

**WEST SHORE-LAKE PONTCHARTRAIN HURRICANE  
PROTECTION  
FEASIBILITY STUDY**

**COST ENGINEERING APPENDIX**

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## **Cost Estimate**

### **Section 1. Cost estimate development**

- a) The project cost estimate was developed in the MCACES MII cost estimating software and used the standard approaches for a feasibility estimate structure regarding labor, equipment, materials, crews, unit prices, quotes, sub- and prime contractor markups. This philosophy was taken wherever practical within the time constraints. It was supplemented with estimating information from other sources where necessary such as quotes, bid data, and A-E estimates. The intent was to provide or convey a “fair and reasonable” estimate that which depicts the local market conditions. The estimates assume a typical application of tiering subcontractors. Given the long time over which this project/program is to be constructed and the unknown economic status during that time, demands from non-governmental civil works projects were not considered to dampen the competition and increase prices.

### **Section 2. Estimate Structure:**

- a) The estimate is structured to reflect the projects performed. The estimate has been subdivided by USACE feature codes that include levees, floodwalls, drainage structure, pipeline relocations, and pump stations.

### **Section 3. Bid competition:**

- a) It is assumed that there will not be an economically saturated market and that bidding competition will be present.

### **Section 4. Contract Acquisition Strategy:**

- a) It is assumed that the contract acquisition strategy will be similar to past projects with large unrestricted design/bid/build contracts. There are no declared contract acquisition plan/types at this time.

### **Section 5. Labor Shortages:**

- a) It is assumed there will be a normal labor market.

### **Section 6. Labor Rates:**

- a) Local labor market wages are above the local Davis-Bacon Wage Determination and actual rates have been used. This is based upon local information and payroll data received from the New Orleans District Construction Representatives and estimators with experiences in past years.

### **Section 7. Materials:**

- a) Cost quotes are used on major construction items when available. Recent quotes may include concrete, steel and concrete piling, rock, gravel and sand. Assumptions include:
  - i) Materials will be purchased as part of the construction contract. The estimate does anticipate government furnished materials for borrow. Prices include delivery of materials.
  - ii) Concrete - will be purchased from commercial batch plants.

- iii) Borrow Material and Haul - Borrow material is considered the highest risk in the contracts, given the large quantities required, uncertainties of sources and materials near the many contract locations. Specific borrow sources have been identified so a conservative estimated haul distance was used. Borrow pit (Bonnet Carre' Spillway) is currently in use and within this distance. All borrow material is assumed Government furnished. NO contractor furnished borrow source are used.
- b) The borrow quantity calculations followed the MVN Geotechnical guidance:
- c) Hauled Levee: 10 BCY of borrow material = 12 LCY hauled = 8 ECY compacted.
- d) An assumed average one-way haul distance of 13 miles for 100yr was used based upon the local Government Furnished pit.
- e) Haul speeds are estimated using 40 mph speed average given the long distances and rural areas.
- f) The 1st lift is an initial lift with geotextile fabric on many design sections. 2nd lift qty assumes construction begins at the pre-degraded 1st lift elevation. All lifts include an overbuild from 1.5 feet to 1.0 feet to account for settlement between lifts. Settlement is predicted to be from 2.5 feet to 0.25 feet. The smaller overbuild and settlement values are for the later year construction lifts.
- g) Rock and stone - The New Orleans delta area has no rock sources. Historically, rock is barged from northern sources on the Mississippi River. This decision is based upon local knowledge, experience and supported with cost quotes.

Section 8. Equipment:

- a) Rates used are based from the latest USACE EP-1110-1-8, Region III. Adjustments are made for fuel and facility capital cost of money (FCCM). Judicious use of owned verses rental rates was considered based on typical contractor usage and local equipment availability. Only a few select pieces of marine \ marsh equipment are considered rental. Full FCCM/Cost of Money rate is latest available; MII program takes EP recommended discount, no other adjustments have been made to the FCCM.
- i) Trucking: The estimate assumed independent self-employed trucking subcontractors due to the large numbers of trucks required.
- ii) Dozers: dozers of the D-5/D-6 variety were chosen based on historical knowledge. Heavier equipment gets mired in the mud and soft soils.
- iii) Rental Rates: Rental rates were used for marsh equipment where rental is typical such as marsh backhoes.

Section 9. Fuel:

- a) Fuels (gasoline, on and off-road diesel) were based on local market averages for on-road and off-road for the Gulf Coast area. The Team found that fuels fluctuate irrationally; thus, used an average.

Section 10. Crews:

- a) Major crew and productivity rates were developed and studied by senior USACE estimators familiar with the type of work. All of the work is typical to the New Orleans District. The crews and productivities were checked by local MVN estimators, discussions with contractors and comparisons with historical cost data. Major crews include clearing and grubbing, hauling, earthwork, piling and concrete.
- b) Most crew work hours are assumed to be 10 hrs 6 days/wk which is typical to the area.
- c) A 10% “markup on labor for weather delay” is selectively applied to the labor in major earthwork placing detail items and associated items that would be affected by small amounts of weather making it unsafe or difficult to place (trying to run dump trucks on a wet levee) or be detrimental/non-compliant to the work being done (trying to place/compact material in the rain). The 10% markup is to cover the common practice of paying for labor “showing up” to the job site and then being sent home due to minor weather which is part of known average weather impacts as reflected within the standard contract specifications. The markup was not applied to small quantities where this can be scheduled around.

Section 11. Unit Prices:

- a) The unit prices found within the various project estimates will fluctuate within a range between similar construction units such as floodwall concrete, earthwork, and piling. Variances are a result of differing haul distances, small or large business markups, subcontracted items, designs and estimates by others.

Section 12. Relocation Cost:

- a) Relocation costs are defined as the relocation of utilities required for project purposes. In cases where potential significant impacts were known, costs were included within the cost estimate. Public roads, bridges, or railroads were not relocated on this project. Floodgates and T-Walls were included in the cost estimate to accommodate roads, bridges, and railroads.

