TOWN OF South Padre Island

SOUTH PADRE ISLAND
PLAN 2010

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Chapter 1

INTRODUCTION

PURPOSE AND SCOPE

Recognizing the need to guide daily decision making in the context of a long-term development perspective, the Board of Aldermen of the Town of South Padre Island decided in 1989 to undertake the preparation of a comprehensive development plan for their community.

This document, the *South Padre Island Plan 2010*, is intended to serve as an informational resource and framework for decision making. It is designed to encourage the discussion of ideas on maintaining and improving the quality of life enjoyed by the residents of South Padre Island. The work was conducted in two phases: phase one (*1990 ANALYSIS*) consisted of the analysis of existing conditions, the identification of key issues, and the formation of conclusions and recommendations. Phase two (*South Padre Island PLAN 2010*) utilized the recommendations from the *1990 ANALYSIS* as a basis for formulating the concepts and proposals for the future.

The first phase of the planning study involved an analysis of 1990 conditions in South Padre Island on topics such as tourism, environmental assessment, the socio-economic structure, land use, community facilities, infrastructure, and transportation. Surveys were distributed among area residents so that citizen views could be gathered and incorporated in suggestions for future development. A cross-section of South Padre Island residents was selected as a nominal group to serve as a feedback panel to assist the research and planning team. Extensive field studies were undertaken by the planning team to collect information about South Padre Island and its region.

During the second phase of the study, preliminary and final audio/visual presentations of the planning concepts were made to the community on proposals

for long-term development policy. Recommendations were made on implementation guidelines for enhancing current and future development.

Urban planning is a process intended to maintain and improve the quality of life in a community. Throughout the preparation of PLAN 2010, the concept of "Sustainable Development" was used as a basis for decision making. This concept, has probably been best defined by the University of British Columbia's Centre for Human Settlements:

> *"Sustainable development is positive socioeconomic change that does not undermine the ecological and social systems upon which communities and society are dependent. Its successful implementation requires integrated policy, planning, and social learning processes; its political viability depends on the full support of the people it affects through their governments, their social institutions, and their private activities."*

It is the intention of this document to provide the framework for a livable and attractive urban environment for the current citizens of South Padre Island as well as for future generations.

THE NATURE OF THE COMPREHENSIVE PLAN

The Comprehensive Plan described in the following sections is an advisory guide for the long-term physical and economic development of South Padre Island. Because of the dynamic nature of communities, a comprehensive plan is also considered to be general, comprehensive, and amendable. It provides information, coordinated policy, and a vision of the city's future potentialities on which to base day-to-day development decisions while safeguarding the public health, safety, and general welfare.

The *South Padre Island Plan 2010* is not intended to represent a static, or inflexible scheme for the future. Rather, it should serve as a dynamic instrument capable of responding to changing conditions in comprehensive and coordinated ways consistent with the Town's means and long-range planning goals.

The comprehensive plan must remain internally consistent so that goals,

policies and objectives are not in conflict with each other or subsequent implementation plans and programs. Its comprehensive framework permits the effect of a change in one part of the plan to be traced throughout all other parts of the document. Increases in residential density, for instance, mean corresponding increases in school needs, traffic congestion, and demand for commercial facilities.

The comprehensive plan should be analyzed in the broader context of its regional setting. Events occurring beyond the community's jurisdiction can have favorable or unfavorable impacts on the plan's major proposals. Maintaining a regional perspective permits timely adjustments to specific elements of the plan while maintaining or reinterpreting the goals, policies, objectives, and programs. This is particularly critical in the case of South Padre Island where tourism is not only of regional but also of national and international scale causing large numbers of people to converge on a small community with limited resources.

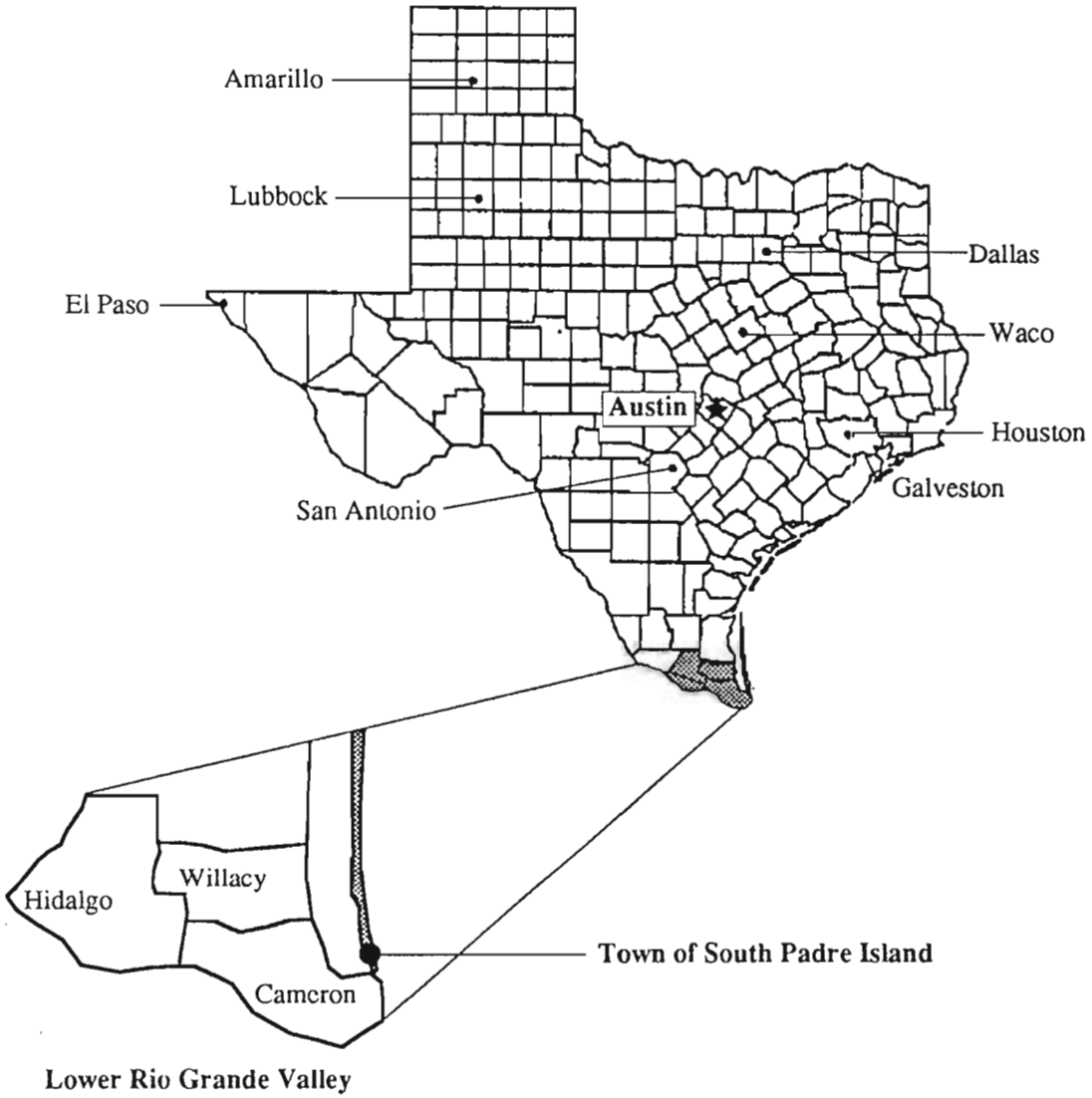
The *South Padre Island Plan* should be amended as required in response to dynamic local, national, and international conditions. It should be reviewed periodically so that it reflects and states development policies accurately. As conditions change in the future, the comprehensive plan must likewise change in order to maintain its relevance to the new set of changed conditions. It should, therefore, be updated periodically at a frequency consistent with the rate of change. Generally, it is recommended that a comprehensive plan be updated every five years. Since it is a public document, the *South Padre Island Plan* should be available at the Town's City Hall and widely distributed in summary form so that individuals and firms can be more informed in their own planning.

GROWTH GUIDANCE SYSTEMS

A comprehensive plan charts the course for future systematic development. No building permit should be issued for development that is contrary and inconsistent with the approved plan. South Padre Island's residents and officials recognize the value of planned development and want to avoid the problems of unguided growth experienced by Texas Gulf Coast communities. The identification

MAP 1

Location Within Texas



SOURCE: Department of Urban & Regional Planning, College of Architecture, Texas A&M University

of environmental systems and coastal zone dynamics and how these factors give the Town its unique urban form are discussed in the context of short-, medium-, and long-range decisions that the community must address in a timely manner to enhance safety and property values. The implementation component of the plan (Chapter 7) outlines critical preparedness and mitigation planning measures in anticipation of environmental events and their impact on current and future development.

The *South Padre Island Plan 2010* begins with a brief history, regional setting, and the regional economic role of the community. Key problems and opportunities are highlighted and form the basis for the major proposals. Subsequent chapters describe in detail the comprehensive concept plan to the year 2010. The document concludes with a chapter on plan implementation guidelines, and a chapter on environmental hazard mitigation and response.

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Historic and Geographic Setting 2

Chapter 2

HISTORICAL AND GEOGRAPHICAL SETTING

HISTORICAL SETTING

The sands of South Padre Island have borne the footprints of various population groups starting with the earliest settlers arriving in the Gulf Coast approximately 8,000 years ago. Archaeologists and anthropologists have identified several indigenous populations which began with the arrival of the Aransas Culture, and the appearance of the Rockport Culture in 1400 A.D. Other native populations included the Karankawas, Lipans, Tonkawas, Comanches, and Kronks. The Spanish Conquistador Alonso Alvarez de Pineda first explored the area in 1519[1] and later Spanish galleons laden with gold and precious stones from the new world were swept onto this segment of the Texas Gulf Coast shore by hurricanes over 400 years ago. Francisco Cabeza de Vaca was shipwrecked on Padre Island but with the help of the area's indigenous population was able to survive and walked back to Mexico City.

The arrival of the conquistadores brought with them the power and influence of the Spanish crown and its system of granting large expanses of land to its settlers in the newly discovered territories. Padre Nicolas Balli, a missionary priest, was granted a substantial portion of the southern tip of Texas including South Padre Island which bears his name. With the aid of his nephew, Juan Jose Balli, they established a cattle ranch with headquarters on the island some 26 miles north of the Island's southern tip. The ranch was named Santa Cruz (Holy Cross).[2]

Padre Balli's founding, missionary, and enterprising efforts were counterpointed by the seesawing battles for control of the new world between Spain, England, the new United States of America, Mexico, and the new world's famous pirates, among others, Jean Lafitte. Lafitte, ousted from an island off the Louisiana coast around 1810, became involved in the War of 1812 by fighting for the United States. He earned a presidential pardon for his valiant exploits.[3] His lust for piracy would pull him back into the kind of legendary activity that gives Padre Island the allure of swashbuckling pirates fighting

over sunken treasures lost among its sand dunes. During the California gold rush days, Port Isabel became a transshipment point for travellers from the eastern seaboard who cut their overland travel west by sailing the Gulf of Mexico. Built between 1851 and 1853, the Port Isabel Lighthouse, now just an imposing downtown historical monument off SH 100, harks back to the lore of the sea and the role it played in guiding ships to the Brazos Santiago Pass.

Up until 1954, when the first causeway connecting Port Isabel to South Padre Island was built, access to the Gulf's surf was by ferry boat across the Laguna Madre. Prior to the construction of the Queen Isabella Causeway, Boca Chica beach was the traditional and popular destination for sand and surf on the coast via SH 4 from Brownsville. The causeway's enhanced accessibility redirected traffic to the Island making it very attractive for swimming, tourism, and beach house development.

The causeways (a similar facility was built in Corpus Christi) launched real estate investments on both ends of the Island in the late 1950s. While the Queen Isabella Causeway was under construction, John L. Tompkins of Corpus Christi platted a development named Padre Beach between two Cameron County island park sites[4]. In 1974, a larger Queen Isabella Causeway was constructed to accommodate the increased tourism and local traffic. The original causeway was converted to a fishing pier.

The emergence of a permanent population led to the incorporation of the Town of South Padre Island in 1973 under a council/manager form of government with a legislative body of five Aldermen, and a Mayor. The City Manager coordinates the administrative functions and staffs, consisting of: Municipal Judge, Police Chief, Fire Chief, Building Official, Transportation Director, Executive Director of the Conventional and Visitors Bureau, and City Attorney.

In the latter part of the 20th Century, South Padre Island has emerged as an important destination for tourism, sports fishing, surfing, and boating. The month of March launches the tourism year with large numbers of university students arriving during "Spring Break" festivities with subsequent waves of vacationers arriving during the summer months. Another annual migratory stream that converges on the Island is the Winter Texans who leave the northern latitudes in the Fall seeking the warmer sub-tropical environment

of "The Valley" from approximately October to March.

GEOGRAPHICAL SETTING

Located on the southernmost tip of Padre Island, whose length of over 100 miles stretches from Corpus Christi at the north end to the Brazos Santiago Pass at the south, the Town of South Padre Island is a unique community on the vast Texas Gulf Coast. South Padre Island is bounded on the east by the Gulf of Mexico, on the south by Isla Blanca County Park and ship channel jetties, on the west by the calm blue-green waters of the Laguna Madre, and on the north by Andy Bowie County Park. Map 1, shows South Padre Island within the Lower Rio Grande Valley which comprises the counties of Cameron, Willacy, and Hidalgo. This vast semi-arid agricultural and ranching region is formed by the delta of the Rio Grande River a good part of which depends on seasonal rain for cultivation with the rest served by an extensive irrigation system fed by the Rio Grande.

Located at practically the same latitude as Miami, Florida, South Padre Island enjoys a sub-tropical environment with mild winters, annual rainfall of approximately 25 inches, prevailing southeasterly winds from March-September, and prevailing northerly winds from October-January.[5]

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1. Vernon Smylie, *Conquistadores and Cannibals, the early history of Padre Island (1519-1845)*, Texas News Syndicate Press, 1964, p.13.
2. Smylie, Ibid., p.19.
3. Smylie, Ibid., p.20
4. Smylie, Ibid., p.29-30.
5. *Environmental Geologic Atlas of Texas Coastal Zone - Brownsville/Harlingen Area*, Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas, 1980, p. 26.

South Padre Island's Regional Role 3

Chapter 3

SOUTH PADRE ISLAND'S REGIONAL ECONOMIC ROLE

THE SOUTH TEXAS REGION

The conceptual definition of what constitutes a region can be as varied as the criteria that are used to define it. Perhaps the term was best defined by Lewis Mumford:

> "... A region being any geographic area that possesses a certain unity of climate, soil, vegetation, industry, and culture. The regionalist attempts to plan such an area so that all its sites and resources, from forest to city, from highland to water level, may be soundly developed, and so that the population will be distributed so as to utilize, rather than to nullify or destroy its natural advantages."[1]

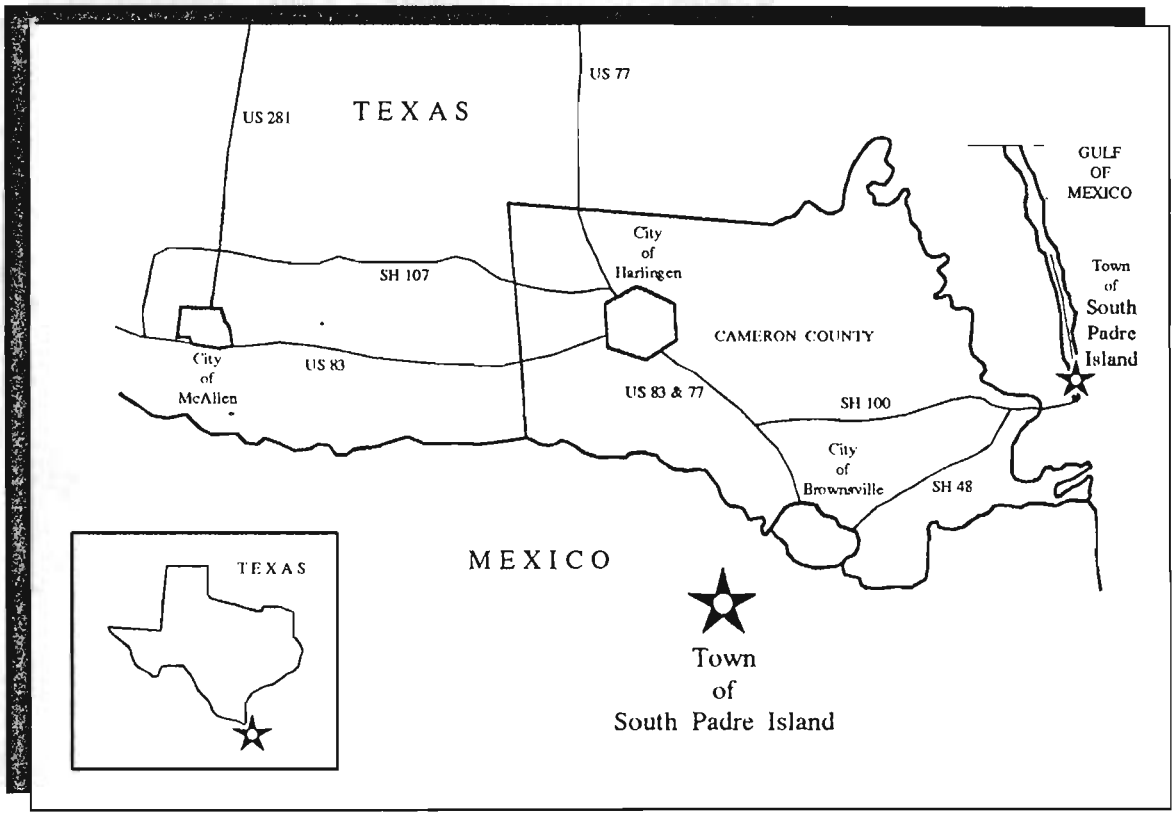
South Padre Island's primary region is that area within a two-hour drive comprised by the three counties of Cameron, Hidalgo, and Willacy, also known as the Lower Rio Grande Valley, and the northern Mexican States of Tamaulipas and Nuevo Leon. A secondary area of regional influence might be considered that area of Texas and northern Mexico within a day's drive. A tertiary area of regional influence might be that area of the world within a one day flying time and beyond. A fourth area of regional influence might comprise an area of influence that extends to the northern United States and southern parts of Canada and from which are attracted the Winter Texans.

COMPARATIVE ADVANTAGE AND REGIONAL ROLE

The socio-economic role that a community plays within a region is based on its *comparative advantage* and acquired *functional specialization*. These terms are used in economic geography and regional planning to define the principal socio-economic functions traditionally associated with a particular location and its strategic role in the development of that region. A given location's role within a region is influenced by the *comparative advantages* enjoyed there as a result of historic, spatial, and/or natural resources that favor that point in space over another location for particular socio-economic

MAP 2

Regional Location



activities. Certain places, for example, have *locational advantages* for the development of a port because of the existence of a protected harbor which facilitates safe anchorage; Port Isabel being a case in point. These places become dynamic transhipment points because products can be received, processed, packaged, and distributed efficiently overland or by ship.

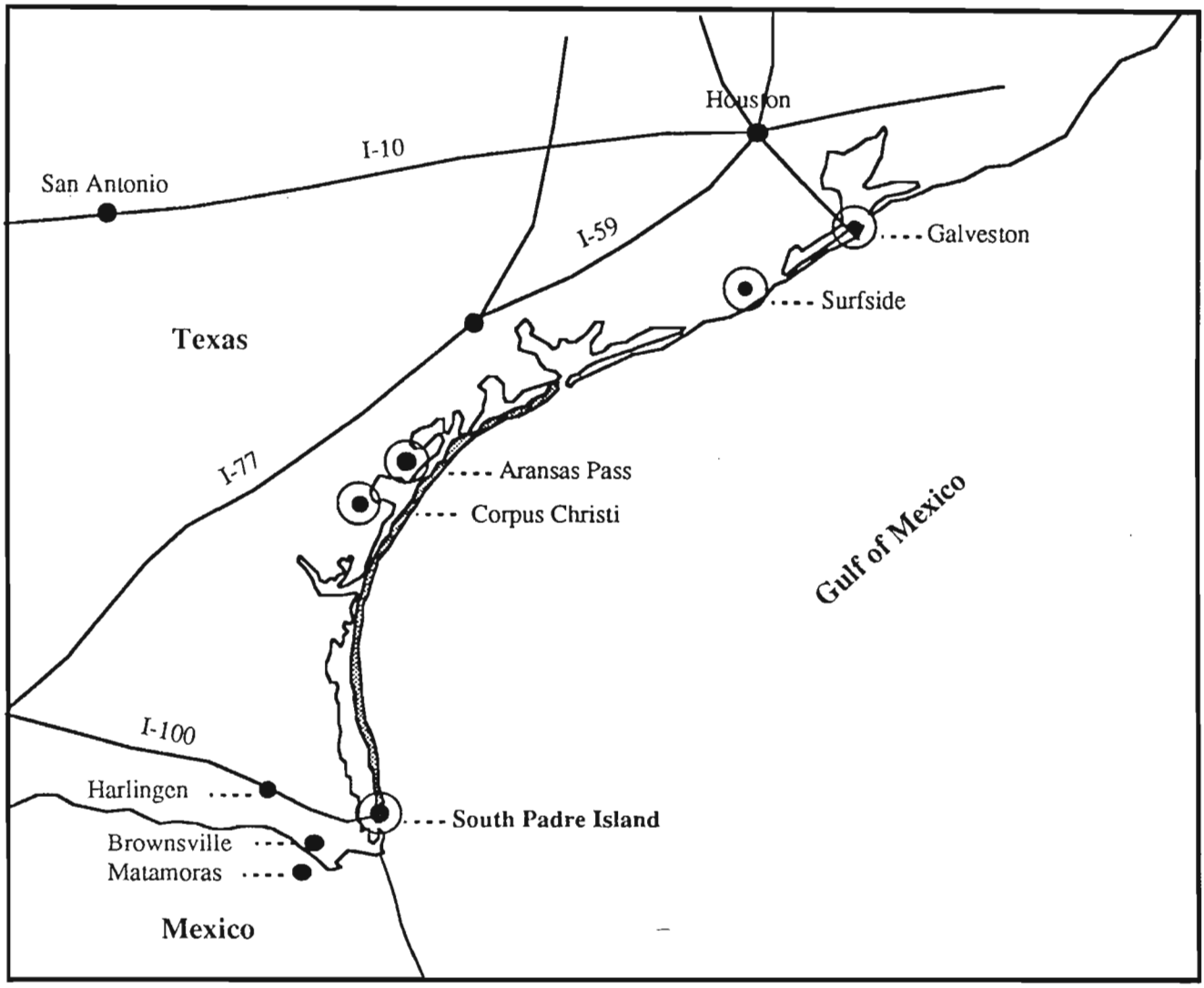
South Padre Island's role in the region is determined by its strategic location at the mouth of the navigable Brazos Santiago Pass which connects the Laguna Madre and Port Isabel to the Gulf of Mexico. Being a barrier island, however, places South Padre Island at a locational disadvantage on the open Gulf since it cannot offer a safe harbor. Port Isabel, on the other hand, is today a commercial port because its relatively protected inland location offers safe harbor for a large shrimping fleet, recreational boating, cruise ships, and a sports fishing fleet; activities which are very complementary to the South Padre Island economy.

South Padre Island's comparative advantage is further exemplified in Map 3, wherein are identified the few locations for accessing sand, surf, and major resorts facilities along the six-hundred miles of Texas Gulf Coast. These are Galveston, Surfside, Corpus Christi-Aransas Pass-Rockport complex, and South Padre Island. A comparative disadvantage is its limited airline and highway accessibility. Because of hurricane vulnerability, the Island depends upon outside sources for water, waste disposal, electricity, other resources and services such as hospitals, schools, and airports. Yet South Padre Island can compete well as a coastal destination for tourists against other coastal locations as demonstrated by surveys conducted in 1987 by the Texas Parks and Wildlife Department. Preliminary figures indicate South Padre Island ranked 2nd out of 101 Texas Coastal destinations for saltwater swimming with over four-million visitor-days and ranked 3rd out of 144 Texas coastal destinations for saltwater fishing with over 1.2 million visitor-days.[2]

The pristine beauty of this barrier island's sand and surf, however, gives South Padre Island its comparative advantage over other communities in the south Texas region. Its attractiveness to residents and tourists created a demand for ferry boat services to connect it to the mainland markets. Across the years, decisions to build the Intracoastal Waterway, causeways, and improved highways have reinforced South Padre Island's coastal environmental advantages and enhanced its future role in the region as an

MAP 3

Major Access Nodes of the Texas Gulf Coast



accessible but secluded place for quiet coastal living in combination with a growing tourism market.

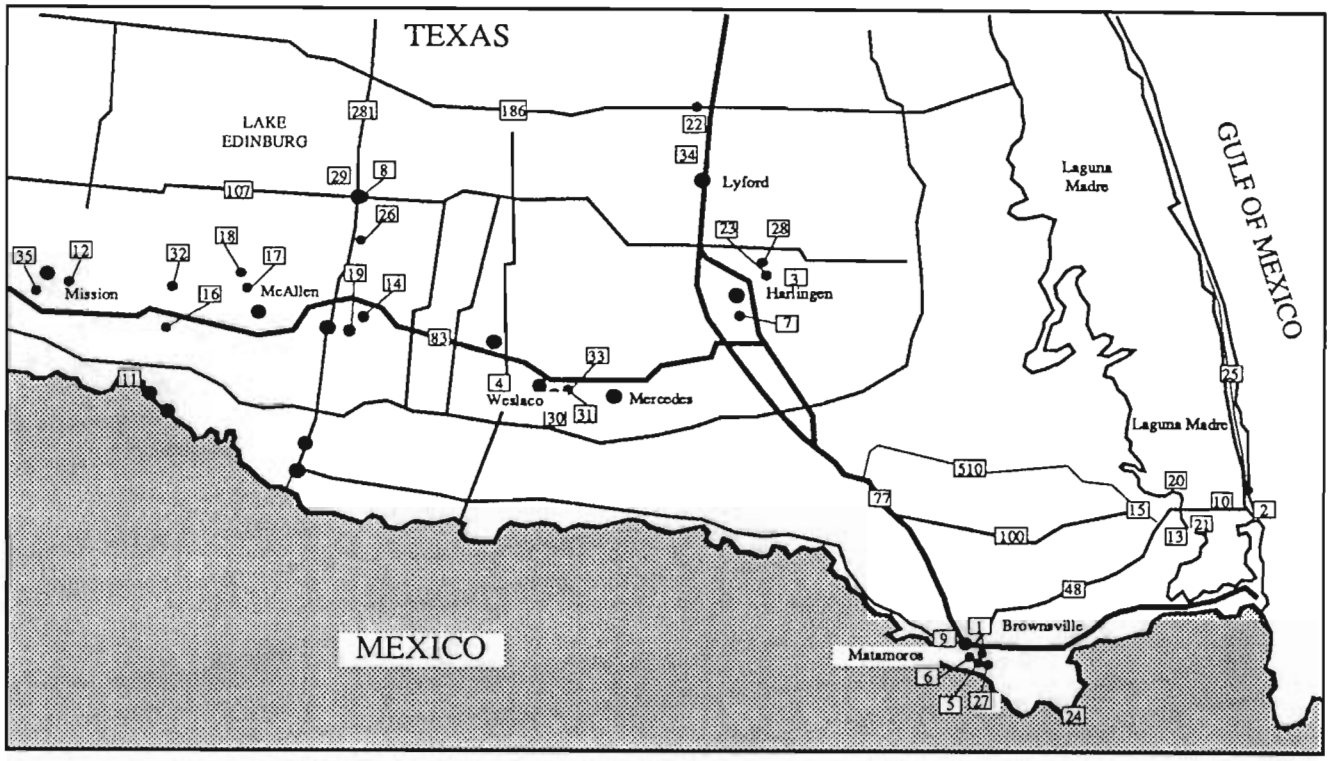
THE LOWER RIO GRANDE VALLEY MICRO-REGION

Its location at the southernmost tip of the state of Texas, gives the Town of South Padre Island a unique sub-tropical environment found only here and in southern Florida in the continental forty-eight states. The typically warm climate of the lower Rio Grande delta is attractive for year-round agriculture and tourism. Its border location next to Mexico provides additional opportunities for international tourism and trade. Map 4, identifies key attractions of the micro-region. Although visited by Spanish Conquistadores in the early 1500's, it was not until 1954 that large scale permanent settlement of the south end of Padre Island became possible with the construction of the Queen Isabella Causeway. This link has enhanced the accessibility of the Island from the mainland via State Highways 100 and 48. The Lower Rio Grande Valley, the rest of the State of Texas, and the nation are within minutes, hours, or a few days by car. Airline service to Harlingen and McAllen provide national and international access. International bridges at Brownsville, Las Flores, and Reynosa have also facilitated tourism and investment trade with Mexico.

The attractiveness of South Padre Island's sand and surf have made this community a national and international destination for a growing number of vacationers and retirees. Unlike other stretches of the Texas Gulf Coast which are more industrialized, South Padre Island's economy is primarily based on tourism and recreation/service related support businesses such as lodging, time-share condominiums, real estate, fishing, boating, transportation, and restaurants. While the arrival in the Lower Rio Grande Valley of Winter Texans (retirees migrating south from the northern states in the Fall) marks the beginning of the winter tourist season, the peak tourist season occurs in mid-March when cabin fever-suffering "Spring Breakers" (mostly college students) arrive in large numbers; often exceeding the local population by a factor of 30. The remainder of the tourist season continues to be busy through September but, thereafter, subsides until November when the winter cycle resumes.

MAP 4

Micro-Regional Attractions



1. Brownsville Art League and Museum
2. Coastal Studies Laboratory
3. Confederate Air Force Flying Museum
4. Donna Hooks Fletcher Museum
5. Fort Brown Memorial Civic Center Complex
6. Gladys Porter Zoo
7. Harlingen Cultural Arts Center
8. Hidalgo County Historical Museum
9. Historic Brownsville Museum
10. Isla Blanca Park
11. La Lomita Mission
12. La Lomita Plaza
13. Le Mistral
14. La Virgen de San Juan del Valle Shrine
15. Lady Bea Shrimp Boat Museum
16. McAllen Botanical Gardens
17. McAllen Memorial Library
18. McAllen Memorial Library
19. Old Clock Museum and Shop
20. Port Isabel Lighthouse
21. Queen Isabella State Fishing Peir
22. Ramondville Historical Center
23. Rio Grande Valley Historical Museum
24. Sabal Palms Sanctuary
25. Sea Turtle, Inc.
26. Sherif's Posse Arena
27. Stillman House Museum
28. Texas Iwo Jima War Memorial
29 UT/Pan American University
30. Valley Nature Center
31. Weslaco Bicultural Museum
32. Westside Park and Nature Company
33. Weslaco City Hall
34. C. W. Wheaton Rodeo Arena
35. Xochil Art Institute

SOUTH PADRE ISLAND'S FUTURE REGIONAL ROLE

The need to maintain and strengthen South Padre Island's tourism economy while providing a quality and safe residential environment for the local population suggests the following multiple regional roles for the Town:

- Traditional community
- A retirement haven
- Resort center
- A location for state conventions

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1. Mel Scott, *American City Planning since 1890*, a history commemorating the Fiftieth Anniversary of the American Institute of Planners, University of California Press, Berkeley and Los Angeles, California, 1969, p.221.
2. Texas Parks and Wildlife Department, 1987, preliminary rankings of Texas coastal destinations for saltwater swimming and fishing, Comprehensive Planning Branch, Austin, Texas.

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Environmental Considerations 4

Chapter 4

ENVIRONMENTAL CONSIDERATIONS

THE STUDY AREA

Communities seldom exist in isolation within their jurisdictional boundaries but rather interact within larger and more complex socio-economic-spatial-environmental systems and contexts. For purposes of this planning effort, the study area for South Padre Island Plan 2010 includes the Town limits and the immediate vicinity including Isla Blanca Park and Brazos Santiago Pass to the south, Andy Bowie Park to the north, the Laguna Madre to the west, the Gulf of Mexico to the east, and the City of Port Isabel.

