

**PL-646 CWPPRA
PROJECT COMPLETION REPORT**

PROJECT NAME	Sabine National Wildlife Refuge Water Control Structure Replacement
CWPPRA/STATE PROJECT NO	CS-23

Report Date January 27, 2005 By: Natural Resources Conservation Service

1. Project Personnel

DNR Project Manager	Ralph Libersat	(225) 342-1952
DNR Construction Project Manager	Dewey Billodeau	(337)-482-0664
DNR Monitoring Manager	Melissa Hymel	(504) 280-4074
Federal Agency Project Manager	Darryl Clark	(337) 291-3111
Federal Agency Contracting Officer	Ralph Broome	(318) 473-7781
Federal Agency Design Engineer	John Chua	(318) 473-7792
Federal Agency COTR	Wayne Melancon	(318) 783-1257 ext. 125
Federal Agency Inspector	Dennis Landry	(318) 783-1257 ext. 125

2. Project Location & Description

Sabine National Wildlife Refuge project is located in Cameron Parish, Louisiana. The project will affect approximately 42,247 acres of fresh to brackish marsh within the refuge. The construction sites are located within the confines of the refuge, east of Louisiana Highway 27 and west of Calcasieu Lake. The approximate center of the project is 93°-24'-30" W Latitude and 29°-53'-09" N Longitude. The affected marsh area units within the refuge are known as deteriorated brackish, healthy brackish marsh, intermediate marsh-North unit and intermediate marsh-South unit. These units comprise 6,175, 19,060, 10,057 and 6,955 acres respectively.

The project consisted of replacing three existing structures that had become non functional. The existing structure at Hog Island Gully Canal, referred to as Site A, consists of a reinforced concrete fixed-crest weir (crest elevation +1.5' MSL) with an 11-foot wide tainter gate (invert elevation -7.0' MSL). The existing structure at Headquarters Canal, referred to as Site B, consists of a single 48-inch diameter corrugated metal pipe conduit with a combination canal/drainage gate. The existing structure at West Cove Canal, referred to as Site C, consists of a reinforced concrete fixed-crest weir (crest elevation +1.5' MSL) with a 7-foot wide tainter gate (invert elevation -7.0' MSL).

The structural measures of the project consist of the removal of the three water control structures described above and construction of three new structures in approximately the same area. The designed structures include two reinforced concrete gated structures and an earthen and corrugated metal pipe structure with gates. All structures include riprap lined inlet and outlet channels.

3. Final Constructed Features

The new structure at Site A consists of a reinforced concrete structure with 6 flow bays controlled by slide gates. Bays numbered 1, 2, 4 & 6 (oriented left to right) have 90" wide x 144" high openings while bays 3 & 4 have 36" wide x 144" high openings. A pair of slide gates regulates flow through each bay. The slide gate that is seated along the structure invert (elevation -7.0' NAVD) is 72" high. The other slide gate is 54" high and complements the first gate by varying the crest elevation (from -1.5' to +3.5' NAVD). All of the slide gates are constructed of aluminum and mounted on a single

stainless steel stem operated by electric actuators. Additionally, bays 1, 2 & 6 also have aluminum drainage gates (flap gates) installed along the Calcasieu Lake side of the structure.

The structure at Site B consists of three 60-inch diameter aluminum corrugated metal pipe conduits each 56 feet in length, passing through an earthen embankment. The aluminum corrugated metal pipes are supported by treated timber piles. Invert elevation of the conduits will be -4.0' NAVD. Combination canal/drainage gates are mounted along the Calcasieu Lake side of the conduits to regulate flow through the structure. Each of the combination gates are attached to a gate stem. Two of the stems are operated by a hand wheel, while the third is operated by an electric motor.

The new structure at Site C consists of a reinforced concrete structure similar to Site A with the exception that it has 5 flow bays controlled by slide gates. Bays 1, 3 & 5 are 90" wide by 144" high and bays 2 & 4 are 36" wide by 144" high. Slide gate configuration is the same as for Site A. Aluminum drainage gates are attached to the Calcasieu Lake side of the structure on bays 1 & 5.

