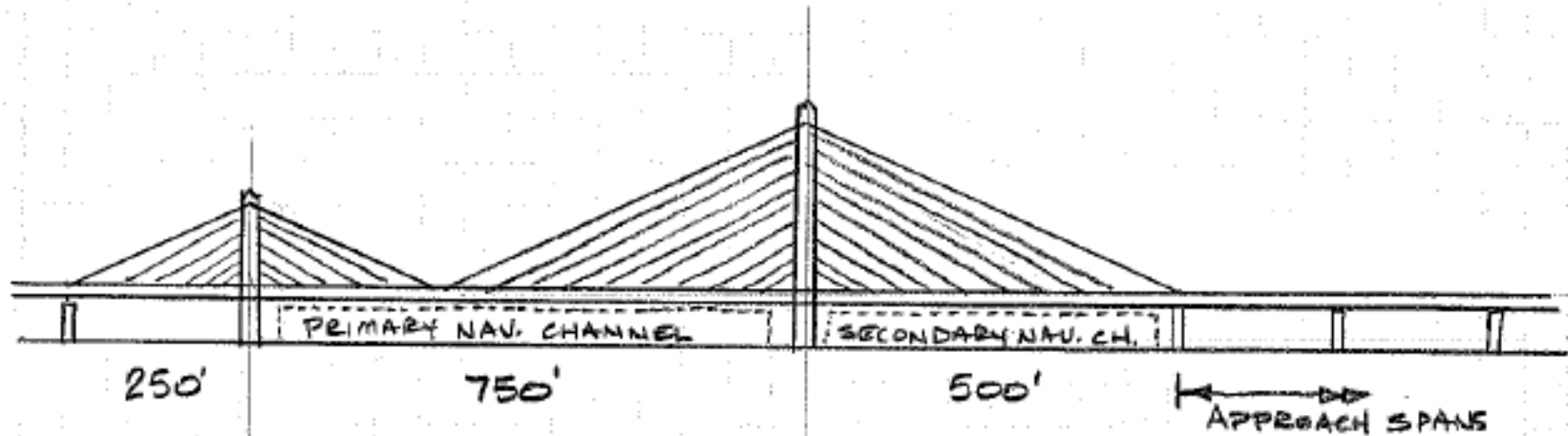
- 4-SPAN CABLE-STAYED CONFIGURATION
(BRIDGE TYPE SELECTION REPORT)



VALUE ENGINEERING RECOMMENDATION # 4

SKETCH OF RECOMMENDED DESIGN

- 3-SPAN CABLE STAYED CONFIGURATION (RECOMMENDATION)



VALUE ENGINEERING RECOMMENDATION # 5

PROJECT: OHIO RIVER BRIDGES, SECTION 2 - DOWNTOWN BRIDGE
 LOCATION: LOUISVILLE, KENTUCKY
 STUDY DATE: FEBRUARY 18 - 22, 2008

DESCRIPTIVE TITLE OF RECOMMENDATION:

Reconfigure span lengths of proposed cable stayed bridge for more efficiency in design (315'-715'-715'-315' in lieu of 250'-750'-750'-250').

ORIGINAL DESIGN:

Original design consists of a 4-span, three tower cable-stayed bridge with span lengths of 250'-750'-750'-250'. This four span arrangement provides a 750' clearance for the primary navigational channel and 750' clearance for the secondary navigational channel. The proposed Tower 4 is aligned with the existing JFK Bridge Pier 3. Whereas, the proposed Tower 5 is not aligned with the existing JFK Bridge Pier 4 and is offset by 250'. The existing JFK Bridge provides a horizontal clearance of 680' for the primary navigational channel and 480' for the secondary navigational channel.

RECOMMENDED CHANGE:

Maintain the proposed four span cable stayed configuration. However, adjust the span lengths to optimize the system for reduced cost and better structural performance.

Tower 4 will remain in alignment with the JFK Bridge Pier 3. Span 3 will be reduced to 715' which places Tower 3 at the edge of the primary navigation channel and in alignment with the JFK Bridge Pier 2. Span 4 will also be reduced to 715' which provides more than adequate horizontal clearance for the secondary navigation channel. The lengths of Spans 2 and 5 will be increased to 315'. This results in a total length of cable stayed structure of 2060' compared to the original concept of 2000'.

This adjustment of the cable stayed span lengths will also reduce the length of Span 1 from 200' to 170'. Likewise, the length of approach spans on the Indiana side can be reduced by 30'.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$147,452,000		\$147,452,000
RECOMMENDED DESIGN	\$137,711,000		\$137,711,000
ESTIMATED SAVINGS OR (COST)	\$9,741,000	\$0	\$9,741,000

VALUE ENGINEERING RECOMMENDATION # 5

ADVANTAGES:

- The 715' spans will be created by cantilevering 400' from Tower 4 and cantilevering 315' from Towers 3 and 5. The 400' cantilevers from Tower 4 are substantially shorter than the 500' cantilever required in the Bridge Type Selection Report, thus the height, structural demand and foundations for Tower 4 will be reduced.
- Cantilevering 400' from Tower 4 and 315' from Towers 3 and 5 creates a more balanced system and spreads out the structural demand more evenly to all three towers.
- From a visual perspective, the height of Towers 3 and 5 will become closer to the height of Tower 4 and may create a more visually pleasing structure.
- The 715' spans will have less structural demand compared to the 750' spans included in the Bridge Type Selection Report, thus saving materials and construction costs.
- The central Tower 4 will be shorter and will be less dominant compared to the adjacent towers and existing JFK Bridge.
- Span 1 is shortened from 200' to 170' which is significant for a simple span steel box girder structure.

DISADVANTAGES:

- Cable stayed bridge becomes 60' longer compared to the Bridge Type Selection Report system
- However, even with a longer length the overall cost will be reduced.
- Tower 4 is shorter by approximately 40' which will reduce the visibility.

JUSTIFICATION:

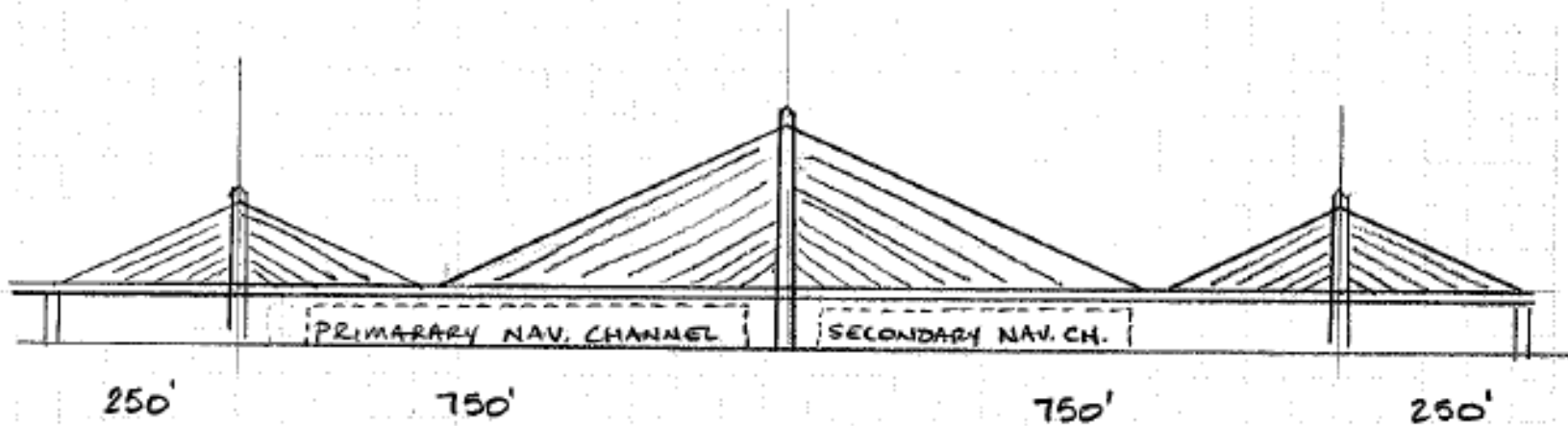
Providing mainspan lengths of 715' meets the functional requirement of clearing the primary and secondary navigation channels and aligning the towers with the existing JFK Bridge Piers 2 and 3.

By adjusting the span lengths as recommended, the structural demands on the central tower and a majority of the superstructure can be reduced which will result in cost savings and better structural performance. Since a four span, three tower cable stayed bridge configuration is a unique structure that has been attempted in only a few locations worldwide, it seems prudent to minimize the additional uniqueness of the variable height towers.