ENVIRONMENTAL DETERMINANTS

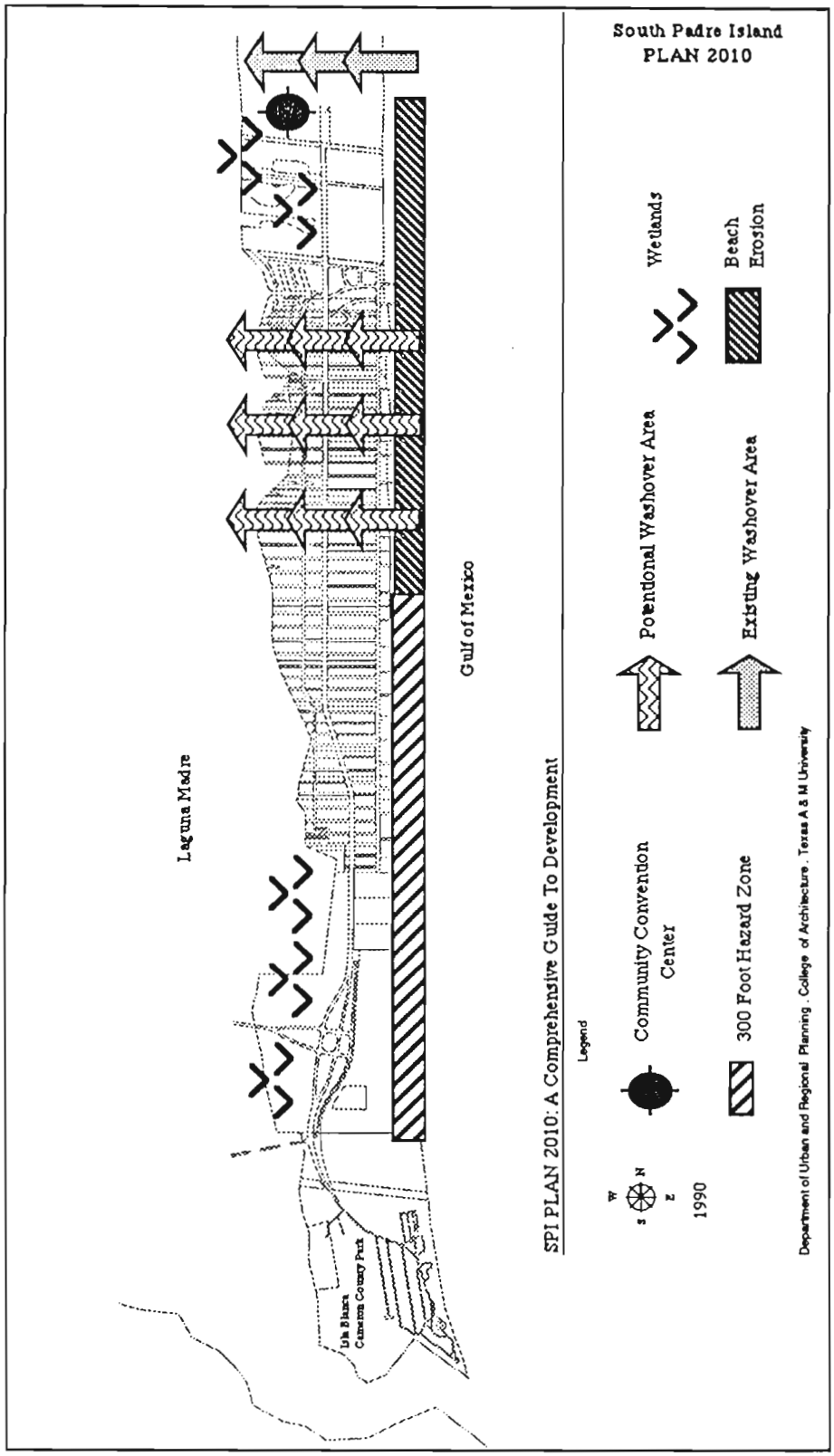
Padre Island is a barrier island configured and subject to continuous reconfiguration by dynamic and complex coastal zone environmental processes. Because the Town of South Padre Island is located on the southern end of this barrier island, its ideal urban form must be responsive to the environmental processes of its natural setting. Therefore, the key environmental factors considered in the preparation of the Town of South Padre Island's Comprehensive Plan are the following:

- **Wetlands**

Wetlands perform subtle, imperceptible, but important ecological functions which sustain the vegetation and marine life of the area including waterfowl, shrimp, oysters, commercial, and sports fish. They also perform cleansing functions by filtering the wastes from runoff, and also, within limits, cleanse the treated and untreated effluent overflow discharged from sewer treatment plants. They also give the Laguna Madre shore area its distinct marine setting.

MAP 5

Environmental Determinants



- **Vegetation and Fore-Island Dunes**

Fore-island dunes are South Padre Island's first line of defense against hurricane generated tidal surge. "Devegetation of vegetated barrier flats and fore-island dunes renders beach front environments highly susceptible to erosion by wind and water, increasing the possibility of destroying a natural barrier by hurricane forces. Devegetation of marsh-bounded and stablized bay shorelines commonly results in shoreline erosion and land loss."[1]

- **Washover and Potential Washover Areas**

Map 5, shows the location of three potential washover areas within the Town Limits of South Padre Island. These washover areas are the result of a previous weakening of the Island by hurricane-induced surge. The tendency is for washovers to heal and revegetate, but they are also prone to reactivation at the same location. It is advisable, therefore, to limit land uses in those areas and set very high performance standards of design and construction. The Andy Bowie Park washover area needs to be monitored as it could threaten the new community convention facility.

- **Beach Erosion**

Severe erosion exists on the northern one-third of the South Padre Island's shoreline. The complex natural processes (i.e., offshore littoral drift, dune, and beach dynamics, and the occurrence of hurricanes and storms) and structural shoreline stabilization measures (i.e., seawalls and jetties) that contribute to erosion must be investigated so that appropriate mitigation measures may be instituted.

- **Hurricanes and the 300 Foot Zone**

The National Hurricane Center has observed that most coastal property damage occurs within 300 feet landward of mean high tide. This part of the coastal area is most severely impacted by hurricane winds.[2] While this zone is considered as a "rule of thumb" in hazard area delineation, as opposed to a scientifically-established zone, it represents a useful guide for identifying both the extent of property-at-risk, and the appropriate types of mitigation measures that may be appropriate.

1. *Environmental Geologic Atlas of the Texas Coastal Zone, Brownsville-Harlingen Map Area*, Bureau of Economic Geology, The University of Texas at Austin, by L.F. Brown, et.al., 1980, p.133.
2. Dr. Neil Frank, Director, National Hurricane Center.

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Community Issues and Opportunities

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Chapter 5

COMMUNITY ISSUES AND OPPORTUNITIES

INTRODUCTION

As any dynamic community, the Town of South Padre Island must address its future on the basis of key community issues and opportunities associated with its location, past growth, current development patterns, and changing state and federal policy. An issue indicates a conflict point, a gap between existing and desired conditions. The analyses conducted as a part of this effort yielded alternative options which were explored by the planning team in coordination with the Town Council, City Manager's Office, staff, nominal group, and feedback from citizens during public presentations. This synthesis, therefore, serves as the culmination of the analysis phase of the study and preparatory step to the formulation of the South Padre Island Comprehensive Plan. This process of continuous dialogue through public participation was crucial to the identification of a consensus on the ends and means of achieving a desirable community. The key environmental, growth, and development policy issues confronting South Padre Island are challenges which may be turned to advantage by creating and seizing strategic opportunities.

ENVIRONMENTAL ISSUES

As discussed in the previous chapter, urban structures on the coast are vulnerable to natural hazards from hurricanes and other storms which cause, shoreline flooding, storm surge, and extremely high winds. Without proper planning, design, and construction standards, the potential for substantial loss of life and property grows as urban growth and development increases the numbers of people and property exposed to natural hazards. Key environmental issues are:

- Wetlands protection: exploring mechanisms for acquiring open space easements.
- Beach erosion: seeking natural methods for restoring and maintaining beach sand.
- Destruction of vegetation and fore-dunes: incentives for restoration and

protection.

- Laguna Madre water quality: ensuring effluent treatment and preserving natural cleansing mechanisms.
- Global warming induced sea rise: monitoring the trend and instituting performance standards.
- Storm water runoff: managing non-point source pollution to protect surface water quality.

GROWTH ISSUES

The following issues and opportunities directly impact the community's potential for population growth and physical development.

- Balancing tourists' needs against local residents' needs.
- Recognizing the carrying capacity of infrastructure and natural systems.
- Developing a dune recovery and protection ordinance.
- Correcting sewer system deficiencies.
- Water supply dependency and the need for additional supply lines from the mainland.
- Fragmented property ownership where small lots inhibit larger planned unit developments.
- Providing quality Single-Family residential areas to diversify housing opportunities.
- Use of the Planned Unit Development (P.U.D.) to optimize the use of vacant land and to minimize street and utilities improvements.
- Maintenance of small town character through low-density development.
- Parking: At times during the year the Town experiences a number of predictable problems caused by limited beach access and insufficient public parking.
- Noise pollution.
- Developing a performance zoning overlay district to protect potential washover areas.
- Coastal development limitations within the 300 foot hurricane hazard zone.
- Community image.

HAZARD ISSUES AND RELATED ENVIRONMENTAL POLICY

The following issues and opportunities are aimed at potential hazards on the

Island:

- Developing a Hurricane emergency evacuation system
- Compliance with FEMA Regulations.[1]
- Storm hazard mitigation planning and zoning.[2]
- Post-disaster reconstruction planning needs.
- Shoreline protection structures (bulkheads, seawalls, and jetties).
- Beach scraping and bulkhead wear.[3]
- Dune-buggies and off-road vehicles.[4]
- Incorporating wetlands into the open space system and using them to buffer residential development.
- Public beach access.[5]
- Integrating storm hazard mitigation (i.e., reduce potential public and private property loss) with environmental and economic development goals (i.e., dune, beach, and wetland protection).

ECONOMIC DEVELOPMENT OPPORTUNITIES

The following issues and opportunities are related to the economic stability of South Padre Island:

- Limited hotel capacity.
- Cooperation with Port Isabel and Laguna Heights for joint tourism development.
- Enhancing visual impact by improving "gateways" at Port Isabel and Laguna Heights.
- Developing a new community/convention facility.
- Controlling Spring Break crowds.
- The need to develop economic diversification.
- Promoting year-round economic activity.
- Enhancing tourism opportunities through Attraction Clusters.
- Diversifying the local economy by attracting professional and office activities.
- Achieving a civic focus by clustering key public services in a new Town Center.
- Improved electrical power service.
- Improved access ramps to Queen Isabella Causeway.
- Improved interregional access with the widening of SH 100.

- Resurgence of the Mexican economy.
- Promoting a cruise ship gambling casino.
- Developing a Valley aquarium.
- Packaging tourist promotions during off-season times of year.

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1. There must be compliance with Section 409 of the Federal Disaster Relief Act (communities must prepare hazard mitigation plans) in order to ensure the availability of federal disaster recovery funds. The Federal Emergency Management Association (FEMA) encourages the development of a comprehensive hazard mitigation plan.
2. Without careful planning and management, the problems posed by the natural hazards will become worse and potentially damaging to the tourism trade. Continued compromising of the integrity of the wetlands might have eventual detrimental water quality impacts. Laguna setbacks need to be considered.
3. The main problems for the Town are hurricanes, coastal storms, and rapid erosion due to loss of the dunes and other negative influences such as beach scraping and bulkheads. There is a continued loss of natural vegetation; this is especially true for those dunes located north of Town. Beach renourishment may need to be assessed as a corrective measure.
4. Uncontrolled dune-buggy usage is destroying fragile vegetation and accelerating the erosion of sand dunes.
5. Attorney General's Office guidelines for providing adequate public beach access and standards for parking and walking distances to the beach or to public beach transportation.

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South Padre Island Plan 2010

6

PART

Introduction 6.1

Chapter 6

Part 1

SOUTH PADRE ISLAND PLAN 2010

INTRODUCTION

South Padre Island Plan 2010 will serve as a comprehensive plan for the people of South Padre Island. The document centers on goals, policies, and objectives, and contains many recommendations for their attainment. The Plan is an expression of the community's highest aspirations. The character of the community is expressed through the programs and investments that support civic and service functions. This character is reflected in the values and priorities which are held by the community's leadership and citizenry.

The Plan's recommendations are cast within a coordinated long-range development concept that delineates and interrelates land use and circulation systems in a manner that is environmentally sound and conducive to the highest and best use of the land. The Plan, therefore, is a physical and programmatic expression of long-term development policy formulated to achieve South Padre Island's goals and objectives. Because South Padre Island is a regional and international tourism center, in some aspects the Plan addresses extra-jurisdictional issues which occur within the surroundings of its micro-region (Port Isabel-Brownsville-Harlingen) or may be more appropriately addressed within the regional context of the Lower Rio Grande Valley (Cameron-Hidalgo-Willacy Counties).

The planning proposals are expressed spatially in the Future Land Use Plan (MAP 8) which forecasts the future physical form of the Town and the key elements of the plan. Although the Plan is viewed as a whole and integrated comprehensive concept, the key elements that make up a complex plan must also be seen individually in order to understand each part and the interrelationships that exist within and between the plan elements. Subsequent sections elaborate on these key elements of the plan and contain descriptive and prescriptive recommendations regarding future land use and open space, the circulation system, the placement of key community facilities,

infrastructure recommendations, and urban design proposals. The last two chapters of *South Padre Island Plan 2010* are action oriented as they include strategic hazard implementation guidelines and mitigation measures for effectuating the planning recommendations.

The following section provides an overview of the major proposals included in the South Padre Island Comprehensive Plan 2010. While numerous ideas were discussed and new ones should be considered in the future, this summary listing permits the reader to grasp at a glance the key concepts which emerged in the preparation of the *South Padre Island Plan 2010* document.

MAJOR PROPOSALS OF THE PLAN

Environmental Integrity

- Ensure an environmentally appropriate urban form.
- Protect beaches, dunes, and wetlands with boardwalks and dune "walkovers".

Socio-Economic Stability

- Establish and maintain an appropriate community character which projects an image of a well-planned resort village.
- Establish South Padre Island as a premiere tourism destination.
- Diversify the economy.

The Physical Structure of the Community

- Create a town center.
- Create attraction clusters.
- Promote a regional aquarium and associated marine research as tourist attractions.
- Ensure compatible land use zones.
- Establish and maintain performance based land use controls.
- Develop a hierarchical-functional transportation system.
- Expand community facilities to include emergency health care services, a

convention facility, and an amphibious airplane terminal with daily service to and from South Padre Island.

- Expand and improve infrastructure.
- Improve South Padre Island's urban image.

Policy, Administrative, and Programmatic Measures

- Maintain a citizens advisory council and encourage public involvement in the planning and decision making processes..
- Implement performance-based development standards.
- Expand and strengthen shoreline management.
- Establish hazard mitigation and reconstruction ordinances and programs.
- Adopt an evacuation plan.
- Adopt a vertical sheltering plan.
- Promote the use of planned unit development.
- Employ a tourism activities director.
- Adopt an "Action Agenda" for plan implementation measures, including regulatory land use controls, capital improvements programming, and development incentives.

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PART

Character of the Community 6.2

Chapter 6

Part 2

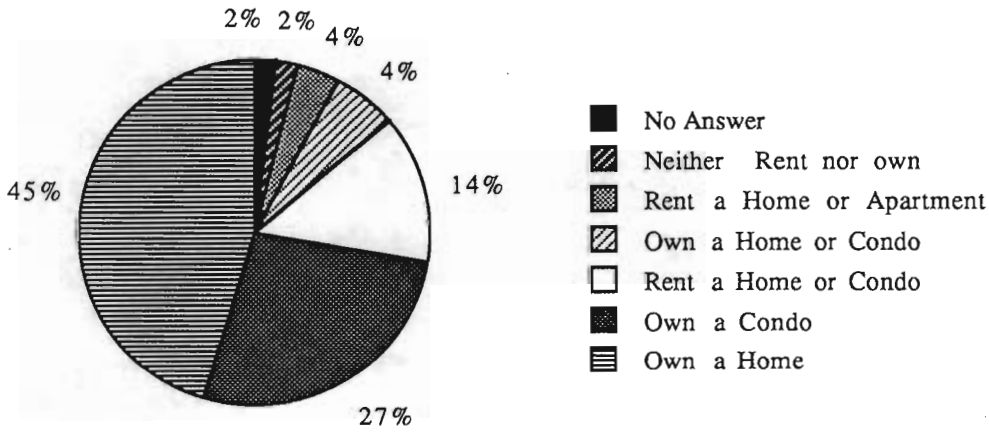
CHARACTER OF THE COMMUNITY

INTRODUCTION

With seventy-eight percent (78%) of the population owning a house and/or condominium, it is clear that the Town of South Padre Island is, and intends to stay, a family oriented beach community where the beauty and intrinsic value of natural resources are preserved and the built environment is safe, efficient, and aesthetically pleasing. *Quality of Life* for residents is ultimately

FIGURE 1

HOME RENTAL AND HOME OWNERSHIP IN THE TOWN OF SOUTH PADRE ISLAND



Source: Var, Turgut, *Permanent Resident Survey Results - South Padre Island*, Department of Recreation, Park, and Tourism Sciences, Texas A&M University, 1989, p. 4.

linked to the quality of the Town's principal source of economic life, tourism trade. Establishing a balance between resident values and tourist values is a

most important goal because without such a balance the community could be overrun with speculative ventures whose short-term interests would sacrifice long-term benefits. Thus, entrepreneurship must be balanced with stewardship.

A survey of the residents of the Town of South Padre Island conducted in 1989 found that "...most residents favored seeing a natural, restricted planning mode which emphasizes quality of life, beautification programs such as public and private landscaping, with more focus on the improvement of existing infrastructure such as underground utilities, a convention center, a golf course, preference for family oriented tourism as opposed to young tourists or students, and catering to Winter Texans."[1]

THE ENVIRONMENT

In addressing issues of environmental consideration, the question of optimum carrying capacity inevitably surfaces. Not only must this question be addressed in terms of what is ultimately technologically possible but also what is economically feasible and environmentally desirable. As previously stated, *Quality of Life* is an ephemeral yet paramount criterion for South Padre Island's tourism-based economy and marine life-style. Making sound use of the land within the Town limits is strategically important because this finite resource may be decreasing due to erosion caused by complex coastal zone dynamics. The link between environmental quality and economic stability was recognized by all in the early stages of the preparation of *South Padre Island Plan 2010*, and was given the highest priority during the Plan's formation.

THE POPULATION

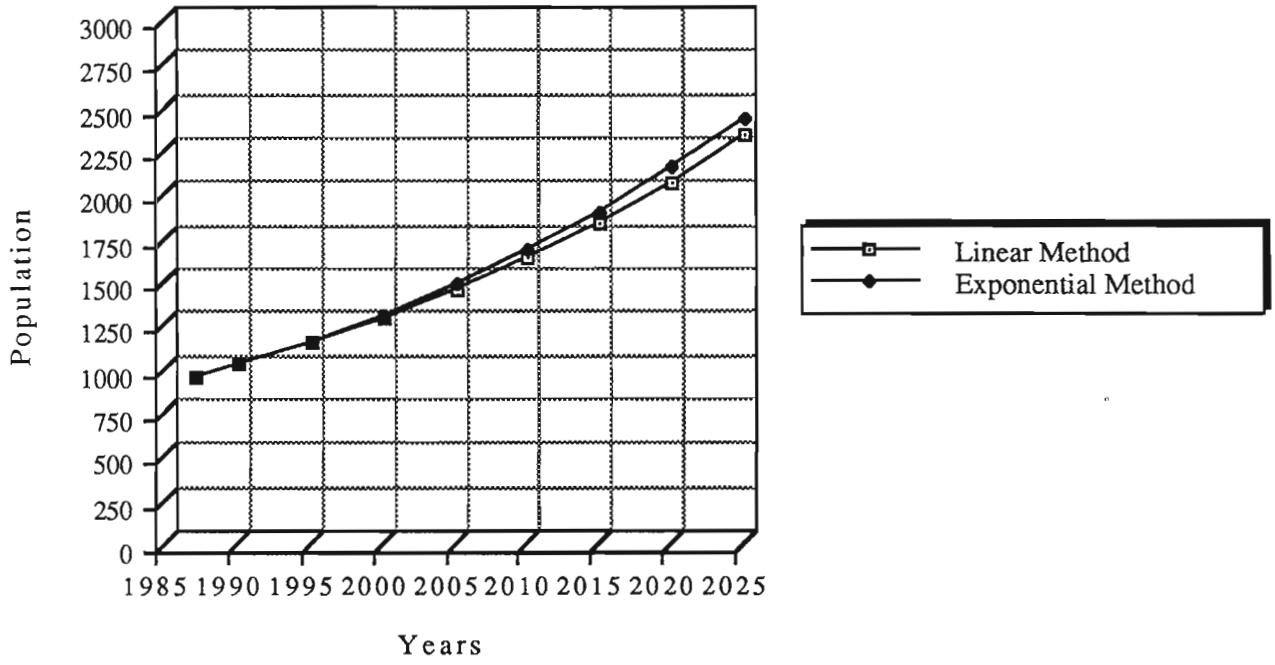
Figure 2 indicates the current and projected population of South Padre Island. The resident population was estimated to be approximately 1,000 persons in 1990. South Padre Island can reach population peaks of 30,000 persons when tourists and second home owners arrive on major holidays. If current population growth trends are extrapolated to the years 2000 and 2010, resident/visiting population ratios could proportionally reach 1,300/39,000 in the year 2000 and 1,600/48,000 in the year 2010.

According to the 1980 Census, South Padre Island has an atypical population

profile with a high median age of 37.4 compared to 25.0 for Cameron County, and 28.2 for the State of Texas. Figure 3 shows that the composition of South Padre Island's population is different from its surrounding region in that it has a higher concentration of professional/managerial, self-employed, and retired types. Future trends foresee the population of Texas and of the United States aging as the baby-boom generation (those born between 1946 and 1964) moves into middle age. Cameron County, and the rest of the lower Rio Grande Valley, will continue to maintain a population younger than that of the State

FIGURE 2

EXISTING AND PROJECTED POPULATION FOR SOUTH PADRE ISLAND



Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning. Planning Laboratory, Fall - 1990.

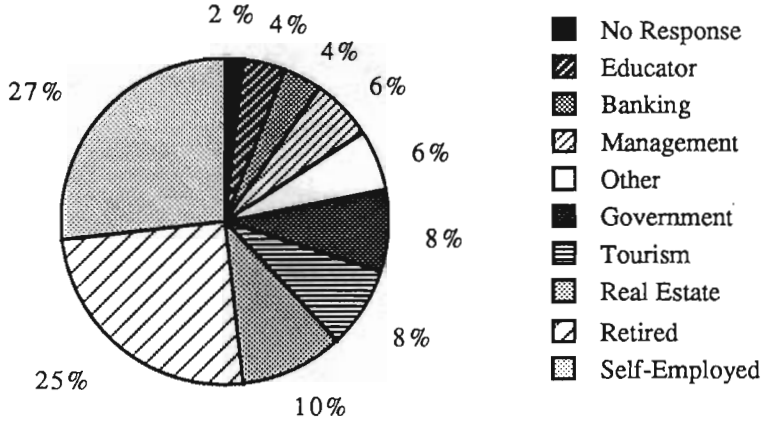
as a whole as a result of the significant Hispanic population which is markedly younger than the State's Anglo population. The age distribution of the residents of the South Padre Island will continue to be somewhat older than that for the surrounding areas and the State as a whole, but should also be relatively stable.

THE ECONOMY

Tourism is the driving socio-economic force of the Town of South Padre Island, therefore, it must exist contemporaneously and in compatibility with other important needs and aspirations of the resident host community. The Texas tourism market share in the future will probably continue to seesaw between South Padre Island, Galveston, and Corpus Christi as shown in Figure 4. Although no stretch of the Gulf Coast is invulnerable to environmental contamination, South Padre Island's less industrialized setting reduces the

FIGURE 3

OCCUPATIONS AMONG RESIDENTS OF THE TOWN OF SOUTH PADRE ISLAND

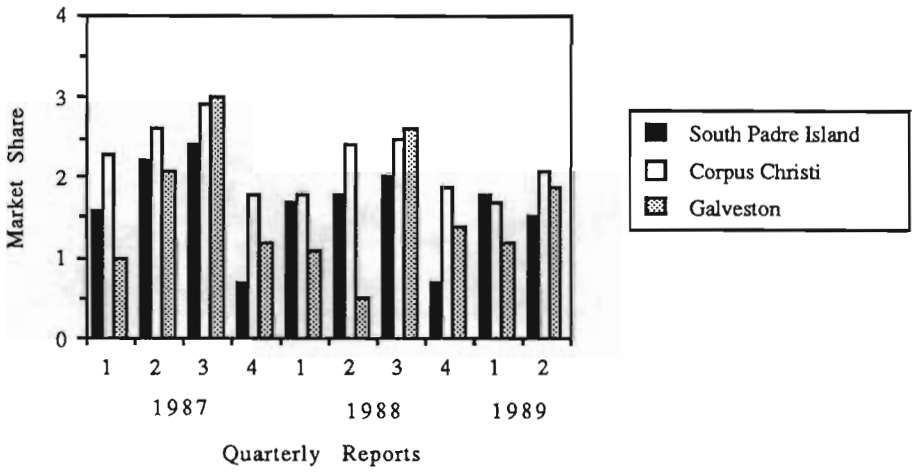


Source: Var, Turgut, *Permanent Resident Survey Results - South Padre Island*, Department of Recreation, Park, and Tourism Sciences, Texas A&M University, 1989, p. 6.

probability of it being affected by major pollution in the future and this, coupled with other environmental measures, may strengthen its increased market share. Constant monitoring of shipping lanes and installation of safety devices along the Intracoastal Waterway and Port of Brownsville Ship Channel should continue to be a high priority.

FIGURE 4

TEXAS TOURISM MARKET SHARE



Source: Var, Turgut, *South Padre Island's Growth Objectives, Development Policies and Strategies*, Dept. of Recreation, Park, and Tourism Sciences, Texas A&M University, 1989.

The character of the community is diminished by, among other factors, the clutter and visual confusion of unregulated signage along its entranceways and thoroughfares. Besides being detrimental to the local economy this condition could contribute to a traffic hazard by diverting a drivers' attention. Determining and maintaining the character of the community was an important consideration in preparing *South Padre Island Plan 2010.*

Source: Var, Turgut, *Permanent Resident Survey Results - South Padre Island*, Department of Recreation, Park, and Tourism Sciences, Texas A&M University, 1989.

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PART

Economic Development Strategies 6.3

Chapter 6

Part 3

ECONOMIC DEVELOPMENT STRATEGIES

Building the economic base of a community is a long, tedious, and difficult endeavor involving the active participation of local, regional, state, and federal constituencies. To that end, economic development is the process of assembling an optimum mix of elected, appointed, civic, business, and volunteer leaders with a shared vision of what the Town of South Padre Island can be and a shared desire to achieve that vision. Important as that may be, however, often the processes of forming a vision and the desire to achieve it are not enough. What must also be present is the ability to convert human, physical, and capital resources into vehicles that allow for the attainment of a desired visionary future by the timely seizing of strategic community enhancing opportunities.

Greater socio-economic well-being for a community, therefore, may be achieved through counterbalancing the synergy generated when entrepreneurial initiatives are shared between the private and public sectors. The Town of South Padre Island is fortunate in that it possesses the human, physical, and fiscal resources requisite for successfully achieving its vision of providing an economic climate conducive to business growth while protecting the community's environmental integrity and an excellent quality of life are present.

Economic development experience has shown that multi-sectored economic bases are inherently stronger as they are less vulnerable to individual sector market shifts. Strengthening economic activity through diversification, therefore, is an important principle of comprehensive economic development. When most communities seek to diversify their local economies, typically, they think in terms of undertaking efforts to become less dependent on one or a few economic sectors and thus pursue an inter-sectoral diversification approach.

The Town of South Padre Island's unique economy, however, suggests the

need for an economic diversification effort of a different sort. An intra-sectoral approach which is sensitive to the Island's fragile environmental resources and its resort ambiance, its principal stock in trade, is a preferable alternative. Recognizing that the Island's economy is overwhelmingly dependent on tourism/recreational expenditures, efforts should be made to diversify within the service (recreational/tourism) sector. Undertaking efforts to become less dependent on one element of the tourism industry (Spring Break'ers) and increasing the off-season flow of tourism expenditures is, for the Town of South Padre Island, as much a strategy of economic diversification as developing a geothermal technology sector is to an oil and gas dominated city.

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PART

Goals and Policies 6.4

Chapter 6

Part 4

GOALS AND POLICIES

Numerous discussions with elected officials, community leaders, representatives of civic organizations, and concerned citizens, led to the identification of the following goals and policies which were used as the foundation for *South Padre Island Plan 2010.*

THE ENVIRONMENT

ENVIRONMENTAL GOALS

Environmental Goal: *Sustainable Development* - To protect and maintain the integrity of the natural environmental systems as renewable resources which enhance the Island's character and socio-economic viability for current and future generations.

ENVIRONMENTAL POLICIES

Environmental Policy 1: *Conservation of Fore-Island Dunes* - Fore-island dunes and their vegetative cover will be protected from being destroyed as these natural systems serve as the Island's beach sand resupply and "first line of defense" against storm surge.

Environmental Policy 2: *Dune Buggies* - Dune buggies are banned from the Town limits consistent with the need to protect Island dunes and fragile vegetation from artificially induced erosion and defacing of the natural landscape.

Environmental Policy 3: *Environmental Impact Assessment* - It is a policy of

the Town to make environmental impact assessments (EIA) a requirement of the permit review process to safeguard valuable natural resources designated as "areas of environmental concern" (AEC's) such as: the estuarine system; consisting of estuarine waters, coastal wetlands, public trust areas; and ocean hazards; such as ocean erodible areas, and high hazard flood areas.

Environmental Policy 4: *Estuarine Development* - It is the policy of the Town to permit only such development to occur along the estuarine shoreline which is compatible with both the dynamic nature of estuarine shore lines and the economic, biological, and social values of the estuarine system.

Environmental Policy 5: *Wetlands* - It is a policy of the Town to mitigate the contaminating effects of storm run-off into the bays and wetlands as an important long-range measure for maintaining the Laguna's water quality, wildlife, marine organisms that sustain fish and shrimp, environmental character, and tourism trade.

Environmental Policy 6: *Flood Insurance Legislation* - It is a policy of the Town to maintain its flood insurance rating by meeting or exceeding the standards for new development as prescribed by the National Flood Insurance Program consistent with the current National Flood Insurance Map for the Town.

Environmental Policy 7: *Gulf Shore Structures* - The Town will prohibit bulkheads, jetties, groins, and similar untested structures along the Gulf shore unless they have been thoroughly researched and meet U.S. Corps of Engineers coastal zone engineering design standards.

Environmental Policy 8: *Laguna Shore Structures* - The Town will protect the Laguna Madre water quality by discouraging the destruction of estuarine shoreline wetlands and by prohibiting the construction of solid concrete bulkheads along the Laguna shore. Alternatively, limited use of riprap retention structures will be permitted for land fill to preserve the natural cleansing process of surface run-off by letting it percolate through soil and rock before reaching the Laguna waters.

Environmental Policy 9: *Beach Solar Access* - The Town will protect solar access to the Gulf beach by establishing a 60-degree solar access angle from mean high tide.

