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

# 2009 Annual Inspection Report

for

## GIWW/ CLOVELLY HYDROLOGIC RESTORATION

State Project Number BA-02
Priority Project List 1

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Prepared by:

Brian Babin, P.E.
Office of Coastal Protection and Restoration
Operations Division
Thibodaux Field Office
1440 Tiger Drive, Suite B
Thibodaux, La. 70301

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# I. Introduction

The GIWW to Clovelly Hydrologic Restoration Project encompasses approximately 14,948 acres of marsh habitat located in the Barataria Basin near the Gulf Intracoastal Waterway (GIWW) in Lafourche Parish, Louisiana. The project is bounded to the north by an arbitrary line through the marsh from the shoreline of Little Lake to the hurricane protection levee northwest of Clovelly Farms, to the west by the South Lafourche hurricane protection levee, to the south by Breton Canal and Superior Canal, and the east by Little Lake and Bay L' Ours. (Appendix A – Project Features Map).

The GIWW to Clovelly (BA-02) project is a hydrologic restoration project consisting of four (4) fixed crest weirs, one (1) variable crest weir, four (4) canal plugs, one (1) channel plug with culvert and flap-gate, 6,000 linear feet of lake rim restoration and approximately 5,000 linear feet of earthen bank stabilization. The purpose of the project is to protect and nourish intermediate marsh in the project area by restoring natural hydrologic conditions, promote greater use of available freshwater and nutrients, limit rapid water level exchange, slow water exchange through over-bank flow, and reduce rapid salinity spikes and saltwater intrusion (Lear, E. 2003).

The GIWW to Clovelly Hydrologic Restoration Project (BA-02) is co-sponsored by the Natural Resource Conservation Service (NRCS) and the Louisiana Office of Coastal Protection and Restoration (OCPR). The project was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) enacted on November 29, 1990 as amended. The GIWW to Clovelly (BA-02) project was approved on the first (1$^{st}$) Priority Project List. (LDNR O&M Plan, 2002).

As a result of the wide-spread ecological and structural damages caused by Hurricanes Gustav and Ike, the CWPPRA Task Force authorized emergency funding, through the OCPR, to conduct post-storm damage assessment inspections of all constructed CWPPRA projects which were believed to have sustained damages from the 2008 storms. The purpose of the damage assessment is to determine the extent of damages to existing project features, if any; provide a full accounting of the necessary corrective actions to repair storm damages along with estimated costs, and to initiate contact with the Federal Emergency Management Agency (FEMA) for potential storm related claims. The annual inspection of the GIWW to Clovelly Hydrologic Restoration (BA-02) project usually occurs in the first quarter (March/April) of each year. However, due to the damage caused by Hurricanes Gustav and Ike, a damage assessment was performed immediately following the storms in September 2008. With concurrence from the federal sponsor, the OCPR has decided not to perform the annual inspection in the first quarter of 2009, but rather use the field information gathered on the damage assessment field trip on September 25, 2008 to produce the 2009 Annual Inspection Report.

## II. Inspection Purpose and Procedures

The purpose of performing an annual inspection is to evaluate the constructed project features, identify any deficiencies, prepare a report detailing the condition of such features, and to recommend corrective actions needed, if any. Should it be determined that corrective actions are needed, OCPR shall provide, in report form, a detailed cost estimate for engineering, design, supervision, inspection, construction contingencies, and an assessment of the urgency of such repairs (O&M Plan, 2002). The annual inspection report also contains a summary of maintenance projects undertaken since the constructed features were completed and an estimated project budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year budget projections for operation and maintenance of the GIWW to Clovelly Hydrologic Restoration (BA-02) project are shown in Appendix C. A summary of past operation and maintenance projects undertaken since the completion of the project are outlined in Section IV of this report.

Immediately following Hurricanes Gustav and Ike in September 2008, the OCPR began damage assessment efforts to inspect all CWPPRA projects. The damage assessment of the GIWW to Clovelly Hydrologic Restoration (BA-02) project was held on September 25, 2008. Participants included Brian Babin, Shane Triche and Elaine Lear with the OCPR. Due to prior commitments, NRCS and the landowner were unable to attend the damage assessment field trip. The damage assessment began at approximately 9:00 a.m. near Structure No.14A at the end of Clovelly Canal and ended at approximately 11:45 a.m. near Structure No. 43 on the interior of project area.

The field inspection included a complete visual inspection of all constructed features within the project area. Staff gauge readings and temporary benchmarks, where available, were used to determine approximate water elevations, elevations of rock weirs, earthen embankments, lake-rim dike and other project features. A GPS unit was used to mark the locations of low areas and breaches along the earthen embankments and rock structures which may require corrective action. In addition to documented visual observations and estimated field measurements, a survey profile of the rock weirs and lake rim along Little Lake and Bay L' Ours, completed in December 2008, were superimposed over the as-built drawings to estimate actual settlement profiles. The profile drawings are included in Appendix D. This data was also used in estimating quantities for the proposed work plan and preparing the three (3) year budgets. The photographs taken during the damage assessment are shown in Appendix B.

## III. Project Description and History

Within the GIWW to Clovelly Hydrologic Restoration (BA-02) project, the average rate of change from marsh habitat to non-marsh habitat (including wetland loss to both open water and commercial development) has been increasing since the 1950's (Lear, 2003). The main reasons for wetland deterioration in the project area as reported by NRCS in the Wetlands

Value Assessment (WVA) summary are saltwater intrusion, oil field activities, subsidence, lack of sedimentation, and reduced freshwater influx.

The purpose of the GIWW to Clovelly (BA-02) project is to protect intermediate marsh in the project area by restoring natural hydrologic conditions that promote greater use of available freshwater and nutrients. This will be accomplished by limiting rapid water level changes, slowing water exchange through over-bank flow, reducing rapid salinities increases, and reducing saltwater intrusion (Lear, 2003). The project objectives and specific goals outlined in the 2003 Monitoring Plan prepared by LDNR are as follows:

Project Objectives are:

- Protect and maintain approximately 14,948 acres of intermediate marsh. This will be achieved by restoring natural hydrologic conditions that promote greater freshwater retention and utilization, prevent rapid salinity increases, and reduce the rate of tidal exchange.
- Reduce shoreline erosion through shoreline stabilization

The specific goals for the project are:

- Increase or maintain marsh to open water ratios.
- Decrease salinity variability in the project area.
- Decrease the water level variability in the project area.
- Increase or maintain the relative abundance of intermediate marsh plants.
- Promote greater freshwater retention and utilization in the project area.
- Reduce shoreline erosion through shoreline stabilization.
- Increase or maintain the relative abundance of submerged aquatic vegetation (SAV).

The GIWW to Clovelly Hydrologic Restoraton project involves the installation and maintenance of structures in two (2) construction units. Construction Unit No.1 and Construction Units No.2 were completed in November 1998 and October 2000, respectively. These structures were designed to reduce the adverse tidal effects in the project area and promote freshwater introduction to better utilize available freshwater and sediment retention. If these objectives are met, it is anticipated that the rate of shoreline erosion will be reduced and a hydrologic regime, conducive to sediment and nutrient deposition, will encourage the re-establishment of emergent and submergent vegetation in eroded areas to more historic low energy environment. (Lear, 2003)

The principle project features of Construction Unit No.1 include:

- Structure 2 – Fixed crest rock weir with boat bay.
- Structure 4 – Fixed crest rock weir with boat bay.
- Structure 7 – Fixed crest rock weir with boat bay.
- Structure 8 – Rock rip rap channel plug.
- Structure 43 – Rock rip rap channel plug.
- Structure 91 – Rock plug with culvert and flap gate.

The principle project features of Construction Unit No.2 include:

- Structure 1 – Fixed crest rock weir with boat bay.
- Structure 4B – Rock rip rap channel plug.
- Structure 14A – Fixed crest rock weir with barge bay.
- Structure 35 – Variable crest weir, water control structure.
- Structure 90 – Rock rip rap channel plug.
- 5,665 linear ft. of Lake Rim Restoration
- 5,023 linear ft. of Rock Bank Stabilization
- 11,711 linear ft. of Earthen Bank Stabilization.

Structure 35 has an operation component which consists of a ten (10) ft. wide variable crest section housing twelve (12) timber stop logs. As outlined in the special conditions of project permits, Structure 35 is operated in accordance with the following operation schedule:

- Variable Crest Weir – the stop logs will be set at 0.5 ft. BML from April to November and removed from November to April (weir sill level = 2.0 ft. BML) to allow for sediment and nutrient inflow during spring.

Construction Unit No.1 has a twenty-year (20 year) project life beginning in November 1997. The twenty-year (20 year) project life of Construction Unit No.2 began in October 2000.

## IV. Summary of Past Operation and Maintenance Projects

**2007 Structure Operations:** In accordance with the operation schedule outlined in the Operations and Maintenance Plan and the special conditions of the permit, Structure 35 has been operated during the months of April and November of each year since April 3, 2002. Operations were suspended in November 2005 due to the movement of large sections of marsh behind structure #35 following Hurricane Katrina, blocking water flow through the structure. However, since this time, the marsh material blocking the structure has worked itself out, opening the existing channel to the interior marsh which enabled structure operations to resume in November 2007. No maintenance dredging of the marsh plug will be required at this time.

**Navigation Aids Maintenance:** Below is a short description of repairs, dates and cost associated with the service of the navigational aids located at Structure 14A:

5/16/02 – Automatic Power of Larose, La. performed maintenance and service to repair navigation lights at Structure 14A. Seventeen (17) flash bulbs were replaced at a total cost of $421.50.

12/16/03 – Automatic Power performed maintenance and service to repair navigation lights at Structure 14A. The battery and flash bulbs were replaced in all four (4) navigation lights at a total cost of $2,189.80.

11/4/04 – Automatic Power performed maintenance and service to repair navigation lights at Structure 14A. One (1) lamp changer, one (1) battery and flash bulbs were replaced at a total cost of $922.23.

11/29/06 – LDNR received public bids for a state-wide maintenance contract for inspection, diagnostic testing, and maintenance of twenty-seven (27) navigational aid systems at ten (10) separate locations state-wide. Four (4) of the twenty-seven (27) navigational aid structures included in this contract are located within the GIWW to Clovelly project area at Structure 14A. The state-wide contract was awarded to the lowest bidder, Automatic Power, Inc. of Larose, La., in the amount of $83,424. This contract is a one (1) year contract with an option to extend for another two (2) years. The notice to proceed with inspections, diagnostic testing and maintenance was issued in February 2007 and is ongoing.