4. Project Cost Elements

CS-23 Sabine Structures	CWPPRA Project Cost Estimates	Cost Incurred as of Construction Completion
Construction	\$2,778,535.00	\$2,761,988.00
E & D	\$ 346,299.00	\$ 347,687.00
Land rights	\$ 0.00	\$ 0.00
Monitoring	\$ 834,094.00	\$ 172,079.00
O & M	\$ 567,987.00	\$ 6,151.00
Total	\$4,528,915.00	\$3,287,905.00

5. Items of Work

See Attachment 1

6. Construction and Construction Oversight Construction Unit #2

Prime construction contractor	F. Miller & Sons
Subcontractor	none
Original construction contract	\$ 2,170,600.35
Change orders	\$ 406,144.26
Over/Under runs	\$ -2,087.95
Final construction contract	\$ 2,574,656.66

7. Major Equipment Used

- 215 Caterpillar Hydraulic Excavator
- 550 G Case Crawler Tractor
- Koehing Crane
- 220 Komatsu Hydraulic Excavator
- Gove -RT-C30 Extendable Boom Highway Rate Crane
- 310 John Deere Rubber Tired
- Manitowok Crane
- 200 Komatsu Hydraulic Excavator
- 322B Caterpillar Long Reach Hydraulic Excavator

300 Komatsu Hydraulic Excavator
Vicon Crane
Various Pumps
Air Compressors
Electric Generator
Various Hand Tools

8. Construction Sequence

Work on the contract began at Site B, the Headquarters Structure. The contractor first removed the existing structure and constructed earthen coffer dams on both sides of the structure to facilitate dewatering. The site was excavated to lines and grades, and then the timber piles that support the pipe structures were driven. The timber pipe cradles were installed, and then the pipe structures (including the gates) were placed in the cradles. The site was then backfilled with compacted earth. Upon completion of the backfilling the rock riprap was installed both sides of the structure. The coffer dams were then removed. At this time the contractor installed the decking and electrical control panel.

After predominately completing work at Site B, the contractor moved to begin work at Site A. The first operation at Site A was to construct access roads. While performing this operation, earthfill was also placed for the boat ramps. Sheet piling was then driven around the perimeter of the foundation for the structure to form the coffer dam for dewatering. The foundation piles were driven, and then the concrete structures were started with the invert slab. Construction continued by placing reinforcing steel, forming and placing the concrete for the remainder of the structure. At this point the steel sheet piling was removed and an earthen coffer dam was placed downstream of the structure. The area between earthen coffer dam and the old structure was then dewatered. The installation of the steel fabrication and installation of the gates and actuators was next. The electrical system was then installed. After the structure was completed, the contractor placed the rock on both inlet and outlet ends of the structure. The contractor then installed the boat launch, the boat turnaround and the fishing piers at this site. The last operation at this site was to remove the earthen coffer dam and the old existing structure.

The contractor used the same sequence and process at Site C as described above for Site A with the exception that the dewatering system consisted only of earthen coffer dams upstream and downstream of the structure. No steel sheet piling was used for dewatering the site. Upon completion of the structure, the contractor then installed the two new boat ramps, rehabilitated an existing boat ramp and installed the new fishing pier. The earthen coffer dams were then removed.

After completion of all of the structural components of the three main structures, technicians from Rotark installed and programmed the PLC (programmable logic controllers). At this time it was discovered that the electrical service to the structures was not a “true” 3-phase power supply which caused problems with the actuator operations. Steps were taken by NRCS and sub-contractors to solve the problem. The first attempt was to install VFD (variable frequency drives) and filters at all of the structures. This did not provide an adequate solution. Then rotary phase converters were installed to provide adequate electrical power at Sites A & C. A short time after the structures were put into operation some of the brass drive nuts in the stem housing began failed. To this date, 3 nuts on site A and one on site C have failed and been replaced. An investigation into the cause of the drive nut failures is currently ongoing.

9. Contract Modifications & Field Changes

See Attachment 1 that also explains all modifications.

10. Pipeline and Utility In the Project Location

<u>Utility Type</u>	<u>Owner</u>	<u>Rep. To Contact</u>
NONE		

11. Construction Safety

The contractor was very safety conscious throughout the duration of the construction. Only a few items were identified during construction which was rapidly addressed by the contractor. Some of the items identified were maintaining impalement protection on exposed vertical reinforcing steel and utilizing fall protection measures when applicable.

12. Additional Comments

There have been numerous problems with the electrical power supply and electronics associated with the two reinforced concrete structures (Sites A & C). The original problem was the power supplied by utility company was not true 3 phase power. An open delta with two powered legs was supplied. The actuators provided for the structures are very sophisticated and require true 3 phase 60 hertz power. The unaltered power caused the actuators to overheat and trip off because of the thermal protection. This problem was attempted to be corrected by the installation a VFD's which used capacitors to develop three phase power. This solution was not effective and ultimately the VFD's were removed and replaced with rotary phase converters.

The gate actuators are operated by manual means and a programmable logic controller (PLC). Problems with the PLC operating the gates as specified kept occurring. The problem was with the original program sequence. The original programming was serial in nature, such that if one gate malfunctioned, the sequence was terminated. The PLC was reprogrammed using parallel program logic to eliminate this problem.

