Project Information Report
PL 109-148 Rehabilitation of Damaged Hurricane/Shore Protection Projects

GRAND ISLE AND VICINITY, LOUISIANA

JEFFERSON PARISH, LA

October 2008

U.S. Army Corps of Engineers

New Orleans District

New Orleans, LA

ATTN: CEMVN-ERO

"Building Strong"

EXECUTIVE SUMMARY

This Project Information Report (PIR) was prepared to address the need for rehabilitation of federal hurricane protection works located on Grand Isle and Vicinity, Louisiana. Damage was incurred to the existing surge protection sand dune, associated beach access structures, jetties and breakwaters, and portions of the Grand Isle beach as a result of Hurricanes Katrina and Rita in 2005, and Hurricanes Gustav and Ike in 2008. A PIR was prepared in 2006 and a Memorandum for Record (MFR) Revision #1 to that PIR was prepared 10 September 08.

The City of Grand Isle requested assistance in writing for repairs to damages on October 4th, 2005 after Katrina, and then on October 21, 2008 after Gustav and Ike. The purpose of this PIR is to detail the damages experienced from the 2008 storms, provide alternatives of action for consideration of repair, and develop cost estimates for these actions. Five alternatives are being studied to develop the most cost effective, safe, and environmentally acceptable measures for rehabilitation based upon sound and modern engineering practices.

The original repairs required after the damage from Hurricane Katrina for the sand dune and berm were never completed. Some emergency measures were taken in an attempt to fortify the dune before Gustav and Ike made landfall. Unfortunately, much of the measures did not survive those events.

Multiple breaches as well as widespread erosion and deterioration of the sand dune developed as a result of these storms. In addition to the dune, parts of the southwestern berm and beachfront were completely destroyed.

Grand Isle and Vicinity is a federal project that is active in the USACE Rehabilitation and Inspection Program (RIP). The project is eligible for rehabilitation assistance by law due to damage incurred from “extraordinary storm” in accordance with PL 109-148. The total rehabilitation project cost expended between 2006 and 2008 is approximately $22 million dollars. This PIR recommends an additional 46 million dollars to restore the project to original project, pre storm elevations.

TABLE OF CONTENTS

1. PROJECT NAME AND LOCATION 4
2. PROJECT AUTHORITY 4
3. PUBLIC SPONSOR 5
4. PROJECT DESIGN DATA AND CONSTRUCTION TIMELINE 6
5. MAINTENANCE 8
6. HISTORY OF PL 84-99 REHABILITATION REQUESTS AND ACTUAL REPAIRS. 8
7. APPLICATION FOR ASSISTANCE 10
8. PROJECT CLASSIFICATION AND PURPOSE 10
9. PROJECT DESIGN PURPOSE 10
10. DISASTER INCIDENT AND DAMAGE DESCRIPTION 10
11. NEED FOR REHABILITATION 12
12. MAINTENANCE SCHEME 13
13. PROJECT REHABILITATION ALTERNATIVES 13
14. PROPOSED ALTERNATIVE 17
15. ECONOMICS and REALESTATE 18
16. ENVIRONMENTAL CONSIDERATIONS 19
APPENDIX A - PUBLIC SPONSOR'S REQUEST FOR ASSISTANCE 24
APPENDIX B - PROJECT VICINITY MAP 27
APPENDIX C - DAMAGE ASSESSMENTS 30
APPENDIX D - GENERAL PLANS FOR ALTERNATIVES 41
APPENDIX E - BORROW SITES 48
APPENDIX F - BOLIVAR PENINSULA TEXAS FIELD VISIT 52

APPENDIX G - WAIVER..... 59
APPENDIX H - COMMANDER'S EMERGENCY IMMINENT THREAT LETTER..... 63
APPENDIX I - ADDITIONAL TIMELINE AND POLICY DECISIONS 64
APPENDIX J - LIST OF PREPARERS..... 70
APPENDIX Z - PIR REVIEW CHECKLIST 72

1. PROJECT NAME AND LOCATION

The Grand Isle and Vicinity, Louisiana, project is located at Grand Isle, a low-lying inhabited barrier island located along the Gulf of Mexico in Jefferson Parish, Louisiana, approximately 50 miles south of New Orleans, LA, Appendix B, Plate 1. The island extends approximately 7.5 miles along the gulf shore generally in a northeast to southwest direction, and is approximately 0.75 mile wide at its center. Natural elevations range from approximately three to five feet National Geodetic Vertical Datum (NGVD) along the gulf shore to sea level marsh along the bay shore of the island. The population of the town is 1,541 (circa 2000 census); during fishing season the population swells to over 12,000 people. Major businesses are fishing, tourism and oil exploration. Grand Isle serves as ExxonMobil's primary marine and helicopter base for its eastern Gulf of Mexico oil and gas operations. ExxonMobil Pipeline Company, a subsidiary of ExxonMobil, also has operations on the island. This represents an important link in the nation's energy supply.

2. PROJECT AUTHORITY

a. Classification: Federal.

b. Authority: The Grand Isle Beach Erosion and Hurricane Protection Project was authorized by resolutions of the House of Representatives and the Senate dated 23 September 1976 and 1 October 1976, respectively, under Section 201 of the Flood Control Act of 1965 (Public Law 89-298, dated 27 October 1965). These resolutions state, in part:

> That pursuant to the provisions of Section 201 of Public Law 298, 89th Congress (79 Stat. 1073), the project for beach erosion and hurricane protection at Grand Isle and Vicinity, Louisiana, is hereby approved substantially in accordance with the recommendations of the Secretary of the Army and the Chief of Engineers in House Document Numbered 94-639, at an estimated Federal cost of $5,709,000.

Additionally, the Energy and Water Development Appropriations Act of 1994 (P.L. 103-126) provided authority to construct offshore breakwaters as an integral part of the repairs to the project following Hurricane Andrew, using funds appropriated in the 1992 Dire Emergency Supplemental Appropriations Act.

c. Estimated original cost of project: $5,709,000

d. Construction completion date of original project: 1991 (Completed and turned over to local sponsor).

e. Additionally, the Energy and Water Development Appropriations Act of 1994 (P.L. 1023-126) provided authority to construct offshore breakwaters as an integral part of the repairs to the project following Hurricane Andrew, using funds appropriated in the 1992 Dire Emergency Supplemental Appropriations Act.

3. PUBLIC SPONSOR

Coastal Protection and Restoration Authority of Louisiana
8900 Jimmy Wedell St., Room 216
Baton Rouge, LA 70807
David Miller, P.E.
Director of Implementation Office of Coastal Protection & Restoration
225-342-3968

4. PROJECT DESIGN DATA AND CONSTRUCTION TIMELINE

a. Sand Berm and Dune: The main features of the hurricane protection project consist of a vegetated sand dune and sand berm extending the length of Grand Isle's gulf shore, and a stone jetty to stabilize the west end of Grand Isle at Caminada Pass. The dune has a 10-foot wide crown with elevations varying between 12 and 13.5 feet NGVD, and side slopes of 1 Vertical (V) on 5 Horizontal (H) protected from erosion by vegetation consisting of sea oats and bitter panicum. The sand berm falls along a 1V on 33H slope from elevation 8.5 at the toe of the dune and gulfward to natural ground or gulf bottom. An additional feeder berm, consisting of a 100-foot sand beach, was added in the vicinity of baseline station 76+00 because of the increased initial erosion in this area.

b. Segmented Breakwaters: New Orleans District (CEMVN) constructed the hurricane protection project in 1984. The project was essentially complete in January 1985, but prior to acceptance by the non-Federal sponsors, it was damaged by winter storms and three hurricanes. Hurricanes Danny, Elena and Juan struck Grand Isle in August, September, and October 1985, respectively. From 1985 to 1989, CEMVN went through several iterations of designs to repair the project. A decision was made to complete the project in two phases. In Phase I, beach repairs, a cuspate bar fronting the state park was dredged and used to restore the beach and dune in the state park. A breakwater demonstration project consisting of two small areas of biodegradable sand-filled bags was built on the shore of Grand Isle. The west end jetty was extended 500 feet and the east end jetty, which is not part of the authorized Federal project, was extended 200 feet to better stabilize the ends of the island. Additionally, upon reanalysis and based

on experience to date, the long-term erosion rate was revised to 140,000 cubic yards per year in 1986. In the reanalysis, the erosion rate of the beach was treated as a uniform process over the entire length of the island. In late 1989, before completion of the rehabilitation, the Town of Grand Isle built a stabilization complex consisting of two groins, a seawall, and four segmented, offshore breakwaters near station 190+00 at the center of the island. In 1991, Phase II of the first nourishment of the beach and dune repair with 600,000 cubic yards of fill was completed. The breakwaters and groins, built by the Town of Grand Isle in 1989, created a complete barrier to the transport of sand alongshore at the middle of the island. As a result, the island west of the breakwaters is relatively stable, and the island east of the breakwaters had a shortage of sand, and suffered significant erosion.

In August 1992, Hurricane Andrew passed by Grand Isle and eroded about 250,000 cubic yards of fill from the project. After Hurricane Andrew, it was believed that a carefully designed system of breakwaters could reduce the erosion rate back to the original 100,000 cubic yard per year computed during project design. The Coastal Engineering Research Center (CERC) was asked to conduct a numerical model to design a breakwater system. Utilizing the Genesis model, CERC tested several configurations of seven-segmented offshore breakwaters east of the Town's stabilization complex. The model indicated that the breakwaters would stabilize the beach over a four to six year period with the inclusion of 100,000 cubic yards of sand at the eastern end of breakwater system. While the breakwaters were being modeled, the non-Federal sponsor tried placing sand on the beach by truck haul with little success, and the process was halted pending construction of the segmented breakwaters. As plans and specifications were being developed for the breakwaters, it was determined that sufficient funds were available to build 23 breakwater segments and the rock structures were installed between December 1994 and May 1995 (1992 Dire Emergency Supplemental Appropriations Act funds).

c. Pedestrian Crossovers: Twenty-one wooden pedestrian crossovers were constructed to allow pedestrian access to the beach without disturbing the dune vegetation. Physically Challenged Ramps: Three ramps were initially constructed out of the original 21 crossovers to allow mobility-challenged individuals to cross the dune. As repairs have been required, the ramps have been converted to meet A DA standards.

7

d. Emergency Vehicle Crossovers: Four emergency vehicle ramps were constructed.

e. West End Jetty: The west end jetty was constructed by the State of Louisiana in 1972 and incorporated into the Federal project at the time of authorization. A jetty at the east end of the island was constructed by the State in 1964; however, it was never authorized to be incorporated into the Federal project.

5. MAINTENANCE

In accordance with the Chief's Report, the non-Federal sponsor is responsible for maintenance, repairs, and periodic beach nourishment of the project after completion as may be required to serve the intended purposes in accordance with regulations prescribed by the Secretary of the Army. The Federal Government was responsible for contributing approximately 12% annually of the cost of beach nourishment associated with beach erosion prevention for an initial period of 15 years following completion of construction. In October 1991, the Corps completed the project and turned it over to the Town of Grand Isle.

6. HISTORY OF PL 84-99 REHABILITATION REQUESTS AND ACTUAL REPAIRS

On 11 November 1986, the Federal government entered into an act of assurance with the Town of Grand Isle for use of PL 84-99 funds. $2,548,637 was provided. This work appears to have included the addition of a clay core at four reaches of the dune, as well as temporary extension of both jetties. In 1992, a request for PL 84-99 funds was granted; $5.5 million of 100% federal funds was appropriated in the Dire Emergency Supplemental Appropriations Act. This work included rebuilding portions of the dune

with a clay core. In 1998, a request for emergency funds was denied. In 2002, a PL 84-99 request was denied but was subsequently granted in 2003. The addition of clay core and graded stone armoring were characterized as betterments at this time. This work also included repair of the breakwaters. Additionally, P.L. 84-99 funds in the amount of $420,000 were provided in 2003 for advance measures. These included 2,275 feet of emergency embankments consisting of a 3-foot high clay core covered with filter fabric, with a 3-foot thick layer of broken concrete, and topped with three feet of sand.

In 2008, work was commenced using funds from PL 109-148. This work was ongoing when Hurricanes Gustav and Ike impacted the Louisiana coast. One week prior to Gustav's land fall, the COE had only repaired 8,000 linear feet of sand dune, plantings, fencing, and beach nourishment along the east end of the island. This fell well short of the total 38,600 feet required for damage repair from the Katrina and Rita storms. 20 breakwaters and 8 navigation lights on the wooden pier near the breakwaters were repaired. The 20 crosswalks that needed repair or replacement were not completed but all the lumber was purchased. Required replacements of two emergency vehicle crossings on the western end of the island were also not completed, but the Articulated Concrete Blocks needed for the crossings were purchased and still remain at the manufacturer.

After Gustav, it was determined to modify the construction of the sand dune with an entrenched, geotextile-wrapped clay core (burrito). Approximately 100 feet of this burrito was completed and another 130 feet was placed but not wrapped and sewn. Also, large sand bags were placed in various breaches to shore up gaps in the dune for emergency rehab in the wake of Hurricane Ike. Appendix I contains reference for an explanation of the allowable use of a clay core.

After the passing of Ike, more emergency repairs were being planned. At the time of the PIR submittal, intentions were to resume construction of the clay core burrito with

remaining emergency funding secured by the Hurricane Protection Office. The rehabilitation work that has taken place since Katrina will total $22 million dollars after the emergency repairs are exhausted.

7. APPLICATION FOR ASSISTANCE

a. Date of Issuance of District's Public Notice: October 2008

b. Date of Public Sponsor's Written Request: October 21, 2008

8. PROJECT CLASSIFICATION AND PURPOSE

The Grand Isle Beach Erosion and Hurricane Protection Project provides protection from wave surge driven by hurricanes that have a 2% frequency recurrence interval (in any given year, there is an average 2% chance of event occurrence, called the 50 year level of protection).

9. PROJECT DESIGN PURPOSE

The protection of the island from surges and wave action generated by storms is achieved by a combination of jetties, breakwaters, beach nourishment, and sacrificial sand dune and berm. These measures work together to reduce hydraulic directional wave surgical forces that would otherwise endanger the infrastructure of the island.

10. DISASTER INCIDENT AND DAMAGE DESCRIPTION

Hurricane Gustav made landfall 35 miles west of Grand Isle, LA on the morning of September 1, 2008 as a strong category 2 hurricane. Grand Isle was located in the northeast quadrant of the storm as it made landfall, which is typically the strongest quadrant of the storm. Because of the storm's orientation relative to Grand Isle, the storm surge was from the gulf side of the island. Gages from the USGS indicated the surge was between 12 and 13 feet above mean seal level, with winds during the storm peaking at 107 mph.

As detailed previously, rehabilitation work from Katrina was not complete. Beachgrass seeds were planted to stabilize the dune against any erosive forces. Sand fences were also placed along parts of the dune to reduce erosion. The short window between the initiation of work and the arrival of Hurricane Gustav did not allow sufficient time for any dune vegetation to take hold. The wave surge from this hurricane overtopped the existing dune barrier, severely eroding the beach as well as the dune itself. The dune was completely breached in many locations. Many of these breaches were eroded around wooden walkway structures leading to the beach. These structures caused localized turbulence and scour. Much of the beach and dune sediment was deposited on top of the island.

Immediately after Hurricane Gustav passed, the COE directed the contractor to start construction of a clay core burrito. As Hurricane Ike approached, the Town of Grand Isle decided to focus all work toward shoring up some of the larger breaches in the dune system. Large and medium sized sandbags were placed in the breaches as a temporary barrier against further storm damage.

Approximately 10 days after the landfall of Hurricane Gustav, Ike, another category 2 storm, passed Grand Isle. While the center of Ike never got closer than 300 miles, its effects were nearly as damaging as Gustav's. With winds as high as 62 mph winds and another 5 ft storm surge coming from the gulf side, an already heavily eroded beach and dune system experienced even more damage. In several locations in which the dune consisted primarily of sand, little to no dune cross section remained. In other locations, sand placed above earlier clay core segments was completely eroded away as well as sections of the clay. The larger sandbags used in breached sections of the dune system remained in place. However, significant scour was seen on either side of this temporary protection. The smaller sandbag measures were immediately cast aside by the storm. Much of the eroded material was deposited on the landward side of the dune.

Grand Isle beach and dune erosion is more prevalent on the southwest end of the island. This trend was amplified during both storms. While most of the beach remained along the upper northeast shore and along the midsection shore of the island, no beach width remained on the southwest end of the island. Much of the clay core material located formerly inland of the beach area was eroded along this area, leaving a new shoreline in what were formerly private back yards.

Some sections of the dune system did survive the storm. Sections where more vegetation had taken hold experienced less erosion. Also, the small, 100 foot burrito section that was able to be wrapped and sewn remained largely unaffected by Hurricane Ike. Some settling of the clay material in the burrito (un-compacted when placed) was observed as well as some stretching of the geo-textile fabric.
The rock jetties on the gulf side of both ends of the island were degraded from the storms. Storm surge wave action removed several feet of rock in the near shore section of the east jetty. Half of the west jetty (gulf side) was degraded down several feet. The degradation of both jetties could have been from either rocks tumbling down from the top, or from scour and launching or slumping of jetty section.

11. NEED FOR REHABILITATION

In this case, the repair work would be performed under P.L. 109-148 for Rehabilitation Assistance and not P.L. 84-99. The Grand Isle and Vicinity, Louisiana, Project fits the criteria for Rehabilitation Assistance under P.L. 109-148. The following 3 conditions have been met: (1) the damaged areas are completed elements of the hurricane protection project, (2) repair is necessary to the design level previously constructed to allow for adequate functioning of the project, and (3) damage was caused by an "extraordinary storm."

The protective sand dune needs to be repaired in order to protect property and infrastructure on the island from direct storm conditions, such as storm surge and wave impacts. The beach and sand dune provide a protective barrier between homes,

businesses, and camps, and the Gulf of Mexico. The west end jetty needs to be repaired to protect the beach and sand dune from the direct impact of waves during a storm event.

Planting, fertilizing, and installation of sand fencing are necessary to protect the sand dune from wind driven erosion. This type of erosion can be as detrimental to the sand dune as wave impacts and storm surge. The pedestrian crosswalks and emergency vehicle crossovers protect the sand dune by providing designated access points to the beach for pedestrians and emergency vehicles without causing negative impacts, such as damage and erosion, to the protective sand dune.

12. MAINTENANCE SCHEME

Maintenance inspections were completed on a periodic basis prior to Hurricane Katrina. However, since March of 2006, the project has been in a state of disrepair so no inspections have been done. These have been replaced by damage assessments.

13. PROJECT REHABILITATION ALTERNATIVES

There are five action alternatives in this report that are being considered under PL-109-148 authority to determine the most "cost effective" alternative as directed by USACEHQ (Memo for Commander, MVD 21 August, Appendix G). These alternatives are as follows:

Alternative 1) No Action.

The project would not be rehabilitated and areas would remain unprotected from future storm events. This alternative was not accepted by the non-federal sponsor because present ownership desires continued protection from storm events provided by complete rehabilitation of the original project.

Alternative 2) Non-Structural Flood Recovery/Floodplain Management.

The project would utilize non-structural strategies involving change in land use offered by other federal and state agencies. This is not acceptable to the non-federal sponsor because present ownership desires continued protection from storm events provided by complete rehabilitation of the original project.

