



**State of Louisiana  
Department of Natural Resources  
Coastal Restoration Division and  
Coastal Engineering Division**

**2005 Operations, Maintenance,  
and Monitoring Report**

for

**Boston Canal/ Vermilion Bay  
Shoreline Stabilization**

State Project Number TV-09  
Priority Project List 2

June 2005  
Vermilion Parish

Prepared by:

Christine Thibodeaux, Monitoring Section, Coastal  
Restoration Division (CRD)  
and  
Mel Guidry, Engineering Technician, Field Engineering  
Section, Coastal Engineering Division (CED)  
Louisiana Department of Natural Resources (LDNR)/Coastal  
Restoration and Management  
Lafayette Field Office  
635 Cajundome Boulevard  
Lafayette, LA 70506

**Suggested Citation:**

Thibodeaux, C. and M. Guidry 2005. *2005 Operations, Maintenance, and Monitoring Report for Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09)*, Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division, Lafayette, Louisiana.



2005 Operations, Maintenance, and Monitoring Report  
for  
Boston Canal/Vermilion Shoreline Stabilization (TV-09)

Table of Contents

|  |    |
|--|----|
| I. Introduction.....                                   | 1  |
| II. Maintenance Activity.....                          | 3  |
| a. Project Feature Inspection Procedures .....         | 3  |
| b. Inspection Results .....                            | 3  |
| c. Maintenance Recommendations .....                   | 4  |
| i. Immediate/Emergency Repairs.....                    | 4  |
| ii. Programmatic/Routine Repairs.....                  | 4  |
| d. Maintenance History.....                            | 4  |
| III. Operation Activity .....                          | 5  |
| a. Operation Plan.....                                 | 5  |
| b. Actual Operations .....                             | 5  |
| IV. Monitoring Activity .....                          | 6  |
| a. Monitoring Goals .....                              | 6  |
| b. Monitoring Elements .....                           | 6  |
| c. Preliminary Monitoring Results and Discussion ..... | 7  |
| V. Conclusions.....                                    | 18 |
| a. Project Effectiveness.....                          | 18 |
| b. Recommended Improvements .....                      | 18 |
| c. Lessons Learned.....                                | 18 |
| VI. References.....                                    | 22 |
| VII. Appendices  |    |
| a. Appendix A (Inspection Photographs)                 |    |
| b. Appendix B (Three-Year Budget Projection)           |    |
| c. Appendix C (Field Inspection Notes)                 |    |



## Preface

The Operations, Maintenance, and Monitoring (OM&M) Report format is a streamlined approach which combines the Operations and Maintenance annual project inspection information with the Monitoring of data and analyses on a project-specific basis. This report includes monitoring data collected through December 2004, and annual Maintenance Inspections through June 2005.

The 2005 report is the second in a series of reports. For additional information on lessons learned, recommendations, and project effectiveness, please refer to the 2004 Operations, Maintenance, and Monitoring Report on the Louisiana Department of Natural Resources (LDNR) web site at [dnr.louisiana.gov](http://dnr.louisiana.gov) (Thibodeaux and Guidry 2007).



## I. Introduction

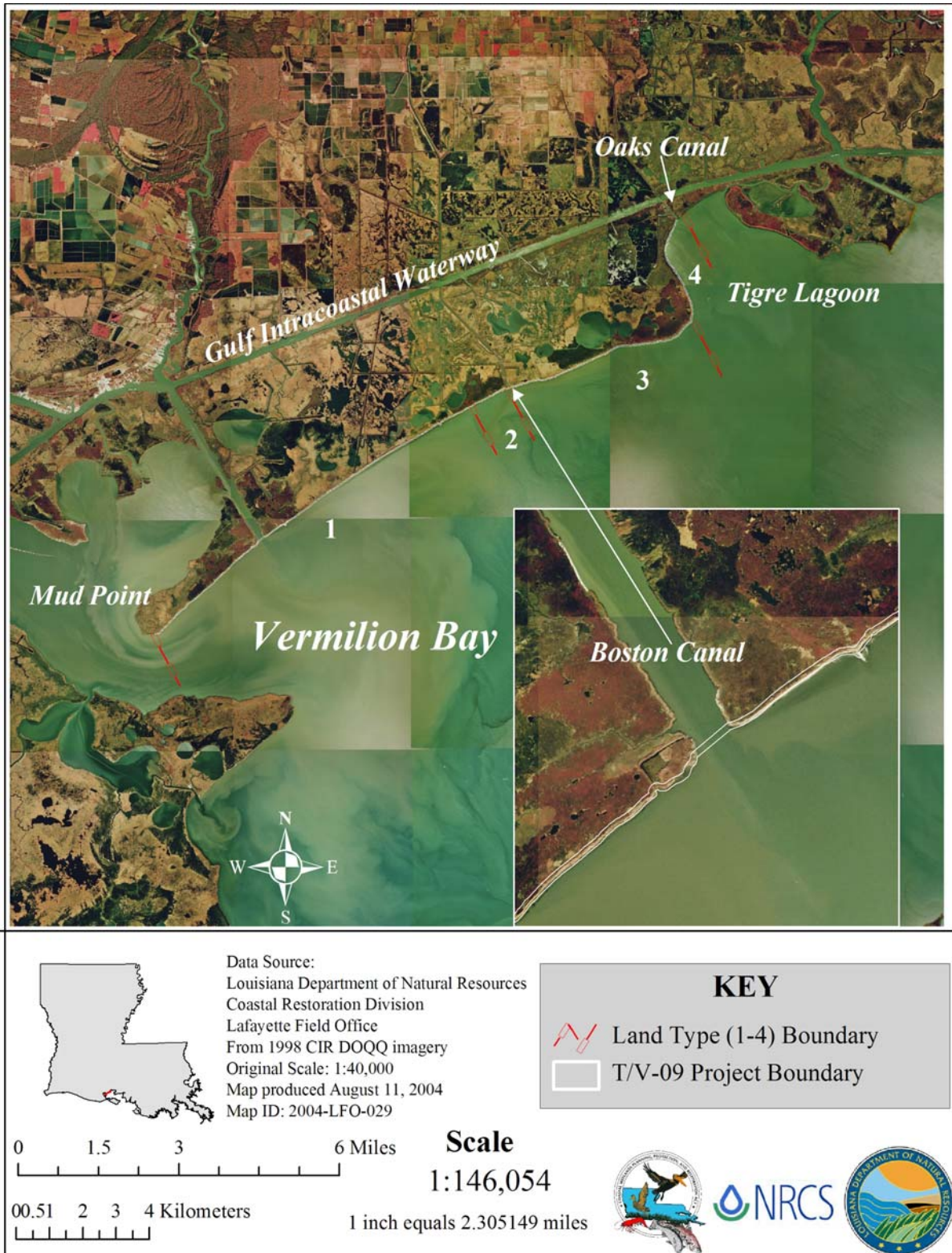
The Boston Canal/Vermilion Shoreline Stabilization project is located in the Teche-Vermilion Basin, which is included in Region 3 of the Coast 2050 Plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). Shoreline erosion is a major cause of land loss in this basin, and shoreline maintenance provides important protection to interior marshes. The project area consists of approximately 466 ac (186 ha) of brackish marsh and open water. It is located in Vermilion Parish, approximately 12 mi (19.3 km) south of Delcambre, Louisiana (figure 1). The project boundaries extend from Mud Point on the western end to Oaks Canal on the eastern end. The northern boundary is brackish marsh and the southern boundary is Vermilion Bay. *Spartina patens* (marshhay cordgrass) and *Schoenoplectus americanus* (chairmaker's bulrush) together make up 64% of the marsh vegetation. *Spartina cynosuroides* (big cordgrass) makes up 19% of the area and is typically found on elevated bayou banks. The interior open water areas contain submerged and floating aquatics which are confined to a narrow band along the pond edge due to the tidal influence.

The shoreline retreat from 1948 to 1972 for Vermilion Bay (Mud Point to Lake Cleodis) as estimated by the Louisiana Department of Transportation and Development was 2.6 ft/yr (0.8 m/yr). Shoreline change in Vermilion Bay in the vicinity of Four Mile Canal calculated by USGS in 2003 was 2.86 ft/yr (0.87 m/yr).

