APPENDIX F

Planning Phase
Value Engineering

Mississippi River Ship Channel, Gulf to Baton Rouge, LA
Responses to VE Study

1. ***Construct river training structures (soft dikes) in selected channel crossings to reduce maintenance dredging.***

The implementation of training structures helps to stabilize the channel to provide reliable depths and widths for safe vessel passage. Currently, training works are authorized and in place in Southwest Pass and in two of the crossings, Red Eye and Medora. Because existing training works in the lower reach of the navigation channel already sufficiently address this concern, additional training works were not considered for the lower reach of the river from Venice to the Gulf, but were considered for the crossings within the Ports of South Louisiana and Baton Rouge. Due to the complexities of various types, quantities, and locations that could be considered, the evaluation of training works within the crossings was delayed to PED phase.

2. ***Expedite construction; open Port of South Louisiana to 50-ft draft in 2 years.***

Based on the construction duration required to construct the MRSC to the current depths, a duration of 3 to 5 years was used for first construction of all alternatives. Also because of constraints in order to be in compliance with the Clean Air Act, we are limited to how many crossings we are allowed to construct each year in the upper reaches.

3. ***Re-evaluate the economics to include planned future development and economic value to other states and the nation****.*

The economic evaluation for the benefit cost ratio can only consider transportation cost savings and not the value of future development.

4. ***Validate dredged material quantity and cost estimates for crossings.***

Dredging indices for the crossings from the 2D model were applied to historical dredging quantities to determine how OMRR&R requirements would increase in future years for alternatives. This analysis provided significantly lower dredging quantities, and associated cost than the results that were obtained from the 1D model. As such, the projected cost of OMRR&R was lowered. This significant cost reduction has resulted in changing the TSP from the pre-VE status.

5. ***Consider constructing project through the Port of Baton Rouge; prioritize future O&M dredging as appropriate.***

(See above item; new recommend plan includes channel deepening to the Port of B.R.)

6. ***Do extensive planning for pipeline and utility relocations to minimize potential impacts to project implementation.***

Will be considered during the construction phase when coordinating with the Non-Federal sponsor who is responsible for relocations.

7. ***Consider reversing dredging operations for channel crossings through the Port of Baton Rouge from upstream to downstream.***

Will consider sequencing work in construction phase. It should be noted that not all crossings will be deepened in one year. In order to accrue benefits, those crossings furthest downriver will be done first. However of the 2 or 3 that are deepened at a time, starting with the upriver crossing can definitely be considered.

8. ***Look for opportunities to piggyback CPRA, and other State projects to use dredged material.***

Can be done in construction phase, but cannot be committed to in feasibility phase.

9 ***Stockpile dredged material for potential use by others or for environmental improvement.***

Must use federal standard for disposal. If stockpiling is within Federal Standard and is requested by another project, it can be done.

10 ***Consider additional HDDA (Hopper Dredge Disposal Area) locations.***

There is sufficient capacity at the existing HDDA which is centrally located in the reach of RM 10.0 AHP to RM 11 BHP which utilizes the HDDA. Therefore the expense to identify a second location is unnecessary.

11. ***Include re-construction or upgrade of existing training structures in the lower river system.***

This is an OMRR&R effort and would not be considered a new construction effort for currently authorized project. Will forward to O&M for consideration.

12. Update MVN total dredging demand projections; address possible market impact.

(See item 4.) The currently anticipated increase in total future district dredging demand appears to be moderate and may not significantly affect market conditions. This, however, is an important cost risk factor that will be re-visited. Annual update of future dredging projections is being performed as part of the update of the O&M VE programmatic study.

13. Consider public-private partnership ('P3') for dredge plant construction.

Will work with any private entities interested in this pursuit.

14. Consider VE recommendations from Dredging Programmatic and BUDMAT studies.

Total dredging program VE recommendations will be considered in PED.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

MISSISSIPPI RIVER SHIP CHANNEL GULF TO BATON ROUGE PHASE III PLANNING PHASE VALUE ENGINEERING REPORT

September 2016

CEMVN-VE-16-04

MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE PHASE III
PLANNING PHASE VALUE ENGINEERING REPORT

SEPTEMBER 2016

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MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE PHASE III
PLANNING PHASE VALUE ENGINEERING REPORT

EXECUTIVE SUMMARY

INTRODUCTION

This report contains the results of the Value Engineering (VE) Workshop that was performed 13 – 15 September, 2016 at the New Orleans District Office. The USACE sanctioned six-step Value Engineering Job Plan was used to facilitate and document the workshop (see **Appendix A** – Value Engineering Job Plan and Workshop Agenda). The objective of this workshop was to incorporate VE analysis into the development of the project design to improve performance and/or cost-effectiveness.

The subject project was in the planning phase with the objective of determining comparative cost-effectiveness and optimization of incremental channel depths between the current 45 feet down to 50 feet of the Mississippi River from Baton Rouge to the Gulf of Mexico (see project map below). An economic summary of alternatives at the time of this workshop is also shown in the below table. A comprehensive presentation of project description and status at the time of this workshop is shown in **Appendix G**.

The primary VE Team was comprised of subject matter experts from the Memphis and New Orleans Districts. Key members of the project delivery team (PDT) including representatives from the local sponsor and their consultants also participated in the study. A roster of workshop participants can be found as **Appendix B**. As part of the workshop, the Team identified important project issues and established project performance attributes that were used to measure the viability of un-screened ideas (ref. **Appendix C**). A function analysis (F.A.S.T.) diagram was developed and is illustrated in **Appendix D**. 'Brainstormed' project improvement ideas were compiled and screened. **Appendix E** lists all ideas (Speculation List) categorized by their disposition (developed or not developed).

In addition to consulting PDT members throughout the workshop, the VE Team referenced a number of current informal project design notes and graphics, meeting minutes and other pertinent documents.

Mississippi River
Baton Rouge to the
Gulf of Mexico
Baton Rouge Front
Baton Rouge
Redeye
Medora
Sardine Point
Granada
Bayou Goula
Alhambra
Philadelphia
Smoke Bend
Belmont
Rich Bend
45' x 500'
Fairview
New Orleans
Crossings
Mile 104.5
New Orleans Harbor
45' x 750'
Mississippi River
Head of Passes
(Mile 0)
Southwest Pass
Mile 18.0 BHP
45' x 600'
Mile 22 BHP
Gulf of Mexico

PROJECT MAP

Channel Alternative	50 ft. Through Port of S. LA	50 ft. Full Channel	48 ft. Through Port S. LA	48 ft. Full Channel	50 ft.SWP/48 ft. Through S. LA	50 ft. LMR/48 ft. All Crossings
First Cost of Construction	$ 88,971,120	$ 183,076,433	$ 5,551,980	$ 88,663,029	$ 87,770,010	$ 170,881,059
Interest During Construction	$ 4,258,086	$ 8,761,890	$ 265,713	$ 4,243,341	$ 4,200,602	$ 8,178,229
Total Investment	$ 93,229,206	$ 191,838,323	$ 5,817,693	$ 92,906,370	$ 91,970,611	$ 179,059,288
Average Annual Const. Cost	$ 3,709,866	$ 7,633,814	$ 231,503	$ 3,697,019	$ 3,659,782	$ 7,125,298
Average Annual Increm. O&M	$ 18,126,110	$ 131,446,950	$ 13,443,710	$ 100,007,021	$ 13,443,710	$ 100,007,021
Total Average Annual Cost	$ 21,835,975	$ 139,080,764	$ 13,675,213	$ 103,704,040	$ 17,103,493	$ 107,132,319
Total Average Annual Benefits	$ 117,960,932	$ 147,273,006	$ 84,339,754	$ 105,658,043	$ 94,538,711	$ 116,549,126
Net Excess Benefits	**$ 96,124,957**	**$ 8,192,243**	**$ 70,664,540**	**$ 1,954,003**	**$ 77,435,218**	**$ 9,416,806**
B/C Ratio	**5.40**	**1.06**	**6.17**	**1.02**	**5.53**	**1.09**

ECONOMIC SUMMARY OF ALTERNATIVES

(AT TIME OF VE WORKSHOP)

SUMMARY OF VE RESULTS

A brief description of major findings and a complete list of all VE recommendations are as follows:

(Major Findings)

- It appears that channel training 'soft dikes' could be installed in at least (8) of the (12) river crossings. Soft dikes have been placed in two crossings in the project reach and both have, and continue to perform well by inducing scour and significantly reducing dredging need. Expected performance of the proposed (8) dike installations would reduce future O&M in these crossings by a substantial amount. This would have a significant positive effect on the economics of extending the 50-ft channel through the Port of Baton Rouge.

- Further analysis and validation of projected shoaling rates and estimated dredging unit costs is recommended. In combination, a possible 'compounded' conservative total cost for dredging the river crossings may be currently tabulated resulting in alternative costs being overestimated. Project benefits over and beyond that presently allowed in USACE policy should also be considered in alternative evaluations.

- A possible alternative to be considered would be construction of a 50-ft channel through the Port of Baton Rouge with a plan of prioritizing maintenance dredging should future excessive shoaling rates be realized. Given the fact that, unlike most Civil Works projects, construction cost is relatively small as compared to future O&M, limited investment risk would be associated with this option.

- There appears to be some potential for use of dredged material from the river crossings. Such use may include both environmental and possible commercial utilization. This would require additional dredging cost and either dry or in-river stockpiling. Such cost would have to be provided by sources outside of USACE dredging per requirement of 'least cost' measures.

- Future dredging demand, along with competing dredging needs from environmental, State of Louisiana and regional states, may overwhelm the supply of available dredging plant and impact project performance and cost. As such, future planning should address projected future market conditions. The application of public-private-partnerships ('P3') may be considered as a viable option to providing new dredge plant if warranted.

(List of VE Recommendations)

1. *Construct river training structures (soft dikes) in selected channel crossings to reduce maintenance dredging.*

2. *Expedite construction; open Port of South Louisiana to 50-ft draft in 2 years.*

3. *Re-evaluate the economics to include planned future development and economic value to other states and the nation.*

4. *Validate dredged material quantity and cost estimates for crossings.*

5. *Consider constructing project through the Port of Baton Rouge; prioritize future O&M dredging as appropriate.*

6. *Do extensive planning for pipeline and utility relocations to minimize potential impacts to project implementation.*

7. *Consider reversing dredging operations for channel crossings through the Port of Baton Rouge from upstream to downstream.*

8. *Look for opportunities to piggyback CPRA, and other State projects to use dredged material.*

9. *Stockpile dredged material for potential use by others or for environmental improvement.*

10. *Consider additional HDDA (Hopper Dredge Disposal Area) locations.*

11. *Include re-construction or upgrade of existing training structures in the lower river system.*

12. *Update MVN total dredging demand projections; address possible market impact.*

13. *Consider public-private partnership ('P3') for dredge plant construction.*

14. *Consider VE recommendations from Dredging Programmatic and BUDMAT studies.*

VALUE ENGINEERING RECOMMENDATIONS

The VE Team identified **(14)** items that are believed to either improve project performance and/or cost-effectiveness. Recommendations are further developed and documented below.

The reader should note that these recommendations were developed in a very short period of time and are intended to present conceptual measures for consideration. Further evaluation and design is required to substantiate each recommendation and provide rationale for its implementation or rejection.

Also, a number of recommendations may 'conflict' with others. That is to say that one idea cannot be implemented with the other. No decision as to preference was made by the VE Team and all options are presented for further consideration by the PDT.

1. Construct river training structures (soft dikes) in selected channel crossings to reduce maintenance dredging -

References

U.S. Army Corps of Engineers, St. Louis District, Applied River Engineering Center (AREC); http://mvs-wc.mvs.usace.army.mil/arec/Basics_Dikes.html

Determinations of Findings Report on The Impact of the Red Eye and Medora Crossings Soft Dikes on Vessel Traffic on the Mississippi River; University of New Orleans, May 2003, prepared for U.S. Army Corps of Engineers New Orleans District

Red Eye Crossing Soft Dikes Demonstration Project Final Report; U.S Army Corps of Engineers New Orleans District, 6 May 1998

Technical Report HL-95-13, Red Eye Crossing Reach, Lower Mississippi River, Report 2 Navigation Conditions, U.S. Army Corps of Engineers Waterways Experiment Station, March 1996

Solicitation No. DACW29-93-B-0040, Redeye Crossing Contraction Dikes, Mississippi River, Mile 224L AHP, East Baton Rouge Parish, Louisiana

Overview

It appears that the use of soft dikes to induce scour may be an effective means to significantly reduce anticipated maintenance dredging in (8) of (12) channel crossings in this project. Past application of such training structures in two crossings in the project area have, and continue to perform effectively and indicate probable success if used in other crossings.

Dikes, sometimes referred to as wing dams or spur dikes, are structures placed in a river to redirect the river's own energy to provide a variety of effects. The structures are usually constructed out of stone, but other materials have been used for construction including but not limited to timber piles, concrete, and sand filled geotextile bags and tubes. On larger rivers, dikes are used to manage sediment response distribution within the channel to deepen the channel and provide adequate depth for navigation. On smaller rivers and tributaries, they have been used primarily to divert flow and stabilize eroding banks.

Dikes are usually built perpendicular to the river flow and vary considerably in height and length. On large rivers, they are built approximately at a height midway up the channel and lengths can vary depending upon a variety of factors *(AREC).* Dikes have been the primary method employed by the U.S. Army Corps of Engineers on the Lower Mississippi River below the confluence of the Ohio and Mississippi Rivers (River Mile 954 Above Head of Passes (AHP)) to assist in maintaining the required authorized navigation channel for commercial barge traffic. These structures have proven to be very effective in helping to maintain the required depth and width of the channel by managing the sediment that moves through the river and helping to reduce the required amount of maintenance dredging in the various river crossings and other areas where sediment tends to be more concentrated.

It should be noted that river pilots do not favor any type of structure on the river bottom. They have, however accepted the use of soft dikes in Lower Mississippi River.

Soft Dikes in the Project Study Area

Although the required depths for the channel are different on the lower portion of the river below Baton Rouge (River Mile 234 AHP), it has been proven that dikes have been effective at helping to reduce the required maintenance dredging and improve the navigation channel in various reaches of the river. Within an 80-mile stretch of the river from just above Baton Rouge (Mile 234), to just above New Orleans (Mile 114), there are twelve river crossings. As the flow of the Mississippi River crosses from one bank to the other, bed material or bed load is dropped making a "HIGH" point or bar in the channel bottom. Along this reach of the river, the Corps of Engineers is currently responsible for maintaining a 500-ft wide by 45-ft deep ship channel (*USACE NO Red Eye Demonstration Report*). It is within these (12) river crossings that the majority of maintenance dredging is performed by the New Orleans District on an annual basis. Figure 1 below provides a schematic of the locations of the various river crossings in the study area.