Alternative 3) Structural Repair, Sand Berm and Dune Restoration, Beach Re-Nourishment, Jetty Repair.

The project would be restored to the original project conditions under the authority of PL109-148. The repairs must be constructed in one construction season. Repairs would be conducted as soon as possible in order to provide protection for the next hurricane season. This particular repair was recommended in the PIR of 2006 and revised in the MFR of 2008 with an estimated cost of $16 million dollars. This alternative achieves the original intent of the project, but the maintenance associated with this design has far exceeded what was originally envisioned in the original GDM. The dune had been damaged and replaced multiple times. The current non-federal sponsor still desires the sacrificial dune concept, but looks toward USACE for more modern, cost effective, and improved design considerations that will reduce maintenance.

Alternative 4) Structural Repair, Sand Berm and Dune Restoration with Geotextile Wrapped Clay Core (Burrito), Beach Re-Nourishment, Jetty Repair.

The project would be restored to the original project conditions under the authority of PL-109-148. The repairs must be constructed in one construction season. Repairs would be conducted as soon as possible in order to provide protection for the next hurricane season. This repair was suggested by the local sponsor, the Town of Grand Isle, after Hurricane Gustave eroded yet again more of the sand dune and the recent 8,000 linear feet of rehabilitation repairs. The concept was that by introducing a stable core, the dune would have more longevity and reduce future maintenance cost.

Beach re-nourishment is required along the western shore of the island to provide berm section and grade for the original project design and is not considered normal maintenance. The estimated cost of this repair is as follows:

GRAND ISLE REHABILITATION ESTIMATE				
RECONNAISANCE LEVEL COST ESTIMATE			Date: Estimator: Designer:	24-Sep-08 Binet/Bailey/Brown/O'Cain/Davinroy Binet
Item	Unit	Quantity	Unit Price	Total
Mob and Demob	LS	1	$200,000	$200,000
Clearing and Grubbing	LS	1	$250,000	$250,000
Trench Keyway	LF	38,600	$10	$386,000
Geotextile	SY	370,600	$8	$2,964,800
Clay Fill	CY	293,750	$70	$20,562,500
Sand Cap To Grade And Beach Rehab	LS	1	$20,000,000	$20,000,000
Roadway Surface For Vehicle Access To Beach				
a. ACB Paving	LS	1	$258,000	$258,000
b. Surfacing	LS	1	$45,000	$45,000
Dune Planting	AC	47	$34,042	$1,599,974
Sand Fencing	LF	37,910	$6.17	$233,905
Jetty Stone Repair	Ton	9,000	$103.37	$930,330
Breakwater Stone	Ton	15,000	$100	$1,500,000
Pier and Timber Work	LS	1	$500,000	$500,000
Navigation Lighting		9	$15,488	$139,392
			Subtotal	$49,569,901
			10% Contingencies	$4,956,990
			Subtotal	$54,526,891
			6% E&D	$3,271,613
			6% S&A	$3,271,613
			E.A.	$2,500,000
			Total	$63,570,118

Alternative 5). Structural Repair, Sand Berm and Dune Restoration with dredge-filled GEOTUBE, Beach Re-Nourishment, Jetty Repair. The project would be restored to the original project conditions under the authority of PL-109-148. The repairs must be constructed in one construction season. This repair was formulized by a team of civil, geotech, and hydraulic engineers from MVS and MVN. The intent was to develop a core as robust and strong as the burrito in Alternative 4 but also protect against tidal

surge scour while still significantly reducing the construction time and cost. A team of engineers visited Bolivar Peninsula, Texas which took a direct hit from Hurricane Ike. Parts of the town of Gillchrist, Texas were completely destroyed by storm surge tidal waves. A sand dune using sand filled Geotubes as the core were used for frontal shore protection. A storm surge of 16 feet was experienced and several people died as a result. Multiple sections of the dune were destroyed. In all cases, forensic evidence indicated that large breaches were caused by a combination of over-topping back scour on the landward side and return flow to the gulf (see Appendix F). Engineers noted that frontal scour protection provided by rolled curtains proved to be very effective. However, land side protection was not adequate. This is a key component to any barrier protection that was overlooked in the past. The estimated cost of using Geotubes with adequate scour protection are as follows:

GRAND ISLE REHABILITATION ESTIMATE				
RECONNAISANCE LEVEL COST ESTIMATE			Date: Estimator: Designer:	24-Sep-08 Binet/Bailey/Brown/O'Cain/Davinroy Binet
Item	Unit	Quantity	Unit Price	Total
Mob and Demob	LS	1	$200,000	$200,000
Clearing and Grubbing	LS	1	$250,000	$250,000
Trench Keyway	LF	38,600	$10	$386,000
Geotextile	LF	38,600	$43	$1,659,800
Scour Apron	LF	77,200	$20	$1,505,400
Sand Fill	CY	345,000	$18	$6,210,000
Sand Cap To Grade And Beach Rehab	LS	1	$20,000,000	$20,000,000
Roadway Surface For Vehicle Access To Beach				
a. ACB Paving	LS	1	$258,000	$258,000
b. Surfacing	LS	1	$45,000	$45,000
Dune Planting	AC	47	$34,042	$1,599,974
Sand Fencing	LF	37,910	$6.17	$233,905
Jetty Stone Repair	Ton	9,000	$103.37	$930,330
Breakwater Stone	Ton	15,000	$100	$1,500,000
Pier and Timber Work	LS	1	$500,000	$500,000
Navigation Lighting		9	$15,488	$139,392
			Subtotal	$35,417,801
			10% Contingencies	$3,541,780
			Subtotal	$38,959,581
			6% E&D	$2,337,575
			6% S&A	$2,337,575
			E.A.	$2,500,000
			Total	$46,134,730

As with Alternative 4, the Beach Re-Nourishment is required on along the western shore of the island to provide berm section and grade for the original project design and is not considered normal maintenance.

14. PROPOSED ALTERNATIVE

In accordance with PL 109-148, the most cost effective alternative, acceptable to the non Federal sponsor, based upon sound engineering that provides the most robust protection against storm surge attack is Alternative 5. A meeting was held with the local sponsors on Wednesday, October 8th, 2008 describing the findings of the forensic investigation conducted at Bolívar Peninsula Texas. As previously discussed, the

estimate for this alternative is $46 million, a savings of $17.5 million dollars as compared to Alternative 4.

15. ECONOMICS AND REAL ESTATE

Economic evaluation under this PIR is waived as per accordance with Memorandum from USACEHQ (Appendix G).

It is anticipated that all work included in the recommendations of this PIR will take place within existing Right of Way (ROW). Access to work area will be through public streets, existing ROW and the Gulf of Mexico. Rehabilitation work has been ongoing since 2006 and is presently continuing, constructing Sand Dunes; the following Real Estate description applies strictly to the rehabilitation work using Geotubes. The Real Estate work for the rehabilitation efforts constructing the Sand Dunes has already been completed and is discussed in the 2006 Grand Isle PIR and the September 2008 Amendment.

Rehabilitation efforts require utilizing an existing borrow site, which is located in the Gulf of Mexico; the site has been environmentally cleared and all necessary real estate interests have been acquired. Presently, it is not known whether the borrow site will provide all needed borrow for rehabilitation; it will remain uncertain until surveys are performed. If it is demonstrated that there is insufficient material available for full rehabilitation, alternate source(s) of material will have to be determined and possible Real Estate acquisition will need to be performed, increasing Real Estate costs. At this time, it is assumed that the aforementioned borrow site will offer all necessary material for full rehabilitation.

The real estate costs included in this PIR reflect the minimal effort required to obtain the necessary right of entry to the existing ROW. If, at a later date, it is determined that additional ROE will be required in these areas, then the real estate requirements will be

reassessed and the costs adjusted accordingly. All applicable Rights of Entry will be obtained prior to the construction contract.

16. ENVIRONMENTAL CONSIDERATIONS

a. Effect of Proposed Work on Environment. Dune repairs are not expected to have significant impacts to endangered species, important fish and wildlife resources, water quality flood plains, or other natural and cultural resources. The proposed action has the potential to impact areas not previously a part of a Federally authorized project and as such has not been the subject of any prior environmental review. This emergency work will be undertaken to restore the Federal Grand Isle Beach Erosion and Hurricane Project to its original design as authorized by PL 89-298. Some of the proposed actions (using fill from borrow sites) has the potential to impact areas not previously a part of a Federally authorized project and as such has not been the subject of any prior environmental review. Grand Isle lies with in the area designated as critical habitat for the Piping Plover by the US Fish and Wildlife Service (USFWS).

Consultation is ongoing with Federal and state resource agencies to ensure compliance with environmental laws such as National Historic Preservation Act, Endangered Species Act, Coastal Zone Management Act, and the Comprehensive Environmental Response, Compensation, and Liability Act. Additional coordination with Federal and state agencies and others will occur as additional information on borrow sites and the final design of the project is developed to ensure concurrence with Federal and state laws.

b. Assessment Issues:

Water Resources: A temporary increase in water turbidity could occur around the rehabilitation area due to dredge activities and the runoff from the construction site.

Best management practices would be part of the construction contract. No adverse impacts associated with turbidity are anticipated.

Hazardous, Toxic, and Radioactive Waste (HTRW) Sites: Risk of encountering HTRW is considered to be low for alternatives being investigated.

Soils and Land Use: Project construction would alter soils and land use outside of the dune footprint. All fill material for the project would come from an from a borrow source that is approved as a part of the NEPA process.

Air Quality: Rehabilitation activities would result in dust and exhaust fumes from equipment. These are short-term minor impacts that would terminate after the repair is completed.

Noise: There should not be any significant impacts. There would be short term impacts to the area that would terminate once repairs are made.

Flora: No long-term adverse impacts are expected as a result of dune repairs.

Fauna: No long-term adverse impacts are expected as a result of dune repairs.

Fisheries: No significant adverse impacts are expected as a result of dune repairs.

Threatened and Endangered Species: Threatened and endangered species are not expected to be impacted as a result of this dune repair.

Cultural Resources: The proposed action would be coordinated with the State Historic Preservation Officer prior to any work being completed. Area is designated as Piping Plover critical habitat by the USFWS and as such close coordination with the Service would occur prior to any work being started.

Socioeconomic Resources: The dune repair would result in the restoration of existing flood protection for the community of Grand Isle.

Aesthetic Resources: Same as pre-construction.

Recreational Resources: The berm and the gulf side of the dune is used as a beach. Therefore there would be a positive impact on recreational resource. All walkways requiring repair or rebuilding would be constructed to meet American with Disability Act standards.

Cumulative Impacts: Cumulative Impacts related to the continued rebuilding of the barrier island protection system are unknown, but would be investigated as a part of the NEPA documentation that is required for this project. The continued replenishment of sand, clay, and rip rap to maintain this dune system is expected to be having impacts to surrounding lands and waters as the material is redistributed after each tropical event that passes through the area.

c. Section 404(b) Evaluations: Section 404 of the Clean Water Act assigns responsibility to the Secretary of the Army to administer a permit program to regulate the excavation or placement of fill material in waters of the Untied States. The excavation or placement of any fill material in the waters of the United States below the ordinary high water elevation or in wetlands must be authorized by a Department of the Army Section 404 permit. A complete 404 (b) (1) evaluation would be prepared prior to any work being completed.

d. Executive Order 11988: Under this Executive Order, federal agencies are to "provide leadership and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the

natural and beneficial values served by floodplains". The St. Louis District, Corps of Engineers is evaluating the proposed dune repairs at the damage sites which occurred in the Grand Isle Beach Erosion and Flood Protection Project during the Hurricanes Gustav and Ike. Not repairing the dune would increase the risk of flood damages. Based on the extent of dune damage that currently exists, it is prudent to repair the dune to restore the level of flood protection that existed prior to the flood event.

By reducing the future risk of flood loss and minimizing the impacts on existing vegetation in the floodplain, this proposed project is in full compliance with this Executive Order.

e. Permits: The Corps would need to apply for a storm water pollution prevention permit from the Louisiana Department of Environmental Quality (LDEQ) pursuant to Section 402 of the Clean Water Act. Any requirements needed to obtain this permit would be included in plans and specifications for this project.

The Corps would be required to obtain a State Water Quality Certification pursuant to Section 401 of the Clean Water Act prior to any work being completed.

The Corps would be required to obtain Coastal Zone Management Act concurrence from the Louisiana Department of Natural Resources (LaDNR) prior to any work being completed.

CEMVS-PM-E has reviewed the proposed action and believes that the action is consistent to the maximum extent practicable, with the State of Louisiana's Coastal Resource Program, but as alternatives are investigated and plans are developed coordination with the LaDNR would continue to ensure consistency

It is anticipated that an Environmental Assessment would be needed prior to any work being completed. CEMVN-PM-R would need approximately 6-9 months to complete the

investigation required for the NEPA, Cultural, and HTRW clearances that are needed for this action.

APPENDICES

APPENDIX A

PUBLIC SPONSOR'S REQUEST FOR ASSISTANCE

Project Information Report
Grand Isle and Vicinity, Louisiana
October 2008

Coastal Protection and Restoration Authority of Louisiana

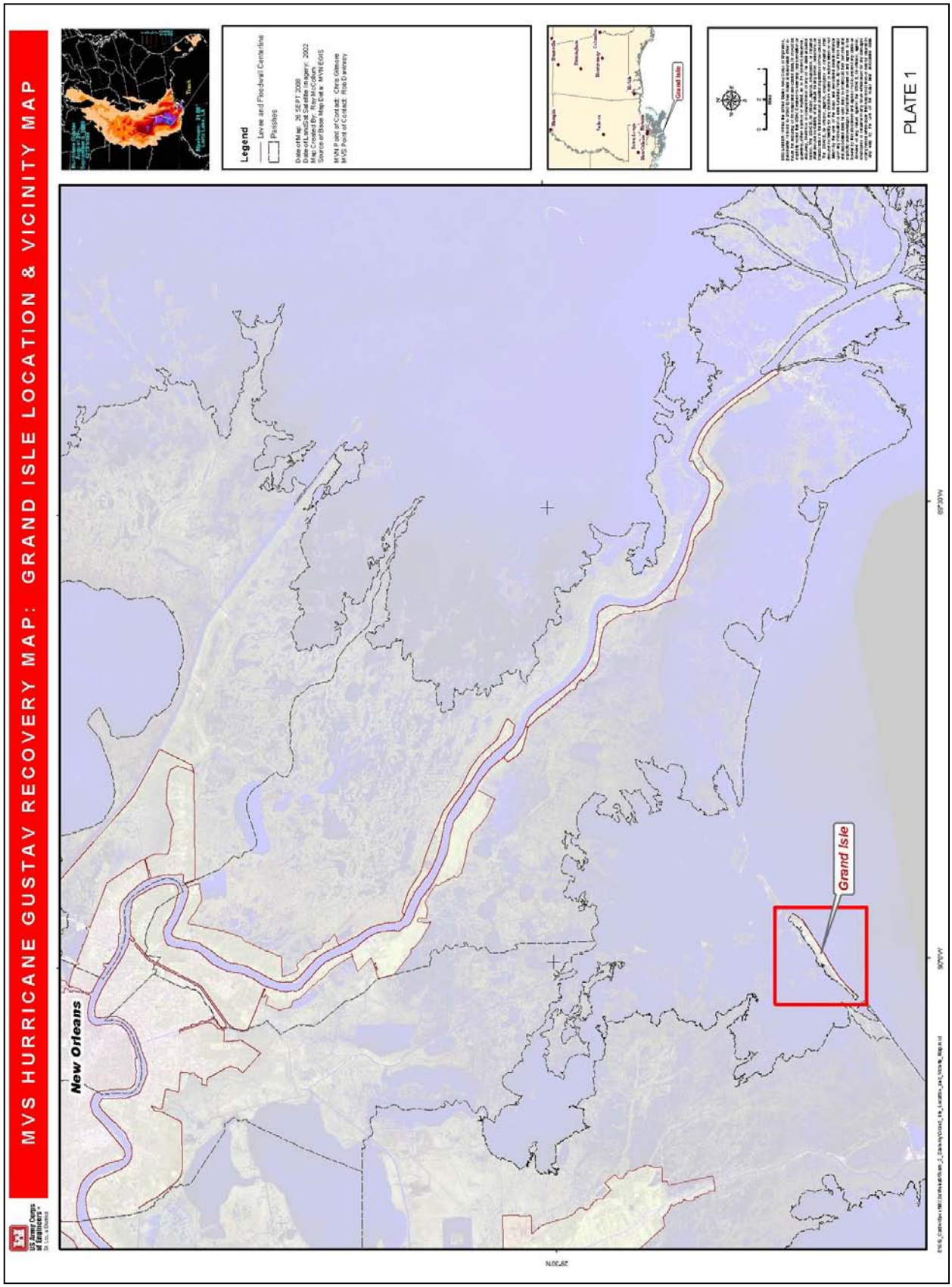
October 21, 2008

Colonel Alvin Lee
U. S. Army Corps of Engineers
New Orleans District
Post Office Box 60267
New Orleans, Louisiana 70161-0267

It is further requested that the local sponsor for the work on Grand Isle which was previously listed as the Louisiana Department of Transportation and Development be transferred to the Louisiana Office of Coastal Protection and Restoration. The point of contact at the Louisiana Department of Transportation and Development on behalf of the local sponsor was previously Ed Preaux and that responsibility will now transfer to Greg Grandy with the Louisiana Office of Coastal Protection and Restoration.