Also a problem with the brass drive nuts on specific gates on Site A & C has been encountered after the final inspection of the structures. The drive nuts at Site A, gates 4, 5, and 6 lower have all been replaced. The failures occurred in the following order, gate 5, gate 6, then gate 4. The drive nut that failed at Site C was on gate 3 lower. This nut has not yet been replaced. The gate numbers shown above are numbered by the openings on each structure from south to north. It this point in time it is still undetermined if the cause for the drive nuts stripping is due to the gates binding, faulty nuts, or problems with the stem threads. This matter is still under investigation.

13. Significant Construction Dates:

Contract No. 50-7212-03-11	Date
Bid Opening	9/14/1999
Construction Contract Award	10/13/1999
Preconstruction Conference	10/25/1999
Notice to Proceed	11/8/1999
Mobilization	11/23/1999
Construction Start	11/23/1999
Construction Completion	9/10/2003
Final Acceptance	3/30/2004

ATTACHMENT 1

ITEMS OF WORK
&
MODIFICATIONS

CONTRACT QUANTITIES

GENERAL - ALL STRUCTURES

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under
1	Structure Removal	1	JOB	LS	\$30,000.00	LS	\$93,300.00	1	\$83,576.00	0.0%
2	Pollution Control	1	JOB	LS	\$7,000.00	LS	\$2,300.00	1	\$2,300.00	0.0%
3	Construction Surveys	1	JOB	LS	\$50,000.00	LS	\$52,000.00	1	\$52,000.00	0.0%
4	Mobilization & Demobilization	1	JOB	LS	\$160,000.00	LS	\$208,600.00	1	\$208,600.00	0.0%
5	Contractor Quality Control	1	JOB	LS	\$100,000.00	LS	\$30,000.00	1	\$30,000.00	0.0%
6	Field Office	1	JOB	LS	\$25,000.00	LS	\$15,000.00	1	\$15,000.00	0.0%
6A	Coastal Wetland Plants (Spartina Patens)	3800	EA	\$3.25	\$12,350.00	\$5.20	\$19,760.00	3,800	\$19,760.00	0.0%
6B	Coastal Wetland Plants (Distichlis Spicata)	3800	EA	\$3.00	\$11,400.00	\$5.75	\$21,850.00	3,800	\$21,850.00	0.0%
6C	Excavation, Trenching	650	L.F.	\$2.00	\$1,300.00	\$6.00	\$3,900.00	525	\$3,150.00	19.2%
6D	Electrical Conduit, PVC	680	L.F.	\$4.50	\$3,060.00	\$10.50	\$7,140.00	525	\$5,512.50	22.8%
6E	Timber Piling, Treated, 30' Long	3	EA	\$450.00	\$1,350.00	\$600.00	\$1,800.00	3	\$1,800.00	0.0%
6F	Electrical Service, Site A	1	JOB	LS	\$5,500.00	LS	\$6,000.00	1	\$5,975.15	0.4%
6G	Electrical Service, Site B	1	JOB	LS	\$1,500.00	LS	\$7,132.00	1	\$7,132.00	0.0%
6H	Electrical Service, Site C	1	JOB	LS	\$7,500.00	LS	\$8,200.00	1	\$5,000.00	39.0%