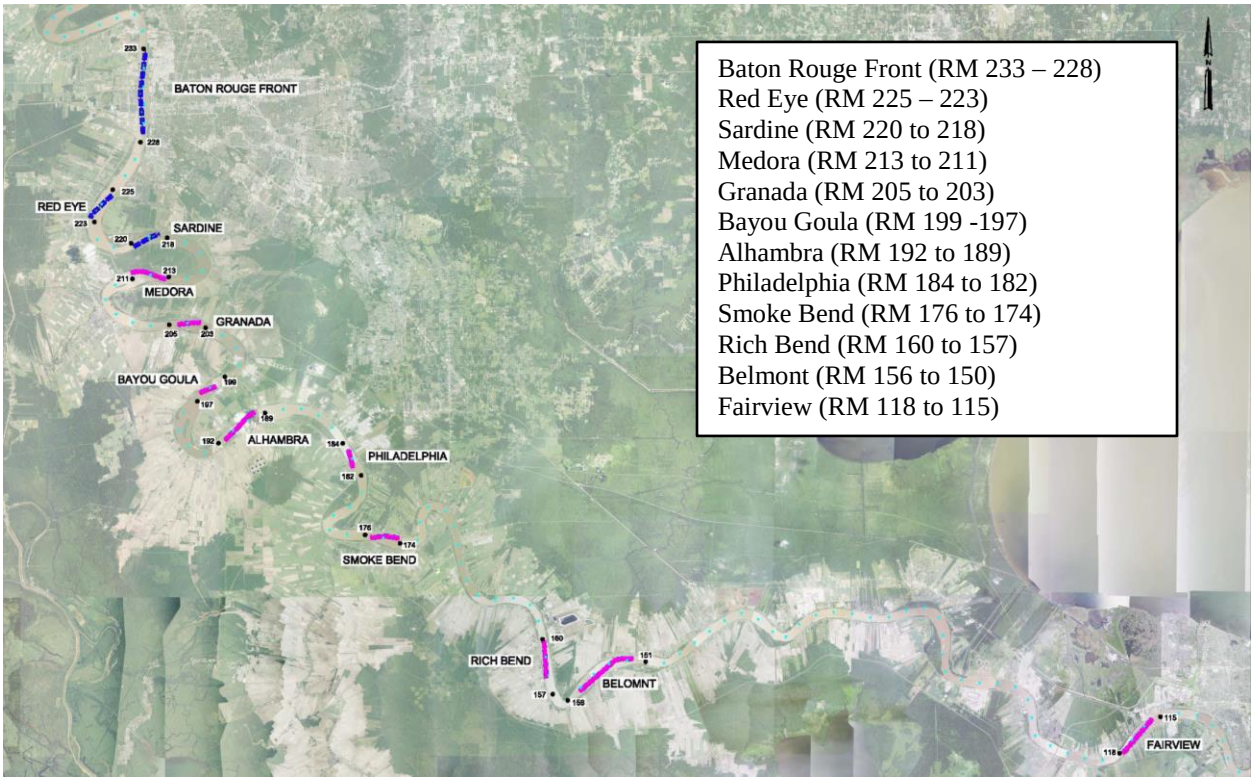


Figure 1. Maintained Channel Crossings (RM 234 AHP to RM 115 AHP)

In the early 1990s, the New Orleans District was authorized to conduct a demonstration project in one of these crossings at Red Eye (RM 225 to RM 223) to evaluate the effects and potential navigation impacts of construction of dikes within the ship channel. Prior to construction of the dikes, the U.S. Army Corps of Engineers Waterways Experiment Station developed both physical and numerical models of the crossing. The results were used to determine the effectiveness of the dike construction in reducing channel shoaling and required annual dredging in the reach. In addition, coordination and input was solicited from the commercial navigation industry and the local sponsor, Louisiana Department of Transportation and Development (LA DOTD). Initially, these entities were concerned at the prospect of stone dikes next to the channel and potential collisions with stone. Due to the high number of vessels using Red Eye Crossing, two design constraints were placed on the project. First, after construction and during low water there must always be a 2,000-ft navigation corridor. Second, the dikes would be built as low as the existing sandbar immediately downstream of the dike field so that tows could pass over the bar and the dikes during high water. In consideration of these concerns and constraints, the dikes were redesigned using sand-filled geotextile containers and geobags to mimic the design and anticipated effect of stone dikes and given the name “soft dikes”. The project was allowed to move forward and a construction contract was awarded in May 1993 under the maintenance project for the 40-ft navigation channel under the Mississippi River, Gulf of Mexico to Baton Rouge Project, O&M General. The work consisted of the construction of 6 soft dikes at various

lengths and elevations in the Red Eye Crossing reach at a final cost of approximately $7.1 million. Figure 2 illustrates an example of soft dike placement location; Figure 3 shows low-water photographs of the final in-placed constructed soft dikes.

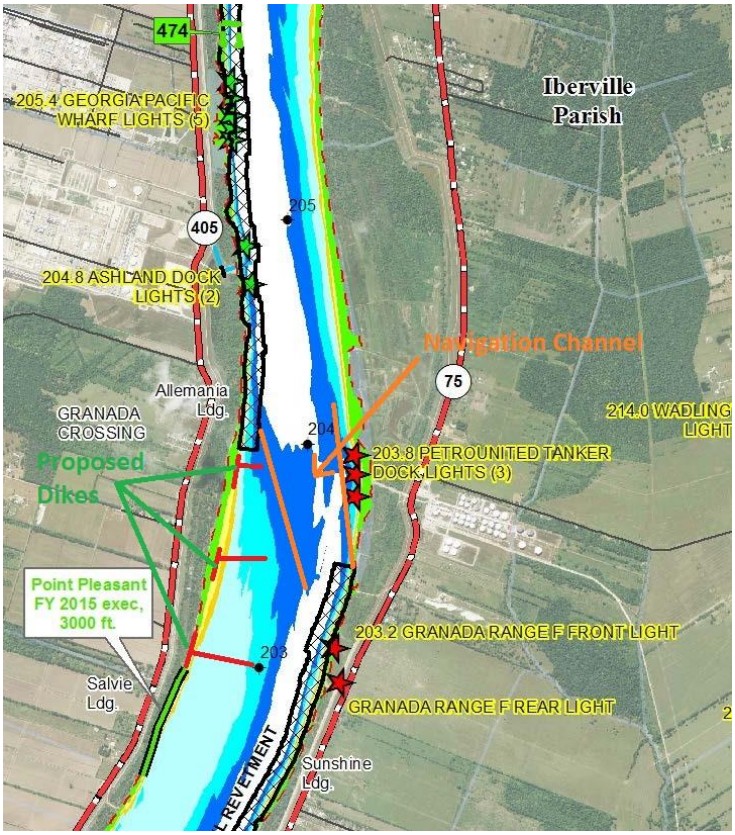


Figure 2 - Example of River Placement of Soft Dikes

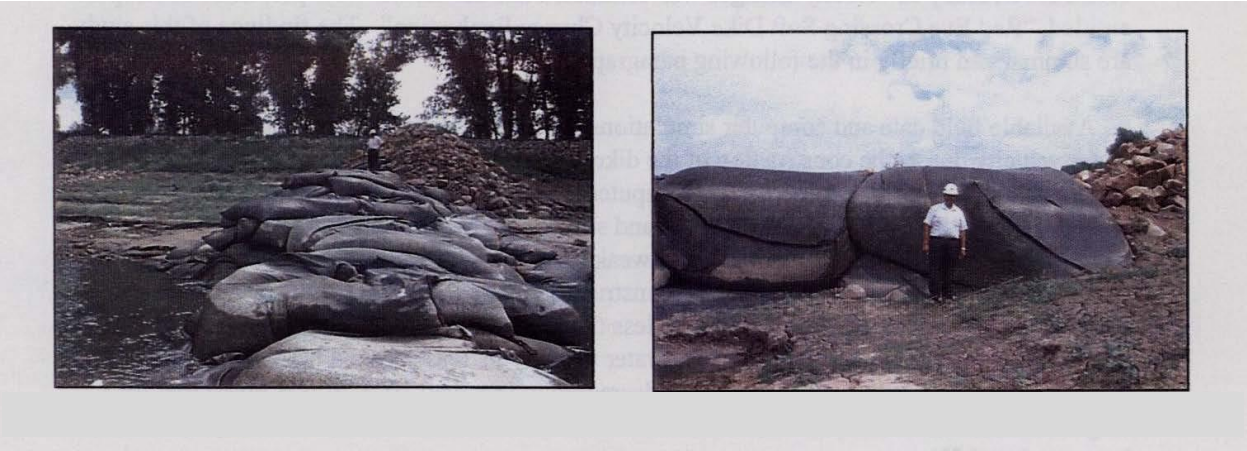


Figure 3 – Photos of Soft Dikes (low water)

Pre and post-construction monitoring and analysis was conducted of the soft dikes at Red Eye Crossing to evaluate performance. This monitoring included frequent detailed hydrographic surveying and analysis of the reach, and a detailed navigation study to include a pilot survey over 2 years post construction from July 1993 to September 1995 as well as videotaping of the reach before and after construction which coincided with the pilot survey. The detailed results of these studies are outlined in the final report dated 6 May 1998 entitled *Red Eye Crossing Soft Dikes Demonstration Project*. In summary the report findings indicated that the Red Eye Crossing Soft Dikes reduced the number of dredging days required to maintain the channel, and did not appear to be a hazard to navigation. The report outlined a reduction in the dredging in this reach in the following 2 years of approximately 50%. A few summary statements from the report recommended exploring the possibility of proceeding with design and construction of soft dikes at other crossings in the study area. "With the success shown at Red Eye, the longest and most complex crossing in this reach of the river, we also recommend to proceed with the design and construction of dikes at less complex crossings. In closing, we believe soft dike systems can provide a cost effective and efficient means of reducing the high cost of maintenance dredging at the deep draft crossings and will enhance our ability to provide a more reliable and dependable channel to our navigation customers." Subsequent soft dikes were successfully constructed at Medora Crossing (RM 213 to RM 211) and were also proven to reduce the required amount of maintenance dredging in this crossing.

Application and Recommended Way Forward

Based on the results of the soft dike demonstration project at Red Eye Crossing and subsequent construction at Medora Crossing, it is anticipated that similar construction would be successful at several of the other crossings within the study area. Based on discussions held on 14 September 2016 with engineers in the Waterways Section of the New Orleans District, it was determined that construction of soft dikes is feasible and practical in (8) of the (12) crossings. (7) of these crossings are in the Baton Rouge reach and one (Belmont) is located in the Port of South Louisiana reach. This proposed work includes the raising in elevation of the existing soft dikes at Red Eye and Medora as well as construction of new dike fields at (6) other crossings.

Current project estimates indicate a total projected increase of 148% of dredged material in the (12) crossings as a result of deepening the channel to 50 feet. Historic realized performance of the two soft dike installation indicates at least a 50% reduction in total dredging need versus the without dike condition. Note that actual dredging reduction may be more than 50%.

For (6) crossings where new dikes can be placed, a 50% reduction of total dredging need yields a **84%** reduction in the added incremental need (148%); for the two crossings with existing

dikes, it is estimated that the net result of upgrading the dikes would decrease total dredging by 35% given the assumed inclusion of the current existing dikes in the shoaling model. This yields a **59%** reduction of the currently calculated added incremental need. Table 1 illustrates estimated potential **annual cost reduction of $57.4 million.**

Crossing	Annual Incremental O&M Cost Reduction
Red Eye	$15,909,613 x .59 = $9,387,000
Sardine	$4,317,095 x .84 = $3,626,000
Medora	$13,673,667 x .59 = $8,068,000
Granada	$4,115,000 x .84 = $3,457,000
Bayou Goula	$11,328,074 x .84 = $9,516,000
Alhambra	$14,189,655 x .84 = $11,920,000
Smoke Bend	$3,626,962 x .84 = $3,047,000
Belmont*	$10,000,000 x .84 = $8,400,000
TOTAL	**$ 57,421,000**

* Incremental Estimated Cost for Port of South LA Crossing with Info Provided in Brief

Table 1. Estimated O&M Cost Savings for Soft Dikes

It should be noted that there must be engineering and design considerations as well as cost considerations made in the planning phase of these projects to include potential impacts to navigation to include existing facilities, relocation of pipelines, construction windows, impacts to channel and bank stability on the constructed banks and opposite banks, and required future maintenance of the constructed soft dikes. Other factors to consider include determination of the approximate elevations (heights) of the soft dikes with respect to the Low Water Reference Plane (LWRP) so as to minimize impacts to navigation of the deep draft channel and consideration of a step up approach to the heights of the structures as done with the Red Eye project. In addition, it is noted that specific authorization for construction of these features must be verified and/or gained prior to initiation of any work.

Costs for Construction of Soft Dikes Estimated Annual O&M Cost Savings

The Red Eye Crossing Soft Dikes were used as the basis for determining the approximate costs of constructing the recommend soft dikes at the various crossings as presented in Table 1 above. A representative design reach for construction of soft dikes is depicted in Figure 4 below.

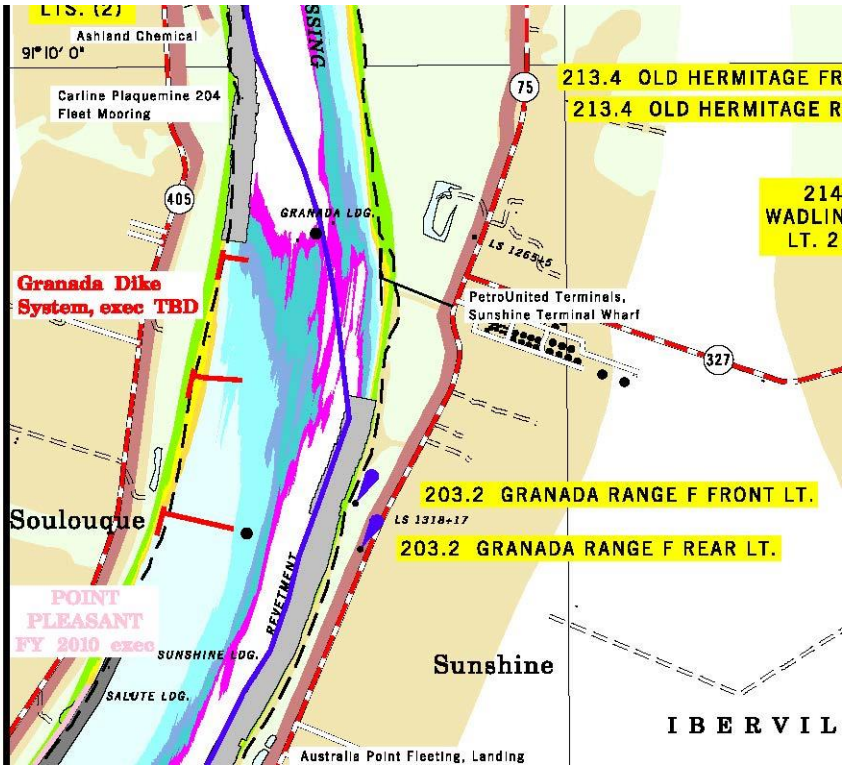


Figure 4. Representative Reach for Soft Dike Construction

An average cost per soft dike was calculated using the average cost per dike for the Red Eye structures and inflating that cost to today's dollars using a historical cost index. Calculations are as noted below:

Red Eye Dikes

- 6 dikes constructed @ total cost of $7.1 million
- 7,700 total linear feet of structures

Cost per linear foot = $7,100,000/7,700 LF = $922/LF

Cost per dike based on linear feet constructed:

Dike 1 – 680 feet x $922/LF = $626,960

Dike 2 – 960 feet x $922/LF = $885,120

Dike 3 – 1,270 feet x $922/LF = $1,170,940

Dike 4 – 1,350 feet x $922/LF = $1,244,700

Dike 5 – 1,690 feet x $922/LF = $1,558,180
Dike 6 – 1,750 feet x $922/LF = $1,613,500

Average Cost Per Dike = $7,100,000 / 6 dikes = $1,183,333.33
Inflation Index from 1992 to 2016 = 2.08
Approximate Cost Per New Dike for 2016 = $1,183,333.33 x 2.08 = $2,461,125.33 =
~$2.5 million
Approximate Cost Per Upgraded Dike (Red Eye and Medora) – Assumed to be 50% of Full Cost =
~ $1.25 million
Table 2 depicts the approximate first construction costs of the proposed dikes for the various crossings:

Crossing	No. Proposed Dikes	*Construction Costs (Millions)
Red Eye	6 (Upgrade)	$7.5
Sardine	2	$5.0
Medora	3 (Upgrade)	$3.8
Granada	3	$7.5
Bayou Goula	4	$10.0
Alhambra	5	$12.5
Smoke Bend	5	$12.5
Belmont	3	$7.5
	TOTAL	**$66,250,000.0**

* $1.25M per dike for Upgrade, $2.5M per dike for new dike

Table 2. Construction Costs for Proposed Soft Dikes

Equivalent Added Annual Cost Calculation:
Using the current 50 Yr. Economic Life index at 3 1/8% of 25.16 results in the following equivalent cost for soft dikes:
$66,250,000/25.16 = **$2,633,000** per year of equivalent added cost

Estimated Net Annual Project Alternative Benefits

Estimated *net additional benefits* to project alternatives are substantial as calculated below for the primary two alternatives under consideration:

50-ft Channel through the Port of Baton Rouge:

Annual O&M savings from anticipated dike performance:	$57,421,000
Added equivalent annual cost for dikes:	2,633,000
Net additional annual benefits:	**$54,788,000**

50-ft Channel through the Port of South Louisiana:

Annual O&M savings from anticipated dike performance:	$8,400,000
Added equivalent annual cost for dikes: ($7.5M /25.16)	298,000
Net additional annual benefits:	**$8,102,000**

Summary

This alternative analysis strongly indicates that soft dike systems can provide a cost effective and efficient means of reducing the high cost of maintenance dredging at proposed deepened river crossings and will enhance the Corps ability to provide a more reliable and dependable channel to our navigation customers. It also appears that the use of training structures is necessary for the potential viability of a 50-ft channel through the Port of Baton Rouge.

The current project authorization may, or may not, permit the inclusion of these training structures as a construction feature. Regardless, soft dikes can be placed with O&M funding.