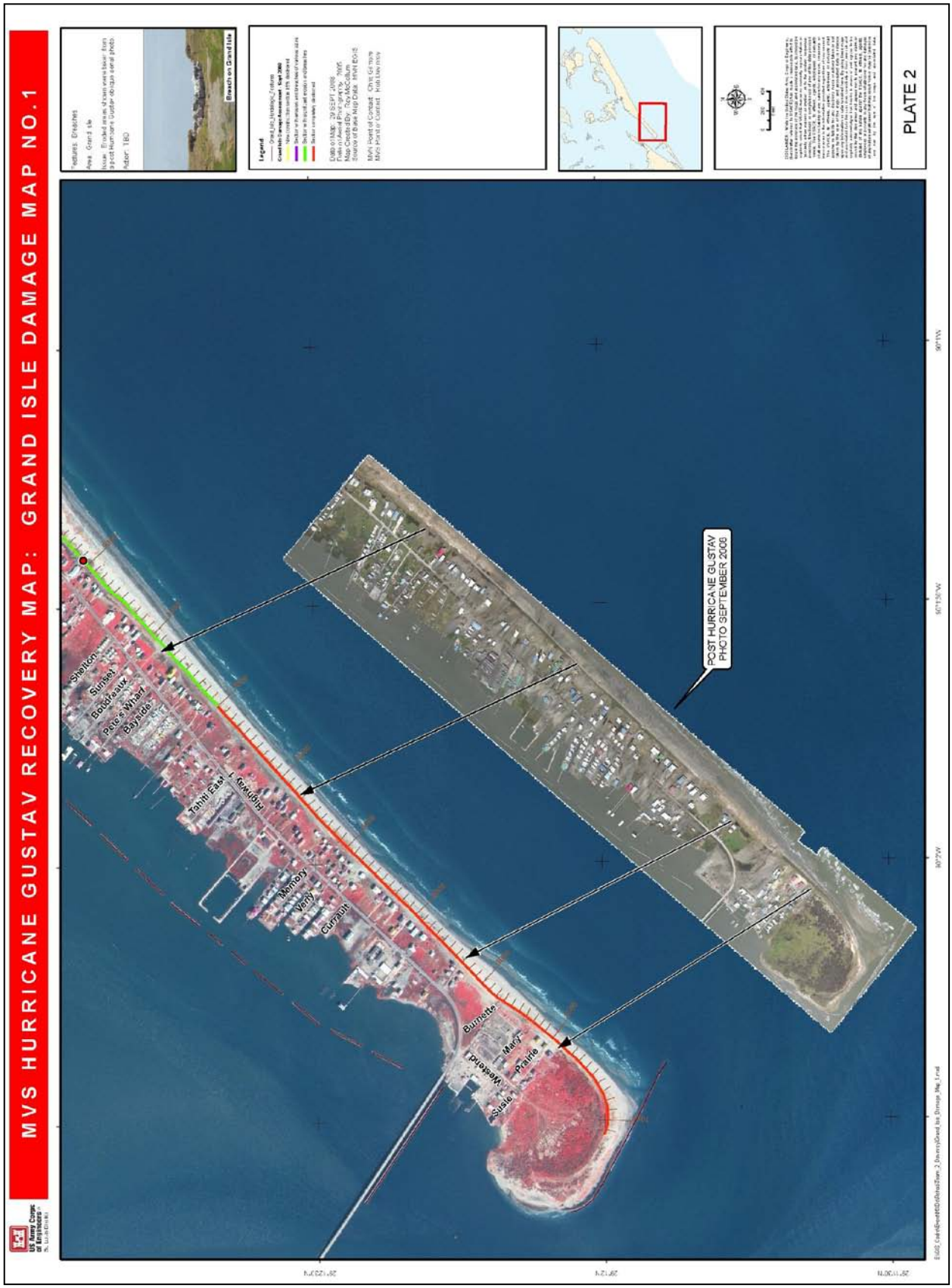
APPENDIX B

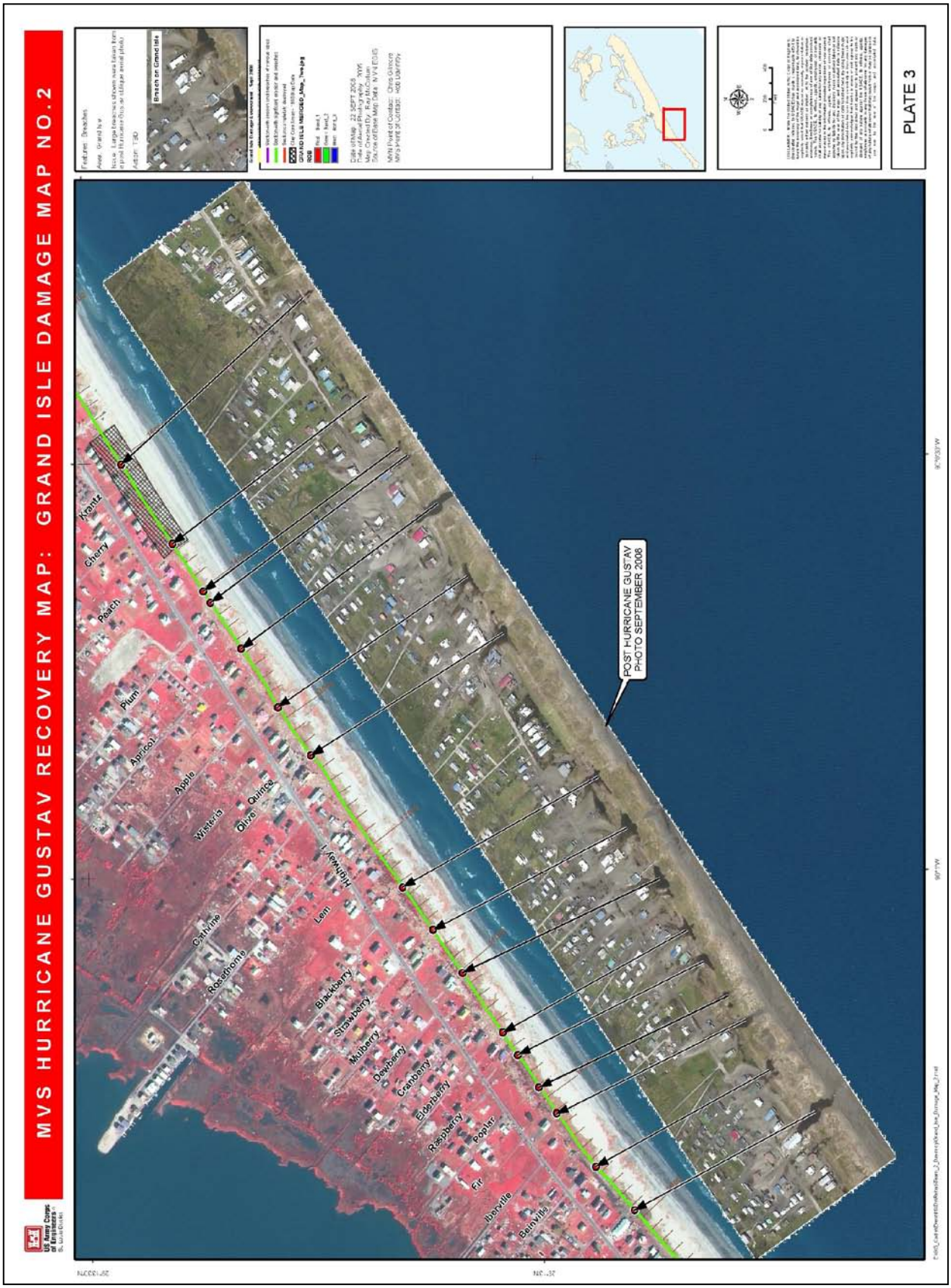
PROJECT VICINITY MAP


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE LOCATION & VICINITY MAP
New Orleans
Grand Isle
Legend
Levee and Floodwall Centerline
Parishes
Grand Isle
PLATE 1

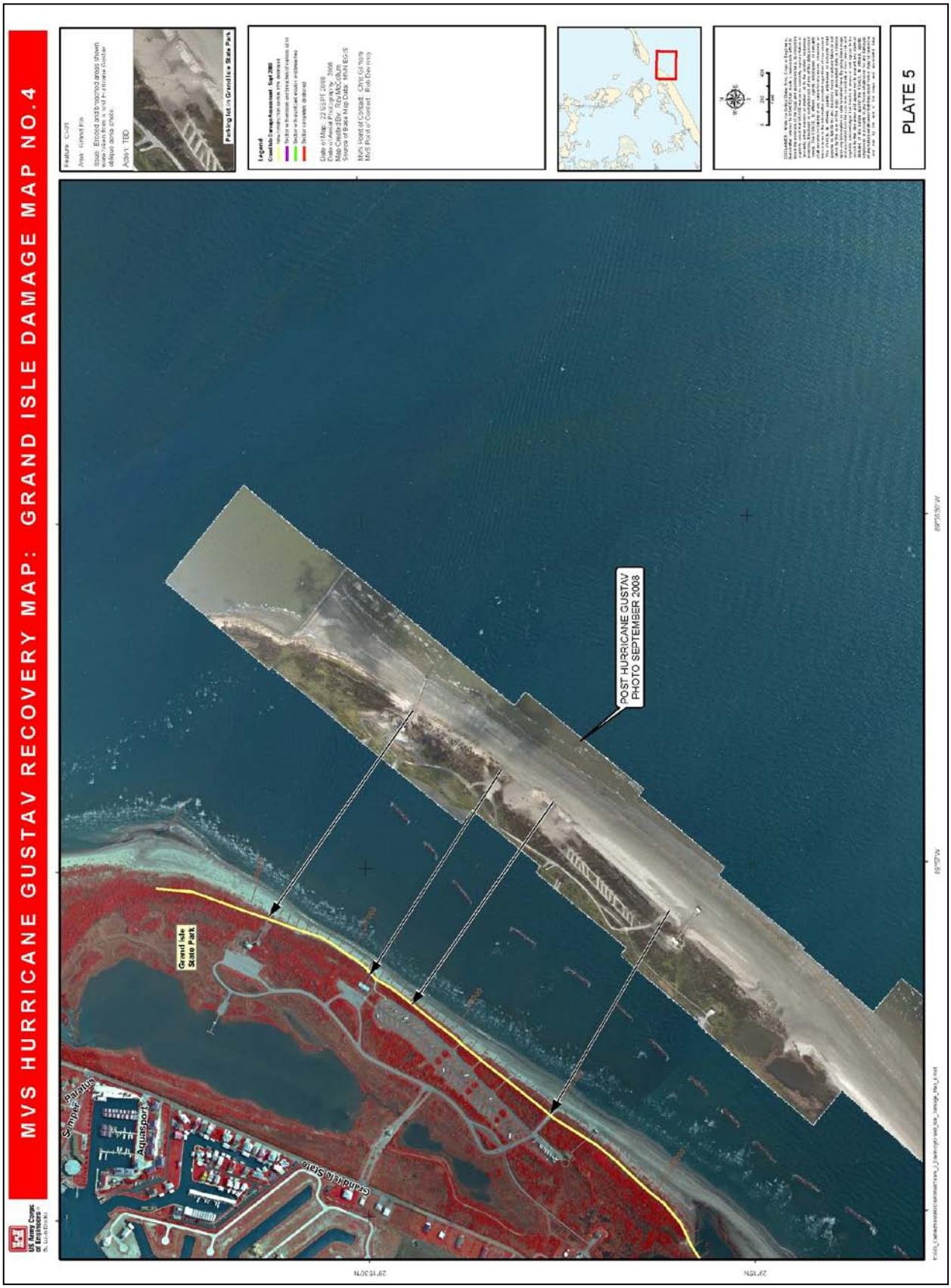
APPENDIX C

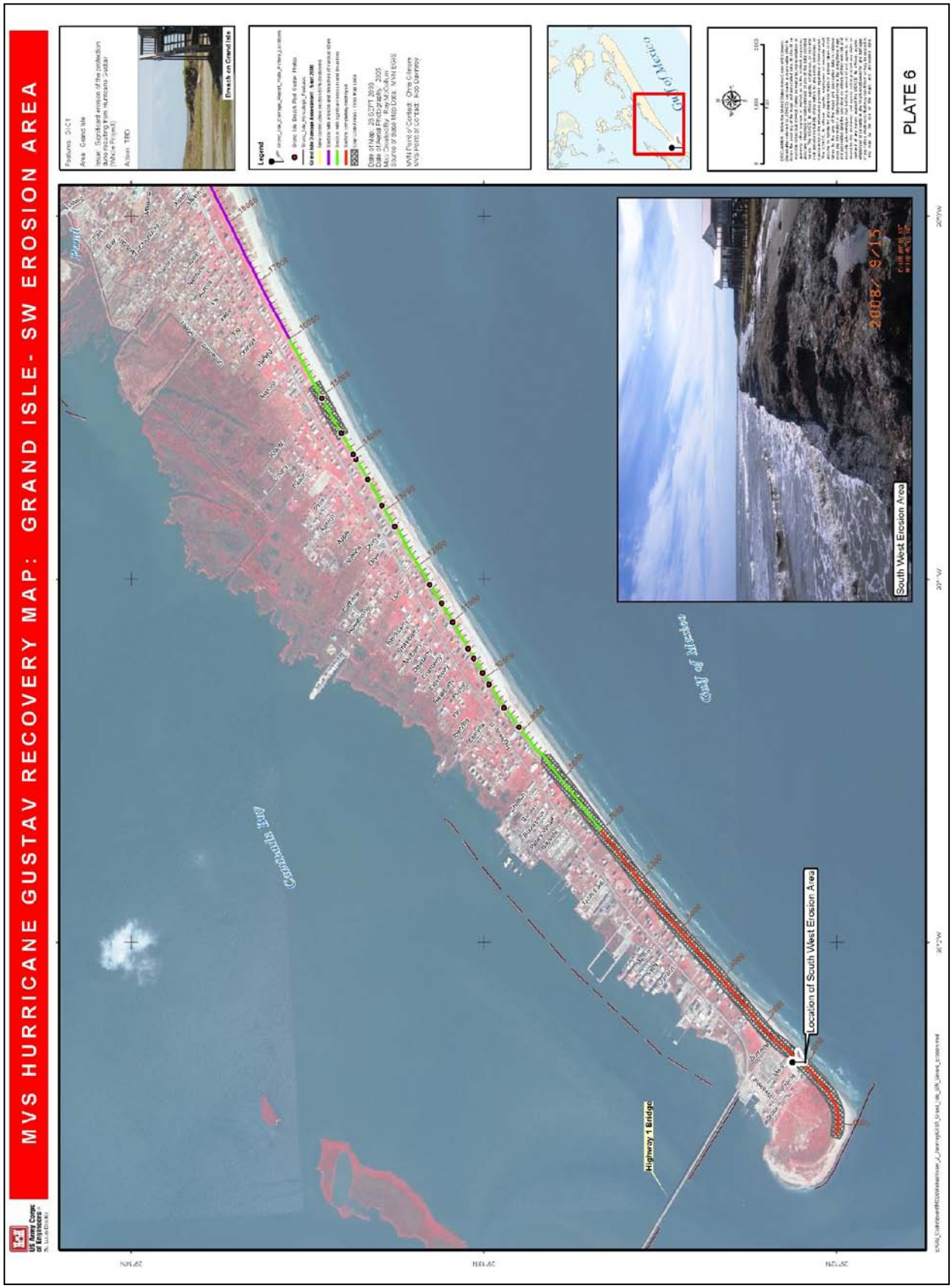
DAMAGE ASSESSMENTS

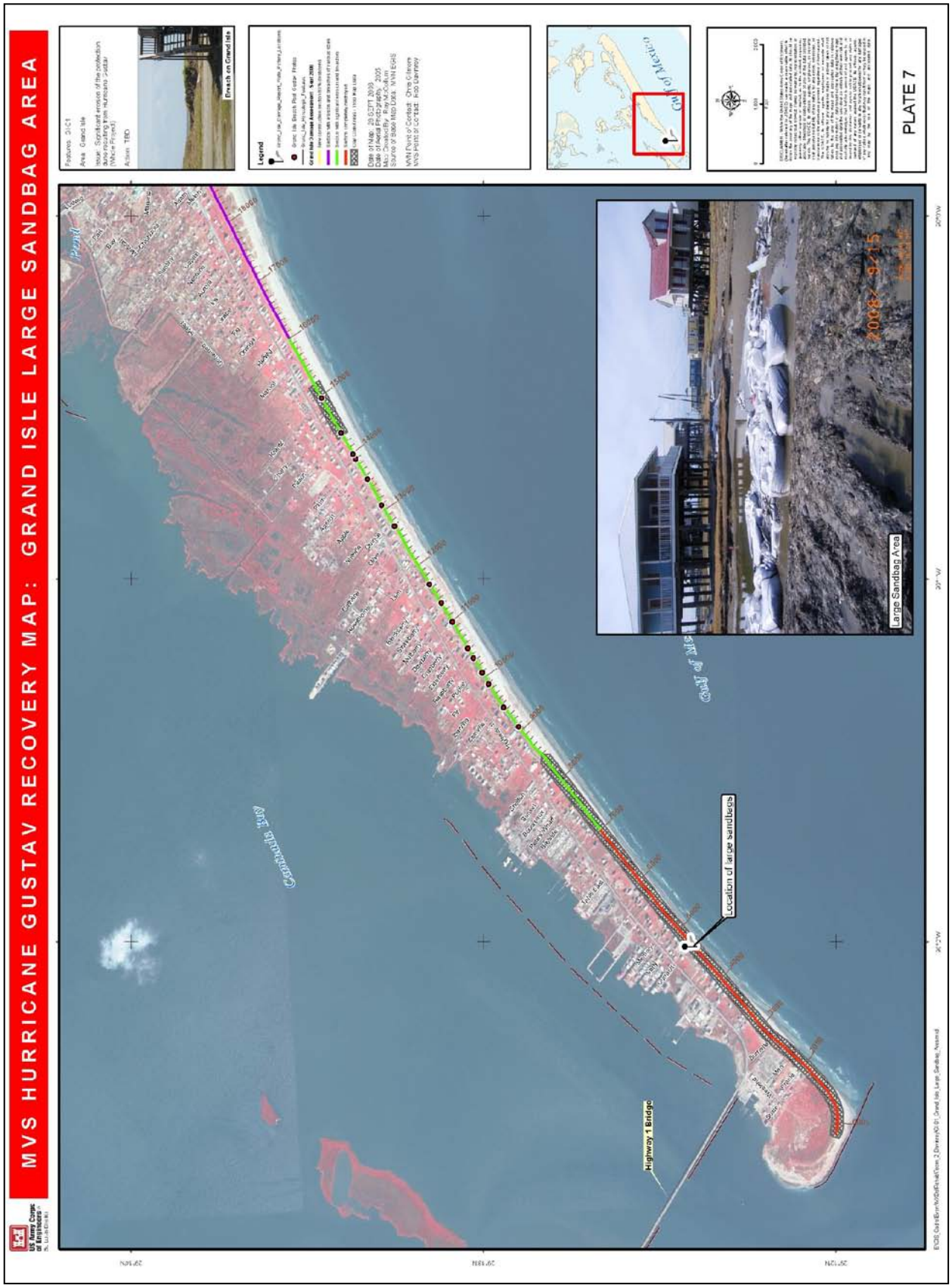

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE DAMAGE MAP NO.1
US Army Corps of Engineers
Features: Beaches
Area: Grand Isle
Scale: Ended area of concern were based from hyperspectral image acquisition
Editor: TBD
Beach on Grand Isle
Legend
Date of IMAGE: 29 SEPT 2008
Data Source: Hydrographic Survey
Map Created By: Troy McCollum
Source of Base Map Data: USGS EDC
MVN Point of Contact: Chris Gaines
MVS Point of Contact: Hal Lawrence
POST HURRICANE GUSTAV
PHOTO SEPTEMBER 2008
Shelton
Sunset
Boudreaux
Pete's Wharf
Bayside
Tahiti East
L. Raiguard
Memory
Venly
Curtauk
Burnette
Weeland
Mary
Prairie
Susie
PLATE 2