Est Sub Total \$415,960.00

Contrat Bid Amount Sub Total \$470,480.00

SITE A, HOG ISLAND GULLY CANAL STRUCTURE

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under
7	Removal of Water	1	JOB	LS	\$100,000.00	LS	\$150,000.00	1	\$150,000.00	0.0%
8	Steel Sheet Piling	2,576	S.F.	\$25.00	\$64,400.00	\$10.00	\$25,760.00	2,576	\$25,760.00	0.0%
9	Timber Piling, Untreated	32	EA	\$450.00	\$14,400.00	\$300.00	\$9,600.00	32	\$9,600.00	0.0%
10	Excavation, Common	1000	C.Y.	\$2.00	\$2,000.00	\$6.00	\$6,000.00	1,000	\$6,000.00	0.0%
11	Reinforced Concrete	168	C.Y.	\$325.00	\$54,600.00	\$415.00	\$69,720.00	168	\$69,720.00	0.0%
12	Steel Reinforcement	29,811	LB	\$0.50	\$14,636.50	\$0.65	\$19,027.45	29,811	\$19,377.15	0.0%
13	Rock Riprap, 400-lb	630	TON	\$40.00	\$25,200.00	\$44.00	\$27,720.00	630	\$27,720.00	0.0%
14	Rock Riprap, 200-lb	3250	TON	\$40.00	\$130,000.00	\$44.00	\$143,000.00	3,250	\$143,000.00	0.0%
15	Aluminum Slide Gate, 90"x72", Class 12-12	4	EA	\$34,400.00	\$137,600.00	\$15,000.00	\$60,000.00	4	\$60,000.00	0.0%
16	Aluminum Slide Gate, 90"x54", Class 10-10	4	EA	\$29,000.00	\$116,000.00	\$12,500.00	\$50,000.00	4	\$50,000.00	0.0%
17	Aluminum Slide Gate, 36"x72", Class 12-12	2	EA	\$31,000.00	\$62,000.00	\$12,500.00	\$25,000.00	2	\$25,000.00	0.0%
18	Aluminum Slide Gate, 36"x54", Class 10-10	2	EA	\$26,200.00	\$52,400.00	\$10,500.00	\$21,000.00	2	\$21,000.00	0.0%
19	Logic Controller	1	JOB	LS	\$25,000.00	LS	\$22,000.00	1	\$22,000.00	0.0%
20	Aluminum Flap Gate, 90"x114"	3	EA	\$30,158.00	\$90,474.00	\$8,500.00	\$25,500.00	3	\$25,500.00	0.0%
21	Crane	1	EA	\$20,000.00	\$20,000.00	\$6,000.00	\$6,000.00	1	\$6,000.00	0.0%
22	Metal Fabrication and Installation	1	JOB	LS	\$25,000.00	LS	\$44,000.00	1	\$44,000.00	0.0%
23	Chain Link Fence	1	JOB	LS	\$1,100.00	LS	\$3,100.00	1	\$3,000.00	0.0%
24	Sign and Barricade	2	EA	\$3,000.00	\$6,000.00	\$3,000.00	\$6,000.00	2	\$6,000.00	0.0%
25	Geotextile	4,560	S.Y.	\$4.50	\$20,520.00	\$1.65	\$7,524.00	4,560	\$7,524.00	0.0%

Est Sub Total \$961,330.50

Contrat Bid Amount Sub Total \$720,851.45

SITE B, HEADQUARTERS CANAL STRUCTURE

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under	
26	Removal of Water	1	JOB	LS	\$50,000.00	LS	\$80,000.00	1	\$80,000.00	0.0%	
27	Timber Piling, Treated, 40' Long	14	EA	\$500.00	\$7,000.00	\$800.00	\$11,200.00	14	\$11,200.00	0.0%	
28	Timber Piling, Treated, 30' Long	18	EA	\$500.00	\$9,000.00	\$650.00	\$11,700.00	18	\$11,700.00	0.0%	
29	Excavation, Common	550	C.Y.	\$2.00	\$1,100.00	\$10.00	\$5,500.00	550	\$5,500.00	0.0%	
30	Earthfill	652	C.Y.	\$4.00	\$2,464.00	\$20.00	\$12,320.00	652	\$13,040.00	0.0%	
31	Corrugated Metal Pipe Conduits, Aluminum, 60" Diameter	168	L.F.	\$91.30	\$15,338.40	\$120.00	\$20,160.00	168	\$20,160.00	0.0%	
32	Rock Riprap, 200-lb	1,348	TON	\$40.00	\$55,680.00	\$50.00	\$67,400.00	1,366	\$68,300.00	1.3%	
33	Aluminum Combination Canal & Drainage Gate, 60" Diameter, Manual Operation	2	EA	\$15,336.00	\$30,672.00	\$7,200.00	\$14,400.00	2	\$14,400.00	0.0%	
34	Aluminum Combination Canal & Drainage Gate, 60" Diameter, Electric Operation	1	EA	\$15,600.00	\$15,600.00	\$15,000.00	\$15,000.00	1	\$15,000.00	0.0%	
35	Logic Controller	DELETED AT BID - ADDED MOD #1					LS	\$19,655.00	1	\$19,655.00	0.0%
36	Metal Fabrication and Installation	1	JOB	LS	\$5,000.00	LS	\$7,600.00	1	\$7,600.00	0.0%	
37	Timber Fabrication and Installation	1	JOB	LS	\$2,850.00	LS	\$12,700.00	1	\$12,700.00	0.0%	
38	Geotextile	2,024	S.Y.	\$4.50	\$9,000.00	\$1.50	\$3,000.00	2,024	\$3,036.00	0.0%	
39	Cellular Concrete Block Mattress	900	S.F.	\$15.00	\$13,500.00	\$5.90	\$5,310.00	900	\$5,310.00	0.0%	

