State of Louisiana
Coastal Protection and Restoration Authority

2022 Annual Inspection Report

For The

Lake Borgne Shoreline Protection Project

State Project Number PO-30
Priority Project List 10

October 2022
St. Bernard Parish

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(PO-30)

Table of Contents

Appendices

I. Introduction

The Lake Borgne Shoreline Protection Project (State Project No. PO-30) was approved on the 10th Priority Project List. A second Lake Borgne Project (PO-31) was approved on the 11th Priority Project List and was subsequently combined with the previously approved Lake Borgne Shoreline Protection Project. The project includes two segments along the southwestern coast of Lake Borgne, in the locations where Lake Borgne is closest to the Mississippi River Gulf Outlet (MRGO). The project features are located entirely in St. Bernard Parish, consisting of 5.7 miles of shoreline protection.

A site map showing the project boundaries is shown in Appendix A.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the Lake Borgne Shoreline Protection Project (PO-30) is to evaluate the constructed project features to identify any deficiencies and to prepare a report detailing the condition of project features and recommending corrective actions needed. Should it be determined that corrective actions are needed, CPRA shall provide a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan). The annual inspection report also contains a summary of maintenance projects (See Section IV) and an estimated projected budget (See Appendix C) for the upcoming three (3) years for operation, maintenance and rehabilitation.

This annual inspection of the Lake Borgne Shoreline Protection Project (PO-30) was performed on June 22, 2022. Weather consisted of mostly cloudy skies and a temperature of approximately 90°F. Taking part in the inspection were Patty Taylor of EPA, the federal sponsor, and Steven Gunter and Taylor Chassaignac of CPRA, the non-federal sponsor. All project features were visited. During the inspection, the nearby Shell Beach gage showed a water level of approximately +0.3 feet NAVD 88.

III. Project Description and History

The project's objectives include preventing and/or reducing the Lake Borgne shoreline retreat in the areas adjacent to Old Shell Beach and Bayou Dupre to mitigate further joining of the lake and MRGO, reestablishing a sustainable lake rim, and preventing and/or reducing conversion of emergent marsh to open water.

The principal project features include a rock breakwater, composite sheet pile wall, and steel double sheet pile structures located in the alignment shown in Appendix A. The Lake Borgne Shoreline Protection Project is divided into two segments: Shell Beach and Bayou Dupre. The Project is further divided into reaches. The Bayou Dupre segment includes Reach 1 (north of Bayou Dupre) and Reach 2 (south of Bayou Dupre). The Shell Beach segment includes Reach 3 Strong (between Fort Bayou and the Tennessee Gas Pipeline), Reach 3 Weak (between the Tennessee Gas Pipeline and Bayou Yscloskey), and Reach 4 (between Bayou Yscloskey and Doulluts Canal). Reach 3 Weak and Reach 3 Strong refer

to classifications determined during the original project design according to soil shear strength profiles.

The segment at Shell Beach extends approximately 3.4 miles between Fort Bayou and Doulluts Canal. The PO-30 rock breakwater ties into the existing rock breakwater, which surrounds the perimeter of Fort Beauregard. The only openings in the breakwater occurred along the mouth of Bayou Yscloskey and across the Tennessee Gas Pipeline right-of-way.

The segment at Bayou Dupre extends approximately 1.5 miles to the north and 0.8 miles to the southeast of Bayou Dupre. At the mouth of Bayou Dupre, where maintenance dredging within the MRGO has created an unnatural water depth, steel double sheet pile structures filled with rock were built on each side of the bayou opening to tie the rock shoreline breakwater into the existing offshore USACE rock breakwater along the MRGO to the east and west of the bayou opening.

Reach 1 and Reach 3 Weak were identified during design as having relatively weak soil foundation conditions compared to the rest of the project. These "weak" areas were designed to have rock be placed in two (2) lifts during the initial construction contract followed by a maintenance lift approximately one (1) year later.

All project features were constructed to an initial height of +4.0 feet NAVD88. Based on the initial design, a minimum feature height of +2.0 feet NAVD88 was determined to best meet project objectives.