2. Expedite construction; open Port of South Louisiana to 50-ft draft in 2 years - The current project implementation schedule for all alternatives indicates no realization of benefits until completion of four-years of construction. It appears that an aggressive, and properly coordinated, design and management plan, including relocations, could result in the opening of of a 50-ft channel through the Port of South Louisiana in two years. Such an expedited schedule would improve project net benefits and B/C ratios as indicated below. The following table illustrates the current and proposed change in expenditures and project benefits for completing a 50-ft channel through the Port of South Louisiana in two years:

				($/MILLIONS)				
YEAR ->	3	2	1	**YEAR '0'**	1 - 48	xx	49	50
(CURRENT PLAN WITH								
4-YR COMPLETION)								
CONSTRUCTION	-22.5	-22.5	-22.5	-22.5				
O&M					-18.1	xx	-18.1	-18.1
BENEFITES					118	xx	118	118
==========	=======	=======	=======	=======	=======	===	=======	=======
YEAR TOTAL:	**-22.5**	**-22.5**	**-22.5**	**-22.5**	**99.9**	**xx**	**99.9**	**99.9**
(PROPOSED PLAN WITH								
2-YR COMPLETION)								
CONSTRUCTION	-45	-45						
O&M			-18.1	-18.1	-18.1	xx	0	0
BENEFITES			118	118	118	xx	0	0
==========	=======	=======	=======	=======	=======	===	=======	=======
YEAR TOTAL:	**-45**	**-45**	**99.9**	**99.9**	**99.9**	**xx**	**0**	**0**
	=======			=======				
YEAR ->	3	2	1	**YEAR '0'**	1 - 48	xx	49	50

ESTIMATED CHANGE IN EXPENDITURES AND BENEFITS FOR PROPOSED
2-YEAR EXPEDITED CONSTRUCTION THROUGH THE PORT OF SOUTH LOUISIANA

(From MVN Economics)
Change in net annual benefits for all 50-ft depth alternatives: +$6,853,000
(Present worth of +$172.4 million)
Change in B/C ratio of 50-ft depth alternatives through Port of South Louisiana:
50-ft Channel through the Port of Baton Rouge: B/C from 1.06 to 1.11
50-ft Channel through the Port of South Louisiana B/C from 5.40 to 5.43

3. Re-evaluate the economics to include planned future development and economic value to other states and the nation - Federal policy may restrict the calculation of full economic value of project benefits. It is recommended that all factors be considered to better assess economic benefits.

The Mississippi River is the highway to the vast central portion of the United States. Much of the commodities and goods produced in the heartland of the United States are brought to world markets via the Mississippi River. Much of the Midwest grain and crop production can only competitively enter world markets through waterborne commerce utilizing the Mississippi River. Products are transported from the rest of the world to the 31 states connected to the river. In addition to transportation, a deeper Mississippi River will spur plant development and expansion, and job creation.

Total United States waterborne foreign commerce in 2014 was 2,345,765,063 short tons. Of that total, the Lower Mississippi River system from Baton Rouge to the mouth of the river handled 490,389,626 tons of waterborne commerce (Source: U.S. Army Corps of Engineers, Navigation Data Center, 2015). According to the USACE, the ports of the Lower Mississippi River handled 20.9% of all U. S. waterborne commerce, both foreign and domestic.

Current federal policy constrains benefit calculation and may not include the important factors discussed above. It is recommended that additional project benefits be considered in determining cost-benefit for project alternatives.

4. Validate dredged material quantity and cost estimates for crossings - Presently (12) channel crossing sites are being dredged to maintain a navigable channel 45 feet deep and approximately 500 feet wide through the upper portion of the Port of South Louisiana and through the Port Baton Rouge. Reaches outside these crossing areas, the prevailing river depths are substantially deep and require minimal maintenance effort. Dredging needs then pick up again on the lower portion of the Mississippi River just above and including Southwest Pass and Bar Channel area.

Dredging is performed primarily by dustpan dredges and current estimated annual average dredging in the (12) crossings is about **19.5 million cubic yards (MCY);** average historical cost is estimated at **$1.23 per cubic yard (CY).**

For the proposed 50-ft deep x 500 ft wide channel, current estimates indicate the (12) channel crossings will require an average annual dredging of **48.4 MCY** (148% increase); unit cost used for this alternative considers continued use of dustpan dredges at a rate of **$3.20 per CY** which includes a 40% contingency.

Determining projected sediment rates by changing the minimum depth through the crossings is difficult to determine, especially factoring in the fact that the sediment placement is high-river event driven. The present dredged material quantity projections are based on a one dimensional model study and the project manager indicated that additional studies are being performed. Unit cost estimates reflect uncertainties, including but not limited to, slope transition quantities associated with the channel deepening. The 40% contingency is higher than the usually applied 25%.

Given the limitations of a short duration feasibility analysis it would appear that both the projected estimated dredging quantities and unit cost are very 'conservative' (high end). It should be noted, however, that these two factors are ***not independent*** of each other. That is to say that a conservative estimate of quantities compounds the alternative cost when conservative unit prices are then applied. As such, there appears to be a higher risk that the current alternative cost may be high versus low.

It is therefore recommended that both estimated projected dredging quantities and unit cost be validated and refined for the (12) channel crossings.

5. Consider constructing project through the Port of Baton Rouge; prioritize future O&M dredging as appropriate - With the inclusion of the above recommended soft dikes and possible realization of lower unit dredging costs deepening and maintaining the ship channel to -50 ft. through the Port of Baton Rouge (PBR) may be warranted. Given the significant 'positive' risks of lower than anticipated O&M dredging need, via possible performance of the proposed river training features, and lower actual unit dredging costs current O&M costs may be significantly lower than currently estimated.

It's important to note that unlike most Civil Works projects the construction cost of including the PBR is relatively low as compared to estimated future O&M costs. As such, the 50-ft channel and training features could be constructed with limited investment risk. Should future O&M be excessive, funding prioritization would be made to maintain the river below the PBR to 50-ft with 45-ft (or slightly deeper) maintenance of the PBR.

6. Do extensive planning for pipeline and utility relocations to minimize potential impacts to project implementation - The current feasibility relocations report included a study area from River Miles (RM) 233.4 to RM 110.6 and resulted in 49 pipelines plus several other utilities that may or may not require relocation. Note that this was a conservative number as some of these facilities may have enough coverage below the 50' channel cut and will not require relocation. At the time of this report it was unknown as to whether these facilities met this requirement so a conservative approach was taken and consequently all utilities were stated to need relocation. The current estimated costs for this item of work are shown below in Table 1.

Directional Drilling Cost/LF	LF	Total Cost
$13,336	3000	$40,008,000.00
Contingencies	25%	$10,002,000.00
Subtotal		$50,010,000.00
E&D (10%)		$5,001,000.00
S&A (8%)		$4,800,800.00
Total		$59,011,800.00

Table 1 – Current Estimated Costs for Relocation of Utility Infrastructure

The various breakdown of the types of facilities are shown in Table 2 along with the latest known utility owner. Keep in mind that some of these facilities may have changed ownership since the latest provided data from the aforementioned utility owner. Other important information taken from the study include:

- Costs are based on directional drilling as this is seen as the most cost effective way to relocate pipeline under the river.
- The minimum length of total pipeline requiring relocation is estimated to be 3000'.
- Entrance and exit points were included in the cost of the relocation and would be installed on each side of the batture located 20' from the toe of the riverside of the levee.
- Hot tapping will be utilized when connecting the new and old pipelines to transfer product prior to final capping and abandonment of the old pipeline.
- Costs in Table 1 above include a 25% contingency, 10% allowance for E&D, and an 8% allowance for S&A.
- The price in Table 1 includes allocation to relocate the facilities to accommodate a dredge depth of 50'.

While the current feasibility study includes relocating or ensuring the relocation of facilities below the 50' dredge cut, it may be prudent to make sure that any facilities requiring relocation are relocated to the project authorization depth of 55'. This could save potential dollars on any future relocations if future projects exceed depths of 50' and approach the authorized depths of the study.

In addition, it will be crucial to ensure that these relocations are completed in sufficient time ahead of the release of the actual dredging contract. To accomplish this task, actual owners will need to be identified if different from those in Table 2. Also, sufficient information will need to be gathered to ensure the following:

- What size pipeline is involved in the relocation?
- At what depth is the current pipeline and will it require relocation?
- Who's responsible for paying for the relocation? This generally will be noted in the permit but could revert back to State and Federal guidelines.
- Execute the pipeline relocation agreement in sufficient time to allow for the relocation of the facilities before award of the dredging contracts.
- Develop a plan to deal with the pipeline owners who do not follow guidelines and ensure utility relocation in a significant amount of time prior to needing relocation.

It's very important to ensure utility relocation and allow for a contingency in time prior to dredging these sites. Proper guidelines and protocol should be established well in advance and all interested parties should be involved early on in the planning stage. Any delay in relocation of facilities could prove detrimental to the project and cost significant dollars in benefits. Currently, yearly benefits are estimated at $118M per year. It is important to the Government as well as the Sponsor that there are no delays in accruing benefits for this project. A timely and well executed plan for the relocations will ensure that this doesn't happen.

Owner	Diameter	Type	River Mile	Qty
Enterprise	16”	NG	233.4	1
Acadian	10.75”	NG	233	3
Acadian	16”	NG	233	1
Mid La Gas	12”	NG	233	1
Bengal	24”	Maint	233	1
Dow	4”	LPG	233	1
Unknown	12”	Brine	197.9	2
Enterprise	Unknown	NG	190.2	1
Kinder Morgan	24”	NG	190.2	2
El Paso	5”	Gas	190.2	1
Southern Nat Gas Co.	12”	Gas	190.1	4
El Paso	5”	Gas	190	1
Kinder Morgan	30”	NG	190	1
Enterprise	8.63”	EGL	189.8	2
Shell	Unknown	Unknown	189.5	6
Gulf South	Unknown	NG	183.4	3
Boardwalk	Unknown	NG	183.3	3
Concha	10”	Propylene	183	1
Shell	Unknown	HVL	182.9	1
Enterprise	10”	HVL	182.9	1
Enterprise	4”	NG	182.7	1
Shell	10”	HVL	182.1	1
Central Bell	Unknown	Unknown	175.5	3
LA Power & Lt. Co.	Unknown	Unknown	175.4	1
Marathon Ash.	30”	Unknown	159.5	1
Shell	40”	EPL	159.5	1
Marathon	30”	CRD	159.5	3
Equilon	40”	Oil	159.3	1
Boardwalk	Unknown	NG	158.2	1
Monterey	6”	Gas	158.2	1
Totals				51 Facilities

Table 2 - Utility Owner and Types of Facilities within the Dredging Footprint RM 233.4-RM 110.6

7. Consider reversing dredging operations for channel crossings through the Port of Baton Rouge from upstream to downstream - Current dredging practice for maintaining channel crossings through the Port of Baton Rouge (PBR) crossing consists of starting at the downstream crossing and proceeding upstream within the limits of this VE study. Dredging from downstream to upstream crossing results in the dustpan dredges discharging and redepositing a portion of the sandy/silty material in the previously dredged downstream crossings. The amount of sediment redeposited in the previously dredged crossing from dredging operations upstream should be a measurable amount but no data was available for this VE study and the amount could be very minimum or could be more substantial. If the sanding rate is determined to be substantial, it would result in cost savings over the 50 year life for the VE study or perpetual savings for the future by reversing the crossing dredging order. Reversing the crossing dredging order would negate filling of the previously dredged downstream crossing at a faster sediment rate than what sediment rates would occur at normal and low stages on the Mississippi River.

A potential negative of reversing the dredging operations would be it would take longer to open up the total length of the channel for the Port of Baton Rouge for a draft of 48 or 50 feet as proposed for this VE study at stages approaching low water river stages initially and/or annually. Depending on how long it would take to dredge the crossings by contract time by using one or multiple dredges could nullify any gains in reversing the dredging order for crossing in the Port of Baton Rouge limits. Dredging operations that take a significant amount of time to open the channel for the Port of Baton Rouge limits could negate benefits from larger ships delivering cargo at the lower businesses sooner.

No recommendations are given for this VE report or cost saving by reversing the dredging operations by starting at the upstream crossings and proceeding downstream. The point of this recommendation is to further investigate to determine the sanding rates on the previously dredged downstream crossings from upstream dredging operations. This investigation could be done as a demonstration type project to conduct multiple surveys of the downstream crossing during dredging operations upstream as compared to sanding rates at low normal flows during non-dredging. Based on the Maritime reports discussed during the VE study, the crossing appear to be surveyed every two weeks or so, therefore, the data for evaluation is most likely available in records. Based on the significance of the sediment deposit rate, a further evaluation would be conducted at that time to see if this alternative would be viable either as a onetime benefit for the initial deepening of the channel or become an order of work for annual dredging.

8. Look for opportunities to piggyback CPRA, and other State projects to use dredged material - The VE team believes that there is an opportunity to coordinate and align CPRA and other State projects, such as projects outlined in the State Master Plan, with the future maintenance dredging required to maintain the 50' channel depth. While the mandate of federal implementation of least-cost dredging must be maintained, addition cost for beneficial use may be obtained from other sources including the authorized Beneficial Use if Dredged Material (BUDMAT) program, the State or other third party.

The 2012 Coastal Master Plan and updated 2017 Plan outline numerous restoration projects that could benefit from the material generated by the construction and maintenance of the channel.

http://www.coastalmasterplan.louisiana.gov/

Louisiana State Parks (Statewide Comprehensive Outdoor Recreation Plan 2014-1019 SCORP) discusses numerous development projects and improvements that could be aligned with the maintenance dredging schedule. Sites for disposal and material processing and excavation could be identified as park projects come online.

http://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index

Additionally, coordination with other organizations such as the Lower Mississippi River Conservation Committee (LRMCC) and working to expedite some of their restoration projects, programs and initiatives.

http://www.lmrcc.org/about-us/

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/la/programs/?cid=nrcs141p2_015683

http://www.brec.org/index.cfm/page/2518/n/362

9. Stockpile dredged material for potential use by others or for environmental improvement -
The current plan for the project is to use Dustpan Dredges in the crossings and a combination of Hopper and Cutter Head Dredges on the Southwest Pass and Bar Channel portions of the study. These areas can be seen in Figure 1. While the Southwest Pass as well as the Bar Channel dredging material will be sent to disposal sites, the material from the crossings will be distributed back into the river on an average of 800-900' from where it is dredged, effectively back in the river channel. Over time a portion of this material works its way back into the channel and thus increasing future O&M costs. The majority of the material is sand that is dredged from the crossings which is deemed suitable for a variety of purposes. These uses can range from highway projects, levee work, backfill material, or possibly batture sites which are strongly being pursued and implemented by the Louisiana State Government.

Figure 1. Project Dredging Locations

Since the dredged material in the Southwest Pass and Bar Channel areas is being used or distributed back into disposal areas for habitat and reuse purposes, the main benefit from this alternative will come from the dredged material of the twelve crossings within the study area (See Figure 2.) The base dredging quantity for the crossings is 8,588,600 CY and the O&M quantity for the crossings is projected to be 48,377,000 CY per year.