Est Sub Total \$217,204.40

Contrat Bid Amount Sub Total \$268,490.00

SABINE NATIONAL WILDLIFE REFUGE
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SITE C, WEST COVE CANAL STRUCTURE

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under
40	Removal of Water	1	JOB	LS	\$100,000.00	LS	\$121,500.00	1	\$121,500.00	0.0%
41	Steel Sheet Piling	2,678	S.F.	\$25.00	\$66,950.00	\$10.00	\$26,780.00	2,678	\$26,780.00	0.0%
42	Timber Piling, Untreated	28	EA	\$450.00	\$12,600.00	\$400.00	\$11,200.00	28	\$11,200.00	0.0%
43	Excavation, Common	1120	C.Y.	\$2.00	\$2,240.00	\$6.00	\$6,720.00	1,120	\$6,720.00	0.0%
44	Reinforced Concrete	154	C.Y.	\$325.00	\$50,050.00	\$415.00	\$63,910.00	154	\$63,910.00	0.0%
45	Steel Reinforcement	26,886	LB	\$0.50	\$13,216.00	\$0.70	\$18,502.40	26,886	\$18,820.20	0.0%
46	Rock Riprap, 400-lb	500	TON	\$40.00	\$20,000.00	\$45.00	\$22,500.00	500	\$22,500.00	0.0%
47	Rock Riprap, 200-lb	3,500	TON	\$40.00	\$126,000.00	\$45.00	\$141,750.00	3,500	\$157,500.00	0.0%
48	Aluminum Slide Gate, 90"x72", Class 12-12	3	EA	\$34,400.00	\$103,200.00	\$15,600.00	\$46,800.00	3	\$46,800.00	0.0%
49	Aluminum Slide Gate, 90"x54", Class 10-10	3	EA	\$29,000.00	\$87,000.00	\$12,800.00	\$38,400.00	3	\$38,400.00	0.0%
50	Aluminum Slide Gate, 36"x72", Class 12-12	2	EA	\$31,000.00	\$62,000.00	\$12,400.00	\$24,800.00	2	\$24,800.00	0.0%
51	Aluminum Slide Gate, 36"x54", Class 10-10	2	EA	\$26,200.00	\$52,400.00	\$10,700.00	\$21,400.00	2	\$21,400.00	0.0%
52	Logic Controller	1	JOB	LS	\$21,000.00	LS	\$22,000.00	1	\$22,000.00	0.0%
53	Aluminum Flap Gate, 90"x114"	2	EA	\$31,830.00	\$63,660.00	\$9,500.00	\$19,000.00	2	\$19,000.00	0.0%
54	Metal Fabrication and Installation	1	JOB	LS	\$22,000.00	LS	\$41,000.00	1	\$41,000.00	0.0%
55	Chain Link Fence	1	JOB	LS	\$1,100.00	LS	\$3,100.00	1	\$3,100.00	0.0%
56	Sign and Barricade	2	EA	\$3,000.00	\$6,000.00	\$3,200.00	\$6,400.00	2	\$6,400.00	0.0%
57	Geotextile	4,340	S.Y.	\$4.50	\$19,530.00	\$1.60	\$6,944.00	4,340	\$6,944.00	0.0%

Est Sub Total \$828,946.00
EST. BASE TOTAL \$2,423,440.90
Contract Bid Amount Sub Total \$642,706.40
BASE CONTRACT BID AMOUNT TOTAL \$2,102,527.85

ADDITIVE ITEMS, SITE C BOAT LAUNCH

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under
58	Earthfill for Access Road	1,045	C.Y.	\$15.50	\$12,245.00	\$15.00	\$15,675.00	1,220	\$18,300.00	16.7%
59	Rockfill for Access Road	303	C.Y.	\$40.00	\$5,800.00	\$45.00	\$13,635.00	303	\$13,635.00	0.0%
60	Corrugated Metal Pipe Conduit, Aluminum, 36" Diameter	60	L.F.	\$50.00	\$3,000.00	\$75.00	\$4,500.00	60	\$4,500.00	0.0%
61	Rock Riprap, 200-lb	81	TON	\$40.00	\$3,240.00	\$47.00	\$3,807.00	81	\$3,807.00	0.0%
62	Geotextile	2,375	S.Y.	\$4.50	\$5,580.00	\$1.60	\$3,800.00	2,375	\$3,800.00	0.0%
63	Cellular Concrete Block Mattress	1536	S.F.	\$15.00	\$23,040.00	\$5.00	\$7,680.00	1,536	\$7,680.00	0.0%