The following describes the construction sequence and completion:

- Construction began on August 1, 2007.
- The breakwater alignment was realigned in the field to conform more closely to the new shoreline location that resulted from the land losses that were accelerated by Hurricane Katrina (which occurred between the design investigations and the start of construction).
- The second lifts were placed on the weak sections in August 2008.
- Before the access and flotation channels could be backfilled, storm surges from Hurricanes Ike and Gustav (September 2008) inundated the area and resulted in the sinking of a large portion of the Reach 1 rock breakwater. Two (2) short sections of Reach 3 "weak soils" were also affected. It was decided to address this issue during the planned maintenance lift to allow time for the team to select an effective solution (described below in Section IV).
- The project was accepted on March 11, 2009.

Annual project inspections are included in the O&M Plan. The Project has a 20 year economic life, which began when the project completion report was submitted to CWPPRA in April 2010.

IV. Summary of Past Operations and Maintenance Projects

There are no operable structures in the project. There have been two maintenance events over the life of the project, as described below.

Hurricanes Ike and Gustav in 2008 resulted in the sinking of large portions of the rock breakwater along Reach 1 and Reach 3 Weak. The design of the previously planned maintenance project performed in 2014 included a rock lift along 5 stretches of Reach 1 and 3 stretches of Reach 3 as well as the installation of a composite sheet pile breakwater behind portions of the rock breakwater that experienced excessive settlement: 4 stretches of Reach 1 and 2 stretches of Reach 3. The contractor placed 13,568 tons of rock as a part of this 2014 maintenance lift and additionally placed 4,563 linear feet of composite sheet pile wall using 902 timber piles, 9,027 linear feet of pressure treated walers, and 67,650 square feet of composite sheet pile. A scour protection feature at the wall toe was added to the sheet pile wall during construction utilizing 4,000 additional tons of rock. The maintenance project was accepted on September 11, 2014.

The composite sheet pile wall that was installed during the 2014 maintenance event was first noted to have damage during the 2016 annual inspection. Over the next five years, the composite sheet pile wall continued to deteriorate, creating the need for a maintenance event. Due to budget limitations that prevented the project team from replacing the damaged wall, the scope of the maintenance event included the removal of the damaged wall (all components except for the timber piles which may be used to reinstall shoreline protection if funding becomes available), enhancing the splice hardware on the intact wall, replacing two tie rods on the double steel sheet pile structure, and replacing one steel tube waler splice on the double steel sheet pile structure. The as-built drawing for Reach 1 is included in Figure 1. The maintenance project was accepted on October 12, 2021.