Environmental Policy 10: *Dune Walkovers* - Dune walkover structures are proposed at key beach access points and from hotels and condominiums as as means of protecting the fore-island dunes from severe erosion. The Town, therefore, encourages the installation of appropriately designed and constructed wooden walkways and steps to the beach, elevated observing platforms, and sand fences in areas where erosion has occurred.

TOURISM

TOURISM GOALS

Tourism Goal 1: *Sustainable Development* - South Padre Island Is a premier regional, national and international tourism destination. It is a recreation resource to be safeguarded for current and future generations.

Tourism Goal 2: *Achieve Balance* - Make South Padre Island a premier tourism destination by expanding opportunities through comprehensive planned development with a spirit of hospitality which makes the visitor feel at home, respects cultural, ecological, and sociological impacts, and always strives to promote a positive relationship between tourism and the resident host community.

Tourism Goal 3: *Diversify the Economy* - Reduce economic vulnerability by widening the array of opportunities for the potential tourist market.

TOURISM POLICIES

Tourism Policy 1: *Environmentally Sensitive Tourism* - Tourism projects will be guided by performance development standards that are compatible with the protection of the natural environment.

Tourism Policy 2: *Project An Image of Friendliness* - The Town endeavors to create an atmosphere of friendliness through public education of employees and citizens on the value of tourism.

Tourism Policy 3: *Tourism Safety* - The Town will maintain a highly qualified police force that is tolerant of tourist activities, prohibits glass containers, and is supported by a 24-hour physician operated emergency center.

ECONOMIC DEVELOPMENT

ECONOMIC DEVELOPMENT GOALS

Economic Development Goal 1: *Enhance Quality of Life* - It is a goal of the Town of South Padre Island to improve the community's quality of life through sound service sector economic activity that promotes and sustains long-term development.

Economic Development Goal 2: *Enhance Economic Opportunities* - It is a goal of the Town of South Padre Island to enhance economic opportunities through environmentally compatible service sector diversification.

Economic Development Goal 3: *Pursue Economic Development Strategies* - The Town of South Padre Island will pursue sound economic development strategies that capitalize on the Island's potential as a year-round resort area.

Economic Development Goal 4: *Diversify the Economy* - The Town of South Padre Island will attempt to reduce its economic vulnerability by diversifying its economic base with business and institutional activities that are complementary to its tourism economy.

LAND USE

LAND USE GOALS

Land Use Goal 1: *Protect the Public Health, Safety, and General Welfare* - Provide for the health, safety, and welfare of the community through a variety of compatible and environmentally sensitive land uses.

Land Use Goal 2: *Spatial Groupings and Buffering* - Ensure land use compatibility through appropriate spatial groupings and the appropriate buffering of land use activities.

Land Use Goal 3: *Safety and Sensitivity* - Enhance safety through environmentally sensitive land use patterns.

LAND USE POLICIES

Land Use Policy 1: *Upgrading of Nonconforming Land Uses* - It is a policy of the Town to safeguard the economic viability of private enterprise by permitting the gradual upgrading of non-conforming land uses.

Land Use Policy 2: *Regular Revision of Land Use Controls* - It is a policy of the Town of South Padre to review, revise, and implement land use ordinances on a regular and timely basis.

Land Use Policy 3: *Identify Nonconformance* - The Town will maintain a non-conforming land use map and database and will notify property owners of such nonconforming status.

Land Use Policy 4: *Nuisance Land Uses Not Permitted* - The Town will not permit activities which constitute a substantial and unreasonable interference with the use and enjoyment of one's property.

Land Use Policy 5: *Development in Wash-Over Zones Prohibited* - It is a policy of the Town to discourage development in areas designated as potential wash-over zones.

Land Use Policy 6: *Down-Zoning for Safety Purposes* - It is a policy of the Town to reduce potential hazards by down-zoning vacant property along the shoreline to lowest densities possible.

Land Use Policy 7: *Relocation of Select Land Use Activities* - It is a policy of the Town to encourage and facilitate the relocation of land uses out of potential wash-over zones by utilizing federal and state programs designed for that purpose.

TRANSPORTATION

TRANSPORTATION GOALS

Transportation Goal 1: *Develope An Integrated Network* - Provide an integrated transportation network for the present and future needs of residents and visitors in South Padre Island.

Transportation Goal 2: *Develop an Hierarchical System* - Provide for the health, safety, and welfare of the community through an hierarchically integrated transportation network that accommodates future changes in travel demand in a manner that is safe, efficient, cost effective, and responsive to emergencies and the seasonal variations of tourism

Transportation Goal 3: *Create a Multiple Modal System* - Develop a diversified transportation system that is capable of moving people in a safe and efficient manner.

Transportation Goal 4: *Create an Emergency Evacuation System* - Provide a transportation system that is adaptable to emergency evacuation requirements.

TRANSPORTATION POLICIES

Transportation Policy 1: *Support Multiple Modal Systems* - It is the policy of the Town to encourage the provision of a variety of mode choices in public and private transportation.

Transportation Policy 2: *Regional Transportation Needs* - It is a policy of the Town to coordinate transportation services on a regionally cooperative basis, and it is a policy of the Town to work cooperatively with area communities and institutions to gain the highest priority for the improvement of the SH-100 and the IH-35 evacuation routes.

Transportation Policy 3: *Parking and Beach Access* - It is the policy of the Town of South Padre Island to support those programs and activities that will enhance availability of parking and accessibility to the public beach.

Transportation Policy 4: *Services and Facilities for the Handicapped* - It is a policy of the Town of South Padre Island to encourage and support public and private facilities that provide adequate access for the handicapped.

Transportation Policy 5: *Discouraging Thru-Traffic* - It is a policy of the Town to reorient local access streets into cul-de-sacs and loop streets in order to discourage thru-traffic in the residential neighborhoods.

COMMUNITY FACILITIES

COMMUNITY FACILITY GOALS

Community Facilities Goal 1: *Protect the Community* - Provide for the health, safety, and welfare of the community through a coordinated system of community facilities that meet current and future needs of security, fire protection, and recreational open space.

Community Facilities Goal 2: *Provide a Safe Environment* - It is a goal of the Town of South Padre Island to provide a safe and secure environment so that visitors and residents may enjoy a sense of well-being.

Community Facilities Goal 3: *Provide Parks and Open Space* - It is the goal of South Padre Island to provide parkland and open space that enhances the permanent residents' environment and increases the recreational opportunities for the visitor.

COMMUNITY FACILITIES POLICIES

Community Facilities Policy 1: *Safety, Accessibility, and Identity* - It is a policy of the Town to do those things necessary to create a system of community facilities that are easily identifiable and provide safe and efficient access for residents to public services.

Community Facilities Policy 2: *Compliance with Insurance Standards* - The Town will continue its efforts to comply with the State Board of Insurance standards as outlined in it's Key Rate Schedule.

Community Facilities Policy 3: *Fire Department Funding* - The Town will continue to provide funding necessary to create a fire department that meets or exceeds state standards of service excellence.

Community Facilities Policy 4: Police Department Support - It is the policy to the Town to continue to provide the best possible police services and achieve the goal of national accreditation of the department.

Community Facilities Policy 5: *Support for EMS Services* - The Town will continue to give full support to its present system of emergency medical delivery system.

Community Facilities Policy 6: *Support for Regional Health Systems* - Recognizing the importance of the regional medical resources to the Town, the policy of South Padre Island will be to support regional health planning and implementation efforts of the County and State.

Community Facilities Policy 7: *Provide Adequate Recreational Opportunities* - The Town's policy is to provide adequate recreational opportunities, particularly beach open space with adequate parking and access. The Town will support and encourage the development of recreational amenities in future development projects.

Community Facilities Policy 8: *Support for Increasing Beach Access* - The Town recognizes the potential demand for access to the public beach areas and will continue to provide such accesses.

Community Facilities Policy 9: *Entry to the Town Image* - The Town favors better identification and community image associated with the entry way to the Island.

Community Facilities Policy 10: *Support for Walking and Bicycling* - The Town supports efforts to increase pedestrian travel on the Island. This may include, bicycle and walking trails and sidewalks in key areas.

INFRASTRUCTURE

INFRASTRUCTURE GOALS

Infrastructure Goal 1: *Provide Potable Water* - It is a goal of the Town of South Padre Island to provide sufficient levels of potable water to accommodate current and future growth through the most cost effective means.

Infrastructure Goal 2: *Provide Sanitary Sewer Services* - It is a goal of the Town of South Padre Island that every structure in the Town be served by a safe and efficient sanitary sewer.

Infrastructure Goal 3: *Convert Overhead Power Lines to an Underground System* - The Town will develop a plan for the installation of underground power lines and implement this plan when funds are available or in the event of having post-storm reconstruction opportunities.

Infrastructure Goal 4: *Develop a Good Solid Waste Management System* - The Town will provide for the efficient, economical, and environmentally responsible collection and disposal of solid waste.

Infrastructure Goal 5: *Protect Estuarine Waters from Con-tamination* - It is a goal of the Town to take all appropriate actions to protect the quality of estuarine water resources and to maintain the natural drainage patterns.

INFRASTRUCTURE POLICIES

Infrastructure Policy 1: *Carrying Capacity and Water Supply* - It is a policy of the Town to maintain a rate of growth that is compatible with the capacity of the Town to efficiently and economically provide water.

Infrastructure Policy 2: *Carrying Capacity and Sanitary Sewer Systems* - It is a policy of the Town to maintain a rate of growth that is compatible with the capacity to efficiently and economically provide sanitary sewer services.

Infrastructure Policy 3: *Protect Estuarine Waters* - The Town recognizes the importance of protecting the estuarine waters and supports the adoption of

ordinances and land use measures that reasonably protect these waters.

Infrastructure Policy 4: *Support for Recycling* - The Town supports and strongly encourages recycling programs. The Town will encourage local businesses to separate recyclable items out of garbage before placing it out for removal and disposal.

COMMUNITY IMAGE

COMMUNITY IMAGE GOALS

Community Image Goal 1: *Create a Premier Resort Image* - Create an urban image that reflects the coastal environmental context and is based on appropriate urban design measures consistent with a premiere resort community.

Community Image Goal 2: *Improve Access Images* - Improve the visual images associated with the physical access to the beaches, commercial shops and centers of attraction.

Community Image Goal 3: *Support Attractive Projects Which Enhance the Image of the Town* - Work to support the construction of attractive development and support further the location of selective development towards those areas of South Padre Island where they can best benefit the long-term community image.

Community Image Goal 4: *Ensure the Generous Use of Plant Materials Throughout the Island* - Ensure that an abundant and wide variety of plant materials are located on the Island and do all that is necessary to present an image of a green space oriented community.

Community Image Goal 5: *Control Signs* - Ensure that the signs located in the Town are attractive, well maintained and project an image of an ordered and well-kept community.

Community Image Goal 6: *Create a Town Center* - Establish an identity and positive image for the community of South Padre Island by creating a "town center" where civic and community functions may take place.

Community Image Goal 7: *Create a Sense of Arrival For Persons Entering the Town* - Develop a grand sense of arrival and identity for the town.

COMMUNITY IMAGE POLICIES

Community Image Policy 1: *Coordination to Achieve Entrance Image* - It is a policy of the Town to work with Port Isabel, Laguna Heights, and Laguna Vista for a coordinated island entrance image.

Community Image Policy 2: *Use of Landscaping with Town Facilities* - The Town will provide landscaping for all community facilities in an effort to provide image leadership and to preserve and enhance the beauty of the Island's natural and built environment.

Community Image Policy 3: *Support of Property Maintenance* - The Town encourages property owners' coordination and collaboration in improving the visual image of the community through incentive programs that promote the timely maintenance and improvement of property.

Community Image Policy 4: *Control of Densities in Visual Corridors* - It is a policy of the Town to set the maximum lot coverage allowable by zone and to increase lot setback requirements along vital visual corridors.

Community Image Policy 5: *Protect the Visual Integrity Through Ordinances* - The Town will encourage, through its development review procedures, buildings and landscape designs which protect the existing visual integrity of the community.

Community Image Policy 6: *Encourage Urban Landscaping* - The Town shall encourage the dedication of land for urban landscaping which enhances the spatial and visual harmony associated with commercial, business, and civic buildings.

Community Image Policy 7: *Development East of Gulf Boulevard Discouraged* - It is a policy of the Town to discourage dense development east of Gulf Boulevard in order to maintain beaches and allow presently undeveloped land to remain as open space.

ENVIRONMENTAL HAZARD MITIGATION AND RESPONSE

EHM&R GOALS

EHM&R GOAL 1: *Protect the Public* - Protect the public from the effects of disastrous events through emergency plans and programs

EHM&R GOAL 2: *Restore and Protect Beach and Dune Systems* - Restore and protect beach and dune system resources, and assure that all development activities are compatible with natural system processes associated with these shoreline resources.

EHM&R GOAL 3: *Improve Access to the Beaches and the Shoreline* - Improve access to public beaches along the Gulf of Mexico and to the shoreline along Laguna Madre.

EHM&R GOAL 4: *Manage Wetland Ecosystems* - Manage South Padre Island's wetland ecosystems to maintain and enhance native habitats, biological diversity, water quality, economic productivity, and flooding and shoreline erosion protection functions.

EHM&R GOAL 5: *Use Mitigation Measures* - Protect human life and developed property through mitigation measures in advance of the occurrence of hurricanes and coastal storms.

EHM&R GOAL 6: *Provide for Redevelopment Planning* - Provide for long-range planning and decision-making to guide the redevelopment activities during the recovery period following major disasters.

EHM&R POLICIES

EHM&R Policy 1: *Rebuilding in Storm Damaged Areas* - Public facilities such as waterlines and roads will be extended or rebuilt in hazard areas only when absolutely necessary, and only to such size and degree necessary to serve the lowest possible level of density existing prior to the storm.

EHM&R Policy 2: *Reconstruction to Comply with all Codes* - All reconstruction will be required to conform to the provisions of the NFIP building code requirements. The Town will strictly enforce the code.

EHM&R Policy 3: *Reconstruction to be Consistent with the CIP* - To rebuild damaged public facilities consistent with the practices and objectives found in the city's Capital Improvement Program.

EHM&R Policy 4: *Reconstruction of Public Facilities* - Reconstructed public facilities will be flood proofed and upgraded to better withstand future hurricanes and storms.

EHM&R Policy 5: *Purchase of Land and Buildings in Storm Damaged Areas* - The Town will take advantage of opportunities which may arise to purchase land or damaged properties in hazard areas following storms, and in particular, to seek federal funds for purchasing severely damaged buildings.

EHM&R Policy 6: *Act on Opportunities to Mitigate Storm Damage* - The Town will take full advantage of opportunities that conform to mitigation policies discussed in the previous section. Examples of policies that could be readily implemented after a major storm include:

a. Land acquisition

b. Enforcement of a 300 foot setback from the Gulf regarding new construction

c. Following a more stringent building code for reconstruction

d. Reducing densities in high-hazard areas

EHM&R Policy 7: *The Emergency Management Plan* - The Town will use the Emergency Management Plan as an operational guide in preparing for, responding to, and recovering from disastrous events requiring emergency actions by local government officials.

EHM&R Policy 8: *Storm Risk Education* - The Town will cooperate with local news media, educational institutions, public service groups, and other agencies in implementing a program of education and information describing the risks posed by hurricanes and coastal storms.

EHM&R Policy 9: *Encourage Development West of Gulf Boulevard* - The Town will encourage future development to occur west of Gulf Boulevard.

EHM&R Policy 10: *Oppose Strategies that Damage Abutting Properties* - The Town will oppose any shoreline management strategy that damages abutting property or endangers the public beach.

EHM&R Policy 11: *Protection of the Dune System Vital* - The Town believes that a healthy dune system is important and will take all actions necessary, including the regulation of development, to preserve and enhance those remaining dunes and the natural reestablishment of dunes to those areas where they had been removed.

EHM&R Policy 12: *Use of Stabilization Systems in Wetlands Discouraged* - The Town will discourage the construction of environmentally incompatible shoreline stabilization systems such as bulkheads in wetland areas.

EHM&R Policy 13: *Rip-Rap in Canals Required* - The Town will require the placement of rip-rap in artificial and natural canal systems where stabilization is needed.

EHM&R Policy 14: *Development of Spiral Canal Systems Encouraged* - The Town will encourage developers to maintain and enhance water circulation and water quality through the use of spiral artificial canal systems, as opposed to finger artificial canal systems.

EHM&R Policy 15: *Encourage Cluster Development in Wetland Areas* - In order to promote long-term maintenance of natural systems, the Town will support development management measures such as restrictive low-density zoning, public acquisition, and clustering in which large parcels of land can be developed without disturbing wetlands.

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PART

Future Land Use 6.5

Chapter 6

Part 5

FUTURE LAND USE

All types of land uses are necessary for cities to be sustained, but consideration needs to be given to their relative location and their compatibility to each other. If this is not the case, incompatible land uses can result which can be detrimental to property values and to the overall condition of the city. When the future land uses of any city are to be planned, some standards and guidelines must be used. In addition to regulating what kind of establishments are built next to each other, care must also be taken when developing land along major traffic thoroughfares. Improper land development practices along arterial streets and highways severely impede traffic flow and the safety of those roads. Design elements such as the number of curb cuts, spacing of curb cuts, lot sizes, and traffic volumes in proposed developments need to be considered. Table 1, below lists the present use of land in South Padre Island.

The *South Padre Island Plan 2010* recommendations for future land use are shown on the future land use plan, which is illustrated on MAP 8. The main difference between the 1990 Land Use (see MAP 6) and the Future Land Use Plan, is that the latter prescribes broad areas with specific land use designations and residential densities. The wide distribution of residential designations on MAP 8 does not mean that all parcels of property within the Town limits should be developed as residential. However, this should be the primary type of land use. Of course, certain types of facilities and services which complement residential development will be necessary in these areas and should be appropriately located. Multiple-family resident projects of similar density could be allowed to locate adjacent to each other, but residential, especially the forms with lower densities, should be buffered from commercial and high business activities.

In order to address the land use needs, the Town was divided into logical planning districts. These are shown on Map 7. The proposals for each planning district are presented on the following pages.

TABLE 1

1990 LAND USE

Land Use	Acres	Percent of Developed Area	Percent of Total Area
Single-Family Residential	63.11	10.2	5.6
Multi-Family Residential	32.21	5.2	2.9
Hotels and Condominiums	191.02	31.1	17.1
Commercial and Retail	48.10	7.8	4.3
Offices	4.02	0.6	0.4
Public and Quasi-Public	15.94	2.6	1.4
Parks and Open Space	67.30	10.9	6.1
Marinas and Canals	5.04	0.8	0.4
Street Right-of-Way	188.95	30.8	16.9
Total Developed Land Use	615.69	100.00	54.7
Vacant or Undeveloped Land	482.93	NA	42.9
Wetlands and Standing Water	27.01	NA	2.4
Total Area	1,125.63		

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

PLANNING DISTRICT 1

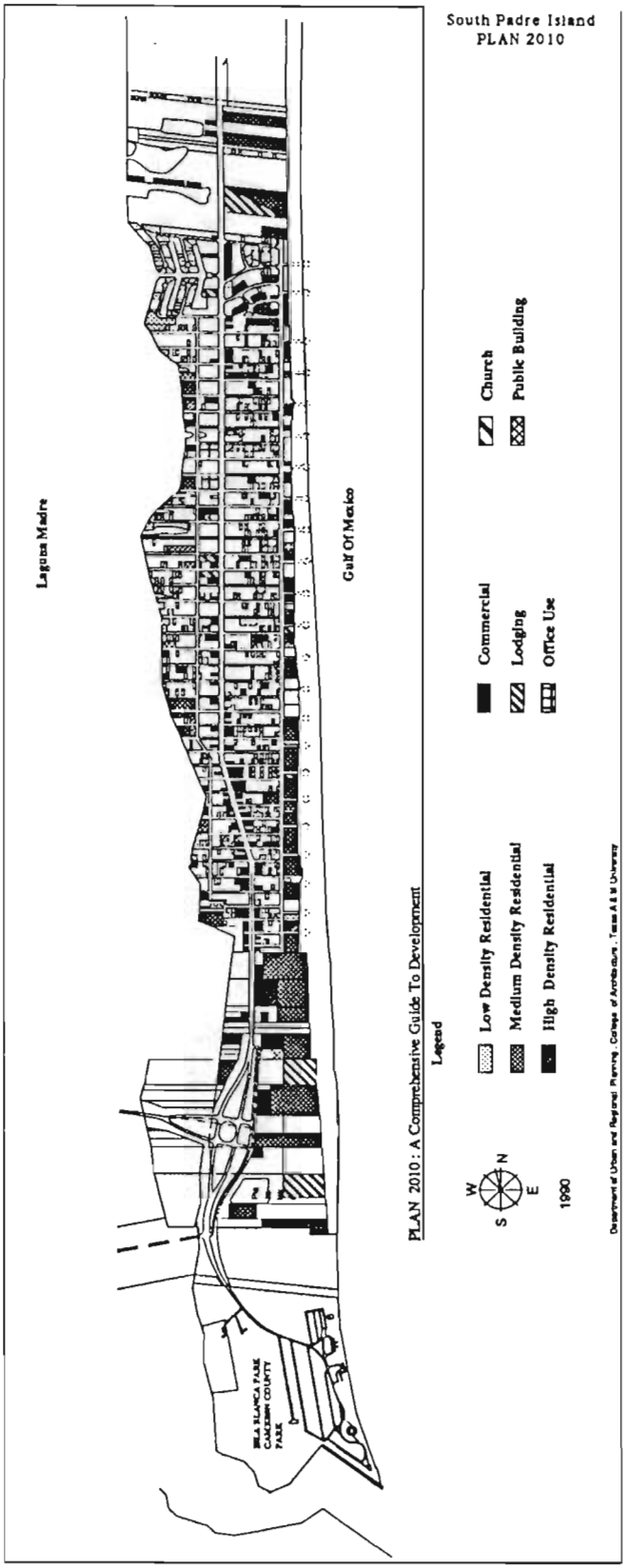
Planning District 1 is located completely outside of the Town limits on the south end of the Island. Its largest feature is Isla Blanca County Park with a ranger's station. There is also a recreational vehicle park, a marina, a general store, the old U.S. Coast Guard station which is presently a research facility of the University of Texas-Pan American. The Town of South Padre Island should try to play role in any future development which occurs in Planning District 1, since it will affect the Town.

PLANNING DISTRICT 2

Planning District 2 comprises 266.9 acres and is almost completely developed. It is comprised largely of hotels, condominiums, and commercial activities which are associated with the tourist industry. There are few remaining large tracts of land in this district which are vacant. Any development which

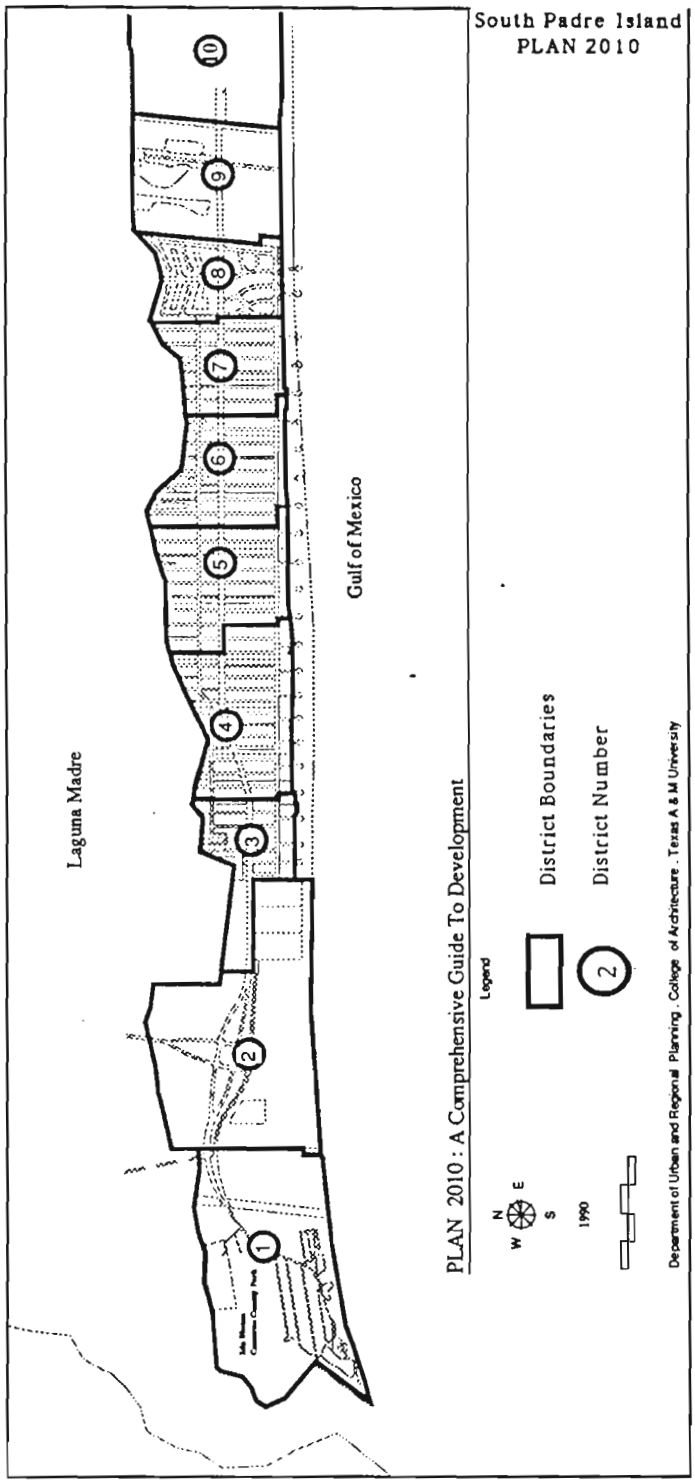
MAP 6

1990 Land Use



MAP 7

Planning Districts



occurs in this Planning District should follow the existing land use patterns, and single-family residences should be prohibited from locating in this District.

TABLE 2

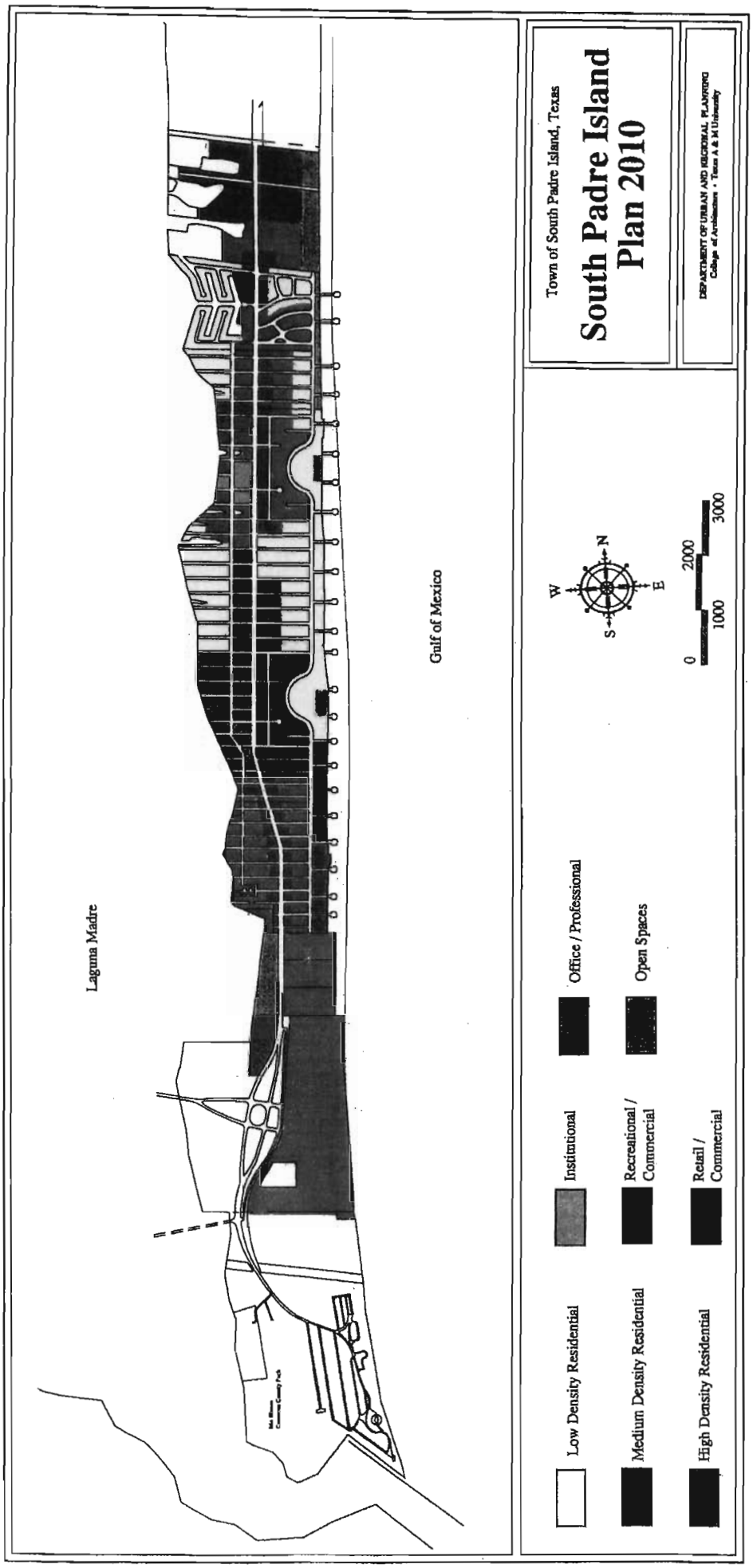
FUTURE LAND USE BY PLANNING DISTRICT

Planning District	Predominant Land Use Type	Area In Acres
1	Isla Blanca Park	255.5
2	Hotels	266.9
3	Commercial	91.6
4	Mixed	177.5
5	Residential	152.3
6	Mixed	139.9
7	Residential	108.8
8	Residential	112.1
9	Recreation and Open Space	186.7
10	Andy Bowie Park	NA

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning Laboratory • Spring 1990.

PLANNING DISTRICT 3

Planning District 3 lends itself to various types of future development. The land along Padre Boulevard is currently developed primarily as commercial. This type of development may continue, but certain restrictions need to be placed on future commercial development here. For example, sites should be at



MAP 8

Future Land Use

least one acre in size in order to allow for sufficient parking and to minimize curb cuts and entrances off of Padre Boulevard. A portion of Planning District 3 which fronts Laguna Madre and surrounds an existing water inlet, could be developed as a mixed-use commercial and entertainment center. The strip of land along Gulf Boulevard, and fronting the beach, should be rezoned to a medium-density residential classification. This would allow for the construction of more suitable buildings in the event that the existing structures are destroyed beyond recovery in a storm or other disaster. The remainder of Planning District 3 should be targeted for medium-density residential development to complement the existing land uses.