Est Additive Sub Total \$52,905.00
Contract Bid Additive Sub Total \$36,346.00

ADDITIVE ITEMS, SITE A BOAT LAUNCH

BID ITEM	WORK	EST. QUANT	UNIT	EST. UNIT PRICE	EST. AMOUNT	CONTRACT UNIT PRICE	CONTRACT AMOUNT	FINAL QUANT	FINAL AMOUNT	%Over or Under
64	Earthfill for Access Road	2,067	C.Y.	\$15.50	\$11,392.50	\$15.00	\$11,025.00	2,067	\$31,005.00	0.0%
65	Rockfill for Access Road	272	C.Y.	\$40.00	\$6,000.00	\$45.00	\$6,750.00	272	\$12,240.00	0.0%
66	Rock Riprap, 200-lb	81	TON	\$40.00	\$3,240.00	\$47.00	\$3,807.00	81	\$3,807.00	0.0%
67	Geotextile	2,742	S.Y.	\$4.50	\$7,155.00	\$1.55	\$2,464.50	2,742	\$4,250.10	0.0%
68	Cellular Concrete Block Mattress	1536	S.F.	\$15.00	\$23,040.00	\$5.00	\$7,680.00	1,536	\$7,680.00	0.0%

Est Additive Sub Total \$50,827.50
EST PROJECT TOTAL \$2,527,173.40
Contract Bid Additive Sub Total \$31,726.50
CONTRACT BID PROJECT TOTAL \$2,170,600.35

MODIFICATION #1

Added logic controller back to contract for Site B, and increased the allowance for electrical service to Site B
M1-1 Changed unit price for CLIN 6D from \$9.00 to \$10.50
M1-2 Changed lump sum amount for CLIN 6G from \$1,650.00 to \$5,500.00
M1-3 Added CLIN 35 which was originally deleted back into the contract at lump sum amount of \$19,655.00
Changed items (M1-1 to M1-3) shown in schedule above in this color for a total increase in contract amount of \$24,535.00

MODIFICATION #2

M2-1 Changed lump sum amount for CLIN 6G from \$5,500.00 to \$7,132.00
M2-2 Increased CLIN 30 quantity from 616 to 652 cy
M2-3 Decreased CLIN 32 quantity from 1392 to 1348 tons
M2-4 Increased CLIN 38 quantity from 2000 to 2024 sy
M2-5 Increased CLIN 62 quantity from 1240 to 2020 sy
M2-6 Increased CLIN 64 quantity from 735 to 1125 cy
M2-7 Increased CLIN 65 quantity from 150 to 180 cy
M2-8 Increased CLIN 67 quantity from 1590 to 2690 sy
Changed items (M2-1 to M2-8) shown in schedule above in this color for a total increase in contract amount of \$10,341.00

MODIFICATION #3

M3-1 Increased CLIN 12 quantity from 29,273 to 29,811 lbs
M3-2 Increased CLIN 45 quantity from 26,432 to 26,886 lbs
Changed items (M3-1 to M3-2) shown in schedule above in this color for a total increase in contract amount of \$667.50

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MODIFICATION #4

M4-1 Increased CLIN 59 quantity from 145 to 237 cy
M4-2 Increased CLIN 64 quantity from 735 to 867 cy
M4-3 Increased CLIN 65 quantity from 150 to 242 cy
M4-4 Increased CLIN 67 quantity from 1590 to 1642 sy
Added the following items to the contract

BID	WORK	EST.	QUANT	UNIT	CONTRACT	CONTRACT	FINAL	FINAL	%Over
ITEM					UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
66A	Remove, Store, Replace Riprap	1	JOB		LS	\$1,824.00	1	\$1,824.00	

Changed items (M41 - M4-4) shown in schedule above in this color

The total increase in contract amount for this modification including changed and added items is \$12,146.60

MODIFICATION #5

Added the following items to the contract

BID	WORK	EST.	QUANT	UNIT	CONTRACT	CONTRACT	FINAL	FINAL	%Over
ITEM					UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
69	Earthfill for Access Road	392	S.F.		\$28.00	\$10,976.00	392	\$10,976.00	
70	Rockfill for Access Road	392	S.F.		\$17.00	\$6,664.00	392	\$6,664.00	
71	Rock Riprap, 200-lb	1	JOB		LS	\$1,200.00	1	\$1,200.00	
72	Remove, Store, Replace Riprap	1	JOB		LS	\$5,024.00	1	\$5,024.00	