Section 13. Mobilization:

- a) Contractor mobilization and demobilization are based on the assumption that most of the contractors will be coming from within the Gulf Coast/Southern region. Mob/demob costs are based on historical studies of detailed Government estimate mob/demobs which averaged 4.9 to 5% of the construction costs. With undefined acquisition strategies and assumed individual project limits for the large number of potential contracts in this program, the estimate utilizes a more comprehensive approx. 5% value applied at each contract rather than risking minimizing mob/demob costs by detailing costs based on an

assumed number of contracts. The 5% value also matches well with the 5% value previously prescribed by Walla Walla District, which has studied historical rates.

Section 14. Field Office Overhead:

- a) The estimate used a field office overhead rate of 12% for the prime contractors at budget level development. Based on historical studies and experience, Walla Walla District has recommended typical rates ranging from 9% to 11% for large civil works projects; however, the 9-11% rate does not consider possible incentives such as camps, allowances, travel trailers, meals, etc. which have been used previously to facilitate projects. With undefined acquisition strategies and assumed individual project limits for the multiple number of potential contracts in this program, the estimate utilizes a more comprehensive percentage based approach applied at each contract rather than risking minimizing overhead costs by detailing costs based on an assumed number of contracts. The applied rates were previously discussed among numerous USACE District cost engineers including Walla Walla, Vicksburg, Norfolk, Huntington, St. Paul and New Orleans.

Section 15. Overhead assumptions may include:

- a) Superintendent, office manager, pickups, periodic travel, costs, communications, temporary offices (contractor and government), office furniture, office supplies, computers and software, as-built drawings and minor designs, tool trailers, staging setup, camp and kitchen maintenance and utilities, utility service, toilets, safety equipment, security and fencing, small hand and power tools, project signs, traffic control, surveys, temp fuel tank station, generators, compressors, lighting, and minor miscellaneous.

Section 16. Home Office Overhead:

- a) Estimate percentages range based upon consideration of 8(a), small business and unrestricted prime contractors. The rates are based upon estimating and negotiating experience, and consultation with local construction representatives. The applied rates were previously discussed among numerous USACE District cost engineers including Walla Walla, Vicksburg, Norfolk, Huntington, St. Paul and New Orleans.

Section 17. Taxes:

- a) Local taxes will be applied, using an average between the parishes that contain the work. Reference the LA parish tax rate website: <http://www.laota.com/pta.htm>

Section 18. Bond:

- a) Bond is assumed 1% applied against the prime contractor, assuming large contracts.

Section 19. E&D and S&A:

- a) USACE Costs to manage design (PED) and construction (S&A) are based on New Orleans District Programmatic Cost Estimate guidance:
  - i) Planning, Engineering & Design (PED): The PED cost includes such costs as project management, engineering, planning, designs, investigations, studies, reviews, value engineering and engineering during construction (EDC). Historically New Orleans

District has used an approximate 12% rate for E&D/EDC, applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis have reported values ranging from 10-15%. Additional costs were added for project management, engineering, planning, designs, investigations, studies, reviews, value engineering. Specific PED costs were originally calculated and then that same percentage was carried forward on all future updates.

- ii) Supervision & Administration (S&A): Historically, New Orleans District used a range from 5% to 15% depending on project size and type applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis report values ranging from 7.5-10%. Consideration includes that a portion of the S&A effort could be performed by contractors. Based on discussions with MVN Construction Division, an S&A cost based on contract durations was developed. Specific S&A costs were originally calculated and then that same percentage was carried forward on all future updates.

Section 20. Contingencies:

- a) Contingencies were developed using the USACE Cost and Schedule Risk Analysis (CSRA) process and the Crystal Ball software that evaluates schedule and cost related risks. See summary in Cost Schedule Risk Analysis (CSRA) section.

Section 21. Escalation:

- a) Escalation used in the TPCS is based upon the US Army Corps of Engineers Engineering Manual (EM) 1110-2-1304 Civil Works Construction Cost Index System (CWCCIS) revised 30 Sept 2013.

Section 22. HTRW:

- a) The estimate includes no costs for any potential Hazardous, Toxic, and Radioactive Waste (HTRW) concerns. Phase 1 HTRW investigations are already complete and the result of this investigation is that no further investigation is recommended.

## **Schedule**

The project schedule was developed based on the construction of the individual features of work to include the entire West Shore Lake Pontchartrain, LA Project which includes construction of earthen levees, floodwalls, floodgates, pumping stations and drainage structures along a 18-mile alignment through LaPlace, Reserve, Garyville and Mt. Airy. Final levee elevations and structure elevations range from +16.0 to +19 ft NAVD88. Structures include a 1 navigable floodgate structure, 6 environmental water control structures, 1 road gate, 2 RR gates, and fronting protection for 4 proposed pumping stations.

A levee lift schedule was laid out that allows for a minimum of 3 years of settlement between levee lifts, minimizes adjacent/conflicting work zones, reduces the cost of interest during construction, and delivers the specified level of risk reduction (1%) by the project base year and maintains that level 50-years into the future.

