APPENDIX C

Engineering

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C-1.0 GENERAL

This Draft Engineering Appendix presents and documents the feasibility level engineering and design completed to identify the Tentatively Selected Plan. Development of the Engineering Appendix was in accordance with Engineering Regulation (ER) 1110-2-1150, "Engineering and Design for Civil Works Projects", dated 31 August 1999. The comparative studies of alternatives, field investigations, designs, and costs estimates presented herein are in sufficient detail to substantiate the recommended plan and baseline estimate.

C-2.0 HYDRAULICS AND HYDROLOGY

C-2.1.1 Model Studies

C-2.1.2 One Dimensional Model

C-2.1.2.1 Purpose

This Coastal & Hydraulics Laboratory Engineering Appendix describes the one-dimensional (1D) sedimentation analysis of proposed options for deepening the Mississippi River Ship Channel.

C-2.1.2.2 Introduction

The 255 mile long Mississippi River Ship Channel extends from Baton Rouge, Louisiana to the Gulf of Mexico and provides deep-draft access to the largest port complex in the United States of America. Annually, the port complex serves an average of 11,000 deep-draft vessels and handles 450 million tons of cargo. The authorized navigation depth of the Ship Channel is 55 feet (ft). The navigation depth is currently maintained to 45ft. The US Army Engineer New Orleans District is evaluating the feasibility of increasing the maintained depth to 48 or 50ft.

Since typical channel depths in most of this reach of the Mississippi River exceed the maintained channel depth, maintenance dredging is required only in relatively short and distinct locations. The reach of the navigation channel that is referred to as the Southwest Pass (SWP) dredging reach, is comprised of the Mississippi River, extending downstream from Venice, LA, to the Head of Passes (HOP) (River Mile 0.0), and the reach below Mile 0.0 which extends downstream through Southwest Pass and the Southwest Pass Bar Channel. The bar channel terminates at approximate river Mile 22.0 below Head of Passes (BHP). (See Figure C-1.) The Mississippi River - Southwest Pass is the longest single dredging reach and has been maintained to a depth of 45ft relative to Mean Low Gulf Southwest Pass (MLG^{SWP}), equivalent to a depth of 48.5ft below Mean Lower Low Water (MLLW), since 1987. The majority of the sediment entering this reach is diverted by distributaries with less than half of the remainder being deposited and subsequently removed by dredging as presented in Figure C-2. Annual dredging quantities in this reach from 1970 to 2008

averaged 19.4 million cubic yards (yd^3). An explantion of the difference between MLG^{SWP} and MLLW is provided in Chapter 3 of the main report.

The remainder of the locations requiring periodic maintenance dredging are river crossings in the upper 120 miles of the Ship Channel (See Figure C-3). These crossings have been maintained to a depth of 45ft relative to the Low Water Reference Plane (LWRP), since 1995. Total annual dredging quantities for the crossings averaged 16 million yd^3 from 1999 to 2015.

Annual dredging requirements can vary greatly. In Southwest Pass, dredging requirements are strongly influenced by sediment supply. Thus, dredging requirements tend to be higher in years with significant floods or prolonged periods of higher than normal flow. Conversely, dredging requirements tend to be lower during years dominated by low to moderate flows. While sediment supply is a significant factor in dredging requirements at crossings, other factors such as hydrograph shape also influence requirements. For example, dredging of a crossing is more likely to be required after a rapid fall in stage than after a slow fall of similar magnitude.

C-2.1.2.3 Model Description

The 1D sedimentation model adopted for this study was developed for the Mississippi River Hydrodynamic and Delta Management Study (Thomas – in preparation) using the HEC-6T computer program (Thomas, 2014). That model was adapted from earlier models including the Mississippi Valley Division (MVD) Regional Model (Copeland and Lombard, 2009) and the Myrtle Grove Diversion Model (Thomas, 2012). The current model extends from Tarbert Landing at Mississippi River Mile (RM) 306 downstream through Southwest Pass to the Jetties at RM 18 Below Head of Passes (BHP). All of the models in this series are based on cross-section data extracted from the 1991-92 Mississippi River Comprehensive Hydrographic Survey and have been extensively validated as described in the above references.

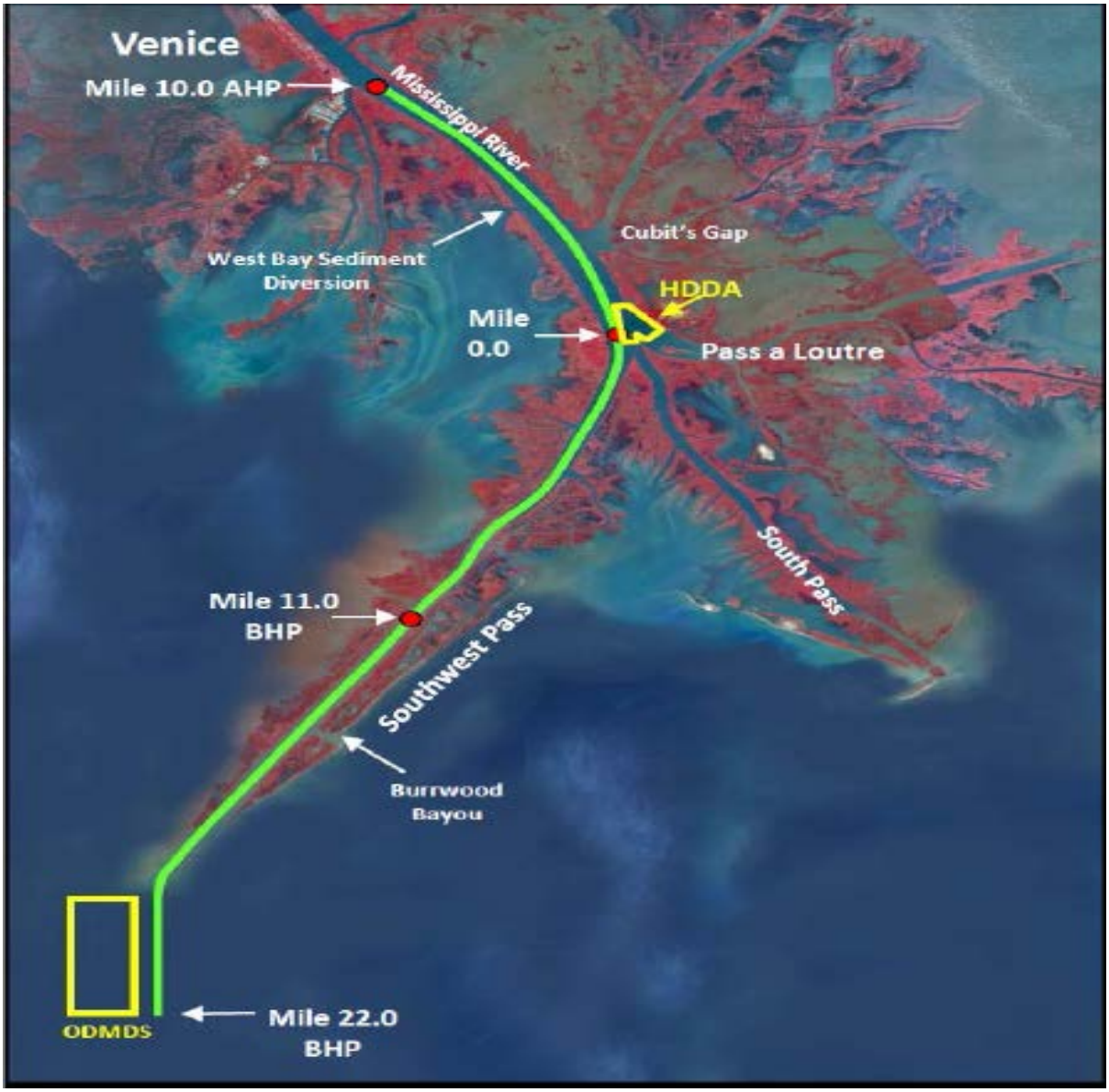

Figure C-1 – Southwest Pass Dredging Reach

The reach of dredging referred to as the "Southwest Pass" dredging reach (Figure C-1), is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 Above Head of Passes (AHP), and the HOP. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA), as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging.

Of particular importance to this study, fine sediment erosion and deposition parameters in the MVD Regional Model were adjusted to reproduce cumulative dredging trends in the Southwest Pass reach from 1991 to 2002. The Myrtle Grove Diversion Model added dredging of the deep draft crossings. The model developed for Mississippi River Hydrodynamic and Delta Management Study incorporated changes in the HEC-6T program that permitted evaluation of the effects of subsidence and eustatic sea level rise. Additionally, all elevation data was adjusted to the North American Datum of 1988 (NAVD88 – 2004.65). Note: All datums henceforth refer to epoch 2004.65.

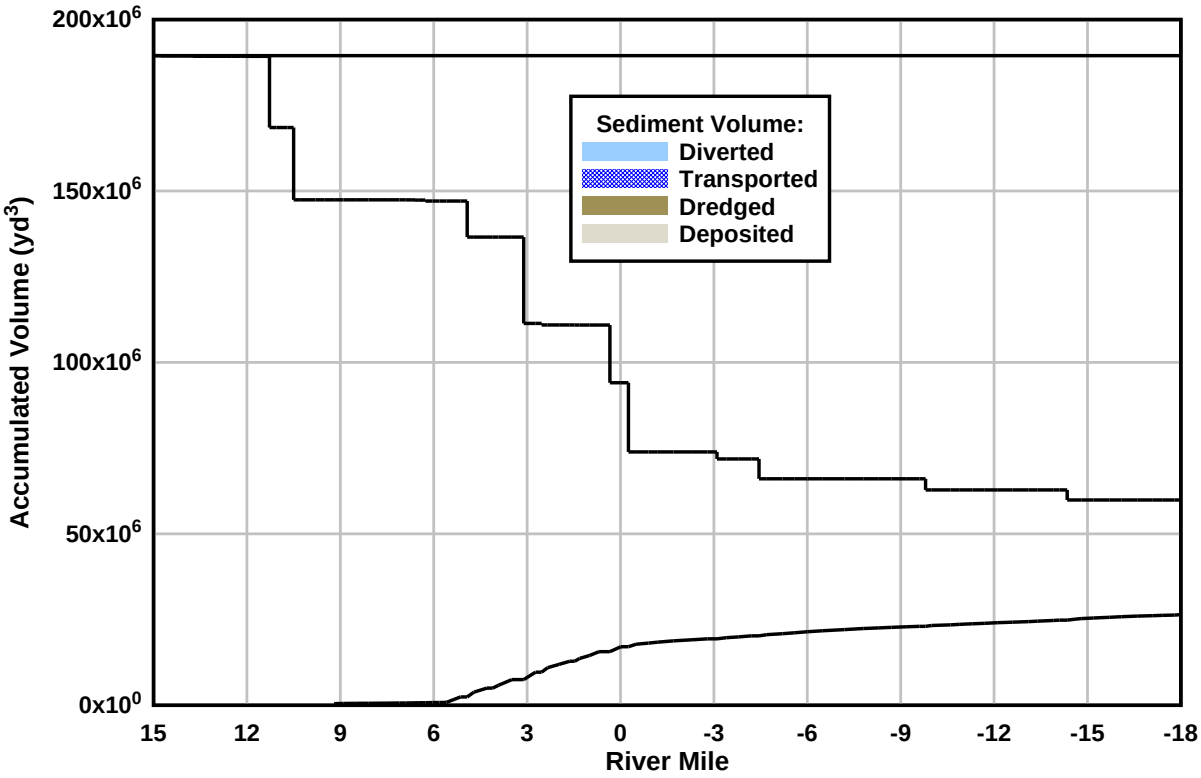

Figure C-2 - Average annual transport and fate of sediment passing the Venice Discharge Range (RM 12.5) and entering the Southwest Pass dredging reach estimated from multi-decade 1D sedimentation model simulations. Annual variations in the estimated values are significant because the annual sediment inflow can vary by a factor of five.

C-2.1.2.4 Methodology/Alternatives

Long-term sedimentation processes were simulated for the 45, 48, and 50ft draft channels and compared to estimate the relative change in required maintenance dredging at each dredging site over the project life. The comparisons were based on the final 50 years of each model simulation. Daily water and sediment inflows at the upstream boundary of the model were derived from the historical record from 1954 through 2003 adjusted for current operations at the Old River Control Complex. Gulf water levels at the downstream boundary of the model were adjusted monthly to account for seasonal changes in the level of the Gulf of Mexico. Simulations for each channel

depth were conducted for no eustatic sea level rise and for the rates proposed by the NRC 1 and NRC 3 curves, 0.5 and 1.5 meter rises at year 2100 respectively.

For this study, all of the historical dredging templates used in the model were adjusted as needed to incorporate design channel widths and side slopes. At the time of model construction, template invert elevations in the Venice to the Gulf of Mexico reach were referenced to MLG-SWP. Subsequent model studies, including the multi-dimensional model studies described in sections C2.1.3 and C2.1.4, will use templates referenced to MLLW. Template invert elevations in the crossing reaches were referenced to the LWRP. In the 1D model, all template invert elevations were converted to NAVD88 as described in Tables C-1 and C-2. Dredging template elevations were not adjusted for eustatic sea level rise during the model simulations. Thus, computed dredging quantities near the end of the 50-year simulation are probably over-estimated for the NRC 3 scenario and to a much lesser extent for the NRC 1 scenario.

The volume of computed dredging in the Venice to the Gulf reach was relatively insensitive to channel deepening. Under existing conditions, the channel traps nearly all of the available sand and most of the silt transported into the reach. Thus, the primary effect of channel deepening in this reach is to shift deposition slightly upstream. Computed dredging volumes are probably more sensitive to estimates of water and sediment diversion from this reach than to the channel depth (See Figure C-2).

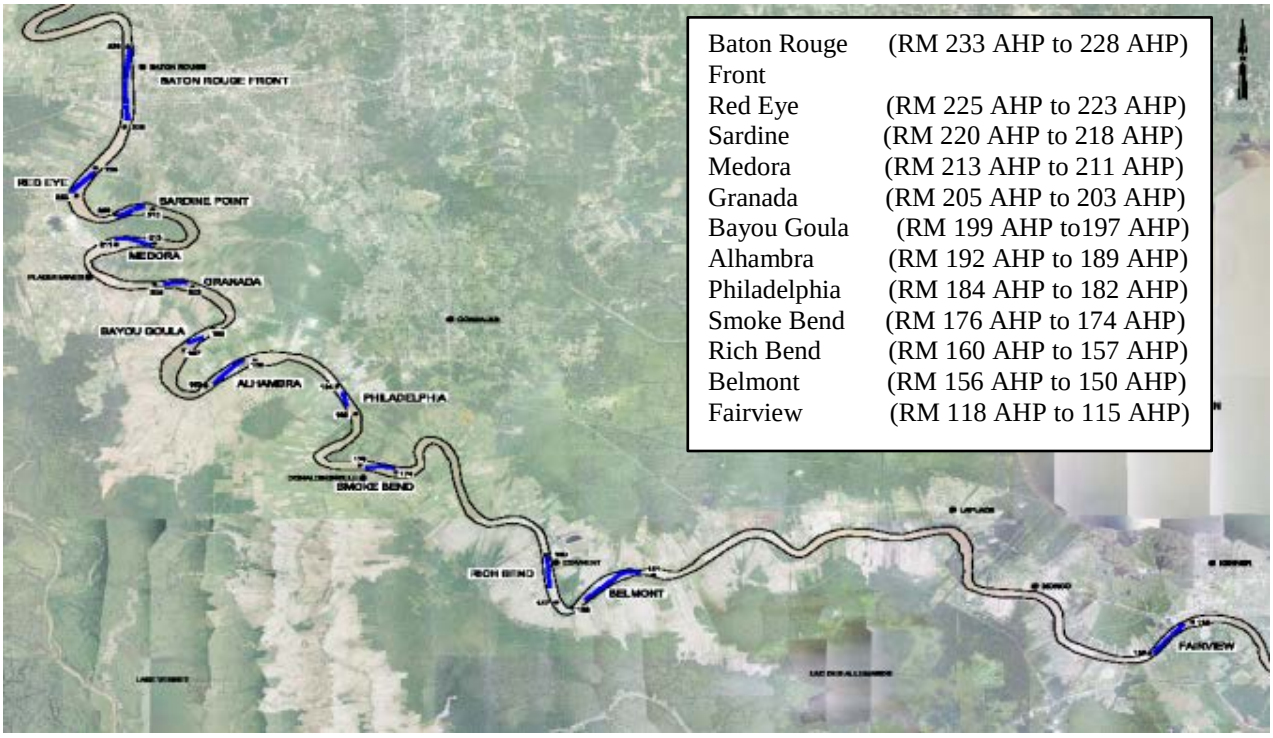

Figure C-3 Ship channel crossings requiring periodic maintenance dredging

Dredging operations are conducted in the model when deposition in the navigation channel exceeds a specified trigger elevation. Traditionally, the trigger elevation has been based on the amount of over-dredging allowed in the dredging template, thus simulated dredging operations are initiated whenever sediment deposition exceeds the depth of over-dredging. This approach, referred to as the "more aggressive dredging schedule" yields a conservative estimate of potential deposition in the navigation channel but may force dredging in some locations where shoaling does not impede navigation. Additionally, by maintaining greater channel depths, this option may induce some deposition that would not occur in the prototype. A "less aggressive dredging schedule," where the trigger elevation was set 1ft below the authorized depth, also was evaluated in this study. For both schedules, dredging operations in the crossings were only conducted when the Mississippi River discharge was less than 600,000 cubic feet per second (cfs), and sediment dredged from each crossing was reintroduced into the river immediately downstream of the crossing. Sediment dredged from the Southwest Pass reach was removed from the model.

C-2.1.2.5 Results

Computed average annual dredging quantities over the 50-year project life are presented in Annex 1. The "Dredging Index" is the ratio of the computed dredging quantities for a specific set of locations and test scenario to the corresponding quantities for a base condition identified in the table header. It describes the relative impacts of channel deepening on historical and projected

future dredging and should be considered more reliable than absolute quantities computed by the model.

Table C-1 - Dredging Template Summary for Southwest Pass

Dredging Reach	Southwest Pass		
River Mile	11.0	2.0	17.8 BHP
* MLLW (ft) to NAVD88	0.3	0.3	-0.7
	Channel invert (ft) NAVD88		
45ft channel	-48.2	-48.2	-49.2
48ft draft	-51.2	-51.2	-52.2
50ft draft	-53.2	-53.2	-54.2
Advanced Maintenance	6ft		
Over-dredging allowance	2ft		
	Dredge cut invert (ft) NAVD88		
45ft draft	-56.2	-57.2	-57.2
48ft draft	-59.2	-59.2	-60.2
50 ft draft	-61.2	-61.2	-62.2
Bottom width	750ft		
Side slopes	1 on 5		
*MLLW may be estimated by linear interpolation between RM 17.8 BHP and RM 2.			

In the Southwest Pass dredging reach, both dredging schedules produced similar results with the more aggressive dredging schedule producing slightly greater quantities but slightly smaller dredging indices. Along with the increase in dredging quantities, the model indicates an upstream shift in deposition in response to channel deepening. Rising sea levels can also be expected to shift deposition upstream.

It should be noted that the 1D model does not address the extent or frequency of salinity intrusion due to channel deepening or relative sea level rise. The salt water wedge is present throughout the year in Southwest Pass and during low flow conditions may intrude upstream of Head of Passes. Fine sediments tend to flocculate when fresh water encounters saline water enhancing sediment deposition. Increased frequency and extent of salinity intrusion, due to channel deepening or relative sea level rise, could increase the contact area between fresh and saline water. However,

such increases are most likely during low flow periods when fine sediment concentrations are relatively low.

Table C-2 - Dredging Template Summary for Crossings

Dredging Reach	Crossings				
River Mile	231	204	183	153	117
*Low Water Reference Plane (ft) NAVD88	2.5	1.9	1.6	1.2	0.8
	Channel invert (ft) NAVD88				
45ft channel	-42.5	-43.1	-43.4	-43.8	-44.2
48ft draft	-45.5	-46.1	-46.4	-46.8	-47.2
50ft draft	-47.5	-48.1	-48.4	-48.8	-49.2
Advanced Maintenance	3ft				
Over-dredging	2ft				
	Dredge cut invert (ft) NAVD88				
45ft draft	-47.5	-48.1	-48.4	-48.8	-49.2
48ft draft	-50.5	-51.1	-51.4	-51.8	-52.2
50ft draft	-52.5	-53.1	-53.4	-53.8	-54.2
Bottom width	500ft				
Side slopes	1 on 5				
*Consult current definition of the LWRP to determine elevations at a specific crossing.					

Computed dredging quantities in the crossings are much less reliable than computed quantities in the Southwest Pass reach. While the dredging descriptions used in earlier models produced reasonable reproductions of observed dredging in the 1990's, these descriptions do not reproduce subsequent increases in observed dredging. An attempt was made to create more consistent descriptions for this study. With these adjustments, the more aggressive dredging schedule produced combined quantities for all crossings for the 45ft channel that were about 25% less than historical quantities. The less aggressive schedule faired far worse, and neither schedule matched the historical distribution of dredging among individual sites. At individual sites where the model is grossly under-predicting dredging requirements for the 45ft channel, large values of the dredging index should not be considered predictive of expected behavior. For the individual sites where computed quantities for the 45ft channel were within the range of historical observations, the

model indicated significant increases, 50% to 200%, in the dredging index when the channel was deepened to 48 or 50 ft.

Since the model estimates of dredging at individual crossings were not reliable, the best available option to account for the potential increase in the sediment trap efficiency of a deeper channel is to apply the estimated dredging index to recent historical dredging requirements.

Modeling efforts to date indicate that the observed increase in dredging in the crossings over the last decade may not be entirely due to increased river flows. Little and Biedenharn (2014) suggest that this reach of the river switched from a degradational or equilibrium state to an aggradational state in the 1990's. Additional studies are needed to determine what factors are responsible for this shift and if the shift is likely to persist into the future. The two-dimensional sedimentation model currently under development (section C2.1.3) may provide some additional insights into specific processes, e.g., rate of point bar development, affecting dredging requirements.

C-2.1.2.6 Stage Impacts of Channel Deepening

Daily stage profiles in the Lower Mississippi River were computed with HEC-6T, a one-dimensional (1D) sedimentation model over a 50-year period for authorized channel depths of 45, 48, and 50 feet. To estimate the impacts of varying channel depth, computed stage profiles through Southwest Pass and in a 25 mile reach above Head of Passes are presented in Figures C4-C7 for selected river discharges at the beginning and end of the 50-year simulation. The simulation included bed profile adjustments due to sedimentation processes and maintenance dredging required to maintain the navigation channel. The model geometry was developed from the 1992 comprehensive bathymetric survey and was calibrated to observed water surface profiles and channel morphology during the 1992-2004 time period.

Computed stage profiles at the beginning and end of the 50-year simulation for an authorized depth of 45ft are presented in Figure C-4 for three index flows. The model extends over 300 miles upstream to Tarbert Landing, and the flows are described in terms of the river discharge at the upstream boundary of the model. Computed flows throughout the model are adjusted to account for diversions of water and sediment. In descending order, the index flows represent a major flood event, a near bank-full flow, and a typical low flow. The slope of the stage profile increases with increasing river discharge.

The model includes approximately 0.75ft of eustatic sea level rise during the 50-year simulation period. This increase in the mean level of the Gulf of Mexico accounts for almost all of the increase in stage shown in Figure C-4 from the beginning to the end of the simulation. In the prototype, the increase in stage due to sea level rise may be moderated by increased flow diversions at existing distributaries. The existing 1D model does not include estimates of these potential changes in diversion rates.

Computed stage profiles at the beginning and end of the 50-year simulation for an authorized depth of 50ft are presented in Figure C-5 for the same flows. Again, almost all of the increase in stage during the simulation may be attributed to eustatic sea level rise.

The initial (Year 0) stage profiles for the 45 and 50ft channels are compared in Figure C-6. As compared to the 45ft channel, increasing the authorized depth to 50ft results in a small decrease in stage throughout this reach. For low flows, the decrease in stage is insignificant. For flood flows, the decrease is typically less than 0.2ft with the largest decreases occurring between the West Bay Sediment Diversion at River Mile (RM) 4.7 and Venice (RM 10.5). Stage profiles for an authorized channel depth of 48ft would be expected to plot between the 45 and 50ft profiles shown in Figure C6.

The final (Year 50) stage profiles for the 45 and 50ft channels are compared in Figure C-7. The response to increased navigation channel depths is similar but slightly smaller than the response indicated in the initial stage profiles presented in Figure C-6. This difference in response can be attributed largely to eustatic sea level rise which caused a general decrease in water surface slope. Some of the difference may also be attributed to variations in sediment erosion and deposition and the timing of simulated dredging events during these two model simulations. Both the computed decreases in stage and water surface slope imply corresponding decreases in mean channel velocity.

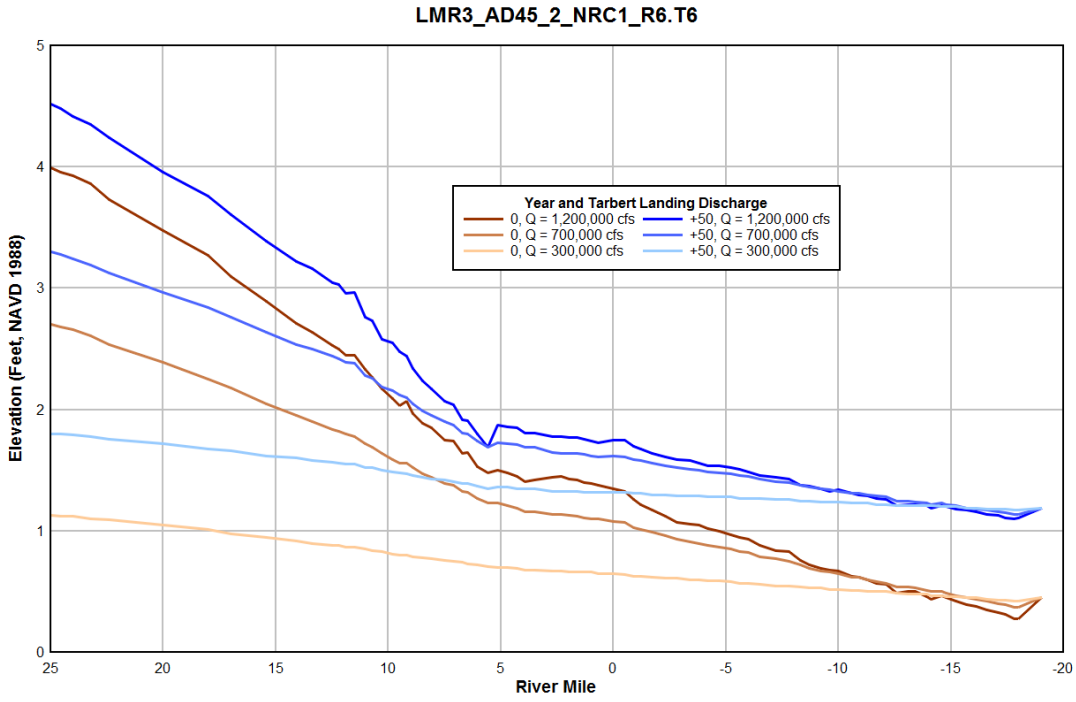

Figure C-4 Computed stage profiles are shown for selected flows at the beginning and end of the project for an authorized depth of 45 feet. The primary driver for stage increases over the life of the project is eustatic sea level rise (NRC 1 curve).

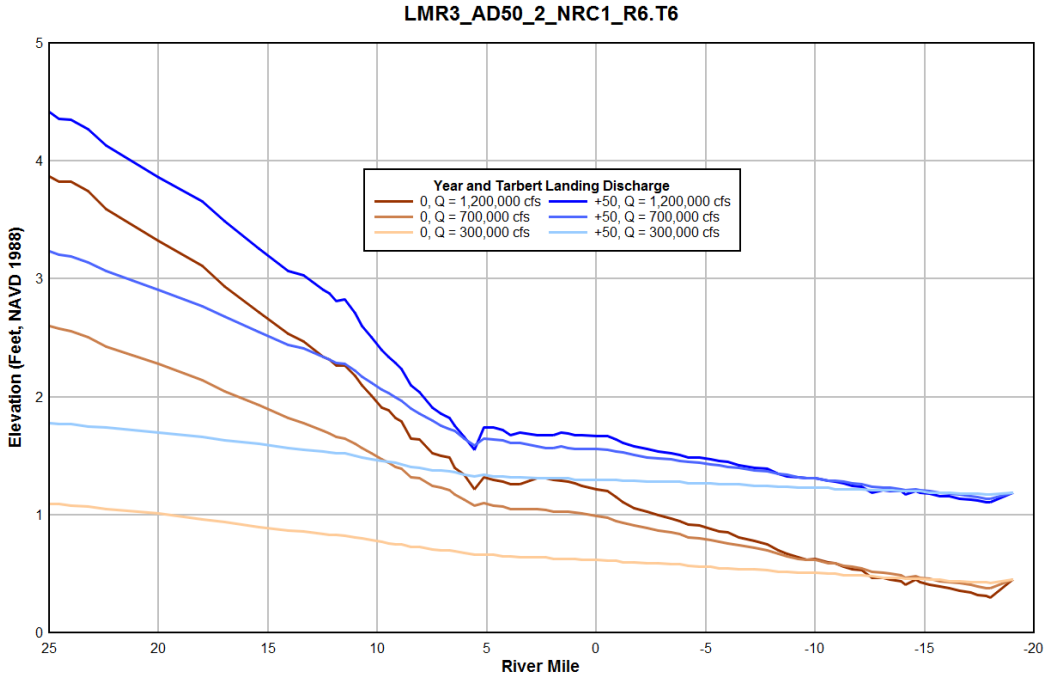

Figure C-5 Computed stage profiles are shown for selected flows at the beginning and end of the project for an authorized depth of 50 feet. The primary driver for stage increases over the life of the project is eustatic sea level rise (NRC 1 curve).

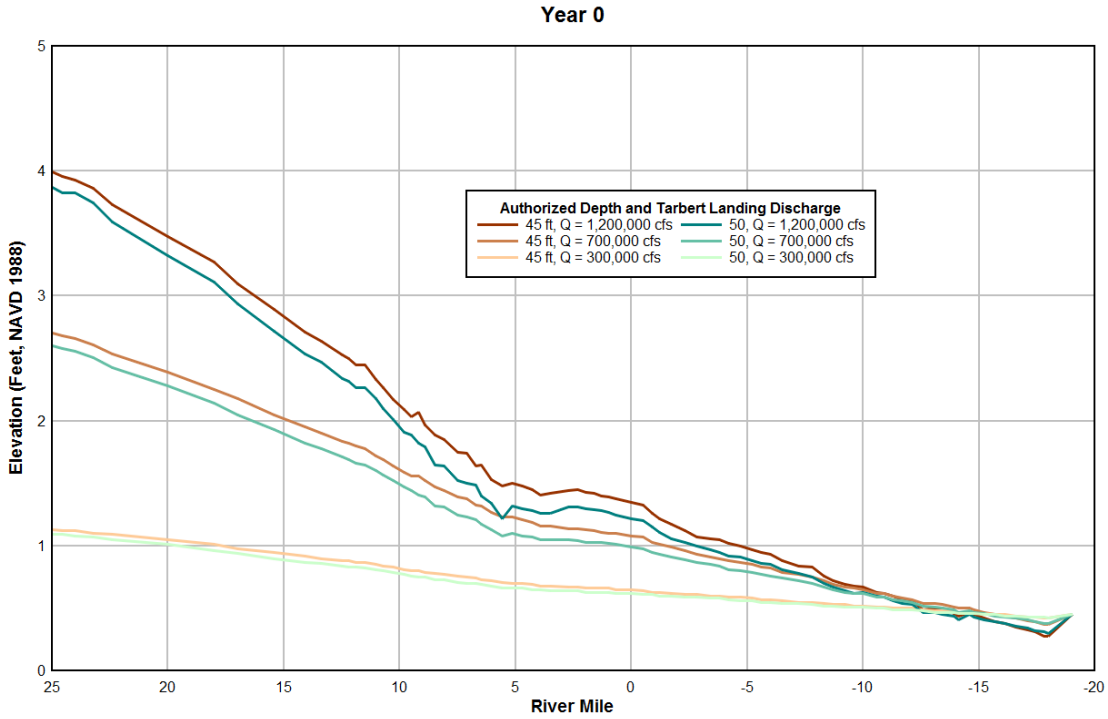

Figure C-6 - Increasing the authorized channel depth from 45 to 50ft slightly lowers the initial computed stage profile. The difference in stage is insignificant at low flows and typically less than 0.2ft for flood flows.

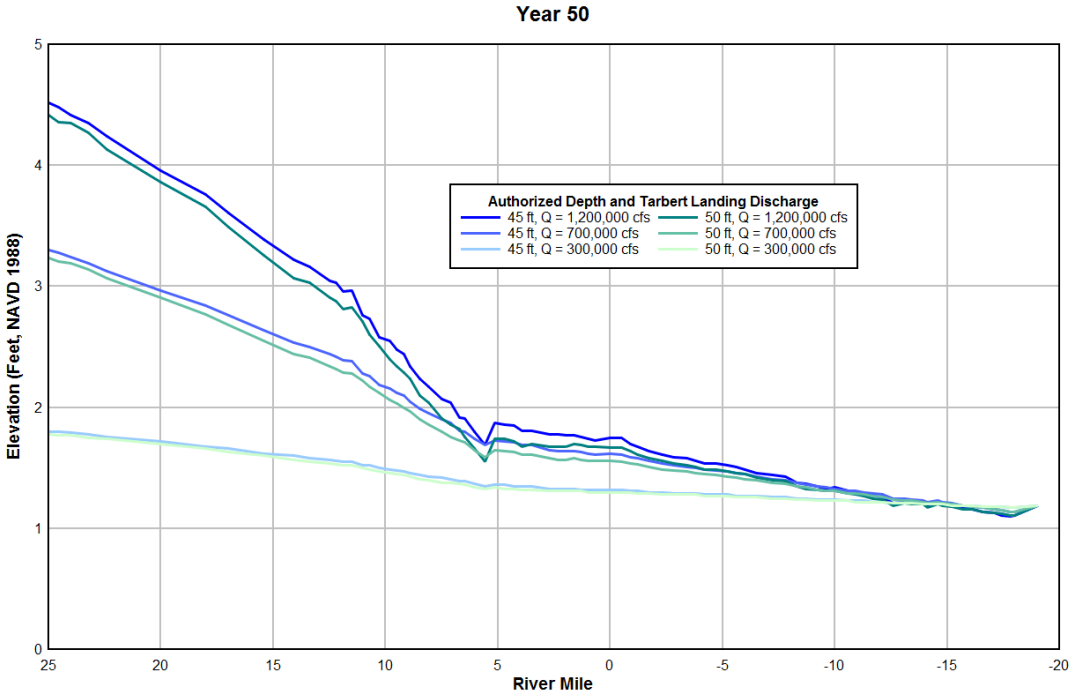

Figure C-7 - The computed reduction in stage due to deepening of the navigation channel persists throughout the 50 year model simulation. The magnitude of the reduction is slightly less at the end of the simulation.

C-2.1.3 Two Dimensional Model

As part of the analysis of proposed channel deepening in the Mississippi River, the AdH model (coupled to SEDLIB) that was developed for the Mississippi Hydrodynamic and Delta Management Study is being applied to address the potential dredging impacts associated with channel deepening in the Mississippi River below Baton Rouge.

The 2D model is being used to address the effects of spatial heterogeneity on dredging requirements in the crossings. For example, if dredging in a particular crossing is a result of the encroachment of a point bar in to the dredge cut, rather than the (more) uniform filling of the cut by pure deposition, this non-uniform filling could alter the effect of deepening on the dredging requirements.

The 2D model has already yielded results, but these results are being subjected to QA/QC requirements and additional sensitivity analyses before being added to the technical database made available to decision makers for this analysis.

C-2.1.4 Three Dimensional Model

The project TSP will be evaluated using a 3D model in order to determine the project impact on salinity intrusion and shoaling. The model to be used was developed under the Mississippi Delta

& Hydrodynamics Study and is documented in "A Report on the Development, Calibration and Initial Application of a Delft3D Z Coordinate Model in the Mississippi Delta", December 2015. Further evaluation of the model's capabilities is documented in "1st Addendum to "A Report on the Development, Calibration and Initial Application of a Delft3D Z Coordinate Model in the Mississippi Delta, December 2015, July 2016, DRAFT report. The Z-model grid coverage is shown in Figure C-8.

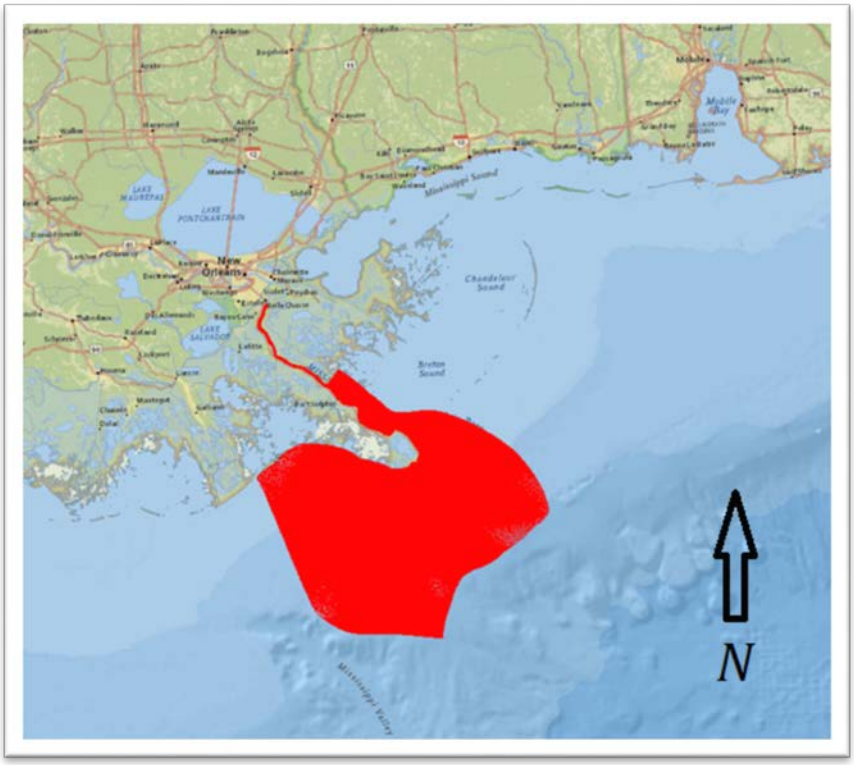

Figure C-8 – Coverage of Delft3D Z-model in the Mississippi Delta.

The intermediate eustatic sea level rise scenario will be applied at the tide boundary for the 2025 and 2075 conditions. Subsidence will be applied to the bathymetry using the future ADH bathymetry as a guideline. The river hydrograph and sediment load will be identical to those reported in the model addendum. The model results with the TSP, future sea level conditions, and bathymetry modified by subsidence will be compared to the 2012/13 existing conditions as reported in the aforementioned addendum.

C-2.2 Water Quality

C-2.2.1 Regulatory Overview

The Clean Water Act (CWA) established a process for states to assess water quality. Section 305(b) requires states to develop a surface water quality monitoring program, and a report

describing the water quality status of state waterbodies with respect to support of designated uses. Section 303(d) requires states to develop and list Total Maximum Daily Loads (TMDLs) for impaired waterbodies (waterbodies with water quality unsupportive of one or more designated uses). A TMDL is the maximum amount of the pollutant(s) contributing to impairment that can enter a waterbody from all sources (including nonpoint sources) and still meet water quality criteria. LDEQ implements a watershed-based approach to reduce pollutant loads in the waterbodies where TMDLs have been established, through the Louisiana Pollutant Discharge Elimination System (LPDES) and Louisiana Nonpoint Source (NPS) programs. For the purpose of state water quality assessment, Louisiana is divided into twelve major basins, which are further divided into waterbodies known as subsegments. The 2014 Louisiana Water Quality Inventory: Integrated Report is the biennial publication prepared by the Louisiana Department of Environmental Quality (LDEQ) on the status of Louisiana waters in accordance with Sections 305(b) and 303(d) (LDEQ 2014).

Designated Uses

Louisiana Surface Water Quality Standards (LAC 33:IX.11) define eight designated uses for surface waters: primary contact recreation; secondary contact recreation; fish and wildlife propagation; drinking water supply; oyster propagation; agriculture; outstanding natural resource; and limited aquatic life and wildlife use. Designated uses for each waterbody and water quality criteria for each designated use are included in the standards. Definitions for the designated uses common to most Louisiana waterbodies are as follows:

- *Primary Contact Recreation:* any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of this type of water use include swimming, skiing, and diving.

- *Secondary Contact Recreation*: any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of this type of water use include fishing, wading, and boating.

- *Fish and Wildlife Propagation*: the use of water for aquatic habitat, food, resting, reproduction, cover, and/or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents damage to indigenous wildlife and aquatic life species associated with the aquatic environment, and contamination of aquatic biota consumed by humans.

- The use subcategory of *limited aquatic life and wildlife* recognizes the natural variability of aquatic habitats, community requirements, and local environmental conditions. *Limited aquatic life and wildlife* use may be designated for waterbodies having habitat that is uniform in structure and morphology, with most of the regionally expected aquatic species absent, low species diversity and richness, and/or a severely imbalanced trophic structure. Aquatic life able to survive and/or propagate in such waterbodies includes species tolerant of severe or variable environmental conditions. Water bodies that might qualify for the *limited aquatic life and wildlife* use subcategory include intermittent streams, and naturally dystrophic and man-made waterbodies with characteristics including, but not limited to, irreversible hydrologic modification, anthropogenically and irreversibly degraded water quality, uniform channel morphology, lack of channel structure, uniform substrate, lack of riparian structure, and similar characteristics making the available habitat for aquatic life and wildlife suboptimal.

If a designated use is not fully supported, the waterbody is considered to be impaired, and suspected causes and sources of impairment are identified. A suspected cause of impairment is a water quality criteria violation associated with impairment (e.g., low dissolved oxygen, non-native aquatic plants), while a suspected source of impairment is an activity, event, or condition associated with a suspected cause of impairment (e.g., agriculture, chemical spills, natural conditions).

Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of surface waters supporting a particular designated use. When criteria are met for a designated use, surface water quality is expected to support the designated use. Louisiana has both general and numeric criteria (LAC 33:IX.1113). General criteria are expressed in a narrative form, and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations or scientific units, and include pH, chloride, sulfate, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances.

The U.S. Environmental Protection Agency (USEPA) has published criteria guidance and recommendations for a number of substances, and states may incorporate these without modifications into their water quality standards. Although states generally use USEPA guidance and recommendations for developing and adopting their own criteria, they are allowed to develop their own methodology. USEPA guidance and recommendations are continuously developed and revised.

National criteria recommendations have been established for the protection of both aquatic life and human health. Aquatic life criteria are designed to protect all aquatic life (plants and animals), and include acute criteria for short-term exposures (e.g., spills) and chronic criteria for long-term exposures. Separate criteria are available for fresh and salt waters. Criteria may be dependent upon other water quality characteristics such as pH, temperature, or hardness. Human health criteria are numerical guidelines for the potential risk of adverse effects to humans due to substances in water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Criteria are available for public drinking water supply and non-drinking water.

Louisiana Pollutant Discharge Elimination System

The LPDES Program administers permitted wastewater discharges into state surface waters, allowing the state to control the amounts and types of wastewaters discharged into its waters in order to meet water quality standards. The program began in 1996, when LDEQ adopted responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the USEPA.

Louisiana Nonpoint Source Program

The Louisiana NPS Program administers nonpoint source pollution management in accordance with Section 319(h)(11) of the CWA, as another measure for meeting water quality standards. It includes partnering with stakeholders and other statewide nonpoint source pollution management programs for the development and execution of watershed implementation plans for reducing nonpoint source pollution, as well as educational outreach with the same objective (LDEQ 2014).

C-2.2.2 Historic and Existing Conditions

Mississippi River

The Mississippi River basin is the largest watershed in the U.S., draining 41% of the land area of the lower 48 states. The study area portion of the watershed can be seen in Figure C-9. River water quality is influenced by both natural and anthropogenic sources, and is controlled by interacting factors such as water acidity, abundance of major inorganic and organic compounds, and suspended sediment.

Natural erosion and weathering of crustal materials influences river water quality by releasing dissolved solids along with small amounts of metals, nutrients, and organic materials. Mississippi River water is considered to be bicarbonate-type, because bicarbonates associated with highly soluble rock and soil in the basin are the primary dissolved salt in river water (Meade 1995). Bicarbonate-type water is slightly alkaline, which influences the partitioning of constituents; for

example, metals in bicarbonate-type water associate with suspended particulates or bed sediments, rather than being in the dissolved phase.

Man's activities in the basin affect both water quality and quantity, and include industry, development, mining, agriculture, and river engineering (e.g., Turner and Rabalais 2003, Raymond et al. 2008). Current anthropogenic influences on river water quality include agriculture, development, and river engineering. The combination of runoff of fertilizer primarily applied for large-scale farming of corn and soybeans in the basin and changes in watershed land cover through development promote elevated nitrate levels in the river (Broussard 2008). Another byproduct of agricultural chemical application in the basin is the presence of pesticides in river water, with the pesticide of greatest ecological concern being atrazine. Atrazine is a broad-leaf herbicide used for weed control that is highly mobile and slow to degrade in surface waters. It can act as an endocrine disruptor for amphibians at concentrations as low as 1 µg/L, and can inhibit root growth of marsh vegetation (Demcheck and Swarzenski 2003, Swarzenski et al. 2005). It is the second most heavily applied pesticide in the lower 48 states (Thelin and Stone 2013). In addition to chemicals associated with agricultural runoff, the river is known for its diminished but still significant suspended sediment load (Meade and Moody 2010). Factors which are suspected to have led to diminished suspended sediment loads in the river primarily include river engineering works and agricultural soil conservation.

River water quality varies due to factors such as seasonality, changing farming practices, and rainfall patterns. As this relates to agricultural runoff and suspended sediment, fertilizer and pesticide concentrations in the river are dependent on their physiochemical properties, timing of application and subsequent rainfall, crop selection, and Federal farm policy, while suspended sediment concentration, load, and grain size distribution are dependent on factors such as river discharge, time between flood events, and water depth (Meade 1995, Allison et al. 2010, Rosen and Xu 2014).

Anthropogenically-induced changes in Mississippi River water quality are primarily related to population increases within the river's watershed and development practices, including the adoption of agricultural soil conservation practices beginning in the 1930s; the construction of major river engineering works during the 20th century; increasing use of fertilizers and pesticides, particularly for industrial farming; and insufficient regulation of point source pollution prior to effective enforcement of the CWA.

Figure C-9 – Study Area within the Mississippi River Watershed

Table C-3, adapted from Garrison (1998), includes a water quality summary for three long-term (periods of record ranging from 1905-1995) monitoring stations in the Mississippi River.

Table C-3 - Mississippi River Water Quality Summary, from Garrison (1998) (BDL = Below Detection Limit)

Group	Parameter	Units	Mississippi River at New Orleans, Louisiana (8)			Mississippi River at Violet, Louisiana (9)			Mississippi River at Belle Chasse, Louisiana (10)		
			Percentile			Percentile			Percentile		
			25th	50th (Median)	75th	25th	50th (Median)	75th	25th	50th (Median)	75th
Physical properties	Specific Conductance	µmhos/cm	346	406	462	324	358	450	332	402	461
	pH	SU	7.3	7.6	7.9	7.4	7.6	7.8	7.3	7.6	7.8
	Water Temperature	°C	11.5	19	28	10.5	17.5	26.2	11	19.2	26.5
	Dissolved Oxygen	mg/L	6.5	8	9.5	7.1	8.1	9.6	6.8	7.9	10.2
	Dissolved Solids		208	245	275	201	220	254	214	249	286
Major cations	Calcium (Dissolved)	mg/L	36	41	45	35	38	44	35	39	43
	Magnesium (Dissolved)		9.7	12	13	9.6	11	13	9.8	12	14
	Sodium (Dissolved)		16	22	28	15	18	26	15	20	28
	Potassium (Dissolved)		2.8	3.3	3.5	2.5	2.9	3.3	2.8	3.3	3.6
Major Anions	Alkalinity (Total, as $CaCO_3$)	mg/L	90	106	118	89	98	115	88	105	120
	Sulfate (Dissolved)		44	53	62	40	46	57	38	48	59
	Chloride (Dissolved)		19	25	30	18	22	29	20	26	32
Nutrients	Ammonia + Organic Nitrogen (Total, as N)	mg/L	0.5	0.7	0.9				0.5	0.7	1
	Nitrate + Nitrite (Total, as N)		0.88	1.2	1.6	0.85	1.2	1.4	1.1	1.4	1.7
	Phosphorus (Total, as P)		0.18	0.24	0.31	0.2	0.24	0.3	0.14	0.2	0.27
Biological Constituents	Fecal coliform	Col/100 mL	170	280	460	2,000	3,100	3,600	140	310	800
	Fecal streptococcus		200	440	880				120	280	750
	Phytoplankton	Cells/mL	760	1,400	2,800				880	1,800	4,100
Metals	Iron (Dissolved)	µg/L	*BDL*	20	40	*BDL*	*BDL*	30	*BDL*	20	29
	Zinc (Dissolved)		*BDL*	*BDL*	20	*BDL*	*BDL*	*BDL*	*BDL*	*BDL*	*BDL*
Organic Compounds	2,4-D (Total)	µg/L	*BDL*	*BDL*	0.2	*BDL*	*BDL*	*BDL*			
	Phenols (Total)					*BDL*	1	2			
	Oil and Grease (Total Recoverable)	mg/L				*BDL*	*BDL*	1			
	Organic Carbon (Total)		3.6	5.6	7.7	6	6.2	8.5	5.2	6.7	8.9

Factors affecting river water quality historically within the watershed are summarized in Turner and Rabalais (2003), and primarily include increasing watershed population and development, lack of soil management practices, removal or replacement of native vegetation, and farming. These factors are thought to have contributed to increases in river suspended sediment and nitrogen concentrations, which correlate with elevated suspended sediment concentrations near the turn of the 20th century and increases in offshore diatom densities since the 19th century. Fertilizer and pesticide application from industrial farming practices have been correlated with increases in river and tributary nitrate concentrations, and the presence of pesticides in these waterbodies. During the second half of the 20th century, nitrate concentrations in the lower river increased from 0.56 to 1.45 mg/L, correlating strongly with a shift to intensive farming of corn and soybeans in the basin, particularly in the Midwest (NSTC/CENR 2000, Broussard 2008, Broussard and Turner 2009). Elevated nutrient concentrations in river water reaching the Gulf of Mexico have been linked to the formation of the annual Gulf of Mexico hypoxic zone, a nearshore area along the Louisiana and Texas coastline ranging in size from 5,000-20,000 square miles with hypoxic bottom waters, which generally appears during the summer months. Most nearshore aquatic organisms are not adapted for life in hypoxic waters and will die if unable to migrate in a timely manner to areas with higher, habitable dissolved oxygen concentrations (NSTC/CENR 2000). Atrazine, developed in the 1950s and therefore previously nonexistent in river water, is now

present at concentrations ranging from 0.1-1.4 µg/L (Demcheck and Swarzenski 2003). The combination of elevated nitrate and atrazine in the river has been linked to wetland losses in areas of coastal Louisiana receiving chronic river water inflows (Swarzenski et al. 2005, 2008). Additionally, there is evidence that agricultural practices and land use have led to increasing river discharge:precipitation and bicarbonate load:river discharge relationships, suggesting that agricultural activities in the basin may be affecting loadings of major ions and agricultural pollutants besides nitrate and atrazine, and increasing river water alkalinity (Raymond et al. 2008).

Decreasing suspended sediment concentrations in the lower river have been linked to river engineering and agricultural soil conservation practices within the basin. The construction of river engineering works in the 1950s and 1960s (particularly the dams along the Lower Missouri River, the largest tributary source of sediment to the lower river), construction of dikes and revetments along the lower river, and agricultural soil conservation practices implemented within the basin are believed to be the major factors contributing to the 60% reduction in the suspended sediment load of the lower river since 1900 (Meade and Moody 2010). Based on watershed and riverine modeling, a 17% reduction has occurred when comparing present loads with calculated loads for the time period prior to European settlement within the watershed, suggesting that watershed development before the adoption of agricultural soil conservation practices contributed to unnaturally elevated suspended sediment loads in the lower river (Tweel and Turner 2012). Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012).

River water quality has also been impacted by inflows of industrial and municipal effluent, as well as unpermitted point source discharges. Insufficient and ineffective regulation of point source pollution until the late 20th century contributed to water quality problems related to organic enrichment, thermal pollution, and the introduction of synthetic organic compounds and heavy metals. The enactment of the Clean Water Act and improved regulation of point sources of pollution have reduced or eliminated many of the water quality problems in the river. However, nonpoint source pollution within the watershed, especially agricultural runoff, continues to generate water quality problems. A recent increase in corn farming within the basin for the production of biofuels has the potential to increase agricultural nonpoint source pollution of the river (COMRACWA 2008). Additionally, although water quality in the river is good with respect to water quality criteria, some heavy metals as well as organic contaminants introduced to the river have an affinity for binding to suspended and bed sediments. Historical evidence suggests suspended sediment in the river may contain elevated levels of some heavy metals with respect to pollution guidelines (Meade 1995). Recent bed sediment chemistry data for samples collected in the river near diversions proposed under the LCA MRDM study suggests some low-level organic

contamination of bed sediments (Weston Solutions 2008, Providence Engineering and Environmental Group 2007).

Louisiana Water Quality Inventory

The 2014 Louisiana Water Quality Inventory: Integrated Report (IR) reports the most recent assessment of waterbody subsegments as required by Sections 303(d) and 305(b) of the CWA. For the Mississippi River, there are three applicable subsegments for the study area including:

- LA070301 (Mississippi River from Monte Sano Bayou [Baton Rouge] to Head of Passes),
- LA070401 (Mississippi River Passes – Head of Passes to Mouth of Passes [includes all passes in the birdfoot delta]), and
- LA070601 (Mississippi River Basin Coastal Bays and Gulf Waters to the State 3 mile limit)

Table C-4 provides the 2014 IR's summary information for the applicable waterbody subsegments as presented in Appendix A of the IR. The upper reaches of the river within the study limits are fully supporting the assigned designated uses. However, the lower reach (coastal/Gulf waters) are listed as impaired due to the reasons shown below. LDEQ has developed a TMDL for mercury in fish tissue impairment while the dissolved oxygen and fecal coliform impairments are listed on the 303(d) list and require TMDL development.

Table C-4 - Mississippi River Waterbody Subsegments

Subsegment Number	Designated Uses					Impaired Use	Suspected Causes of Impairment	Suspected Sources of Impairment
	PCR[1]	SCR[2]	FWP[3]	DWS[4]	OYS[5]			
LA070301	F[6]	F	F	F				
LA070401	F	F	F		F			
LA070601	F	F	**N**[7]		**N**	FWP	Mercury in fish tissue	Atmospheric deposition of toxics and unknown source
	F	F	**N**		**N**	FWP	Dissolved oxygen	Upstream source
	F	F	**N**		**N**	OYS	Fecal coliform	On-site treatment systems, waterfowl, and other wildlife

[1] *Primary Contact Recreation (swimming)*

[2] *Secondary Contact Recreation (boating)*

[3] *Fish and Wildlife Propagation (fishing)*

[4] *Drinking Water Supply*

[5] *Oyster Propagation*

[6] *Fully supporting*

[7] *Not supporting*

C-2.2.3 Alternative 1 (No Action Alternative Future without Project Conditions – Year 50)

Direct and Indirect Impacts: There would be no direct or indirect impacts from implementing the No Action Alternative.

Cumulative Impacts: Without the proposed project, study area water quality would likely continue current trends. For example, surface water quality has improved significantly with the implementation of the Clean Water Act and industrial and municipal discharge programs such as NPDES. These programs continue to advance with new or improved technologies to treat wastewater discharges.

The causes of impairment listed in Table C-4 above will continue to degrade water quality until TMDL development and execution, and the suspected sources are addressed. In addition, contaminants of emerging concern such as pharmaceuticals and personal care products, microplastics, etc. continue to present uncertainty for surface water quality and potential concerns for human health and the environment.

C-2.2.4 Alternative 2 (a depth of 48 ft for the Crossings and a depth of 48 ft in Lower Mississippi River)

Direct and Indirect Impacts: See Direct and Indirect Impacts section for Alternative 3 below.

Cumulative Impacts: See Cumulative Impacts section for Alternative 3 below.

C-2.2.5 Alternative 3 (a depth of 50 ft for the Crossings and a depth of 50 ft in Lower Mississippi River)

Direct and Indirect Impacts: The upper reach of the river from Baton Rouge to New Orleans has 12 crossings where channel depths are generally maintained at a depth of 45 feet. At 11 of the crossings, sediment samples were collected along with river water for chemical analyses of the sediment and dredging elutriates where dredging would occur to deepen the river. Section C5 of this report summarizes the findings of those analyses.

This section will be updated with an evaluation of any potential direct or indirect impacts as it relates to drinking water intakes (three identified) in close proximity or just downstream of the crossings locations. Figure C-10 shows the Donaldsonville intake at the Smoke Bend Crossing and Figure C-11 shows two intakes for the St. James Water Districts #1 and #2 in relation to Belmont Crossing. Based on the chemical analyses, if elutriates show concentrations of contaminants above water quality criteria potential impacts to drinking water intakes would be evaluated as necessary.

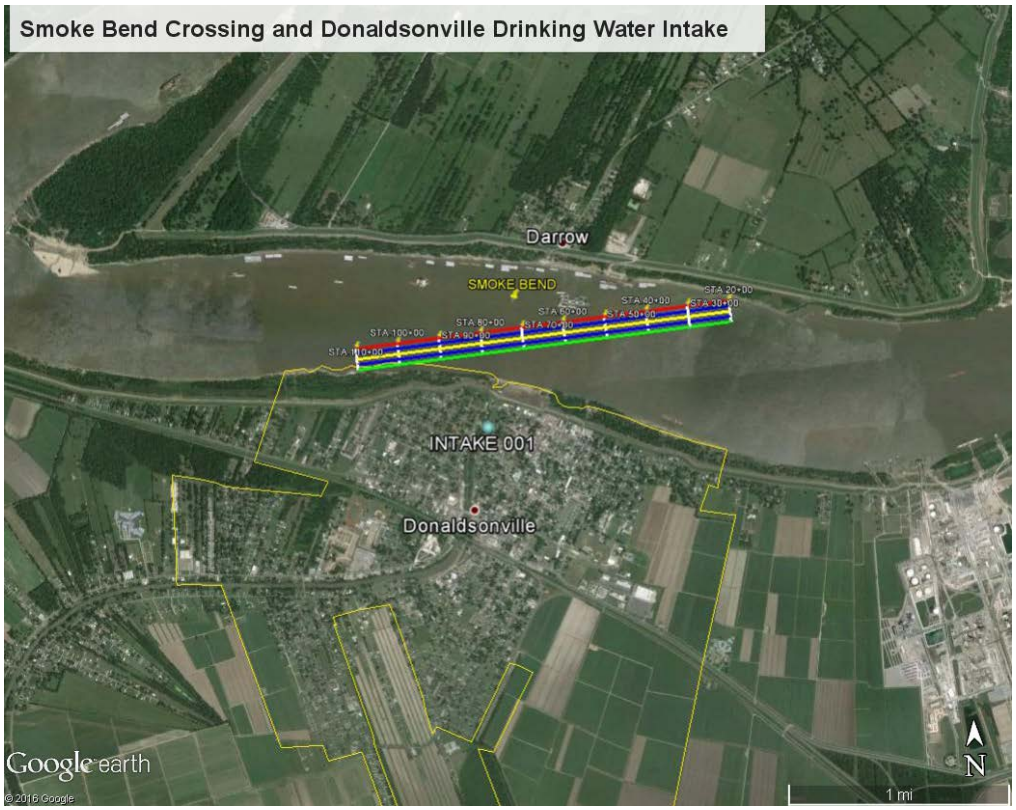

Figure C-10 – Smoke Bend Crossing and Donaldsonville Drinking Water Intake

C-2.2.6 Additional Alternatives Considered

The three alternatives as described above were reviewed and approved by the CEMVN vertical team (i.e., Division and HQ) and local sponsor at the designated Alternatives Milestone meeting on July 6, 2016 at CEMVN. These three alternatives were carried forward for the Engineering analysis concurrent to the evaluation of the draft SEIS, and economic and cost benefit anaylsis. Through the economic analysis additional alterntives were developed that considered combinations of the No Action and Alternatives 2 and 3 to maximize benefits and reduce costs. This resulted in new alternatives of varying depths throughout the project area. The direct, indirect and cumulative impacts of these additional alternatives will be the same as Alternative 2 and 3 or less.

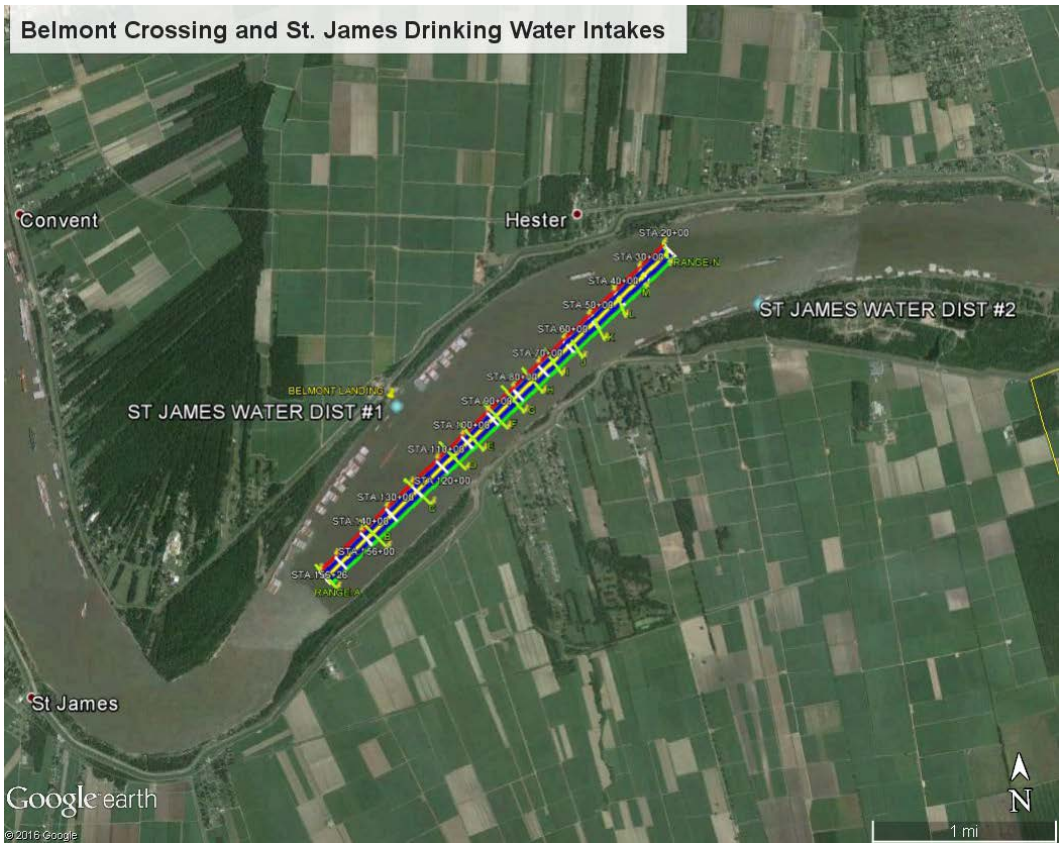

Figure C-11 – Belmont Crossing and St. James Water District #1 and #2 Intakes

In the lower section of the river, there are five water intakes that could potentially be impacted by saltwater intrusion due to deepening of the river. These include:

- Dalcour Water at river mile 81
- Belle Chasse at river mile 76
- East Pointe a La Hache at river mile 50
- Port Sulphur Water District at river mile 49
- Boothville Water at river mile 19

To evaluate this potential concern, a three-dimensional model is being developed. Section C2.1.3 of this report will document the findings of the model. This section (Water Quality) will be updated with any potential impacts to the intakes listed above.

Cumulative Impacts: With the proposed action, long-term, cumulative impacts are not anticipated as it relates to surface water quality. Near-term disturbances due to dredging activities such as

increased turbidity and potential suspension of contaminants that may exist in the bed sediments would likely have a short duration before returning to pre-dredging conditions. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available. Section C5 will discuss any potential impacts to other resources.