These added items increased the contract amount of \$23,864

MODIFICATION #6

M6-1 Increased CLIN 58 quantity from 790 to 1005 cy
M6-2 Increased CLIN 59 quantity from 237 to 266 cy
M6-3 Increased CLIN 62 quantity from 2020 to 2264 cy
M6-4 Increased CLIN 64 quantity from 1125 to 1257 cy
M6-5 Increased CLIN 65 quantity from 180 to 272 cy
M6-6 Increased CLIN 67 quantity from 2690 to 2742 sy
Added the following items to the contract

BID	WORK	EST.	QUANT	UNIT	CONTRACT	CONTRACT	FINAL	FINAL	%Over
ITEM					UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
22A	Metal Fab & Installation Site A	1	JOB		LS	\$1,200.00	1	\$1,200.00	
73	Lock Open Devices	1	JOB		LS	\$6,869.68	1	\$6,869.68	
74	Handrail Stabilization	1	JOB		LS	\$880.00	1	\$880.00	

Changed items (M6-1 to M6-6) shown in schedule above in this color

The total increase in contract amount for this modification including changed and added items is \$13,870.08

MODIFICATION #7

No modification #7 was executed

MODIFICATION #8

M8-1 Increased CLIN 59 quantity from 266 to 303 cy
M8-2 Increased CLIN 62 quantity from 2264 to 2375 sy

Changed items (M8-1 to M8-2) shown in schedule above in this color for a total increase in contract amount of \$1842.60

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MODIFICATION #9

M9-1 Increased CLIN 58 quantity from 1005 to 1045 cy
Added the following items to the contract to repair slope failure at Site C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
D23	Excavation	180	CY	\$6.00	\$1,080.00	180	\$1,080.00	
D24	Earth Backfill	130	CY	\$10.00	\$1,300.00	130	\$1,300.00	
D25	Rock Riprap	500	Tons	\$45.00	\$22,500.00	500	\$22,500.00	
D26	Geotextile	510	SY	\$1.60	\$816.00	510	\$816.00	

Added the following items to the contract to add shims to stabilize handrails at Sites A, B, & C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
22B	Metal Fabrication Site A	1	JOB	LS	\$2,295.00	1	\$2,295.00	
36A	Metal Fabrication Site A	1	JOB	LS	\$560.00	1	\$560.00	
54A	Metal Fabrication Site A	1	JOB	LS	\$2,317.00	1	\$2,317.00	

Added the following items to the contract to add additional fishing piers at Sites A & C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
D1	15' Piles, Site A, North Pier	28	EA	\$350.00	\$2,295.00	28	\$9,800.00	
D2	Timber Fabrication, Site A North Pier	1	Job	LS	\$13,016.60	1	\$13,016.60	
D3	15' Piles, Site A, South Pier	16	EA	\$350.00	\$2,317.00	16	\$5,600.00	
D4	Timber Fabrication, Site A South Pier	1	Job	LS	\$7,744.10	1	\$7,744.10	
D5	15' Piles, Site A, East Launch	6	EA	\$430.00	\$560.00	6	\$2,580.00	
D6	30' Piles, Site A, East Launch	8	EA	\$600.00	\$2,317.00	8	\$4,800.00	
D7	15' Piles, Site C, North Pier	46	EA	\$430.00	\$2,295.00	46	\$19,780.00	
D8	Timber Fabrication, Site C North Pier	1	Job	LS	\$19,965.60	1	\$19,965.60	
D9	15' Piles, Site C, South Pier	22	EA	\$430.00	\$2,317.00	22	\$9,460.00	
D10	Timber Fabrication, Site C South Pier	1	Job	LS	\$10,479.60	1	\$10,479.60	
D11	15' Piles, Site C, Northeast Launch	12	EA	\$430.00	\$560.00	12	\$5,160.00	
D12	30' Piles, Site C, Northeast Launch	12	EA	\$600.00	\$2,317.00	12	\$7,200.00	
D13	15' Piles, Site C, Northwest Launch	4	EA	\$430.00	\$2,317.00	4	\$1,720.00	
D14	30' Piles, Site C, Northwest Launch	8	EA	\$600.00	\$2,317.00	8	\$4,800.00	

Added the following items to the contract to pay to remobilize crane to Site A

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
D27	Remobilize Crane to Site A	1	JOB	LS	\$5,000.00	1	\$5,000.00	

Changed item (M9-1) shown in schedule above in this color
The total increase in contract amount for this modification including changed and added items is \$158573.90