PLANNING DISTRICT 4

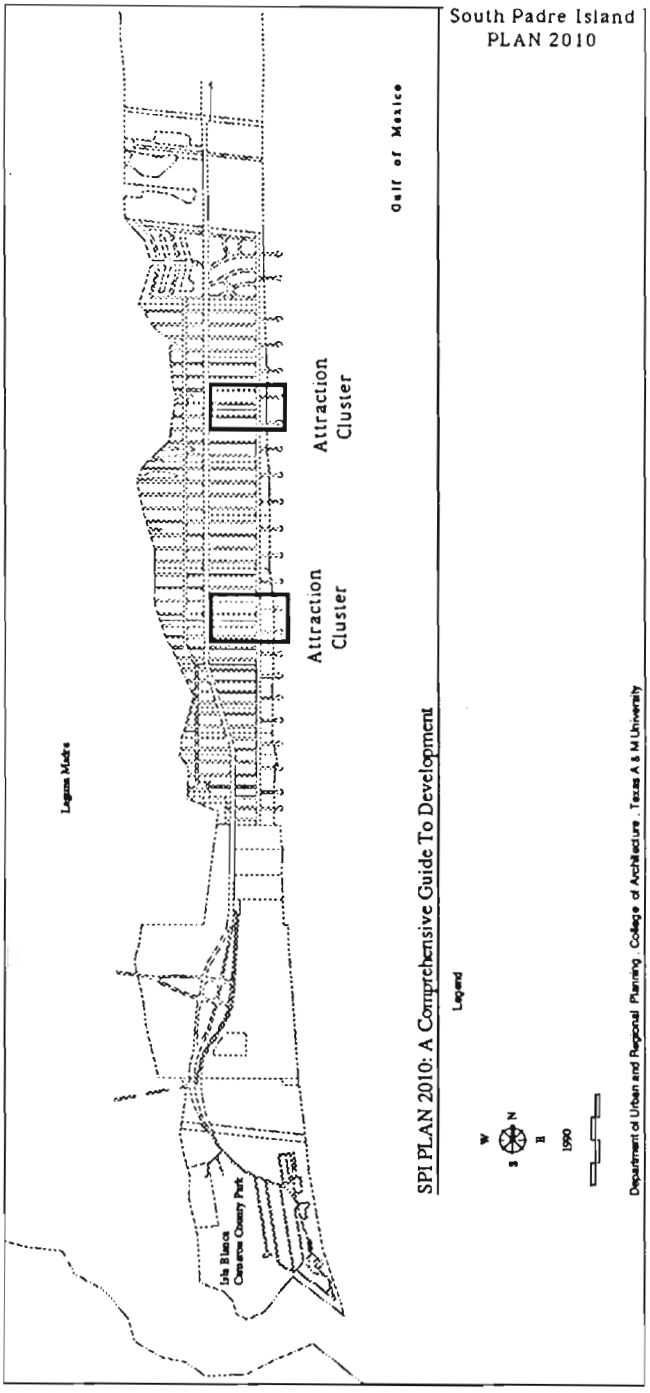
Commercial development along Padre Boulevard may continue into Planning District 4, on the basis of considerations as discussed in reference to Planning District 3, above. The beach front properties should be rezoned as in Planning District 3. The properties along the west side of Padre Boulevard in the northern half of this District currently have some office development on them. The vacant parcels there could be developed similarly to create an office center for the community. The remainder of the Planning District 4 should be developed as low and medium-density residential.

PLANNING DISTRICT 5

In Planning District 5 the Island widens somewhat. This widening allows for more space to buffer different land use types. The south part of this area situated between Padre and Gulf Boulevards is appropriate for a mixed-use attraction cluster development of various commercial activities. An existing pocket of vacant land which fronts the beach should remain vacant so that it can be used to tie the cluster development to the waterfront. This open space along the beach enhances compliance with the Texas Open Beaches Act. A more detailed discussion of this type of development is found later in this section. The remainder of land along Padre Boulevard in Planning District 5 could be developed with higher densities of residential development. This action would help attain the goal of tiering future development so that higher densities are located in the center of the Island. Medium-density residential units could be established next to the commercial and high-density development zones. On the other side of the medium-density residential, low-density residential development should occur. This is a "buffered" approach to

MAP 9

Attraction Cluster Locations



land use development and this concept of land use compatibility is central to the land use strategies employed in this document. Thus, lower residential densities are buffered from commercial, business and higher residential densities by medium residential density projects. The lower densities of residential development would also be more appropriate along the Gulf of Mexico beach and the Laguna Madre waterfront.

Some of the northern end of Planning District 5 is located in a wash-over zone. This is a portion of the Island that is most susceptible to flooding and tidal surges in the event of a hurricane or other tropical storm. Therefore, certain performance standards of construction should be established and followed in this zone.

PLANNING DISTRICT 6

Planning District 6 could easily become the activity center of South Padre Island. This is so because the government administrative headquarters are proposed to be located in this area, along with the post office, at the northern end on the west side of Padre Boulevard. A vacant block of land exists between the municipal complex and the post office which should be reserved for development of future expansion of public buildings to create a Town Center.

This development could extend to the Laguna Madre, enhanced by some parks. Across Padre Boulevard from the proposed Town Center is a site which could be developed as another mixed-use commercial cluster, as discussed in Planning District 5, above. Medium-density residential development should be designated on the edges of the Town Center and the attraction cluster.

On the other side of this medium-density buffer, the land is suitable for development of low-density residential units. Low-density development should extend to the beach front on the Gulf of Mexico. This designation may require rezoning the beach front properties as discussed in Planning District 3. It is here in Planning District 6 that the beach is eroding. Therefore any development along the beach should be sensitive to this problem. Portions of Planning District 6 also lie in wash-over zones and appropriate measures should be taken to discourage development in these areas.

PLANNING DISTRICT 7

Planning District 7 should be developed primarily for residential uses. An

existing pocket of commercial activity has been designated on the Future Land Use Plan and should remain of this nature in order to serve adjacent residential developments. Development in Planning District 7 should be tiered away from the beach and Laguna Madre shores and blended with appropriate amounts of high, medium, and low-density residential land use. Attention should also be given to the wash-over zones which partially lie in this area.

PLANNING DISTRICT 8

Planning District 8 comprises mostly residential uses. The neighborhoods have distinctive urban design qualities as a result of non-rectilinear street patterns and the use of finger canals. Future development in this area should be exclusively residential of properly juxtaposed medium and low-density designs. Medium-density residential should occur along Padre Boulevard and toward the Gulf of Mexico in the southern end of Planning District 8. The northern end of the beach front is too small for any reasonable type of development and should be acquired for use as open space. Single-family and multi-family neighborhoods extend along the cul-de-sacs and curvilinear streets giving the area a sense of order, continuity, and a marine quality that is very appealing.

PLANNING DISTRICT 9

Planning District 9 is only partially developed at the current time. On both sides of Padre Boulevard, about half-way to either body of water, the land is developable. However, between these points and the water, the land is extremely sensitive. On the west side, along the Laguna Madre, wetlands exist which serve as habitats for wildlife, as well as protection for the interior of the Island from flooding and tidal surges.

On the east side of the Island in this district, the beach is eroding and the frontal dunes are cut diagonally from southeast to northwest. Development should be limited to areas outside both of these environmentally sensitive zones for the protection of properties. Projects which occur in this district should be medium-density residential at the south end, and higher-density in the northern three-quarters of the district along Padre Boulevard. Two pockets of commercial development are designated at the extreme south end of Planning District 9 to serve it as well as Planning District 8.

PLANNING DISTRICT 10

Planning District 10 comprises Andy Bowie County Park on the north end of the Town Limits of South Padre Island. It is included within the Town planning area because the site for the future Community Convention Center has been targeted here on land leased from Cameron County. The area has beach, vegetated sand dunes, wetlands, sandy tidal flats, potential washover areas, and access from SH 100 (Padre Boulevard). The site of the Convention facility is a 30-acre parcel of land between SH 100 and the Laguna Madre. The elevated structure is situated approximately half-way between the street and Laguna shore.

An elevated boardwalk is contemplated to connect the Convention facility to an island located in the wetlands where an observation deck will be built. The site plan also calls for prevention of vehicular-induced erosion by pile-driving into the firm sand a row of bollards along the perimeter. This unobtrusive three-foot high permeable perimeter "fence" would permit walking conventioneers and wildlife freedom of movement to the laguna shores and tidal flats to the north.

Another special feature of this district is the proposed Amphibious Airplane Terminal on the Laguna Madre. This facility would permit air service connection to the state's major metropolitan areas and other coastal resorts. *The Wave* trolley service connects the convention facility to the rest of the Island. The feasibility of a "Cayman style" golf course (scaled-down to conserve land) should be determined and could be located in and around the sandy flats and dunes to provide golfers with a truly unique experience where the sandy areas serve as the fairways.

SPECIAL DEVELOPMENT CONSIDERATIONS

PERFORMANCE STANDARDS ZONES

For properties located within designated wash-over zones, FEMA recommended performance standards for construction in the coastal zone should be established to maximize the safety of any structures built there. Compliance with these or higher standards will enhance the property owners qualifications for obtaining disaster relief from storm damage. Development

in these zones should be limited to low and medium-density residential units to minimize the number of people living in these areas. Some of the property in these zones could be used as parking lots to serve adjacent commercial developments.

ATTRACTION CLUSTERS DEVELOPMENT

The Attraction Clusters concept, mixed-use commercial cluster developments referenced in the discussion of Planning Districts 5 and 6, are visualized as a variety of complementary commercial and tourist-related activities whose compact concentration creates powerful economic mix. The location of these are shown on Map 9. The clusters constitute places where one can find a variety of attractions and services. Small specialty shops, eating and drinking establishments and small, mid-rise hotels are some of the types of facilities and services which could be included in these clusters. Sufficient parking to support these facilities should be provided. The commercial-tourism clusters should tie in with the vacant pockets of land along the shore front to take advantage of the beach and Gulf vistas.

A cost and tax generation estimate was prepared for one of the proposed attraction cluster projects. It has an estimated total taxable value of $6,115,727 of which $2,340,747 would consist of improvements and $3,636,980 in land. The total taxable value of the residential lots (both improved and unimproved) is $3,994,185 while the equivalent commercial portion is $1,983,543.

There are 149 lots in the proposed cluster, 10 of which are shore-front parcels. Twenty-five lots would be zoned for commercial use, and 124 lots would be zoned for residential. Thirty-seven lots would be improved leaving 112 parcels undeveloped.

The build-out plan for this project shows parking in the section nearest Padre Boulevard. This is intentionally designed so that the shops would be easy to find. A large parking lot is available just off an arterial street, making both the location of the parking lot and the parking process itself simple and efficient. The beach front lots would be left open for access as well as for the retention of a clear view to and from the cluster.

There would be public rest rooms and showers nearest the beach with a pedestrian food mall and shops encountered in the walk toward Padre

Boulevard. The facilities would consist of condominiums and retail establishments as well as medical facilities, and small diversified businesses. The eating facilities would be both outside, inside, casual and semi-formal.

Public areas would exist where concerts and speeches could be heard. There would be shady areas and places for sitting, watching, and talking. The walkways would be of decorative stone and would be interspersed with shrubs, grass, and decorative walls. Lights would illuminate the complex after dark and would extend to and along the beach for night use. There would be no auto traffic or parking in the pedestrian enclave area. Gulf Boulevard would become a walking extension of the cluster project and would contain four foot walls along the walk to facilitate residential privacy. There would be benches and lights along Gulf Boulevard to make the area comfortable and safe for pedestrians. The attraction cluster would be developed as a planned unit development (PUD) with restrictions.

The proposed plan calls for the re-routing of Gulf Boulevard into a gentle curving drive inside the cluster to slow traffic and provide an aesthetic pleasing appearance to the area. There would be pockets of parking for public access to the beach as well as the expansive parking near Padre Boulevard. The purpose of the cluster would be to move development back from the beach, and allowing moderate building densities and mixed land uses within the District.

Public beach access problems would be materially reduced with the addition of the clusters. Traffic congestion would be lessened due to the availability of plentiful parking in a known place. This design concept would create a captivating environment and ensure the pleasant beach experience visitors want.

TOMPKINS CHANNEL

Although not within the municipal limits of South Padre Island, Tompkins Channel runs parallel to the Island on the west, along Planning Districts 2 - 9. The Channel is an important physical element because of the present and future access that if offers to the Laguna Madre side of the Island. Future dredging of the Channel could significantly impact development trends.

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PART

Transportation 6.6

Chapter 6

Part 6

TRANSPORTATION

INTRODUCTION

The level of activity in a city is dependent to a large degree on the movement of goods and services throughout the urbanized area, which in turn shapes the overall economy. When land uses are integrated with the transportation system, the urban area is more visually pleasing and the economy is frequently more efficient. Transportation planners strive to create a transportation system that has no less than four important attributes. The planner attempts to produce a transportation system that is:

- Safe
- Efficient
- Attractive
- Economical

In attempting to design a system that has all of these attributes, the planner will normally start by viewing the system within the context of its major functions. One authoritative source has defined these functions as follows.[1]

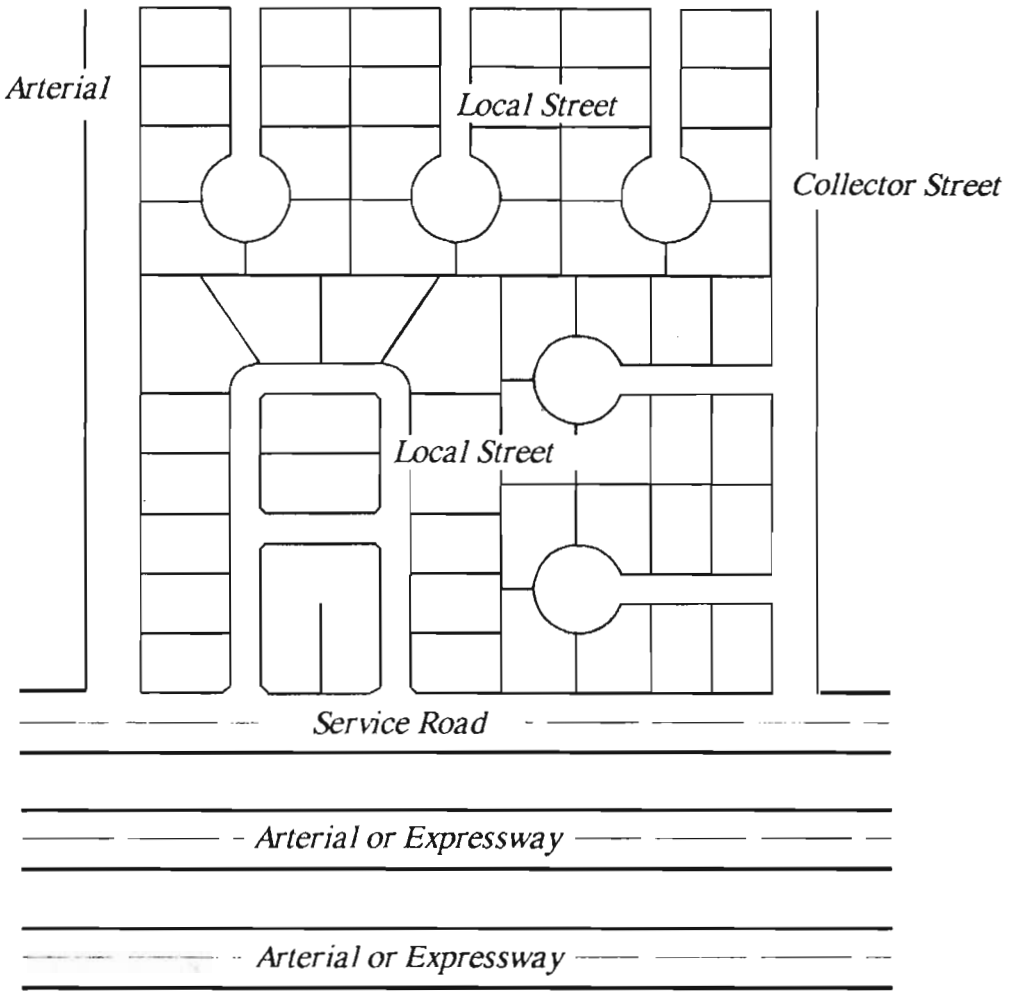
1. To provide a framework for future growth and development which permits the creation of logical residential and non-residential areas bounded by high capacity major arterials.

2. To provide standards for circulation system development by adopting pavement widths and corresponding right-of-way requirements for various pavement types of streets. Standards for each thoroughfare type are based upon a predetermined use intensity corresponding to the anticipated land use at that location.

3. To minimize traffic movement through existing and future residential

FIGURE 5

The Functional Street Classification System



areas.

4. To provide adequate routes in or near the central area to allow efficient traffic movement to and from the area.

5. To guide the expenditure of funds for major street improvements as future growth occurs.

6. To guide the subdivision of land and to provide a basic framework for the organization of urban land uses.

7. To create a concept which any agency can use in coordinating their development efforts.

The transportation planner uses a *functional street classification system* in designing the street structure. An example of the functional street classification system is shown in Figure 5. This system is essentially hierarchical and contains the following elements:

- Arterials: The main function of an arterial is to move high volumes of traffic at speeds of 35-45 mph. They typically have a right-of-way from 95 to 140 feet wide, and they are usually spaced one to two miles apart, with a minimum roadway intersection spacing of one-half mile. Arterials provide continuity throughout the urbanized area. No on-street parking is generally allowed on arterials. They normally serve as a link to freeway or interregional highway systems.

- Collectors: The main function of a collector street is to distribute traffic between local streets and arterial streets. They typically have a right-of-way from 60 to 90 feet. Their spacing varies from one-half to one and one-half miles. They are generally not permitted to cross arterial streets. Collector streets are generally designed for a speed limit of 25-30 miles per hour.

- Locals: The main function of a local street is to provide access to property. Right-of-way varies from 50 to 60 feet. Local streets are what most people think of when they envision a typical neighborhood street. They are usually designed for a speed limit of 25 miles per hour.

Streets designed on the basis of the functional street classification system have

numerous benefits, including the following:[2]

1. The arterials can be designed to safely accommodate the high traffic volumes and high speeds.

2. Traffic control is simplified.

3. The pavement of designated streets can be designed to carry a high number of repetitions and high wheel loads. Other streets can be designed for a low number of repetitions and light wheel loads. Consequently, total maintenance costs are reduced.

4. Residential areas are not subject to through traffic, which makes them more desirable and safer places to live. Commercial office and retail land uses are concentrated in fewer but larger and better-designed developments. Strip development is reduced.

Other transportation design criteria which were utilized in structuring *South Padre Island Plan 2010* included the following: Two characteristics distinguish a residential subdivision designed with traffic safety in mind: First, there should be a limited number of access points with the major arterial streets which border the subdivision. These access points are the major collectors serving the subdivision and are commonly spaced at intervals of at least one-quarter mile. Second, the internal street system should be discontinuous so as to discourage through traffic from penetrating the subdivision. Research has demonstrated that gridiron subdivisions experience almost eight times the annual number of accidents as limited-access subdivisions. Further improvements in residential traffic safety can be achieved by the use of three-way intersections which research has shown to be safer than four-way intersections. Mixed-use developments can reduce overall parking area requirements 20 to 25 percent by sharing facilities and taking advantage of the staggered peak demand patterns of different land uses.

The transportation system proposals found in this component of *South Padre Plan 2010* are based on a multiple-mode concept. The plan considers a variety of transportation modes to reduce automobile congestion by complementing them with pedestrian walkways, bicycle paths, public transit, and an Island shuttle. Other modes which are supported include the use of ferry boats and amphibious airplanes.

Table 3 contains a summary of the minimum recommended design standards for a street system for South Padre Island.

TABLE 3

STREET SYSTEM DESIGN STANDARDS

Element	Arterial	Major Collector	Minor Collector	Local Streets Types Loop	Cul-De-Sac
Paved Surface	47-51 feet	41 feet	37 feet	29 feet	29 feet
Number of Lanes	4	2	2	2	2
Median Width	12	NA[1]	NA	NA	NA
Right Turn Lane	Channeled or Continuous	NA	NA	NA	NA
Left Turn Lane	Continuous	NA	NA	NA	NA
Right-Of-Way	80 feet	70 feet	65 feet	60 feet	60 feet
Operating Speed	45 MPH	35 MPH	30 MPH	25 MPH	25 MPH
Minimum Turn Radius	1,000 feet	500 feet	350 feet	175 feet	175 feet
Signal Spacing	1/4 Mile	NA	NA	NA	NA
Corner Clearance Downstream	350	150	most distant	most distant	most distant
Corner Clearance Downstream	300	150	most distant	most distant	most distant
Parking	prohibited	permitted	permitted	permitted	permitted
Sidewalks	both sides	both sides	both sides	both sides	both sides
Maximum Dwellings Served	NA	1,000	400	50	24

1. Not applicable

Source: Stover, Vergil G., and Koepke, Frank J., *Transportation and Land Development*, under commission from the Institute of Transportation Engineers, Prentice-Hall, Inc., 1987.

PROPOSALS

The following specific proposals are aimed at improving the major arterials in the Town:

Padre Boulevard

- Build a barrier curb median along undeveloped areas. Do not install tear drop medians because a raised pavement marker is more effective with the best solution for controlling access being a 6 inch high landscaped barrier median. This combination provides safety and a more attractive urban scape.

- Acquire additional right-of-way so that there is a consistent right-of-way of at least seventy feet along both Padre Boulevard and Laguna Boulevards.

- Reduce automobile reliance by providing bicycle lanes along Padre Boulevard.

- Adopt strict permitting mechanisms for the location of access cuts and drives on Padre Boulevard.

  - permit a maximum of one access cut for each property.
  - specify corner clearance.
  - specify the minimum frontage to allowable for curb cuts.
  - include these items in the South Padre Island subdivision regulations and enact them into the Town ordinances.

Gulf Boulevard

- Provide designated bikeways.

- Provide separate sidewalks.

- Install portable curbing between parking spaces and the sidewalk along the boulevard.

Laguna Boulevard

• To accommodate traffic generated from the anticipated future growth of residential areas and waterfront developments along the Laguna Madre shores, it is recommended that Laguna Boulevard be upgraded to a minor arterial with a minimum right-of-way of seventy feet.

Amber Jack

• To provide continuity, connect the South end of Laguna Boulevard to Padre Boulevard at Amber Jack. Increase Amber Jack right-of-way to seventy feet and improve signalization as required to accommodate enhanced intersection movements. A proposed design for a two-block area between Amber Jack and Swordfish Streets is shown in Figure 6. This design would help to create a link between Laguna Boulevard and Padre Boulevard.

Cul-De-Sacs Off Of Gulf Boulevard

• Demarcate the officially designated fifty foot public right-of-way width for each of the cul-de-sacs located laterally to Gulf Boulevard and, depending on each cul-de-sac's depth, provide a maximum feasible number of 90 degree parking spaces on one side and a pedestrian lane on the other side.

Harbor Street

• To enhance traffic flow, remove the traffic signal at Harbor Street.

Public Beach Access and Parking

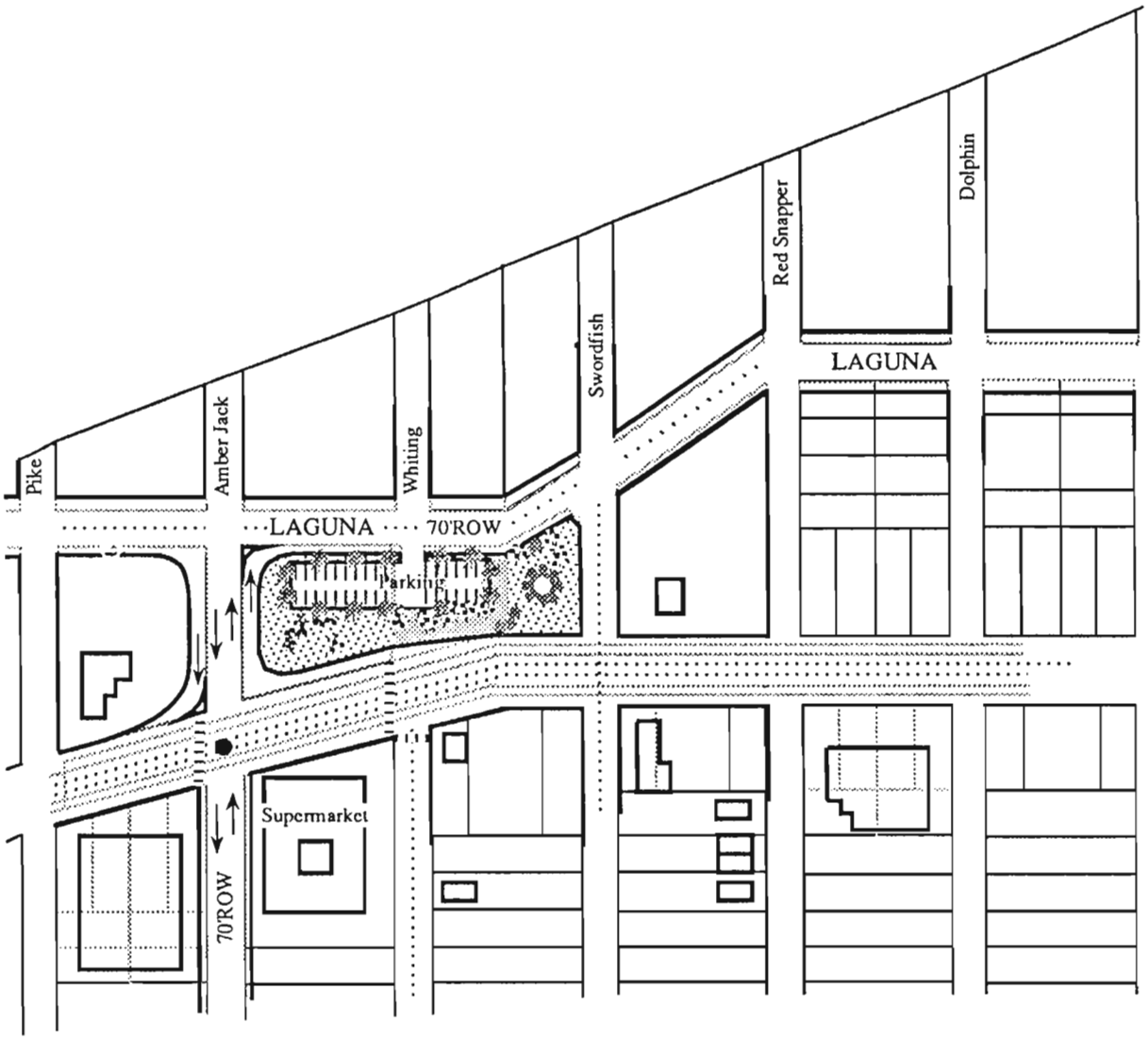
• Establish a seasonal parking charge. A nominal charge for a seasonal parking permit would help defray some of the costs of providing parking, maintenance, clean-up, and security. However, to satisfy the need for unencumbered access to the public beach, a reasonable number of free parking spaces should be made available.

Amphibious Aircraft Airport

• Enhance accessibility to South Padre Island by providing amphibious

FIGURE 6

PROPOSED LAGUNA BOULEVARD AND PADRE BOULEVARD LINK



airplane and/or helicopter service between Austin, Dallas/Fort Worth, Houston, San Antonio, and South Padre Island.

It is recommended that a feasibility study be undertaken to determine the viability of providing additional linkages with the state's major metropolitan areas through amphibious aircraft service. The Laguna Madre's calm waters would appear to be ideal for landing such aircraft along side the new community convention facility on the north end of Town. The gently sloping hard packed sand of the tidal flats in the vicinity of the convention facility might provide land access without having to build a ramp. Currently recreational vehicles access the sandy flats with no apparent traction problems. If "getting there is half the fun", perhaps, accessing South Padre Island via an amphibious airplane might be uniquely attractive for many tourists driven by the allure of adventure and exhilaration or simply doing something different.

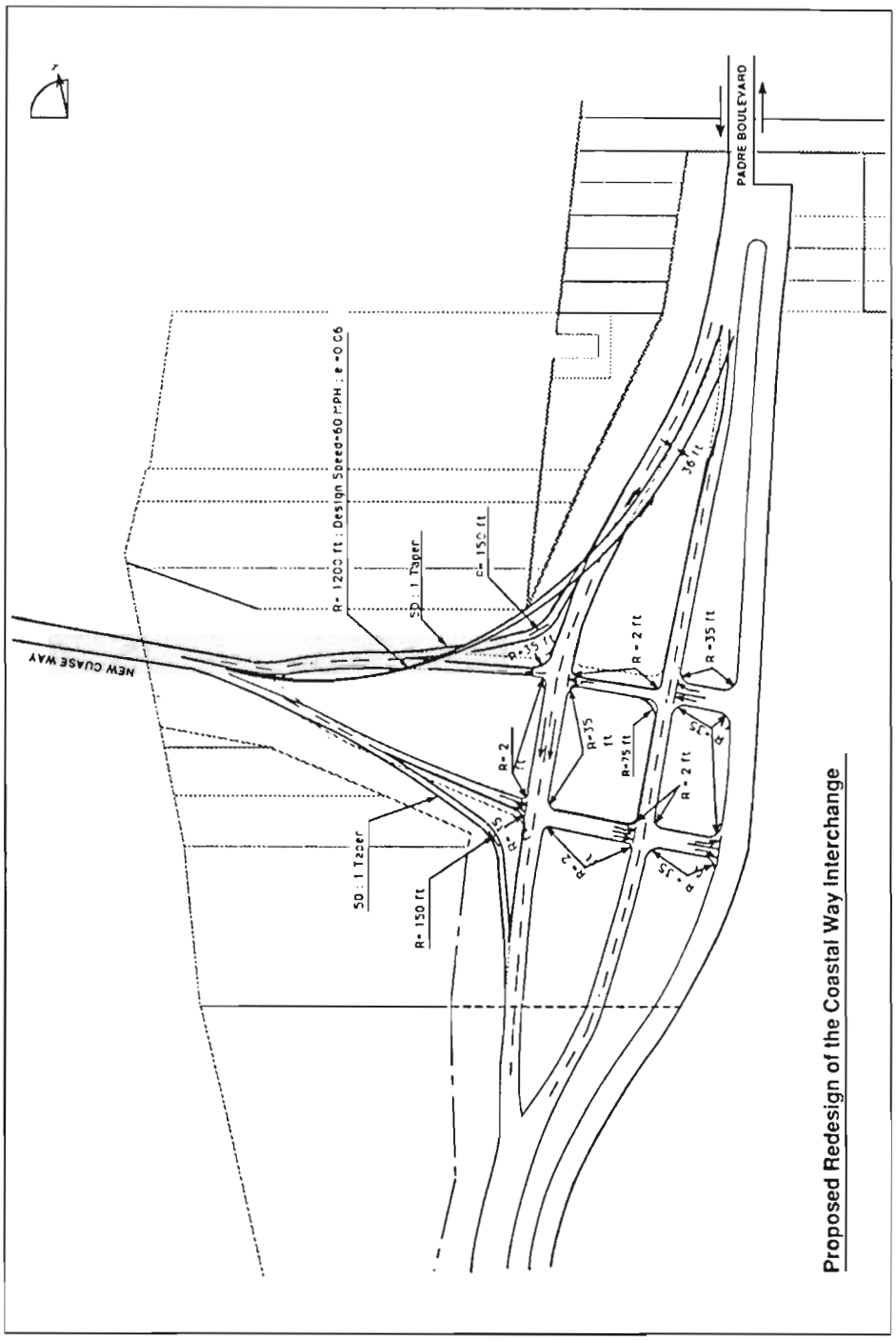
Gateways

- The redesign of the causeway interchange offers an opportunity to enhance traffic circulation and emergency evacuation. A proposal for such a redesign is shown in Figure 7. Because this is the main approach and gateway to the Island, careful study of the visual quality of the proposed elevated structure is important. The design of the support pylons and ramp can be made into a practical and attractive sculpture which not only has utility but is visually appealing. Landscaping, earth berming, and the placement of appropriately scaled public sculpture would further enhance the attractiveness of this gateway.

- An important consideration about the Town's gateway is that it is the terminus of a corridor that begins 26 miles out of Town where Interstate Highway 35 off-ramps to State Highway 100. The attractiveness of this corridor and the image it projects to visitors is important because of the impact that it has on tourism trade. It is recommended, therefore, that a South Padre Island SH-100 corridor task force be organized with representation from Cameron County and the Towns of Los Fresnos, Laguna Vista, Laguna Heights, Port Isabel, and South Padre Island to work with the State Department of Highways and Public Transportation in preparing an immediate action program and a long-range coordinated improvement plan for this important tourism link. A similar effort should be undertaken for the SH-48 link from Brownsville.

FIGURE 7

PROPOSED REDESIGN OF THE CAUSEWAY
AND THE PADRE BOULEVARD INTERCHANGE



General Street and Parking Improvements

- Provide a major beach parking area in conjunction with proposed attraction/commercial cluster developments in wash-over zones.

