PROGRESS GALVESTON

# City of Galveston Erosion Response Plan

## Galveston Planning & Development Regulations

**ADOPTED**

**APRIL 12, 2012**

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# 1. INTRODUCTION

## 1.1. Purpose of ERP

The City of Galveston has prepared this Erosion Response Plan (ERP) to achieve the following broad local objectives:

- reduce public expenditures for erosion and storm damage losses to public and private property, including public beaches;
- ensure the health and stability of existing dune systems and dune vegetation;
- encourage the natural recovery of dunes and beaches following storm-induced erosion;
- provide for the establishment of new dunes through restoration projects; and
- allow for the landward migration of beaches and dunes due to erosion.

Provisions of the ERP are designed to implement dune protection, erosion response, and beach access policies and objectives in the City Comprehensive Plan and comply with State requirements set forth in Title 31 Texas Administrative Code, §15.17 (31 TAC 15.17). In 2009, the Texas legislature adopted Texas Natural Resources Code §33.607, which requires local governments along the Gulf Coast to develop plans for reducing public expenditures for erosion and storm damage losses. To implement the law, the Texas General Land Office (GLO) adopted rules to guide local government's preparation of erosion response plans. The rules are intended to ensure local governments enact regulations to reduce future storm damage and protect public access to beaches.

The ERP identifies recommended amendments to the City's existing Dune Protection and Beach Access Plan found in Section 29-90 (Development, Preservation and Protection of Sand Dunes) of the Zoning Standards (Chapter 29 of the Code of Ordinances of the City of Galveston). Consistent with Texas Natural Resources Code, §61.001 (Open Beaches Act) and §63.001, et seq. (Dune Protection Act), the City's Dune Protection and Beach Access Plan, with these amendments, establishes standards for managing the public beach and human activities occurring on property fronting the Gulf of Mexico within 1000 feet of mean high tide.

In accordance with Texas Natural Resources Code §33.607, the ERP will need to be reviewed, and updated as appropriate, every five (5) years or after a storm event that affects the Galveston coast, whichever occurs first. In the event of a significant storm event, the GLO will often enact temporary "emergency" rules that will take precedence over locally adopted regulations. During the timeframe of the temporary rules, the City of Galveston will review and assess any changes in shoreline conditions that may require amendments to the ERP.

## 1.2. Scope of the Plan

The ERP addresses conditions along the 30-mile long Gulf coastline on Galveston Island, excluding the Galveston Island State Park and the Town of Jamaica Beach. Sections of the ERP offer the following:

- a review of existing shoreline conditions, including information regarding shoreline change or erosion rates;
- a definition of a Dune Conservation Area where beachfront dunes naturally occur, where restored (man-made) dunes may be located, and where dunes may migrate landward as erosion occurs;
- construction prohibitions, exemptions, and standards for construction activities within and seaward of the Dune Conservation Area;
- a definition of an Enhanced Construction Zone and construction standards for construction activities within the Enhanced Construction Zone;
- opportunities for mitigation, restoration, and preservation of dune systems;
- strategies to improve public beach access;
- procedures for post-storm damage assessment of beach access points; and
- criteria for acquiring property within or seaward of the Dune Conservation Area.

## 1.3. Relationship to Other City Plans

The ERP is designed to be consistent with City plans and policies, including the 2011 Comprehensive Plan for the City of Galveston (Comp Plan), adopted in October 2011, and the Hazard Mitigation Plan, adopted in April 2011. The Comp Plan identifies protection of the Island's beach and dune systems as top priorities for the City, and includes the following two objectives especially relevant to the ERP.

- OBJECTIVE NR-2. PROTECT THE INTEGRITY AND FUNCTION OF GALVESTON ISLAND'S BEACHES, DUNES, AND BAY WETLANDS. Galveston Island's beaches, dunes, and bay wetlands are sensitive natural resources providing a number of well-recognized benefits. Beaches and dunes are an integral part of the coastal landscape, lending beauty to the shoreline. As natural coastal barriers, the Island's dunes absorb the force of winds and high waves during major storms and help prevent or delay inland flooding and resulting property damage. Dunes also function as a source for natural beach nourishment after storms. The bay's marsh wetlands provide critical area for native and migratory land and marine species and act as natural buffers from the full force of waves, winds, and storm surges. Additionally, these wetland areas filter sediments and pollutants from the water draining from upland areas thus helping to maintain water quality. The Island's beaches, dunes, and bay wetlands play critical roles in protecting the Island from the effects of the coastal forces, and the health of these sensitive, inter-related ecosystems plays a key part in ensuring the City's long-term resiliency and sustainability.

- OBJECTIVE NR-4. RESPOND PROACTIVELY TO LAND LOSS ON GALVESTON ISLAND. Land loss associated with shoreline retreat along the Island's beach and bay, resulting from a combination of regional subsidence, erosion, and relative sea level rise, has increasingly challenged government agencies and coastal communities. Over the years, man-made projects that influence the near-shore system such as the construction of dams and levees in riverine systems have reduced the sources of sediment to the Gulf Coast. Likewise, the construction of jetties and navigation channels has interrupted the littoral flow of sediments (long-shore drift) at coastal passes. Upland development also affects the natural migration of sediments. As a result, while East Beach accretes due to eddies in the long-shore current interrupted by the jetties at Bolivar Roads, most of Galveston's beachfront shoreline from Stewart Beach westward is eroding at rates that have averaged between 5-10 feet per year for the last fifty years. Without continued intervention, land loss on Galveston Island will not be reversed in the life span of this document. The impact of global sea level rise is anticipated to be greatest on low-lying barrier islands, such as Galveston Island. The City of Galveston did not create these regional or global circumstances, but given the disproportionate impact they have on this community, it is incumbent on the City to continue to respond proactively. The City has taken important first steps toward such a response, but much remains to be done to ensure that any future development on the Island is sustainable and resilient.

In addition, the Comp Plan includes the following strategies which provided guidance in the development of the ERP:

- Land Use Element Strategies
  - Perform Assessment of the Sensitive Environmental Areas Islandwide
  - Create Matrix of Development Incentives and Regulations to Protect and Preserve Sensitive Environmental Areas
  - Encourage Alternative Methods to Further Protect Dunes, Wetlands, Scenic Open Space and Community Character on the West End
- Natural Resource Element Strategies
  - Strengthen Regulations Designed to Protect and Restore the Island's Dune Systems
  - Review and Update Zoning Standards and Subdivision Regulations to Protect the Integrity and Function of Galveston's Natural Resources
  - Maintain and Implement the City's Beach Access Plan
  - Develop and Implement a Dune Management and Restoration Plan
  - Participate with other Governmental Agencies and Initiate Intergovernmental Coordination Efforts to Mitigate Coastal Land Loss
  - Partner to Promote Beach and Bay Shoreline Stabilization
  - Establish and Dedicate Local Funding for Shoreline Stabilization
  - Research and Implement Innovative Projects to Promote Shoreline Stabilization
- Infrastructure Element Strategies
  - Continue to Explore Structural and Non-Structural Mitigation Strategies

  - Maintain and Protect Existing Mitigation Features
- Disaster Planning Element Strategies
  - Develop a Coastal Erosion Response Plan (ERP) and Address Non-Coastal Land Loss
  - Protect the Integrity of the Seawall

The Hazard Mitigation Plan identifies a variety of natural hazards and risks and the actions the City should take to reduce the effects of natural hazards on the place and its population. The Hazard Mitigation Plan identifies coastal erosion and coastal retreat as two of the hazards with the "highest potential for damaging physical assets, people and operations in Galveston." The Hazard Mitigation Plan includes an action plan that identifies citywide goals and objectives and specific actions that should be taken to mitigate against potential natural hazards, including:

- supporting aggressive beach nourishment program to address critical erosion areas;
- installing shoreline protection devices in areas subject to coastal erosion to reinforce dune systems; and
- elevating of structures at risk from flooding.

## 1.4. Planning Process and Public Input

Public involvement has played a central role in the development of beachfront construction, beach access, and dune protection and restoration plans and programs in the City of Galveston. Prior to Hurricane Ike, the Planning Commission had periodically conducted workshops to discuss beachfront construction regulations specifically-related to construction setbacks and building practices. In addition, the City spent considerable time drafting comments in response to 2007 legislation regarding erosion response planning (House Bill 2819). The City's final comments regarding HB 2819 were submitted to the GLO on August 14, 2008.

An intensive process of public engagement was followed in preparing the ERP. Starting in April 2011, ERP provisions were discussed in a variety of public forums and workshops, including the following:

| | |
|---|---|
| April 28, 2011 | City Council Workshop |
| April 30, 2011 | Progress Galveston Public Workshop |
| May 3, 2011 | Planning Commission Regular Meeting |
| May 10, 2011 | Planning Commission Workshop |
| May 24, 2011 | Planning Commission Workshop with Public Comment |
| June 7, 2011 | Planning Commission Public Hearing |
| June 9, 2011 | City Council Public Hearing |
| June 23, 2011 | City Council Public Hearing |
| July 15, 2011 | Stakeholder Meeting with west end property owners |
| July 21, 2011 | Progress Galveston Public Workshop |
| September 28, 2011 | ERP Workshop 1 |

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|---|---|
| September 29, 2011 | Stakeholder Meeting with west end property owners |
| October 12, 2011 | ERP Workshop 2 |
| October 26, 2011 | ERP Workshop 3 |
| November 3, 2011 | Progress Galveston Public Workshop |
| November 16, 2011 | ERP Workshop 4 |
| January 31, 2012 | Planning Commission Workshop |
| February 7, 2012 | Planning Public Hearing |
| March 9, 2012 | City Council Workshop |
| April 12, 2012 | City Council Public Hearing (Plan Adoption) |

In addition to these forums and workshops, the City posted information, updates, and draft maps and plans on City websites, including the City's home page (www.cityofgalveston.org) and the website established for post-Ike planning initiatives (www.progressgalveston.com).

## 2. EXISTING SHORELINE CONDITIONS

This section of the ERP provides a general overview of shoreline conditions on Galveston Island, including a review of shoreline change rates for segments of the City of Galveston shoreline and a general description of the existing dune system.

### 2.1. Overview

Coastal erosion, storm events, and coastal construction projects have strongly influenced conditions along the Galveston coastline. Significant portions of the Island's coast experience high rates of erosion, upland development has impacted the natural landward migration of dune systems and sediments, and coastal shoreline protection projects (i.e., jetties, seawall, and navigation channels) have limited the supply and interrupted the long-shore drift of sediment. The combined effects of these phenomena have diminished the health and stability of Galveston's beach and dune systems, and thus increased the vulnerability of public and private property to damage during major storms.

**Figure 1. Effects of severe storm damage and erosion sustained during Hurricane Ike.**

While the eastern end of Galveston Island accretes due to a reversal in longshore transport caused by the jetties at Bolivar Roads, most of Galveston's beachfront shoreline from Stewart Beach westward is eroding. Several locations on the Island, such as at the western end of the Galveston Seawall, have experienced a high average rate of erosion of more than eight (8) feet per year. For the past century, the Seawall has protected the core of the City from major storms, but with high rates of erosion and an impaired dune system, the western end of the Island remains particularly susceptible to flooding and other impacts of major storms. The western end of the Island is largely developed, with limited unplatted parcels remaining. Over the past several decades, beach nourishment and dune restoration projects have helped address long-term erosion through introduction of sand to the beach/dune system, but for the most part, erosion along the western end of the Island has continued to make beachfront property and infrastructure vulnerable to damage in major storm events.

## 2.2. Shoreline Change Rates

Similar to other areas along the Texas coast, Galveston Island's shoreline is subject to considerable variability in actual shoreline change rates from year to year. A typical cycle consists of a large storm-induced retreat followed by months, and sometimes years, of recovery during relatively benign wave conditions. Shoreline locations also vary seasonally, typically exhibiting winter retreat and summer advance. Tracking shoreline change over time is an important factor to consider in developing erosion response measures.

As designated by the State of Texas, The University of Texas at Austin, Bureau of Economic Geology (BEG) is the official repository of statewide historic shoreline change data. In preparing this ERP, the City reviewed BEG historical and projected shoreline data, including the most recently reported average shoreline change rates for the period

between 1882 and 2007. [1] These shoreline change rates were "calculated for the latest coast-wide aerial photography that predates Hurricane Ike, which significantly altered beach and dune morphology and shoreline position."[2] Due to the extent of shoreline management activity on Galveston Island over the past 15 years, the City has chosen to utilize the linear regression rate (LRR) to best reflect long-term background erosion rates.

For purposes of the ERP, the beaches within the City of Galveston were divided into the following Aggregate Shoreline Change Zones based on analysis of BEG shoreline change rates:

- ***Accreting Zone.*** Average annual shoreline advance in excess of +1 feet per year;
- ***Stable Zone*****.** Average annual shoreline change of -1 to +1 feet per year;
- ***Eroding Zone (-2 ft/yr).*** Average annual shoreline retreat of -1 to -3 feet per year;
- ***Eroding Zone (-4 ft/yr).*** Average annual shoreline retreat of -3 to -5 feet per year;
- ***Eroding Zone (-6 ft/yr).*** Average annual shoreline retreat of -5 to -7 feet per year;
- ***Eroding Zone (-8 ft/yr).*** Average annual shoreline retreat in excess of -7 feet per year.
- ***Seawall Zone.*** Shoreline change affected by Seawall.

The following table and attached Exhibit A: Aggregate Shoreline Change Zone Maps identify the general location and extent of each of the Aggregate Shoreline Change Zones.

[1] Bureau of Economic Geology. http://www.beg.utexas.edu/coastal/download.php

[2] Paine, J. G., Mathew, S., and Caudle, T.L. 2011. Texas Gulf shoreline change rates through 2007: The University of Texas at Austin, Bureau of Economic Geology. Final report prepared for General Land Office, under contract no. 10-041-000-3737, 38 p. + CD-ROM.

**TABLE 1: AGGREGATE SHORELINE CHANGE ZONES**

| Aggregate Shoreline Change Zone | | Western Boundary | Eastern Boundary |
|---|---|---|---|
| 1 | Accreting | West end of Island | Pointe West |
| 2 | Stable (0 ft/yr) | Small segment within Pointe West | |
| 3 | Eroding (-2 ft/yr) | Pointe West | Ocean Club Villas (Grassy Point Road) |
| 4 | Eroding (-4 ft/yr) | Ocean Club Villas (Grassy Point Road) | Terramar Subdivision (Beach Access Point) |
| 5 | Eroding (-2 ft/yr) | Terramar Subdivision (Beach Access Point) | Texas Campground |
| 6 | Stable (0 ft/yr) | Texas Campground | City of Jamaica Beach |
| | *n/a –City of Jamaica Beach and & Galveston Island State Park* | | |
| 7 | Eroding (-2 ft/yr) | Galveston Island State Park (13 Mile Road) | Marquette Property |
| 8 | Eroding (-4 ft/yr) | Marquette Property | Spanish Grant Blvd |
| 9 | Eroding (-6 ft/yr) | Spanish Grant Blvd | Sunrise Estates (Sunrise Ct) |
| 10 | Eroding (-8 ft/yr) | Sunrise Estates (Sunrise Ct) | West end of Seawall (103rd Street) |
| 11 | Seawall Zone | West end of Seawall (103rd Street) | 11th Street |
| 12 | Stable (0 ft/yr) | 11th Street | 9th Street |
| 13 | Accreting | 9th Street | Beach Drive |
| 14 | Stable (0 ft/yr) | Small segment near Beach Drive | |
| 15 | Accreting | Beach Drive | East end of Island |

The City should investigate feasibility of an annual survey of erosion rates that could be used to determine Aggregate Shoreline Change Zones in future editions of ERP.

