



**State of Louisiana  
Coastal Protection and Restoration Authority**

**2019 Annual Inspection Report**

for

**Lake Borgne Shoreline Protection  
Project**

State Project Number PO-30  
Priority Project List 10

September 2019  
St. Bernard Parish

Prepared by:

Taylor M. Daigle, E.I.  
Coastal Protection and Restoration Authority  
New Orleans Field Office  
CERM, Suite 309  
2045 Lakeshore Drive  
New Orleans, LA 70122



**2019 Annual Inspection Report  
for  
Lake Borgne Shoreline Protection Project  
(PO-30)**

**Table of Contents**

|      |   |   |
|------|---|---|
| I.   | Introduction.....   | 1 |
| II.  | Inspection Purpose and Procedures .....                   | 1 |
| III. | Project Description and History .....                     | 1 |
| IV.  | Summary of Past Operations and Maintenance Projects ..... | 3 |
| V.   | Inspection Results .....                                  | 3 |
| VI.  | Conclusions and Recommendations .....                     | 6 |

**Appendices**

- Appendix A Project Features Map
- Appendix B Photographs
- Appendix C Three-Year Operations & Maintenance Budgets
- Appendix D Field Inspection Form



## **I. Introduction**

The Lake Borgne Shoreline Protection Project (State Project No. PO-30) was approved on the 10<sup>th</sup> Priority Project List. A second Lake Borgne Project (PO-31) was approved on the 11<sup>th</sup> 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 along with a map identifying all of the project features within the project area.

## **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 May 29, 2019 and June 20, 2019. Weather on May 29<sup>th</sup> consisted of partly cloudy skies, a temperature of approximately 91°F, and winds out of the south at around 8 knots. Taking part in the May 29<sup>th</sup> inspection were Steven Gunter, Barry Richard, and Taylor Daigle of CPRA, the non-federal sponsor. All project features were visited. An additional inspection was then completed on June 20<sup>th</sup> to accommodate the availability of the federal sponsor representative. Weather on June 20<sup>th</sup> consisted of partly cloudy skies, a temperature of 92°F, and winds out of the SSW at around 14 knots. Taking part in the June 20<sup>th</sup> inspection were: Steven Gunter, Barry Richard, and Taylor Daigle of CPRA; and Adrian Chavarria of EPA, the federal sponsor. The gage at the Bayou Dupre Sector Gate was observed during the inspection and showed a water level of approximately +1.5 feet NAVD 88 on May 29<sup>th</sup> and +0.6 feet NAVD 88 on June 20<sup>th</sup>. Except as otherwise noted, the photographs included in Appendix B were taken at the time of the June 20<sup>th</sup> inspection.

## **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 and composite sheetpile wall as 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 section 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 section at Bayou Dupre extends approximately 1.5 miles to the west and 0.8 miles to the east of Bayou Dupre. At the mouth of Bayou Dupre, where maintenance dredging within the MRGO has created an unnatural water depth, sheet pile structures on each side of the bayou opening tied 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 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 planned. The Project has a 20 year economic life, which began at project completion in 2009.



## **IV. Summary of Past Operations and Maintenance Projects**

There are no operable structures in the project. There has been one maintenance event over the life of the project, as described below.

Hurricanes Ike and Gustav 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 sheetpile 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 maintenance lift and additionally placed 4,563 linear feet of composite sheetpile wall using 902 timber piles, 9,027 linear feet of pressure treated walers, and 67,650 square feet of composite sheetpile. A scour protection feature was added to the sheetpile wall during construction utilizing 4,000 additional tons of rock.

The maintenance project was accepted on September 11, 2014.

## **V. Inspection Results**

- A. Breakwater Reach 1 (North of Bayou Dupre)** – There is significant deterioration of this feature, as described below from north to south. See Figure 1 for point coordinates.