## Total Project Cost Summary (TPCS)

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\*\*\*\* TOTAL PROJECT COST SUMMARY \*\*\*\*

Printed:6/27/2014  
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PROJECT: West Shore Lake Pontchartrain Study  
PROJECT NO: 108870  
LOCATION: St. John The Baptist and St. Charles Parishes, LA

DISTRICT: MVN New Orleans District  
POC: CHIEF, COST ENGINEERING, THOMAS D. MURPHY, P.E.  
PREPARED: 6/27/2014

This Estimate reflects the scope and schedule in report: West Shore Lake Pontchartrain Study Report 2014

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	Program Year (Budget EC): 2015 Effective Price Level Date: 1 OCT 14				Spent Thru: 1-Oct-13 (\$K) K	L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
						ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J					
02	RELOCATIONS	\$14,768	\$4,430	30.0%	\$19,198	1.6%	\$14,998	\$4,499	\$19,497	\$0		\$16,130	\$4,839	\$20,969
06	FISH & WILDLIFE FACILITIES	\$87,628	\$21,907	25.0%	\$109,535	1.6%	\$88,990	\$22,248	\$111,238	\$0		\$95,708	\$23,928	\$119,636
11	LEVEES & FLOODWALLS	\$290,883	\$87,265	30.0%	\$378,148	1.6%	\$295,408	\$88,622	\$384,030	\$0		\$377,140	\$113,141	\$490,281
13	PUMPING PLANT	\$75,691	\$22,707	30.0%	\$98,398	1.6%	\$76,868	\$23,060	\$99,928	\$0		\$82,671	\$24,801	\$107,472
<b>CONSTRUCTION ESTIMATE TOTALS:</b>		<b>\$468,970</b>	<b>\$136,309</b>		<b>\$605,279</b>	<b>1.6%</b>	<b>\$476,264</b>	<b>\$138,429</b>	<b>\$614,693</b>	<b>\$0</b>		<b>\$571,649</b>	<b>\$166,709</b>	<b>\$738,358</b>
01	LANDS AND DAMAGES	\$7,638	\$1,909	25.0%	\$9,547	1.6%	\$7,756	\$1,939	\$9,695	\$0		\$7,901	\$1,975	\$9,876
30	PLANNING, ENGINEERING & DESIGN	\$38,189	\$11,455	30.0%	\$49,644	2.2%	\$39,012	\$11,705	\$50,717	\$0		\$64,562	\$19,380	\$83,942
31	CONSTRUCTION MANAGEMENT	\$32,366	\$9,711	30.0%	\$42,077	2.2%	\$33,065	\$9,921	\$42,986	\$0		\$56,253	\$16,878	\$73,131
<b>PROJECT COST TOTALS:</b>		<b>\$647,163</b>	<b>\$159,384</b>	<b>29.1%</b>	<b>\$706,547</b>		<b>\$556,097</b>	<b>\$161,994</b>	<b>\$718,091</b>	<b>\$0</b>		<b>\$700,365</b>	<b>\$204,942</b>	<b>\$905,307</b>

- \_\_\_\_\_ CHIEF, COST ENGINEERING, THOMAS D. MURPHY, P.E.
- \_\_\_\_\_ PROJECT MANAGER, JEFFREY J. VARISCO
- \_\_\_\_\_ CHIEF, REAL ESTATE, LINDA LABURE
- \_\_\_\_\_ CHIEF, PLANNING, TROY CONSTANCE
- \_\_\_\_\_ CHIEF, ENGINEERING, MARK R. HOAGUE, P.E.
- \_\_\_\_\_ CHIEF, OPERATIONS, CHRIS ACCARDO
- \_\_\_\_\_ CHIEF, CONSTRUCTION, STUART S. WAITS, P.E.
- \_\_\_\_\_ CHIEF, CONTRACTING, TIMOTHY BLACK
- \_\_\_\_\_ CHIEF, PM-PB, MARK WINGATE
- \_\_\_\_\_ CHIEF, DPM, GARY HAWKINS

ESTIMATED FEDERAL COST: 65% \$588,450  
ESTIMATED NON-FEDERAL COST: 35% \$316,857  
**ESTIMATED TOTAL PROJECT COST: \$905,307**

# MII Cost Estimate

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U.S. Army Corps of Engineers  
Project WSLP: West Shore Lake Pontchartrain Feasibility Study  
West Shore Lake Pontchartrain MII Appendix Summary  
WEST SHORE LAKE PONTCHARTRAIN  
HURRICANE AND STORM DAMAGE RISK REDUCTION STUDY  
INTEGRATED DRAFT FEASIBILITY REPORT  
AND ENVIRONMENTAL IMPACT STATEMENT

Estimated by

Designed by

Prepared by Miguel Ramos

Preparation Date 2/11/2014

Effective Date of Pricing 2/11/2014

Estimated Construction Time Days

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        11 02 Floodwalls ..... 1  
    **13 PUMPING PLANT** ..... 1  
        13 01 Pumping Stations ..... 1  
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            02 01 01 SectionC4, Sta. 278+27.66 ..... 2  
            02 01 02 SectionC5, Sta. 279+17.82 ..... 2  
            02 01 03 SectionC5, Sta. 282+89.77 ..... 2  
            02 01 04 SectionC5, Sta. 301+77.52 ..... 2  
            02 01 05 SectionC7, Sta. 359+12.35 ..... 2  
            02 01 06 SectionC7, Sta. 359+94.66 ..... 2  
            02 01 07 SectionC7, Sta. 363+92.87 ..... 2  
            02 01 08 SectionC10, Sta. 539+22.35 ..... 2  
            02 01 09 SectionC15, Sta. 659+33.14 ..... 2  
            02 01 10 SectionC15, Sta. 659+68.54 ..... 2  
            02 01 11 SectionC15, Sta. 659+94.36 ..... 2  
            02 01 12 SectionC18, Sta. 846+28.98 ..... 2  
            02 01 13 SectionC18, Sta. 846+35.39 ..... 2  
            02 01 14 SectionC18, Sta. 847+12.35 ..... 2  
            02 01 15 SectionC18, Sta. 847+22.35 ..... 2  
            02 01 16 SectionC18, Sta. 847+64.36 ..... 2  
            02 01 17 SectionC19, Sta. 860+72.35 ..... 2  
            02 01 18 SectionC20, Sta. 918+33.25 ..... 2  
            02 01 19 SectionC22, Sta. 971+62.57 ..... 2  
            02 01 20 SectionC22, Sta. 972+22.53 ..... 2  
            02 01 21 SectionC22, Sta. 972+33.25 ..... 2  
            02 01 22 SectionC22, Sta. 972+55.31 ..... 2  
            02 01 23 SectionC22, Sta. 972+62.39 ..... 2  
            02 01 24 SectionC22, Sta. 973+01.55 ..... 2  
            02 01 25 SectionC22, Sta. 973+26.55 ..... 2  
            02 01 26 SectionC22, Sta. 973+30.22 ..... 2  
            02 01 27 SectionC22, Sta. 973+36.22 ..... 2  
            02 01 28 SectionC22, Sta. 973+58.11 ..... 2  
            02 01 29 SectionC22, Sta. 973+99.62 ..... 2  
            02 01 30 SectionC22, Sta. 974+99.22 ..... 2  
            02 01 31 SectionC22, Sta. 981+84.33 ..... 2  
            02 01 32 SectionC22, Sta. 983+02.36 ..... 2  
            02 01 33 SectionC22, Sta. 983+18.66 ..... 2  
            02 01 34 SectionC22, Sta. 983+28.47 ..... 2  
            02 01 35 SectionC22, Sta.970+82.33 ..... 2  
            02 01 36 SectionC22, Sta.973+87.33 ..... 2  
    **06 FISH & WILDLIFE FACILITIES** ..... 2  
    **11 LEVEES & FLOODWALLS** ..... 2