## 2.3. Beach and Dune System

Coastal beaches and dune systems are sensitive natural resources and provide a number of well-recognized benefits. Beaches and dunes are an integral part of the coastal landscape, lending both beauty and protection to the shoreline. As natural coastal barriers, the Island's dunes absorb the force of winds and high waves during major storms and help prevent or delay inland flooding and resulting property damage. Dunes provide protection to landward structures by blocking storm tides and waves, and by providing a sediment source for natural beach nourishment after storms. Wide beaches and high continuous dunes are the best defense against coastal storms. High, continuous dunes tend to block storm surge, while lower, discontinuous dunes can be overrun by storm surge and flood low-lying areas behind them.[3]

Due to high levels of erosion, coastal development, and destruction caused by Hurricane Ike, the dune system and line of vegetation (LOV)—the extreme seaward boundary of natural vegetation—on the western end of Galveston Island are incomplete and discontinuous. Where dune systems exist, they include both natural and restored (man-

[3] McKenna, K.K. and Paine, J.G. 2009. Texas Coastwide Erosion Response Plan. Prepared for the Texas General Land Office, Contract No. 06-076-000, 86 p. + apps.

made) systems, with dune height, width, and vegetated cover varying along the shoreline.

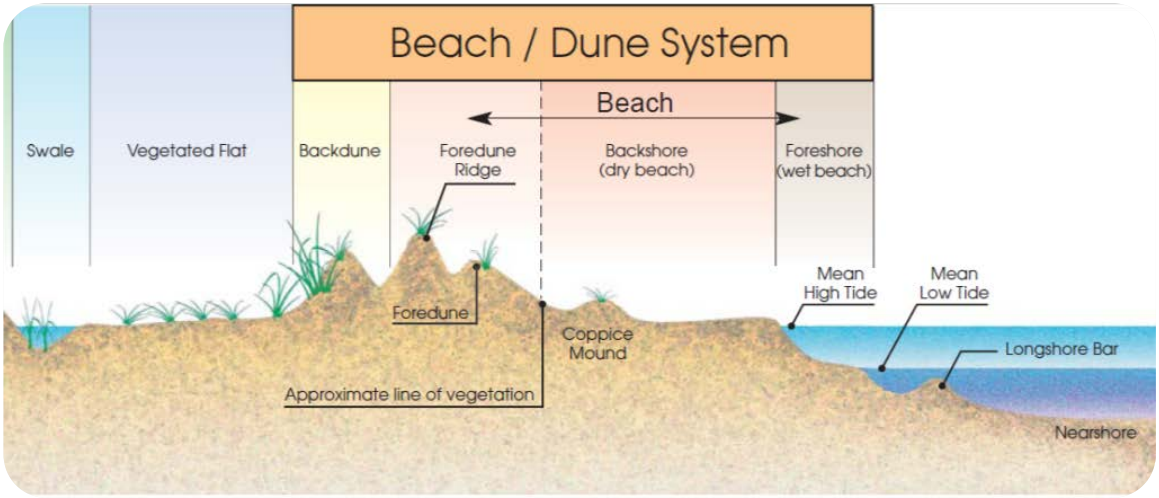


**Figure 2. Illustration showing typical cross section of a Texas barrier island. (Modified from from GLO Dune Manual)**

**Figure 3. Restored (man-made) dune system with recently established vegetation.**

Recent research, however, provides information regarding locations along the beach where dunes are most likely to naturally form and remain relatively stable. Through analysis of LIDAR surveys, Gibeaut and Caudle concluded that the elevation where dunes are most likely to form (or where the natural line of vegetation may occur) is about four (4) feet above mean sea level (MSL), or approximately 4.5 feet above the North American Vertical Datum (NAVD).[4] The seaward extent of dune systems, marked by the line of vegetation, typically forms at or above this elevation because it is sufficiently high

[4] Gibeaut, J.C., and Caudle, T.L. 2009. Defining and Mapping Foredunes, the Line of Vegetation, and Shorelines along the Texas Gulf Coast. Harte Research Institute for the Gulf of Mexico Studies and Bureau of Economic Geology, p. 10.

enough on the dry beach to not be affected by normal, seasonal tidal fluctuations. Additionally, Gibeaut and Caudle determined that the typical natural foredune complex along the upper Texas coast occupies an approximate 200-foot wide corridor as measured landward from the +4.5 feet NAVD contour. Gibeaut, Gutierrez, and Hepner suggested that, along the upper Texas coast, washover and damage to beachfront construction from storms with surges of up to approximately five (5) feet does not typically occur where the foredunes are at least ten (10) feet high or 100 feet wide.[5]

During the design of the West Galveston Island Beach Nourishment Project for the GLO in 2010, the shape of natural dunes along west Galveston Island was analyzed. As shown in Figures 4 through 7, the width of natural foredunes at select locations along Galveston ranges from approximately 60 to 110 feet. Measurements of natural dunes at the Galveston Island State Park by Gibeaut, Gutierrez, and Hepner showed a foredune width of approximately 65 to 110 feet (Figure 4).

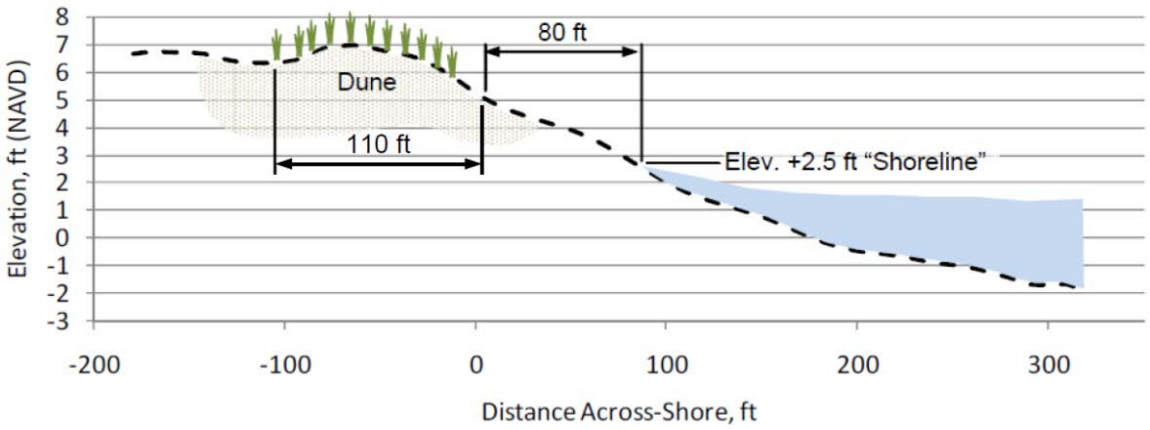


**Figure 4. Average profile representing natural dune/beach system at Galveston Island State Park (modified after HDR 2009).[6]**

[5] GIbeaut, J.C., Gutierrez, R., and Hepner, T. 2002. Threshold conditions for episodic beach erosion along the southeast Texas coast. Gulf Coast Association of Geological Societies Transactions, v. 52, p. 323-335.

[6] HDR Engineering, Inc. 2009. Performance Analysis for the Proposed West Galveston Island End of Seawall Beach Nourishment. Prepared for the Texas General Land Office, CEPRA Project No. 1391, HDR Project No. 124626 (PW83321), 22 p. + apps.

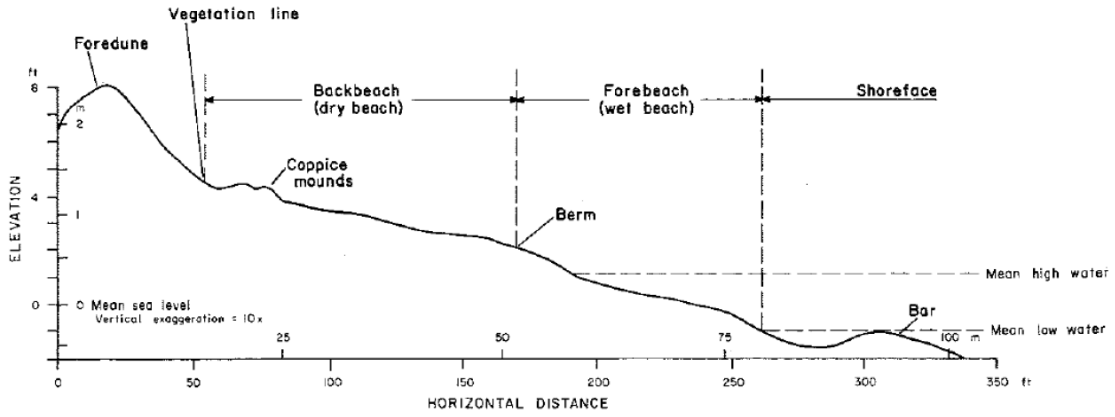


**Figure 5. Natural Beach Profile at West Galveston Island.**[7]

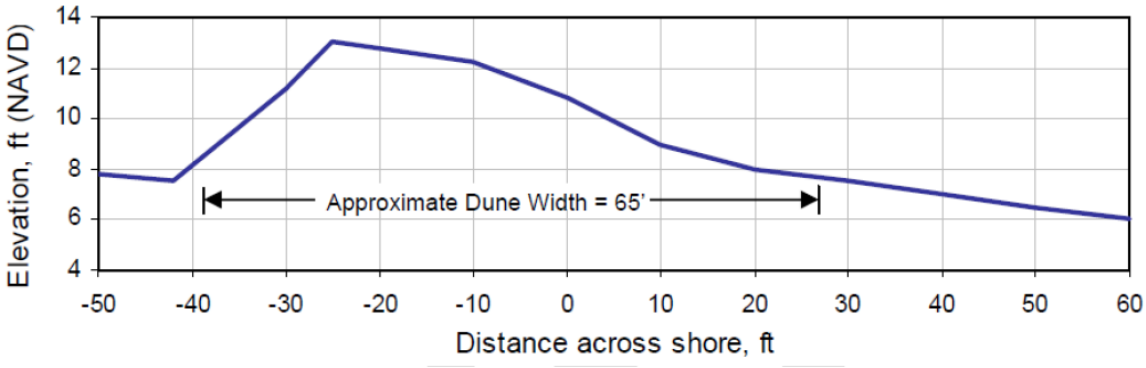


**Figure 6. Natural dune profile at Silverleaf's Seaside Resort (June 2004).**[8]

[7] Morton, R.A. and Paine, J.G. 1985. Beach and Vegetation-Line Changes at Galveston Island, Texas: Erosion, Deposition, and Recovery from Hurricane Alicia. Geological Circular 85-5. The University of Texas at Austin, Bureau of Economic Geology.

[8] HDR Engineering, Inc. 2009. West Galveston Island End of Seawall Beach Nourishment, Design Basis Memorandum. Prepared for the Texas General Land Office, CEPRA Project No. 1391, HDR Project No. 88091 (PW83321), 72 p. + apps.

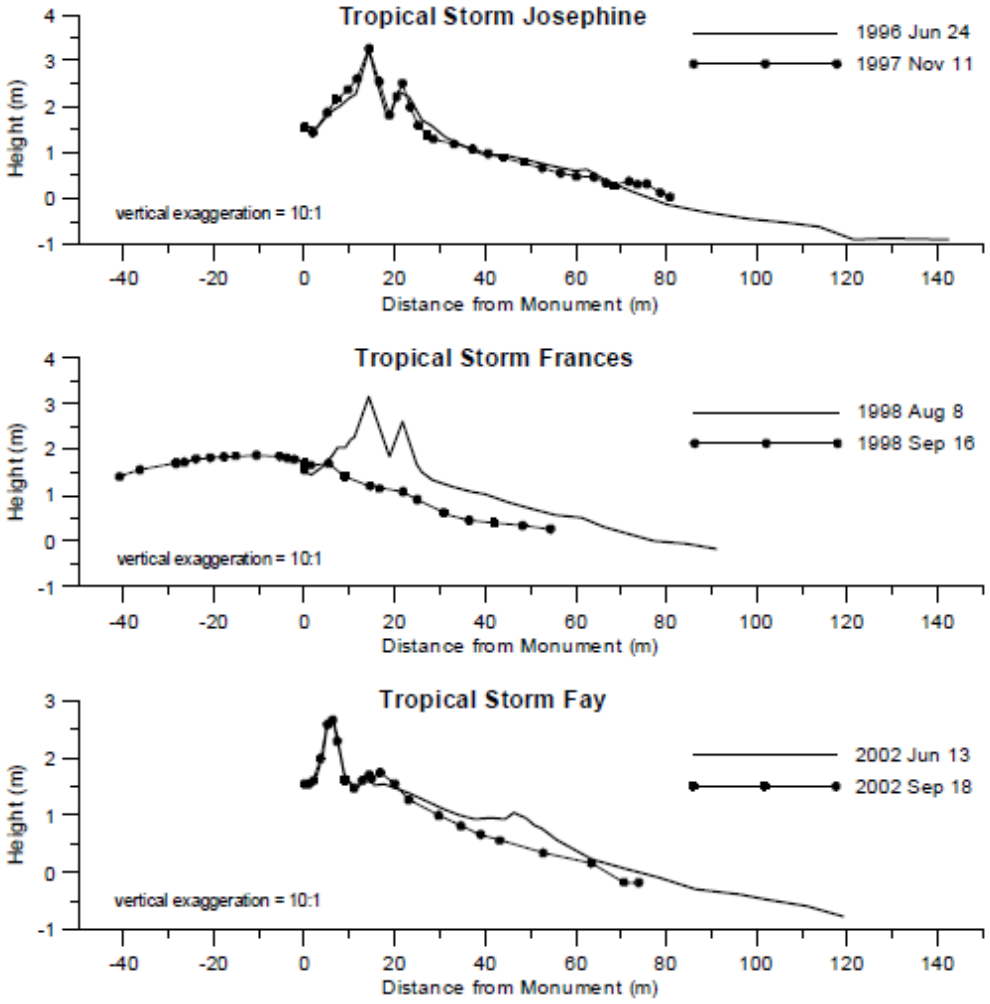


**Figure 7. Natural dune profiles from Galveston Island State Park before and after major storms (modified after Gibeaut *et al*. 2003).**[9]

Based on recent research regarding dune locations and profiles, the City has adopted the following definition for restored (man-made) dunes:

> *For the purposes of determining construction setbacks and the location of the Dune Protection Line, a restored dune shall be defined as having more than 50% vegetative cover, a 3:1 slope, an average height of 75% of the island's base flood elevation as measured from mean sea level, a naturally established connection to the dune contour and elevation of the adjacent property, and shall not extend further seaward than 4.1' elevation from mean sea level.*

[9] Gibeaut, J. C., Hepner, T. L., Waldinger, R. L., Andrews, J. R., Smyth, R. C., and Gutierrez, R. 2003. Geotextile tubes along the upper Texas Gulf coast: May 2000 to March 2003. The University of Texas at Austin, Bureau of Economic Geology. Final report prepared for Texas Coastal Coordination Council pursuant to National Oceanic and Atmospheric Administration Award No. NA07OZ0134, under GLO contract number 02-493 R, 37 p. + apps.

These guidelines result in a dune footprint that is a minimum of 50 feet wide and has a dune height of approximately ten (10) feet.

## 3. DUNE CONSERVATION AREA AND ENHANCED CONSTRUCTION ZONE

### 3.1. Definition

The City will amend existing regulations to define a Dune Conservation Area and an Enhanced Construction Zone as follows:

- **Dune Conservations Area.** The Dune Conservations Area shall be defined as areas along Galveston's Gulf Coast where beachfront dunes naturally occur and where restored (man-made) dunes may be located. The Dune Conservation Area shall also include lands within 25' of the north toe of existing or restored (man-made) dunes.
- **Enhanced Construction Zone.** The Enhanced Construction Zone shall be defined as areas immediately landward of the Dune Conservation Area with the potential to be effected by the long-term effects of erosion. The Enhanced Constructed Zone shall be established for areas with Aggregate Shoreline Change Rates between -2 and -8 feet per year as defined in Section 3.2 below. Construction activities in the Enhanced Construction Zone will be required to meet higher standards than activities in areas further landward.