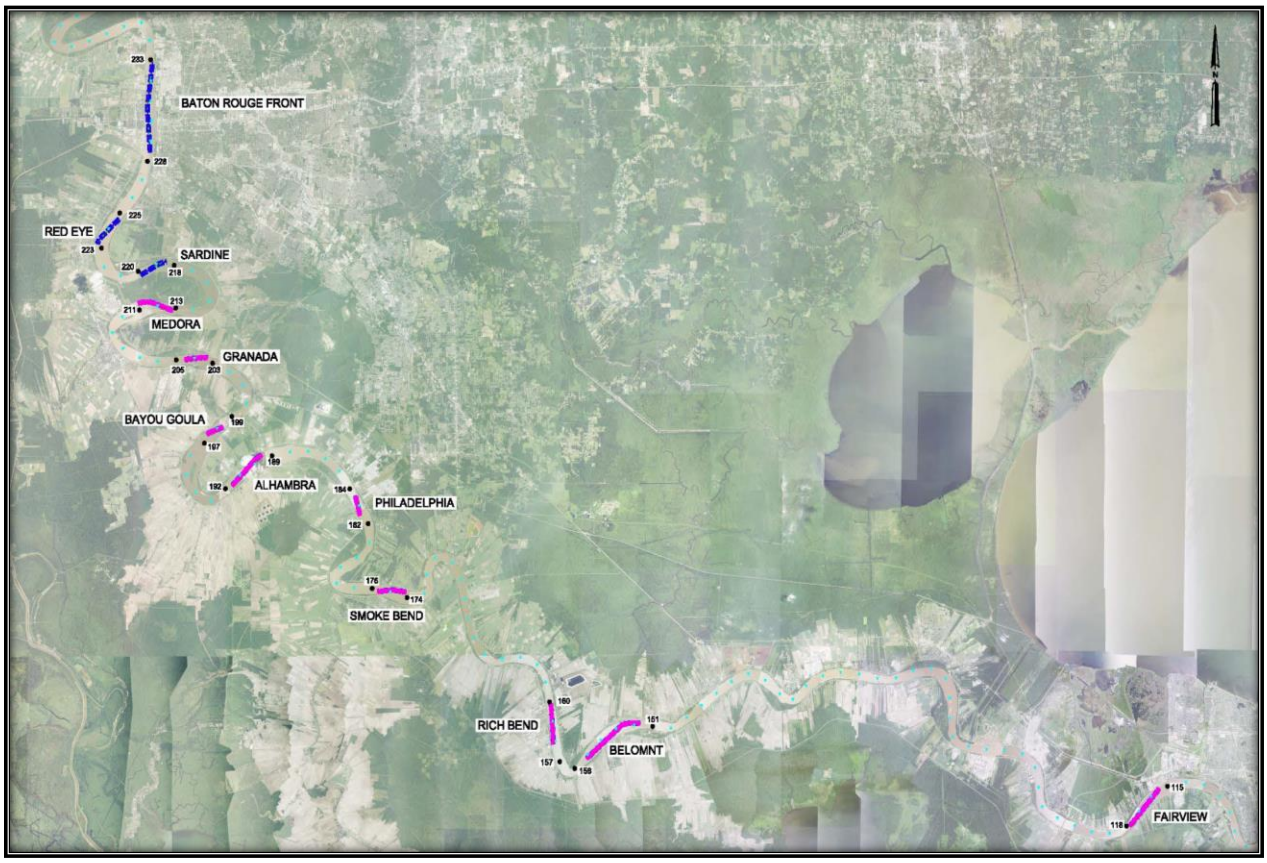


Figure 2 - Twelve Crossings within the Study Footprint

Commercial use may prove to be cost-effective. Throughout the project life, multiple scenarios will prevail within the project footprint where dredged material generally distributed back into the channel can be used on other projects. Any benefit to other projects could also be deemed a benefit to the economy. If the proper planning and coordination is implemented it's not unreasonable to think that a modest 20-25% of the material can be utilized for such uses. If the material is within a reasonable haul to other projects it could provide a material cost benefit to the economy of an estimated $5/CY. At the same time a portion of this material will not be

potentially back in the channel costing the Government a currently estimated [1]$3.21/CY on future dredging projects which ultimately reduces future O&M costs.

Use can range from highway projects, various construction projects, concrete products, backfill material, park areas or many more such uses. Various projects similar to this have already been performed and partnered with the (CPRA) Coastal Protection and Restoration Authority. More information pertaining to these projects can be found at the following web address: http://cims.coastal.la.gov/outreach/Default.aspx.

Should such market demand volume, dredging cost and use value be realized, net economic benefits to the project would be substantial.

Another potential use near the crossings would be habitat creation/restoration on the river batture. [2]The batture community develops on the slope between the natural levee crest and major streams/rivers. It is a pioneer community which is first to appear on newly formed sand bars and river margins. The area receives sands and silts with each flood. The soils are semi-permanently inundated or saturated. Soil inundation or saturation by surface water or groundwater occurs periodically for a major portion of the growing season. Consequently, dredged material could be used to make artificial batture sites that would ultimately provide habitat for wildlife as well as provide eco habitat for various plant species.

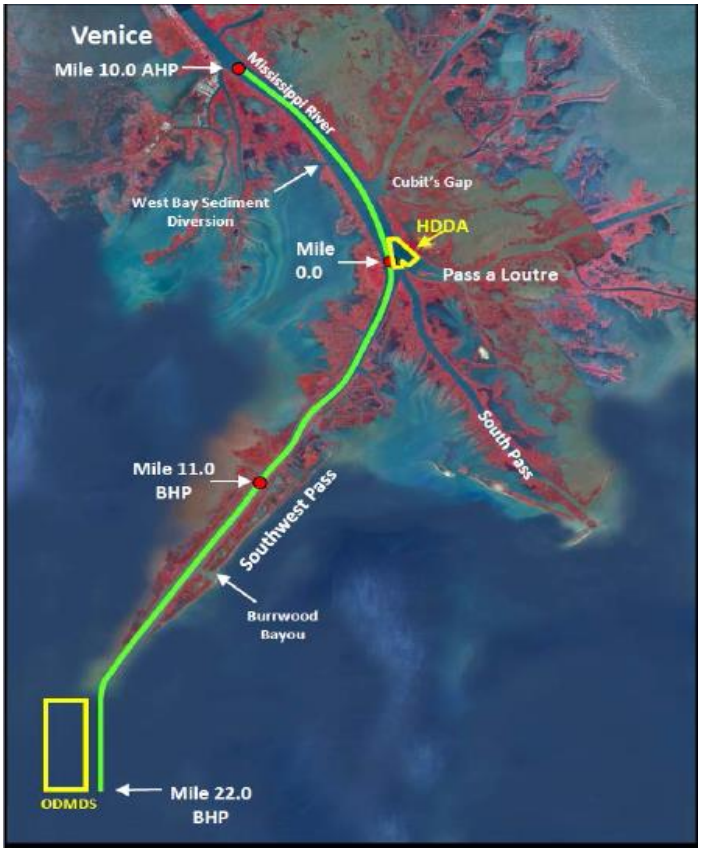
The potential development of batture nature parks can also be considered as a sub-option.

It should be noted that federal O&M dredging is mandated to employ least-cost methods. As such, the State (or other approved entity) would have to invest the additional dredging cost for stockpiling versus side-cast dredging. Beneficial use for habitat creation or rehabilitation, however, could be funded by the USACE Beneficial Use of Dredged Material (BUDMAT) authority.

10. Consider additional HDDA (Hopper Dredge Disposal Area) locations - There are presently two HDDA locations for dredge disposal sites as shown on the map 1 below. These two areas take dredged material from hopper dredge units. The site near Mile 0.0 is currently re-dredged and material is used for environmental restoration (ref. BUDMAT program). Apparently the present two HDDA disposal sites are filling up faster than the dredge material is being mined. Additional sites along the lower portion of the ship channel would reduce dredging costs by

reducing the time it takes to drive to each site, placed dredge disposal sediment and return to the dredge area.

There are no HDDA disposal sites for the upper reaches of this project (Ports of South Louisiana and Baton Rouge) where there are (12) crossings that are dredged annually. Generally these sites are dredged by dustpan dredges which distribute the vacuumed sediment materials only a short distance of around 500 – 1,000 feet from the point where the dredge is dredging. Having multiple HDDA disposal areas on the upper reaches of the ship channel would allow both hopper and cutter head dredges to deposit materials for dredging these crossing sites so that the State of Louisiana and/or the BUDMAT program could utilize these materials. Multiple HDDA sites in this stretch of the river would allow both hopper and cutterhead dredges to be used in the event that dustpan dredges were not available for dredging these crossings in the event this project was implemented with construction to follow at a fast pace to incur benefits sooner in the project schedule or overwhelm the dustpan dredging capability.
There are no cost saving shown for this alternative. However, creating multiple HDDA sites would provide a means of utilizing hopper and cutterhead dredges in the crossings and perhaps creating a stockpile for secondary dredging and beneficial use.



Present HDDA Locations

11. Include re-construction or upgrade of existing training structures in the lower river system

Existing rock and timber pile dike training structures in the lower river navigation system (SW Pass and Bar Channel) have deteriorated and have limited functionality. In order for the proposed project to be efficiently maintained (minimize O&M dredging) it is critical that these structures be upgraded. It is recommended that such work be added as part of the construction of this 50-ft channel upgrade or as an immediate order of O&M work.

12. Update MVN total dredging demand projections; address possible market impact -

Current navigation channel and other needs require about 90 - 100 million cubic yards (m c y) of dredging per year. Future planned navigation and coastal restoration projects indicate a potential significant expansion of the District's dredging program.

In the previous Dredging Program VE study of 2009 a rough attempt at estimating annual future dredging was made. These projections were updated in March 2015 and again for this study as indicated in the below tables. The first indicates maximum future dredging demand via inclusion of the Port of Baton Rouge maintained to a 50-ft channel depth and the second with the Port of Baton Rouge maintained at the current 45-ft depth with downstream reaches through the Port of South Louisiana deepened to 50-ft. In conjunction with other district projects, increased annual dredging demand could range from 30 – 60 mcy per year. This will be a substantial increase that may be realized in a relatively short period of time given authorization and funding of this project.

If the maximum level of increased dredging demand is realized two-to-four additional dustpan, cutterhead (or other large capacity) plants would be needed in a short period of time to meet this need (Ref. OD-T Memorandum of July 31, 2009 in 2015 (or 2009) Dredging Program VE Study estimating dredging plant requirements to accommodate the above program increase). For the high-end increase may require some government involvement to avoid plant shortage and associated performance and market impact (see next recommendation). A lower anticipated dredging demand would require less new plant and may not indicate government participation in fabricating new plant.

In addition to MVN future demand there may also be future increase in demand by other federal and state agencies. It will be important to include these entities in our regional dredging program near and long-term strategies. Given the extensive anticipated program expansion there appears to be a need to form a permanent standing management group to develop and execute such strategic planning.

MVN - ESTIMATED PROJECTED TOTAL DREDGING NEED THROUGH FY 2027; HIGH-END ESTIMATE (INCLUDES 50-FT CHANNEL THROUGH PORT OF BATON ROUGE)													Sep-16
	Project	Project	Year:	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027 ->
Area	Type	Total Estimated Dredging Quantity (million CY):		86	93	98	97	96	148	138	147	145	145	148
		ROUNDED:		90	90	100	100	100	150	140	150	150	150	150
MS River	CM	Mississippi River		42	42	42	42	42	42	42	42	42	42	42
	CM	Baton Rouge Harbor		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	CM	Baptiste Collette Navigation Channel Maintenance Dredging		0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	FPNAV	Baptiste Collette Navigation Channel Deepening							?					
	FPNAV	Baptiste Collette Navigation Channel Maintenance Dredging							?					0
	FPNAV	Inner Harbor Navigation Canal Lock Replacement							?					
	FPNAV	MS River Deepening							35	35	35	35	35	35
Barataria	FPLCA	MRGO Ecosystem Restoration							13	13	13	13	13	13
	FPLCA	LCA - MSR Delta Management (est max dredging)									5	5	5	5
	CM	Tiger Pass		1	1	1	1	1	1	1	1	1	1	1
	CM	Fourchon		0.03			0.03			0.03			0.03	
	FPLCA	Caminida Headlands Restoration		2.5	2.5									
	FPLCA	Shell Island Restoration		1.5	1.5									
	FPLCA	Bayou DuPont		3	3	3	3	3	3	3	3	3	3	3
Terrebonne	CM	Houma Navigation Canal (HNC) Bay and Bar			2			2			2			2
	FPNAV	HNC Deepening							1	1	1	1	1	1
	FPLCA	Terrebonne Basin Islands Restoration				10	10	10	10					
Atchafalaya	CM	Port of Iberia							?					?
	CM	Atchafalaya River		12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	CM	Atchafalaya Basin		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	CM	Freshwater Bayou				0.5				0.5				0.5
	CM	Calcasieu River		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	CM	Mermentau River/Basin		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
SW LA	FPLCA	SW Coastal									2.6	2.6	2.6	2.6
(General)	CM	GIWW		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	CM	Miscellaneoous New Orleans District Maintenance Dredging		7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	FPLCA	CWPPRA Projects		0.8 to 6	0.8 to 6	0.8 to 6	0.8 to 6							
			(average)	3.5	3.5	3.5	3.5							
	Other Projects Not Currently Identified and 'Contingency'			5	10	10	10	10	15	15	15	15	15	15
	CM	= *Current Channel Maintenennce*												
	FPNAV	= *Future Navigation Project*												
	FPLCA	= *Future Louisiana Coastal Area or State Master Plan Ecological Restoration Project*												

MVN - ESTIMATED PROJECTED TOTAL DREDGING NEED THROUGH FY 2027; LOW-END ESTIMATE (INCLUDES 50-FT CHANNEL THROUGH PORT OF SOUTH LA)													Sep-16
	Project	Project Year:	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027 ->
Area	Type	Total Estimated Dredging Quantity (million CY):	86	93	98	97	96	120	110	119	117	117	120
		ROUNDED:	90	90	100	100	100	120	110	120	120	120	120
MS River	CM	Mississippi River	42	42	42	42	42	42	42	42	42	42	42
	CM	Baton Rouge Harbor	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	CM	Baptiste Collette Navigation Channel Maintenance Dredging	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	FPNAV	Baptiste Collette Navigation Channel Deepening						?					
	FPNAV	Baptiste Collette Navigation Channel Maintenance Dredging						?					0
	FPNAV	Inner Harbor Navigation Canal Lock Replacement						?					
	FPNAV	MS River Deepening						10	10	10	10	10	10
Barataria	FPLCA	MRGO Ecosystem Restoration						13	13	13	13	13	13
	FPLCA	LCA - MSR Delta Management (est max dredging)								5	5	5	5
	CM	Tiger Pass	1	1	1	1	1	1	1	1	1	1	1
	CM	Fourchon	0.03			0.03			0.03			0.03	
	FPLCA	Caminida Headlands Restoration	2.5	2.5									
	FPLCA	Shell Island Restoration	1.5	1.5									
	FPLCA	Bayou DuPont	3	3	3	3	3	3	3	3	3	3	3
Terrebonne	CM	Houma Navigation Canal (HNC) Bay and Bar		2			2			2			2
	FPNAV	HNC Deepening						1	1	1	1	1	1
	FPLCA	Terrebonne Basin Islands Restoration			10	10	10	10					
Atchafalaya	CM	Port of Iberia						?					?
	CM	Atchafalaya River	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	CM	Atchafalaya Basin	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	CM	Freshwater Bayou			0.5				0.5				0.5
	CM	Calcasieu River	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	CM	Mermentau River/Basin	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
SW LA	FPLCA	SW Coastal								2.6	2.6	2.6	2.6
(General)	CM	GIWW	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	CM	Miscellaneoous New Orleans District Maintenance Dredging	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	FPLCA	CWPPRA Projects	0.8 to 6	0.8 to 6	0.8 to 6	0.8 to 6							
		(average)	3.5	3.5	3.5	3.5							
	Other Projects Not Currently Identified and 'Contingency'		5	10	10	10	10	12	12	12	12	12	12
	CM	= *Current Channel Maintenennce*											
	FPNAV	= *Future Navigation Project*											
	FPLCA	= *Future Louisiana Coastal Area or State Master Plan Ecological Restoration Project*											

13. Consider public-private partnership ('P3') for dredge plant construction - Current future dredging estimates indicate that if constructing and maintaining a 50-ft channel through the Port of Baton Rouge is implemented, dredging demand from the New Orleans District would increase by approximately 67% in a short period of time (see above recommendation). Given the fact that current dredging capacity is dictated by dredge availability, the projected quantity will far exceed the available dredge plant in and beyond the region.

While private industry will 'respond' to this need by manufacturing additional dredge fleet as projects progress, it is likely that such plant development will severely lag project demand. It isn't likely that private industry will produce more plant than is needed as they will perceive a risk of over-supplying intermediate need. Such projected constant shortages will likely limit bid completion and raise prices substantially.

A possible means of avoiding this problem may be government partnerships with private industry to fabricate new plants in advance of individual project need. Such partnerships are currently being encouraged by USACE (known as 'P3'). There are various 'lease/purchase' and other innovative procurement options that balance risk and optimize financial advantages between the government and industry. In general, the government can secure capital at relative low cost and industry can take tax advantages of ownership via depreciation deduction. Such advance fabrication of dredge plants could help in achieving adequate resource supply to meet projected project demand.

It is imperative to note that no entity within MVN (or the Corps at large) is currently tasked or has the proper means to pursue or develop the above suggested government participation in dredge plant fabrication. Also, current law may prohibit such as specifically related to dredging. District management should consider establishing a task force to address this (and perhaps other) resource availability issue(s). A detailed discussion defending the reversal of current policy and allowing expansion of the Federal dredge fleet can be found in the May 31, 2002 report entitled "The Case for the Federal Hopper Dredge Fleet on the Pacific Coast".

Federal Interest in Public-Private Partnerships

A roundtable policy discussion on P3 for Ports and Waterways was held in 2014 with members of various Port Commissions, the Waterways Council, and the Chief of Operations and Regulatory, HQ, Corps of Engineers and Chaired by U. S. Rep John Duncan (R-TN). The purpose

of the discussion was to examine the use and opportunities for P3s across all modes of transportation, economic development, public buildings, water and marine infrastructure.