11 01 Levees .....	2
11 01 01 1stLift .....	2
11 01 02 2nd Lift .....	2
11 01 03 2030 Lift .....	2
11 01 04 2045 Lift .....	2
11 01 05 2060 Lift .....	2
11 01 06 St. James Parish - Non Structural Risk Reduction .....	2
11 02 Floodwalls .....	2
11 02 01 T-wall Interstate: C4; Sta. 229+54 to +236+00 .....	2
11 02 02 T-Wall and DrainageStructurePS; C4; Sta. 261+79 to 264+90 .....	3
11 02 03 T-wall and Swing Gate: C5; Sta. 299+66 to to 301+54 .....	3
11 02 04 T-wall Interstate: C5; Sta. 302+14 to +304+61 .....	3
11 02 05 T-wall and Pipeline: C7; Sta. 358+25 to +363+75 .....	3
11 02 06 T-wall and Pipeline: C8; Sta. 387+77 to +394+00 .....	3
11 02 07 T-Wall and DrainageStructurePS; C8; Sta. 450+40 to 453+40 .....	3
11 02 08 T-wall and Swing Gate: C10; Sta. 512+35 to to 513+35 .....	3
11 02 09 T-wall Interstate: C12; Sta. 607+11 to +612+85 .....	3
11 02 10 T-Wall and DrainageStructurePS; C14; Sta. 659+22 to 663+17 .....	3
11 02 11 T-wall and Swing Gate: C17; Sta. 752+70 to to 755+57 .....	3
11 02 12 T-wall and Pipeline: C18; Sta. 846+00 to +850+00 .....	3
11 02 13 T-wall and Pipeline: C19; Sta. 859+00 to +862+00 .....	3
11 02 14 T-Wall and DrainageStructurePS; C20; Sta. 934+82 to 937+57 .....	3
11 02 15 T-wall and Pipeline: C22; Sta. 971+31 to +974+32 .....	3
11 02 16 T-wall and RR gate: C22; Sta. 983+56 to to 985+06 .....	3
11 02 17 T-wall and RR gate: C22; Sta. 1045+21 to to 1045+74 .....	3
13 PUMPING PLANT .....	3
13 01 Pumping Stations .....	3
13 01 01 Mobilization and demobilization .....	3
13 01 02 C4: Sta. 261+79 to 264+90: 1100 cfs .....	3
13 01 03 C8: Sta. 450+40 to 453+40: 200 cfs .....	3
13 01 04 C14: Sta. 659+22 to 663+17: 400 cfs .....	3
13 01 05 C20: Sta. 934+82 to 937+57: 450 cfs .....	3

<b>Description</b>	<b>ContractCost</b>	<b>ProjectCost</b>
<b>ProjectTop Level Cost Summary</b>	<b>468,969,069.53</b>	<b>468,969,069.53</b>
<b>02 RELOCATIONS</b>	<b>14,767,635.81</b>	<b>14,767,635.81</b>
02 01 Pipelines	14,767,635.81	14,767,635.81
<b>06 FISH &amp; WILDLIFE FACILITIES</b>	<b>87,628,000.00</b>	<b>87,628,000.00</b>
<b>11 LEVEES &amp; FLOODWALLS</b>	<b>290,882,619.67</b>	<b>290,882,619.67</b>
11 01 Levees	207,039,617.69	207,039,617.69
11 02 Floodwalls	83,843,001.98	83,843,001.98
<b>13 PUMPING PLANT</b>	<b>75,690,814.06</b>	<b>75,690,814.06</b>
13 01 Pumping Stations	75,690,814.06	75,690,814.06

