

# Chaland Headland Restoration (BA-38-2) CWPPRA Project Project Completion Report



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Prepared for  
**Louisiana Department of Natural Resources  
and National Oceanic and Atmospheric  
Administration**



Planning

Engineering

Geotechnical Services

Environmental Services

GIS and Mapping Services

Survey Operations



## PROJECT COMPLETION REPORT

**Project Name: CHALAND HEADLAND RESTORATION CWPPRA PROJECT**

**CWPPRA/State Project No. BA-38-2**

**Report Date: April 18, 2007 By: Coastal Planning & Engineering, Inc.**

### 1. Project Managers/Contracting Officer

NOAA CO:	Pamela Wittler-Stichweh	Tel: (816) 426-2067
NOAA COTR:	Jason Manthey, P.E.	Tel: (816) 426-7841
NOAA Project Manager:	Rachel Sweeney	Tel: (225) 389-0508 ext.206
DNR Project Manager:	Greg Grandy	Tel: (225) 342-6412
DNR Project Engineer:	Russ Joffrion, P.E.	Tel: (225) 342-6850
CPE Project Manager:	Gordon Thomson, P.E.	Tel: (561) 391-8102
CPE Engineer of Record:	Gordon Thomson, P.E.	Tel: (561) 391-8102
CPE Construction Observers:	Andrew Wycklendt	Tel: (561) 391-8102
	Brian Kendrick, P.E.	Tel: (225) 205-7211
	Neil Wood	Tel: (561) 391-8102
	Catherine Moran	
	Jonathan Rager	

### 2. Location and Description of the Project as Approved for Construction by the Task Force

The project is located along the Plaquemines/Barataria Shoreline. The Chalant Headland segment is about 3.1 miles long, and is located between Pass La Mer and Chalant Pass, in south Plaquemines Parish, Louisiana.

Wetlands, dune, and swale habitats within the project area have undergone substantial loss due to subsidence, sea-level rise, oil and gas activities (e.g., pipeline construction), and marine and wind induced shoreline erosion (i.e., gulfside and bayside). Marine processes acting on the abandoned deltaic headlands rework and redistribute previously deposited sediment. The shoreline has breached in several locations, resulting in the formation of new tidal inlets.

The project's primary goals are 1) to prevent breaching of the barrier shoreline by increasing its width and average height and 2) to protect and create dune, swale, and intertidal marsh habitats.

Restoration of Chaland Headland will result in the restoration and creation of about 180 acres of dune, beach and berm, and the restoration and creation of about 246 acres of intertidal saline marsh. About 2.5 million cubic yards of sand and silt will be mined from an offshore borrow area in the Gulf of Mexico to construct the dune and marsh features. Additional features include installation of sand fencing concurrent with dune construction, dune and marsh vegetative plantings, post-construction gapping of retention dikes and creation of tidal features.

### **3. Final As-Built Features, Boundaries and Resulting Acreage**

The Contractor, Weeks Marine, Inc., was paid for the placement of 1,748,443 cubic yards of beach fill and 735,206 cubic yards of marsh fill. However, the Contractor overfilled the template and the total volume placed was approximately 2,443,500 cubic yards of beach fill and 927,400 cubic yards of marsh fill. The total volume of material removed from the borrow area was 3,967,400 cubic yards. The total area of the completed project is 230 acres of beach and 254 acres of marsh. Acreages calculated south of the designed beach and marsh intersection with an elevation greater than 0 feet NAVD were assumed to be beach. Acreages calculated north of the designed beach and marsh intersection with an elevation greater than -1.5 feet NAVD were assumed to be marsh. The profile lines shown in the plans were used to develop the resultant acreages. The length of habitat along each line was determined. This was then multiplied by the effective distance of that profile line to determine the area.

Beach fill was placed continuously along the length of the project area. The beach fill had a berm crest elevation of +6.0 feet NAVD with a maximum berm crest width of 280 feet. A beach slope of 1V:45H was constructed from the top of the berm crest to the pre-existing grade between Station 8+00 and Station 83+00. A beach slope of 1V:30H was constructed from the top of the berm crest to the mean water line (+1.0 feet NAVD) and a beach slope of 1V:90H was constructed from the mean water line to the pre-existing grade between Station 84+00 and Station 140+51.

Marsh fill was placed continuously along the length of the project area between the beach and the primary dike. The elevation of the placed marsh fill was +2.5 feet NAVD. The marsh fill was placed after filling the northern toe of the beach and achieving the 1V:45H northern slope from the +2.5 feet NAVD contour to the pre-existing grade.

Sand fencing was installed along the length of the project area to minimize wind blown erosion. A double row of sand fence with an 80-foot gap centered about the berm crest was installed between Station 8+00 and Station 109+00. A single row of sand fence located approximately 50 feet north of the northern dune crest was installed between Station 109+00 and Station 121+00. The northern component of a double row of sand fence with a 40-foot gap was installed approximately 30 feet south of the dune vegetation line between Station 121+00 and Station 140+51. A single row of sand fence located approximately 30 feet south of the dune vegetation line was installed between Station 140+51 and Station 150+00. Passages through the fencing were located at 450-foot intervals.

The as-built drawings are attached. These drawings detail the elevation and location of the placed beach and marsh fill, final borrow area survey, the location of the installed sand fence and settlement plates, and the location of the analyzed sand samples.