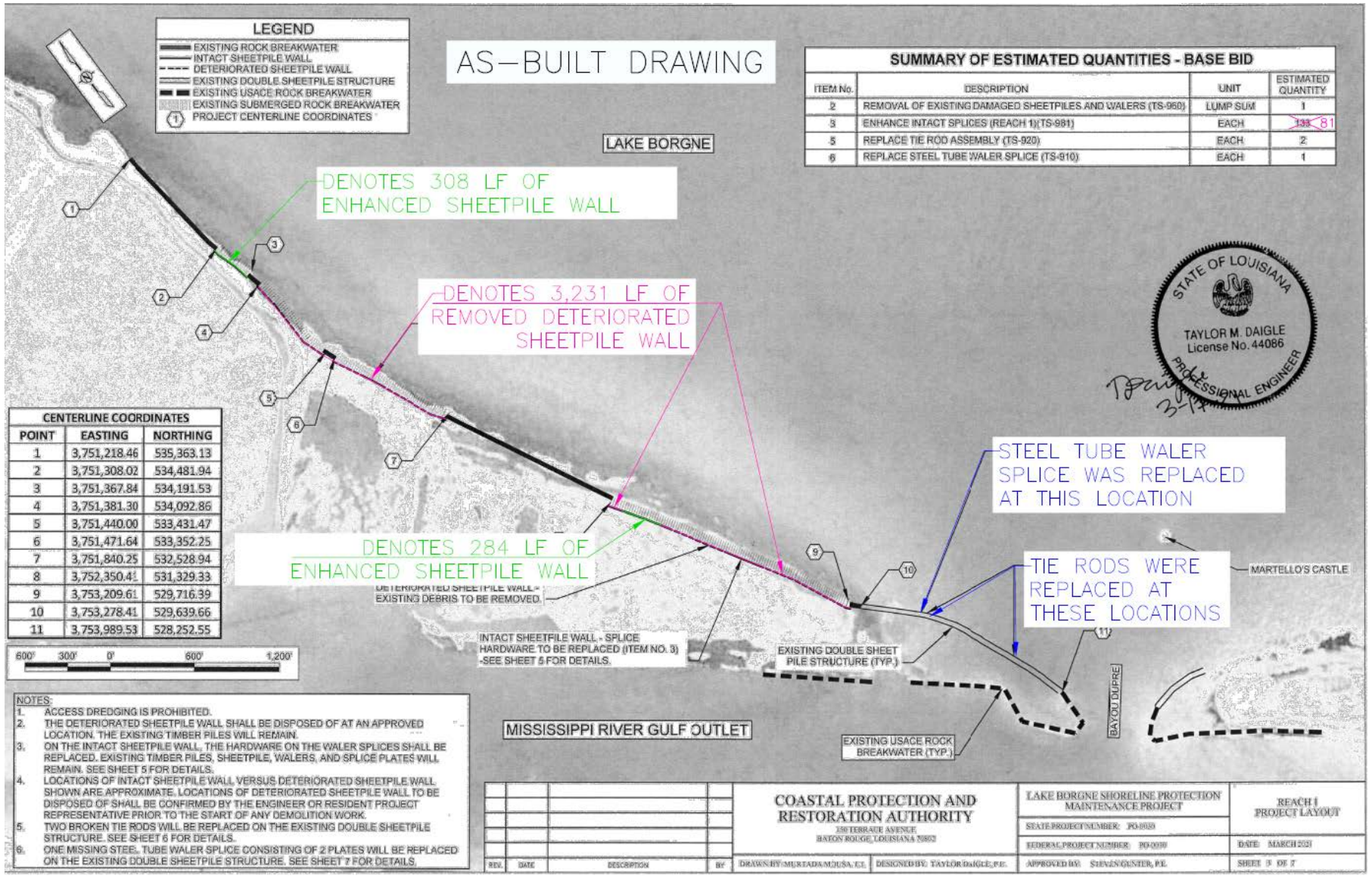


Figure 1: 2021 Maintenance Event As Built for Reach 1

V. Inspection Results

A. Breakwater Reach 1 (North of Bayou Dupre) – Along the composite sheetpile alignment, localized damage was noted in three (3) locations as a result of Hurricane Ida (August 2021). It appears that a vessel or debris struck the composite sheet pile wall at these locations. Since the 2021 inspection, two of the three damaged locations from Hurricane Ida have experienced further deterioration. In addition, one splice plate was observed to be non-functional (missing all 3 bolts on one side), and damage was noted at the northern extent of the sheetpile. In all other locations, the recently enhanced composite sheet pile wall is functioning. The areas that were removed during the maintenance event are no longer functioning as a breakwater. The rock breakwater has experienced some settlement but is in generally good condition.

B. Breakwater Reach 2 (South of Bayou Dupre) – The rock breakwater has experienced some settlement but is in generally good condition.

C. Breakwater Reach 3 Strong (West of Tennessee Gas Pipeline) – The rock breakwater has numerous low spots with marsh retreat observed behind those locations. Other areas are performing well.

D. Breakwater Reach 3 Weak (Between Tennessee Gas Pipeline and Bayou Yscloskey) – The rock breakwater has experienced some settlement but is in generally good condition. The recently enhanced composite sheet pile wall appears to be in good condition.

E. Breakwater Reach 4 (Easy of Bayou Yscloskey) – The rock breakwater has experienced some settlement but is in generally good condition.

F. Double Sheet pile Wall Breakwater at the mouth of Bayou Dupre – The double sheet pile wall breakwater appears to be performing well, although significant corrosion of all features of the steel sheet pile structure is noted. The interior rock has experienced minor settlement, but this does not appear to be impacting project performance.

G. **Warning Signs –**

a. Warning Sign (WS) 10 –Located in Reach 1 between the PO-30 structure and the MRGO – Pile is in place, but sign is missing.
b. WS 11 – Located in Reach 1 on the Lake Borgne side of the PO-30 structure – Pile and sign are in place, but sign is in poor condition.
c. WS 12 – Located in Reach 2 on the Lake Borgne side of the PO-30 structure – Pile and sign are both missing.

VI. Conclusions and Recommendations

Project Condition

CPRA concludes that the Lake Borgne Shoreline Protection Project (PO-30) is achieving project objectives along the majority of the project length. Approximately 11% of the project length has been removed, as described in Section IV.