As described in the No Action Alternative, other on-going activities and sources of impairment will continue to influence surface water quality, which would be beyond the impacts of the proposed action.

C-3.0 GEOTECHNICAL INVESTIGATIONS AND DESIGN

This section includes the existing soils investigations for the channel deepening within the Mississippi River crossings, Cubits Gap to Head of Passes, Southwest Pass, and the Bar Channel.

C-3.1 Geotechnical Design for Channel Deepening

This portion of the report contains the plan for feasibility level geotechnical design performed for the proposed channel deepening within the river crossings, Cubits Gap to Head of Passes, Southwest Pass, and the Bar Channel. This report covers the soils, geology, foundation investigation and conditions.

C-3.1.1 Data Collection

No new borings were drilled for this project. Existing general type and undisturbed borings, Cone Penetrometer Tests (CPT), and dredged material grab samples are available throughout the entire project area.

C-3.1.2 Project Design Criteria

For this investigation, the channel depth is 50 feet MLLW in the Bar Channel, Southwest Pass, and Cubits Gap to Head of Passes with a channel width of 600 feet in the Bar Channel and 750 feet in Southwest Pass and Cubits Gap to Head of Passes. For the crossings, the channel depth is 50 feet NAVD88 with a channel width of 500 feet. A 1V on 5H slope will be used for the side slopes.

C-3.1.3 Field Investigation

C-3.1.3.1 Undisturbed Soil Borings

Numerous undisturbed soil borings exist throughout the project area. The soil borings were obtained by the USACE, A/E contract, and local sponsors. The boring plots are available through a Freedom of Information Act request.

C-3.1.3.2 General Type Soil Borings

Numerous general type soil borings exist throughout the project area. The soil borings were obtained by the USACE, A/E contract, and local sponsors. The boring plots are available through a Freedom of Information Act request.

C-3.1.3.3 Cone Penetrometer Test Data

Cone Penetrometer Test (CPT) data is available for portions of the project area, and were obtained by the USACE and A/E contract. The CPT plots are available through a Freedom of Information Act request.

C-3.1.3.4 Dredged Material Samples

Dredged material grab samples are available for portions of the project area. Spreadsheets of the data are available through a Freedom of Information Act request.

C-3.1.4 Geology

Geologic profiles have been developed for various projects along the river, and are available upon request.

The study area is located partially within the Central Gulf Coastal Plain physiographic province: the upper portion within the Mississippi River Alluvial Plain (from Baton Rouge to the vicinity of Donaldsonville), and the lower portion within the Mississippi River Deltaic Plain (from the vicinity of Donaldsonville to the gulf). The oldest deposits encountered within the study area are of Pleistocene Age (Ice Age). These deposits outcrop in the vicinity of Baton Rouge and dip beneath the surface in a southwesterly direction. At the end of the Ice Age, sea level had been lowered to a stage 400-450 feet below is present level and the Mississippi River Valley system had become deeply entrenched within the coastal plain sediments. Approximately 3,500 to 5,000 years ago, as sea level approached its present stand, the entrenched valley was gradually filled with Holocene (more recent) alluvial sediments which covered the exposed weathered and eroded surface of the Ice Age deposits. As the succeeding Mississippi River system migrated laterally back and forth across the alluvial plain, delta lobe complexes were formed below the general latitude of Donaldsonville, Louisiana. These triangle-shaped delta lobes, which continually shifted deposition to areas of steeper gradient, displaced the gulf waters and deposited fine-grained materials southeastward, eventually forming the existing deltaic plain. The modern “birds-foot” delta is continuing this process and extending deposition gulf ward toward the continental shelf. (Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981.)

C-3.1.4.1 Foundation Conditions

Between Baton Rouge and College Point, below Donaldsonville, Louisiana, the existing Mississippi River channel is incised in more recent deposits consisting of a top-stratum of relatively fine-grained soils overlying a substratum of sand and gravelly sands. The top-stratum is generally composed of natural levee clays and silts, backswamp clays and channel filling clays on the concave sides of the bends and accretionary clays, silts, and sands and point bar silts, silty sands, and sands on the convex sides of the bends. Below Donaldsonville, Louisiana, the river is incised in more recent and Ice Age deposits. Generally, on the concave sides of the bends, the banks are composed of more recent materials consisting of a top stratum of fine-grained soils overlying, and in some areas contacting laterally, Ice Age deposits. Between Donaldsonville and Kenner, Louisiana, this relatively fine-grained top-stratum consists of natural levee, undifferentiated deltaic plain, swamp, and marsh materials. Between Kenner, Louisiana, and the gulf, the top-stratum on the concave sides of the bends consists of natural levee, swamp, marsh, abandoned distributary, interdistributary, intradelta, prodelta, bay sound, estuarine, and nearshore gulf deposits. On the convex sides of the bends, the top stratum consists of accretionary and point bar deposits. The more recent top-stratum deposits are underlain by Ice Age materials throughout the area. A general physical description of the soils encountered in the various geologic environments is as follows:

- Natural levee – Interfingering layers of fat and lean clays and layers of silt.
- Point bar – Silts, silty sands and sands with thin layers of clay.
- Accretionary – Alternating layers of clay, silt, silty sands, and sands.
- Abandoned distributary – Layers of fat and lean clays, silts, and silty sands.
- Abandoned course – Layers of fat and lean clays and silts in upper portions with sands in lower portions.
- Backswamp – Homogeneous fat clays with wood, organic matter, and a few layers of silt.
- Undifferentiated deltaic plain – Fat and lean clays with lenses and layers of silt.
- Marsh – Organic clays, silts, and oozes with plant roots and particles (grasses and sedges).
- Swamp – Organic clays and silts with decayed wood (trees and shrubs).
- Interdistributary – Fat clays with thin lenses and layers of silt and a few thin layers of fine sand.
- Intradelta – Interfingered layers of silt, silty sand, and sand, with lenses and layers of fat clay (forms the sandy “barfinger” wedges at the mouth of the river).

- Prodelta – Homogeneous fat clays of medium consistency.
- Nearshore gulf – Silty sands and sand with shells.
- Estuarine – Silts, silty sands, and sands (reworked) with shells.
- Substratum – Massive sands grading to gravelly sands and gravel with depth.
- Pleistocene – Stiff to very stiff, oxidized clays with lenses and layers of silt, silty sand, and sand.
- (Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981)

C-3.1.4.2 Terrain and Land Use

The study area is characterized by low relief with elevations varying from a maximum of approximately 30 feet National Geodetic Vertical Datum in the vicinity of Baton Rouge, Louisiana, to a minimum near sea level in the marsh areas near the mouth of the Mississippi River. Large areas in and below New Orleans have been leveed and subjected to drainage by pumps. As a result of subsidence and shrinkage of the drainage soil, ground surface elevations as low as -10 feet are found. The most prominent topographic features are the natural levees which flank the present course, abandoned courses, and abandoned distributaries of the Mississippi River system. These natural levees form ridges which stand significantly above the surrounding swamps and marshes and vary in width from over 5 miles in the vicinity of Baton Rouge to less than 1,000 feet near the Gulf of Mexico. Drainage in the area is away from the river and its elevated natural levees into the adjoining swamps and marshes. Surrounding the natural levees in the area south and east of New Orleans, Louisiana, are vast marshes which are broken and fragmented by numerous bayous, lagoons, canals, lakes, ponds, and smaller abandoned distributaries.

The silt-laden overflow which formed the delta of the Mississippi River is now confined by a manmade levee system, the construction of which was initiated in 1712 and which now extends from Baton Rouge to Bohemia, Louisiana, on the east bank, and from above the study area to Venice, Louisiana, on the west bank. There are no natural tributaries nor distributaries through the portion on the levee system within the study area, and periodic overflow is limited to the area downstream of the artificial levees. The marshes throughout the study area are being lost to subsidence and erosion. These marshes no longer receive the sediments necessary for their stabilization or aggradation, and their rate of erosion accelerates as fetch lengths increase and wave action increases. Even though accretion is occurring at the mouths of a few of the passes of the Mississippi River, erosion is occurring in most of the marshes between the passes.

Land adjacent to the Mississippi River between Baton Rouge, Louisiana, and the Gulf of Mexico is extensively developed for agricultural, industrial, urban, and suburban uses. Excluded from this development are natural levees near the mouth of the river that are too low and narrow to justify flood protection. Protected land along the river below New Orleans, Louisiana, is used primarily for agriculture along with some suburban and industrial development. There is extensive urban, suburban, and industrial development in the vicinities of New Orleans and Baton Rouge, Louisiana, while the land between these metropolitan areas is also developed primarily for agriculture along with industrial and suburban development. Continued and increasing restrictions on crops basic to the area, due to this development, and the deep-draft navigational project in the river have accelerated a trend of decreasing agricultural activity and increasing industrialization. This trend is more pronounced in the area between New Orleans and Baton Rouge, Louisiana. Land being converted to industrial sites, for the most part, is located immediately adjacent to the river while recent residential development is mainly located near existing towns. Suburban or semirural development is also spreading along the river and is radiating out from larger population centers such as Baton Rouge and New Orleans, Louisiana. There remains, however, a considerable amount of agricultural land along the entire reach of the Mississippi River within the study area that has not been converted to other uses.

(Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981.)

C-3.1.5 Laboratory Tests

C-3.1.5.1 Testing for Undisturbed Soil Borings

For the undisturbed soil borings, visual classifications were made on all samples obtained from the soil borings. Water content determinations were made on all cohesive soil samples. Unconfined Compression (UCT) tests and Unconsolidated-Undrained (Q) shear tests were performed on samples from the undisturbed borings. Liquid and plastic limits were determined for all samples on which UCT's and Q tests were performed. The results of these tests are available through a Freedom of Information Act request.

C-3.1.5.2 Testing for General Type Soil Borings

For the general type soil borings, visual classifications were made on all samples obtained from the soil borings. Water content determinations were made on all cohesive soil samples. Unconfined Compression Tests (UCTs) were performed on samples from the general type borings. Liquid and plastic limits were determined for all samples on which UCTs were performed. The results of these tests are available through a Freedom of Information Act request.

C-3.1.5.3 Testing for Cone Penetrometer Tests

The results of the Cone Penetrometer Tests are available through a Freedom of Information Act request.

C-3.1.5.4 Testing for Dredged Material Samples

For the dredged material grab samples, classifications were made on all samples in accordance with USCS and as supplemented by "Guide for Moisture Contents Adapted to CEMVN-ED-F Soils". Specific gravity, grain size, hydrometer, and sieve tests were performed on all samples and reports were presented containing the grain size curve, D85, D60, D50, D30, D15, D10, Cc and Cu values. Relative maximum and minimum density testing was performed on granular samples (ASTM D-4253 and ASTM D-4254). The results of these tests are available through a Freedom of Information Act request.

C-3.1.6 Foundation Design

C-3.1.6.1 General

The geotechnical design was broken into several areas, namely the crossings (Baton Rouge Front, Red Eye, Sardine, Medora, Grenada, Bayou Goula, Alhambra, Philadelphia, Smoke Bend, Rich Bend, Belmont, and Fairview), Cubits Gap to Head of Passes (RM 7.0 or 6.0 AHP to 0.5 BHP), Southwest Pass (RM 0.5 BHP to 19.5 BHP), and the Bar Channel (RM 19.5 BHP to 22 BHP). For the foundation design, the project was further divided into soils reaches. The soils reaches were based on subsurface stratifications and subsurface soil shear strengths.

C-3.1.6.2 Design Soil Parameters

Design soil parameters (Q-Case) and subsurface stratifications for each soils reach for the foundation design of each area are available through a Freedom of Information Act request.

C-4.0 CIVIL DESIGN

C-4.1 Channel Design

C-4.1.1 General

The currently authorized and maintained Mississippi River – Gulf to Baton Rouge project is located within the Mississippi River between the Gulf of Mexico, approximate Mile 22.1 BHP (Below Head of Passes) and Baton Rouge, Louisiana, approximate Mile 232.4 AHP (Above Head of Passes). The current project was constructed in multiple phases, with Phase I providing a 45ft MLG^{SWP} deep draft channel from the Gulf to Mile 181 AHP which was completed in December 1988, and Phase II providing a 45ft MLG deep draft channel (reduced by the Low Water Reference Plane (LWRP) within this non-tidal segment of the river) from Mile 181 AHP to the upper limit at Mile 232.4 AHP in Baton Rouge, Louisiana.

Note: In practice, MLG at SWP has become a localized reference, or in this case, a series of local staff gages referenced with MLG. The series of gages along Southwest Pass were set and maintained to NGVD29. Over the years the water control gages were surveyed and moved as necessary to allow them to properly reference NGVD29. The MLG gages were not moved as necessary in order to maintain the 0.78ft offsets. As a result, MLG at Southwest Pass, as it is presently used in practice is approximately 3.5ft below MLLW.

For this phase of the study, 2004–2006 Mississippi River hydrographic surveys were utilized in determining the reaches that would be proposed for enlargement, based off of the depths and widths along the river projected in the survey. This reevaluation study evaluates the feasibility of deepening the current project to depths of 48ft Mean Lower Low Water, equal to 45ft MLG^{SWP} and 50ft MLLW (47ft MLG^{SWP}), commencing with the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river).

For this reach, an advance maintenance of 6ft below each alternative depth was applied, along with an allowable overdepth of 2ft. Advanced maintenance is performed to avoid frequent re-dredging and to ensure the lease overall cost of maintaining the project, by allowing post-dredging shoaling to occur without impacting project depth. Allowable overdepth will account for inaccuracies in the dredging process as well shoaling during construction and maintenance dredging events, and facilitate obtaining the full advance maintenance prism. For the reach of river extending upstream of Mile 13.4 AHP, the project depths of 48ft and 50ft below the LWRP (Low Water Reference Plane) were evaluated and adjusted using the 2007 LWRP NAVD88 elevations obtained from the curves provided in the following graph. The project reach of extends through the Ports of St Bernard, New Orleans, South Louisiana, and Baton Rouge upstream to Mile 232.4 AHP. This

information was used in determining the adjusted dredging elevations of the Mississippi River crossing locations for both the 48ft and 50ft alternatives. See the following tables for the 48ft and 50ft template information utilized for the crossings. As depicted by these tables, an advance maintenance of 3ft below each adjusted crossing project elevation was applied, along with an overdepth of 2ft to account for inaccuracies in the dredging process and to account for shoaling during the dredging process and facilitate obtaining the full advance maintenance.

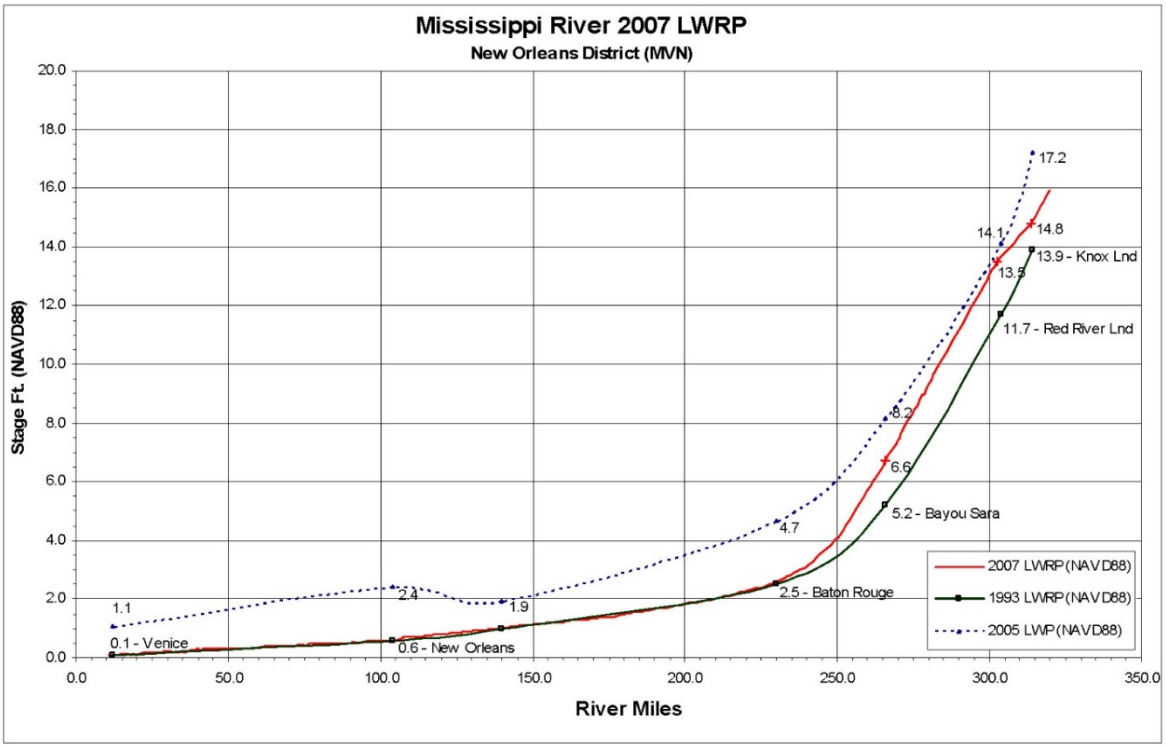

Figure C-12 - 2007 LWRP Elevations – NAVD88

Table C-5 - 48ft Crossing Template Information

Crossing Location	River Mile	2007 LWRP FT. NAVD88	-48' NAVD88	3' Adv Maint	Side Slopes	Bottom Width (250' O/C)	2' Overdepth by 500' Width
Baton Rouge Front	231	2.50	-45.50	-48.50	1 on 5	500	-50.50
Red Eye	224	2.40	-45.60	-48.60	1 on 5	500	-50.60
Sardine Point	219	2.30	-45.70	-48.70	1 on 5	500	-50.70
Manchac Bend	215	2.15	-45.85	-48.85	1 on 5	500	-50.85
Medora	212	2.00	-46.00	-49.00	1 on 5	500	-51.00
Grenada	204	1.90	-46.10	-49.10	1 on 5	500	-51.10
Bayou Goula	198	1.80	-46.20	-49.20	1 on 5	500	-51.20
Alhambra	191	1.70	-46.30	-49.30	1 on 5	500	-51.30
Philadelphia Point	183	1.60	-46.40	-49.40	1 on 5	500	-51.40
81 Mile Point	179	1.55	-46.45	-49.45	1 on 5	500	-51.45
Smoke Bend	175	1.45	-46.55	-49.55	1 on 5	500	-51.55
Rich Bend	159	1.25	-46.75	-49.75	1 on 5	500	-51.75
Belmont	153	1.20	-46.80	-49.80	1 on 5	500	-51.80
Fairview	117	0.80	-47.20	-50.20	1 on 5	500	-52.20

Table C-6 - 50ft Crossing Template Information

Crossing Location	River Mile	2007 LWRP FT. NAVD88	-50' NAVD88	3' Adv Maint	Side Slopes	Bottom Width (250' O/C)	2' Overdepth by 500' Width
Baton Rouge Front	231	2.50	-47.50	-50.50	1 on 5	500	-52.50
Red Eye	224	2.40	-47.60	-50.60	1 on 5	500	-52.60
Sardine Point	219	2.30	-47.70	-50.70	1 on 5	500	-52.70
Manchac Bend	215	2.15	-47.85	-50.85	1 on 5	500	-52.85
Medora	212	2.00	-48.00	-51.00	1 on 5	500	-53.00
Grenada	204	1.90	-48.10	-51.10	1 on 5	500	-53.10
Bayou Goula	198	1.80	-48.20	-51.20	1 on 5	500	-53.20
Alhambra	191	1.70	-48.30	-51.30	1 on 5	500	-53.30
Philadelphia Point	183	1.60	-48.40	-51.40	1 on 5	500	-53.40
81 Mile Point	179	1.55	-48.45	-51.45	1 on 5	500	-53.45
Smoke Bend	175	1.45	-48.55	-51.55	1 on 5	500	-53.55
Rich Bend	159	1.25	-48.75	-51.75	1 on 5	500	-53.75
Belmont	153	1.20	-48.80	-51.80	1 on 5	500	-53.80
Fairview	117	0.80	-49.20	-52.20	1 on 5	500	-54.20

It should be noted that the reevaluation study strictly considered deepening of the current project, with channel widths remaining the same throughout the entire reach. Channel widths and side slopes utilized in the study for generating quantities and costs are as follows:

Channel Reach	Bottom Width	Side Slopes
Jetty and Bar Entrance Channel (Miles 22.1 BHP to 19.5 BHP)	600ft	1V on 3H
SW Pass Reach (Miles 19.5 BHP to 6 AHP)	750ft*	1V on 3H
Miles 6 AHP to 181 AHP	750ft	1V on 3H
Miles 181 AHP to 233.8 AHP	500ft	1V on 5H

*Note that channel transitions from 600ft to 750ft in width between Miles 17.5 BHP and 18.0 BHP

The above limits and dimensions are identical for the current -45ft project with the exception of the side slopes for the crossings between Miles 181 AHP and 232.4 AHP where the side slopes for this reevaluation study have been flattened from the originally authorized 1V on 3H to 1V on 5H to better reflect the actual side slopes that are being obtained during O&M dredging of the crossings due to the sandy material that is encountered while dredging within these reaches of the Mississippi River. The proposed channel alignments within the SW Pass and Mississippi River crossing reaches, which are maintained on an annual basis, will follow the existing alignments that are currently used for navigation and maintenance dredging.

C-4.1.2 48ft Channel Alternative

This alternative will provide a 48ft deep draft project from the Gulf of Mexico to Baton Rouge, Louisiana. The project design elevation for this channel alternative is -48.0ft MLLW, beginning at the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass (SWP) to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river Reach). This -48ft MLLW elevation correlates to the original authorized depth of 45ft MLG, (as used in practice locally at this site), to which the project was deepened in 1987 and to which it is currently maintained. As stated in paragraph C4.1.1, this reach of channel is often referred to as the SW Pass reach, and will be dredged to a depth of 6ft below -48ft MLLW (advanced maintenance), over the bottom widths and side slopes specified at the end of paragraph C4.1.1. An allowable overdepth of 2ft was accounted for in disposal area capacity evaluation and cost estimating. Dredging quantities were based off of hydrographic surveys of the Mississippi River – SW Pass performed in September 2015. It is anticipated that shoaling within this reach of the river will remain consistent with historical patterns, and similar dredging requirements are anticipated between approximate Miles 6 AHP and 22 BHP.

For the upper portion of the study, the Mississippi River crossings listed in the tables in paragraph C4.1.1 were evaluated under this reevaluation study. The crossings which are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88) for each respective crossing location, would be deepened to 48ft below the LWRP under this alternative. The advance maintenance and allowable overdepth, 3ft and 2ft respectively, which are currently applied for maintenance of the crossings under the current 45ft project, would be retained for this deepening alternative. In addition, the current channel bottom width of 500ft was determined to be adequate to accommodate projected future vessels and was therefore used for this alternative, and channel side slopes of 1V on 5H were utilized for this reevaluation study in estimating quantities. For determining construction quantities, it was assumed that construction would immediately follow annual O&M dredging of the crossings and be performed during low water season. For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities.

C-4.1.3 50ft Channel Alternative

This alternative will provide a 50ft deep draft project from the Gulf of Mexico to Baton Rouge, Louisiana. The project design elevation for this channel alternative is -50.0ft MLLW, beginning at the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass (SWP) to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river Reach). As stated in paragraph C4.1.1, this reach of channel is often referred to as the SW Pass reach, and will be dredged to a depth of 6ft below -50ft MLLW, over the bottom widths and side slopes specified in paragraph C4.1.1. An allowable overdepth of 2ft was accounted for in disposal area capacity evaluation and cost estimating. Dredging quantities were based off of hydrographic surveys of the Mississippi River – SW Pass performed in September 2015. It is anticipated that shoaling within this reach of the river will remain consistent with historical patterns, and similar dredging requirements are anticipated between approximate Miles 6 AHP and 22 BHP.

The Mississippi River crossings listed in the tables in paragraph C4.1.1 were evaluated under this reevaluation study. The crossings which are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88) for each respective crossing location, would be deepened to 50ft below the LWRP under this alternative. The potential for required dredging of any additional crossings is being evaluated under the ongoing 2D model analysis. The advance maintenance and allowable overdepth, 3ft and 2ft respectively, which are currently applied for maintenance of the crossings under the current 45ft project, would be retained for this deepening alternative. In addition, the current channel bottom width of 500ft was determined to be adequate to accommodate projected future vessels and was therefore used for this alternative, and channel side slopes of 1V on 5H were utilized for this reevaluation study in estimating quantities. For determining construction quantities, it was assumed that construction would

immediately follow annual O&M dredging of the crossings and be performed during low water season. For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities.

C-4.2 Dredging and Disposal for Construction (Both the 48ft and 50ft Alternatives)

C-4.2.1 General

Dredging and disposal alternatives investigated in this study centered on identifying the least-cost, environmentally acceptable plan. Dredging for construction of both the 48ft and 50ft channels would be accomplished via different types of dredging equipment, similar to that utilized for the construction of the current 45ft channel.

C-4.2.2 Mississippi River - SW Pass Channel Reach

For the deepening of the SW Pass reach from the current project depth of 48ft MLLW to 50ft MLLW, it is anticipated that deepening will be required between approximate Mile 6 AHP and approximate Mile 22.1 BHP. Construction of the 50ft MLLW project in SW Pass would be accomplished via 3 separate contracts: two (2) hydraulic cutterhead contracts covering the reach between Miles 6 AHP to 19.5 BHP, and one (1) hopper dredge contract covering the jetty and bar channel reach from Miles 19.5 BHP to 22.1 BHP. For the hydraulic cutterhead dredging work, all dredge material would be utilized in a beneficial manner for either bank stabilization behind existing foreshore dikes along the channel or for marsh creation in the adjacent open waters. Construction of the jetty and bar channel reach from Miles 19.5 BHP to 22.1 BHP would be performed via mobile hopper dredge(s) versus stationary cutterhead dredges as this area of work will be within the Gulf entrance channel and susceptible to high sea conditions, as well as having to contend with deep draft vessels both exiting to and entering from the Gulf of Mexico via the jetties. For the hopper dredging work, all material will be dredged and hauled to the EPA approved ODMDS (Ocean Dredge Material Disposal Sites) adjacent to and west of the gulf entrance channel between Approximate Miles 20.4R BHP and 23.1R BHP.

C-4.2.3 Mississippi River Crossings

While there are a total of 24 crossing locations between New Orleans and Baton Rouge, only 12 of these crossings currently require maintenance dredging. These 12 deep draft crossings were evaluated as part of the deepening study based upon channel conditions that existed in the fall/ winter of 2014. The crossings that are being carried over for further evaluation in the next study phase are: Baton Rouge Front, Red Eye, Sardine Point, Medora, Granada, Bayou Goula, Alhambra, Philadelphia Point, Smoke Bend, Rich Bend, Belmont, and Fairview. Other crossing locations that will be reconsidered during the next phase of this reevaluation study as potentially

requiring maintenance dredging, based off of future channel surveys and 2-D model results, will include: Missouri Bend and 81 Mile Point.

As previously stated in paragraph C4.1.3, the crossings are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88 datum) for each respective crossing location, and would be deepened to either 48ft or 50ft below the LWRP under this study. Construction would be accomplished via contract and/or Government dustpan dredge(s) which is consistent with the method of construction utilized for deepening as well as maintenance of the crossings. Material dredged from the crossings would be placed adjacent to the crossing and put back into the system for the material to be carried downstream and to fallout into deeper holes within the river.

C-4.2.4 Construction Schedule

For initial construction of either alternative, it is anticipated that construction of the project will be accomplished within a four year period, commencing during low water season following routine annual O&M dredging of the channel.

C-4.3 Operations and Maintenance Dredging

Annual maintenance dredging will be required within the reaches of the Mississippi River addressed in this reevaluation report. For this phase of the study, EDRC was tasked with developing a 1D model to determine the annual maintenance dredging quantities that could be anticipated within the crossings, as well as the lower Mississippi River reach between Venice and the Gulf, otherwise referred to as the Mississippi River - SW Pass Channel reach.

C-4.3.1 Mississippi River - SW Pass Channel Reach

The ERDC 1D model results received broke out the anticipated shoaling over the following reaches:

Southwest Pass Reach– Miles 18.0 BHP to 0.5 BHP

Head of Passes Reach – Miles 0.5 BHP to 1.5 AHP

Fairway/ Anchorage at Pilottown Reach – Miles 1.5 AHP to 5.0 AHP

Venice Reach – Miles 5.0 AHP to 11.0 AHP

While the projected annual quantities from the 1D model were, for the most part, in line with those obtained during historical O&M dredging of the channel, there were some issues with the results that were projected for the Head of Passes and Fairway/ Anchorage at Pilottown reaches where the model projections were well above the average annual quantities dredged within these reaches.

The District and ERDC both agreed that shoaling and maintenance dredging needs within the lower portion of the Mississippi River, from Venice, Louisiana (Mile 11 AHP) to the Gulf entrance channel (Mile 22.1 BHP), would remain essentially the same as the current 45ft project. **As a result, the dredging needs for both the 48ft and 50ft channel alternatives in this reach were based off of average annual quantities obtained from historical dredging performed within the above reaches of the Mississippi River - SW Pass channel.** The following annual maintenance plan was developed through coordination with the District's Operations Manager and used in obtaining the average annual O&M dredging costs for both the -48ft MLLW and -50ft MLLW alternatives:

Cubits Gap to Head of Passes reach (Approximate Miles 6 AHP to 0.5 BHP)

The ERDC 1D model indicated annual dredging of approximately 19,000,000 cys/yr for this reach, referred to in the EDRC model as the Head of Passes Reach – Miles 0.5 BHP to 1.5 AHP, combined with the Fairway/ Anchorage at Pilottown Reach – Miles 1.5 AHP to 5.0 AHP. However, based off of annual dredging performed within these reaches combined, and accounting for the possible extension of dredging to Mile 6.0 AHP, cost estimates were based off of an annual quantity of 9,000,000 cys for the reach between Miles 0.5 BHP and 6.0 AHP. **It is estimated that approximately 2,500,000 cys would be removed annually by one (1) cutter head dredge (1 mob and demob), and 6,500,000 cys being removed by hopper dredges (assumes 4 hopper contracts and 4 mobs and demobs).** If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the event Contract hoppers are unable to meet the O&M needs. Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre via the dredge-and-haul method. The HDDA, as shown in Figure C-1, is a designated in channel hopper disposal site. The site is mined on a periodic basis via cutterhead dredge, using project funds, and the material is transported either east or west of the channel and used for wetland creation.

SW Pass reach; Mile 0.5 BHP to 19.5 BHP

The ERDC 1D model indicated annual dredging of approximately 9,000,000 cys/yr for the Mile 0.5 BHP to 18 BHP reach. However, based off of annual dredging performed within these reaches combined, and accounting for the possible extension of dredging below Mile 18.0 BHP to Mile 19.5 BHP, cost estimates were based off of an annual quantity of approximately 9,500,000 cys for the reach, as compared to the 9,000,000 cys/ yr estimated by the ERDC 1D model for Miles 0.5 BHP to 18.0 BHP. **It is estimated that approximately 5,250,000 cys would be removed annually by two (2) cutter head dredge (2 mobs and demobs), and 4,250,000 cys being removed by hopper dredges (assumes 3 hopper contracts and 3 mobs and demobs).** If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the

event the dredging industry is unable to meet the O&M needs. Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, while material removed by hopper dredges would be placed within the hopper dredge disposal area (HDDA) within Pass A Loutre or the ODMDS located adjacent to the entrance bar channel via the dredge-and-haul method.

Jetty and Bar Channel Reach; Mile 19.5 BHP to approx. 22.1 BHP

As the ERDC 1D model did not account to for this reach of the channel, previous historical quantities were utilized in developing and average annual quantity to be dredged. **It is estimated that approximately 3,750,000 cys would be removed annually by hopper dredge. (Assumes one contract hopper, so one mob and demob).** This quantity falls with the range of average annual quantities dredged based off averages for the last 5 and 10 years of dredging in the bar channel. The dredged material would be disposed of within the designated EPA ODMDS via the dredge and haul method. However, on occasions when weather and tidal conditions are appropriate, agitation dredging may be performed. If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the event Contract hoppers are unable to meet the O&M needs.

C-4.3.2 Mississippi River Crossings

The ERDC 1D model evaluated shoaling within the Mississippi River at the following crossing locations:

Site	River Miles (AHP)	Site	River Miles (AHP)
Fairview Crossing	115.2 to 117.2	Granada	203.3 to 206.6
Belmont Crossing	152.6 to 155.1	Medora Crossing	211.6 to 212.3
Rich Bend	157.9 to 159.5	Sardine Point	218.7 to 219.9
Smoke Bend	174.5 to 175.9	Red Eye Crossing	223.4 to 225.4
Philadelphia Point	181.72 to 183.6	Baton Rouge Front	228.1 to 232.7
Alhambra	189.4 to 190.9	Wilkerson Point	233.9 to 234.5
Bayou Goula Crossing	197.5 to 198.4		

The model assessed annual dredging that would be required at each of the above crossings for the current -45ft project, as well as the proposed -48ft LWRP and -50ft LWRP project alternatives. The crossing width utilized was the current 500ft to which the current project is maintained. The following table provides the average annual quantities estimated (1D model) to be dredged at each crossing considered in this study, as well as the average annual quantities

removed at each crossing based off of information received from the District's Operations Division covering years 1999 through 2015.

Table C-7 - Estimated Average Annual Dredge Quantities per Crossing

Crossing Sites	48ft Below LWRP (Adjusted NAVD88)	50ft Below LWRP (Adjusted NAVD88)	Average annual quantities for 45ft Below LWRP (Adjusted to NAVD88)
Baton Rouge Front	2244.00	8219.00	1,845,387.00
Red Eye	7,399,138.00	10,080,422.00	4,359,091.00
Sardine	2,942.00	0.00	1,181,210.00
Medora	6,359,640.00	7,249,703.00	1,051,192.00
Granada	4,689.00	6,769.00	1,125,646.00
Bayou Goula	5,268,874.00	6,562,383.00	950,932.00
Alhambra	6,600,408.00	7,278,225.00	2,481,629.00
Philadelphia	3,560.00	1,850.00	256,276.00
Smoke Bend	1,687,483.00	2,002,032.00	518,415.00
Rich Bend	222,823.00	1,046,694.00	15,041.00
Belmont	3,363,272.00	4,039,445.00	1,949,741.00
Fairview	0	0	0.00

As can be seen, the ERDC 1D model results for four (4) of the crossing sites, highlighted in red (Baton Rouge Front, Sardine Point, Granada, and Philadelphia Point), fell well below the average annual quantities captured during O&M dredging of the crossings for the current 45ft project over the last 16 years. (See Annex 2).

As a result of the significant disparity between the current project's annual O&M dredging quantities, and the quantities produced by the 1D model for the 48ft and 50ft deepening alternatives, the average annual quantities gathered for the 45ft project at these crossing sites were taken and indexed by factors to bring them closer to the percentage increases that were produced for the other eight crossings. For these crossings, we compared the percentage increase that were projected between the model results and the average annual CYS dredged, and simply projected the following: **a) for the 48ft project, a 70% increase over the annual O&M quantities for the current 45ft project, and b) for the 50ft project, a 130% increase over the annual O&M quantities for the current 45ft project.** These percentages fell in line with (for the most part less than) the percentage increases/dredging indexes that are reflective of the "more aggressive dredging schedule" 1D model results provide by ERDC. (See **Section C2.1.1.4.)** The following table depicts the quantity comparisons between the ERDC 1D model results for Baton Rouge Front, Sardine Point, Granada, and Philadelphia Point (in RED) and **the adjusted quantities for**

the 48ft and 50ft alternatives that were used to obtain costs (in GREEN). Those crossings showing significantly high increases in maintenance dredging were not adjusted.

Table C-8 - Quantity Comparisons between ERDC 1D Model Results and Adjusted Quantities Used to Obtain Dredging Costs

Crossing Sites	48ft Below LWRP (Adjusted NAVD88)	50ft Below LWRP (Adjusted NAVD88)	Average annual quantities for 45ft Below LWRP (Adjusted to NAVD88)	48ft Below LWRP (Adjusted NAVD88) Adjusted Quantities	50ft Below LWRP (Adjusted NAVD88) Adjusted Quantities
Baton Rouge Front	2244.00	8219.00	1,845,387.00	3,137,000.00	4,235,000.00
Red Eye	7,399,138.00	10,080,422.00	4,359,091.00		
Sardine	2,942.00	0.00	1,181,210.00	2,008,000.00	2,711,000.00
Medora	6,359,640.00	7,249,703.00	1,051,192.00		
Granada	4,689.00	6,769.00	1,125,646.00	1,914,000.00	2,583,000.00
Bayou Goula	5,268,874.00	6,562,383.00	950,932.00		
Alhambra	6,600,408.00	7,278,225.00	2,481,629.00		
Philadelphia	3,560.00	1,850.00	256,276.00	436,000.00	588,000.00
Smoke Bend	1,687,483.00	2,002,032.00	518,415.00		
Rich Bend	222,823.00	1,046,694.00	15,041.00		
Belmont	3,363,272.00	4,039,445.00	1,949,741.00		
Fairview	0	0	0.00		

For all crossings, it is projected that O&M dredging would be accomplished via contract (1) and Government (1-2) dustpan dredges, with the material dredged from the crossings disposed of adjacent to the crossings and put back into the system for the material to be carried downstream and to fallout into deeper holes within the river.

The 48 ft. and 50 ft. dredge quantities for each individual crossing were used to formulate different benefit and cost alternative combinations of deepening throughout the project area

C-4.4 Additional O&M Needs

In order to properly maintain the project, there are other existing features that would warrant O&M, but for which cannot be accommodated due to shortfalls in the annual O&M budget. The following is a list of O&M needs and projected "annual costs" that need to be captured in the overall project costs for the deepening study. The breakdown of those annual costs/needs is as follows:

- O&M dredging of New Orleans Harbor - While dredging is not projected to increase from that currently performed for the existing -45ft MLG project, the average annual costs required to maintain the NO harbor is estimated to be approx. $4.5 Million/ Year;

- O&M of the Hopper Dredge Disposal Area at HOP - Continued O&M will be required and is estimated to cost approx. $17 Million/ Year;
- O&M for the Saltwater Barrier Sill - Average annual cost is estimated to be approximately $1.2 Million/ Year; and
- O&M of training works (i.e. foreshore and pile dike repairs, jetty repairs, and existing dikes in crossings) - Average annual cost is estimated to be approximately $15 Million/ Year.
- TOTAL - $37.7 Million/ Year

These are estimated annual O&M requirements and some of these costs are due to the fact that the project has not been properly budgeted in the past to perform some of these O&M needs. And while these are needs for the current project that simply do not get funded, they still need to be captured in the annual costs developed for this deepening study.

C-4.5 Relocations

C-4.5.1 Purpose

Relocation data was collected, tabulated and detailed in this appendix by the U.S. Army Corps of Engineers, New Orleans District, Engineering Division, Relocations Team, to a feasibility level of design, prior to the selection of a Tentatively Selected Plan (TSP). The Relocations Team reviewed proposed designs against existing facility maps and databases to obtain information on existing facilities. Historical project files were also reviewed against the scope of this effort. As is typical for feasibility level design, ownership of the facilities listed has not been confirmed at this time.

The Relocations Team then made assumptions based on the proposed feasibility level project design and project location to determine project relocation requirements. These requirements are based on the latest relocation methods previously used by other facility owners on other Corps projects. The cost estimates presented in this report were developed by New Orleans District. These relocation costs represent a feasibility level of design and will be further refined once a TSP is chosen and approved costs estimates submitted by the affected utility owners.

C-4.5.2 Scope

Improvements for the Mississippi River will involve dredging to a bottom depth of 50 feet MLLW. The list of affected facilities in Table C9 covers those facilities located from River Mile 233.0 to River Mile 158.0 (non-continuous).

C-4.5.3 Estimated Relocations Costs

The total estimated cost for relocations of pipe, power and communication lines is $40,008,000. This figure includes basic costs for the relocation items but does not include contingency and escalation. Estimated relocation costs for utilities are summarized in Table C-9.

Table C-9. River Deepening Facilities Relocation Costs

Owner	River Mile (AHP)	Quantity	Size	Description*	Cost to Relocate Per Linear Foot Per Pipeline
River Mile 234 to 229					
Enterprise	233.4	1	16 inch	Natural Gas	$267.00
Acadian	233	3	10.75 inch	TBD	$190.00
Acadian	233	1	16 inch	TBD	$267.00
Mid La Gas	233	1	12 inch	TBD	$219.00
Bengal	233	1	24 inch	Maintenance	$415.00
Dow	232.7	1	4 inch	LPG	$94.00
Exxon	232.7	4	12 inch	CRD	**ASC
Exxon	232.7	3	varies	LPG/OHV	**ASC
Exxon	232.6	1	8 inch	Propylene	**ASC
Exxon	232.6	1	6 inch	TBD	**ASC
Exxon	232.5	2	TBD	TBD	**ASC
Exxon	232.5	1	12.75 inch	TBD	**ASC
Exxon	232.5	4	12 inch	TBD	**ASC
Exxon	231.9	2	8 inch	TBD	**ASC
Exxon	231.9	2	12 inch	TBD	**ASC
Exxon	231.9	3	4 inch	TBD	**ASC
Exxon	231.9	2	TBD	TBD	**ASC
Exxon	231.9	1	6 inch	TBD	**ASC
Exxon	231.9	2	6 inch	TBD	**ASC
Exxon	231.9	2	8.63 inch	TBD	**ASC
River Mile 199 to 194					

TBD	197.9	2	12 inch	Brine	$219.00
River Mile 193 to 188					
Enterprise	190.2	1	TBD	NG	$219.00
KinderMorgan	190.2	2	24 inch	NG	$415.00
El Paso	190.2	1	5 inch	Gas	$112.00
Southern Natural Gas Co	190.1	4	12 inch	Gas	$219.00
Southern Natural Gas Co	190.1	4	30 inch	Gas	**ASC
Southern Natural Gas Co	190.1	4	24 inch	Gas	**ASC
El Paso	190	1	5 inch	Gas	$112.00
KinderMorgan	190	1	30 inch	NG	$525.00
Enterprise	189.8	2	8.63 inch	EGL	$159.00
Shell	189.7	6	TBD	TBD	$219.00
River Mile 185 to 181					
El Paso	183.5	1	TBD	OHV	**ASC
Gulf South	183.4	3	TBD	NG	$219.00
Boardwalk	183.3	1	30 inch	NG	$525.00
Concha	183	1	10 inch	Propylene	$181.00
Shell	182.9	1	TBD	HVL	$219.00
Enterprise	182.9	1	10 inch	HVL	$181.00
Enterprise	182.7	1	4 inch	NG	$94.00
Shell	182.1	1	10 inch	HVL	$181.00
Enterprise	182.6	1	4 inch	NG	**ASC
River Mile 179 to 172					
Central Bell Tel. Co.	175.5	3	TBD	TBD	$219.00
La Power & Lt. Co	175.4	1	TBD	TBD	$219.00
River Mile 160 to 155					
Marathon Ashland	159.5	1	30 inch	TBD	$525.00
Shell	159.5	1	40 inch	EPL	$700.00
Marathon	159.5	3	30 inch	CRD	$525.00
Equilon	159.3	1	40 inch	Oil	$700.00
Acadian	159.2	1	8.63 inch	NG	**ASC
Shell	159.3	1	40 inch	CRD	**ASC
Marathon	159.3	1	40 inch	CRD	**ASC

Boardwalk	158.2	1	TBD	NG	$219.00
Monterey	158.2	1	6 inch	Gas	$127.00
*Facility descriptions based on available records. Not all acronyms are known; descriptions to be clarified with facility owners upon TSP selection.					
**ASC = Assumed Sufficient Clearance based on preliminary data. Owners to be contacted upon TSP selection for verification					

C-5.0 ENVIRONMENTAL ENGINEERING

C-5.1 Environmental Objectives and Requirements

Environmental objectives and requirements described herein will be fulfilled by compliance with plans for the management of dredged material and by adopting and enforcing prudent and reasonable measures to avoid impacts and by the completion of measures described in the Environmental Impact Statement (EIS) prepared for this study.

C-5.2 Environmental Considerations

C-5.2.1 Environmental Effects of the Project

a. Emissions from the dredging vessel and other heavy equipment will locally degrade air quality during channel dredging and dredged material pumping operations.

b. Water clarity and quality at the dredging and disposal sites will be temporarily affected by the dredging process. Some soil particles are temporarily lost in the water column during the dredging process. With time, the sediments are winnowed out, and settle back down on the channel and disposal area water bottoms thus re-establishing water clarity and quality as it existed prior to the dredging and disposal operations.

c. The benthic microorganism community will be temporarily affected in disposal area water bottom habitats while the area adjusts to the new environment created by the project.

C-5.2.2 Integration of Environmental Sensitivity into All Aspects of the Project

Environmental sensitivity has been incorporated into all aspects of project design, with an emphasis on the proposed plan for disposal of dredged material. Avoidance and minimization of adverse impacts have been incorporated into the project construction and maintenance plan to the maximum extent practicable. Shoal material removed from Southwest Pass by cutterhead dredges will be placed in shallow open water and eroded marsh areas for the purpose of creating and restoring coastal habitat in the Mississippi River delta. Dredged material placement sites used for

coastal habitat development will be monitored annually by acquisition of aerial photography used to determine land loss/gain.

C-5.2.3 Lessons Learned During Past Projects

Dredged material placement sites that have been utilized over the past 30 years will continue to be utilized for this project. Lessons learned over this period will be incorporated into disposal operations to help maintain the channel while contributing positively to Louisiana coastal restoration efforts.

C-5.2.4 Incorporation of Environmental Compliance

There are numerous environmental laws and regulations which govern protection of the public and environment during the construction phase of a project that are incorporated into the feasibility design for this project. Environmental compliance measures for this project are related primarily to the methods used for dredged material disposal during both project construction and project maintenance. The plan for dredged material disposal is contained in the project EIS.

Local, State and Federal environmental compliance measures incorporated into the project include:

- Protection of Environmental Resources
- Preservation and Recovery of Historical, and Cultural Resources
- Protection of Water Resources
- Protection of Fish and Wildlife Resources
- Protection of Air Resources
- Pollution Prevention

C-5.2.5 Mitigation for Unavoidable Impacts

Partial implementation of the deep draft Mississippi River Ship Channel Project to a depth of 45 feet resulted in increased frequency and duration of salinity intrusion events along the Lower Mississippi River channel. These salinity intrusion events affect municipal and industrial river water supplies below River Mile 64 AHP. Engineering measures capable of mitigating water quality problems were included with channel deepening design studies.

Principal components of the salinity intrusion mitigation plan are:

1. Measures to increase Plaquemines Parish water treatment capacity of Belle Chasse, LA water treatment (River Mile 75.8 AHP)

2. Water transmission lines and booster pump stations to connect the additional capacity at Belle Chasse to other water treatment plans on west bank of Mississippi River at West Pointe-a-la-Hache and Boothville, LA.

3. Previously constructed improvements for East Bank Mitigation Works

4. Conversion of existing community pond at Davant, LA to a storage reservoir

5. Construction of a siphon from the Mississippi River to the reservoir for purpose of replenishing fresh water in reservoir;

6. Construction of transmission lines from reservoir to water treatment plan on east bank of Mississippi River at East Pointe-a-la-Hache, LA.

7. Upgrades, as necessary to provide for future increases in demand for potable water in the affected region of Plaquemines Parish, LA at such time as average consumption increases by an increment of 25 percent over average consumption in the last two years preceding beginning of construction of the mitigation plan.

8. Construction of a submarine barrier sill in the Mississippi River, Louisiana, between River Miles 65.1 AHP and 63.1 AHP

Since completion of the 45-foot channel, the submarine barrier sill has been constructed three times, in 1988, 1999, and 2012.

C-5.3 Hazardous Toxic and Radioactive Waste (HTRW)

Historic dredging events within the channel have not encountered HTRW. Therefore, based upon the HTRW assessment performed as described in the EIS and prior in-house investigations, it has been determined that there would be a low probability of encountering contaminated sites or toxic substances during project construction and maintenance activities.

C-6.0 COST ESTIMATES

C-6.1 Basis of Cost Estimate

Detailed cost estimates for all alternatives studied are included in Annex 3 of this report. The final initial construction cost estimate for the selected plan was also finalized utilizing the Micro-Computer Aided Cost Estimating System (M-CACES), and is included in Annex 3. The cost estimate reflects current and applicable pricing and addresses specific construction procedures for the various line items in the estimate.

The estimated costs were based upon an analysis of each line item evaluating quantity, production rate, and time, together with the appropriate equipment, labor, and material costs. Some cost are actual cost for dredging provided by Operations Division of Memphis District and New Orleans District. In addition, these costs were based on actual in-house knowledge and experience by MVN cost engineers who either personally designed or estimated similar projects.

All the construction work is common to MVN.

C-6.2 Contingencies

Contingencies for the cost estimates were based upon similar cost estimates that had a risk analysis performed using the Abbreviated Risk Analysis.

Contingencies for engineering and design are based on uncertainties involved in the preparation of plans and specifications, and in engineering during construction.

These include cost of field data collection; unanticipated design problems; change in design based on the review of the report, changes in design criteria; and changes in overhead rates.

Contingencies for construction management are based on using historical average of time growth for similar type contracts in the area. The time growth includes additional duration for unusually severe weather and unknown changes to the contracts.

C-6.3 Detailed Estimate

The project cost estimate for the selected plan in M-CACES format is included in Annex 3 of this report. The project estimate of first cost, which included costs for lands and damages, and real estate costs during construction, as well as construction cost is included in Annex 3. Annex 3 also includes cost estimates for all alternatives studied.

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ANNEXES

ANNEX 1 **DREDGING RESULTS FROM 1D MODEL**

ANNEX 2 **AVERAGE ANNUAL DREDGING QUANTIES FOR 45ft PROJECT**

ANNEX 3 **MCACES**

ANNEX 4 **DQC COMMENT REPORTS FROM DRCHECKS**

ANNEX 1 - DREDGING RESULTS FROM 1D MODEL

Intermediate eustatic sea level rise (NRC 1)		Annual Dredging Volume (cubic yards)						Dredging Index (Relative to AD48_1)				Dredging Index (Relative to AD48_2)			Historical
		Less Aggressive Dredging Schedule			More Aggressive Dredging Schedule			Less Aggressive Dredging Schedule				More Aggressive Dredging Schedule			
Site	**X-Sections (River Miles)**	**AD45_1**	**AD48_1**	**AD50_1**	**AD45_2**	**AD48_2**	**AD50_2**	**AD45_1**	**AD48_1**	**AD50_1**	**AD48_2**	**AD45_2**	**AD48_2**	**AD50_2**	
Southwest Pass	*18 BHP to 0.5 BHP*	9,465,182	9,318,507	9,405,579	9,365,859	9,174,291	9,027,595	1.02	1	1.01	0.98	1.02	1	0.98	
Head of Passes	*HOP to 1.5 AHP*	5,387,797	5,503,834	5,808,605	5,617,060	5,919,837	5,823,594	0.98	1	1.06	1.08	0.95	1	0.98	
Fairway at Pilottown	*2 to 5 AHP*	9,298,868	11,339,982	12,259,007	11,672,360	12,854,554	13,611,081	0.82	1	1.08	1.13	0.91	1	1.06	
Venice	*5 to 11 AHP*	9,671	25,751	24,001	26,182	29,834	30,748	0.38	1	0.93	1.16	0.88	1	1.03	
															1970-2008
Southwest Pass	*18 BHP to 11 AHP*	24,161,518	26,188,074	27,497,192	26,681,461	27,978,516	28,493,018	0.92	1	1.05	1.07	0.95	1	1.02	19,400,000

		Dredging Index (Relative to AD45_1)				Dredging Index (Relative to AD45_2)			
		AD45_1	**AD48_1**	**AD50_1**	**AD45_2**	**AD45_2**	**AD48_2**	**AD50_2**	
Fairview Crossing	*115.2 to 117.2*							+	
Belmont Crossing	*152.6 to 155.1*		+	+	+	1	6.13	7.36	
Rich Bend	*157.9 to 159.5*			+			+	+	
Smoke Bend	*174.5 to 175.9*		+	+	+	1	22.27	26.42	
Philadelphia Point	*181.72 to 183.6*		+				+	+	
Alhambra	*189.4 to 190.9*	1	2.02	2.51	1.81	1	1.49	1.65	
Bayou Goula Crossing	*197.5 to 198.4*	1	1.86	2.84	1.61	1	1.89	2.35	
Granada	*203.3 to 206.6*		+	+	+	1	5.29	7.64	
Medora Crossing	*211.6 to 212.3*	1	1.95	2.20	1.47	1	1.68	1.92	
Sardine Point	*218.7 to 219.9*			+			+		
Red Eye Crossing	*223.4 to 225.4*	1	11.30	22.68	3.71	1	7.10	9.67	
Baton Rouge Front	*228.1 to 232.7*	1	1.46	1.45	0.81	1	1.45	5.32	
Wilkerson Point	*233.9 to 234.5*			+				+	
									1999-2015
Crossings	*152.6 to 234.5*	1	2.59	3.94	1.80	1	2.44	3.02	15,998,198
Total		1	1.42	1.77	1.26	1	1.50	1.70	

Computed dredging volumes shown in this table are 50-year averages (2020-2069) based on historical mean daily flows from 1954 through 2003 adjusted for current operations at Old River. This model simulation included the NRC 1 eustatic sea level rise (+0.5 meters in 2100).

Less Aggressive Dredging Schedule (Option_1): Initiate dredging in the model when deposition reaches a level 1 foot below the authorized depth minimized required dredging (reasonable assumption for Southwest Pass). *This option greatly under-estimates historical dredging in the crossings.*

More Aggressive Dredging Schedule (Option_2): Initiate dredging in the model when deposition exceeds the over-dredging depth (2 ft) within the dredging template. This option provides a better estimate of long-term deposition within the dredging template but may force dredging in some locations where shoaling does not impede navigation.

Notes:

1. Dredging in the crossings is initiated only when the river flow is less than 600,000 cfs and the dredging rate is limited to 60,000 cubic yards per day at each site. Dredged material is reintroduced into the water column downstream of the site.

2. Below river mile 11 AHP, all dredged material is removed from the system, i.e., the model assumes that the material deposited at the head of Pass a Loutre does not enter Southwest Pass.

3. Dredging volumes include advance maintenance and over-dredging.

\+ Dredging was computed for FWP condition, but not FWOP condition.

\- Dredging was computed for FWOP condition, but not FWP condition.

ANNEX 2 - AVERAGE ANNUAL DREDGING QUANTIES FOR 45ft PROJECT

Fiscal Year	Alhambra	Belmont	Smoke Bend	Medora	Red Eye	Baton Rouge Front	Missouri Bend	Sardine Point	Philadelphia Point	Bayou Goula	Granada	81 Mile Point	Rich Bend	Unknown	Total CYS
2015	1,462,302	3,911,537	253,740	1,729,408	5,624,707	971,116	0	490,000	0	1,015,955	2,083,005	0	0	0	**17,541,770**
2014					2,065,000			1,653,920							
2014	764,030	1,720,110	330,120	368,506	1,352,769	1,494,797	294,074	397,978	259,140	205,533	293,133				
2014	764,030	1,720,110	330,120	368,506	3,417,769	1,494,797	294,074	2,051,898	259,140	205,533	293,133	0	0	0	**11,199,110**
2013	964,860	2,755,000			1,124,073				288,620	106,900	377,026				
2013	1,381,383	151,000	782,420	653,478	2,886,549	470,263	287,489	1,083,656	289,144	688,195	1,552,301				
2013	2,346,243	2,906,000	782,420	653,478	4,010,622	470,263	287,489	1,083,656	577,764	795,095	1,929,327	0	0	0	**15,842,357**
2012					1,474,743										
2012	1,829,880	1,589,050	489,600	899,620	477,195	1,748,144		1,448,116							
2012	2,565,039	158,088	266,045	1,792,265	3,365,894	2,863,034	477,196	1,207,490	238,436	873,253	647,175		112,890		
2012	4,394,919	1,747,138	755,645	2,691,885	5,317,832	4,611,178	477,196	2,655,606	238,436	873,253	647,175	0	112,890	0	**24,523,153**
2011		293,668													
2011		481,120													
2011		177,715													
2011	3,356,680	1,374,522	598,040					2,002,605		1,147,363					
2011	235,051	796,377	182,932	1,360,873	5,992,014	1,485,331		198,333	572,510	410,984	1,156,767				
2011	3,591,731	3,123,402	780,972	1,360,873	5,992,014	1,485,331	0	2,200,938	572,510	1,558,347	1,156,767	0	0	0	**21,822,885**
2010		1,796,658									1,218,951				
2010		995,879	477,095	1,182,938	1,368,260						225,290				
2010	2,839,155	392,049	949,291	794,089	5,247,949	2,390,678	577,308	620,065		621,614	1,297,291				
2010	2,839,155	3,184,586	1,426,386	1,977,027	6,616,209	2,390,678	577,308	620,065	0	621,614	2,741,532	0	0	0	**22,994,560**
2009	882,645	1,362,580	1,151,743	860,648	7,492,725	4,094,395	96,467	448,794	571,176	893,004	454,794		127,763		
2009	2,861,971	156,541		524,808				1,095,205		301,316	976,444				
2009		704,328		274,272						939,063					
2009	3,744,616	2,223,449	1,151,743	1,659,728	7,492,725	4,094,395	96,467	1,543,999	571,176	2,133,383	1,431,238	0	127,763	0	**26,270,682**
2008	2,862,616	1,750,716	432,795	447,366	3,117,293	2,695,046	414,709	596,074	867,248	214,793	320,297				
2008	2,516,019	229,932	711,662	579,265	3,359,384			1,132,462		1,950,574	1,238,552				
2008		874,328													
2008		696,639		496,305						102,006	117,747				
2008		349,601		53,419											
2008	5,378,635	3,901,216	1,144,457	1,576,355	6,476,677	2,695,046	414,709	1,728,536	867,248	2,267,373	1,676,596	0	0	0	**28,126,848**
2007	1,144,748	555,320	187,730		3,804,170	222,703	1,060,694	950,476	104,859	249,846	392,768	588,755		421,542	
2007	784,096	901,885								392,494					
2007	1,928,844	1,457,205	187,730	0	3,804,170	222,703	1,060,694	950,476	104,859	642,340	392,768	588,755	0	421,542	**11,762,086**
2006	1,349,945	655,931	191,918		355,195	1,212,909		1,131,372		407,667	542,390				
2006		739,782	197,733		1,441,994	296,773				184,899					
2006	1,349,945	1,395,713	389,651	1,245,098	1,797,189	1,509,682	0	1,131,372	0	592,566	542,390	0	0	0	**9,953,606**
2005	1,547,799	1,371,671	210,434	1,680,784	5,156,586	2,791,086		637,173		1,659,015	746,114				
2005	962,687	1,130,864	206,066	330,612	517,576	265,903					154,570				
2005	2,510,486	2,502,535	416,500	2,011,396	5,674,162	3,056,989	0	637,173	0	1,659,015	900,684	0	0	0	**19,368,940**
2004	759,375	609,517	42,889	590,039	1,426,494	1,168,591		698,241		322,983	630,547				
2004					1,404,112	1,003,724									
2004	759,375	609,517	42,889	590,039	2,830,606	2,172,315	0	698,241	0	322,983	630,547	0	0	0	**8,656,512**
2003	1,286,452	792,433	62,144	759,914	1,064,350	1,445,393		483,605		371,777	904,933				
2003	976,969	612,098	87,248	302,654	2,367,533			482,098		555,802	465,422				
2003										83,608					
2003	2,263,421	1,404,531	149,392	1,062,568	3,431,883	1,445,393	0	965,703	0	1,011,187	1,370,355	0	0	0	**13,104,433**
2002	1,152,876	1,325,671	410,537	380,340	203,973	210,414		994,873	165,728	316,631	1,466,208				
2002	1,179,907	190,616		371,620	1,867,064	1,331,221		360,184	297,287	369,205					
2002				80,003	517,774			144,148							
2002	2,332,783	1,516,287	410,537	831,963	2,588,811	1,541,635	0	1,499,205	463,015	685,836	1,466,208	0	0	0	**13,336,280**
2001	356,623	362,920	79,994	161,724	1,764,615	493,897		161,334		513,441	308,641				
2001	1,168,865	641,713			1,567,964	46,133		517,803		410,316	805,790				
2001	483,445	342,967									506,624				
2001	2,008,933	1,347,600	79,994	161,724	3,332,579	540,030	0	679,137		923,757	1,621,055	0	0	0	**10,694,809**
2000	1,445,296	82,088	246,206	137,084	996,229	410,212		224,822	370,500	253,941	315,119				
2000		293,008			68,822	690,835					272,399				
2000		331,150													
2000	1,445,296	706,246	246,206	137,084	1,065,051	1,101,047	0	224,822	370,500	253,941	587,518	0	0	0	**6,137,711**
1999	1,182,992	748,001		417,366	2,939,777	496,999		228,525	75,765	151,025	141,680				
1999	864,656	702,315		73,986	2,957,375	197,703				174,670	481,362				
1999										342,999					
1999	2,047,648	1,450,316	0	491,352	5,897,152	694,702	0	228,525	75,765	668,694	623,042	0	0	0	**12,177,196**
Sum Total	**39,706,060**	**31,195,851**	**8,294,642**	**16,819,076**	**69,745,451**	**29,526,184**	**3,207,937**	**18,899,352**	**4,100,413**	**15,214,917**	**18,010,335**	**588,755**	**240,653**	**421,542**	**255,971,168**
Annual Average	**2,481,629**	**1,949,741**	**518,415**	**1,051,192**	**4,359,091**	**1,845,387**	**200,496**	**1,181,210**	**256,276**	**950,932**	**1,125,646**	**36,797**	**15,041**	**26,346**	**15,998,198**

ANNEX 3 - MCACES

MISSISSIPPI RIVER DEEPENING
Fuel $2.25 per gallon for fuel.

Estimated by Benjamin Salamone Designed by US Army Corps of Engineers
Prepared by Benjamin Salamone

Preparation Date 7/22/2016 Effective Date of Pricing 7/22/2016
Estimated Construction Time Days

Description	ContractCost	ProjectCost
ProjectTop Level Cost Summary	**669,890,909.64**	**669,890,909.64**
01 LANDS AND DAMAGES	**2,000,000.00**	**2,000,000.00**
02 RELOCATIONS	**40,008,000.00**	**40,008,000.00**
09 CHANNELS AND CANALS	**627,882,909.64**	**627,882,909.64**
09 01 CHANNELS	**627,882,909.64**	**627,882,909.64**
09 01 01 Construction	**212,414,200.60**	**212,414,200.60**
Construction-50-ft Depth MLLW	**78,106,290.78**	**78,106,290.78**
Construction Crossings - 50-ft Depth - MLLW	**24,144,353.56**	**24,144,353.56**
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)]	**8,342,720.00**	**8,342,720.00**
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)]	**45,619,217.22**	**45,619,217.22**
Construction-48-ft Depth MLLW	**56,668,065.78**	**56,668,065.78**
Construction Crossings - 48-ft Depth - MLLW	**16,592,567.94**	**16,592,567.94**
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)]	**6,134,500.00**	**6,134,500.00**
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)]	**33,940,997.84**	**33,940,997.84**
Construction-48-ft Depth MLLW FROM 45-FT MLLW	**77,639,844.05**	**77,639,844.05**
Construction Crossings - 48-ft Depth - MLLW FROM 45-FT MLLW	**16,592,567.94**	**16,592,567.94**
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW	**9,358,336.00**	**9,358,336.00**
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW	**51,688,940.11**	**51,688,940.11**
09 01 02 Maintenance	**415,468,709.04**	**415,468,709.04**
Maintenance-48-ft Depth MLLW	**198,072,011.07**	**198,072,011.07**
O&M Dredging 48-ft Depth MLLW	**160,372,011.07**	**160,372,011.07**
O&M Additional Annual Cost	**37,700,000.00**	**37,700,000.00**
Maintenance-50-ft Depth - MLLW	**217,396,697.97**	**217,396,697.97**
O&M Dredging 50-ft Depth	**179,696,697.97**	**179,696,697.97**
O&M Additional Annual Cost	**37,700,000.00**	**37,700,000.00**

Labor ID: NOL2015 EQ ID: EP14R03 Currency in US dollars TRACES MII Version 4.3

Description	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost	ContractCost	CostToPrime
Project Cost Summary	**6,975,913.44**	**34,980,686.78**	**0.00**	**590,797,747.23**	**632,754,347.45**	**669,890,909.64**	**135,042,044.32**
01 LANDS AND DAMAGES	**0.00**	**0.00**	**0.00**	**2,000,000.00**	**2,000,000.00**	**2,000,000.00**	**0.00**
02 RELOCATIONS	**0.00**	**0.00**	**0.00**	**40,008,000.00**	**40,008,000.00**	**40,008,000.00**	**0.00**
09 CHANNELS AND CANALS	**6,975,913.44**	**34,980,686.78**	**0.00**	**548,789,747.23**	**590,746,347.45**	**627,882,909.64**	**135,042,044.32**
09 01 CHANNELS	**6,975,913.44**	**34,980,686.78**	**0.00**	**548,789,747.23**	**590,746,347.45**	**627,882,909.64**	**135,042,044.32**
09 01 01 Construction	**5,181,735.09**	**25,987,297.76**	**0.00**	**152,936,526.44**	**184,105,559.29**	**212,414,200.60**	**102,940,513.86**
09 01 02 Maintenance	**1,794,178.34**	**8,993,389.02**	**0.00**	**395,853,220.79**	**406,640,788.16**	**415,468,709.04**	**32,101,530.46**

Labor ID: NOL2015 EQ ID: EP14R03 Currency in US dollars TRACES MII Version 4.3

Description **Page**

Miss River Ship Channel Deepening TSP

MISSISSIPPI RIVER DEEPENING
Fuel $2.25 per gallon for fuel.