Table 1: Breakwater Reach 1 Summary

| Start Point | End Point | Length (LF) | Type      | Condition   |
|-------------|-----------|-------------|-----------|---|
| R1          | R3        | 890         | Rock      | Good  |
| R3          | R4        | 290         | Sheetpile | Good. Three splices are missing bolts on the southern side of the splice. One sheet is missing. The performance of the feature does not appear to be affected.  |
| R4          | R5        | 110         | Rock      | Good  |
| R5          | R6        | 660         | Sheetpile | This entire section is badly deteriorated. None of this section appears to be salvageable aside from the piles. A maintenance event is being planned to rehabilitate this segment.  |
| R6          | R7        | 90          | Rock      | Good  |
| R7          | R8        | 905         | Sheetpile | Approximately 35% of the length of this segment will be able to remain, and approximately 65% of the length of this segment will need to be rehabilitated, with only the piles to remain. From north to south, the first 150 feet will need to be rehabilitated, followed by 325 feet that can remain, and the remainder of approximately 430 feet will need to be rehabilitated. A maintenance event is being planned to repair this segment.  |
| R8          | R9        | 1310        | Rock      | This segment has experienced some settlement. There is one area (about 150 to 200 feet long) that has settled to approximately +0.75' NAVD 88. This occurs at roughly 29°57'20.14", -89°50'43.84".  |
| R9          | R10       | 1850        | Sheetpile | Approximately 65% of the length of this segment will be able to remain, and approximately 35% of the length of this segment will need to be rehabilitated, with only the piles to remain. From north to south, the first 725 feet can remain, followed by 175 feet that will need to be rehabilitated, followed by 270 feet that can remain, followed by 105 feet that will need to be rehabilitated, followed by 215 feet that can remain, and the remainder of the approximately 360 feet will need to be rehabilitated. A maintenance event is being planned to rehabilitate this segment. |