# V. Inspection Results

## CONSTRUCTION UNIT NO.1

### Structure 2 – Fixed crest rock weir with boat bay

Structure No.2 was constructed using a three (3) level split weir crest. The as-built drawings indicate that the sill elevation closest to the bank on each side of the structure was constructed to an elevation of 3.9’ NAVD. The sill section between the bank section and the boat bay was constructed to an elevation of 2.3’ NAVD. The lowest crest elevation within the boat bay section was constructed to an elevation of -5.1’ NAVD. After comparing the most recent survey profile data from 2008 (shown in Appendix D), it was apparent that the most severe settlement had occurred within the boat bay section (approximately 4.0’) with a crest elevation of -9.0’ NAVD at the center of the bay. The settlement of the intermediate section between the boat bay and the bank was relatively minor (approximately 1.3’) with elevations ranging from 0.5’ NAVD to 1.0’ NAVD. Other than the settlement of the boat bay section, the structure appeared to be in fair condition with no breaching around the ends of the structure. As a result of our inspection and review of as-built drawings and recent profile surveys, it is recommended that that structure be recapped with rock riprap to the original design crest elevations. In addition to reconstruction of the rock weir, it is likely that temporary floatation dredging will be required to access the site during construction due to the shallow water bottoms leading from the lake to the structure. All signs and supports were in good condition (Appendix B: Photos 1-4).

### Structure 4 – Fixed crest rock weir with boat bay

Structure No.4 was also constructed using a three (3) level split weir crest. The rock weir section closest to the bank on both sides of the structure was constructed to an elevation of 3.8’ NAVD. Data from the 2008 surveys indicate that the crest of the section has settled to marsh elevation (approximately 1.0’ NAVD). The intermediate section between the bank section and the boat bay was constructed to an elevation of 2.4’ NAVD. Comparing the 2008 surveys with the as-built drawings show differences of 2.4’ to 7.0’. The most severe settlement of Structure No.4 occurred within the intermediate crest on the south side of the

structure. Considering the large elevation differences on the south crest, it is apparent that rock structure was displaced from strong currents in the channel rather than settlement or compaction of soils beneath the structure only. The crest of the boat bay was constructed to an elevation of -3.9' NAVD. The most recent elevation data show that the lowest crest elevation of the boat bay is currently at -6.0' NAVD, resulting in a difference of approximately 2.0'. Due to the amount of settlement and displaced rock within the boat bay and southern weir section, it is recommended that Structure 4 be reconstructed to the original design crest elevations. To prevent the obvious displacement of rock material on the south side of the structure, it may be necessary to recap the structure with a larger stone which would minimize displacement during strong current conditions. As reported in previous inspection reports, the warning sign on the north side of the structure was destroyed during Hurricane Katrina and no longer exists. A warning sign on the north side of the structure shall also be replaced. (Appendix B: Photos 5-7). The 2008 survey profile of Structure No.4 plotted over the original as-built section is shown in Appendix D.

**Structure 7– Fixed crest rock weir w/ boat bay**

Structure No.7 appeared to be in fair condition with no visual damage to the rock weir. The as-built drawings indicate that the fixed crest rock weir was constructed to elevations of -4.4 NAVD 88 at the boat bay and +2.4' NAVD 88 on the north and south sides, between the bank section and the boat bay. The elevation profile of Structure No.7 in 2008 revealed that the rock weir had settled uniformly throughout with settlement ranging from 1.0' to 1.5'. All signs, supports and earthen embankment tie-ins appear to be in good condition. The settlement of Structure No.7 is considered to be minor and is not recommended for corrective actions at this time. (Appendix B: Photos 8-10). The 2008 survey profile and as-built section of Structure No.7 is shown in Appendix D.

**Structure 8– Rock rip-rap weir**

Structure No.8 is a small rock weir with boat bay located on the north side of Structure No.8. A steel gate was also constructed across the opening of the structure to prevent access to the marsh area behind the structure. Structure No.8 was not profiled during the most recent survey completed in 2008. From a visual inspection, rock weir appeared to be in fair condition with no erosion or washouts around the structure. The gate closure constructed across the weir was destroyed by Hurricanes Gustav and Ike and no longer exists. At this time, there are no recommendations for replacement of the steel gate. (Appendix B: Photo 11)

**Structure 43 – Rock rip-rap channel plug**

As indicated on previous inspection reports, there is a 5 to 7 ft. wide shallow breach in the embankment on the east side of the structure. It appears that the breach has not increased in width or depth from previous inspections. It is possible that water may by-passes the structure on high tides since the crest of the structure is only slightly above the existing marsh. The crest of the weir plug was originally constructed to an elevation of +2.45' NAVD 88. At this time, there are no recommendations for maintenance of Structure No. 43. The condition of the breach will be re-evaluated on future site visits. (Photos not available)

**Structure 91 – Rock plug with culvert and flap gate**

The rock plug structure with flap-gate appeared to be in very good condition with no visible indication of settlement or breaching around the structure. The culvert, flap gate, signs, timber supports and earthen embankments were also in good condition. The sheet metal covering the tops of the timber piles supporting the corrugated metal pipe were rusted and corroded. Although corrosion was present, the tops of the timber piles appeared to be in good condition. We did observe excessive barnacle growth in and around the flap-gated structure below the waterline. The barnacle growth does not appear to be having an adverse affect on gate operations. (Appendix B: Photo 12-15)

**CONSTRUCTION UNIT NO.2**

**Structure 1 – Fixed crest rock weir w/ barge bay**

The rock weir with barge bay was in good condition with no apparent settlement. The rock weir was constructed to a -6.4' NAVD 88 at the barge bay and +4.0' NAVD 88 along the crest on each side of the structure between the barge bay and shoreline. Staff gauge readings from a CRMS station just north of the structure indicated a water elevation of 2.10' NAVD 88 at 11:03 a.m. on the date of the inspection. Using the water elevation, we estimated that the rock weir section on both sides of the structure to be approximately +3.5' to 4.0' NAVD 88, reinforcing our observations that no settlement has occurred. Over the years, we have noticed increased damage to the timber piles supporting the warning signs at the entrance to the barge bay. Several vertical piles are split, the batter piles are off center and the surface of all the piles are worn or scarred from vessels rubbing the timbers while accessing the barge bay. To avoid the possibility of structural failure of the timber support piles, we are recommending that the all four (4) timber cluster piles be replaced. It is also recommended that the timber pile structures be moved slightly outward, towards the bank (approximately 1'), to allow for additional clearance for barges to move through the barge bay without interference from the timber pile clusters. (Appendix B: 16-21)

**Structure 4 A & 4B – Rock rip-rap channel plug**

Structures 4A & 4B appeared to be in fair condition with average crest elevations of approximately 1.5' NAVD. . From as-built drawings prepared by NRCS, it was determined that the crest of the rock plug was constructed to an elevation of 3.0' NAVD. The most recent survey data collected by John Chance Surveys in 2008 show settlement ranging from 1.5' to 2.0'. It is recommended that the existing plug be recapped with rock riprap to raise the crest elevation to the original design elevation. The 2008 survey profile of Structures 4A & 4B are shown in Appendix D.

The marsh tie-in on the south side of the structure was severely damaged. We found that a large section of the existing marsh on the south side of the structure had eroded away during Hurricanes Gustav and Ike. Prior to the 2008 storms, the marsh on the south side of the structure was very thin with a narrow strip of marsh connecting the rock plug to the existing shoreline. The post-storm assessment of this area revealed extensive erosion which resulted in a breach, estimated to be approximately 1,500' wide, between the current marsh bank and the structure, leaving a large opening behind the structure to the interior marsh. Due to lack of stable marsh on the south side of the structure and high wave energies generated from the bay,

we are recommending that the rock plug be extended across the open water approximately 1,500' to the north side of Structure No.4. Although a lengthy structure, it is necessary to provide protection from the bay and to reduce the risk of future breaching, thus compromising the hydrology of the project. (Appendix B: Photos 22-25)

**Structure 14A – Fixed crest rock weir with barge bay**

The fixed crest weir with barge bay was in fair to good condition with minor settlement and displacement of rock rip-rap on the south side of the barge bay. The crest of the structure on both sides of the barge bay was constructed to an elevation of +4.0 NAVD. The scour pad at the bottom of the barge bay was constructed to -6.5' NAVD. From the most recent survey information collected in 2008, it was determined that the crest elevations of the rock weir on both sides of the barge bay faired very well since construction. It appears that the crest elevations north of the barge bay did not settle at all, while the crest elevations on the south side experienced only minor settlement, less than 1.0'. The most noticeable settlement and/or scour were at the bottom of the barge bay itself. The 2008 survey data show bottom depths ranging from -6.5' to -15' NAVD88 indicating that the scour pad and riprap at the bottom of the channel had eroded or washed out by the strong currents through the structure. It is recommended that the rock scour pad be reconstructed to the original design elevations. Due to the strong currents through the barge bay, we are also recommending that a larger rock be used to slow the rate of scour. The 2008 survey profiles of Structure No.14A are shown in Appendix D.

In addition to the settlement/scour at the bottom the barge bay, the landowner and NRCS representatives notified the OCPR of erosion problems on the south side tie-in to the shoreline. We found that the shoreline in this location had eroded back past the interior toe of the rock weir as indicated in a field trip report prepared by NRCS on June 19, 2006. Although erosion is a concern in this area, it appears that there is no immediate threat of breaching which would compromise the hydrology of the project. However, to slow future erosion in this area, NRCS has recommended that planting additional smooth cordgrass on the lake side just north of the structure to buffer the wave action along the shoreline. OCPR agree that this is the most logical and cost effective method of protecting the shoreline in this area. NRCS has indicated in their inspection report (dated June 19, 2006) that they would initiate a plantings project to protect the vulnerable areas along the shoreline. The NRCS field inspection report outlining recommended actions by NRCS can be found in Appendix E of the 2008 Annual Inspection Report.