The project was designed to stabilize the Boston Canal and Vermilion Bay shorelines to prevent further regression of the shorelines into the adjacent marsh. Vegetation was planted along approximately 13.25 mi (21.3 km) of the Vermilion Bay north shoreline bounded on the west by Mud Point and on the east by Oaks Canal. The transplants, 34,090 trade-gallon pots of *Spartina alterniflora* (saltmarsh cordgrass), were planted parallel to the shoreline on 5-ft (1.5-m) centers in two rows west of Boston Canal and in three rows east of Boston Canal. Planting was completed in September 1995.

Rock dikes were constructed parallel to the banks of Boston Canal, extending into Vermilion Bay and then turning 90° to re-establish the shoreline. The structures are designed to prevent the banks at the mouth of the Boston Canal from widening into the adjacent marshes. Sediment fences were installed behind each rock dike to trap sediments during times of overwash. This increased sedimentation will subsequently encourage revegetation of the area behind the dikes. Construction was completed on September 1, 1995.





**Figure 1.** Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) project area, and land type boundaries.





## **II. Maintenance Activity**

### **a. Project Feature Inspection Procedures**

The purpose of the annual inspection of the Boston Canal/Vermilion Bay Shoreline Stabilization Project (TV-09) is to evaluate the constructed and planted project features and to identify any deficiencies. Information from the inspection will be used to prepare a report detailing the condition of project features and to recommend necessary corrective actions. Should it be determined that corrective actions are needed, LDNR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs. The annual inspection report also contains a summary of maintenance projects, if any, which were completed since construction of the project features, and an estimated projected budget for the upcoming three (3) years for operation, maintenance, and rehabilitation. Photographs taken as part of the inspection are presented in Appendix A. The 3-year projected operation and maintenance budget is shown in Appendix B.

An inspection of the Boston Canal/Vermilion Bay Shoreline Stabilization Project (TV-09) was held on January 5, 2005, under partly cloudy skies and mild temperatures. In attendance were Stan Aucoin, Dewey Billodeau, Herbert Juneau, and Patrick Landry of LDNR. The Natural Resources Conservation Service (NRCS) was represented by Brad Sticker. Parties met at the Lafayette Field Office of LDNR's Coastal Engineering Division (CED) and proceeded to the TV-09 project area. The annual inspection began at approximately 1:30 pm.

The field inspection included a complete visual inspection of the rock breakwaters and the vegetative plantings east of Boston Canal. Staff gauge readings were used to determine approximate elevations of water, rock weirs, earthen embankments, steel bulkhead structures, and other project features. Photographs were taken at each project feature (see Appendix A) and Field Inspection notes were completed in the field to record measurements and deficiencies (see Appendix C).

### **b. Inspection Results**

#### **Rock Breakwaters:**

For the most part, the breakwaters are in excellent post-construction condition. There is no apparent toe scour or rock displacement. The western end of the dike where it ties into the Vermilion Bay shoreline continues to worsen. A small gap left during original construction appears to have caused this problem. While the situation is similar on the southeast tie-in, it is not as severe. No gap was left on this end during construction. Recommendations made to repair these gaps during the O & M



inspection of June 2003 have been reconsidered due to the high unit costs and logistics associated with such minor repairs. These areas will be closely monitored, and should the situation significantly worsen, steps will be taken to close/stabilize these areas. Signage and associated pilings are stable and functioning. (Photos: Appendix A, Photos 5 - 6)

**Sediment Fencing:**

The sediment fencing has been removed.

**Smooth Cordgrass Plantings:**

Although the plants were not closely inspected on this trip, according to Christine Thibodeaux, TV-09 Monitoring Manager, “the high average percent survival of the *Spartina alterniflora* on the shoreline indicate that the plants have become established. The plants have become indistinguishable from one another and form a continuous vegetated layer along the shoreline.” Percent survival of *S. alterniflora* at 36 months post-planting averaged 90.6 % among all land types. Percent survival of *S. alterniflora* at 36 months post-planting in the high, medium, and low *P. australis* coverage was 12.5 %, 62.5 %, and 89.1 %, respectively. Percent cover of *S. alterniflora* at 36 months post-planting in high, medium, and low *P. australis* coverage was 5.6 %, 56.9 %, and 75.9 %, respectively.

**c. Maintenance Recommendations**

**i. Immediate/Emergency Repairs**

None

**ii. Programmatic/Routine Repairs**

None

**d. Maintenance History**

Below is a summary of completed maintenance projects and operation tasks performed since October 1995, the construction completion date of the Boston Canal/Vermilion Bay Shoreline Stabilization Project (TV-09).

**Maintenance Project – Loland Broussard:**

This maintenance project included the modification of the sediment trapping fences constructed behind the rock dikes by Loland Broussard of NRCS in concurrence with LDNR and at no cost to Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) on March 7, 2002. Modification of the fences involved cutting the geotextile panels from the top of the fence down to approx. 6 in.(15 cm) below the mud line (~ 30 in. [76 cm]) and removing the panel. The 4 x 4 wooden posts were not disturbed and left intact. The reinforcement wire behind each panel was severely deteriorated and virtually nonexistent. The southernmost fences were preventing





sediment from filling the entire area behind the dikes. Since the fences have been removed, sediment has been more evenly distributed. Vegetation continues to increase.

### **III. Operation Activity**

#### **a. Operation Plan**

There are no water control structures associated with this project, therefore no Structural Operation Plan is required.

#### **b. Actual Operations**

There are no water control structures associated with this project, therefore no Structural Operation Plan is required.



#### IV. Monitoring Activity

Pursuant to a CWPPRA Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the TV-09 Monitoring Plan to merge it with CRMS-*Wetlands* and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act.

##### a. Monitoring Goals

The objectives for the Boston Canal/Vermilion Bay Shoreline Stabilization Project (TV-09) are:

1. Protect approximately 466 ac (186 ha) of wetlands between Mud Point and Oaks Canal from physical erosion from Vermilion Bay through shoreline stabilization.
2. Stabilize 13.25 mi (21.3 km) of the Vermilion Bay shoreline and prevent further regression of the Boston Canal banks.

The following goals will contribute to the evaluation of the above projects:

1. Decrease the rate of shoreline erosion at the intersection of the Boston Canal and Vermilion Bay by armoring the corners of the canal with rock bulkheads.
2. Decrease the rate of shoreline erosion and maintain the integrity of approximately 466 ac (186 ha) of shoreline and interior marsh on the northern edge of Vermilion Bay by establishing *S. alterniflora* along the shoreline.

##### b. Monitoring Elements

###### Aerial Photography:

To document vegetated and non-vegetated areas, near vertical color-infrared aerial photography (1:24,000 scale with ground controls) was obtained in 1994 (pre-construction) and post-construction in 1997. The original photographs were checked for flight accuracy, color correctness, and clarity and were subsequently archived. Aerial photographs were scanned, mosaicked, and georectified by U.S. Geological Survey/National Wetlands Research Center (USGS/NWRC) personnel according to standard operating procedures (Steyer et al. 1995, revised 2000).

###### Vegetation:

The general condition of the vegetation plantings was documented using a generally accepted methodology similar to Mendelssohn and Hester (1988), Coastal Vegetation Project, Timbalier Island. Species composition and percent cover were monitored in 1.0-m<sup>2</sup> plots marked with one corner pole to allow revisiting the same plot over time.



The same corner pole was used to mark a plot of 16 plants to determine percent survival by counting live stems within each plot, dividing by the total number of plants, and multiplying by 100. Three percent of four groups of plantings were randomly sampled. The groups represent the variable topography of the shoreline. These criteria were documented at 6 months post-construction, and at years 1996 and 1999, when the original plants became indistinguishable. Herbivore damage was to be recorded if observed.