Development conditions and standards that apply to the Dune Conservation Area and Enhanced Construction Zone do not apply to properties within the Seawall Zone, as shown in Exhibit A. Development within this area shall be governed by existing City and state policies and regulations.

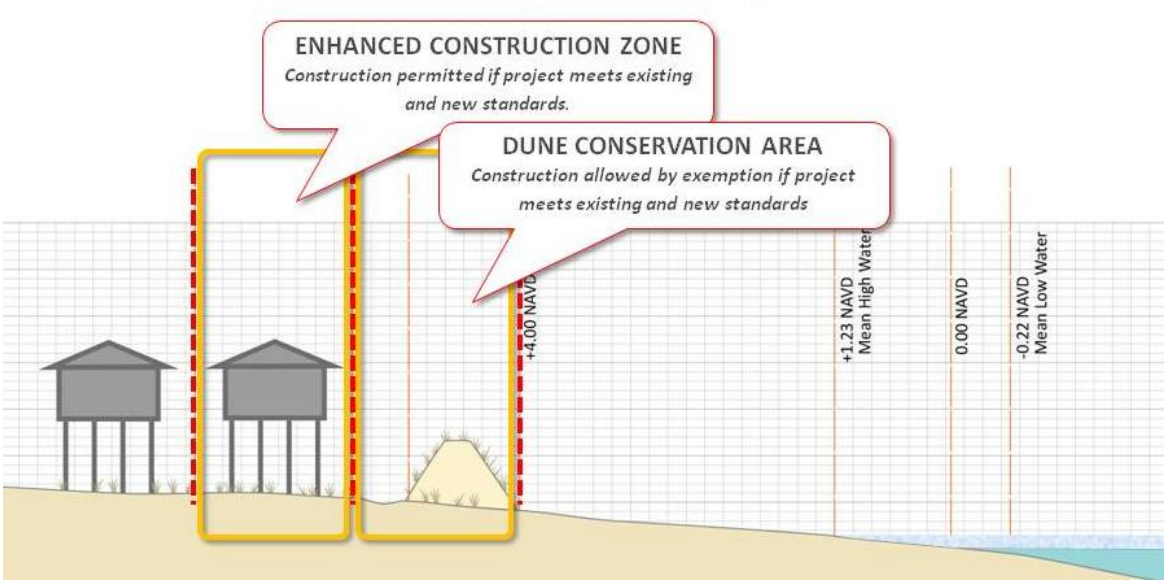


**Figure 8. Graphic illustrating limits of the Dune Conservation Area and Enhanced Construction Zone.**

### 3.2. Mapping of Dune Conservation Area and Enhanced Construction Zone

*The City will amend existing regulations to require the following be shown on boundary and topographic surveys submitted with applications for Beachfront Construction Certificates and Dune Protection Permits:*

- **Dune Conservation Area Limits.** The seaward limit of the Dune Conservation Area shall be the most seaward contour line corresponding to elevation +4.00 foot NAVD as established by topographic survey. Where proposed beach nourishment, dune restoration, or other activity has the potential to influence a property's natural topography and/or move beach or dune contours seaward, the seaward limit shall be established by determining the +4.00 foot NAVD elevation prior to construction. Where beach contour lines have been affected by beach maintenance or construction projects, the seaward limit shall be established by a line connecting the nearest naturally-occurring +4.00 foot NAVD contour to the west and the east of the property. The landward limit of the Dune Conservation Area shall be defined as the north toe of an existing dune or restored (man-made) dune plus a 25-foot landward offset.
- **Enhanced Construction Zone Limits.** The landward limit of the Enhanced Construction Zone shall be shown for areas along Galveston's Gulf Coast with Aggregate Shoreline Change Rates of between -2 and -8 feet per year. The landward limits shall be 125 feet from the landward limit of the Dune Conservation Area.
- **Seawall Zone Limits.** Mapping of the Dune Conservation Area and Enhanced Construction Zone is not required for properties along the Seawall Zone.

The City will establish procedures for applicants to follow in surveying and mapping of the seaward and landward limits of the Dune Conservation Area and Enhanced Construction Zone.

The approximate extent of the Dune Conservation Area and Enhanced Construction Zone are shown on the attached Exhibit B: Dune Conservation Area and Enhanced Construction Zone Maps. These maps, indicating the approximate limits of the Dune Conservation Area and Enhanced Construction Zone, are included for illustrative purposes only—actual area limits shall be established by an individual survey of each parcel prior to submittal of an application for a Beachfront Construction Certificate or Dune Protection Permit.

The City will investigate the feasibility of instituting a long-term survey program to map the limits of the Dune Conservation Area and Enhanced Construction Zone, subject to City Council goals and budget appropriations. Survey data collected through the survey program will be used to guide future planning efforts and as a tool to assess changing beachfront conditions.

## 4. EXEMPTIONS FOR CONSTRUCTION IN DUNE CONSERVATION AREA

This section of the ERP describes standards for exemptions for construction in the Dune Conservation Area. The City recognizes that beach and dune systems are vital natural resources providing protection to upland properties and structures, recreation areas, and public infrastructure, and will therefore amend existing regulations to ensure new construction is sited and designed to accomplish the following general objectives:

- avoid or minimize adverse impacts to existing dune systems;
- avoid or minimize development in areas were dunes may be located through natural formation, landward migration, or restoration; and
- allow natural dune fluctuations, migration, and recovery following coastal storm events.

### 4.1. Construction within or Seaward of Dune Conservation Area

The City will amend existing regulations to prohibit construction within or seaward of the Dune Conservation Area and provide for exemptions for new construction and renovations of existing structures. To the maximum extent practicable, all structures shall be constructed landward of the Dune Conservation Area. Construction of structures landward of the Dune Conservation Area establishes a rebuttable presumption that the permittee has followed the mitigation sequence requirements for avoidance and minimization of efforts on dune and dune vegetation specified in §15.4(f) of the Natural Resources and Conservation Code. However, the permittee is not exempt from compliance with compensatory mitigation requirements for unavoidable adverse effects on dunes and dune vegetation.

### 4.2. Consideration of Exemptions

The City will amend existing regulations to allow property owners to request an exemption from the prohibition on construction within or seaward of the Dune Conservation Area for one of the following:

- Properties for which the owner has demonstrated to the satisfaction of the City that there is no practicable alternative to construction within or seaward of the Dune Conservation Area. For the purposes of this ERP, practicable means available and capable of being done after taking into consideration existing building practices, siting alternatives, and the footprint of the structure in relation to the area of the building portion of the lot, and considering the overall development plan for the property.
- Properties with a valid Beachfront Construction Certificate approved under the City's Dune Protection and Beach Access Plan prior to the adoption of any amendments adopted pursuant to this ERP.
- Structures located within or seaward of the Dune Conservation Area prior to the effective date of any amendments to the City's Dune Protection and Beach Access

Plan adopted pursuant to this ERP for which modifications are sought that do not increase the footprint further seaward of the existing structure, that have not been determined "substantially damaged" under the City's flood regulations, and that have not been abandoned for a period of more than 12 months. For the purposes of this section, "abandoned" shall mean a rebuttable determination by the City of an intention to not repair or return to the structure.

Structures within or seaward of the Dune Conservation Area that have been substantially damaged or abandoned for a period of more than 12 months shall be subject to conditions of the ERP.

## 5. CONSTRUCTION STANDARDS AND CONDITIONS

The City will amend existing regulations to apply the following construction standards and conditions to projects in the Enhanced Construction Zone and for projects found to be exempt from the prohibition on construction within or seaward of the Dune Conservation Area.

Existing regulations will be amended to establish that Beachfront Construction Certificates for construction activity landward of the Dune Conservation Area will be issued by the Department of Planning and Community Development. Dune Protection Permits and Beachfront Construction Certificates for construction within or seaward of the Dune Conservation Area will be reviewed by the Department of Planning and Community Development and issued by the Planning Commission.

***Mitigation Plan***

› The applicant shall prepare a comprehensive mitigation plan which includes a detailed description of the methods used to avoid, minimize, mitigate, and/or compensate for any adverse effects on dunes or dune vegetation. *[existing in Sections 29-90 (b) and 29-90 (l)]*

***Prohibited Activities***

› The proposed construction shall not involve a prohibited activity as defined in Section 29-90 (j). *[existing in Section 29-90 (j)]*
› The proposed construction shall not materially weaken dunes or materially damage dune vegetation based on substantive findings under Section 29-90 (k). *[existing in Section 29-90 (k)]*

***Dune Protection and Restoration***

› The proposed construction shall be located as far landward as practicable. *[per 31 TAC §15.17 but addressed in Section 29-90 (i)]*
› No ground-level enclosures below base flood elevation (BFE) shall be allowed in the Dune Conservation Area. *[new requirement per 31 TAC §15.17]*
› The proposed construction shall be designed to minimize impacts to natural hydrology and provide for the gradual and dispersed drainage of storm water

runoff, such that runoff within the lot approximates natural rates, volumes, and direction of flow to avoid erosion and dune damage. *[per 31 TAC §15.17 but addressed in Sections 29-90 (b) and (k)]*

- The proposed construction shall not result in the removal or destruction of vegetation or alteration of existing topography unless otherwise unavoidable during construction. Where impacts are unavoidable, areas where vegetation was removed or destroyed shall be revegetated and topography shall be restored consistent with provisions of Section 29-90 (c). *[existing in Section 29-90 (c)]*
- Prior to the commencement of proposed construction, a dune enhancement or restoration project consistent with the definition for restored (man-made) dunes provided in Section 29-54 shall be completed. In cases where completion of an enhancement or restoration project is deemed infeasible due to site constraints as determined by the Department of Planning and Community Development, payment of a fee-in-lieu of satisfying the requirement shall be made to the City. Funds collected will be used to support dune restoration, beach nourishment, or beach access improvements. *[new requirement]*

***Site and Building Design***

- The proposed construction shall be designed to minimize the extent of paved areas as follows:
  - Paving or altering of sites is prohibited in the area seaward of 25 feet from the north toe of an existing or restored (man-made) dune. [existing in Sections 29-90 (j) and 29-90 (m)]
  - Paving used under the habitable structure and for driveway(s) connecting the habitable structure and the street is limited to the use of 4 foot by 4 foot sections of fibrous reinforced concrete in lieu of steel reinforcement in accordance with City specifications, which shall be a maximum of four inches thick with sections separated by expansion joists, or pervious materials approved by the Department of Planning and Community Development. The City shall assess a “Fibrous Reinforced Concrete Maintenance Fee” of $200.00 to be used to pay for the clean-up of fibrous reinforced concrete from the public beaches should the need arise. [existing in Sections 29-90 (j) and 29-90 (m)]
  - Driveways are limited to the linear width of the primary structure, along the main street, and a minimum of 15% of the front yard must be maintained as open/unimproved area. The area for measurement of the open/unimproved space will be from the front building façade, where the driveway begins, to the platted property line. *[existing in Sections 29-90 (j) and 29-90 (m)]*
  - For large-scale construction, impervious surfaces shall be limited to 40% of the area landward of the Dune Conservation Area. The determination of the percentage of impervious surfaces and pervious surfaces allowed must include the area beneath the habitable structure, whether or not the area or any portion of the area beneath the habitable structure is left in a natural state. *[new requirement previously proposed]*

- Plans and certifications for proposed structures shall be sealed by a registered professional engineer licensed in the State of Texas, providing evidence of the following:
  - The adequacy of elevated building foundations and the proper placement, compaction, and protection of fill when used as construction for all newly constructed, substantially damaged, and substantially improved buildings elevated on pilings, posts, piers, or columns in accordance with the latest edition of specifications outlined in American Society of Civil Engineers, Structural Engineering Institute, Flood Resistant Design and Construction, ASCE 24-05. *[new requirement per 31 TAC §15.17]*
  - Structures are elevated and enclosures below BFE are in conformance with the FEMA requirements for building in Flood Hazard Areas and the City's Flood Prevention Ordinance. *[per 31 TAC §15.17 but addressed in Section 29-90 (m)]*
  - Construction is designed to minimize impacts to natural hydrology. *[per 31 TAC §15.17 but addressed in Section 29-90 (k)]*
  - For small-scale construction, structures are designed for feasible, above-site relocation. *[existing Section 29-90 (m)]*
- For large-scale construction, financial assurance is required to fund the eventual relocation or demolition and removal of the proposed structure. Financial assurance may be provided in the form of an irrevocable letter of credit, performance bond, or other instruments acceptable to the City. *[existing Section 29-90 and new requirement previously proposed]*

***Beach Access***

- All developments, other than single-family habitable structures on previously platted lots, shall provide an accessible-public beach access walkover that complies with Texas Department of Licensing and Regulation Standards. *[new requirement previously proposed / dune walkover design addressed in Section 29-90(e)]*

***Plat Notation***

- All new subdivisions of land submitted for plat approval after April 12, 2012 shall contain a note on the plat advising of the location of the property within the Dune Conservation Area, and that reads substantially as follows: "The lots or parcels shown on this plat may be located within the Dune Conservation Area and may be subject to more stringent building requirements or limitations under State of Texas or City of Galveston regulations." For land not required to be platted, prior to the issuance of a building permit for construction of a residential structure or use on property located within the Dune Conservation Area that has been platted prior to April 12, 2012, or that is otherwise not required to be platted, an affidavit in the form prescribed by the city shall be executed by the owners of the property setting forth notice language as described above." *[new requirement previously proposed]*

During Land Development Regulations update process, regulations shall be created to specifically address building requirements for accreting and stable beaches, with special emphasis on managed beaches.

## 6. PRESERVING AND ENHANCING PUBLIC BEACH ACCESS

This section of the ERP describes actions the City will undertake to preserve and enhance the public's right of access to and use of the public beach. Following state requirements, the City has evaluated the condition of existing beach access improvements and assessed their vulnerability to damage from erosion and storm events. The City has also prepared plans to manage, maintain, and improve conditions at existing and potential access points which include the following:

- establishment of design and construction standards to reduce post-storm repair costs;
- establishment of goals to guide ongoing beach access maintenance and improvement activities;
- identification of priorities and an implementation schedule for improvements; and
- establishment of procedures for post-storm assessments to document damage and requirements for repair and rehabilitation.

### 6.1. Beach Access Inventory and Evaluation

As documented in the attached Exhibit C: Beach Access Inventory and Evaluation and shown on Exhibit D: Beach Access Maps, the City has 41 public beach access points offering a range of amenities to residents and visitors. The inventory and evaluation, performed in December 2011, documents the location and extent, type, and condition of improvements at each access point, and defines measures required for protection, restoration, and enhancement.


**Figure 9. Beach access sign along FM 3005.**

As shown in Exhibit C, the following information was collected for each beach access point:

- location (subdivision and cross-streets);
- type, condition, and number of parking spaces provided;
- road and access condition;
- condition of amenities including parking, bollards, dune walkovers;
- type and location of signage; and
- recommended improvements to protection from erosion and storm surge (acquisition, entry and site improvements, revegetation, signage and others).

The updated inventory and evaluation serves as the basis for setting priorities for improvements and determining appropriate forms of funding for projects, including qualifying for FEMA post-storm funding.

## 6.2. Beach Access Construction Methods and Design Improvements

To ensure beach access improvements are better able to withstand the effects of erosion and storm events, the City will adopt by reference the beach access and walkover construction standards provided in the GLO's *Dune Protection and Improvement Manual for the Gulf Coast (Dune Manual)*. The *Dune Manual* provides important guidance regarding the location and design of beach walkovers and access roads, preferred construction materials and methods, and related recommendations to improve access while protecting dunes and dune vegetation. For example, the *Dune Manual* calls for vehicle access roads through dunes to be elevated, angled to help limit direct penetration of surge and waves through or past the dunes during storms, and as narrow as practical to minimize dune destruction (Figure 11).