VALUE ENGINEERING RECOMMENDATION # 5

SKETCH OF ORIGINAL DESIGN

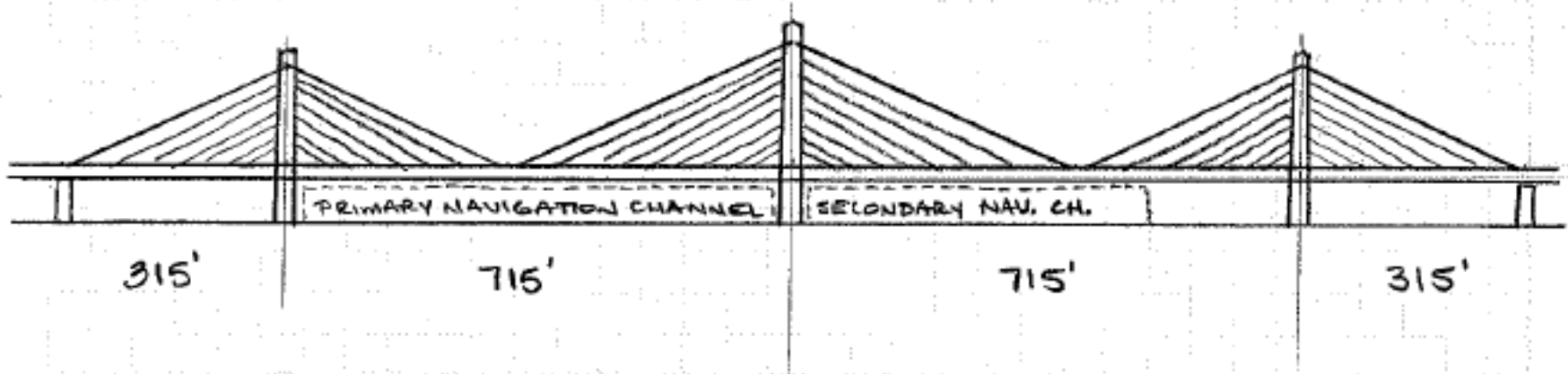
- 4-SPAN CABLE-STAYED CONFIGURATION
(BRIDGE TYPE SELECTION REPORT)



VALUE ENGINEERING RECOMMENDATION # 5

SKETCH OF RECOMMENDED DESIGN

- 4-SPAN REVISED CABLE-STAYED CONFIGURATION



VALUE ENGINEERING DESIGN COMMENT # 6

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Relocate Pier 8 closer to Riverside Drive to eliminate potential for barge impact.

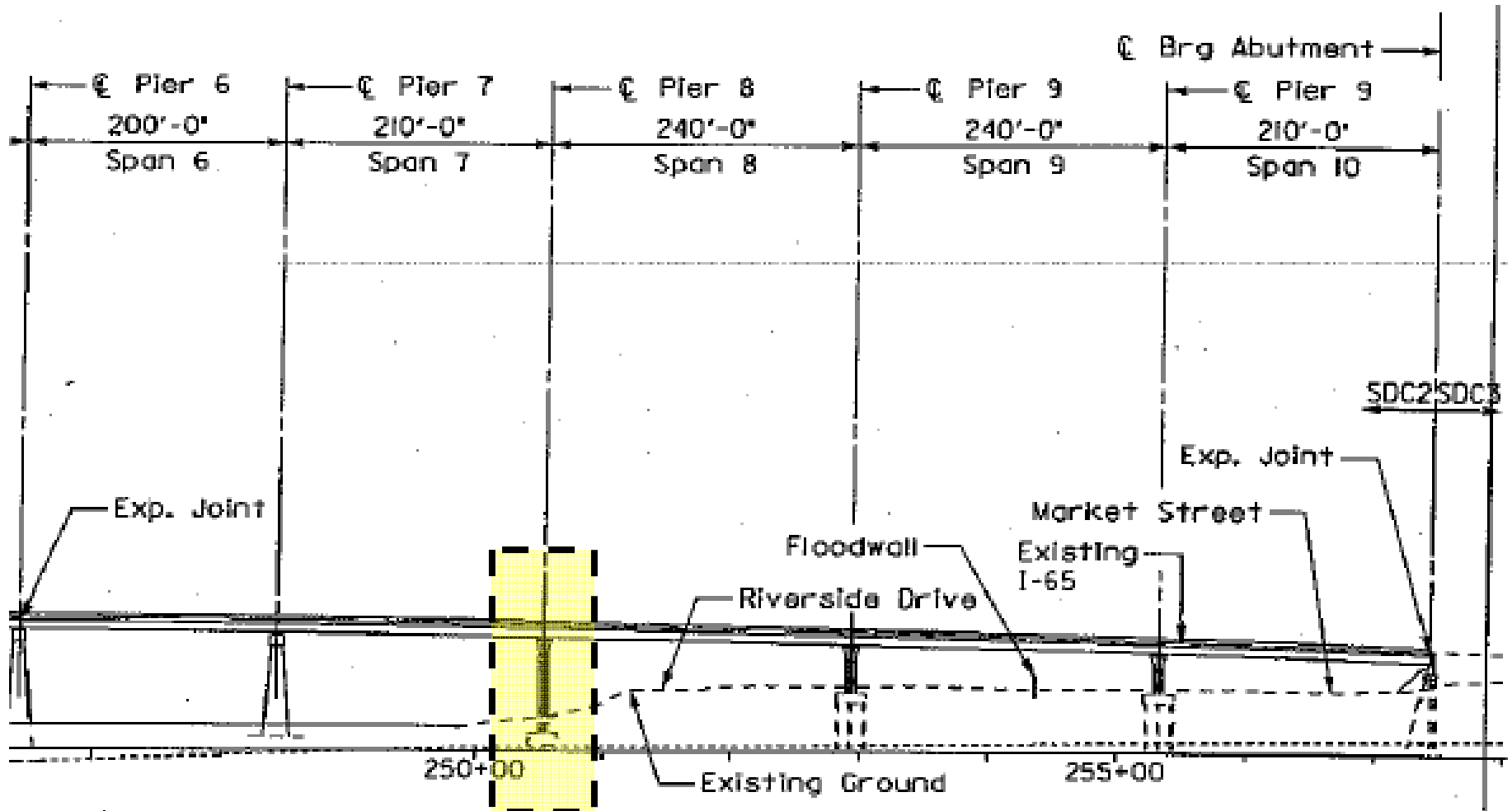
COMMENTARY:

The Indiana approach spans as configured in the Bridge Type Selection Report places Pier 8 on the river bank during Normal Pool water levels. However, during high water events the pier is in the water and is vulnerable to barge impacts.

Consider moving Pier 8 to the north and placing it closer to Riverside Drive where the ground elevation is higher and therefore the potential for barge collisions is reduced or eliminated. This also has the beneficial effect of reducing the length of Spans 8 and 9 which are currently set at 240'-0".

VALUE ENGINEERING DESIGN COMMENT # 6

SKETCH OF ORIGINAL DESIGN



VALUE ENGINEERING DESIGN COMMENT # 7

DESCRIPTIVE TITLE OF DESIGN COMMENT:

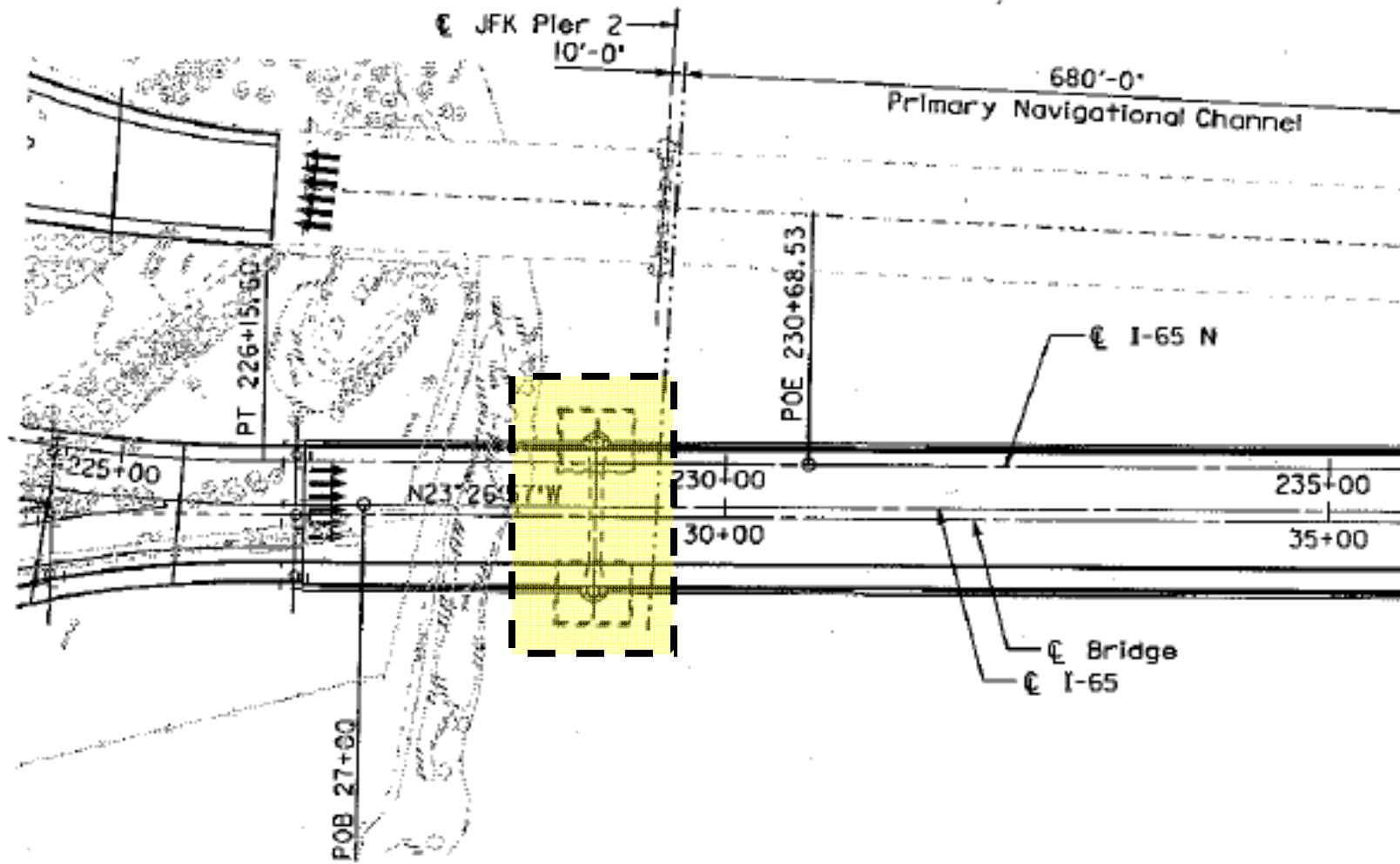
Move Tower 3 closer to edge of primary navigation channel.