Estimated by Benjamin Salamone Designed by US Army Corps of Engineers
Prepared by Benjamin Salamone

Preparation Date 10/7/2016 Effective Date of Pricing 10/7/2016
Estimated Construction Time Days

Description	ContractCost	ProjectCost
ProjectTop Level Cost Summary	**206,282,590.93**	**206,282,590.93**
01 LANDS AND DAMAGES	**2,000,000.00**	**2,000,000.00**
02 RELOCATIONS	**11,600,000.00**	**11,600,000.00**
09 CHANNELS AND CANALS	**192,682,590.93**	**192,682,590.93**
09 01 CHANNELS	**192,682,590.93**	**192,682,590.93**
09 01 01 Construction	**58,992,199.86**	**58,992,199.86**
Construction-50-ft Depth MLLW	**58,992,199.86**	**58,992,199.86**
Construction Crossings - 50-ft Depth - MLLW	**4,848,573.13**	**4,848,573.13**
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)]	**8,342,720.00**	**8,342,720.00**
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)]	**45,800,906.73**	**45,800,906.73**
09 01 02 Maintenance	**133,690,391.08**	**133,690,391.08**
Maintenance-50-ft Depth - MLLW	**133,690,391.08**	**133,690,391.08**
O&M Dredging 50-ft Depth	**95,990,391.08**	**95,990,391.08**
O&M Additional Annual Cost	**37,700,000.00**	**37,700,000.00**

Labor ID: NLS2015 EQ ID: EP14R08 Currency in US dollars TRACES MII Version 4.3

Description	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost	ContractCost	CostToPrime
Project Cost Summary	**2,700,318.94**	**13,772,879.82**	**0.00**	**175,491,308.19**	**191,964,506.94**	**206,282,590.93**	**52,065,759.95**
01 LANDS AND DAMAGES	**0.00**	**0.00**	**0.00**	**2,000,000.00**	**2,000,000.00**	**2,000,000.00**	**0.00**
02 RELOCATIONS	**0.00**	**0.00**	**0.00**	**11,600,000.00**	**11,600,000.00**	**11,600,000.00**	**0.00**
09 CHANNELS AND CANALS	**2,700,318.94**	**13,772,879.82**	**0.00**	**161,891,308.19**	**178,364,506.94**	**192,682,590.93**	**52,065,759.95**
09 01 CHANNELS	**2,700,318.94**	**13,772,879.82**	**0.00**	**161,891,308.19**	**178,364,506.94**	**192,682,590.93**	**52,065,759.95**
09 01 01 Construction	**1,803,229.77**	**9,183,470.37**	**0.00**	**38,126,872.78**	**49,113,572.91**	**58,992,199.86**	**35,922,279.79**
09 01 02 Maintenance	**897,089.17**	**4,589,409.45**	**0.00**	**123,764,435.41**	**129,250,934.03**	**133,690,391.08**	**16,143,480.17**

Labor ID: NLS2015 EQ ID: EP14R08 Currency in US dollars TRACES MII Version 4.3

Description **Page**

ANNEX 4 - DQC COMMENT REPORTS FROM DRCHECKS

UNCLASSIFIED\\FOR OFFICIAL USE ONLY

Comment Report: All Comments
Project: (MRSC) Miss River Ship Channel Deepening Study Review: Draft Engineering Appendix DQC Review
Displaying 56 comments for the criteria specified in this report.
1591 ms to run this page

Id	Discipline	Section/Figure	Page Number	Line Number
6687960	Environmental	n/a	3	Last paragraph, 3rd line

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

It is incorrect to refer to the entire dredging area in the lower river as "Southwest Pass". Another name must be used when discussing the river above Mile 0.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-1	Evaluation **Concurred** As the reach of dredging referred to as the "Southwest Pass dredging reach", was intended to cover the entire reach from Venice, La to the Gulf of Mexico, this sentence will be revised as follows for clarification purposes: "The reach of the navigation channel that is referred to as the Southwest Pass dredging reach, is comprised of the Mississippi River, extending downstream from Venice, LA, to the Head of Passes (river Mile 0.0), and the reach below Mile 0.0 which extends downstream through Southwest Pass and the Southwest Pass Bar Channel. The bar channel terminates at approximate river Mile 22.0 BHP. (See Figure C1) The Mississippi River- Southwest Pass is the longest single dredging reach and has been maintained to a depth of 45ft relative to Mean Low Gulf (MLG) since 1987." Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016
1-2	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
1-3	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687971	Environmental	Figure C1	5	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

"Southwest Pass Dredging Reach" is a very misleading term to use to describe the entire area dredged in the lower river above and below Head of Passes. The Corps cannot redefine the limits of geographic features. Another term needs to be used.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** The description under Figure C1 should be revised as follows: "The reach of dredging referred to as the "Southwest Pass" dredging reach, is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 AHP, and the Head of Passes (HOP), river Mile 0.0. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower

	half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA). as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging." Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687974	Environmental	Figure C1 and C2	5 and 6	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Figure C1 shows the dredging area (erroneously referred to as the Southwest Pass dredging reach in both figures) extending to Mile 10 AHP, while Figure C2 shows it extending to mile 15 AHP. Some explanation should be added to note that the figures are showing different reaches of the channel.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Proposed modification to first sentence of caption C2: "Average annual transport and fate of sediment passing the Venice Discharge Range (RM 12.5) and entering the Southwest Pass dredging reach estimated from multi-decade 1D sedimentation model simulations." I agree that the Southwest Pass dredging reach terminology is awkward; but, it is consistent with historical reporting of dredging volumes, e.g., see p. 342 of ERDC/CHL TR-13-15, West Bay Sediment Diversion Effects. Other than the expanded text proposed in responses to 6687960 and 6687971, the next option would be to find or define an appropriate name for the entire reach, e.g. Mississippi River Delta Dredging Reach. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687975	Environmental	Figure C3	7	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Recommend replacing this figure with the updated, similar figure contained in the Engineering Plates file.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Figure will be replaced with the one contained in the plates. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687982	Environmental	C3.2.2.1 and elsewhere	30	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Verify that the District (Geotech) would send boring plots to anyone requesting them without a FOIA request and at no charge. If they would, no problem with text.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Concur. Will update the text to include that a FOIA will be required. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687984	Environmental	C3.2.3.5	33	4

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Remove "Gulf Outlet".

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Concur, will remove. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687988	Environmental	C3.2.3.5	34	1

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Reference sentence beginning with "Continued and increasing..." It is unclear what this sentence means. Who or what is restricting crops? Maybe it means less land would be available for crops due to development. If so, it should be made clear.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** This paragraph was cited from the 1981 report. I will rewrite or remove this portion to clarify. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687993	Environmental	Figure: River Deepening Facilities Relocation Costs	37	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Need to add explanation of acronyms used in table.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** The acronyms are provided from the various databases accessed in the first stages of investigation and are not always accurate; accurate facility descriptions, sizes and depths will be obtained from the owners when a TSP is selected. Submitted By: Zane Janicki (504-862-1328) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6687995	Environmental	C5.2.5 - First sentence in section	39	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Add "Partial" to beginning of sentence and add "to a depth of 45 feet" after the word "Project".

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Agreed Submitted By: Edward Creef (504-862-2521) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688024	Environmental	Multiple figures	44 through 55	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Note that the text in these figures is too small to be read if printed on normal size paper. Either the figures need to be reprinted with larger text or they will need to be bound on tabloid (11x17 inch) paper.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation **Concurred** Figures will be replaced with larger size prints. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016

	Current Comment Status: **Comment Closed**

6688753	Environmental	n/a	Appendix C1, pg. 22	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The following sentence references a model's boundaries, but there is no information about the model or boundary location.

"Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data for the reach of the river south of the model boundaries suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012)."

Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Modified sentence as follows: Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012). Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016
	Current Comment Status: **Comment Closed**

6688767	Environmental	n/a	Appendix C1, pg. 24-27	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Discussion should be added regarding deepening alternatives effect on salinity intrusion and resultant water quality impacts to freshwater intakes south of New Orleans.

Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Language added to address 3D model development and that this section will be updated once model results availalbe to assess potential impacts. Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016
	Current Comment Status: **Comment Closed**

6688783	Hydraulics	Figure C2	Appendix C1, page 6	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

There is a "Deposited" element in the legend but it is not apparent where this appears in the chart body.

Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** The model computed slightly less than 1 million cubic yards of annual deposition in this reach that is not removed by dredging. That volume is not visible in the printed half-page plot. The simple solution is to remove the "Deposited" element from the legend since this volume is insignificant compared to other "Fates". Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 11 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016
	Current Comment Status: **Comment Closed**

6688917	Environmental	C4 Civil Design	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Tables and figures need to be numbered consistent with other sections of the appendix.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Tables and figures will be renumbered to be consistent with other sections of the appendix. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688929	Environmental	C4.1.1 second paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Reference sentence beginning with "For this reach..." Remove the first "and" and add St. Bernard to the list of ports. Also, this sentence needs to be split into at least 2 sentences as it is grammatically incorrect.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** This portion of the 2nd paragraph has been revised to read as follows: "For this reach, an advance maintenance of 6' below each alternative depth was applied, along with an overdepth of 2'. This advance maintenance and allowable overdepth will account for inaccuracies in the dredging process, as well shoaling during construction and maintenance dredging, and facilitate obtaining the full advance maintenance. For the reach of river extending upstream of Mile 13.4 AHP, the project depths of 48' and 50' below the LWRP (Low Water Reference Plane) were evaluated and adjusted using the 2007 LWRP NAVD88 elevations obtained from the curves provided in the following graph. The project reach of extends through the Ports of St Bernard, New Orleans, South Louisiana, and Baton Rouge upstream to Mile 232.4 AHP." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment.

	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688936	Hydraulics	n/a	Appendix C1, page 8	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The following sentence is somewhat misleading: "It should be noted that the 1D model does not address potential increases in the extent or frequency of salinity intrusion due to channel deepening or relative sea level rise." This implies that the 1D model is capable of resolving existing salinity intrusion conditions. In reality it is only capable of resolving the relationship between low water conditions and resultant sedimentation in the lower river which is due to multiple factors including impacts of salinity intrusion.

Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Proposed revision to sentence 1: "It should be noted that the 1D model does not address the extent or frequency of salinity intrusion." Proposed revision to next to last sentence in the same paragraph: "Increased frequency and extent of salinity intrusion, due to channel deepening or relative sea level rise, could increase the contact area between fresh and saline water." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 11 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016
	Current Comment Status: **Comment Closed**

6688938	Environmental	C4.1.2 first paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Sentence beginning with "As stated in...". It appears that allowable overdepth is missing from this discussion. This comment is also applicable to the similar sentence in Section 4.1.3.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** The following was inserted in the 1st paragraph of 4.1.2 and 4.1.3: "An allowable overdepth of 2' was also accounted for." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688941	Environmental	C4.1.2 first paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Last sentence. Something wrong - needs editing.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Last sentence was revised as follows: "For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688945	Environmental	C4.1.2 second paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Sentence beginning with "In addition...". Something is missing from the sentence. Same problem in Section C4.1.3.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

Revised Oct 06 2016.

1-0	Evaluation **Concurred** Revised last sentence to reads as follows: For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities. Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688947	Environmental	C4.2.2 second sentence	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Change 19.5 AHP to 19.5 BHP.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Thanks . Correction Made Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016

	Current Comment Status: **Comment Closed**

6688948	Environmental	C4.2.2 Fourth sentence	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

This sentence is a repeat of the first sentence. Delete it.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Redundant sentence deleted Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688951	Environmental	C4.2.3 First sentence	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Delete "During this study" as it adversely affects the way the sentence reads.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Correction Made Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688976	Environmental	C4.2.3 First paragraph, last sentence	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Explain what "next phase" refers to.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** The last sentence has been revised as follows: "Other locations that will be reconsidered during the next phase of this re-evaluation study, based off of future channel surveys and 2-D model results, will include: Missouri Bend and 81 Mile Point." This is simply stating that when we proceed to the next phase of the study, which will include results of the ERDC 2-D model, all crossings will be re-evaluated using the 2-D model results, as well as verification of quantities, dredging reaches, and possibly the addition of

	other crossing that may need to be constructed and maintained. Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688980	Environmental	C4.3 first sentence	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

As written, the sentence states the entire reach of the river from the Gulf to Baton Rouge will require annual dredging. Sentence needs rewriting.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** First sentence has been revised to read as follows: "Annual maintenance dredging will be required within the reaches of the Mississippi River addressed in this re-evaluation report. Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688984	Environmental	C4.3.1 second paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Rewrite "It was agreed to by all...". Maybe state "The ERDC model predicted..."

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** This paragraph has been revised to read as follows: "While the projected annual quantities from the 1-D model were, for the most part, in line with those obtained during historical O&M dredging of the channel, there were some issues with the results that were projected for the Head of Passes and Fairway/ Anchorage at Pilottown reaches where the model projections were well above the average annual quantities dredged within these reaches. The District and ERDC both agreed that shoaling and maintenance dredging needs within the lower portion of the Mississippi River, from Venice, Louisiana (Mile 11 AHP) to the Gulf entrance channel (Mile 22.1 BHP), would remain essentially the same as for the current 45' project. As a result, the dredging needs for both the 48' and 50' channel alternatives in this reach were based off of average annual quantities obtained from historical dredging performed within the above reaches of the Mississippi River - SW Pass channel. The following annual maintenance plan was developed through coordination with the District's Operations Manager and used in obtaining the average annual O&M dredging costs for both the -48' MLLW and -50' MLLW alternatives:" Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment.

Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
Current Comment Status: **Comment Closed**

6688989	Environmental	C4.3.1 second paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Second sentence beginning with "However, while the...". Add river miles to define the reaches.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Mileages added Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688992	Environmental	C4.3.1 paragraph numbered "1)"	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Last sentence. Not all material from this reach would be beneficially used. Much of the material disposed in the HDDA located at the head of Pass a Loutre is swept downstream. Need to remove the statement about 100% beneficial use.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

Revised Oct 06 2016.

1-0	Evaluation **Non-concurred** This is 100% beneficial use is referring to the disposal of material that is dredged and disposed of by "cutterhead" dredges, for which disposal is 100% beneficial. However, I revised the last sentence to read as follows in hopes of further clarifying this. "Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre via the dredge-and-haul method." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688996	Environmental	C4.3.1 Paragraph numbered "2)"	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Last sentence is wrong. Material hauled to the HDDA and the ODMDS is not 100% beneficial. What is dredged out of the HDDA could be considered 100% beneficial, but not 100% of what is dumped into the HDDA. None of what goes to the ODMDS is beneficial use.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Non-concurred** As for para 1); the last sentence has been revised as follows for further clarification : "Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre or the ODMDS located adjacent to the entrance bar channel via the dredge-and-haul method." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6688999	Environmental	C4.3.2 second to last paragraph	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Sentence beginning with "These percentages fell...". Add reference to Section C2.1.1.4. where the "more aggressive dredging schedule" is described.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Added "(See Section C2.1.1.4.)" Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6689101	Geotechnical	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Geotech has reviewed the report and has no comments.

Submitted By: Kathryn Chaisson (504-862-2985). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Thank you for your review. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Kathryn Chaisson (504-862-2985) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689105	Engineering Management	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

From the 2013 Mississippi River Hydrographic Survey Book (File No. H-5-55630, ISBN 978-0-09848572-2-7), Narrative Sheet:

"Low Water Reference Plane (LWRP) is a hydraulic-based reference plane established from long-term observations of the river's stage, discharge rates, and flow duration periods developed about the 97% flow duration line and/or the 97% stage exceedance of daily lows for the period of record at a specific site. Per EM 1110-2-1003, Engineering and Design Hydrographic Surveying [EM], construction and improvement along the middle and lower Mississippi river are performed relative to the LWRP at a particular point."

The Civil write generically references LWRP, while in their drawings they reference LWRP (2007). The Civil write-up , or somewhere else in the overall document, it should be stated that the Deepening Study is utilizing LWRP of 2007 epoch, or restated Year 2007 recomputation. (Ralph Scheid)

Submitted By: Leslie Lombard (504-862-2490). Submitted On: Oct 06 2016

1-0	Evaluation **Non-concurred** Paragraph C4.1.1, 2nd paragraph, as well as the 3 charts in C4.1.1, address utilization of the 2007 LWRP Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 18 2016
	Current Comment Status: **Comment Closed**

6689324	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

1. The MII is using the 2012 Costbook. A newer 2015 version is available for use. Suggest updating to latest version.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Mii is revised. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689325	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

2. Estimate is using current labor, equipment and fuel libraries/rates.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Noted.

	Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689326	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

3. No subcontractors are being used on the estimate. This is unusual but not necessarily wrong.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Noted. The surveying could be contracted out but the estimate does not do this. Project is dredging and disposal with no dike construction. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689327	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

4. All folders under folder 09 01 "Channels" does not have a contractor assigned. This means no contractor markups were assigned to these costs since they were not included in the CEDEP file.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Noted. The Crossings estimate used includes a markup since it is an ACTUAL COST for the Dustpan Dredges to do work. The folder containing Southwest Pass DOES have a contractor assigned and is marked up correctly. The Bar Channel folders do not need a contractor assigned because the hopper dredging work is marked up in CEDEP. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689328	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

5. Item "Mobilization and Demobilization of Dust Pan Dredge" for the Belmont channel has a zero value on the quantity.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Concur. The cost for mobilization is captured in the folder named Initial Mobilization and Demobilization. The folder named Mobilization and Demobilization with zero cost will be removed. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689329	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

6. Folders "Fairview Point" and "Rich Bend" are empty since they are a no cost item. Suggest including an item with zero cost to make sure they appear in the cost report. Otherwise they will be omitted from the report.

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Concur. An item was inserted into the Mii. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689330	Cost Engineering	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

7. On the MII, the cost for the dust pan dredge were provided by Operations Division of Memphis District which may be used during the plan formulation period but may not pass the review by MCX which requires a more detailed estimate (Crews, labor, equip, etc.).

Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016

1-0	Evaluation **Concurred** Do not concur. The cost provided by Memphis District are the ACTUAL COST for dust pan dredges to do work. Two of the dredges are government owned dredges and one is a procurement negotiated with a contractor. The unit price for this work was conservatively selected from the unit price of the Dust Pan Dredge Hurley which is the most expensive plant to operate. The dredge production rates for construction were adjusted to mimic a virgin cut. The maintenance production was as provided by Memphis District. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016
	Current Comment Status: **Comment Closed**

6689927	Engineering Support	n/a	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

No comment.

Submitted By: Gaynell Morrison (504-862-2034). Submitted On: Oct 07 2016

1-0	Evaluation **Concurred** Thank you for your review. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 11 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Gaynell Morrison (504-862-2034) Submitted On: Oct 19 2016
	Current Comment Status: **Comment Closed**

6693649	Civil	n/a	Page 1 - Table of Contents	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The Appendix title is labeled "Appendix C 1".

Assume this is "Appendix C"?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Non-concurred** The Engineering Appendix is divided into two parts. Appendix C 1 contains the main report which includes an annex. Appendix C 2 is reserved for the Technical Plates. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Understood, comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693667	Civil	n/a	Page 3	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph C1 - GENERAL

Recommend this paragraph be greatly enhanced to include a solid description to include (1) actual project limits [for instance, what is actual upper limit?] and breakout of specific reaches, (2) current method of maintenance [crossings dredged, dredge type, disposal plan, discuss HDDA cleanout, soft dikes, structures, etc.]. The reader should be able to understand the existing project prior to getting into the proposed enhancements. (3) Currently authorized vs. currently maintained.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** As the engineering appendix this section is intended to document the engineering requirements. The items listed such as project limits, reaches, maintenance methods, etc. are described in the main body of the report (Chapters 1 and 3). With the exception of HDDA cleanout soft dikes and other structures. These are not described as they are not existing OMRR&R features, and are not relevant to the comparison of alternatives. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 14 2016
1-1	

	Backcheck Recommendation **Open Comment** The Chapters 1 and 3 were not provided for review under this current review; and review of those items may alleviate the feeling of inadequacy in the contents of the Engineering Appendix opening paragraph. However, the HDDA cleanout, and maintenance of channel training structures are indeed existing OMRR&R features, and are major components in the future maintenance of the project. For the sake of independent reviewers trying to understand the overall project, and explanation of these features should be provided. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
2-0	Evaluation **Concurred** Chapters 1 and 3 have been provided to the reviewer. The channel training structures had been scoped at the beginning of this study such that they would not be investigated for each alternative. They were identified as low risk items in terms of how they would impact the evaluation and selection of an alternative. Therefore the information requested for these features were not gathered ahead of time. This information, as well as that for the HDDA cleanout, will have to be gathered together in order to provide the requested explanation. Currently there is not sufficient time to pursue this effort. Though, time may allow this effort for the Final Report Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 27 2016
2-1	Backcheck Recommendation **Close Comment** Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 28 2016
	Current Comment Status: **Comment Closed**

6693671	Civil	n/a	Page 3	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph C2.1.1.2. Already, we have confusion regarding datum reference. The paragraph is mentioning MLG and MLLW elevations interchangeably.(authorized to 55 MLG. Currently maintained to 45 MLG. evaluating 48 or 50 MLLW.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **For Information Only** The first paragraph refers only to navigation depths (or draft). The choice of a datum is location dependent. The second and third paragraphs refer to historical practice and reference the appropriate datum for each location. The flow of this section might be improved if the first sentence of the second paragraph became the last sentence of the first paragraph. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Thank you for that explanation - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693673	Civil	n/a	Page 4	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph C2.1.1.2. At the end of this paragraph, add enhanced discussion something like, "Actual annual dredging requirements can vary greatly, and can be correlated directly to the stage hydrograph for any given year. During years of high river flow or multiple peaks in the hydrograph, dredging requirements are greater. Conversely, lesser maintenance dredging is required during years of low/moderate hydrographs."

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** Proposed addition: "Annual dredging requirements can vary greatly. In Southwest Pass, dredging requirements are strongly influenced by sediment supply. Thus, dredging requirements tend to be higher in years with significant floods or prolonged periods of higher than normal flow. Conversely, dredging requirements tend to be lower during years dominated by low to moderate flows. While sediment supply is a significant factor in dredging requirements at crossings, other factors such as hydrograph shape also influence requirements. For example, dredging of a crossing is more likely to be required after a rapid fall in stage than after a slow fall of similar magnitude." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Thank you - concur with proposed addition; comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693676	Civil	n/a	Page 5	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Figure C1. The caption below this figure appears to limit disposal of this reach to either HDDA or ODMDS. Cutterhead dredging in this reach of river uses material beneficially via direct pump into marsh creation areas.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** Caption has been revised: "The reach of dredging referred to as the "Southwest Pass" dredging reach, is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 AHP, and the Head of Passes (HOP), river Mile 0.0. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA). as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Thank you - concur with revised caption. Comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693694	Civil	n/a	Page 6	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

[**Critical/Flagged**]

Paragraph C2.1.1.4. This paragraph appears to state that the model was run for 45, 48 and 50 MLG(??) There is no alternate plan for 48 or 50' MLG channels. If projected construction and/or maintenance requirements were based on MLG elevations, this would result in a potential problem with all quantities/cost estimates derived.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **For Information Only** All elevations in the model are referenced to NAVD 1988 (see paragraph 2 of section C2.1.1.3). I will restate this in section C2.1.1.4. Table C1 is a summary of a more detailed spreadsheet, supplied by the PDT, describing this conversion for the dredging templates referenced to MLG-SWP. Table C2 is a corresponding summary for the crossings where channel depths are referenced to the Low Water Reference Plane. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Response Part 1 - Understood and concur. Response Part 3 - Understood and concur. Response Part 2 - Still confused as to how the 50' draft project relates to a dredging template of -53.2 NAVD88 = -53.7 MLLW(?) It still appears that dredging is extending approximately 3 feet below the proposed target depth of -50.0 MLLW, which has significant impacts to computations of future maintenance dredging. This misunderstanding will be discussed with our H&H PDT representative and resurfaced if an actual concern is realized. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693699	Civil	n/a	Page 7	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Figure C3. Several minor comments as follows: (1) "BELMONT" is misspelled in the label. (2) the river miles shown are not readable, (3) FAIRVIEW is not in the inset table if it is suppose to be. (4) Why do some crossings appear red and others blue? Does this signify anything?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** The figure is being updated to include additional and readable labeling. A clearer background image will be added. The misspelling will be corrected. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693710	Civil	n/a	Page 7	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

For this reviewer, while the trigger elevation for the "less aggressive dredging schedule" (1 ft below authorized)is clear, the trigger elevation for the "more aggressive dredging schedule" is not understood. Does this propose dredging when the entire advanced maintenance template is still clean?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** Proposed revision to second sentence:

	"Traditionally, the trigger elevation has been based on the amount of over-dredging allowed in the dredging template, thus simulated dredging operations are initiated whenever sediment deposition exceeds the depth of over-dredging." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Understood - the label of "more aggressive dredging schedule" is certainly justifiable. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693720	Civil	n/a	Page 8	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Table C1. Again, this table shows project dredging depths to -53.2 NAVD88. The deepest proposal is -50 MLLW. Were these inverts used to compute dredge quantities?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Non-concurred** Table C1 is a summary of a detailed set of dredging template elevations approved by the PDT for use in the 1D model. This comment may indicate a need to better explain the relationship between MLLW and MLG. Seasonal variations in the mean level of the Gulf of Mexico are similar in magnitude to the tidal range. A channel designed solely to MLLW would be unreliable at lower low tide coincident with a seasonal low level of the Gulf. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Open Comment** Concur - it appears a better relationship is needed between MLLW and MLG if that will resolve this concern, or an explanation of exactly what the authorized dredging template represents. Again, the reviewer was of the opinion that the channel authorization would be a dredging template of -50.0' MLLW + 6' advanced maintenance + an allowable 2' overdepth dredging. This results in a maximum environmentally cleared dredging template to a depth of -58.0' MLLW. The table C1 indicates a maximum allowable dredge depth of -61.2' NAVD88, which converts roughly to -61.5' NAVD88. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
2-0	Evaluation **Concurred** The text describing table C1 has been revised to clarify the datums used for template construction: "For this study, all of the historical dredging templates used in the model were adjusted as needed to incorporate design channel widths and side slopes. At the time of model construction, template invert elevations in the Venice to the Gulf of Mexico reach were referenced to MLG-SWP. Subsequent model studies, including the multi-dimensional model studies described in sections C2.1.2 and C2.1.3, will use templates referenced to MLLW. Template invert elevations in the crossing reaches were referenced to the LWRP. In the 1D model, all template invert elevations were converted to NAVD 1988 as described in Tables C1 and C2. Dredging template elevations were not adjusted for eustatic sea level rise during the model simulations. Thus, computed dredging quantities near the end of the 50-year simulation are probably over-estimated for the NRC 3 scenario and to a much lesser extent for the NRC 1 scenario." The volume of computed dredging in the Venice to the Gulf reach was relatively insensitive to channel deepening. Under existing conditions, the channel traps nearly all of the available sand and most of the silt transported into the reach. Thus, the primary effect of channel deepening in this reach is to shift deposition slightly upstream. Computed dredging volumes are probably more sensitive to estimates of water and sediment diversion from this reach than to the channel depth (see Figure C2).

	Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 27 2016
2-1	Backcheck Recommendation **Close Comment** Comment closed as requested. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 28 2016
	Current Comment Status: **Comment Closed**

6693749	Civil	n/a	Page 9	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

First paragraph after Table C2 discusses that "while dredging descriptions used in earlier models produced reasonable reproductions of observed dredging in the 1990's, these descriptions do not reproduce subsequent increases in observed dredging." Could this be a result of hydro-power coming in line in the early 1990's? If so, it should be stated here.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **For Information Only** Changes in operation of the Old River Control Complex represent one of a number of factors, that could be responsible for an increase in dredging and a reported change in the characteristics of the dredged material. MRG&P Report 6, ORCC Sedimentation Investigation, concluded that current sediment diversions are inadequate and ERDC/CHL TR-14-5, Miss River Geomorphic Assessment,indicates that downstream reaches are aggradational. Definitive attribution remains elusive because multiple changes are occurring in a complex system. Given the cost of maintenance, further investigation of the causes and possible mitigation is certainly merited. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016
1-1	Backcheck Recommendation **Close Comment** Concur with evaluation - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693778	Civil	n/a	Page 9	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

First paragraph below Table C2 clearly states that "neither schedule matched the historical distribution of dredging among individual sites." In fact, the entire write-up does not promote any confidence in the model results; yet the TSP was based on model findings. It should be CLEARLY stated that additional analysis is required to verify the TSP selection.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** The TSP was based on the quantities for construction and operation as provided by waterways. These quantities were a combination of model results and historical dredging practices. It is recognized in the main body of the report (Chapter 8) that the TSP is subject to change and development. The following is included in Chapter 8 "Recommendation." "Information found in this document may be subject to change and further development during feasibility analysis, to include additional hydraulic modeling, as well as from review and resolution of comments received: from both the public other agencies; the Agency Technical Review (ATR); and Independent External Peer Review (IEPR), all of which will help refine the Tentatively Selected Plan (TSP). The information provided in this chapter is based on the TSP as currently defined and may be refined and/or changed prior to publication of the final report."

	Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 14 2016
1-1	Backcheck Recommendation **Close Comment** The quantities provided by waterways for operation were based on 1D model results! However, if the main report clarifies the concern that additional analysis will likely revise the information currently found in the report in conjunction with resolution of comments to certainly be received on this subject during ATR and IEPR, I am willing to close this comment at this time. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693803	Civil	n/a	Page 24	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph C2.2.4 title states that the recommended plan is deepening the SW Pass and the Crossings to 50 feet. I thought the TSP was not dredging the crossing in the Baton Rouge Port region. In fact, how many alternatives were analyzed? C2.2.4 speaks of "Alternative B" and C2.2.5 speaks of "Alternative A". Were any other combinations combined as alternative actions?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Non-concurred** Per discussion with Environmental Manager, the selected plan as you describe is not an actual alternative that was analyzed as part of the SEIS alternatives analysis. For legal and environmental clearance, the SEIS and the WQ section will match as written in the Water Quality section of the report. Planning will write to the new, "hybrid" alternative in a different section of their report. The alternatives in the WQ section (No Action, Alt A, and Alt B) are correct from a NEPA standpoint and will provide environmental clearance for Planning to negotiate the new, "hybrid" alternative discussed at TSP. Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 14 2016
1-1	Backcheck Recommendation **Close Comment** Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693810	Civil	n/a	Page 30	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Two corrections should be made to paragraph C3.2.1.2 "Project Design Criteria". (1) indicates a channel width of 750' for the entire SWP reach; the bar channel is a 600' width. (2) For the crossings, the channel depth should be defined in NAVD88 as referenced to the LWRP.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** Concur Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693814	Civil	n/a	Page 33	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Paragraph C3.2.3.5. The 4th line references the mouth of the Mississippi River-Gulf Outlet". Is this in reference to the MRGO or the mouth of the Mississippi River?

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** This is in reference to the mouth of the Mississippi River and has been changed. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6693823	Civil	n/a	Page 35	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The entire Geotechnical section speaks of available data, geologic profiles, etc. There is no actual discussion of any actual designs that have been performed or need to be performed. Were any slope stability analysis for navigation dredging performed or needed.

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016

1-0	Evaluation **Concurred** Analyses have not yet been performed, but will be as needed, and the final report will be updated. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016
1-1	Backcheck Recommendation **Close Comment** Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6695087	Civil	Sectioh 4.3.2	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

In the paragraph following the yellow and blue "Average Annual Dredging Quantities for 45' Project" table, recommend adding an explanatory sentence towards the end of this text which reads something like, "The significant increase in specific crossing dredge quantities based on the 1D model results appears highly questionable as compared to the historic average; for instance, Redeye (70% increase), Medora (500% increase), Bayou Goula (450% increase), Alhambra (166% increase), and Smoke Bend (225% increase)for the 48' project. Dredging requirements for these crossing need to be further analyzed with the 2D model results."

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 14 2016

1-0	Evaluation **Concurred** Recommend adding the following text at the end of C2.1.15 (prior to discussion of the the 2D modeling work): "Since the model estimates of dredging at individual crossings were not reliable, the best available option to account for the potential increase in the sediment trap efficiency of a deeper channel is to apply the estimated dredging index to recent historical dredging

	requirements. Modeling efforts to date indicate that the observed increase in dredging in the crossings over the last decade may not be entirely due to increased river flows. Little and Biedenharn (2014) suggest that this reach of the river switched from a degradational or equilibrium state to an aggradational state in the 1990's. Additional studies are needed to determine what factors are responsible for this shift and if the shift is likely to persist into the future. The two-dimensional sedimentation model currently under development (section C2.1.2) may provide some additional insights into specific processes, e.g., rate of point bar development, affecting dredging requirements." Additional Reference: Little, Charles D, Jr. and Biedenharn, David S. (2014). Mississippi River Hydrodynamic and Delta Management Study (MRHDM)?Geomorphic Assessment, ERDC/CHL Technical Report TR-14-5, US Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS. In keeping with the spirit of the first sentence above, the section C4.3.2 estimates of 70% and 130% avoid double-counting the difference between computed and observed dredging requirements for the 45 ft channel. The raw dredging index produced from the model results is most likely an overly conservative estimate of the dredging requirements in the deeper channels. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 19 2016
1-1	Backcheck Recommendation **Close Comment** Proposed language will certainly assist in the concerns of overly conservative estimating of future maintenance requirements, which currently appear to result in the omission of the Baton Rouge Harbor reach of channel from recommended deepening. Await the potential for additional insight from future analysis. Concur with the recommendation for this additional language. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

6695942	Civil	Relocations	n/a	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

The relocations sections should be sustainably rewritten to include a detail write-up that identifies what is being relocated (pipeline/utilities that cross under the channel bed of the Mississippi); what assumptions were made to estimate impacted utilities (pipelines permitted after xx date were assumed to below the required depth); the assumptions used to develop the cost estimate (construction type/size etc). If necessary refer to the 1983 GDM for example text.

Submitted By: Jennifer Vititoe (504-862-1252). Submitted On: Oct 14 2016

1-0	Evaluation **Concurred** There are three comments here, responses are as follows: *The table in the write-up includes the best information available for facilities within the work (i.e. dredging) limits. As noted in the write-up, more information will be obtained once a TSP is selected and owners provide details on the facilities. *The table will be revised to include any facilities that were believed to be of sufficient depth that relocation was not included in the cost estimate. The write up will be revised to note that while these facilities were not believed to require relocation, the owners will be contacted for confirmation. *regarding assumptions on costs, the write up states: "The cost estimates presented in this report were developed by New Orleans District Costs Section." Please contact Cost section for any necessary clarification. Submitted By: Zane Janicki (504-862-1328) Submitted On: Oct 17 2016
1-1	

	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Jennifer Vititoe (504-862-1252) Submitted On: Oct 20 2016
	Current Comment Status: **Comment Closed**

APPENDIX C – TECHNICAL PLATES

Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
48' Project Depth
Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)

Southwest Pass - Bar Channel, -51' MLG (-54 MLLW)

STA.	AREA (SF)	Vol. (CF)	Vol. (CY)
0	319.76		
1000	1,214.85	767,305.00	28,418.70
2000	1,477.79	1,346,320.00	49,863.70
3000	1,638.57	1,558,180.00	57,710.37
4000	1,454.27	1,546,420.00	57,274.81
5000	1,563.57	1,508,920.00	55,885.93
6000	2,168.22	1,865,895.00	69,107.22
7000	2,062.54	2,115,380.00	78,347.41
8000	1,982.17	2,022,355.00	74,902.04
9000	1,839.28	1,910,725.00	70,767.59
10000	2,585.00	2,212,140.00	81,931.11
10019	4,674.00	68,960.50	2,554.09
10219	2,192.39	686,639.00	25,431.07
10474.52	1,771.69	506,450.86	18,757.44
10761.58	2,010.88	542,912.27	20,107.86
11000	2,156.01	496,734.96	18,397.59
12000	1,994.99	2,075,500.00	76,870.37
13000	3,066.94	2,530,965.00	93,739.44
13038	3,090.55	116,992.27	4,333.05
14000	2,553.91	2,714,983.00	100,554.93
14045	2,517.37	114,103.74	4,226.06
		Total:	**989,180.80 CY**

Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
50' Project Depth
Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)

Southwest Pass - Bar Channel, -53 (MLG)

STA.	AREA (SF)	Vol. (CF)	Vol. (CY)
0	1,027.68		
1000	2,339.25	1,683,465.00	62,350.56
2000	2,687.89	2,513,570.00	93,095.19
3000	2,936.31	2,812,100.00	104,151.85
4000	2,743.65	2,839,980.00	105,184.44
5000	2,870.38	2,807,015.00	103,963.52
6000	3,519.71	3,195,045.00	118,335.00
7000	3,411.58	3,465,645.00	128,357.22
8000	3,242.95	3,327,265.00	123,232.04
9000	2,947.75	3,095,350.00	114,642.59
10000	3,235.40	3,091,575.00	114,502.78
10019	5,588.15	83,823.73	3,104.58
10219	3,083.67	867,182.00	32,117.85
10474.52	2,617.55	728,387.87	26,977.33
10761.58	2,914.25	793,979.25	29,406.64
11000	3,250.29	734,874.81	27,217.59
12000	3,409.15	3,329,720.00	123,322.96
13000	4,398.28	3,903,713.95	144,582.00
13038	4,411.48	167,385.40	6,199.46
14000	4,068.53	4,078,884.81	151,069.81
14045	4,037.81	182,392.65	6,755.28
		Total:	**1,618,568.68 CY**

Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
48' Project Depth
Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)

48' MLLW Southwest Pass To -51' (MLG)

STA.	AREA (SF)	Vol. (CF)
2776+29.07	155.20	0.00
2778+29.07	103.20	957.20
2780+29.07	46.20	553.20
2782+29.07	4.20	186.40
2784+29.07	0.00	15.40
2786+29.07	1.40	5.20
2788+29.07	15.10	61.20
2790+29.07	42.80	214.40
2792+29.07	53.40	356.40
2794+29.07	37.20	335.80
2796+29.07	20.70	214.60
2798+29.07	26.60	175.30
2800+29.07	56.80	309.20
2802+29.07	83.20	518.80
2804+29.07	68.10	560.60
2806+29.07	56.80	462.60
2808+29.07	72.60	479.20
2810+29.07	96.70	627.00
2812+29.07	115.90	787.30
2814+29.07	100.90	802.70
2816+29.07	69.20	629.70
2818+29.07	39.50	402.40
2820+29.07	99.20	513.70
2822+29.07	194.50	1,087.70
2824+29.07	317.70	1,897.10
2826+29.07	343.80	2,450.00
2828+29.07	406.70	2,779.30
2830+29.07	483.40	3,296.60
2832+29.07	534.50	3,770.00
2834+29.07	622.00	4,283.20
2836+29.07	739.90	5,044.20
2838+29.07	832.30	5,823.10
2840+29.07	1,001.50	6,792.00
2842+29.07	1,098.70	7,778.50
2844+29.07	1,191.40	8,481.60
2846+29.07	1,295.70	9,211.50
2848+29.07	1,297.80	9,605.70
2850+29.07	1,263.50	9,486.40

Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
50' Project Depth
Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)

50' MLLW Southwest Pass To -53 (MLG)

STA.	AREA (SF)	Vol. (CY)
2776+29.07	477.5	0
2778+29.07	411.7	3293.1
2780+29.07	346.3	2807.4
2782+29.07	288.8	2352.3
2784+29.07	239.5	1956.8
2786+29.07	187.1	1580.3
2788+29.07	165.1	1304.5
2790+29.07	198.6	1346.8
2792+29.07	214.8	1531.1
2794+29.07	194.5	1516
2796+29.07	165.2	1332.3
2798+29.07	200	1352.9
2800+29.07	299.3	1849.2
2802+29.07	361.7	2448.1
2804+29.07	359.1	2669.7
2806+29.07	419.8	2885
2808+29.07	402.2	3044.5
2810+29.07	455.3	3175.8
2812+29.07	542.4	3695.3
2814+29.07	604.2	4246.8
2816+29.07	733.1	4952.9
2818+29.07	856.2	5886.1
2820+29.07	1110.3	7283.2
2822+29.07	1425.6	9392.1
2824+29.07	1713.5	11626.2
2826+29.07	1649.7	12456.5
2828+29.07	1573.1	11936.2
2830+29.07	1575	11659.5
2832+29.07	1821.3	12578.7
2834+29.07	2064.9	14393
2836+29.07	2253.1	15992.6
2838+29.07	2367.6	17114.1
2840+29.07	2521.5	18107.9
2842+29.07	2612.5	19014.6
2844+29.07	2681.9	19608.9
2846+29.07	2766.5	20179.2
2848+29.07	2791.9	20586.7
2850+29.07	2780.4	20638.4

2852+29.07	1,222.90	9,208.90
2854+29.07	1,151.90	8,795.40
2856+29.07	1,063.90	8,206.80
2858+29.07	992.50	7,616.50
2860+29.07	1,267.30	8,369.80
2862+29.07	1,306.40	9,532.40
2864+29.07	1,350.90	9,841.80
2866+29.07	1,330.90	9,932.50
2868+29.07	1,280.90	9,673.20
2870+29.07	1,358.40	9,775.30
2872+29.07	1,499.50	10,585.00
2874+29.07	1,613.30	11,529.10
2876+29.07	1,728.90	12,378.60
2878+29.07	1,854.20	13,270.70
2880+29.07	1,987.60	14,228.80
2882+29.07	1,983.60	14,708.10
2884+29.07	1,905.50	14,404.30
2886+29.07	1,837.00	13,861.40
2888+29.07	1,891.60	13,809.80
2890+29.07	1,917.70	14,108.60
2892+29.07	1,975.00	14,417.50
2894+29.07	2,064.10	14,959.70
2896+29.07	2,180.90	15,722.30
2898+29.07	2,304.50	16,612.60
2900+29.07	2,440.00	17,572.30
2902+29.07	2,566.10	18,541.20
2904+29.07	2,682.00	19,437.50
2906+29.07	2,691.80	19,903.00
2908+29.07	2,553.40	19,426.80
2910+29.07	2,409.80	18,382.30
2912+29.07	2,285.80	17,391.20
2914+29.07	2,193.60	16,590.60
2916+29.07	2,100.00	15,902.50
2918+29.07	2,004.70	15,202.60
2920+29.07	2,038.60	14,975.10
2922+29.07	2,032.00	15,076.20
2924+29.07	1,865.80	14,436.30
2926+29.07	1,701.90	13,213.80
2928+29.07	1,600.50	12,230.90
2930+29.07	1,559.30	11,702.80
2932+29.07	1,517.70	11,396.40
2934+29.07	1,376.60	10,719.70
2936+29.07	1,239.70	9,690.00
2938+29.07	1,111.70	8,709.10
2940+29.07	980.50	7,749.20
2942+29.07	887.70	6,919.50
2944+29.07	822.80	6,335.20

2852+29.07	2754	20497.8
2854+29.07	2681.1	20129.9
2856+29.07	2585.3	19505.3
2858+29.07	2490.7	18800.2
2860+29.07	2776	19506.4
2862+29.07	2830.6	20765.4
2864+29.07	2887.9	21179.6
2866+29.07	2867.6	21316.5
2868+29.07	2816.8	21053.2
2870+29.07	2899.9	21172.8
2872+29.07	3047.7	22028.1
2874+29.07	3166.9	23017.4
2876+29.07	3285	23896.1
2878+29.07	3413.3	24808.5
2880+29.07	3549.9	25789.5
2882+29.07	3546.6	26283.3
2884+29.07	3467.8	25979.2
2886+29.07	3398.9	25432
2888+29.07	3451.4	25371.4
2890+29.07	3476.5	25658.8
2892+29.07	3533.3	25962.1
2894+29.07	3624.5	26510.6
2896+29.07	3746.7	27301
2898+29.07	3875.7	28231.3
2900+29.07	4013.9	29220.7
2902+29.07	4136.6	30187
2904+29.07	4250.2	31062.4
2906+29.07	4258.3	31513.1
2908+29.07	4119.1	31027.5
2910+29.07	3975.2	29978.9
2912+29.07	3851.8	28988.7
2914+29.07	3760.9	28194.9
2916+29.07	3668.6	27516.6
2918+29.07	3575	26828.3
2920+29.07	3600.4	26575.8
2922+29.07	3588.5	26625.9
2924+29.07	3424.5	25974.1
2926+29.07	3262.8	24767.7
2928+29.07	3163.6	23801.5
2930+29.07	3125	23291.1
2932+29.07	3087.5	23009
2934+29.07	2940.7	22326.5
2936+29.07	2797.3	21251.9
2938+29.07	2661.5	20217.8
2940+29.07	2516.9	19178.9
2942+29.07	2348.5	18020
2944+29.07	2168	16727.9

2946+29.07	783.10	5,947.70
2948+29.07	768.60	5,747.00
2950+29.07	723.00	5,524.50
2952+29.07	545.80	4,699.40
2954+29.07	396.20	3,488.90
2956+29.07	330.40	2,691.20
2958+29.07	318.40	2,403.20
2960+29.07	382.60	2,596.30
2962+29.07	424.40	2,988.90
2964+29.07	499.70	3,422.50
2966+29.07	539.70	3,849.70
2968+29.07	582.10	4,154.80
2970+29.07	636.90	4,514.80
2972+29.07	683.20	4,889.50
2974+29.07	779.90	5,419.20
2976+29.07	986.10	6,541.00
2978+29.07	1,296.50	8,454.20
2980+29.07	1,625.40	10,821.90
2982+29.07	1,660.40	12,169.60
2984+29.07	1,574.10	11,979.50
2986+29.07	1,495.50	11,368.70
2988+29.07	1,408.10	10,754.10
2990+29.07	1,311.40	10,072.20
2992+29.07	1,232.00	9,420.00
2994+29.07	1,406.40	9,772.10
2996+29.07	1,618.90	11,205.00
2998+29.07	1,901.30	13,037.90
3000+29.07	2,254.10	15,390.50
3002+29.07	2,620.90	18,055.40
3004+29.07	2,572.90	19,236.00
3006+29.07	2,517.30	18,852.50
3008+29.07	2,455.10	18,416.50
3010+29.07	2,377.00	17,896.80
3012+29.07	2,302.30	17,330.60
3014+29.07	2,234.90	16,804.40
3016+29.07	2,200.60	16,427.90
3018+29.07	2,099.00	15,924.50
3020+29.07	1,881.80	14,743.80
3022+29.07	1,725.80	13,361.50
3024+29.07	1,804.40	13,074.80
3026+29.07	1,898.00	13,712.60
3028+29.07	1,770.20	13,585.90
3030+29.07	1,501.90	12,119.00
3032+29.07	1,453.70	10,946.80
3034+29.07	1,410.40	10,607.90
3036+29.07	1,445.60	10,577.80
3038+29.07	1,435.00	10,668.90

2946+29.07	2081.3	15738
2948+29.07	2087.3	15439.1
2950+29.07	2028.6	15244.2
2952+29.07	1776.5	14093
2954+29.07	1518.6	12203.8
2956+29.07	1491.4	11147.9
2958+29.07	1503.2	11090.9
2960+29.07	1521.5	11202.4
2962+29.07	1591.6	11529.9
2964+29.07	1668	12072.6
2966+29.07	1754.3	12675.1
2968+29.07	1871.2	13427.9
2970+29.07	2000	14338
2972+29.07	2131.4	15301.6
2974+29.07	2269.6	16300
2976+29.07	2531.7	17782.8
2978+29.07	2862	19976.7
2980+29.07	3198.4	22445.9
2982+29.07	3238.2	23839.4
2984+29.07	3155.2	23679.2
2986+29.07	3076.4	23079.9
2988+29.07	2990.1	22468.7
2990+29.07	2896.4	21802.1
2992+29.07	2815.9	21156.9
2994+29.07	3002.9	21551.2
2996+29.07	3200.9	22977
2998+29.07	3495	24799.5
3000+29.07	3861.5	27246
3002+29.07	4230.1	29968.7
3004+29.07	4178.3	31142.2
3006+29.07	4116.2	30720.5
3008+29.07	4054.1	30260.3
3010+29.07	3983.5	29768.7
3012+29.07	3914.5	29251.9
3014+29.07	3839.4	28718.1
3016+29.07	3796.8	28282
3018+29.07	3691.9	27735.7
3020+29.07	3474.3	26541.4
3022+29.07	3281.2	25020.6
3024+29.07	3396.6	24732.9
3026+29.07	3486.3	25492.3
3028+29.07	3358	25349.2
3030+29.07	3090.6	23883.7
3032+29.07	2898.3	22181.2
3034+29.07	2953	21671.8
3036+29.07	3029.9	22159.1
3038+29.07	3016.1	22392.6

3040+29.07	1,371.30	10,393.50
3042+29.07	1,314.40	9,947.10
3044+29.07	1,216.90	9,375.40
3046+29.07	1,006.30	8,234.10
3048+29.07	977.50	7,347.50
3050+29.07	943.20	7,113.90
3052+29.07	972.20	7,094.20
3054+29.07	1,063.60	7,539.90
3056+29.07	1,035.90	7,775.80
3058+29.07	938.40	7,312.20
3060+29.07	935.50	6,940.50
3062+29.07	872.80	6,697.60
3064+29.07	744.90	5,991.70
3066+29.07	564.00	4,847.90
3068+29.07	577.70	4,228.70
3070+29.07	792.70	5,075.90
3072+29.07	1,007.50	6,667.40
3074+29.07	1,175.60	8,085.40
3076+29.07	1,295.10	9,150.70
3078+29.07	1,316.80	9,673.50
3080+29.07	1,198.60	9,316.30
3082+29.07	1,044.80	8,309.10
3084+29.07	928.70	7,309.20
3086+29.07	742.50	6,189.60
3088+29.07	482.60	4,537.60
3090+29.07	452.50	3,463.50
3092+29.07	457.10	3,369.20
3094+29.07	579.80	3,840.60
3096+29.07	707.60	4,768.10
3098+29.07	937.30	6,092.00
3100+29.07	1,024.00	7,264.00
3102+29.07	1,138.30	8,008.50
3104+29.07	1,430.20	9,512.90
3106+29.07	1,703.60	11,606.60
3108+29.07	1,884.80	13,290.30
3110+29.07	2,129.20	14,866.50
3112+29.07	1,959.20	15,142.00
3114+29.07	1,715.70	13,610.50
3116+29.07	1,699.00	12,646.90
3118+29.07	1,462.90	11,710.60
a 0+29.07	1,114.70	9,546.30
a 2+29.07	1,324.20	9,032.80
a 4+29.07	1,620.90	10,907.60
a 6+29.07	1,951.20	13,230.00
a 8+29.07	2,057.60	14,847.60
a 10+29.07	1,574.70	13,453.10
a 12+29.07	1,562.10	11,617.90

3040+29.07	2951	22100.4
3042+29.07	2880.1	21596.9
3044+29.07	2781.9	20970.5
3046+29.07	2521	19640.3
3048+29.07	2465.8	18469.7
3050+29.07	2360.6	17875.7
3052+29.07	2103.7	16534.5
3054+29.07	2271.7	16205.1
3056+29.07	2403.3	17314.7
3058+29.07	2378.6	17711
3060+29.07	2435.6	17830.7
3062+29.07	2381.6	17841.5
3064+29.07	2274.3	17243.9
3066+29.07	2042.7	15988.9
3068+29.07	1918.8	14672.2
3070+29.07	2188.9	15213.6
3072+29.07	2403.7	17009.8
3074+29.07	2658.8	18750
3076+29.07	2815.3	20274.1
3078+29.07	2823.3	20883.6
3080+29.07	2497	19704.6
3082+29.07	2191	17362.8
3084+29.07	2096.2	15878.5
3086+29.07	1962.2	15030.9
3088+29.07	1622.7	13277.3
3090+29.07	1321	10902.6
3092+29.07	1355.9	9914.6
3094+29.07	1789.8	11650.9
3096+29.07	2175.4	14686
3098+29.07	2453.1	17142.8
3100+29.07	2508	18374.6
3102+29.07	2550.6	18735.5
3104+29.07	2926.8	20286.6
3106+29.07	3298.2	23055.5
3108+29.07	3484.4	25120.7
3110+29.07	3725.3	26702.4
3112+29.07	3547.3	26935.3
3114+29.07	3260.3	25213.2
3116+29.07	3255.8	24133.8
3118+29.07	3018.6	23238.7
a 0+29.07	2677.6	21097.2
a 2+29.07	2785.5	20234
a 4+29.07	3165	22039
a 6+29.07	3502.7	24695.2
a 8+29.07	3630.1	26417.8
a 10+29.07	3140.4	25076
a 12+29.07	3121.3	23191.5

a 14+29.07	1,959.40	13,042.70
a 16+29.07	2,106.70	15,059.60
a 18+29.07	2,400.90	16,694.70
a 20+29.07	2,710.90	18,932.50
a 22+29.07	2,900.00	20,781.30
a 24+29.07	3,007.30	21,878.90
a 26+29.07	2,523.20	20,483.00
a 28+29.07	2,424.60	18,325.00
a 30+29.07	2,697.50	18,970.80
a 32+29.07	2,968.50	20,985.20
a 34+29.07	3,181.60	22,778.00
a 36+29.07	3,081.90	23,197.90
a 38+29.07	2,730.60	21,527.90
a 40+29.07	2,759.10	20,332.10
a 42+29.07	3,074.30	21,604.90
a 44+29.07	2,770.50	21,647.30
a 46+29.07	2,161.90	18,268.20
a 48+29.07	2,187.10	16,107.50
a 50+29.07	2,520.50	17,435.70
a 52+29.07	2,636.10	19,098.70
a 54+29.07	2,498.60	19,017.50
a 56+29.07	2,479.00	18,435.70
a 58+29.07	2,608.30	18,841.80
a 60+29.07	2,594.90	19,270.80
a 62+29.07	2,434.60	18,627.70
a 64+29.07	2,226.40	17,262.90
a 66+29.07	2,053.30	15,850.40
a 68+29.07	2,244.60	15,918.20
a 70+29.07	2,631.10	18,058.10
a 72+29.07	2,780.40	20,042.40
a 74+29.07	2,806.10	20,690.80
a 76+29.07	2,664.80	20,262.90
a 78+29.07	2,375.60	18,668.40
a 80+29.07	2,290.40	17,281.40
a 82+29.07	2,305.70	17,022.30
a 84+29.07	2,316.90	17,120.70
a 86+29.07	2,354.80	17,302.60
a 88+29.07	2,490.70	17,945.90
a 90+29.07	2,699.40	19,222.30
a 92+29.07	2,655.30	19,832.10
a 94+29.07	2,298.80	18,348.50
a 96+29.07	2,135.20	16,422.10
a 98+29.07	2,403.20	16,808.80
a 100+29.07	2,724.40	18,991.20
a 102+29.07	2,652.10	19,913.10
a 104+29.07	2,586.90	19,403.70
a 106+29.07	2,442.50	18,627.10

a 14+29.07	3545.1	24690.4
a 16+29.07	3676.3	26745.9
a 18+29.07	3977.8	28348.5
a 20+29.07	4299.8	30658
a 22+29.07	4498.4	32586
a 24+29.07	4593.8	33674.7
a 26+29.07	4129.3	32307.8
a 28+29.07	4036.6	30244
a 30+29.07	4328.1	30980.3
a 32+29.07	4615.7	33125.3
a 34+29.07	4829.8	34983.3
a 36+29.07	4732.8	35416.9
a 38+29.07	4373.5	33727.1
a 40+29.07	4395.6	32478.3
a 42+29.07	4714.8	33742.3
a 44+29.07	4410.8	33798.7
a 46+29.07	3790.2	30374.3
a 48+29.07	3846.3	28283.5
a 50+29.07	4231.3	29916.9
a 52+29.07	4358.6	31814.2
a 54+29.07	4156.4	31536.8
a 56+29.07	4108.5	30610.7
a 58+29.07	4232.6	30893.2
a 60+29.07	4209.5	31267.2
a 62+29.07	4040.6	30556.1
a 64+29.07	3831.2	29154.8
a 66+29.07	3737.7	28032.7
a 68+29.07	3936.5	28422.9
a 70+29.07	4275.5	30414.9
a 72+29.07	4404	32146.5
a 74+29.07	4440.3	32756.9
a 76+29.07	4292	32341.9
a 78+29.07	3986.9	30662.5
a 80+29.07	3892.2	29181.7
a 82+29.07	3898.9	28855.6
a 84+29.07	3908	28914.3
a 86+29.07	3955.6	29124.6
a 88+29.07	4096.2	29821.5
a 90+29.07	4307	31123
a 92+29.07	4277.7	31795.2
a 94+29.07	3913.6	30338.2
a 96+29.07	3743.8	28361
a 98+29.07	4006.4	28704.7
a 100+29.07	4338.4	30906.7
a 102+29.07	4260.4	31847.4
a 104+29.07	4198.8	31330.6
a 106+29.07	4056.5	30575.4

a 108+29.07	2,352.20	17,758.10
a 110+29.07	2,177.80	16,777.80
a 112+29.07	1,887.10	15,055.10
a 114+29.07	1,800.70	13,658.50
a 116+29.07	1,949.60	13,889.90
a 118+29.07	2,009.70	14,663.80
a 120+29.07	2,089.20	15,181.20
a 122+29.07	2,715.80	17,796.50
a 124+29.07	3,029.00	21,276.90
a 126+29.07	3,179.60	22,994.70
a 128+29.07	2,957.50	22,729.90
a 130+29.07	2,706.40	20,977.20
a 132+29.07	2,426.40	19,010.20
a 134+29.07	2,120.00	16,838.50
a 136+29.07	1,564.90	13,647.70
a 138+29.07	1,529.30	11,459.90
a 140+29.07	1,568.10	11,472.00
a 142+29.07	1,584.70	11,677.30
a 144+29.07	1,569.80	11,683.50
a 146+29.07	1,564.10	11,607.20
a 148+29.07	1,711.50	12,131.90
a 150+29.07	1,846.10	13,176.40
a 152+29.07	2,004.00	14,259.90
a 154+29.07	2,141.80	15,355.10
a 156+29.07	2,322.90	16,536.20
a 158+29.07	2,573.30	18,134.30
a 160+29.07	2,722.40	19,614.00
a 162+29.07	2,765.60	20,326.00
a 164+29.07	2,739.00	20,387.40
a 166+29.07	2,641.10	19,926.40
a 168+29.07	2,329.60	18,410.10
a 170+29.07	2,028.50	16,141.30
a 172+29.07	1,754.80	14,012.50
a 174+29.07	1,487.70	12,009.30
a 176+29.07	1,122.30	9,666.60
a 178+29.07	760.70	6,974.10
a 180+29.07	531.30	4,784.90
a 182+29.07	393.50	3,424.90
a 184+29.07	278.70	2,489.70
a 186+29.07	232.10	1,891.90
a 188+29.07	217.50	1,665.00
a 190+29.07	207.30	1,573.20
a 192+29.07	212.70	1,555.40
a 194+29.07	350.50	2,085.80
a 196+29.07	382.60	2,715.20
a 198+29.07	426.60	2,996.90
a 200+29.07	577.60	3,719.30

a 108+29.07	3979.1	29761.7
a 110+29.07	3790.1	28774.9
a 112+29.07	3456.8	26840.3
a 114+29.07	3346.5	25197.3
a 116+29.07	3516.9	25419.9
a 118+29.07	3588.6	26316.4
a 120+29.07	3577.6	26541.4
a 122+29.07	4253.6	29004.5
a 124+29.07	4540.9	32572.1
a 126+29.07	4678.8	34146.9
a 128+29.07	4417.4	33689.7
a 130+29.07	4136	31679.4
a 132+29.07	3836.3	29527.2
a 134+29.07	3511.4	27213.6
a 136+29.07	3114.9	24541.5
a 138+29.07	2711.3	21578.5
a 140+29.07	2736.2	20176.2
a 142+29.07	2742.1	20290.2
a 144+29.07	2730.1	20267.6
a 146+29.07	2735.4	20242.7
a 148+29.07	3017	21305.3
a 150+29.07	3291.1	23363.3
a 152+29.07	3539.6	25298.7
a 154+29.07	3735.3	26944
a 156+29.07	3928.8	28385.8
a 158+29.07	4175.8	30017.3
a 160+29.07	4317.7	31457.6
a 162+29.07	4346.9	32091.3
a 164+29.07	4307.5	32053.6
a 166+29.07	4204	31524.2
a 168+29.07	3863.7	29880.3
a 170+29.07	3529.9	27383.9
a 172+29.07	3190.9	24891.9
a 174+29.07	2844	22351.5
a 176+29.07	2389.4	19383.2
a 178+29.07	1921.2	15965.2
a 180+29.07	1519.4	12742.8
a 182+29.07	1184.6	10014.9
a 184+29.07	954.3	7922
a 186+29.07	912.9	6915.4
a 188+29.07	970.7	6976.2
a 190+29.07	1121.4	7748.5
a 192+29.07	1352.6	9162.9
a 194+29.07	1676.3	11218
a 196+29.07	1790.8	12841
a 198+29.07	1771.5	13193.5
a 200+29.07	1733.4	12980.8

a 202+29.07	732.00	4,850.30
a 204+29.07	859.10	5,892.80
a 206+29.07	910.80	6,555.10
a 208+29.07	934.70	6,835.00
a 210+29.07	1,005.00	7,184.10
a 212+29.07	1,128.60	7,902.40
a 214+29.07	1,292.50	8,967.10
a 216+29.07	1,421.80	10,052.90
a 218+29.07	1,530.90	10,936.00
a 220+29.07	1,675.70	11,876.20
a 222+29.07	1,826.00	12,969.00
a 224+29.07	1,991.70	14,139.40
a 226+29.07	2,033.20	14,906.90
a 228+29.07	1,938.70	14,710.90
a 230+29.07	1,857.50	14,060.10
a 232+29.07	1,787.60	13,500.30
a 234+29.07	1,726.40	13,014.90
a 236+29.07	1,719.90	12,764.20
a 238+29.07	1,805.80	13,058.00
a 240+29.07	1,921.30	13,804.10
a 242+29.07	2,054.20	14,724.30
a 244+29.07	2,203.20	15,768.30
a 246+29.07	2,273.30	16,579.60
a 248+29.07	2,147.70	16,374.00
a 250+29.07	2,022.80	15,446.10
a 252+29.07	1,898.50	14,523.30
a 254+29.07	1,786.90	13,649.80
a 256+29.07	1,641.00	12,696.10
a 258+29.07	1,368.70	11,147.00
a 260+29.07	1,095.10	9,125.20
a 262+29.07	830.20	7,130.90
a 264+29.07	588.10	5,252.90
a 266+29.07	464.10	3,896.90
a 268+29.07	435.80	3,333.00
a 270+29.07	410.20	3,133.30
a 272+29.07	396.50	2,987.70
a 274+29.07	405.90	2,971.70
a 276+29.07	433.60	3,109.10
a 278+29.07	470.40	3,348.30
a 280+29.07	532.70	3,715.30
a 282+29.07	619.60	4,267.70
a 284+29.07	718.70	4,956.80
a 286+29.07	822.70	5,709.10
a 288+29.07	1,164.40	7,359.90
a 290+29.07	1,596.10	10,224.10
a 292+29.07	2,103.60	13,702.30
a 294+29.07	2,655.80	17,627.40