**Figure 10. Dune walkover completed following Hurricane Ike.**

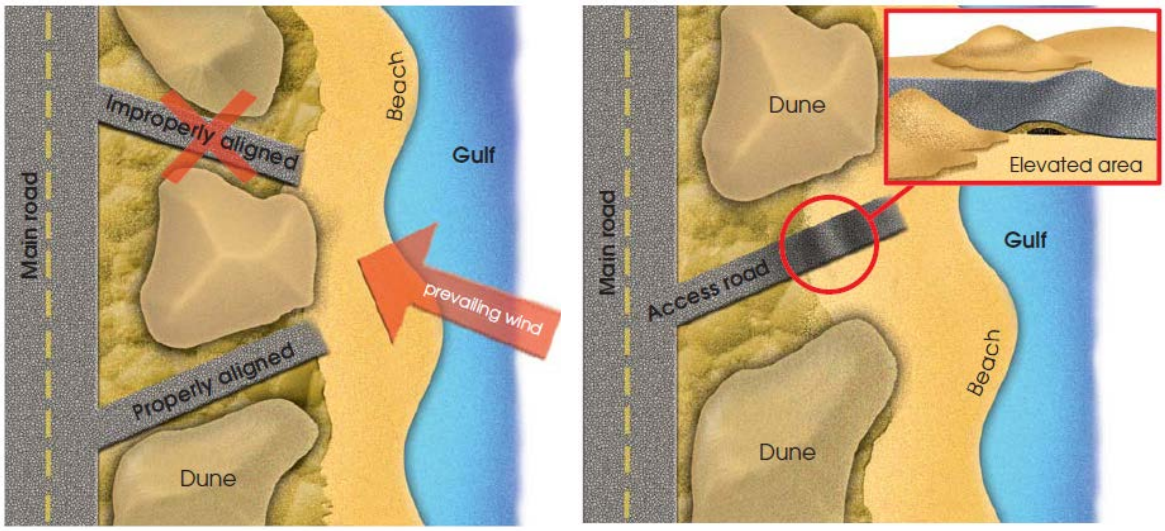


**Figure 11. Recommended alignment and elevation of beach access roads. (GLO Dune Manual)**

## 6.3. Beach Access Goals, Priorities, Implementation Schedule, and Funding Sources

Among the City's goals for beach access on the Island is the enhancement of the public's right to use and have access to beaches, balanced with the rights of private property owners and the protection of the coastal environment. This will be accomplished by providing quality access improvements and minimizing the potential for damage to such improvements by following best practices in their design, construction, maintenance, and restoration.

To achieve this broad goal over the long-term, the City seeks to provide the following for all existing and future public beach access points:

- signage advising the public of beach access and parking locations, types of access provided, dune protection standards, applicable city/state/federal regulations, and protected habitats;
- bollards and fencing designating beach access parking, pedestrian, and special use areas, as well as protection of dunes and vegetation areas;
- improvements to roadway transition areas where roadways intersect with the beach and on-beach parking and driving access;
- improvements to drainage features serving the beach area, adjacent properties, city and state roadways;
- amenities, such as showers, restrooms, lighting and refreshments, and park facilities;
- enhancements to public safety, including increased lifeguard coverage and presence of emergency personnel;
- improved ADA access, including, but not limited to, access for beach wheelchairs, installation of access mats and accessible dune walkovers, and programming; and
- geo-referencing of beach access points and access improvements.

The City's short-term beach access priorities include procuring funding to address post-Ike repair and improvement needs, upgrade deficient conditions at key locations, and minimize the potential for damage due to erosion and storm events. Table 2 identifies the City's short-term priorities for improvements, upgrades, and repairs by public access point. Priorities for improvements and investments were established based on levels of use, need of repair, safety and security concern, and need to reduce the potential for damage in future storm events.

The City's short-term priorities also include procuring funding to purchase equipment required to support local beach access maintenance and improvement activities. Equipment required includes front end loaders, water trucks, and street graders. The City shall make efforts to include annual budget appropriations to adequately fund beach access labor, materials. and equipment.

**TABLE 2. SHORT-TERM BEACH ACCESS IMPROVEMENT IMPLEMENTATION SCHEDULE**

| Public Access Point | Location | Improvement |
|---|---|---|
| Access Points 2, 5, 6, 9, & 13 | Various City and County Parks Locations | signage, drainage, parking areas, pedestrian walkways, roadways |
| Access Point 7 | 8 Mile Road | roadway transition area |
| Access Points 11 and 12 | Spanish Grant and Bermuda Beach Subdivisions | roadway improvements, drainage |
| Access Point 15A | Pirates Beach and Palm Beach Subdivisions | drainage |
| Access Point 16 | 13 Mile Road/Gulf Palms Subdivision | roadway paving, drainage |
| Access Point 18 | 16 Mile Road | roadway paving, drainage |
| Access Point 19 | Karankawa Beach | drainage |
| Access Point 25 | Gateway Boulevard | roadway transition area |
| Access Point 32 | County Pocket Park 32 | undeveloped access |
| Access Point 35 | Half Moon Beach West | driving area |
| Access Point 41 | Pointe San Luis | roadway access, bollards, dune protection |

The City's long-term beach access priorities include upgrading access points as required to address the following:

- changing environmental conditions;
- increases in localized erosion;
- the effects of recent and potential future storm activity;

- changes in patterns of use; and
- enhancements in the safe and convenient access to beaches.

As the implementation of individual actions to achieve goals is contingent upon available funding, including grant funding and resources gained through partnerships with private organizations or entities, the City will evaluate the following funding sources to determine their potential to support investments in beach access improvements:

- NOAA Programs and Grants
- GLO Program and Grants
  - Coastal Erosion Planning and Response Act (CEPRA)
  - Coastal Impact Assistance Program (CIAP)
  - Coastal Management Program (CMP)
  - Beach Maintenance Reimbursement Fund
  - Coastal and Estuarine Land Conservation Program (CELCP)
- Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) Gulf of Mexico Energy Security Act (GOMESA) funds
- City of Galveston Capital Improvement Program
- Local Beach User Fees
- Homeowner Associations (HOAs)
- Convention Center Surplus Fund

### 6.4. Post-Storm Assessment Procedures

The updated Beach Access Inventory and Evaluation (Exhibit C), which documents all publically-funded beach access improvements and amenities, will be used as the basis for conducting assessments of beach access conditions and improvements immediately following significant meteorological events. As soon as conditions allow, the City will assess compliance with the Dune Protection and Beach Access Plan and associated regulations, document non-compliance, and identify required repairs or replacements to amenities including parking, pedestrian and vehicular access ways, signage, etc. The City will develop a schedule and identify local funding, claims, and grants for each improvement.

## 7. PRESERVING, RESTORING, AND ENHANCING DUNE SYSTEMS

This section of the ERP presents actions and strategies the City will undertake to preserve, restore, and enhance dune systems for storm protection and conservation purposes. As provided below, the City has recently adopted a definition for restored (man-made) dunes; identified locations for potential dune restoration projects and measures to protect dune systems and dune vegetation; and identified goals, implementation schedules, and potential funding sources to accomplish dune restoration and enhancement projects.

**Figure 12. Restored (man-made) dune with fencing to protect vegetation.**

## 7.1. Definition of and Criteria for Restored (Man-Made) Dunes

Recent City plans, policies, and ordinance revisions recognize that healthy dune systems play a central role in protecting public and private property from the effects of storm events and coastal erosion. Vital dune systems, with sufficient height, width, vegetative cover, and continuity, can serve as effective barriers against wind and wave action, thus providing a measure of protection to public and private investments along the coast.

As described in previous sections of the ERP, the City's existing regulations include provisions addressing dune protection, revegetation, and restoration, and a recently adopted section provides minimum standards for the creation of restored (man-made) dunes. As defined in existing Section 29-54, restored (man-made) dunes shall have the following characteristics:

- 50% vegetative cover;
- a minimum 3:1 slope;
- an average height of 75% of the island's base flood elevation as measured from mean sea level;
- a naturally established connection to the dune contour and elevation of the adjacent property; and
- shall not extend further seaward than 4.1' from mean sea level.

In addition, the City will revise existing regulations to require dune restoration projects as a condition for approval of exemptions for development within the Dune Conservation Area.

To further promote the protection of dunes and dune systems, the City will amend existing regulations to reference dune vegetation best practices in the GLO's *Dune Manual.* The *Dune Manual* provides guidance regarding plant selection, planting practices, transplanting, watering, fertilization, maintenance, and survival rates. For

example, the *Dune Manual* provides the following guidance regarding plant selection and the use of native hay and sand fencing as protection measures:

- ***Seaward Face of the Dune.*** Bitter Panicum (grass), Sea Oats (grass), Marsh Hay Cordgrass (grass), beach morning glory (vine, and seagrapes (vine).
- ***Landward Side of the Dune.*** Low-growing plants and shrubs found on the back side of the dunes include seacoast bluestem, cucumber leaf sunflower, rose ring gallardia, partridge pea, prickly pear, and lantana. Many of these are flowering plants, an attractive alternative to dune grasses though less effective as dune stabilizers.
- ***Native Hay.*** The use of a three (3) to six (6) inch thick layer native hay, with seeds of the above listed vegetation, on bare sand areas to provide immediate protection from blowing sand and encourage the natural process of re-seeding. The hay must be harvested in fall when mature seeds are present.
- ***Sand Fencing.*** Encourage limited use of sand fencing to build up dunes where revegetation alone is unlikely to encourage sufficient dune width and height. Sand fencing can be used as a first step prior to revegetation.

## 7.2. Enhanced Dune Protection Measures for Existing Structures

The City's existing regulations include several provisions designed to protect existing dunes and dune systems. These provisions, along with new requirements called for under previous sections of the ERP, are designed to ensure modifications to existing structures will provide enhanced protection of dune systems.

Sections 29-90 (j)(6) and (7) of the Zoning Standards require protection of the dune systems for existing structures to obtain a Dune Protection Permit or Beachfront Construction Certificate. The following prohibitions are in place and will be amended to reference the potential for development within the Dune Conservation Area:

- paving, grading, or altering the ground below the lowest habitable floor in any manner, including mowing, grading, filling, or fertilizing, is prohibited in the following areas, whichever is further landward:
  - the area between the line of vegetation and 25 feet seaward from the habitable structure, or
  - the area 25 feet landward of the north toe of the dune;
- only indigenous dune vegetation described in the GLO's *Dune Manual* shall be planted seaward of the line 25 feet landward of the north toe of the dune; and
- dune walkovers, footpaths, and irrigation systems for the dune that are approved through a Beachfront Construction Certificate may be allowed.

## 7.3. Dune Goals, Implementation Schedule, and Funding Sources

Promoting the formation of a continuous dune system is the City's long-term goal for beachfront areas beyond the limits of the Seawall. Although achieving the goal may be difficult given existing development patterns, damage sustained during Hurricane Ike,

and the long-term effects of erosion, the City will focus resources on protecting and enhancing dune stability in locations where dunes exist, supporting dune restoration and recovery in areas affected by storm events, and establishing dune systems conditions in locations without dunes through beach nourishment and dune restoration projects.

To achieve the long-term goal, the City will align regulations and public investment strategies to accomplish the following:

- fill in gaps and blowouts in existing dunes and promote revegetation of these areas;
- ensure restoration projects match existing dune heights and widths or meet minimum standards for restored (man-made) dunes as defined by City regulations;
- promote revegetation of existing and developing dunes; and
- investigate the effectiveness of innovative dune restoration and beach nourishment methods, such as, but not limited to the use of recycled Christmas trees and sand creation using recycled glass.

Given high levels of damage sustained by the Island's dune systems and dune vegetation during Hurricane Ike, the City's short-term priorities for dune restoration focus on completing previously planned nourishment and dune restoration projects in areas experiencing high rates of erosion. As shown in Exhibit E: Dune Restoration and Beach Nourishment Priority Area Map and Table 3, these areas include large expanses of the beachfront directly west of the Seawall, as well as an area in front of the Seawall west of 61st Street.

### TABLE 3. DUNE RESTORATION, REVEGETATION & NOURISHMENT IMPLEMENTATION SCHEDULE—SHORT-TERM PRIORITIES

| Priority Level | Area | Improvements |
|---|---|---|
| High | 61st Street and end of Seawall | beach nourishment |
| High | End of Seawall west to 13 Mile Road | dune restoration, dune revegetation, and beach nourishment |
| Medium | 16 Mile Road west | dune restoration, dune revegetation, and beach nourishment |

The short-term restoration areas have been prioritized based requirements to protect immediate threats to private property, public infrastructure, and publically-owned lands. Over the long-term, priorities will be established based on evaluation of historic erosion rates and sand migration patterns, addressing breaches and blowouts, protecting wildlife habitat, and enhancing the width, height, and vegetative cover of existing dunes.

Implementation of the dune restoration or revegetation projects described previously is dependent on the availability of funding. The City will continue to pursue opportunities

for restoration or revegetation including grants and other sources of funding. Potential funding sources include, but are not limited to, the following grants and programs:

- NOAA Programs and Grants
- GLO Program and Grants
  - Coastal Erosion Planning and Response Act (CEPRA)
  - Coastal Impact Assistance Program (CIAP)
  - Coastal Management Program (CMP)
  - Beach Maintenance Reimbursement Fund
  - Coastal and Estuarine Land Conservation Program (CELCP)
- Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) Gulf of Mexico Energy Security Act (GOMESA) funds
- City of Galveston Capital Improvement Program
- Local Beach User Fees
- Homeowner Associations (HOAs)

In addition, the City will explore the feasibility of establishing a dune restoration fund and encouraging private participation in dune restoration and revegetation.

The City, in conjunction with local, state, and federal partners, shall aggressively pursue beach nourishment and dune restoration projects to address long-term erosion on Galveston Island. The City's Industrial Development Corporation (IDC), which administers the 4B Sales tax, has approximately $1 million annually for beach nourishment projects. The Galveston Park Board of Trustees (Park Board) also has a multi-million dollar account from beach access fees that may be utilized for beach nourishment**,** beach park improvements and beach access. In addition, the Park Board is pursuing a model beach and dune project with the assistance of the Texas General Land Office for the area at the end of the Seawall to Dellanara Park that will utilize FEMA funds from Hurricane Ike.


**Figure 13. Sign indicating location of dune revegetation project.**

## 8. VOLUNTARY ACQUISITION OF PROPERTY

Purchase or buyout of vulnerable properties provides another option to reduce public expenditures following storms and address the long-term impacts of erosion. The City has established criteria for identifying properties for voluntary acquisition of fee simple title or a lesser interest acquisition. These properties, which may have structures located partially or entirely seaward of the Dune Conservation Area, experience severe damage during storms, impede the development of a natural dune system, and restrict the use of the public beach.

Prior to the City considering a property eligible for participation in a voluntary acquisition or buyout program, the following factors must be evaluated:

- the presence and extent of structures or other improvements seaward of the Dune Conservation Area;
- effects on the public's access to the beach, including proximity or adjacency to public access points;
- effects on hydrology as determined by a registered professional geologist or engineer licensed in the State of Texas;
- effects on the health of existing dunes and dune systems;
- effects on the potential to establish restored (man-made) dunes;
- effects on adjacent property, including effects on localized erosion;
- potential to acquire multiple, similarly-situated properties; and
- other factors with the potential to affect public health and safety.

The following sequence of activities will be followed during City-initiated acquisition processes:

- identification of potential properties;
- negotiation of acquisition;
- funding procurement;
- agreement execution; and
- removal of structures.

Prior to consideration of a voluntary acquisition program, the City must identify other governmental entities as partners and determine funding sources for the program.