Portions of the rock breakwater have experienced settlement below the design elevation (+2.0 feet NAVD 88), and portions of the composite sheetpile wall are damaged, despite recent maintenance. The double sheet pile wall breakwater has experienced significant corrosion of all features. Addressing these items via a maintenance event is not recommended by CPRA at this time due to budget constraints and the ability to realize cost savings by performing work items to address these concerns concurrently with other end of life actions (i.e. the removal of all remaining components of the composite sheetpile wall).

CPRA recommends an end-of-life maintenance event to include the removal of all remaining components of the composite sheetpile wall, a rock lift in selected low areas, and addressing the corrosion on the steel double sheet pile wall breakwater. A budget increase would likely be required for this final maintenance event.

Immediate Repairs

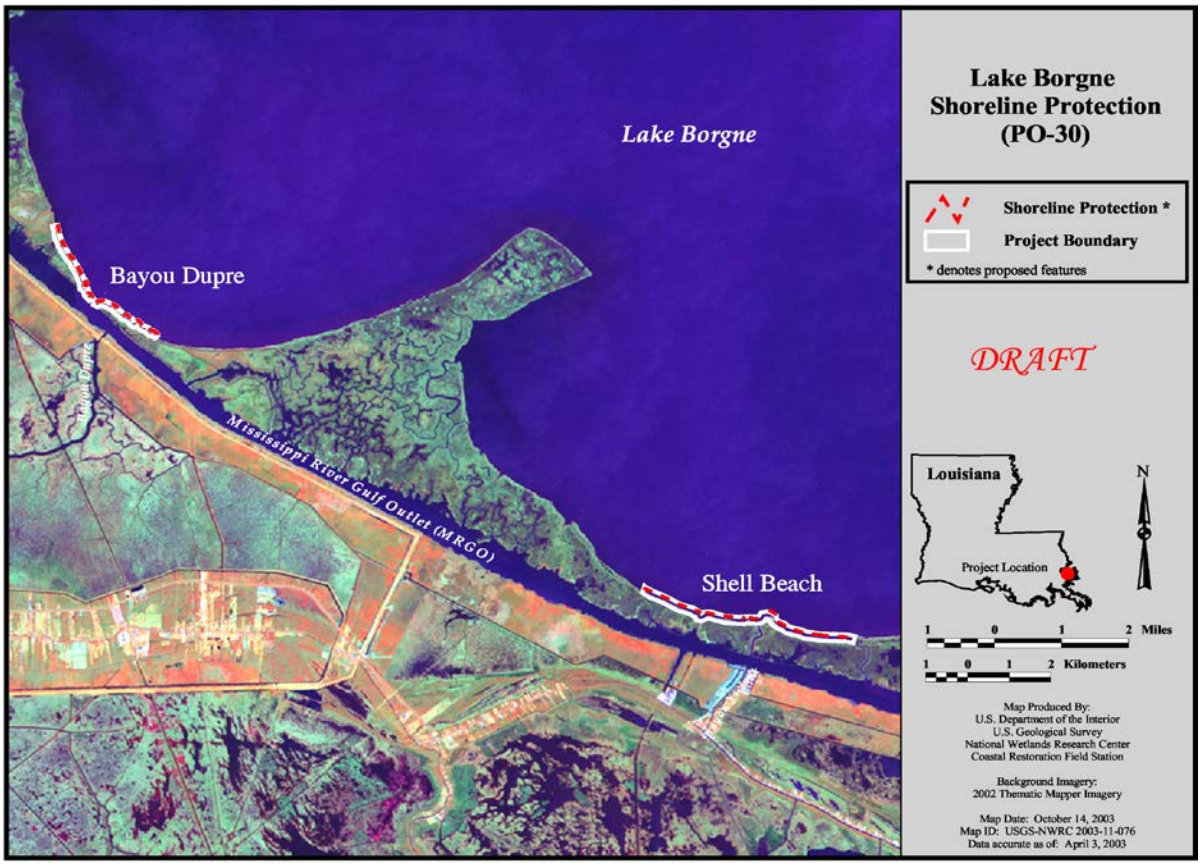
Immediate repairs include the replacement of the warning signs near the mouth of Bayou Dupre. CPRA is currently assembling contract documents for this work.

Programmed Maintenance

Continue to monitor the condition of the breakwaters, especially Reach 1 and Reach 3 Weak. Plan for an end-of-life maintenance event as described above in, “Project Condition.”