### **Shoreline Change:**

To document shoreline movement, continuous differential GPS was established at the mean high water line along the original shoreline adjacent to vegetative plantings in the project area. The reference shoreline site located east of Avery Canal was subsequently found to have been planted by the landowner prior to the project plantings. The vegetative plantings effectively made the reference shoreline similar to the project shoreline and therefore not a valid reference. Only project area shoreline data are presented here. The shoreline was mapped in post-construction years 1998, 2001, and 2004. Future surveys are scheduled for 2008 and 2013 to provide a template for mapping shoreline position and shoreline changes over time. In future reports, shoreline positions will be compared to historical datasets available in digitized format for 1956, 1978, and 1988 shorelines.

## **c. Preliminary Monitoring Results and Discussion**

### **Aerial Photography:**

Land/water analysis of the project area indicated an increase of 57.4 ac (23.2 ha) from 1994 to 1997 (figures 2-4). Some of the land gain is in the interior part of the project area, unrelated to project features; however the plantings on the bay shoreline indicated effective protection and sediment trapping (figure 2), and there were gains in the areas behind the rock dikes (figure 3). Also, there were no breaches in the shoreline indicating that the interior marsh has remained protected from potential bay wave erosion.

### **Vegetation:**

Percent survival of *S. alterniflora* at the 36-month post-planting averaged 90.6 % among all land types. Percent survival of *S. alterniflora* at the 36-month post-planting in the high, medium, and low *P. australis* coverage was 12.5 %, 62.5 %, and 89.1 %, respectively. Percent cover of *S. alterniflora* at the 36-month post-planting in high, medium, and low *P. australis* coverage was 5.6 %, 56.9 %, and 75.9 %, respectively. The high average percent survival and percent cover of the *S. alterniflora* on the shoreline indicate that the plants have become established. However, the data indicate that survivorship and percent cover of *S. alterniflora* were lessened in established stands of *P. australis*. Data collection on vegetation is complete as per the 1999 vegetation survey because individual plants in the plots were indistinguishable (figures

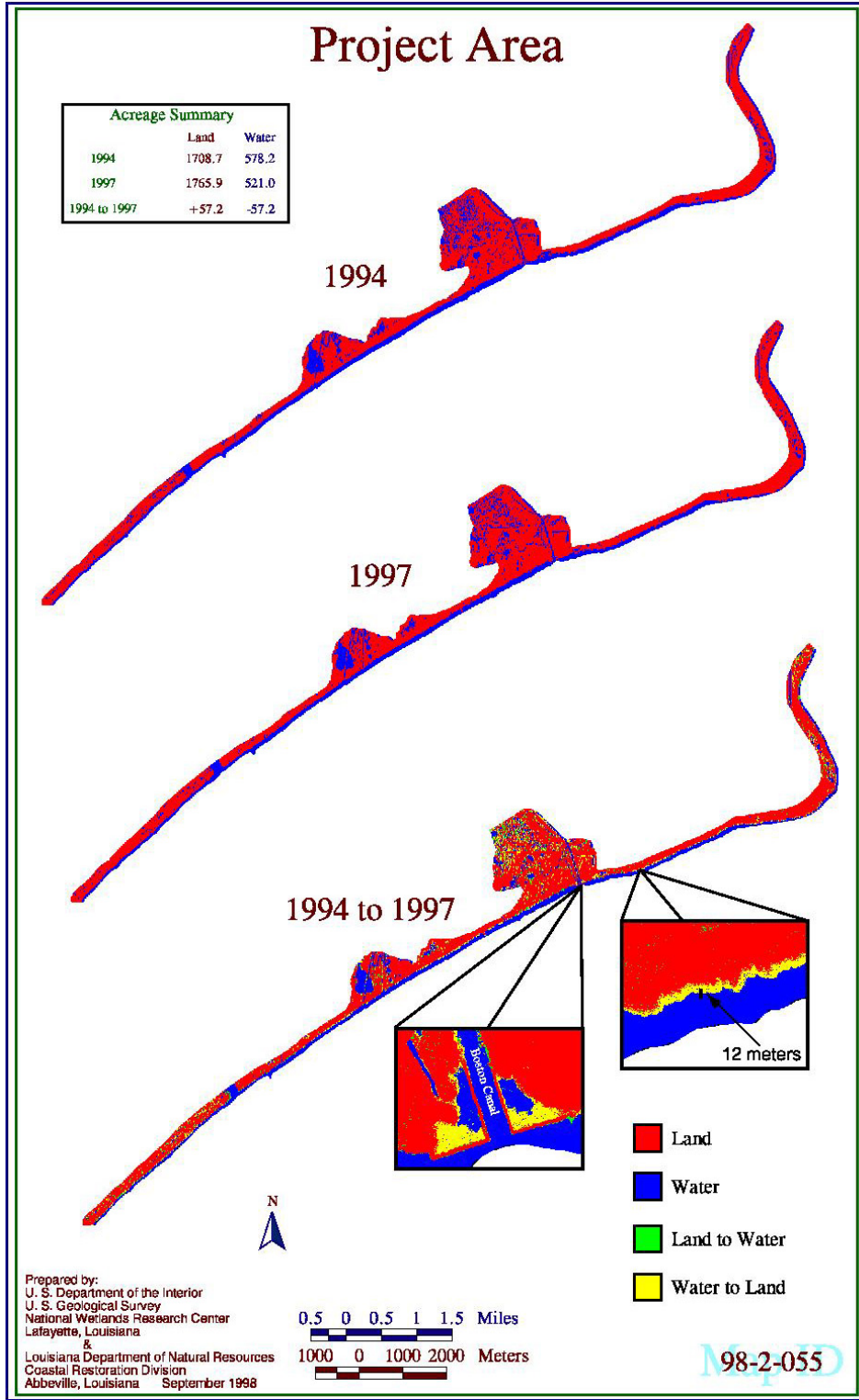


4-6). During the 2004 shoreline mapping the vegetation along some of the shoreline was photographed and appeared to be in good condition (figure 7).

**Shoreline Change:**

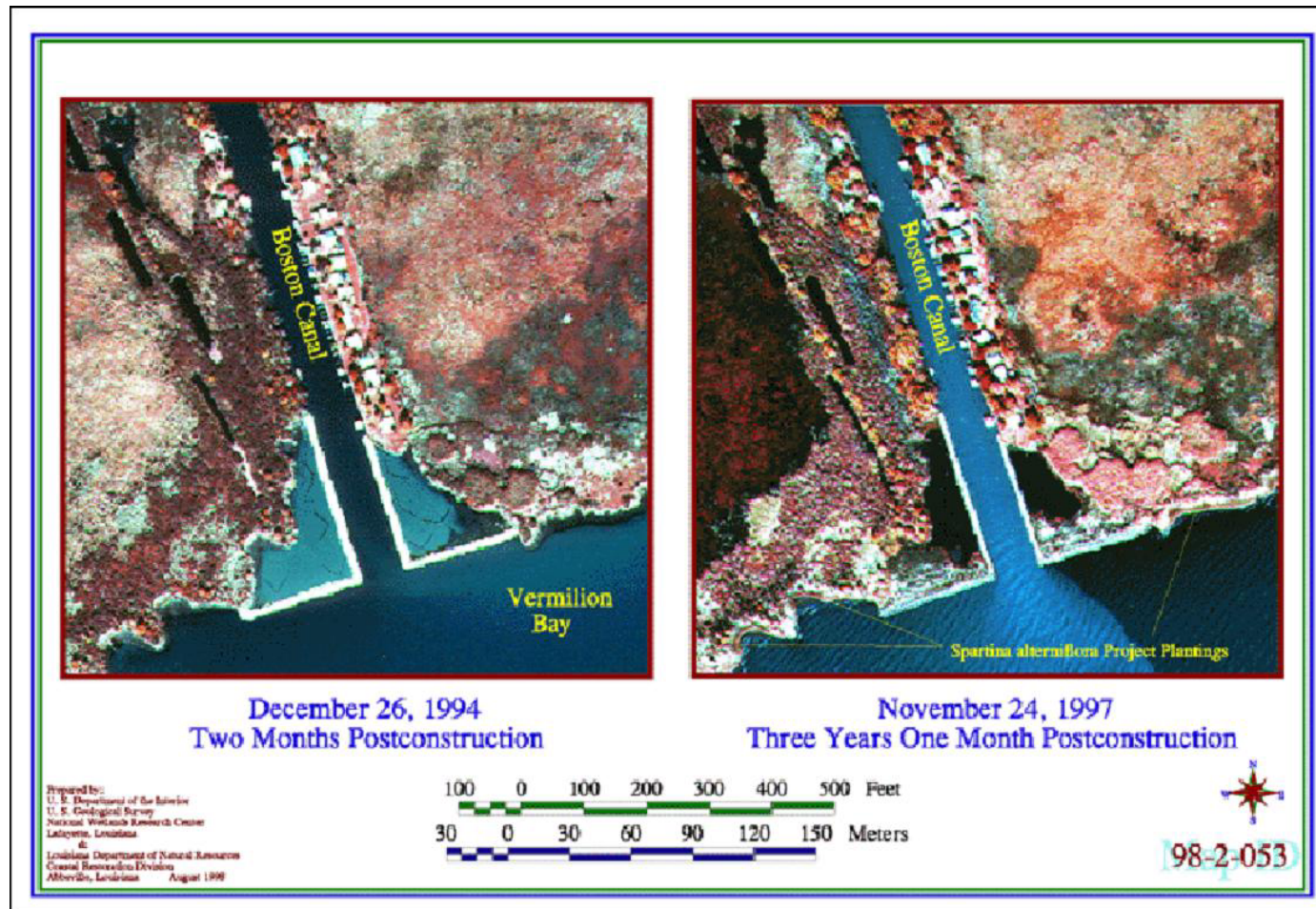
A comparison of DGPS mapping of the 13.25-mi (21.3-km) project shoreline in 1998 and 2001 indicated total losses of 6.4 ac (2.6 ha) and total gains of 13.46 ac (5.45 ha) for a net gain of 7.06 ac (3.1 ha) (figure 8). Between 2001 and 2004, total shoreline losses were 22.68 ac (9.18 ha) and total gains were 0.8 ac (0.3 ha) for a net loss of 21.88 ac (8.85 ha) (figure 9). Hurricane Lili, which passed over the area in 2002, likely accounted for much of the loss through wave-induced erosion. Although not mapped in this effort, the shoreline areas behind the rock dikes were completely protected and have accumulated sediment (figure 10). The reference area originally chosen for the project was later determined to be invalid when it was discovered that the landowner had installed a series of vegetative plantings beginning prior to the completion of the Boston Canal project.