In September of 2105, MVN and ASCE hosted a workshop with project stakeholders to discuss alternative financing concepts. Utilizing the P3 concepts, the IHNC Lock replacement as well as Larose to Golden Meadow Hurricane Protection Project were identified to focus on as pilot projects. The path forward was decided to engage P3 private sector expertise to complete in FY16, and to develop a P3 pilot program to develop a private investment plan for the two recommended projects. Once complete, use the lessons learned for future projects such as Morganza to the Gulf, SELA, and Comite.

There are also many organizations and support groups that have programs that can assist and facilitate P3 in projects such as the NCPPP (national Council for Public-Private Partnerships. See links below for event and federal participation examples:

http://www.ncppp.org/about/overview-mission/

http://www.ncppp.org/army-corps-to-solicit-public-comment-on-p3-pilot-program-for-water-projects/

http://federalp3summit.org/

http://www.ncppp.org/events/past-events/dodfederal-energy-water-forum-presentations/

14. Consider VE recommendations from Dredging Programmatic and BUDMAT studies -

A number of past VE studies contain additional recommendations applicable to this project that should be further considered. A summary list of such recommendations from two recent studies: *"MVN Dredging Program, July 2015", and "Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report, October 2014"*, is shown as **Appendix F.**

APPENDIX A - VALUE ENGINEERING JOB PLAN AND WORKSHOP AGENDA

VALUE ENGINEERING JOB PLAN AND WORKSHOP AGENDA

This workshop was conducted using the six-phase Value Engineering Job Plan as sanctioned by USACE and SAVE International. This process, as listed below, was executed as part of daily activities as described in the following Workshop Agenda:

USACE VALUE ENGINEERING JOB PLAN

(Information Phase)

At the beginning of the study, the project team presents current planning and design status of the project. This includes a general overview and various project requirements. Project details are presented as appropriate. Discussion with the VE Team enhances the Team's knowledge and understanding of the project. A field trip to the project site may also be included as part of information gathering.

(Function Analysis Phase)

Key to the VE process is the Function Analysis Process. Analyzing the functional requirements of a project is essential to assuring an owner that the project has been designed to meet the stated criteria and its need and purpose. The analysis of these functions is a primary element in a value study, and is used to develop alternatives. This procedure is beneficial to the team, as it forces the participants to think in terms of functions and their relative value in meeting the project's need and purpose. This facilitates a deeper understanding of the project.

(Creativity Phase)

The Creativity Phase involves identifying and listing creative ideas. During this phase, the team participates in a brainstorming session to identify as many means as possible to provide the necessary project functions. Judgment of the ideas is not permitted in order to generate a broad range of ideas.

(Evaluation Phase)

The purpose of the Evaluation Phase was to systematically assess the potential impacts of ideas generated during the Creativity Phase relative to their potential for value improvement. Each idea is evaluated in terms of its potential impact to cost and overall project performance. Once each idea is fully evaluated, it is given a rating to identify whether it would be carried forward and developed as an alternative, presented as a design suggestion, dismissed from further consideration or is already being done.

(Development Phase)

During the Development Phase, ideas passing evaluation are expanded and developed into value alternatives. The development process considers such things as the impact to performance, cost, constructability, and schedule of the alternative concepts relative to the baseline concept. This analysis is prepared as appropriate for each alternative, and the information may include an initial cost and life-cycle cost comparisons. Each alternative describes the baseline concept and proposed changes and includes a technical discussion. Sketches and calculations may also be included for each alternative as appropriate.

(Presentation Phase)

The VE Workshop concludes with a preliminary presentation of the value team's assessment of the project and value alternatives. The presentation provides an opportunity for the owner, project team, and stakeholders to preview the alternatives and develop an understanding of the rationale behind them.

VALUE ENGINEERING WORKSHOP AGENDA FOR:
Mississippi River Ship Channel – Re-evaluation

WORKSHOP DATE AND LOCATION: 13 – 15 September, 2016
New Orleans District Office – Room 328

Tuesday, 13 Sep

9:00 AM – 5:00 PM (START WORKSHOP)

Introductions

VE Facilitator presents overview of VE process and workshop schedule

(INFORMATION PHASE)

Project Manager (PM) presents project overview

Technical Manager(s) present current design status

VE Facilitator leads discussion to:

. Identify, discuss and list project general and specific project issues

. Identify, discuss and list project performance standards and attributes

(FUNCTION ANALYSIS PHASE)

VE Facilitator leads group to develop project Function Analysis System Technique (F.A.S.T.) Diagram

Wednesday

9:00 AM – 5:00 PM

VE Facilitator leads the following:

Review of project issues, performance attributes and functions

(CREATIVITY PHASE)

Conduct and document idea brainstorming session

(ANALYSIS PHASE)

Conduct and document idea screening

(DEVELOPMENT PHASE)

Assign recommendation write-ups

Present write-up format

Thursday

9:00 AM – 5:00 PM

Complete write-ups of recommendations

Presentation meeting of workshop results to be held at a later date.

APPENDIX B: WORKSHOP PARTICIPANT ROSTER

MISSISSIPPI RIVER SHIP CHANNEL VALUE ENGINEERING WORKSHOP 13 - 15 SEP 2016			
NAME	**ORGANIZATION**	**E-MAIL**	**PHONE**
Frank Vicidomina (Facilitator)	CEMVN-PM	Frank.Vicidomina@usace.army.mil	(504) 862-1251
John Eblen (Co-facilitator)	CEMVN-PM-W	John.L.Eblen@usace.army.mil	(504) 862-1855
Jeromy Carpenter (Primary VE Team)	CEMVM-EC-D	Jeromy.G.Carpenter@usace.army.mil	(901) 544-0810
Zachary Cook (Primary VE Team)	CEMVM-EC-H	Zachary.H.Cook@usace.army.mil	(901) 544-3387
Norm Newman (Primary VE Team)	CEMVM-EC-G	Norman.E.Newman@usace.army.mil	(901) 544-3815
Steve Keen (PM)	CEMVN-PM-BC	Steven.E.Keen@usace.army.mil	(504) 862-2915
Michelle Kornick	CEMVN-OD-C	Michelle.S.Kornick@usace.army.mil	(504) 862-1842
Mark Haab	CEMVN-PDE-N	Mark.E.Haab@usace.army.mil	(504) 847-1903
Rick Broussard	CEMVN-ED-LW	Richard.W.Broussard@usace.army.mil	(504) 812-2402
Keith O'Cain	CEMVN-ED-L	**Keith.J.O'Cain@usace.army.mil**	
Leslie Lombard	CEMVN-ED-ST	Leslie.Lombard@usace.army.mil	(504) 862-2490
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Eric Salamone	CEMVN-ED-SC	Benjamin.E.Salamone@usace.army.mil	(504) 862-1676
Jennifer Vititoe	CEMVN-PD	Jennifer.M.Vititoe@usace.army.mil	(504)862-1282
Sharon J. Balfour	DOTD	Sharon.Balfour@la.gov	(225) 379-3035
Bijan Khaleghi	CEMVN-EDS	Bijan.Khaleghi@usace.army.mil	(504) 862-2736
Tim Axtman	CEMVN-PD	Timothy.J.Axtman@usace.army.mil	(504)862-1921
Chris Collins	DOTD	Christopher.Collins@la.gov	
Phillip Jones	DOTD	Phil.Jones@la.gov	

APPENDIX C: PROJECT ISSUES AND PERFORMANCE ATTRIBUTES

As part of a comprehensive value analysis process, project issues were identified and discussed by the VE Team, PDT and Local Sponsors. Directly addressing these issues was included referred to as part of the Creativity Phase along with individual project functions in the F.A.S.T. diagram illustrated in ***Appendix D****.*

Five 'evaluation criteria' used by the PDT in screening alternative measures were established as VE 'Performance Attributes' used as a means of determining idea viability.

Anticipated construction features were identified and order of magnitude cost estimates were developed in order to provide some relative basis for proposal comparison, where applicable.

PROJECT ISSUES

1. 45 ft depth limit creates shipping **inefficiencies** (due to light loading)

2. Safety Concerns with widths (decreases from >750 ft to 500 ft)

3. Maintenance Inefficiencies: At times of **high shoaling rates**, the deposition of sediment is higher

4. Saltwater intrusion – Low Risk
    - Flocculation changes only impacts SWP
    - Limited impacts due small potential changes in depths (1.5 ft)
    - Limited impacts to salt water sill activation
    - Lower channel has already migrated from a 45 MLLW depth to a 48 MLLW
    - No observed changes in the frequency of activation
    - 3D model being conducted to fully understand the Flocculation Process
    - No expected changes to the TSP based on results

5. Relative Sea Level Rise Impacts – Low Risk
    - Impacts to lower channel only
    - Limited impacts on plan selection

- Key assumption: Operations would continue to maintain existing bank lines
- High RLRS rates could reduce disposal cost. (More open water near channel)
- Deposition of material could vary by location
- 2D model is currently being conducted
- Annual O&M could be reduced, since 1D results assumed all shoaling occurred in Navigation channel

6. Relocations – Low Risk
    - Expect all Relocations not to be a concern once fully investigated

7. Substantial increase in annual MVN dredging demand.

8. State strongly supports project through Baton Rouge

9. May not have accounted for new plants announced.

10. Benefits start after 4-yr construction

11. Dredge disposal plan.

12. Will disposal from crossings shoal other channel locations?

13. Added duration time to dredge crossings deeper; need for added plant.

14. Funding availability impact on keeping crossings open (dredged to full depth)

15. May be opportunity to improve crossing shoaling (soft dikes, etc.)

16. Current channel training features are not funded for repairs.

17. Can funds for this project (construction) be used to repair upgrading jetties, etc.

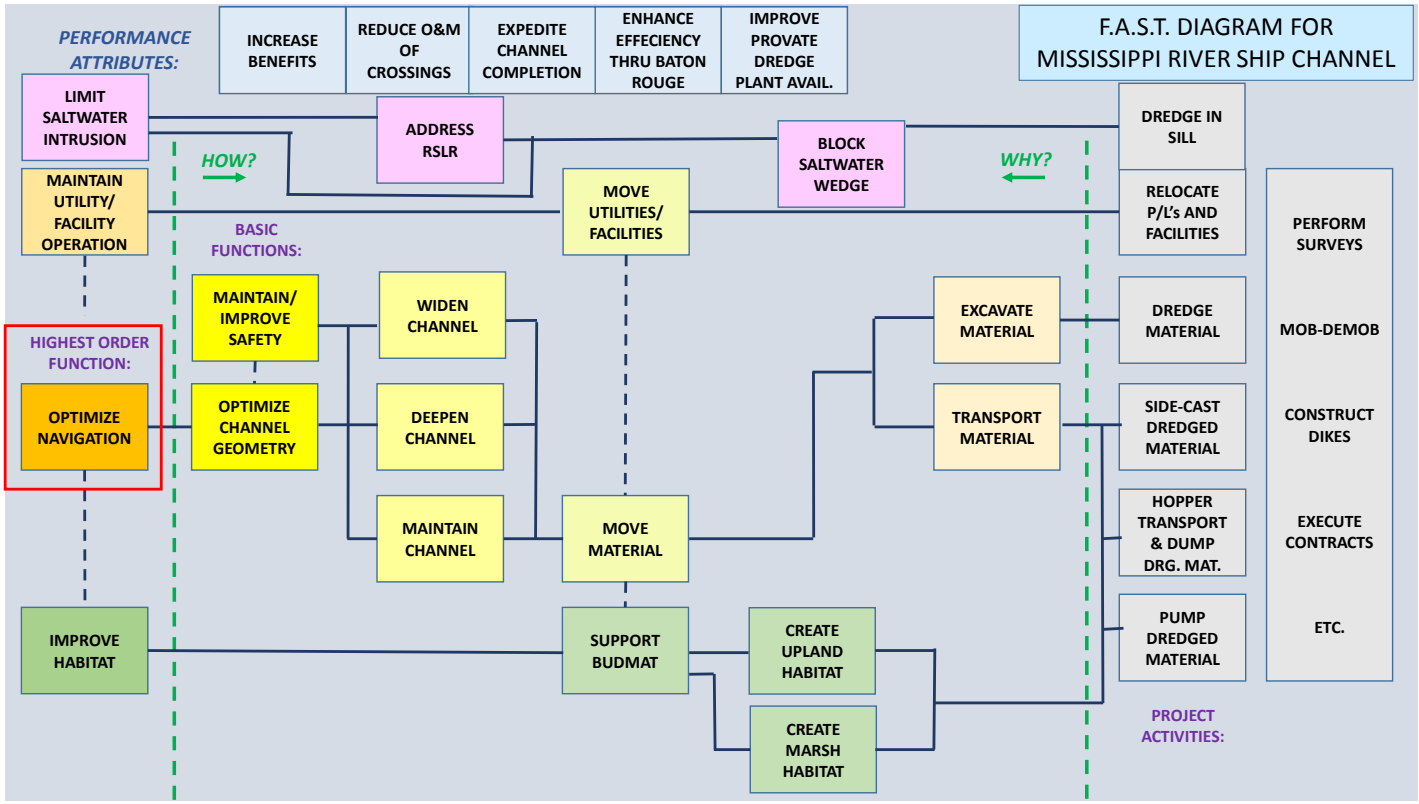
18. Are up-state benefits included?

PERFORMANCE ATTRIBUTES

The VE Team used the following evaluation criteria, also defined in the VE process as 'performance attributes', that were established by the PDT in screening project alternative measures:

1. Increase benefits
2. Reduction of operation cost of crossings
3. Expedite channel completion
4. Enhancing project efficiency through Baton Rouge
5. Improves private plant competitiveness and availability

APPENDIX D: FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM



APPENDIX E: SPECULATION LIST

		MISSISSIPPI RIVER SHIP CHANNEL - VE SPECULATION LIST - PAGE 1
===	==	==========
AR	1	Update MVN total dredging demand projections; address possible market impact
AR	2	Consider VE recommendations from Dredging Programmatic and BUDMAT studies
AR	3	Look for opportunities to piggyback CPRA and other State projects; use dredged material
w/3	26	Create batture park(s) - coordinate with state Parks
w/3	29	Explore possible multi-purpose useage for dredged material
AR	8	Evaluate benefits of construction of training structures (soft dikes, etc.)
w/8	41	Add line item construction cost for training works TBD; reduce O&M accordingly
AR	10	Expedite construction; open So LA d/s earlier than 4-years
AR	17	Reconcile benefits caculation with state
w/17	5	Consider economics to include other states and future plants, and development
w/17	6	Re-evaluate future economic development on the river
AR	20	Dredge crossings in BR area from u/s to d/s
AR	30	Stockpile dredged material; bid out or free to other users
w/30	21	Designate batture sites along crossings for disposal and re-use
w/30	25	Find use for dredged material from crossings (road projects, etc.)
w/30	27	Consider d/s dredging reduction benefit of removing material from the river
AR	31	Consider additional HDDA locations
AR	34	Do extensive planning for P/L relocations to minimize time
AR	36	Do P3 on dredge plant construction
w/36	4	Consider design-build
w/36	12	Investigate measures to increase dredging competition/availability
AR	37	Include re-construction or upgrade of existing training structures project construction
AR	38	Re-vist / review dredge / validate material calculations for crossings
AR	42	Composite recommendation: Re-visit benefits, add training features and reduce O&M,
AR	43	Re-calculate B/C ratios with inclusion of training dikes and advance benefits to So LA
AR	40	**Construct project through B.R. with limited recommended contingient future O&M; re-eval after 10-years**
XBD	39	Show alternative cost in present worth (billions)
XBD	9	Experiment with new dredging technology
XBD	15	Keep integral project thru Baton Rouge
XBD	16	Factor sponsor preference in plan selection
XBD	23	Fully fund project construct at one time (eliminate mob-demob costs)
XBD	24	Use corps dredges for construction
XBD	28	Consider RSLR in channel depth
XBD	35	Comminate with industry on potential MVN dredging future demand
		construct through Baton Rouge with contingient O&M limits; re-eval in 10-years
X	7	Look at 48 ft in Baton Rouge; 50-ft So LA and d/s
X	11	Get rid of restrictions on federal dredges
X	13	Change OMB policy on 2.5 B/C ratio for funding priority
X	14	Do not use 2.5 B/C as project selection criterion
X	18	Extend railroad to move navigation goods
X	19	Construct P/L along river (east and west banks)
X	22	Assign monetary benefits to environmental use of dredged material
X	32	Construct locks and dam with diversions
X	33	Construct diversion/navigation channel off the river
		AR = Alternative Recommendation; X = Idea Eliminated; XBD = Being Done; 'w/xx' = Combin Item