**Actual Benefited Acres:**     **230 acres of constructed beach**  
   **254 acres of created marsh**

**4. Habitat Acreages**

Barrier island shoreline projects are evaluated for environmental benefits using quantitative projections of plan form performance. Performance is quantified using habitat acreage descriptions for the wetland value assessment (WVA). The range of various habitat elevations and associated descriptions are defined in Table 1. The habitat acreages were calculated for the pre-construction, post-construction, and design template conditions to assist in future WVA calculations.

**Table 1  
Habitat Acreage Descriptions**

<b>Habitat</b>	<b>Description</b>
Dune	≥ +5 feet, NAVD The portions of the dune platform anticipated to be within the elevation range.
Supratidal	≥ +2 feet to < +5 feet, NAVD Beach berms and portions of the fore and back slope of the dune within the elevation range. Also includes primary retention/containment dikes for the period anticipated to remain in the elevation range. Generally includes a major portion of the marsh platform until the time dewatering and consolidation reduce the elevation to intertidal.
Gulf Intertidal	≥ 0 feet to < +2.0 feet, NAVD Gulf side beach slope/shallow open water.
Bay Intertidal	≥ 0 feet to < +2.0 feet, NAVD Bayside elevations including vegetated wetlands, flats and bayside open water areas.
Subtidal	≥ -1.5 feet to < 0.0 feet, NAVD or 1,000 feet bayward of the 0.0 feet contour. Shallow Open water bayside area only.

The construction template (including beach and dune, marsh, and the oil infrastructure access canal) defined the horizontal limits of the WVA. Intertidal acreages calculated north of the project baseline were assumed to be Bay Intertidal. Intertidal acreages calculated south of the project baseline were assumed to be Gulf Intertidal. The profile lines shown in the plans were used to develop the WVA acreages. The length of habitat elevation along each line was determined. This was then multiplied by the effective distance of that profile line to determine the area. The WVA acreages are shown in Table 2.

**Table 2  
Habitat Acreages**

<b>Habitat</b>	<b>Pre-Construction Acreage</b>	<b>Template Acreage</b>	<b>Post-Construction Acreage</b>
Dune	2.8	111.8	81.1
Supratidal	83.9	316.0	333.5
Gulf Intertidal	13.3	26.5	59.5
Bay Intertidal	156.7	5.5	9.7
Subtidal	76.9	1.9	0.7

**5. Key Project Cost Elements**

**Table 3  
Key Project Cost Elements**

<b>Project Element</b>	<b>Project Cost Estimate</b>	<b>Cost Incurred as of Construction Completion</b>
Construction	\$24,450,300.00	\$15,815,598.02
Engineering & Design	\$726,760.75	\$757,698.75
Observations / Contract Administration	\$486,955.00	\$634,620.00
<b>Total</b>	<b>\$25,664,015.75</b>	<b>\$17,207,916.77</b>

Notes:

1. Project cost estimate included a 25% contingency.
2. Engineering and design costs were split equally with the Pelican Island design work.

6. Items of Work Construction, Final Quantities, and Monetary Amounts

Table 4  
Items of Work Construction, Final Quantities, and Monetary Amounts

Item No.	Item	Bid Quantity	Unit	Construction Cost Estimate Unit Price	Construction Cost Estimate	Bid Unit Price	Bid Amount	Final Quantity	Final Amount	% Over / Under
1	Mobilization & Demobilization	1	Job	\$2,300,000.00	\$2,300,000.00	\$1,663,000.00	\$1,663,000.00	1	\$1,663,000.00	-28
2	Performance & Payment Bonds	1	Job	\$115,000.00	\$115,000.00	\$85,000.00	\$85,000.00	1	\$85,000.00	-26
3	Island Breach Closure	1	Job	\$230,000.00	\$230,000.00	\$165,000.00	\$165,000.00	1	\$165,000.00	-28
4	Dune & Beach Fill	1,792,200	CY	\$8.34	\$14,942,600.00	\$5.55	\$9,946,710.00	1,748,443	\$9,703,858.65	-35
5	Marsh Fill	950,200	CY	\$5.46	\$5,190,600.00	\$3.05	\$2,898,110.00	735,206	\$2,242,378.30	-57
6	Primary Dikes	20,294	LF	\$40.25	\$816,900.00	\$13.35	\$270,924.90	16,273	\$217,244.55	-73
7	Oil Infrastructure Access Canal Dredging	2,960	LF	\$92.03	\$272,400.00	\$44.55	\$131,868.00	2,960	\$131,868.00	-52
8	Canal Closures	3	EA	\$57,500.00	\$172,500.00	\$18,750.00	\$56,250.00	3	\$56,250.00	-67
9	Sand Fencing	27,390	LF	\$11.50	\$315,000.00	\$7.75	\$212,272.50	27,349	\$211,954.75	-33
10	Settlement Plates	7	EA	\$1,385.71	\$9,700.00	\$1,885.00	\$13,195.00	7	\$13,195.00	36
11	Signs	5	EA	\$1,380.00	\$6,900.00	\$1,645.00	\$8,225.00	5	\$8,225.00	19
12	Pre-Construction Survey	1	Job	\$32,700.00	\$32,700.00	\$74,200.00	\$74,200.00	1	\$74,200.00	127
13	As-Built Survey	1	Job	\$46,000.00	\$46,000.00	\$24,440.00	\$24,440.00	1	\$24,440.00	-47
	<b>Sub-Total of Bid Items</b>				<b>\$24,450,300.00</b>		<b>\$15,549,195.40</b>		<b>\$14,596,614.25</b>	<b>-40</b>
14	Mod. 1 Additional Insured	-	-	-	-	-	-	-	-	-
15	Mod. 2 Dredge Robinson Canal	1	Job	\$267,710.00	\$267,710.00	1	\$238,887.00	1	\$238,887.00	-11
16	Mod. 3 Re-Establish Survey Marker	1	Job	\$15,376.33	\$15,376.33	1	\$32,993.62	1	\$32,993.62	115
17	Mod. 4 Contract Time Extension	-	-	-	-	-	-	-	-	-
18	Mod. 5 Sand Fencing Posts	27,390	LF	-	-	(\$0.20)	(\$5,478.00)	27,349	(\$5,469.80)	-
19	Mod. 6 Additional Beach and Dune Fill	1	Job	-	-	-	\$988,234.45	-	-	-
20	Mod. 7 Post Construction	1	Job	-	-	-	(\$988,234.45)	-	-	-
21	Mod. 8 Final Change	1	Job	-	-	-	(\$952,572.95)	-	-	-
	<b>Total</b>				<b>\$24,733,386.33</b>		<b>\$14,863,025.07</b>		<b>\$14,863,025.07</b>	<b>-40</b>