a 202+29.07	1739	12860.4
a 204+29.07	1804.6	13124.3
a 206+29.07	1866.8	13597.6
a 208+29.07	1962.5	14182.6
a 210+29.07	2081.1	14976.6
a 212+29.07	2199.6	15854.5
a 214+29.07	2316.3	16725.5
a 216+29.07	2460.6	17692.1
a 218+29.07	2626.1	18839.5
a 220+29.07	2800.1	20097
a 222+29.07	2994.1	21460
a 224+29.07	3193.2	22915.8
a 226+29.07	3258.4	23894.8
a 228+29.07	3192.9	23893.8
a 230+29.07	3137.2	23444.9
a 232+29.07	3096.2	23086.8
a 234+29.07	3088.2	22905.3
a 236+29.07	3160.8	23144.5
a 238+29.07	3308.9	23961.8
a 240+29.07	3464.9	25088.2
a 242+29.07	3627	26266.4
a 244+29.07	3796.6	27495
a 246+29.07	3874.3	28410.8
a 248+29.07	3748.2	28231.3
a 250+29.07	3622.8	27299.8
a 252+29.07	3498	26373.4
a 254+29.07	3373.3	25449.3
a 256+29.07	3195.7	24329.4
a 258+29.07	2909.3	22610.8
a 260+29.07	2618.2	20472.1
a 262+29.07	2322.5	18299
a 264+29.07	2023.2	16095.4
a 266+29.07	1834.1	14286.6
a 268+29.07	1824.6	13551
a 270+29.07	1813.5	13474.6
a 272+29.07	1800.8	13386.2
a 274+29.07	1786.5	13286.2
a 276+29.07	1769.6	13170.9
a 278+29.07	1834	13346.7
a 280+29.07	1915.6	13887.6
a 282+29.07	2003	14513.6
a 284+29.07	2091	15162.9
a 286+29.07	2177.6	15809.4
a 288+29.07	2639.6	17841.5
a 290+29.07	3165	21498.5
a 292+29.07	3717.5	25490.8
a 294+29.07	4298.5	29689.1

a 296+29.07	2,809.60	20,242.40
a 298+29.07	2,405.30	19,314.50
a 300+29.07	2,038.40	16,458.30
a 302+29.07	1,745.60	14,015.00
a 304+29.07	1,712.60	12,808.20
a 306+29.07	1,784.60	12,952.60
a 308+29.07	1,613.90	12,587.10
a 310+29.07	1,261.30	10,648.80
a 312+29.07	953.80	8,203.90
a 314+29.07	879.00	6,788.20
a 316+29.07	891.00	6,555.80
a 318+29.07	838.10	6,404.00
a 320+29.07	881.40	6,368.20
a 322+29.07	986.10	6,916.40
a 324+29.07	1,131.30	7,842.10
a 326+29.07	1,136.50	8,399.10
a 328+29.07	1,077.90	8,201.40
a 330+29.07	978.70	7,617.10
a 332+29.07	895.80	6,942.60
a 334+29.07	930.40	6,763.70
a 336+29.07	1,092.80	7,493.30
a 338+29.07	1,260.60	8,716.20
a 340+29.07	1,423.80	9,942.30
a 342+29.07	1,589.30	11,159.60
a 344+29.07	1,726.20	12,279.40
a 346+29.07	1,671.90	12,585.40
a 348+29.07	1,628.60	12,224.00
a 350+29.07	1,658.30	12,173.60
a 352+29.07	1,780.30	12,735.40
a 354+29.07	1,936.70	13,766.50
a 356+29.07	2,079.30	14,873.80
a 358+29.07	2,206.10	15,871.80
a 360+29.07	2,328.90	16,796.60
a 362+29.07	2,451.50	17,705.30
a 364+29.07	2,310.90	17,638.30
a 366+29.07	2,186.40	16,656.50
a 368+29.07	2,092.80	15,848.90
a 370+29.07	2,002.80	15,169.10
a 372+29.07	1,913.90	14,506.50
a 374+29.07	1,808.00	13,784.80
a 376+29.07	1,700.30	12,993.50
a 378+29.07	1,593.90	12,200.70
a 380+29.07	1,491.20	11,426.30
a 382+29.07	1,403.40	10,720.50
a 384+29.07	1,474.60	10,659.20
a 386+29.07	1,576.40	11,300.20
a 388+29.07	1,684.40	12,077.00

a 296+29.07	4462.1	32446.7
a 298+29.07	4039.1	31486
a 300+29.07	3635.2	28423.2
a 302+29.07	3242.6	25473
a 304+29.07	3260.2	24084.2
a 306+29.07	3310.1	24334.2
a 308+29.07	3094.6	23720.8
a 310+29.07	2658.1	21306.1
a 312+29.07	2134.3	17749.6
a 314+29.07	2013	15360.3
a 316+29.07	2221.4	15682.9
a 318+29.07	2304.3	16761.7
a 320+29.07	2414.4	17476.5
a 322+29.07	2495.9	18186.5
a 324+29.07	2569.9	18762.6
a 326+29.07	2595.9	19132.7
a 328+29.07	2555	19077.2
a 330+29.07	2452.8	18547.2
a 332+29.07	2305.5	17623.1
a 334+29.07	2247.8	16863.8
a 336+29.07	2347.3	17018.7
a 338+29.07	2437.2	17720.4
a 340+29.07	2554.1	18486.3
a 342+29.07	2687.8	19414.3
a 344+29.07	2826.2	20421.9
a 346+29.07	2859.6	21058.4
a 348+29.07	2970.9	21594.4
a 350+29.07	3082.6	22420.4
a 352+29.07	3211.7	23312.2
a 354+29.07	3318.8	24187.2
a 356+29.07	3411.3	24926.5
a 358+29.07	3506.8	25622.7
a 360+29.07	3605.1	26340.4
a 362+29.07	3705.8	27077.4
a 364+29.07	3552.4	26882.2
a 366+29.07	3403	25760.5
a 368+29.07	3263.1	24689
a 370+29.07	3139.1	23711.8
a 372+29.07	3033	22859.8
a 374+29.07	2940.9	22125.6
a 376+29.07	2857.8	21476.5
a 378+29.07	2815	21010.4
a 380+29.07	2804.4	20812.9
a 382+29.07	2822.7	20841.2
a 384+29.07	2853.3	21022
a 386+29.07	2892.7	21281.3
a 388+29.07	2952.1	21647.5

a 390+29.07	1,794.70	12,885.30
a 392+29.07	1,906.80	13,709.00
a 394+29.07	1,825.30	13,822.60
a 396+29.07	1,708.70	13,088.80
a 398+29.07	1,596.30	12,240.40
a 400+29.07	1,508.90	11,500.50
a 402+29.07	1,483.80	11,084.10
a 404+29.07	1,462.70	10,913.20
a 406+29.07	1,513.10	11,021.60
a 408+29.07	1,628.80	11,636.60
a 410+29.07	1,750.20	12,514.50
a 412+29.07	1,884.70	13,462.50
a 414+29.07	1,963.20	14,251.60
a 416+29.07	2,006.10	14,701.20
a 418+29.07	2,076.80	15,122.00
a 420+29.07	2,169.20	15,726.20
a 422+29.07	2,282.30	16,487.10
a 424+29.07	2,420.50	17,417.80
a 426+29.07	2,418.20	17,921.10
a 428+29.07	2,347.30	17,650.00
a 430+29.07	2,284.20	17,153.90
a 432+29.07	2,235.20	16,738.70
a 434+29.07	2,209.50	16,462.10
a 436+29.07	2,116.90	16,023.70
a 438+29.07	1,990.80	15,213.60
a 440+29.07	1,915.60	14,468.10
a 442+29.07	1,905.10	14,150.60
a 444+29.07	1,648.70	13,162.10
a 446+29.07	1,371.30	11,185.00
a 448+29.07	1,117.50	9,217.60
a 450+29.07	902.40	7,481.10
a 452+29.07	711.10	5,975.80
a 454+29.07	718.30	5,293.80
a 456+29.07	761.90	5,481.90
a 458+29.07	749.30	5,596.90
a 460+29.07	659.20	5,216.50
a 462+29.07	554.70	4,495.70
a 464+29.07	664.50	4,515.60
a 466+29.07	821.50	5,503.80
a 468+29.07	895.60	6,359.70
a 470+29.07	872.40	6,548.20
a 472+29.07	927.30	6,665.40
a 474+29.07	1,098.40	7,502.50
a 476+29.07	1,203.40	8,525.20
a 478+29.07	1,169.40	8,788.10
a 480+29.07	978.50	7,955.10
a 482+29.07	808.20	6,617.40

a 390+29.07	3044.6	22210.1
a 392+29.07	3146.2	22928.7
a 394+29.07	3078.3	23053.7
a 396+29.07	2989.5	22473.4
a 398+29.07	2928.8	21919.6
a 400+29.07	2914.6	21642.3
a 402+29.07	2905.9	21557.5
a 404+29.07	2997.7	21865.1
a 406+29.07	3109.7	22619.8
a 408+29.07	3225.4	23463.3
a 410+29.07	3345.5	24336.6
a 412+29.07	3479.3	25276.9
a 414+29.07	3553.4	26047.2
a 416+29.07	3599.7	26493.3
a 418+29.07	3691.1	27003.1
a 420+29.07	3783.8	27684.8
a 422+29.07	3878.6	28379.4
a 424+29.07	4002	29187.5
a 426+29.07	3986.7	29587.6
a 428+29.07	3904.3	29225.8
a 430+29.07	3829.4	28643.2
a 432+29.07	3769.4	28143.5
a 434+29.07	3733.5	27788.5
a 436+29.07	3622.3	27243.8
a 438+29.07	3469.5	26266.1
a 440+29.07	3352.6	25267.1
a 442+29.07	3278.7	24560.5
a 444+29.07	2869.6	22771.4
a 446+29.07	2558.6	20104.4
a 448+29.07	2248.5	17804.2
a 450+29.07	1968.2	15617.4
a 452+29.07	1737.9	13726.5
a 454+29.07	1739.7	12880.2
a 456+29.07	1743.2	12899.5
a 458+29.07	1685.8	12700
a 460+29.07	1554.3	12000.5
a 462+29.07	1419.5	11014
a 464+29.07	1580	11109.1
a 466+29.07	1776.3	12430.7
a 468+29.07	1873	13515.8
a 470+29.07	1862.1	13833.8
a 472+29.07	1876.2	13845.7
a 474+29.07	2009	14389.6
a 476+29.07	2084.7	15162.1
a 478+29.07	2038.7	15271.9
a 480+29.07	1852.6	14412.2
a 482+29.07	1600.6	12789.5

a 484+29.07	807.50	5,984.10
a 486+29.07	937.20	6,461.70
a 488+29.07	1,064.50	7,413.50
a 490+29.07	1,174.50	8,292.50
a 492+29.07	1,247.30	8,969.80
a 494+29.07	1,256.90	9,275.00
a 496+29.07	1,229.80	9,210.10
a 498+29.07	1,186.30	8,948.30
a 500+29.07	1,130.20	8,579.60
a 502+29.07	1,065.70	8,132.90
a 504+29.07	1,052.70	7,845.60
a 506+29.07	1,057.60	7,815.70
a 508+29.07	1,075.30	7,899.70
a 510+29.07	1,084.90	8,000.80
a 512+29.07	1,109.60	8,127.60
a 514+29.07	1,200.20	8,554.80
a 516+29.07	1,241.40	9,043.00
a 518+29.07	1,285.60	9,359.20
a 520+29.07	1,320.40	9,652.00
a 522+29.07	1,367.30	9,954.60
a 524+29.07	1,501.60	10,625.50
a 526+29.07	1,650.30	11,673.80
a 528+29.07	1,843.60	12,940.40
a 530+29.07	2,050.20	14,421.40
a 532+29.07	2,215.00	15,796.90
a 534+29.07	2,237.70	16,491.50
a 536+29.07	2,266.40	16,682.00
a 538+29.07	2,303.70	16,926.30
a 540+29.07	2,361.40	17,278.20
a 542+29.07	2,428.10	17,738.80
a 544+29.07	2,503.30	18,264.20
a 546+29.07	2,577.50	18,817.60
a 548+29.07	2,651.00	19,364.70
a 550+29.07	2,729.00	19,925.80
a 552+29.07	2,771.70	20,372.90
a 554+29.07	2,743.10	20,425.10
a 556+29.07	2,722.10	20,241.50
a 558+29.07	2,706.60	20,106.20
a 560+29.07	2,696.40	20,010.80
a 562+29.07	2,638.60	19,759.00
a 564+29.07	2,548.10	19,209.80
a 566+29.07	2,464.80	18,566.10
a 568+29.07	2,388.80	17,976.20
a 570+29.07	2,318.70	17,435.00
a 572+29.07	2,363.00	17,339.50
a 574+29.07	2,515.90	18,070.00
a 576+29.07	2,688.50	19,275.60

a 484+29.07	1618.4	11921.9
a 486+29.07	1782.9	12597.4
a 488+29.07	1935.4	13771.6
a 490+29.07	2057.8	14789.6
a 492+29.07	2143	15558.4
a 494+29.07	2177.5	16001.6
a 496+29.07	2190.3	16176.9
a 498+29.07	2195.8	16244.9
a 500+29.07	2239.3	16426.5
a 502+29.07	2308.6	16844.2
a 504+29.07	2350.7	17256.7
a 506+29.07	2364.1	17462.2
a 508+29.07	2367.4	17523.8
a 510+29.07	2350.6	17474
a 512+29.07	2358.9	17442.7
a 514+29.07	2491.2	17963.5
a 516+29.07	2571.5	18750.8
a 518+29.07	2612.8	19201.3
a 520+29.07	2639.6	19453.7
a 522+29.07	2705.1	19795.3
a 524+29.07	2910.3	20797.9
a 526+29.07	3115.4	22317.6
a 528+29.07	3321.5	23840.2
a 530+29.07	3542.7	25422.9
a 532+29.07	3725.6	26919.6
a 534+29.07	3775	27779.8
a 536+29.07	3828.6	28161.5
a 538+29.07	3884.7	28567.8
a 540+29.07	3941.9	28987.4
a 542+29.07	4008.3	29445.1
a 544+29.07	4090.1	29993.9
a 546+29.07	4173.4	30605.3
a 548+29.07	4267.2	31261.5
a 550+29.07	4355.9	31937.7
a 552+29.07	4399.6	32427.8
a 554+29.07	4369.1	32476.6
a 556+29.07	4348	32285.4
a 558+29.07	4335.6	32161.4
a 560+29.07	4329	32091.2
a 562+29.07	4269	31844.5
a 564+29.07	4171.6	31261.6
a 566+29.07	4081.5	30567.3
a 568+29.07	3999.5	29929.9
a 570+29.07	3926.1	29354.2
a 572+29.07	3973	29255.7
a 574+29.07	4128.5	30005.4
a 576+29.07	4302.1	31224.4

a 578+29.07	2,888.60	20,655.80
a 580+29.07	3,112.50	22,226.20
a 582+29.07	3,064.40	22,877.50
a 584+29.07	2,734.30	21,476.50
a 586+29.07	2,385.10	18,960.70
a 588+29.07	2,026.10	16,337.80
a 590+29.07	1,672.10	13,697.00
a 592+29.07	1,553.60	11,947.00
a 594+29.07	1,559.30	11,529.20
a 596+29.07	1,576.40	11,613.60
a 598+29.07	1,601.20	11,769.00
a 600+29.07	1,632.40	11,976.30
a 602+29.07	1,722.50	12,425.40
a 604+29.07	1,836.10	13,180.10
a 606+29.07	1,953.00	14,033.60
a 608+29.07	2,073.10	14,911.20
a 610+29.07	2,196.90	15,814.50
a 612+29.07	2,266.80	16,532.10
a 614+29.07	2,309.80	16,950.50
a 616+29.07	2,341.20	17,226.10
a 618+29.07	2,361.10	17,416.10
a 620+29.07	2,370.20	17,523.50
a 622+29.07	2,392.60	17,640.00
a 624+29.07	2,437.80	17,890.50
a 626+29.07	2,502.30	18,297.00
a 628+29.07	2,576.10	18,808.90
a 630+29.07	2,661.20	19,397.40
a 632+29.07	2,768.60	20,110.50
a 634+29.07	2,893.00	20,968.80
a 636+29.07	2,980.90	21,754.90
a 638+29.07	2,971.50	22,045.80
a 640+29.07	2,939.60	21,892.90
a 642+29.07	2,815.20	21,314.00
a 644+29.07	2,700.50	20,428.50
a 646+29.07	2,594.30	19,610.30
a 648+29.07	2,488.10	18,823.60
a 650+29.07	2,360.60	17,958.20
a 652+29.07	2,243.30	17,051.50
a 654+29.07	2,134.30	16,213.30
a 656+29.07	2,040.60	15,462.40
a 658+29.07	1,946.70	14,767.80
a 660+29.07	1,855.70	14,083.20
a 662+29.07	1,774.30	13,444.50
a 664+29.07	1,713.40	12,917.40
a 666+29.07	1,779.40	12,936.30
a 668+29.07	1,858.10	13,472.20
a 670+29.07	1,947.60	14,095.10

a 578+29.07	4495.3	32583
a 580+29.07	4708.3	34087.3
a 582+29.07	4653.3	34672.4
a 584+29.07	4314.7	33214.9
a 586+29.07	3959.1	30643.9
a 588+29.07	3593.1	27971
a 590+29.07	3231.7	25277
a 592+29.07	3130.5	23563.9
a 594+29.07	3139.2	23221.1
a 596+29.07	3156.8	23318.3
a 598+29.07	3181	23473.3
a 600+29.07	3212.2	23678.6
a 602+29.07	3302.6	24128.9
a 604+29.07	3417.7	24890.2
a 606+29.07	3536.8	25757.4
a 608+29.07	3659.8	26653.8
a 610+29.07	3786.8	27579.8
a 612+29.07	3867	28347.2
a 614+29.07	3921.4	28845.7
a 616+29.07	3964	29204.9
a 618+29.07	3989.4	29457
a 620+29.07	3993	29564.4
a 622+29.07	4003.7	29617.1
a 624+29.07	4035.7	29775.4
a 626+29.07	4088.8	30090.7
a 628+29.07	4166.3	30574.3
a 630+29.07	4268.8	31240.8
a 632+29.07	4389.8	32068.8
a 634+29.07	4527.8	33028.3
a 636+29.07	4624	33895.7
a 638+29.07	4613.7	34213.9
a 640+29.07	4582.1	34058.6
a 642+29.07	4459.3	33486.6
a 644+29.07	4343.6	32603.3
a 646+29.07	4234.9	31772.3
a 648+29.07	4124.1	30959.5
a 650+29.07	3987.6	30043.6
a 652+29.07	3859.2	29062.4
a 654+29.07	3739.1	28141.9
a 656+29.07	3640.9	27333.3
a 658+29.07	3555.5	26653
a 660+29.07	3471.6	26025.9
a 662+29.07	3388.7	25408.2
a 664+29.07	3326	24869.2
a 666+29.07	3397.6	24902.4
a 668+29.07	3490.9	25513.1
a 670+29.07	3595.2	26244.9

a 672+29.07	2,038.30	14,762.70
a 674+29.07	2,200.30	15,698.80
a 676+29.07	2,365.30	16,909.80
a 678+29.07	2,537.90	18,159.90
a 680+29.07	2,700.30	19,400.70
a 682+29.07	2,420.70	18,966.70
a 684+29.07	2,132.60	16,864.20
a 686+29.07	1,836.00	14,698.60
a 688+29.07	1,545.00	12,522.20
a 690+29.07	1,514.20	11,330.40
a 692+29.07	1,508.70	11,196.10
a 694+29.07	1,573.70	11,416.20
a 696+29.07	1,638.00	11,894.90
a 698+29.07	1,704.00	12,377.50
a 700+29.07	1,771.10	12,870.70
a 702+29.07	1,883.60	13,535.90
a 704+29.07	1,972.70	14,282.50
a 706+29.07	2,042.10	14,869.70
a 708+29.07	2,094.00	15,319.00
a 710+29.07	2,130.30	15,645.50
a 712+29.07	2,187.50	15,992.00
a 714+29.07	2,237.10	16,387.50
a 716+29.07	2,277.60	16,721.10
a 718+29.07	2,335.60	17,086.00
a 720+29.07	2,367.80	17,419.90
a 722+29.07	2,369.80	17,546.80
a 724+29.07	2,341.00	17,447.60
a 726+29.07	2,288.20	17,145.20
a 728+29.07	2,248.10	16,801.10
a 730+29.07	2,213.10	16,523.20
a 732+29.07	2,183.00	16,282.00
a 734+29.07	2,287.00	16,555.40
a 736+29.07	2,393.80	17,336.00
a 738+29.07	2,438.70	17,898.20
a 740+29.07	2,422.30	18,003.70
a 742+29.07	2,359.00	17,708.60
a 744+29.07	2,462.00	17,855.60
a 746+29.07	2,566.30	18,623.20
a 748+29.07	2,625.80	19,229.90
a 750+29.07	2,674.40	19,630.30
a 752+29.07	2,712.10	19,950.00
a 754+29.07	2,757.70	20,258.40
a 756+29.07	2,801.40	20,589.20
a 758+29.07	2,827.60	20,848.20
a 760+29.07	2,840.90	20,994.30
a 762+29.07	2,862.90	21,125.20
a 764+29.07	2,872.50	21,242.30

a 672+29.07	3699.4	27017
a 674+29.07	3868.3	28028.5
a 676+29.07	4040	29290
a 678+29.07	4216.6	30580.1
a 680+29.07	4382.2	31847.7
a 682+29.07	4091.9	31385.6
a 684+29.07	3792.9	29203.1
a 686+29.07	3490.3	26975.1
a 688+29.07	3200.6	24781.4
a 690+29.07	3182	23639.3
a 692+29.07	3174.9	23544
a 694+29.07	3239.7	23757.9
a 696+29.07	3302.9	24232
a 698+29.07	3367.1	24703.8
a 700+29.07	3432.2	25182.6
a 702+29.07	3540.3	25824.2
a 704+29.07	3624.5	26536.2
a 706+29.07	3682.7	27063.4
a 708+29.07	3720.2	27418
a 710+29.07	3737.8	27622.3
a 712+29.07	3780.8	27846.8
a 714+29.07	3823.4	28163.8
a 716+29.07	3860.4	28458.5
a 718+29.07	3933	28864.4
a 720+29.07	3983.2	29319.3
a 722+29.07	4002.8	29577.8
a 724+29.07	3982.6	29575.5
a 726+29.07	3928.6	29300.7
a 728+29.07	3886.8	28946
a 730+29.07	3845.1	28636.6
a 732+29.07	3804.7	28332.6
a 734+29.07	3904.4	28552.4
a 736+29.07	4017.7	29341.2
a 738+29.07	4071.8	29961.3
a 740+29.07	4068.1	30148.1
a 742+29.07	4000.9	29885.2
a 744+29.07	4063.9	29869.4
a 746+29.07	4171.4	30501.1
a 748+29.07	4233.6	31129.7
a 750+29.07	4287.1	31558.2
a 752+29.07	4333.7	31928.9
a 754+29.07	4382.1	32280.5
a 756+29.07	4440.1	32674.6
a 758+29.07	4478.7	33032.4
a 760+29.07	4494.5	33233.9
a 762+29.07	4518.9	33382.8
a 764+29.07	4529.1	33511

a 766+29.07	2,887.30	21,332.60
a 768+29.07	2,906.20	21,457.30
a 770+29.07	2,881.10	21,434.20
a 772+29.07	2,883.80	21,351.50
a 774+29.07	2,912.50	21,467.90
a 776+29.07	2,956.60	21,737.50
a 778+29.07	2,967.60	21,941.50
a 780+29.07	2,959.80	21,953.10
a 782+29.07	2,928.00	21,806.50
a 784+29.07	2,870.10	21,474.20
a 786+29.07	2,879.40	21,294.40
a 788+29.07	2,909.90	21,442.00
a 790+29.07	2,960.30	21,741.60
a 792+29.07	3,025.40	22,169.20
a 794+29.07	3,049.30	22,498.80
a 796+29.07	3,065.40	22,647.00
a 798+29.07	3,078.70	22,755.90
a 800+29.07	3,092.70	22,857.30
a 802+29.07	3,173.90	23,209.80
a 804+29.07	3,279.50	23,901.40
a 806+29.07	3,402.40	24,747.60
a 808+29.07	3,546.70	25,737.40
a 810+29.07	3,656.20	26,677.30
a 812+29.07	3,752.30	27,438.90
a 814+29.07	3,836.90	28,108.20
a 816+29.07	3,904.60	28,672.00
a 818+29.07	3,866.50	28,781.70
a 820+29.07	3,827.40	28,496.00
a 822+29.07	3,794.90	28,230.80
a 824+29.07	3,768.60	28,013.00
a 826+29.07	3,792.90	28,005.60
a 828+29.07	3,829.40	28,230.50
a 830+29.07	3,876.00	28,538.20
a 832+29.07	3,931.20	28,915.30
a 834+29.07	3,915.30	29,061.10
a 836+29.07	3,917.60	29,010.90
a 838+29.07	3,936.00	29,087.50
a 840+29.07	3,970.20	29,282.40
a 842+29.07	3,954.00	29,348.90
a 844+29.07	3,935.00	29,218.40
a 846+29.07	3,928.20	29,123.00
a 848+29.07	3,939.60	29,140.30
a 850+29.07	3,776.90	28,579.90
a 852+29.07	3,598.80	27,317.50
a 854+29.07	3,447.70	26,098.10
a 856+29.07	3,342.60	25,149.30
a 858+29.07	3,344.90	24,768.80

a 766+29.07	4544.4	33605.4
a 768+29.07	4562.4	33728.8
a 770+29.07	4523.9	33652.8
a 772+29.07	4511.8	33465.3
a 774+29.07	4537.3	33515
a 776+29.07	4594.8	33822.4
a 778+29.07	4615.1	34110.5
a 780+29.07	4611	34170.7
a 782+29.07	4578.9	34036.7
a 784+29.07	4518.5	33694
a 786+29.07	4515.8	33460.4
a 788+29.07	4534.2	33518.5
a 790+29.07	4572.9	33729.8
a 792+29.07	4636.7	34109.7
a 794+29.07	4659.7	34431.4
a 796+29.07	4679.3	34589.2
a 798+29.07	4702.2	34746.3
a 800+29.07	4728.2	34927.1
a 802+29.07	4805.8	35311
a 804+29.07	4909.6	35983
a 806+29.07	5033.6	36826.9
a 808+29.07	5187.6	37856.4
a 810+29.07	5316.4	38903.9
a 812+29.07	5433.5	39814.5
a 814+29.07	5533	40616.7
a 816+29.07	5613	41281.5
a 818+29.07	5567.6	41409.7
a 820+29.07	5519.6	41064
a 822+29.07	5473	40713.6
a 824+29.07	5432.3	40390.1
a 826+29.07	5453.6	40318.2
a 828+29.07	5489	40528
a 830+29.07	5534.3	40826.8
a 832+29.07	5590.1	41201.6
a 834+29.07	5563	41307.8
a 836+29.07	5559.5	41194.4
a 838+29.07	5584.5	41274.2
a 840+29.07	5626.2	41521.1
a 842+29.07	5603.5	41591.5
a 844+29.07	5575.8	41404.8
a 846+29.07	5568.7	41275.7
a 848+29.07	5584.4	41307.6
a 850+29.07	5422.3	40765.7
a 852+29.07	5250.5	39528.9
a 854+29.07	5107.4	38362.6
a 856+29.07	5011.1	37475.9
a 858+29.07	5014.4	37131.3

a 860+29.07	3,351.50	24,801.60
a 862+29.07	3,356.90	24,845.70
a 864+29.07	3,360.40	24,878.70
a 866+29.07	3,332.30	24,787.90
a 868+29.07	3,294.50	24,543.80
a 870+29.07	3,247.00	24,227.80
a 872+29.07	3,188.80	23,836.30
a 874+29.07	3,229.70	23,772.40
a 876+29.07	3,295.50	24,167.50
a 878+29.07	3,386.40	24,747.60
a 880+29.07	3,496.30	25,491.20
a 882+29.07	3,461.80	25,770.70
a 884+29.07	3,377.90	25,332.30
a 886+29.07	3,252.80	24,558.10
a 888+29.07	3,089.00	23,488.30
a 890+29.07	3,249.20	23,474.90
a 892+29.07	3,425.20	24,719.90
a 894+29.07	3,580.70	25,947.70
a 896+29.07	3,716.00	27,024.80
a 898+29.07	3,746.20	27,637.60
a 900+29.07	3,619.90	27,281.90
a 902+29.07	3,502.60	26,379.80
a 904+29.07	3,317.90	25,260.90
a 906+29.07	3,129.40	23,878.70
a 908+29.07	3,159.10	23,290.60
a 910+29.07	3,164.60	23,420.90
a 912+29.07	3,103.20	23,214.00
a 914+29.07	2,960.30	22,457.40
a 916+29.07	2,867.10	21,582.80
a 918+29.07	2,828.80	21,096.10
a 920+29.07	2,814.60	20,901.50
a 922+29.07	2,817.20	20,858.40
a 924+29.07	2,783.00	20,741.40
a 926+29.07	2,759.90	20,529.00
a 928+29.07	2,745.20	20,389.10
a 930+29.07	2,738.30	20,309.30
a 932+29.07	2,699.30	20,139.30
a 934+29.07	2,660.80	19,852.40
a 936+29.07	2,626.00	19,580.70
a 938+29.07	2,595.80	19,340.00
a 940+29.07	2,564.90	19,113.90
a 942+29.07	2,552.30	18,952.50
a 944+29.07	2,562.70	18,944.30
a 946+29.07	2,587.90	19,076.10
a 948+29.07	2,452.60	18,668.20
a 950+29.07	2,363.60	17,837.70
a 952+29.07	2,300.60	17,274.80

a 860+29.07	5020.1	37164.7
a 862+29.07	5025	37203.9
a 864+29.07	5031.6	37246.7
a 866+29.07	5008.2	37184.5
a 868+29.07	4974.7	36973.6
a 870+29.07	4931.4	36689.2
a 872+29.07	4876	36323.8
a 874+29.07	4909.1	36241.3
a 876+29.07	4968	36581.8
a 878+29.07	5052.1	37111.3
a 880+29.07	5162.2	37830.6
a 882+29.07	5136.9	38144.9
a 884+29.07	5058.8	37762
a 886+29.07	4939.6	37031
a 888+29.07	4779.1	35995
a 890+29.07	4937.1	35985.8
a 892+29.07	5109.3	37208.8
a 894+29.07	5261	38408.5
a 896+29.07	5392.4	39457.1
a 898+29.07	5414	40023.8
a 900+29.07	5299.1	39678.4
a 902+29.07	5182.5	38821
a 904+29.07	4984.2	37654.7
a 906+29.07	4786	36185.9
a 908+29.07	4835.8	35636.1
a 910+29.07	4850	35873.1
a 912+29.07	4783.3	35678.7
a 914+29.07	4630.1	34864.4
a 916+29.07	4546.5	33987.5
a 918+29.07	4521.8	33586.2
a 920+29.07	4509.4	33448.8
a 922+29.07	4509.7	33404.3
a 924+29.07	4474.7	33275.9
a 926+29.07	4447.4	33045.1
a 928+29.07	4427.7	32870.7
a 930+29.07	4415.9	32754
a 932+29.07	4379.7	32576.3
a 934+29.07	4343.8	32309.3
a 936+29.07	4311.1	32055.2
a 938+29.07	4280.6	31821.1
a 940+29.07	4238	31550.3
a 942+29.07	4219.9	31325.6
a 944+29.07	4228.2	31289.4
a 946+29.07	4256.7	31425.5
a 948+29.07	4106.9	30976.2
a 950+29.07	4016.5	30086.7
a 952+29.07	3962.4	29551.5

a 954+29.07	2,254.60	16,871.10
a 956+29.07	2,316.10	16,928.40
a 958+29.07	2,519.70	17,910.20
a 960+29.07	2,653.10	19,158.40
a 962+29.07	2,694.40	19,805.30
a 964+29.07	2,692.30	19,950.60
a 966+29.07	2,765.70	20,214.60
a 968+29.07	2,803.30	20,625.90
a 970+29.07	2,716.20	20,442.90
a 972+29.07	2,541.70	19,474.00
a 974+29.07	2,609.10	19,077.20
a 976+29.07	2,780.50	19,961.60
a 978+29.07	2,766.40	20,544.20
a 980+29.07	2,722.40	20,328.70
a 982+29.07	2,749.80	20,267.30
a 984+29.07	2,746.70	20,357.40
a 986+29.07	2,832.20	20,662.50
a 988+29.07	3,086.80	21,922.20
a 990+29.07	3,310.00	23,691.90
a 992+29.07	3,501.60	25,228.20
a 994+29.07	3,512.20	25,976.90
a 996+29.07	3,693.80	26,688.90
a 998+29.07	3,891.20	28,092.70
a 1000+29.07	4,094.60	29,577.00
a 1002+29.07	4,572.50	32,100.20
a 1004+29.07	4,486.90	33,553.00
a 1006+29.07	2,631.50	26,364.40
a 1008+29.07	2,614.20	19,428.70
a 1010+29.07	2,519.40	19,013.30
a 1012+29.07	2,561.20	18,817.00
a 1014+29.07	2,765.80	19,729.80
a 1016+29.07	2,748.50	20,423.30
a 1018+29.07	2,611.00	19,849.80
a 1020+29.07	2,695.30	19,653.00
a 1022+29.07	2,869.20	20,609.50
a 1024+29.07	2,735.10	20,756.90
a 1026+29.07	2,705.20	20,149.50
a 1028+29.07	2,891.60	20,728.80
a 1030+29.07	2,876.20	21,361.90
a 1032+29.07	2,789.50	20,983.80
a 1034+29.07	2,844.60	20,866.90
a 1036+29.07	3,088.60	21,974.90
a 1038+29.07	3,142.80	23,079.20
a 1040+29.07	3,099.10	23,118.10
a 1042+29.07	3,131.90	23,077.80
a 1044+29.07	3,326.40	23,919.70
a 1046+29.07	3,441.30	25,065.70

a 954+29.07	3920.4	29195.5
a 956+29.07	3982.6	29270.4
a 958+29.07	4205.2	30325.3
a 960+29.07	4340.8	31652.1
a 962+29.07	4376.3	32285.8
a 964+29.07	4385.1	32449.8
a 966+29.07	4467.7	32788.1
a 968+29.07	4505.5	33233.8
a 970+29.07	4418.5	33051.6
a 972+29.07	4226.3	32017.7
a 974+29.07	4297.9	31571
a 976+29.07	4487.9	32539.8
a 978+29.07	4484	33229.2
a 980+29.07	4428.6	33009.7
a 982+29.07	4460.1	32921.1
a 984+29.07	4465.4	33057.4
a 986+29.07	4559.9	33426.9
a 988+29.07	4823.6	34753.4
a 990+29.07	5037.8	36523.7
a 992+29.07	5193.4	37893.6
a 994+29.07	5275.6	38774.3
a 996+29.07	5471.8	39805.1
a 998+29.07	5666.8	41253.9
a 1000+29.07	5858	42684.3
a 1002+29.07	6335.2	45160
a 1004+29.07	6186.9	46378.3
a 1006+29.07	4023.5	37816.2
a 1008+29.07	3950.9	29534.6
a 1010+29.07	3887.1	29029.7
a 1012+29.07	3968.2	29093.9
a 1014+29.07	4191.7	30222.1
a 1016+29.07	4157	30921.3
a 1018+29.07	4015.8	30269.7
a 1020+29.07	4151.3	30248.4
a 1022+29.07	4302.2	31309.2
a 1024+29.07	4155.8	31326.1
a 1026+29.07	4159.5	30797.7
a 1028+29.07	4340.5	31481.6
a 1030+29.07	4331	32116.7
a 1032+29.07	4243.8	31758.5
a 1034+29.07	4280.6	31571.8
a 1036+29.07	4516.4	32581.4
a 1038+29.07	4572.6	33662.9
a 1040+29.07	4531.5	33719
a 1042+29.07	4562.9	33683.3
a 1044+29.07	4754.8	34510.2
a 1046+29.07	4870.9	35650.6

a 1048+29.07	3,273.00	24,867.90
a 1050+29.07	3,313.80	24,395.70
a 1052+29.07	3,628.00	25,710.40
a 1054+29.07	3,730.50	27,253.80
a 1056+29.07	3,732.10	27,639.30
a 1058+29.07	3,629.60	27,265.60
a 1060+29.07	3,588.50	26,733.70
a 1062+29.07	3,428.40	25,988.30
a 1064+29.07	3,311.70	24,963.10
a 1066+29.07	3,261.10	24,343.40
a 1068+29.07	3,316.40	24,360.90
a 1070+29.07	3,349.80	24,689.50
a 1072+29.07	3,007.60	23,545.90
a 1074+29.07	2,812.60	21,556.40
a 1076+29.07	2,883.60	21,097.10
a 1078+29.07	2,920.50	21,496.50
a 1080+29.07	2,516.30	20,136.10
a 1082+29.07	2,359.40	18,058.10
a 1083+69.58	2,514.40	12,681.60
	Total:	**10,578,135.90**

a 1048+29.07	4707.9	35477
a 1050+29.07	4752.7	35039.4
a 1052+29.07	5072.2	36388.5
a 1054+29.07	5184	37985.9
a 1056+29.07	5190.8	38425.1
a 1058+29.07	5105.1	38132.9
a 1060+29.07	5079.8	37722.1
a 1062+29.07	4926.7	37061.3
a 1064+29.07	4816.3	36085.3
a 1066+29.07	4765.6	35488.5
a 1068+29.07	4826.7	35526.8
a 1070+29.07	4867.1	35902.8
a 1072+29.07	4530.1	34804.3
a 1074+29.07	4340.2	32852.9
a 1076+29.07	4404.1	32386.2
a 1078+29.07	4438.8	32751.5
a 1080+29.07	4041.9	31410.2
a 1082+29.07	3882.9	29351.1
a 1083+69.58	4027.2	20582
	Total:	**18,281,269.70**

US Army Corps
of Engineers
New Orleans District

MISSISSIPPI SHIP CHANNEL DEEPENING STUDY,

MISSISSIPPI RIVER,
SOUTHWEST PASS,
CONSTRUCTION DREDGING

SEPT 2016

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

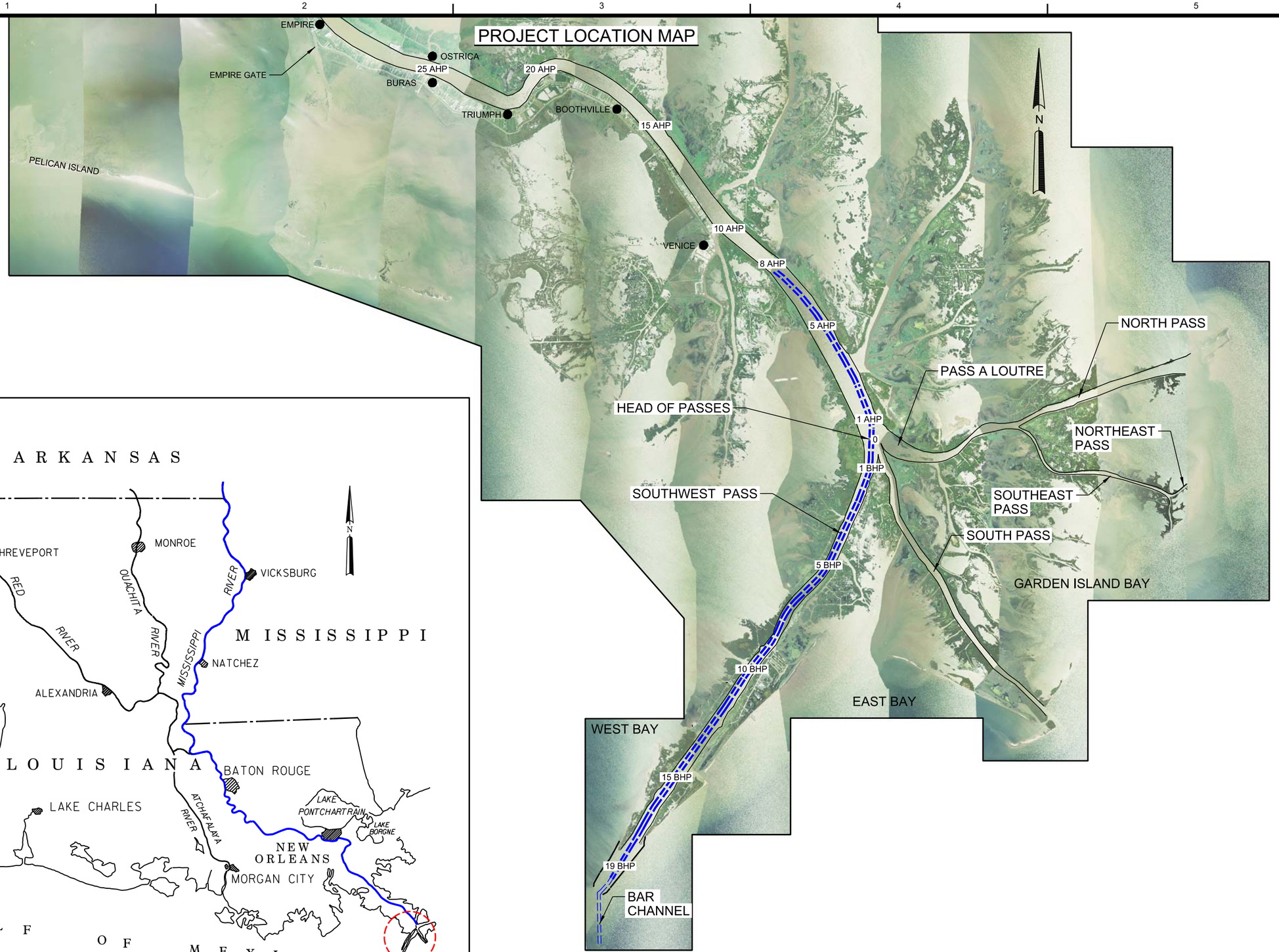
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL DEEPENING STUDY
MISSISSIPPI RIVER, SOUTHWEST PASS, CONSTRUCTION DREDGING

COVER SHEET

SHEET IDENTIFICATION
G-01

PROJECT LOCATION MAP



US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 29 MAY 2015
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER-SOUTHWEST PASS,
CONSTRUCTION DREDGING

VICINITY AND PROJECT LOCATION MAP

SHEET IDENTIFICATION
G-02

INDEX OF DRAWINGS

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C-06	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 2776+29 TO STA. a200+29
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C-08	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 2776+29 TO STA. a200+29
C-09	CROSS SECTIONS, 50' PROJECT DEPTH, STA. a400+29 TO STA. a1083+70

GENERAL NOTES:

1. SURVEY DATA FOR CROSS SECTIONS ARE 2015 SURVEYS AND OBTAINED FROM MVN OPERATIONS. SURVEYS WERE TAKEN IN MLG ELEVATIONS. PROJECT DEPTHS FOR THE 48' AND 50' PROJECTS ARE IN MLLW ELEVATIONS. CROSS SECTION WERE CUT TO CORRESPONDING MLG ELEVATIONS AND GRADE LINES AND DREDGE TEMPLATE LINES ARE OFFSET 3 FT LOWER TO REPRESENT MLLW AS SHOWN ON SHEETS G-04 AND G-05.
2. ELEVATIONS ON CROSS SECTIONS REFER TO MLLW UNLESS OTHERWISE NOTED.
3. AERIAL PHOTOGRAPHY FLOWN (2010).
4. ALL XY COORDINATES ARE LOUISIANA STATE PLANE, SOUTH, US SURVEY FEET.

ABBREVIATIONS

APPROX.	APPROXIMATE
AHP	ABOVE HEAD OF PASSES
BEC	BOTTOM EDGE OF CUT
BHP	BELOW HEAD OS PASSES
C/L	CENTERLINE
EL.	ELEVATION
H	HORIZONTAL
MLLW	MEAN LOWER LOW WATER
MLG	MEAN LOW GULF
STA.	STATION
V	VERTICAL

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

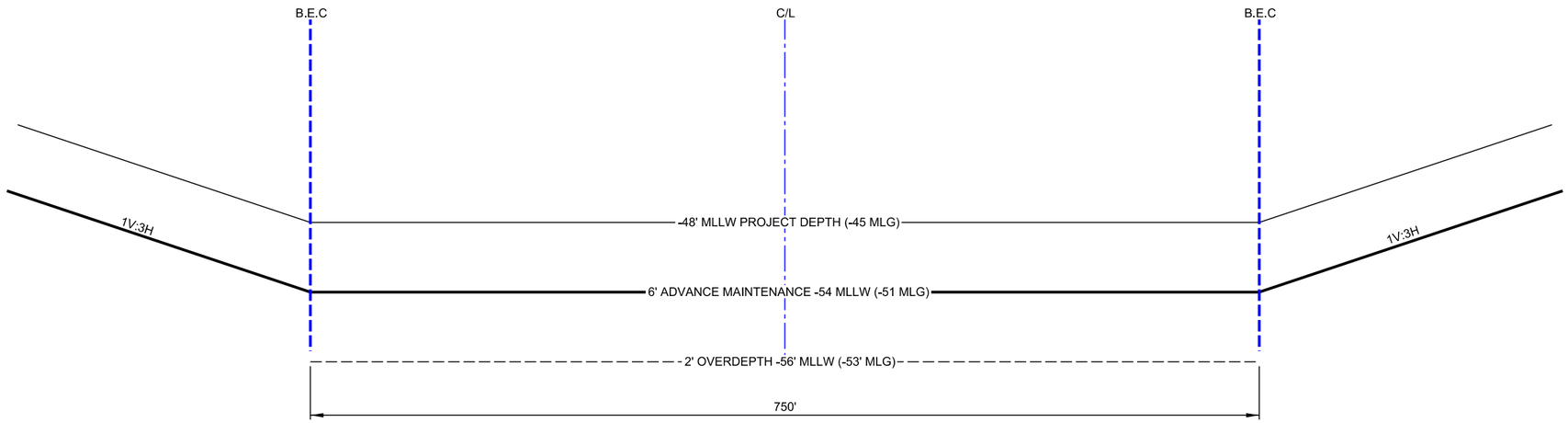
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
SIZE: ANSI D
CKD BY: PRG
PLOT DATE: 26 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SOUTHWEST PASS,
CONSTRUCTION DREDGING

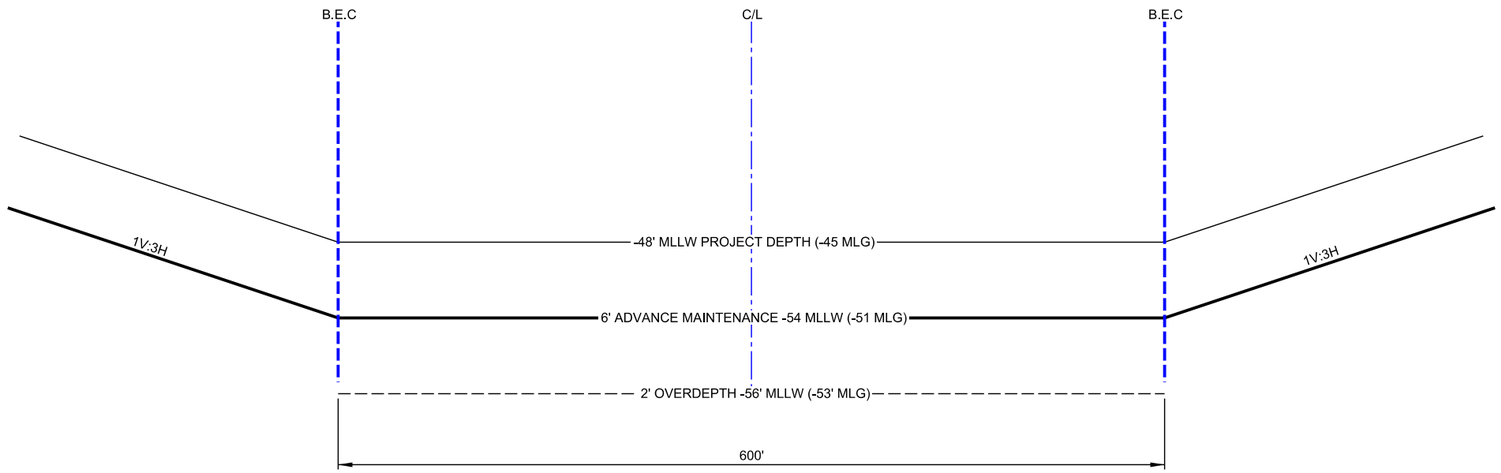
INDEX, GENERAL NOTES, AND ABBREVIATIONS

SHEET IDENTIFICATION
G-03



-48' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION 2776+29 (APPROX. MILE 8 AHP)
TO
STATION a990+00 (APPROX. MILE 17.5 BHP)



-48' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION a990+00 (APPROX. MILE 17.5 BHP)
TO
STATION a1090+00 (APPROX. MILE 19.5 BHP)

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

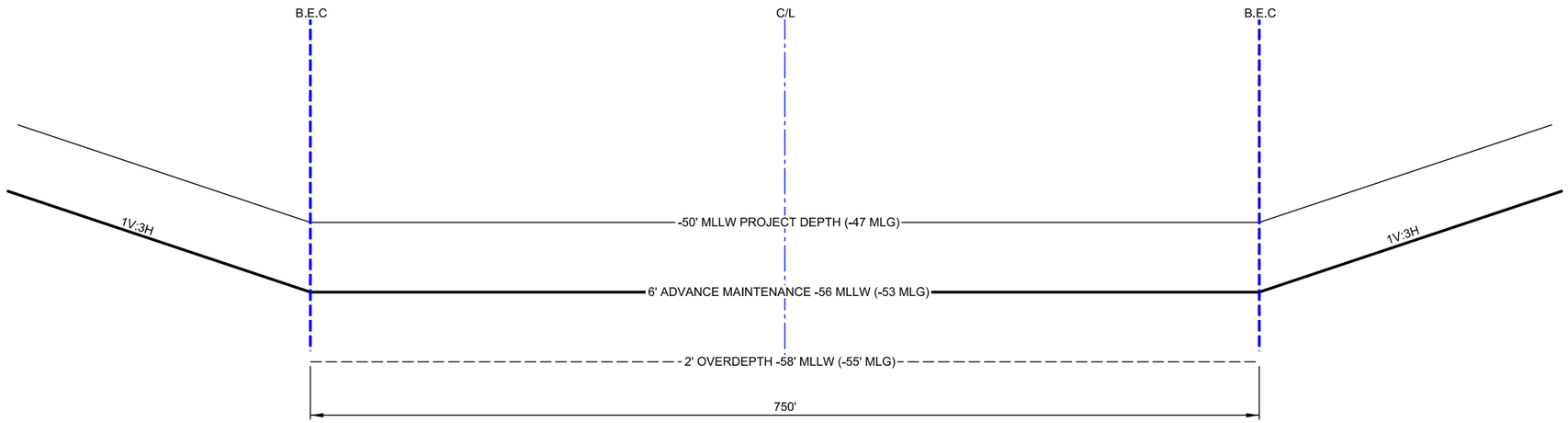
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER, GULFPORT PASS,
CONSTRUCTION DREDGING

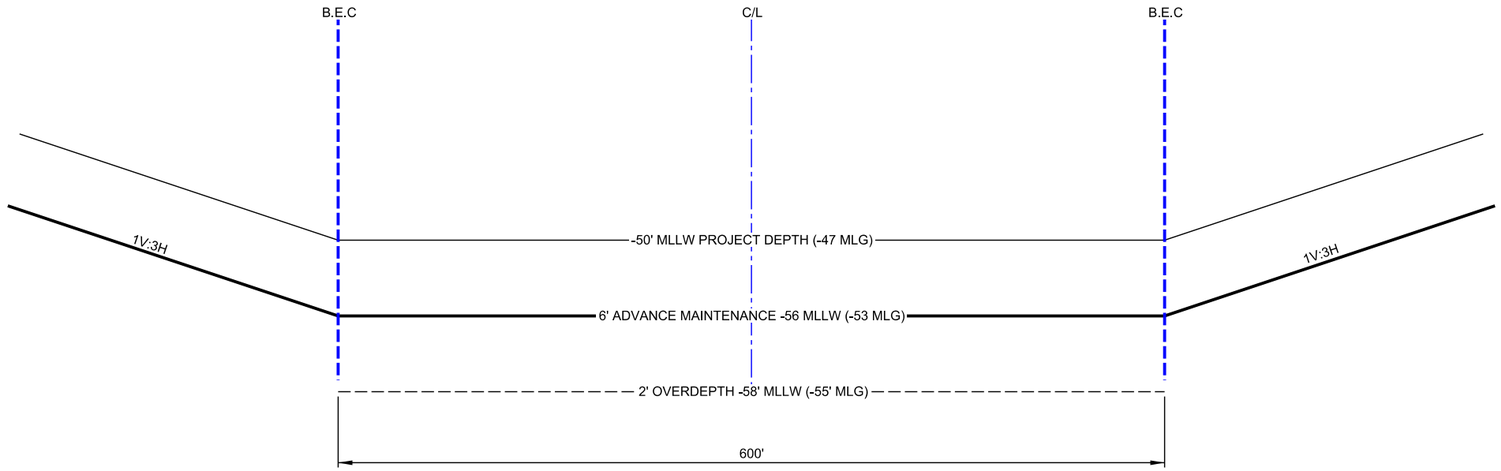
48' PROJECT DEPTH,
DREDGING TEMPLATE

SHEET IDENTIFICATION
G-04



-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION 2776+29 (APPROX. MILE 8 AHP)
TO
STATION a990+00 (APPROX. MILE 17.5 BHP)



-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION a990+00 (APPROX. MILE 17.5 BHP)
TO
STATION a1090+00 (APPROX. MILE 19.5 BHP)

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

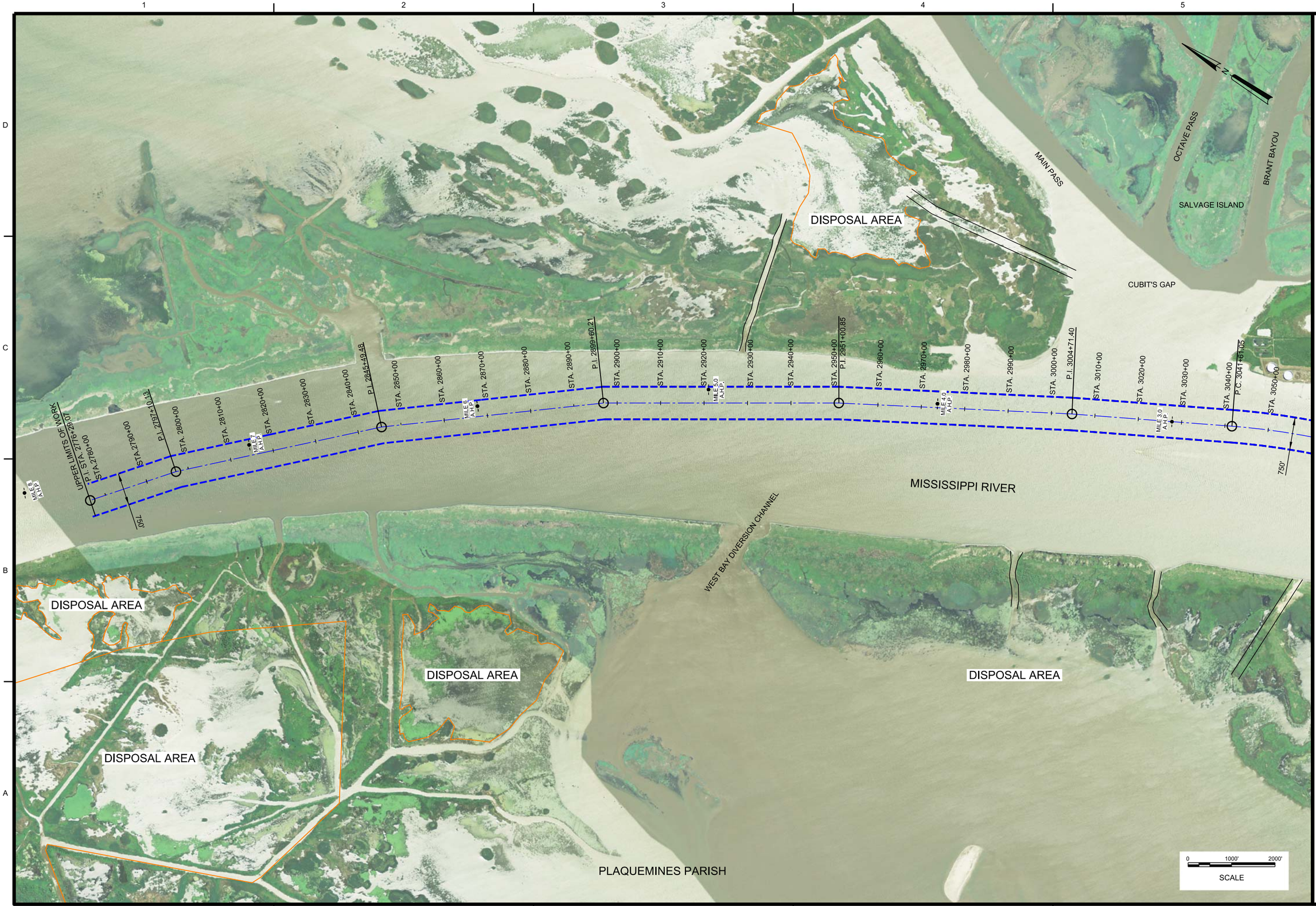
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 26 SEPT 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER, GULFPORT PASS,
CONSTRUCTION DREDGING

50' PROJECT DEPTH,
DREDGING TEMPLATE

SHEET IDENTIFICATION
G-05



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NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

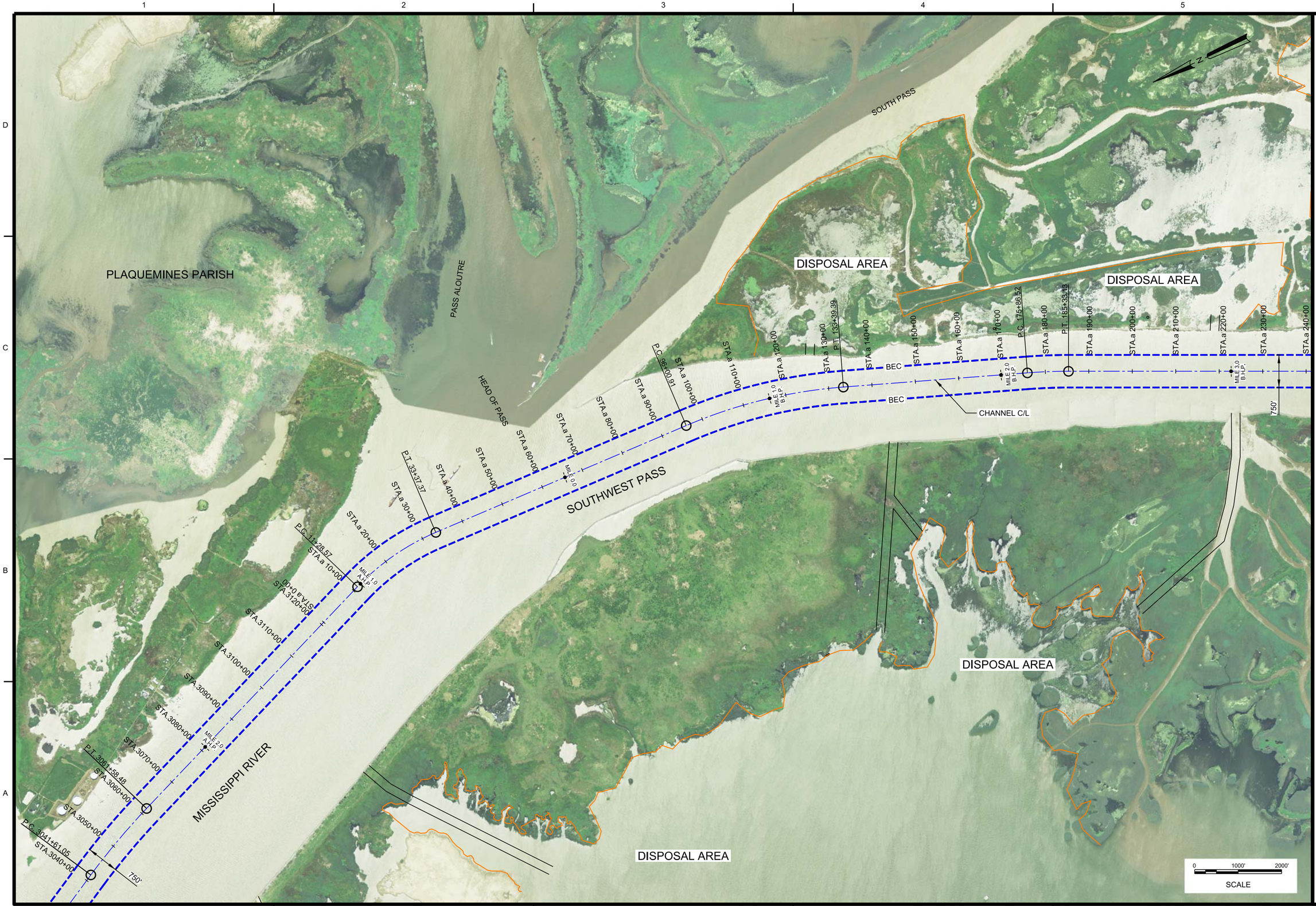
DESIGNED BY: PATRICK R. GREY
DRWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH OCAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 25 OCT 2016
SCALE: AS STD
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER - SOUTHWEST PASS,
CONSTRUCTION DREDGING

SOUTHWEST PASS SHIP CHANNEL,
STA. 2780+00 TO STA. 3050+00

SHEET IDENTIFICATION
C-01



US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

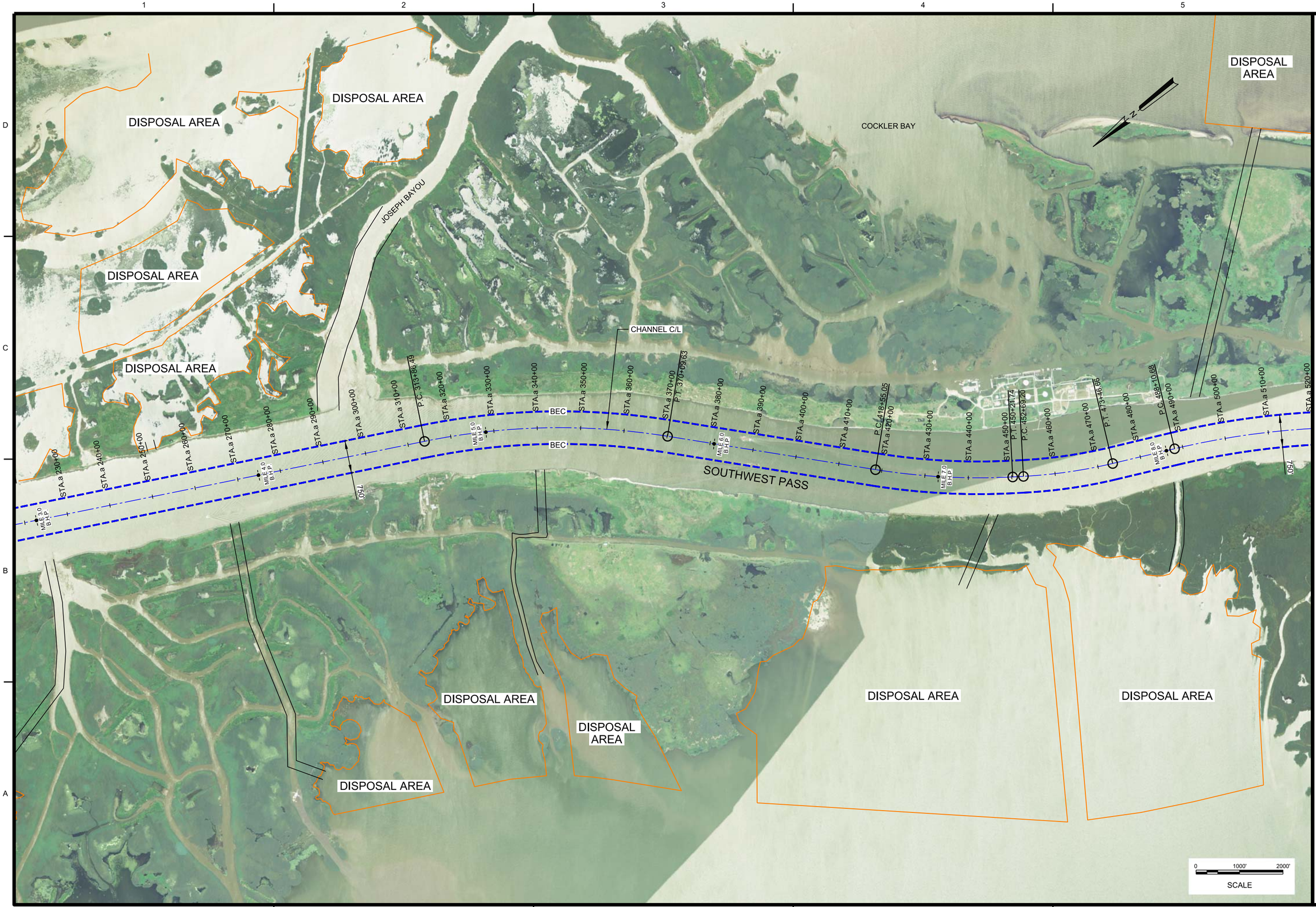
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CARK
PLOT SCALE: 1=1
PLOT DATE: 8/19/2015
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SOUTHWEST PASS,
CONSTRUCTION DREDGING