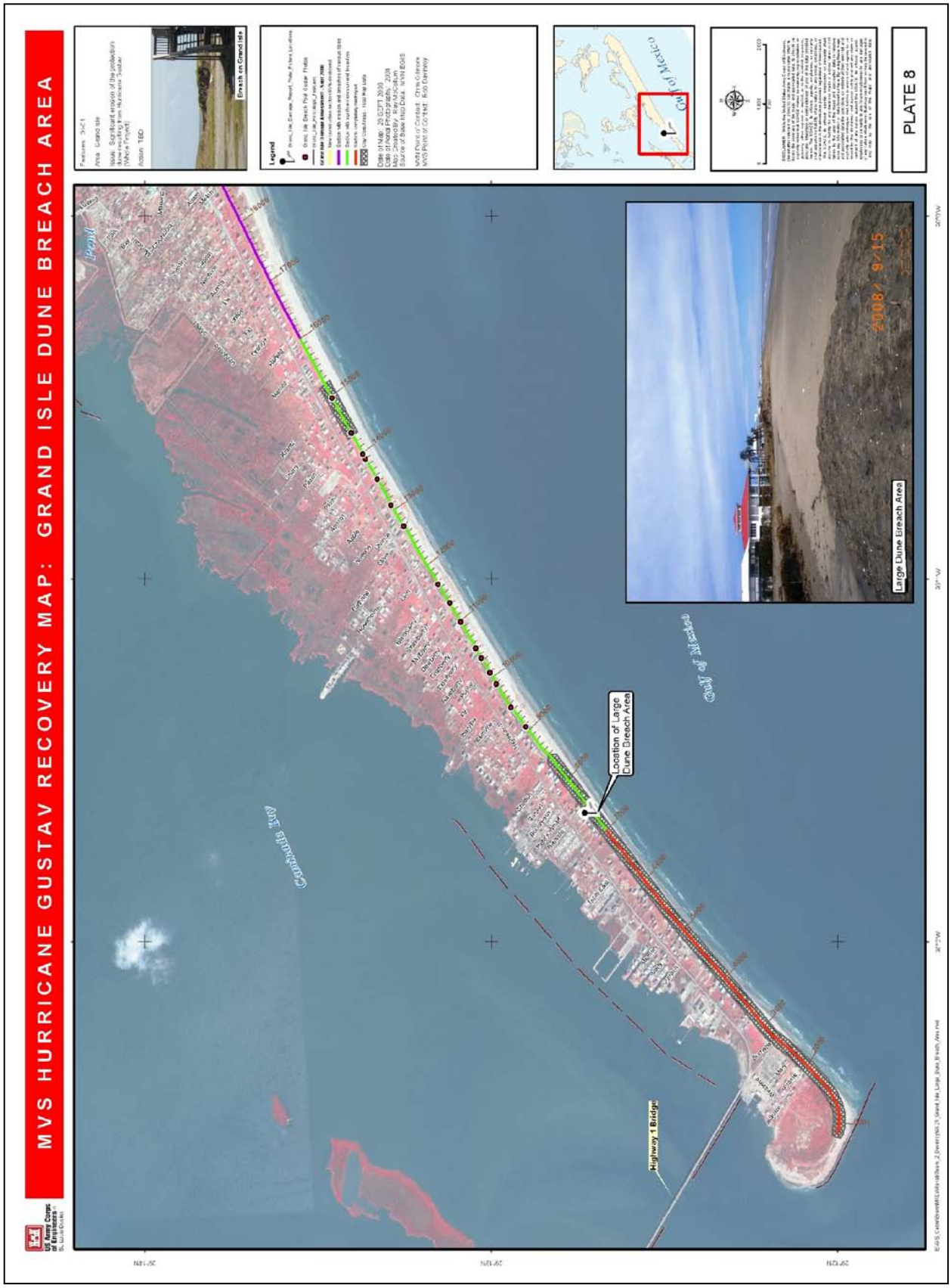

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE DAMAGE MAP NO.2
US Army Corps of Engineers
Krantz
Cherry
Peach
Plum
Apricot
Apple
Wisteria
Olive
Quince
Highway
Lem
Catrine
Rosehomie
Blackberry
Strawberry
Mulberry
Dewberry
Cranberry
Elderberry
Raspberry
Poplar
Fir
Ibarville
Bernville
POST HURRICANE GUSTAV
PHOTO SEPTEMBER 2008
PLATE 3

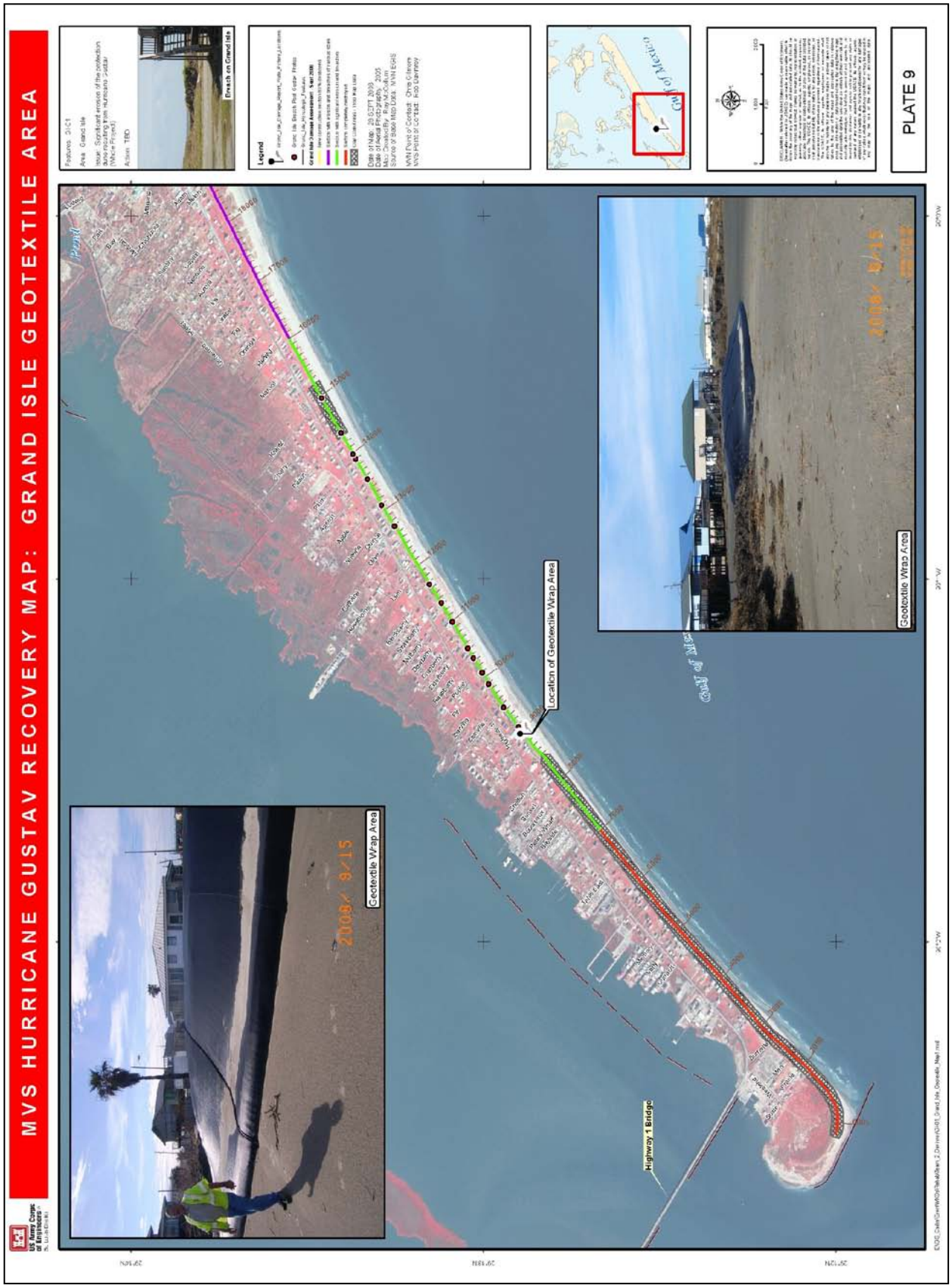
MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE DAMAGE MAP NO. 3
US Army Corps of Engineers
Beach on Grand Isle
Legend
Grand Isle State
Exxon Mobil
Highway 1
Yacht Harbor
Loma Linda
Grand Isle State
Grand Isle Slabs
Orleans
Willow
Birch
Pine
Walnut
Jefferson
POST HURRICANE GUSTAV PHOTO SEPTEMBER 2008
PLATE 4

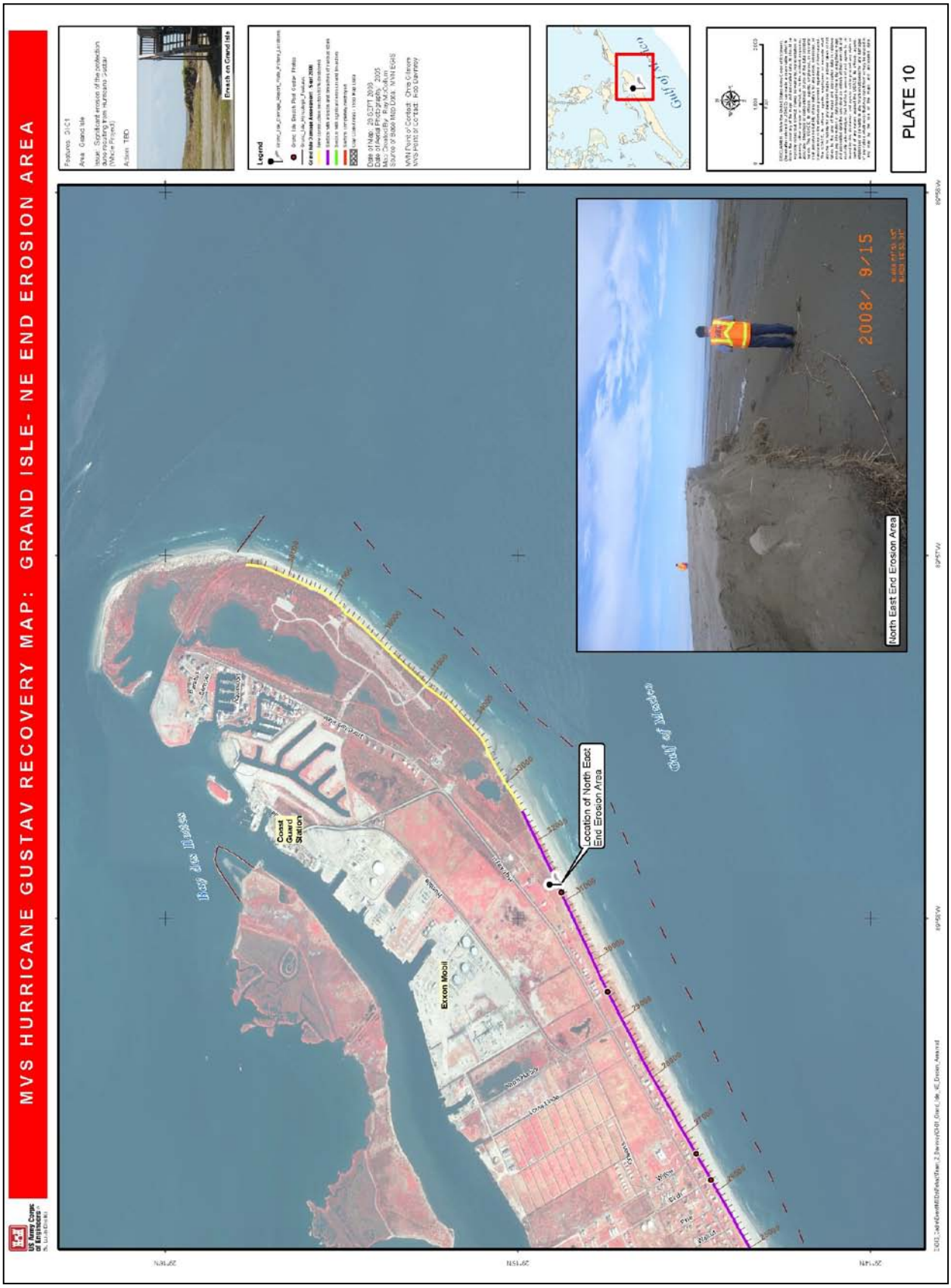

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE DAMAGE MAP NO.4
US Army Corps of Engineers
Grand Isle State Park
Paradise Sandbar
Aquasport
Grand Isle State
POST HURRICANE GUSTAV PHOTO SEPTEMBER 2008
Parking lot in Grand Isle State Park
Legend
PLATE 5

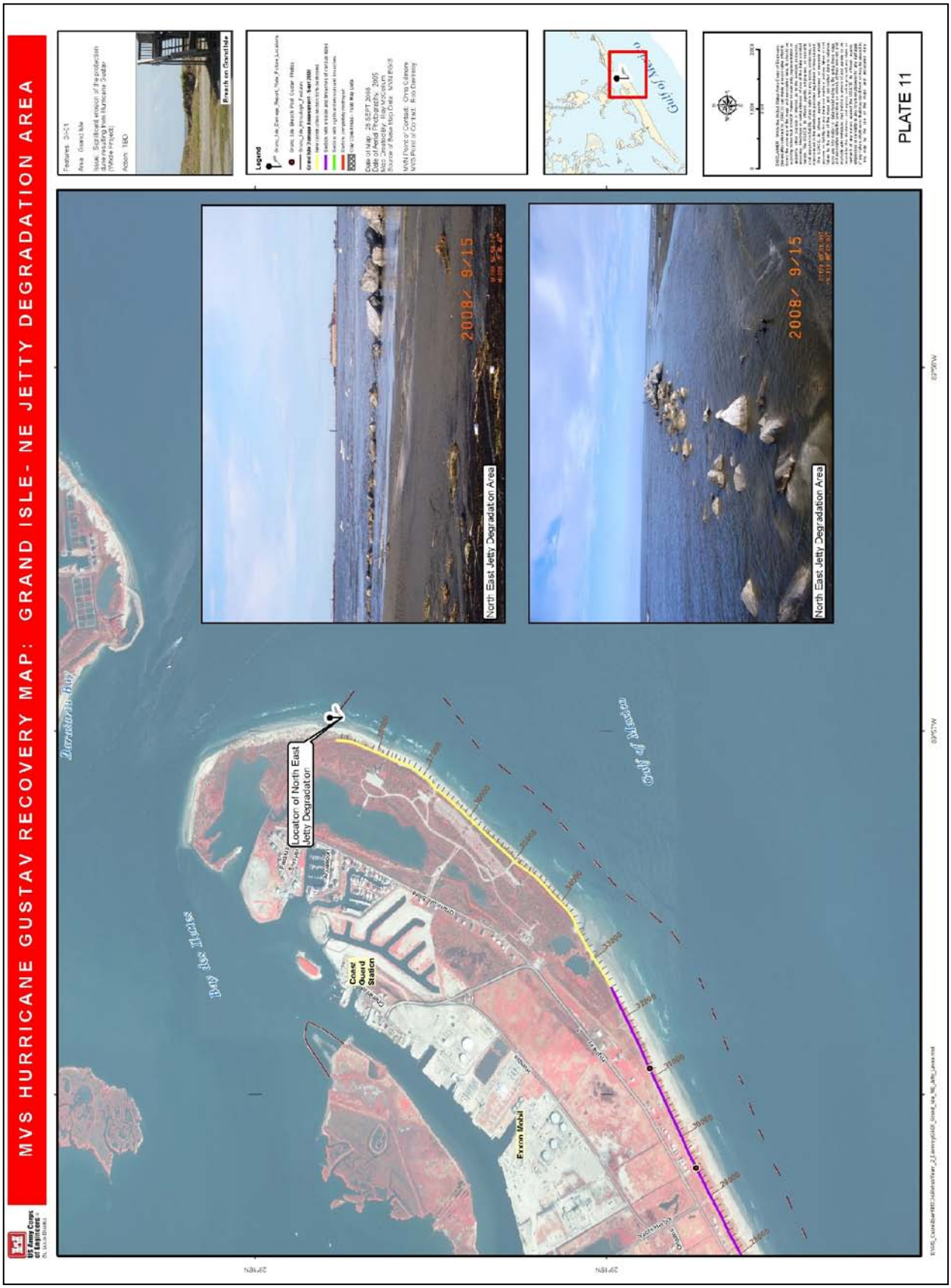

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE- SW EROSION AREA
Features: 3/C1
Area: Grand Isle
Issue: Significant erosion of the protection due resulting from Hurricane Gustav (NWO Project)
Action: TBD
Breach on Grand Isle
Legend
Date of Map: 29 OCT 2008
Date of Aerial Photography: 2005
Location: Grand Isle, Louisiana
Source of Base Map Data: NOAA ERS
MVN Point of Contact: Chris Gibson
MVS Point of Contact: Rod Gerpoy
Gulf of Mexico
PLATE 6
Barataria Bay
Gulf of Mexico
Location of South West Erosion Area
Highway 1 Bridge
South West Erosion Area
2008/ 9/15


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE LARGE SANDBAG AREA
US Army Corps of Engineers
Features: 01C1
Area: Grand Isle
Issue: Significant erosion of the protection zone resulting from Hurricane Gustav (NWC#1Project)
Action: TBD
Breach on Grand Isle
Legend
Date of Map: 29 OCT 2008
Datum: NAD83 (FEET)
Projection: Lambert Conformal Conic
Source of Base Map Data: NOAA ENC
MVN Point of Contact: Chris Gibson
MVS Point of Contact: Rob Gerhardt
Gulf of Mexico
Large Sandbag Area
2008-9-15
Location of large sandbags
Highway 1 Bridge
Caminada Bay
Barrier Island
PLATE 7


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE DUNE BREACH AREA
US Army Corps of Engineers
Breach on Grand Isle
Legend
Gulf of Mexico
Location of Large Dune Breach Area
Large Dune Breach Area
2008 / 9-15
Highway 1 Bridge
Caminada Bay
Gulf of Mexico
PLATE 8