In addition to federal or state acquisition programs, the City should investigate the development of local programs for property acquisition that may utilize Beach User fees, bond funds, or general fund budget. The City shall establish standards for use of acquired properties, prior to program finalization. These standards can include uses such as, but not limited to:

- open space;
- wetland and dune mitigation;
- beach nourishment;

- park facilities;
- drainage improvements;
- beach access and parking;
- ADA facilities;
- recreational uses; and
- public Infrastructure.

**DOCUMENT INFORMATION**

Plan prepared by HDR Engineering, Inc. for the City of Galveston, Texas. Completed as part of Progress Galveston, a planning initiative led by the City's Department of Planning & Community Development with technical assistance provided by HDR Engineering, Inc., Kendig Keast Collaborative, Winter & Company, and the Law Offices of Kimberley Mickelson. Partial funding provided through a grant from the U.S. Department of Housing and Urban Development.

**For more information, please contact:**

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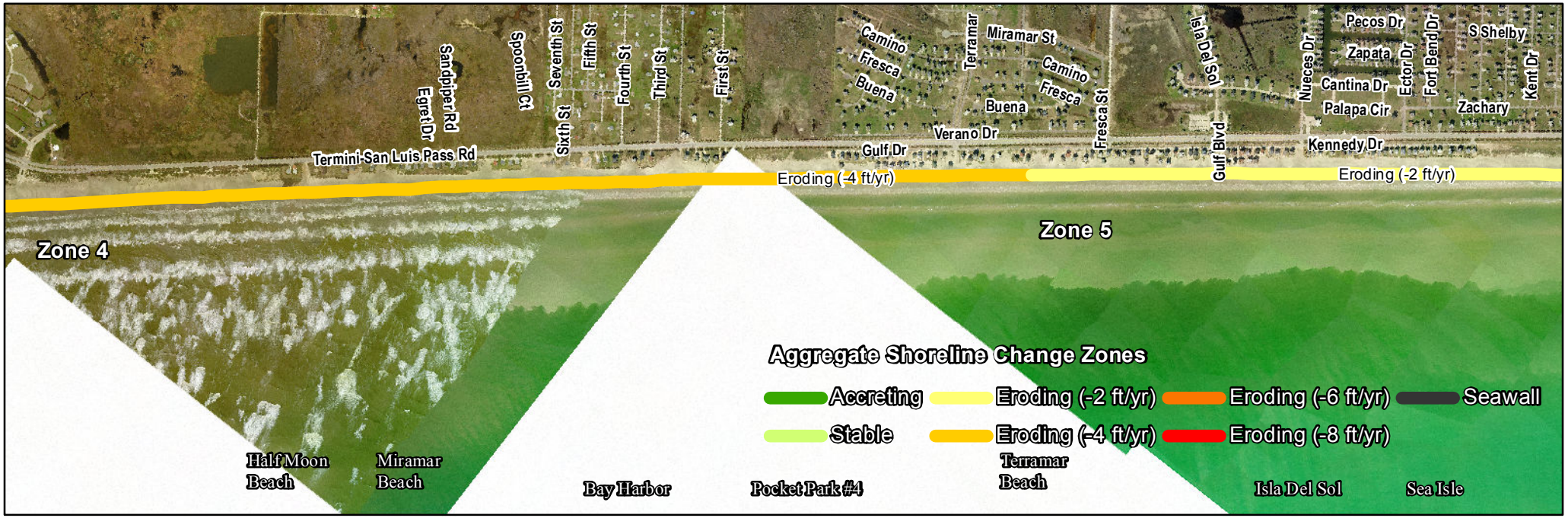
**EXHIBIT A: AGGREGATE SHORELINE CHANGE ZONE MAPS**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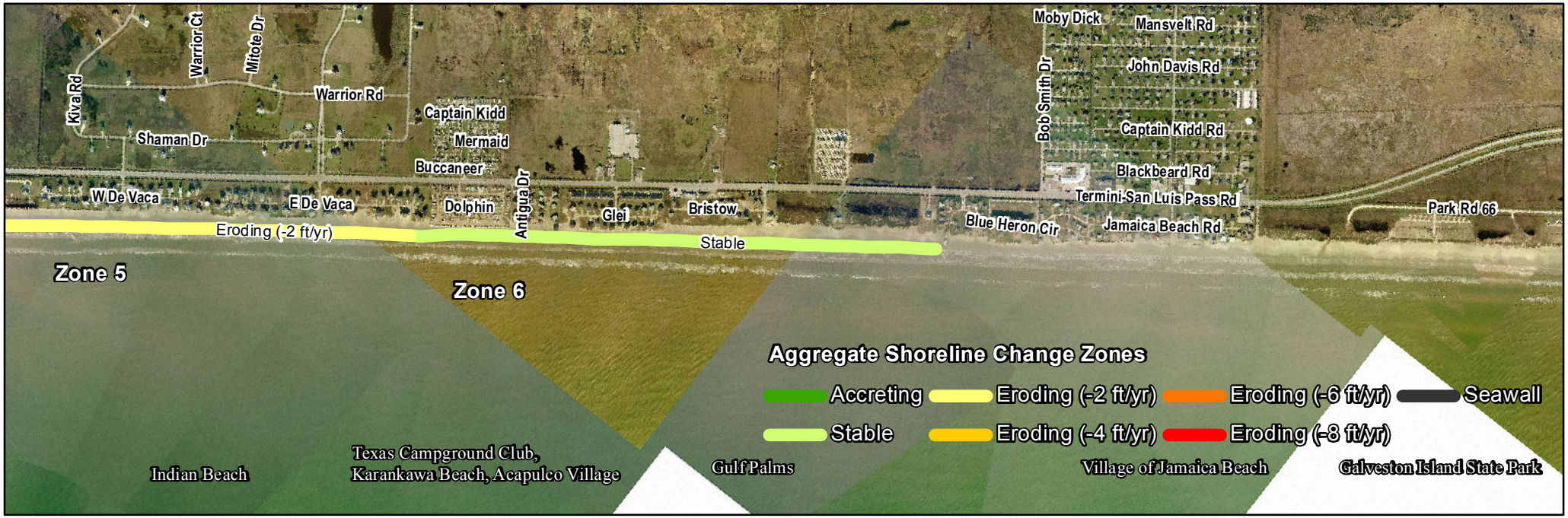
# City of Galveston
# Aggregate Shoreline Change Zones
# Erosion Response Plan

Aerial Imagery from Spring 2010

0 0.25 0.5 Miles

**Sheet 1 of 5**

Map Last Updated: 2/29/2012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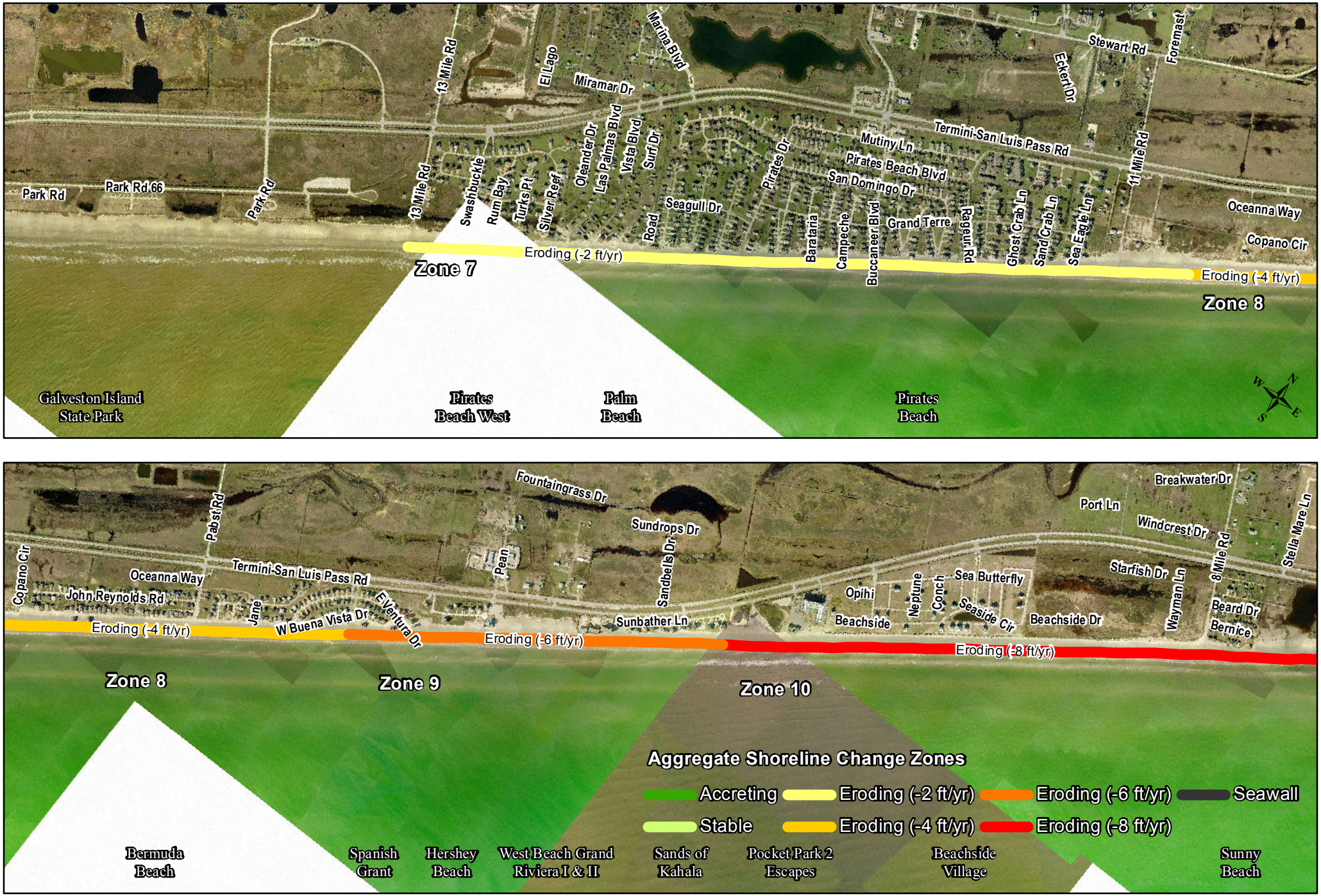
# City of Galveston
# Aggregate Shoreline Change Zones
# Erosion Response Plan

Aerial Imagery from Spring 2010

0 0.25 0.5 Miles

**Sheet 2 of 5**

Map Last Updated: 2/29/2012

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# Aggregate Shoreline Change Zones
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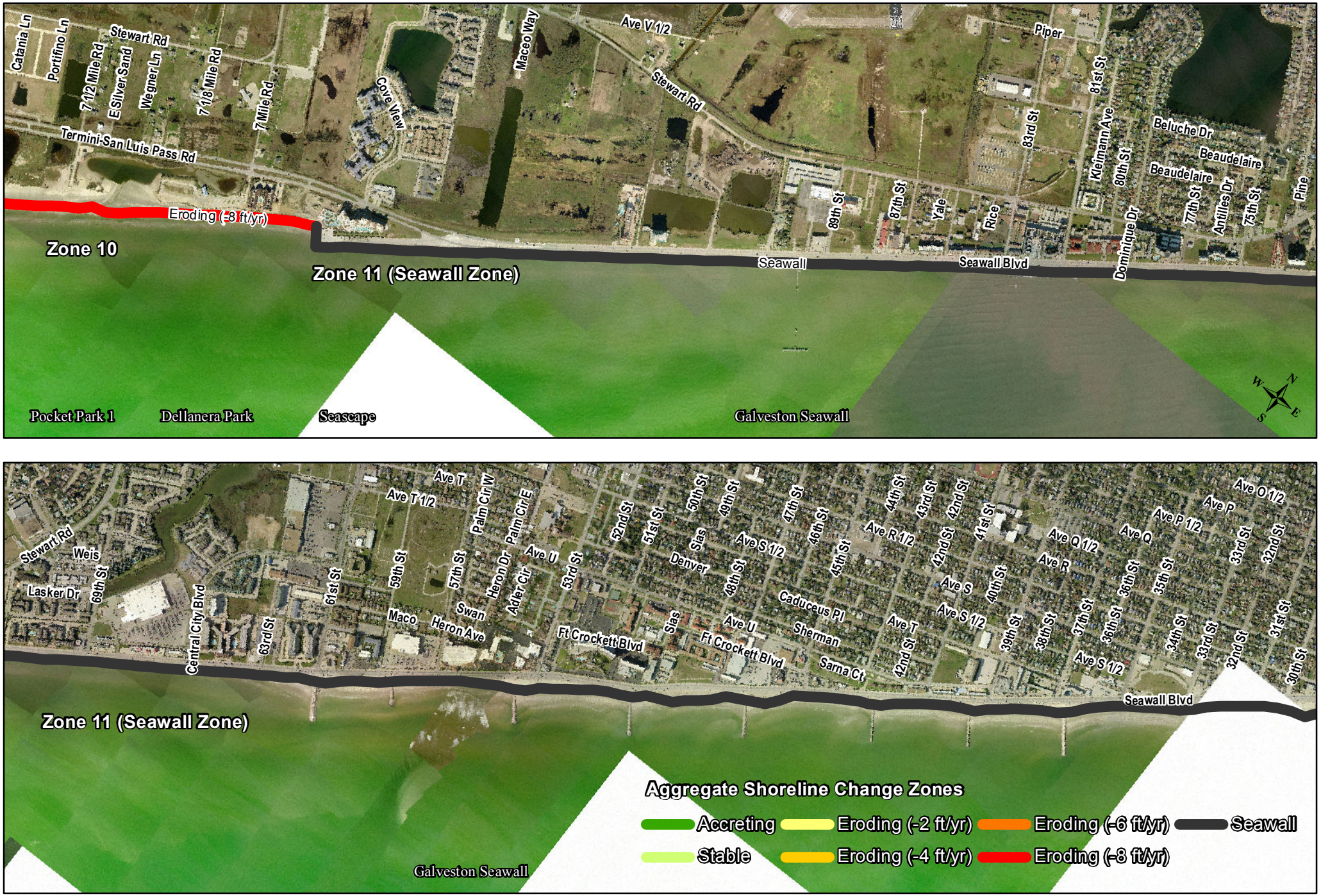
Aerial Imagery from Spring 2010

0 0.25 0.5 Miles

**Sheet 3 of 5**

Map Last Updated: 2/29/2012

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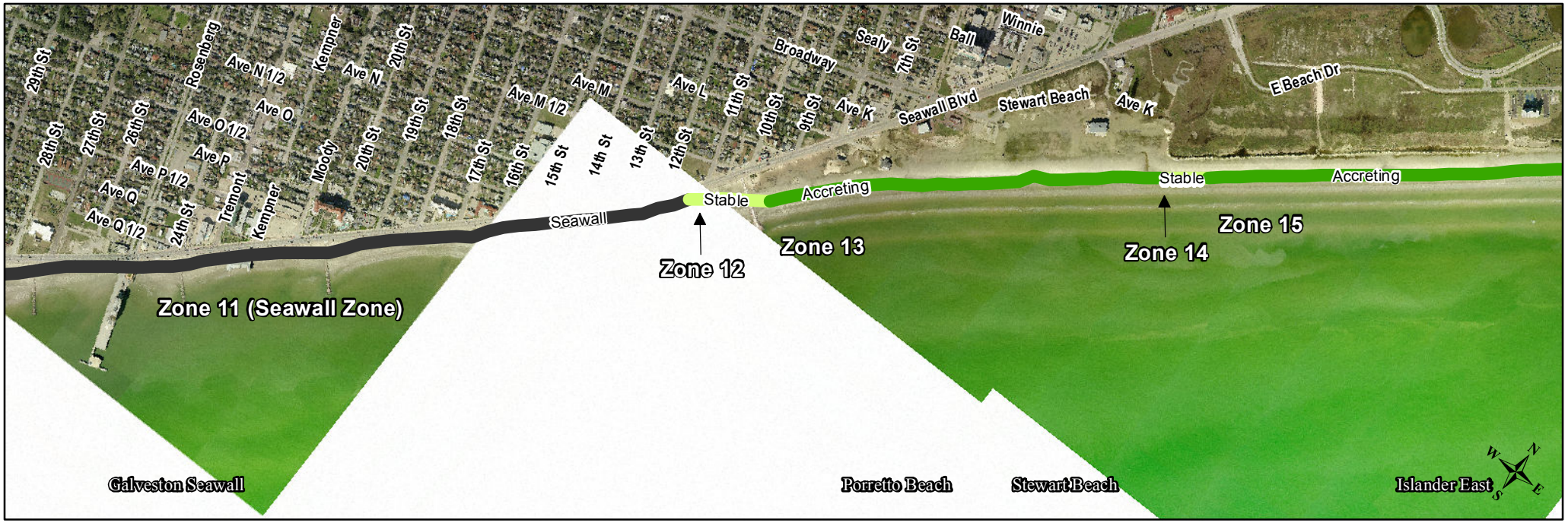
# City of Galveston
# Aggregate Shoreline Change Zones
# Erosion Response Plan