**Figure 2.** Boston Canal/Vermilion Bay Shoreline Stabilization (T/V-09) GIS land/water analysis of project area.

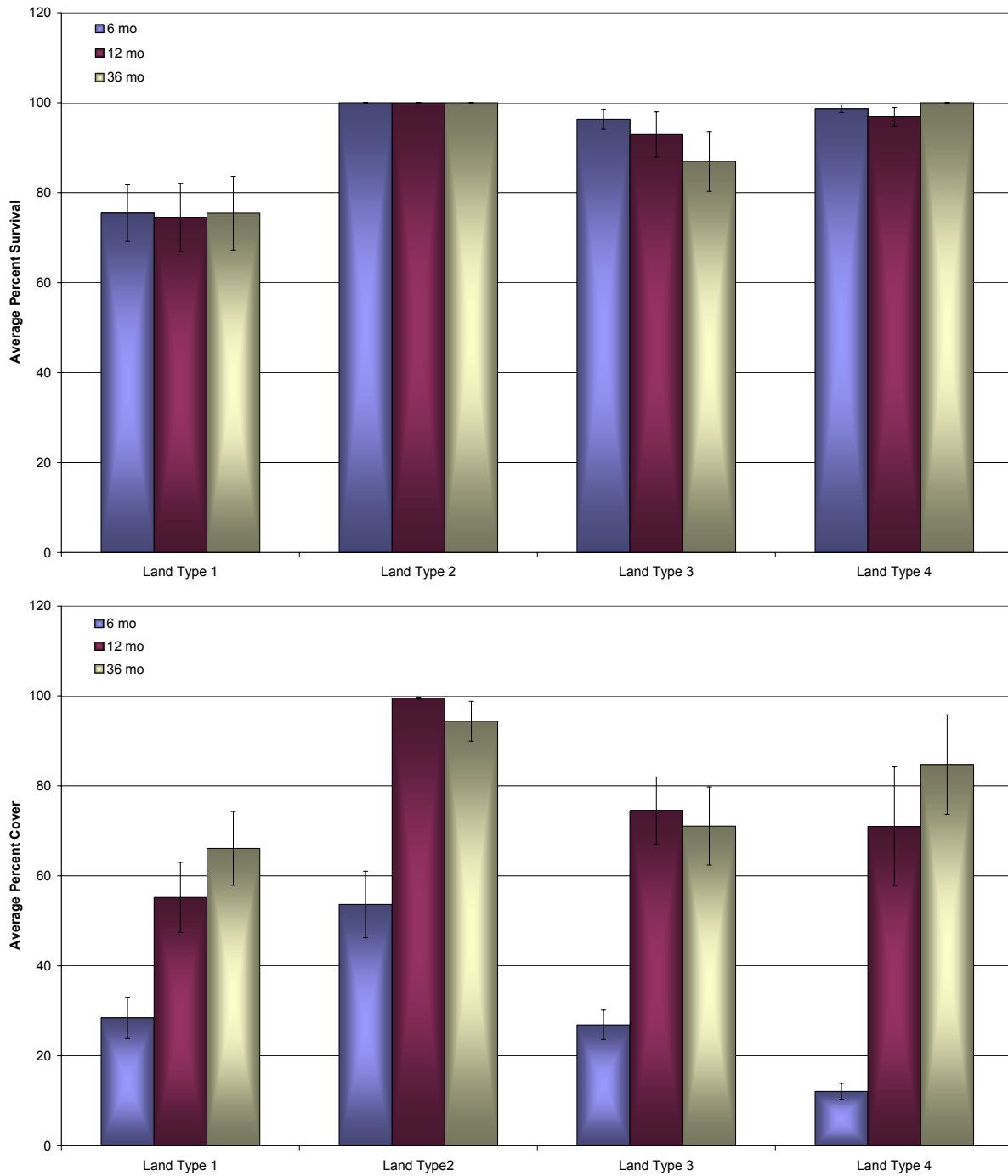




**Figure 3.** Aerial photography comparison of Boston Canal Shoreline Stabilization (TV-09) project at two months post-construction (December 26, 1994) and three years, one month post-construction (November 24, 1997).