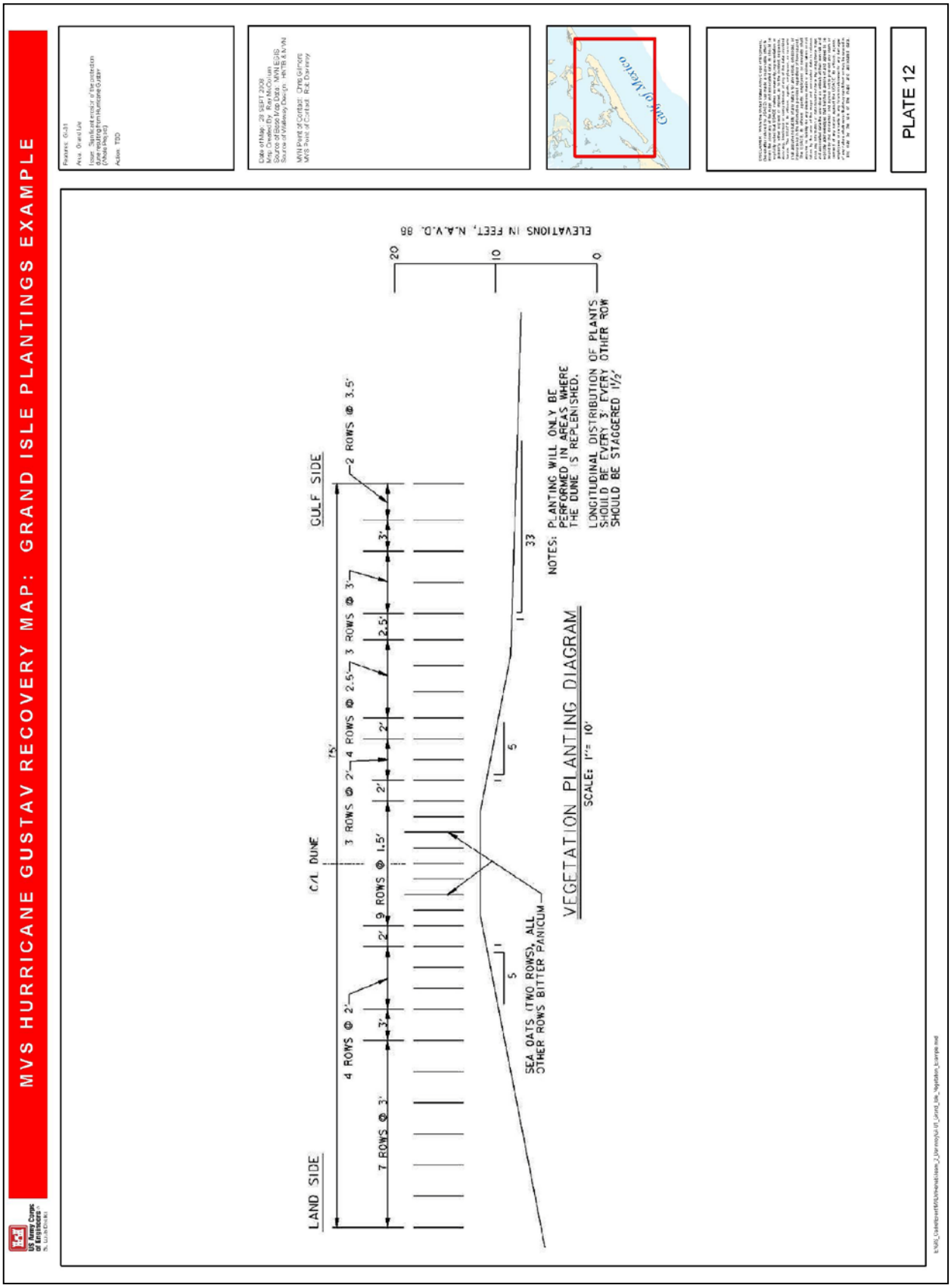

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE GEOTEXTILE AREA
US Army Corps of Engineers
Features: 3/C1
Area: Grand Isle
Issue: Significant erosion of the protection zone resulting from Hurricane Gustav (NWO Project)
Action: TBD
Breach on Grand Isle
Legend
Date of Map: 29 OCT 2008
Datum: NAD83 (FEET)
Projection: State Plane Louisiana South
Source of Base Map Data: NOAA ESRI
MVN Point of Contact: Chris Gibson
MVS Point of Contact: Rod Gerringer
City of Mexico
Location of Geotextile Wrap Area
Highway 1 Bridge
Geotextile Wrap Area
2008-8-15
Geotextile Wrap Area
2008-8-15
PLATE 9

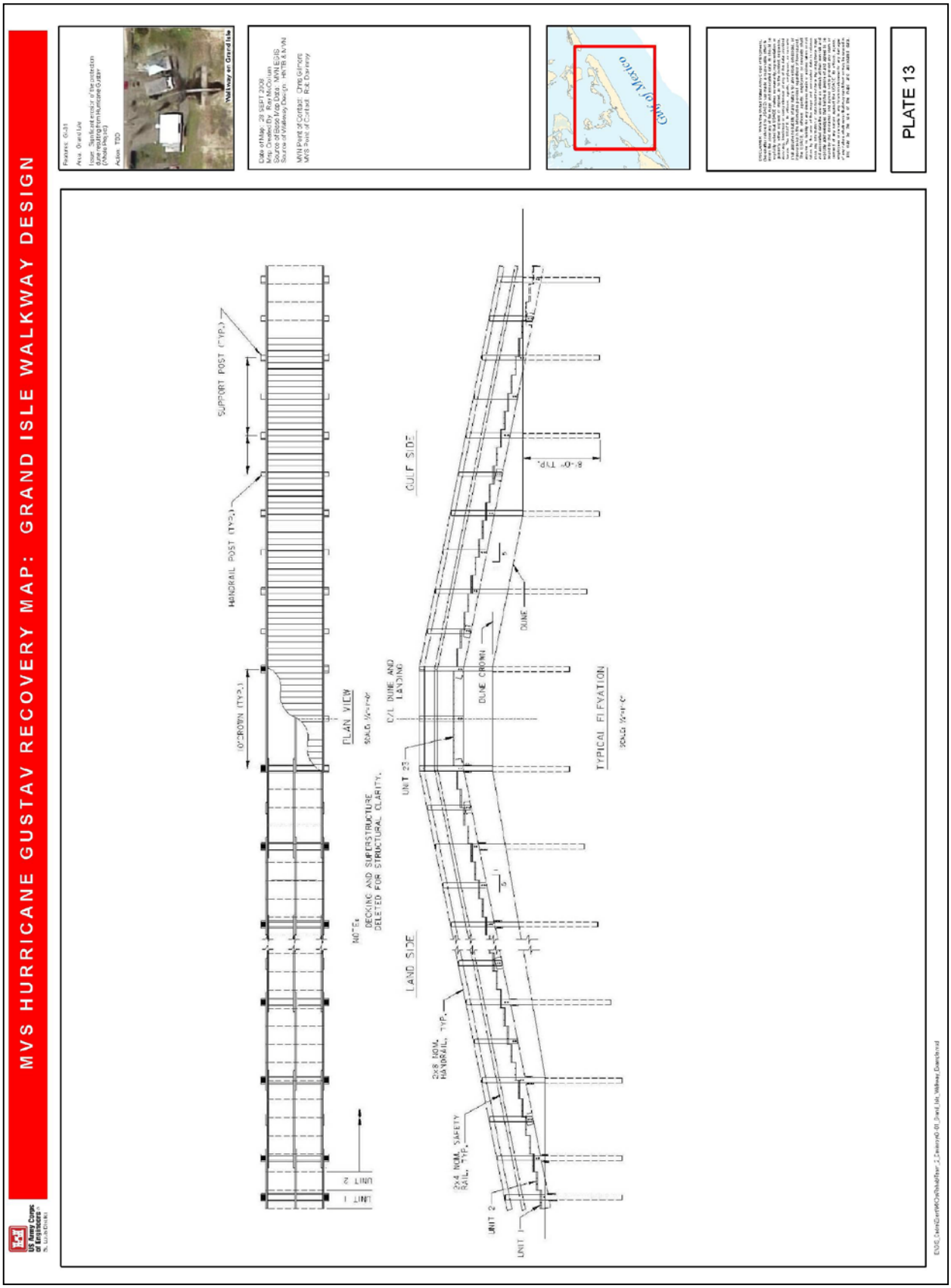

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE- NE END EROSION AREA
US Army Corps of Engineers
Features: 3/C1
Area: Grand Isle
Issue: Significant erosion of the collection zone resulting from Hurricane Gustav (NE end Project)
Action: TBD
Breach on Grand Isle
Legend
Date of Map: 29 OCT 2008
Data Collected: Pre-Gustav 2005
Post-Gustav 9/15/2008
Source of Base Map Data: NOAA ENC
MVN Point of Contact: Chris Gibson
MVS Point of Contact: Rod Gaspard
Gulf of Mexico
North East End Erosion Area
2008/ 9/15
Location of North East End Erosion Area
Coast Guard Station
Exxon Mobil
Bay Eloi Inlet
Gulf of Mexico
PLATE 10

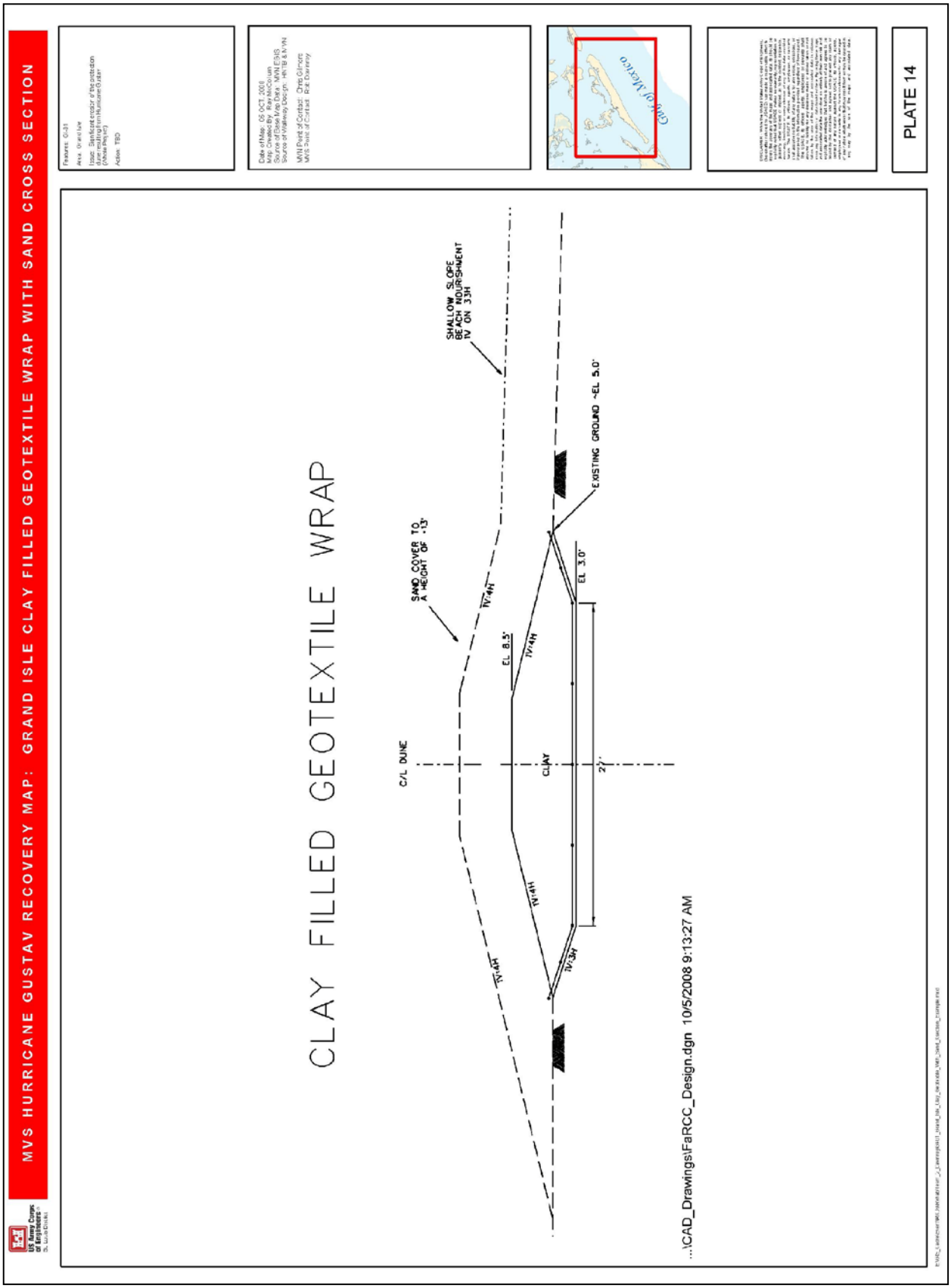

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE- NE JETTY DEGRADATION AREA
US Army Corps of Engineers
Features: 3-C-1
Area: Grand Isle
Issue: Significant erosion of the protection dune resulting from Hurricane Gustav (Hence Project)
Action: TBD
Beach on Grand Isle
Legend
Grand Isle Damage Assessment: Sept 2008
Date of Map: 29 SEPT 2008
Coordinate Reference System: NAD 1983
Map Created By: Ray Vickcium
Source of Base Map Data: MVM EGIS
MVN Point of Contact: Chris Gilmore
MVS Point of Contact: Rob Dermoy
Gulf of Mexico
Barataria Bay
Bay Aux Ilettes
Locator of North East Jetty Degradation
Coast Guard Station
Exxon Mobil
2008/ 9/15
North East Jetty Degradation Area
2008/ 9/15
North East Jetty Degradation Area
PLATE 11