The timber navigational aid supports were in fair condition with visible damage to the southwest timber support structure and navigation lights on the northwest support structure. Longitudinal cracks, scrapes and abrasions were noted on the face of the timber batter piles on the northwest support structure. There is no indication that the structural integrity of the timber dolphin is compromised by the observed damage at this time. However, we are recommending that the two (2) timber cluster piles on the west side of the structure be replaced during the next maintenance cycle. We also noticed that the support pole on the navigation aid unit on the southwest timber structure was bent. It is apparent that this is a direct result of Hurricanes Gustav and Ike. The damage to the navigational aid system shall be repaired under the Inspection, Diagnostic Testing and Maintenance contract between

Automatic Power, Inc., the navigational aid maintenance company, and the OCPR. (Appendix B: Photos 26-33)

**Structure 35 – Variable crest weir , water control structure**

Other than minor corrosion and paint chipping along the channel cap of the bulkhead, handrails and movable boom deck, the structure itself was in good condition. The stop logs, cables, signs, supports and other hardware appear to be operable and in good condition. The stop logs were manipulated in November 2008 and May 2009 as per the permitted operations schedule. Although there was no damage to the structure itself, we did note that marsh material had accumulated on the marsh side of the structure partially blocking the conveyance channel to the interior marsh. Hurricanes Gustav and Ike produced similar conditions as in the case of Hurricane Katrina where large sections of floating marsh were lodged in the conveyance channel directly behind Structure No. 35. Although a considerable amount of marsh material was present in the channel, the inlet from the interior marsh to the weir opening was not completely closed, allowing water to freely flow through the structure under normal tidal conditions. At this time, we are not recommending any corrective actions to open the channel. We believe that the width of the channel will continue to widen over time through natural tidal action as in the case following Hurricane Katrina. (Appendix B: Photos 34-36)

**Structure 90 – Rock rip-rap channel plug**

The rock riprap channel plug appeared to be in very good condition with no apparent settlement or breaching around the ends of the structure. The signs and supports were also in good condition. (Appendix B: 37-39)

**Lake Rim Restoration**

An inspection of the foreshore rock dike along the lake rim of Bay L' Ours revealed several areas along the structure where previously documented settlement has occurred. As indicated on previous inspections, as well as this one, low areas of the rock dike included segments between Stations 7+00 and 13+00, 36+00 and 41+00, and the intersection near the mouth of Breton Canal. Under intense wave action, it is difficult to identify areas of settlement by visual inspection. Therefore, with concurrence from NRCS, OCPR initiated a topographic survey including a centerline profile and cross sections of the structure. The profile survey of the lake rim and other structures long the shoreline of Little Lake was completed in December 2008. The survey profile and cross-section data can be found in Appendix D. The results of the profile survey revealed minor to moderate settlement along the entire length of the structure. The lake rim structure was constructed between +2.0' and +3.0' NAVD with six (6) fish dip locations. From the as-built drawings, it was apparent that the +2.0' NAVD elevation was not achieved during construction, possibly due to poor soil conditions and excessive settlement immediately following placement of the rock dike. From the 2008 surveys, it is estimated that the rock lake rim has settled approximately 1.0'. We are recommending that refurbishment of the lake rim be included in the 2009/2010 work plan for maintenance of the GIWW to Clovelly project. Initial concerns with maintenance of the foreshore dike were that shallow waters adjacent to the foreshore dike would prevent barges from working in the area without temporarily dredging floatation channels. However, field measurements taken in 2007 and elevation data provided in the 2008 survey indicate that the water depths adjacent to the rock dike are approximately 5' in depth, which should be adequate to float barge equipment to

facilitate any required maintenance. Although it is anticipated that access dredging will not be required, additional bathymetric data may be required during the design phase of the project to extend sections into the lake to confirm our assumptions. The 2008 profile drawings of the lake rim with superimposed as-built profiles are shown in Appendix D. (Appendix B: Photo 40)

**Earthen bank stabilization**

The earthen embankments located near the southern boundary of the project appear to be in a similar condition as observed during the March 2008 inspections. There are five (5) breaches identified for repairs and/or refurbishment to be included in the 2009/2010 Work Plan. Breach 1 is located along the north bank of Breton Canal just southwest of the first location canal from Bay L' Ours and is approximately 15' wide. Breach 2 is located along the northeast bank of the second location canal north of Breton Canal and is approximately 10' wide. Breach 3 is located on the south bank of the same location canal as Breach 2 and is approximately 15' wide. Breach 4 is located on the west bank of a location canal that intersects Superior Canal east of Structure No. 1 and is approximately 30' wide. Another breach, designated as Breach 5, was discovered at the end of a dead end channel south of Breach 4. (Typical breach photos are shown in Appendix B).

An overall maintenance permit for the GIWW to Clovelly (BA-02) project was obtained from the Corps of Engineers to maintain all constructed features of the GIWW to Clovelly Hydrologic Restoration project through March 31, 2013, at which time an permit extension shall be required. Breaches 1 through 4 and 6 are included in the provisions of this permit since these overflow banks were refurbished during the original construction contract. However, since Breach 5 was not a constructed feature of the original project, these repairs are not included in the overall maintenance permit. An evaluation of all maintenance repairs will be made leading up to the upcoming maintenance event to determine if additional permit authorizations are required.

## VI. Conclusions and Recommendations

An overview of all the project features of the GIWW to Clovelly project revealed a number of deficiencies, as noted in Section V of this report, which will require repairs and/or rehabilitation in the 2009/2010 plan year. Below is a summary of the identified deficiencies, recommended methods of repair and estimate cost estimate to be included in the 2009/2010 Work Plan. The 2009/2010 Work Plan maps of the project area identifying the location of proposed maintenance are shown in Appendix E.

Structure No.1

The deficiencies at Structure No.1 were limited to the four (4) timber cluster piles near the entrance of the barge bay. Several of the vertical piles were split down the middle, the batter piles were off center and the surface of all the timbers were worn or scarred from marine vessels rubbing the timbers while accessing the barge bay. We are recommending total replacement of all four (4) cluster piles. The method of construction would included removing

all existing cluster piles (vertical and batter) and replacing with new treated piling and hardware. Detailed itemized costs are shown in the budget worksheet under Appendix C.

Structure No.2

Structure No.2 was found to be in fair condition with approximately 4' of settlement within the boat bay section. We are recommending that the boat bay section and fixed crest sections be raised to the original constructed elevations using rock riprap. Due to shallow condition a the mouth of the channel near Bay L' Ours, access dredging may be required to facilitate the refurbishment of Structure No.2. Detailed itemized construction costs are shown in the budget worksheet in Appendix C.

Structure No.4

Structure No.4 was found to be in fair to poor condition with severe settlement and/or displacement of the rock material on the south side of the structure and moderate settlement of the rock lining the boat bay and rock weir section on the north side. The warning sign on the north side of the structure was also missing. Recommendation for refurbishing this structure includes refurbishment of rock riprap along the entire structure by raising the crest to original design elevations and installation of a new warning sign. As in the case of Structure No.2, temporary access dredging may be required to complete maintenance of this structure. Detailed itemized construction costs are shown under the budget worksheet in Appendix C.

Structure No. 4A & 4B

The rock plug structures appeared to be in fair condition with moderate settlement. The critical area of concern associated with this structure is large breach that has developed on the south side of the structure resulting from the 2008 storms. The marsh on the south side of the structure is completely gone with little remaining shoreline to facilitate a breach closure by extending the structure. Due to the lack of stable marsh along the shoreline in this area, we are recommending that the rock plug be extended from the south side of Structure 4A & 4B, approximately 1,500 linear feet, to the north side of Structure No.4. It is estimated that approximately 8,384 tons of rip rap will be required to rehabilitate Structures 4A and 4B and extend the rock plug to the north side of Structure No.4. Detailed itemized construction costs for the rock plug extension are outlined in the budget worksheet in Appendix C.

Structure 14A

Structure No.14A was in fair to good condition with moderate damage to the timber cluster piles on the west side of the structure in Clovelly Canal and severe settlement and/or scour along the bottom section within the limits of the barge bay. It is recommended that the two (2) timber cluster pile support structures be replaced and the navigational aid systems cleaned and reinstalled. It is also recommended that the rock scour pad be reconstructed to the original design elevations. Due to the strong currents through the barge bay, it is also recommended that a larger rock be used to slow the rate of scour. Detailed itemized construction costs for replacement of the timber cluster piles are outlined in the budget worksheet in Appendix C.

Lake Rim Restoration

As indicated in the inspection results and on previous inspections, a large portion of the rock dike along the lake rim has settled below the constructed crest elevation. From depths reading taken at random locations on the lake side of the structure, it was determined that access dredging is unlikely since depths appear to be adequate to float barges during construction. The method of repair includes recapping the foreshore rock dike with rip rap along entire length of the structure to the original design elevation. Detailed construction costs are outlined in the budget worksheet under Appendix C.

Earthen bank stabilization

In all, five (5) breaches ranging from 10' to 30' wide were identified within the southern portion of the project area which will require maintenance. Breach locations are shown in the Work Plan Map of Appendix E. It is recommended that breaches 1 through 5 be closed and re-constructed to the original design elevations utilizing available in situ material from adjacent channel bottoms. Detailed construction costs are outlined in the budget worksheets under Appendix C.

Other minor deficiencies noted during this inspection included shoreline erosion and small cuts banks along the west bank of Little Lake south of Structure 14A. Since there are no major breaches in the shoreline, that is currently jeopardizing the internal hydraulics of the project, we are not recommending any improvements or maintenance at this time. The inspection team will closely monitor the shoreline in this area on future site visits to determine if conditions have changed.