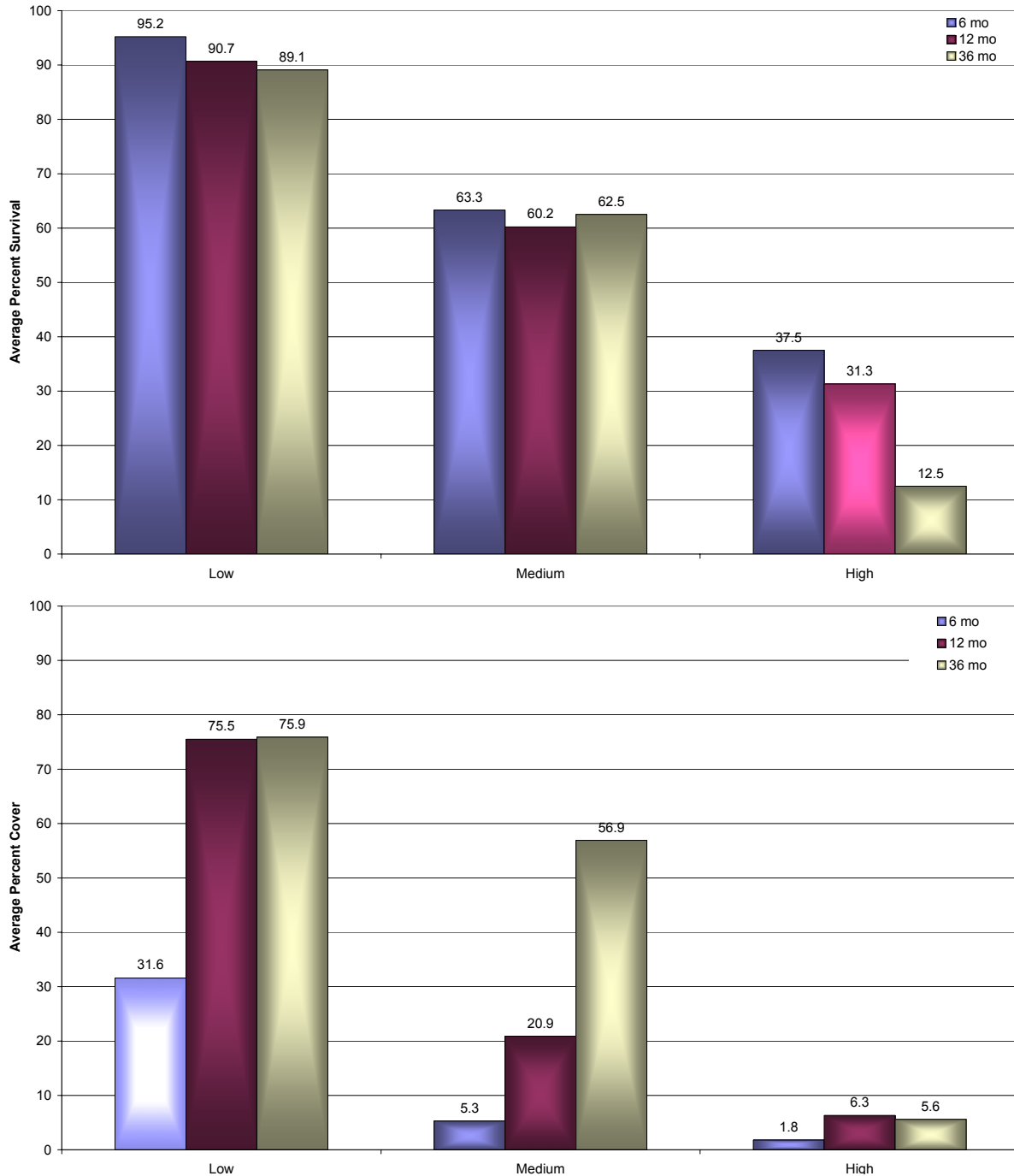






**Figure 4.** Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) average percent survival (upper) and average percent cover (lower) of *Spartina alterniflora* plantings in land types 1-4 observed at 6, 12, and 36 months post-planting, 1995, 1996, and 1999 means  $\pm$  SE.





**Figure 5.** Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) average percent survival (upper) and average percent cover (lower) of *Spartina alterniflora* plantings at 6, 12, and 36 months post-planting in low, medium, and high levels of *Phragmites australis* coverage.



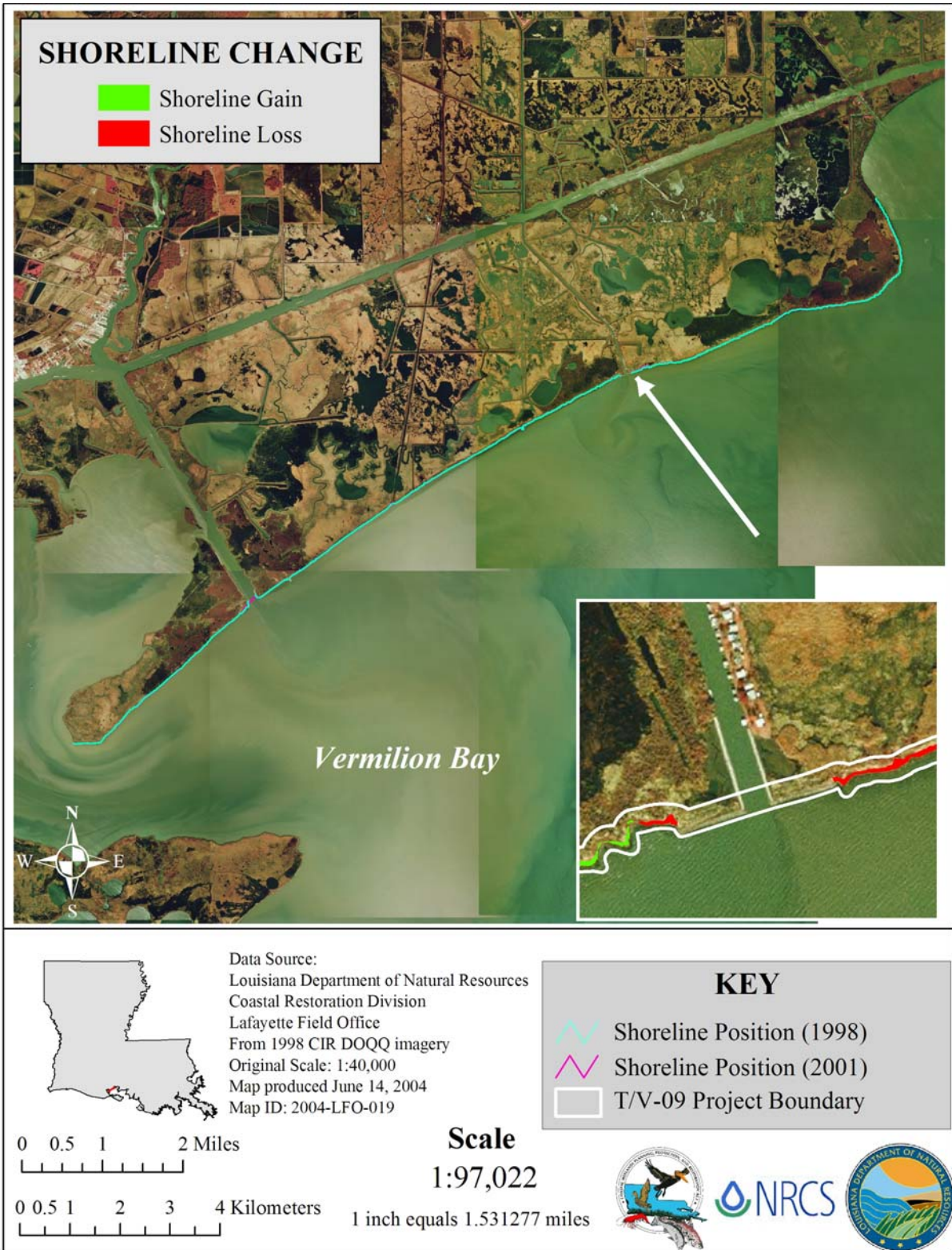


**Figure 6.** *Spartina alterniflora* planting at 6 (upper), 12 (center), and 36 (lower) months post-planting monitoring.