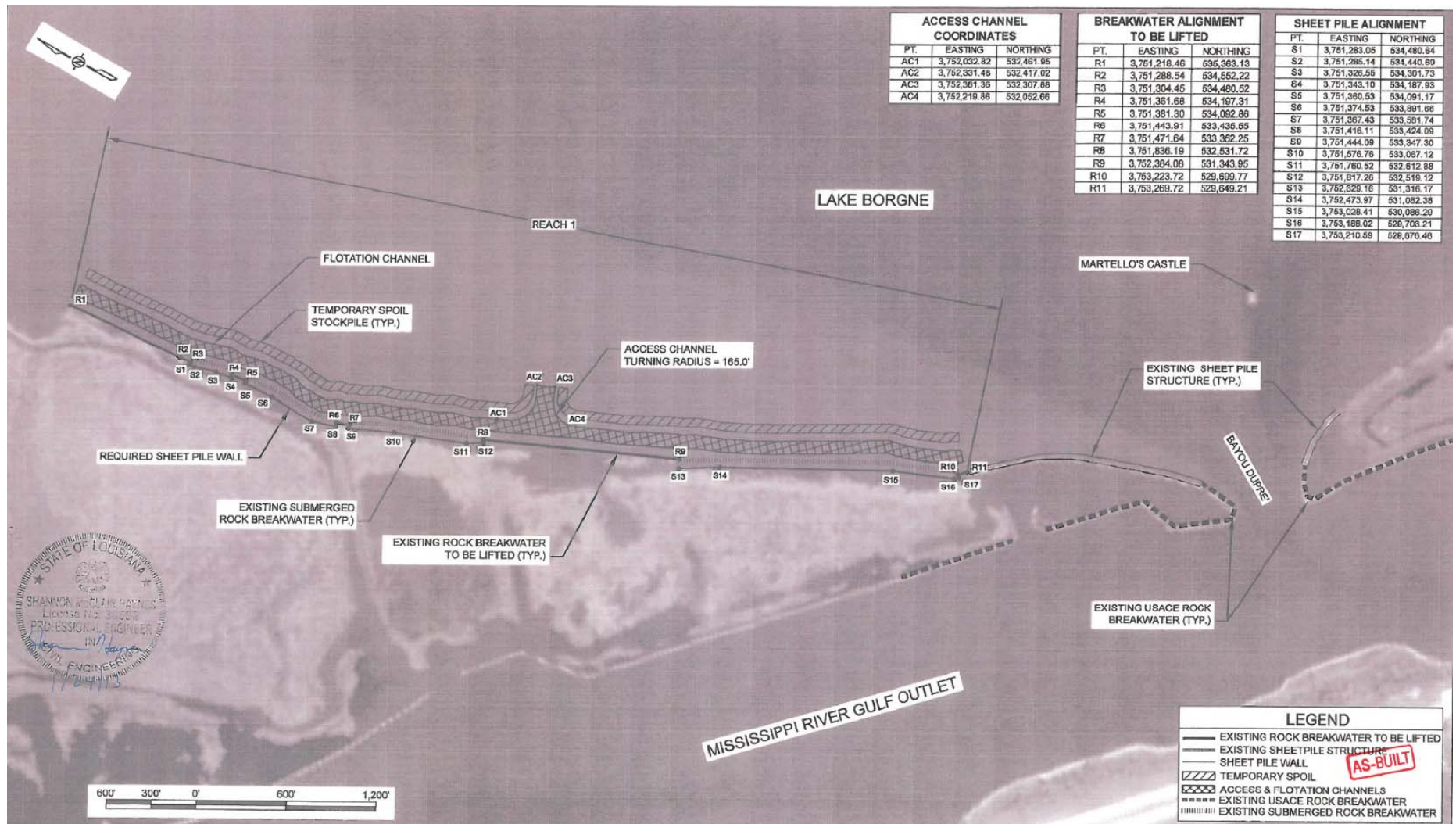


Figure 1: 2013 Maintenance Event As Built for Reach 1

- B. Breakwater Reach 2 (South of Bayou Dupre)** – The rock breakwater appears to be mostly in good condition. There is a section approximately 100 feet long at 29°56'30.55", -89°49'59.21" that appears to be approximately 0.5 feet lower than the adjacent rock.
- C. Breakwater Reach 3 Strong (West of Tennessee Gas Pipeline)** – The rock breakwater has some areas of settlement to below +1.5' NAVD 88 at the following locations: about 100' long at 29°52'14.76", -89°41'48.65" and about 200' long at 29°52'10.36", -89°41'31.07". The marsh is very healthy. There is some rock settlement and marsh retreat at the mouth of Fort Bayou.
- D. Breakwater Reach 3 Weak (Between Tennessee Gas Pipeline and Bayou Yscloskey)** – The rock breakwater and composite sheetpile walls were in good condition. Some washers and one bolt are missing. One sheet is missing.
- E. Breakwater Reach 4 (East of Bayou Yscloskey)** – The rock breakwater appears to be in good condition with the exception of one area roughly 200' long at approximately 29°51'44.85", -89°39'39.40" that has settled to about +1.75' NAVD 88.
- F. Double Sheetpile Wall Breakwater at the mouth of Bayou Dupre** – The double sheetpile wall breakwater appears to be in good condition. One tie rod has failed. A maintenance event is being planned to replace the tie rod. The rock has experienced minor settlement to roughly +2.0' NAVD 88. The performance of the feature does not appear to be affected.
- G. Warning Signs** – The warning signs at the double sheet-pile wall breakwater are present and appear to be in good condition.

## **VI. Conclusions and Recommendations**

### **Project Condition**

CPRA concludes that the Lake Borgne Shoreline Protection Project (PO-30) is achieving project objectives along approximately 94% of the project length, with significant deterioration along the remaining length that should be repaired as soon as possible.

While portions of the rock breakwater have experienced some settling as noted in this report, CPRA does not recommend a rock lift at this time. Because the great majority of the rock breakwater appears to be at or above design elevation (+2.0 feet NAVD 88), the areas that would be lifted would be small, and the benefits would be limited.