SOUTHWEST PASS SHIP CHANNEL
STA. 3050+00 TO STA. a240+00

SHEET IDENTIFICATION
C-02



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NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

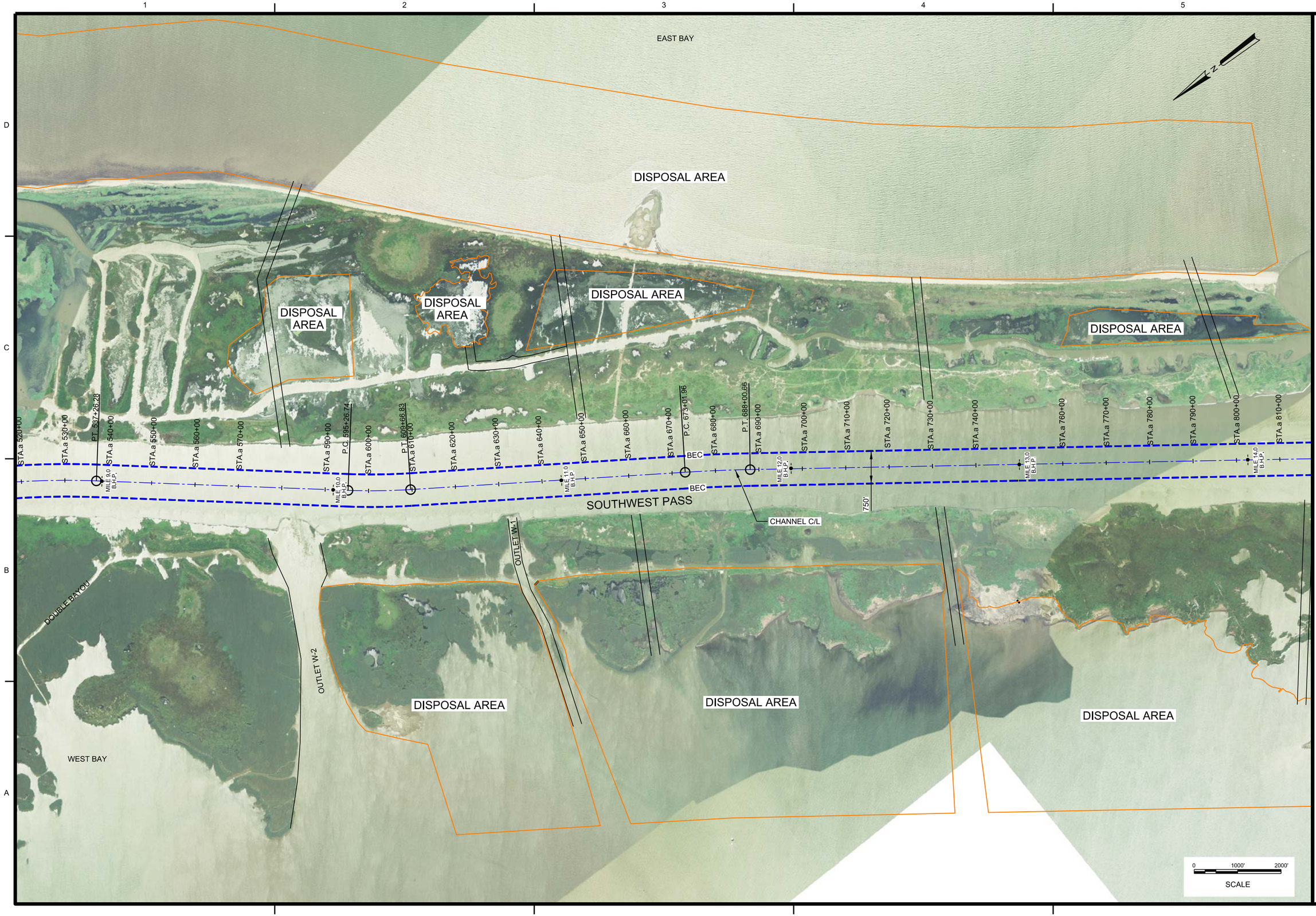
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CLARK
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1" = 1000'
PLOT DATE: 26 SEP 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
PRE-DEEPENING STUDY:
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING

SOUTHWEST PASS SHIP CHANNEL,
STA. a240+00 TO STA. a520+00

SHEET IDENTIFICATION
C-03



US Army Corps of Engineers
NEW ORLEANS DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH CUCAIN
PLOT DATE: 26 FEB 2015
PLOT SCALE: 1:2000.1
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER-SOUTHWEST PASS,
CONSTRUCTION DREDGING

SOUTHWEST PASS SHIP CHANNEL,
STA. a520+00 TO STA. a810+00

SHEET IDENTIFICATION
C-04

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

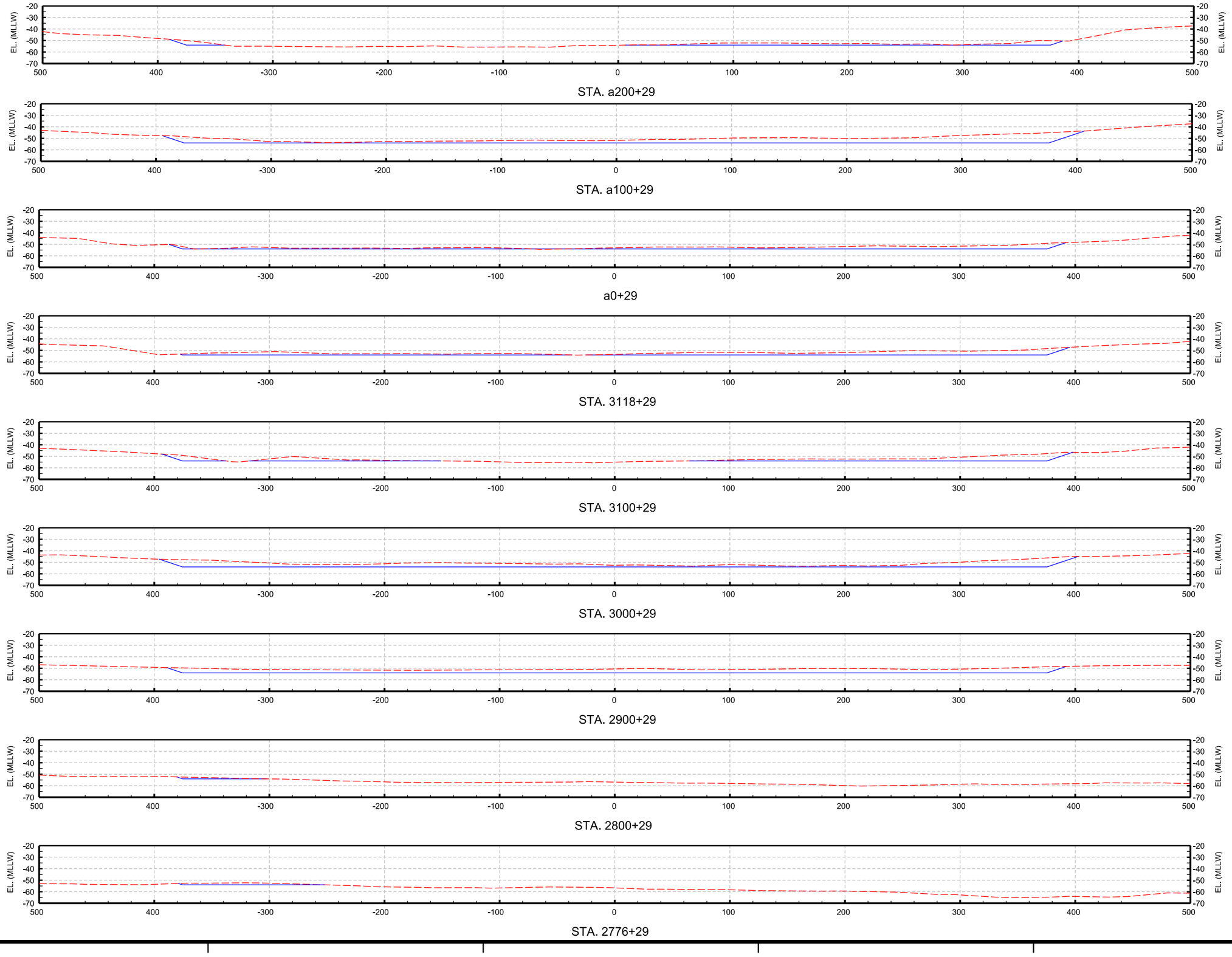
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY		DATE:
DWN BY: PRG	CKD BY: PRG	SOLICITATION NO.:
SUBMITTED BY: KEITH O'CAIN		CONTRACT NO.:
PLOT SCALE: 12000:1	PLOT DATE: 28 SEPT 2016	FILE NUMBER:
SIZE: ANSI D	FILE NAME:	

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING

SOUTHWEST PASS SHIP CHANNEL
STA. a810+00 TO STA. a1094+00

SHEET IDENTIFICATION
C-05



NOTE: CROSS SECTIONS TO -54.0 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

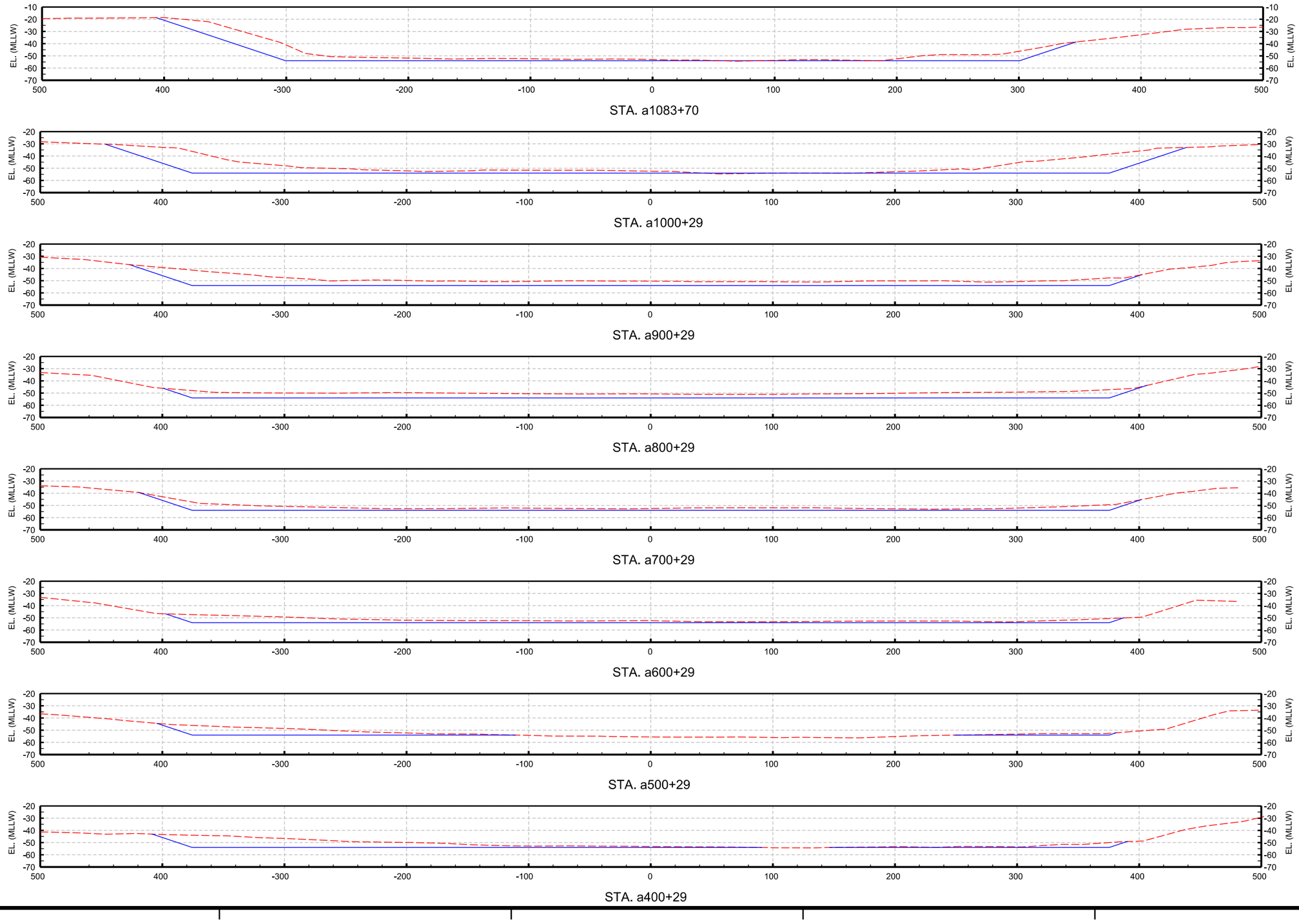
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 29 AUGUST 2019
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER-GULF OUTLET PASS,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 2776+29 TO STA. a200+29

SHEET IDENTIFICATION
C-06



NOTE: CROSS SECTIONS TO -54 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

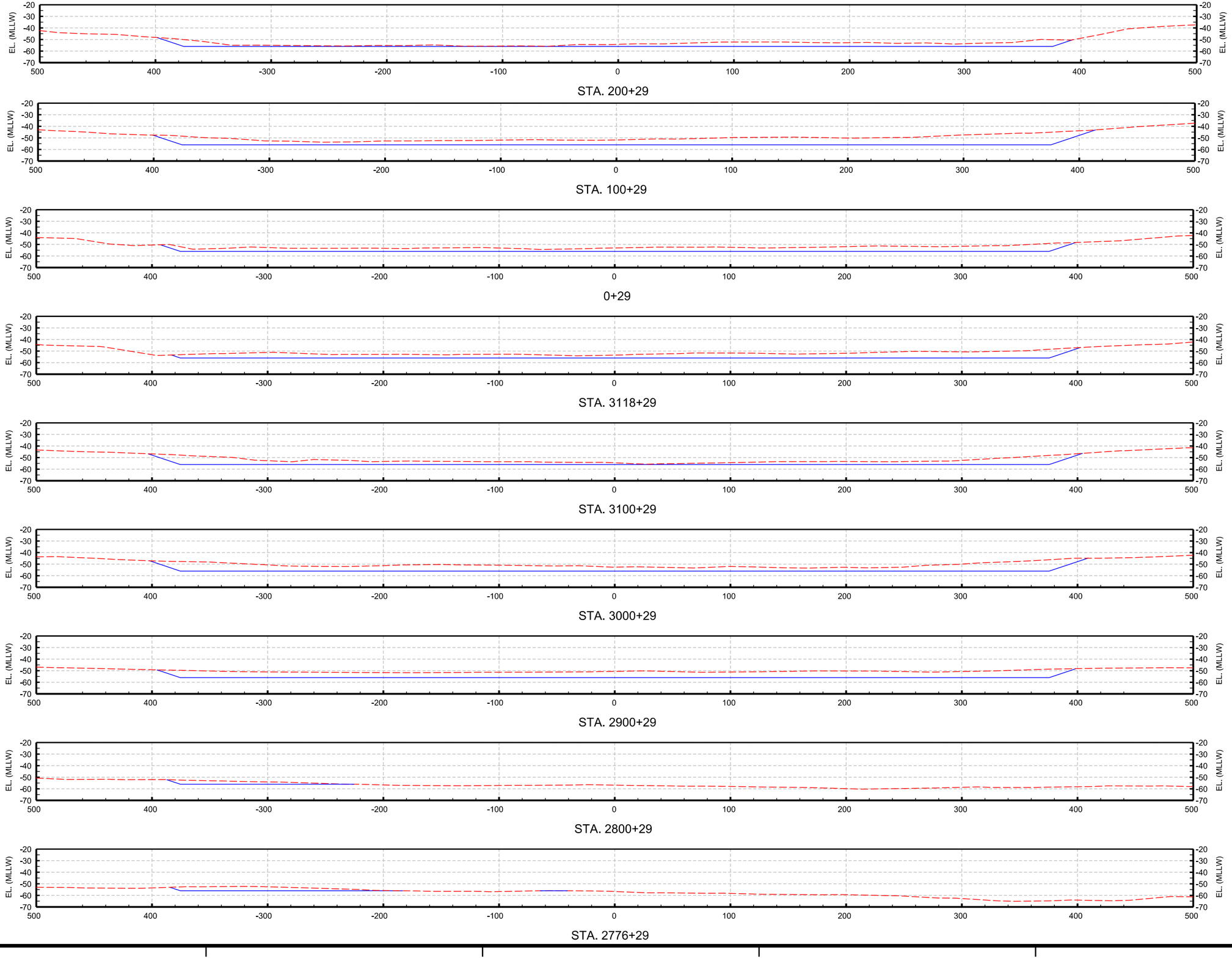
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 29 JULY 2015
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER - GULF OUTLET PASS,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. a400+29 TO STA. a1083+70

SHEET IDENTIFICATION
C-07



NOTE: CROSS SECTIONS TO -56 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

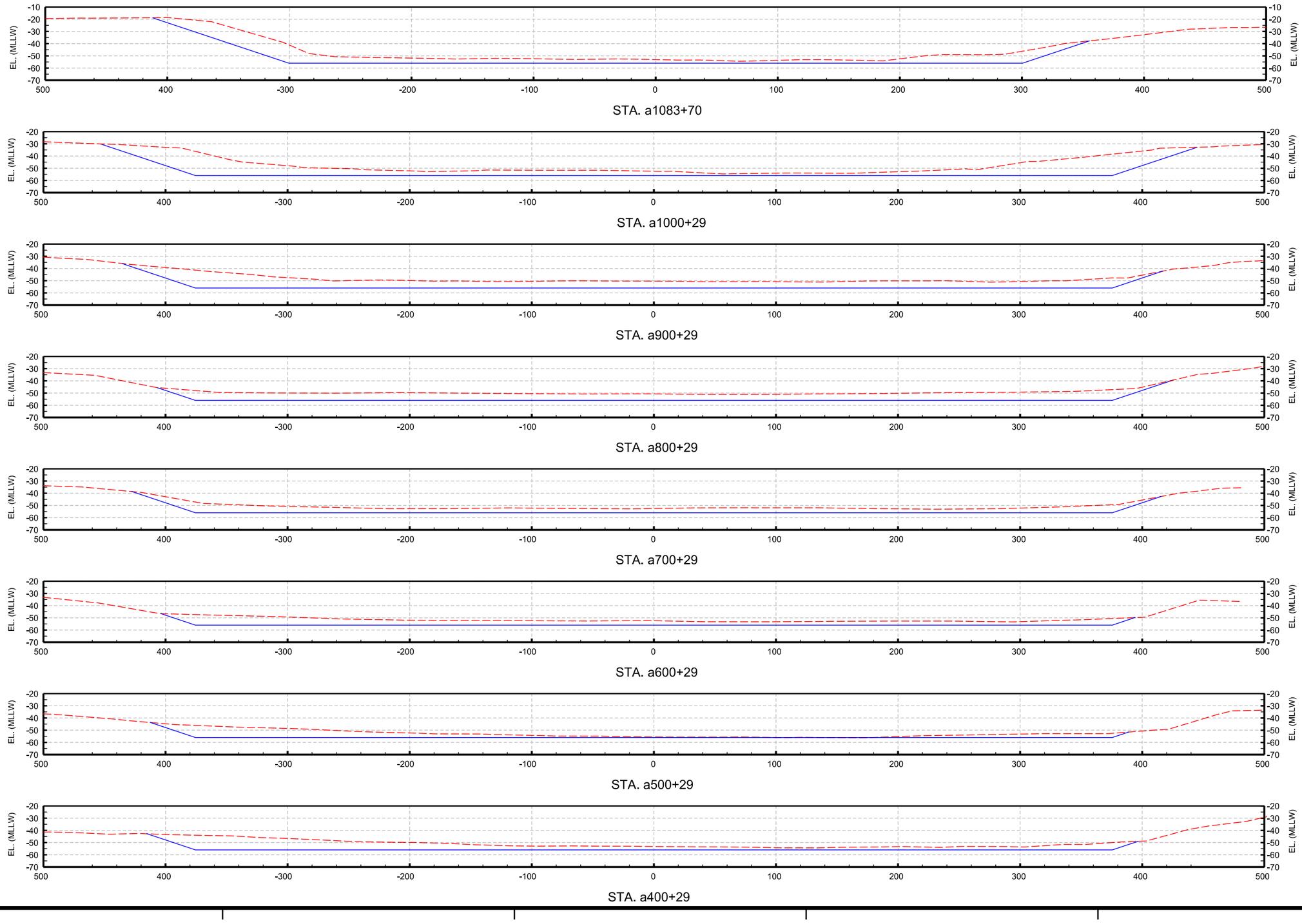
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER-GULF OUTLET PASS,
CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH,
STA. 2776+29 TO STA. a200+29

SHEET IDENTIFICATION
C-08



NOTE: CROSS SECTIONS TO -56 MLLW DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 29 JULY 2015
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER-GULF OUTLET PASS,
CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH,
STA. a400+29 TO STA. a1083+70

SHEET IDENTIFICATION
C-09

US Army Corps
of Engineers
New Orleans District

MISSISSIPPI SHIP CHANNEL DEEPENING STUDY,

MISSISSIPPI RIVER,
BAR CHANNEL,
CONSTRUCTION DREDGING

SEPT 2016

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

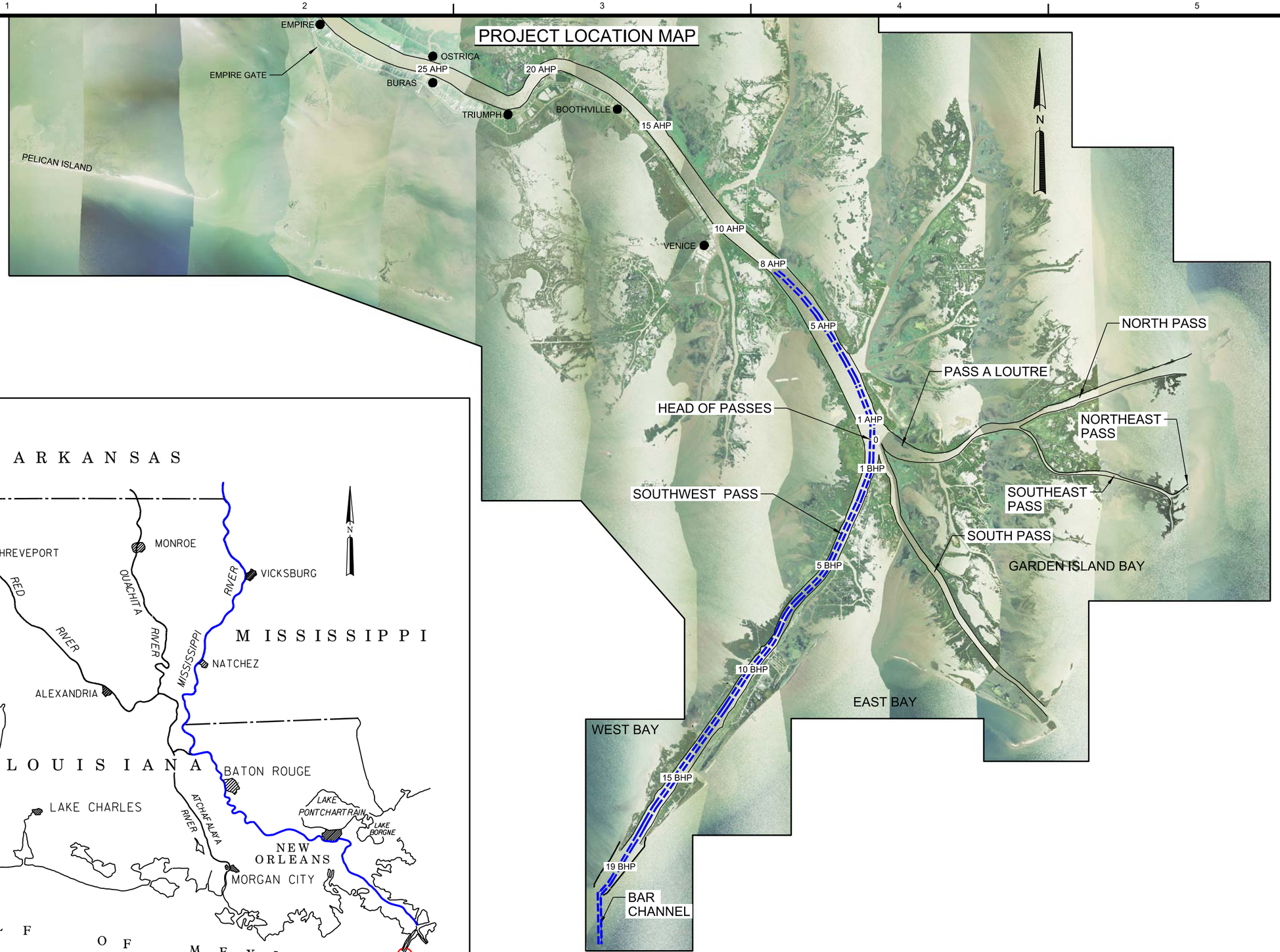
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL DEEPENING STUDY
MISSISSIPPI RIVER, SOUTHWEST PASS, CONSTRUCTION DREDGING

COVER SHEET

SHEET IDENTIFICATION
G-01

PROJECT LOCATION MAP



US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: As noted
PLOT DATE: 23 SEP 2015
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER BAR CHANNEL
CONSTRUCTION DREDGING

VICINITY AND PROJECT LOCATION MAP

SHEET IDENTIFICATION
G-02

INDEX OF DRAWINGS

NO.	SHEET TITLE
G-01	COVER SHEET
G-02	VICINITY AND PROJECT LOCATION MAP
G-03	INDEX, GENERAL NOTES, AND ABBREVIATIONS
G-04	40' AND 50' PROJECT DEPTH, DREDGING TEMPLATE
C-01	BAR CHANNEL
C-02	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 0+00 TO STA. 50+00
C-03	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 60+00 TO STA. 101+19
C-04	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 102+19 TO STA. 130+00
C-05	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 130+38 TO STA. 140+45
C-06	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 0+00 TO STA. 50+00
C-07	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 60+00 TO STA. 101+19
C-08	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 102+19 TO STA. 130+00
C-09	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 130+38 TO STA. 140+45

GENERAL NOTES:

1. SURVEY DATA FOR CROSS SECTIONS ARE 2015 SURVEYS AND OBTAINED FROM MVN OPERATIONS. SURVEYS WERE TAKEN IN MLG ELEVATIONS. PROJECT DEPTHS FOR THE 48' AND 50' PROJECTS ARE IN MLLW ELEVATIONS. CROSS SECTION WERE CUT TO CORRESPONDING MLG ELEVATIONS AND OFFSET 3 FT LOWER TO REPRESENT MLLW AS SHOWN ON SHEETS G-04.
2. ELEVATIONS ON CROSS SECTIONS REFER TO MLLW UNLESS OTHERWISE NOTED.
3. AERIAL PHOTOGRAPHY FLOWN (2010).
4. ALL XY COORDINATES ARE LOUISIANA STATE PLANE, SOUTH, US SURVEY FEET.

ABBREVIATIONS

APPROX.	APPROXIMATE
AHP	ABOVE HEAD OF PASSES
BEC	BOTTOM EDGE OF CUT
BHP	BELOW HEAD OS PASSES
C/L	CENTERLINE
EL.	ELEVATION
H	HORIZONTAL
MLLW	MEAN LOWER LOW WATER
MLG	MEAN LOW GULF
STA.	STATION
V	VERTICAL

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

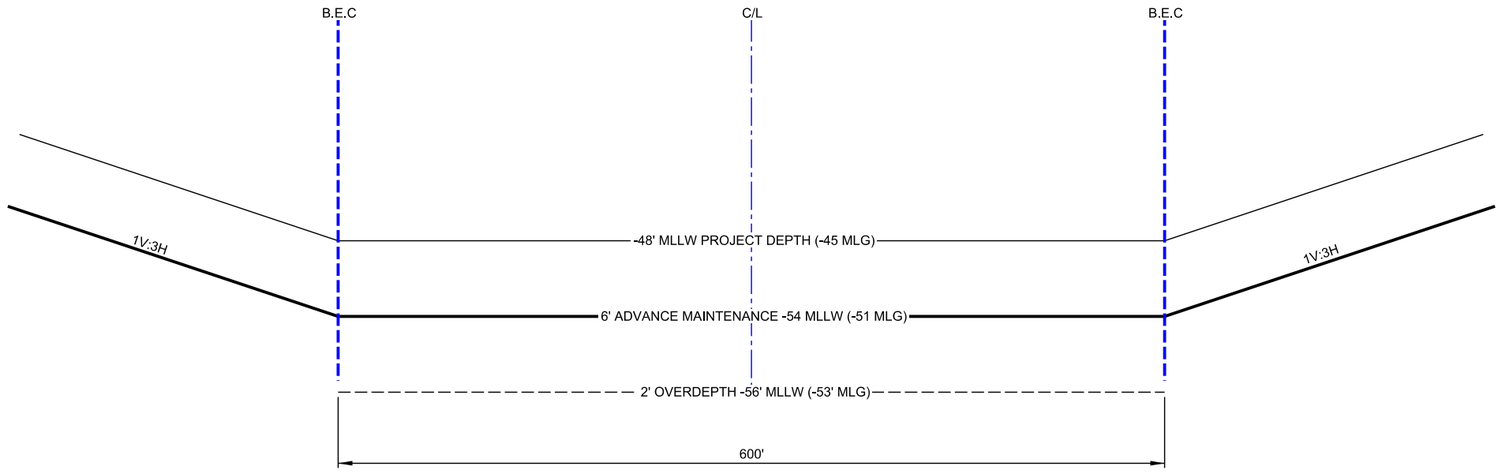
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
SIZE: ANSI D
CHK'D BY: PRG
PLOT DATE: 26 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

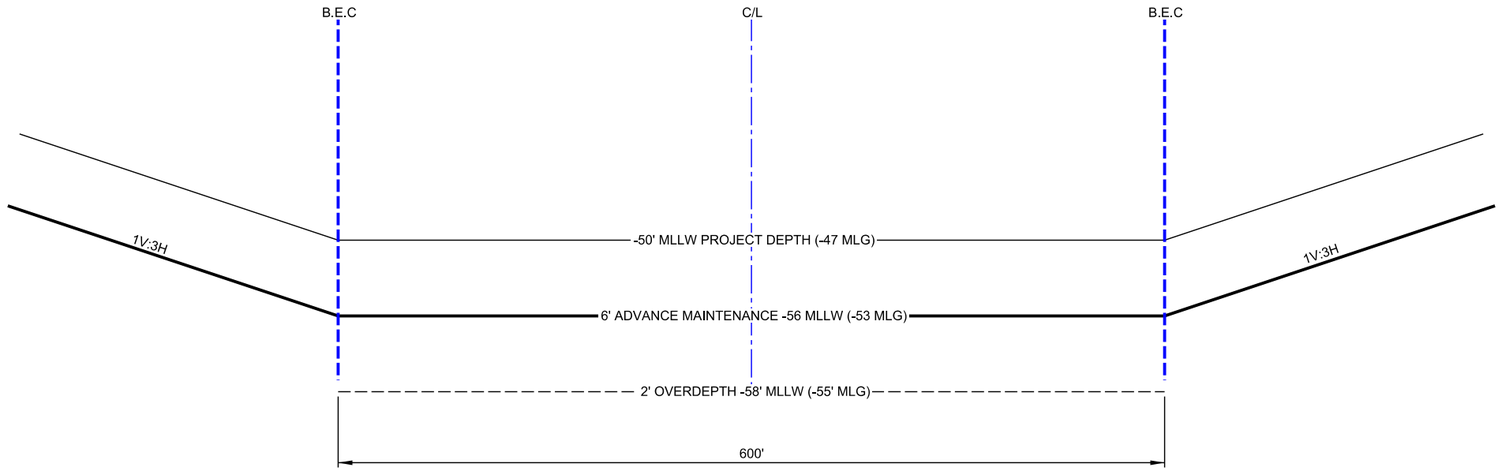
MISSISSIPPI RIVER SHIP CHANNEL DEEPENING STUDY
MISSISSIPPI RIVER BAR CHANNEL
CONSTRUCTION DREDGING

INDEX, GENERAL NOTES, AND ABBREVIATIONS

SHEET IDENTIFICATION
G-03



-48' (MLLW) PROJECT DEPTH DREDGING TEMPLATE



-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

48' AND 50 PROJECT DEPTH,
DREDGING TEMPLATE

SHEET IDENTIFICATION
G-04

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

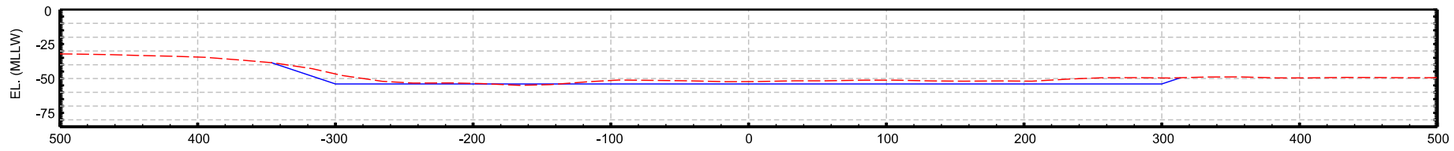
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS NOTED
PLOT DATE: 29 AUGUST 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

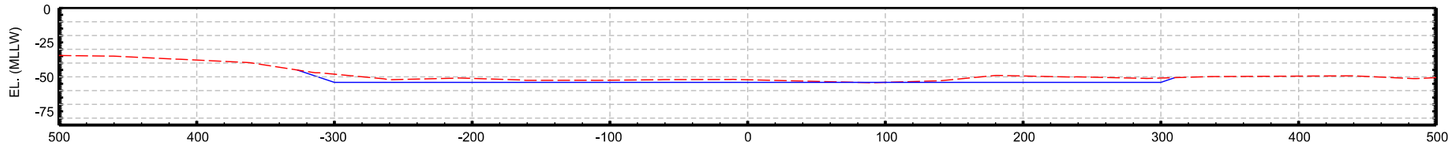
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER BAR CHANNEL
CONSTRUCTION DREDGING

BAR CHANNEL

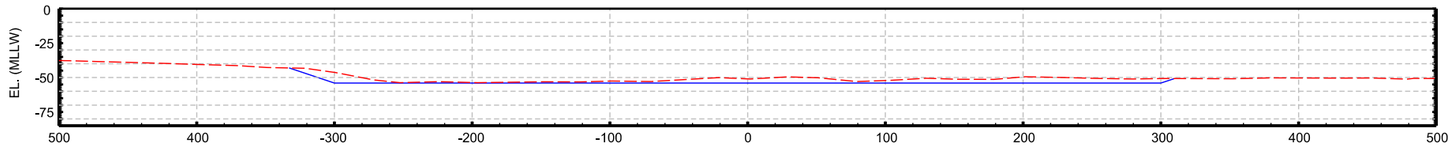
SHEET IDENTIFICATION
C-01



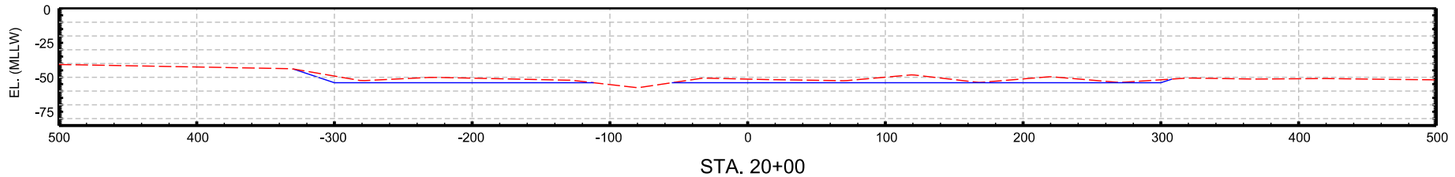
STA. 50+00



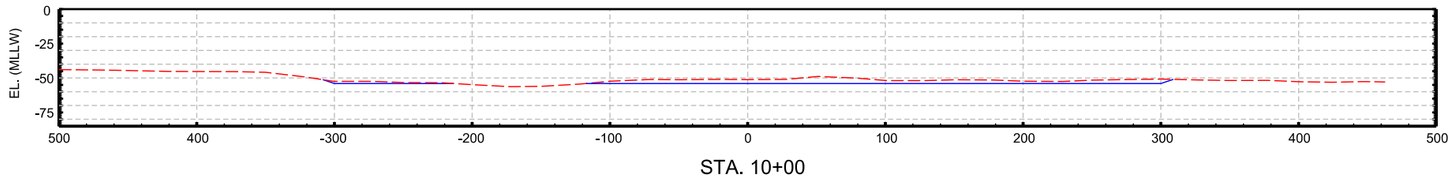
STA. 40+00



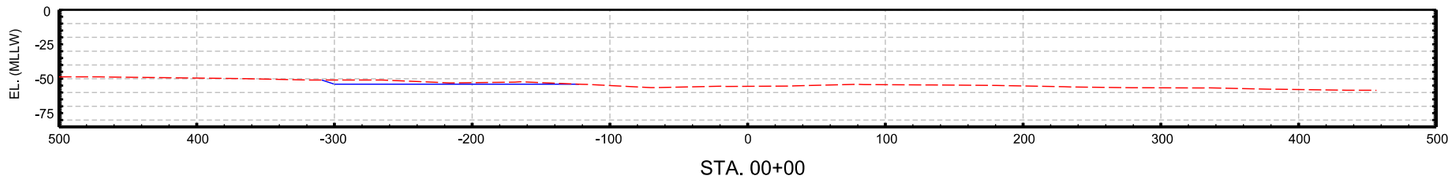
STA. 30+00



STA. 20+00



STA. 10+00



STA. 00+00

NOTE: CROSS SECTIONS -54 MLLW DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR
MARK	DESCRIPTION	DATE	APPR

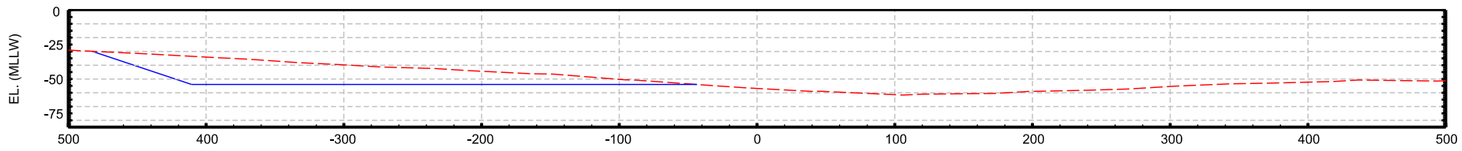
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH CUCAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 26 SEPT 2016
PLOT SCALE: 1:1
SIZE: ANSI D
FILE NUMBER:
FILE NAME= C-12.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

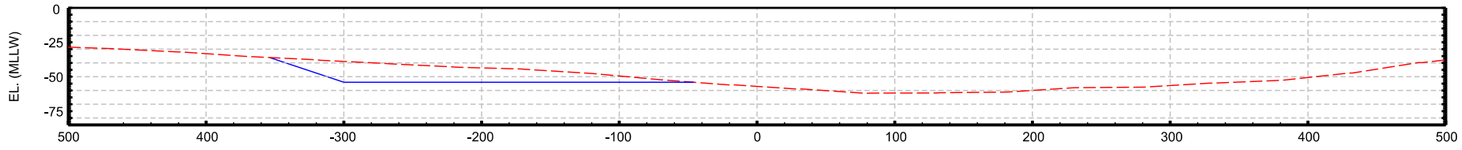
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 0+00 TO STA. 50+00

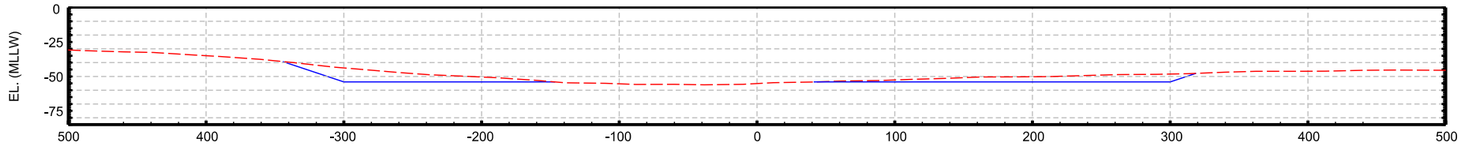
SHEET IDENTIFICATION
C-02



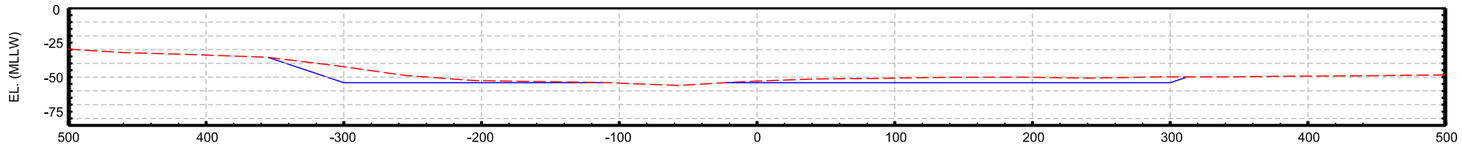
STA. 100+19



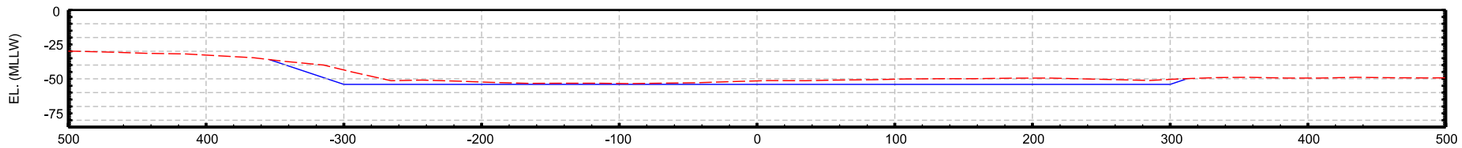
STA. 100+00



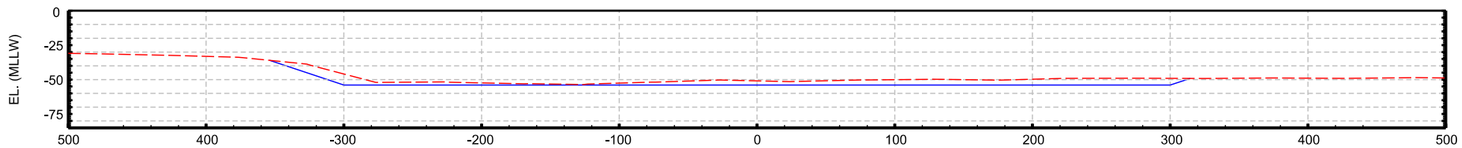
STA. 90+00



STA. 80+00



STA. 70+00



STA. 60+00

NOTE: CROSS SECTIONS TO -54 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

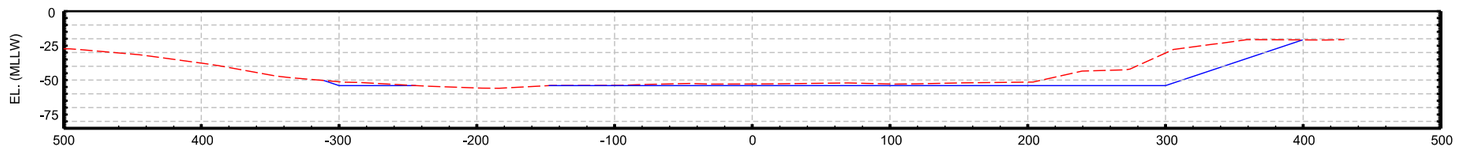
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT SCALE: AS SHOWN
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME: C-12.dgn

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

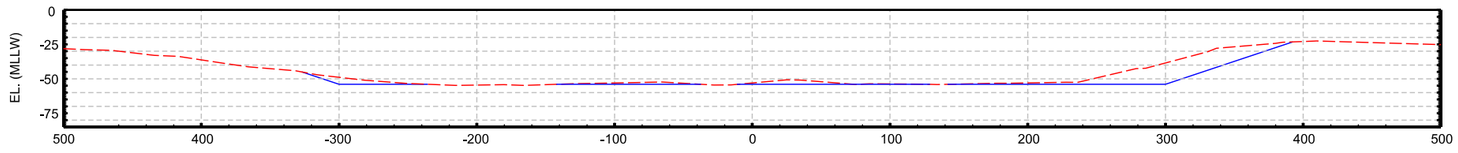
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 60+00 TO STA. 100+19

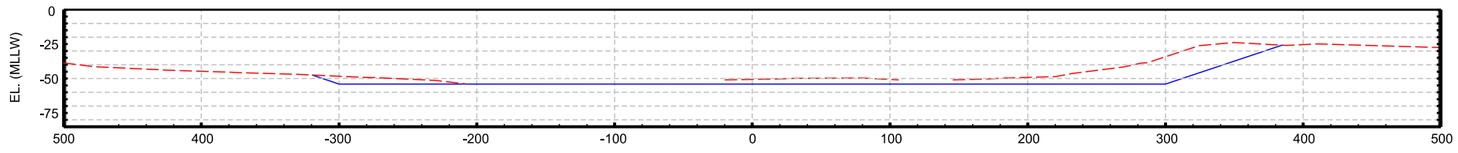
SHEET IDENTIFICATION
C-03



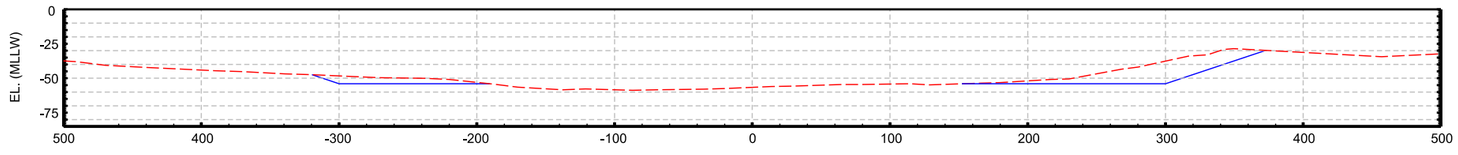
STA. 130+00



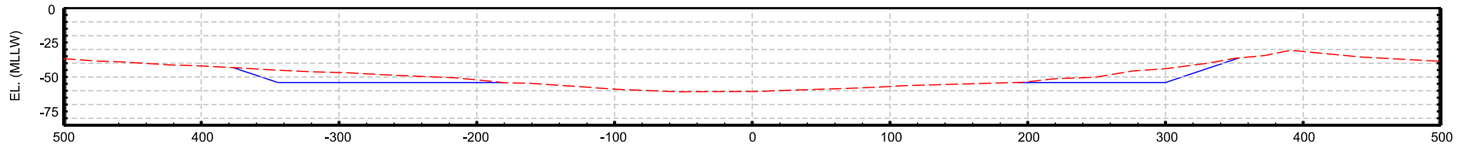
STA. 120+00



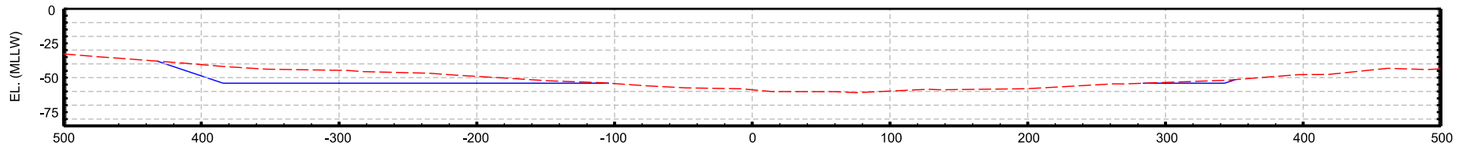
STA. 110+00



STA. 107+61.58



STA. 104+74.52



STA. 102+19

NOTE: CROSS SECTIONS TO -54 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

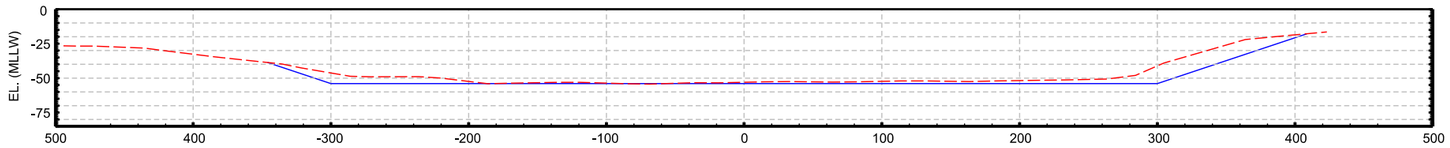
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: ASIS
PLOT DATE: 26 SEPT 2016
SIZE: ANSI D
FILE NAME: C-12.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

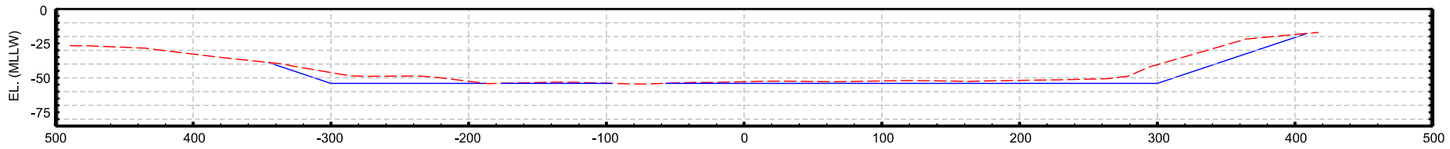
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 102+19 TO STA. 130+00

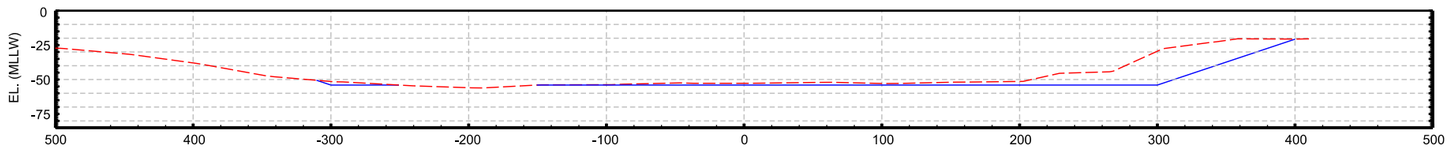
SHEET IDENTIFICATION
C-04



STA. 140+45



STA. 140+00



STA. 130+38

NOTE: CROSS SECTIONS TO -54 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

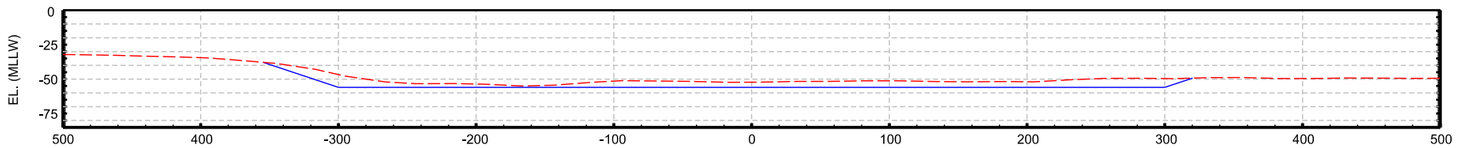
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

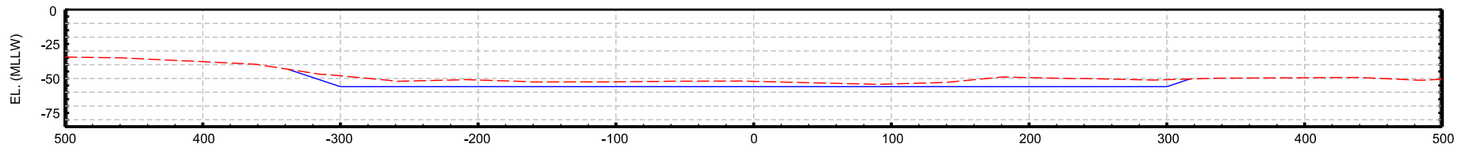
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 130+38 TO STA. 140+45

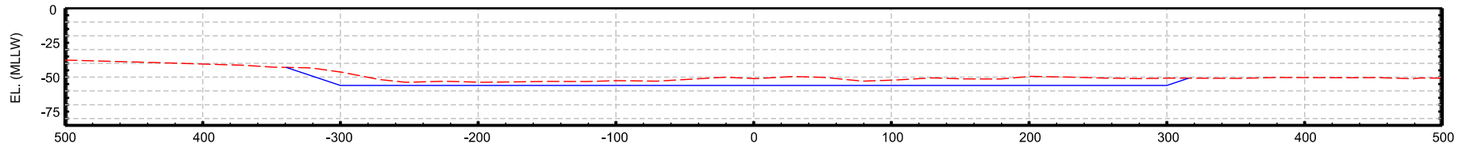
SHEET IDENTIFICATION
C-05



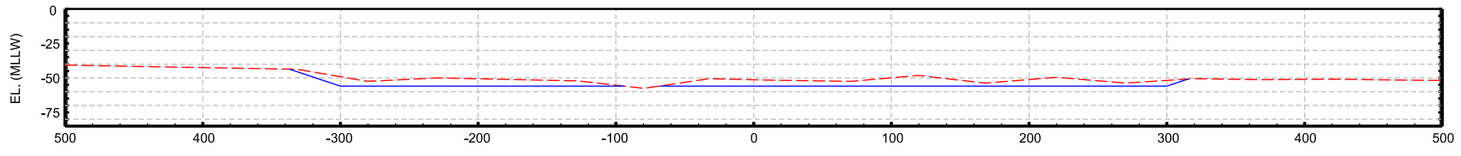
STA. 50+00



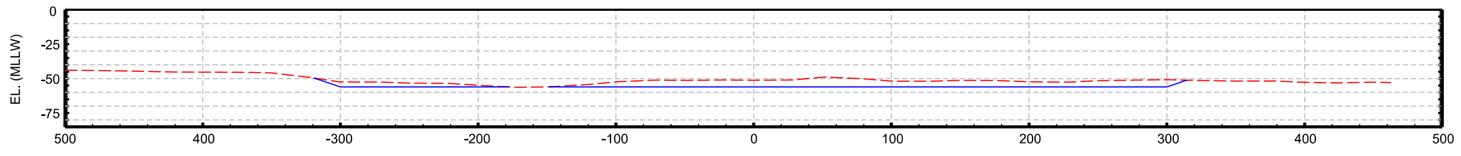
STA. 40+00



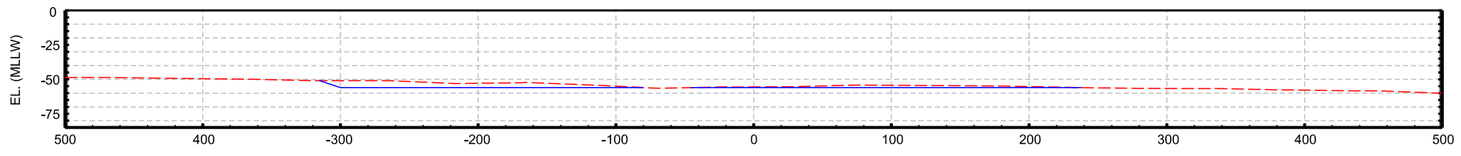
STA. 30+00



STA. 20+00



STA. 10+00



STA. 00+00

NOTE: CROSS SECTIONS TO -56 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

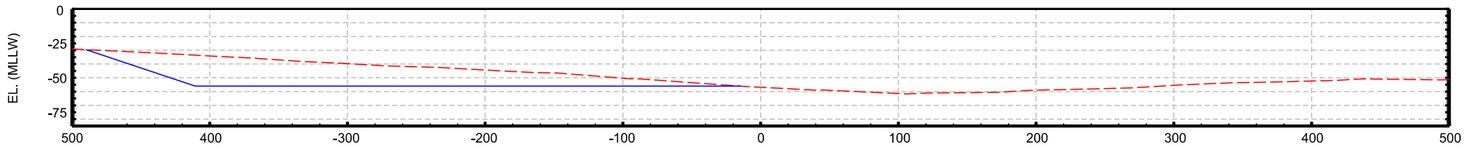
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

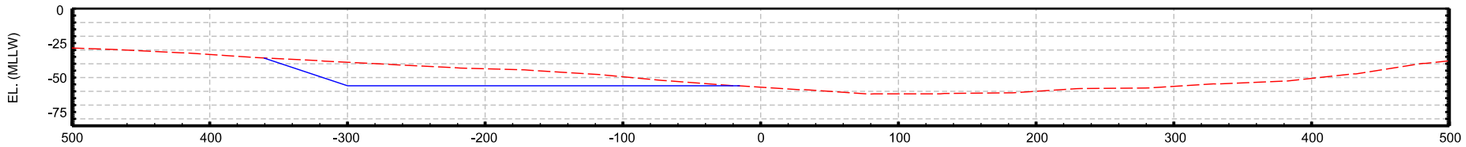
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH,
STA. 0+00 TO STA. 50+00

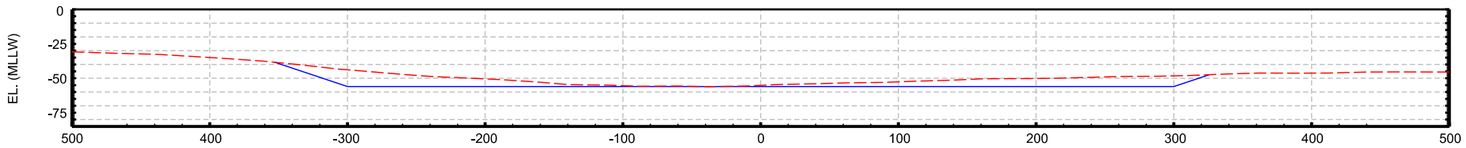
SHEET IDENTIFICATION
C-06



STA. 100+19

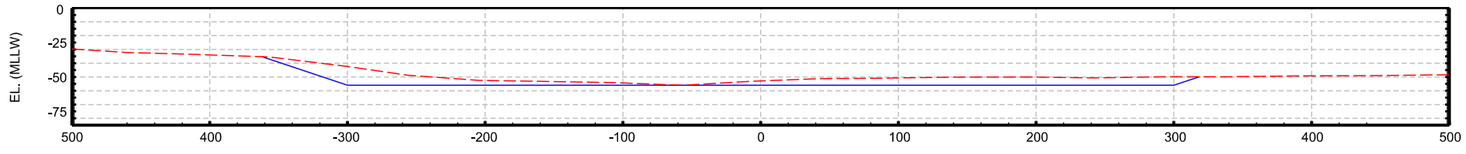


STA. 100+00

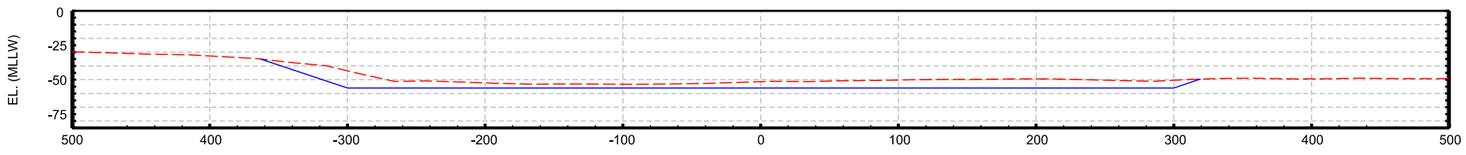


STA. 90+00

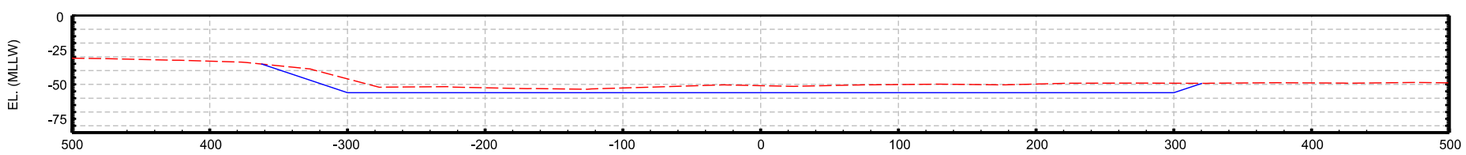
NOTE: CROSS SECTIONS TO -56 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.



STA. 80+00



STA. 70+00



STA. 60+00

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

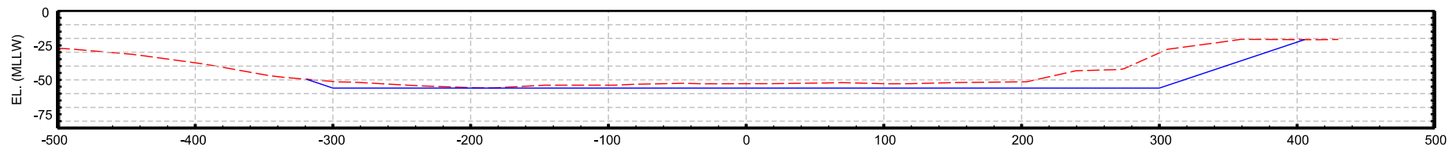
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
PLOT DATE: 26 SEPT 2016
SIZE: ANSI D
FILE NAME: C-12.dgn
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

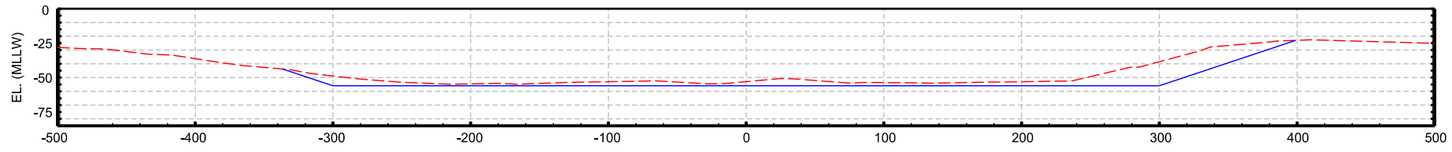
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL
CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH
STA. 60+00 TO STA. 100+19

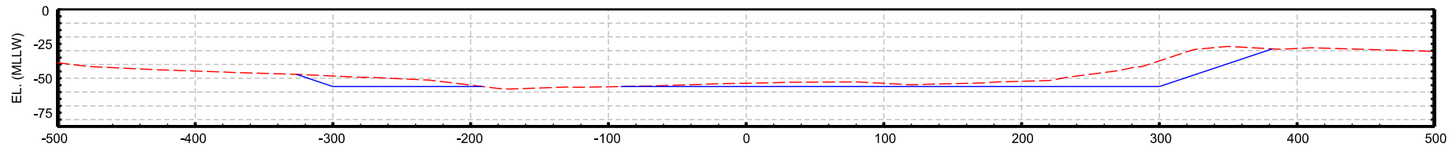
SHEET IDENTIFICATION
C-07



STA. 130+00

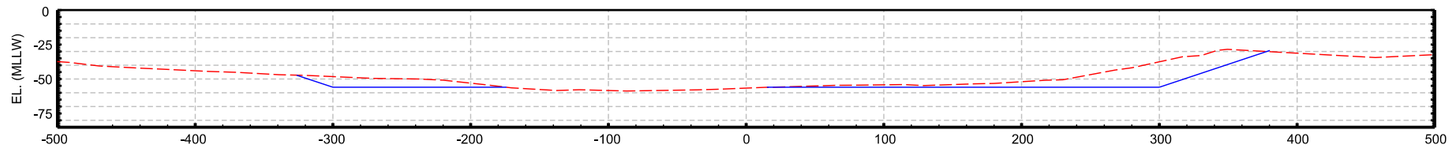


STA. 120+00

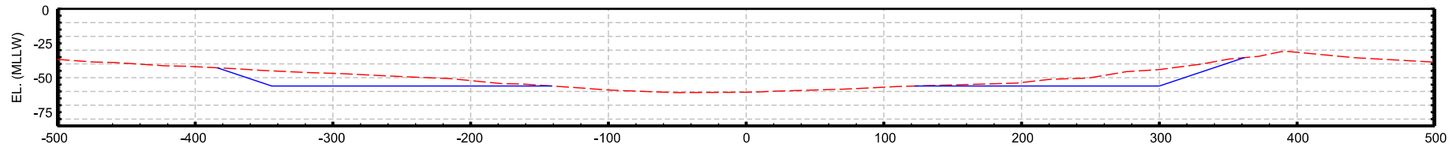


STA. 110+00

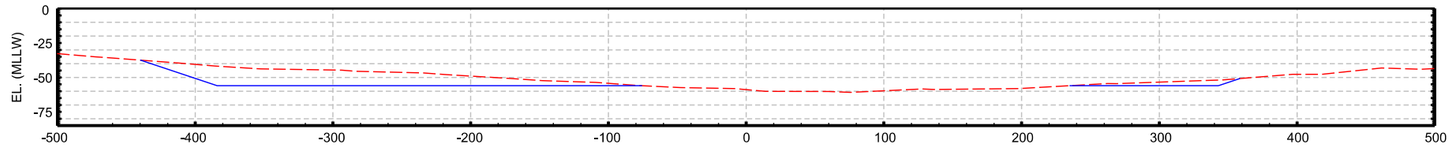
NOTE: CROSS SECTIONS TO -56 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.