**APPENDIX F: List of Recommendations from Previous Recent VE Studies: "*MVN Dredging Program, July 2015", and "Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report,*
October 2014",**

Summary of VE Recommendations – MVN Dredging Program, July 2015:

PROGRAM MANAGEMENT

1. Develop future dredging needs schedule to include planned navigation, environmental restoration and other proposed projects
2. Build more dredging plant by means of direct government assistance or partnership with private industry
3. Pursue changing restrictions on the use of the Dredge Wheeler
4. Expand local sponsor partnership opportunities
5. Submit projects for GOMESA funding
6. Conduct expanded-scope regional dredging coordination; Revise Gulf Coast Cutterhead Group
7. Create regionalization demonstration project of appropriations for all MVN projects
8. Create a formal Gulf Coast Corps Authority Management Strategy for Dredging
9. Get more funds allocated during Continuing Resolutions
10. Perform dredging on biannual basis to maximize the amount of dredging for a given dollar
11. Conduct lessons learned workshops, to include contractors, for continued improvement of program
12. Establish a standardized database for dredging information input, sharing, and use

CONTRACT OPTIONS

13. Shorten dredging contracts to free up equipment; Optimize contract length to reflect actual production rate
14. Analyze efficiency of equipment usage
15. Utilize more Request for Proposal (RFP) contracts when a low number of bidders are anticipated
16. Use options contract to address limited end-of-year funds
17. Use base + future year(s) option contracts; Award multi-year open-by-amendment contracts for dredging
18. Include options to contract for multiple federal projects within a certain proximity to minimize mobilization/demobilization to extent possible

19. Use location-based IDIQ contract

20. Obtain waiver for Continuing Contract Clause where policy is driver

21. Change incentive clause pay ratio form 1:1 to a more favorable percentage for the government

TECHNICAL CONSIDERATIONS

21. Use side-cast dredge (e.g. McFarland, Merritt) for demonstration project, especially in the Atchafalaya River Bar Channel
22. Re-visit 2007 hopper pump-out review analysis for Mississippi River Dredging
23. Utilize permanent pipelines for material placement where advantageous
24. Include some upland and intermediate elevation for marsh creation dredged material placement
25. Excavate previously utilized dredge upland placement sites for use on other projects
26. Consider beneficial used placement of material via advance maintenance over-dredging of channel within authorized depth; pay difference with BUDMAT funds
27. Dredge sediment traps consistent with beneficial use

Summary of VE Recommendations – Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report, October 2014

1. Modify Recently Awarded HDDA Dredging Contract to Include BUDMAT Features

2. Endorse Fish and Wildlife Service (FWS) Proposed Island/Delta Alternative

3. Obtain Advance O&M Funds in FY 15 and Combine with BUDMAT Work

4. Eliminate Hopper Release to HDDA; Pump Out to BUDMAT Target Areas

5. Consider Advanced Maintenance Over-Dredging of Channel

6. Create Sediment Trap(s) via Dredging the West Side of the River (Coast Guard Anchorage Area)

7. Amend NEPA to Allow Higher Island and/or Marsh Elevation

8. Increase Contract Performance Period (HDDA Dredging)

9. Consider purchasing all land for all alternatives up-front

10. Build Sediment Trap(s) Near Venice for BUDMAT Marsh/Island Creation West and Northwest of Venice (Future BUDMAT Project)

APPENDIX G: PROJECT INFORMATION PRESENTATION

Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Phase III

20 Sept 2016 - TSP Milestone
USACE
New Orleans District
Regional Planning
Environment Division
South

Planning Chief: Troy Constance
Senior PM: Marti Lucore
PM: Steve Keen
Planner: Travis Creel and Jennifer Vititoe

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

US Army Corps of Engineers
BUILDING STRONG®

Legislative Authority and Construction

Project Authority:

- 1985 Supplemental Appropriations Act (PL-99 88) Authorized for construction
- 1986 - Record of Decision
- 1986 - Water Resources Development Act (PL 99-662) formalized the project cost-sharing provisions
- Project Authorized to a depth 55'
- Agreement with NFS currently only supports construction and maintenance to a depth of 45'

Non-Federal Sponsor: The Louisiana Dept. of Transportation and Development

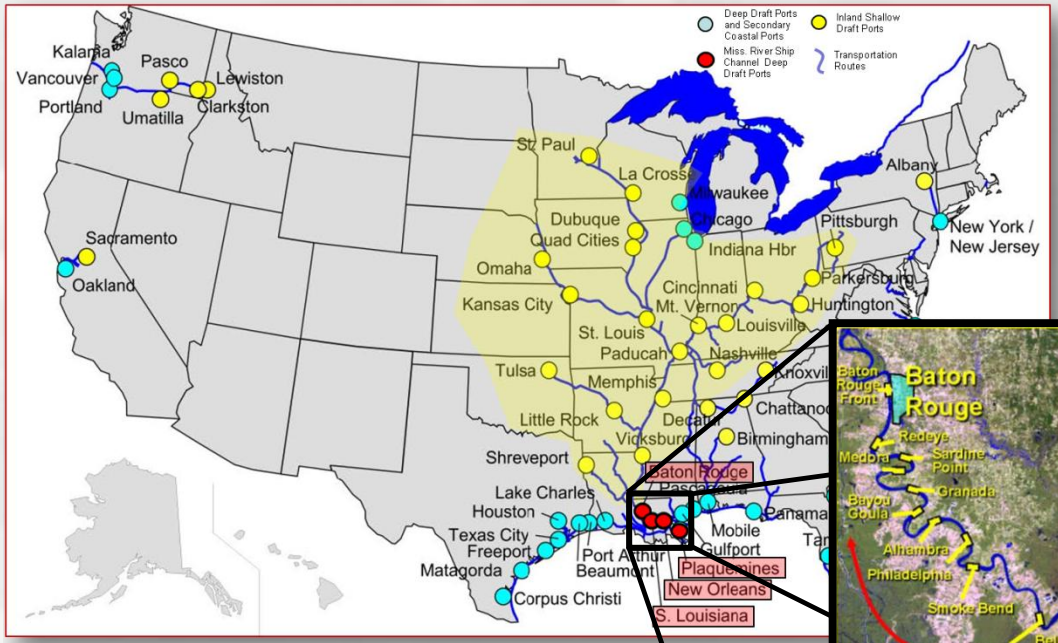
- Construction in December of 1987 and provided for a depth of 45 feet from Donaldsonville, LA (Mile 181.0) to the Gulf of Mexico

- Construction in December 1994 involved deepening of the MRSC to 45 feet between Donaldsonville, LA (Mile 181.0) to Baton Rouge and included dredging eight river crossings

Initiate General Reevaluation Report

- LaDOTD supported construction if building a 50 foot deep channel is viable

Study Area


Deep Draft Ports and Secondary Coastal Ports
Inland Shallow Draft Ports
Miss. River Ship Channel Deep Draft Ports
Transportation Routes
Kalama
Vancouver
Portland
Pasco
Umatilla
Lewiston
Clarkston
Sacramento
Oakland
St. Paul
La Crosse
Milwaukee
Chicago
Dubuque
Quad Cities
Omaha
Kansas City
Indiana Hbr
Pittsburgh
Albany
New York / New Jersey
Parkersburg
Huntington
Cincinnati
Mt. Vernon
Louisville
St. Louis
Paducah
Nashville
Tulsa
Memphis
Little Rock
Decatur
Vicksburg
Birmingham
Shreveport
Baton Rouge
Lake Charles
Houston
Texas City
Freeport
Matagorda
Port Arthur
Beaumont
Mobile
Gulfport
Plaquemines
New Orleans
S. Louisiana
Corpus Christi

Mississippi River
Baton Rouge to the
Gulf of Mexico
Baton Rouge
Baton Rouge Front
Redeye
Medora
Sardine Point
Granada
Bayou Goula
Alhambra
Philadelphia
Smoke Bend
Belmont
Rich Bend
45' x 500'
Fairview
New Orleans
Crossings
Mile 104.5
Mississippi River
45' x 750'
New Orleans Harbor
Head of Passes
(Mile 0)
Southwest Pass
Mile 18.0 BHP
45' x 600'
Mile 22 BHP
Gulf of Mexico

Problems/Opportunities

Purpose: The purpose of the GRR is to evaluate the depth that creates the greatest net benefits up to a depth of 50 ft, in order to proceed to implementation of deepening the MRSC from the current depths*

Problem: Transportation Cost Inefficiency

- 45 ft depth limit creates shipping **inefficiencies** (due to light loading)
- Safety Concerns with widths (decreases from >750 ft to 500 ft)
- Maintenance Inefficiencies: At times of **high shoaling rates**, the deposition of sediment is higher

Opportunities:

- Reduce light loading
- Allow for easier maneuvering
- Efficiencies of operation and maintenance dredging intervals

*Maintained Conditions for the Lower Mississippi River (~ Mile 12 Above Head of Passes (AHP) to the Gulf through Southwest Pass) are at a depth of 48.5 ft.

Study Characteristics/Issues:

- Maintenance frequency not typical when compared to the rest of the nation
- Changing laws related Cost Share Agreement
- Multiple ports on one waterway (Largest model built or run by PCX)

TSP Selection Criteria:

- Intent of the study is to identify the next increment of construction for the entire channel based on:
  - Benefit to Cost Ration greater than 1
  - Net Excess Benefit to the nation
- Results in a Director's Report to justify the next construction increment

Alternatives Considered at AMM

Initial Array:

- Alt1 Exist45:

  45 ft depth with a 500 ft channel width at the crossings,

  45 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

  45 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

- Alt2 Exist48:

  48 ft depth with a 750 ft channel width at the crossings,

  48 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

  48 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

- Alt3 Exist50:

  50 ft depth with a 750 ft channel width at the crossings,

  50 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

  50 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

Screening Alternatives Considered

Consideration of Channel Width:

- Limited safety concerns related to channel widths with current shipping fleet
- Safety will be a concern with future shipping fleets as ship length increases

Result: Limited alternatives to varying channel depths only

Consideration of Existing Channel Depth:

- MVN Operations Division (MVN OD): “No changes to the current dredging depths for SW Pass until the MRSC Deepening Study can be completed”

Result:

- Alt 1 Exist45 became the “Appropriated” conditions for evaluations
- No Action Alternative became a base condition with a depth of 48 ft in Lower MS River

Revised Focus Array

Permutations: Combination of depths for Lower Mississippi and Crossings Considered

- Lower MS 48 ft Condition to 45 ft; Crossings remain at 45 ft (Appropriated Condition)
- Lower MS from 45 ft to 48 ft; Crossings remain at 45 ft
- **Lower MS remains at 48 ft; Crossings remain at 45 ft (Base Condition)**
- **Lower MS remains at 48 ft; Crossings deepened from 45 ft to 48 ft**
- **Lower MS deepened from 48 ft to 50 ft; Crossings deepened from 45 ft to 50 ft**
- Lower MS deepened from 48 ft to 50 ft; Crossings remain at 45 ft
- Lower MS deepened from 48 ft to 50 ft; Crossings deepened from 45 ft to 48 ft

Revised Focused Array (TSP Decision)

- **Appropriated Condition:** 45 ft (existing depth, Crossings) and 45 ft (Lower MS River)
- **Alternative 1 (No action/Base Condition):** 45 ft at Crossings) and 48 ft in Lower MS River)*
- **Alternative 2**: Lower MS at 48 ft and Crossings at 48 ft
- **Alternative 3**: Lower MS 48 ft to 50 ft and Crossings 45 ft to 50 ft

*Per ER 1110-2-8160, all depths should be reported in a Mean Lower Low Water (MLLW) tidal datum for all official documentation. Maintained Conditions for the Lower Mississippi River (~ Mile 12 Above Head of Passes (AHP) to the Gulf through Southwest Pass) are at a depth of 48.5 ft. Data point rounded to 48ft for economic models.

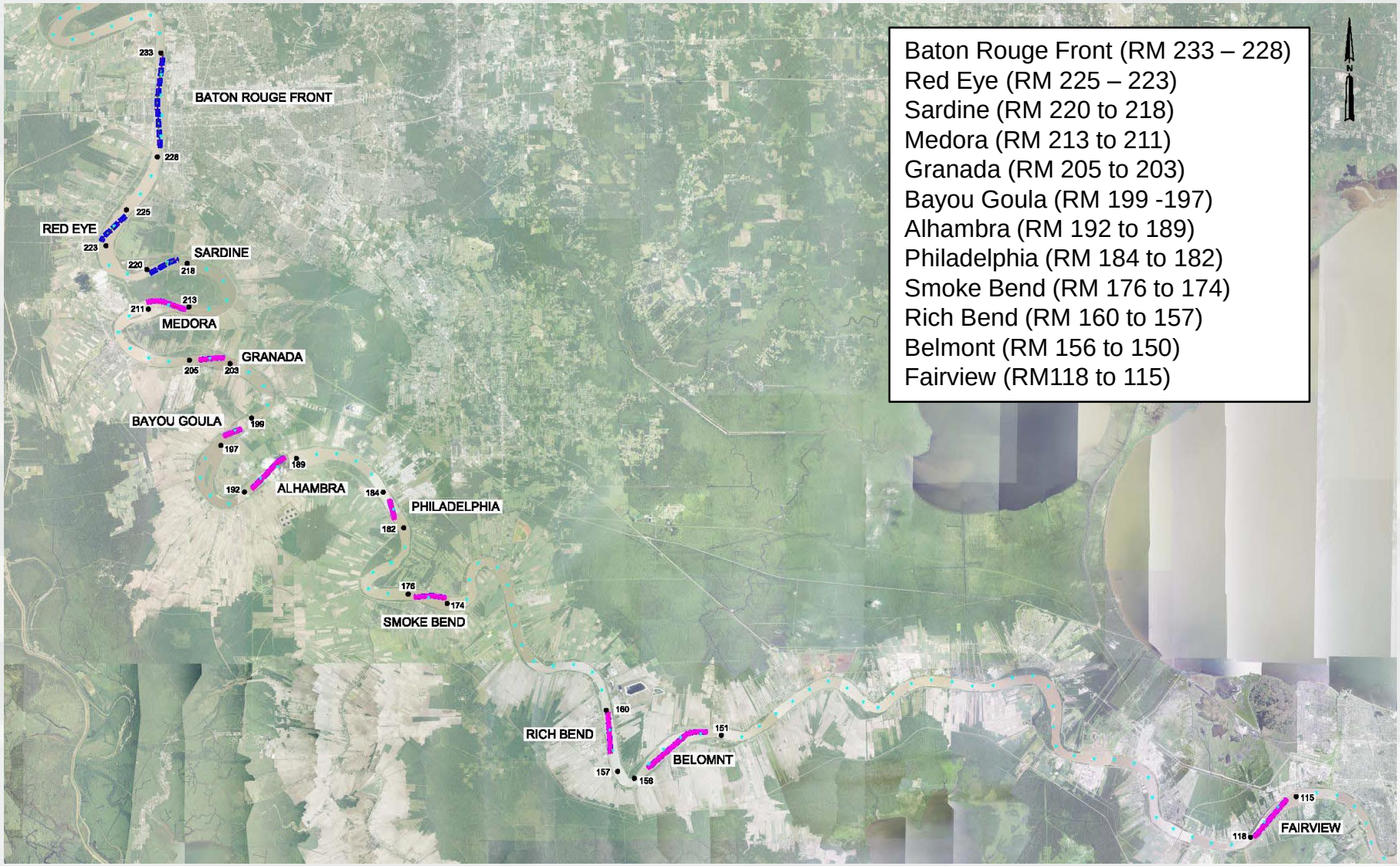
Engineering Evaluations

Areas of evaluations:

- Existing and Possible Future MS River Crossings
- Lower MS: Southwest Pass and Bar Channel (Divided for cost estimates)

- All other areas naturally deeper than the authorized depth
- Used existing dredging and 1D model to develop construction and O&M cost
- Due to the limited change in depth between 48 ft and 50 ft in SWP, 2D and 3D not needed at this phase of study

Engineering: Crossings



Baton Rouge Front (RM 233 – 228)
Red Eye (RM 225 – 223)
Sardine (RM 220 to 218)
Medora (RM 213 to 211)
Granada (RM 205 to 203)
Bayou Goula (RM 199 -197)
Alhambra (RM 192 to 189)
Philadelphia (RM 184 to 182)
Smoke Bend (RM 176 to 174)
Rich Bend (RM 160 to 157)
Belmont (RM 156 to 150)
Fairview (RM118 to 115)