## 7. Construction and Construction Oversight

Prime Construction Contractor	Weeks Marine, Inc.
Subcontractor (Pre-Construction Survey)	C&C Technologies, Inc.
Subcontractor (Post-Construction Survey)	C.H. Fenstermaker & Associates, Inc.
Subcontractor (Sand Fence Installation)	Soil Erosion Services, Inc.
Original Construction Contract	\$15,549,195.40
Change Orders	(\$686,170.33)
Cost Reduction due to Underfilling	\$0.00
Final Construction Contract	\$14,863,025.07

## 8. Oversight and Administration for Construction

Construction Oversight Contractor	Coastal Planning & Engineering, Inc.
Final Amount	\$634,620.00

## 9. Major Equipment Used

Weeks Marine, Inc.  
4600 Manitowoc Bucket Dredge 542  
Linkbelt Dragline Bucket Dredge 418  
30" Cutterhead Dredge "Tom James"  
Quarters Barge  
3 Tug Boats (Captain John, Miss Helen, Augusta)  
2 Crew Boats (Bayou Princess, Cheyane)  
3 Survey Skiffs  
4 D-6 Bulldozers  
2 Marsh Buggies  
1 Front End Loader

## 10. Construction Sequence

### *Robinson Canal Dredging (March 25, 2006 – April 4, 2006)*

Conditions caused by Hurricanes Katrina and Rita in August and September 2005 delayed the start of construction by 118 days. The Contractor, Weeks Marine, began the project by dredging Robinson Canal to gain access to the project site. The canal was dredged to a depth of -7 feet NAVD with a bottom width of 60 feet and side slopes of 1V:1H. Weeks Marine used a 6 cubic yard clamshell bucket to dredge Robinson Canal. Dredging began from the north access and continued approximately 1.32 miles south to a location approximately 1.25 miles north of the project site. The spoil was side cast east and west of the canal.

*Oil Infrastructure Access Canal Dredging (April 14, 2006 – June 28, 2006)*

Upon completion of Robinson Canal dredging, Weeks Marine started dredging the oil infrastructure access canal. The canal was dredged to a depth of -7 feet NAVD with a bottom width of 30 feet and side slopes of 1V:2H. Dredging began from the west access near Station 92+12 and continued east to Station 121+16. Weeks Marine used a 1 cubic yard clamshell bucket to dredge the south side of the canal. Spoil from the south side of the canal was side cast south to construct the primary dike. A 6 cubic yard clamshell bucket dredged the remaining width of the canal and placed the spoil on a mud barge. The total length of the dredged canal is approximately 2,960 feet.

*Primary Dike Construction (April 4, 2006 – June 28, 2006)*

Primary dike construction was performed in parallel with the dredging of the oil infrastructure access canal. The primary dike was constructed to an elevation of approximately +5 feet NAVD with a crest width of 5 feet and side slopes of 1V:8H. The primary dike west of Station 53+40 was constructed using spoil from the adjacent source within the marsh fill footprint. Spoil from the oil infrastructure access canal was used to construct the primary dike at locations with no adjacent fill sources or where pipelines prevented excavation adjacent to the dike (Sta. 58+23 to Sta. 92+12 and Sta. 121+16 to Sta. 140+51). Marsh buggies were used to shape and assist in capping the primary dike as several lifts were required to achieve the design elevation. The total length of the constructed primary dike is approximately 16,270 feet.

*Canal Closures (May 10, 2006 – June 26, 2006)*

After constructing the primary dike, Weeks Marine closed three canals to complete the northern barrier of the created marsh. The canal closures were constructed to an elevation of approximately +5 feet NAVD with a crest width of 20 feet and side slopes of 1V:8H. All canal closures were constructed using spoil from the oil infrastructure access canal. The canal closure between Station 90+42 and Station 92+12 was completed first followed by the closure between Station 124+40 and Station 126+00. The canal closure between Station 53+40 and Station 58+23 was completed after the island breach between Station 34+04 and Station 53+40 was filled.