**References:**

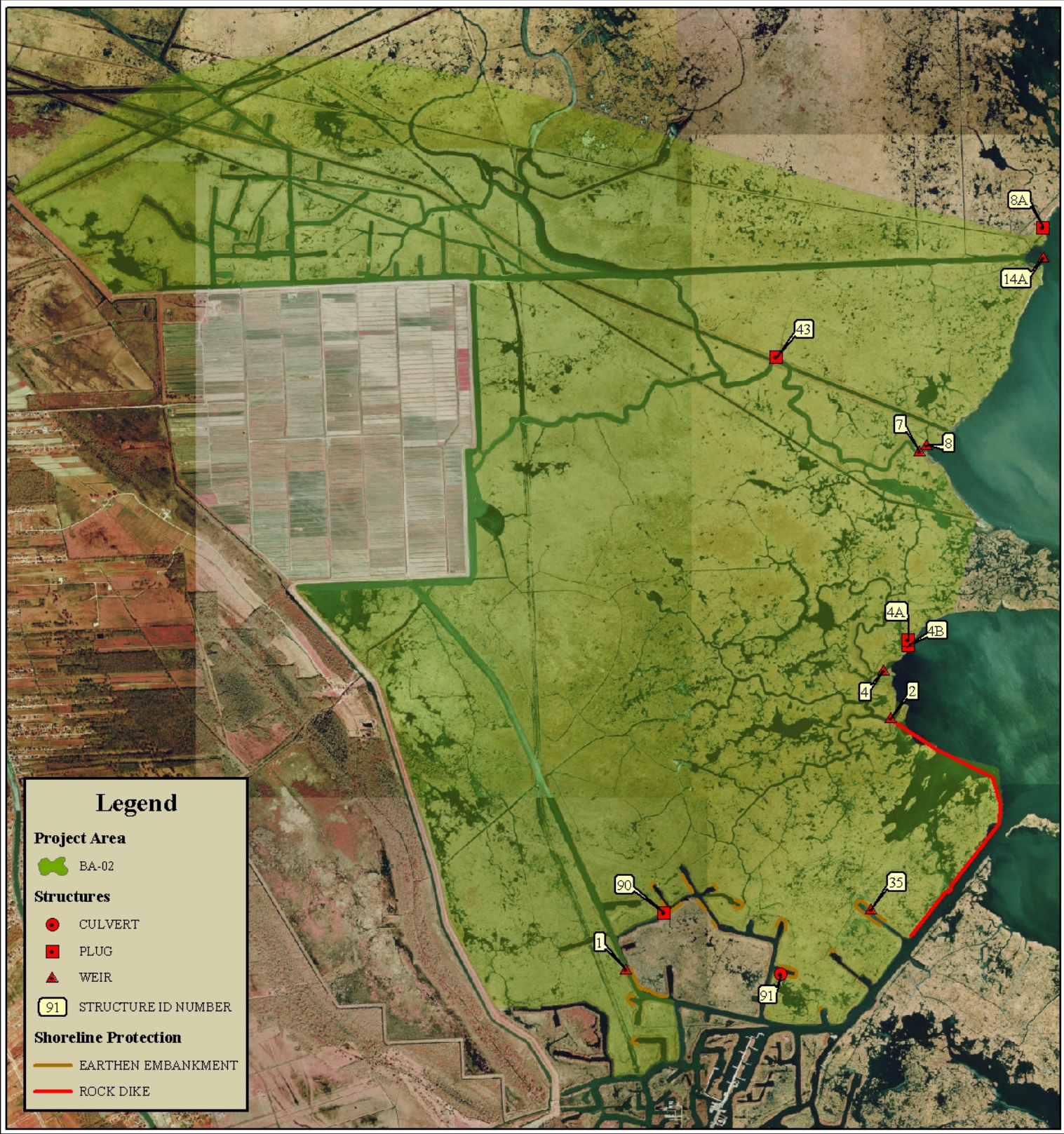
Lear, E. 2003. *Monitoring Plan for the GIWW (Gulf Intracoastal Waterway) to Clovelly Project (BA-02)*, Louisiana Department of Natural Resources, Coastal Restoration Division, 24 pp.

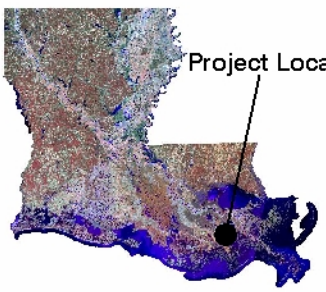
LDNR, Pyburn & Odom, Inc. 2002. *Operation, Maintenance and Rehabilitation Plan for the GIWW to Clovelly Hydrologic Restoration Project (BA-02)*. Louisiana Department of Natural Resources, Coastal Restoration Division. Baton Rouge, Louisiana, Pyburn & Odom, Inc. Baton Rouge. 8 pp plus Attachments.

Kinler, 2006. *Memorandum, GIWW to Clovelly (BA-02) – Inspection of Little Lake Shoreline South of Site 14A.* Natural Resource Conservation Service, Baton Rouge, La. 5 pp.

# Appendix A

# Project Features Map




# BA02 - GIWW to Clovelly Hydrologic Restoration

## PROJECT FEATURES MAP

0 1 2 Miles

0 2.5 5 Kilometers

N

Data Source:

LA Dept. Natural Resources
Coastal Engineering Division
Thibodaux Field Office

1998 DOQQ

Date: May 26, 2005

Map ID: 2005-TFO-029

# Appendix B

# Photographs


Photo No. 1 – View of fixed crest weir section with boat bay (Structure No.2)


Photo No.2 – view of the weir crest section on the south side of boat bay of Structure No.2.


Photo No. 3 – view of weir crest section on the north side of boat bay of Structure No.2


Photo No. 4 – view of rock dike structure along lake rim of Bay L' Ours south of Structure No.2.


Structure No.5 – view of rock weir with boat bay along shoreline of Bay L' Ours (Structure No.4)


Photo No. 6 – view of the southwest end of weir crest of Structure No. 4.


Photo No. 7 – view of the northeast end of weir crest (Structure No.4)


Photo No. 8 – rock weir with boat bay (Structure No.7). Iron gate destroyed during storms.


Photo No.9 – Photo of rock weir with boat bay (Structure No.8) looking west.


Photo No.10 – view of south side crest of weir with boat bay (Structure No.8)


Photo No.11 – view of north side crest of weir with boat bay (Structure No.8)


Photo No. 12 – view of the rock plug with corrugated culvert and flap gate (Structure No.91) located along a dead-end oilfield canal southwest of Structure No.35.

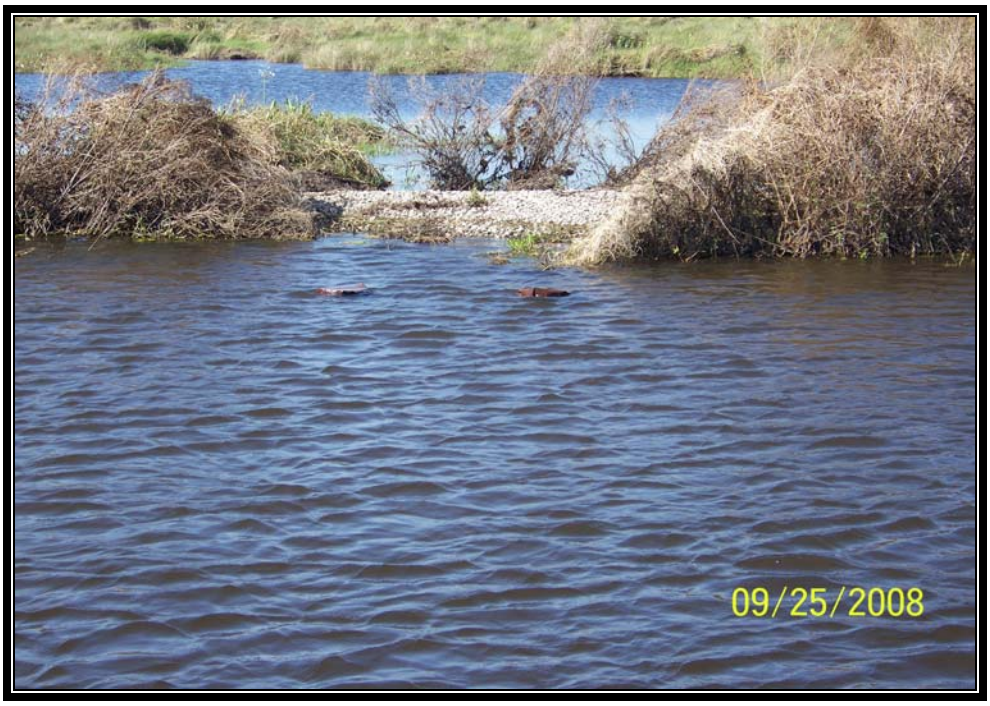



Photo No. 13 – view of submerged corrugated culvert and flap gate on Structure No. 91.


Photo No. 14 – view along centerline of rock plug w/ culvert (Structure No.91) looking east.


Photo No. 15 – view of low level earthen embankment at the end of and oilfield canal across from Structure No.91.


Photo No. 16 – photo of the fixed crest rock weir with barge bay (Structure No.1) looking north.


Photo No. 17 - view of the fixed crest rock weir section on the east side of the barge bay of Structure No.1.


Photo No. 18 - view of the fixed crest rock weir on the west side of the barge bay at Structure No.1


Photo No. 19 – damaged timber pile support on the navigational aid structure at the barge bay opening of Structure No. 1.


Photo No. 20 – damaged timber pile cluster on the navigation aid structure near the barge by opening of Structure No.1.


Photo No. 21 – damaged timber pile cluster on the navigational aid structure at the barge bay opening of Structure No.1.


Photo No. 22 – view of large opening in marsh on the south side of Structures 4A & 4B, resulting from Hurricanes Gustav and Ike.


Photo No. 23 – view of large opening in marsh on the south side of Structures 4A & 4B, resulting from Hurricanes Gustav and Ike.


Photo No. 24 – view of rock plug along the west bank of Bay L' Ours (Structure 4A & 4B)


Photo No.25 – another view of large opening along shoreline of Bay L' Ours adjacent to Structures 4A & 4B. Hurricane Gustav and Ike decimated the marsh south of this structure.


Photo No.26 - view of rock weir at barge bay location looking east towards Little Lake.


Photo No.27 – damaged navigational aid light northwest of barge bay at Structure 14A.


Photo No.28 – view of damaged navigational aid light and timber pile support on the northwest side of Structure 14A.


Photo No. 29 - view of the southern rock weir section of Structure 14a near the barge bay to the marsh tie-in.


Photo No.30 – view along the centerline of the northern weir section of Structure 14A to the marsh tie-in.


Photo No.31 - view of the navigational aid structure on the northeast side of Structure 14A.


Photo No.32 – northern most rock weir section of Structure 14A near the terminus.


Photo No.33 – southern end of the rock weir (Structure 14A) near the marsh tie-in.


Photo No. 34 – view of  the broken marsh clumps in the tidal channel behind Structure No. 35.


Photo No. 35 – view of the steel bulkhead section on the south side of Structure No. 35.