- Encourage the use of shared parking between daytime and night time commercial activities to help reduce the overall amount of required parking lots.

- Locate parking lots within 660 feet of the public beach.

Sign Control and Public Notice Enhancements

- Provide clear directional signs indicating public beach access points.

- Use stone pavement or wood decking in decorative patterns to delineate pedestrian routes to beach access.

- Provide sidewalk and crosswalk pavement markings on local streets.

- Require commercial signs to be set back beyond the street right-of-way line.

- Install and maintain break-away sign supports.

- Provide for a traffic sign maintenance program.

- Change yield signs to stop signs only if warranted.

Other Transportation Related Improvements

- Provide shuttle service for beach, hotel and mainland points (Port Isabel) during the peak season.

- Improve linkages between Brownsville and Harlingen.

- Install six-inch barrier curbs, painted yellow, to delineate intersection curb returns.

- Increase the set back of fire hydrants.

- Adopt setback requirement with provision for a minimum of four foot sidewalks.

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1. Stover & Koepke, *Transportation and Land Development*, Institute of Transportation Engineers, Prentice Hall, 1988.
2. Ibid.

PART

Community Facilities 6.7

Chapter 6

Part 7

COMMUNITY FACILITIES

INTRODUCTION

Providing effective and properly located community facilities in South Padre Island is essential for the safety and welfare of both the permanent residents and visitors. The growth and development of the tourism market relates directly to how accessible and functional public services are. Considering the fact that the Town serves more visitors than it does the permanent residents, the visibility and accessibility issues are of utmost importance. The image of a friendly place to visit is important, however if police, fire, and health service must take precedence, and it is imperative that the use and effectiveness of these services be continually monitored and updated as necessary in order to meet the changing needs of the community.

Viewing the community services as a system, is a first step in meeting the needs of the Town. This system has inputs (increases in population, new buildings, recreational demands) that constantly change the demands placed on it. To produce a successful outcome or output the system must be monitored and adjusted as necessary with programs and tasks identified to create an efficient and equitable efficient delivery structure. The system includes the following components:

- police and fire protection
- health delivery
- municipal services
- recreational programs and parks

All of these services should be easily identified and accessible.

An architectural development theme for all municipal facilities should be created to improve the community image and to make it easier to identity all of the services identified above. The thematic components may include color scheme

and uniform sign design that orientates the viewer to community facilities.

The Town Center concept would increase the visibility and effective delivery of municipal services, police and fire protection. It is recommended that city blocks 136, 137, and 146 be acquired for the development of this concept. The portion of the area that is in the washover zone should be planned and designed for open space that welcomes residents and tourists to the area. Expansion of the municipal building complex should consist of two separate buildings. One for city hall and municipal court, and a second building for the police and fire departments. The city administration, the police department and the fire department have all identified the need for increased space to function more productively and efficiently.

COORDINATION

A central database should be created to integrate crime indexes, fire department data, and pertinent emergency medical information. The data base would be used to coordinate efforts for both planning and servicing the community. A yearly written plan should be formulated for the delivery of all the above services. Such a plan should be created with the combined efforts of the police department, fire department, and the Emergency Medical Service Foundation.

POLICE

For police department needs the following recommendations are made: The jail facilities should be expanded and redesigned for processing prisoners effectively and for providing adequate space for administrative support personnel. Staffing of permanent full-time patrolmen and investigators should be increased and incentives should be established for expanding the reserve officers to fill the vacant authorized positions. Immediate attention should be given to accreditation standards. The minimum time period for accreditation by the Commission on Accreditation for Law Enforcement Agencies should not exceed five years.

FIRE PROTECTION

The Key Rate Schedule indicates how protected a city is from fire hazards. Using this as a basis for rating South Padre Island's Fire Department is not totally

accurate since the Key Rating was performed in 1984. From 1984 to the present several improvements have been made that appear to be in compliance with the Key Rate standards. Communication with the State Board of Insurance should be initiated immediately in the form of a written request for a new inspection. With the added personnel and equipment the unprotected status should become protected . The Key Rate of $0.89 may be reduced. This would be an excellent opportunity to determine the status of the department and gain further insight into the problem areas before implementation occur and changes to structures, equipment etc. are made. After a new inspection by the State Board of Insurance and the current status is determined, a goal of the Town should be the attainment of protected status with a significant reduction in the Key Rate. A target goal could be possibly $0.35 which is near Port Isabel's rating.

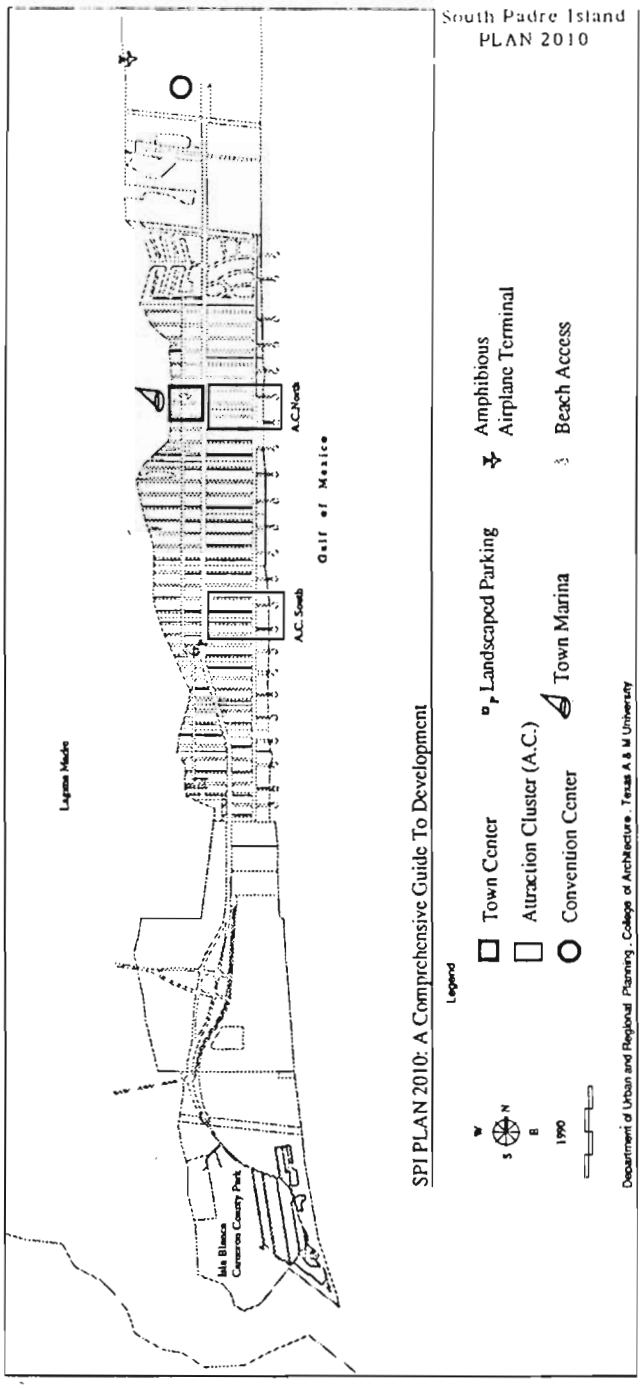
The establishment of fire hydrants every 300 feet would require major capital expenditures. A possible solution may be to add a minimum of 10 fire hydrants per year, initially concentrated in the hotel district and then located where the need is most apparent. The "Floating Pump" the fire department owns could serve in the absence of a fire hydrant. This device has the capacity to pump 420 gallons/minute with 27 pounds per square inch pressure. The pump can use bay or swimming pool water. This device provides a basis to begin a dialogue with the State Board of Insurance to discuss opportunities for improving the Key Rate.

The Town should build a fire training tower with a test pit. However, such a facility does not necessarily have to be built on the Island. A possible solution may be for South Padre Island to contract with Harlingen or MacAllen for the use their training facilities. This is another area for possible discussion with the State Board of Insurance.

The personnel needs of the department are being met at the present time, however added fire fighters will be necessary when the new Convention Center is completed. The increase in the number of fire fighters would also permit flexibility in present scheduling and meeting any population demands the Island experiences. Five fire fighters should be added per year starting in 1990 with the total of fifteen additional fire fighters by 1992. Recruitment efforts for volunteer firemen should begin to increase from the five who serve at present to at least 20 in the next three years. The volunteers could offset population fluctuations without adding cost to the Town budget.

MAP 10

Proposed Community Facilities



convention center. The locations should not be decided upon before approval from the State Board of Insurance. Locating the sub-station before their approval could result in increases in capital expenditures without a reduction in the Key Rate.

HEALTH SERVICES

The availability of health services is a major concern for communities of all sizes. The essential task of community health assessment is to determine the community's resources and needs accurately so that strategies can be developed which are in accord with the community's development needs. To achieve this, it is recommended that South Padre Island hire a consultant to assess the demand on the health system and to provide expertise in the advisability of expansion of existing services. Of primary consideration is an emergency holding area for patients with a treatment center attached. Public and private partnerships should be encouraged to have as a minimum, 24 hour primary care medical coverage by a physician or physician's assistant.

PARKS AND RECREATION

It is recommended that the Town make every effort to create a carefully integrated parks and recreation system that serves the permanent resident and the visitor. Creating a Parks and Recreation Board would be a first step in planning effective, efficient, and aesthetically pleasing areas. Some of the existing parks could be redesigned and made more attractive. The beach access and open space is planned in accordance with the private development along Gulf Boulevard and is deficient in public parking, concessions, planned recreational activities, and coordinated access. To create standards for design, adequacy, and efficacy the Parks and Recreation Board would integrate all of the above needs and create a unified approach to parkland and recreation needs. Every effort should be made to communicate with the State to gain insight into it's guidelines on public beach access. This would enhance the planning process when developing guidelines for public open space and beach access. The beach clusters discussed in the Part 6.5 of this document are one such development scheme to provide adequate public access. All recreational and park development plans should compliment economic and community image planning goals that the Town has identified.

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PART

Infrastructure 6.8

Chapter 6

Part 8

INFRASTRUCTURE

INTRODUCTION

The South Padre Island Plan 2010 infrastructure component is designed to fulfill the Town's need for an infrastructure system that meets the community's current and future peak demands. Each component of the infrastructure system represents a finite capacity which may ultimately be the basis for a growth management system that makes optimum use of the community's scarce land and infrastructure resources while protecting the environment.

WATER SERVICE

Water is one of the key elements to be considered when determining the potential carrying capacity of a community. The Town has always had to import its water supply from sources located on the mainland. There are no wells on the Island because there is no freshwater strata below it. The Town's water supply and treatment of wastewater are managed by Cameron County Fresh Water Supply District #1. The 1987 pumping supply levels of freshwater (6.5 million gallons per day) are sufficient to handle the peak seasonal demands beyond the year 2010. The daily maximum supply capacity of water to the Town does not include the 2.065 million gallons of water contained in storage, since this total amount is held back for emergency reserve and the maintenance of sufficient fire flow. If the populations continue to increase and consumption patterns are maintained, the Town will need to have its water storage facilities increased.

Based upon the requirements set out by the State Board of Insurance in 1984, the Town of South Padre Island should have the following amounts of water storage capacity for the corresponding populations indicated. Note that current storage capacity is 2.065 million gallons with 0.9 million gallons in elevated tanks and 1.165 million gallons of ground storage.

TABLE 4

ESTIMATED PEAK WATER DEMAND: 1987 - 2010

Year	Projected Peak Demand[1]	Capacity[2]	Percent of Capacity
1987	3.229	6.5 MGD†	49.67
1988	4.042	6.5 MGD	62.18
1989	4.530	6.5 MGD	69.69
1990	4.681	6.5 MGD	72.02
1995	4.696	6.5 MGD	72.25
2000	4.726	6.5 MGD	72.71
2005	4.749	6.5 MGD	73.06
2010	4.772	6.5 MGD	73.41

*projected peak demand is based on the highest use day for 1989
**not including 2.065 million gallons in storage capacity
†MGD represents millions of gallons per day in pumping supply

Source:Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

TABLE 5

FRESHWATER STORAGE CAPACITY STANDARDS

Population	Total Storage	Elevated Storage
10,000	1.30 MG†	0.55 MG
15,000	1.95 MG	0.83 MG
20,000	2.60 MG	1.10 MG
25,000	3.25 MG	1.38 MG
30,000	3.90 MG	1.65 MG
35,000	4.55 MG	1.93 MG
40,000	5.20 MG	2.20 MG

†MGD represents millions of gallons per day in pumping supply

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

WASTEWATER

As the population increases, the demand for wastewater service will also increase. The projected levels of wastewater are calculated at 70% of total potable water consumed. The Isla Blanca Wastewater Treatment Plant provides approximately 79% of the Town's total service demand. The Andy Bowie Treatment Plant manages the remaining 21% of wastewater generated on the Island. It is important to note that the Isla Blanca facility has regularly received supply loads in excess of its maximum allowable capacity levels.

TABLE 6

ESTIMATED PEAK WASTEWATER TREATMENT DEMAND: 1987 - 2010†
ISLA BLANCA TREATMENT PLANT

Year	Projected Peak Demand	Current Capacity	New Capacity	Percent of Capacity
1987	2.0623	1.5 MGD	137.48	
1988	2.5600	1.5 MGD	- -	170.66
1989	2.8927	1.5 MGD	- -	192.84
1990	2.5886	1.5 MGD	- -	172.57
1995	2.5969	- -	2.6 MGD	99.88
2000	2.6136	- -	2.6 MGD	100.52
2005	2.6262	- -	2.6 MGD	101.01
2010	2.6387	- -	2.6 MGD	101.49

† The demand for wastewater service reflects a tourist population held constant while the resident population increased.

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

The information presented above reflects peak demands that would be incurred by a tourist population of 30,000 and a resident population experiencing marginal growth. As the figures indicate, the upgraded water treatment facilities for the Isla Blanca Treatment Plant will be insufficient from the outset. To further illustrate the impacts of increased levels of wastewater upon existing facilities, the following table shows peak tourist populations with a growth rate increasing by 5% every five years.

TABLE 7

ESTIMATED PEAK WASTEWATER TREATMENT DEMAND: 1987 - 2010†
ANDY BOWIE TREATMENT PLANT

Year	Projected Peak Demand	Current Capacity	New Capacity	Percent of Capacity
1987	0.6545	0.75 MGD	--	87.26
1988	0.4624	0.75 MGD	--	61.65
1989	0.8910	0.75 MGD	--	118.80
1990	0.6881	0.75 MGD	--	91.75
1995	0.6903	--	1.25 MGD	55.47
2000	0.6948	--	1.25 MGD	55.50
2005	0.6981	--	1.25 MGD	55.85
2010	0.7014	--	1.25 MGD	56.11

† The demand for wastewater service reflects a tourist population held constant while the resident population increased.

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

TABLE 8

ESTIMATED PEAK WASTEWATER TREATMENT DEMAND: 1995 - 2010††
ISLA BLANCA TREATMENT PLANT

Year	Projected Peak Demand	New Capacity	Percent of Capacity
1995	2.7222	2.6 MGD	104.7
2000	2.6136	2.6 MGD	110.4
2005	2.6262	2.6 MGD	116.2
2010	2.6387	2.6 MGD	122.3

†† The demand levels reflect a peak tourist population increasing by 5% every five years.

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

TABLE 9

ESTIMATED PEAK WASTEWATER TREATMENT DEMAND: 1995 - 2010††
ANDY BOWIE TREATMENT PLANT

Year	Projected Peak Demand	New Capacity	Percent of Capacity
1995	0.7236	1.25 MGD	57.90
2000	0.7630	1.25 MGD	61.09
2005	0.8031	1.25 MGD	64.30
2010	0.8449	1.25 MGD	67.60

†† The demand levels reflect a peak tourist population increasing by 5% every five years.

Source: Texas A&M University, College of Architecture, Department of Urban & Regional Planning, PLAN 601 Laboratory • 1990.

ELECTRICITY

There are two power transformers currently servicing the needs of the Town. The first, South Padre Island Substation, is located on the bay side of the north most end of Town. Within the substation is housed a transformer which has a standard rating of 25 mega Watts (25 thousand kilowatts). This level of power can be supplied at a continuous rate without overburdening the unit. Of the total power demand for the Town, the transformer at the South Padre Island Substation supplies 86%. Coastal Power and Light Company has obtained a permit from the office of the Corps of Engineers to lay another power feeder under the bay. At the time that the feeder will connect to the substation, a second transformer will be added. The total power load that can be managed by the two transformers in the South Padre Island Substation will be 50 mega watts. The second power transformer supplying the Town is located at the Causeway Substation in Port Isabel. Only one of its breakers is dedicated to servicing the Island, providing on average of 3.6 mega watts of power.

It is anticipated that the electrical peak power demands of the Town will be sustainable under current and expected future conditions.

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PART

Community Image 6.9

Chapter 6

Part 9

COMMUNITY IMAGE

URBAN DESIGN CONCEPTS

MAP 10 in Part 6.7 of this document illustrated suggestions for the creation of an integrated urban image building framework for the Town of South Padre Island. The proposals coordinate current amenities and their sequential integration with future urban form givers. They include the proposed Town Center, Community Convention Center, and Attraction Clusters. The Plan shows graphically how these amenities can be linked via the pedestrian, bicycle, and vehicular circulation systems. The urban experience could be further enhanced by the placement of distinctive public sculpture at the causeway gateway, restored wetlands, Town Lake, Laguna boardwalks, Laguna Fisherman Wharf attraction center, and a Town Marina on the Laguna.

URBAN FORM

The environmental context of South Padre Island requires a regionally appropriate urban form that is responsive to the Island's coastal zone dynamics. It is proposed that the Town promote a tiered development concept that stairsteps development away from the waters' edge with denser and taller development towards the relatively more protected center of the Island along Padre Boulevard. This concept suggests the down-zoning of the Gulf shore which is subject to storm surge and the flood-prone areas along the Laguna's shore. Down-zoning of development along the Gulf shore and its placement landward of Gulf Boulevard would enhance safety by permitting the restoration of the frontal protective dunes. The tiered concept would also promote the retention of views from the upper floors of the mid-rise structures. A value enhancing feature for all property.

The location of these taller structures in what is relatively considered to be the safest part of the Island from hurricane threat, would also permit them to

FIGURE 8

Town Center and Attraction Cluster Concept

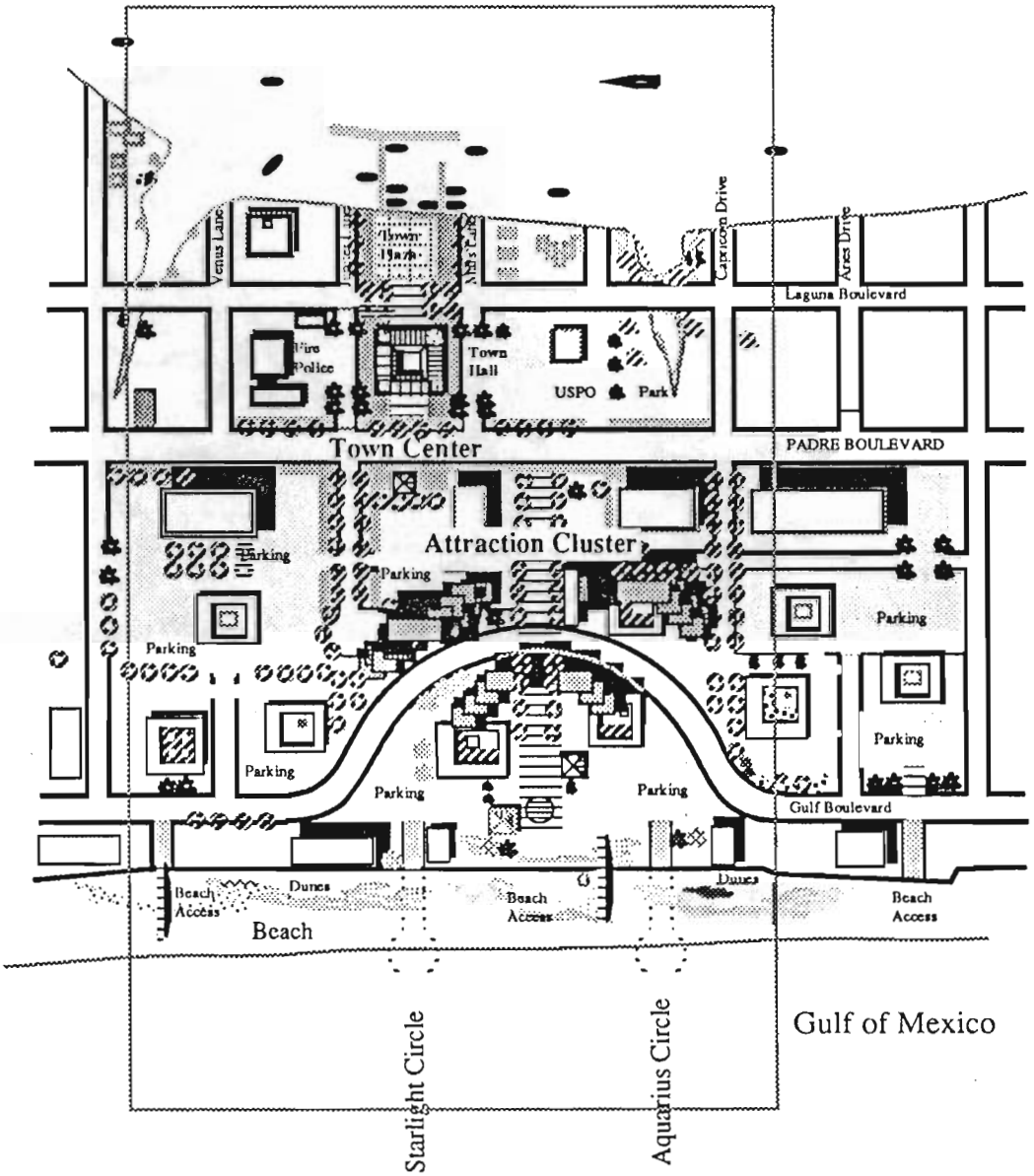


FIGURE 6.13 TOWN CENTER AND ATTRACTION CLUSTER CONCEPTS

serve as emergency vertical evacuation shelters. Although total Island evacuation is preferred in the case of an emergency, recent environmental research has found that mid-rise structures perform better against the high winds of hurricanes and, therefore, are better suited as vertical shelters.

THE TOWN CENTER & ATTRACTION CLUSTERS

Figure 8 conceptually illustrates the spatial location and configuration of the proposed Town Center between the Laguna shores and Padre Boulevard and the mixed-use Attraction Cluster between Padre Boulevard and Gulf Boulevard. Figure 9 further illustrates how typical existing lotting could be replatted to concentrate development in more environmentally appropriate configurations. Positive features of this concept are the protected common space which might be the frontal dunes or wetlands, the opportunity for creating common recreational amenities, and a substantial reduction in the area and linear feet of infrastructure and streets.

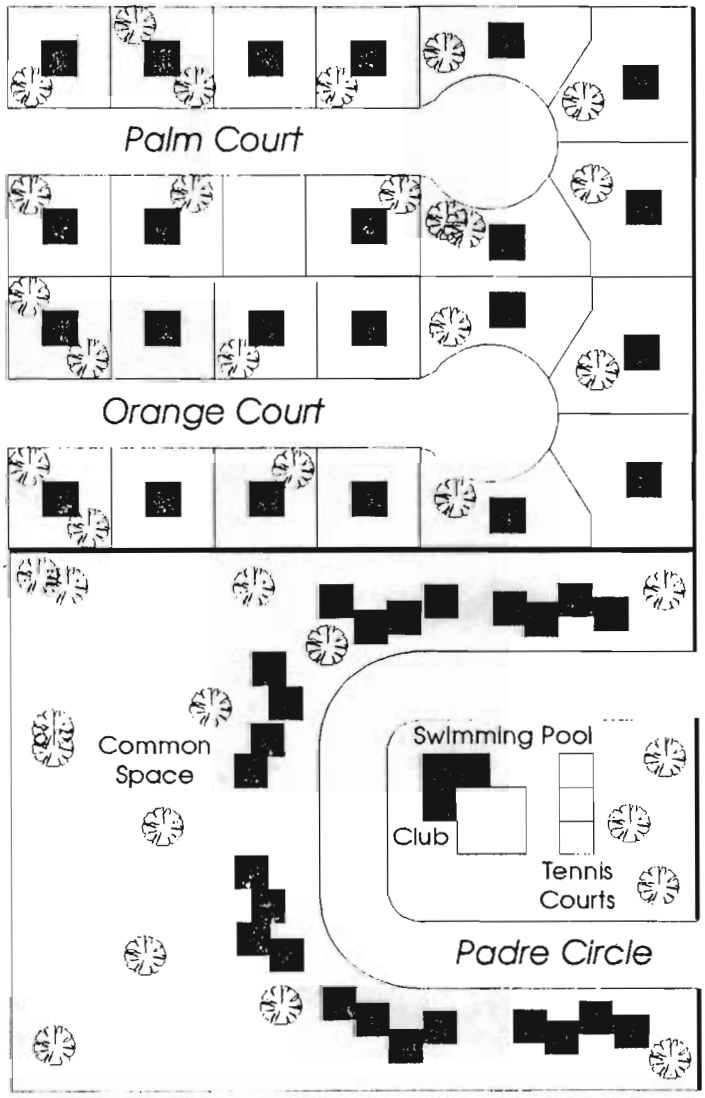
The Town Center idea is predicated on the idea of providing a conveniently central municipal complex for serving the public. The proposal would be a cost-effective solution because it would take advantage of existing facilities, and because it also creates an opportunity for establishing an urban design standard. The Town Center should project an identifying image for the community, provide a place for civic functions, and serve as a model of regionally appropriate design that takes the coastal zone environment into consideration. The Town Hall building, for example, should be built off the ground consistent with FEMA guidelines. The enclosed courtyard should be designed to provide shelter for visitors and landscaping from the strong Gulf breeze and occasional cold snaps. The elevated structure would also allow shaded sitting areas for visitors or public gatherings.

LAGUNA SHORELINE

The practice of bulkheading the Laguna shoreline has dire long-term implications as it exacerbates the natural cleansing effect of urban run-off that is filtered by wetlands and/or a permeable edge. The riprapping technique is preferable to a solid impervious structure because it facilitates the filtration of storm run-off from streets, parking lots, and lawns. The use of

FIGURE 9

Conventional Development and Planned Unit or Cluster Development



native vegetation for lawns and gardens should be encouraged to minimize the amount of fertilizer used and which ultimately drains into the bay waters causing ecological imbalances. Street drainage should be managed to minimize the polluting impact on the wetlands' and Laguna's clean water.

The Laguna's estuarine system should also be protected as it performs an important role in preserving the marine ecology of the Island. Here the use of elevated boardwalks can facilitate the enjoyment of this natural resource without harming it. Through these and other measures such as improved sewer treatment capacity, the Laguna's water quality can be maintained indefinitely and its considerable economic significance to this resort community can be safeguarded. *South Padre Island Plan 2010* envisions the placement of "windows on the Laguna" for views of the water through the careful site planning of marinas and fisherman's wharf type mixed-use developments and the acquisition of public open-space at strategic locations along the Laguna shoreline.

THEMATIC DESIGN

It is suggested that a Town logo be developed to associate the Wave Shuttle bus, public parking clusters, beach access cul-de-sacs, and community facilities.

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Plan Implementation Guidelines

7

Chapter 7

PLAN IMPLEMENTATION

INTRODUCTION

In undertaking the formulation of *South Padre Island PLAN 2010*, the Town has taken the first step in preparing for a viable and efficient future. The Plan reflects the positive and negative attributes of the Town. The Plan also suggests alternatives for future capital expenditures and regulatory controls to create an environment which is both a superior place to live and to visit. The success of *South Padre Island PLAN 2010* can only be judged by the way in which it is implemented. The plan implementation process begins with the adoption of the instrument.

South Padre Island PLAN 2010 should be adopted by resolution of the Board of Aldermen after the citizens and staff of the Town have reviewed and revised it. The goals, objectives and policies contained in the Plan should reflect both the needs and desires of the community. The formulation and adoption of a comprehensive plan is a difficult and involved task. However, once goals, objectives and policies are identified, a community can then begin working toward the future with a set of formal guidelines and procedures. By adopting the plan, the Town of South Padre Island has publicly articulated the community policies by which future development will be evaluated, and through which capital expenditures, and annual budgets will be formulated.

The potential of South Padre Island may be limited geographically. However, the selection of the correct methods of plan implementation, which minimize the limitations and build upon the strengths of South Padre Island, are essential to the social and economic vitality of the community. The implementation techniques that follow will materially support the goals, objectives, and policies found in this document.

Special attention should be given to the objectives and action agenda found in at the end of this part of the Plan. This agenda compliments the alternatives which follow, and should be viewed as an integral component of a total plan implementation system.

REGULATORY CONTROLS

THE ZONING ORDINANCE

The Town's current zoning ordinance should be redesigned to meet the recommendations contained in *South Padre Island Plan 2010*. Zoning is a tool necessary to protect the city and it's citizens from land use conflicts A well designed zoning ordinance will insure that future development will be located and designed to protect both the economic vitality and ecological character of the Town. It will also serve to reshape future land use and redeveloped land use to complement adjacent properties. The current zoning ordinance should be reviewed and revised to incorporate the goals and policies contained in the Plan.

Two distinct types of zoning have evolved, *Euclidian* and *Performance*, and both are suggested alternatives for the Town. Euclidian, or strict districting, assigns land uses to specific areas of the community. The Euclidian zoning ordinance should include requirements for:

1. Minimum lot size for each type of land use
2. Frontage minimum for each type of land use
3. Depth minimum for each type of land use
4. Lot coverage maximum for each type of land use
5. Front, side and rear yard setbacks for each type of land use
6. Height limitations
7. Parking lot requirements

Euclidian zoning will lead efforts to achieve a sound pattern of land uses. Performance zoning does not restrict land uses to a certain district. Instead, it concentrates on the impacts of a certain type of land use on adjoining properties and the community as a whole. It emphasizes alleviation of the "nuisance like" characteristics of a particular land use activity. For example the criteria for a land use in a performance zoned area may be noise emissions, parking space requirements, density of land use, trip generation, air quality, odor, or water pollution standards. Performance zoning is suggested for use in the hazardous zones and washover areas identified in the Plan.

SUBDIVISION REGULATIONS

A subdivision ordinance with replatting guidelines will help significantly in attempts to achieve the quality development alternatives for the Town. Subdivision regulations also create a formalized process which will ensure quality development, proper infrastructure provision, and a legal platting and replatting within both Cameron County and the Town. The subdivision regulation ordinance identifies what amenities and improvements must be provided by the developer in order for construction to occur. The subdivision ordinance should be coordinated with the zoning ordinance and Plan. The subdivision review process will insure future quality development, the zoning ordinance will protect the continuity of the built environment, and the comprehensive plan details future land use goals.

A BEACH AND DUNE ORDINANCE

An ordinance should be enacted to protect the existing beaches and dunes. The beach and dune protection ordinance should be aimed at preserving existing beaches and dunes, which will in time protect development on the Island and aid in the replenishment of the erosion processes. The ordinance should also include a section concerning erosion control zones, areas of high erosion rates, and it should outline management strategies for the zones, including but not limited to structural controls and erosion management strategies. Beach and dune formation are natural processes and these processes should be protected to allow natural formation to occur. Beach and dune replenishment techniques should be described in the ordinance. Replenishment is an expensive response to "extreme" situations which endanger development on the Island. As the shoreline and dunes change the ordinance can be changed to meet the new conditions.

BUILDING CODES

The current building codes should be reviewed and modified, if necessary, to meet the unique coastal and barrier island environment. The building code provides important structural guidelines for new development on the Island. A well written ordinance will insure that all new structures meet the health and safety concerns of the residents and businesses of the Town.