STA. 107+61.58



STA. 104+74.52



STA. 102+19

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

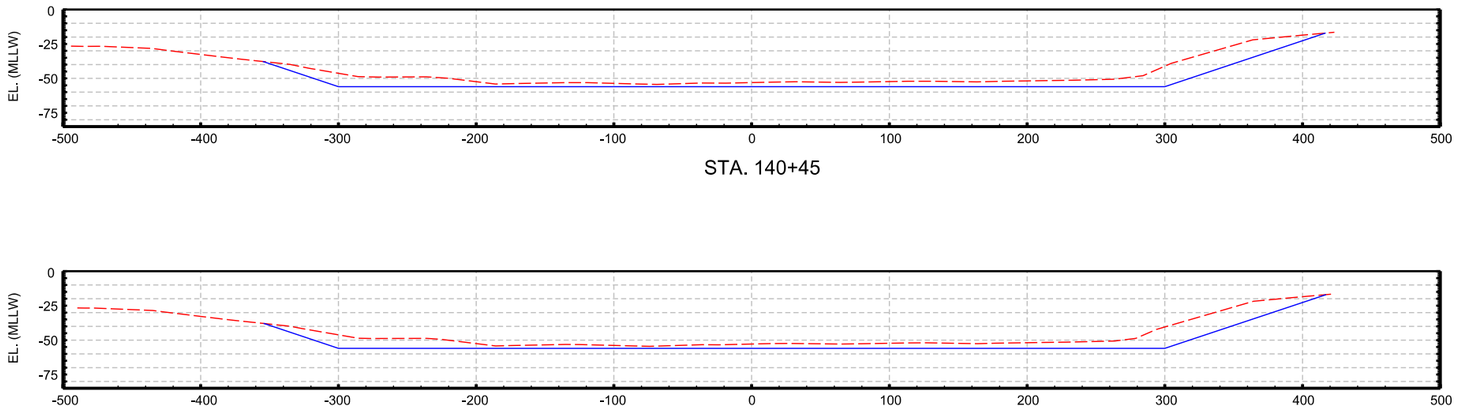
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: As NOTED
SIZE: ANSI D
PLOT DATE: 26 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL,
CONSTRUCTION DREDGING

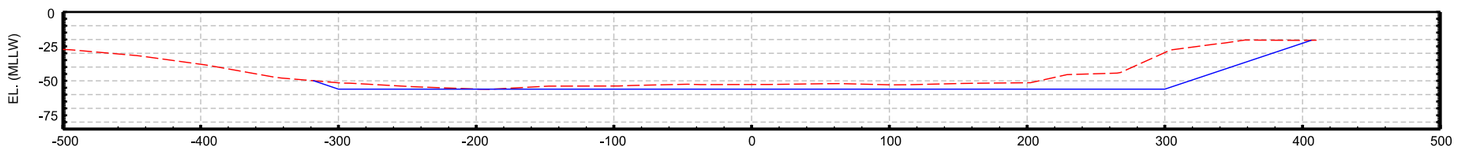
CROSS SECTIONS
50' PROJECT DEPTH,
STA. 102+19 TO STA. 130+00

SHEET IDENTIFICATION
C-08



STA. 140+45

STA. 140+00



STA. 130+38

NOTE: CROSS SECTIONS TO -56 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SET
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 26 SEPT 2016
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL DEEPENING STUDY
MISSISSIPPI RIVER SHIP CHANNEL, CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH,
STA. 130+38 TO STA. 140+45

SHEET IDENTIFICATION
C-09

US Army Corps
of Engineers
New Orleans District

MISSISSIPPI SHIP CHANNEL DEEPENING STUDY,

MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

SEPT 2016

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: NTS
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME: G-01 COVER SHEET
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

COVER SHEET

SHEET IDENTIFICATION
G-01

1 2 3 4 5

D C B A

233
BATON ROUGE
BATON ROUGE FRONT
228
225
RED EYE
223
SARDINE POINT
220
218
213
211
MEDORA
PLAQUEMINES
GRANADA
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BAYOU GOULA
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ALHAMBRA
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PHILADELPHIA
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DONALDSONVILLE
SMOKE BEND
RICH BEND
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BELMONT
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GONZALES
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LAKE MAUREPAS
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LAC DES ALLEMANDS
LAKE VERRET
N

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NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY		DATE:	
DWN BY: PRG	CKD BY: PRG	SOLICITATION NO.:	
SUBMITTED BY: KEITH O'CAIN		CONTRACT NO.:	
PLOT SCALE: 1=0.001	PLOT DATE: 8/5/2016	FILE NUMBER:	
SIZE: ANSI D	FILE NAME:		

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

PROJECT LOCATION AND VICINITY MAP

SHEET IDENTIFICATION
G-02

MISSISSIPPI RIVER CROSSINGS -48' PROJECT DEPTH ELEVATION CONVERSIONS AND CROSSING CHANNEL TEMPLATES

CROSSING LOCATION	RIVER MILE	2007 LWRP FT. NAVD88	-48' NAVD88	3' ADVANCE MAINT.	SIDE SLOPES	BOTTOM WIDTH (250' O/C)	2' OVERDEPTH BY 500' WIDTH
BATON ROUGE FRONT	231	2.50'	-45.50	-48.50	1V ON 5H	500'	-50.50
RED EYE	224	2.40'	-45.60	-48.60	1V ON 5H	500'	-50.60
SARDINE POINT	219	2.30'	-45.70	-48.70	1V ON 5H	500'	-50.70
MEDORA	212	2.00'	-46.00	49.00	1V ON 5H	500'	-53.20
GRANADA	204	1.90'	-46.10	-49.10	1V ON 5H	500'	-51.10
BAYOU GOULA	198	1.80'	-46.20	-49.20	1V ON 5H	500'	-51.20
ALHAMBRA	191	1.70'	-46.30	-49.30	1V ON 5H	500'	-51.40
PHILADELPHIA	183	1.60'	-46.40	-49.40	1V ON 5H	500'	-51.40
SMOKE BEND	175	1.45'	-46.55'	-49.55'	1V ON 5H	500'	-51.55
RICH BEND	159	1.25'	-46.75	-49.75'	1V ON 5H	500'	-51.75
BELMONT	153	1.20'	-46.80	-49.80	1V ON 5H	500'	-51.80
FAIRVIEW	117	0.80'	-47.20	-50.20	1V ON 5H	500'	-52.20

MISSISSIPPI RIVER CROSSINGS -50' PROJECT DEPTH ELEVATION CONVERSIONS AND CROSSING CHANNEL TEMPLATES

CROSSING LOCATION	RIVER MILE	2007 LWRP FT. NAVD88	-50' NAVD88	3' ADVANCE MAINT.	SIDE SLOPES	BOTTOM WIDTH (250' O/C)	2' OVERDEPTH BY 500' WIDTH
BATON ROUGE FRONT	231	2.50'	-47.50	-50.50	1V ON 5H	500'	-52.50
RED EYE	224	2.40'	-47.60	-50.60	1V ON 5H	500'	-52.60
SARDINE POINT	219	2.30'	-47.70	-50.60	1V ON 5H	500'	-52.70
MEDORA	212	2.00'	-48.00	-51.00	1V ON 5H	500'	-53.00
GRANADA	204	1.90'	-48.10	-51.10	1V ON 5H	500'	-53.10
BAYOU GOULA	198	1.80'	-48.20	-51.20	1V ON 5H	500'	-53.20
ALHAMBRA	191	1.70'	-48.30	-51.30	1V ON 5H	500'	-53.40
PHILADELPHIA	183	1.60'	-48.40	-51.40	1V ON 5H	500'	-53.40
SMOKE BEND	175	1.45'	-48.55	-51.55	1V ON 5H	500'	-53.55
RICH BEND	159	1.25'	-48.75	-51.75	1V ON 5H	500'	-53.75
BELMONT	153	1.20'	-48.80	-51.75	1V ON 5H	500'	-53.80
FAIRVIEW	117	0.80'	-49.20	-52.20	1V ON 5H	500'	-54.20

INDEX OF DRAWINGS

GENERAL NOTES:

1. SURVEY DATA FOR CROSS SECTIONS OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS. SURVEYS SHOULD REFLECT AFTER MAINTENANCE DREDGING SURVEYS.
2. ELEVATIONS REFER TO NAVD88 (2009.55) UNLESS OTHERWISE NOTED.
3. AERIAL PHOTOGRAPHY FLOWN (2010).
4. ALL XY COORDINATES ARE LOUISIANA STATE PLANE, SOUTH, US SURVEY FEET.

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1:1
PLOT DATE: 25 SEP 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME: G-03.dgn

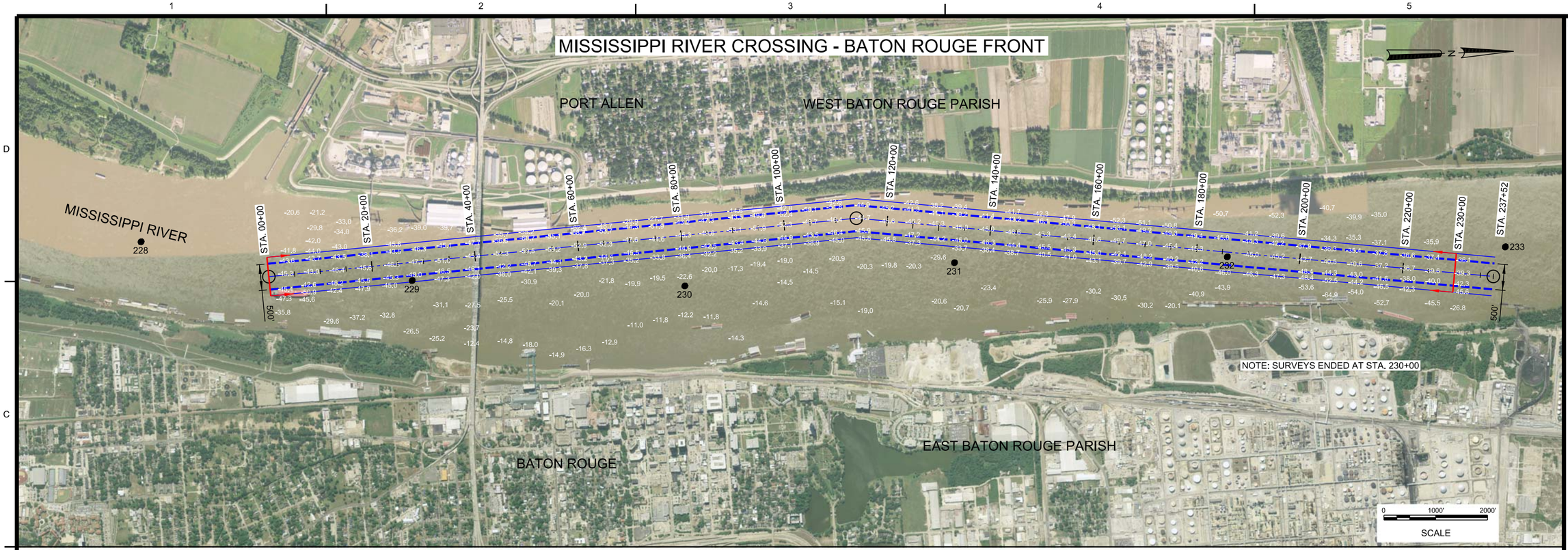
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

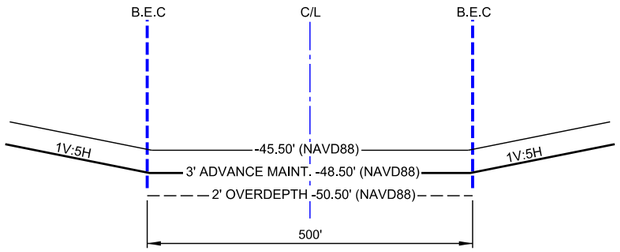
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY, MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

INDEX, CROSSING TEMPLATES, AND GENERAL NOTES

SHEET IDENTIFICATION
G-03

MISSISSIPPI RIVER CROSSING - BATON ROUGE FRONT





NOTES:

1) 48' PROJECT DEPTH EQUATES TO -45.50' (NAVD88) FOR THE BATON ROUGE FRONT CROSSING LOCATION.

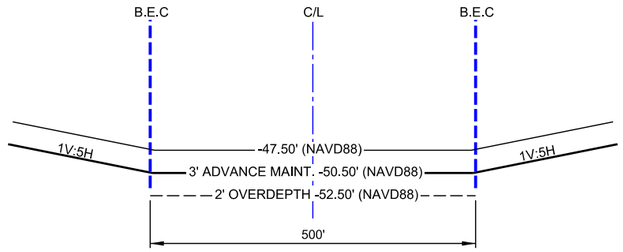
2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-01A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-01C.

4) DREDGING LIMITS FROM STA. 0+00 TO 230+00.

THEORETICAL SECTION - 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -47.50' (NAVD88) FOR THE BATON ROUGE FRONT CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-01B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-01C.

4) DREDGING LIMITS FROM STA. 0+00 TO 230+00.

THEORETICAL SECTION - 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3323658.181
	Y 701360.307
P.I. STA. 114+01.96	X 3322867.857
	Y 712734.745
P.I. STA. 327+52	X 3324359.133
	Y 724994.948

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NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 2.00000
PLOT DATE: 29 SEP 2016
FILE NUMBER:
SIZE: D ANSI D
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

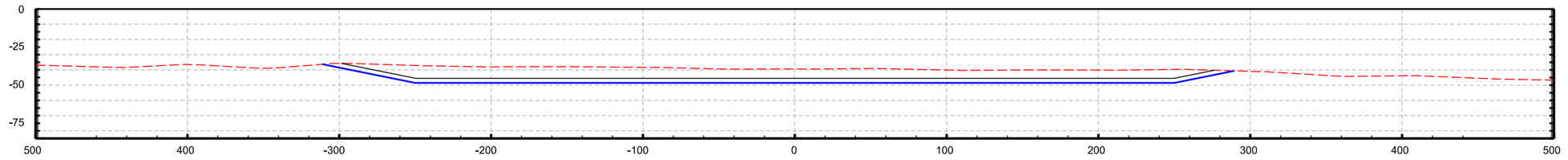
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BATON ROUGE FRONT
48' AND 50' PROJECT DEPTHS PLAN

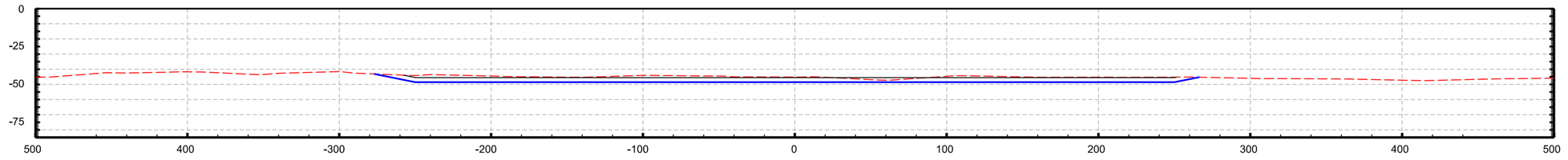
SHEET IDENTIFICATION
C-01

BATON ROUGE FRONT CROSSING - 48' PROJECT DEPTH CROSS SECTIONS

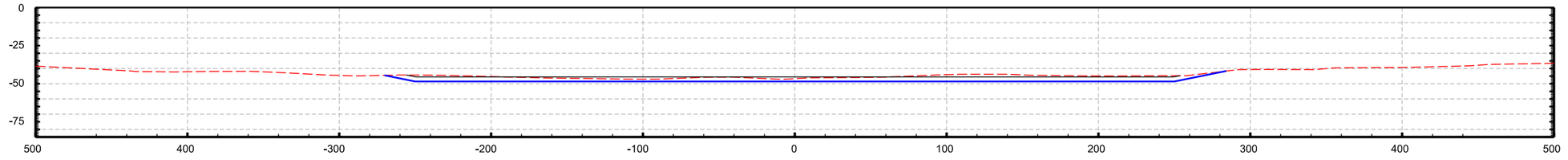
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-45.50' NAVD88)
3' ADVANCE MAINTENANCE (-48.50' NAVD88)



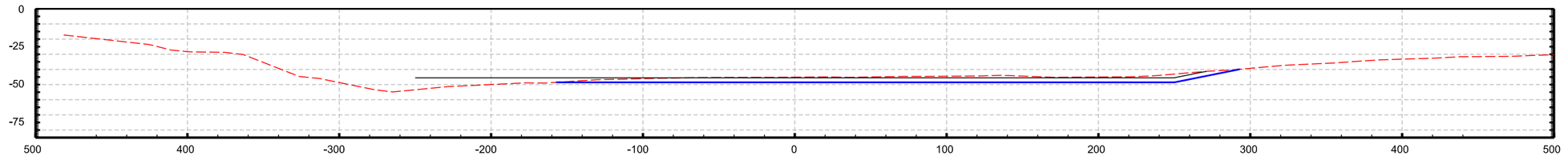
STA. 225+00



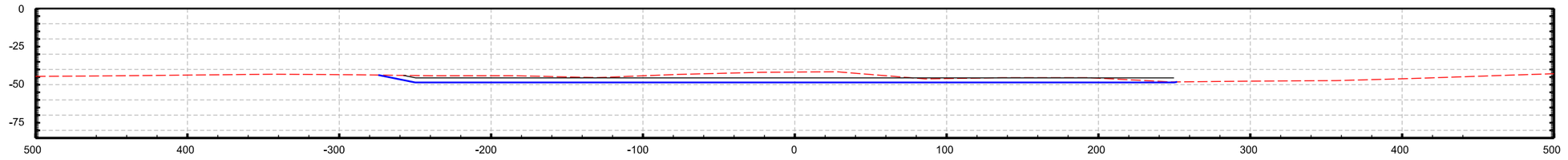
STA. 190+00



STA. 145+00



STA. 75+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS PER SCALE
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 1/5/2016
FILE NAME:

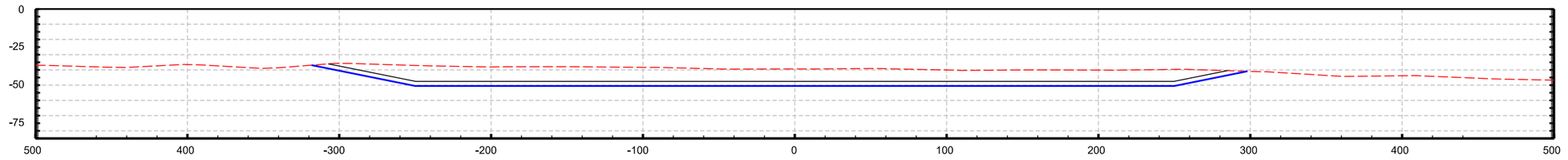
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BATON ROUGE FRONT
CROSS SECTIONS
48' PROJECT DEPTH

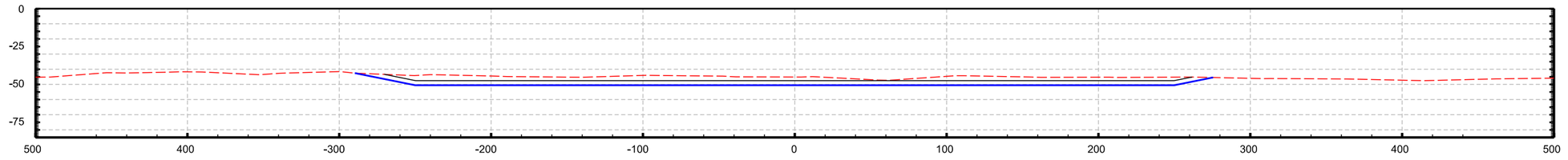
SHEET IDENTIFICATION
C-01A

BATON ROUGE FRONT CROSSING - 50' PROJECT DEPTH CROSS SECTIONS

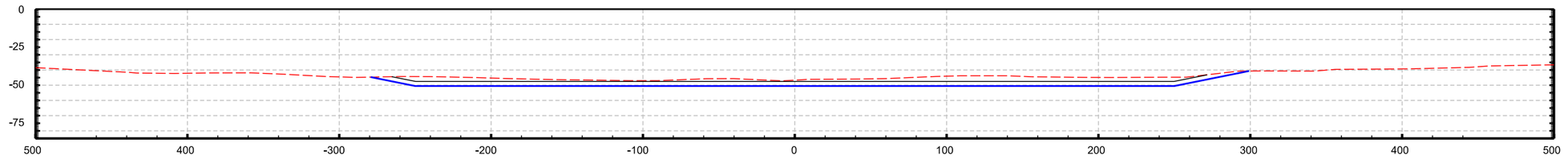
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-47.50' NAVD88)
3' ADVANCE MAINTENANCE (-50.50' NAVD88)



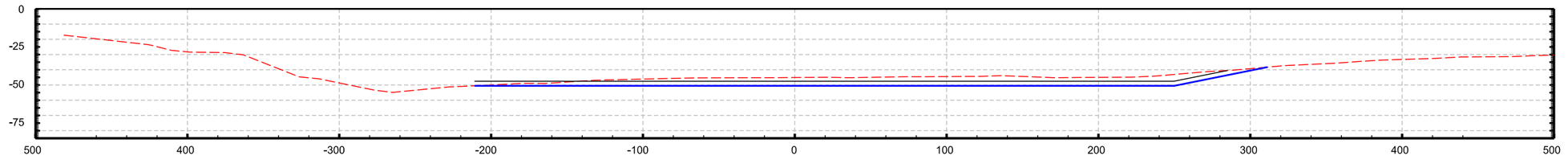
STA. 225+00



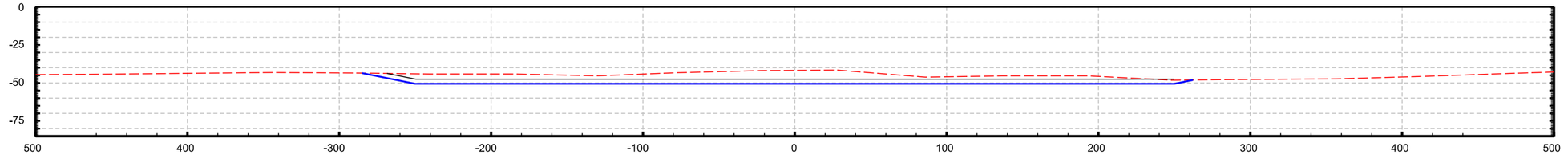
STA. 190+00



STA. 145+00



STA. 75+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS PER PLOT
PLOT DATE: 15 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BATON ROUGE FRONT
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-01B

MISSISSIPPI RIVER CROSSING, BATON ROUGE FRONT, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	2,121.50	0.00
5+00.00	2,336.40	41,277.00
10+00.00	1,615.50	36,591.80
15+00.00	2,011.80	33,585.80
20+00.00	2,513.10	41,896.90
25+00.00	1,197.00	34,353.30
30+00.00	480.90	15,536.40
35+00.00	859.20	12,408.30
40+00.00	774.80	15,129.60
45+00.00	485.30	11,667.60
50+00.00	71.00	5,150.50
55+00.00	326.60	3,680.60
60+00.00	613.10	8,700.10
65+00.00	532.90	10,610.80
70+00.00	982.60	14,032.90
75+00.00	1,480.80	22,809.60
80+00.00	997.20	22,944.00
85+00.00	714.70	15,850.70
90+00.00	620.50	12,362.90
95+00.00	269.70	8,242.10
100+00.00	419.90	6,385.00
105+00.00	792.00	11,221.00
110+00.00	638.00	13,240.10
115+00.00	1,469.90	19,517.40
120+00.00	1,758.60	29,893.80
125+00.00	1,620.80	31,291.20
130+00.00	2,051.20	34,000.50
135+00.00	2,276.90	40,074.90
140+00.00	1,992.30	39,529.10
145+00.00	1,627.40	33,515.90
150+00.00	974.70	24,093.50
155+00.00	959.30	17,907.50
160+00.00	972.00	17,883.20
165+00.00	1,270.50	20,764.40
170+00.00	925.40	20,332.20
175+00.00	1,894.50	26,109.90
180+00.00	1,743.60	33,685.70
185+00.00	1,513.70	30,159.40
190+00.00	1,846.90	31,116.00
195+00.00	1,949.10	35,147.80
200+00.00	3,177.60	47,469.80
205+00.00	4,478.10	70,886.10
210+00.00	4,704.40	85,022.30
215+00.00	5,670.40	96,062.60
220+00.00	6,364.00	111,429.90
225+00.00	5,271.60	107,736.80
230+00.00	0.00	48,810.70
	TOTAL:	**1,450,810.70 CY**

MISSISSIPPI RIVER CROSSING, BATON ROUGE FRONT, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	3,194.90	0.00
5+00.00	3,430.80	61,349.20
10+00.00	2,716.60	56,920.40
15+00.00	3,131.80	54,151.40
20+00.00	3,667.90	62,959.70
25+00.00	2,249.00	54,786.50
30+00.00	1,470.70	34,442.00
35+00.00	1,911.80	31,319.40
40+00.00	1,558.80	32,135.00
45+00.00	852.30	22,325.20
50+00.00	216.20	9,894.10
55+00.00	649.50	8,015.50
60+00.00	1,127.30	16,451.20
65+00.00	1,075.50	20,395.70
70+00.00	2,106.70	29,464.40
75+00.00	2,461.20	42,295.40
80+00.00	2,137.40	42,579.90
85+00.00	1,476.50	33,462.50
90+00.00	1,122.60	24,066.50
95+00.00	636.70	16,290.20
100+00.00	928.20	14,490.10
105+00.00	1,765.10	24,938.40
110+00.00	1,554.90	30,740.80
115+00.00	2,580.80	38,293.30
120+00.00	2,846.20	50,249.70
125+00.00	2,749.70	51,813.40
130+00.00	3,204.30	55,129.60
135+00.00	3,448.80	61,603.20
140+00.00	3,141.30	61,019.40
145+00.00	2,763.20	54,671.30
150+00.00	1,929.50	43,451.40
155+00.00	1,687.30	33,489.20
160+00.00	1,666.90	31,057.50
165+00.00	1,894.50	32,976.00
170+00.00	1,803.10	34,236.80
175+00.00	2,949.00	44,000.90
180+00.00	2,831.30	53,521.70
185+00.00	2,606.40	50,349.10
190+00.00	2,955.70	51,501.20
195+00.00	3,065.40	55,751.40
200+00.00	4,303.80	68,233.40
205+00.00	5,639.60	92,068.40
210+00.00	5,911.20	106,951.80
215+00.00	6,870.00	118,344.40
220+00.00	7,589.40	133,882.70
225+00.00	6,488.40	130,349.90
230+00.00	0.00	60,078.10
	TOTAL:	**2,236,497.30 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BATON ROUGE FRONT, 48' AND 50' PROJECT DEPTH DREDGING QUANTITIES

SHEET IDENTIFICATION
C-01C

WEST BATON ROUGE PARISH

MISSISSIPPI RIVER CROSSING - RED EYE

SOUTH RIVER ROAD (988)

MISSISSIPPI RIVER

RIVER ROAD (327)

EAST BATON ROUGE PARISH

223

224

225

500'

STA. 90+23

STA. 80+00

STA. 60+00

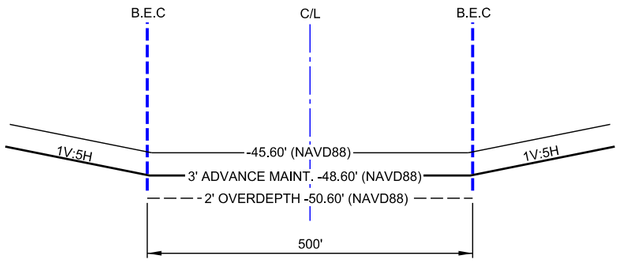
STA. 40+00

STA. 20+00

STA. 00+00

0 500' 1000'

SCALE



NOTES:

1) 48' PROJECT DEPTH EQUATES TO -45.60' (NAVD88) FOR THE BATON RED EYE CROSSING LOCATION.

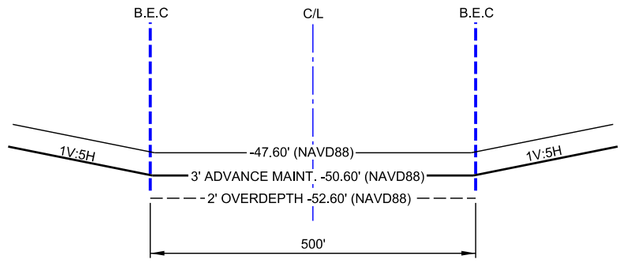
2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-02A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-02C.

4) DREDGING LIMITS FROM STA. 0+00 TO STA. 85+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -47.60' (NAVD88) FOR THE RED EYE CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-02B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-02C.

4) DREDGING LIMITS FROM STA. 0+00 TO STA. 85+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -10.3 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3314757.525
	Y 683878.208
P.I. STA. 75+12.76	X 3309313.082
	Y 678701.604
P.I. STA. 90+23	X 3308588.141
	Y 677382.144

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR
MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1" = 2000'
PLOT DATE: 29 SEP 2016
FILE NUMBER:
FILE NAME:
SIZE: ANSI D

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

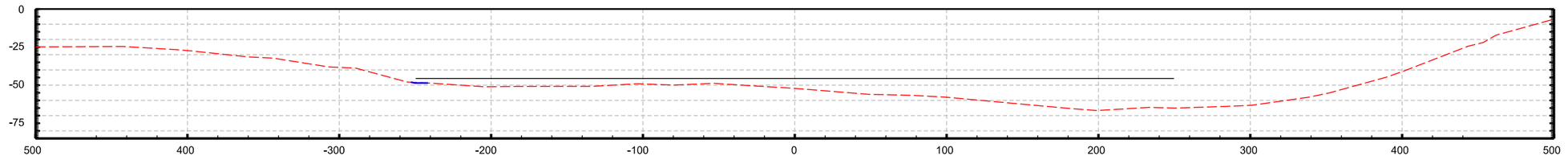
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

RED EYE
48' AND 50' PROJECT DEPTHS

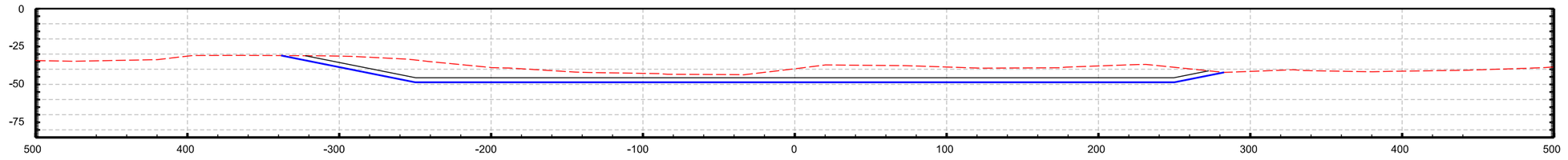
SHEET IDENTIFICATION
C-02

RED EYE CROSSING - 48' PROJECT DEPTH CROSS SECTIONS

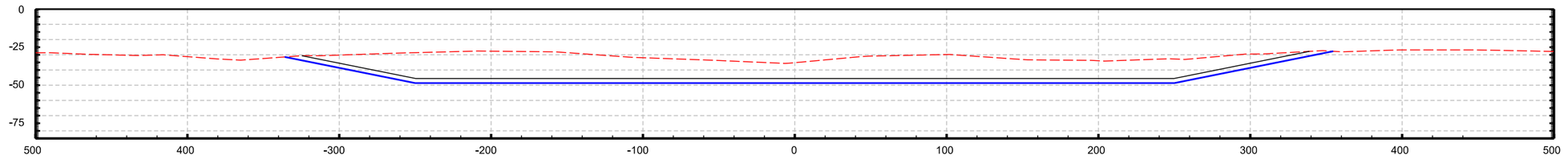
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-45.60' NAVD88)
3' ADVANCE MAINTENANCE (-48.60' NAVD88)



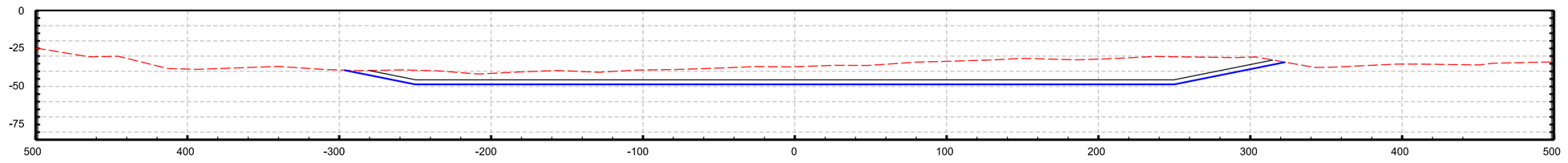
STA. 85+00



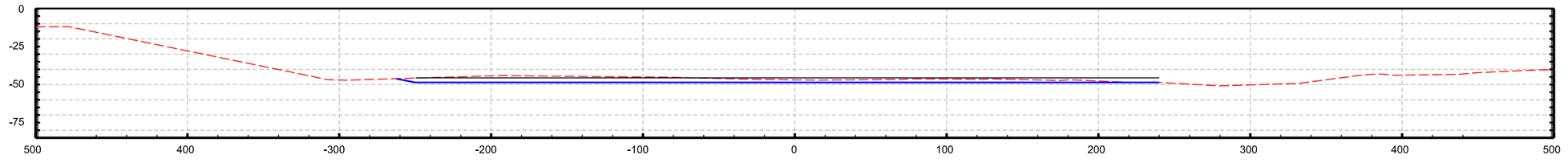
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR
MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 1/5/2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

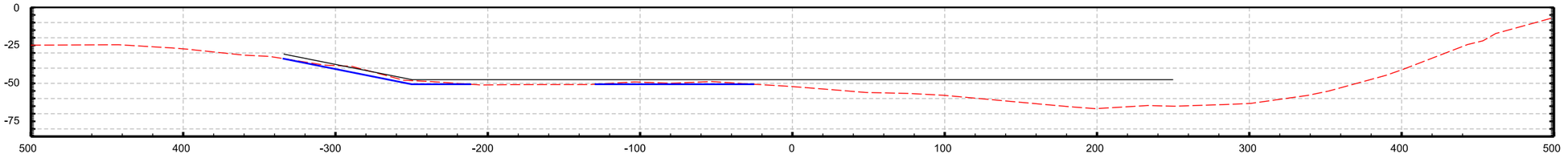
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

RED EYE
CROSS SECTIONS
48' PROJECT DEPTH

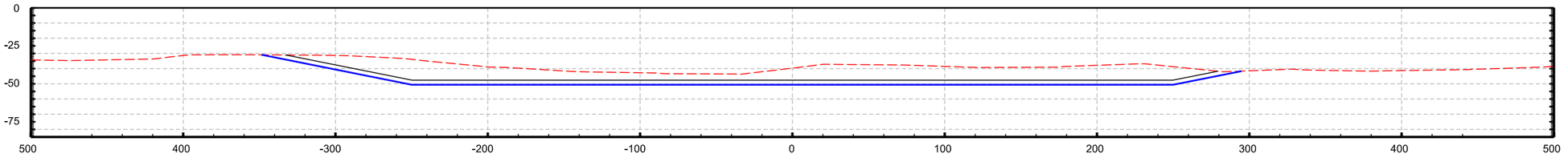
SHEET IDENTIFICATION
C-02A

RED EYE CROSSING - 50' PROJECT DEPTH CROSS SECTIONS

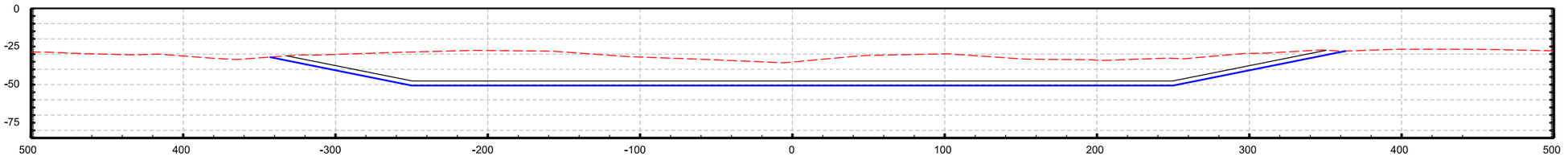
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-47.60' NAVD88)
3' ADVANCE MAINTENANCE (-50.60' NAVD88)



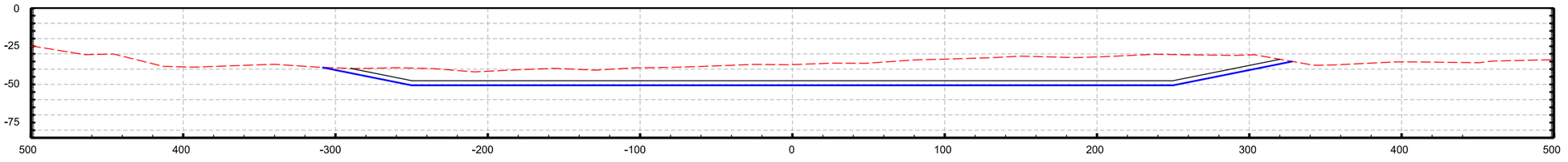
STA. 85+00



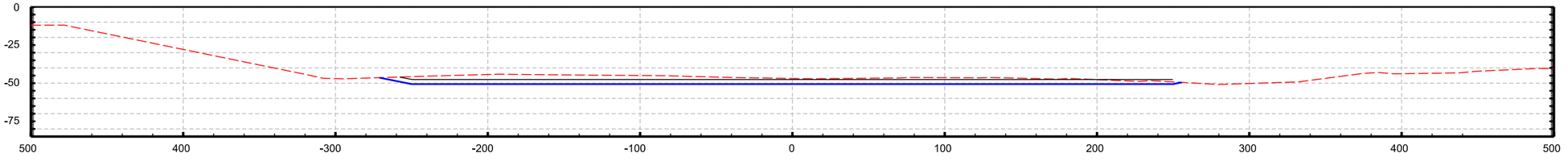
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 1/5/2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

RED EYE
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-02B

MISSISSIPPI RIVER CROSSING, RED EYE, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	1,256.90	0.00
5+00.00	2,917.60	38,653.10
10+00.00	4,720.30	70,721.60
15+00.00	5,147.20	91,365.50
20+00.00	5,170.90	95,537.20
25+00.00	7,113.10	113,740.00
30+00.00	6,497.70	126,025.20
35+00.00	7,373.50	128,436.60
40+00.00	9,238.70	153,816.40
45+00.00	11,446.70	191,531.40
50+00.00	10,273.00	201,108.90
55+00.00	9,610.60	184,107.50
60+00.00	9,206.10	174,228.30
65+00.00	13,322.50	208,598.10
70+00.00	7,647.00	194,162.20
75+00.00	5,421.70	121,006.60
80+00.00	3,657.60	84,067.30
85+00.00	2.40	33,888.50
90+00.00	0.00	22.10
90+22.83	0.00	0.00
	TOTAL:	**2,211,016.50 CY**

MISSISSIPPI RIVER CROSSING, RED EYE, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	2,290.40	0.00
5+00.00	4,073.90	58,928.40
10+00.00	5,967.10	92,972.30
15+00.00	6,346.30	114,013.80
20+00.00	6,424.10	118,244.40
25+00.00	8,369.70	136,979.10
30+00.00	7,815.00	149,858.10
35+00.00	8,722.30	153,123.20
40+00.00	10,586.70	178,787.70
45+00.00	12,813.00	216,664.30
50+00.00	11,669.40	226,689.00
55+00.00	10,960.20	209,533.80
60+00.00	10,568.00	199,335.00
65+00.00	14,708.10	234,037.40
70+00.00	9,004.50	219,560.80
75+00.00	6,685.90	145,281.20
80+00.00	4,747.50	105,865.10
85+00.00	324.20	46,961.00
90+00.00	112.50	4,044.00
90+22.83	125.20	100.50
	TOTAL:	**2,610,979.10 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

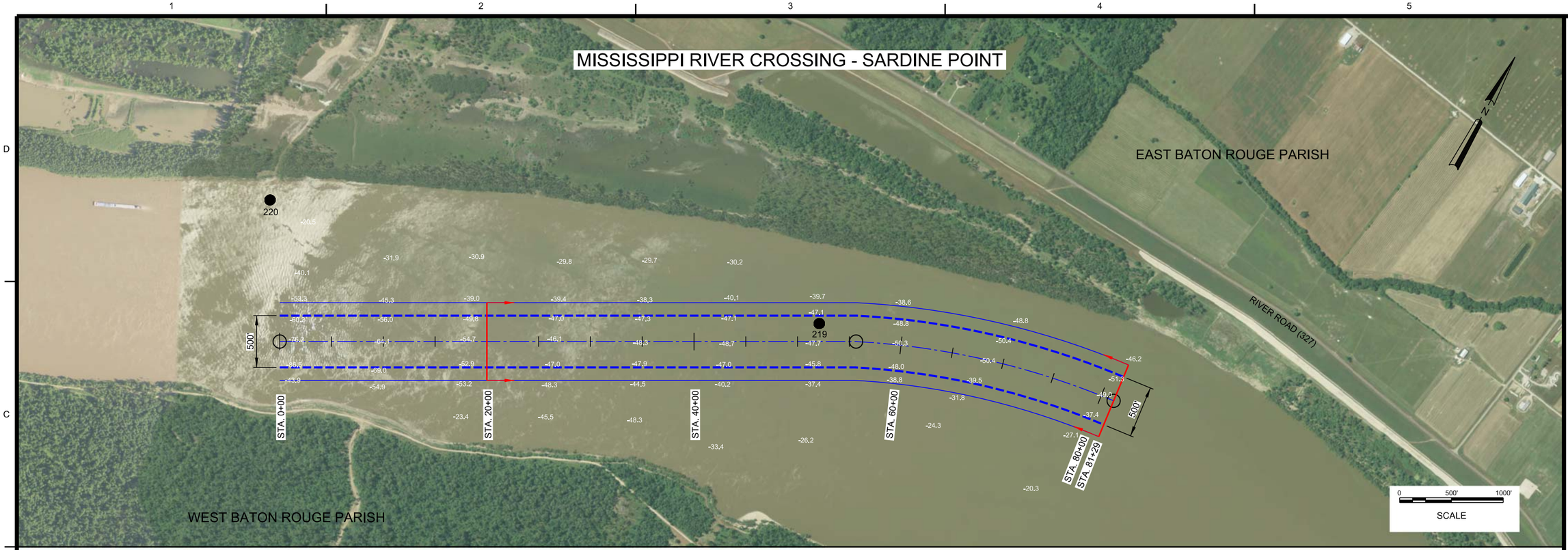
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

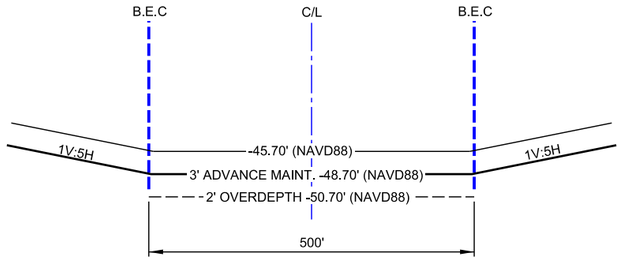
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

RED EYE,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-02C

MISSISSIPPI RIVER CROSSING - SARDINE POINT





NOTES:

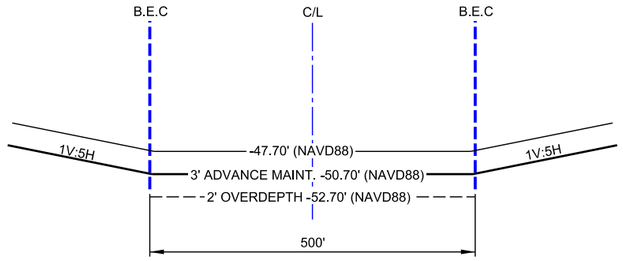
1) 48' PROJECT DEPTH EQUATES TO -45.70' (NAVD88) FOR THE SARDINE POINT CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-03A.

3) DREDGING AVERAGE END AND QUANTITIES ARE SHOWN ON SHEET C-03C.

4) DREDGING LIMITS FROM STA. 20+00 TO 81+29.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -47.70' (NAVD88) FOR THE SARDINE POINT CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-03B.

3) DREDGING AVERAGE END AND QUANTITIES ARE SHOWN ON SHEET C-03C.

4) DREDGING LIMITS FROM STA. 20+00 TO 81+29.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3321002.694
	Y 669203.425
P.I. STA. 55+64.71	X 3325863.307
	Y 671912.742
P.I. STA. 81+29	X 3328313.943
	Y 672623.693

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CHD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1:1
PLOT DATE: 29 SEP 2016
FILE NUMBER:
SIZE: ANSI D
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

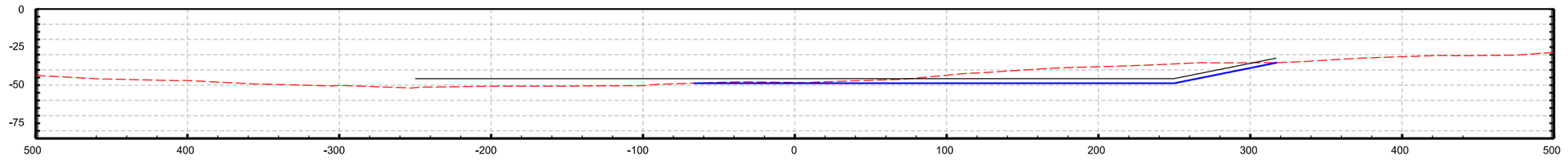
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

SARDINE POINT
48' AND 50' PROJECT DEPTHS

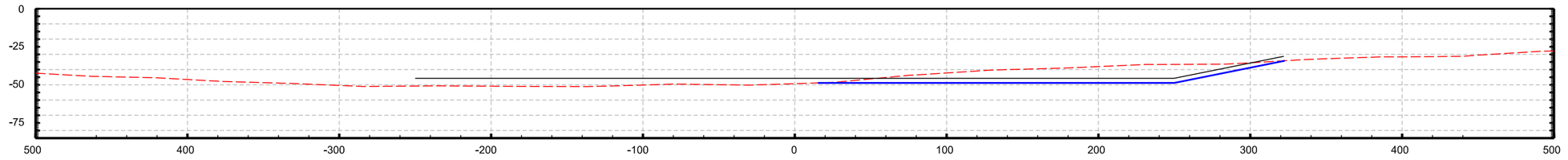
SHEET IDENTIFICATION
C-03

SARDINE POINT - 48' PROJECT DEPTH CROSS SECTIONS

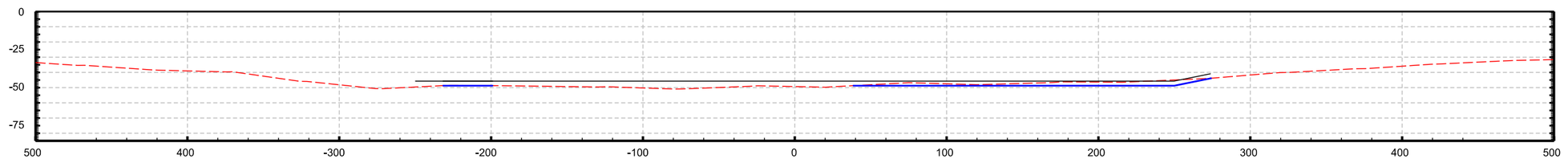
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-45.70' NAVD88)
3' ADVANCE MAINTENANCE (-48.70' NAVD88)



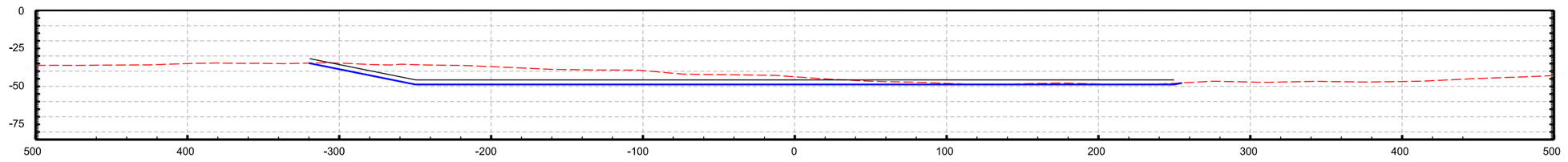
STA. 81+29



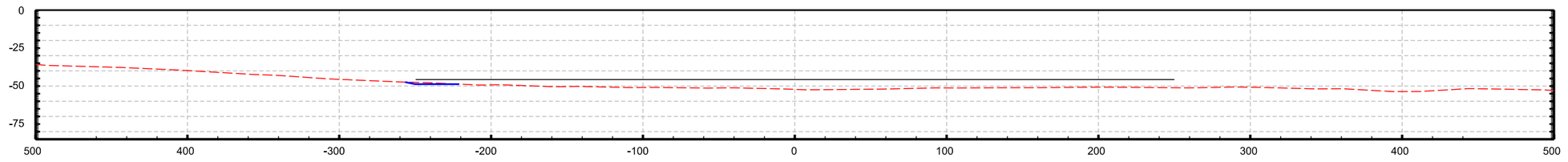
STA. 80+00



STA. 60+00



STA. 40+00



STA. 20+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DRWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 15 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

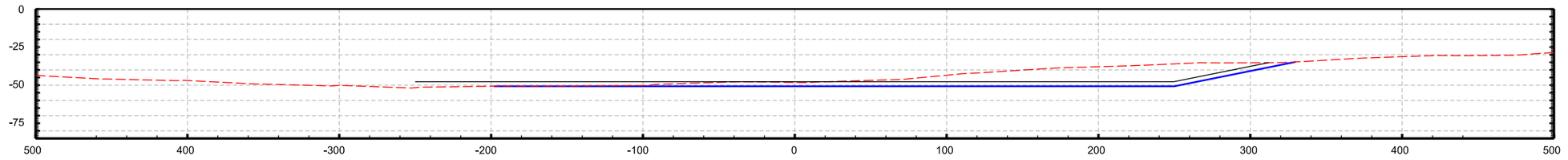
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

SARDINE POINT
CROSS SECTIONS
48' PROJECT DEPTH

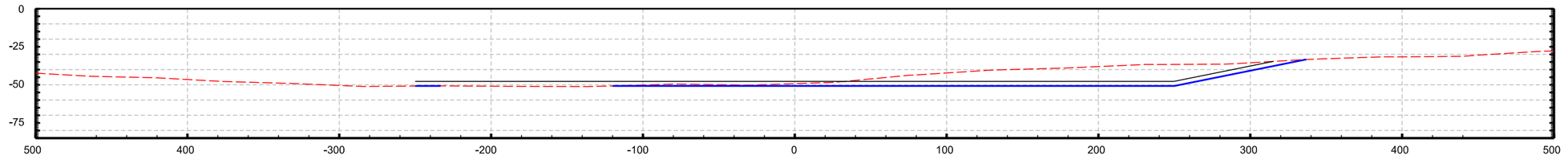
SHEET IDENTIFICATION
C-03A

SARDINE POINT - 50' PROJECT DEPTH CROSS SECTIONS

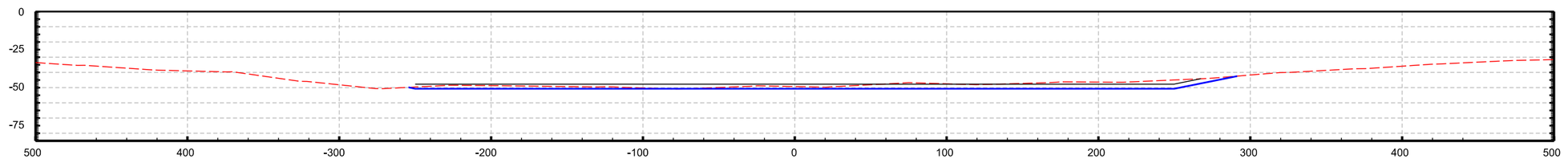
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-47.70' NAVD88)
3' ADVANCE MAINTENANCE (-50.70' NAVD88)



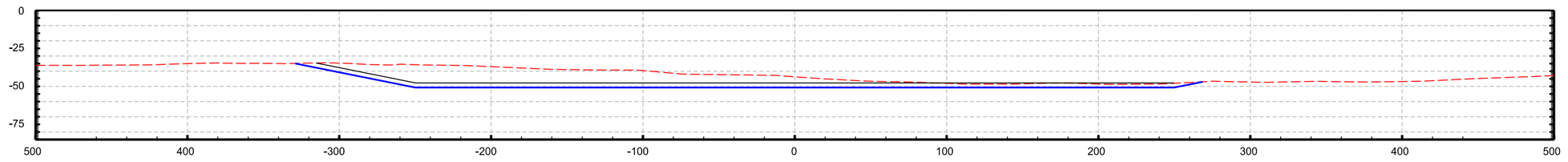
STA. 81+29



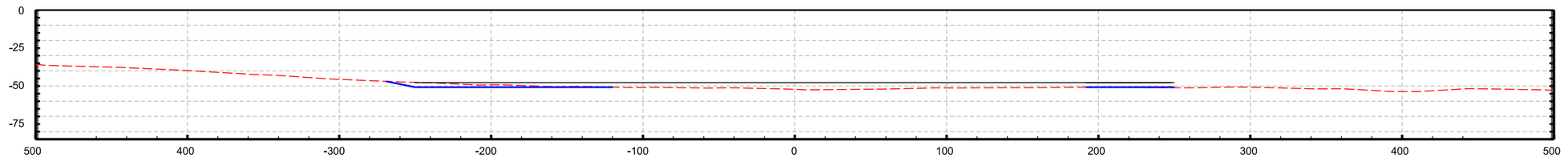
STA. 80+00



STA. 60+00



STA. 40+00



STA. 20+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
PLOT DATE: 15 SEP 2016
FILE NAME:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

SARDINE POINT
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-03B

MISSISSIPPI RIVER CROSSING, SARDINE POINT, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	22.90	211.70
25+00.00	710.50	6,790.10
30+00.00	848.10	14,430.80
35+00.00	1,790.20	24,428.20
40+00.00	3,066.50	44,969.00
45+00.00	551.20	33,496.70
50+00.00	487.50	9,617.20
55+00.00	340.70	7,668.20
60+00.00	423.90	7,079.20
65+00.00	1,148.30	14,557.40
70+00.00	1,277.90	22,465.40
75+00.00	2,795.10	37,713.60
80+00.00	2,146.30	45,753.60
81+29.02	2,124.60	10,204.10
	TOTAL:	**279,385.20 CY**

MISSISSIPPI RIVER CROSSING, SARDINE POINT, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	21.80	201.70
20+00.00	195.20	2,008.70
25+00.00	1,778.90	18,278.70
30+00.00	1,922.50	34,272.20
35+00.00	2,895.40	44,610.20
40+00.00	4,239.30	66,062.50
45+00.00	1,615.00	54,206.20
50+00.00	1,475.80	28,617.90
55+00.00	1,243.00	25,173.30
60+00.00	1,283.80	23,395.90
65+00.00	2,101.70	31,347.10
70+00.00	2,401.90	41,699.30
75+00.00	3,959.20	58,899.10
80+00.00	2,900.70	63,518.50
81+29.02	2,965.40	14,015.60
	TOTAL:	**506,306.90 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK | DESCRIPTION | DATE | APPR.

MARK | DESCRIPTION | DATE | APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

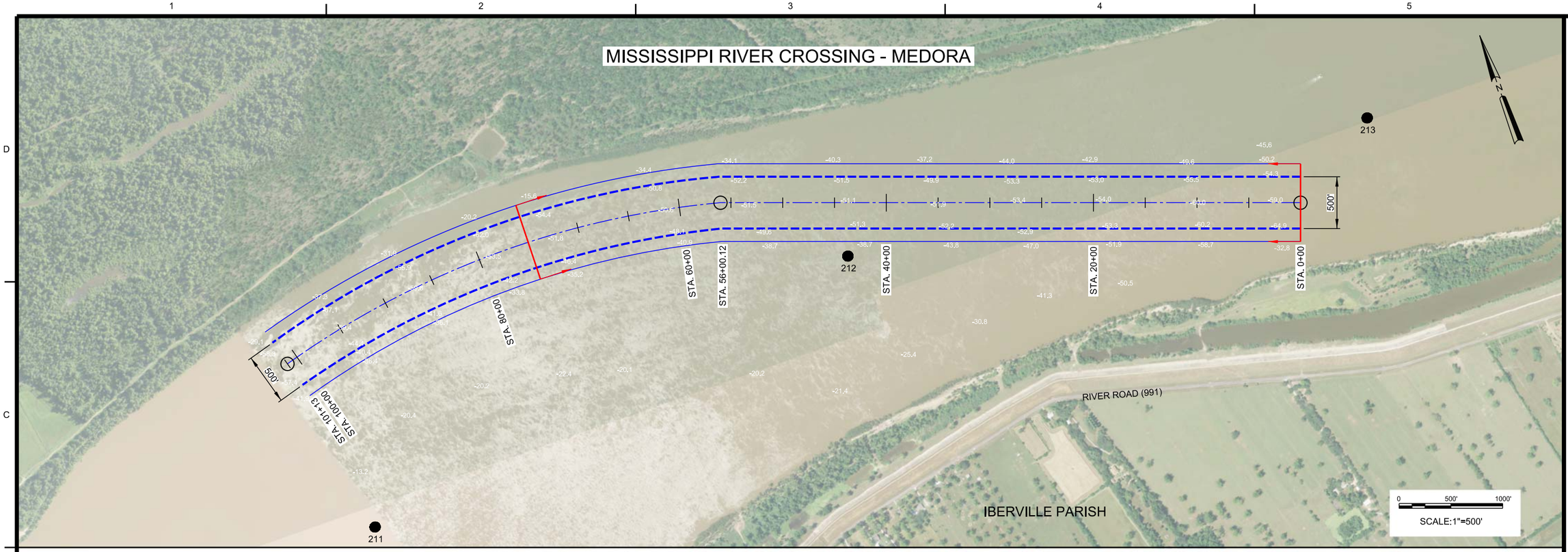
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

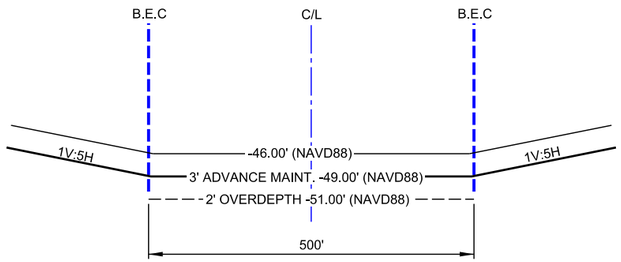
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

SARDINE POINT,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-03C

MISSISSIPPI RIVER CROSSING - MEDORA





NOTES:

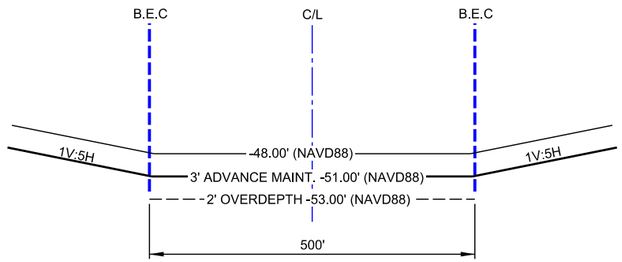
1) 48' PROJECT DEPTH EQUATES TO -46.00' (NAVD88) FOR THE MEDORA CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-04A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-04C.

3) DREDGING LIMITS FROM STA. 0+00 TO 75+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.00' (NAVD88) FOR THE MEDORA CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-04B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-04C.