Photo No. 36 – view of the steel bulkhead section, deck grating and lifting boom on the north side of Structure No.35.


Photo No. 37 – view of rock plug (Structure No. 90) located across and existing oilfield canal just northeast of Structure No.1.


Photo No.38 – view rock plug and bank tie-in on the north side of Structure No. 90.


Photo No. 39 – view of the rock plug and bank tie-in on the south side of Structure No.90.


Photo No.40 - view of rock dike along the lake rim of Bay L' Ours near the entrance of Brenton Canal.


Photo No.41 – existing shoreline along the west bank of Little Lake south of Structure 14A.


Photo No.42 – existing shoreline along the west bank of Little Lake south of Structure 14A.


Photo No. 43 – small shell mitten along the western shoreline of Little Lake south of Structure 14A.


Photo No. 44 – small breach in the existing shoreline opening into a small pond along the west bank of Little Lake south of Structure 14A.


Photo No. 45 – view of exiting wooden bulkhead at the head of an oilfield canal along the shoreline of Little Lake.


Photo No. 46 – view of a small breach located along Breton Canal just south of oilfield channel leading to Structure No.35


Photo No. 47 – view of breach location on the south bank of the second oilfield canal from Bay L' Ours.


Photo No. 48 – view of typical breach in the earthen embankment.


Photo No. 49 – view of typical breach in the earthen embankment.


Photo No. 50 – view of the wrack line on the Lafourche Parish protection levee along the eastern boundary of the project.


Photo No. 51 -view of the wrack line on the Lafourche Parish protection levee along the eastern boundary of the GIWW to Clovelly project.

# Appendix C

# Three Year Budget Projection

## GIWW TO CLOVELLY, PHASES 1 & 2 / BAO2 / PPL1

### Three-Year Operations & Maintenance Budgets 07/01/2009 - 06/30/12

| Project Manager | O & M Manager | Federal Sponsor | Prepared By |
|---|---|---|---|
| | *B. Babin* | *NRCS* | *B. Babin* |

| | 2009/2010 | 2010/2011 | 2011/2012 |
|---|---|---|---|
| ***Maintenance Inspection*** | $ 5,736.00 | $ 5,908.00 | $ 6,085.00 |
| ***Structure Operation*** | $ 8,000.00 | $ 8,000.00 | $ 8,000.00 |
| ***Administration*** | $ 23,500.00 | $ 3,500.00 | $ 3,500.00 |
| ***COE Administration*** | $ 1,225.00 | $ 1,240.00 | $ 1,257.00 |
| ***Maintenance/Rehabilitation*** | | | |
| 09/10 Description | Major maintenance: rock refurbishment of Structures 2, 4, 4A, 4B, Breach 5 and the lake ri | | |
| | repairs of earthen embankment breaches, nav. Aid maintenance, structure operations. Assessment Survey | | |
| *E&D* | $ 140,827.00 | | |
| *Construction* | $ 2,102,647.00 | | |
| *Construction Oversight* | $ 107,100.00 | | |
| *Sub Total - Maint. And Rehab.* | $ 2,350,574.00 | | |
| 10/11 Description: | Routine Maintenance: navigation aid maintenace and structure operations | | |
| *E&D* | | $ - | |
| *Construction* | | $ 3,000.00 | |
| *Construction Oversight* | | $ - | |
| *Sub Total - Maint. And Rehab.* | | $ 3,000.00 | |
| 11/12 Description: | Routine Maintenance: navigation aid maintenance and structure operations | | |
| *E&D* | | | $ - |
| *Construction* | | | $ 3,000.00 |
| *Construction Oversight* | | | $ - |
| *Sub Total - Maint. And Rehab.* | | | $ 3,000.00 |

| | 2009/2010 | 2010/2011 | 2011/2012 |
|---|---|---|---|
| ***Total O&M Budgets*** | **$ 2,389,035.00** | **$ 21,648.00** | **$ 21,842.00** |
| **Total O&M Budget 2009 through 2012** | | | **$ 2,432,525.00** |
| **Unexpended O&M Budget** | | | **$ 990,782.61** |
| **Remaining O&M Budget (Projected)** | | | **$ 1,441,742.00** |

Note: 2009-2012 Unexpeded O&M budgets includes a deduction of $86,456 for MIPR O&M funds allocated for NRCS (see attached worksheet for 09-12 accounting)

**OPERATIONS & MAINTENANCE BUDGET WORKSHEET**

**Project: BA-02 GIWW to Clovelly Hydrologic Restoration Ph. 1 &2**

**FY 09/10 –**

| | | |
|---|---|---|
| OCPR Administration | | $ 23,500* |
| COE Administration | | $ 1,225 |
| O&M Inspection & Report | | $ 5,736 |
| Structure Operations: | | $ 8,000 |
| Maintenance: | | $2,350,574 |
| E&D and Surveying: | $ 140,827** | |
| Construction: | $2,099,647*** | |
| Construction Oversight: | $ 107,100**** | |
| General Maintenance: | $ 3,000***** | |

**Operation and Maintenance Assumptions:**

Structure Operations: water control structure operated twice annually for a total of $4,000 per operation. (2)($4,000) = $8,000 plus ($2,000 for OCPR administration.)*

General Maintenance: Water control structure, navigation aids repair. (Construction: $3,000)*****. (Administration: $1,500)*

Maintenance: Refurbishment of rock structures Nos. 2, 4, 4A and 4B and the Lake Rim, repair of five (5) earthen embankment breaches and construct a rock dike closure between Structure 4A & 4B and Structure 4. The estimated construction costs for the proposed 09/10 maintenance project are detailed below:

**Structure No.2**

Assumptions: Rock riprap refurbishment:
1’ Cap - Sta. 0+00 to 0+80; 10’ top width; 3:1 side slopes
4’ full section – Sta. 0+80 to 1+40; 9’ top, 3:1 slopes
1’ cap – Sta. 1+40 to Sta. 2+20; 10’ top, 3:1 side slopes
Access dredging:
1500 linear ft. flotation channel
40’ wide flotation channel with 2:1 side slopes; 6’ depth
Mobilization included in overall construction budget

Rock Replenishment:
1’ cap – 13 sf. X 80 lft. / 27 x 1.5 = 57.8 tons x (2) = 116 tons
Boat Bay Section – 88 sf. X 60 lft. / 27 x 1.5 = 293 tons

409 tons x (25% contingency) = 511 tons @ $70/ton = $35,770

Access Dredging:
312 sf. x 1,500 lft. /27 = 17,333 cy. @ $4.00/cu. yd = $69,333

Estimated construction cost: $105,103

**Structure No.4**

Assumptions: Rock riprap refurbishment:
2' Cap - Sta. 0+00 to 0+20; 10' top width; 3:1 side slopes
6' full section – Sta. 0+20 to 0+60; 10' top, 3:1 slopes
2' cap – Sta. 0+60 to Sta. 1+70; 10' top, 3:1 side slopes
Access dredging:
1200 ft. access channel
40' flotation channel with 2:1 side slopes; 6' depth
Mobilization included in overall construction budget

Rock Replenishment:
2' cap – 32 sf. X 130 lft. / 27 x 1.5 = 231 tons
Full Section – 168 sf. X 40 lft. / 27 x 1.5 = 373 tons

604 tons x (25% contingency) = 755 tons @ $70/ton = $52,850

Access Dredging:
312 sf. x 1,200 lft. /27 = 13,866 cy. @ $4.00/cu. yd = $55,467

Estimated construction cost: $108,317

**Structure No.4A & 4B**

Assumptions: 2' cap existing structure w/ rock riprap:
4 ft. top width; 3:1 side slopes; +3.5 'NAVD crest elev.
water bottom approx. -2.0' NAVD.
Access dredging:
1,500 ft. access channel
40' flotation channel with 2:1 side slopes; 6' depth
Mobilization included in overall construction budget

Rock replenishment:
20 sf. x 500 lft. /27 x 1.5 = 556 tons

556 tons x (25% contingency) = 985 tons @ $70/ton = $68,950

Access Dredging:
312 sf. x 1,500 lft. /27 = 17,333 cy. @ $4.00/cu. yd = $69,332

Estimated construction cost: $138,282

**Lake Rim Restoration**

Assumptions: Cap existing lake rim:
5,665 linear ft.
4' top width; 3:1 side slopes
1.5' cap on foreshore rock dike
Do not anticipate access dredging

12.75 sf. x 5,665 lft. /27 = 2,675 cy. x 1.5 = 4,013 tons

4,013 tons x (25% contingency) = 5,016 tons

5,016 tons @ $70/ton = $351,120

Estimated construction cost: $351,120

**Rock Dike Extension from 4A & 4B to Structure 4**

Assumptions: Crest elevation: +3.5' NAVD
Estimated water bottom: -2' NAVD
4' top width; 3:1 side slopes
1,200 linear feet (Full Section)
Flotation Dredging included in cost for Structures 4, 4A and 4B
Geotextile Fabric: approx. 5,500 sy.