Appendix A

Project Features Map



Lake Borgne Shoreline Protection (PO-30)

Appendix B

Photographs

Photo 1: Reach 1

Northern side of Damage Location #1 – 29º57’6”, -89º50’37” – During Hurricane Ida, something appears to have struck the structure here. This location has experienced further damage since the 2021 post-Ida inspection.

Photo 2: Reach 1

Southern side of Damage Location #1

Photo 3: Reach 1

Damage Location #2 – 29º57’40”, -89º50’50” – During Hurricane Ida, something appears to have struck the structure here. This location has experienced further damage since the 2021 post-Ida inspection.

Photo 4: Reach 1

Damage Location #2 – Closer view of northern side of damaged area.

Photo 5: Reach 1

Damage Location #2 – Closer view of southern side of damaged area.

Photo 6: Reach 1

Damage Location #3 – 29º57’9”, -89º50’39” – Some more minor damage was noted at this location. It is difficult to see in this photo, but the damaged location is near the center/left of this photo. No further damage was noted at this location since the time of the 2021 post-Ida inspection.

Photo 7: Reach 1
Splice non-functional as it is missing all 3 bolts on one side.

Photo 8: Reach 1
Timber pile noted out of alignment

Photo 9: Reach 1
Rock breakwater in generally good condition

Photo 10: Reach 1
This area of the rock breakwater has experienced significant settlement.

Photo 11: Reach 1

WS 10 – Pile is in place, but sign is missing.

Photo 12: Reach 1

WS 11 – Pile and sign are in place, but sign is in poor condition.

Photo 13: Reach 1

Double steel sheet pile structure appears to be functioning well, although significant corrosion was noted.

Photo 14: Reach 2

Double steel sheet pile structure appears to be functioning well, although significant corrosion was noted.

Photo 15: Reach 2
Rock breakwater in generally good condition

Photo 16: Reach 2
This area of the rock breakwater has experienced significant settlement with associated shoreline retreat visible.

Photo 17: Reach 3

This area of the rock breakwater has experienced significant settlement with associated shoreline retreat visible.

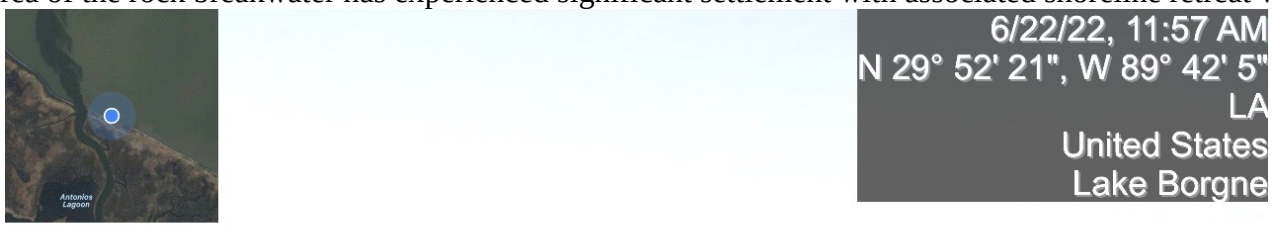


Photo 18: Reach 3

Rock breakwater in generally good condition

Photo 19: Reach 3

This area of the rock breakwater has experienced significant settlement with associated shoreline retreat visible.

Photo 20: Reach 3

Composite sheet pile wall appears to be in generally good condition.

Photo 21: Reach 4
Rocks appear to be in generally good condition.

Appendix C

Three-Year Operations & Maintenance Budget

Lake Borgne Shoreline Protection - PO-30
Federal Sponsor: EPA
Construction Completed : April 12, 2010
PPL 10