A HOUSING CODE

A housing code should be enacted which protects both the health and the safety of the residents and improves the overall appearance of South Padre Island. The housing code should include provisions for exterior painting of homes, broken widow replacement, roof condition inspection and repair requirements. The ordinance can serve as the basis for the recommended "Clean Sweep Week" suggestion contained in the "Community Image" action agenda. The "Clean Sweep Week" should be coordinated with local civic groups and hardware merchants in order to achieve more public participation. The housing code should be applied to all dwelling structures in the Town, including apartments, townhomes, and condominiums.

LANDSCAPING AND COMMUNITY APPEARANCE ORDINANCES AND GUIDELINES

The Town should adopt a landscaping ordinance which pertains to all development. This ordinance should specify the use of plant materials in parking areas, as well as on building sites generally. A substantial increase in the amount of green plant material on the Island has been identified throughout the Plan as a significant step in improving the image of South Padre Island.

The use of plant materials in urban developments adds aesthetics to the area, as well as providing noise and visual buffers between different types of land uses. All developments which have a land use classification of multi-family, commercial, or office should be required to dedicate a certain percentage of the acreage for landscaping. Any such landscaping requirements should be in addition to any landscaping which is required for associated parking lots.

The visual images along the entry to the Town are extremely important factors in formulating one's perception of the of South Padre Island. Given this, and the fact that tourism is the life-blood of the Town, it is extremely important to identify those visual elements which detract from the quality look of the Island and to enact those guidelines and ordinances which will help to remove such unsightly elements. An amortization program should be established under the provisions of the Town's zoning ordinance to enable the alleviation of nonconforming land uses along the entry corridor. Site design, landscaping, sign type, and color palette guidelines should be formulated and distributed to aid

property owners in property development and maintenance.

The large beach front hotels and condominium buildings effectively have two entrances; one is on the street side, and one is on the beach side. This situation provides a challenging task for the placement of large solid waste receptacles, commonly referred to as dumpsters. The dumpsters should be placed in a discrete location and screened with some type of appropriate wall or landscaping. Thought must also be given to refuse truck access and pedestrian conflicts.

A design review committee should be created to review all building permit application and design plans. The committee should be composed of technical experts in architecture and urban design, who have an understanding of the precise measures outlined to protect the visual image of the Town.

SIGN CONTROL

The Town's sign control ordinance should be reviewed within the context of the goals and objectives of the South Padre Island Plan 2010. Sign control is important for tourism and economic vitality. A thematic set of letter and color designs, and consistent illumination methods for signs in the Town will make it appear more orderly and unified to the visitor. The Town's sign ordinance should control the number of signs, location, size, materials used in construction, colors, appropriate letter styles, the use and location of portable signs, and illumination techniques.

AN UNSAFE STRUCTURE ORDINANCE

An unsafe structure ordinance is necessary to protect citizens. Such an ordinance can also be used to protect the visual image of the Town and guard against the loss in value to adjacent land owners due to abandoned and neglected property.

FINANCIAL MECHANISMS AND PARTICIPATORY TOOLS

CAPITAL IMPROVEMENTS PROGRAMMING

The Capital Improvements Program (CIP) is the link between the Town's comprehensive plan and the construction and improvement of public facilities. Capital improvements programming for a town is an on-going process. Therefore, it is essential that a community know in advance what major projects it will undertake and what expenses will be incurred. A CIP serves this purpose. From the year of its creation, the CIP is always projecting five years in advance for large investments such as water and sewer additions, roads, open space and parks, and the community buildings such as the recommended Town Center.

The CIP is used to determine financing opportunities. State and Federal grants and foundation gifts are alternative financing sources often found in CIP's. The CIP can also be used to control growth away from hazardous areas. The Town can effectively spur development toward stable areas by providing infrastructure in those areas and purchasing land in sensitive areas with CIP funds.

TRANSFERABLE DEVELOPMENT RIGHTS

A Transfer of Development Rights (TDR) program is one in which a private land owner is given a right to use alternative sites at higher densities than would ordinarily be permitted within a certain zone of the Town. Such a program would allow the Town to offer developers with tracts of land in hazardous and sensitive areas of the Island with the opportunity to develop elsewhere at higher densities, thus retaining a reasonable financial return on their initial property investment.

FEMA SECTION 1362

Section 1362 provides funds to local governments to acquire flood-prone land areas where structures are located which have been severely damaged by a storm event. The community must remove and demolish the on-site structure

and manage the site as a park or open space. The Town should began planning for this situation, so that these funds can be acquired in the event of a hurricane or other flooding event. Section 1362 funds are dedicated to achieve efficient management of floodplain areas and to encourage development away from hazardous areas. The only disadvantage to the program is the fact that a natural disaster will have to occur in order to receive any funding.

THE UPTON-JONES AMENDMENT

The Upton-Jones Amendment provides federal funds to purchase lands to relocate certain structures from hazardous areas *prior* to damage by natural flood events. The local government will once again gain open space and parks, but will pay for the removal of the structures. The Upton-Jones Amendment will result in a more effective flood hazard mitigation procedure, prevention before a private citizen looses capital investment in a residence or business. The use of Section 1362 and Upton-Jones funds will prevent the destruction-reconstruction cycle evident in many coastal communities and flood prone areas. The program requires that structures must be subject to imminent danger of collapse in order to receive funding.

TAX INCREMENT FINANCING

Special Improvement Districts, such as the proposed commercial clusters, will most likely be financed with bond monies. The new improvements in the special district will raise the adjacent property values. These higher property values will result in more tax revenue from the properties in the area. The difference in property taxes before and after the improvements is the tax increment. Tax increment financing occurs when the Town takes the added tax revenues from the property tax and sets that amount aside to pay off the bonds. Once the bond is retired the Town can add the increment to the general revenue fund or can finance further improvements to the special districts. Tax increment financing could allow the city to finance the cluster development, while insuring bonded indebtedness will be paid off.

PUBLIC PARTICIPATION

Public meetings should be held regularly to inform the public of the *South Padre Island Plan 2010* and to explain the implementation process as it is undertaken. At a scheduled Board of Alderman meeting or Planning and Zoning Commission meeting a planning review session can be initiated. Public meetings will be necessary before the adoption of the plan to discuss it and it's implications. Public meetings will also be necessary to explain many of the changes to existing ordinances and/or new ordinances being implemented. Public meetings serve as an important feedback forum to gauge public opinion on the issues facing the Town and it's residents.

The Town is moving toward a program of professionalism in the management of growth. Training workshops should be held in which the planning process is explained. The workshops can be used to explain the complexities of planning and implementation, as well as, give a "holistic" view of the Town (explaining the purpose of one action in the economic-social-geographic view). The training workshops will also be necessary to train participants who are members of the suggested committees and task forces. Professional organizations and certain government agencies will often provide technical support, materials and speakers for training workshops, examples may include: the Texas Chapter of the American Planning Association (APA) or the Southmost Texas Section of the Texas Chapter APA, the Texas Municipal League, or possibly the Lower Rio Grande Valley Development Council.

Periodic phone or mail surveys can be used to determine the attitude of the public toward the steps undertaken in the planning process, as well as to obtain an understanding of the issues that the public feels are important to the Town. The phone and mail surveys can also be used to determine the success of the plan in meeting the Town resident's needs. The results from the survey will dictate the need for revisions and updates to *South Padre Island Plan 2010*. Mail and phone surveys often reach the residents who will not otherwise attend town meetings.

AN ANNUAL REPORT

An *Annual Report* would explain the current state of South Padre Island. Such a report prepared by the city staff would show current trends in the area and explain the progress toward reaching the goals enunciated in *South Padre*

Island Plan 2010. The annual report should include at a minimum:

1. Updates of the land use map with non-conforming land uses outlined
2. Updates on the sign control ordinance
3. Progress on the community appearance campaign
4. New subdivisions platted
5. Rezoning and variances allowed
6. Success of "Clean Sweep" week
7. Beach erosion and build-up
8. Economic and population trends

The annual report will make the citizens more aware of the entire situation surrounding development and use of the Island, and will give the Town a format in which to "show-off" it's successful planning efforts.

ACTION AGENDA

The following objectives constitute an Action Agenda for implementing the recommendations contained in *South Padre Island Plan 2010:*

THE ENVIRONMENT

Environmental Objective 1: Dunes Restoration and Beach Conservation Task Force

The Town of South Padre Island will declare a moratorium on dune removal and appoint a task force of staff, citizens, and business leaders to study the restoration of the fore-island dunes not only for their aesthetic quality but also for their important role as a "first line of defense" against storm surge.

Environmental Objective 2: Beach Erosion Study

A detailed geomorphologic study will be undertaken to determine the cause and possible corrective measures for dealing with the very serious beach erosion

problem that particularly impacts the northern one third of the Town limits on the Gulf of Mexico. An objective of the study will be the determination of ocean-front setback lines to be enforced by the Town to protect the line of oceanfront sand dunes.

Environmental Objective 3: Environmental Legislation Specialist
Because of the frequency of change in federal and state legislation pertinent to communities in the coastal zone, the Town will periodically retain the services of an environmental legislation specialist to assist in the identification of funding sources for community development loans and grants for water quality, wetlands, dunes, and beach protection through hazard mitigation programs.

Environmental Objective 4: Urban Forester
The Town will create a new position, or retain the services of an urban forester, to assist with the planning, design, and development of a coordinated urban landscape program that uses regionally adapted plant materials and ground cover that protects the dunes and wetlands ecology.

Environmental Objective 5: Wetlands Elevated Boardwalks
Elevated treated wood boardwalks will be constructed as a means of providing access to the wetlands for walking and observing marine and bird life.

Environmental Objective 6: National Flood Insurance Map
The National Flood Insurance Map for the Town is no longer accurate. An accurate re-mapping survey will be conducted.

Environmental Objective 7: Coastal Zone Building Standards
Strict coastal zone building code standards for construction will be adopted and enforced to minimize damage due to fluctuations in flood elevation and wave action of storms.

TOURISM

Tourism Objective 1: Use of Washover Areas
As a part of its recreation program and consistent with fiscal limitations as a part of its regular capital facilities programming, the Town will construct tennis courts (clay courts), soccer fields, softball diamonds, basketball courts, and similar facilities in potential washover areas.

Tourism Objective 2: National Promotion Campaigning

The Town will work with the travel and tour companies that bring nonresidents to Texas and will investigate the possibility of hosting events such as:

- National Checkers Round-Up, winner gets South Padre Island week vacation for two.
- High school University Interscholastic League competitions (debate, drama, math)
- Yacht and sail boat races Houston and South Padre Island, or Corpus-Christi and South Padre Island
- Serve as a major stop on a " Chile Cook off Tour"
- Conduct Running and/or bicycle races
- Organize a "Beach Theater" stage production in the spring and summer
- Conduct "Bonfire Folk Tales" in the fall and winter
- Work with Brownsville to get a Renaissance Festival to come to the area
- Promote "super kite" competitions in which the kites would be constructed specifically to withstand the strong, steady gulf breezes

Tourism Objective 3: Increase Off-Season and Night Tourism

The Town will endeavor to increase both day and night tourism during the off-season, by promoting tournaments, athletics, festivals, concerts, family activities, and dancing in coordination with the Chamber of Commerce.

Tourism Objective 4: Increase Restaurant Diversity

The Town will work with the Chamber of Commerce to create an adequate mix of eating establishments which cater to all price ranges, monitor the placement of such restaurants so as to promote diverse locations and encourage opportunities for limited food service on a 24-hour basis.

Tourism Objective 5: Tourism Activities Director

The Town will create a new position tied to planned tourism. This position will be for the Island in the same capacity as an "activity director" is for a cruise ship.

Tourism Objective 6: The Valley Aquarium

In coordination with educational institutions, communities, and private organizations throughout the Lower Rio Grande Valley and northern Mexico, South Padre Island will explore the possibility of creating an education and

research oriented aquarium featuring Gulf of Mexico marine life. The Valley Aquarium would be an educational and tourist center.

Tourism Objective 7: Beach Access
The Town will promote public access to the beach through the installation of private and public parking areas, dune walkovers, and steps at the end of street right-of-ways along Gulf Boulevard.

Tourism Objective 8: Showers and Sanitary Facilities
In coordination with the Chamber of Commerce, hotels, and condominiums, the Town will provide rinse showers and sanitary facilities at approximately quarter-mile intervals along the Gulf shore city limits.

Tourism Objective 9: Highway Corridor and Approach Images
The Town will establish and maintain links with lower Rio Grande Valley corridor tourism attraction areas, enhance the amenities of approach highways, and promote these areas as essential to the regional image of South Padre Island.

Tourism Objective 10: Development of Attraction Clusters
The Town will endeavor to work with the private sector to increase the attractiveness of the Island and enhance its image by creating tourism *Attraction Clusters* in planned unit commercial and business developments that provide full amenities for pedestrians, contain ample off-street parking, with full beach/laguna access.

Tourism Objective 11: Landscaping and Beautification Guidelines
The Town will adopt landscaping and beautification guidelines for the Island by instituting ordinances that specify regionally appropriate plants, providing guidelines for sidewalks, curbs, and decorative paving. The Town will enact thematic design ordinances which guide the architectural character, color scheme, and exterior expression of commercial and business structures.

ECONOMIC DEVELOPMENT

Economic Development Objective 1: Beach Parking
Where feasible, the Town will build beach parking facilities at the cul-de-sac right-of-ways off Gulf and Laguna Boulevards and acquire vacant lots on either side of these locations to expand public and private parking.

Economic Development Objective 2: Remote Parking Sites

The Town will identify possible remote parking sites that could be served by a trolley car system during peak season demand.

Economic Development Objective 3: Texas Tourism Market Share

Improve the economic growth opportunities such that South Padre Island achieves a 3% market share of the Texas tourism economy by the year 2000.

Economic Development Objective 4: Monitor Texas Tourism Trends

The Town will actively monitor and report on the status and trends in the South Padre Island economy. Conduct necessary research and develop an econometric model to assist in anticipating and identifying travel demands of seasonal visitors. No city with as many opportunities and as much to gain as South Padre Island should make strategic economic decisions without the empirical data necessary to support them. Unfortunately, socio-economic data in Texas is typically reported for large cities or at the county level and small towns of South Padre Island's size do not have the necessary census reported data relative to current business conditions and economic activity readily available. Employment, sales, and other data necessary to form opinions and shape decisions is simply not kept by State and/or Federal agencies in sufficient detail or with sufficient frequency for local officials to spot trends or establish historical patterns.

Economic Development Objective 5: Promote Off-Season Events

Efforts will be made to improve economic growth by creating opportunities for off-season tourism events, with three at the end of the year (October, November and December) and two at the beginning of the year (January and February). Develop and promote more off-peak season events in coordination with hotels and time-share condominiums through promotional campaigns with large companies and department stores.

Economic Development Objective 6: Coastal Research

In coordination with The University of Texas Pan American Coastal Studies Laboratory located at Isla Blanca County Park, the Town of South Padre Island will promote the attraction of marine research firms pursuing scientific applications of interest to coastal industries and the protection of endangered species.

Economic Development Objective 7: Protection of Endangered Species

Promote and actively support non-profit organizations, such as Sea Turtle, Inc., that protect endangered species and bring credibility to the Island as a place where the earth's resources are protected.

Economic Development Objective 8: Regional Access and Beach Parking

The Town will conduct a feasibility study to determine the viability of constructing an amphibious airplane terminal on the Laguna Madre for the operation of passenger aircraft from Thursdays through Sundays to major Texas cities.

Economic Development Objective 9: Highway 100 and Highway 44 Expansion and Improvement

The Texas Highway Commission will be strongly encouraged to expedite the expansion of Highway 100. Additionally, an equally strong campaign will be undertaken to Improve transportation linkages with Brownsville by upgrading Highway 44.

Economic Development Objective 10: Parking and Bath House Fees Study

Town staff will conduct a feasibility study to determine the legal and economic viability of charging a nominal annual visitors' fee to pay for parking and bathhouse facilities at convenient locations to the beach.

Economic Development Objective 11: Retirement Haven

The Town will develop a more aggressive and more targeted promotion campaign to enhance the Island's potential as a permanent retirement home.

Economic Development Objective 12: Development of a Regional Tourism Plan

The Town will urge the adoption and funding of a regional tourism promotion plan by the Lower Rio Grande Development Council.

Economic Development Objective 13: South Padre Island Economic Development Council

A region-wide pubic/private tourism promotion and development organization composed of representatives from the hotel/motel industry, air carriers, and tourism related retail establishments will be formed to implement economic development strategies.

Economic Development Objective 14: Tourism Database

Every effort will be made to work in collaboration with the South Padre Island Visitor and Convention Bureau to develope a quarterly "Survey of Current Business Conditions" to be completed by South Padre Island business and aimed at determining the status and trends in employment, sales, and other measures of general economic activity.

LAND USE

Land Use Objective 1: Control Noise

Adopt an ordinance which limits bars and night clubs in their off-site production of music and noise to no later than 10:00 p.m. during weekday evenings.

Land Use Objective 2: Promote Mixed Uses on Padre Boulevard

Promote the development of mixed-use complexes along Padre Boulevard that include commercial, professional, and office uses.

Land Use Objective 3: Create a Land Acquisition Fund

Determine the feasibility of establishing a Land Acquisition Fund to acquire vacant property located in potential wash-over zones and shorefront whose highest and best use is natural open space, recreational open-space, and/or parking.

Land Use Objective 4: Establish a Transferable Development Rights (TDR) Program

Establish a Transferable Development Rights program to accelerate the relocation of properties in potential wash-over areas.

Land Use Objective 5: Lease Vacant Land

To recover its investment the Town will lease to private investors the use of vacant land in potential wash-over zones for parking and recreational open space.

Land Use Objective 6: Establish Overlay Zone Performance Standards

Establish an overlay zone of special performance based standards of construction requirements 300 feet inland of shoreline to protect people and buildings from destructive hurricane wind and storm surge. Establish an overlay zone of special

construction requirements north of Sunset Boulevard to the north city limits.

Land Use Objective 7: Address Hazard Prone Areas Land Uses
Modify current development patterns in hazard prone areas by utilizing mechanisms such as TDR or community development revenue bonds for funding a long-term land acquisition fund for parking and outdoor recreation areas. Nominal user fees would be collected for maintaining the facilities and debt service.

Land Use Objective 8: Down-Zone for Reclassification Purposes
Down-zone current undeveloped parcels shoreward of Gulf Boulevard, classify as nonconforming land uses, and re-zone as low-density residential or acquire for parks and parking.

Land Use Objective 9: Implement New Building and Housing Codes
Adopt, enhance, and enforce building and housing codes that meet or exceed the highest standards for coastal zone development.

TRANSPORTATION

Transportation Objective 1: Control the Number of Driveways
The Town will establish an access management program to reduce the number of driveways along the arterial network.

Transportation Objective 2: Improve Street Maintenance
The Town will improve safety and preserve the community's character by enforcing street standards and by instituting street maintenance programs that preserve the integrity of the transportation network.

Transportation Objective 3: Seek Federal Aid for Transportation Needs
Investigate the availability of federal aid for transportation improvements that enhance safety, accessibility, and emergency evacuation.

Transportation Objective 4: Conduct Traffic Management Study
Undertake a traffic management study of Padre Boulevard, to enhance its traffic movement function by minimizing the number of curb cuts and local street

intersections.

Transportation Objective 5: Provide Park and Ride Services
Provide park and ride facilities throughout the Island to encourage the use of the *wave* shuttle between major nodes of activity.

Transportation Objective 6: Construct Sidewalk Promenades
Build sidewalk promenades along commercial segments of Padre, Gulf, and Laguna Boulevards to minimize vehicular activity by encouraging pedestrian activity.

Transportation Objective 7: Construct Bicycle Paths
Build a system of paved bicycle paths from the major hotel concentrations and attraction clusters to the beach access points and the Laguna Marinas.

Transportation Objective 8: Provide Public Transportation
To reduce the congestion of the transportation network, provide a reliable complementary public transportation system that circulates within and out of the Island.

Transportation Objective 9: Develop Access Management Program
The Town will develop an access management program designed to reduce the number of traffic conflicts between through and turning traffic movements.

Transportation Objective 10: Improve Beach Access Information
Improve beach access by providing clearly marked routes for pedestrian and vehicular traffic.

Transportation Objective 11: Develop Gulf Boulevard Cul-De-Sacs
Develop the beach-front cul-de-sac right-of-ways off Gulf Boulevard to allow for public access to the beach.

Transportation Objective 12: Develop Walk-Overs
Develop walk-over structures at the beach access cul-de-sacs to facilitate access and protect the frontal sand dunes.

COMMUNITY FACILITIES

Community Facilities Objective 1: Create a Town Center
Create a consolidated "Town Center" in city blocks 136, 137, and 146 with all public services located in one area to promote identity and accessibility.

Community Facilities Objective 2: Identify a Design Theme and Logo
Choose a design theme and logo that easily identifies South Padre Island community facilities.

Community Facilities Objective 3: Reduce the Insurance Key Rate
Reduce the Key Rate Schedule of 89 cents established by the State Board of Insurance to at least 37 cents and thereby raise the status to protected in the next two years.

Community Facilities Objective 4: Create an Annual Fire Protection Plan
Formulate a yearly fire protection plan for use during peak population periods. This plan will be done in cooperation with the police department and the Emergency Medical Service.

Community Facilities Objective 5: Build a Fire Sub-Station
Plan and budget for a fire sub-station near the convention center.

Community Facilities Objective 6: Create an Annual Police Protection Plan
Formulate a yearly plan for police protection during peak population periods. This plan will be done in cooperation with the fire department and the Emergency Medical Service.

Community Facilities Objective 7: Earn LEAA Accreditation
Meet or exceed the standards of the Law Enforcement Agency Accreditation Program and obtain accreditation within the next five years.

Community Facilities Objective 8: Fill Reserve Police Positions
Fill the ten positions for reserve officers in the police department within the next two years.

Community Facilities Objective 9: Expand and Relocate Police Department
Expand and redesign the police department according to needs and recognized

standards. The expansion and relocation of the police department project will be completed within the next three years.

Community Facilities Objective 10: Perform Health Needs Assessment
Within the next year, create a task force to determine the health needs on the Island. Hire a health consultant to to do health needs assessment for South Padre Island. The main consideration of this study would be need for emergency holding area and primary care clinic and economic viability of such a facility.

Community Facilities Objective 11: Create a Safety and Security Database
Create a data base of yearly police, fire, and emergency medical service activities and coordinate all in the form of a yearly report to properly plan for services to meet standards in each of the above areas.

Community Facilities Objective 12: Create a Parks and Recreation Board
Create a Parks and Recreation Board within the next fiscal year. This board will be responsible for planning and implementing adequate parkland and open space for the Town.

Community Facilities Objective 13: Increase Parking and Beach Access
Increase public parking, beach access, and recreational activities on the ocean side of the Island by developing the concept of the beach clusters discussed in the Urban image section of the plan.

Community Facilities Objective 14: Create Standards for Wetlands
Develop standards for development in washover areas, wetlands, and erosion zones, with these standards complimenting open space and parks planning and implementation efforts of the Parks and Recreation Board.

Community Facilities Objective 15: Improve Transit and Parks Relationship
View the transit system as a moving link to the community services and provide a parking lot for park and ride service on the south end of the Island, with stops at the beach cluster areas.

Community Facilities Objective 16: Support Bird Watching Interest
The Town weill encourage the interest of bird watching enthusiasts in an around the wetlands by providing appropriately designed elevated boardwalks and look-out stations which facilitate this family oriented tourism activity .

INFRASTRUCTURE

Infrastructure Objective 1: Investigate Solid Waste Management Authority
The Town will investigate the potential for assuming solid waste management as a municipal function. The Town will consider the feasibility of developing a cooperative agreement with other local communities to manage solid waste.

Infrastructure Objective 2: Create a Solid Waste Management Plan
The Town will develop and adopt a solid waste management plan.

Infrastructure Objective 3: Establish Recycling Dropoffs
The Town will establish recycling dropoffs for paper, cans, and bottles at specified places throughout the community.

Infrastructure Objective 4: Solid Waste Management Incentives
In its development review processes the Town will establish incentives to encourage project designs which facilitate the collection of solid waste, and which minimize negative effects that might result from the collection system.

Infrastructure Objective 5: Screen Dumpsters to Enhance Town Image
The Town will organize a committee of hotel and business representatives to explore ways in which the dumpsters can be screened to aid in improving the image of the community. The Town will develop zoning regulations that require clustering of dumpsters and the provision of adequate visual screening.

Infrastructure Objective 6: Require Storm Water Detention
In revising its developmental ordinances, the Town will require that the first half inch of storm water be diverted into surface or subsurface detention and filtration containers, ponds, etc.

Infrastructure Objectives 7: Investigate Innovative Water Conservation Systems
The Town will appoint a task force to develop a water conservation program. The Town will investigate innovative water conservation techniques and technology for use in new development and existing structures.

Infrastructure Objectives 8: Investigate Gray-Water Use
The Town will investigate the uses of gray-water supplies to meet various

community needs such as irrigation.

Infrastructure Objectives 9: Conduct Wastewater Plant Study
The Town, in conjunction with the CCWD#1 will conduct a study to determine the feasibility of building secondary wastewater treatment plants on the Island.

COMMUNITY IMAGE

Community Image Objective 1: Create a Land Banking Program
In order to provide a feeling of spaciousness and visual integrity, the Town will begin a land banking program for the acquisition and a maintenance of property for perpetual open space.

Community Image Objective 2: Institute Pre-Approved Plans System
The Town will institute a system of pre-approved subdivision and project plans as a catalyst for the construction of urban design oriented development.

Community Image Objective 3: Establishment of "Clean Sweep Week"
The Town will institute a semi-annual "Clean Sweep Week" for the collection of trash, abandoned appliances, and clutter; as well as emphasizing the maintenance and improvement of homes, shops, and businesses.

Community Image Objective 4: Creation of a Mowing Ordinance
The Town will create and enforce a mowing ordinance.

Community Image Objective 5: Establish Parking Lot Landscaping Ordinance
The Town will adopt standards for parking lot maintenance and landscaping.

Community Image Objective 6: Work With Media to Sensitize Citizens
The Town will collaborate with the mass media in raising the level of public awareness about community appearance.

Community Image Objective 7: Create a Sign Control Ordinance
The Town will create a sign control ordinance to regulate the materials, size, design, color, location, and lighting of all signs.

Community Image Objective 8: Create a Recommended Color Palette

To discourage the use of garish colors which detract from the community's image, the Town will adopt and recommend a color palette for all structures.

Community Image Objective 9: Sponsor Sculpture Competition
The Town will sponsor a competition for a monumental piece of public art to be permanently located and displayed October 12th, 1992 at the Isabella Causeway entrance interchange commemorating the Quintacentennial of the discovery of the Americas by Christopher Columbus.

ENVIRONMENTAL HAZARD MITIGATION AND RESPONSE

EHM&R Objective 1: Improve Beach Access
Improve beach access by providing clearly marked routes for pedestrian and vehicular traffic.

EHM&R Objective 2: Create Beach and Dune Task Force
The city will designate a beach and dune conservation task force, with responsibility for:

a. preparing a beach and dune management plan, with appropriate ordinances and regulatory standards;

b. preparing a renourishment plan, particularly for eroding areas where public facilities and access exist;

c. maintaining a central clearinghouse for information and beach and dune studies and recommendations by public and private organizations;

d. educating citizens and developers about costs and benefits of alternative beach and dune restoration and protection approaches;

e. preparing a beach access plan and performance standards regarding distance between each access point;

f. recognizing the protective functions of sand dunes and beaches which act as a natural defensive walls from hurricanes and coastal storms

g. requiring that buildings on beachfront lots be located as far landward as possible; and

h. prohibiting hardened vertical shoreline stabilization structures.

EHM&R Objective 3: Provide Parking
To provide parking facilities at all beach access points where such development is appropriate and feasible.

EHM&R Objective 4: Protect Against Erosion
Protect public beach access areas from erosion, the city will keep such areas well-vegetated and construct elevated walkways above dunes.

EHM&R Objective 5: Enforce Litter and Dumping Laws
Enforce city litter and dumping control ordinances in public recreation areas.

EHM&R Objective 6: Acquire Additional Beach Access and Parking
Acquire by donation or purchase additional beach access areas and related parking facilities when property become available, giving priority to property that may become unsuitable for development due to natural causes.

EHM&R Objective 7: Apply for State and Federal Funds
Apply for available State and Federal funds for acquisition, improvement or maintenance of beach access sites, parking facilities, and other related public recreational facilities, and cooperate with the State to assure that beach access is available and well-maintained.

EHM&R Objective 8: Monitor Wetland Water Quality
Designate an ongoing wetland water quality monitoring program.

EHM&R Objective 9: Maintain Communications
Maintain communication with other local, state and federal agencies engaged in water quality monitoring, and review their data, conclusions and recommendations;

EHM&R Objective 10: Report on Water Quality Conditions
Develope a system for reporting water quality conditions on a regular basis.

EHM&R Objective 11: Refine Wetlands Map
Refine the current map of wetlands and regularly update it.

EHM&R Objective 12: Downzone to Reduce Hazard Probability
Rezone to reduce permitted densities along the beachfront, and specifically within the beachfront high hazard zone defined as 300 feet landward of the mean high tide or up to Gulf Boulevard, whichever is further landward.

EHM&R Objective 13: Strategically Place Capital Improvements
Design and enact a capital improvements program which will encourage development away from high hazard areas and minimize public investment at-risk, including the siting of public facilities and infrastructure in less hazardous locations.

EHM&R Objective 14: Increase Open Space
Increase the amount of open space available for recreation by purchasing land in hazardous areas.

EHM&R Objective 15: Create a Damage Assessment Team
Create a damage-assessment team to consider the type and extent of structural and environmental damage, and characteristics of storms. From these analyses, the team should determine the causes of damage (ie. severity of storm, poor construction, or improper zoning).

EHM&R Objective 16: Create a Recovery Task Force
Create a recovery task force to forestall haphazard reconstruction and use the information gathered by the damage-assessment team to begin the implementation of previously established reconstruction policies. It is important to have a framework established in advance to ensure effective regulation of reconstruction.

EHM&R Objective 17: Establish Recovery Ordinance
Establish a Post-Disaster Reconstruction and Recovery Ordinance dealing with zoning changes nuisances and non-conformaties to implement the diaster recovery and reconstruction policies.

EHM&R Objective 18: Identify Critical Roads
Designate critical roadway links causing congestion on key roads to be used as evacuation routes as high priority for capital improvements.

EHM&R Objective 19: Provide Vertical Shelters

Provide on-site vertical shelters in case all people at-risk cannot be evacuated in the event of an impending hurricane. Such shelters will be required to meet standards established by county and state government, including the provision of adequate shelter space, elevation above hurricane surge flooding levels, adequate flood proofing, glass protection, emergency electric power needs, water supplies, and other basic needs.

EHM&R Objective 20: Make Sand Removal Unlawful

Prohibit the movement of beach sand out of the beach and dune system.

EHM&R Objective 21: Regulate Wetland Development

Prohibit the filling, excavation and construction of ditches, canals, dikes, roads above grade, or additional drainage structures in wetlands unless it is demonstrated that such proposed construction will not cause higher rates of runoff, degradation of water quality, or otherwise alter the existing wetland ecosystems.

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Strategic Hazard Mitigation and Response

8

Chapter 8

STRATEGIC HAZARD MITIGATION AND RESPONSE PLAN

INTRODUCTION

It is imperative that the Town of South Padre Island protect and enhance the integrity of the natural environment in which the Island is situated. The Town can maintain and promote its appeal as a place to visit and live by preserving its character as a premier beach community. The Town should preserve and enhance its physical attractiveness and its natural beauty and plan for beach and dune preservation and restoration, and wetland protection through the zoning and subdivision regulations as well as other development actions and policies. The following sections of the Plan provide guidelines for strategic action regarding environmental and hazard mitigation measures.