112.75 sf. x 1,200 lft./27 = 5,011 cy. x 1.5 = 7,517 tons
7,517 tons x (25% contingency) = 9,396 tons @ $70/ton = $657,720

Geotextile fabric: 5,500 sy. @ $10.00/sy. = $55,000

Estimated construction cost: $712,720

**Structure No. 14a**

Assumptions: Rock riprap refurbishment:
1.0' Cap - Sta. 2+00 to 3+84; 4' top width; 3:1 side slopes
8.0' Scour Pad - Sta. 3+84 to 5+00; 62' scour pad
1.0' Cap – Sta. 5+00 to Sta. 13+00; 4' top, 3:1 side slopes

1' Cap: 7.0 sf. x 184 lft./27 = 47 cy. x 1.5 = 72 tons

8' Scour Pad: 496 sf. x 116 = 2,130 cy. x 1.5 = 3,196 tons

1' Cap: 7.0 sf. x 800 lft. / 27 = 207 cy. x 1.5 = 311

3,579 tons x (25% contingency) = 4,474 tons @ $70/ton = $313,180

Estimated construction cost: $313,180

**Breach Repairs 1 through 5**

Assumptions: insitu material from adjacent channels
2' above marsh elevation (approx. +3.0' NAVD)
average bottom: -5.0'
1:6 side slopes; 14' top width
550 linear feet total

500 sq.ft. x 550 ft. = 275,000 cu.ft./27 = 10,185 @ $5.00/yd. = $50,925

Estimated construction cost: $50,925

**Replacement of four (6) Timber Cluster Piles**

4 @ Structure No.1 and 2 @ Structure 14A
Treated timber piles – 50' Long
Lump Sum: $20,000
6 @ $20,000 = $120,000

**Overall Estimated Budget of 09/10 Maintenance Project**:

| | | |
|---|---|---|
| Mobilization & Demob: | Lump Sum | $ 200,000 |
| Access Dredging: | Lump Sum | $ 194,132 |
| Geotextile Fabric (5,500 sy.): | $10.00/sy. | $ 55,000 |
| Repair of Rock Structures (21,137 tons): | $70/ton | $1,479,590 |
| Earthen embankment refurbishment: | Lump Sum | $ 50,925 |
| Timber Cluster Piles ($20,000 each) | 6 Each | $ 120,000 |
| Total Construction Cost: | | **$2,099,647*** ** |

| | |
|---|---|
| Additional Surveying: | $ 25,000** |
| Engineering & Design: | $115,827** |
| Construction Inspection: | $ 93,600**** |
| (120 day contract: 1,440 hrs @ $65/hr.) | |
| Construction Admin: | $ 13,500**** |
| (150 hrs @ $90/hr.) | |
| OCPRAdmin: | $ 20,000* |
| | **$267,927** |

**Overall Project Budget:** **$2,367,574**

**FY 10/11 –**

| | | |
|---|---|---|
| OCPR Administration | | $ 3,500* |
| COE Administration | | $ 1,240 |
| O&M Inspection & Report | | $ 5,908 |
| Structure Operations: | | $ 8,000 |
| Maintenance: | | $ 3,000 |
| E&D: | $ 0 | |
| Construction: | $ 0 | |
| Construction Oversight: | $ 0 | |
| General Maintenance: | $ 3,000 | |

**Operation and Maintenance Assumptions:**

Structure Operations: water control structure operated twice annually for a total of $4,000 per operation. (2)($4,000) = $8,000 plus $2,000* for OCPR administration.

General Maintenance: Water control structure, navigation aids repair. Construction: $3000. Administration: $1,500*

**FY 11/12 –**

| | | |
|---|---|---|
| OCPR Administration | | $ 3,500* |
| COE Administration | | $ 1,257 |
| O&M Inspection & Report | | $ 6,085 |
| Structure Operations: | | $ 8,000 |
| Maintenance: | | $ 3,000 |
| E&D: | $ 0 | |
| Construction: | $ 0 | |
| Construction Oversight: | $ 0 | |
| General Maintenance: | $ 3,000 | |

**Operation and Maintenance Assumptions:**

Structure Operations: water control structure operated twice annually for a total of $4,000 per operation. (2)($4,000) = $8,000 plus $2,000* for OCPR administration.

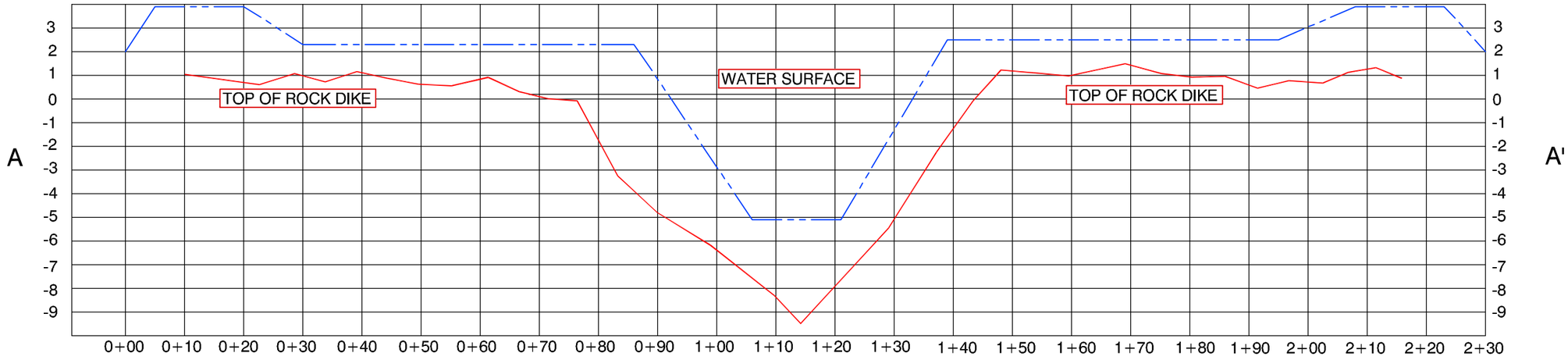
General Maintenance: Water control structure, navigation aids repair. Construction: $3,000. Administration: $1,500*

2009-2012 Accounting

| | |
|---|---|
| Total Expenditures (Lana Report through April 09): | $ 172,481.27 |
| NRCS Expenditures | $ -27,817.00 |
| State Expenditures (Lana Report) | $ 144,664.27 |
| OCPR Expenditures (April 09 through June 09) | $ 13,176.12 |
| **Total State Expenditures:** | **$ 157,840.39** |
| **Total Federal Expenditures:** | **$ 86,456.00** |
| **Unexpended O&M Funds:** | **$ 990,782.61** |

# Appendix D

# As-built / 2008 Survey Profiles




## STRUCTURE 2 PROFILE

Horizontal Scale 1":20'
Vertical Scale 1":5'

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

- JOHN CHANCE SURVEY 2008
- AS-BUILT SURVEY

Proj. Mgr.: RMJ
Revised:
Printed: 2/9/09

Coastal Protection & Restoration
**Authority of Louisiana, OCPR**

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**STRUCTURE 2**

LAFOURCHE PARISH, LOUISIANA

JOHN CHANCE
LAND SURVEYS, INC.

| | | | |
|---|---|---|---|
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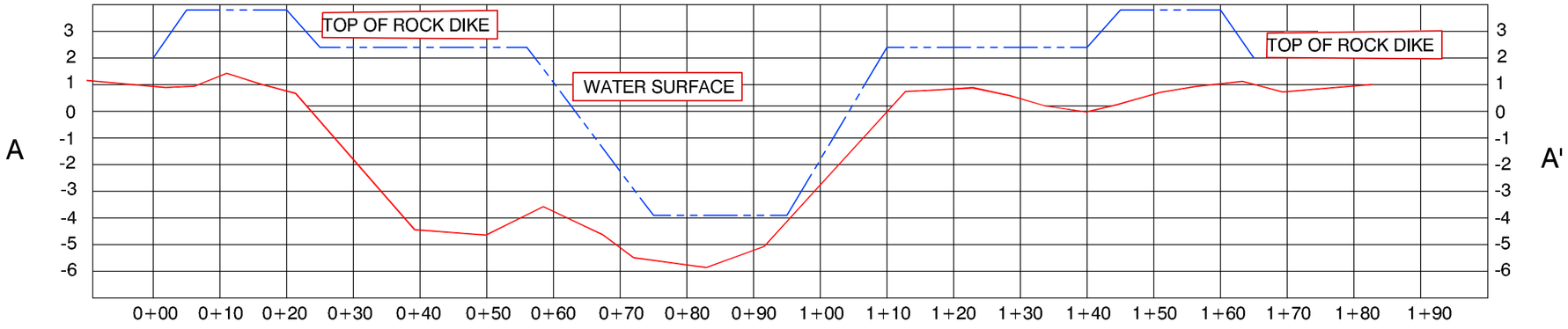


## STRUCTURE 4 PROFILE

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Vertical Scale 1":5'

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| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

- JOHN CHANCE SURVEY 2008
- AS-BUILT SURVEY

Proj. Mgr.: RMJ
Revised:
Printed: 2/9/09

Coastal Protection & Restoration
**Authority of Louisiana, OCPR**

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**STRUCTURE 4**

LAFOURCHE PARISH, LOUISIANA

JOHN CHANCE
LAND SURVEYS, INC.

| | |
|---|---|
| GEODETIC DATUM: NAD83<br>ZONE: LOUISIANA SOUTH<br>GRID UNITS: US SURVEY FEET | SCALE AS SHOWN |
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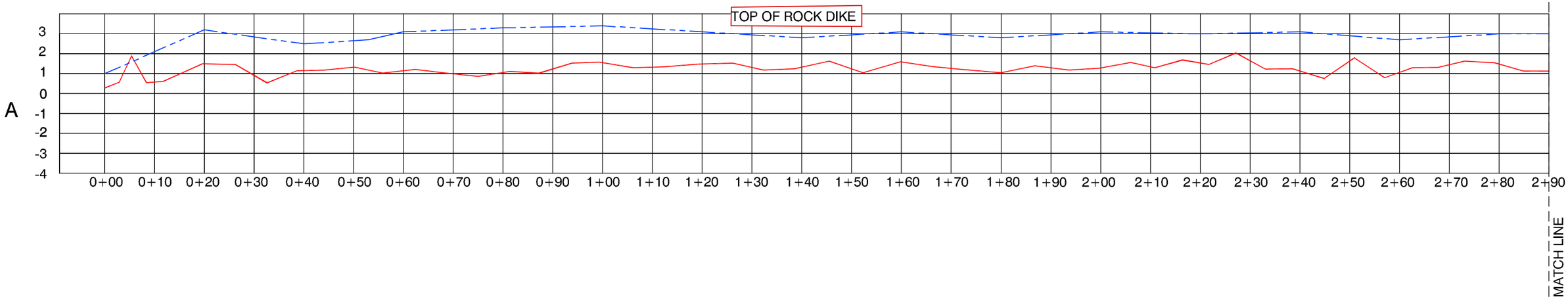