### **Immediate Repairs**

CPRA is currently planning a maintenance event to rehabilitate segments along the sheetpile wall in Reach 1, replace the failed tie rod on the double sheetpile wall breakwater, and enhance intact waler splices by replacing hardware with more durable alternatives.



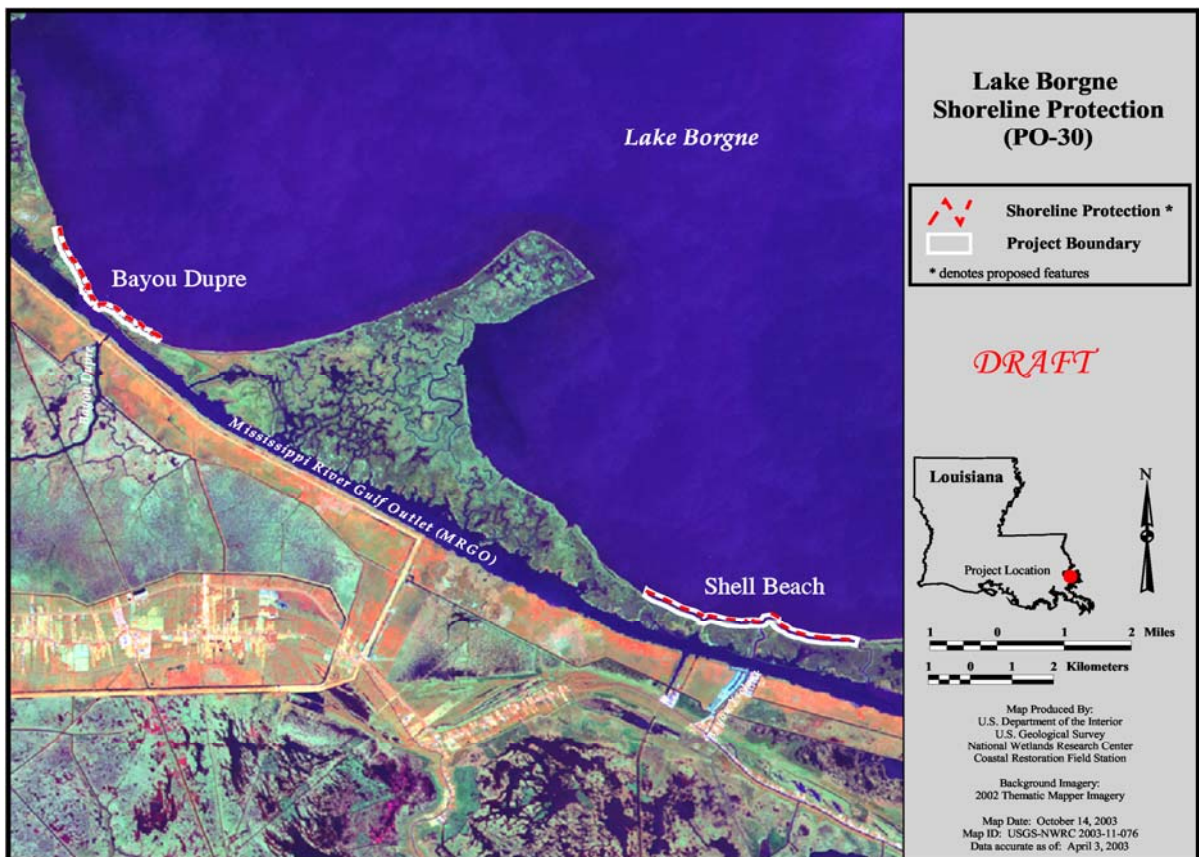


### **Programmed Maintenance**

Continue to monitor the condition of the breakwaters, especially Reach 1 and Reach 3 Weak.