Description	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost	ContractCost	CostToPrime
<b>Project Cost Summary</b>	<b>48,127,914.35</b>	<b>75,155,567.99</b>	<b>58,772,943.00</b>	<b>202,675,807.09</b>	<b>384,732,232.42</b>	<b>468,969,069.53</b>	<b>262,024,157.66</b>
<b>02 RELOCATIONS</b>	<b>1,660,594.94</b>	<b>270,544.62</b>	<b>3,552,201.00</b>	<b>5,839,192.96</b>	<b>11,322,533.52</b>	<b>14,767,635.81</b>	<b>11,322,533.52</b>
<b>02 01 Pipelines</b>	<b>1,660,594.94</b>	<b>270,544.62</b>	<b>3,552,201.00</b>	<b>5,839,192.96</b>	<b>11,322,533.52</b>	<b>14,767,635.81</b>	<b>11,322,533.52</b>
02 01 01 SectionC4, Sta. 278+27.66	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 02 SectionC5, Sta. 279+17.82	33,669.75	6,528.03	82,169.65	126,297.78	248,665.21	324,326.46	248,665.21
02 01 03 SectionC5, Sta. 282+89.77	40,354.56	7,338.05	81,700.95	144,194.44	273,588.01	356,832.51	273,588.01
02 01 04 SectionC5, Sta. 301+77.52	63,123.78	10,107.23	185,937.65	151,366.67	410,535.32	535,448.73	410,535.32
02 01 05 SectionC7, Sta. 359+12.35	40,354.56	7,338.05	81,700.95	144,194.44	273,588.01	356,832.51	273,588.01
02 01 06 SectionC7, Sta. 359+94.66	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 07 SectionC7, Sta. 363+92.87	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 08 SectionC10, Sta. 539+22.35	33,669.75	6,528.03	82,169.65	126,297.78	248,665.21	324,326.46	248,665.21
02 01 09 SectionC15, Sta. 659+12.35	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 10 SectionC15, Sta. 659+68.54	33,669.75	6,528.03	82,169.65	126,297.78	248,665.21	324,326.46	248,665.21
02 01 11 SectionC15, Sta. 659+94.36	33,669.75	6,528.03	82,169.65	126,297.78	248,665.21	324,326.46	248,665.21
02 01 12 SectionC18, Sta. 846+28.98	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 13 SectionC18, Sta. 846+35.39	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 14 SectionC18, Sta. 847+12.35	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 15 SectionC18, Sta. 847+22.35	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 16 SectionC18, Sta. 847+64.36	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 17 SectionC19, Sta. 860+72.35	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 18 SectionC20, Sta. 918+33.25	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 19 SectionC22, Sta. 971+62.57	63,123.78	10,107.23	185,937.65	151,366.67	410,535.32	535,448.73	410,535.32
02 01 20 SectionC22, Sta. 972+22.53	36,319.74	6,770.63	82,169.65	139,183.33	264,443.35	344,905.42	264,443.35
02 01 21 SectionC22, Sta. 972+33.25	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 22 SectionC22, Sta. 972+55.31	36,319.74	6,770.63	82,169.65	139,183.33	264,443.35	344,905.42	264,443.35
02 01 23 SectionC22, Sta. 972+62.39	63,205.27	10,107.87	185,937.65	151,366.67	410,617.45	535,555.84	410,617.45
02 01 24 SectionC22, Sta. 973+01.55	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 25 SectionC22, Sta. 973+26.55	72,225.61	11,287.33	185,937.65	159,488.89	428,939.48	559,452.70	428,939.48
02 01 26 SectionC22, Sta. 973+30.22	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 27 SectionC22, Sta. 973+36.22	40,354.56	7,338.05	81,700.95	144,194.44	273,588.01	356,832.51	273,588.01
02 01 28 SectionC22, Sta. 973+58.11	61,602.61	7,600.81	81,700.95	245,875.93	396,780.30	517,508.46	396,780.30
02 01 29 SectionC22, Sta. 973+99.62	55,537.92	9,336.78	163,047.65	147,305.56	375,227.91	489,398.35	375,227.91
02 01 30 SectionC22, Sta. 974+99.22	36,319.74	6,770.63	82,169.65	139,183.33	264,443.35	344,905.42	264,443.35
02 01 31 SectionC22, Sta. 981+84.33	36,319.74	6,770.63	82,169.65	139,183.33	264,443.35	344,905.42	264,443.35
02 01 32 SectionC22, Sta. 983+02.36	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 33 SectionC22, Sta. 983+18.66	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
02 01 34 SectionC22, Sta. 983+28.47	63,205.27	10,107.87	185,937.65	151,366.67	410,617.45	535,555.84	410,617.45
02 01 35 SectionC22, Sta.970+82.33	40,354.56	7,338.05	81,700.95	144,194.44	273,588.01	356,832.51	273,588.01
02 01 36 SectionC22, Sta.973+87.33	34,597.62	6,613.70	82,169.65	132,122.22	255,503.19	333,245.04	255,503.19
<b>06 FISH &amp; WILDLIFE FACILITIES</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>87,628,000.00</b>	<b>87,628,000.00</b>	<b>87,628,000.00</b>	<b>0.00</b>
<b>11 LEVEES &amp; FLOODWALLS</b>	<b>39,836,939.00</b>	<b>73,873,942.67</b>	<b>47,171,411.68</b>	<b>65,763,755.26</b>	<b>226,646,048.62</b>	<b>290,882,619.67</b>	<b>198,482,181.82</b>
<b>11 01 Levees</b>	<b>34,768,541.85</b>	<b>70,135,413.52</b>	<b>5,367,208.40</b>	<b>51,952,820.06</b>	<b>162,223,983.83</b>	<b>207,039,617.69</b>	<b>134,654,117.03</b>
11 01 01 1stLift	20,879,057.46	39,316,772.28	2,793,475.28	8,202,781.00	71,192,086.02	96,588,321.09	75,111,220.66
11 01 02 2nd Lift	1,502,323.52	3,778,790.77	341,587.43	1,600,558.63	7,223,260.34	9,621,763.38	7,433,858.57
11 01 03 2030 Lift	4,026,111.63	8,830,191.02	744,048.56	2,825,932.83	16,426,284.04	21,980,240.93	17,009,684.97
11 01 04 2045 Lift	4,732,586.91	10,027,916.57	744,048.56	3,096,123.04	18,600,675.08	24,923,034.49	19,296,153.31
11 01 05 2060 Lift	3,628,462.33	8,181,742.89	744,048.56	2,730,726.56	15,284,980.35	20,429,559.80	15,803,199.53
11 01 06 St. James Parish - Non Structural Risk Reduction	0.00	0.00	0.00	33,496,698.00	33,496,698.00	33,496,698.00	0.00
<b>11 02 Floodwalls</b>	<b>5,068,397.15</b>	<b>3,738,529.15</b>	<b>41,804,203.28</b>	<b>13,810,935.20</b>	<b>64,422,064.79</b>	<b>83,843,001.98</b>	<b>63,828,064.79</b>
11 02 01 T-wall Interstate: C4; Sta. 229+54 to +236+00	543,440.11	428,140.32	4,738,881.19	623,245.25	6,333,706.86	8,260,861.06	6,333,706.86

