U.S. Army Corps of Engineers, Kansas City District

Final Feasibility Report

APPENDIX F

VALUE ENGINEERING

Kansas Citys, Missouri and Kansas
Flood Risk Management Project
Final Feasibility Report

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Kansas Citys, Missouri and Kansas, Flood Risk Management Project
Final Feasibility Report

Value Engineering Certification

I, Eric Lynn, Project Manager, certify that the Value Engineering process as required by ER 11-1-321 (Change 1), Army Programs Value Engineering has been completed for this Feasibility Study. I certify compliance with Public Law 99-662 (33 USC 2288) and OMB Circular A-131. The VE study was completed on 25 October 2013 by the appropriate authority. All VE proposals indicating potential savings over $1,000,000 have been resolved with approval of the MSC Commander.

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Project Manager

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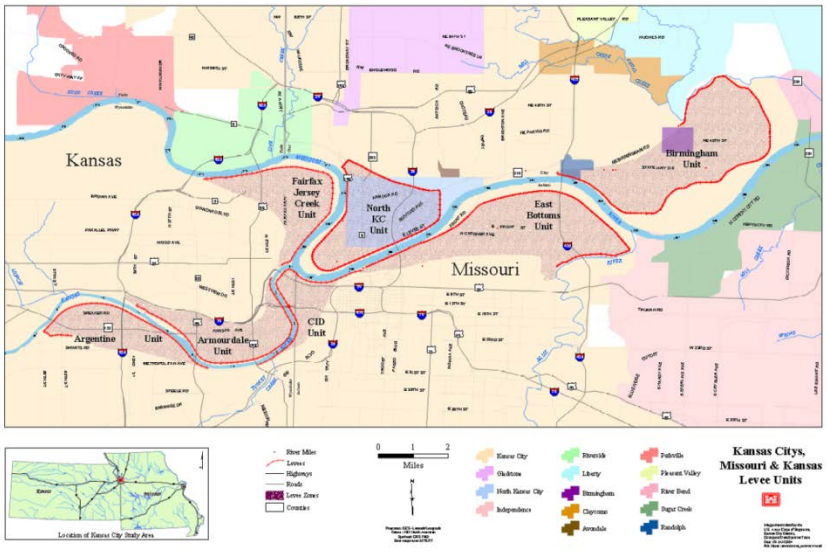
District Value Engineering Officer

US Army Corps of Engineers®

Kansas Citys, Missouri and Kansas Flood Risk Management Project



Value Engineering Study

Final Report

October 21 – October 25, 2013

PREPARED FOR
USACE (NWK)
601 E. 12th Street
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HNTB would like to extend its appreciation to the US Army Corps of Engineers for being selected to assist the Project Delivery Team in verifying current design concepts, offering potential improvements, and reducing risks to the project by conducting this value engineering workshop. The enthusiasm of the VE participants provided an abundance of information for USACE (NWK) to consider throughout the remainder of the project delivery process. Thank you all for your insight and effort.

EXECUTIVE SUMMARY

Introduction

USACE (NWK) requested HNTB to conduct a value engineering study of the Kansas Citys, Missouri and Kansas Flood Risk Management Project located in Kansas City, Kansas and Kansas City, Missouri. The value engineering study was conducted according to USACE regulations and consisted of the following phases:

- Pre-workshop planning
- Information:
  - Review of available information gathered or generated by Project Delivery team
  - Validation of constraints
  - Validation of project goals, objectives, purpose and need
- Function Analysis:
  - Component functions, performance and operations
  - Risk identification
  - Cost analysis
- Creative: brainstorming ideas open throughout the workshop on all components and elements
- Evaluation of ideas
- Development of ideas and recommendations
- Presentation of conclusions and recommendations
- Resolution: documented decision on the implementation of each recommendation

The value engineering study occurred early in the project development near completion of feasibility study and before preliminary plans. The Project Delivery Team is able to implement recommendations as part of the continuing concept evaluation process. The recommendations focused on operations, design concepts, utility coordination, right of way acquisition, both the design and construction schedule, and the entire project delivery process.

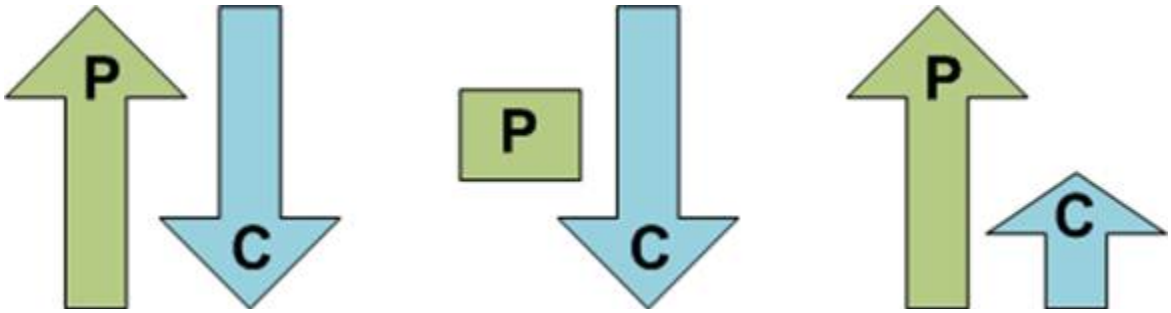
The VE report for the Kansas Citys, Missouri and Kansas Flood Risk Management Project summarizes the analyses, recommendations, and suggestions of the VE team and presents their conclusions in several tables. More detailed information for each idea is provided in the Appendices. Most importantly, the decision and implementation worksheet is provided following the summary. Completing this worksheet by the management team complies with USACE (NWK) regulations, and will enable written directions to be provided to the Project Delivery team.