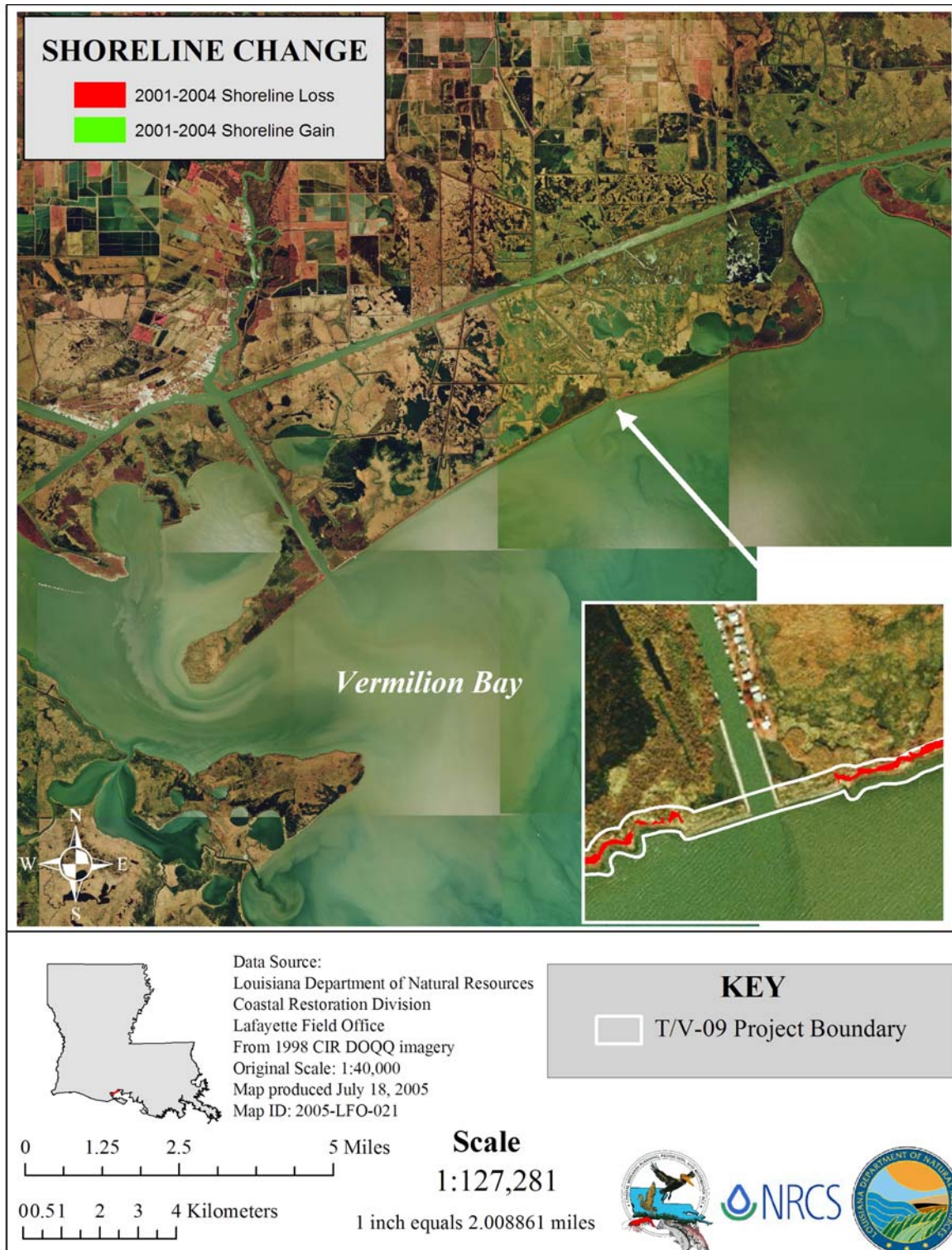
**Figure 7.** Boston Canal/Vermilion Bay Shoreline Stabilization Project GPS shoreline survey September 29, 2004. The wooden post in the lower photo indicates erosion behind the vegetation planting at this monitoring station.





**Figure 8.** Shoreline position change for Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) project using 1998 and 2001 differential global positioning system mapping data.





**Figure 9.** Shoreline position change for Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) project using 2001 and 2004 differential global positioning system mapping data.





**Figure 10.** Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) rock dike and sediment fences at the mouth of Boston Canal (January 2001).

## V. Conclusions

### a. Project Effectiveness

The project is experiencing erosion along the Vermilion Bay shoreline despite the success of the plantings. Between 2001 and 2004, 7.6 ac/yr (3.08 ha/yr) were lost while 0.27 ac/yr (0.11 ha/yr) were gained, based on GPS of the shoreline. The shoreline erosion rate between 2001 and 2004 is 5.04 ft/yr (1.54 m/yr). Hurricane Lili struck the Louisiana coast east of Vermilion Bay near Cote Blanche in October 2002. Considering that the monitoring results from the first monitoring interval showed accretion occurred along some section of shoreline and a net gain in acreage was achieved, it is highly probable that the wave energy from the storm produced the erosion and resulting net loss. Although the plantings of *S. alterniflora* have become well established and are indistinguishable from each other along most of the shoreline, the plantings cannot protect shorelines from hurricane-force wave energy.

Sediment build-up behind the dike on the east and west sides is continuing and vegetation has taken over the exposed mud flats (figures 11-13). Elevation data show an increase in sedimentation behind the rock breakwater.

### b. Recommended Improvements

Installation of a staff gage in the vicinity is recommended.

Any significant gaps in the vegetative plantings along the shoreline should be monitored. LDNR will coordinate with NRCS for consensus on any proposed replanting.

### c. Lessons Learned

Survivorship and percent cover of *S. alterniflora* were lessened in established stands of *P. australis*. Planting *S. alterniflora* in dense stands of *P. australis* should be avoided. Sediment fences inhibited even distribution of sediment behind the rock breakwaters. In March 2002, wire on the sediment fences was removed by NRCS personnel to allow the sediment to be more evenly distributed into the open water areas behind the fences closest to the shore (see figure 12). The use of sediment fences may not be necessary behind rock breakwaters.





**Figure 11.** Boston Canal/Vermilion Bay Shoreline Stabilization (TV-09) photographs: (Upper) sedimentation behind the dike December 1994; (Lower) vegetation growing behind the dike in February 1998.





**Figure 12.** Boston Canal/Vermilion Bay Shoreline Stabilization (T/V-09) photographs: (Upper) vegetation behind the dike (July 1999); (Lower) vegetation behind the dike in October 2001.



Figure 13. Boston Canal/Vermilion Bay Shoreline Stabilization Project (TV-09) behind the eastern rock dike, November 9, 2004.

## VI. REFERENCES

- Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1998. Coast 2050: Toward a sustainable coastal Louisiana. Baton Rouge, La.: Louisiana Department of Natural Resources. 161 pp.
- Mendelssohn, I. A. and M. W. Hester 1988. Coastal vegetation project: Timbalier Island. Final report submitted to Texaco, USA, New Orleans Division, New Orleans, La. Agreement No. RC-84-01.244 pp.
- Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995, revised 2000. Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open-file report no. 95-01. Baton Rouge, La. Louisiana Department of Natural Resources Coastal Restoration Division. 97 pp., plus appendices.
- Thibodeaux, C. and M. Guidry 2007. 2004 Operations, Maintenance and Monitoring Report for Boston Canal Shoreline Protection Project (TV-09). Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division. 31 pp.





**Appendix A**  
**(Inspection Photographs)**



Photo 1—Southwest tie-in





Photo 2—Southeast tie in



Photo 3—Mouth of Boston Canal showing signage





Photo 4—East side of Boston Canal showing vegetation behind dike



Photo 5- Vegetation along bayshore



Photo 6 – Vegetation along bayshore

**Appendix B  
(Three-Year Budget Projection)  
BOSTON CANAL / TV09 / PPL2**

**Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08**

|                 |               |                 |             |
|-----------------|---------------|-----------------|-------------|
| Project Manager | O & M Manager | Federal Sponsor | Prepared By |
|                 |               | NRCS            |             |

|                               | 2005/2006   | 2006/2007   | 2007/2008   |
|-------------------------------|-------------|-------------|-------------|
| <b>Maintenance Inspection</b> | \$ 4,955.00 | \$ 5,119.00 | \$ 5,288.00 |
| <b>Structure Operation</b>    | \$ -        | \$ -        | \$ -        |
| <b>Administration</b>         | \$ -        | \$ -        | \$ -        |

**Maintenance/Rehabilitation**

05/06 Description: Staff Gage installation

|                                      |                    |
|--------------------------------------|--------------------|
| E&D                                  | \$ -               |
| Construction                         | \$ 5,000.00        |
| Construction Oversight               | \$ -               |
| <i>Sub Total - Maint. And Rehab.</i> | <u>\$ 5,000.00</u> |

06/07 Description:

|                                      |             |
|--------------------------------------|-------------|
| E&D                                  |             |
| Construction                         |             |
| Construction Oversight               |             |
| <i>Sub Total - Maint. And Rehab.</i> | <u>\$ -</u> |

07/08 Description:

|                                      |             |
|--------------------------------------|-------------|
| E&D                                  | \$ -        |
| Construction                         | \$ -        |
| Construction Oversight               | \$ -        |
| <i>Sub Total - Maint. And Rehab.</i> | <u>\$ -</u> |

|                              | 2005/2006          | 2006/2007          | 2007/2008          |
|------------------------------|--------------------|--------------------|--------------------|
| <b>Total O&amp;M Budgets</b> | <u>\$ 9,955.00</u> | <u>\$ 5,119.00</u> | <u>\$ 5,288.00</u> |