*Overburden Removal (May 29, 2006 – December 4, 2006)*

The Contractor periodically stripped overburden to uncover sand within the Quatre Bayou borrow area. The overburden was either pumped to the marsh creation area or side cast within the horizontal limits of the borrow area. Weeks Marine side cast overburden for seven days prior to pumping sand to the beach. Forty-six percent of the total dredge time was spent removing overburden from the borrow area. Twenty-one percent of the stripped overburden was pumped to the marsh and seventy-nine percent was side cast.

*Beach and Dune Construction (June 5, 2006 – December 6, 2006)*

The 30-inch cutterhead dredge “Tom James” was used to construct the beach and marsh fill. The submerged line came ashore at Sta 29+20. A 90° dredge pipe elbow pointed upwards at the end of the discharge pipe to reduce flow velocities. A series of Y-valves were used to separate the single discharge pipe into multiple ends to further reduce the discharge velocities at the end of the pipe.



Beach construction started in an easterly direction from Sta 29+20. The template between Station 29+20 and Station 53+40 was filled to an elevation of approximately +4 feet NAVD. After closing the western breach, the discharge direction was switched to fill the template west of Station 29+20 to an elevation of approximately +4 feet NAVD. Three outfalls were used to fill the template to an elevation of approximately +6 feet NAVD between Station 29+20 and Station 19+52. The Contractor encountered difficulty filling the template to +6 feet NAVD west of Station 19+52. The Government accepted the underfilled template west of Sta 19+52 due to the volume of material that was placed outside of the template and the Contractor's good faith effort to fill the template.

The Contractor reoriented the discharge pipeline and started pumping east again. The template between Station 29+20 and Station 83+00 was then filled to an elevation of approximately +6 feet NAVD using two outfalls. However, the Contractor experienced difficulty in controlling the seaward toe of fill. Weeks Marine requested a slope adjustment on September 29, 2006. The seaward slope was changed from 1V:45H to 1V:30H between the dune crest (+6 feet NAVD) and the slope break (+1 foot NAVD) while the offshore slope was adjusted to 1V:90H. The seaward slope east of Station 84+00 was adjusted on October 5, 2006.

The template between Station 84+00 and Station 96+96 was filled east to an elevation of approximately +6 feet NAVD using two outfalls. The northern portion of the beach template was filled to an elevation of approximately +4 feet NAVD between Station 96+96 and Station 140+51 to allow for the placement of marsh fill. The Contractor then returned to Station 96+96 to fill the remaining template. The template was filled to an elevation of approximately +6 feet NAVD between Station 96+96 and Station 111+48. The fill elevation gradually decreased from approximately +6 feet NAVD at Station 111+48 to approximately +2 feet NAVD at Station 140+51.

*Marsh Creation (June 29, 2006 – November 22, 2006)*

The marsh template west of Station 53+40 was continuously filled to achieve the design elevation. Overburden was pumped to the marsh using a 30-inch diameter pipe with a 90° dredge pipe elbow pointed upwards at the end; the dredge pipe elbow was used to reduce flow velocities. Prior to advancing the shore pipe east, the marsh was filled to an elevation of approximately +3.2 feet NAVD west of Station 38+88 as Weeks Marine expected the fill to consolidate and achieve the design template elevation of +2.5 feet NAVD. However, the high sand content in the fill pumped to this cell of the marsh creation area resulted in less consolidation than expected by Weeks Marine. The marsh template between Station 38+88 and Station 53+40 was filled to an elevation of approximately +2.8 feet NAVD.

The marsh template east of Station 53+40 was constructed in parallel with the beach. Marsh fill was pumped during the day while beach fill was placed at night. Filling the marsh template during the day enabled the Contractor to monitor and control the fill elevation. Marsh buggies were used to make cuts in the fill area thus promoting flow and uniform fill. Letting the fill settle overnight allowed the placed fill to uniformly spread throughout the marsh creation cell while reducing the impact to existing vegetation.

Overburden was pumped to the marsh east of Station 53+40 using a 30-inch diameter flexible PVC pipe without a diffuser on the end. The flexible PVC pipe was not advanced during marsh creation but was moved to different locations within the cell to achieve a uniform fill. The marsh template was filled to an elevation of approximately +2.5 feet NAVD between Station 53+40 and Station 106+64 and east of Station 124+40. The marsh template was filled to an elevation of approximately +2 feet NAVD between Station 106+64 and Station 124+40 as flow was restricted; marsh buggies did not make cuts in the marsh between Station 106+64 and Station 124+40 as rutting and channeling would have adversely impacted the existing marsh.

*Sand Fence Installation (September 6, 2006 – December 29, 2006)*

Sand fence was installed to aid in the stabilization and retention of sand within the project area. The sand fence consisted of 3/8-inch thick, 1½-inch wide, by 4-foot long wooden slats with 2¼-inch gaps between slats which were connected with five strands of wire. The slats were painted with a red iron oxide stain. The sand fence was attached to untreated round 4-inch diameter by 8-foot long posts which extended approximately 4 feet above the ground. An auger was used to dig holes for the posts.

The Contractor installed a double row of sand fence between Station 7+42 and Station 149+30. The two rows of sand fence were separated by 80 feet, centered about the dune crest centerline. Each section of sand fence was approximately 450 feet long. There was a 30-foot overlap between each section and the overlapped sections had a 6-foot gap between them to facilitate ATV travel between the sand fence rows during post-construction monitoring. The total length of the installed sand fence is approximately 27,350 feet.