Current Approved O&M Budget	Year 0 FY10	Year - 1 FY11	Year -2 FY12	Year -3 FY13	Year -4 FY14	Year -5 FY15	Year -6 FY16	Year -7 FY17	Year -8 FY18	Year -9 FY19	Year -10 FY20	Year -11 FY21	Year -12 FY22	Year -13 FY23	Year -14 FY24	Year -15 FY25	Year -16 FY26	Year - 17 FY27	Year -18 FY28	Year -19 FY29	Year-20 FY30	Project Life Budget	Currently Funded
State O&M	$0	$6,646,735	$5,565	$5,741	$4,790	$4,951	$88,400	$5,282	$5,453	$5,628	$5,806	$5,988	$6,174	$6,363	$88,400	$6,755	$6,957	$7,163	$7,373	$7,588		$6,921,112	
Corps Admin	$729	$744	$760	$776	$792	$809	$826	$843	$861	$879	$897	$916	$935	$955	$975	$996	$1,017	$1,038	$1,060	$1,082		$17,890	
Federal S&A	$1,041	$132,935	$1,086	$1,108	$1,132	$1,155	$1,180	$1,204	$1,230	$1,256	$1,282	$1,309	$1,336	$1,364	$1,393	$1,422	$1,452	$1,483	$1,514	$1,547		$157,429	
Total	$1,770	$6,780,414	$7,411	$7,625	$6,714	$6,915	$90,406	$7,329	$7,544	$7,763	$7,985	$8,213	$8,445	$8,682	$90,768	$9,173	$9,426	$9,684	$9,947	$10,217		$7,096,431	$6,895,932

Projected O&M Expenditures																						Remaining Project Life	Current 3 year Budget
Maintenance Inspection														$16,396	$16,829	$17,274	$17,730	$18,197	$18,678	$19,170	$21,256	$145,529	$50,498
General Admin																						$0	$0
Surveys																						$0	$0
Sign Replacement																						$0	$0
Federal S&A														$1,364	$1,393	$1,422	$1,452	$1,483	$1,514	$1,547		$10,175	$4,179
Supervision and Inspection																						$0	$0
Construction																						$0	$0
Total	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,760	$18,222	$18,696	$19,182	$19,680	$20,192	$20,717	$21,256	$155,704	$54,677

O&M Expenditures from Nov 2020 LANA Report	$5,734,320	Current O&M Budget less COE Admin	$7,078,541	Current Project Life Budget less COE Admin	$7,078,541
State O&M Expenditures not submitted for in-kind credit	$574,760	Remaining Available O&M Budget	$769,461	Total Projected Project Life Budget	$6,464,784
Federal Sponsor MIPRs (if applicable)	$0	**Add'l Funding amount needed thru FY20-FY22**	**-$714,784**	**Project Life Budget Request Amount**	**-$613,757**

Note: The November 2020 LANA report is the most recent LANA report that CPRA has received.

Appendix D

Field Inspection Form

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: **PO-30 Lake Borgne Shoreline Protection Project**

Date of Inspection: 6/22/2022 Start Time: 9:45 am

Structure No. _____N/A_____

Inspector(s): Steven Gunter (CPRA), Taylor Chassaignac (CPRA), Patty Taylor (EPA)

Structure Description: Shoreline Protection Breakwater

Water Level: +0.3 feet NAVD 88

Type of Inspection: Annual

Weather Conditions: mostly cloudy

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Reach 1 Rock Breakwater	Good	Some settlement	N/A	9-10	Most rock appears to be in good condition. Some settlement observed.
Reach 1 Composite Sheetpile Const. 2013 Maintained 2021	Good	Localized damage observed	N/A	1-8	Two of the three locations that were damaged during Hurricane Ida have experienced further deterioration. In addition, one splice plate was observed to be non-functional (missing all 3 bolts on one side), and damage was noted at the northern extent of the sheetpile. In all other locations, the recently enhanced composite sheet pile wall is functioning.
Reach 2 Rock Breakwater	Good	Some settlement	N/A	15-16	Most rock appears to be in good condition. Some settlement observed.
Reach 3 Rock Breakwater	Good	Some settlement	N/A	17-19	The rock breakwater has numerous low spots with marsh retreat observed behind those locations. Other areas are performing well.
Reach 3 Composite Sheetpile Const. 2013 Maintained 2021	Good	None	N/A	20	Recently maintained wall is in good condition.
Reach 4 Rock Breakwater	Good	Some settlement	N/A	21	Most rock appears to be in good condition. Some settlement observed.
Reaches 1 & 2 Double Sheet-pile	Good	None	Yes	11, 13-14	Corrosion observed throughout steel sheetpile and steel tube walers. Rock has experienced minor settlement.
Reaches 1 & 2 Warning Signs	Good	None	N/A	11-12	The sign on WS-10 missing (timber pile still in place). WS-11 is in place, but the sign is in poor condition. WS-12 is completely missing (both sign and timber pile).