COMMENTARY:

The current cable stayed bridge configuration proposed in the Bridge Type Selection Report has the edge of Tower 3 located approximately 35' clear space to the edge of the primary navigation channel. Consideration should be given to moving Tower 3 to the north by approximately 35' and placing the tower leg adjacent to the primary navigation channel. This Design Comment is in conjunction with VE Recommendation 5 which proposes a length of 715' for Span 3.

VALUE ENGINEERING DESIGN COMMENT # 7

SKETCH OF ORIGINAL DESIGN



VALUE ENGINEERING DESIGN COMMENT # 8

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Shape of towers with triangular edge requires custom forming full height; simplify tower cross section.

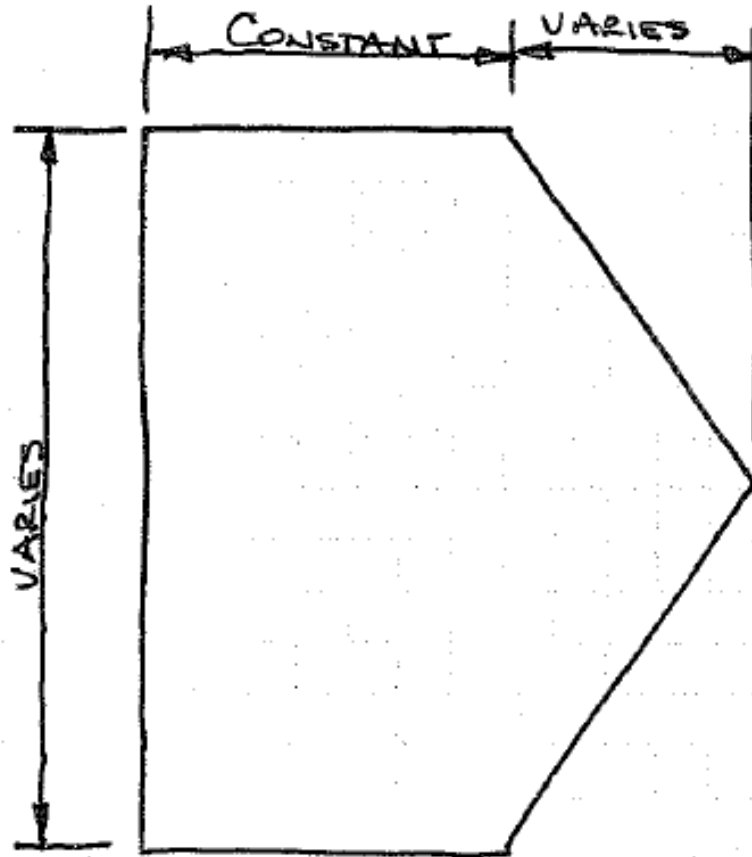
COMMENTARY:

The text in the Bridge Type Selection Report for the four span cable stayed bridge states that the tower cross section will be comprised of a rectangular base with a triangular nose on the outside faces. With this triangular nose, it is necessary for the section to taper in both the depth and transverse width of the leg.

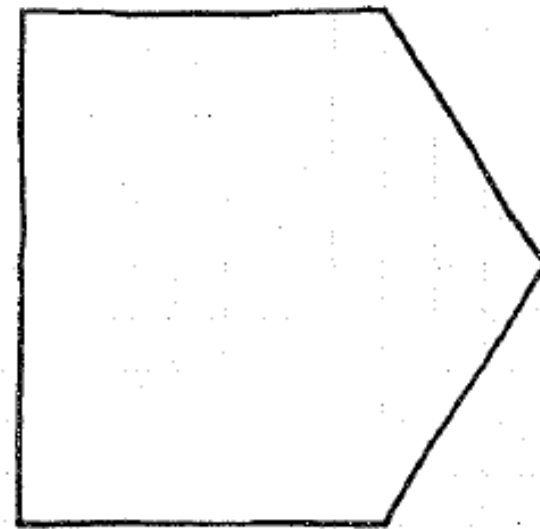
While this triangular nose on the tower legs may create an interesting look, it will require customized forming for the full height of the tower. Consideration should be given to modifying the triangular nose so that a reasonable forming system can be developed for the towers.

VALUE ENGINEERING DESIGN COMMENT # 8

SKETCH OF ORIGINAL DESIGN



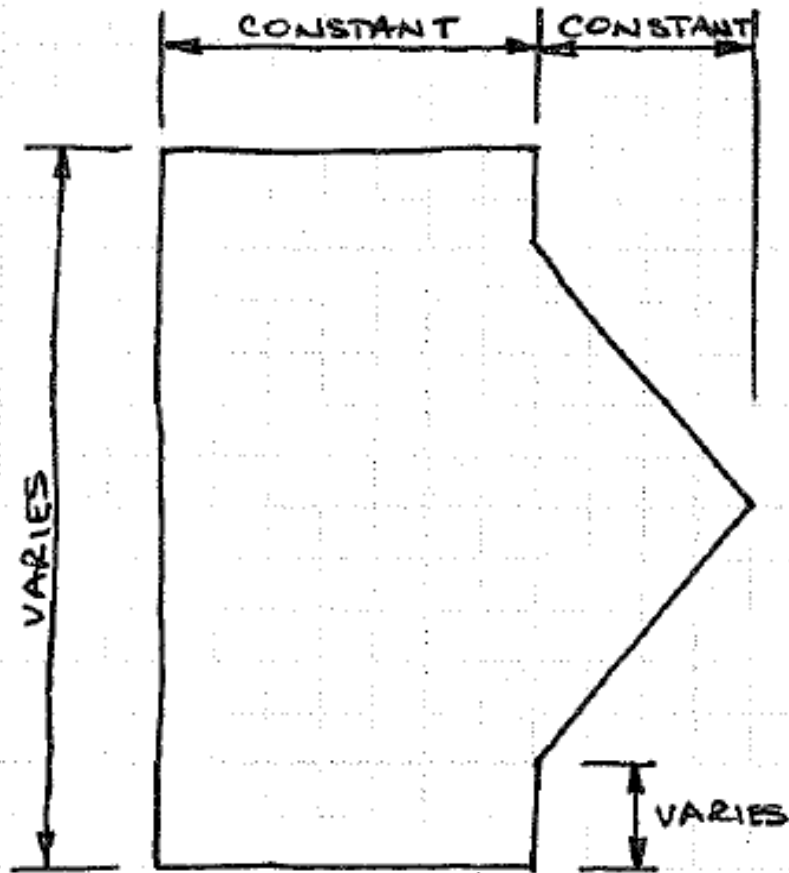
TOWER AT DECK LEVEL



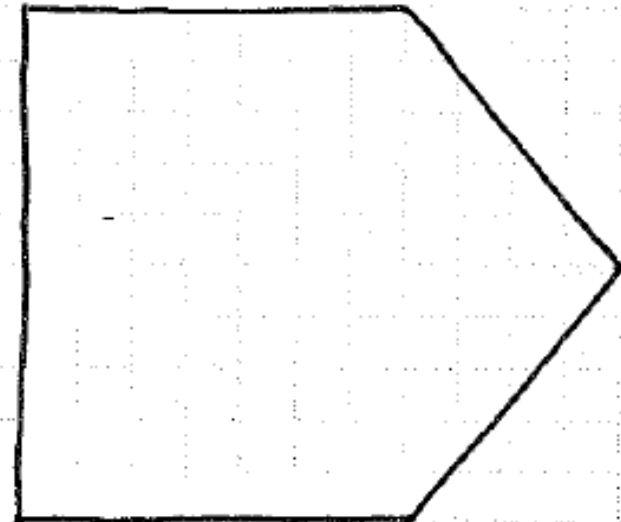
TOWER AT TOP

VALUE ENGINEERING DESIGN COMMENT # 8

SKETCH OF RECOMMENDED DESIGN



TOWER AT DECK LEVEL



TOWER AT TOP

VALUE ENGINEERING DESIGN COMMENT # 9

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize plate girders on Indiana approach spans.

COMMENTARY:

The Advanced Situation Folder recommends using trapezoidal steel box girders for the approach spans on the Indiana side. Consideration should be given to using steel plate girders instead of steel box girders. The steel plate girders are generally significantly more cost effective than steel box girders. In addition, the shape of the plate girders is more consistent with the plate girder system that is being proposed for the cable stayed bridge.