**OPERATION AND MAINTENANCE BUDGET 07/01/2005-06/30/2006**  
**BOSTON CANAL/TV-09/PPL2**

| DESCRIPTION                   | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|-------------------------------|------|-----------|------------|-----------------|
| O&M Inspection and Report     | EACH | 1         | \$4,955.00 | \$4,955.00      |
| General Structure Maintenance | LUMP | 1         | \$0.00     | \$0.00          |
| Engineering and Design        | LUMP | 1         | \$0.00     | \$0.00          |
| Operations Contract           | LUMP | 1         | \$0.00     | \$0.00          |
| Construction Oversight        | LUMP | 1         | \$0.00     | \$0.00          |

**ADMINISTRATION**

|                                    |      |   |            |               |
|------------------------------------|------|---|------------|---------------|
| LDNR / CRD Admin.                  | LUMP | 0 | \$0.00     | \$0.00        |
| FEDERAL SPONSER Admin.             | LUMP | 0 | \$0.00     | \$0.00        |
| SURVEY Admin.                      | LUMP | 0 | \$2,000.00 | \$0.00        |
| OTHER                              |      |   |            | \$0.00        |
| <b>TOTAL ADMINISTRATION COSTS:</b> |      |   |            | <b>\$0.00</b> |

**MAINTENANCE / CONSTRUCTION**

**SURVEY**

| SURVEY DESCRIPTION:        | DESCRIPTION                  | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL   |
|----------------------------|------------------------------|------|-----------|------------|-------------------|
|                            | Secondary Monument           | EACH | 0         | \$0.00     | \$0.00            |
|                            | Staff Gauge / Recorders      | EACH | 1         | \$5,000.00 | \$5,000.00        |
|                            | Marsh Elevation / Topography | LUMP | 0         | \$0.00     | \$0.00            |
|                            | TBM Installation             | EACH | 0         | \$0.00     | \$0.00            |
|                            | OTHER                        |      |           |            | \$0.00            |
| <b>TOTAL SURVEY COSTS:</b> |                              |      |           |            | <b>\$5,000.00</b> |

**GEOTECHNICAL**

| GEOTECH DESCRIPTION:             | DESCRIPTION | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|----------------------------------|-------------|------|-----------|------------|-----------------|
|                                  | Borings     | EACH | 0         | \$0.00     | \$0.00          |
|                                  | OTHER       |      |           |            | \$0.00          |
| <b>TOTAL GEOTECHNICAL COSTS:</b> |             |      |           |            | <b>\$0.00</b>   |

**CONSTRUCTION**

| CONSTRUCTION DESCRIPTION:        | DESCRIPTION                       | UNIT     | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|----------------------------------|-----------------------------------|----------|-----------|------------|-----------------|
|                                  | Rip Rap                           | LIN FT   | 0         | \$0.00     | \$0.00          |
|                                  |                                   | TON / FT | 0.0       | \$0.00     | \$0.00          |
|                                  |                                   | TONS     | 0         | \$0.00     | \$0.00          |
|                                  |                                   |          | 0         | \$0.00     | \$0.00          |
|                                  | Filter Cloth / Geogrid Fabric     | SQ YD    | 0         | \$0.00     | \$0.00          |
|                                  | Navigation Aid                    | EACH     | 0         | \$0.00     | \$0.00          |
|                                  | Signage                           | EACH     | 0         | \$0.00     | \$0.00          |
|                                  | General Excavation / Fill         | CU YD    | 0         | \$0.00     | \$0.00          |
|                                  | Dredging                          | CU YD    | 0         | \$0.00     | \$0.00          |
|                                  | Sheet Piles (Lin Ft or Sq Yds)    |          | 0         | \$0.00     | \$0.00          |
|                                  | Timber Piles (each or lump sum)   |          | 0         | \$0.00     | \$0.00          |
|                                  | Timber Members (each or lump sum) |          | 0         | \$0.00     | \$0.00          |
|                                  | Hardware                          | LUMP     | 1         | \$0.00     | \$0.00          |
|                                  | Materials                         | LUMP     | 1         | \$0.00     | \$0.00          |
|                                  | Mob / Demob                       | LUMP     | 1         | \$0.00     | \$0.00          |
|                                  | Contingency                       | LUMP     | 1         | \$0.00     | \$0.00          |
|                                  | General Structure Maintenance     | LUMP     | 1         | \$0.00     | \$0.00          |
|                                  | OTHER                             |          |           | \$0.00     | \$0.00          |
|                                  | OTHER                             |          |           | \$0.00     | \$0.00          |
|                                  | OTHER                             |          |           | \$0.00     | \$0.00          |
| <b>TOTAL CONSTRUCTION COSTS:</b> |                                   |          |           |            | <b>\$0.00</b>   |

**TOTAL OPERATIONS AND MAINTENANCE BUDGET: \$9,955.00**





**OPERATION AND MAINTENANCE BUDGET 07/01/2006-06/30/2007**  
**BOSTON CANAL/TV-09/PPL2**

| DESCRIPTION                   | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|-------------------------------|------|-----------|------------|-----------------|
| O&M Inspection and Report     | EACH | 1         | \$5,119.00 | \$5,119.00      |
| General Structure Maintenance | LUMP | 1         | \$0.00     | \$0.00          |
| Engineering and Design        | LUMP | 1         | \$0.00     | \$0.00          |
| Operations Contract           | LUMP | 1         | \$0.00     | \$0.00          |
| Construction Oversight        | LUMP | 1         | \$0.00     | \$0.00          |

**ADMINISTRATION**

|                                    |      |   |        |               |
|------------------------------------|------|---|--------|---------------|
| LDNR / CRD Admin.                  | LUMP | 0 | \$0.00 | \$0.00        |
| FEDERAL SPONSER Admin.             | LUMP | 0 | \$0.00 | \$0.00        |
| SURVEY Admin.                      | LUMP | 0 | \$0.00 | \$0.00        |
| OTHER                              |      |   |        | \$0.00        |
| <b>TOTAL ADMINISTRATION COSTS:</b> |      |   |        | <b>\$0.00</b> |

**MAINTENANCE / CONSTRUCTION**

**SURVEY**

| SURVEY DESCRIPTION:        | DESCRIPTION                  | UNIT | EST. QTY. | UNIT PRICE    | ESTIMATED TOTAL |
|----------------------------|------------------------------|------|-----------|---------------|-----------------|
|                            | Secondary Monument           | EACH | 0         | \$0.00        | \$0.00          |
|                            | Staff Gauge / Recorders      | EACH | 0         | \$0.00        | \$0.00          |
|                            | Marsh Elevation / Topography | LUMP | 0         | \$0.00        | \$0.00          |
|                            | TBM Installation             | EACH | 0         | \$0.00        | \$0.00          |
|                            | OTHER                        |      |           |               | \$0.00          |
| <b>TOTAL SURVEY COSTS:</b> |                              |      |           | <b>\$0.00</b> |                 |

**GEOTECHNICAL**

| GEOTECH DESCRIPTION:             | DESCRIPTION | UNIT | EST. QTY. | UNIT PRICE    | ESTIMATED TOTAL |
|----------------------------------|-------------|------|-----------|---------------|-----------------|
|                                  | Borings     | EACH | 0         | \$0.00        | \$0.00          |
|                                  | OTHER       |      |           |               | \$0.00          |
| <b>TOTAL GEOTECHNICAL COSTS:</b> |             |      |           | <b>\$0.00</b> |                 |