*Settlement Plate Installation (May 10, 2006 – August 16, 2006)*

Seven settlement plates were installed to monitor the post-construction subsidence of the island. The settlement plates consist of a 4-foot by 4-foot by ¼-inch steel plate with a three-inch galvanized capped riser pipe connected to the center of the plate. The settlement plates were installed such that the top of the riser was between 3 and 8 feet above the proposed grade.

*Navigation Warning Sign Installation (May 17, 2006 – June 28, 2006)*

Five navigation warning signs were installed at canal closures to warn the public of the changed site condition. The warning signs are 3/16-inch aluminum plates 4 feet square with a 2-inch orange reflective boarder. The signs are attached to a 25-foot long treated timber pile driven into the ground such that the elevation of the top of the pile is approximately +11 feet NAVD.

## **11. Problems Encountered**

*Beach Template Overfill*

The Contractor had problems controlling the seaward toe of fill. The beach template was overfilled by thirty-one percent with an additional 578,400 cubic yards of sand placed on the beach. An excess of 418,000 cubic yards of sand was placed on the beach, overfilling the beach template by thirty-nine percent, prior to requesting a slope adjustment. After adjusting the offshore slope, the Contractor overfilled the beach template by twenty percent placing an additional 160,400 cubic yards of sand on the beach.

### *Marsh Template Overfill*

The Contractor experienced problems filling the marsh to the design elevation (+2.5 feet NAVD) within the specified tolerance (+/- 0.3 feet). With an additional 164,600 cubic yards of overburden pumped to the marsh creation area, the marsh template was overfilled by twenty-two percent. Weeks Marine developed a system whereby they pumped marsh fill during the day to better control the marsh fill elevation and pumped sand fill at night.

### *Pass La Mer*

High losses were experienced at the west end of the project and the fill material nearly closed Pass La Mer. Shore parallel containment dikes were used to control the northern and southern extents of the fill. A north-south running containment dike was constructed at the west end of the project to control the western extent of the fill. When pumping sand west from Station 19+52 the slurry flowed between the north and south containment dikes toward Pass La Mer. The north-south containment dike rapidly eroded and allowed the slurry to flow into Pass La Mer. Prior to receiving direction from the Government, Weeks Marine stopped pumping beach fill west and dismantled the shore pipe. Temporary navigation fencing was placed across Pass La Mer to inform boaters of the changed conditions. Prior to project completion tidal flow re-opened Pass La Mer.

### *Sidecast Material in the Borrow Area*

The material pumped to the beach east of Station 111+48 had a higher silt concentration than expected. The fill material was dredged from the southwest corner of the Quatre Bayou borrow area near vibracores QBVC-02-08 and QBVC-02-34. The vibracore logs suggest that the material should have had the lowest silt content anywhere in the borrow area. A review of the seismic record also suggests that the material was uniform throughout this area. Analysis of the cutterhead data shows that Weeks Marine stripped to the required depth. When dredging sand they were mostly within the required cut area; therefore, the Contractor should have been accessing clean material.

A hypothesis for the high silt content on the east end is that overburden was flowing into the dredge pit from the surrounding area. Originally, Weeks Marine thought that they would not have to use the southwest portion of the borrow area. They wanted to avoid it because it had the thickest overburden and it was located furthest from the beach. However, due to the losses incurred by not controlling the fill and not requesting a change in construction slope earlier, Weeks Marine had to access this portion of the borrow area. Unfortunately, they had side cast much of the overburden immediately north of this section. Hence, when they went to dredge the southwest corner there was a high bank of previously fluidized material adjacent to the sand deposit. This material likely flowed into the hole as Weeks Marine dredged. Future projects should consider providing a separate disposal area.

### *Sand Fence*

Fill material on the constructed dune crest east of Station 111+48 had a high silt content preventing the installation of sand fence. The constructed beach east of Station 111+48 required a row of sand fence to be moved north onto the landward dune slope. A second row of sand fence could not be installed on the constructed beach. Holes for the installation of fence posts were dug on the dune crest. However, the holes would fill prior to installing the fence posts.

The fence was relocated to areas where the fence could be constructed while still providing the benefit of the sand fence.

## **12. Construction Change Orders**

### *Change Order #1 – December 21, 2005*

Change order #1 added Louisiana Land and Exploration/Burlington Resources as an additional insured. No change in contract time or total cost resulted from this change order.

### *Change Order #2 – February 9, 2006*

Change order #2 incorporated additional work and services for dredging 6,000 feet of Robinson Canal. Weeks Marine intended to use Robinson Canal as its access channel for equipment and personnel. However, Robinson Canal shoaled due to the passage of Hurricanes Katrina and Rita, necessitating the additional dredge work. The change order extended the contract time by 21 days to July 29, 2006. The change order increased the total cost of the project by \$238,887.00 to \$15,788,082.40.

### *Change Order #3 – April 5, 2006*

Change order #3 incorporated additional work and services for the re-establishment of the Chenier Ronquille Secondary Survey Monument. This monument was destroyed during the passage of Hurricane Katrina. No change in contract time resulted from this change order. The change order increased the total cost of the project by \$32,993.62 to \$15,821,076.02.