VALUE ENGINEERING RECOMMENDATION # 10

PROJECT: OHIO RIVER BRIDGES, SECTION 2 - DOWNTOWN BRIDGE
LOCATION: LOUISVILLE, KENTUCKY
STUDY DATE: FEBRUARY 18 - 22, 2008

DESCRIPTIVE TITLE OF RECOMMENDATION:

Utilize 4 foot shoulders in lieu of 12 foot shoulders on the new I-65 NB Bridge.

ORIGINAL DESIGN:

The original design includes 12 foot shoulders across the new I-65 NB Bridge across the Ohio River. The 12' shoulder is the desirable shoulder width in the January 2005 AASHTO Policy on Design Standards on the Interstate System.

RECOMMENDED CHANGE:

The recommended change calls for the reduction of the 12 foot shoulder width to 4 foot. The same AASHTO guide (January 2005 AASHTO Policy on Design Standards on the Interstate System) on page 5 states that 4 foot is allowable on long bridges greater than 200 foot in length. The new I-65 bridge is 3300 foot long.

SUMMARY OF COST ANALYSIS			
	First Cost	O & M Costs (Present Worth)	Total LC Cost (Present Worth)
ORIGINAL DESIGN	\$15,840,000		\$15,840,000
RECOMMENDED DESIGN	\$0		\$0
ESTIMATED SAVINGS OR (COST)	\$15,840,000	\$0	\$15,840,000

VALUE ENGINEERING RECOMMENDATION # 10

ADVANTAGES:

- Reduces the deck drainage runoff
- Reduces the deck area and thus reduce maintenance needs
- Reduces construction time since there is less deck to construct
- Reduces the materials needed to construct the bridge
- Reduces the weight of the superstructure
- Discourages the use of shoulder as an unauthorized travel lane

DISADVANTAGES:

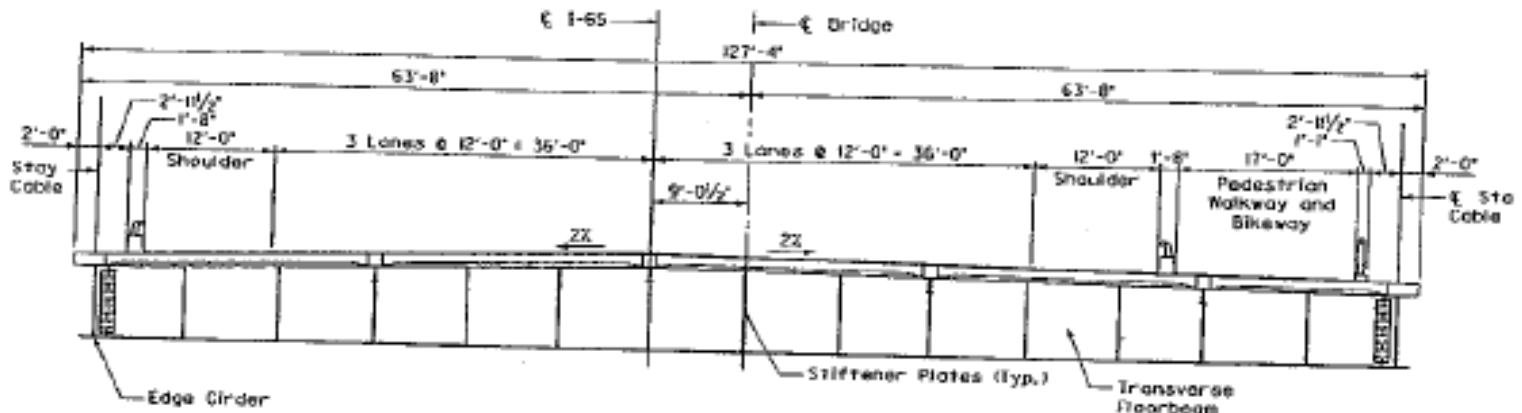
- Reduces the available width on the shoulder for emergency vehicles and broken down vehicles
- Reduces the storage area for snow plowing
- Reduces the available width for Incident Management situations
- Increases drainage inlets and bridge drainage due to reduced spread area
- Reduces capacity due to proximity of edge of traveled way to the roadside barrier

JUSTIFICATION:

Given the cost of this megaproject (\$4.1 billion) and the increased scrutiny by the public, every effort should be made to control costs. Given that 4 foot shoulders are within current AASHTO guidelines, a modification to this width is reasonable to recommend.

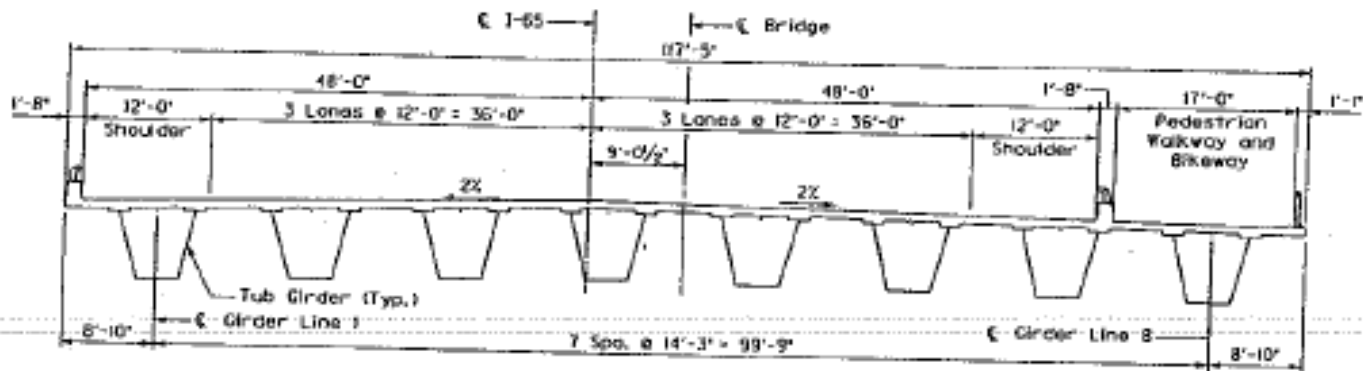
VALUE ENGINEERING RECOMMENDATION # 10

SKETCH OF ORIGINAL DESIGN



DECK SECTION

Main Spans 2 thru 51

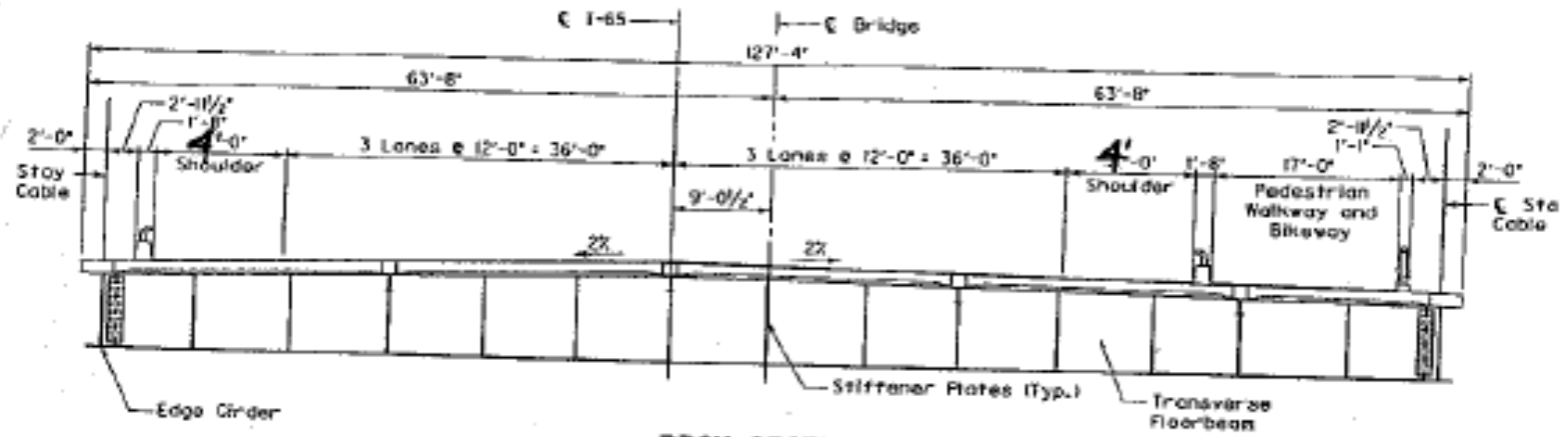


DECK SECTION

Approach Spans 1 and 6 thru 10
 (Spans 6 thru 10 shown, Span 1 varied)