**Appendix A**  
**Project Features Map**





# Lake Borgne Shoreline Protection (PO-0030) Bayou Dupre Segment

- Settlement Plate
- Sheetpile (2013 Maintenance)
- Breakwater Lift (2013 Maintenance)
- Back-to-Back Sheetpile
- Rock Breakwater
- Preexisting USACE Breakwater (not a PO-30 feature)

Lake Borgne

Mississippi River Gulf Outlet

Martello's  
Castle

Bayou Dupre

Bayou Dupre



0 500 1,000  
Feet

Source:  
Coastal Protection and  
Restoration Authority of Louisiana  
Imagery  
2016 DOQQ  
Map Date: May 16, 2019



# Lake Borgne Shoreline Protection (PO-0030) Shell Beach Segment

- Settlement Plate
- Sheetpile (2013 Maintenance)
- ||||| Breakwater Lift (2013 Maintenance)
- ||||| Rock Breakwater
- PL- Tennessee Gas Pipeline

Lake Borgne

Fort  
Beauregard

Old  
Shell  
Beach

Shell  
Beach

Mississippi River Gulf Outlet

Yscloskey



0 1,000 2,000  
Feet

Source:  
Coastal Protection and  
Restoration Authority of Louisiana  
Imagery:  
2016 DOQQ  
Map Date: May 16, 2019



## **Appendix B**

### **Photographs**





**Photo 1: Reach 1 (5/29/2019)**

Beginning of sheetpile wall- No repairs required on this stretch: 29°57'40.45", -89°50'51.04"



**Photo 2: Reach 1 (5/29/2019)**

No repairs required on this stretch: 29°57'39.24", -89°50'50.90"





**Photo 3: Reach 1**

No repairs required on this stretch, but missing & deteriorated washers visible, and one sheet is missing:  
29°57'39.59", -89°50'51.10"



**Photo 4: Reach 1 (5/29/2019)**

Entire stretch to be rehabilitated (aside from piles): 29°57'35.98", -89°50'49.97





**Photo 5: Reach 1 (5/29/2019)**

Entire stretch to be rehabilitated (aside from piles): 29°57'34.34", -89°50'50.13"



**Photo 6: Reach 1 (5/29/2019)**

Entire stretch to be rehabilitated (aside from piles)





**Photo 7: Reach 1**

Entire stretch to be rehabilitated (aside from piles): 29°57'34.60", -89°50'50.52"



**Photo 8: Reach 1**

Entire stretch to be rehabilitated (aside from piles) – Note that the side of the splice that failed utilized lag bolts. The side of the splice that remained intact utilized through bolts: 29°57'34.60", -89°50'50.57"



**Photo 9: Reach 1 (5/29/2019)**

Entire stretch to be rehabilitated (aside from piles): 29°57'34.75", -89°50'50.46"





**Photo 10: Reach 1 (5/29/2019)**

Short rock breakwater segment in good condition: 29°57'30.31", -89°50'49.06"



**Photo 11 – Reach 1**

Approximately 65% of this segment to be rehabilitated (aside from piles): 29°57'28.68", -89°50'49.28"





**Photo 12: Reach 1**

Low spot: 29°57'18.18", -89°50'43.57"



**Photo 13: Reach 1**

Approximately 35% of this segment to be rehabilitated (aside from piles) – Note that heads of bolts are deteriorated/missing: 29°57'7.19", -89°50'38.35"





**Photo 14: Reach 1**  
29°56'51.55", -89°50'27.86"



**Photo 15: Reach 1**  
29°56'40.07, -89°50'21.76"



**Photo 16: Reach 2 (5/29/2019)**  
29°56'21.04", -89°49'45.95"



**Photo 17: Reach 2 (5/29/2019)**  
29°56'25.88", -89°49'53.99"





**Photo 18: Reach 2**  
29°56'35.12", -89°50'14.92"



**Photo 19: Reach 3 Strong**  
29°52'24.08", -89°42'12.27"



**Photo 20: Reach 3 Weak**  
29°52'22.81", -89°42'11.72"



**Photo 21: Reach 3 Weak (5/29/2019)**  
29°52'1.99", -89°41'8.11"





**Photo 22: Reach 3 Weak (5/29/2019)**  
29°52'0.28", -89°40'58.66"



**Photo 23: Reach 4**  
29°51'41.21", -89°39'22.66"



## **Appendix C**

### **Three-Year Operations & Maintenance Budget**

[illegible]