### *Change Order #4 – July 3, 2006*

Change order #4 incorporated a time extension of 118 days due to conditions caused by Hurricanes Katrina and Rita, which resulted in a delayed start of construction. The change order extended the contract time by 118 days to November 24, 2006. No change in total cost resulted from this change order.

### *Change Order #5 – August 21, 2006*

Change order #5 accepted a change in specification for fence posts requested in RFI #6. The specification for fence posts was changed from 4-inch by 4-inch by 8-foot treated posts to 4-inch by 4-inch by 8-foot untreated posts. No change in contract time resulted from this change order. The change order resulted in a credit to the contract of \$0.20 per linear foot of installed sand fence reducing the total cost of the project by \$5,478.00 to \$15,815,598.02.

### *Change Order #6 – November 15, 2006*

Change order #6 was intended to adjust the beach and dune fill, marsh fill, and primary dike contract quantities. The beach and dune fill quantity was to be increased by 93,020 cubic yards at a unit cost of \$12.62 per cubic yard. The marsh fill quantity was to be reduced by 204,819 cubic yards at a unit cost of \$0.65 per cubic yard. The primary dike quantity was to be reduced by 3,936 linear feet at a unit cost of \$13.35 per linear foot. The change order was to extend the contract time by 70 days to February 2, 2007. The change order was to increase the total cost of the project by \$988,234.45 to \$16,803,832.47. Weeks Marine did not sign this change order.

*Change Order #7 – December 15, 2006*

Change order #7 was a unilateral modification needed to provide for the changes in beach and dune fill, marsh fill, and primary dike contract quantities in exchange for the Government not assessing liquidated damages for the completion of the project. The beach and dune fill quantity was decreased by 93,020 cubic yards at a unit cost of \$12.62 per cubic yard. The marsh fill quantity was increased by 204,819 cubic yards at a unit cost of \$0.65 per cubic yard. The primary dike quantity was increased by 3,936 linear feet at a unit cost of \$13.35 per linear foot. The change order extended the contract time by 90 days to February 22, 2007. The change order reduced the total cost of the project by \$988,234.45 to \$15,815,598.02. The change order canceled change order #6 in its entirety.

*Change Order #8 – April 10, 2007*

Change order #8 incorporated the change in the final pay volume compared to the bid volume. The beach and dune fill quantity was decreased by 43,757 cubic yards at the bid unit cost of \$5.55 per cubic yard. The marsh fill quantity was decreased by 214,994 cubic yards at the bid unit cost of \$3.05 per cubic yard. The primary dike quantity was decreased by 4,021 linear feet at the bid unit cost of \$13.35 per linear foot. The sand fence quantity was decreased by 41 linear feet at the revised unit cost of \$7.55 per linear foot. There was no change in contract time. The change order reduced the total cost of the project by \$952,572.95 to \$14,863,025.07.

### **13. Construction Field Adjustments**

*Field Adjustment #1 – January 11, 2006*

Field adjustment #1 granted the Contractor permission to submit partial pre-construction survey data in accordance with RFI #1.

*Field Adjustment #2 – May 17, 2006*

Field adjustment #2 changed the settlement plate installation requirements. The contract drawings and technical provisions did not indicate a maximum top of pipe elevation for the settlement plates. The Louisiana Department of Natural Resources requested a maximum top of pipe elevation between 5 and 8 feet above the target ground elevation.

*Field Adjustment #3 – May 17, 2006*

Field adjustment #3 changed the locations of the navigation warning signs. The locations of the signs had to be revised due to realignment of the primary dike and reassessment of the originally proposed locations.

*Field Adjustment #4 – August 18, 2006*

Field adjustment #4 increased all sand cut depths by 5 feet. The dredge depth was increased to allow for more efficient excavation of the borrow area sands and to compensate for the Contractor's difficulty in managing beach and dune fill placement. Project permits were accordingly amended by the U.S. Army Corps of Engineers, Louisiana Department of Environmental Quality, and the Louisiana Department of Natural Resources.

*Field Adjustment #5 – August 31, 2006*

Field adjustment #5 adjusted the sand fence locations shown in the bid plans. The length of sand fence to be installed remained the same. The sand fence locations were revised to facilitate accurate installation of the sand fence per the revised construction plans.

*Field Adjustment #6 – September 9, 2006*

Field adjustment #6 adjusted the required sand fence wiring wraps at the end of fence sections. Technical Provision 32.1 states “At the end of fence sections, two wraps of wiring shall be used at each fence wire and at the top and the bottom.” The top and bottom wraps were waived as the upper and lower fence wires (which are wrapped) are near the extremities of the wood slats.

*Field Adjustment #7 – October 11, 2006*

Field adjustment #7 changed the sand fence layout shown in the construction plans. The sand fence gap width at the 30-foot section overlaps was changed from 3 feet to 6 feet to facilitate efficient monitoring and field assessments of the beach following construction. The sand fence spacing between the north and south sand fence lines was changed from 50 feet to 80 feet. The sand fence was extended to the western end of the project to promote dune creation in the project area where the constructed berm crest elevation was below the +6 feet NAVD design crest elevation. The length of sand fence to be installed remained the same as a portion of the southern row of sand fence was removed from the east end of the project.