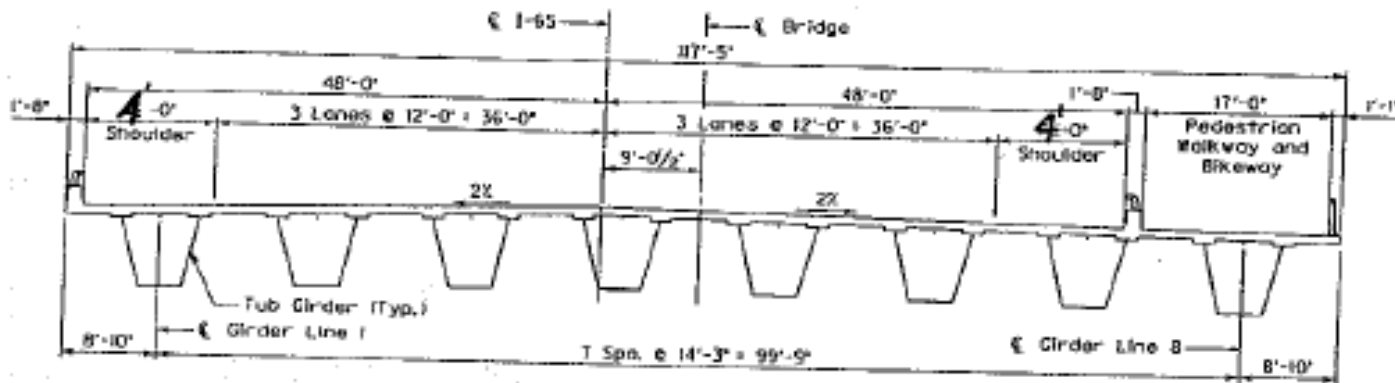
VALUE ENGINEERING RECOMMENDATION # 10

SKETCH OF RECOMMENDED DESIGN



DECK SECTION

(Main Spans 2 thru 51)



DECK SECTION

(Approach Spans 1 and 6 thru 10)
(Span 6 thru 10 shown, Span 1 varies)

VALUE ENGINEERING RECOMMENDATION # 10

CALCULATIONS

Assumptions:

- Shoulder reduction (12' to 4') = 8'
- Deck Cost / SF = \$ 300/SF ∴ Note - This is not the full cost shown in the project estimate.
- Reduced Bridge Deck Area = (2)(8)(3300) = 52,800 SF

Cost Savings

$$= (52,800 \text{ SF}) (\$ 300/\text{SF})$$

$$= \$ 15,840,000$$

VALUE ENGINEERING DESIGN COMMENT # 11

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize minimal enhancements to the transition between Span 1 and the cable stayed span 2 in lieu of creating expensive aesthetic.

COMMENTARY:

Given the existing cost of the Ohio River Bridges Project and the fact that the current transition between Span 1 and Span 2 of the new I-65 NB Bridge is a reasonable design solution, the VE Study Team does not recommend making additional enhancements to this location. The existing condition could be slightly improved by the inclusion of a masking wall or other fascia.

VALUE ENGINEERING DESIGN COMMENT # 12

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize similar design criteria for pedestrian cage/fence on both the new I-65 northbound bridge and the East End Bridge.

COMMENTARY:

The VE Team recommends that both the I-65 northbound Downtown Bridge and the East End Bridge utilize the same design criteria for the pedestrian/bicycle pathway. As currently shown, the East End Bridge has a 72" high pedestrian cage. The new I-65 northbound Downtown Bridge does not show a dimension. To limit the KYTC liability and to provide consistent designs, the VE team feels it is prudent to match the design criteria since these two bridges are part of one project. This does not mean that each project must have similar architectural treatment. Each should be designed with its own context sensitivity while maintaining the same overall design criteria such as the 17' width being utilized for each bridge.

VALUE ENGINEERING DESIGN COMMENT # 13

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize vacated ROW from reconstructed Kennedy Interchange project for construction staging.

COMMENTARY:

The VE Team acknowledges the limited staging and storage area for the new I-65 NB Bridge project. A possible option, depending on the project sequence, is utilizing the vacated ROW from the reconstruction of the Kennedy Interchange project. The reconstructed Kennedy Interchange will be shifted south, away from the Ohio River, thus freeing up 45 acres of excess ROW. There has been commitment to turn this excess property over to the City and Waterfront Development Corporation, but if the timing works out, this property would make an excellent staging area for the I-65 NB Bridge project. Once the construction projects are complete, the excess ROW could then be turned over to the City as promised.

VALUE ENGINEERING DESIGN COMMENT # 14

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Allow storm water to run off of new bridge into the Ohio River in lieu of capturing the storm water.

COMMENTARY:

During the Design Team in briefing there were comments made regarding the uncertainty of whether the bridge deck runoff must be captured and piped away from the structure in lieu of draining directly into the Ohio River. The VE Team would not recommend capturing the storm water runoff and piping it off the structure given the added costs for material and the long term maintenance issues with a bridge drainage system. Draining directly into the Ohio River by a vertical downspout, the outlet of which will be located below the lowest structural member will also eliminate the complications of directing the piping through the abutment.

VALUE ENGINEERING DESIGN COMMENT # 15

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Coordinate between Section 2 and 5 to design appropriate concrete barriers.

COMMENTARY:

During the Design Team inbriefing on the East End Bridge there was discussion about the concrete barriers being TL-5 crash compliant. In reviewing the new I-65 NB bridge plans it was not evident if that project was utilizing similar design criteria for the concrete barriers. The VE Team feels it is prudent to use the same design criteria for the concrete barriers on both bridges since they are included under one project. This would help limit liability from a future incident and will provide design consistency between the bridge projects, as well as a safer facility for the traveling public.

VALUE ENGINEERING DESIGN COMMENT # 16

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Place northbound Span 1 into the Section 1 contract.

COMMENTARY:

The current split on the development of the plans requires that the first span on the NB Ohio River Bridge be designed by the designer of the main span over the Ohio River. It is suggested that this span be removed from Section 2 and be added to Section 1. The bridge type should be the same on Span 1 as the bridge type on the bridges in Section 1 (Interchange). Coordination is required in either case but the inclusion of Span 1 with the bridges in the interchange will allow the Section 1 contractor to construct Span 1, providing a more efficient process. This allows for the main span cable stayed bridge to be separated as a standalone project.

VALUE ENGINEERING DESIGN COMMENT # 17

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Construct crossover on embankment in lieu of on the temporary bridge.

COMMENTARY:

Reference is made to the “SDC2 Maintenance of Traffic Study” dated November 1, 2007. It refers to the General Engineering report that was developed as part of the ROD which recommends using a crossover bridge to maintain traffic on I-65 and the Court Avenue exit ramp.

The study examined two alternatives, both of which placed the I-65 mainline crossover on the embankment. Alternative 1 utilized a crossover bridge to shift the Court Avenue exit traffic to the new location near the new exit gore area and had a preliminary construction cost estimate of \$2.5 million. Alternative 2 utilized a crossover on the embankment to shift the exit traffic to the new location near the end of the new ramp and had a preliminary construction cost estimate of \$1.75 million. Each alternative has its own advantages.

It is noted that Alternative 1 would require that the new I-65 Indiana bridge approach spans be completed prior to implementation of this phase, or would not be completed until later using part-width construction. Therefore, Alternative 2 is recommended by the VE team.