## **Appendix D**

### **Field Inspection Form**

| MAINTENANCE INSPECTION REPORT CHECK SHEET                                 |           |                                    |           |  |  |
|---|-----------|------------------------------------|-----------|--|--|
| Project No. / Name: <b>PO-30 Lake Borgne Shoreline Protection Project</b> |           |                                    |           | Date of Inspection: 5/29/2019 & 6/20/2019      Start Time: <u>8:00 am</u>  |  |
| Structure No. <u>N/A</u>  |           |                                    |           | Inspector(s): <u>Steven Gunter (CPRA), Barry Richard (CPRA), Taylor Daigle (CPRA),<br/>Adrian Chavarria (EPA)</u><br>Water Level: +1.5 feet NAVD 88 (5/29/2019), +0.6 feet NAVD 88 (6/20/2019) |  |
| Structure Description: <u>Shoreline Protection Breakwater</u>             |           |                                    |           |  |  |
| Type of Inspection: <u>Annual</u>   |           |                                    |           |  |  |
|   |           |                                    |           | Weather Conditions: partly cloudy, S winds at 8 knots on average (5/29/2019), SSW winds at 14 knots on average (6/20/2019)   |  |
| Item  | Condition | Physical Damage                    | Corrosion | Photo #  | Observations and Remarks   |
| Reach 1<br>Rock Breakwater  | Good      | Some settlement                    | N/A       | 10, 12   | Most rock appears to be in good condition. One area about 150-200' in length has settled to approximately +0.75' NAVD 88 at roughly 29°57'20.14", -89°50'43.84".   |
| Reach 1<br>Composite Sheetpile<br>Const. 2013                             | Poor      | Deteriorating<br>Sheetpile<br>Wall | N/A       | 1-9, 11, 13  | Significant damage noted. A maintenance event is being planned to rehabilitate this feature. Some areas remain intact. There are four segments of sheetpile in this area. The northernmost segment is intact and does not require any rehabilitation. The second segment from the north is completely deteriorated and will need to be fully rehabilitated aside from the piles. The third segment from the north requires approximately 65% rehabilitation. The southernmost segment requires approximately 35% rehabilitation. |
| Reach 2<br>Rock Breakwater  | Good      | Some settlement                    | N/A       | 16-17  | There is one area roughly 100 feet long at 29°56'30.55", -89°49'59.21" that appears to be approximately 0.5 feet lower than the adjacent rock.   |
| Reach 3<br>Rock Breakwater  | Good      | Some settlement                    | N/A       | 19-20, 22  | The rock breakwater has some areas of settlement to below +1.5' NAVD 88 at the following locations: about 100' long at 29°52'14.76", -89°41'48.65" and about 200' long at 29°52'10.36", -89°41'31.07". The marsh is very healthy. There is some rock settlement and marsh retreat at the mouth of Fort Bayou.  |
| Reach 3<br>Composite Sheetpile<br>Const. 2013                             | Good      | None                               | N/A       | 21-22  | Some washers and one bolt are missing. One sheet is missing.   |
| Reach 4<br>Rock Breakwater  | Good      | Some settlement                    | N/A       | 23   | The rock breakwater appears to be in good condition with the exception of one area roughly 200' long at approximately 29°51'44.85", -89°39'39.40" that has settled to about +1.75' NAVD 88.  |
| Reaches 1 & 2<br>Double Sheet-pile  | Good      | Minor                              | light     | 14-15  | One tie rod has failed. Rock has experienced minor settlement - to roughly +2.0' NAVD 88.  |
| Reaches 1 & 2<br>Warning Signs  | Good      | None                               | N/A       | 18   |  |