Description	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost	ContractCost	CostToPrime
11 02 02 T-Wall and DrainageStructurePS; C4; Sta. 261+79 to 264+90	372,104.76	234,420.02	2,759,138.59	1,185,472.13	4,551,135.50	5,935,907.50	4,551,135.50
11 02 03 T-wall and Swing Gate: C5; Sta. 299+66 to to 301+54	175,698.73	128,114.38	1,710,294.13	605,641.00	2,619,748.24	3,416,857.88	2,619,748.24
11 02 04 T-wall Interstate: C5; Sta. 302+14 to +304+61	214,087.28	167,384.62	1,850,896.78	424,417.25	2,656,785.93	3,465,165.02	2,656,785.93
11 02 05 T-wall and Pipeline: C7; Sta. 358+25 to +363+75	447,951.48	353,280.85	3,934,062.76	659,237.00	5,394,532.09	7,035,923.99	5,394,532.09
11 02 06 T-wall and Pipeline: C8; Sta. 387+77 to +394+00	506,135.01	399,545.23	4,451,095.51	669,820.88	6,026,596.63	7,860,306.54	6,026,596.63
11 02 07 T-Wall and DrainageStructurePS; C8; Sta. 450+40 to 453+40	360,800.40	226,331.42	2,667,659.85	1,185,512.05	4,440,303.72	5,791,352.98	4,440,303.72
11 02 08 T-wall and Swing Gate: C10; Sta. 512+35 to to 513+35	109,645.45	77,797.80	1,107,615.59	592,597.38	1,887,656.22	2,462,012.54	1,887,656.22
11 02 09 T-wall Interstate: C12; Sta. 607+11 to +612+85	467,188.47	369,481.02	3,922,818.31	535,662.25	5,295,150.05	6,906,303.02	5,295,150.05
11 02 10 T-Wall and DrainageStructurePS; C14; Sta. 659+22 to 663+17	430,312.51	278,867.42	3,163,908.91	1,199,811.80	5,072,900.64	6,616,429.88	5,072,900.64
11 02 11 T-wall and Swing Gate: C17; Sta. 752+70 to to 755+57	238,425.99	176,578.71	2,086,017.77	620,237.50	3,121,259.97	4,070,964.37	3,121,259.97
11 02 12 T-wall and Pipeline: C18; Sta. 846+00 to +850+00	320,809.49	251,007.91	2,607,258.85	637,137.88	3,816,214.13	4,977,371.92	3,816,214.13
11 02 13 T-wall and Pipeline: C19; Sta. 859+00 to +862+00	243,611.53	190,253.35	1,977,996.68	622,199.13	3,034,060.69	3,957,233.00	3,034,060.69
11 02 14 T-Wall and DrainageStructurePS; C20; Sta. 934+82 to 937+57	264,248.81	170,569.68	1,715,224.92	1,177,526.73	3,327,570.13	4,340,048.43	3,327,570.13
11 02 15 T-wall and Pipeline: C22; Sta. 971+31 to +974+32	236,179.95	182,477.91	1,686,451.15	622,200.00	2,727,309.01	3,557,146.12	2,727,309.01
11 02 16 T-wall and RR gate: C22; Sta. 983+56 to to 985+06	95,770.21	73,733.78	901,664.28	1,225,160.13	2,296,328.40	2,904,663.17	1,999,328.40
11 02 17 T-wall and RR gate: C22; Sta. 1045+21 to to 1045+74	41,986.99	30,544.74	523,218.00	1,225,056.88	1,820,806.60	2,284,454.56	1,523,806.60
13 PUMPING PLANT	6,630,380.40	1,011,080.70	8,049,330.32	43,444,858.86	59,135,650.29	75,690,814.06	52,219,442.32
13 01 Pumping Stations	6,630,380.40	1,011,080.70	8,049,330.32	43,444,858.86	59,135,650.29	75,690,814.06	52,219,442.32
13 01 01 Mobilization and demobilization	0.00	0.00	0.00	3,188,310.12	3,188,310.12	4,158,415.84	3,188,310.12
13 01 02 C4: Sta. 261+79 to 264+90: 1100 cfs	1,806,475.61	272,412.48	2,191,632.04	14,280,182.00	18,550,702.14	23,787,349.26	16,600,583.14
13 01 03 C8: Sta. 450+40 to 453+40: 200 cfs	1,641,579.11	250,272.81	2,007,212.91	6,702,370.00	10,601,434.84	13,445,609.02	9,122,320.56
13 01 04 C14: Sta. 659+22 to 663+17: 400 cfs	1,619,481.31	249,610.29	1,989,001.69	9,181,655.37	13,039,748.66	16,527,213.09	11,121,813.34
13 01 05 C20: Sta. 934+82 to 937+57: 450 cfs	1,562,844.37	238,785.12	1,861,483.68	10,092,341.37	13,755,454.53	17,772,226.84	12,186,415.16