VALUE ENGINEERING DESIGN COMMENT # 17

EXHIBIT 1

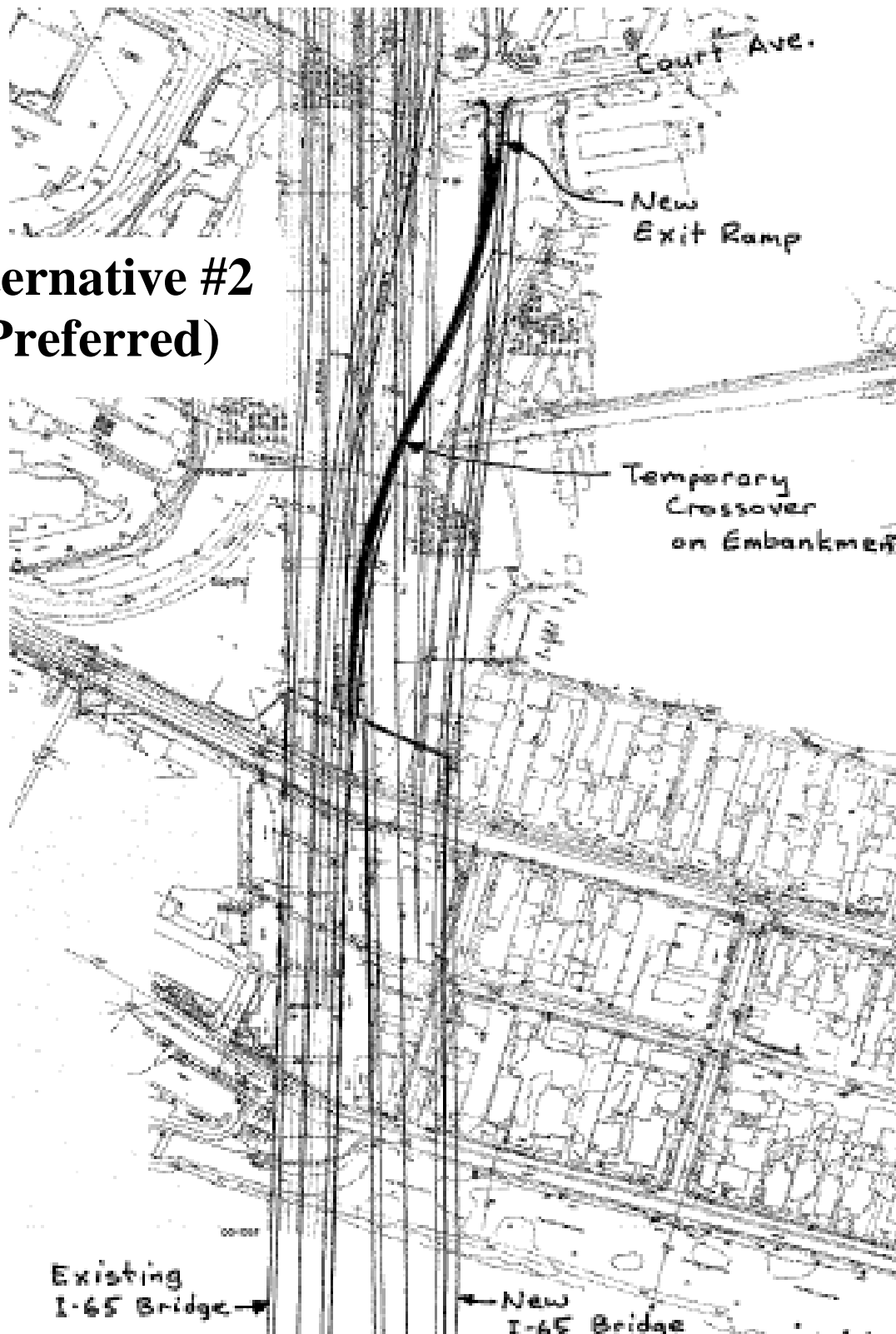
**Alternative #1
(Not Preferred)**



VALUE ENGINEERING DESIGN COMMENT # 17

EXHIBIT 2

**Alternative #2
(Preferred)**



VALUE ENGINEERING DESIGN COMMENT # 18

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Develop conceptual plans to connect new bridge to existing roadways in case Sections 1 or 3 lag behind Section 2.

COMMENTARY:

Due to potential funding or construction issues, Sections 1 and/or 3 may lag Section 2 and may be unable to convey traffic to/from the new bridge in a timely manner. If this should occur, then interest on the unused investment would quickly become significant. Consider development of conceptual plans for temporary connections to meet existing I-65 and ramps on both sides of the river.

VALUE ENGINEERING DESIGN COMMENT # 19

DESCRIPTIVE TITLE OF DESIGN COMMENT:

Utilize existing JFK Bridge median barrier during construction of superelevation transition.

COMMENTARY:

After the new bridge is open to northbound traffic, construct the superelevation transition at the south end of the JFK Bridge prior to median barrier removal on the JFK Bridge.

APPENDICES

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

CONTENTS

A. Study Participants	A-2
B. Cost Information	A-5
C. Function Analysis	A-10
D. Creative Idea List and Evaluation	A-12

APPENDIX A
Participants

APPENDIX A - Participants

Workshop Attendance

Attendees				Participation						
				Meetings		Study Sessions				
Name	Organization and Address	Tel # and Email	Role in wk shop	Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
Bob Bondi	Baker 9750 Ormsby Station Rd. Ste. 210 Louisville, KY 40223	412-269-7907 rbondi@mbakercorp.com	SDC-2 Bridge Designer		X					
Paul Boone	INDOT	812-282-7493 pboone@indot.in.gov	INDOT Owner		X					
Matt Bullock	KYTC District 5, 8310 Westport Rd. Louisville, KY 40242	502-367-6411 Matt.Bullock@ky.gov	KYTC Owner	X						
Stephen Curless	URS 36 East Seventh St. Ste. 2300 Cincinnati, OH 45202	513-419-3504 Steve_curless@urscorp.com	VE Roadway/MOT	X	X	X	X	X	X	X
Greg Groves	URS 325 W Main St. Ste. 1200 Louisville, KY 40202	502-217-1509 Greg_Groves@urscorp.com	VE Design Expert	X	X	X	X	X	X	X
Rob Harris	CTS 305 N Hurstbourne Parkway Ste 100 Louisville, KY 40222	502-394-3841 rharris@CTSGEC.com	KYTC Deputy Project Manager	X	X					
David Jeakle	URS 7650 West Courtney Campbell Causeway, Tampa, FL 33607	813-636-2467 David_jeakle@urscorp.com	VE Bridge Expert	X	X	X	X	X	X	X
Craig Klusman	URS 325 W Main St. Ste. 1200 Louisville, KY 40202	502-217-1502 Craig_klusman@urscorp.com	Observer		X					
Lauren Mudd	URS 325 W Main St. Ste. 1200 Louisville, KY 40202	502-569-2301 Lauren_Mudd@urscorp.com	VE Technical Recorder		X	X	X	X	X	X
Kim Mulder	KYTC 200 Metro St. Frankfort, KY 40622	502-564-0319 Kimberley.Mulder@ky.gov	KYTC Owner		X					
Patrick Osborne	Baker 9750 Ormsby Station Rd. Ste. 210 Louisville, KY 40223	502-339-5867 posborne@mbakercorp.com	SDC-2 Design Engineer	X	X					
Sam Raies	CTS 305 N Hurstbourne Parkway Ste 100 Louisville, KY 40222	502-394-3844 Wisam.Raies@Parsons.com	SDC-2 & 5 Project Manager	X	X					
Miguel Rosales	R & P		SDC-2 Bridge Architect		By Phone					
Norman Roush	URS # 4 Mission Way Ste. 201 Scott Depot, WV 25560	304-757-6642 Norman_Roush@urscorp.com	VE Geometrics & Roadway Design	X	X	X	X	X	X	X
John Sacksteder	CTS 305 N Hurstbourne Parkway Ste 100 Louisville, KY 40222	502-394-3847 jsacksteder@CTSGEC.com	CTS Project Manager	X	X					
Kyle Schafersman	URS 8300 College Blvd. Ste. 200 Overland Park, Kansas 66210	913-344-1019 Kyle_Schafersman@urscorp.com	VE Team Leader	X	X	X	X	X	X	X
Aaron Stover	Baker 9750 Ormsby Station Rd. Ste. 210 Louisville, KY 40223	502-339-5871 astover@mbakercorp.com	SDC-2 Bridge Engineer	X	X					
Jorge Suarez	Baker 9750 Ormsby Station Rd. Ste. 210 Louisville, KY 40223	412-269-1927 jsuarez@mbakercorp.com	SDC-2 Designer		X					
Jadie Tomlinson	KYTC 200 Metro St. Frankfort, KY 40622	502-564-0319 Jadie.Tomlinson@ky.gov	KYTC Owner	X	X					

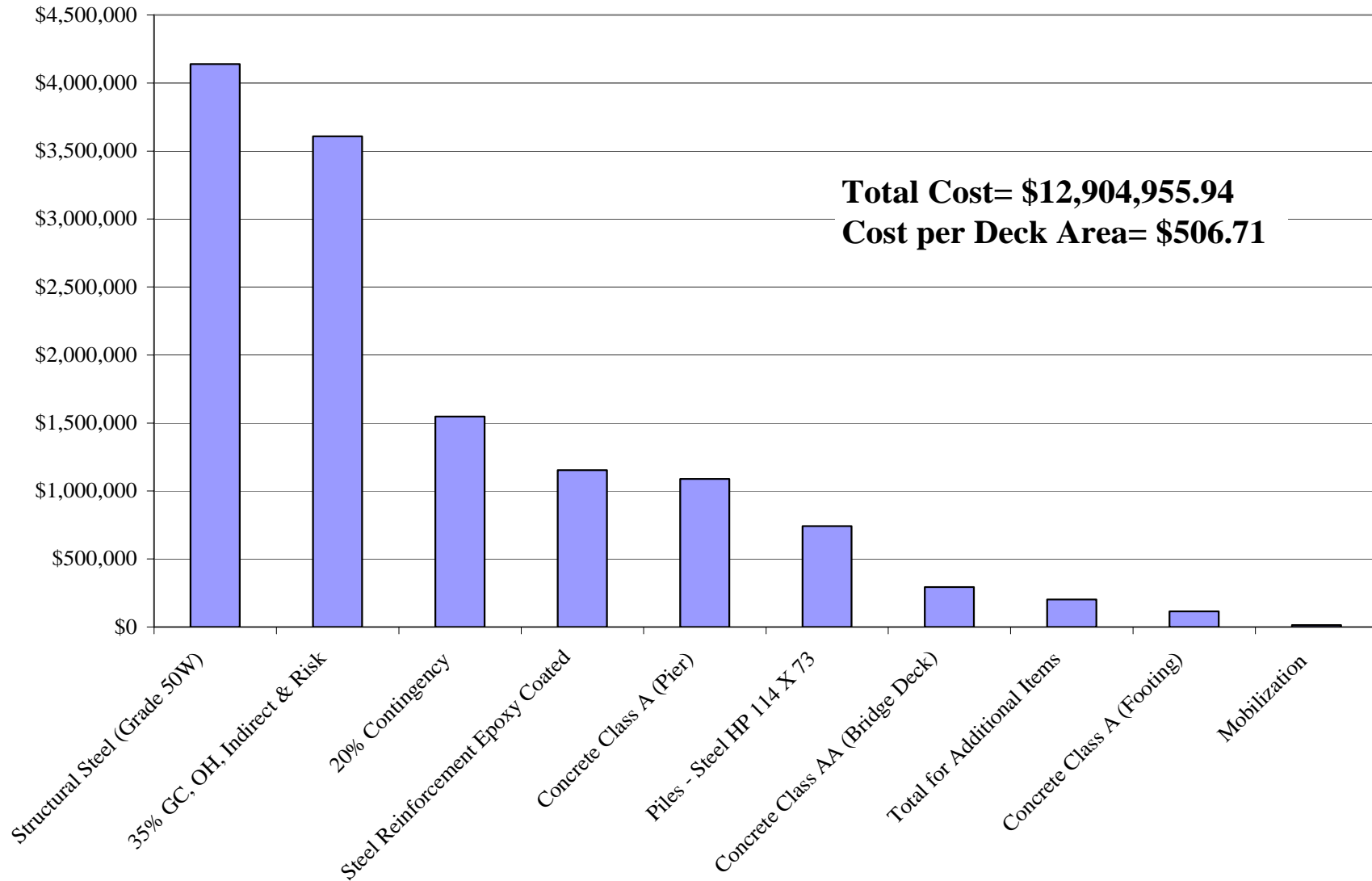
Workshop Attendance

Attendees				Participation						
				Meetings		Study Sessions				
Name	Organization and Address	Tel # and Email	Role in wk shop	Intro	Out Brief	Day 1	Day 2	Day 3	Day 4	Day 5
J.B. Williams	Baker 9750 Ormsby Station Rd. Ste. 210 Louisville, KY 40223	502-339-5866 jwilliams@mbakercorp.com	SDC-2 Project Manger	X	X					