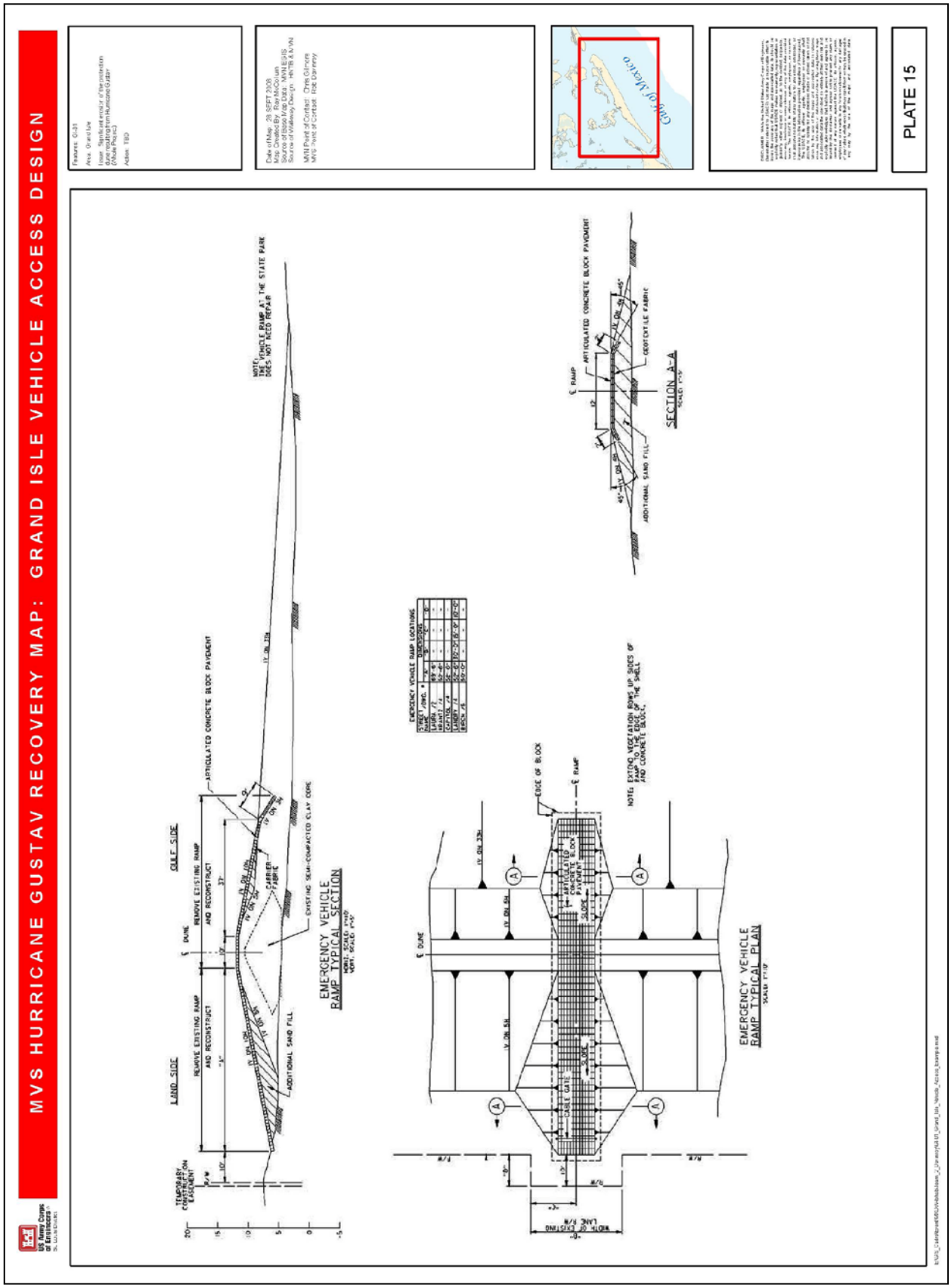
APPENDIX D

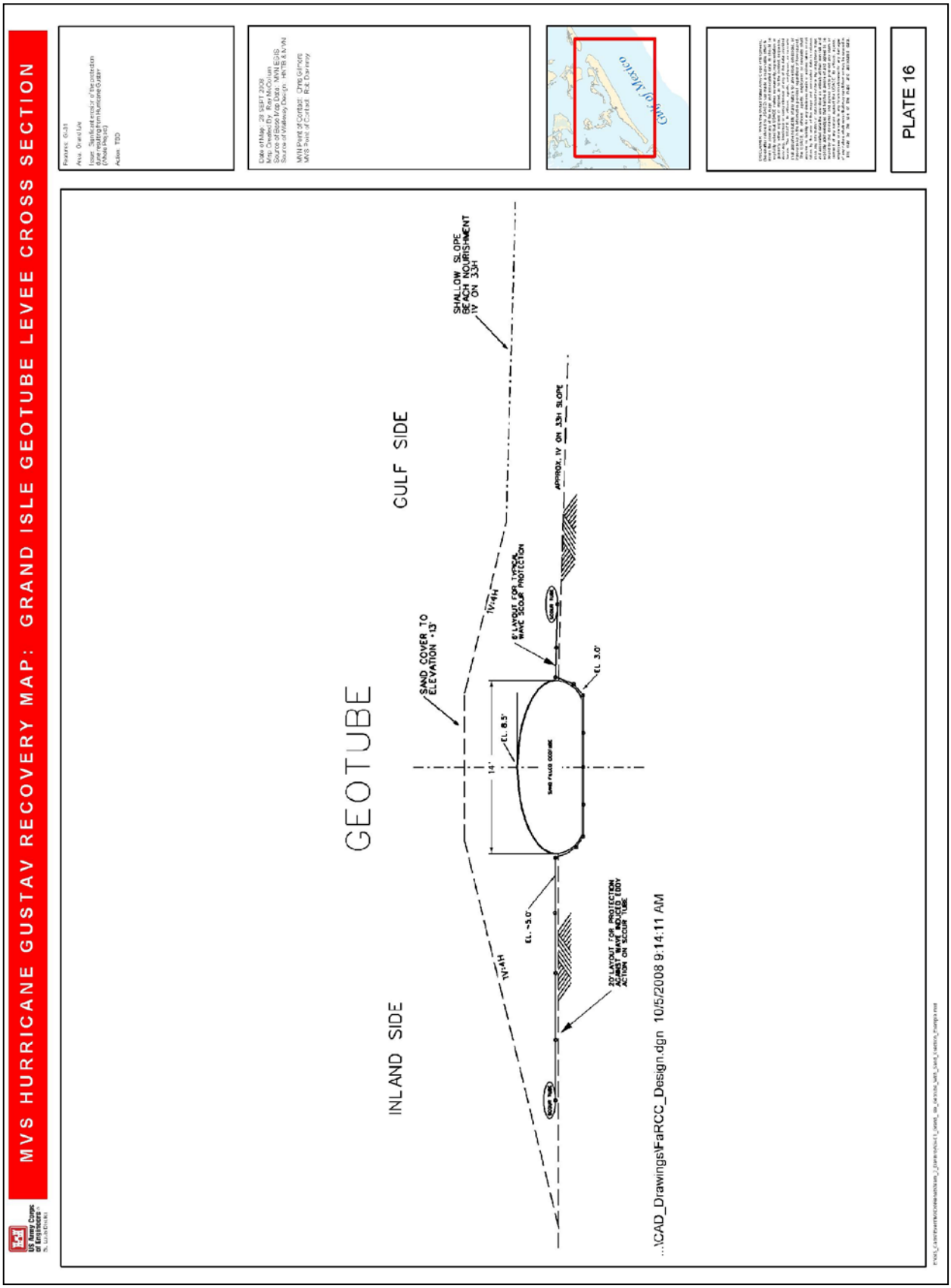
GENERAL PLANS FOR ALTERNATIVES

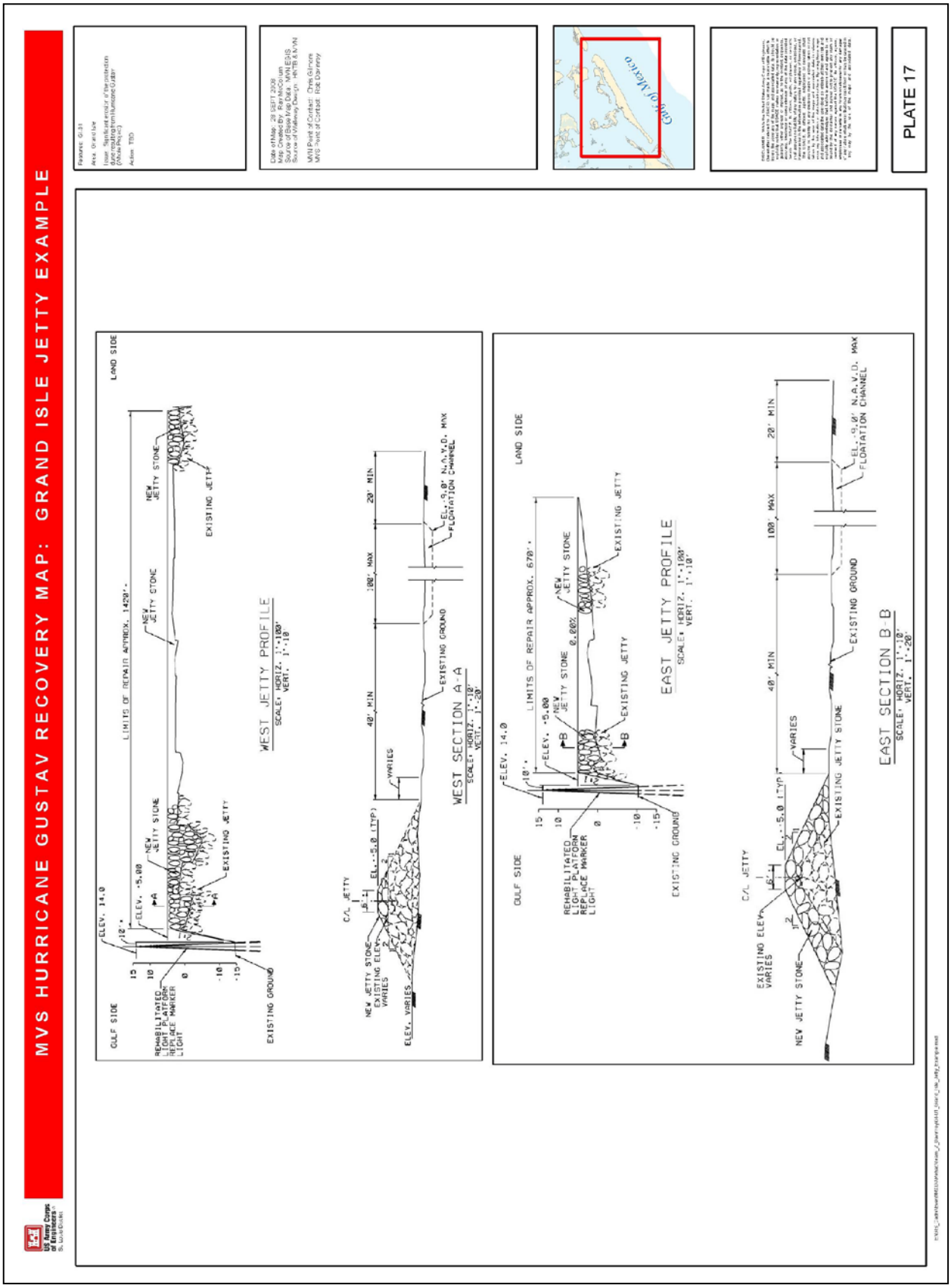

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE PLANTINGS EXAMPLE
US Army Corps of Engineers
Feature: G-31
Area: Grand Isle
Issue: Significant erosion of the protection dune resulting from Hurricane Gustav (Made Region)
Action: TBD
Date of Map: 29 SEPT 2008
Map Created By: Rick McCollum
Source of Base Map Data: MVN EGIS
Source of Walkway Design: HNTB & MVN
MVN Point of Contact: Chris Gilmore
MVS Point of Contact: Rick Downey
City of Mexico
PLATE 12
LAND SIDE
C/L DUNE
GULF SIDE
7 ROWS @ 3'
4 ROWS @ 2'
3'
2'
9 ROWS @ 1.5'
2'
3 ROWS @ 2'
4 ROWS @ 2.5'
2'
3 ROWS @ 3'
2.5'
3'
2 ROWS @ 3.5'
75'
SEA OATS (TWO ROWS), ALL OTHER ROWS BITTER PANICUM
5
1
33
NOTES: PLANTING WILL ONLY BE PERFORMED IN AREAS WHERE THE DUNE IS REPLENISHED.
LONGITUDINAL DISTRIBUTION OF PLANTS SHOULD BE EVERY 3' EVERY OTHER ROW SHOULD BE STAGGERED 1½'
VEGETATION PLANTING DIAGRAM
SCALE: 1"= 10'
ELEVATIONS IN FEET, N.A.V.D. 88
20
10
0


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE WALKWAY DESIGN
US Army Corps of Engineers
Walkway on Grand Isle
City of Mexico
PLATE 13
SUPPORT POST (TYP.)
HANDRAIL POST (TYP.)
10'-0" (TYP.)
PLAN VIEW
SCALE: 1/4"=1'-0"
NOTE:
DECKING AND SUPERSTRUCTURE DELETED FOR STRUCTURAL CLARITY.
UNIT 1
UNIT 2
GULF SIDE
LAND SIDE
C/L DUNE AND LANDING
DUNE CROWN
DUNE
UNIT 23
8'-0" TYP.
2x8 NOM. HANDRAIL, TYP.
2x4 NOM. SAFETY RAIL, TYP.
TYPICAL ELEVATION
SCALE: 1/4"=1'-0"


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE CLAY FILLED GEOTEXTILE WRAP WITH SAND CROSS SECTION
US Army Corps of Engineers
New Orleans District
Feature: G-31
Area: Grand Isle
Issue: Significant scour of the protection dune during hurricanes Gustav (Onde Project)
Action: TBD
Date of Map: 05 OCT 2008
Map Created By: Rachel Colvin
Source of Base Map Data: MVN ESIS
Source of Walkway Design: HNTB & MVN
MVN Point of Contact: Chris Gilmore
MVS Point of Contact: Rick Downey
Gulf of Mexico
PLATE 14
CLAY FILLED GEOTEXTILE WRAP
SHALLOW SLOPE BEACH NOURISHMENT 1V ON 33H
SAND COVER TO A HEIGHT OF +13'
EXISTING GROUND ~EL 5.0'
EL 3.0'
EL 8.5'
1V:4H
1V:4H
1V:4H
1V:4H
1V:3H
C/L DUNE
CLAY
27'
...\CAD_Drawings\FaRCC_Design.dgn 10/5/2008 9:13:27 AM

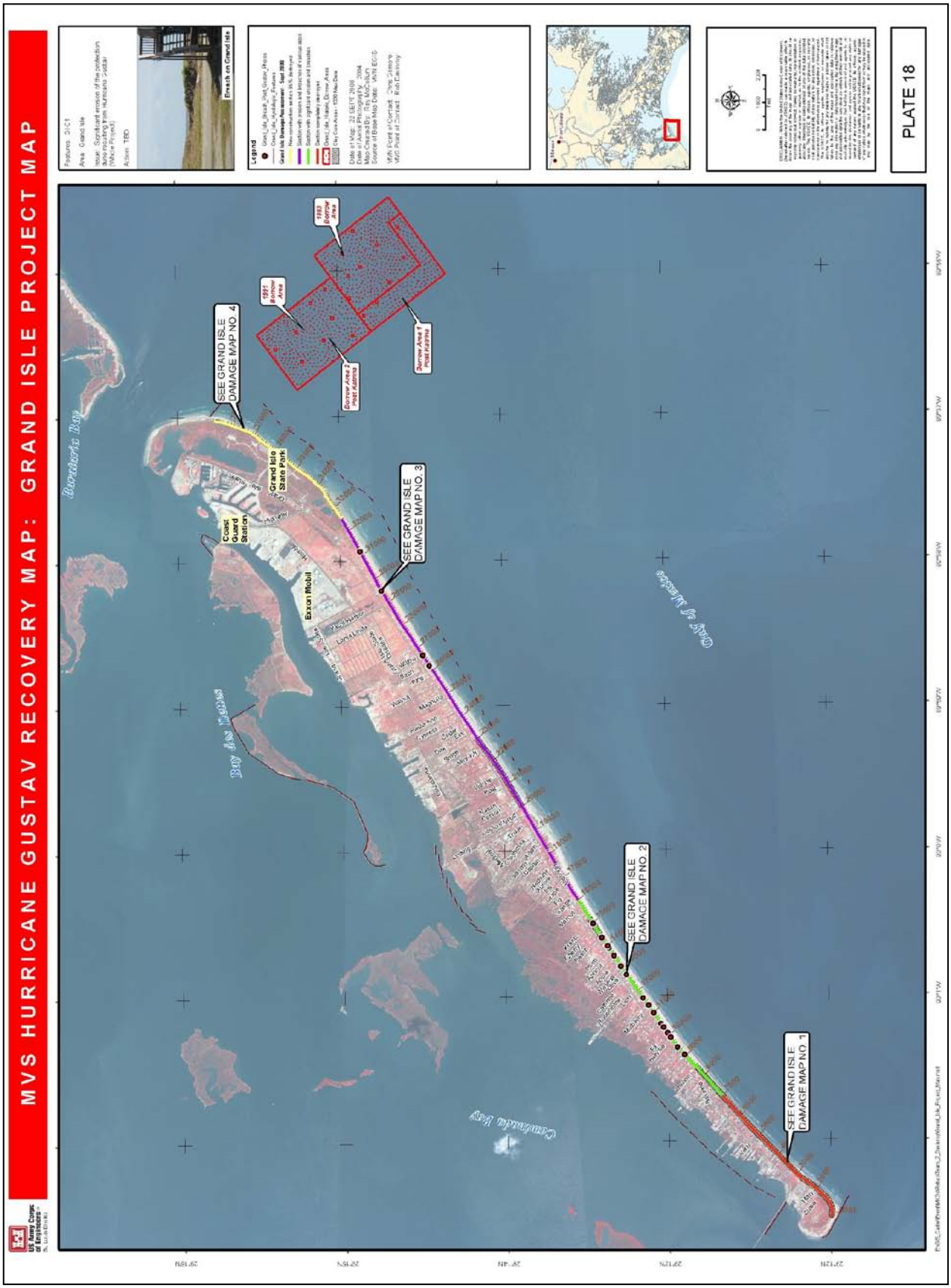

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE VEHICLE ACCESS DESIGN
US Army Corps of Engineers
Features: G-31
Area: Grand Isle
Issue: Significant erosion of the protection dune resulting from Hurricane Gustav (Made Pacific)
Action: TBD
Date of Map: 28 SEPT 2008
Map Created By: Ray McCollum
Source of Basic Map Data: MVN EGIS
Source of Map Design: MVN TEAM
MVN Point of Contact: Chris Gimore
MVN Point of Contact: Rick Dormay
Gulf of Mexico
PLATE 15
LAND SIDE
GULF SIDE
REMOVE EXISTING RAMP AND RECONSTRUCT
ARTICULATED CONCRETE BLOCK PAVEMENT
EXISTING SEMI-COMPACTED CLAY DDRS
ADDITIONAL SAND FILL
EMERGENCY VEHICLE RAMP TYPICAL SECTION
EMERGENCY VEHICLE RAMP LOCATIONS
EDGE OF BLOCK
NOTE: EXTEND VEGETATION ROWS UP SIDES OF RAMP TO THE EDGE OF THE SHELL
EMERGENCY VEHICLE RAMP TYPICAL PLAN
SECTION A-A
GEOTEXTILE FABRIC

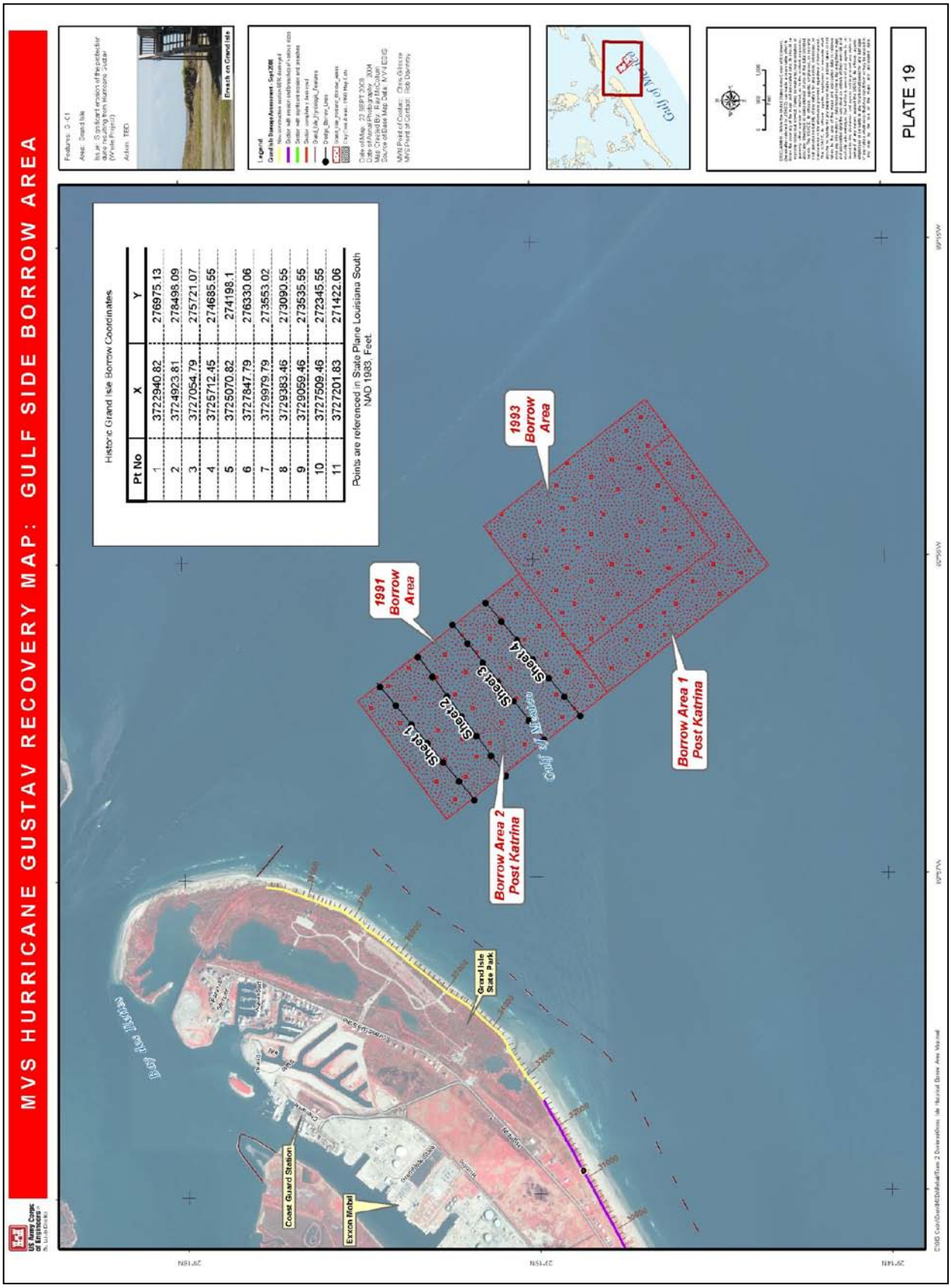

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE GEOTUBE LEVEE CROSS SECTION
US Army Corps of Engineers
Feature: GI-31
Area: Grand Isle
Issue: Significant erosion of the protection dune resulting from Hurricane Gustav (Made Region)
Action: TBD
Date of Map: 29 SEPT 2008
Map Created By: Rick McCown
Source of Base Map Data: MVN EGIS
Source of Waterway Design: HNTB & MVN
MVN Point of Contact: Chris Gilmore
MVS Point of Contact: Rick Downey
Gulf of Mexico
PLATE 16
GEOTUBE
INLAND SIDE
GULF SIDE
SAND COVER TO ELEVATION +13'
SHALLOW SLOPE BEACH NOURISHMENT 1V ON 3.3H
APPROX. 1V ON 3.3H SLOPE
1V:4H
1V:4H
14'
EL. 8.5'
EL. 3.0'
EL. -3.0'
8' LAYOUT FOR TYPICAL WAVE SCOUR PROTECTION
20' LAYOUT FOR PROTECTION AGAINST WAVE REFLECTED ACTION ON SCOUR TUBE
SAND FILLED GEOTUBE
SCOUR TUBE
...\CAD_Drawings\FaRCC_Design.dgn 10/5/2008 9:14:11 AM