# Project Construction Schedule

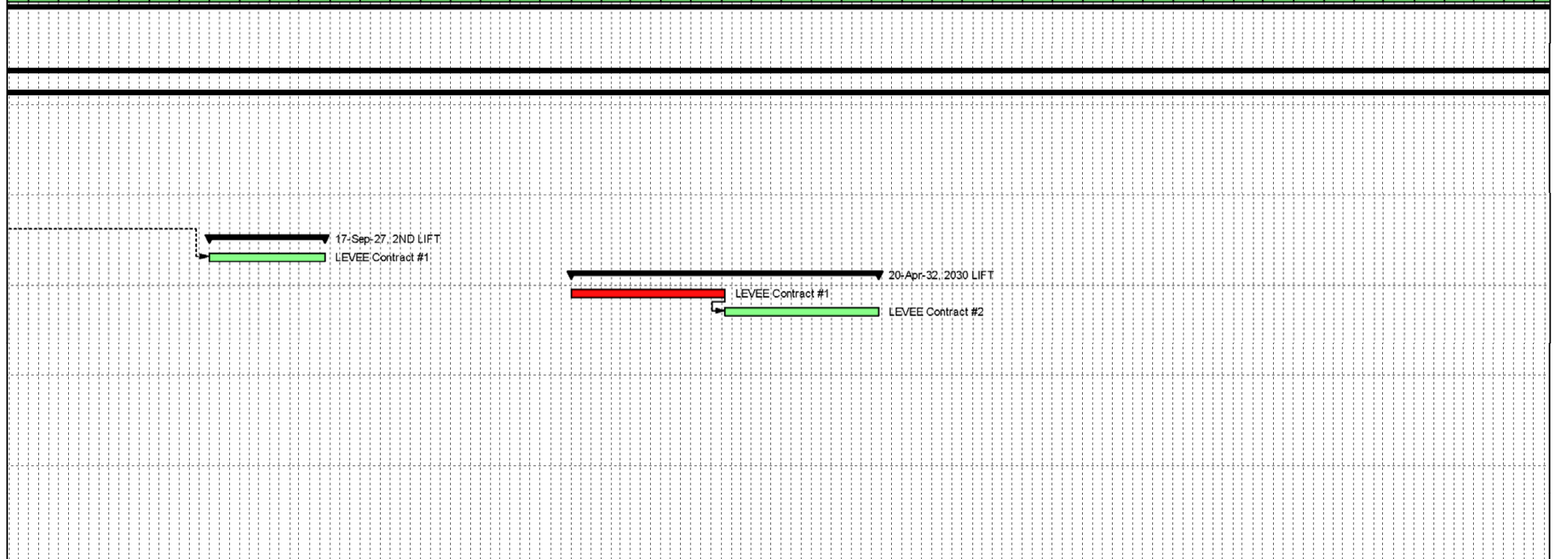
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Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2017				2018				2019				2020				2021				2022				2023				2024			
						Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
<b>West Shore Lake Pontchartrain Feasibility Study</b>																																					
<b>RELOCATIONS</b>																																					
A1020	RELOCATIONS	400	03-Oct-17*	11-Jan-19	13789																																
<b>LEVEES &amp; FLOODWALLS</b>																																					
<b>LEVEES</b>																																					
<b>1ST LIFT</b>																																					
A*	LEVEE Contract #1	560	03-Oct-16	17-Jul-18	13942																																
A*	LEVEE Contract #2	560	03-Oct-16	17-Jul-18	13942																																
A*	LEVEE Contract #3	560	03-Oct-16	17-Jul-18	13080																																
A*	LEVEE Contract #4	560	18-Jul-18	30-Apr-20	13382																																
A*	LEVEE Contract #5	560	18-Jul-18	30-Apr-20	13382																																
A*	LEVEE Contract #6	560	18-Jul-18	30-Apr-20	13080																																
<b>2ND LIFT</b>																																					
A*	LEVEE Contract #1	302	01-Oct-26	17-Sep-27	11071																																
<b>2030 LIFT</b>																																					
A*	LEVEE Contract #1	399	03-Oct-29*	10-Jan-31	0																																
A*	LEVEE Contract #2	399	11-Jan-31	20-Apr-32	9634																																
<b>2045 LIFT</b>																																					
A*	LEVEE Contract #1	463	03-Oct-44*	26-Mar-46	0																																
A*	LEVEE Contract #2	463	27-Mar-46	17-Sep-47	4810																																
<b>2060 LIFT</b>																																					
A*	LEVEE Contract #1	363	04-Oct-60*	30-Nov-61	0																																
A*	LEVEE Contract #2	363	01-Dec-61	27-Jan-63	0																																
<b>FLOODWALLS</b>																																					
A1120	Flood Wall Contract #1	296	03-Oct-17*	12-Sep-18	13661																																
A1130	Flood Wall Contract #2	324	03-Oct-17*	15-Oct-18	13527																																
A1140	Flood Wall Contract #3	338	16-Oct-18	13-Nov-19	13527																																
A1150	Flood Wall Contract #4	232	13-Sep-18	10-Jun-19	13661																																
<b>PUMPING PLANT</b>																																					
A1190	Pump Stations	528	03-Oct-17*	10-Jun-19	13661																																