Next Actions

Conclusion of workshop and Presentation of Recommendations: October 25, 2013	Draft idea worksheets provided by VE team to Project Manager and Project Delivery team.
Five days after workshop: October 30, 2013	Worksheet comments returned from USACE (NWK) to HNTB.
Seven days after workshop: November 1, 2013	Draft report submitted to USACE (NWK) management with Recommendation Approval Worksheet.
PDT review of draft report submittal: January, 2014	USACE (NWK) management completes the Recommendation Approval Worksheet with decisions on each recommendation; and returns comments on draft report.
Final Report Submittal: March, 2014	Final report provided to USACE (NWK) incorporating comment resolution.

Value Engineering Recommendations

Value engineering seeks to improve performance (P) and reduce costs (C). Some examples and a graphic illustration of positive value engineering analyses are:



Increased Performance	Same Performance	Increased Performance
Decreased Cost	Decreased Cost	Small Increased Cost

The VE team identified three ideas, six design suggestions, and three recommendations for implementation with a potential cost savings of approximately $15 million to $18 million based on evaluating performance and cost. These ideas originated from analyzing the construction cost estimates, identifying potential areas of risk regarding the schedule (performance) and the construction cost; and discussing the expectations of the VE study.

The report utilizes a Change of Cost methodology to properly account for the estimated savings or added costs. Savings are subtracted from the current cost estimate; while added costs would increase the current cost estimate. Therefore, please note that throughout the report cost changes are indicated as:

- **(Savings)** – the parentheses and red font indicate a potential cost reduction
- **Increase** – no parentheses and the black font indicate a potential added cost

The Summary of Recommendations is noted in the table below. In some cases, construction time was reduced; or situations that could increase construction time were avoided. In some cases, two recommendations are mutually exclusive; only one can be implemented and the other(s) is therefore excluded. Each recommendation identifies those others that are mutually exclusive. The Appendix includes more detailed worksheets and calculations for each of the recommendations.

	Idea	Change in Cost (Savings) Increase	VE Team Recommended Action
1	Consider Portable Pumps and Relief Wells for Armourdale Sta. 62+00 to 82+00 in lieu of Slurry Wall. (Mutually exclusive with Recommendation 2)	($18.0 M)	The VE team recommends a collected relief well system with portable pumps be considered during PED provided the extent of the potential groundwater contamination between 45+00 and 75+00 is determined by testing performed during PED. While a relief well system option requires maintenance, it has a much lower upfront cost than a slurry wall and does not disrupt existing utilities.
2	Consider Permanent Pumps and Relief Wells for Armourdale Sta. 62+00 to 82+00 in lieu of Slurry Wall. (Mutually exclusive with Recommendation 1)	($13.6 M)	The VE team recommends a collected relief well system with a permanent pump station be considered during PED provided the extent of the potential groundwater contamination between 45+00 and 75+00 is determined by testing performed during PED. While a relief well system option requires maintenance, it has a much lower upfront cost than a slurry wall and does not disrupt existing utilities.
3	The CID Levee terminus at the south end, approximate station 138+00, is proposed to use tieback Alt. #3, a new floodwall and two stoplog structures from the earthen levee to high ground. Proposed change is to replace one of these stoplog structures with a continuation of the floodwall leaving only one stoplog structure.	($2.1 M)	Replace the proposed stoplog structure to be constructed over the rail yard track with a continuation of the concrete floodwall and only construct one stoplog structure over the mainline tracks. This will require the acquisition of the land through the end of the rail yard and removal of the rail necessary to construct the floodwall however, the elimination of the stoplog alleviates the local sponsor's tasks necessary to maintain the stoplog structure, store stoplogs, install them at times of high water, etc.
	Preliminary Estimated Change in Cost	($ 15.7 to $18.0 Million)	

Design Suggestions

The VE team identified a number of ideas that because of time limitations, development of conceptual plans, or lack of cost data could not be further developed as recommendations. Nonetheless, the idea has been investigated and suggested for the Project Delivery team to consider as the project continues to develop. Please refer to the Idea Development Worksheets in the Appendices for possible further details.