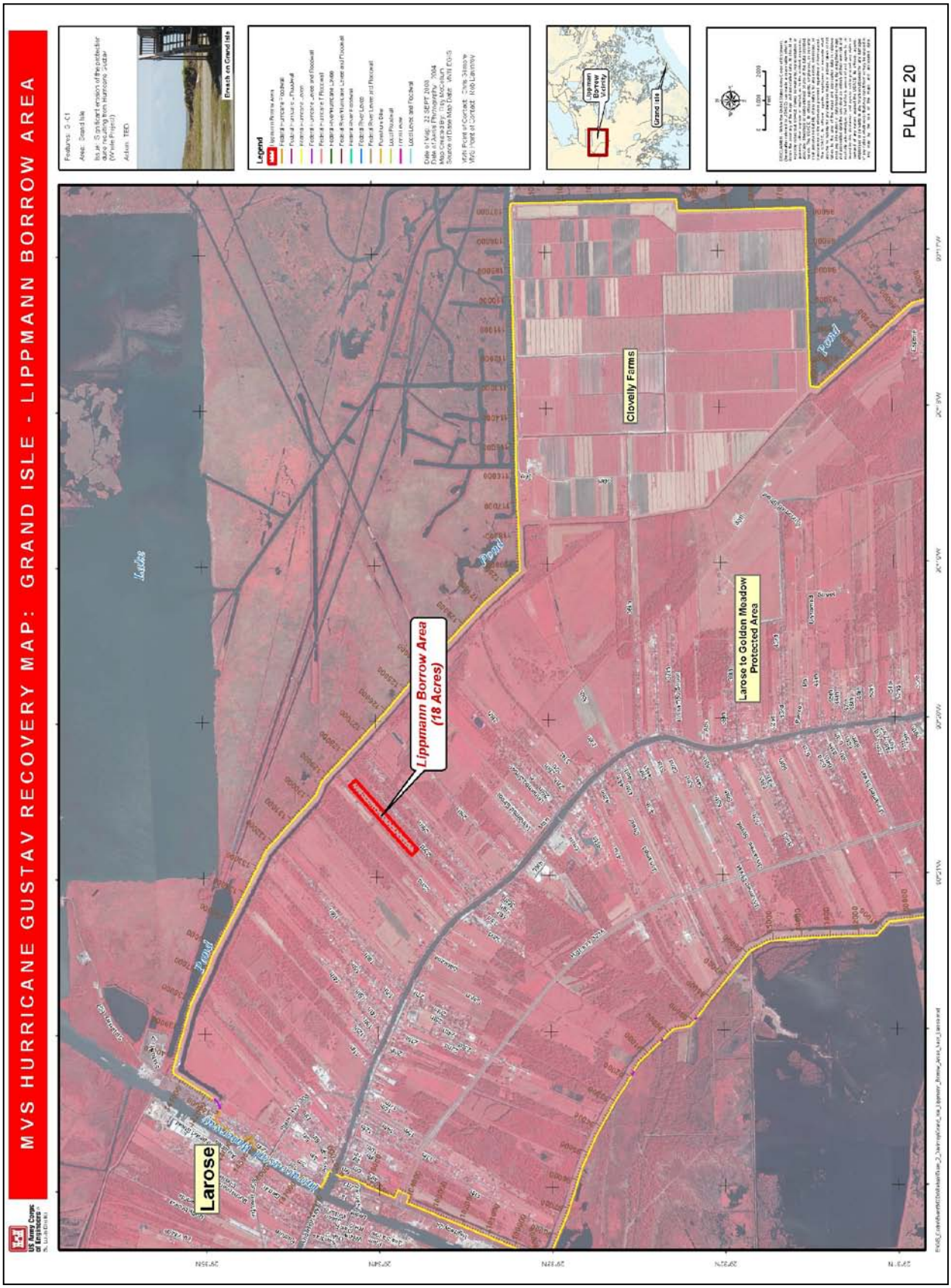

MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE JETTY EXAMPLE
US Army Corps of Engineers
Gulf of Mexico
WEST JETTY PROFILE
SCALE: HORIZ. 1":100' VERT. 1":10'
WEST SECTION A-A
SCALE: HORIZ. 1":10' VERT. 1":20'
EAST JETTY PROFILE
SCALE: HORIZ. 1":100' VERT. 1":10'
EAST SECTION B-B
SCALE: HORIZ. 1":10' VERT. 1":20'
GULF SIDE
LAND SIDE
LIMITS OF REPAIR APPROX. 1420'
LIMITS OF REPAIR APPROX. 670'
ELEV. 14.0
ELEV. -5.00
NEW JETTY STONE
EXISTING JETTY
EXISTING GROUND
REHABILITATED LIGHT PLATFORM REPLACE MARKER LIGHT
C/L JETTY
EL. -5.0 (TYP)
EXISTING ELEV. VARIES
ELEV. VARIES
VARIES
40' MIN
100' MAX
20' MIN
EL. -9.0' N.A.V.D. MAX FLOATATION CHANNEL
0.00%
PLATE 17

APPENDIX E

BORROW SITES


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE PROJECT MAP
Features: 3/C1
Area: Grand Isle
Issue: Significant erosion of the protection dune resulting from Hurricane Gustav (Nov Project)
Action: TBD
Breach on Grand Isle
Legend
Grand Isle Damage Assessment, Sept 2008
Grand Isle Damage Assessment, Nov 2008
Section with significant erosion and breaches
Section completely overwash
Grand Isle Historic Borrow Areas
Date of Aerial Photography: 2004
Date of Map: 22 SEPT 2008
Source of Base Map Data: USACE-MVN
Source of Borrow Areas: USACE-MVN, ECID
With Point of Contact: Chris Gainey
With Point of Contact: Brad Dastugue
PLATE 18
SEE GRAND ISLE DAMAGE MAP NO. 4
SEE GRAND ISLE DAMAGE MAP NO. 3
SEE GRAND ISLE DAMAGE MAP NO. 2
SEE GRAND ISLE DAMAGE MAP NO. 1
1991 Borrow Area
1993 Borrow Area
Borrow Area 2 Post Gustav
Borrow Area 1 Post Katrina
Grand Isle State Park
Coast Guard Station
Exxon Mobil
Barataria Bay
Bay des Ilettes
Caillou Bay
Gulf of Mexico


MVS HURRICANE GUSTAV RECOVERY MAP: GULF SIDE BORROW AREA
Features: G-C1
Area: Grand Isle
Brief: Significant erosion of the protective dune resulting from Hurricane Katrina (Private Project)
Action: TBD
Breach on Grand Isle
Legend
Grand Isle Survey Assessment, Sept 2008
Sector with minor overwash and breaches of various sizes
Sector with significant erosion and breaches
Sector complete / secured
Grand_Isle_Flyovers_Features
Dredge_Borrow_Areas
Grand_Isle_Protect_Borrow_areas
Date of Map: 22 SEPT 2008
Date of Aerial Photography: 2004
Map Projection: Lambert Conformal
Source of Base Map Data: NVM EDIS
MVN Point of Contact: Chris Gibson
MVS Point of Contact: Rob Doering
Gulf of Mexico
PLATE 19
Historic Grand Isle Borrow Coordinates
Pt No | X | Y
1 | 3722940.82 | 276975.13
2 | 3724923.81 | 278498.09
3 | 3727054.79 | 275721.07
4 | 3725712.45 | 274685.55
5 | 3725070.82 | 274198.1
6 | 3727847.79 | 276330.06
7 | 3729979.79 | 273553.02
8 | 3729383.46 | 273090.55
9 | 3729059.46 | 273535.55
10 | 3727509.46 | 272345.55
11 | 3727201.83 | 271422.06
Points are referenced in State Plane Louisiana South NAD 1983, Feet.
1993 Borrow Area
1991 Borrow Area
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Borrow Area 2 Post Katrina
Borrow Area 1 Post Katrina
Gulf of Mexico
Grand Isle State Park
Coast Guard Station
Exxon Mobil
Bay Jean Lafourche


MVS HURRICANE GUSTAV RECOVERY MAP: GRAND ISLE - LIPPMANN BORROW AREA
Breach on Grand Isle
Legend
Lippmann Borrow Area
Grand Isle
Lake
Pond
Larose
Clovelly Farms
Lippmann Borrow Area
(18 Acres)
Larose to Golden Meadow
Protected Area
PLATE 20

APPENDIX F
BOLIVAR PENINSULA TEXAS FIELD VISIT

On September 30, 2008 engineers of the Hurricane Recovery Team (Bailey, Brown, Davinroy, Wheeler) visited the Bolivar Peninsula in Galveston County, Texas. This area was hit hard by Hurricane Ike on the morning of September 11. The entire peninsula was ravaged by severe storm surges of nearly 14 feet and winds over 100 mph. Many homes and businesses were completely removed from their timber pile foundations and deposited into the bay behind the peninsula. Some people that did not head the evacuation warning died as a result. Damage near the beach was catastrophic. Damage inland was extensive as well.

Galveston County, in 2000, installed a series of Geotube structures along the gulf side beach in sections of Bolivar Peninsula near the town of Gilchrist. These geo-textile structures were built as an erosion control and protection measure from storm tides. Like the clay burrito concept at Grand Isle, they served as a rooted core for a protective sand dune. The tubes themselves were approximately 6' in height and 34' in circumference. They were protected by a scour blanket and smaller anchor tubes extending 6' gulfward and 6' inland that ran the entire length of the Geotube line. The tubes were filled with sand that was trucked in from an inland source. Then they were covered in a thick Ultraviolet (UV) light protection blanket. After the geotube, scour protection, and UV light blanket, the entire structure was covered in sand to give the appearance of a natural dune system.

Upon arriving at the eastern end of the geotube line, the team immediately noticed that all sand cover was removed by the storm. The geotube was left exposed to the elements. Most of the UV protection was still in place, but was damaged in several areas. Broad scour depressions (~50'-75' in width) were noted immediately inland of the geotube line. The ground was littered with a cover of small, brittle shells with sharp edges. Very little debris was seen at the eastern end of the geotubes. The team

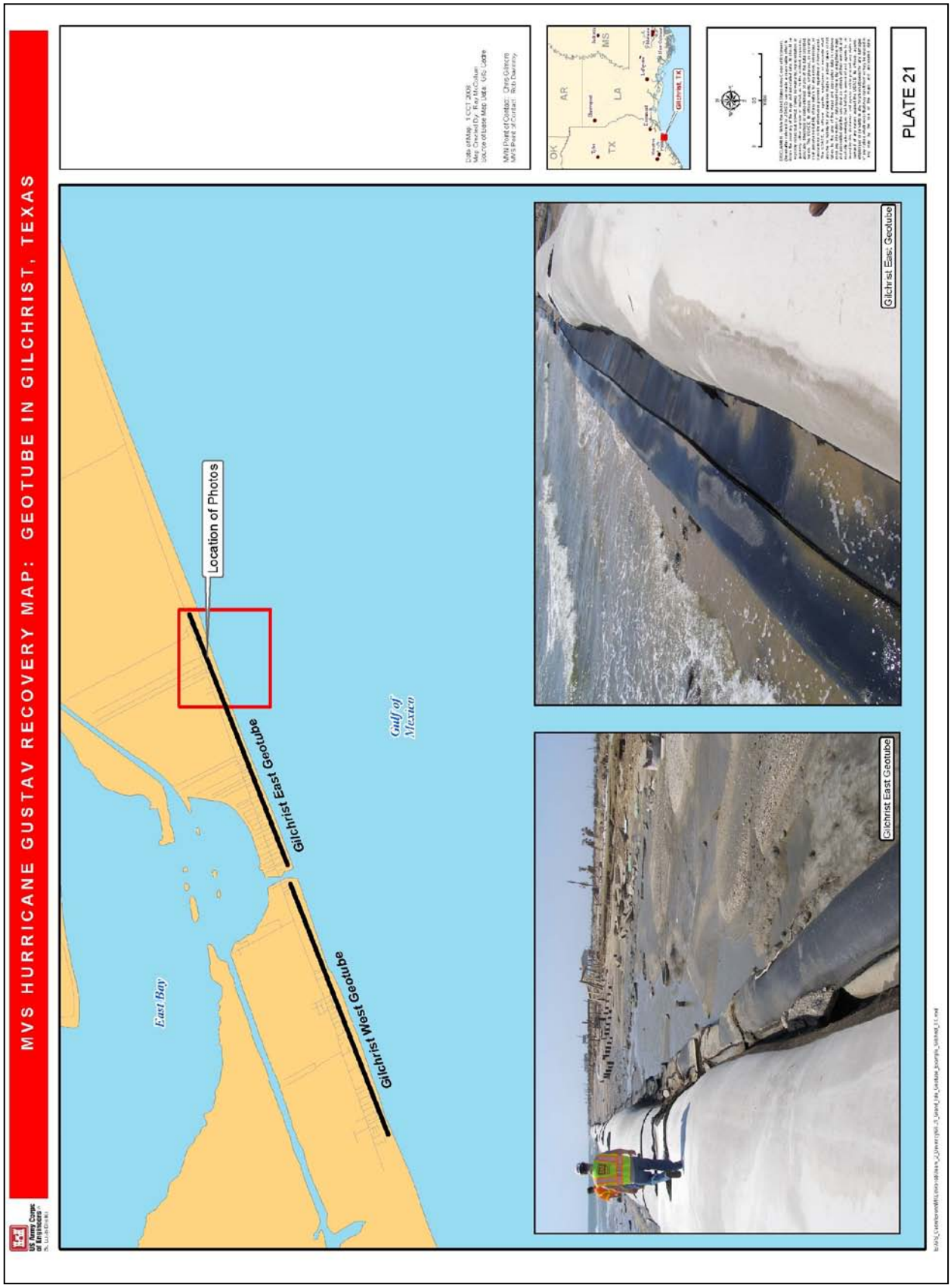
assumed that much of the debris from the destroyed homes was probably deposited in the bay behind the peninsula from the incoming storm surge attack.

Most of the geotube line had not moved laterally. However, some breaches of varying lengths were noted. The breaches appeared to have been caused by rips or tears in the geotubes. In all cases, the broken geotubes were pointed out toward the gulf. Geotube connection points did not appear to have been more vulnerable to failure than midlength sections. It was also noted that no breaches in the geotube were oriented inland of the original geotube line. This led the team to suspect that the surge wave flow back toward the gulf from the bay was strong and could possibly have been the ultimate cause of several or all geotube failure points. Further evidence of strong gulfward return flow from the bay was that all grass was laid down in the direction of the gulf.

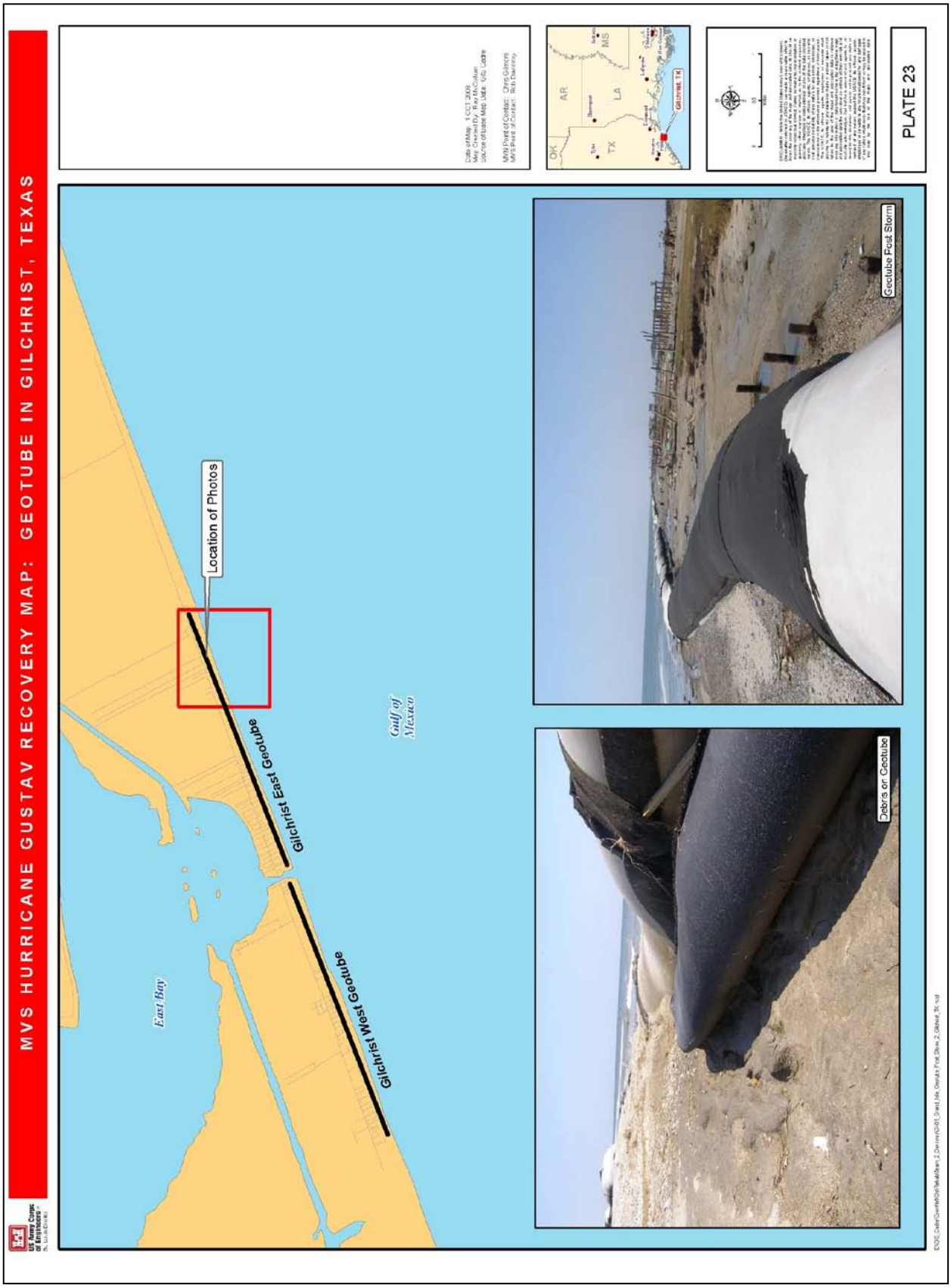
The team also noted that the gulf side scour blanket and tube performed as designed. Much of the gulf side scour tubes were buried in the sand and shells, protecting against gulf side undercutting of the geotube line. The inland scour blanket and tube did not perform so admirably. The scour tube was pushed up against the larger geotube in most locations, and had not buried deep into the sand as designed. The team noted that two different hydraulic conditions on the two sides of the geotube were probably responsible for the different performances. Evidence suggested that wave/scour action from the gulf over the top of the geotube caused uplift forces that literally picked up the scour tube on the inland side and deposited it at the face of the larger geotube. The compromised scour protection could have led to the ultimate undermining of the larger main geotube. When the surge water retuned from the bay toward the gulf, the undermined scour holes became drainage points, as evident by the Head-cutting observed just landward of the geotube breaches.

The erosion associated with the headcutting extended all the way to the next hardened structure, State Hwy 87. In many breached areas, all sand was removed from the

beach and dune so that a sandy silt layer of consolidated material was left. A localized delta of accretion was also noted at a few breach locations. This accretion could have occurred as water pooled behind the geotubes before it could escape to the gulf or from high tide conditions well after the storm deposited material into low areas.


MVS HURRICANE GUSTAV RECOVERY MAP: GEOTUBE IN GILCHRIST, TEXAS
US Army Corps of Engineers
Location of Photos
Gilchrist East Geotube
Gilchrist West Geotube
East Bay
Gulf of Mexico
Gilchrist East Geotube
Gilchrist East Geotube
OK
AR
TX
LA
MS
Gilchrist, TX
PLATE 21

MVS HURRICANE GUSTAV RECOVERY MAP: GEOTUBE IN GILCHRIST, TEXAS
US Army Corps of Engineers
Location of Photos
Gilchrist East Geotube
Gilchrist West Geotube
East Bay
Gulf of Mexico
Scour Protection on Geotube
Debris on Geotube
OK
AR
TX
LA
MS
Gilchrist, TX
PLATE 22


MVS HURRICANE GUSTAV RECOVERY MAP: GEOTUBE IN GILCHRIST, TEXAS
Location of Photos
Gilchrist East Geotube
Gilchrist West Geotube
East Bay
Gulf of Mexico
Debris on Geotube
Geotube Post Storm
Gilchrist, TX
PLATE 23

MVS HURRICANE GUSTAV RECOVERY MAP: GEOTUBE EXAMPLES IN GILCHRIST, TEXAS
Vicinity of Photos
Gilchrist East Geotube
Gilchrist West Geotube
East Bay
Gulf of Mexico
Geotube before storm
Geotube after storm
Gilchrist, TX
PLATE 24

APPENDIX G

WAIVER

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

CECW-MVD 21 August 2006

MEMORANDUM FOR COMMANDER, MISSISSIPPI VALLEY DIVISION

SUBJECT: Request for Waivers to Specific Corps Policies Affecting Prompt Completion of the Hurricane Protection System for 3rd Supplemental Work

1. Reference CEMVD-PD-N memorandum dated 4 August 2006, subject: Request for Waivers to Specific Corps Policies Affecting Prompt Completion of the Hurricane Protection System for 3rd Supplemental Work and Proposal for Basis of Discussion with Council on Environmental Quality (CEQ) on Alternative Procedures for 3rd and 4th Supplemental Work.