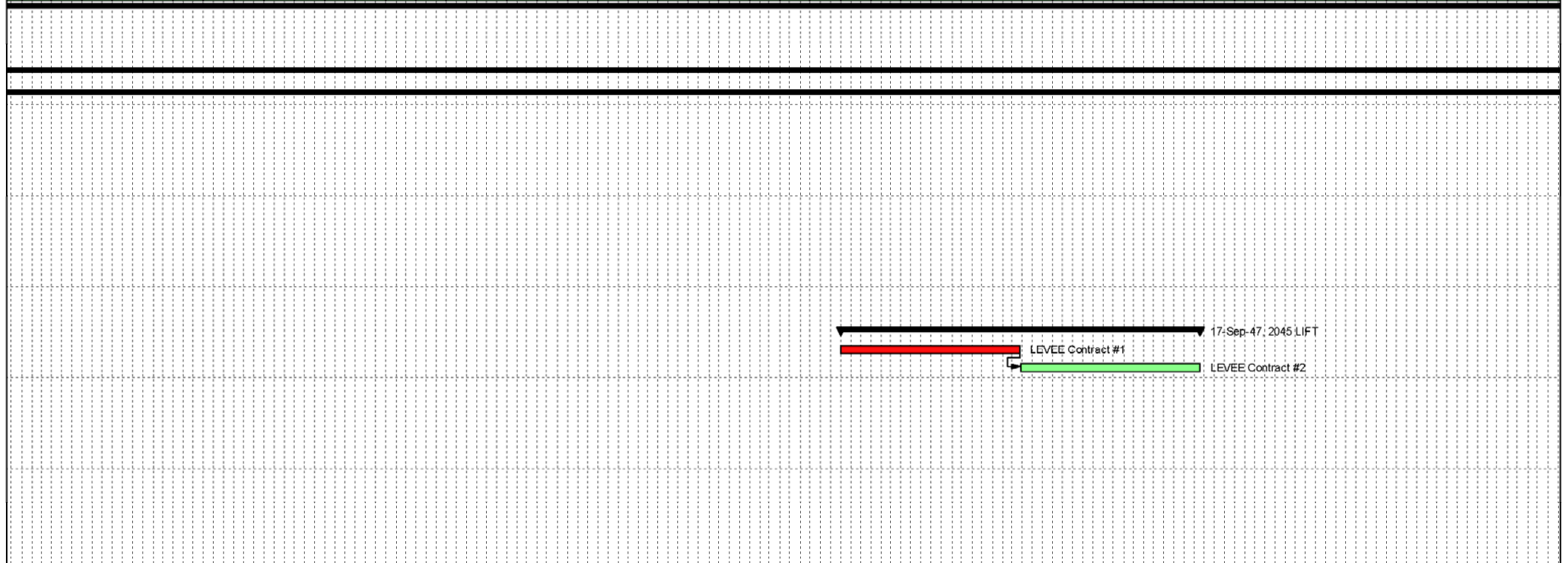
█ Remaining Level of Effort   
 █ Remaining Work   
 █ Actual Work   
 █ Critical Remaining Work   
 ◆ Milestone   
 ▼ Summary



2025				2026				2027				2028				2029				2030				2031				2032				2033				2034				2035				2036				2037			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				



	2038				2039				2040				2041				2042				2043				2044				2045				2046				2047				2048				2049				2050		
4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3								





## Cost and Schedule Risk Analysis (CSRA)

In an effort to identify the applicable cost and schedule risks inherent with execution of the Recommended Alternative, we prepared a Cost and Schedule Risk Analysis as per ER 1110-2-1302 of 15-Sep-2008. These were implemented in an effort to determine a contingency cost required for cost estimating and based on the risk items associated with the project. The results of these analyses are determined by qualifying and quantifying all potential cost risks and running a Monte Carlo simulation to produce the frequency spectrum and probability range for the applied risk costs. The cost contingency is obtained from the 80-percent contingency as determined by this analysis.

The initial Risk Register considered 38 risk items. From the initial 38 risk items, a total of 6 potential moderate and high risk items were chosen for modeling purposes for the Cost Risk Analysis and 5 risk items for the Schedule Risk Analysis. Assumptions were made for each risk item before running the Monte Carlo simulation. The result of the simulation for the Cost and Schedule Risk Analysis gave a 27% and 5.5% percent (rounded) contingency respectively at the 80-percent confidence level.

The contingency cost for this project was utilized for a Micro Computer Aided Cost Estimating System (MCACES) estimation of the costs associated with the 100 Year Protection Plan (1% Annual Chance Surge Risk Reduction Plan). The potential cost risks developed during this analysis also serve as an indicator of how to avoid unforeseen escalation of project costs throughout project implementation and therefore, may be used as a valuable tool in all future aspect of the project study, design, and construction planning and estimation.

The major contributors to the resulting total project cost contingency for the Cost Estimate were:

- (CON-1) Construction Modifications - risk of contract modifications.
- (TL-4) Borrow/fill sources identified / secured – risk of having to purchase borrow material for future lifts.
- (PR-4) Fuel Cost - risk of inflation on the cost of fuel.

The major contributors to the resulting total project schedule contingency for the project schedule were:

- (CA-2) Numerous Separate Contracts – risk of delays in schedule due to protests, access to projects, multiple contractors coordinating work effort and highway traffic.
- (PPM-3) Funding Availability at Pre-solicitation stage - risk of delays in schedule due to lack of funding during early stages (PED phase) of the project.
- (PR-6) Stakeholders request late changes risk of delays in schedule due to any additional work or alignment.

The corresponding Total Cost including contingency (cost & schedule) for the Cost Risk Analysis is presented on table 1.

**Table 1. Cost Contingency Analysis Table**

Confidence Level	Value	Contingency
Most Likely Cost Estimate	\$381,341,070	0.00%
5%	\$427,641,254	12.14%
50%	\$463,402,864	21.52%
<b>80%</b>	<b>\$484,330,803</b>	<b>27.01%</b>
95%	\$503,822,683	32.12%

The corresponding Total Cost including contingency (cost & schedule) for the Project Schedule is presented on Table 2.

**Table 2. Schedule Contingency Analysis Table**

Confidence Level	Value	Contingency
Most Likely Cost Estimate	557.0 Months	0.00%
5%	568.5 Months	2.07%
50%	580.5 Months	4.22%
<b>80%</b>	<b>587.5 Months</b>	<b>5.48%</b>
95%	593.7 Months	6.59%

The rounded contingency percentages for **Project Cost (27%)** and for the **Project Schedule (5.5%)** were transferred to the TPCS for final calculation of total contingency and cost. Lands and Damages cost and contingency are not included in the above. (NOTE: The rounding of the contingencies causes the totals on the TPCS to be slightly higher than and not add up to exactly the costs above.)

For more detailed information on the CSRA, see the complete CSRA Risk Report.