**CONSTRUCTION**

| CONSTRUCTION DESCRIPTION:        | DESCRIPTION                       | UNIT     | EST. QTY. | UNIT PRICE    | ESTIMATED TOTAL |
|----------------------------------|-----------------------------------|----------|-----------|---------------|-----------------|
|                                  | Rip Rap                           | LIN FT   | 0         | \$0.00        | \$0.00          |
|                                  |                                   | TON / FT | 0.0       | \$0.00        | \$0.00          |
|                                  |                                   | TONS     | 0         | \$0.00        | \$0.00          |
|                                  |                                   |          | 0         | \$0.00        | \$0.00          |
|                                  | Filter Cloth / Geogrid Fabric     | SQ YD    | 0         | \$0.00        | \$0.00          |
|                                  | Navigation Aid                    | EACH     | 0         | \$0.00        | \$0.00          |
|                                  | Signage                           | EACH     | 0         | \$0.00        | \$0.00          |
|                                  | General Excavation / Fill         | CU YD    | 0         | \$0.00        | \$0.00          |
|                                  | Dredging                          | CU YD    | 0         | \$0.00        | \$0.00          |
|                                  | Sheet Piles (Lin Ft or Sq Yds)    |          | 0         | \$0.00        | \$0.00          |
|                                  | Timber Piles (each or lump sum)   |          | 0         | \$0.00        | \$0.00          |
|                                  | Timber Members (each or lump sum) |          | 0         | \$0.00        | \$0.00          |
|                                  | Hardware                          | LUMP     | 1         | \$0.00        | \$0.00          |
|                                  | Materials                         | LUMP     | 1         | \$0.00        | \$0.00          |
|                                  | Mob / Demob                       | LUMP     | 1         | \$0.00        | \$0.00          |
|                                  | Contingency                       | LUMP     | 1         | \$0.00        | \$0.00          |
|                                  | General Structure Maintenance     | LUMP     | 1         | \$0.00        | \$0.00          |
|                                  | OTHER                             |          |           |               | \$0.00          |
|                                  | OTHER                             |          |           |               | \$0.00          |
|                                  | OTHER                             |          |           |               | \$0.00          |
| <b>TOTAL CONSTRUCTION COSTS:</b> |                                   |          |           | <b>\$0.00</b> |                 |

**TOTAL OPERATIONS AND MAINTENANCE BUDGET: \$5,119.00**



**OPERATION AND MAINTENANCE BUDGET 07/01/2007-06/30/2008**  
**BOSTON CANAL/TV-09/PPL2**

| DESCRIPTION                   | UNIT | EST. QTY. | UNIT PRICE | ESTIMATED TOTAL |
|-------------------------------|------|-----------|------------|-----------------|
| O&M Inspection and Report     | EACH | 1         | \$5,288.00 | \$5,288.00      |
| General Structure Maintenance | LUMP | 1         | \$0.00     | \$0.00          |
| Engineering and Design        | LUMP | 1         | \$0.00     | \$0.00          |
| Operations Contract           | LUMP | 1         | \$0.00     | \$0.00          |
| Construction Oversight        | LUMP | 1         | \$0.00     | \$0.00          |

**ADMINISTRATION**

|                                    |      |   |        |               |
|------------------------------------|------|---|--------|---------------|
| LDNR / CRD Admin.                  | LUMP | 1 | \$0.00 | \$0.00        |
| FEDERAL SPONSER Admin.             | LUMP | 1 | \$0.00 | \$0.00        |
| SURVEY Admin.                      | LUMP | 1 | \$0.00 | \$0.00        |
| OTHER                              |      |   |        | \$0.00        |
| <b>TOTAL ADMINISTRATION COSTS:</b> |      |   |        | <b>\$0.00</b> |

**MAINTENANCE / CONSTRUCTION**

**SURVEY**

| SURVEY DESCRIPTION:          |      |   |        |               |  |
|------------------------------|------|---|--------|---------------|--|
| Secondary Monument           | EACH | 0 | \$0.00 | \$0.00        |  |
| Staff Gauge / Recorders      | EACH | 0 | \$0.00 | \$0.00        |  |
| Marsh Elevation / Topography | LUMP | 0 | \$0.00 | \$0.00        |  |
| TBM Installation             | EACH | 0 | \$0.00 | \$0.00        |  |
| OTHER                        |      |   |        | \$0.00        |  |
| <b>TOTAL SURVEY COSTS:</b>   |      |   |        | <b>\$0.00</b> |  |

**GEOTECHNICAL**

| GEOTECH DESCRIPTION:             |      |   |        |               |  |
|----------------------------------|------|---|--------|---------------|--|
| Borings                          | EACH | 0 | \$0.00 | \$0.00        |  |
| OTHER                            |      |   |        | \$0.00        |  |
| <b>TOTAL GEOTECHNICAL COSTS:</b> |      |   |        | <b>\$0.00</b> |  |

**CONSTRUCTION**

| CONSTRUCTION DESCRIPTION:         |        |          |        |               |        |
|-----------------------------------|--------|----------|--------|---------------|--------|
| Rip Rap                           | LIN FT | TON / FT | TONS   | UNIT PRICE    |        |
|                                   | 0      | 0.0      | 0      | \$0.00        | \$0.00 |
|                                   | 0      | 0.0      | 0      | \$0.00        | \$0.00 |
|                                   | 0      | 0.0      | 0      | \$0.00        | \$0.00 |
| Filter Cloth / Geogrid Fabric     | SQ YD  | 0        | \$0.00 | \$0.00        |        |
| Navigation Aid                    | EACH   | 0        | \$0.00 | \$0.00        |        |
| Signage                           | EACH   | 0        | \$0.00 | \$0.00        |        |
| General Excavation / Fill         | CU YD  | 0        | \$0.00 | \$0.00        |        |
| Dredging                          | CU YD  | 0        | \$0.00 | \$0.00        |        |
| Sheet Piles (Lin Ft or Sq Yds)    |        | 0        | \$0.00 | \$0.00        |        |
| Timber Piles (each or lump sum)   |        | 0        | \$0.00 | \$0.00        |        |
| Timber Members (each or lump sum) |        | 0        | \$0.00 | \$0.00        |        |
| Hardware                          | LUMP   | 1        | \$0.00 | \$0.00        |        |
| Materials                         | LUMP   | 1        | \$0.00 | \$0.00        |        |
| Mob / Demob                       | LUMP   | 1        | \$0.00 | \$0.00        |        |
| Contingency                       | LUMP   | 1        | \$0.00 | \$0.00        |        |
| General Structure Maintenance     | LUMP   | 1        | \$0.00 | \$0.00        |        |
| OTHER                             |        |          | \$0.00 | \$0.00        |        |
| OTHER                             |        |          | \$0.00 | \$0.00        |        |
| OTHER                             |        |          | \$0.00 | \$0.00        |        |
| <b>TOTAL CONSTRUCTION COSTS:</b>  |        |          |        | <b>\$0.00</b> |        |

**TOTAL OPERATIONS AND MAINTENANCE BUDGET:** **\$5,288.00**



## Appendix C (Field Inspection Notes)

### MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Narr TV-09 Boston Canal/Vermilion Bay Bank Protection

Date of Inspection: January 5, 2005 Time: 1:30 p.m.

Structure No. \_\_\_\_\_

Inspector(s): Stan Aucoin, Pat Landry, Herb Juneau, Dewey Billodeau  
Brad Sticker

Structure Descrip Rock Dike

Water Level Inside: \_\_\_\_\_ Outside: \_\_\_\_\_

Type of Inspectic Annual

Weather Conditions: Partly cloudy and mild temperatures

| Item                  | Condition | Physical Damage | Corrosion | Photo # | Observations and Remarks                                  |
|-----------------------|-----------|-----------------|-----------|---------|---|
| Steel Bulkhead / Caps |           |                 |           |         |   |
| Steel Grating         |           |                 |           |         |   |
| Stop Logs             |           |                 |           |         |   |
| Hardware              |           |                 |           |         |   |
| Timber Piles          |           |                 |           |         |   |
| Timber Wales          |           |                 |           |         |   |
| Galv. Pile Caps       |           |                 |           |         |   |
| Cables                |           |                 |           |         |   |
| Signage / Supports    |           |                 |           |         |   |
| Rip Rap (fill)        | Good      |                 |           |         | Western end of rock dike needs some repair.               |
| Vegetative Plantings  |           |                 |           |         | Plantings have become established, survival rate is good. |

What are the conditions of the existing levees?  
 Are there any noticeable breaches?  
 Settlement of rock plugs and rock weirs?  
 Position of stoplogs at the time of the inspection?  
 Are there any signs of vandalism?