2. The referenced memorandum requested numerous policy waivers for work being conducted as directed by the Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006, dated 30 December 2005 (3rd Supplemental). Our intent is to implement a comprehensive strategy that includes an integrated approach for all projects and plans for rebuilding and strengthening the system. HQUSACE determination of the specific requested policy waivers is provided below.

a. Waiver of policy requirements for environmental compliance prior to approval by MVD Commander of decision documents (APIRs) for work accelerated under 3rd Supplemental and prior to approval by MVD Commander of amended project agreements for such Work. A waiver is hereby granted of the policy requirements for environmental compliance prior to approval by MVD Commander of decision documents (APIRs) for work accelerated under 3rd Supplemental. A waiver is also granted of the policy requirements for environmental compliance prior to approval by the MVD Commander of amended project agreements for work accelerated under 3rd Supplemental. Compliance with all environmental laws must be completed prior to construction contract award.

b. Cost effectiveness.

i) Non-Federal projects specifically named in the 4th supplemental will require an assessment of continued need for the project, with the determination of the most cost effective alternative within the funds appropriated documented in a supporting document. These projects would include Plaquemines Parish West Bank Back Levee incorporation into the federal system & Terrebonne Parish non-Federal levees.

CECW-MVD
SUBJECT: Request for Waivers to Specific Corps Policies Affecting Prompt Completion of the Hurricane Protection System for 3rd Supplemental Work

ii) Within the appropriated funds, repairs of non-Federal projects not specifically named in the 3rd supplemental appropriation must be economically justified. These would include the Plaquemines Parish non-Federal East Bank back levee, the Grand Isle non-Federal levee and any other non-Federal levees proposed for repair and restoration to original design standards. Additionally, the 3rd supplemental authorized the restoration of these projects to original design levels. The waiver request indicates that to achieve a level of safety acceptable to the Corps, the levee sections for the Plaquemines Parish east bank levee and the Grand Isle levee would be larger than what is currently in place. This increased levee section is anticipated to cause significant wetlands and salt water impacts which contribute to the higher project cost. A complete list of the non-federal projects that are being repaired or considered for repairs under the 3rd supplemental must be provided so that the full scope of the work effort can be understood.

iii) Restoration to design elevation for Federal projects named in the 3rd supplemental will require a determination of the most cost effective alternative.

iv) Accelerated construction of Federal projects under the 3rd Supplemental will require an analysis of the most cost effective alternative if a decision document was previously prepared determining its economic justification. Work without previous project-specific decision documents, such as some projects under the Southeast Louisiana (SELA) program, will require economic justification.

c. Non-applicability of ER-ll05-2-100. NED-based project formulation as described in ER 1105-2-100 will not apply to the hurricane and storm damage reduction projects directed in the 3rd Supplemental. However, the District must evaluate the impacts of modifications to the authorized project required to address the findings of the Interagency Performance Evaluation Taskforce (IPET). If significant modifications are required (e.g. replacing a levee with a floodwall due to space limitations), the PIR must provide sufficient information to support the most cost-effective measure.

d. Waiver of Real Estate Policy that Requires Environmental Compliance and Final Cultural Certifications prior to beginning Negotiations for LERRD acquisition. EC 405-1-11 paragraph 5-14.e.(1) and (2) dated 30 December 2003 states that prior to the initiation of negotiations for the acquisition of interests in land, compliance with the National Environmental Policies Act (NEPA) and the National Historical Preservation Act (NHPA) is required and a HTRW investigation must be conducted. A waiver of this policy is granted. HTRW investigations will be completed prior to actually obtaining LERRDs. Preliminary cultural and Threatened and Endangered Species investigations will be completed prior to actually obtaining LERRDs . Completion of environmental and historical preservation compliance is required prior to construction contract award.

2

CECW-MVD
SUBJECT: Request for Waivers to Specific Corps Policies Affecting Prompt Completion of the Hurricane Protection System for 3rd Supplemental Work

e. Waiver from requirements limiting contingency, E&D and S&A amounts. ER 500-1-1, 5-2 v (1) indicates that higher amounts for E&D and/or S&A can be allowed if circumstances merit and they are justified. Increased requirements for E&D, S&A and contingency should be identified and justified in the decision document. Any approved higher contingency, E&D, S&A amounts need to take into consideration that the funds available are limited to those funds provided in the 3rd supplemental appropriation.

3. The request also specifically references ER 500-1-1, 5-20 (a) in paragraph 1 a. This paragraph is in reference to the general policy for eligibility for rehabilitation assistance to Hurricane Shore Protection Projects (HSPP) under authority of PL84-99. This policy indicates that only completed portions of federally authorized hurricane or shore protection projects are eligible for rehabilitation assistance. The policy limiting rehabilitation assistance to federally authorized hurricane shore protection projects is a statutory limitation to authority in PL 84-99. As a result, waiver of this policy can not be granted.

4. The referenced memorandum requested delegation of signature authority for Records of Decisions (ROD) to the lowest Command level possible. Due to the significance of this effort, signature authority will remain at the headquarters level and is delegated to the Division Commander. Further delegation is not permitted.

5. Concerning signature of the ROD for the Morganza to the Gulf Hurricane Protection Project, ASA (CW) is not able to sign the ROD until the Administration has completed review of the project. Should Congress authorize the project in the pending Water Resources Development Act of 2006, the ROD will be processed to the Director of Civil Works for signature.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E., SES
Deputy Director of Civil Works

3

APPENDIX H

COMMANDER'S EMERGENCY IMMINENT THREAT LETTER

N/A

APPENDIX I

ADDITIONAL TIMELINE AND POLICY DECISIONS

As originally authorized, the Grand Isle Beach Erosion and Hurricane Protection Project consists of a vegetated sandfill dune with a sand filled berm on its Gulfward side, a single stone jetty, and requires periodic beach nourishment. In accordance with the 1983 local cooperation agreement, beach re-nourishment was cost shared with the local sponsor for a period of 15 years. Under the terms of the 1983 local cooperation agreement, the Corps' obligation to share in the cost of post-construction beach re-nourishment has been fulfilled. The authorized plan represented the locally preferred plan for a sand filled sacrificial dune, rather than the more traditional form of levee protection.

As a result of damages from Hurricanes Katrina and Rita, Congress authorized and funded repair and restoration of the Grand Isle Hurricane Protection Dune to the authorized level of design protection in 3rd Supp, using FCCE funds. In 2006, work was commenced, pursuant to the approved Project Information Report (PIR) using funds from PL 109-148. This work was ongoing when Hurricane Gustav impacted the Louisiana coast. Approved funding for work under the 2006 PIR had increased to $16.4 million by the date that Hurricane Gustav's impact was experienced by Grand Isle. After Ike approved funding totaled $22 million. Significant damages resulted from Hurricanes Gustav and Ike during the first 2 weeks of September 2008. Initial estimates indicated and additional $35 million would be needed on top of the $22 million already approved for repair and restoration of Grand Isle to the authorized level of design protection of the original project. The request was sent to HQ in late September 08.

By email dated 12 September 2008, HQUSACE issued guidance regarding the repair and restoration of Federal and non-Federal flood control works and Federal HSDRRS projects damaged by Hurricanes Gustav and Ike. As it relates to the repair and restoration of the Grand Isle dune, this guidance provides as follows:

"...Ongoing repair and restoration work funded with 3rd Supplemental repair and restoration appropriations may be repaired and restored using available 3rd Supplemental repair and restoration appropriations. (e.g. ongoing Grand Isle repair and restoration)...Note - "Available" means that funds have not been previously committed, obligated or identified as being necessary for repair and restoration of Hurricane Katrina damage (e.g., funds for real estate, mitigation, OMRR&R and removal of the temporary closure structures and pumps at the Outfall Canals; etc.) When available 3rd Supplemental repair and restoration funds have been exhausted, a request must be made to HQ for FCCE PL 84-99 funds."

Repair and restoration of the Grand Isle Dune to its authorized level of design protection, in accordance with the repair and restoration authority of PL 109-148 (3rd Supp), could include placement of a six-foot, clay-filled, geotextile-wrapped core in a 2 foot deep trench keyway (burrito). The burrito was to be covered by a vegetated sand-cap to the authorized level of design protection. Associated work includes beach restoration, sand fencing, roadway access to the Gulf-side beach, certain jetty stone repairs, replacement of breakwater stone, navigation lights, and pier and timber repairs. The estimate for the described work is $63 million dollars.

A team of engineers from MVS visited the Bolívar Peninsula in Texas on Sept 29, 2008 and inspected GEOTUBES that were used for dune protection along this barrier peninsula. In assessing damage and doing a forensic investigation of the failure mechanism, another more robust, cost effective alternative was formulated by MVS and MVN engineers that could increase the stability of the Grand Isle Dune during future storm events and protect against scour that would otherwise compromise design. The estimate for this work is $46.1 million dollars.

In addition, a design was formulated to provide a more permanent structure and to stabilize the eroding beach front. 1) Placement of articulated concrete blocks over the entire surface of the sand cap and 2) Construction of a series of jetties along the Gulf

side of the island in order to stabilize/decrease advancing beach erosion. The addition of these items would increase the cost of the two Grand Isle Dune repair alternatives by $70 million. This work would have to be carried out under project authority, and a full economic and environmental analysis would have to be completed.

Issues under discussion centered around the authority to utilize clay fill for the burrito; to place the articulated concrete blocks over the top of the dune; and to construct a series of jetties. After discussion with the Corps Policy Cell, the following conclusions were reached:

1) $63 Million or $46.1 million Project Repair/Restoration: While the original authorization for the Grand Isle project was for a vegetated sand filled dune, the alternative repair and restoration effort stipulates placement of a compacted clay-filled, geotextile-wrapped burrito core, or a sand filled GEOTUBE core, topped by a vegetated sand cap. The proposed plans anticipates that all or a part of the clay core or GEOTUBE core would remain in place after a tropical storm or hurricane event.

a) In order to justify elements proposed for repair and restoration under PL 84-99 and 3rd Supp, the elements must be necessary to assure that the restored project will perform as designed and intended to perform. The clay burrito or GEOTUBE, when topped by the vegetated sand cap, would fully achieve the authorized level of design protection and would insure that the repaired/restored dune will perform in accordance with its intended design and would not exceed the authorized level of design protection.

b) ER 500-1-1 provides that rehabilitation assistance is limited to repair or restoration to the pre-disaster condition and level of protection; however, 3rd Supp authorizes restoration to the authorized level of design protection. Although the original authorization documents for the Grand Isle project envision a sand filled dune, ER 500-1-1, Para. 5-2.b.(1) provides "...[I] Improvements to design and equipment (e.g. geomembranes) that are a result of state of the art technology, and are commonly

incorporated into current designs in accordance with sound engineering principals, are permissible, and are not considered betterments." History of this project shows that the Corps has re-constructed or substantially repaired the Grand Isle dune a number of times since the project was authorized. PL 84-99 repairs in 1992, 2002, 2003 and 2008 included use of a clay core. GEOTUBES have been used for cores extensively throughout the gulf coast. For these reasons, use of both of these to the authorized level of design protection is deemed to represent state of the art engineering techniques commonly used and thus does not represent a betterment.

c) Since the two alternatives of the project are limited to restoration of the authorized level of design protection in accordance with 3rd Supp, this work is governed by the ASA(CW) waivers set forth in the CECW-MVD memorandum, dated August 21, 2006, SUBJECT: Request for Waivers to Specific Corps Policies Affecting Prompt Completion of the Hurricane Protection Work for 3rd Supplemental Work. ("August 2006 Waiver". See attached copy.) As such, the economic evaluation of the proposed repair/restoration work requires determination of the most cost effective alternative, rather than the NED based plan formulation (full benefit/cost evaluation) required by ER 1105-2-100. (See Para. 2.b.iii and 2.c of the August 2006 waiver.). This is why engineers took it upon themselves to study and formulate the sand filled GEOTUBE design.

2): The construction of the $70 million additional elements (Placement of articulated concrete blocks on top of the sand filled dune and construction of a system of jetties) is not authorized by the original Grand Isle authorization or by the 3rd Supp. Implementation of these elements may be accomplished either by: 1) Agreement of the non-Federal sponsor, CPRA, to bear all of the cost of these elements as a betterment/locally preferred plan; or 2) Approval of a Post Authorization Change report and subsequent authorization and funding by Congress.

a) Construction of these elements, whether as a non-Federal sponsor betterment or as a newly authorized element of the Federal project, would require additional environmental compliance investigations and documents to fully comply with all environmental laws and regulations.

b) Justification of the articulated concrete blocks and the jetty system must comply with the NED plan formulation requirements of ER 1105-2-100.

c) Absent Congressional authorization to the contrary, it is likely that the Non-Federal cost-share for these newly authorized elements would be in accordance with the post-WRDA 86 cost sharing requirements for a normal Civil Works HSDRRS project.

3) Beach Re-nourishment: One item was perhaps not fully addressed. Para 5-18.d. of EP 500-1-1 addresses the cost share allocation for re-nourishment. The cost would be full Federal based upon the understanding that this work is authorized under 3rd Supp and, as such, restoration to the full design level of protection, inclusive of beach re-nourishment required for foundational stability of the dune, is authorized to be performed at full Federal expense. However, note that Para 5-18.d. of EP 500-1-1 provides that the cost share for rehabilitation assistance is limited to that amount necessary to restore the project to pre-storm level/condition of the project, or the amount needed for adequate functioning of the project, whichever is less. Under the EP, the cost of ineligible re-nourishment would be borne in accordance with the project cost sharing agreement. (In this case, ineligible costs would be 100% non-Federal under the PL 84-99 guidance.) It is MVN's opinion that the PL 84-99 limitations do not apply to 3rd Supp FCCE repair/restoration projects. Based upon current law, therefore, all of these costs would be borne at full Federal expense. (Subject, of course, to Congressional actions in providing the requisite additional appropriations.)

APPENDIX J

LIST OF PREPARERS

Team Members that helped in the preparation of the Grand Isle PIR Effort:

Deanne Strauser, MVS, Assistant Deputy, Program Manager

Rob Davinroy, MVS, Project Manager

Chris Gilmore, MVN, Project Manager

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Jasen Brown, MVS, Civil and Hydraulic Engineer

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Patrick Grey, MVN, Civil Engineer

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Raymond McCollum, MVS, GIS Cartographer

Charlie Hanneken, MVS, Ecologist

Steele Beller, MVS, Real Estate Specialist

John Daves, MVS, Battle Captain

Gib Owen, MVN, Ecological Planning and Restoration

Beth Nord, MVN, Ecological Planning and Restoration

APPENDIX Z

PIR REVIEW CHECKLIST

EP 500-1-1
30 Sep 01

PIR Review Checklist for FCW Rehabilitation Projects

	YES	NO	N/A	
1.	✓			The project is active in the RIP. [ER, 5-2.a.]
2.	✓			The project was damaged by flood(s) or coastal storm(s). [ER, 5-2.]
3.	✓			The Public Sponsor has requested Rehabilitation Assistance in writing. [EP, 5-10.b.]
4.	✓			The Public Sponsor has agreed to sign the Cooperation Agreement, which will occur before USACE begins rehabilitation work. [ER, 5-10.]
5.	✓			The estimated construction cost of the rehabilitation is greater than $15,000, and is not considered sponsor maintenance. [ER, 5-2.q.]
6.	✓			The repair option selected is the option that is the least cost to the Federal government, or, the sponsor's preferred alternative is selected with all increases in cost paid by the public sponsor. PIR includes justification for non-select of the least cost alternative. [ER, 5-2.h. and 5-11.e.(3)]
7.	✓			The public sponsor is aware of the opportunity to seek a nonstructural alternative project, and has decided to proceed with a structural rehabilitation. [ER, 5-16]
8.				The cost estimate in the PIR itemized the work to identify the Public Sponsor's cost share. [ER, 5-11]
9.				The rehabilitation project has a favorable benefit cost ratio of greater than 1.0:1. [ER, 5-2.r.]
10.	✓			The proposed work will not modify the FCW to increase the degree of protection or capacity, or to provide protection to a larger area. [ER, 5-2.n.]
11.				Betterments are paid 100 percent by the Public Sponsor. [5-2.o.]
12.				The CA contains a provision for 80% Federal and 20% local cost share for non-Federal projects. [ER, 5-11.a.]
13.				Cost for any betterments are identified separately in the cost estimate. [ER, 5-2.o.]

Page Z-1

FIGURE 5-4. PIR Review Checklist (Appendix Z) for FCW Rehabilitation Projects

5-22

PIR Review Checklist for FCW Rehabilitation Projects (Continued)

	YES	NO	N/A	
14.	___	___	✓	Repair of deliberate levee cuts is the responsibility of the public sponsor, except as provided for in ER 500-1-1, paragraphs 5-2.j. and 4-3.h. [ER, 5-2.j. and 4-3.h.]
15.	___	___		All deficient and deferred maintenance will be paid for or accomplished by the Public Sponsor, without receiving credit toward any sponsor's cost share. [ER, 5-2.g.]
16.	___	___	✓	Any relocation of levees is adequately justified. [ER, 5-2.h.]
17.	___	___		USACE assistance does not correct design or construction deficiencies. [ER, 5-12.a.]
18.	___	✓		An assessment of environmental requirements was completed. [ER, 5-13., and EP, Figure 5-3, paragraph 12.]
19.	___	✓		The project complies with NEPA, and required documentation was completed and placed in Appendix G of the PIR. [ER, 2-3.k.; ER, 5-13.; and EP, Figure 5-3, paragraph 12.]
20.	✓	___		The Endangered Species Act was appropriately considered. [ER, 5-13.g., and EP, Figure 5-3., paragraph 12.]
21.	✓	___		EO 11988 requirements were considered in the process of evaluating the proposed project for rehabilitation. [ER, 5-13.f., and EP, Figure 5-3, paragraph 12.]
22.	✓	___		The completed PIR has been reviewed and the PIR Checklist has been reviewed and signed by the Emergency Management Office. [EP, 5-11.a.(3)(a)]
23.	✓	___	___	The completed PIR meets all policy, procedural, content, and formatting requirements of ER 500-1-1 and EP 500-1-1. [ER, 2-3.b.]

EM REVIEWING OFFICIAL'S SIGNATURE

_____
NAME
TITLE
TELEPHONE NUMBER

Page Z-2

FIGURE 5-4. PIR Review Checklist (Appendix Z) for FCW Rehabilitation Projects (Continued)

5-23

DISTRICT PROJECT AUTHENTICATION

Project Information Report

Grand Isle and Vicinity, LA., Hurricane Protection Project

Jefferson Parish

PIR Prepared

By:_____

Robert D. Davinroy, P.E. Date

Project Manager

PIR Reviewed

By:_____

Deanne M. Strauser Date

Deputy Project Manager

PIR Reviewed

By:_____

Chris Gilmore, P.E. Date

Project Manager HPO

Emergency Management Approval

By:_____

Andamo E. Ford Date

Lieutenant Colonel, US Army

Deputy District Commander, HSDRRS

CERTIFICATION OF LEGAL REVIEW

The Project Information Report (PIR) for repair of the Grand Isle and Vicinity, Louisiana, Hurricane Protection Project has been reviewed by the Office of Counsel, New Orleans District and is legally sufficient.

Reviewed
By:_____
Assistant District Counsel Date

Certified
By:_____
District Counsel Date

District-Level Approval By:_____
Alvin B. Lee Date
Colonel, US Army
District Commander