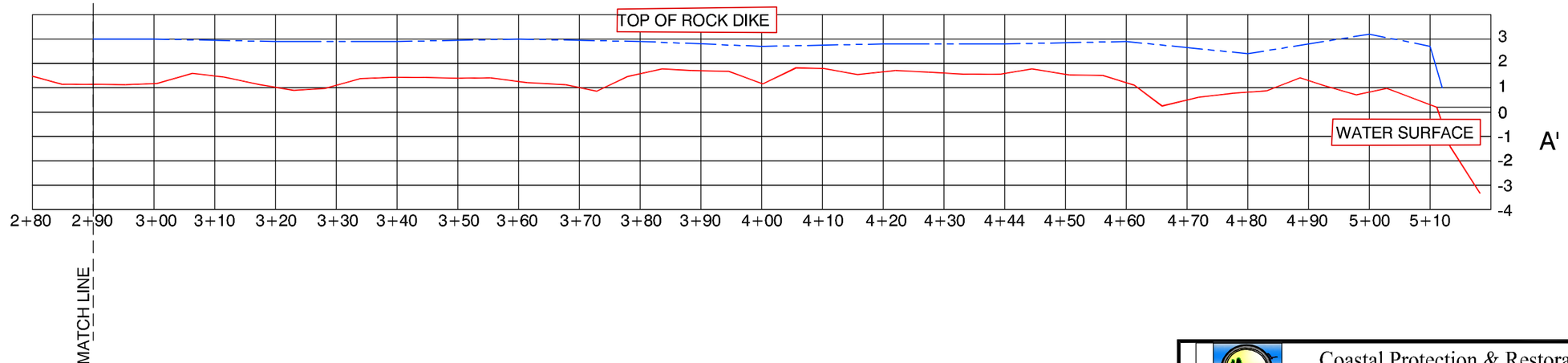


# STRUCTURE 4A-4B PROFILE

Horizontal Scale 1":20'
Vertical Scale 1":5'

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| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

- JOHN CHANCE SURVEY 2008
- AS-BUILT SURVEY

Proj. Mgr.: RMJ
Revised:
Printed: 2/9/09

Coastal Protection & Restoration
**Authority of Louisiana, OCPR**

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**STRUCTURE 4A-4B**

LAFOURCHE PARISH, LOUISIANA

JOHN CHANCE
LAND SURVEYS, INC.

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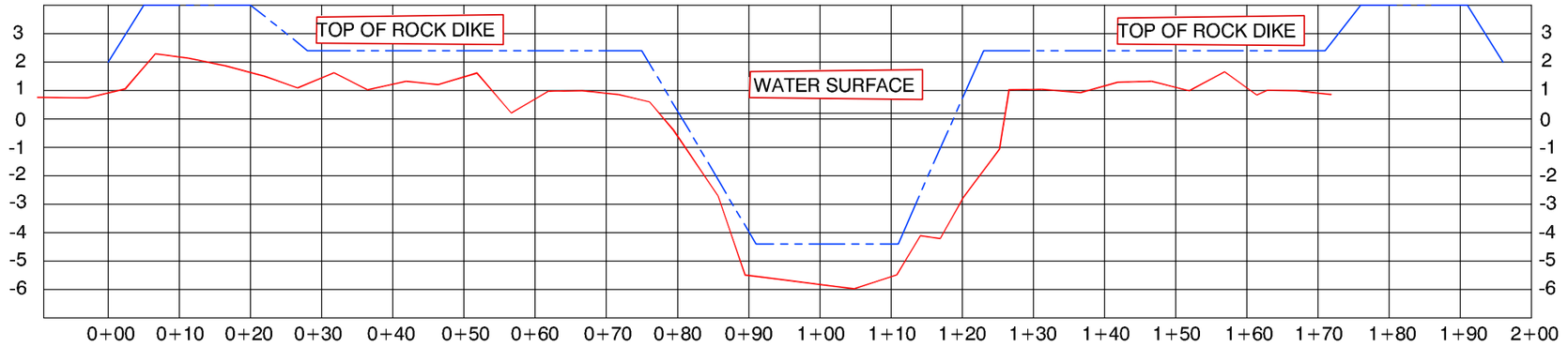


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## SRUCTURE 7 PROFILE

Horizontal Scale 1":20'
Vertical Scale 1":5'

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| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

JOHN CHANCE SURVEY 2008

AS-BUILT SURVEY

Proj. Mgr.: RMJ
Revised:
Printed: 2/9/09

Coastal Protection & Restoration
**Authority of Louisiana, OCPR**

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**STRUCTURE 7**

LAFOURCHE PARISH, LOUISIANA

JOHN CHANCE
LAND SURVEYS, INC.

| | | | |
|---|---|---|---|
| GEODETIC DATUM: NAD83<br>ZONE: LOUISIANA SOUTH<br>GRID UNITS: US SURVEY FEET | | SCALE AS SHOWN | |
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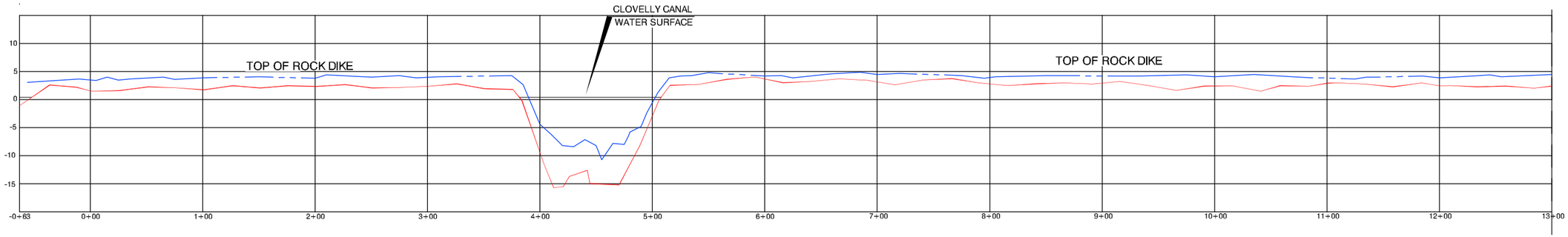
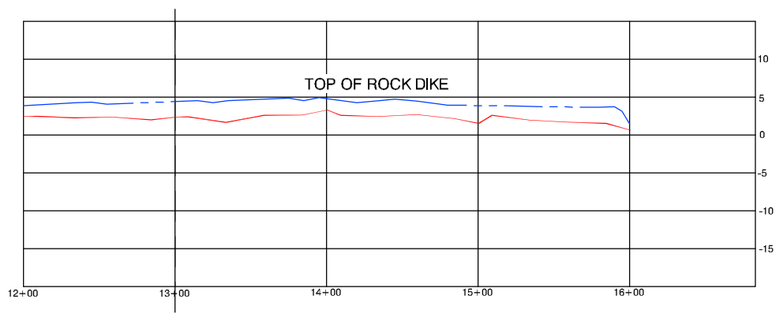



MATCHLINE




MATCHLINE

A'

# STRUCTURE 14A PROFILE

Horizontal Scale 1":100'
Vertical Scale 1":20'

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| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

JOHN CHANCE SURVEY 2008

AS-BUILT SURVEY

Proj. Mgr.: RMJ
Revised:
Printed: 2/6/09

Coastal Protection & Restoration
**Authority of Louisiana, OCPR**

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**STRUCTURE 14A**

LAFOURCHE PARISH, LOUISIANA

**JOHN CHANCE**
LAND SURVEYS, INC.

GEODETIC DATUM: NAD83
ZONE: LOUISIANA SOUTH
GRID UNITS: US SURVEY FEET

SCALE AS SHOWN

Job No.: 08-0513 | Date: 2/6/09 | Drwn: VIT | Chart: 2 Of: 5

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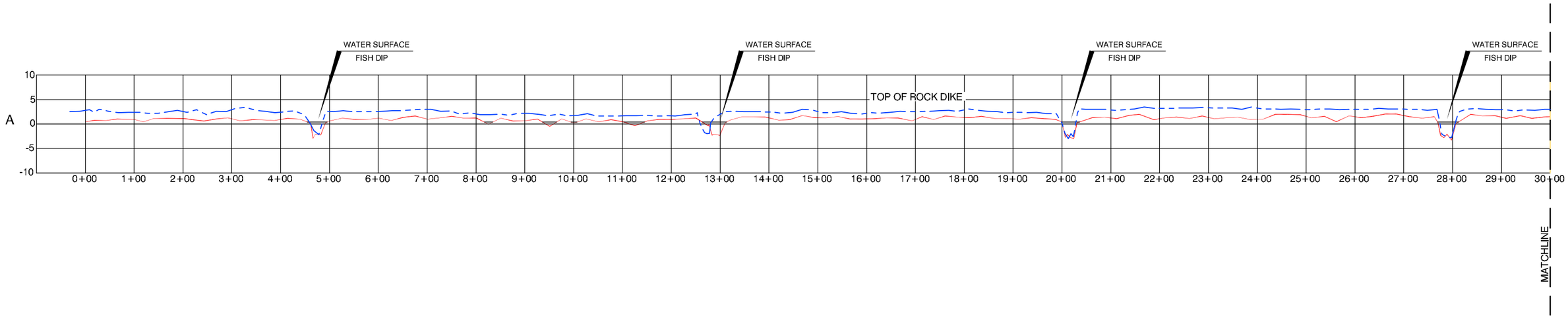
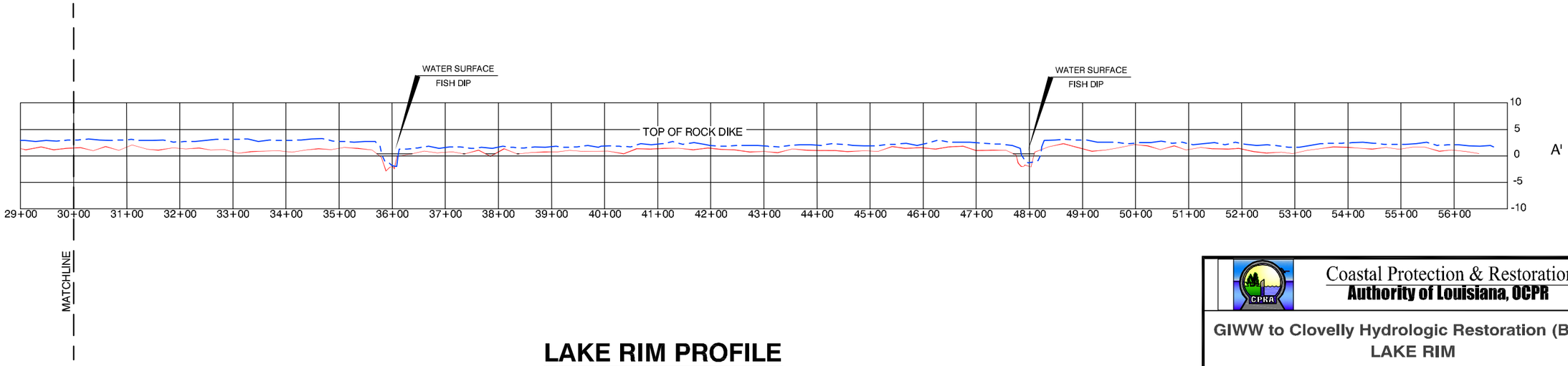



# LAKE RIM PROFILE

Horizontal Scale 1":200'
Vertical Scale 1":20'

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 3/5/2009 | ADDED CONSTRUCTION AS-BUILT PROFILE | SJT |

**LEGEND**

- JOHN CHANCE SURVEY 2008
- AS-BUILT SURVEY

Coastal Protection & Restoration
Authority of Louisiana, OCPR

**GIWW to Clovelly Hydrologic Restoration (BA-02)**
**LAKE RIM**

LAFOURCHE PARISH, LOUISIANA

JOHN CHANCE
LAND SURVEYS, INC.