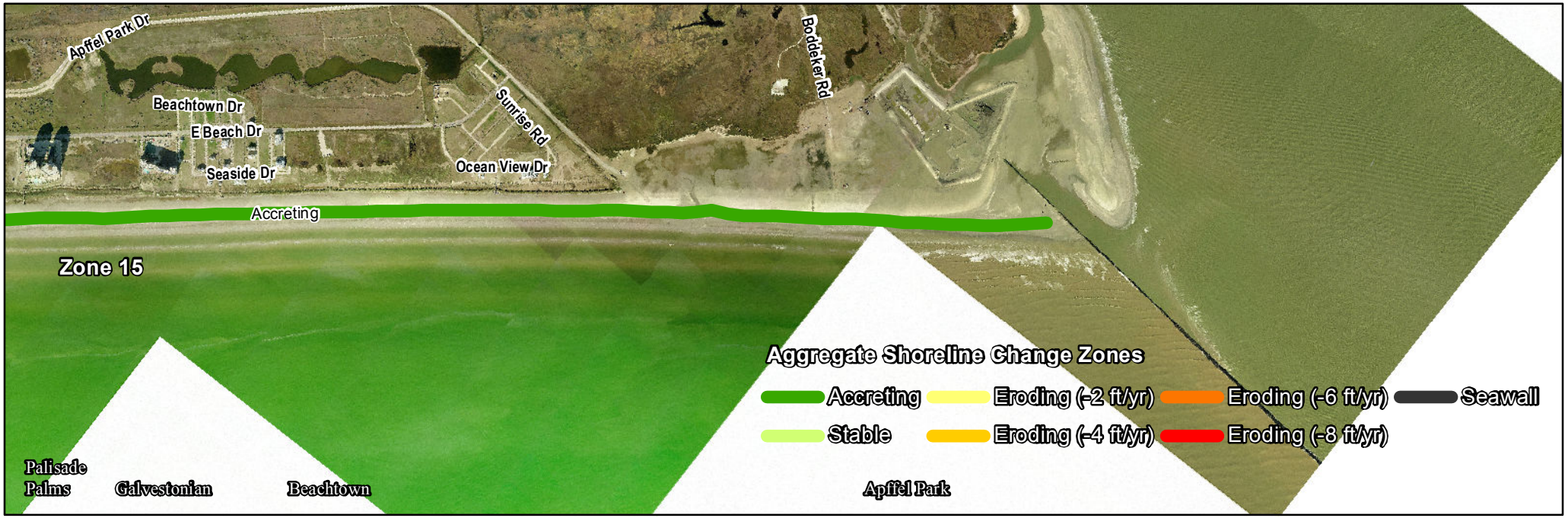
Aerial Imagery from Spring 2010

0 0.25 0.5 Miles

**Sheet 4 of 5**

Map Last Updated: 2/29/2012

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# City of Galveston
# Aggregate Shoreline Change Zones
# Erosion Response Plan

Aerial Imagery from Spring 2010

0 0.25 0.5 Miles

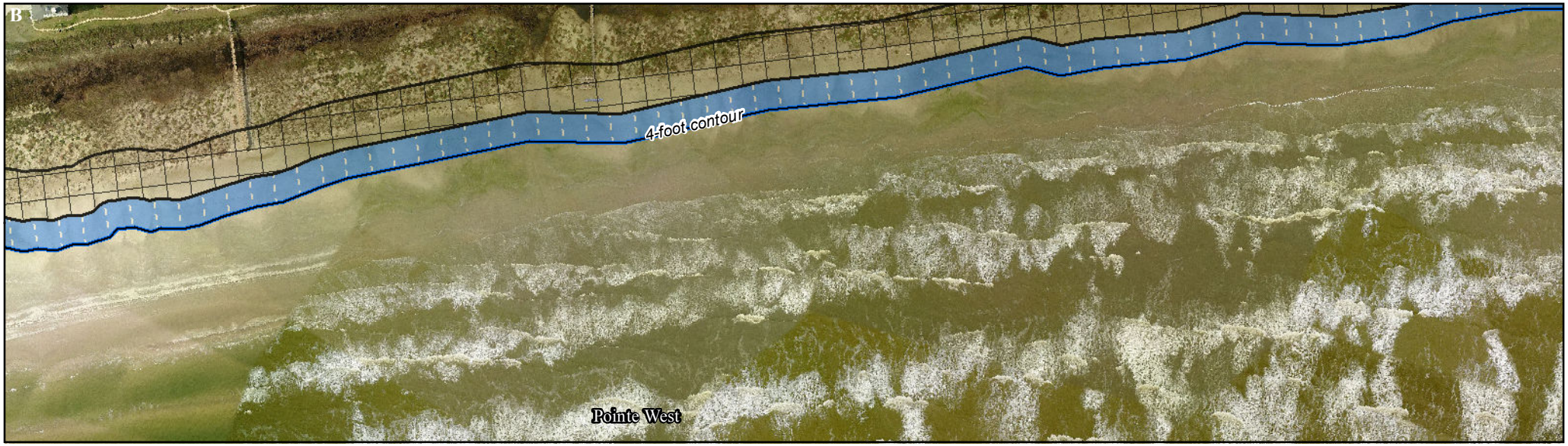
**Sheet 5 of 5**

Map Last Updated: 2/29/2012

**EXHIBIT B: DUNE CONSERVATION AREA AND ENHANCED CONSTRUCTION ZONE MAPS**

[Note: Map data for the entire City is also available on the City's website at http://gis.cityofgalveston.org/web_ERP/mapviewer.jsf?width=1122&height=790]



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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010

*Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 1 of 15**

Map Last Updated: 5/2/2012




**Department of Planning and Community Development**
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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 2 of 15**

Map Last Updated: 5/2/2012


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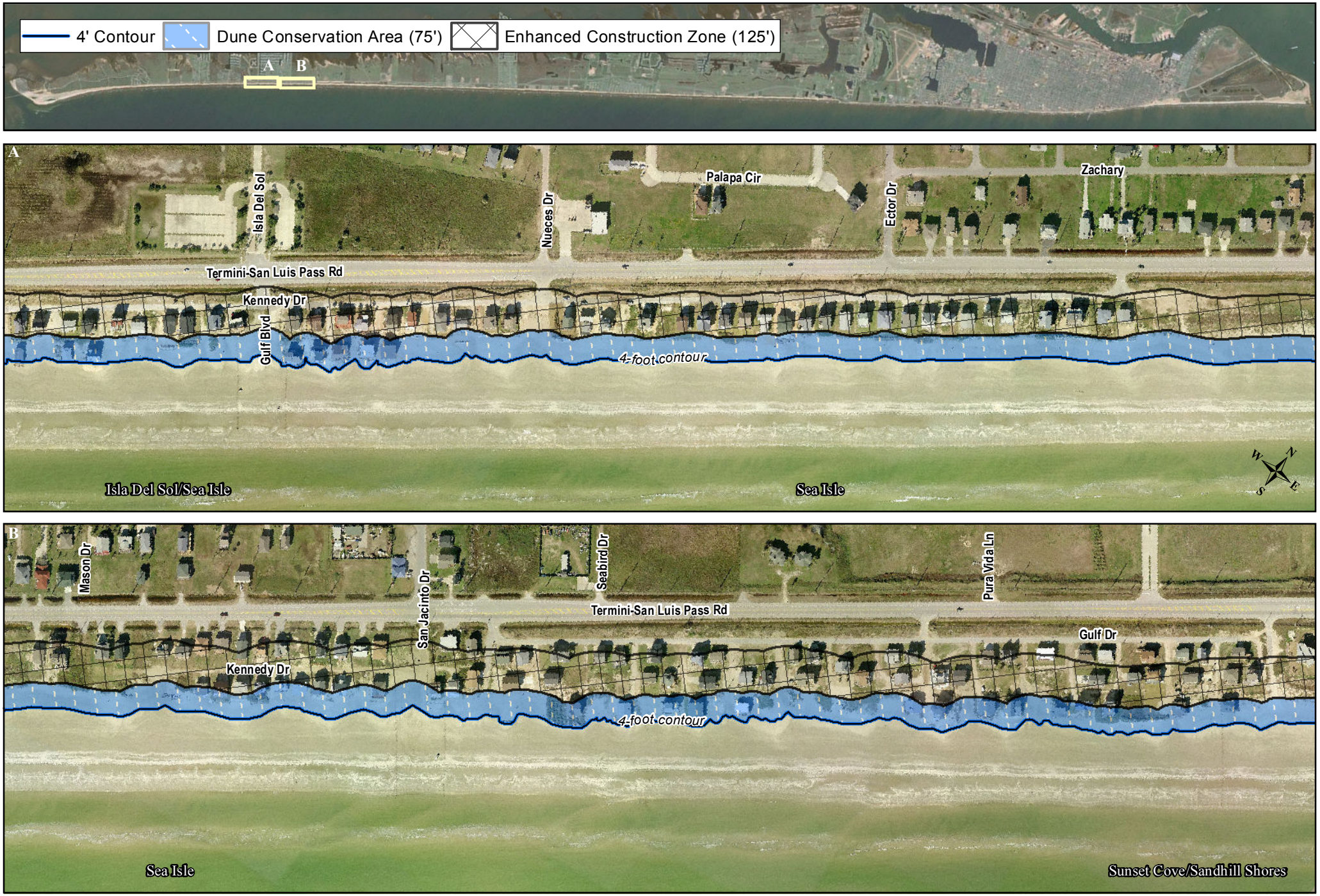
# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 3 of 15**

Map Last Updated: 5/2/2012

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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 4 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 5 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 6 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 7 of 15**

Map Last Updated: 5/2/2012


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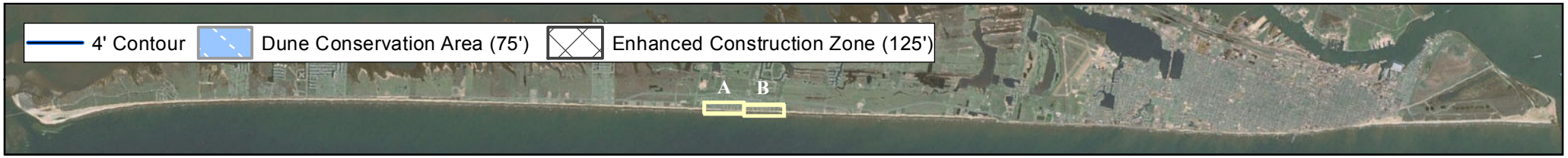
# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 8 of 15**

Map Last Updated: 5/2/2012



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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 9 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 10 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 11 of 15**

Map Last Updated: 5/2/2012




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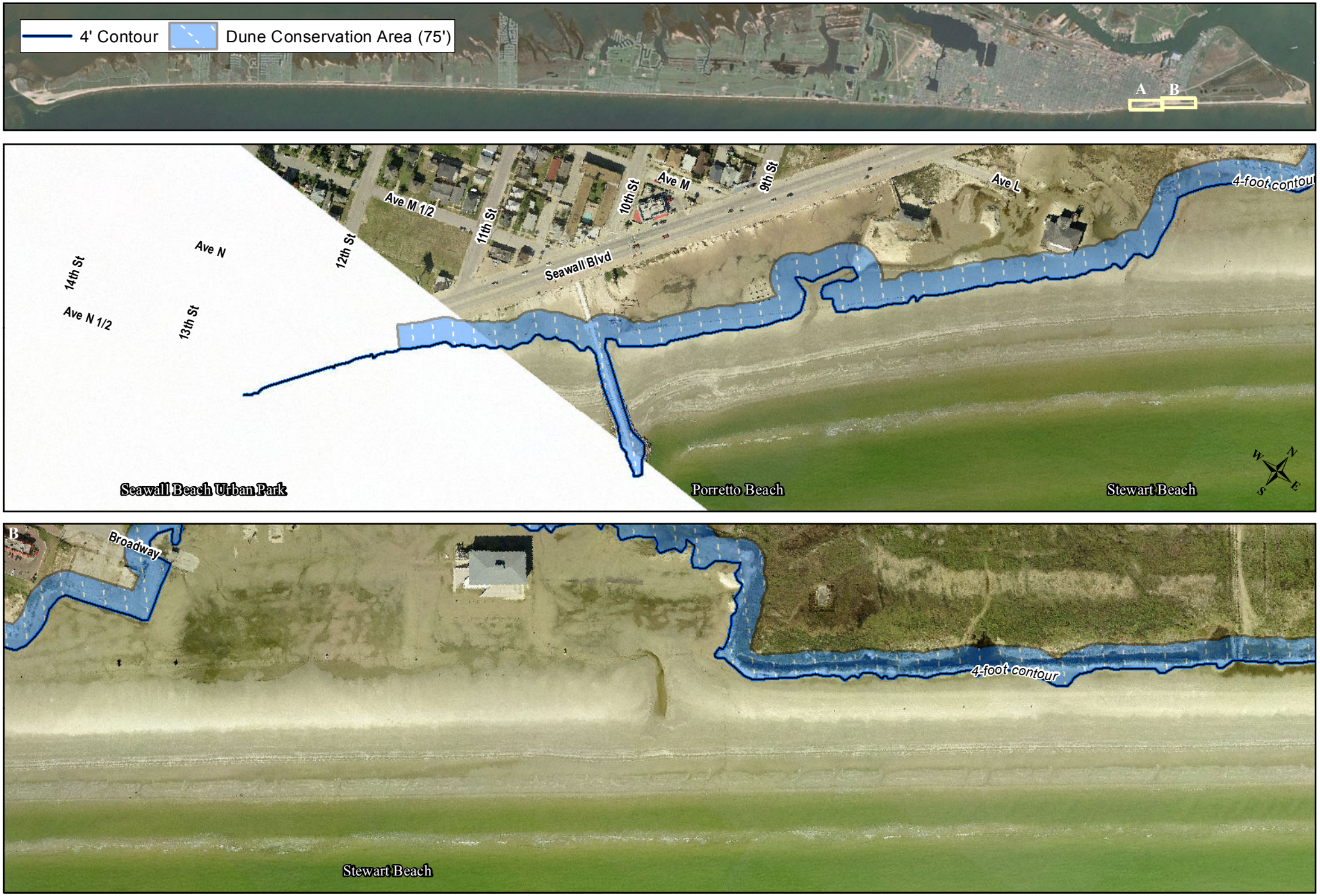
# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 12 of 15**

Map Last Updated: 5/2/2012

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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 13 of 15**

Map Last Updated: 5/2/2012




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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 14 of 15**