4) DREDGING LIMITS FROM STA. 0+00 TO 75+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -50.5 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3330058.982
	Y 659896.493
P.I. STA. 56+00.21	X 3324802.987
	Y 661828.982
P.I. STA. 101+13	X 3320342.321
	Y 661812.682

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH OCAIN
PLOT SCALE: 1=1
PLOT DATE: 20 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

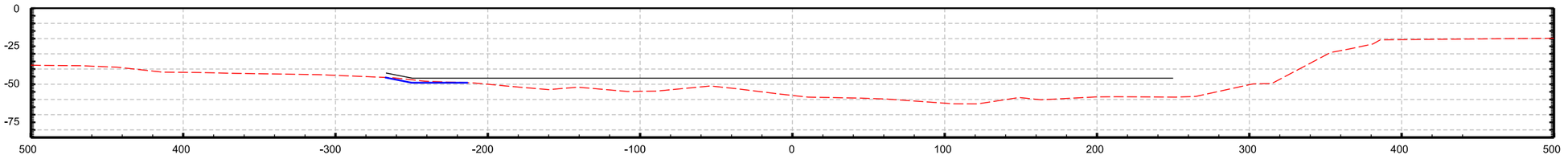
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

MEDORA
48' AND 50' PROJECT DEPTHS

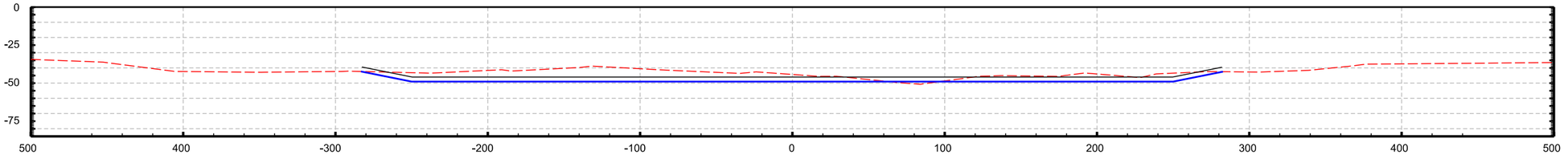
SHEET IDENTIFICATION
C-04

MEDORA CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

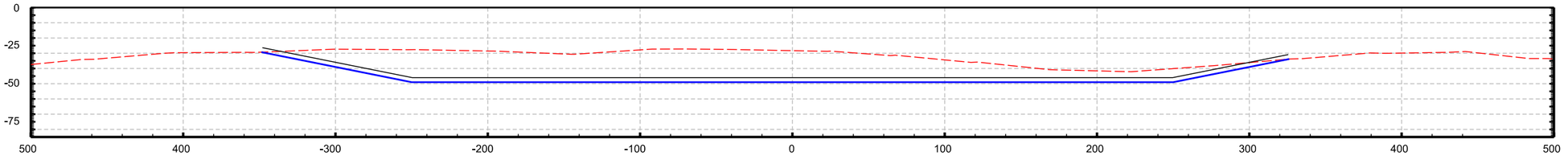
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.00' NAVD88)
3' ADVANCE MAINTENANCE (-49.00' NAVD88)



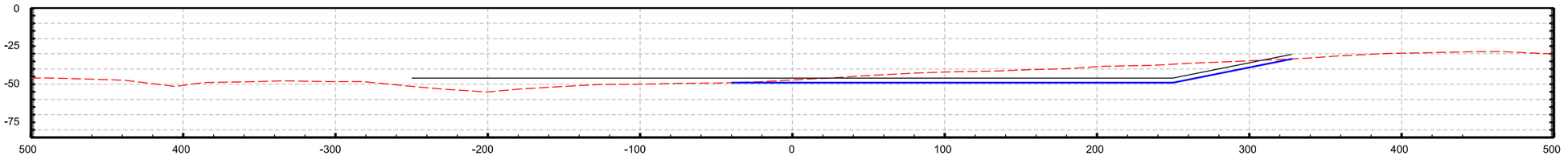
STA. 75+00



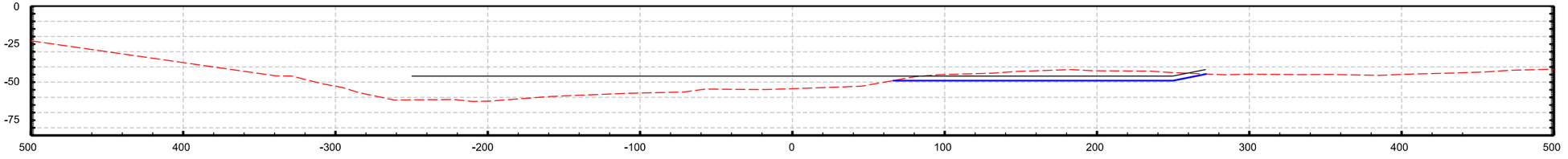
STA. 60+00



STA. 35+00



STA. 15+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 15 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

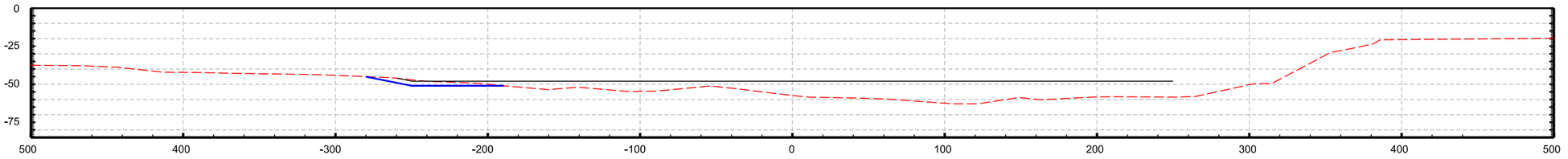
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

MEDORA
CROSS SECTIONS
48' PROJECT DEPTH

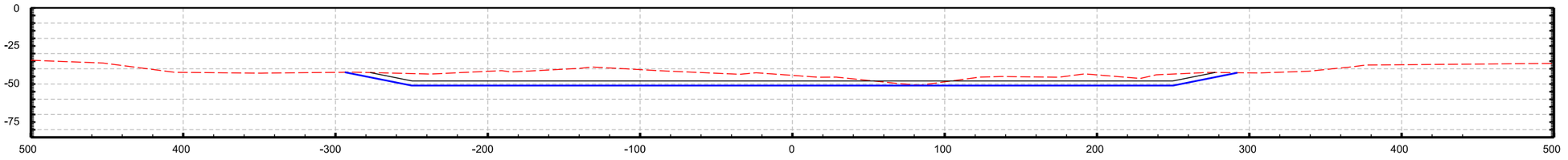
SHEET IDENTIFICATION
C-04A

MEDORA CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

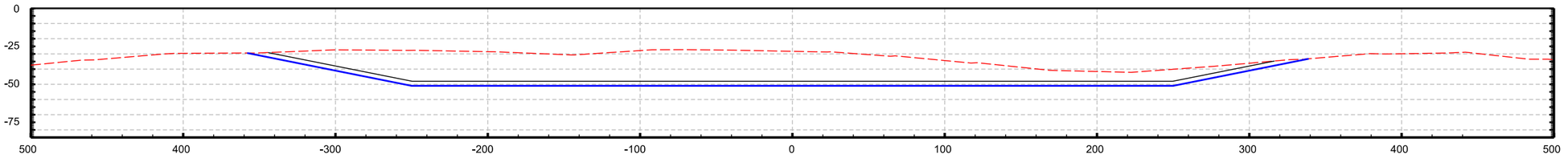
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.00' NAVD88)
3' ADVANCE MAINTENANCE (-51.00' NAVD88)



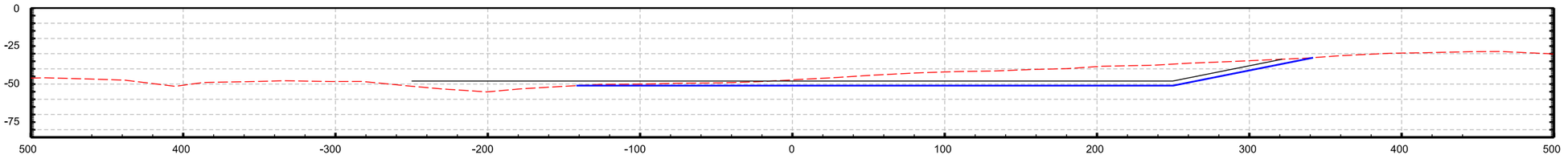
STA. 75+00



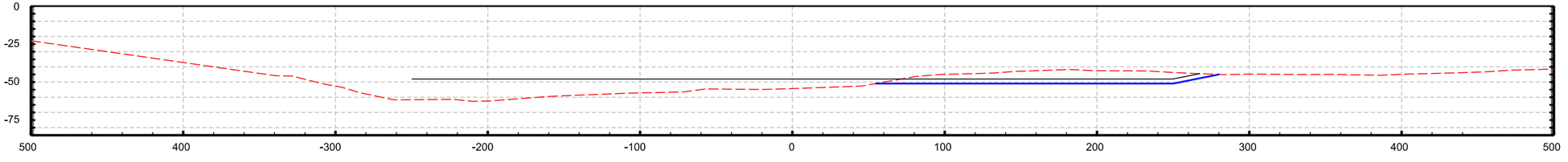
STA. 60+00



STA. 35+00



STA. 15+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 15 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

MEDORA
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-04B

MISSISSIPPI RIVER CROSSING, MEDORA, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	1,039.80	0.00
5+00.00	2,116.10	29,221.40
10+00.00	4,225.40	58,717.10
15+00.00	2,366.60	61,036.20
20+00.00	1,724.50	37,880.50
25+00.00	327.00	18,995.70
30+00.00	1,894.10	20,565.80
35+00.00	9,855.20	108,790.10
40+00.00	8,641.70	171,267.80
45+00.00	5,727.80	133,051.10
50+00.00	3,693.70	87,236.20
55+00.00	3,333.90	65,070.00
60+00.00	2,748.70	56,319.80
65+00.00	1,221.10	36,757.00
70+00.00	265.90	13,768.70
75+00.00	45.80	2,886.50
80+00.00	62.50	1,002.80
85+00.00	71.50	1,241.00
90+00.00	0.00	662.20
95+00.00	79.3	734.1
100+00.00	0.1	734.9
101+13.09	0	0.2
	TOTAL:	**905,939.10 CY**

MISSISSIPPI RIVER CROSSING, MEDORA, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	1,471.80	0.00
5+00.00	2,854.70	40,060.70
10+00.00	5,418.80	76,606.60
15+00.00	3,236.90	80,145.40
20+00.00	2,367.40	51,891.90
25+00.00	696.60	28,370.30
30+00.00	3,021.00	34,422.00
35+00.00	11,225.30	131,910.50
40+00.00	9,944.40	196,016.30
45+00.00	6,953.30	156,460.40
50+00.00	4,893.80	109,695.60
55+00.00	4,522.30	87,186.30
60+00.00	3,870.80	77,713.90
65+00.00	1,941.00	53,812.80
70+00.00	642.50	23,921.00
75+00.00	193.60	7,741.30
80+00.00	265.70	4,252.60
85+00.00	166.70	4,003.50
90+00.00	0.90	1,551.50
95+00.00	454.4	4216.1
100+00.00	61.2	4773.9
101+13.09	50.1	232.9
	TOTAL:	**1,174,985.50 CY**

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

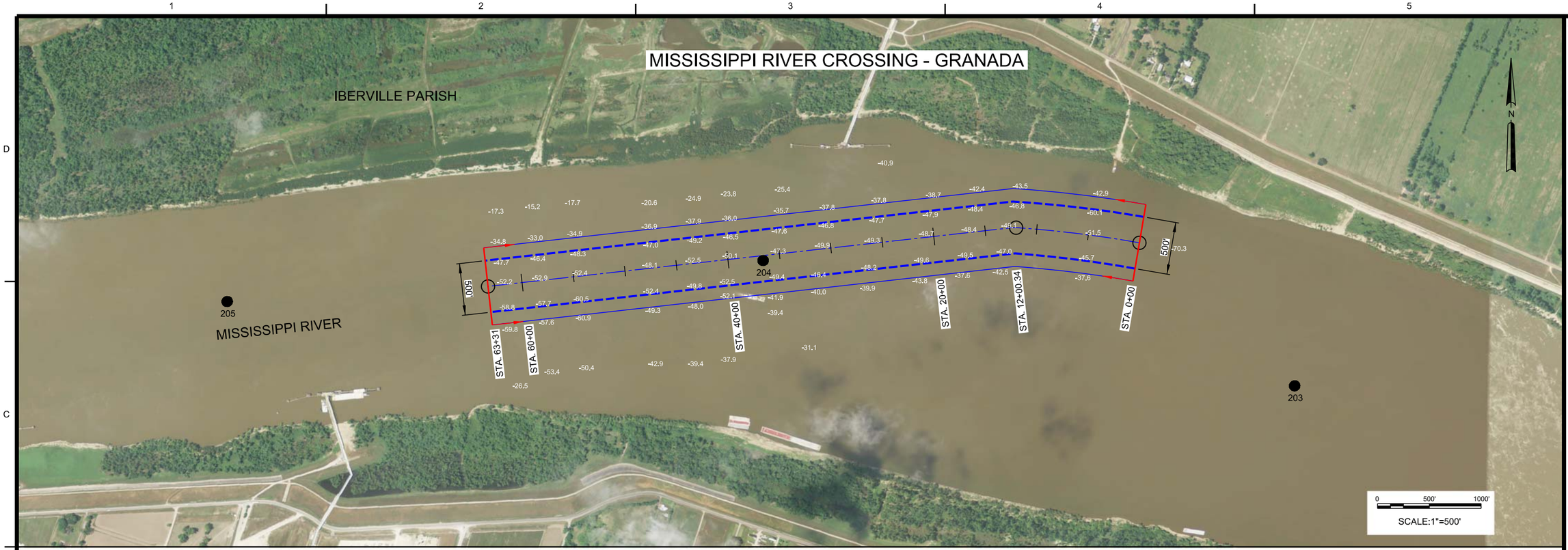
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

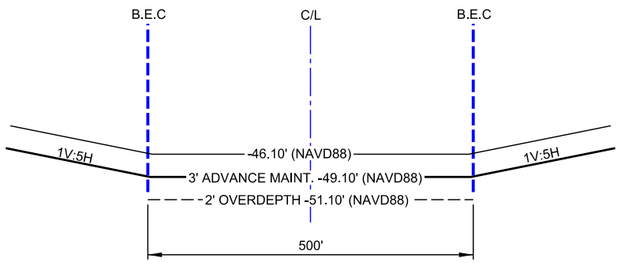
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

MEDORA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-04C

MISSISSIPPI RIVER CROSSING - GRANADA





NOTES:

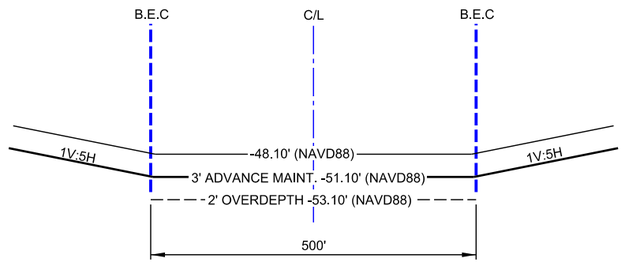
1) 48' PROJECT DEPTH EQUATES TO -46.00' (NAVD88) FOR THE GRANADA CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-05A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-05C.

4) DREDGING LIMITS FROM STA. 0+00 TO 63+31.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.00' (NAVD88) FOR THE GRANADA CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-05B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-05C.

4) DREDGING LIMITS FROM STA. 0+00 TO 63+31.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -0,0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3339950.079
	Y 647487.100
P.I. STA. 12+00.34	X 3338762.386
	Y 647633.077
P.I. STA. 63+31	X 3333660.832
	Y 647065.641

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 20-APR-2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

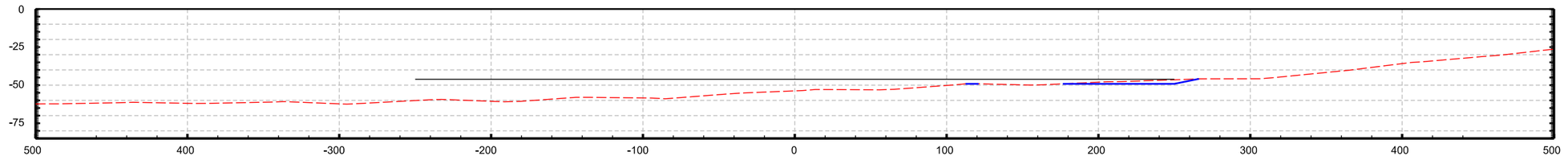
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

GRANADA
48' AND 50' PROJECT DEPTHS

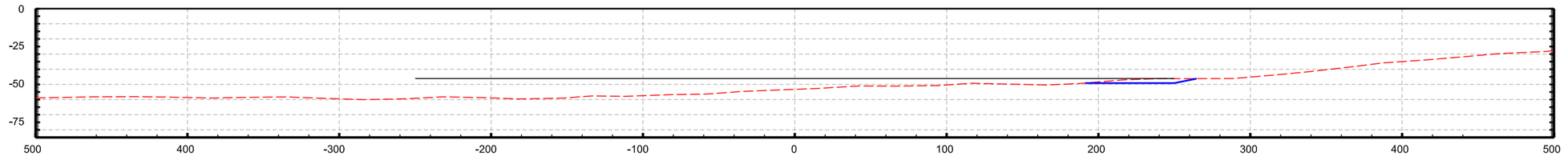
SHEET IDENTIFICATION
C-05

GRENADA CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

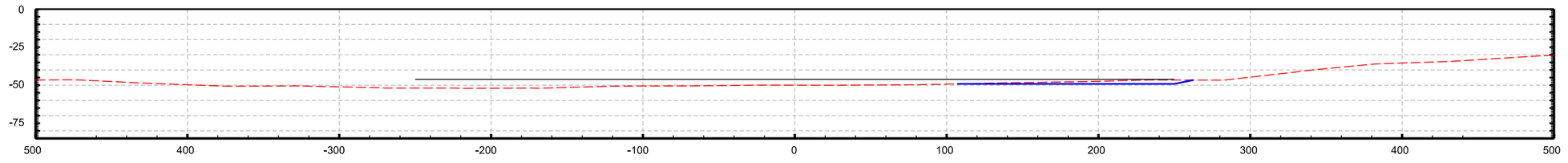
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.10' NAVD88)
3' ADVANCE MAINTENANCE (-49.10' NAVD88)



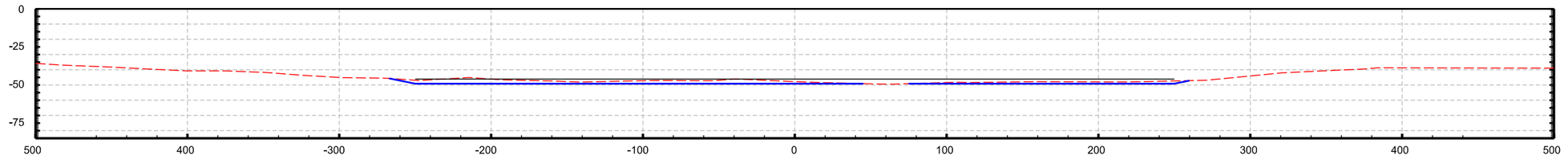
STA. 63+30



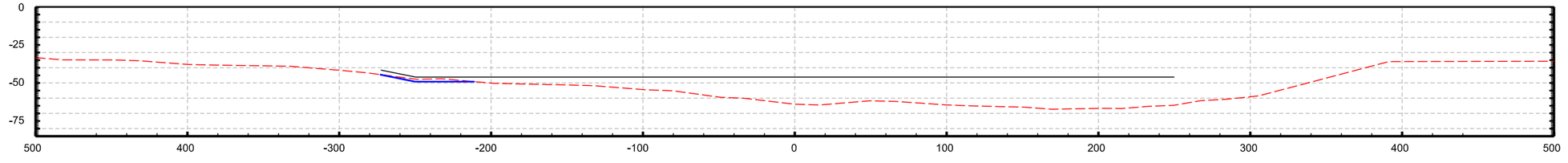
STA. 60+00



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 1/5/2016
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

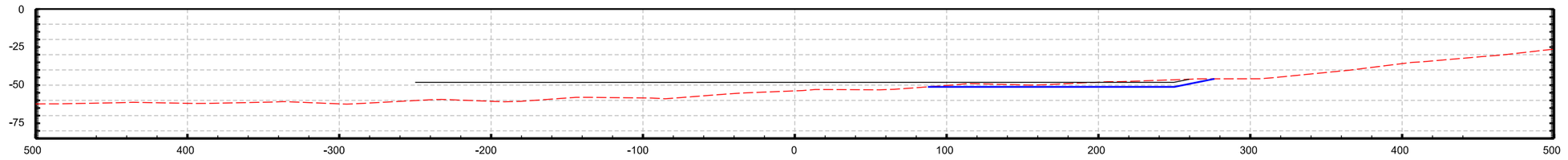
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

GRENADA
CROSS SECTIONS
48' PROJECT DEPTH

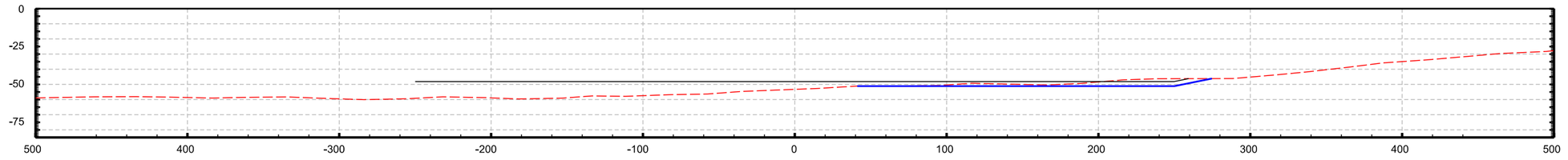
SHEET IDENTIFICATION
C-05A

GRENADA CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

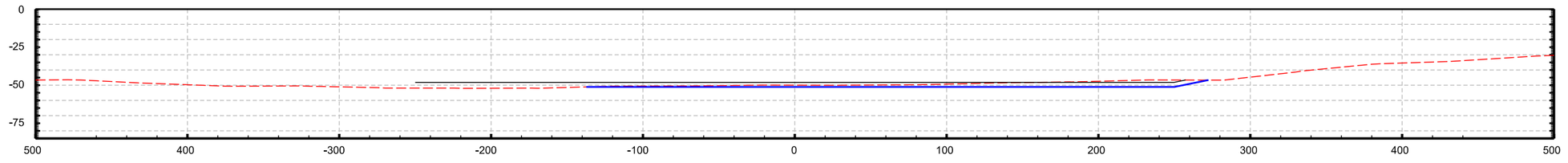
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.10' NAVD88)
3' ADVANCE MAINTENANCE (-51.10' NAVD88)



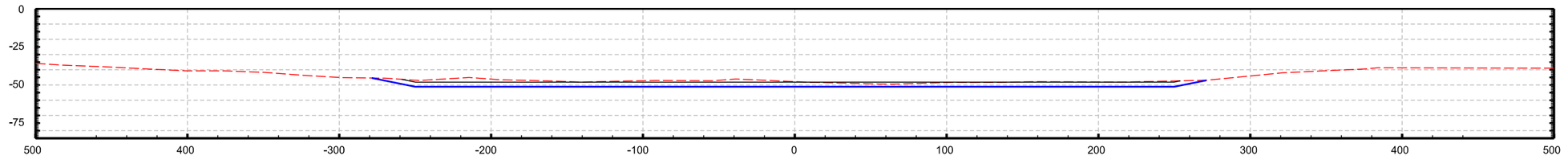
STA. 63+30



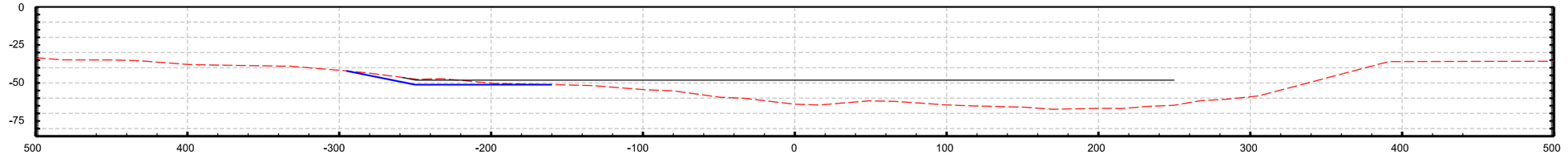
STA. 60+00



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 1/5/2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

GRENADA
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-05B

MISSISSIPPI RIVER CROSSING, GRANADA, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	69.30	0.00
5+00.00	725.70	7,361.40
10+00.00	781.70	13,957.40
15+00.00	759.10	14,266.70
20+00.00	785.40	14,301.00
25+00.00	652.10	13,309.50
30+00.00	717.80	12,684.20
35+00.00	506.90	11,339.80
40+00.00	209.80	6,635.70
45+00.00	95.10	2,822.90
50+00.00	268.20	3,363.40
55+00.00	93.30	3,346.70
60+00.00	136.80	2,129.80
63+30.33	126.20	1,608.60
	TOTAL:	**107,127.10 CY**

MISSISSIPPI RIVER CROSSING, GRANADA, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	252.80	0.00
5+00.00	1,295.60	14,337.30
10+00.00	1,731.00	28,023.90
15+00.00	1,819.60	32,875.80
20+00.00	1,857.20	34,044.60
25+00.00	1,718.20	33,105.60
30+00.00	1,781.50	32,404.70
35+00.00	1,401.90	29,476.30
40+00.00	773.80	20,145.50
45+00.00	570.00	12,441.90
50+00.00	788.90	12,582.40
55+00.00	341.60	10,468.40
60+00.00	421.20	7,063.70
63+30.33	443.30	5,288.30
	TOTAL:	**272,258.40 CY**

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

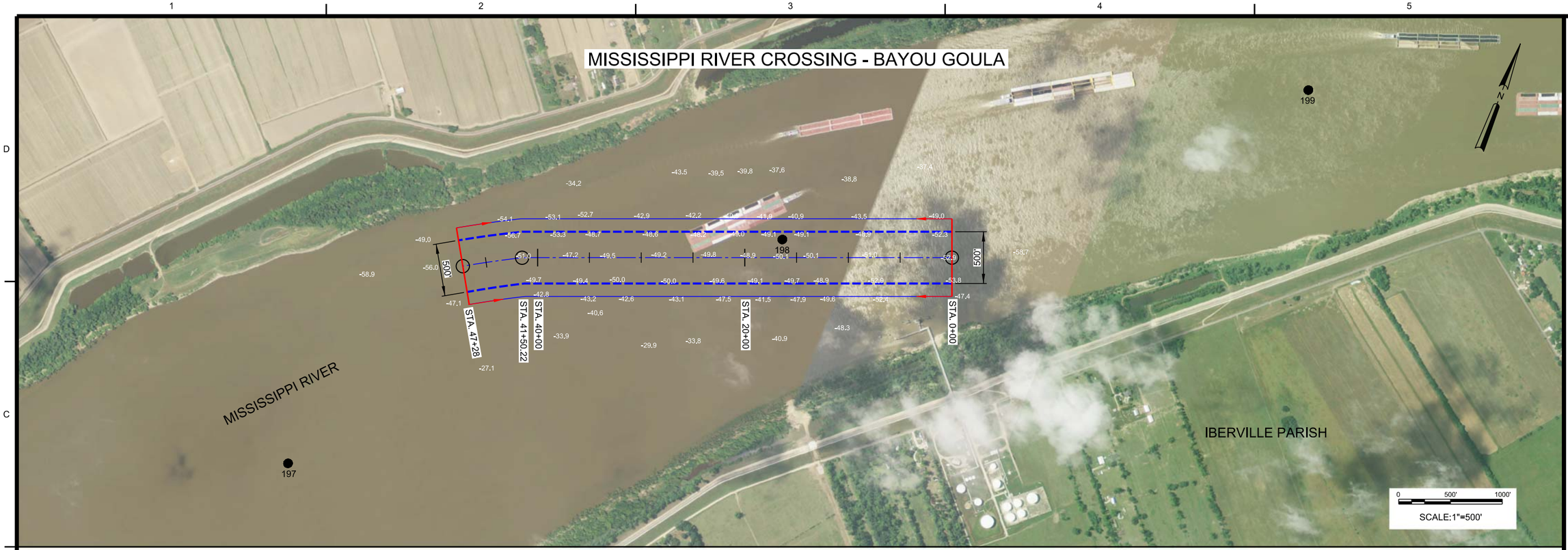
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 29 SEP 2016
FILE NUMBER:
FILE NAME:

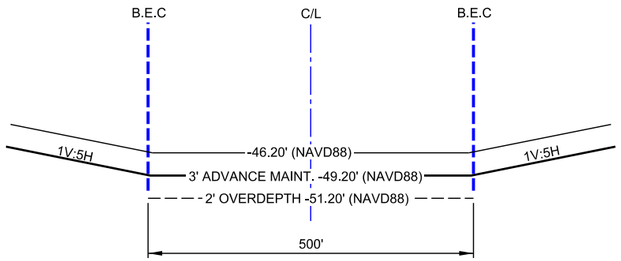
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

GRANADA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-05C

MISSISSIPPI RIVER CROSSING - BAYOU GOULA





NOTES:

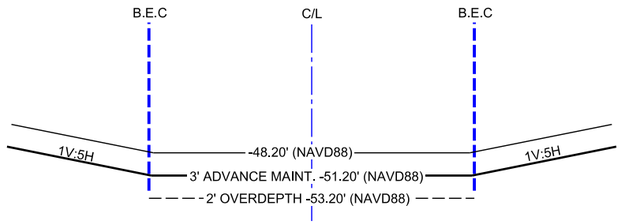
1) 48' PROJECT DEPTH EQUATES TO -46.20' (NAVD88) FOR THE BAYOU GOULA CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-06A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-06C.

4) DREDGING LIMITS FROM STA. 0+00 TO 47+28.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.20' (NAVD88) FOR THE BAYOU GOULA CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-06B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-06C.

4) DREDGING LIMITS FROM STA. 0+00 TO 47+28.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -0.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3344357.388
	Y 629359.378
P.I. STA. 41+50.22	X 3340488.677
	Y 627857.679
P.I. STA. 63+31	X 3339984.490
	Y 627574.848

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK | DESCRIPTION | DATE | APPR.

MARK | DESCRIPTION | DATE | APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

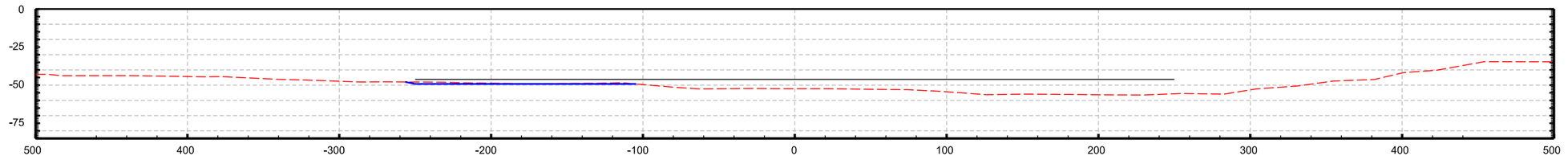
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BAYOU GOULA
48' AND 50' PROJECT DEPTHS

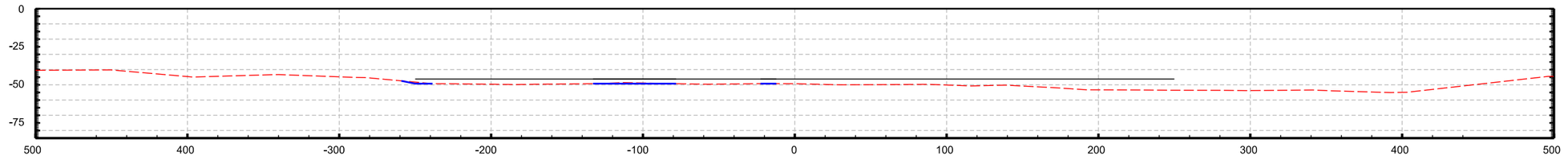
SHEET IDENTIFICATION
C-06

BAYOU GOULA CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

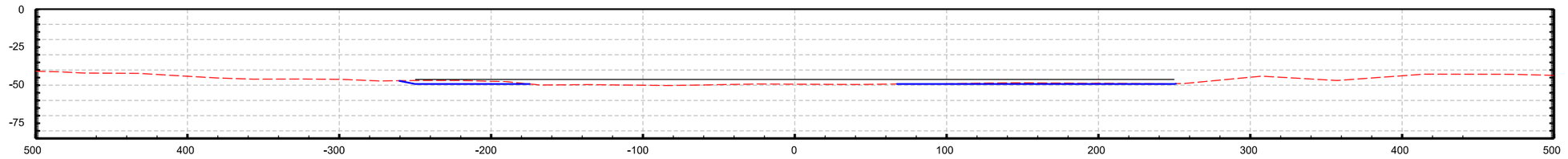
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.20' NAVD88)
3' ADVANCE MAINTENANCE (-49.20' NAVD88)



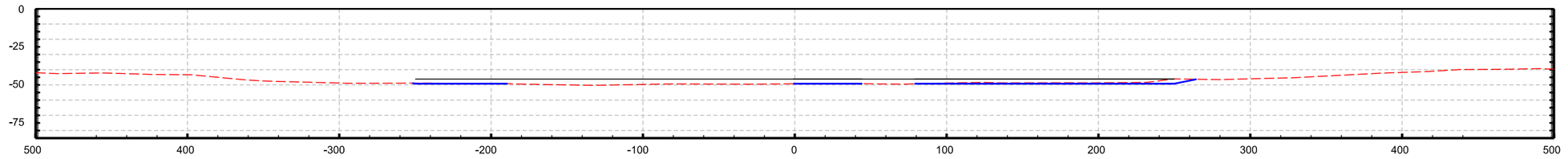
STA. 47+28



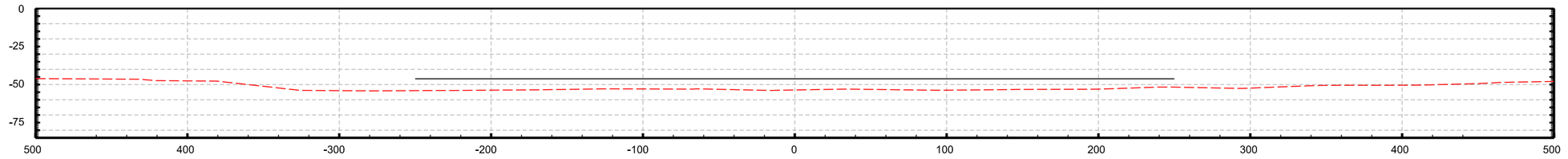
STA. 40+00



STA. 30+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 15 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

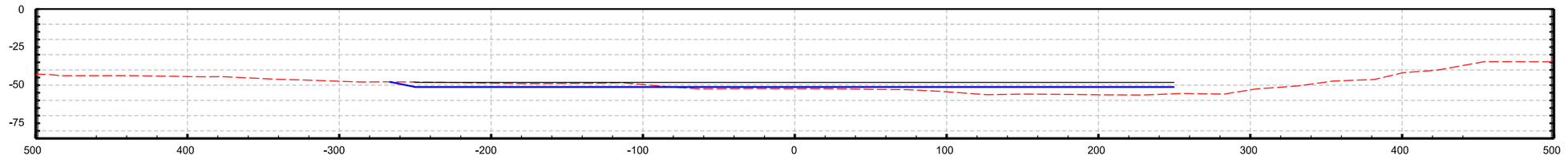
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BAYOU GOULA
CROSS SECTIONS
48' PROJECT DEPTH

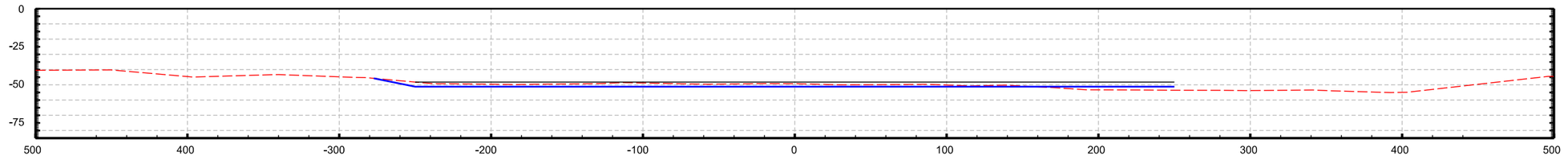
SHEET IDENTIFICATION
C-06A

BAYOU GOULA CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

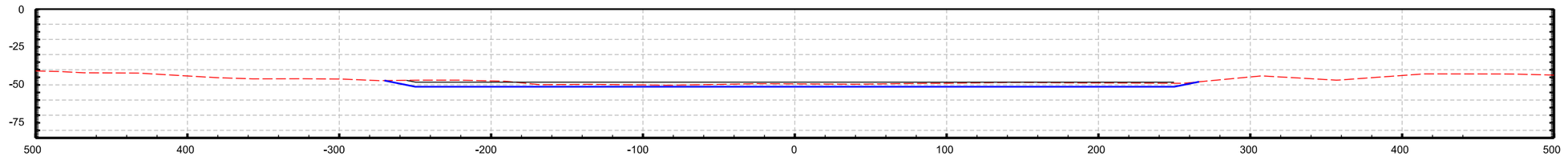
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.20' NAVD88)
3' ADVANCE MAINTENANCE (-51.20' NAVD88)



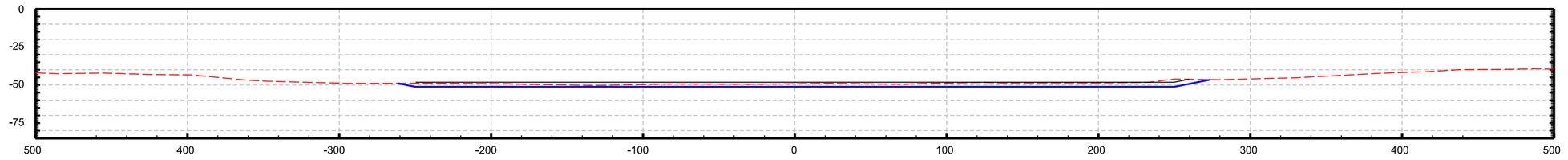
STA. 47+28



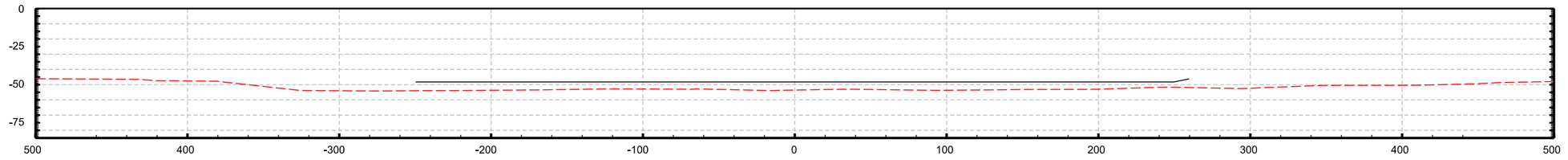
STA. 40+00



STA. 30+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 15 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BAYOU GOULA
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-06B

MISSISSIPPI RIVER CROSSING, BAYOU GOULA, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	2.50	23.20
15+00.00	13.30	146.50
20+00.00	168.80	1,685.90
25+00.00	113.10	2,609.60
30+00.00	244.40	3,310.30
35+00.00	18.30	2,432.50
40+00.00	28.30	431.80
45+00.00	53.50	757.70
47+28.14	90.30	607.50
	TOTAL:	**12,005.00 CY**

MISSISSIPPI RIVER CROSSING, BAYOU GOULA, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	73.60	681.10
10+00.00	507.80	5,382.90
15+00.00	646.90	10,691.60
20+00.00	1,136.50	16,512.80
25+00.00	958.20	19,395.30
30+00.00	1,189.80	19,889.10
35+00.00	882.70	19,189.40
40+00.00	703.90	14,690.20
45+00.00	473.80	10,904.20
47+28.14	427.90	3,809.30
	TOTAL:	**121,145.90 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

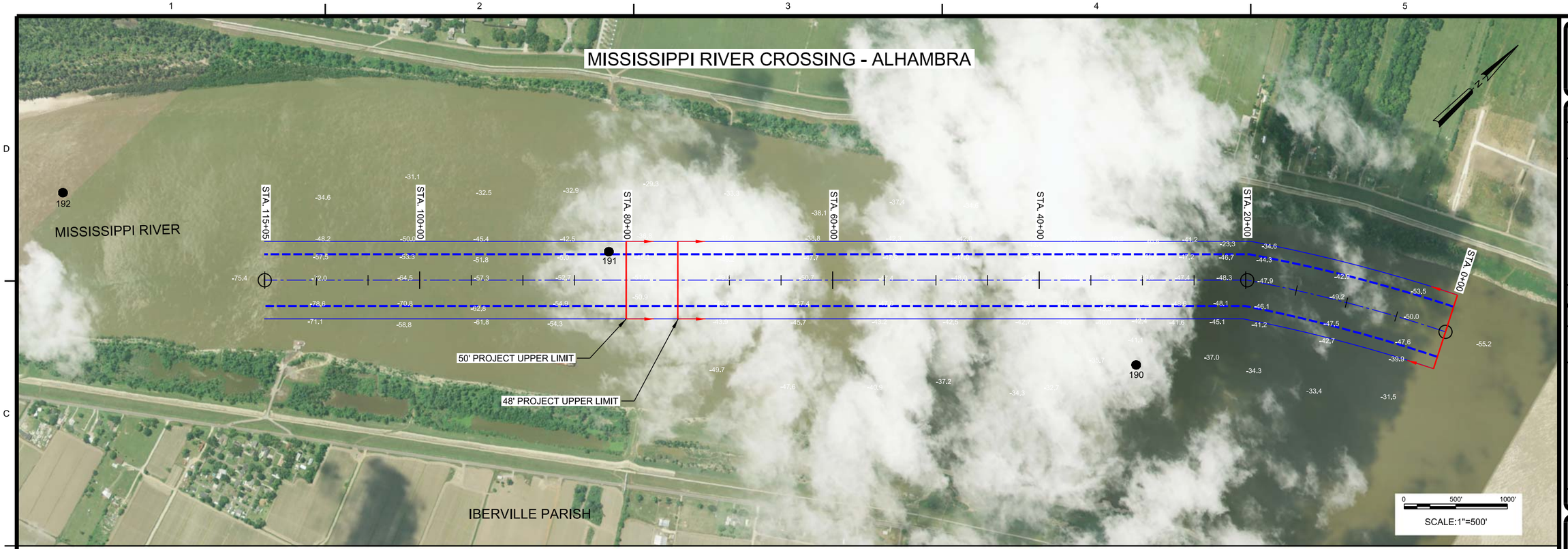
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

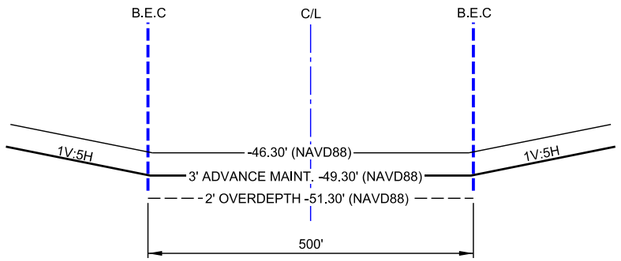
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BAYOU GOULA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-06C

MISSISSIPPI RIVER CROSSING - ALHAMBRA





NOTES:

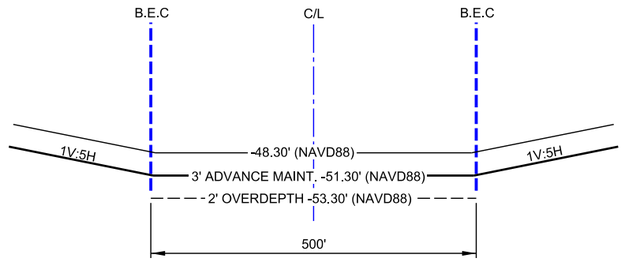
1) 48' PROJECT DEPTH EQUATES TO -46.30' (NAVD88) FOR THE ALHAMBRA CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-07A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-07C.

4) DREDGING LIMITS FROM STA. 0+00 TO 75+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.30' (NAVD88) FOR THE ALHAMBRA CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-06B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-07C.

4) DREDGING LIMITS FROM STA. 0+00 TO 80+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3355464.239
	Y 622010.180
P.I. STA. 19+50.72	X 3353774.750
	Y 620970.970
P.I. STA. 115+05	X 3347183.477
	Y 614101.561

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR
MARK	DESCRIPTION	DATE	APPR

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 20 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

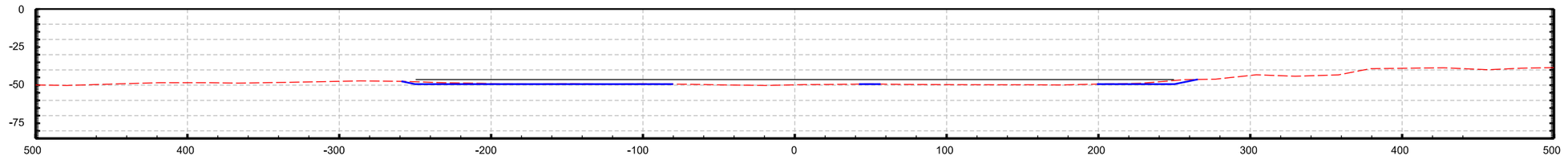
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

ALHAMBRA
48' AND 50' PROJECT DEPTHS

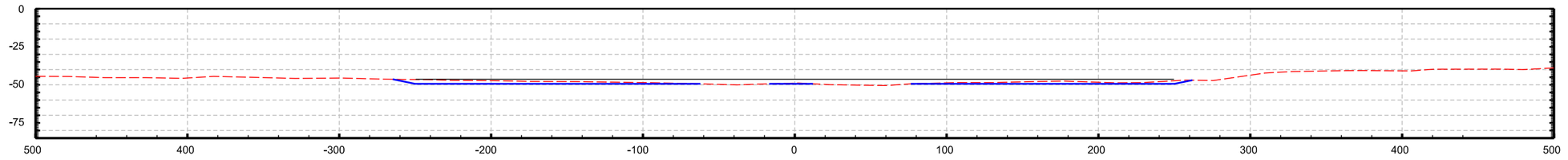
SHEET IDENTIFICATION
C-07

ALHAMBRA CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

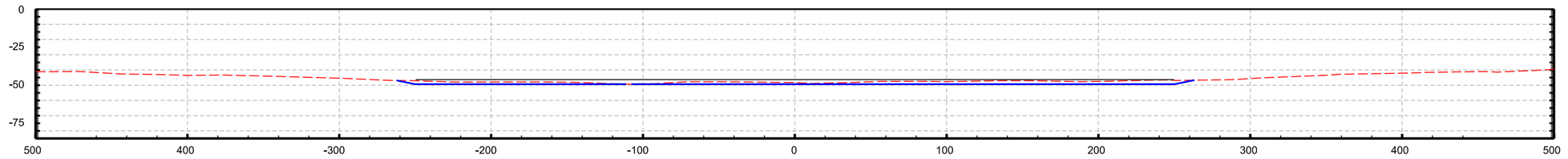
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.30' NAVD88)
3' ADVANCE MAINTENANCE (-49.30' NAVD88)



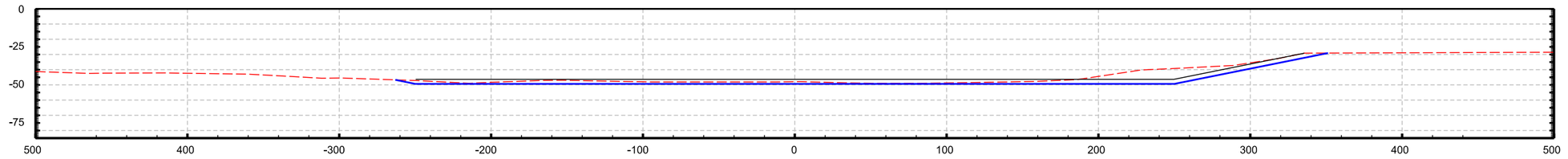
STA. 75+00



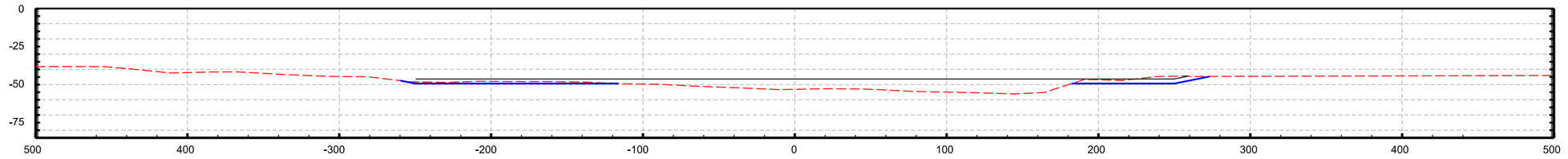
STA. 60+00



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 1/5/2016
FILE NUMBER:
FILE NAME:

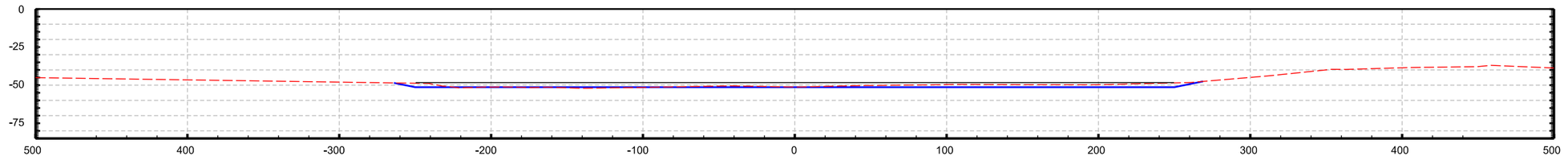
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

ALHAMBRA
CROSS SECTIONS
48' PROJECT DEPTH

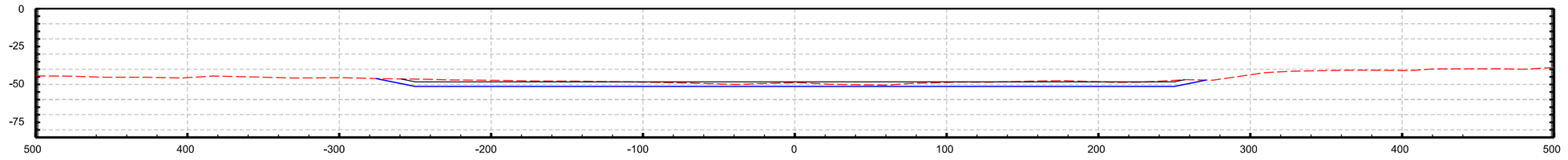
SHEET IDENTIFICATION
C-07A

ALHAMBRA CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

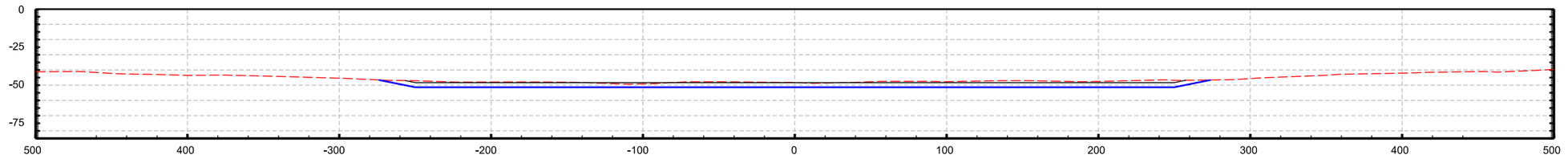
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.30' NAVD88)
3' ADVANCE MAINTENANCE (-51.30' NAVD88)



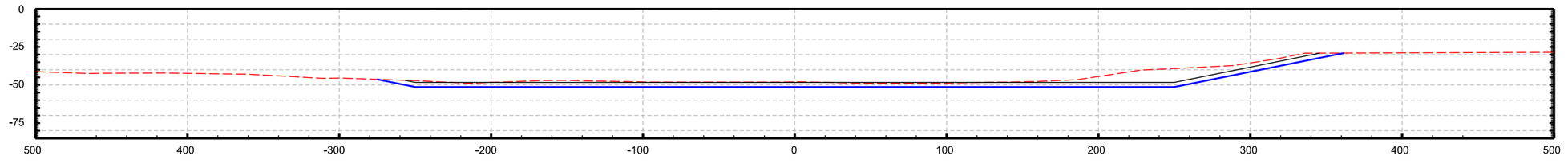
STA. 80+00



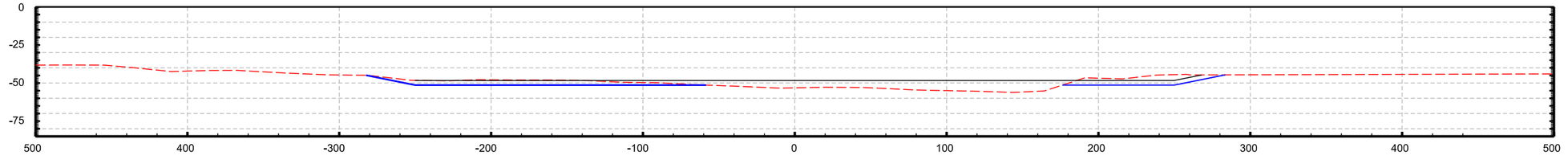
STA. 60+00



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 26 OCT 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

ALHAMBRA
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-07B

MISSISSIPPI RIVER CROSSING, ALHAMBRA, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	408.20	0.00
5+00.00	180.80	5,453.90
10+00.00	539.30	6,667.20
15+00.00	876.00	13,104.00
20+00.00	1,493.70	21,941.40
25+00.00	667.30	20,009.60
30+00.00	1,127.20	16,615.90
35+00.00	821.00	18,039.30
40+00.00	787.80	14,896.50
45+00.00	940.00	15,997.80
50+00.00	701.20	15,196.50
55+00.00	813.50	14,025.50
60+00.00	499.50	12,158.00
65+00.00	308.20	7,479.40
70+00.00	329.10	5,901.70
75+00.00	131.60	4,266.60
80+00.00	20.70	1,410.80
85+00.00	0.00	191.80
90+00.00	0.00	0.00
95+00.00	0.00	0.00
100+00.00	0.00	0.00
105+00.00	0.00	0.00
110+00.00	0.00	0.00
	TOTAL:	**193,355.90 CY**

MISSISSIPPI RIVER CROSSING, ALHAMBRA, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	986.50	0.00
5+00.00	666.30	15,303.70
10+00.00	1,437.20	19,476.30
15+00.00	1,995.00	31,779.40
20+00.00	2,744.50	43,884.20
25+00.00	1,731.30	41,443.00
30+00.00	2,198.30	36,385.80
35+00.00	1,913.00	38,067.90
40+00.00	1,860.60	34,941.00
45+00.00	2,038.10	36,098.80
50+00.00	1,774.90	35,305.30
55+00.00	1,878.90	33,831.30
60+00.00	1,509.70	31,376.00
65+00.00	1,280.00	25,830.70
70+00.00	1,306.80	23,951.90
75+00.00	1,101.50	22,299.40
80+00.00	498.30	14,812.90
85+00.00	188.60	6,359.80
90+00.00	111.00	2,773.50
95+00.00	30.80	1,312.30
100+00.00	0.00	284.80
105+00.00	0.00	0.00
110+00.00	0.00	0.00
	TOTAL:	**495,518.00 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

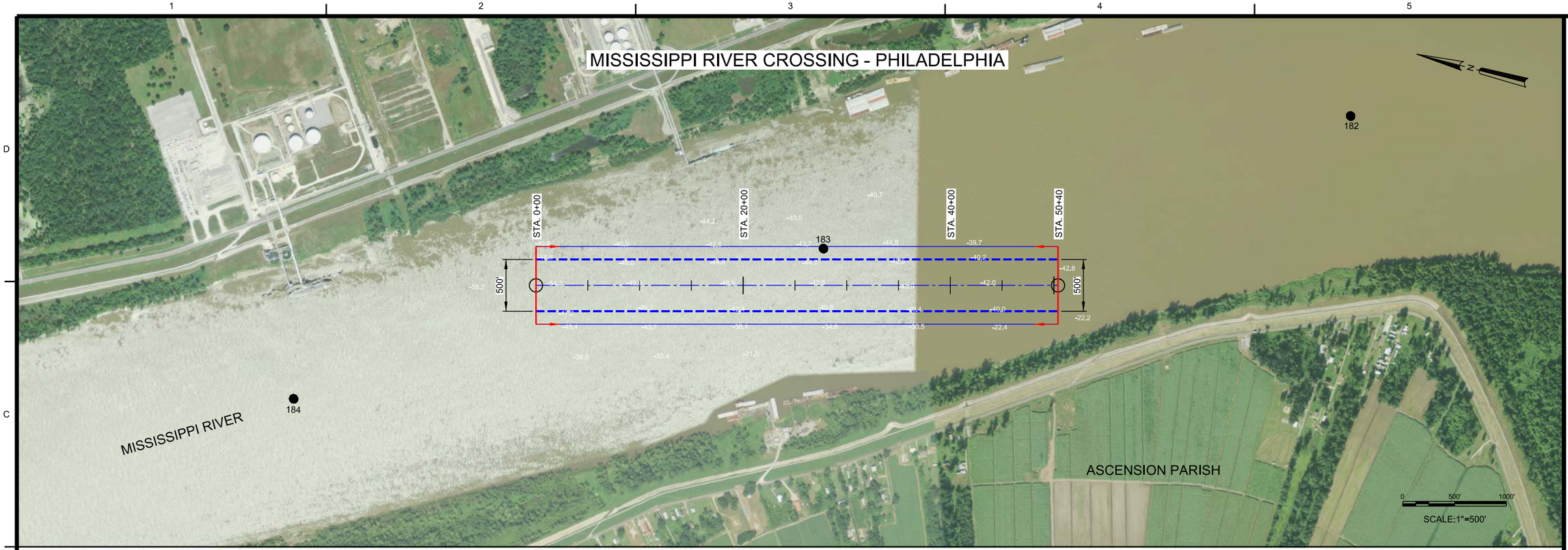
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

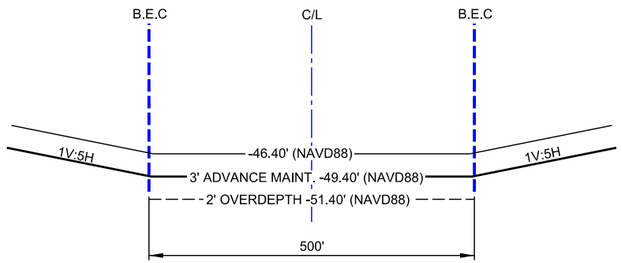
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

ALHAMBRA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-07C





NOTES:

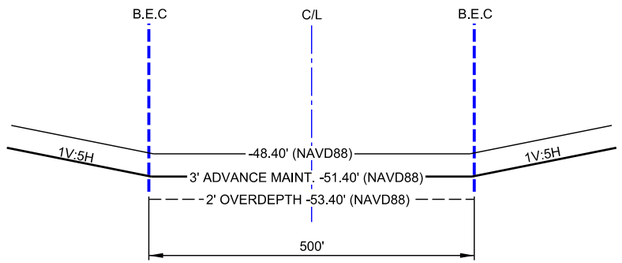
1) 48' PROJECT DEPTH EQUATES TO -46.30' (NAVD88) FOR THE PHILADELPHIA CROSSING LOCATION.

2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-08A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-07C.

4) DREDGING LIMITS FROM STA. 0+00 TO 75+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH
NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.30' (NAVD88) FOR THE PHILADELPHIA CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-08B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-07C.

4) DREDGING LIMITS FROM STA. 0+00 TO 75+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH
NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3382319.649
	Y 611265.705
P.I. STA. 50+40	X 3383585.306
	Y 606386.797

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE:
PLOT DATE: 29 SEP 2016
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SIZE: ANSI D
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

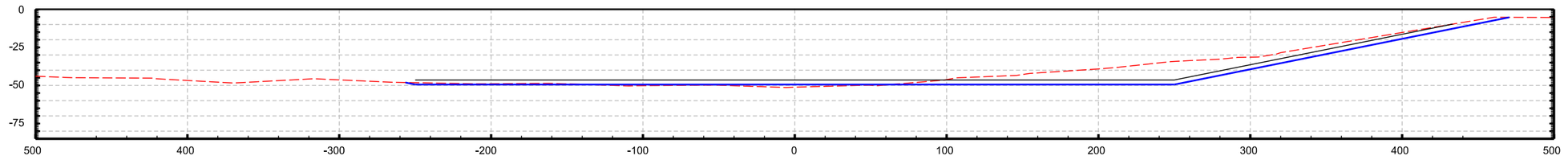
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

PHILADELPHIA
48' AND 50' PROJECT DEPTHS

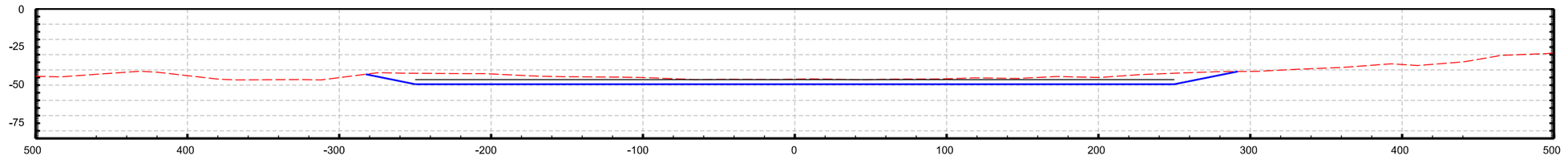
SHEET IDENTIFICATION
C-08

PHILADELPHIA CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

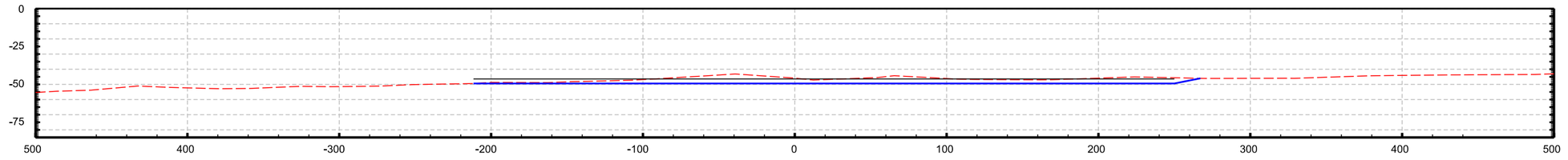
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.40' NAVD88)
3' ADVANCE MAINTENANCE (-49.40' NAVD88)



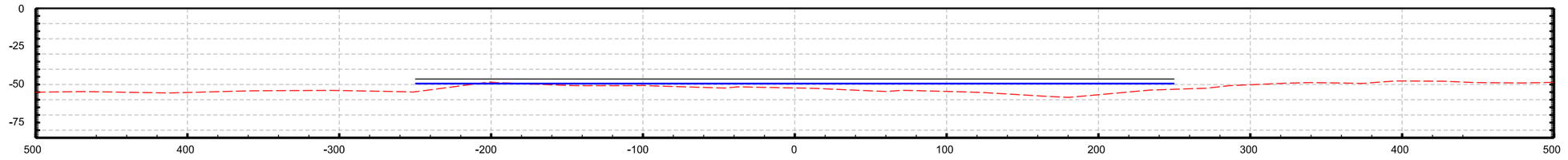
STA. 50+40



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
PLOT DATE: 1/5/2016
FILE NAME:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

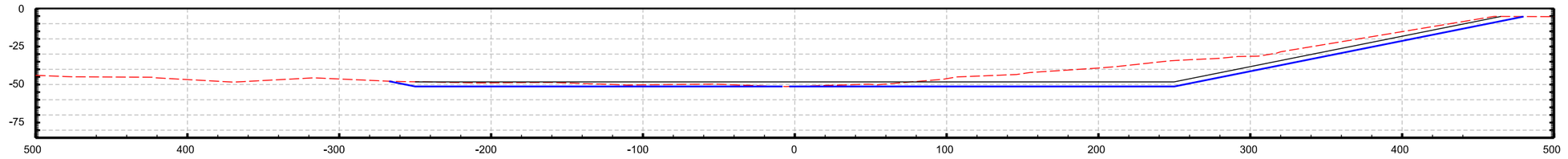
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

PHILADELPHIA
CROSS SECTIONS
48' PROJECT DEPTH

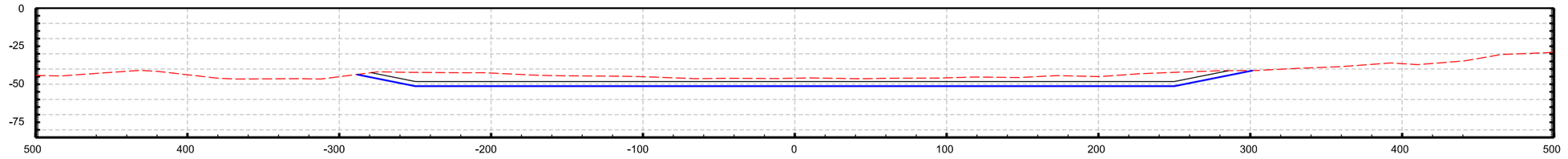
SHEET IDENTIFICATION
C-08A

PHILADELPHIA CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

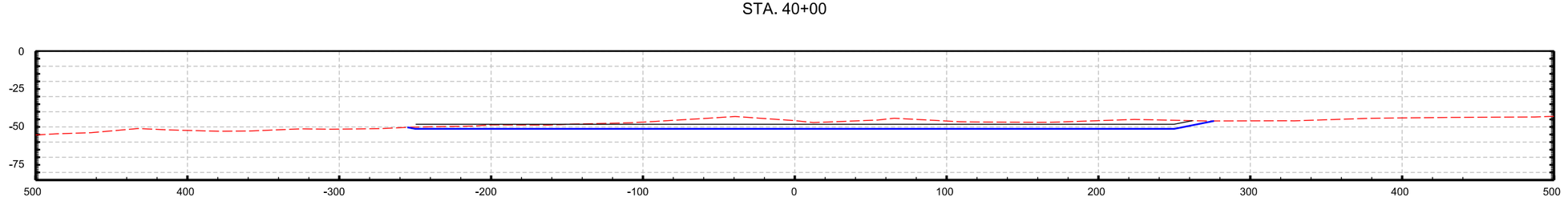
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.40' NAVD88)
3' ADVANCE MAINTENANCE (-51.40' NAVD88)



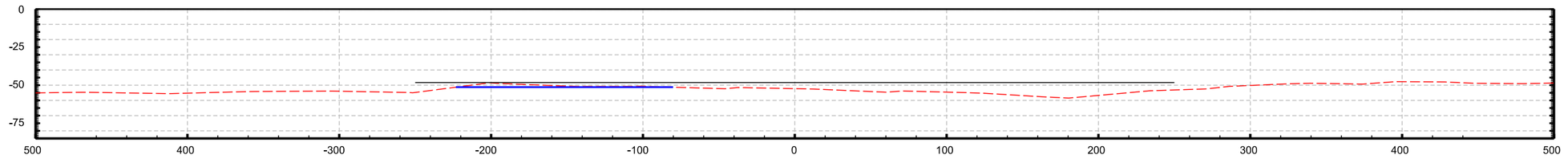
STA. 50+40



STA. 40+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 1/5/2016
FILE NAME:
FILE NUMBER:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

PHILADELPHIA
CROSS SECTIONS
48' PROJECT DEPTH

SHEET IDENTIFICATION
C-08B

MISSISSIPPI RIVER CROSSING, PHILADELPHIA, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
50+40.40	0.00	0.00
	TOTAL:	**0.00 CY**

MISSISSIPPI RIVER CROSSING, PHILADELPHIA, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	151.90	0.00
5+00.00	164.20	2,927.00
10+00.00	75.80	2,222.50
15+00.00	1,762.90	17,025.30
20+00.00	2,429.10	38,814.40
25+00.00	2,267.00	43,482.30
30+00.00	3,445.00	52,889.60
35+00.00	3,643.00	65,630.00
40+00.00	3,652.30	67,548.60
45+00.00	2,443.40	56,441.00
50+00.00	3,661.60	56,527.60
50+40.40	4,033.40	5,757.10
	TOTAL:	**409,265.40 CY**

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

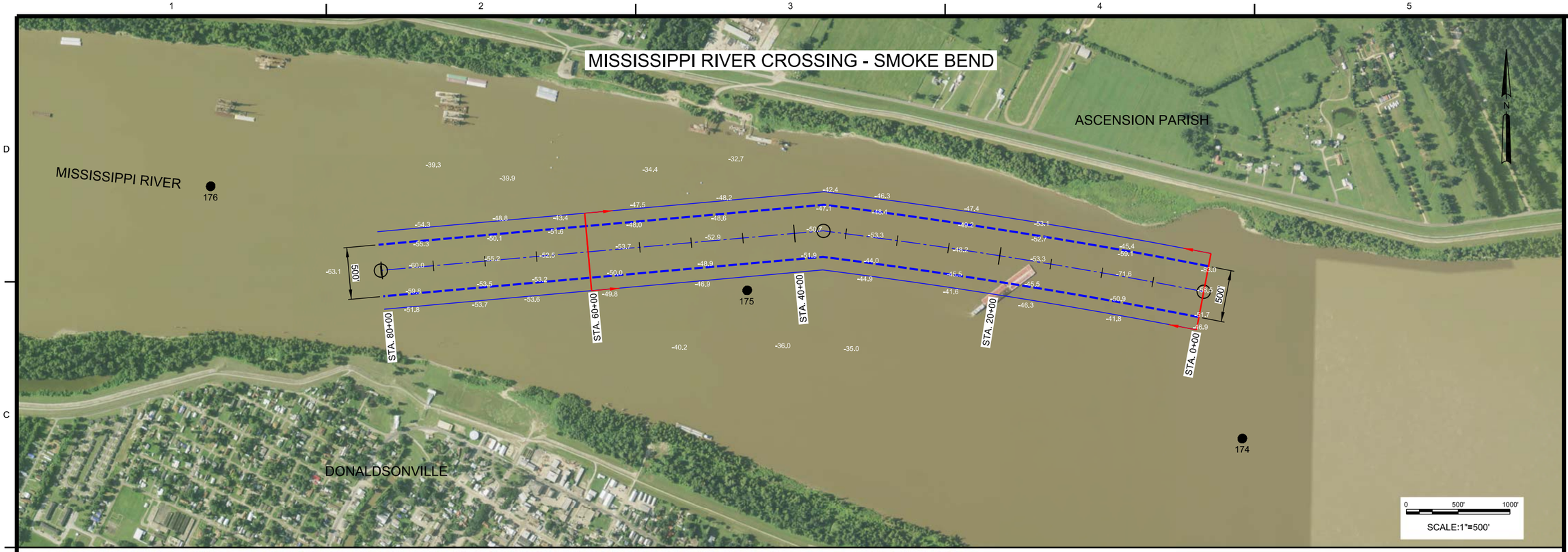
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1:1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

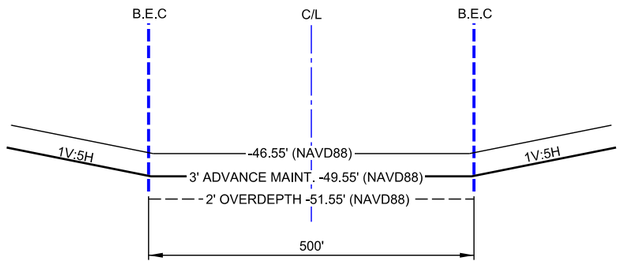
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

PHILADELPHIA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-08C

MISSISSIPPI RIVER CROSSING - SMOKE BEND





NOTES:

1) 48' PROJECT DEPTH EQUATES TO -46.55' (NAVD88) FOR THE SMOKE BEND CROSSING LOCATION.