Engineering: Southwest Pass

Cubits Gap to Head of Passes Reach

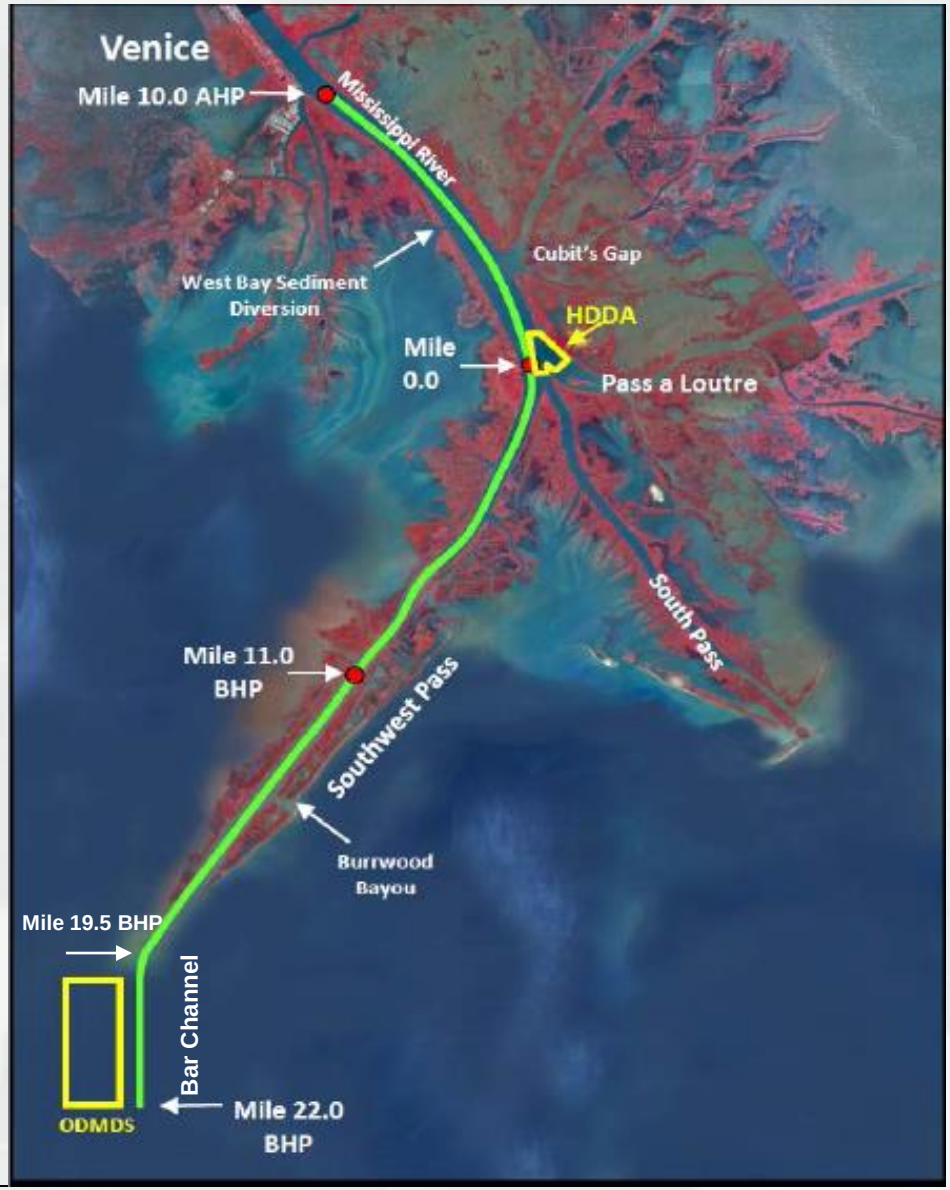
RM 7.0 or 6.0 AHP to RM 0.5 BHP

Southwest Pass

RM 0.5 BHP to RM 19.5 BHP

Bar Channel and Jetties

RM 19.5 BHP to RM22 BHP



Engineering

Engineering Assumptions: Construction, O&M and Disposal

	Construction Method	O&M Method	Disposal Method
Crossings	Dustpan Dredge	Dustpan Dredge	Material Placed Downstream in Channel
Southwest Pass	Cutter Head Dredge	Combination of Cutterhead and Hopper Dredges	Disposal Site
Bar Channel	Hopper Dredge	Hopper Dredge	Disposal Site

- Construction: 4-yr construction duration
- Operations and Maintenance: 3 dredge cycles per year
- Documented in risk register (assumed current dredging practices would be conservative)

Engineering:
Construction from Appropriated Condition
Lower MS only

45 ft to 48 ft		
	Construction Quantities (CY)	Construction Cost
Crossings	N/A	$84,939,642
Southwest Pass	21,204,000	
Bar Channel	1,905,200	
Total	23,109,200	

Considers constructing the Lower Mississippi, from the appropriated 45 ft depth to the existing condition of 48 ft

Plan Formulation – Economic Results

Construction from Appropriated Condition Lower MS only

MRSC – SWP and Bar Channel	
Average Annual Benefits and Costs (3.125%)	
Channel Alternative	**From 45 ft to 48 ft**
First Cost of Construction	$84,939,642
Average Annual Cost	3,541,763
Average Annual Increm. O&M	None
Total Average Annual Benefits	$45,922,826
B/C Ratio	13.0

O&M Cost for SWP and Bar Channel is equal for all depths, no incremental cost

SWP and Bar Channel at current depth of 48 ft MLLW is economically justified; based on ROM estimates

Negative benefit of $46M annually if channel returned to 45 ft MLLW depth

No detailed economic runs were performed

Engineering

Construction from Base Conditions

Alternative 1: No Action		
	Construction Quantities (CY)	Construction Cost
Total	None	None
Alternative 2		
	Construction Quantities (CY)	Construction Cost
Crossings	5,467,000	$88,663,029
Southwest Pass	N/A	
BarChannel	N/A	
Total	5,467,000	
Alternative 3		
	Construction Quantities (CY)	Construction Cost
Crossings	8,588,600	$180,576,499
Southwest Pass	18,281,000	
BarChannel	1,619,000	
Total	28,488,600	

Base Conditions: Uses the existing 45 ft depth in Crossings, and 48 ft in Southwest Pass and Bar Channel

Alternative 1 45 ft depth (no action): Crossings, Southwest Pass, and Bar Channel would all remain at current depth and width, no construction cost

Alternative 2 48 ft depth: Bar Channel and Southwest Pass remain at the current depth of 48 ft, and Crossings are deepened from existing 45 ft to 48 ft

Alternative 3: 50 ft depth: Bar Channel and Southwest Pass are deepened from existing 48 ft to 50, and Crossings are deepened from existing 45 ft to 50 ft

Engineering:

O&M Dredging (Sediment) Only

Alternative 1: No Action			
	Current O&M Quantities (CY)	Current O&M Expenditures	Incremental Cost Increase
Crossings	19,419,180	$23,969,413	N/A
Alternative 2			
	O&M Quantities	O&M Cost	Incremental Cost Increase
Crossings	38,397,000	$124,308,045	$100,338,632
Alternative 3			
	O&M Quantities	O&M Cost	Incremental Cost Increase
Crossings	48,377,000	$155,451,482	$131,482,069

- Incremental difference of dredging of the crossings only
- Alternative 1:
  - Quantities and Cost reflects the 5 year average of actual expenditures from Operations
  - Cost reflect an average cost of $1.25 per cubic yard over the last 5 years
- Alternatives 2 and 3:
  - Quantities include the neat line estimate only
  - Cost includes a 20% increase in quantities for over depth
  - Cost reflect a cost of $1.94 per cubic yard (conservatively used cost of more expensive dustpan dredge)
  - Cost includes PED (6%) and S&A (8%), and a risk based contingency
- Other O&M items for dredging of SWP and Bar Channel, and repair of training works remains constant for all alternatives. There is no increase is shoaling and dredge material between 45 ft, 48 ft, and 50 ft

Engineering – Total O&M

Alternative 1: No Action			
	Current O&M Quantities (CY)	Current O&M Budget	Incremental Cost Increase
Total	35,318,498	$200,000,000	N/A
Alternative 2			
	O&M Quantities (CY)	O&M Cost	Incremental Cost Increase
Crossings	38,397,000	$300,007,021	$100,007,021
Southwest Pass	18,500,000		
BarChannel	3,750,000		
Total	60,647,000		
Alternative 3			
	O&M Quantities (CY)	O&M Cost	Incremental Cost Increase
Crossings	48,377,000	$331,446,950	$131,446,950
Southwest Pass	18,500,000		
BarChannel	3,750,000		
Total	70,627,000		

- **Cost for the No Action Alternative is based on Operations Divisions annual capabilities if fully funded. Quantities for the No Action Alternative are based on annual average of dredge quantities over the last 5 years**
- **O&M capabilities for the current project include the following:**
  - Dredging SWP (including the bar channel) and the crossings;
  - Dredging of New Orleans Harbor Access Area and Hopper Dredge Disposal Area
  - Repair of SWP foreshore rock & jetty repairs
  - Repair of SWP pile dire repair
  - Annual Saltwater Barrier Sill
- **Incremental Cost Increase reflects the increased O&M cost for each alternative above the current O&M capabilities**

Permutations

	Permutations						
	Appropriated		Alternative 1 (no action)	Alternative 2	Alternative 3	Alternative 3a	Alternative 3b
Change in depth at lower MS	48’ to 45’	45' to 48'	48' to 48'	48' to 48'	48' to 50'	48' to 50'	48' to 50'
Incremental O&M Cost	$0	$0	$0	$0	$0	$0	$0
Construction Cost	N/A	$84M	$0	$0	$80M	$80M	$80M
Change in depth at crossings	45' to 45'	45' to 45'	45' to 45'	45' to 48'	45' to 50'	45' to 45'	45' to 48'
Incremental O&M Cost	$0	$0	$0	$100M	$131M	$0	$100M
Construction Cost	$0	$0	$0	$89M	$101M	$0	$89M
	Totals						
Total Incremental O&M Cost	$0	$0	$0	$100M	$131M	$0	$100M
Total Construction Cost	$0	$59	$0	$89M	$181M	$80M	$169M
Total Average Annual Cost	- $3.5M	$3.5M	N/A	$103M	$139M	$3.4M	$107M
Total Average Benefits	- $45.9	$45.9M	N/A	$105M	$147M	$10.8M	$116M
Net Excess Benefits	- $42.3	$42.3M	N/A	$1.9M	$8.1M	$7.4M	$9.4M
B/C Ratio	N/A	13.0	N/A	1.02	1.06	3.18	1.09

* Model uses existing conditions of SWP and Bar Channel at 48 ft

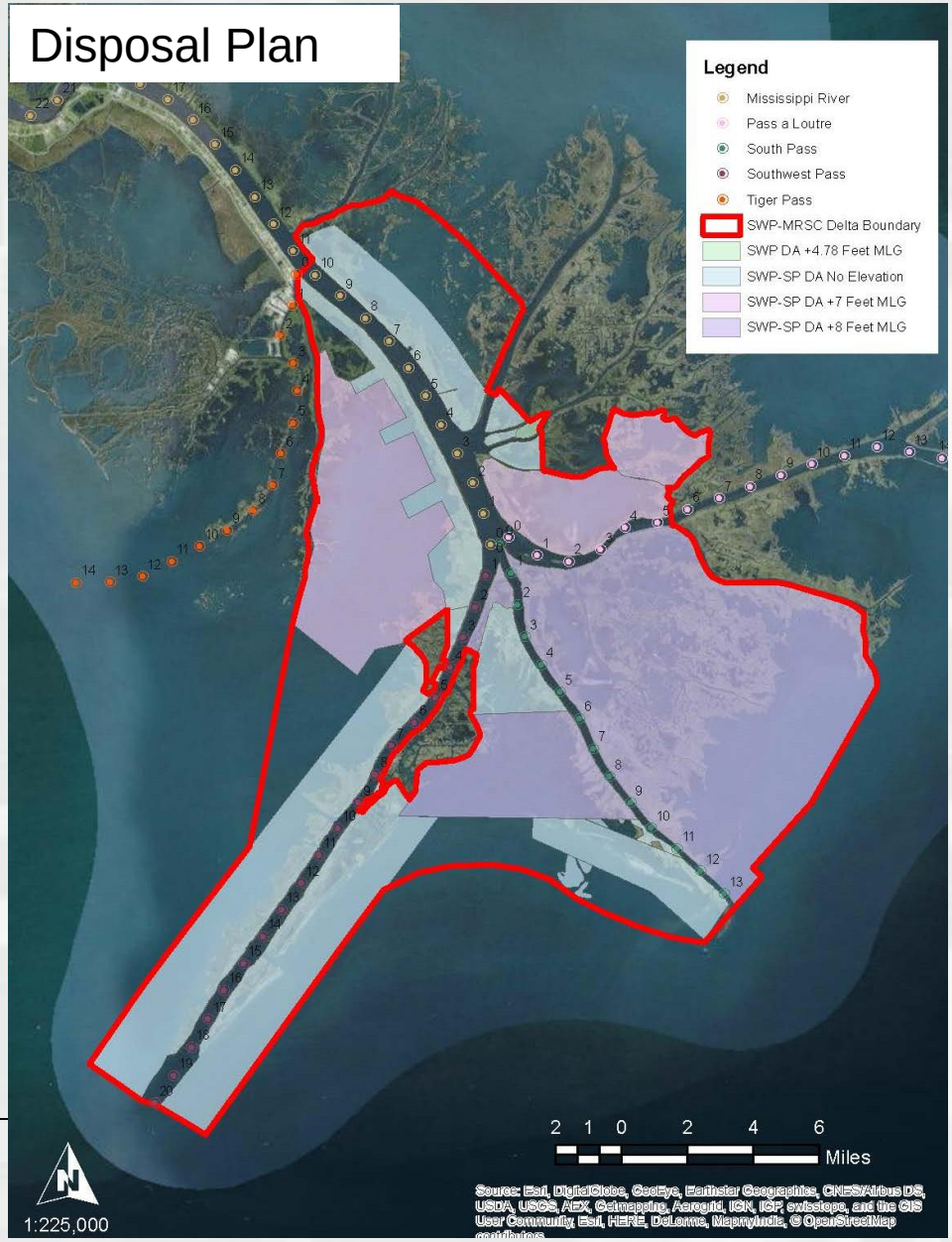
Plan Formulation – Economic Results

MRSC - Baton Rouge to Gulf Deepening Project		
Average Annual Benefits and Costs (3.125%)		
Channel Alternative	Alternative 2	Alternative 3
First Cost of Construction	$88,663,029	$183,076,433
Interest During Construction	$4,243,341	$8,761,890
Total Investment	$92,906,370	$191,838,323
Average Annual Const. Cost	$3,697,019	$7,633,814
Average Annual Increm. O&M	$100,007,021	$131,446,950
Total Average Annual Cost	$103,704,040	$139,080,764
Total Average Annual Benefits	$105,658,043	$147,273,006
Net Excess Benefits	$1,954,003	$8,192,243
B/C Ratio	**1.02**	**1.06**

- Economic Results for alternatives as originally defined
- Although not reflected in this analysis, there are real and tangible benefits to be gained in the region upriver from Baton Rouge by deepening the channel.
- RED (regional economic development) benefits come in the form of efficiencies that are separate from the transportation cost savings used by the Corps to evaluate a project.