GEODETIC DATUM: NAD83
ZONE: LOUISIANA SOUTH
GRID UNITS: US SURVEY FEET

SCALE AS SHOWN

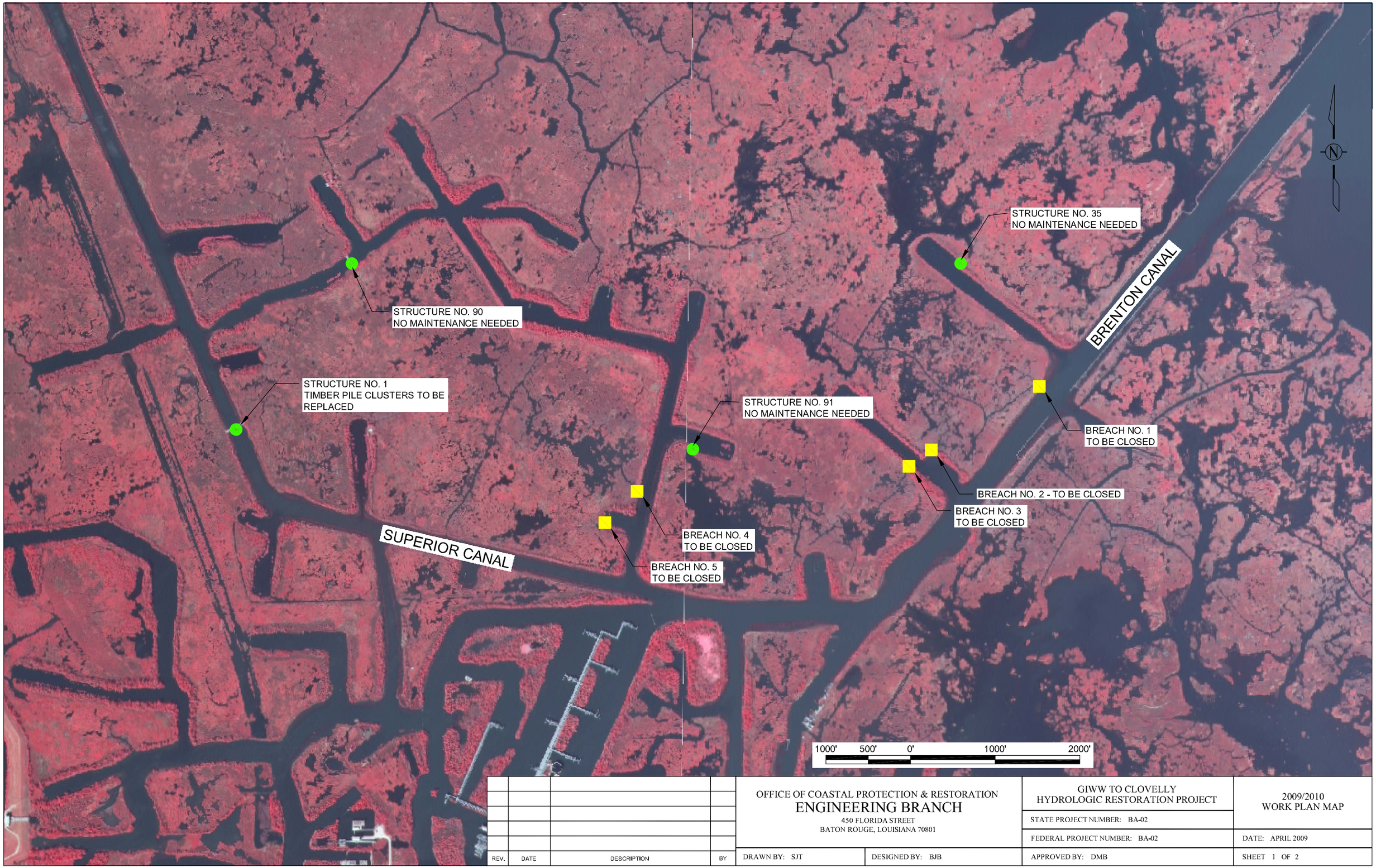
Job No.: 08-0513 | Date: 2/6/09 | Drwn: VIT | Chart: 2 Of: 4

Dwgfile: L:\2008\080513\CAD\C-SECTIONS_profiles

Proj. Mgr.: RMJ
Revised: 3/5/09
Printed: 2/6/09

# Appendix E

# 2009/ 2010 Maintenance Plan

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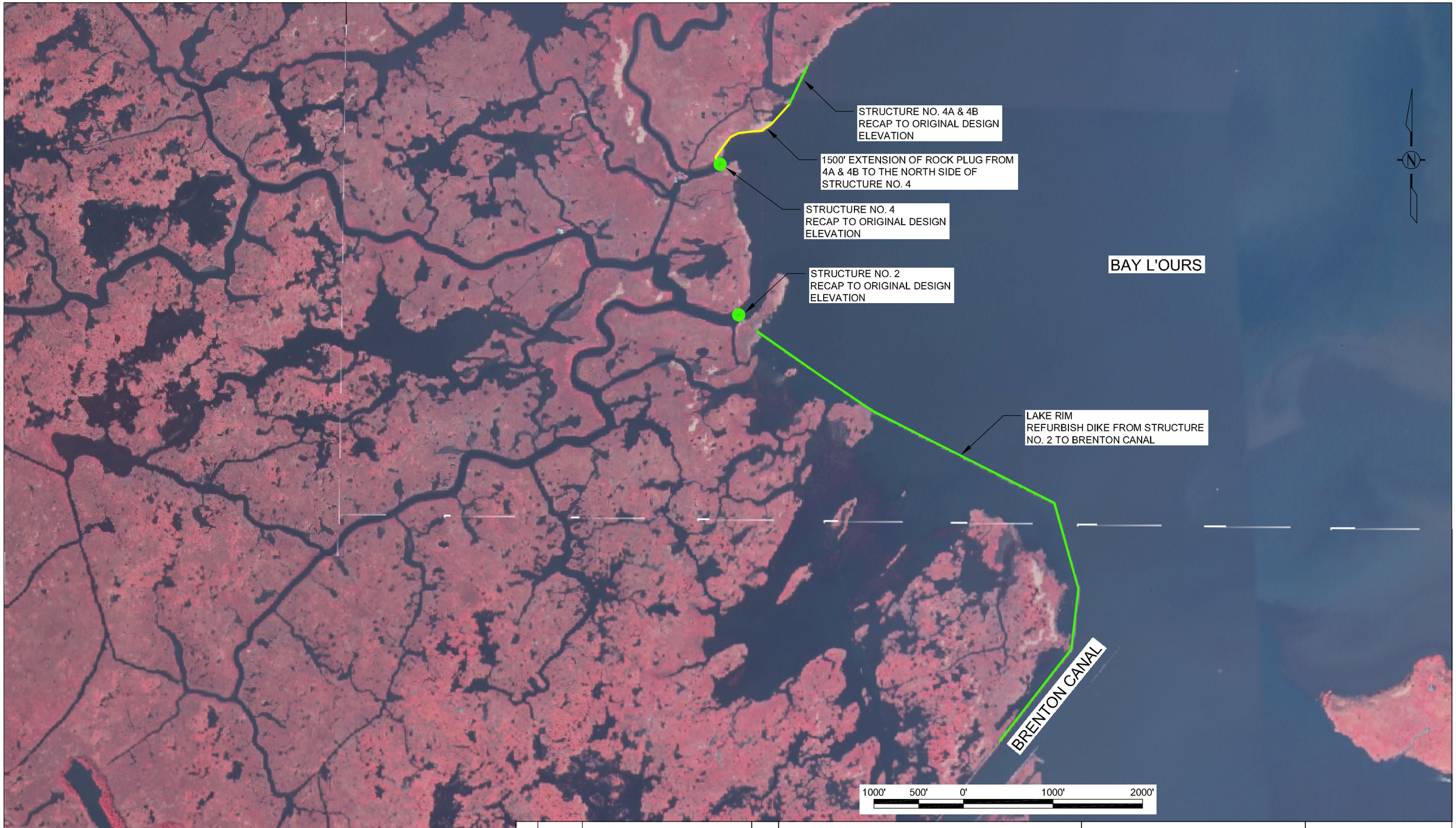
OFFICE OF COASTAL PROTECTION & RESTORATION
ENGINEERING BRANCH
450 FLORIDA STREET
BATON ROUGE, LOUISIANA 70801

GIWW TO CLOVELLY
HYDROLOGIC RESTORATION PROJECT

2009/2010
WORK PLAN MAP

| | | | |
|---|---|---|---|
| DRAWN BY: SJT | DESIGNED BY: BJB | STATE PROJECT NUMBER: BA-02 | |
| | | FEDERAL PROJECT NUMBER: BA-02 | DATE: APRIL 2009 |
| | | APPROVED BY: DMB | SHEET 1 OF 2 |

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GIWW TO CLOVELLY
HYDROLOGIC RESTORATION PROJECT

2009/2010
WORK PLAN MAP

| | | | |
|---|---|---|---|
| DRAWN BY: SJT | DESIGNED BY: BJB | STATE PROJECT NUMBER: BA-02 | |
| | | FEDERAL PROJECT NUMBER: BA-02 | DATE: APRIL 2009 |
| | | APPROVED BY: DMB | SHEET 2 OF 2 |