Idea	DESIGN SUGGESTIONS
DS-1	Review and clarify design criteria as identified in the Report Inconsistencies.
DS-2	Review and expand on the CID-KS and ARM Construction Phasing Suggestions.
DS-3	As stated in Appendix D of the draft Feasibility Report for the Armourdale Unit, "the installation of relief wells as underseepage controls between station 45+00 and 75+00 may result in the discharge or migration of VOC contaminated groundwater and should be avoided." But it goes on to state that "since the plume has not been clearly identified, a smaller restrictive area could be established with additional investigations if relief wells are required." Because a relief well system may prove to be more economical than the currently selected slurry wall (see Ideas 1 & 2), the VE team suggest performing environmental screening during PED on soil and water samples obtained along the landside toe between station 66+00 and 75+00. In addition, an argument can be made that groundwater will flow to relief wells from the river during a flood event, rather than from a landward area of contamination.
DS-4	Based on our review of the draft Feasibility Report, it appears that the landside blanket thickness from station 66+00 to station 79+00 along the Armourdale Unit was estimated to be locally thin (12 to 15 feet) based on historic borings performed near centerline of levee. Significant project costs associated with the underseepage control are tied to this assumption. During PED, the VE team suggests performing relatively shallow borings on the landside toe along this reach to verify the landside blanket's character and thickness.
DS-5	If a potential zone of groundwater contamination is confirmed to be present along the Armourdale Unit between station 66+00 and 75+00 and relief wells cannot be used (see DS-3), the VE team suggests evaluating partial implementation of Ideas 1 or 2 during PED. In other words, the life cycle cost of a relief well system installed between Station 75+00 and 79+00 should be compared to savings associated with shortening the slurry wall 700 feet (by deleting the portion between Station 75+00 and 82+00). This shorter relief well system might make the use of portable pumps or a reconfiguration of the existing Osage Avenue Pump Plant attractive options. We also note that the vast majority of existing utilities that conflict with the proposed slurry wall are located between station 75+00 and 82+00, another reason to carefully consider a mixture of underseepage control methods during PED.
DS-6	The cost of the slurry cutoff wall selected for the Armourdale Unit between Station 62+00 and 82+00 is highly dependent on the top of bedrock elevation and, if a key is required, the character of the bedrock. Therefore, the VE team suggests performing exploratory borings along the alignment of the wall during PED. The VE team also suggests that hydraulic analysis be performed during PED to determine if the slurry wall can be terminated directly above top of rock or if it must be keyed into the rock (the rock key is the most expensive portion of the slurry wall).

Implementation

A Value Engineering Recommendation Approval Form is included below. A separate working copy of the Recommendation Approval Worksheet has been furnished for distribution to the management team for their review and documentation of their deliberations and decisions on each recommendation. When completed the final worksheet with the documented decisions will be included in this section of the report.

Value Engineering Recommendation Approval Form

Project: Kansas Citys, Missouri and Kansas Flood Risk Management Project

VE Workshop Dates: October 21 - October 25, 2013

	Recommendation	Accept, Reject, or Accept for Further Review (Select cell and use dropdown arrow)	Reason for Acceptance or Rejection	Functional Benefit (use capital X)					VE Team Estimated Change of Cost (Savings) Increase
				Safety	Operations	Environment	Construction	Other	
1	*Consider Portable Pumps and Relief Wells for Armourdale Sta. 62+00 to 82+00 in liue of Slurry Wall (mutually exclusive with Recommendation 2).* The VE team recommends a collected relief well system with portable pumps be considered during PED provided the extent of the potential groundwater contamination between 45+00 and 75+00 is determined by testing performed during PED. While a relief well system option requires maintenance, it has a much lower upfront cost than a slurry wall and does not disrupt existing utilities.	Accept for Further Review	potential cost savings and reduced utility disruption						($18.0 M)
2	*Consider Permanent Pumps and Relief Wells for Armourdale Sta. 62+00 to 82+00 in lieu of Slurry Wall (mutually exclusive with Reommendation 1).* The VE team recommends a collected relief well system with a permanent pump station be considered during PED provided the extent of the potential groundwater contamination between 45+00 and 75+00 is determined by testing performed during PED. While a relief well system option requires maintenance, it has a much lower upfront cost than a slurry wall and does not disrupt existing utilities.	Accept for Further Review	potential cost savings and reduced utility disruption						($13.6 M)

Value Engineering Recommendation Approval Form

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				Safety	Operations	Environment	Construction	Other	
3	*The CID Levee terminus at the south end, approximate station 138+00, is proposed to use tieback Alt. #3, a new floodwall and two stoplog structures from the earthen levee to high ground. Proposed change is to replace one of these stoplog structures with a continuation of the floodwall, leaving only one stoplog structure.* Replace the proposed stoplog structure to be constructed over the rail yard track with a continuation of the concrete floodwall and only construct one stoplog structure over the mainline tracks. This will require the acquisition of the land through the end of the rail yard and removal of the rail necessary to construct the floodwall however, the elimination of the stoplog alleviates the local sponsor's tasks necessary to maintain the stoplog structue, store stoplogs, install them at times of high watr, etc.	Accept for Further Review	potential cost savings and reduced need for sponsor maintenance						($2.1 M)
			All Recommendations and Total Change in Cost:	**0**	**0**	**0**	**0**	**0**	**($15.7 to $18.0 M)**
			Total for # Accepted Recommendations:	**0**	**0**	**0**	**0**	**0**	**$0**
								Total Project Cost	**$217,818,409**
								Number of Design Suggestions	**6**