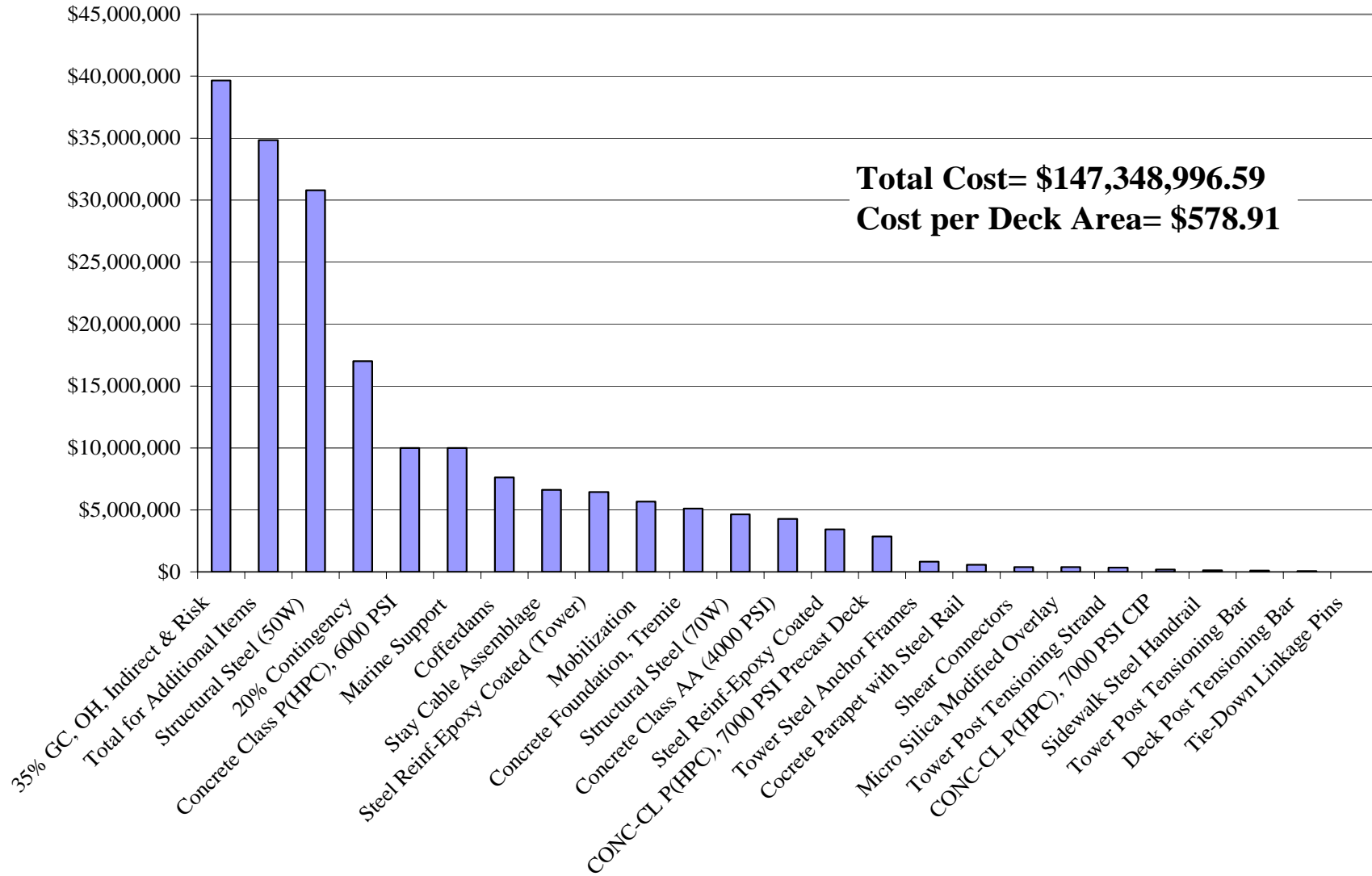
APPENDIX B
Cost Information

APPENDIX B - Cost Information

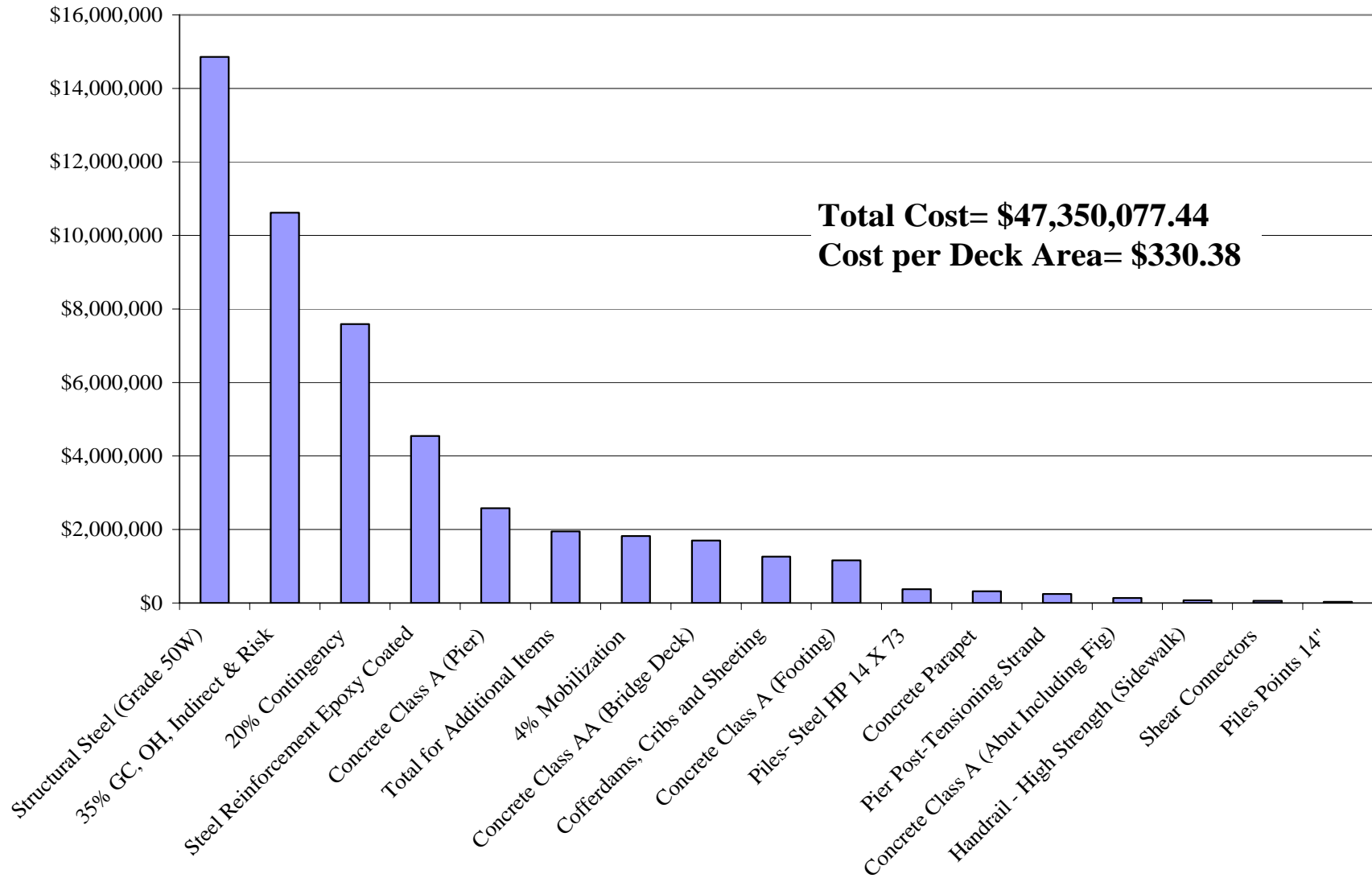
**Louisville-Southern Indiana Ohio River Bridges Project
Section 2 - Downtown Bridge (I-65 Northbound Kentucky Approach Span)
Advanced Situation Folder Estimate As Of 1/31/08**