*Field Adjustment #8 – October 20, 2006*

Field adjustment #8 waived the lower template tolerance in the former water discharge area between Station 104+22 and Station 124+40. The upper tolerance remained unchanged. Payment was made for material placed in this area regardless of whether the lower tolerance was met. The lower tolerance was waived to avoid requiring the Contractor to move equipment through this area to meet the tolerance. The use of tracked equipment to facilitate flow and distribution of fill material would have adversely impacted the existing marsh.

*Field Adjustment #9 – December 11, 2006*

Field adjustment #9 requested that the Contractor use existing on-site equipment to create three gaps in the primary dike. The gaps were created after fill operations were completed and the Government accepted the adjacent marsh fill sections. The gaps were created by removing material from the primary dike. The constructed gaps were about twenty to twenty-five feet wide and excavated to the elevation of the adjacent marsh platform. Material excavated during gapping was scraped onto the adjacent primary dike and/or compressed in place. The gaps were created to allow water trapped within the marsh creation area to drain and to encourage tidal flushing that can contribute to marsh establishment within the project area.

*Field Adjustment #10 – February 23, 2007*

Field Adjustment Report #10 altered the sand fence design. Conditions caused by the poor fill quality (silty and soft) between Station 110+00 and Station 124+40 required the sand fence to be offset 50 feet north of the landward dune crest. The second row of sand fence between Station 110+00 and Station 124+40 was removed due to the limited width of the dune with good quality material. The removed sand fence was added to the east and west ends of the island to promote dune creation near the extremities (which were under-filled). A second row of sand fence was

added to the east end of the island on top of the dune crest and the south row of sand fence was extended east.

#### **14. Requests for Interpretation**

*Request for Interpretation #1 – January 7, 2006*

Request for interpretation #1 requested that dredging operations commence prior to the completion of all land surveys. This was approved with stipulations that the Contractor could only start construction in areas where the pre-construction survey had been completed and submitted.

*Request for Interpretation #2 – January 9, 2006*

Request for interpretation #2 requested permission to invoice pre-construction surveys based on a percentage completed per pay period. This request was approved.

*Request for Interpretation #3 – April 10, 2006*

Request for interpretation #3 requested field adjustments in the alignment of the primary dike and fill source. These requests were approved with minor revisions and stipulations.

*Request for Interpretation #4 – April 23, 2006*

Request for interpretation #4 requested field adjustments in the alignment of the primary dike and fill source. Revisions were requested but the RFI was approved.

*Request for Interpretation #5 – May 5, 2006*

Request for interpretation #5 requested permission to make changes in the number of grade elevations established on each marsh grade stake. This request was denied.

*Request for Interpretation #6 – May 12, 2006*

Request for interpretation #6 requested permission to change the sand fence post requirements. The request was approved but the Government requested a change order for a reduction in the cost of the fence posts. See change order #5.

*Request for Interpretation #7 – May 26, 2006*

Request for interpretation #7 requested permission to degrade, trench, and/or install drainpipe as needed to prevent blockage of overburden flow in order to maintain uniform fill in the marsh creation area. Some items were accepted, others were denied. See the RFI for details.

*Request for Interpretation #8 – June 7, 2006*

Request for interpretation #8 requested permission to protect the west end primary dike from erosion caused by waves using geotextile fabric. This request was denied.

*Request for Interpretation #9 – June 21, 2006*

Request for interpretation #9 requested permission to side cast Hunt Oil maintenance dredging spoil in the marsh template. The request could not be adequately evaluated due to insufficient data. The request was withdrawn following further discussions between Weeks Marine and Hunt Oil.

*Request for Interpretation #10 – June 21, 2006*

Request for interpretation #10 requested permission to dispose natural debris (trees, driftwood, snags, etc.) on the island by burning it. The request was approved with the condition that Weeks Marine obtain burn permits.

*Request for Interpretation #11 – August 9, 2006*

Request for interpretation #11 requested that the Government address the issue associated with the completion of the beach and dune template between Station 5+00 and Station 16+00. The request was approved. See the RFI for details.

*Request for Interpretation #12 – October 20, 2006*

Request for interpretation #12 requested permission to install discharge pipes to assist in dewatering the created marsh. The request was approved with provisions.

## 15. Pipeline and Other Utility Crossings

Please see the construction plans sheets 4 and 5 of 38 for the location and description of pipelines and other utility crossings within the project footprint. The table below provides contact information for the associated pipeline and utility crossing representatives.

**Table 5**  
**Utility Company Representatives**

<b>Company</b>	<b>Rep. to Contact</b>	<b>Phone</b>
Apache	Tim Allen	(985) 879-3528
Burlington	Jeff Deblieux	(985) 853-3009
Burlington	Kermit Coulon	(985) 879-1517
Chevron	David Louviere	(985) 396-3507
Columbia Gulf	Eric Theriot	(985) 879-3301
Gulf South	Doug Arnold	(985) 879-1818
Hunt	Ken Babin	(985) 858-5000
Hunt	Gerald Tompkins	(985) 856-6784
Hunt	Jack Kodrin	(985) 856-6787
Hunt	John Blanchard	(985) 856-6787
Koch - Gulf South	Judy Tanier	(316) 828-8089
LA Intrastate Gas	Chris Greneaux	(337) 354-1707
Swift	Danny Jarvis	(832) 461-8810
Texas Eastern (Duke)	Jerome Snyder	(985) 876-6851

## 16. Safety and Accidents

Two unmarked 4-inch flowlines were excavated along the west bank of the W-Canal near Station 54+00. Weeks Marine suspended dredging operations until a magnetometer survey for additional unmarked flowlines within the area to be excavated was completed. No additional accidents were reported or observed.