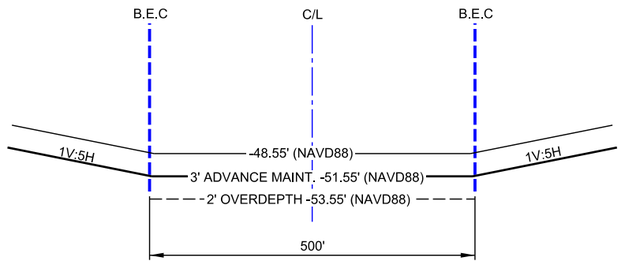
2) CROSS SECTIONS FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-09A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-09C.

4) DREDGING LIMITS FROM STA. 0+00 TO 60+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.55' (NAVD88) FOR THE SMOKE BEND CROSSING LOCATION.

2) CROSS SECTIONS FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-09B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-09C.

4) DREDGING LIMITS FROM STA. 0+00 TO 60+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATIONS (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3396675.365
	Y 586143.887
P.I. STA. 37+18.63	X 3393011.442
	Y 586729.608
P.I. STA. 80+09.13	X 3388730.584
	Y 586348.021

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH OCAIN
PLOT SCALE:
PLOT DATE: AS OF 2/2/2016
SIZE: ANSI D
FILE NAME:

DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

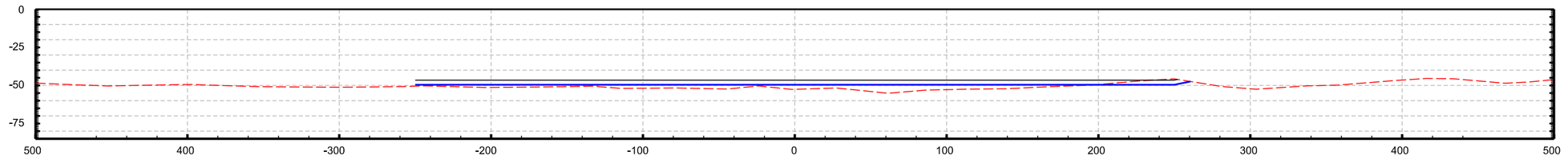
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

SMOKE BEND
48' AND 50' PROJECT DEPTHS

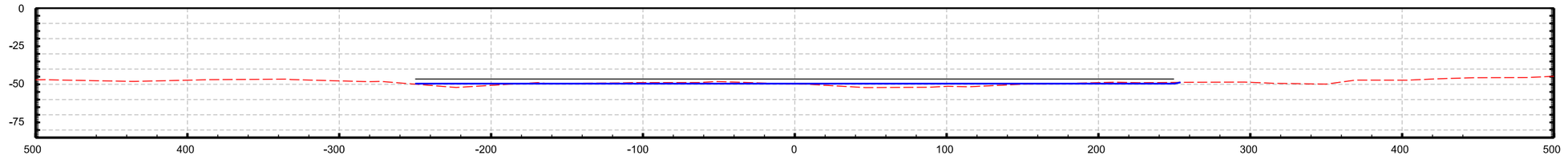
SHEET IDENTIFICATION
C-09

SMOKE BEND CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

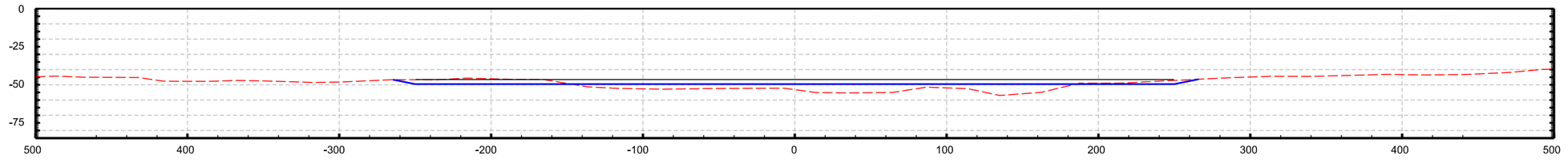
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.55' NAVD88)
3' ADVANCE MAINTENANCE (-49.55' NAVD88)



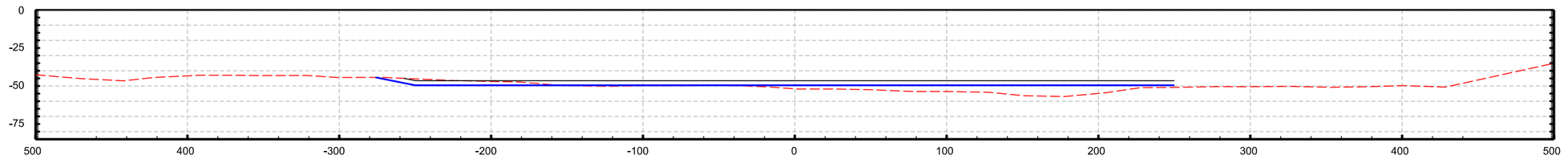
STA. 60+00



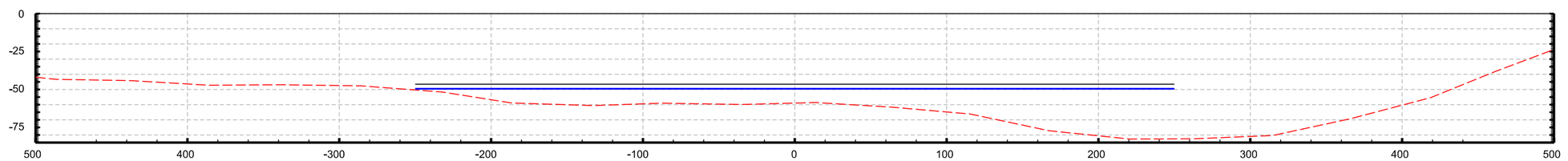
STA. 50+00



STA. 35+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 1/5/2016
FILE NAME:
FILE NUMBER:

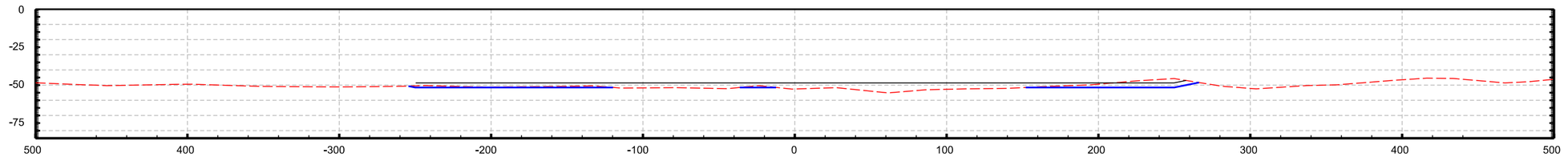
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

SMOKE BEND
CROSS SECTIONS
48' PROJECT DEPTH

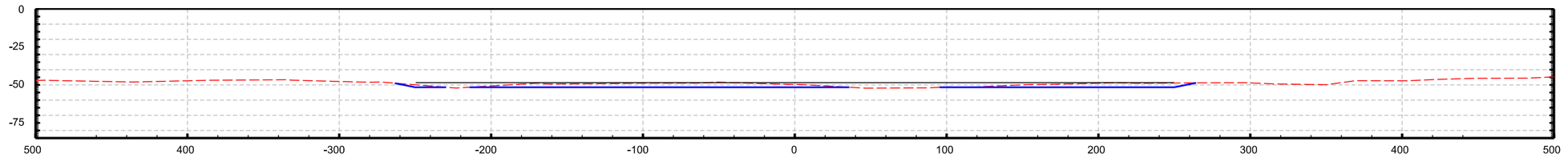
SHEET IDENTIFICATION
C-09A

SMOKE BEND CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

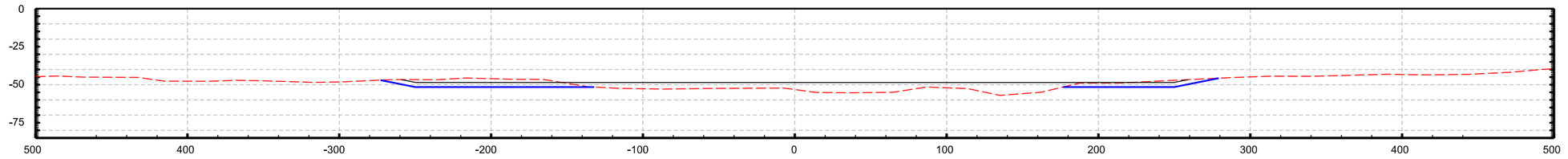
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.55' NAVD88)
3' ADVANCE MAINTENANCE (-51.55' NAVD88)



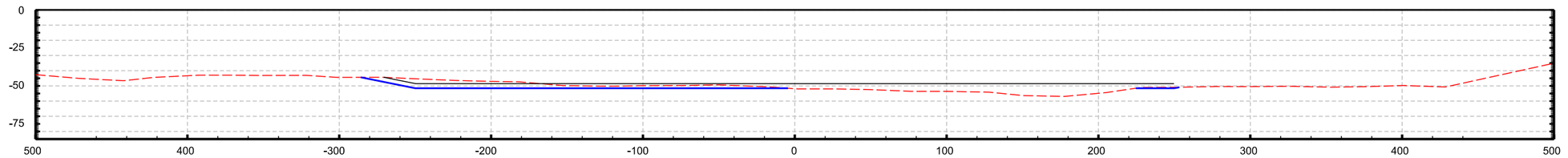
STA. 60+00



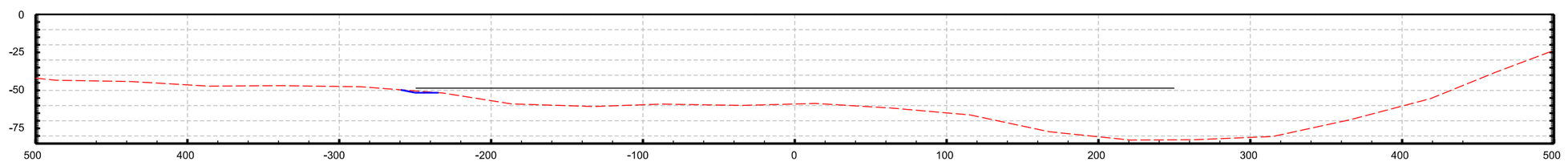
STA. 50+00



STA. 35+00



STA. 20+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 1/5/2016
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

SMOKE BEND
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-09B

MISSISSIPPI RIVER CROSSING, SMOKE BEND, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	24.30	225.00
15+00.00	157.20	1,680.50
20+00.00	296.50	4,201.20
25+00.00	266.40	5,212.00
30+00.00	324.30	5,469.40
35+00.00	414.60	6,841.50
40+00.00	114.70	4,900.90
45+00.00	250.30	3,379.90
50+00.00	147.40	3,682.30
55+00.00	182.10	3,051.00
60+00.00	127.70	2,869.00
65+00.00	0.00	1,182.80
70+00.00	0.00	0.00
75+00.00	0.00	0.00
80+00.00	0.00	0.00
80+08.86	0.00	0.00
	TOTAL:	**42,695.50 CY**

MISSISSIPPI RIVER CROSSING, SMOKE BEND, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	14.60	0.00
5+00.00	41.10	515.70
10+00.00	164.10	1,900.00
15+00.00	400.60	5,229.00
20+00.00	796.50	11,084.00
25+00.00	923.80	15,928.80
30+00.00	696.00	14,998.40
35+00.00	853.80	14,350.30
40+00.00	556.10	13,054.60
45+00.00	1,069.10	15,048.10
50+00.00	849.70	17,767.30
55+00.00	752.50	14,834.90
60+00.00	403.80	10,706.10
65+00.00	42.90	4,136.20
70+00.00	32.00	694.00
75+00.00	0.00	296.70
80+00.00	0.00	0.00
80+08.86	0.00	0.00
	TOTAL:	**140,544.10 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

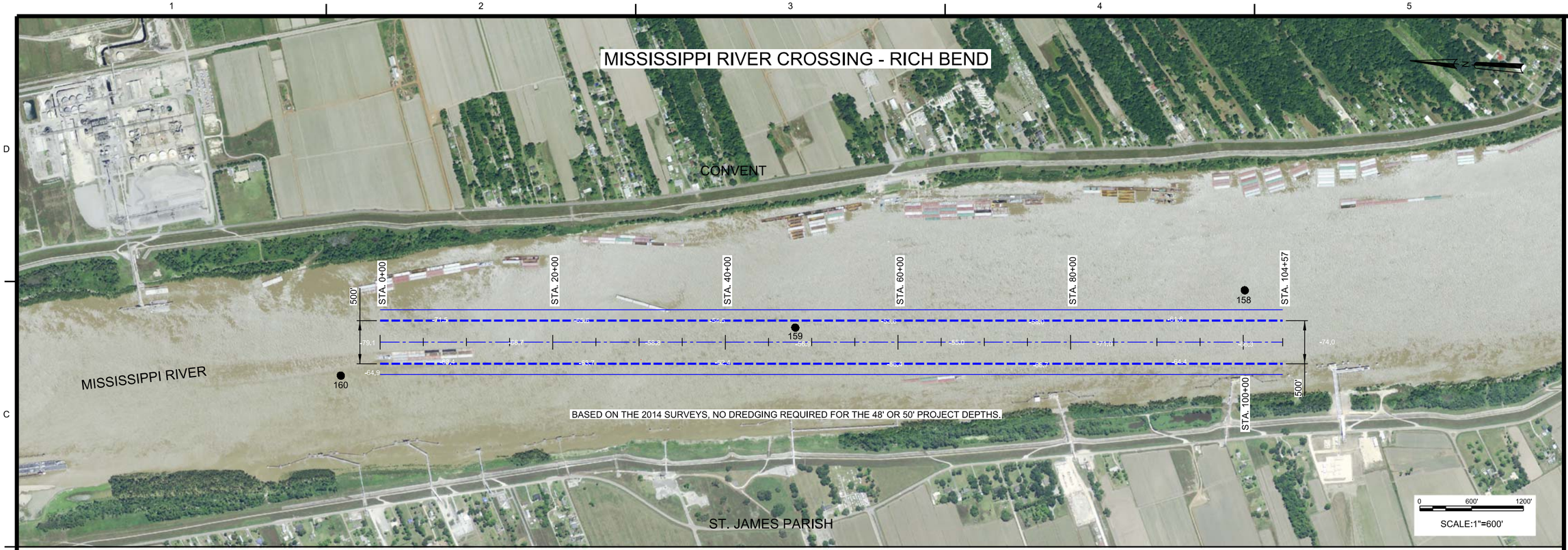
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
SIZE: ANSI D
PLOT DATE: 26 SEP 2016
FILE NAME:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

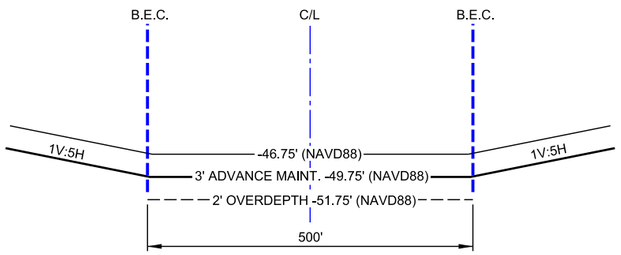
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

SMOKE BEND,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-09C

MISSISSIPPI RIVER CROSSING - RICH BEND





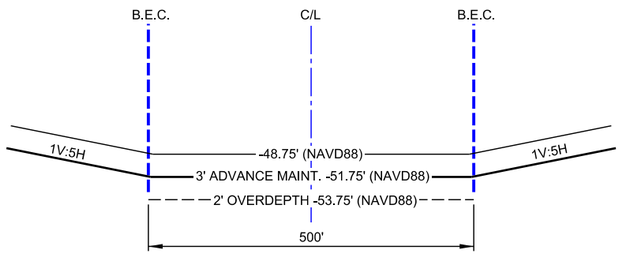
NOTES:

1) 48' PROJECT DEPTH EQUATES TO -46.75' (NAVD88) FOR THE RICH BEND CROSSING LOCATION.

2) CROSS SECTION FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-10A.

THEORETICAL SECTION, 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.75' (NAVD88) FOR THE RICH BEND CROSSING LOCATION.

2) CROSS SECTION FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-10B.

THEORETICAL SECTION, 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3438132.511
	Y 556947.274
P.I. STA. 104+57	X 3438850.322
	Y 546514.649

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK | DESCRIPTION | DATE | APPR.

MARK | DESCRIPTION | DATE | APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH OCAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 20 FEB 2015
PLOT SCALE: 2:1
SIZE: ANSI D
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

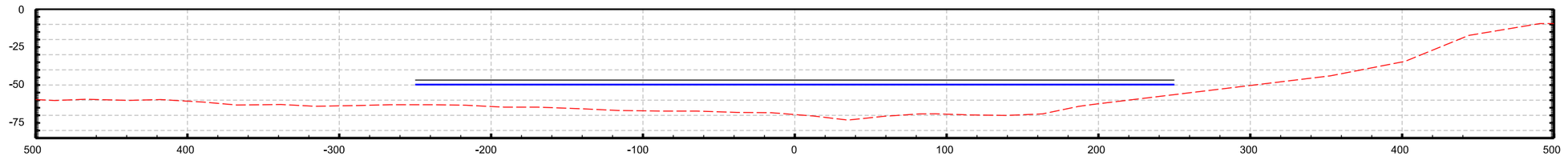
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

RICH BEND
48' AND 50' PROJECT DEPTHS

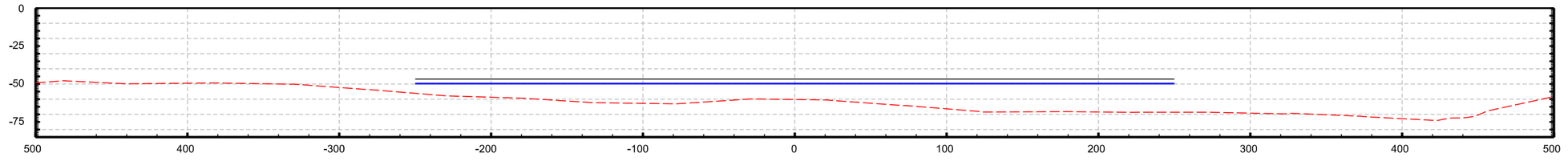
SHEET IDENTIFICATION
C-10

RICH BEND CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

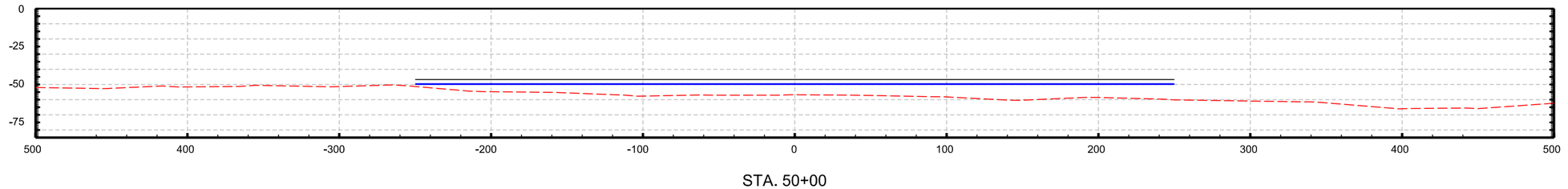
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.75' NAVD88)
3' ADVANCE MAINTENANCE (-49.75' NAVD88)



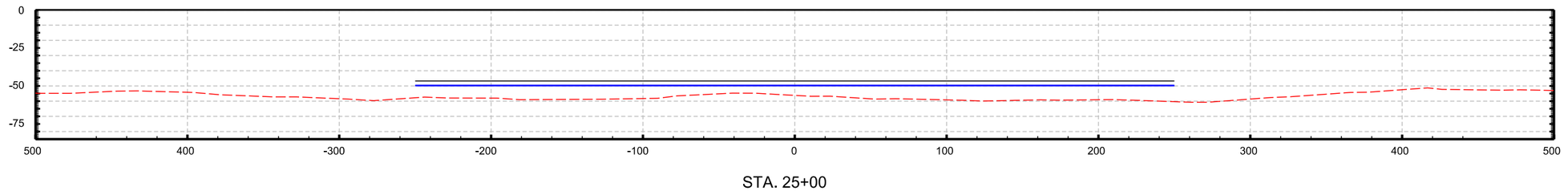
STA. 104+57



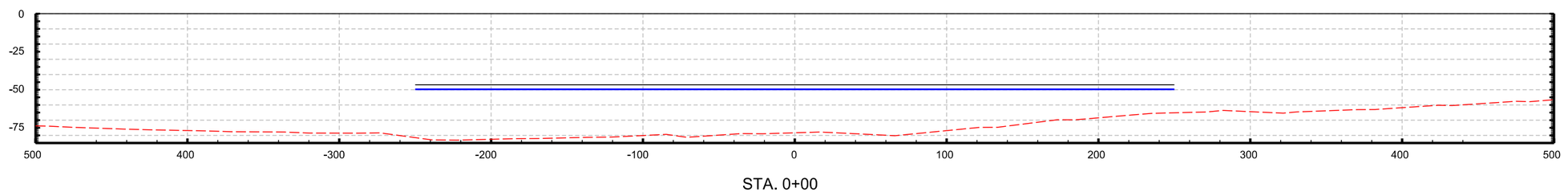
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
PLOT DATE: 1/5/2016
FILE NAME:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

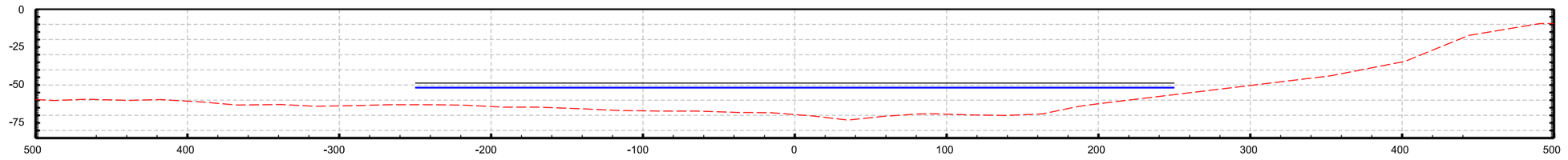
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

RICH BEND
CROSS SECTIONS
48' PROJECT DEPTH

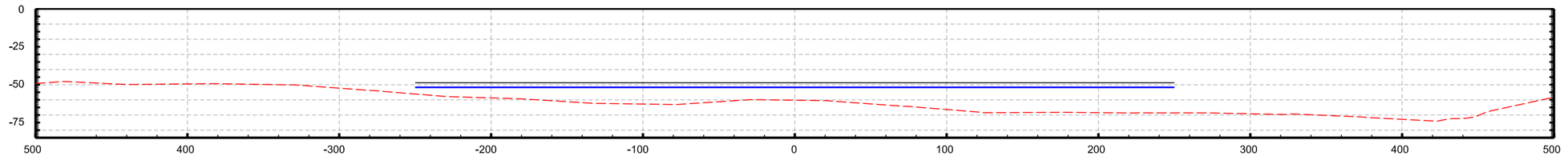
SHEET IDENTIFICATION
C-10A

RICH BEND CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

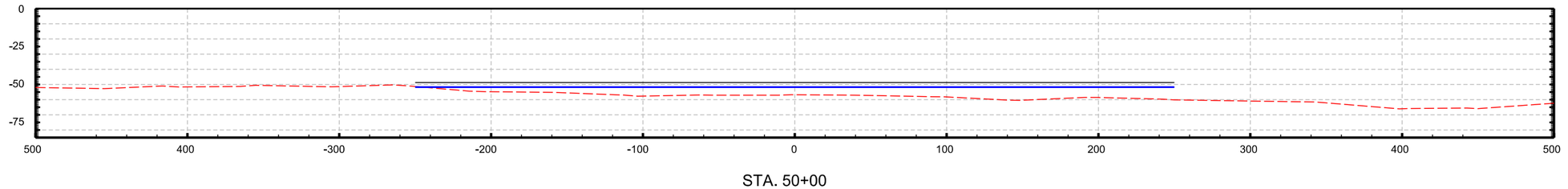
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.75' NAVD88)
3' ADVANCE MAINTENANCE (-51.75' NAVD88)



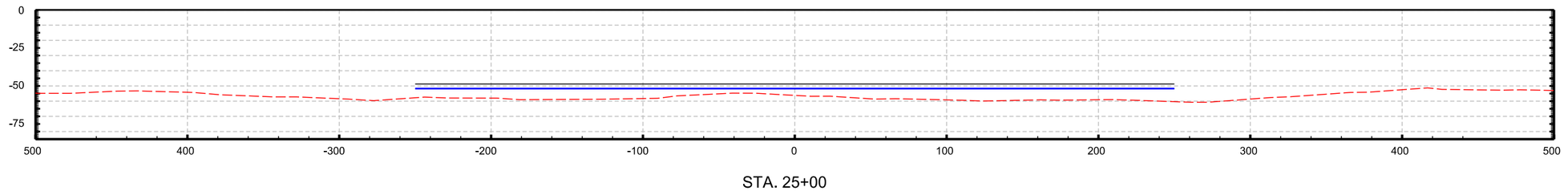
STA. 104+57



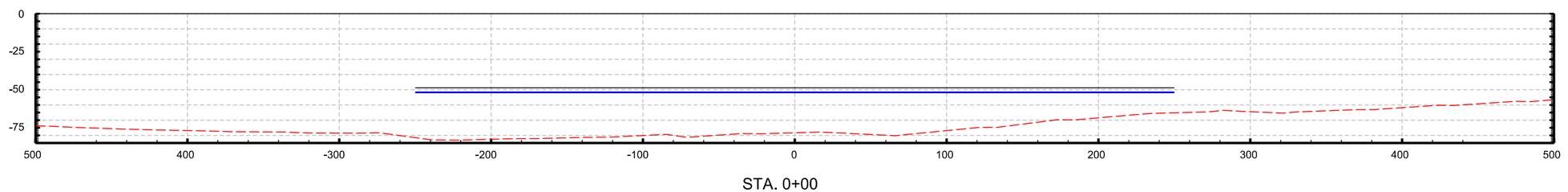
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 1 OCT 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

RICH BEND
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-10B

MISSISSIPPI RIVER CROSSING, RICH BEND, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
55+00.00	0.00	0.00
60+00.00	0.00	0.00
65+00.00	0.00	0.00
70+00.00	0.00	0.00
75+00.00	0.00	0.00
80+00.00	0.00	0.00
85+00.00	0.00	0.00
90+00.00	0.00	0.00
95+00.00	0.00	0.00
100+00.00	0.00	0.00
104+57.29	0.00	0.00
	TOTAL:	**0.00 CY**

MISSISSIPPI RIVER CROSSING, RICH BEND, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	1.60	15.00
55+00.00	0.00	15.00
60+00.00	0.00	0.00
65+00.00	71.70	663.90
70+00.00	11.80	773.20
75+00.00	0.00	109.30
80+00.00	0.00	0.00
85+00.00	0.00	0.00
90+00.00	0.00	0.00
95+00.00	0.00	0.00
100+00.00	0.00	0.00
104+57.29	0.00	0.00
	TOTAL:	**1,576.40 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

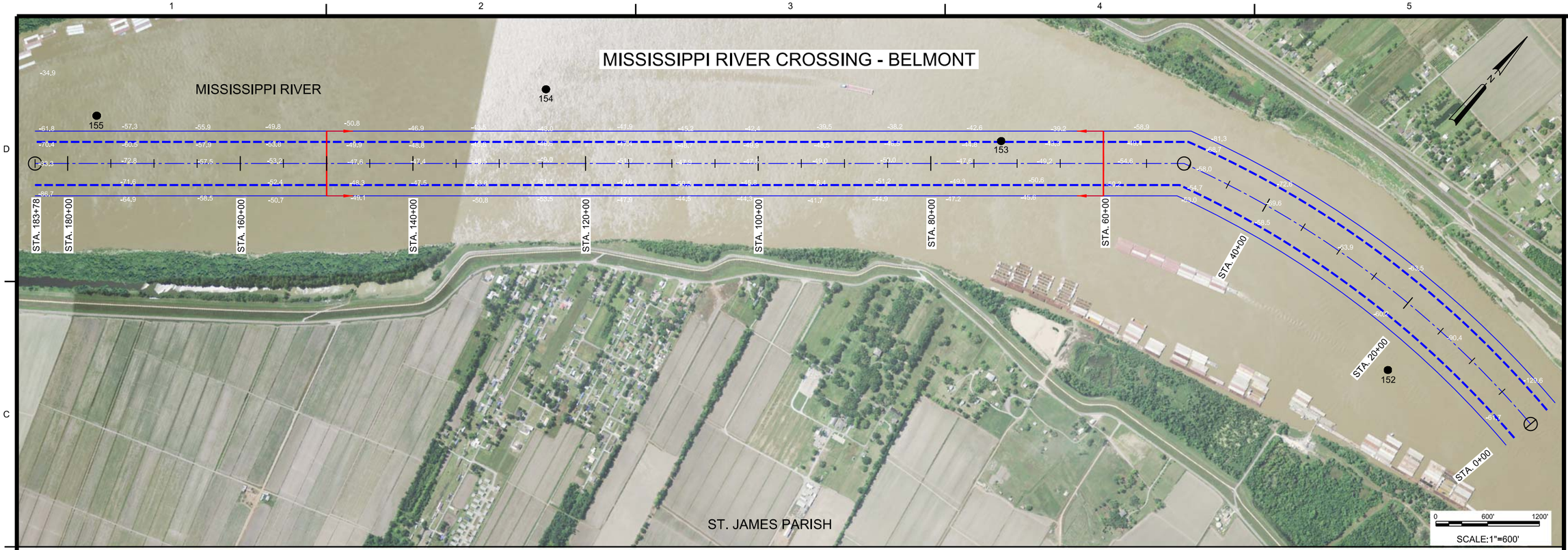
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

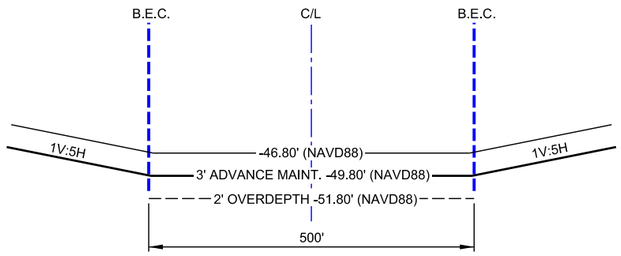
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

RICH BEND,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-10C

MISSISSIPPI RIVER CROSSING - BELMONT





NOTES:

1) 48' PROJECT DEPTH EQUATES TO -46.80' (NAVD88) FOR THE BELMONT CROSSING LOCATION.

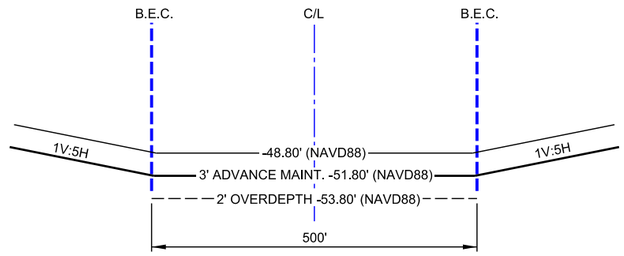
2) CROSS SECTION FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-11A.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-11C.

4) DREDGING LIMITS FROM STA. 60+00 to 150+00.

THEORETICAL SECTION, 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.80' (NAVD88) FOR THE BELMONT CROSSING LOCATION.

2) CROSS SECTION FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-11B.

3) DREDGING AVERAGE END AND QUANTITIES SHOWN ON SHEET C-11C.

4) DREDGING LIMITS FROM STA. 60+00 to 150+00.

THEORETICAL SECTION, 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATIONS (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3463499.644
	Y 551800.968
P.I. STA. 50+64.8	X 3458489.041
	Y 551433.110
P.I. STA. 183+78	X 3448462.919
	Y 542674.198

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH OCAIN
PLOT SCALE:
PLOT DATE: 29 SEP 2016
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
SIZE: ANSI D
FILE NAME:

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

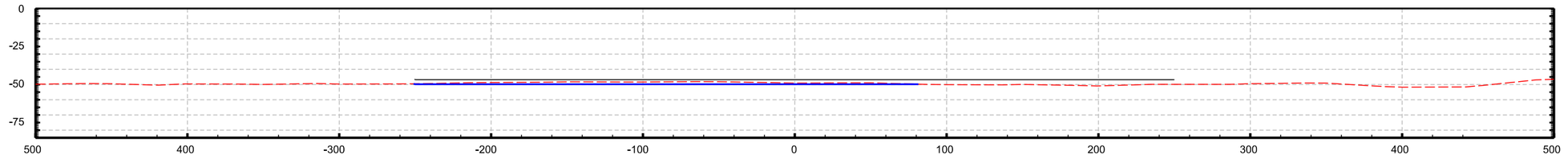
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BELMONT
48' AND 50' PROJECT DEPTHS

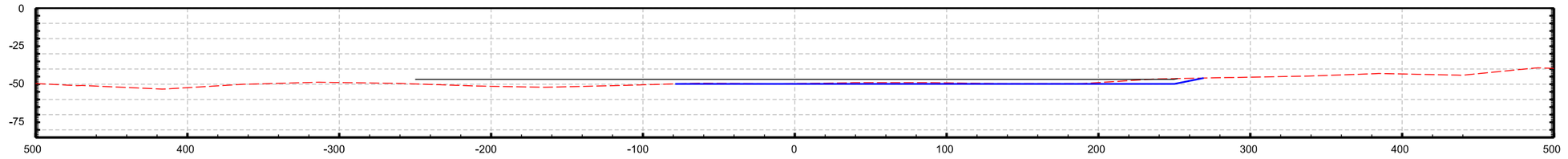
SHEET IDENTIFICATION
C-11

BELMONT CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

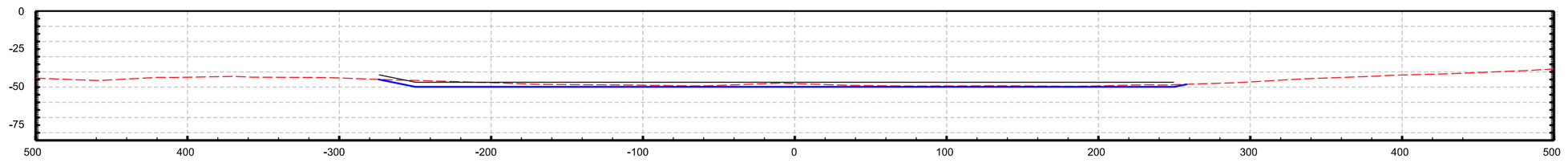
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-46.80' NAVD88)
3' ADVANCE MAINTENANCE (-49.80' NAVD88)



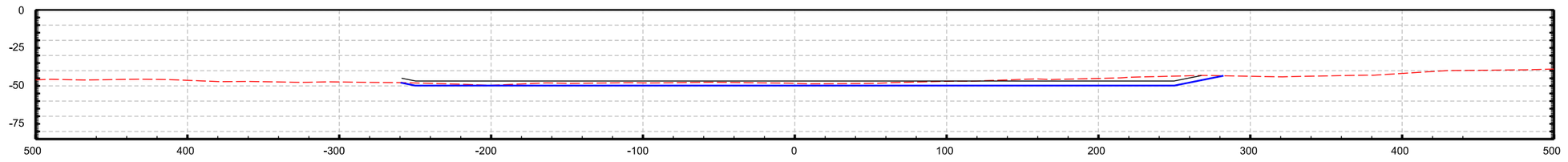
STA. 150+00



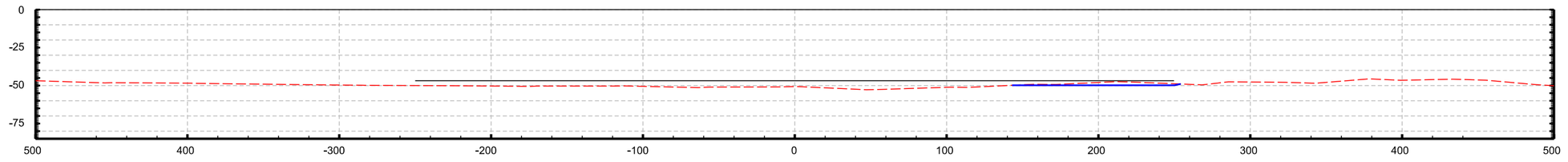
STA. 125+00



STA. 100+00



STA. 75+00



STA. 60+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT DATE: 1/5/2016
FILE NAME:

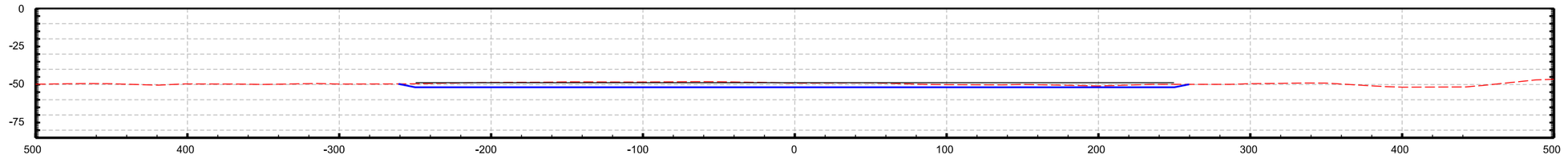
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BELMONT
CROSS SECTIONS
48' PROJECT DEPTH

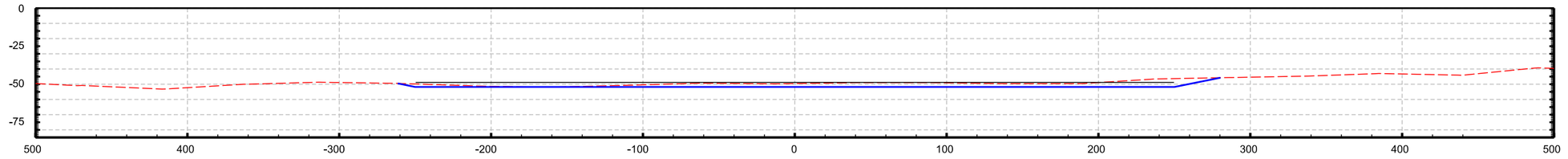
SHEET IDENTIFICATION
C-11A

BELMONT CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

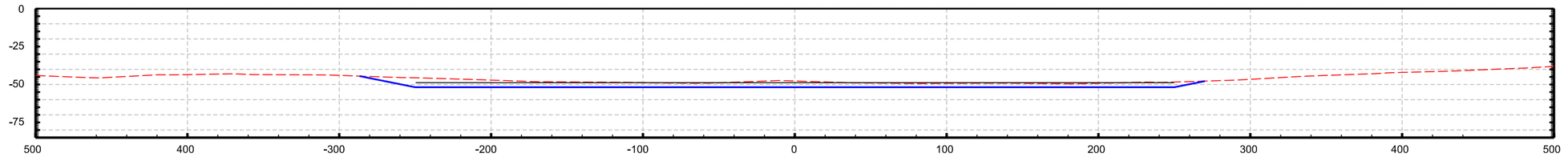
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-48.80' NAVD88)
3' ADVANCE MAINTENANCE (-51.80' NAVD88)



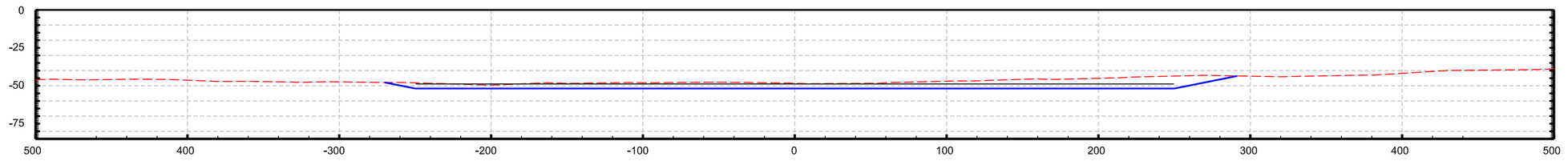
STA. 150+00



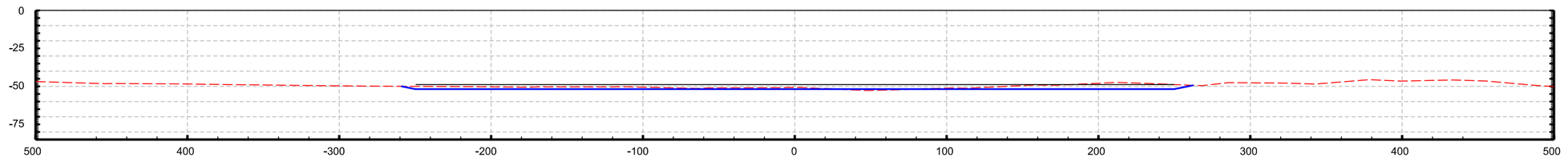
STA. 125+00



STA. 100+00



STA. 75+00



STA. 60+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 1/5/2016
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

BELMONT
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-11B

MISSISSIPPI RIVER CROSSING, BELMONT, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
55+00.00	0.00	0.00
60+00.00	140.40	1,299.70
65+00.00	1,306.60	13,397.90
70+00.00	1,110.60	22,381.20
75+00.00	1,317.50	22,481.60
80+00.00	1,083.50	22,231.30
85+00.00	587.70	15,474.30
90+00.00	617.30	11,157.40
95+00.00	1,013.40	15,099.20
100+00.00	717.90	16,030.80
105+00.00	535.30	11,603.40
110+00.00	418.90	8,834.90
115+00.00	374.70	7,348.50
120+00.00	342.90	6,644.70
125+00.00	271.50	5,689.00
130+00.00	630.30	8,349.80
135+00.00	989.40	14,997.20
140+00.00	1,173.90	20,030.80
145+00.00	1,077.10	20,842.40
150+00.00	376.00	13,454.80
155+00.00	0.00	3,481.80
160+00.00	0.00	0.00
165+00.00	0.00	0.00
170+00.00	0.00	0.00
175+00.00	0.00	0.00
180+00.00	0.00	0.00
183+76.35	0.00	0.00
	TOTAL:	**260,830.70 CY**

MISSISSIPPI RIVER CROSSING, BELMONT, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
55+00.00	82.70	766.10
60+00.00	765.80	7,857.10
65+00.00	2,402.90	29,340.00
70+00.00	2,198.30	42,603.60
75+00.00	2,420.90	42,770.50
80+00.00	2,180.70	42,608.10
85+00.00	1,554.20	34,582.70
90+00.00	1,720.70	30,323.00
95+00.00	2,110.80	35,476.70
100+00.00	1,807.40	36,279.30
105+00.00	1,601.30	31,562.00
110+00.00	1,365.30	27,469.00
115+00.00	1,255.90	24,271.10
120+00.00	1,178.40	22,540.40
125+00.00	1,125.30	21,330.50
130+00.00	1,553.50	24,803.50
135+00.00	1,979.20	32,710.40
140+00.00	2,246.90	39,130.50
145+00.00	2,136.30	40,585.10
150+00.00	1,323.80	32,037.90
155+00.00	150.20	13,647.60
160+00.00	0.00	1,390.40
165+00.00	0.00	0.00
170+00.00	0.00	0.00
175+00.00	0.00	0.00
180+00.00	0.00	0.00
183+76.35	0.00	0.00
	TOTAL:	**614,058.50 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

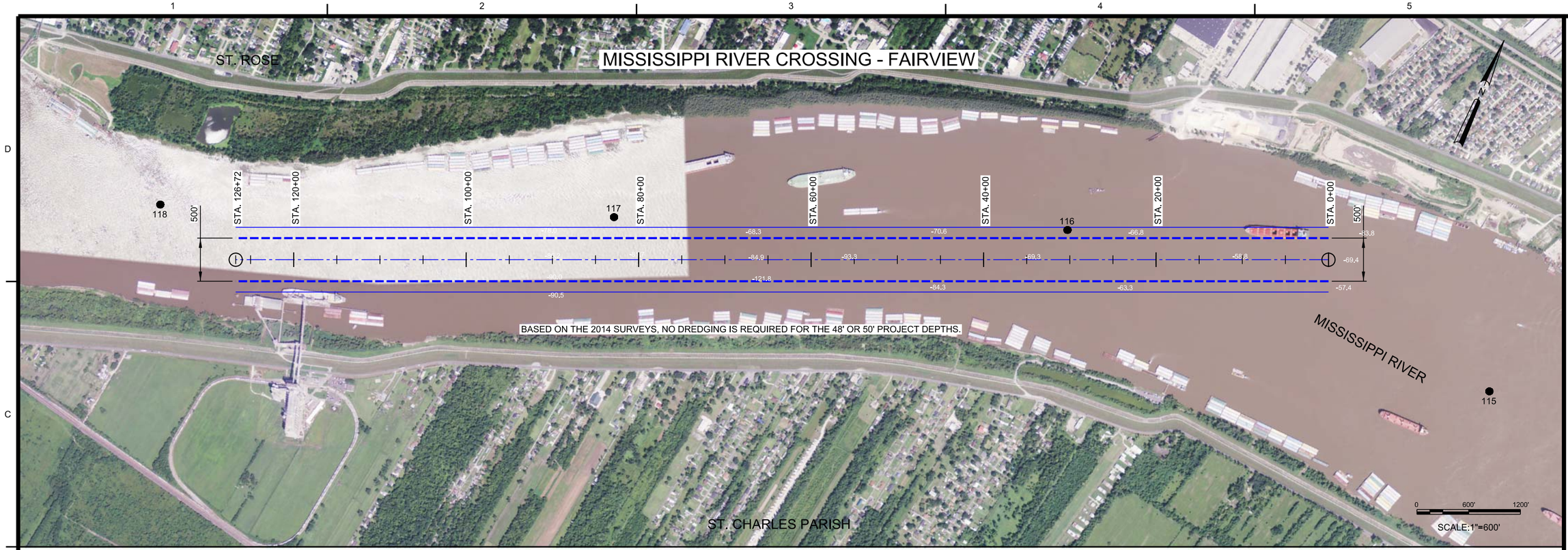
DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 26 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

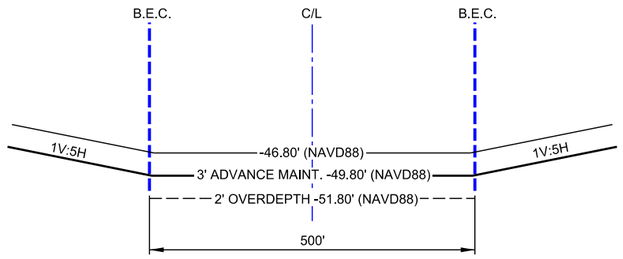
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

BELMONT,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-11C

MISSISSIPPI RIVER CROSSING - FAIRVIEW





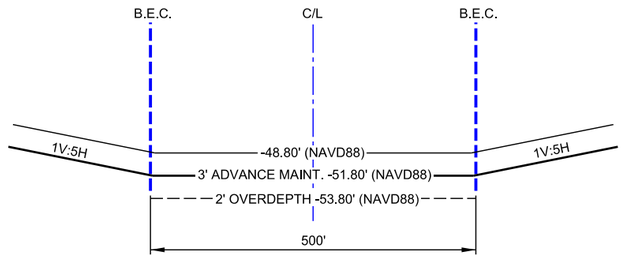
NOTES:

1) 48' PROJECT DEPTH EQUATES TO -46.80' (NAVD88) FOR THE FAIRVIEW CROSSING LOCATION.

2) CROSS SECTION FOR 48' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-12A.

THEORETICAL SECTION, 48' CHANNEL DEPTH

NOT TO SCALE



NOTES:

1) 50' PROJECT DEPTH EQUATES TO -48.80' (NAVD88) FOR THE FAIRVIEW CROSSING LOCATION.

2) CROSS SECTION FOR 50' PROJECT OF THIS CROSSING IS SHOWN ON SHEET C-12B.

THEORETICAL SECTION, 50' CHANNEL DEPTH

NOT TO SCALE

LEGEND

- CROSSING CENTERLINE
- BOTTOM EDGE OF CUT (BEC)
- TOP EDGE OF CUT
- DREDGING LIMITS
- P.I.
- -00.0 SPOT ELEVATION (2014 SURVEYS)

CROSSING C/L P.I. COORDINATES

P.I. STA. 0+00	X 3611805.207
	Y 534625.481
P.I. STA. 126+72	X 3603544.457
	Y 525015.857

US Army Corps of Engineers®
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DRAWN BY: PRG
CHKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1=1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
FILE NUMBER:
FILE NAME:

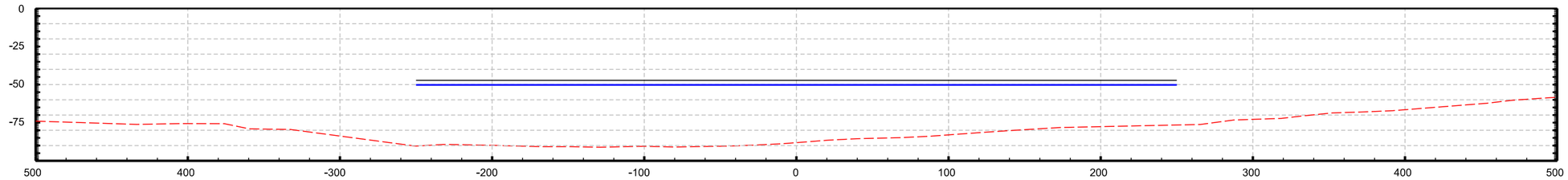
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

FAIRVIEW
48' AND 50' PROJECT DEPTHS

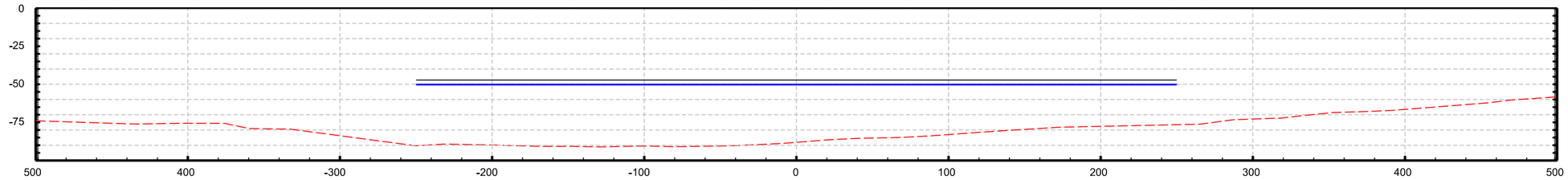
SHEET IDENTIFICATION
C-12

FAIRVIEW CROSSING, 48' PROJECT DEPTH CROSS SECTIONS

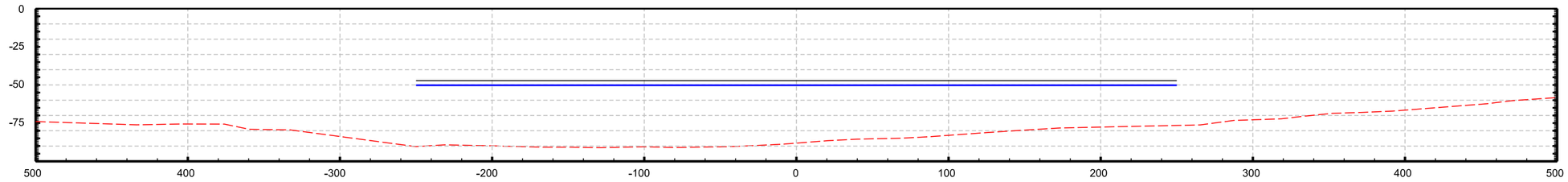
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-47.20' NAVD88)
3' ADVANCE MAINTENANCE (-50.20' NAVD88)



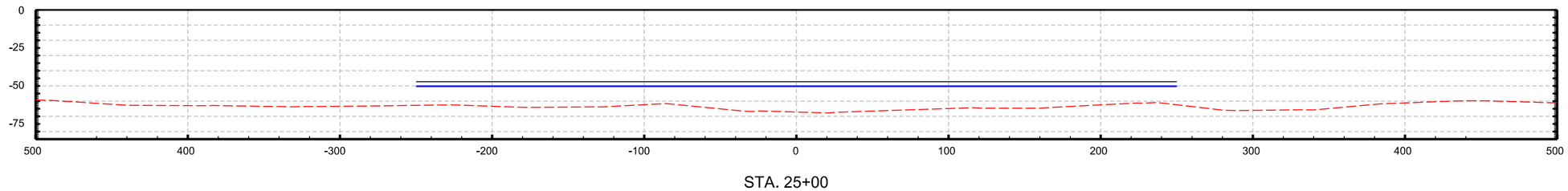
STA. 90+00



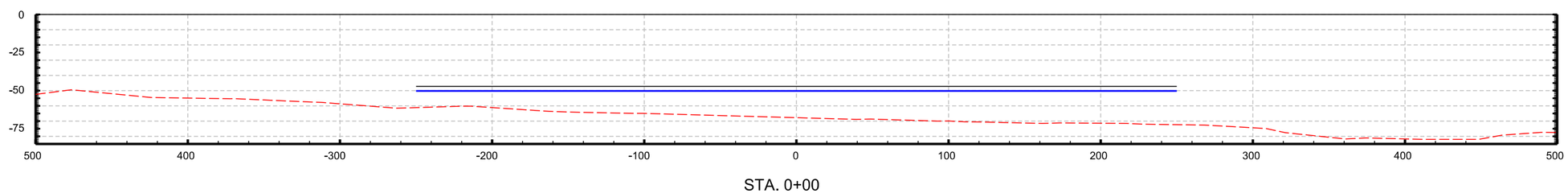
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT DATE: 1/5/2016
FILE NUMBER:
FILE NAME:

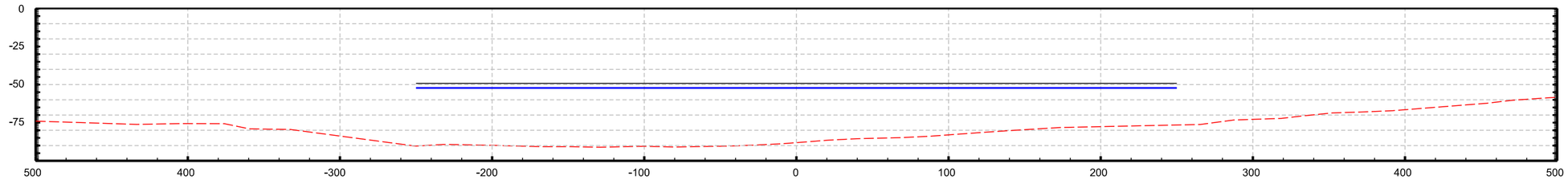
MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

FAIRVIEW
CROSS SECTIONS
48' PROJECT DEPTH

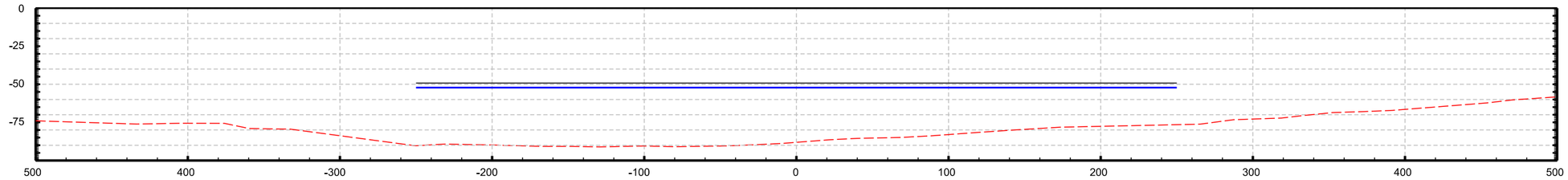
SHEET IDENTIFICATION
C-12A

FAIRVIEW CROSSING, 50' PROJECT DEPTH CROSS SECTIONS

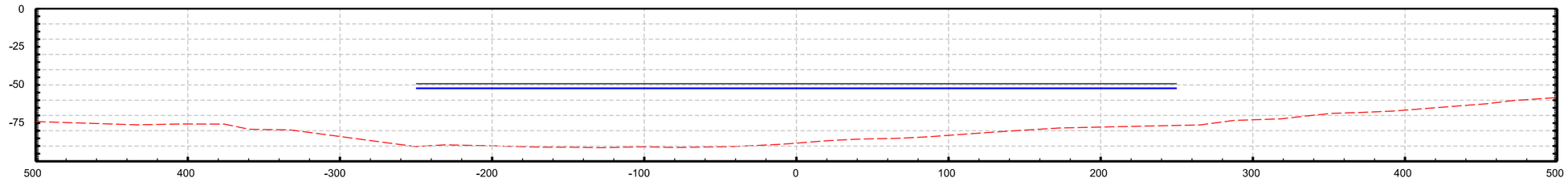
EXISTING GRADE
PROPOSED AUTHORIZED GRADE (-49.20' NAVD88)
3' ADVANCE MAINTENANCE (-52.20' NAVD88)



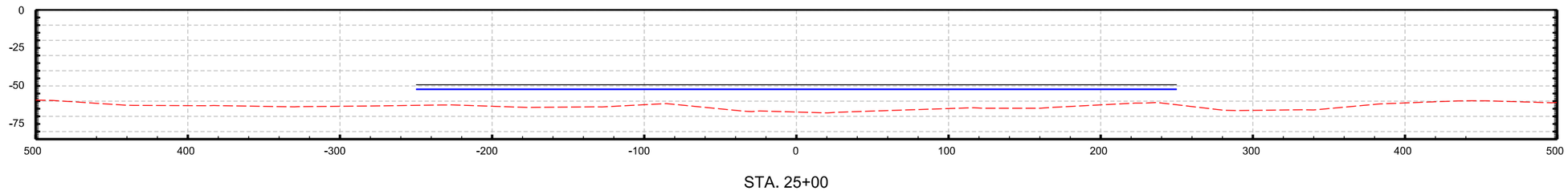
STA. 90+00



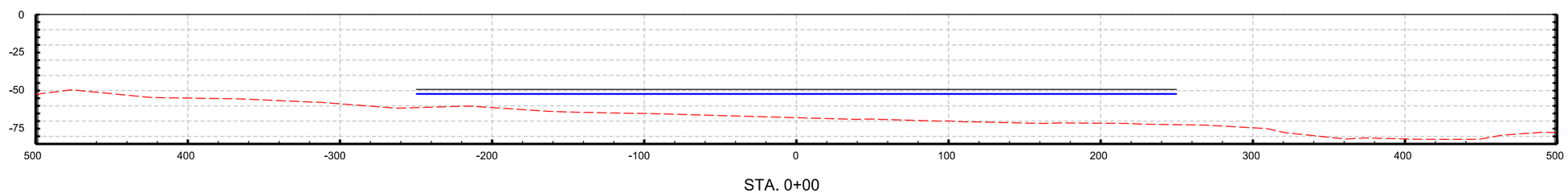
STA. 75+00



STA. 50+00



STA. 25+00



STA. 0+00

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR

MARK	DESCRIPTION	DATE	APPR

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: AS SHOWN
PLOT DATE: 1 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY - MISSISSIPPI RIVER CROSSINGS

FAIRVIEW
CROSS SECTIONS
50' PROJECT DEPTH

SHEET IDENTIFICATION
C-12B

MISSISSIPPI RIVER CROSSING, FAIRVIEW, 48' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
55+00.00	0.00	0.00
60+00.00	0.00	0.00
65+00.00	0.00	0.00
70+00.00	0.00	0.00
75+00.00	0.00	0.00
80+00.00	0.00	0.00
85+00.00	0.00	0.00
90+00.00	0.00	0.00
95+00.00	0.00	0.00
	TOTAL:	**260,830.70 CY**

MISSISSIPPI RIVER CROSSING, FAIRVIEW, 50' PROJECT DEPTH, QUANTITIES

QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
55+00.00	0.00	0.00
60+00.00	0.00	0.00
65+00.00	0.00	0.00
70+00.00	0.00	0.00
75+00.00	0.00	0.00
80+00.00	0.00	0.00
85+00.00	0.00	0.00
90+00.00	0.00	0.00
95+00.00	0.00	0.00
	TOTAL:	**614,058.50 CY**

US Army Corps of Engineers
NEW ORLEANS DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

DESIGNED BY: PATRICK R. GREY
DWN BY: PRG
CKD BY: PRG
SUBMITTED BY: KEITH O'CAIN
PLOT SCALE: 1=1
PLOT DATE: 29 SEP 2016
SIZE: ANSI D
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL, DEEPENING STUDY
MISSISSIPPI RIVER CROSSINGS, CONSTRUCTION DREDGING

FAIRVIEW,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET IDENTIFICATION
C-12C