MODIFICATION #10

Added the following items to the contract to rehabilitate existingsouthwest boat launch at Site C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
D15	15' Timber Piles	20	EA	\$430.00	\$8,600.00	20	\$8,600.00	
D16	30' Timber Piles	8	EA	\$600.00	\$4,800.00	8	\$4,800.00	
D17	Excavation	260	CY	\$6.00	\$1,560.00	260	\$1,560.00	
D18	Rockfill	60	CY	\$45.00	\$2,700.00	60	\$2,700.00	
D20	Rock Riprap	30	Tons	\$45.00	\$1,350.00	30	\$1,350.00	
D21	Geotextile	270	SY	\$1.60	\$432.00	270	\$432.00	
D22	Cellular Concrete Matress	1920	SF	\$8.50	\$16,320.00	1,920	\$16,320.00	

These added items increased the contract amount \$35762.00

MODIFICATION #11

Added the following items to the contract to remove 120 linear feet of existing pier at Site C and added concrete cap over existing Northwest boat launch at Site C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
75	Removal of pier, Site C	120	LF	\$16.50	\$1,980.00	120	\$1,980.00	
76	Concrete, Reinforced, Class 5000, Center boat launch Site C	18	CY	\$415.00	\$7,470.00	18	\$7,470.00	

These added items increased the contract amount \$9450.00

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MODIFICATION #12

Added work to stiffen the electrical and control panels at Sites A & C, add access steps to Sites A & C, add pad eyes to flap gates at Site B, place rockfill on access road at Site C, drill drainage holes in each of the flap gate support beams at Sites A & C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
77	Electrical & Control Panel Stiffeners Sites A & C	1	JOB	LS	\$1,084.00	1	\$1,084.00	
78	Access Steps, Sites A & C	3	EA	\$970.00	\$2,910.00	3	\$2,910.00	
79	Pad Eyes, Flap Gates, Site B	1	JOB	LS	\$240.00	1	\$240.00	
80	Rockfill, Access Road, Tie in Site C	10	CY	\$45.00	\$450.00	10	\$450.00	
81	Flap Gate Support Beam Holes	1	JOB	LS	\$80.00	1	\$80.00	

These added items increased the contract amount \$4764.00

MODIFICATION #13

Added work to install variable frequency drives to attempt to correct power supply to the actuators at Sites A, B, & C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
82	Correct Power Source Deficiency at Sites A, B, & C	1	JOB	LS	\$10,340.00	1	\$24,312.00	

These added items increased the contract amount \$10340.00

MODIFICATION #14

M14-1 Increased CLIN 82 quantity from \$10340.00 to \$24,312.00 to install filters with the variable frequency drives
M14-2 Decreased CLIN 1 from \$93,000 to \$83,576.00
M14-3 Increased CLIN 47 quantity from 3150 to 3500 tons
M14-4 Increased CLIN 64 quantity from 1257 to 2067 CY
Added work to install bird excluder devices at Sites A, B, & C

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
83	Bird Excluder Devices	1	JOB	LS	\$1,284.00	1	\$1,284.00	

Changed items (M14-1 to M14-2) shown in schedule above in this color

The total increase in contract amount for this modification including changed and added items is \$33,432.00

MODIFICATION #15

- Increased contract amount by \$10,526.28 for electrical work at Sites A & C and extension project telephone service at job trailer

MODIFICATION #16

- Increased contract amount by \$35,008.30 to install transient voltage surge suppressors and reprogram gate operations at Sites A, B, & C, install rotary phase converts at Sites A & C and remove all variable frequency drives, and restore power to Site C.

MODIFICATION #17

Added various items as a result of final inspection check list

BID	EST.	CONTRACT	CONTRACT	FINAL	FINAL	%Over		
ITEM	WORK	QUANT	UNIT	UNIT PRICE	AMOUNT	QUANT	AMOUNT	or Under
83A	One day training session for Rotork Gate Operations	1	JOB	LS	\$3,971.00	1	\$3,971.00	
84	Furnish drill type operator for manual gate operations at Site B	1	JOB	LS	\$3,346.00	1	\$3,346.00	
85	Install one 110V electrical outlet at Site B	1	JOB	LS	\$108.00	1	\$108.00	
86	Replace all batteries in actuators	1	JOB	LS	\$284.00	1	\$284.00	
87	Install SS bird excluder devices	1	JOB	LS	\$3,034.00	1	\$3,034.00	
88	Repair concrete beam at Site C	1	JOB	LS	\$403.00	1	\$403.00	
89	Install SS keepers on flap gate hinge pins	1	JOB	LS	\$977.00	1	\$977.00	

The total increase in contract amount for this modification is \$12,123.00

MODIFICATION #18

- Unilateral change order to repair two gates at Site A that included removing drive gears, inspecting and chasing stem threads, machine new gears, and reinstall stems and gears. No price included in this modification. Work was paid for under modification #19.

MODIFICATION #19

- Increased the contract amount by \$8,880.00 to pay for work issued in Modification #18