BEACH AND DUNE PRESERVATION AND RESTORATION

Barrier islands are dynamic environments that are continually modified by a variety of on going natural forces, such as washover area fountain, offshore littoral drift currents, dune and beach sand movement, and coastal storms and hurricanes. Barrier islands in Texas and along most U.S. coastlines are also undergoing long-term landward migration. Further portions of the South Padre Island shore line are experiencing long-term erosion as a result of decreasing sand supply in the littoral drift, the occurrence of hurricanes and storms, and a general sea level rise. Such erosion makes development along the island's shoreline particularly at risk to natural forces.

Historically, problems have arisen on South Padre Island as construction of buildings along the shorefront has necessitated the expenditure of public and private funds to protect these structures from natural forces. This construction has led to the removal or destruction of most of the fore dunes.

Several methods can be used to stabilize the shore front. These include the following:

- Beach renourishment
- Sand trapping
- Shore line protection works

Beach renourishment programs involve the placement of sand on the beach to build back former dunes and eroding upper beach. Because most beach renourishment programs only involve the upper portions of the beach, such efforts increase the beach slope and can cause accelerated rates of erosion. Further, the results of renourishment efforts are often temporary. A single coastal storm or hurricane can erode much of the renourished sand. Nevertheless, beach renourishment efforts can assist in preserving beachfront property without accelerating erosion on nearby properties and diminishing public use of the beach as in the case with the two structural beach stabilization methods.

Sand trapping structures, such as groins and jetties are built perpendicular to the shoreline. Jetties like the one at the mouth of the Brazos Santiago Channel are long structures designed to keep sand from filling in shipping channels, and coastal inlets and bays. Groins are smaller and attempt to trap sand flowing in the littoral drift current. Such structures are expensive and can cause extensive beach erosion down-current and beach accretion up-current, as they alter natural sand replenishment processes.

Shore line protection works, such as seawalls and bulkheads, are built parallel to the shore line. On South Padre Island, there are numerous protection works along the Gulf of Mexico shore line. These structures are designed to protect beach front property from hurricanes and coastal storms, and long-term erosion forces. These structures, however, reflect wave action, and intensify the erosion on the ends of the structures. Over the long-term, shore line protection works can actually undermine the beach and require on going maintenance. They are also generally ineffective at property protection without on going renourishment of the beach seaward of the "hardened" shore line. This portion of the beach would rapidly erode away without such renourishment.

An additional problem related to shore line protection works is that long stretches of the Laguna Madre shore line have been bulkheaded. Such bulkheading can be damaging to wetland habitats as they restrict intertidal water flow. A more responsible approach is to recognize the natural system dynamics of the shore line and to manage and plan for development accordingly. This is, the location, density and layout of development should account for the natural processes of the valuable shore line resource.

Prevention of the shore line hardening will preserve the public beach which extends from the mean of high water line to the beginning of the natural vegetation line. While such prevention does enhance the preservation of the public's beach, it does not address the problem of providing public access to the beach. In South Padre Island, public access to the beach is limited. This is especially true along the south of the Town's built-up area immediately north of Isla Blanca Park.

Further, several large buildings and shore protection structures project into the public beach. This intrusion is most notable on the north end of Town. Thus, a variety of public actions that involve acquisition and development of access-ways should be undertaken.

WETLANDS PROTECTION

Wetlands are transitional habitats. Some wetlands are "wet" all of the time while others are infrequently wet. The Army Corps of Engineers plays a prominent role in the wetland permitting process. The Corps defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetland areas can also be transitorial in nature. Transitorial wetland areas are characterized by a mixture of plant species typical of uplands and wetlands.

Coastal wetlands on South Padre Island are important for several reasons. They provide:

- Fish and shellfish habitat and spawning areas

- Protected nurseries for numerous species of fish
- Nesting sites and habitat for many species of shore birds and waterfowl
- Storm buffers that lessen the impact of erosion along the shore line

Constant tidal cycling fertilizes all wetlands and removes metabolic wastes, making wetlands more productive than most other natural ecosystems. They are generally considered to be twice as productive as prime agricultural lands.

On South Padre Island, several development practices have degraded or destroyed wetland ecosystems. The finger canal system on the north side of the Town could create problems related to water turnover and flushing action. In straight "dead-end" finger canals, stratification and stagnation occur. The tidal energy is lost in such canal systems. Other adverse practices involve bulkheading and the infilling of wetlands along the Laguna Madre shore line.

HAZARD MITIGATION, POST-DISASTER PLANNING, AND RESPONSE

Hurricanes and sever coastal storms pose a major risk to life and property on South Padre Island, and Texas generally. South Padre Island is especially vulnerable to coastal storms because of its minimal width and elevation. With the exception of Florida, the annual probability of a hurricane striking Texas is grater than all other coastal states. Recent storm experiences in Texas, however, have been more frequent than any other coastal state. For instance, from 1965 to 1985, five storms struck the Texas coast. Each of these storms caused damage exceeding $300 million dollars. In additional to hurricanes, South Padre Island is subject to tropical storms and winter storms.

There are three primary threats posed by hurricanes and coastal storms:

1. Wind
2. Flooding
3. The battering of the wave action

Each storm may cause permanent loss of a portion of the recreational beach and a steepening of the offshore portions of the beach. The natural beach responds to a storm by flattening itself, or building offsore bars, or by doing both of these things.

These threats occur in varying degrees given a storm magnitude and the general configuration of the coast line. The magnitude of a hurricane is based on a standardized hurricane intensity scale, known as the *Saffir-Simpson Scale*. This scale ranges from a low of one (1) to a high of five (5). The most recent major hurricane to strick in the vicinity of South Padre Island was Hurricane Alan in 1980. It reached category 5 status at its peak intensity, but was a category 2 hurricane by the time it reached landfall.

The future risk to life and property as a result of hurricanes and coastal storms is substantial given the potential for future urban growth. In developing *South Padre Island Plan 2010*, a preliminary analysis of current and future property-at-risk in a sample high hazard zone was conducted. Within the southern most washover area, the current value of the 9.2 acres of improved property at risk is approximately $5.2 million dollars. Assuming current land use intensity patterns of improved property will occur on the remaining 38.8 acres of unimproved property in this area, it is estimated that the potential build-out value of property would be approximately $22.7 million dollars. Thus, the potential future property loss could increase by a magnitude of four.

The public response to hurricanes and severe coastal storms occurs in four stages:

- Pre-storm mitigation
- Warning and preparedness
- Response
- Recovery and reconstruction

Coastal storm hazard mitigation involves activities taken before a disaster strikes that eliminates or reduces the potential property damage and the lost of

life. While catastrophic storms can be devastating, they offer "windows of opportunity" to redirect hazard mitigation policy toward creating a safer environment. Almost without exception, after a damaging storm, there is a strong push to rebuild an urban area in precisely the same way it was built before the storm. However, if a reconstruction plan has been prepared in advance of a disaster, the successful alteration of the town's urban form can begin. This alteration process can lead to a safer community.

Emergency preparedness and response involves a range of policies that can be invoked both before and after a disaster. Of crucial importance are those activities that deal with inter-organizational coordination, evacuation, and sheltering.

The implementation of the hazard mitigation and response plan Action Agenda contained in Chapter 7 of this document will go a long way in establishing a system of measure that will protect both the citizens of the Town and the Island's precious environment and related ecosystems.

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MEMORANDUM

To: James V. Chisholm, City Manager

From: Sylvia Stamps

Subject: 2010 Plan Update Status

Date: January 6, 1997

As you requested, I have reviewed the information provided by Mr. Page. The areas that have not been updated are followed by (No Info.) to identify those sections. All other areas have statistical information backing up his research.

1. Historical & Geographical Setting

2. Environmental Conditions

3. Demographic Date

    (1) Population Characteristics

        (A) Total Population

        (B) Growth Over Time

        (C) Age/Sex Composition

        (D) Racial Characteristics - No Info.

        (E) Educational Level

    (2) Economic Characteristics

        (A) Occupation - No Info.

        (B) Employment

        (C) Labor Force

        (D) Household Income

        (E) Type of Income By Family

(F) Income by Race

(G) Effective Buying Income - No Info.

(H) Consumer Spending Patterns - No Info.

(I) Retail Sales - No Info.

(J) Wholesale Trade - No Info.

(K) Service Industries - No Info.

(3) Governmental Finances - No Info.

4. Patterns of Development

(1) Existing Land Use - No Info.

(2) Building Permits

(3) Housing Characteristics

Mr. Page did not complete Chapter 5 - Transportation and Chapter 6 - Community Facilities. The goals and objectives have not been established and the future plans addressing Chapter 1 - Land Use, Chapter 2 - Transportation and Chapter 3 - Community Facilities are not completed.

COPY

M E M O R A N D U M

To: AdHoc Committee Update Plan 2010

From: Ray Kendall RHK

Subject: Information Packet on Plan 2010

Date: June 27, 1997

Enclosed for your review and consideration is a copy of the 2010 Plan. Also included are some revisions that were initiated by Mr. B.J. Page, our former Planning Director.

This information will provide you with the necessary background in preparation for your first meeting to be announced at a later date. If you have any questions please call me at 210-761-6456.

Thank You.

RHK/cg

SOUTH PADRE ISLAND PLAN 2010

UPDATE OUTLINE

PHASE 1 -- ASSESSMENT OF EXISTING CONDITIONS

The analysis of existing conditions is an essential element of any comprehensive plan, serving two central purposes. First, before any meaningful work can be accomplished on projecting future needs, the basic make-up of the structure of the community as it currently exists, must be understood. This analysis should involve not only the social elements of the community, but the physical elements as well. Secondly, but equally important, is the identification of historical trends that may be impacting the community over time. Is the "face" of the community changing? What implications do these trends have for the future development of the community?

Under this phase, a body of data will be developed, both in narrative and graphic form, for the purpose of creating a comprehensive picture of the study area as it currently exists. The work tasks proposed will review not only existing conditions, but will also provide comparisons over time developed from previous studies of the community. With the completion of Phase 1, all necessary background data will have been accumulated to provide the Town's decision-makers with a complete, overall picture of the community that can then serve as a basis for the future policy decisions required in the later stages of the Comprehensive Plan Update planning process.

A. Historical Background and Geographic Setting

B. Environmental Conditions -- Climate, Physiology, Geology, Soils, Flood Data, Wetlands, etc.

C. Demographic Data -- Review and update demographic data on the community, including but not necessarily limited to:

1) Population Characteristics -- Total Population, Growth Over Time, Age/Sex Composition, Racial Characteristics, Educational Level, and so on.

2) Economic Characteristics -- Occupation, Employment, Labor Force, Household Income, Type of Income by Family, Income by Race, Effective Buying Income, Consumer Spending Patterns, Retail Sales, Wholesale Trade, Service Industries, etc.

3) Governmental Finances -- Trends in Assessed Value, Sales Tax, Revenue and Expenditure Analysis, Bonding Status, etc.

4) Projections: A projection of population will be prepared utilizing a 20-year planning period.

D. Patterns of Development -- The following data elements will be inventoried to create a depiction of the historical development of the community.

1) Existing Land Use -- Existing land uses will be identified and mapped for the entire planning area. The data will be mapped on a parcel by parcel basis, and then converted to acreage by land use type. This information will then be compared to the data contained in the Town's 2010 Plan to quantify basic changes in land use over the intervening period. This information will also be compared against national studies concerning average land use patterns to identify how the development of South Padre Island compares against the national norm.

2) Building Conditions -- Each building within the planning area will be visually evaluated as to structural condition. This information will be mapped to present a graphic depiction of the overall quality of structures within the community.

3) Building Permits -- The nature and quantity of building permits will be inventoried over the previous 10-year period in order to assess issues such as development cycles, areas of development emphasis, relative growth.

4) Housing Characteristics -- Owner Occupied Units versus Renter Occupied Units, Year-round Occupied Units Versus Seasonally Occupied Units, Median Value of Owner Occupied Units, Median Contract Rent, Housing Units by Year Constructed, and Persons per Household.

E. The Transportation System -- Under this task, the transportation system will be evaluated to determine its relationship as both a positive and, in some cases, negative factor within the study area. Specific information which will be obtained/identified shall include but not necessarily be limited to the following:

1) Streets --

a) Based upon an actual field survey of the system, the general street surface conditions present will be identified. Street right-of-way and pavement widths will be identified.

b) The most current available traffic counts for streets within the study area will be obtained.

c) The responsible Town and State agencies will be contacted to identify all proposed transportation improvements that are under consideration within the study area. This information will concern both those projects which are imminent, as well as long-range plans.

d) The major street corridors that unify the area will be identified. Major intersections impacting these corridors will be identified in addition to any other intersections which warrant study. Existing traffic circulation problems will be identified based upon available Town and State sources.

e) Based upon this information, a functional classification system for the community will be established and a capacity analysis conducted.

2) Pedestrian Movement -- Based upon a field survey, the location and general surface conditions of all pedestrian ways within the community will be analyzed. The efficiency and completeness of the pedestrian circulation system will be assessed.

3) Other Transportation Services -- All other transportation systems serving South Padre Island, such as rail, bus, truck, shuttle, and air services, will be inventoried.

F. Parks and Recreation -- Parks and recreation facilities available both within and around South Padre Island will be inventoried as to location, size, type, and activities available. In addition to Town-owned facilities, this inventory will include schools, facilities owned by other governmental entities, and private recreational facilities. A needs analysis focusing on both park type and facilities offered will be conducted by comparing this information to recognized national standards.

G. Public Utility Systems -- Under this task, the various public utility systems will be assessed to identify any limiting factors that may be present, and that could have a negative effect on the potential for future development. Systems to be inventoried shall include, but not necessarily be limited to the sanitary sewer system, water supply system, electric supply system, telecommunications system, and cable television. Issues that will be discussed will include: location, age, and capacity of treatment/generating facilities; capacity of storage facilities; location, size, and age of distribution/collection lines, etc.

H. Community Facilities -- Community facilities, such as police and fire protection, libraries, schools, health care facilities, solid waste management, and emergency management services will be inventoried as to location, type, size, service provided, manpower levels, equipment availability, service radii, and condition of facilities.

TECHNICAL MEMORANDUM # 1

Upon completion of the collection of all the background material and planning data discussed under Phase 1, a detailed review and analysis will be conducted by the Planning staff. The results of that review and analysis will be developed in narrative form for presentation to the Planning and Zoning Commission as a technical memorandum at a strategy session. Following that session, any resulting revisions will be made, with the technical memorandum then forming the basis of the "Analysis of Existing Conditions" element of the Plan.

PHASE # 2 -- FORMULATION OF GOALS AND OBJECTIVES

Goals and objectives provide the basic framework for what the Future Plan should achieve. A goals and objectives workshop, including the Planning and Zoning Commission and the Mayor and Board of Aldermen, at a minimum, will be held, using a goal-setting procedure known as the "nominal group process." Depending upon the level of participation, and success, more than one workshop may be required.

Many consultants propose establishing goals and objectives at the outset of the planning process. We feel this step is more effective and productive following completion of the "Analysis of Existing Conditions" element of the Plan. With that data available, the workshop participants have a complete understanding of where the Town currently stands. In addition, at this point, both the Commission and the Board of Aldermen will have become oriented to thinking comprehensively about the community in future terms. Finally, it is essential that the goals and objectives established effectively embody the vision of the future Town generated by the workshop participants. The "nominal group process" noted above is a structured approach to goal setting that provides each participant the opportunity to have input, while restraining the emotionalism that sometimes accompanies open, public hearing-type formats.

TECHNICAL MEMORANDUM # 3

At the conclusion of this goal-setting process, a technical memorandum will be generated reviewing the goals and objectives established as a result of the workshop for presentation to the Planning and Zoning Commission at a strategy session. Any refinements following that session will be made, with the technical memorandum then forming the basis of the "Development of Goals and Objectives" element of the Plan.

PHASE # 3 -- DEVELOPMENT PLANS AND STRATEGIES

Using the background planning data gathered in Phase 1, as well as the goals and objectives formulated in Phase 2, development plans and strategies will be prepared for each of the following items:

A. Transportation Plan -- This plan will present a "system" analysis of the overall street network. Arterial, collector, and local streets will be identified along with their future circulation needs. Specific recommendations will be presented for both short- and long-term system improvements.

B. Community Facilities Plan -- This plan will illustrate the current and future needs of the Town of South Padre Island within the areas of police and fire protection, education, health care facilities, and other necessary public services. In identifying these needs, locally adopted standards will be compared against the population projection generated in Phase 1.

C. Public Utility Systems Plan -- This plan will illustrate the current and future needs of the Town of South Padre Island in the area of public utility systems. In identifying these needs, industry standards in comparison to the existing population will be utilized to assess the current situation, as well as in the development future needs through use of the previously discussed population projections.

D. Parks and Recreation Plan -- This plan will identify existing deficiencies in the parks and recreation system as it currently exists, and shall make specific recommendations for corrective action. The Plan will also propose the extent of future needs, including land areas, type of needs, and generalized site locations.

E. Future Land Use Plan -- Based upon the background planning data developed during Phase 1, as well as the specific development plans and strategies developed to this point, a future land use plan will be developed for the planning area. This plan will specify both the existing and proposed new land uses anticipated within the planning area over a 20-year projection period. Future land uses will be mapped and shall identify the location, type, and density of proposed development.

TECHNICAL MEMORANDUM # 3

The results of the analysis completed in Phase 3 will be compiled in narrative form for review by the Planning and Zoning Commission at a strategy session, along with the pertinent descriptive maps. any revisions resulting from the strategy session will be incorporated, with the technical memorandum forming the basis of the "Development Plan" element of the Plan.

At this point, it is not uncommon to find that there are alternative approaches to achieve the same ends. In these cases, the Commission would have to determine which alternative is the preferred approach. Recognizing this, depending upon the amount of data involved and the number of alternatives, more than one strategy session may be required to provide sufficient opportunity for Commission involvement.

PHASE # 4 -- IMPLEMENTATION

A Comprehensive Plan incorporates many proposals which are generally considered reasonable, feasible, and important to the welfare of entire community; however, the value of that Plan will be measured in terms of the degree of success which the community achieves in accomplishing those proposals. In this regard, a practical implementation strategy which recognizes current and future limitations on the Town is a critical element. The focus of this Phase of the planning process will be to address those actions available to the Town for the achievement of the various goals and objectives established by the Plan. This Phase will address policy issues, such as plan adoption procedures, amendments to existing codes and ordinances, and the creation of new codes and ordinances. This Phase will also discuss financial approaches to physical improvements identified by the Plan, and will discuss the concept of Capital Improvements Programming.

TECHNICAL MEMORANDUM # 4

Upon completion of the development of the various approaches to implementation of the Plan, the results of that review and analysis will be developed in narrative form for presentation to the Planning and Zoning Commission as a technical memorandum at a strategy session. Following that session, any resulting revisions will be made, with the technical memorandum then forming the basis of the "Plan Implementation" element of the Plan.

PLAN PREPARATION

Following the completion of Phases 1 through 4, an overall comprehensive plan document will be prepared incorporating all graphic, narrative, and tabular data. This is purely an administrative task in which the information contained in the various technical memoranda are combined into one document for official adoption by the Planning and Zoning Commission and the Board of Aldermen.

INTRODUCTION

A community is best characterized by the make-up of its people and their living and working environments. Communities with attractive commercial locations, well-kept residential areas, adequate parks and schools, and a street system conducive to the expeditious movement of pedestrian and vehicular traffic will generally experience positive growth in both population and economy. Unfortunately, as is the case with most communities, the basic problem is how to address this growth, as it takes place, such that it becomes self-reinforcing rather than the type of growth that, through its impacts on the quality of life, leads to the gradual decline of the community's residential, commercial, and public areas.

A "comprehensive plan" is designed to provide the necessary guidance for the future physical growth and development of the community or area under study. It consists of a combination of written and graphic materials dealing with a general physical design of the study area interrelated with social and economic goals. The purpose of the comprehensive plan is to provide a guide for developing a balanced, efficient, and healthful community that meets the needs of its residents.

This Comprehensive Plan for the development of the Town of South Padre Island considers land as a community resource, both in terms of its existing condition, as well as space that can be utilized to provide for future additional growth. Just as with any resource there are more efficient ways to use land that others. This Comprehensive Plan attempts to determine the most efficient way to use this space in terms of public investment and the services the community provides. In short, the Plan aims at eliminating the inherent inefficiencies of the market mechanism, while balancing the rights of the private property-owner; thereby, providing a basis for rational decision-making and rational development.

In order to achieve this, such a Plan should basically be:

1. Comprehensive -- The plan must encompass all geographic parts of the community, and all functional activities which bear on physical development.

2. General -- The plan must be flexible. The plan summarizes policies and proposals, and should not indicate specific locations or detailed regulations, such that the community's freedom of movement is restricted.

3. Long Range -- Although the plan addresses short term problems and issues, its main function is to look beyond this foreground of pressing issues to generate a perspective on possibilities and problems twenty years into the future.

Although growth within any community is an extremely complex action, affected by many variables and intricate interrelationships, growth patterns may be simply defined by analyzing six basic components which, together, impact development. These are: people, employment, shelter, community facilities, transportation, and the environment. The diagram below graphically presents the interrelationships of the growth cycle.

The key component in the growth cycle is people. People need jobs to provide for their families. People need decent shelter in which to house their families. Groups of families living together within a defined area must have both the adequate community facilities necessary to support that density of development, as well as the transportation system necessary to get to work, to shopping area, and to recreational pursuits. Finally, people need a suitable living environment. If it becomes degraded, the community's overall quality of life also declines, and the cycle can reverse. Through a detailed investigation of these components, weaknesses in the overall fabric of the community can be identified for eventual corrective action as the Plan is implemented.

For the purposes of this Comprehensive Plan, the "study area" shall consist of that portion of the Town of South Padre Island bounded by the Gulf of Mexico on the east, the municipal limits on the north and south, and the Laguna Madre on the east, including those unincorporated areas to the north and south of the existing Town limits that can be reasonably considered as future growth areas for the community. The following outline reviews the various elements of the Comprehensive Plan developed for this study area.

Phase 1 of this Comprehensive Plan presents an in-depth analysis of the physical, environmental, geographical, and economic influences that have shaped, and are shaping, the development of the community. Areas inventoried include: historical and geographical setting, population, economic characteristics, existing land use and intensity, housing characteristics, transportation, parks and recreation, public utilities, community facilities, and environmental factors.

Phase 2, utilizing the background information developed in the first Phase, develops goals and objectives which not only provide the community's "vision" of the future development of the study area, but also provides an evaluative criteria against which the proposed future development plan for the study area can be compared to insure its conformity with that "vision."

Phase 3 presents the proposed Future Development Plan for the study area, again focusing on land use and intensity, transportation, parks and recreation, public utilities, and community facilities.

Phase 4 addresses implementation of the Comprehensive Plan by identifying the specific steps necessary to implement the total program by task responsibility (i.e., Board of Aldermen, City Manager, etc.) and timing.

The Comprehensive Plan, after its adoption by the Board of Aldermen, will be used as:

* A long-range guide for evaluation of proposals for physical changes and scheduled improvements.

* A framework for the development of policy for the Zoning Ordinance, Subdivision Regulations and other codes.

* A framework for conducting more specific and detailed studies of future planning projects.

* A source of information and a statement of planning policy which is useful to citizens and businessmen in making decisions regarding their individual development plans.

In conclusion, it should be recognized that city planning is a continuous process and, in any growing community, certain revisions in the various plan elements of such a Comprehensive Plan will be necessary from time-to-time. Such revisions should be carefully considered and weighed against the general intent and long-range objectives embodied in the Comprehensive Plan so as to insure that the maximum well-being of all citizens in the community is preserved.

Chapter 1

HISTORICAL AND GEOGRAPHIC SETTING

Historical Setting

The sands of South Padre Island have borne the footprints of various population groups starting with the earliest settlers arriving at the Gulf Coast approximately 8,000 years ago. Archeologists and anthropologists have identified several indigenous populations which began with the arrival of the Aransas Culture, and the appearance of the Rockport Culture in 1400 A.D. During historic times, three main groups have put the natural resources of Padre Island to use: The Karankawa Indians, the Spanish, and the Americans.

The Karankawa Indians: The semi-arid lands of the South Texas coastal bend, between the Guadalupe River and the Rio Grande, were never inhabited by the Plains Indians, such as the Lipan Apaches and the Commanches. Instead, small tribes of Indians maintained a subsistence off the coastal lands by hunting and gathering food. One of the groups dwelling within this area was the Karankawas. The exact origin of the Karankawas is uncertain because little is known about their language or culture.

After sifting through the tons of oyster shells that formed the bulk of the "kitchen" middens, or trash heaps, left by the Karankawas, archeologists have been able to piece together some of the basic aspects of the Karankawa culture. T.N. Campbell, author of An Appraisal of the Archeological Resources of Padre Island, Texas (1964), reports that there are 20 different Karankawa campsites in the northern 20 miles of Padre Island, as well as two others south of the Mansfield Channel. The reports of explorers, traders, and missionaries provide other sources of information on this culture.

The Karankawas tattooed and painted their bodies, and coated themselves with a vile smelling animal oil mixture that repelled mosquitos and Europeans alike. They were excellent fishermen and good hunters, using large cedar bows too strong for the average person to bend. Canoes, or pirogues, were made from hollowed-out logs. The food of the Karankawas varied with the seasons. Although they hunted deer and other large game and gathered nuts, berries, and cactus fruit, their diet consisted mostly of fish, shellfish, birds, and bird eggs obtained from the Laguna Madre and vicinity.

The total population of the five Karankawa tribes is unknown, but estimates range from about 1,000 to as many as 28,800. Seperated into groups of 30 to 40, the Karankawas lived a nomadic life. They set up summer camps on Padre and wintered in crude portable huts on the mainland. The tent-like lodges made of willow poles and deer skins would accomodate two families, or about seven or eight people.

Archeologists have gathered little evidence of Karankawan religion. The Indians apparently worshipped two deities called Pichini and Mel, and held ceremonies for giving

thanks and for imploring the assistance of the gods. The Karankawas evidently practiced cannabalism, but not as a food source. Cannabalism instead involved the superstitious belief that by eating the flesh of an enemy, the Karankawas could transfer the victim's strength to themselves.

As explorers and settlers invaded their country, the Karankawas resisted fiercely. Disease, lack of organization, and the Indians' small numbers, doomed them to extinction once others desired their land. The Karankawas became impediments to the expansion of Anglo-American and Mexican settlements.

Just as with their origins, the final fate of the Karankawas is also uncertain. In the mid-1840's, remnants of the once sizable Indian tribe fled southward. One group settled on South Padre Island and another group settled in Tamaulipas, Mexico. Conflicting reports exist about those who settled on South Padre Island. A sensational account in 1846 by Samuel Reid of the Texas Rangers, maintained that some of the warriors, driven to desperation by their sufferings, murdered their women and children, and chose South Padre Island as a suitable place to linger out the remnant of their lives. Another final Karankawa account was in 1858. Problems in Tamaulipas forced a number of Karankawas to flee back across the Rio Grande into Texas, where they were exterminated by ranchers.

The Spaniards: Invention of the printing press and the mariner's compass marked the beginning of the end for American Indians, for these inventions made possible the boom in European exploration and expansion that occurred in the 1500's. Exploration of the Padre Island region began in 1519, when the Spanish governor of Jamaica, Francisco Garay, eager to match the golden successes of Hernando Cortes in Mexico, ordered Alonso de Pineda to explore the north and west coasts of the Gulf of Mexico.

Pineda's main objective was to find the strait of Anian -- the rumored water passage to India. He did not find the nonexistent strait, but he did chart the Gulf coastline from the tip of Florida to Tampico. In the process, he discovered and named the Bay of Corpus Christi and Isla Blanca (Padre Island), and touched ashore at the mouth of the Rio de las Palmas, the modern-day Rio Grande.

In April of 1554, a group of Spaniards landed on Padre Island, but certainly not by choice. Four ships had set sail from Veracruz carrying treasure and some of Mexico's wealthiest residents back to Spain. As the fleet reached Texas latitudes, it was struck by a fierce storm. The Spanish vessels were scattered by the raging storm. Three of the ships ran aground on Padre Island, but one made it safely to Havana. The survivors, exhausted and starving, took supplies from the wreck and spent 6 days on Padre's beaches before they were greeted by a band of Indians. The Spaniards, fleeing southward under showers of arrows, were gradually reduced in numbers. Only a few of the Spaniards survived the ordeal, eventually making their way southward to a Mexican settlement and safety.

One shrewd nobleman, Francisco Vasquez, who survived the shipwrecks, had left the group early and returned to the wrecks, where there remained a plentiful supply of food and other goods. Vasquez reasoned that ships would be sent to search for the survivors, and particularly the treasure. Within 3 months, Vasquez was rescued.

When Pineda reported to Governor Garay on the 1519 expedition, he suggested that the region of the Rio de las Palmas be colonized. Two subsequent colonization attempts failed, however, and these failures marked the area as unfit for habitation early on. But when Robert LaSalle established a French stockade, Fort Louis, on Matagorda Bay in 1685, Spanish interest in South Texas was rekindled. Alonso de Leon led five expeditions into the coastal region before finding LaSalle's abandoned fort in 1689.

In a half-hearted attempt to forestall any more French designs on this region, the Spanish authorities in Mexico ordered a presidio, or fort, built near the confluence of the San Antonio and Guadalupe Rivers, at what is now Goliad. The Spaniards also established a mission called Nuestra Senora Espiritu Santo de Zuniga to pacify the coastal Indians, especially the Karankawas. The mission, however, was finally abandoned as a failure. The Karankawas refused to give up their traditional life patterns, and the Spaniards could not give them security against raiding Apaches and Commanches.

This same concern with defense of the Texas region, which the Spaniards considered an invaluable buffer between Mexico and the expanding British and French colonial empires in North America, prompted the Spanish authorities to order Jose Escandon to explore the region and initiate civilian settlements in the late 1740's. Escandon launched a carefully planned and successful colonization effort, which led to the establishment of settlements on both sides of the Rio Grande, from its mouth, northwest, to the site of current day Laredo. These settlers were the first to use this region for cattle grazing.

After the English defeat of the French at the end of the Seven Years' War in 1763, the English gained all French and Spanish territory east of the Mississippi. Soon rumors spread that they were establishing forts along the Gulf in an effort to expand their empire. Escandon was ordered to investigate these rumors, and one of the expeditions he sent under the direction of Diego Ortiz Parrilla was to explore Isla Blanca. Parrilla's report contains probably the first description of Padre Island.

By 1760, Spanish cattle grazed on land from what is now Mexico to the Nueces River. This region was no longer a widlerness, but a territory of large ranches. One story tells of a hurricane flood in 1791 that inundated Padre Island and the mainland shore, killing 50,000 head of cattle belonging to one Spanish cattle baron. But an extensive ranching enterprise was not begun on Padre Island until 1800, when the Portugese priest, Father Nicholas Balli, a member of a land- and cattle-rich family, settled near the Rio Grande, and successfully gained a grant to the island from King Charles IV of Spain. Padre Balli established ranching operations on the island and was joined in the venture by his nephew, Juan Jose Balli, although neither of them actually lived on Padre Island. The ranch headquarters, Santa Cruz de Buena Vista, was located about 26 miles from the southern end of the island.

When Padre Hidalgo launched the successful struggle for Mexican Independence in 1810, Padre Balli fled to Santa Cruz, as he was known to be sympathetic to the Spanish establishment, which had granted him, and his family, land. After the revolution, Balli had to work hard to get the Mexican government to reconfirm his title to "Padre's Island." Unfortunately, Padre Balli died in the same year that the grant was verified -- 1828. The Balli family continued to ranch on the island until 1840, but they had begun to sell parts of their land as early as 1830.