Map Last Updated: 5/2/2012


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# Erosion Response Plan
# Dune Conservation Areas and Enhanced Construction Zones

Imagery Date: Spring 2010 *Map is for illustration only*

0 0.1 0.2 Miles

**Sheet 15 of 15**

Map Last Updated: 5/2/2012

**EXHIBIT C: BEACH ACCESS INVENTORY AND EVALUATION**

## EXHIBIT C: BEACH ACCESS INVENTORY AND EVALUATION

PROGRESS GALVESTON

| Beach Access Point # | Subdivision | On-/Off-Beach Parking | Linear Feet | Beach User Fee | Parking Spaces | BAP Req. 1=15' | BAP Parking Spaces | Bollards (east/ west) | Main Road Directional Street Signage | Dune Walkover & Type | Dune Walkover Signage | Other Amenities | Roadway Conditions | Parking Area Striping | Notes | Types of Signage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Apffel Park | On | 3,887 | Yes and free | 7,000 | 260 | No # | East | 2 BA signs at park entrance only | no | | In const. phase | good | | only 1 BA sign on Apfell Park Drive, need more | Need H/C signs in free parking area |
| 1 (A) | Beachtown | On and off | 245/ 4,629t | free | 329 | 309 | 120 on/ 181 off | Both, good | Need BA signs both sides | yes both | no, but needed | none | good | yes | bollards that stick out blocking access need removing | footpath sign for Center Village lot & H/C 4 free lot |
| 1 (B) | Palisade Palms | Off | 1,595 | free | 162 | 107 | 162 | None-needed | Need BAP signs on Seawall at E. Beach | yes/ADA | yes | none | good | yes | BA sign has B & C need to be separated and relocated | good |
| 1 (C | Area W of Islander-Stewart Beach | On and off | 2,640/ 3,653t | free | 400+ | 243 | 88 on/ 201 off | Both, good | Need BAP signs on E. Beach b4 lots | no | | yes | good | | need BA sign on Seawall S. side at E. Beach | need footpath sign |
| 2 | Stewart Beach | On | 2,640 | Yes and free | 2,000 | 176 | No # | Both, good | Seawall signs ok | no | | yes | good | no | | good |
| 3 | Seawall Urban Park | Off | 33,884 | free | 230 | 2,259 | 230 | None-needed | Seawall signs ok | yes, ADA 57th | yes | yes | good | yes | | need more signage for Seawall |
| 4 | End of Seawall | Off | 1,025 | free | 150 | 69 | 150 | None-needed | 3005 signs ok | yes, concrete ADA | no, but needed | none | good | only newly const. | Rest of AP needs striped | no access signs to beach posted |
| 5 | Dellanera Park | Off | 1,095 | yes | 65 | 73 | No # | None-needed | 3005 signs ok | yes, ADA | yes | Overnight camp | good | yes | dune walkover and dune pending FEMA reimbursement | good |
| 6 | Pocket Park #1 | On | 1,690 | yes | 200 | 113 | No # | Both | 3005 signs ok | | | none | needs work | no | dune walkover and dune pending FEMA reimbursement | needs footpath signs |
| 7 | Sunny Beach | On | 1,300 | free | 138 | 87 | No # | Both, good | 3005 signs ok | no | | none | good | | | DNE, NP & 2 H/C signs gone |
| 8 | Beachside Village | Off | 2,212 | free | 148 | 148 | 148 | None-needed | 3005 signs ok | yes, ADA | no, but needed | none | good | no | 5 wood mats only one with BA signs | need ADA walkover sign & on street signs |
| 9 | Pocket Park #2 | Off | 939 | yes | 352 | 63 | 352 | None-needed | 3005 signs ok | no, ADA needed | no footpath signage | yes, bathrooms | good | only ADA | Parking lot needs striped, need bollards W. side | good |
| 10 | 10 Mile Road | On and off | 1,065 | free | 118 on/ 58 off | 71 | No # | Both, good | 3005 signs ok | no | | none | needs work | no, lot needs it | H/C signs to E. need relocated to S. dunes | DNE sign on west gone |

## EXHIBIT C: BEACH ACCESS INVENTORY AND EVALUATION

PROGRESS GALVESTON

| Beach Access Point # | Subdivision | On-/Off-Beach Parking | Linear Feet | Beach User Fee | Parking Spaces | BAP Req. 1=15' | BAP Parking Spaces | Bollards (east/ west) | Main Road Directional Street Signage | Dune Walkover & Type | Dune Walkover Signage | Other Amenities | Roadway Conditions | Parking Area Striping | Notes | Types of Signage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Spanish Grant | Off | 1,700 | free | 118 | 114 | 46off | None-needed | 3005 signs ok | no, but needed | | none | needs work | | dunes are building, need footpath signs | no on-street parking on Ventura or Main |
| 12 | Bermuda Beach | On | 3,085 | free | 277 | 206 | 66 on/ 211 off | Both, good | 3005 signs ok | no | | none | good | | On beach parking expanded to 300' 150' in BAP | No DNE on E. |
| 13 | Pocket Park #3 | Off | 332 | Yes | 273off | 23 | 273 | None-needed | 3005 signs ok | | | | | | could not get in | |
| 14 | 11 Mile Road | On | 300 | free | 66 | 20 | No # | Both, good | 3005 signs ok | no | | none | good | | Bollards W. only 18" high, need replace and need 2 E | good |
| 15 (A) | Pirates Beach | Off | 5,388 | free | 360 | 360 | No # | None-needed | 3005 signs ok | no, but needed | | none | good | no | Dune Walkovers are being replaced by FEMA | need footpath and on street parking signs |
| 15 (B) | Palm Beach | Off | 1,154 | free | 77 | 77 | No # | None-needed | 3005 signs ok | no | | none | good | no | Remove Residents Access Only signs at Surf and Vista | need footpath and on street parking signs |
| 15 (C | Pirates Beach West | Off | 1,289 | free | 86 | 86 | No # | None-needed | 3005 signs ok | no, but needed | No footpath signage | none | good | | Need footpath signs, need walkover | only one BA sign at entrance of subdivision |
| 16 | 13 Mile Road | On | 640 | free | 267 | 43 | No # | Both, good | 3005 signs ok | no | | none | needs grading | | H/C sign on N needs to be moved to access area | DNE, NP, Turtle signs gone |
| 17 | 15 Mile Road | On | 150 | free | 32 | 10 | No # | Both, good | 3005 signs ok | no | | none | need to clear sand | | H/C signs on W to far north need relocating | DNE signs gone, NVBP gone |
| 18 | 16 Mile Road | On | 760 | free | 328 | 51 | No # | Both, good | 3005 signs ok | no | | none | needs work | | dunes have formed on N portion of bollards | H/C signs to N, need relocating to S. |
| 19 | Karankawa Beach | Off | 1,003 | free | 40 | 67 | 27 | None-needed | 3005 signs ok | no, footpaths 2 | footpath signs ok | none | needs work | no | no parking sign on lot S. of 17726 needs to be removed | need on street parking signs |
| 20 | Indian Beach | Off | 4,021 | free | 200 | 268 | 200 | None-needed | 3005 signs ok | no but needed | no footpath signs | none | needs work | no | walkovers pending FEMA reimbursement & permitting | need on street parking signs |
| 21 | Kahala Beach Estates | Off | 1,850 | free | 79 | 124 | 59 | None-needed | 3005 signs ok | yes | yes | none | good | no | walkovers located east of 19055 and 19031 Kahala | good |

## EXHIBIT C: BEACH ACCESS INVENTORY AND EVALUATION

PROGRESS GALVESTON

| Beach Access Point # | Subdivision | On-/Off-Beach Parking | Linear Feet | Beach User Fee | Parking Spaces | BAP Req. 1=15' | BAP Parking Spaces | Bollards (east/ west) | Main Road Directional Street Signage | Dune Walkover & Type | Dune Walkover Signage | Other Amenities | Roadway Conditions | Parking Area Striping | Notes | Types of Signage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | Silverleaf Resort | Off | 635 | free | 58 | 43 | 43 | None-needed | 3005 signs ok | yes/ADA | yes | yes, portolets | good | no | | good |
| 23 | Dunes of West Beach | Off | 3,045 | free | 203 | 203 | 203 | None-needed | 3005 signs ok | no | no | | good | no | 2 pathways for BAP, 4 walkovers to be replaced FEMA | only 1 on-street parking sign on W. side |
| 24 | Sandhill Shores | Off | 3,892 | free | 259 | 259 | 259 | None-needed | 3005 signs ok | | no | none | good | no | 2 pathways, need to pull plat to see location | no on-street parking or walkover signs |
| 25 | Gateway-Sea Isle | On | 330 | free | 144 | 22 | No # | Both, missing W | 3005 signs ok | no | | none | good | | dunes have formed to N of bollards H/C | H/C signs to N, need relocating |
| 26 | San Jacinto-Sea Isle | On | 150 | free | 57 | 10 | No # | Both, good | no signage on south of 3005 | no | | none | good | | DNE and NP signs on east are painted over | need to replace 2 signs on east |
| 27 | Sea Isle Parking Lot | Off | 900 | free | 200 | 60 | 88 | None-needed | 3005 signs ok | no | | none | fair | | Need footpath signs, need walkover | nothing other than 3005 signs |
| 28 | Sea Isle/Terramar | Off | 3,815 | free | 630 | 255 | 610 | None-needed | 3005 signs ok | no | | none | fair | | need on street parking and footpath signs | nothing other than 3005 signs |
| 29 | Isla Del Sol | Off | No beach | free | 80 | 0 | 25 | None-needed | 3005 signs ok | no | | none | good | yes | Lot on north side of 3005 | no beach signage needed |
| 30 | Gulf Blvd. Isla Del Sol | On | 150 | free | 57 | 10 | No # | Both, good | 3005 signs ok | no | | none | good | | | DNE sign on west gone |
| 31 | Terramar Dr. | On | 300 | free | 124 | 20 | No # | Both, good | 3005 signs ok | no | | none | good | | H/C signs N, E & W sides blocked by dune | DNE sign on west gone |
| 32 | Pocket Park # 4 | Off | 925 | free | 188 | 62 | No # | None-needed | 3005 signs ok | no, footpath | | none | | | | need footpath signs |
| 33 | 2nd St. Bay Harbor | On | 2,025 | free | 186 | 135 | No # | Both, good | 3005 signs ok | no | | none | good | | | need DNE and turtle signs on west side |
| 34 | Miramar | On and off | 1,572 | free | 348 | 104 | 60 off | Both, good out of alignment | 3005 signs ok | no | | none | needs grading | | | good |

## EXHIBIT C: BEACH ACCESS INVENTORY AND EVALUATION

PROGRESS GALVESTON

| Beach Access Point # | Subdivision | On-/Off-Beach Parking | Linear Feet | Beach User Fee | Parking Spaces | BAP Req. 1=15' | BAP Parking Spaces | Bollards (east/ west) | Main Road Directional Street Signage | Dune Walkover & Type | Dune Walkover Signage | Other Amenities | Roadway Conditions | Parking Area Striping | Notes | Types of Signage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | Half Moon/ Stavanger | On | 3,768 | free | 2,000+ | 251 | No # | east, no missing | 3005 sign on So. gone, N. need H/C | no | | none | good | | | on east side DNE and NP signs gone |
| 36 | Salt Cedar | On | 1,000 | free | 600 | 63 | No # | west, no missing | 3005 signs ok | no | | none | entry needs repair | | | good |
| 37 | Playa San Luis | Off | 1,311 | free | 120 | 87 | 88 | None-needed | 3005 signs ok | yes | only 1 on Courageous | none | good | on-street | | one BA sign at entry for street parking |
| 38 | Pointe San Luis 1 | Off | 13,000 total | free | 100 | 867 | 100 | None-needed | 3005 signs ok | yes/standard | yes | none | good | n/a | | good |
| 39 | Pointe San Luis 2 | Off | | free | 100 | | 100 | None-needed | 3005 signs need ADA on N & S signs | yes/ADA | yes | picnic shelter | good | yes | | BA signs good in subdivision |
| 40 | Pointe San Luis 3 | Off | | free | 100 | | 100 | None-needed | 3005 signs ok | yes/ADA | no | none | good | no | | need 1 BA sign at the turn to south |
| 41 | Pointe San Luis 4 | On | | free | 2,506 | | No # | most are missing | 3005 signs need ADA on N & S signs | n/a | n/a | none | terrible | n/a | | only 1 BA direction sign, need more |

**EXHIBIT D: BEACH ACCESS MAPS**


**1(B): Palisade Palms**

**On-beach:**
N/A

**Off-beach:**
Parking lot containing a minimum of 108 spaces.

1 dedicated pedestrian pathway for public use.

Street parking via East Beach Drive.

**Amenities:**
ADA dune walkover

**1(A): Beachtown Development**

**On-beach:**
N/A

**Off-beach:**
Parking lot containing a minimum of 108 spaces.

1 dedicated pedestrian pathway for public use.

Street parking via East Beach Drive.

**Amenities:**
N/A

**1: Apffel Park**

**On-beach:**
Parking within Park boundaries for beach user fee.

Free parking available outside of park boundaries.

**Off-beach:**
N/A

**Amenities:**
Currently provided.

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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# City of Galveston
# Public Beach Access Plan
# January 2012

0 0.25 0.5 Miles

**Sheet 1 of 9**

Map Last Updated:
1/17/2012


**3: Seawall Beach Urban Park**

**On-beach:**
N/A

**Off-beach:**
Street parking, north and south sides of Seawall Blvd

Minimum of 10% free parking spaces (approximately 230 spaces total distributed throughout the Seawall Beach Urban Park)

**Amenities:**
ADA walkover at 57th Street. Several sets of stairs leading from Seawall to beach.

**2: Stewart Beach**

**On-beach:**
Parking within Park boundaries for beach user fee.
Free parking available.
Restricted use area, minimum width of 2,640 linear feet on the eastern end of the park.