### 17. Additional Comments Pertaining to Construction, Completed Project, etc.

The beach fill material matched the expected beach fill quality except in the area between Station 110+00 and Station 124+00; the beach fill material placed between Station 110+00 and Station 124+00 had a higher silt content than expected or allowed by the specifications. It was hypothesized that this was due to previously side cast material flowing into the dredge area.

The material placed in the marsh between Station 7+42 and Station 53+40 did not consolidate as much as expected by Weeks Marine. The material appeared to have a higher percentage of sands than originally anticipated. It was unclear if this was natural variation within the overburden layer or whether Weeks Marine was extracting sand from the beach fill portion of the borrow area that was located beneath the marsh fill overburden.

### 18. Significant Construction Dates

**Table 6**  
**Significant Construction Dates**

<b>Construction Item</b>	<b>Date</b>
Bid Opening	July 27, 2005
Construction Contract Awarded	August 23, 2005
Notice to Proceed	November 15, 2005
Pre-construction Conference	November 15, 2005
Start of Robinson Canal Dredging	March 25, 2006
Start of Primary Dike Construction	April 4, 2006
Start of Oil Infrastructure Access Canal Dredging	April 14, 2006
Completion of Oil Infrastructure Access Canal Dredging	June 28, 2006
Completion of Primary Dike Construction	June 28, 2006
Start of Borrow Area Stripping	May 29, 2006
Start of Discharge to Beach	June 5, 2006
Start of Discharge to Marsh	June 29, 2006
Start of Sand Fence Construction	September 6, 2006
Completion of Discharge to Marsh	November 22, 2006
Completion of Discharge to Beach	December 6, 2006
Completion of Sand Fence Construction	December 29, 2006
Substantial Completion	January 5, 2007
Final Acceptance	

## NOAA SUPPLEMENT TO COMPLETION REPORT

### CONSTRUCTION PLANS

List any items pertinent to the plans that caused problems, need clarification or changes for future contracts of this nature.

DESCRIPTION OF ITEM IN PLANS	RECOMMENDATIONS FOR FUTURE CONTRACTS
Pipeline Locations: It was known that there may be unmarked pipelines in the project area. A magnetometer survey was required prior to excavation but this was only performed along the pay profiles. The Contractor's survey did not detect a pipeline due to the spacing of the lines and this pipeline was exposed during excavation activities.	In future contracts the original plans and specifications should require the Contractor to conduct a magnetometer survey prior to excavating material within a given area to locate unmarked pipelines. The survey should be performed on a grid system and not solely along the pay profiles.
Pre-Construction Survey: It was known that the project area had to be surveyed prior to construction. Transportation issues delayed the completion of the pre-construction survey prohibiting the Contractor from starting dredge and fill operations while on-site.	In future contracts located in remote areas the pre-construction survey should be completed prior to the Contractor mobilizing equipment.

### GENERAL COMMENTS

List any significant items which worked well and should be repeated or which caused problems, need clarification or changes for future contracts of this nature.

DESCRIPTION OF ITEM	RECOMMENDATIONS FOR FUTURE CONTRACTS
Relationship between Owner, Contractor, and Engineer	The Contractor's Project Manager should be more involved in the submittal of pre-construction items.
Observations	A full time observer was useful for relaying day to day activities. Bi-weekly trips by the Government and Engineer were appropriate for assessing progress and discussing items of greater concern with the Contractor.

**Identified Other Submittals:**

- Appendix A - 11x17" As-built Drawings (attached & on CD, pdf format)  
8.5x11" As-built Beach Fill Cross Sections (attached & on CD, pdf format)  
8.5x11" As-built Marsh Fill Cross Sections (attached & on CD, pdf format)  
Borrow Area Bathymetric Survey Data (on CD, ASCII format)  
Pre and Post Construction Survey Data (on CD, ASCII format)
- Appendix B - Invoice Related Correspondence (on CD, pdf format)
- Appendix C - General Correspondence (on CD, pdf format)
- Appendix D - Contract Modifications (attached & on CD, pdf format)
- Appendix E - Change Orders (attached & on CD, pdf format)
- Appendix F - Field Adjustment Reports (attached & on CD, pdf format)
- Appendix G - Requests for Interpretation (attached & on CD, pdf format)
- Appendix H - WMI Daily Quality Control Reports (on CD, pdf format)
- Appendix I - CPE Daily Observation Reports (on CD, pdf format)
- Appendix J - CPE Bi-Weekly Reports (on CD, pdf format)
- Appendix K - Construction Meeting Minutes (on CD, pdf format)
- Appendix L - Survey Certifications (on CD, pdf format)
- Appendix M - Beach Fill Grain Size Analysis (on CD, pdf format)
- Appendix N - Permit Sketches (on CD, pdf format)
- Appendix O - Construction Plans and Specifications (on CD, pdf format)

Report prepared by:

Andrew J. Wycklendt  
Coastal Engineer  
Coastal Planning & Engineering, Inc.

Gordon G. Thomson, P.E.  
Engineer of Record, Reg No. 31412  
Coastal Planning & Engineering, Inc.