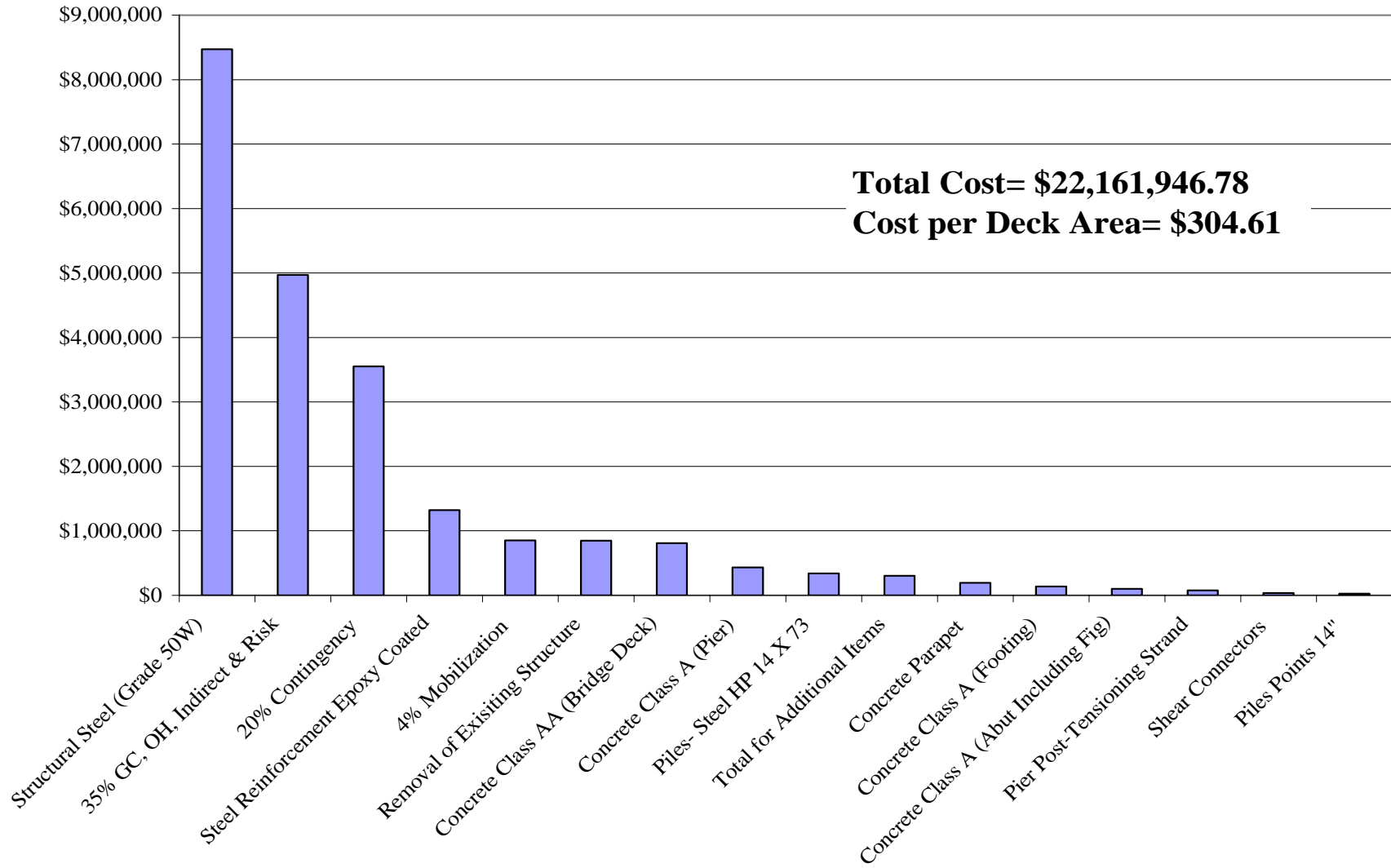
**Louisville-Southern Indiana Ohio River Bridges Project
Section 2 - Downtown Bridge (I-65 Northbound Cable Stay Spans 2-5)
Advanced Situation Folder Estimate As Of 1/31/08**



**Louisville-Southern Indiana Ohio River Bridges Project
Section 2 - Downtown Bridge (I-65 Northbound Indiana 5 Approach Spans)
Advanced Situation Folder Estimate As Of 11/29/07**



**Louisville-Southern Indiana Ohio River Bridges Project
Section 2 - Downtown Bridge (3 Indiana Approach Spans on SB I-65)
Advanced Situation Folder Estimate As Of 1/31/08**



APPENDIX C
Function Analysis

APPENDIX C - Function Analysis

Function Model

Item	Function
Northbound I-65 Bridge	
Separate Kentucky Approach Spans	Transition interchange to bridge
-200 ft simple span	Control cable stay design
-flared; variable width	Accommodate arbitrary division of section
Spans 2-5	Clearing primary and secondary navigation channel
-3 tower, 4 span cable stay	
-composite steel grid system	Utilize economical deck solution
-full (12') shoulders	Meets AASHTO desirable
-span lengths	Maintain existing JFK bridge navigational channels
17' Pedestrian Path	Meets local group request
Separate Indiana Approach Spans	
-5 span lengths	Accommodate with consistent land usage
-steel girders	Accommodate arbitrary division of section
-plate or box girders	Pending Indiana design of section 3
Southbound I-65 (existing JFK bridge)	
Existing Steel Truss	
-7 lanes (3 SB, 4 NB) to 6 lanes SB	Accommodate SB traffic needs
-close to full shoulders	
-super-elevation transition	Attain super-elevation for section 1
-possible improvement of 1% cross slope	Meet standards
	Examine complete deck replacement vs. rehab
Separate Indiana Approach Spans	
-remove existing 5 spans replace with 3 (210, 255, 194 ft)	Correct structural deficiencies
-addition of I-65 SB on ramp	Facilitate traffic from Indiana to Kentucky
Temporary Cross Over on Indiana Side	
-temporary bridge	Maintain I-65 NB exit ramp
	Maintain I-65 thru traffic
Unknown MOT for Renovating JFK Bridge	Incomplete design
Lack of Staging Area	Incomplete design

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	TM Resp.
1	Utilize edge girders not integral with towers 3 and 5 in lieu of integral girders	Develop	D. Jeakle
2	Relocate pier 8 closer to Riverside Drive to eliminate potential for barge impact	DC	D. Jeakle
3	Eliminate tower 5 and associated stay cables; reconfigure and extend approach spans on Indiana side (250-750-500 in lieu of 250-750-750-250)	Develop	D. Jeakle
4	Reconfigure span lengths of proposed cable stayed bridge for more efficiency in design (315-715-715-315 in lieu of 250-750-750-250)	Develop	D. Jeakle
5	Move tower 3 closer to edge of primary navigation channel	DC	D. Jeakle
6	Shape of tower with triangular edge requires custom forming full height; simplify tower cross Section	DC	D. Jeakle
7	Place pedestrian walkway/bikeway on cantilever Section outside of cable plane in lieu of inside cable plane	DC	D. Jeakle
8	Place northbound span 1 into Section 1 contract	DC	N. Roush
9	Utilize minimal enhancements to the transition between span 1 and the cable stayed span 2 in lieu of creating expensive aesthetic transition	DC	G. Groves
10	Maintain existing 5 spans on southbound I-65 on Indiana side in lieu of replacing with 3 spans	Develop	K. Schafersman
11	Utilize 4 feet shoulders in lieu of 12 feet on new northbound bridge	Develop	G. Groves
12	Modify superelevation to eliminate transition on JFK bridge	Develop	N. Roush
13	Construct crossover on embankment in lieu of on the temporary bridge	Develop	S. Curless
14	Place pedestrian path on Big 4 Railroad Bridge in lieu of on northbound bridge	Develop	K. Schafersman
15	Remove asphalt on existing JFK bridge and reshape transition as necessary	Develop	N. Roush
16	Provide temporary approaches from existing I-65 northbound in Kentucky and Indiana to the new bridge (regardless of completion of Section 1 & 3)	DC	S. Curless
17	Utilize similar design criteria for pedestrian cage for both bridges	DC	G. Groves
18	Utilize plate girders on Indiana approach spans	DC	D. Jeakle
19	After new bridge is open to northbound traffic construct superelevation transition prior to median barrier removal on JFK bridge	DC	S. Curless
20	Utilize vacated ROW from reconstructed Kennedy interchange project for construction staging	DC	G. Groves
21	Allow storm water to run off of new bridge into the river in lieu of capturing the storm water	DC	G. Groves
22	Utilize design-build in lieu of design-bid-build	Eliminate	
23	Coordinate between Section 2 and 5 to design appropriate concrete barriers considering recommendations of FHWA	DC	G. Groves

Development Status Legend:

- Develop: Idea is considered by the VE team to be a viable value enhancement possibility and is currently being developed as a VE recommendation
- Eliminate: 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 Comment to the designers with no easily quantifiable cost associated

END OF REPORT

This report was compiled and edited by:
Kyle Schafersman, EIT, CVS
URS Corporation
8300 College Boulevard, Suite 200
Overland Park, KS 66210
913-344-1019 Tel
913-344-1011 Fax

This report was commissioned by:
The Kentucky Transportation Cabinet
Frankfort, Kentucky 40622

This report was released for publication by:
Merle Braden, PE, CVS
QA/QC Manager
URS Value Engineering Services
913-432-3140 Tel
merle_braden@urscorp.com



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