**Off-beach:**
N/A

**Amenities:**
Currently Provided

**1(C): Area west of the Islander East to eastern boundary of Stewart Beach Park**

**On-beach:**
Restricted use area, minimum width of 2,640 linear feet on the eastern end of the park

**Off-beach:**
Two (2) parking lots containing a minimum of 201 spaces

**Amenities:**
N/A

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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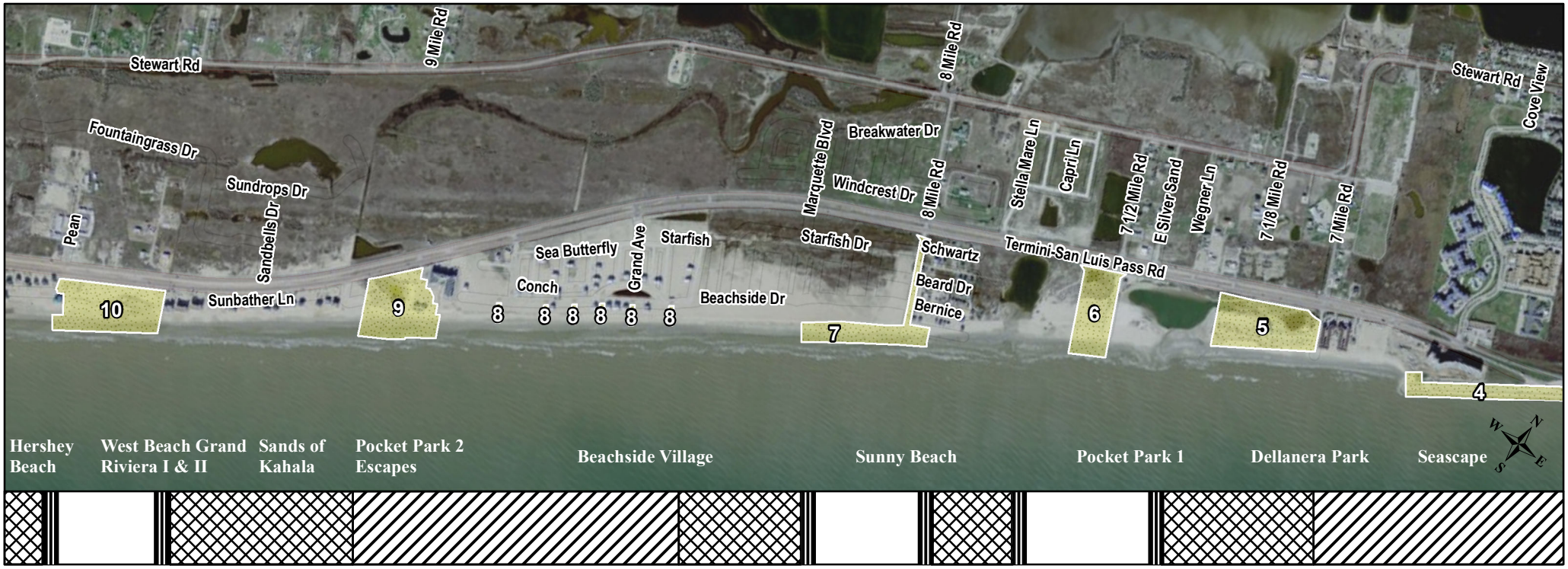
# City of Galveston Public Beach Access Plan January 2012

0 0.25 0.5 Miles



Map Last Updated: 1/17/2012




**10: 10-Mile Road/Hershey Beach Subdivision**

**On-beach:**
Parking via 10-Mile Rd, minimum width of 1,065 linear ft

**Off-beach:**
Parking lot, minimum 58 spaces

**Amenities:**
N/A

**9: Pocket Park #2, Escapes! Condominiums**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum 352 spaces
1 wheelchair accessible dune walkover for public use
1 dedicated pedestrian pathway for public use

**Amenities:**
Currently provided

**8: Beachside Village Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum 148 spaces on Sea Butterfly St
3 dedicated pedestrian pathways for public use

**Amenities:**
N/A

**7: Sunny Beach Subdivision**

**On-beach:**
Parking via 8-Mile Rd, minimum 1,300 linear ft in width

**Off-beach:**
N/A

**Amenities:**
N/A

**6: Pocket Park #1**

**On-beach:**
Parking via 7 1/2-Mile Rd (109th St), minimum width of 1,300 linear ft

**Off-beach:**
Parking Lot

**Amenities:**
N/A

**5: Dellanera RV Park**

**On-beach:**
N/A

**Off-beach:**
Overnight campsites only. Wheelchair accessible dune walkover

**Amenities:**
Currently provided

**4: End of Seawall**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum 150 spaces
Pedestrian pathway from parking lot to the beach.

**Amenities:**
Walkway to beach

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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**15(A): Pirates Beach Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking throughout subdivision.
14 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**14: 11-Mile Road**

**On-beach:**
Parking via 11-Mile Rd, minimum width of 300 linear ft

**Off-beach:**
N/A

**Amenities:**
N/A

**13: Pocket Park #3**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum of 273 parking spaces.

Wheelchair accessible dune walkover for public use.

**Amenities:**
Currently provided

**12: Bermuda Beach Subdivision**

**On-beach:**
Parking via Pabst Rd, minimum width of 150 linear ft

**Off-beach:**
On-street parking, minimum of 211 parking spaces throughout subdivision.

2 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**11: Spanish Grant Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 45 spaces, Spanish Grant Boulevard median.

3 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**10: 10-Mile Road/Hershey Beach Subdivision**

**On-beach:**
Parking via 10-Mile Road, minimum width of 1,065 linear ft.

**Off-beach:**
Parking lot, minimum 58 spaces.

**Amenities:**
N/A

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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# City of Galveston
# Public Beach Access Plan
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0 0.25 0.5 Miles



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Outside of City of Galveston Jurisdiction | Outside of City of Galveston Jurisdiction

**17: 15-Mile Road**

**On-beach:**
Parking via 15-Mile Rd, minimum width of 150 linear ft

**Off-beach:**
N/A

**Amenities:**
N/A

**16: 13-Mile Road**

**On-beach:**
Parking via 13-Mile Rd, minimum width of 640 linear ft

**Off-beach:**
N/A

**Amenities:**
N/A

**15(C): Pirates Beach West Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking throughout subdivision.

4 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**15(B): Palm Beach Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking throughout subdivision.

3 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

Bollards | Pedestrian beach served by on-beach parking | Pedestrian beach served by off-beach parking | Pedestrian beach served by off-beach and on-beach parking | Vehicular Access | Restricted Access | Seasonal Access

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# City of Galveston Public Beach Access Plan January 2012

0 0.25 0.5 Miles



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Outside of City of Galveston Jurisdiction

**22: Silverleaf Resorts**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum of 43 spaces.

1 dedicated pedestrian pathway for public use.

**Amenities:**
N/A

**21: Kahala Beach Estates, Addition #1**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 59 spaces on Kahala Drive E.

2 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**20: Indian Beach**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 200 spaces on East and West De Vaca.

4 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**19: Karankawa Beach**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 27 spaces on Habla and Glei Streets.

2 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**18: 16-Mile Road**

**On-beach:**
Parking via 16-Mile Road, minimum width of 1,000 linear ft.

**Off-beach:**
N/A

**Amenities:**
N/A

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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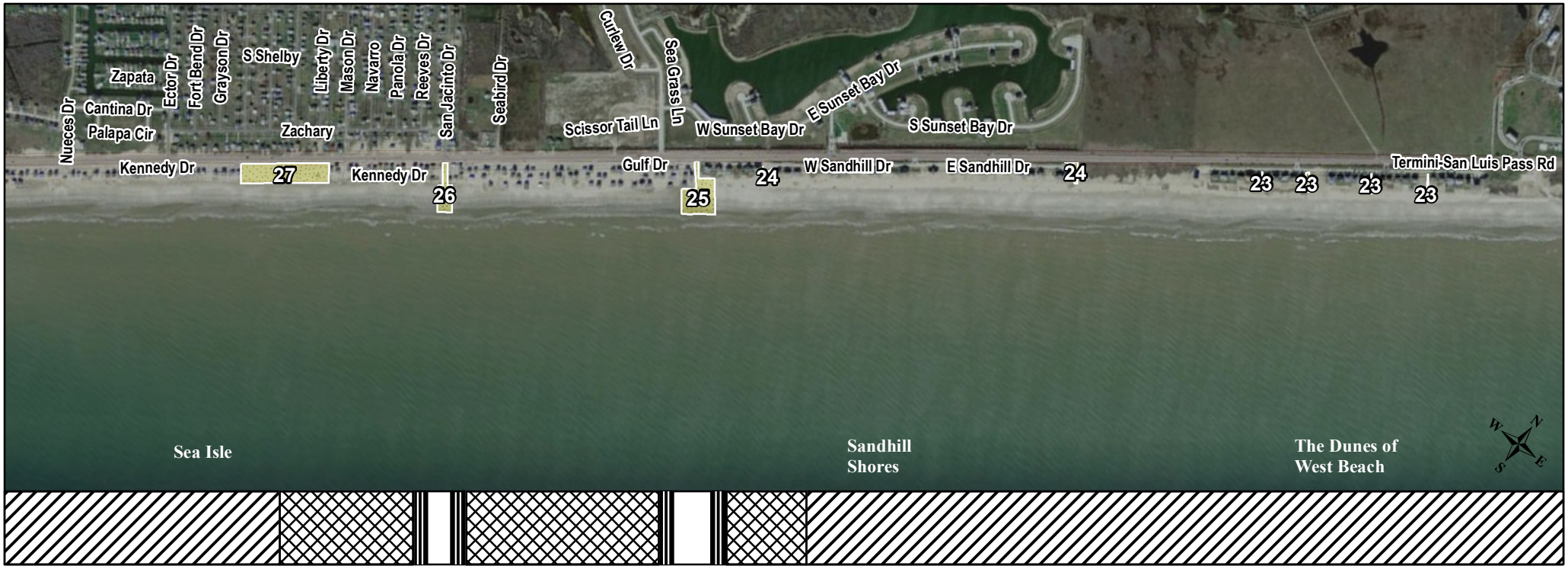
Map Last Updated: 1/17/2012




**27: "Sea Isle" Parking Area**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum of 88 spaces.

1 dedicated pedestrian pathway for public use.

**Amenities:**
N/A

**26: San Jacinto Street - Sea Isle Subdivision**

**On-beach:**
Parking via San Jacinto Street, minimum width of 150 linear feet.

**Off-beach:**
N/A

**Amenities:**
N/A

**25: Gateway Boulevard - Sea Isle Subdivision**

**On-beach:**
Parking via Gateway Boulevard, minimum width of 330 linear feet.

**Off-beach:**
N/A

**Amenities:**
N/A

**24: Sandhill Shores Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 208 spaces on Sandhill Drive.

2 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**23: The Dunes of West Beach**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 172 spaces on Shores Drive.

2 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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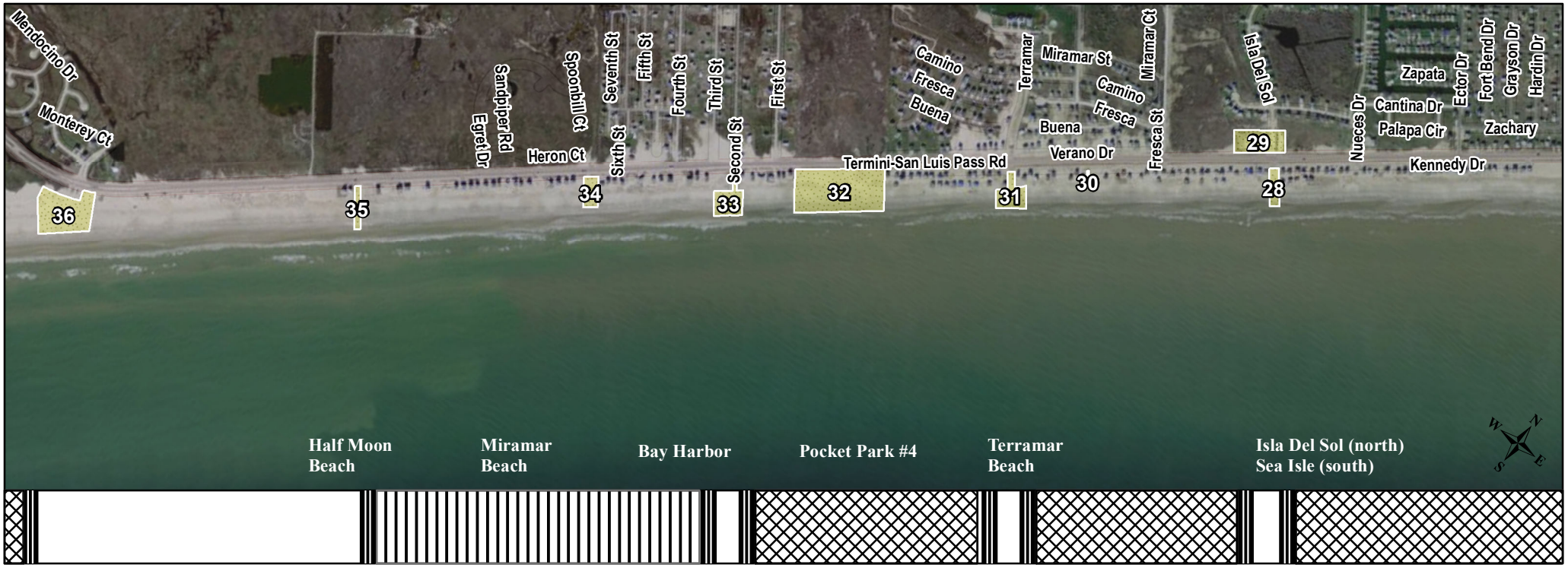
# City of Galveston
# Public Beach Access Plan
# January 2012

0 0.25 0.5 Miles

**Sheet 7 of 9**

Map Last Updated: 1/17/2012




**36: Salt Cedar Avenue**

**On-beach:**
Unrestricted vehicular access to the east to AP 35.

**Off-beach:**
N/A

**Amenities:**
N/A

**35: Half Moon Beach & Stavanger Beach Subdivisions**

**On-beach:**
Seasonal access to the east.
Unrestricted vehicular access to the west to AP 36

**Off-beach:**
N/A

**Amenities:**
N/A

**34: Miramar Subdivision**

**On-beach:**
Seasonal access via AP 35 (one way traffic, west to east).
Parking lot, minimum of 60 spaces via FM 3005

**Off-beach:**
1 dedicated pedestrian pathway

**Amenities:**
N/A

**33: Second Street, Bay Harbor Subdivision**

**On-beach:**
Parking via Second Street, minimum width of 300 linear feet.
Seasonal access to the west.

**Off-beach:**
N/A

**Amenities:**
N/A

**32: Pocket Park #4**

**On-beach:**
N/A

**Off-beach:**
Parking lot, 1 dedicated pedestrian pathway for public use.

**Amenities:**
N/A

**31: Terramar Drive, Terramar Beach Subdivision**

**On-beach:**
Parking via Terramar Drive, minimum width of 300 linear feet

**Off-beach:**
N/A

**Amenities:**
N/A

**30: Gulf Boulevard, Isla Del Sol Subdivision**

**On-beach:**
Parking via Gulf Boulevard, minimum width of 150 linear feet

**Off-beach:**
N/A

**Amenities:**
N/A

**29: Isla Del Sol Subdivision**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum 25 spaces (located north of FM 3005, via Isla Del Sol Dr)

**Amenities:**
N/A

**28: Sea Isle and Terramar Beach Subdivision**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 610 spaces on Kennedy/Gulf Drive.

Dedicated pedestrian pathways for public use throughout subdivisions.

**Amenities:**
N/A

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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# City of Galveston
# Public Beach Access Plan
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0 0.25 0.5 Miles



Map Last Updated:
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**41: Point San Luis 4 (toll bridge area)**

**On-beach:**
Seasonal access provided, minimum width of 1,200 linear feet.*

Unrestricted vehicular access, minimum width of 3,230 linear feet.*

**Off-beach:**
N/A

**Amenities:**
Pedestrian area designated by bollard placement.

**40: Point San Luis 3**

**On-beach:**
Parking lot, minimum 100 spaces.*
25 reserve parking spaces dedicated in the event of erosion.*
1 dedicated pedestrian pathway for public use.*

**Off-beach:**
N/A

**Amenities:**
N/A

**39: Point San Luis 2**

**On-beach:**
N/A

**Off-beach:**
Parking lot, minimum of 100 spaces.*

1 wheelchair accessible dune walkover for public use.*

**Amenities:**
Future

**38: Pointe San Luis 1 (western boundary of Playa San Luis Subdivision)**

**On-beach:**
N/A

**Off-beach:**
On-street parking, minimum of 88 spaces throughout subdivision.

4 dedicated pedestrian pathways for public use.

**Amenities:**
N/A

**37: Playa San Luis Subdivision**

**On-beach:**
Unrestricted vehicular access to the east to AP 35.

**Off-beach:**
N/A

**Amenities:**
N/A

** Please note, beach access improvements will not occur until substantial phyiscal improvements occur.*

Bollards

Pedestrian beach served by on-beach parking

Pedestrian beach served by off-beach parking

Pedestrian beach served by off-beach and on-beach parking

Vehicular Access

Restricted Access

Seasonal Access

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# Public Beach Access Plan
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0 0.25 0.5 Miles



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**EXHIBIT E: DUNE RESTORATION AND BEACH NOURISHMENT PRIORITY AREA MAP**


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# City of Galveston
# Dune Restoration & Beach Nourishment
# Priority Areas - Erosion Response Plan

0 1.5 3 Miles

Map Last Updated: 1/13/2012