Environmental Compliance

- Collecting and analyzing sediments as required for Sec 404 of CWA
- Formal coordination with the agencies ongoing (e.g., 401, 404, Sec 7 ESA, 106, etc.)
- Coordination documents will be included with the Draft Report in the DSEIS
- Beneficial use acres cleared:
  - Previously Cleared Disposal Area Total Acreage = ~ 143,207 acres
  - New Disposal Area Total Acreage = ~ 24,111 acres



Pending Risk Items

- **Saltwater intrusion – Low Risk**
  - Anticipate limited impacts due small potential changes in depths (1.5 ft)
  - Anticipate limited impacts to salt water sill activation
  - No observed changes in the frequency of activation
  - 3D model being developed to better understand potential shoaling impacts
  - No expected changes to the TSP based on results

- **Relative Sea Level Rise Impacts – Low Risk**
  - Impacts to lower channel only
  - Limited impacts on plan selection
  - Key assumption: Operations would continue to maintain existing bank lines
  - High RLRS rates could reduce disposal cost. (More open water near channel)
  - Deposition of material could vary by location
  - 2D model is currently being conducted
  - Annual O&M could be reduced, since 1D results assumed all shoaling occurred in Navigation channel

- **Relocations – Low Risk**
  - Expect all Relocations not to be a concern once fully investigated

Tentatively Selected Plan

(Based on Criteria)

Alternative 3: Full 50 ft depth:

- Bar Channel and Southwest Pass are deepened from existing 48 ft to 50,
- Crossings are deepened from existing 45 ft to 50 ft

(Reflects cost of Alternative 3 – Subject to change with final Recommendation)

Investment Cost	
Total Project Construction Cost	$183, 076, 433
Interest During Construction	$8,761,890
Total Investment Cost	$191,828,323
Average Annual Cost	
Interest and Amortization of Initial Investment	$7,633,814
Additional Annual Cost (if applicable)	N/A
Average Annual Incremental OMRR&R[1]	$131,446,950
Total Average Annual Cost	$139,080,764
Average Annual Benefits	$147,283,006
Net Annual Benefits	$8,192,243
Benefit Cost Ratio	
Benefit Cost Ration (computed at 7%)[2]	1.06

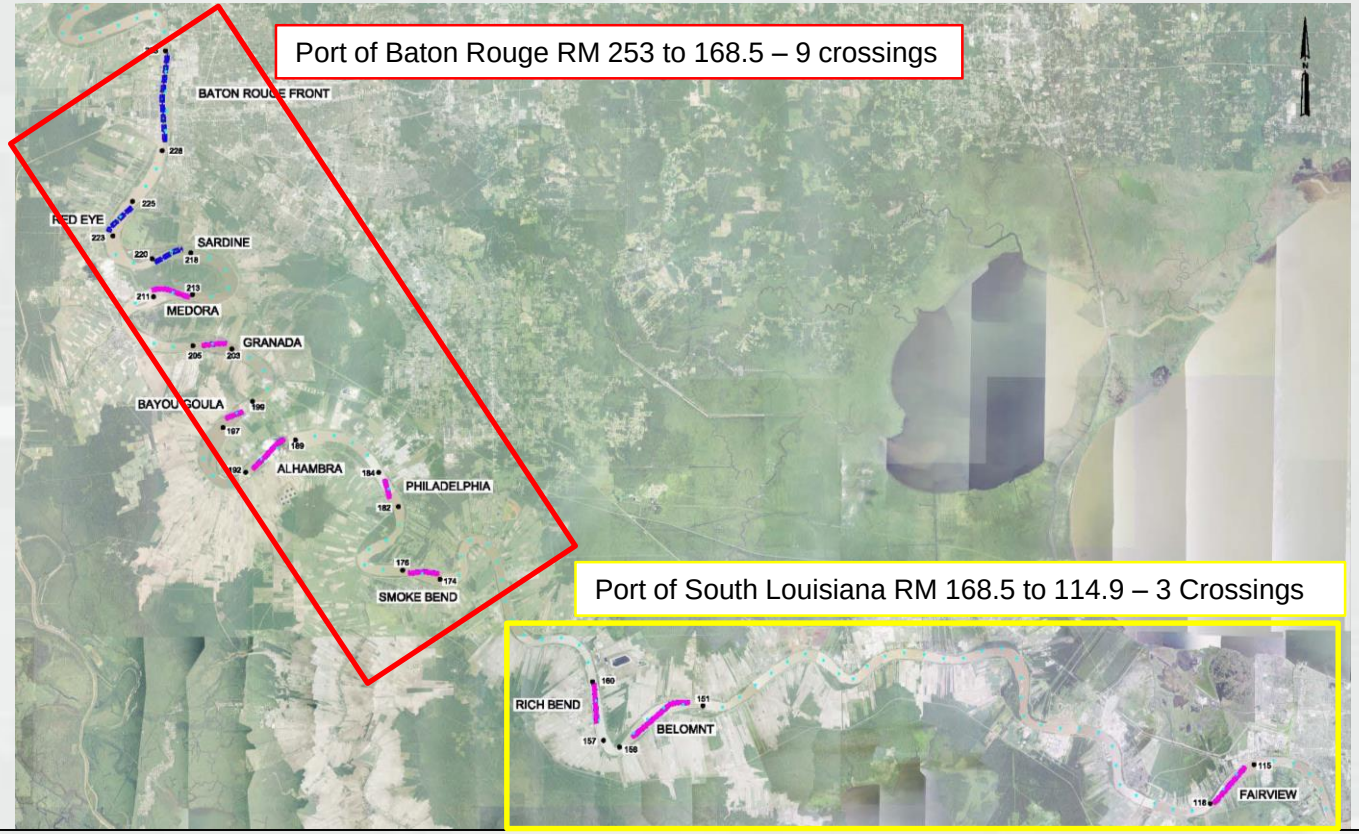
- Additional design work on train dikes to be include to further reduce the annual incremental OMRR&R

*Criteria defined as B/C greater than 1 and net excessive benefits

Optimization

Opportunities exist to optimize

- Alternatives 2 and 3 looked at deepening the entire MRSC to a uniform depth
- Permutations divided the MRSC between the Lower MS and the crossings
  - Opportunity to obtain greatest Net Benefits between alternatives 3 and 3a
  - Considered deepening crossings incrementally by ports



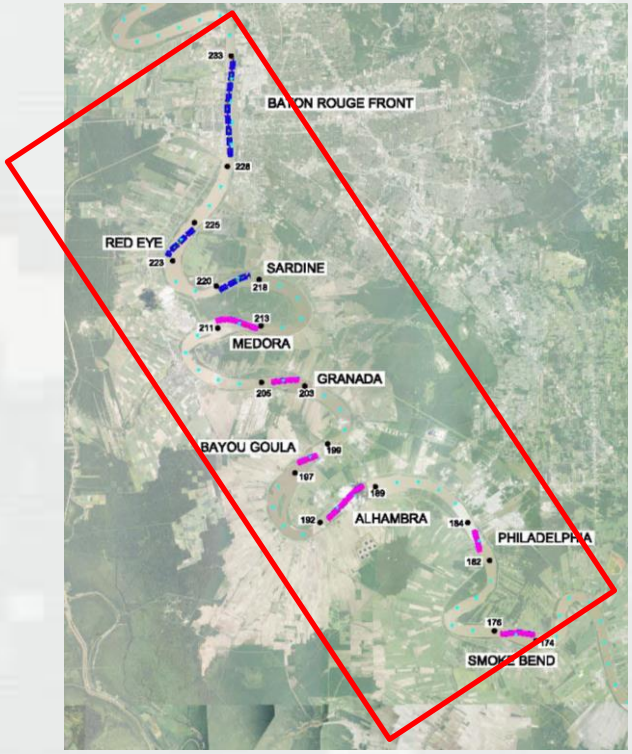
Optimization

Channel Alternative	50 ft. Through Port of S. LA	50 ft. Full Channel	48 ft. Through Port S. LA	48 ft. Full Channel	50 ft.SWP/48 ft. Through S. LA	50 ft. LMR/48 ft. All Crossings
First Cost of Construction	$ 88,971,120	$ 183,076,433	$ 5,551,980	$ 88,663,029	$ 87,770,010	$ 170,881,059
Interest During Construction	$ 4,258,086	$ 8,761,890	$ 265,713	$ 4,243,341	$ 4,200,602	$ 8,178,229
Total Investment	$ 93,229,206	$ 191,838,323	$ 5,817,693	$ 92,906,370	$ 91,970,611	$ 179,059,288
Average Annual Const. Cost	$ 3,709,866	$ 7,633,814	$ 231,503	$ 3,697,019	$ 3,659,782	$ 7,125,298
Average Annual Increm. O&M	$ 18,126,110	$ 131,446,950	$ 13,443,710	$ 100,007,021	$ 13,443,710	$ 100,007,021
Total Average Annual Cost	$ 21,835,975	$ 139,080,764	$ 13,675,213	$ 103,704,040	$ 17,103,493	$ 107,132,319
Total Average Annual Benefits	$ 117,960,932	$ 147,273,006	$ 84,339,754	$ 105,658,043	$ 94,538,711	$ 116,549,126
Net Excess Benefits	**$ 96,124,957**	**$ 8,192,243**	**$ 70,664,540**	**$ 1,954,003**	**$ 77,435,218**	**$ 9,416,806**
B/C Ratio	**5.40**	**1.06**	**6.17**	**1.02**	**5.53**	**1.09**
*~ PRESENT WORTH OF TOTAL COST (**$B**):*	*$0.5*	*$3.4*	*$0.3*	*$2.6*	*$0.4*	*$2.7*

Optimization

- Greatest Benefits occur at depth of 50' through the Port of South Louisiana (includes Bar Channel, Southwest Pass, and 3 crossings)
- Greatest Incremental O&M occurs in the crossings for the Port of Baton Rouge
- Greatest Net Benefit is deepening to 50' through Port of South LA

Optimization



Construction to 48' by Crossings within Port of Baton Rouge		
Crossing	Initial Construction Cost	Incremental O&M Cost
Baton Rouge Front	$3,525,930.00	$6,744,386.14
Red Eye	$5,375,160.00	$15,909,613.47
Sardine	$680,400.00	$4,317,095.12
Medora	$2,201,580.00	$13,673,667.80
Granada	$262,440.00	$4,115,000.03
Bayou Goula	$29,160.00	$11,328,074.78
Alhambra	$471,420.00	$14,189,655.26
Philadelphia	$0.00	$937,377.23
Smoke Bend	$104,490.00	$3,626,961.88

Optimization

- Construction and O&M quantities and cost show most of dredging occurs in the upper crossings
- There maybe opportunity to deepen crossing within the Port of Baton Rouge to 48' and experience increased benefits
- Would require a facility by facility analysis of the cost and benefits

Recommendation

- Deepen the channel to 50 ft through the Port of South of Louisiana
- Initiating construction downriver moving upriver, will allow for successive movement of large ships upriver
- Complete a nodal analysis of the facilities and crossings through the Port of Baton Rouge during the 4 year construction period

Recommendation: Complete the study as scheduled to deepen the channel to 50 ft through the Port of South of Louisiana, and complete a future study effort to occur concurrent to construction for the the nodal analysis of Port of Baton Rouge

Project Management - Implementation

- Funding Stream:

Through FY15	FY16	FY17	FY18
550,000	550,000	450,000	0

Tentatively Selected Plan Milestone	**20 SEP 2016**
Agency Decision Milestone	08 MAR 2017
Division Engineer Transmittal	27 OCT 2017
Civil Works Review Board (if needed for a Director's Report)	22 DEC 2017
30-Day S&A Review start	03 JAN 2018
30-Day S&A Review end	02 FEB 2018
Director's Report	30 MAR 2018

Steps to Next Milestone

Task	Dates
Draft Report Released ATR and IEPR Start	10-Nov-2016
Public Review Closes	30-Dec-2016
Agency Decision Milestone	08 MAR 2017

Questions and Open Discussion

Backup

Vessel Calls

Plaquemines

	BC Capesize	BC Handymax	BC Handysize	BC Panamax	TOTAL
2025					
Existing Conditions	100	190	85	82	**457**
With Project 50'	100	190	85	79	**454**
2035					
Existing Conditions	113	212	110	77	**512**
With Project 50'	113	212	110	74	**509**
2045					
Existing Conditions	122	228	119	87	**556**
With Project 50'	122	228	119	82	**551**

Vessel Calls

New Orleans

	BC Capesize	PT Panamax	Aframax	Suezmax	PT Medium	BC Handymax	BC Handysize	BC Panamax	Chemical Tanker	General Cargo	TOTAL
2025											
Existing Conditions	44	30	67	3	14	364	36	85	299	365	**1,307**
With Project 50'	44	30	67	3	14	364	31	85	295	365	**1,298**
2035											
Existing Conditions	49	31	69	3	14	445	37	96	315	425	**1,484**
With Project 50'	49	31	69	3	14	445	29	96	312	425	**1,473**
2045											
Existing Conditions	53	32	71	3	15	526	46	107	318	485	**1,656**
With Project 50'	53	32	71	3	15	526	36	107	314	485	**1,642**

Vessel Calls

South LA

	BC Capesize	BC Handymax	BC Handysize	BC Panamax	PT Panamax	Aframax	Suezmax	PT Medium	Chemical Tanker	General Cargo	TOTAL
2025											
Existing Conditions	242	566	241	340	289	75	74	220	347	109	**2,503**
With Project 48'	242	566	241	311	289	71	74	220	291	109	**2,414**
With Project 50'	242	566	241	311	289	71	74	220	266	109	**2,389**
2035											
Existing Conditions	266	624	264	374	307	87	79	236	368	121	**2,726**
With Project 48'	266	624	264	344	307	82	79	236	310	121	**2,633**
With Project 50'	266	624	264	344	307	81	79	236	285	121	**2,607**
2045											
Existing Conditions	290	682	287	403	326	98	83	251	393	133	**2,946**
With Project 48'	290	682	287	371	326	93	83	251	327	133	**2,843**
With Project 50'	290	682	287	370	326	91	83	251	302	133	**2,815**

Vessel Calls

Baton Rouge

	BC Capesize	BC Handymax	BC Handysize	BC Panamax	PT Panamax	Aframax	PT Medium	Chemical Tanker	General Cargo	TOTAL
2025										
Existing Conditions	17	45	32	55	72	90	35	246	30	**622**
With Project 48'	17	45	21	55	72	90	35	230	30	**595**
With Project 50'	17	45	16	55	72	90	35	223	30	**583**
2035										
Existing Conditions	22	55	31	67	80	99	39	238	37	**668**
With Project 48'	22	55	16	67	80	99	39	220	37	**635**
With Project 50'	22	55	13	67	80	99	39	213	37	**625**
2045										
Existing Conditions	26	66	34	80	87	109	42	224	45	**713**
With Project 48'	26	66	20	80	87	109	42	205	45	**680**
With Project 50'	26	66	16	80	87	109	42	198	45	**669**

CEMVN-ED-SC
Cost and Specifications Team

August 11, 2016
Khaleghi/2736

MEMORANDUM FOR Chief, Relocation Team

SUBJECT: Mississipi River Deepening Feasibility Study, River Mile 233.4 to 110.6 (Revised List)

1. The cost of the directional drilling for this job is done as follows:

(Unknown pipe diameters are assumed 12")

The total cost of one foot of Directional Drilling based on the attachment:

$13,336 X 3000	= $40,008,000
Contingencies (25%)	= $10,002,000
Subtotal	=$50,010,000
E & D (10%)	=$5,001,000
S & A (8%)	=$4,000,800
Project Total	= $59,011,800

2 For questions, contact Bijan Khaleghi, ext. 2736.

Thomas D. Murphy, P.E.
Chief, Cost Engineering Team

Owner	Mile	Qty	Size	Description		Status	Vertical Clearance*
Mile 234 to 229 - Dwg 4 (C-01)							
Enterprise	233.4	1	16"	Natural Gas	267	a	*From what point (MLLW, River Bottom)?
Acadian	233	3	10.75"		190		
Acadian	233	1	16"		267		
Mid La Gas	233	1	12"		219		
Bengal	233	1	24"	Maint	415	a	
Dow	232.7	1	4"	LPG	94	d	
Mile 199 to 194 - Dwg 9 (C-06)							
?	197.9	2	12"	Brine	219	a	

Green can be removed from estimate, Yellow TBD

Owner	Mile	Qty	Size	Description		Status	Vertical Clearance*
Mile 193 to 188 - Dwg 10 (C-7)							
Enterprise	190.2	1	?	NG	219	a	
KinderMorgan	190.2	2	24	NG	415	a	
El Paso	190.2	1	5"	Gas	112	a	
Southern Natural Gas Co	190.1	4	12"	Gas	219	a	
El Paso	190	1	5"	Gas	112	a	
KinderMorgan	190	1	30"	NG	525	a	
Enterprise	189.8	2	8.63"	EGL	159	d	
Shell	189.5	6	?	?	219	?	-40
Mile 185 to 181 - Dwg 11 (C-8)							
Gulf South	183.4	3	?	NG	219	a	-26
Boardwalk	183.3	1	30"	NG	525	a	
Concha	183	1	10"	Propylene	181	?	
Shell	182.9	1	?	HVL	219	a	
Enterprise	182.9	1	10"	HVL	181	a	
Enterprise	182.7	1	4"	NG	94	a	
Shell	182.1	1	10"	HVL	181	a	
Mile 179 to 172 - Dwg 12 (C-9)							
Central Bell Tel. Co.	175.5	3	?	?	219	?	-38
La Pwr & Lt. Co	175.4	1	?	?	219	?	

Green can be removed from estimate, Yellow TBD

Owner	Mile	Qty	Size	Description		Status	Vertical Clearance*
Mile 160 to 155 - Dwg 13 (C-10)							
Marathon Ashland	159.5	1	30		525	?	
Shell	159.5	1	40"	EPL	700	d	
Marathon	159.5	3	30"	CRD	525	a	
Equilon	159.3	1	40"	Oil	700	a	
Boardwalk	158.2	1	?	NG	219	a	
Monterey	158.2	1	6"	Gas	127	a	-60

$13,336

Green can be removed from estimate, Yellow TBD