The Americans: As the Mexican ranchers were developing the grazing potential of South Texas, the first Anglo-American settlers were colonizing the fertile lands along the Brazos and the Colorado Rivers in central Texas. When the Revolution for Texas' Independence broke out in 1836 against the Mexican dictator Santa Ana, the sparsely settled ranching country to the south became a no-man's land. In this confusion, the notorious smuggler, Henry Lawrence Kinney established trading operations in the Corpus Christi Bay area. By 1840, he had established a trading post on the south rim of the bay and had a personal police force of 40 men.

Although the conclusion of the Texas Revolution for Independence fixed the boundary of the new republic at the Rio Grande, the Mexican government never really accepted it, contending instead that the boundary was at the Nueces River. This dispute was intensified when the United States voted to annex the Republic of Texas in 1845. In a show of power, President Polk ordered General Zachary Taylor to occupy the disputed area between the two rivers, a region including Padre Island. Taylor and his troops traveled by sea to Rockport and after a 6-month stay at Kinney's trading post, moved on to Port Isabel to establish the main supply base. Fort Brown was established by this time. Captain Ben McCulloch and his Texas Rangers first brought the United States flag to Padre Island as they travelled its length to report for duty with Taylor's forces.

On Taylor's orders, Lieutenant George Meade, later to gain fame as the commander of the Union forces at Gettysburg, conducted a 10-day survey of the navigability of the waters of the Laguna Madre and transportation routes on the island itself. Meade's map, made in November of 1845, was the first detailed map of the island. At the end of the Mexican War in 1848, the Treaty of Guadalupe Hidalgo established the Rio Grande as the boundary between Mexico and the United States, and the status of Padre Island as part of the United States was finalized.

Port Isabel was the vital link in the American supply system during the Mexican War. Brownsville and Corpus Christi also experienced a wartime boom, and during the gold rush years of the mid-1800's, all three communities became important as supply stations for the "forty-niners'" trek across the arid Southwest. Richard King and Mifflin Kenedy, later of King Ranch fame, made a small fortune off their 200-ton shallow draft sternwheeler steamboats that plowed up the Rio Grande, almost as far as Laredo.

The booming Port Isabel trade had attracted the attention of John Singer, whose brother Issac was starting his sewing machine empire. In 1847, the adventurous Singer and his wife and son set out for Port Isabel to establish a shipping business. They were swept

off course by a storm, and their schooner was dashed aground on South Padre Island. The Singers took a liking to their new home and set up housekeeping on the southern tip of the island.

The last of the Balli descendants had left the island in 1844 in the face of the American annexation of Texas with its Rio Grande border. After the conclusion of the Mexican War, land-hungry Texans turned their attention to the Mexican ranching lands south of the Nueces River. They posed such a threat to the Mexican landowners that most of the Mexicans felt compelled to sell out at any price in order to salvage anything. By such purchases, payment of back taxes, or simply squatter's rights, Americans had acquired most of these lands by the outbreak of the Civil War. As of 1846, Jose Maria Tovar owned the northern half of Padre Island, and the southern half was owned by Balli's seven heirs, but by the mid-1850's, almost all of the original Balli grant was in American hands. The Singers purchased one-seventh of the south half from one of the Balli heirs in 1851, and by 1855 had leased much of the rest of the southern part for their thriving ranching business.

Six Singer children were born on the island, and at the height of the ranching boom, the Singer headquarters consisted of about 15 buildings. The Singers' profitable ranching business was shortlived, however. Because of the Singers' Union sympathies, the Texas Confederates ordered them off the island in 1861. Singer was forced to make a hasty departure, and quickly buried $800,000 in a jar near his home. This was the basis of one of the island's most intriguing treasure stories, for after the end of the Civil War, Singer was unable to find the cache. A short time later, Mrs. Singer died, and the Singer family permanently left the island in 1866, selling their holdings to railroad entrepeneur Jay Cooke.

During the Civil War, the effective Union blockade cut off all direct Confederate contact with Europe. The Confederates quickly found a solution to the blockade. They transported cotton overland to Mexico south of the Brazos Santiago Pass at the south tip of South Padre Island. From there it was shipped out on European vessels and traded in Europe for drugs, food, clothing, and war supplies. The Mexican port of Baghdad became a boomtown full of deserters, spies, and gamblers. In an effort to cut down the flow of Confederate goods to Baghdad, 7,000 Union troops stormed ashore on Brazos Island, south of Padre, in November of 1863. They captured Brownsville, which forced the cotton caravans to enter Mexico as far north as Eagle Pass.

During the confusion of the Civil War, the unattended cattle herds in South Texas expanded tremendously. Throughout the 1850's, Richard King and Mifflin Kenedy had been acquiring the lands that would constitute the legendary King Ranch, which now covers almost 1 million acres. As early as 1854, King purchased 12,000 acres on Padre Island from a niece of Padre Balli. And in the early 1870's, King and Kenedy leased additional acreage on the island. At the height of their operations on the island, there were some 70 people located at the headquarters near the site of Balli's old headquarters at Santa Cruz. King's ranching operations on the island were severely curtailed, however, after a damaging storm in 1880.

One sidelight to the history of ranching on Padre Island was the appearance of meat packeries along the coast and on the island during the 1870's. The tremendous over supply of cattle in relation to the Texas market had dropped beef to a few cents per pound. The cattle hides became more valuable than the meat. At these packeries, cattle were slaughtered for their hides and tallow, and some meat was packed in salt to be shipped. During 1872, 300,000 hides were shipped out of Rockport and Corpus Christi alone. One large packery was located just south of Corpus Christi Pass on Packery Channel. By the end of the 1870's, the packery boom was over, as the cattle drives to railheads in Kansas and Nebraska poured Texas beef into midwestern and eastern markets.

The profitable days of the open range came to an end at about the same time as the packeries did. In 1882, Kenedy fenced in his La Parra ranch; this marked the beginning of the end of the open range. This prompted the appearance of the real successor to the Padre Island ranching heritage of Balli and Singer -- Patrick Dunn. Dunn was the son of Irish immigrants who came to Corpus Christi in the 1850's. He became a successful rancher by taking advantage of the open range. The advent of barbed wire fencing directed his attention to the natural "fences" of Padre Island, with the Gulf on one side and the Laguna Madre on the other. He first leased land on the northern part of the island in 1879. By 1926, he owned almost all of Padre Island's 130,000 acres. During the periodic round-ups, Dunn's cowboys started at the south tip of the island and drove the cattle from line camp to line camp, holding them in corrals at night. The line camps were built 15 miles apart, since that was the maximum distance the cattle could be driven in 1 day, and still be corralled before dark. The cattle were then driven to market across the lagoon at a point below Flour Bluff.

Dunn, the "Duke" of Padre, became a legend in his own time. He closely supervised his extensive ranching operations and conducted experiments on the introduction of non-native grasses. A notable in the Democratic Party, he was a State legislator from 1910 to 1916, and helped launch the political carrer of John Nance Garner. In 1926, Dunn sold his surface rights to real estate developer Colonel Sam Robertson. The Duke retained grazing rights and ranched until his death in 1937. His son, Burton Dunn continued to run the Dunn ranching business. Some of the line camps on Padre Island were still used as collecting points for cattle during round-ups as late as 1971.

Colonel Sam Robertson, a former scout for General John J. Pershing, was the first representative of the age of the automobile and tourism to foresee the resort potential of Padre Island. After purchasing Dunn's Padre holdings for $125,000, Robertson began work on a wooden causeway from Corpus Christi to Padre. This Don Patricio Causeway, named after Patrick Dunn, opened on July 4, 1927. It consisted of two wooden troughs just wide enough to fit the wheels of a Model T Ford. The causeway was destroyed by a hurricane in 1933, but the supports are still visible crossing the Laguna Madre. Colonel Sam also provided ferry service to both ends of the island and access to his Twenty-Five Mile Hotel on the southern end of the island.

Robertson's big hopes for a tourist boom fizzled, and then the Great Depression hit in 1929. No longer able to keep up his payments, Colonel Sam sold his island property to Albert and Frank Jones, two brothers from Kansas City. The Jones brothers established the Ocean Beach Drive Corporation, but did not expand Robertson's developments. The hurricane of 1933 that destroyed the Don Patricio Causeway also destroyed most of Colonel Sam's buildings, wiping out any ideas the brothers may have had of continuing with Robertson's schemes.

During the 1920's, Governor Pat Neff established the foundations for the Texas State Park System, and during the 1930's, Federal funds made the parks more usable and accessible to the public. It was at this time that a drive began to establish a park on Padre Island. In 1937, Representative W.E. Pope introduced a bill authorizing the State Parks Board to acquire acreage for a park on the island. The promoters of this bill established the Padre Island Park Association, which rallied support from all over South Texas. The Legislature passed the bill, but Governor James Allred vetoed it. The basis of his veto was that the State might already own most of Padre Island because the island was much larger than the 11.5 leagues included in Padre Balli's original grant. In 1945, the Texas Supreme Court upheld the private ownership of all of the island.

Obviously, Allred's veto, along with the drawn out title suit, and World War II, slowed the establishment of the park and allowed Robertson's successors the opportunity to develop the island. A causeway from Corpus Christi to the island was completed in 1950, and the construction of a causeway from Port Isabel followed 4 years later. This obviously stimulated resort development.

Up until 1954, when the first causeway connecting Port Isabel to South Padre Island was built, access to the Gulf's surf was by ferry boat across the Laguna Madre. Prior to the construction of the Queen Isabella Causeway, Boca Chica beach was the traditional and popular destination for sand and surf on the coast via State Highway 4 from Brownsville. The causeway's enhanced accessibility redirected traffic to the island making it very attractive for swimming, tourism, and beach house development.

The two causeways launched real estate investments on both ends of the island in the late 1950's. While the Queen Isabella Causeway was under construction, John L. Tompkins of Corpus Christi platted a multi-million dollar development, named Padre Beach, between two Cameron County island park sites. And today, both the northern and the southern ends of Padre Island are lined with resort hotels and condominiums.
In 1974, a larger Queen Isabella Causeway was constructed to accommodate the increased tourism and local traffic. The original causeway was closed and converted into a fishing pier until 1993, when the western end adjoining the island was removed due to its dangerous physical condition.

The emergence of a permanent population led to the incorporation of the Town of South Padre Island in 1973, under a council/manager form of government. The legislative body consists of five Aldermen and an independantly elected Mayor. The City Manager supervises and coordinates the day-to-day administrative functions and staffs of the

Municipal Court, Police, Fire Department, Public Works, Planning Department, Building Department, Health Department, and Convention and Visitor's Bureau.

In the latter part of the 20th century, South Padre Island has emerged as an important destination for tourism, sport fishing, surfing and boating. The month of March launches the tourism year with the arrival of large numbers of university students for "Spring Break" festivities. This is followed by subsequent waves of vacationers for the Easter holidays, and throughout the summer months. Another annual migratory stream that converges on the island is the "Winter Texans;" visitors who leave their permanent residences in the northern lattitudes in the Fall of each year seeking the warmer, sub-tropical environment of the Rio Grande Valley from approximately October to March, at which point the tourism cycle begins again.

Geographical Setting

General Setting:

Padre Island, whose length is over 100 miles, stretches from Corpus Christi at the north end to the Brazos Santiago Pass at the south. Located at the southern most tip of Padre Island, the Town of South Padre Island is a unique community on the vast Texas Gulf Coast. South Padre Island is bounded on the east by the Gulf of Mexico, on the south by Isla Blanca County Park and the ship channel jetties, on the west by the calm blue-green waters of the Laguna Madre, and on the north by Andy Bowie County Park. Map 1, shows South Padre Island within the Lower Rio Grande Valley, which comprises the counties of Cameron, Willacy, and Hidalgo. This vast, semi-arid agricultural and ranching region is formed by the delta of the Rio Grande, a good part of which depends on seasonal rain for cultivation, with the rest served by an extensive irrigation system fed by reservoirs along that river.

South Padre Island's Regional Role:

The conceptual definition of what constitutes a region can be as varied as the criteria that are used to define it. Perhaps the term was best defined by Lewis Mumford, an early planning scholar, who wrote:

> "...A region being any geographic area that possesses a certain unity of climate, soil, vegetation, industry, and culture. The regionalist attempts to plan such an area so that all its sites and resources, from forest to city, from highland to water level, may be soundly developed, and so that the population will be distributed so as to utilize, rather than nullify or destroy its natural advantages."

South Padre Island's primary region is that area within a two-hour automobile drive, comprised by the three counties of Cameron, Hidalgo, and Willacy, otherwise known as the Lower Rio Grande Valley, and the northern Mexican States of Tamaulipas and Nuevo Leon. A secondary area of regional influence can be considered that area of Texas and northern Mexico within a day's automobile drive. A third area of regional influence would

be an area that extends to the northern United States and the southern parts of Canada, from which the "Winter Texans" are attracted. Finally, a fourth area of regional influence might extend to the world at large, with the role played by South Padre Island in international tourism.

The socio-economic role that a community plays within a region is based upon its *comparative advantage* and its acquired *functional specialization*. These terms are used in economic geography and regional planning to define the principal socio-economic functions traditionally associated with a particular location, and its strategic role in the development of that region.

A given location's role within a region is influenced by the comparative advantages enjoyed there as a result of historic, spatial, and/or natural resources that favor that point in space over another location for particular socio-economic activities. Certain places have locational advantages for the development of port facilities due to the existence of a protected harborage, facilitating safe anchorage. Port Isabel is a case in point. Such locations become dynamic transshipment points because products can be received, processed, packaged and distributed efficiently overland or by ship.

South Padre Island's role in the region is determined by its strategic location at the mouth of the navigable Brazos Santiago Pass, which connects the Laguna Madre and Port Isabel with the Gulf of Mexico. Being a barrier island, however, places South Padre Island at a locational disadvantage on the open Gulf since it cannot offer a safe harbor. Port Isabel, on the other hand, is today a commercial port because its relatively protected inland location offers safe harbor for a large shrimping fleet, recreational boating, sport fishing, and cruise ships; activities which are very complementary to the South Padre Island economy.

The pristine beauty of South Padre Island's sand and surf, however, gives the island its comparative advantage over other communities in the South Texas region. Its attractiveness to residents and tourists created the initial demand for ferry boat services to connect it to mainland markets. Over the years, decisions to build the Intracoastal Waterway, permanent causeways, and inproved highways have reinforced South Padre Island's coastal environmental advantages, and enhanced its role in the region as an accessible, but secluded, place for quiet coastal living in combination with a growing tourism market.

South Padre Island's comparative advantage is further exemplified in Map 2, which identifies the few locations for accessing sand, surf, and major resort facilities along the six hundred miles of Texas Gulf Coast. These are Galveston, Surfside, the Corpus Christi-Aransas Pass-Rockport complex, and South Padre Island. Because of hurricane vulnerability, the Island depends upon outside sources for water, waste disposal, electricity, and other resources and services such as hospitals, schools, and airports. However, South Padre Island competes well as a coastal destination for tourists against other coastal locations in Texas as demonstrated by surveys conducted in 1987 by the Texas Parks and Wildlife Department. These survey figures indicate South Padre Island

ranks second out of 101 Texas coastal destinations for saltwater swimming, and ranked third out of 144 Texas coastal destinations for saltwater fishing.

The attractiveness of South Padre Island's sand and surf have made this community a national and international destination for a growing number of vacationers and retirees. Unlike other stretches of the Texas Gulf Coast which are more industrialized, South Padre Island's economy is primarily based on tourism and recreation/service related support businesses such as lodging, time-share condominiums, real estate, fishing, boating, transportation, and restaurants. Its location at the southern most tip of the State of Texas, gives the Town of South Padre Island a unique sub-tropical environment found only here and in southern Florida within the intercontinental United States. The typically warm climate of the lower Rio Grande delta is attractive for year-round agriculture and tourism. Its border location next to Mexico provides additional opportunities for international tourism and trade, facilitated by international bridges at Brownsville, Los Indios, Nuevo Progresso, Pharr, and McAllen/Reynosa.

Although visited by the Spanish conquistadores in the early 1500's, it was not until 1954 that large-scale, permanent settlement of the south end of Padre Island became feasible with the construction of the original Queen Isabella Causeway. This link has enhanced the accessibility of the Island from the mainland via State Highways 100 and 48. The Lower Rio Grande Valley, the rest of the State of Texas, and the rest of the nation are within minutes, hours, or a few days by car, while airline service to Brownsville, Harlingen, and McAllen provide national and international access.

Chapter 2

ENVIRONMENTAL CONDITIONS

Introduction

More than any other factor, the natural features of the environment dictate which land uses are appropriate for a particular area. Each feature will dictate to some degree what type of building may be constructed, whether or not it will be suited to certain features, what costs will be involved in the construction of streets and utilities, and other similar questions. Frequently, an environmental constraint can be minimized, or even eliminated, by minor engineering changes, proper site design, and/or construction techniques. Other constraints may be so severe that development would be impossible.

The essential purpose of land use planning is to attempt to program growth into those areas best suited for development, while minimizing growth in those less suitable areas. In the past, the impact of growth on nature was largely ignored. The tough lesson that has been learned, however, has been that even if a community plans for good jobs, housing, community facilities, and transportation needs, all is lost if the base is destroyed that supports it all. The following Chapter is designed to evaluate the various natural elements that make-up our environment and their impact on the potential for development.

Climate

Precipitation and Evaporation: South Padre Island's climate can be classified as semi-arid, sub-tropical. This climate is characterized by evaporation levels that equal, or in some cases exceeds rainfall. Average annual rainfall averages from approximately 29 inches to 26 inches. However, precipitation values alone are not necessarily significant until compared with precipitation deficiency values. South Padre Island experiences 23 to 31 inches of moisture deficiency because of excessive evaporation and plant transpiration. This combination of lower annual rainfall and higher evaporation rates results in a drier climate and a different set of environments from those areas farther northeast and along the Gulf coastline. Rainfall is generally concentrated during August, September, and October. Occasionally, spring and early summer rains can be significant. Some moisture accompanies winter "northers," but this precipitation is generally unimportant to the yearly rainfall budget.

The importance of a negative effective precipitation value for the area is indicated by the sparse coastal vegetation, the high density of hurricane washover channels and breaches, the small areas of marshes, the absence of swamps, and the dominance of wind (eolian) processes. Rainfall deficiency, coupled with the high permeability of the substrate leads to low soil moisture, an important factor that determines whether or not the vegetation cover will survive drought cycles. The effectiveness of vegetation in protecting loose sand deposits against erosion by wind and storm tidal surge can be observed in the decrease

in dune stability and the increase in washover channels from east to south along the Texas Gulf coast.

Temperature: The higher rate of evaporation results from a higher mean annual temperature. Average temperatures range from approximately 72 degrees to 74 degrees Fahrenheit. Temperatures on the Island are moderated by tropical maritime air coming off the Gulf of Mexico. Although temperatures on the nearby Texas mainland commonly exceed 100 degrees Fahrenheit during the summer, Island temperatures are rarely above 95 degrees Fahrenheit. At Corpus Christi, on the mainland near the northern end of Padre Island, the temperature falls to freezing or below about 10 times a year. Freezing temperatures, however, are less frequent southward and are rare on South Padre Island.

Wind Effects: Two principal wind regimes dominate the Texas Coastal Zone: persistent, southeasterly winds from March through November, and short-lived but strong northerly winds from December through February. Much more important than prevailing wind direction, however, is the predominance of the wind as defined by duration and velocity.

Prevailing winds are those winds with the greatest frequency or duration during the year, referring to the length of time that the wind blows from a particular direction. Predominant winds refer to the amount of energy expended or available for work such as in dune migration, in generation of waves and longshore drift, and in deflation or erosion. For example, during passage of a severe polar front, a north wind may blow for 24 hours, but at average wind velocities of perhaps 30 to 40 miles per hour. Therefore, the effectiveness or predominance of the wind results from its duration times its velocity, or 24 hours times 30 miles per hour, which equals 720 units.

The dry, southeasterly winds, are the predominant winds of the region, and do most of the erosion, transportation, and deposition. Their predominance can be easily understood when it is recognized that they may blow at averages of 15 to 20 miles per hour for 2 or 3 months per year (i.e., 1,680 hours {70 days} times 15 miles per hour equals 25,200 units). The northwest-southeast orientation of most eolian deposits and landforms in the region is evidence of the dominance of the southeasterly wind regime. Northerly winds, which may be wet or dry, are short-lived, and therefore, have a lesser impact on the Texas coast. Other winds impact on the coastal zone, but are significantly less effective in generating waves, currents, tidal effects, and landforms.

Prevailing and predominant winds from the southeast develop wave trains that are translated into extensive breakers as the waves contact the bottom of the relatively smooth, sloping inner continental shelf and shoreface. These wave trains result in secondary waves and currents that control deposition and erosion along barrier islands. Wave crests oriented northeast-southwest, for example, move northwestward across the shoreface, where they refract to strike the coastline at almost a 90 degree angle. Waves may break and reform three or four times across the broad shoreface, resulting in three or four lines of breakers and associated breaker bars of shell and sand that change size and shift position as wave size varies.

Because these wave trains cross the shoreface at a slight angle, a net longshore drift is generated. Net drift results in sediment particles being repeatedly moved onshore and alongshore. Under the dominant southeasterly wind regime, sediment is continually moved onshore to the beach where swash and backwash remove fine particles that are returned to deeper waters of the shoreface and the inner continental shelf. Storms may also push large volumes of sand high onto the beach, producing storm berms, either to be eroded and redistributed, or to be stabilized by vegetation as beach ridges.

Sediment supplied to South Padre Island via longshore currents is derived from erosion of the inner continental shelf, the Rio Grande deltaic headland, from the Rio Grande, and from erosion of the shelf and other barrier islands. Southeasterly winds coupled with hurricanes transport the sand across South Padre Island to form back-island dune fields or to broad wind-tidal flats, and supply sediment to the Laguna Madre.

Under conditions of constant water depth, a significant sand supply available from longshore drift, and/or from sea floor deposits on the nearby inner continental shelf can produce accretion of the sandy beach and shoreface. Where water depth increases, a deficit in sand supply produces sand-starved beaches that are normally erosional, and shift landward in the absence of an adequate sand supply. South Padre Island beaches are largely in an erosional phase, as indicated by historical monitoring, the short-term monitoring of selected beach segments, the high percentage of shell on the beaches, the presence of marsh and wind-tidal flats, and particularly the relatively steep shoreface profile.

Although the southeasterly prevailing winds are also the predominant winds, the northerly winds which occur during the months of December, January, and February as the result of rapidly moving polar fronts are also important. Rain and winds up to 50 miles per hour may accompany these sudden 24- to 36-hour storms. These northerly winds blow approximately parallel to the Laguna Madre, and establish a complex circulation system within it, generating currents that move water from north to south within the Laguna Madre complex.

Northers provide a mechanism for exchanging some water between the northern and southern Laguna Madre. If northers are accompanied by rains, fresh-water discharge from streams into the Laguna Madre results. Additionally, northers accelerate the exchange of water between the southern Laguna Madre and the Gulf via the Mansfield and Brazos Santiago Passes. North winds also generate currents that move southward along the margins of the Laguna Madre, with some return flow along the center of the lagoon via the Gulf Intracoastal Waterway, although spoil and shoal areas tend to impede this flow. The adjacent broad areas of wind tidal flats are also commonly flooded.

Hurricanes and Tropical Storms: The average climatic conditions previously described are punctuated by fierce tropical storms and hurricanes. Tropical storms become hurricanes when the wind velocity exceeds 74 miles per hour. Wind velocities in the most intense hurricanes may exceed 200 miles per hour. The cyclonic wind circulation of these storms, which may be hundreds of miles in diameter, has a counter-clockwise motion in

the Northern Hemisphere. The storms are characterized by very low barometric pressure, with the lowest pressure in the central calm region, or "eye" of the storm. Hurricanes may deposit tens of inches of rain and commonly spawn tornadoes, contributing to their destructiveness.

Hurricanes and tropical storms accelerate coastal processes so that during their few hours of passage, the coastal systems experience a degree of erosion and deposition equal to months or years at the normal level of coastal activity. Most hurricanes strike the coast from the southeast, although they may veer along the coast, striking it at any angle. Hurricanes are becoming mores serious because of expanding population and development. However, hurricanes are the principal mechanism by which bays are flushed of pollutants. In addition, hurricanes transport shelf sand onto the shoreface, tending to compensate for the problems arising from low tidal ranges and low river discharge.

Hurricanes vary in intensity and size, but several factors affect the severity of their impact with the coast: (1) the bottom slope and profile of the inner shelf and shoreface; (2) the position and degree of the astronomical tide cycle at the time the hurricane approaches; (3) the shape and orientation of barrier islands, passes, and upper bay areas; (4) the degree of vegetative cover in the areas of impact; and (5) the angle at which the hurricane cell strikes the coastline. These factors determine how much of the storm tidal surge will be dissipated when it strikes land, and how much energy will remain to inflict damage.

Hurricanes display highly variable wind velocities and heights of storm tidal surge, but a general hurricane model developed by McGowen and others in 1970 is useful in describing the effects of a "typical" hurricane when it moves ashore. The storm approach is marked by rising tides and increased wind velocities. The longer the storm remains offshore in the Gulf, the greater will be the storm surge. Storm tides are higher in narrow, funnellike bays than along the straight barrier shoreline; storm tides may reach 25 feet above sea level. The storm surge deposits sand and shell berms on the beaches, pushes shell and sand onto the shoreface, erodes fore-island dunes, and may breach the barrier island through washover channels. Strong southwestward currents along the shoreface result from the hurricane-induced counterclockwise circulation.

As the storm passes over the shoreline, the counterclockwise winds generate unique currents within the bays. On the left, or south, side of the eye, water and sediments are flushed from the bays through tidal passes and storm channels; on the right, or north, side of the eye, water is stacked in bays, and bay shorelines are eroded. Currents along the barrier island shoreface commonly switch to the northeast as the eye moves inland, accompanied by low atmospheric pressure and a violent shift in wind direction.

Moving inland, the storm cell becomes weak and diffused, commonly generating numerous tornadoes. Water stacked in bays during the storm approach and impact drains gulfward through passes and storm channels. Heavy rains normally persist inland causing intensive flooding along streams and poorly drained coastal prairies.

Reorganized bay and Gulf circulation rapidly seals the mouth of storm breaches in the barrier and waves begin to erode the storm berms.

Tropical cyclones (tropical storms and hurricanes) strike the Texas coast at an average rate of 0.67 storms per year. In other words, two storms strike the coast every three years. Most hurricanes hitting the Texas coast originate in the Caribbean Sea or the Gulf of Mexico. The hurricane season actually begins in late spring, but the prime time for tropical cyclone development is late summer and early fall, or from August through October.

A hurricane striking the Brownsville-Harlingen area at a high angle to the coast causes maximum storm-tide flooding on the broad wind-tidal flats on the back side of South Padre Island and in the vicinity of South Bay. Wind-tidal flats and other low-lying areas around the margins of the Laguna Madre are also flooded. Storm-tidal surge may reach as far inland as the turning basin at the head of the Brownsville Ship Channel and Resaca de los Fresnos in the vicinity of the Laguna Atacosa National Wildlife Refuge. Most of South Padre Island and the Gulf shoreline south of Brazos Santiago pass were completely inundated by Hurricanes Carla and Beulah. Much of the deltaic and eolian plain of the Brownsville-Harlingen area were flooded by the hurricane-aftermath rainfall associated with these storms. These areas are relatively flat, have a gentle seaward slope, and are underlain locally by impermeable muds, inhibiting rapid run-off. Fully 33 percent of the Brownsville-Harlingen area was flooded by Hurricane Beulah's storm surge and rainfall flooding. A 50- to 100-year hurricane that generated maximum winds, flood tides, and rainfall could inundate more than one-third of the area with storm surge and rainfall flooding.

Geologic History

South Padre Island is a very young geologic feature when compared with the Earth. According to the most recent estimates, the Earth is about 4.5 billion years old. South Padre Island began forming as a submerged bar no more than about 4,500 to 5,000 years ago according to radiocarbon dating of shells. The origin of barrier islands has been debated for years; however, it is obvious that barriers form and are modified by different processes or combinations of processes depending upon such variable factors as the sediment source, the sediment type and supply, the rate and direction of relative sea-level changes, the basin shape, the slope of the continental shelf, the direction and strength of currents and waves, and the magnitude of tides.

Geologists generally agree upon the basic stages of South Padre Island's development, although the precise time that each stage occurred is still debated. Any discussion of the development of South Padre Island should begin with the geologic events immediately preceding its origin. Figure ____ is a schematic representation of the stages leading to the formation of Texas barrier islands, based upon LeBlanc and Hodgson's (1959) interpretation of the history of the Texas Gulf Coast. The figure is not meant to show the exact geography of the coast line at the various stages, but rather is a series of models illustrating the probable relationships among sea levels, rivers, divides, subaqueous

shoals, and islands.

About 18,000 years ago, near the end of the final (Wisconsin) glacial stage at the end of the Pleistocene Era, world-wide sea level was about 300 to 450 feet lower than it is now, as a result of the vast amount of water contained in the glacial deposits. At that time, the shoreline was much farther gulfward on what is now the submerged inner continental shelf bordering the Gulf of Mexico, approximately 50 to 55 statute miles east of the present Padre Island shoreline. Rivers draining Texas carried sediments across the "shelf" and deposited them into these Gulf areas that are now about 50 miles offshore. Upstream, however, rivers scoured deep valleys across the coastal plain and the emergent shelf.

By the end of the Holocene, about 4,500 years ago, and after a long period of glacial melting, sea level reached within approximately 15 feet of present sea level. (The final small changes in sea level have resulted from the compaction and subsidence of the Gulf Coast area, and minor glacial fluctuations.) The old river valleys carved during the lower stand of sea level were flooded and became the bays and estuaries along the present Texas coast.

During the period of sea level rise, the Rio Grande valley that extended across what is now the inner continental shelf was slowly filled by a transgressive sequence made up in ascending order by fluvial, deltaic, estuarine, and finally marine sediments. By about 7,000 years ago, the Rio Grande estuary that extended inland beyond the position of the present Gulf shoreline began to be filled by the late Holocene Rio Grande delta and fluvial systems. The estuary was filled progressively by prograding delta sand and mud, and aggrading fluvial sand and mud.

When sea level reached its approximate present level, the Rio Grande delta continued to prograde into the open Gulf of Mexico to a position at least 10 miles east of the present coastline. Between 3,400 and 1,900 years ago, sediment supplied to this large Rio Grande delta diminished rapidly as aridity increased and rainfall decreased in South Texas. In the absence of sufficient sand to maintain delta building, the Rio Grande delta began to subside slowly with the consequent net erosion of the delta shoreline.

When sea level stabilized near today's level several thousand years ago, landwardly transgressing sand shoals, or bars, that had formed just offshore began to merge. The old submerged river delta and barrier island deposits laid down farther seaward during times of lower sea level were eroded to supply sand for the joining sand bars. As waves and currents carried the eroded sand in toward the shore from the submerged deposits and along the shore from rivers, the bars were built up and emerged as a chain of short barrier islands. These initial islands were positioned primarily on the divides between the old Pleistocene river valleys.

Much of the sand transported by the longshore drift was deposited on the down current ends of the barrier islands, resulting in spit accretion. After a history of shifting, abandonment, and reestablishment by storm breaches, many of the tidal inlets were

eventually closed. Consequently, a number of short islands were joined to form the longer islands present today. The Laguna Madre was formed between the island chain and the mainland shoreline as the relict Rio Grande delta subsided, and the islands formed, cutting it off from the Gulf.

The barrier islands were built both vertically by eolian (wind) processes, and by maritime processes, as sand carried in from the shelf was added to the shorefaces of the islands. The islands were also built lagoonward by both storm washover and eolian deposition. As the volume of sand, which was derived from the relict Rio Grande delta and directly from the river diminished, the island became increasingly sediment starved. Consequently, South Padre Island sands have become thinner, and the island's landward shift has become faster as it has become increasingly sediment deficient.

Today, the maximum thickness between South Padre Island's sediments at sea level and the original Pleistocene level below is about 35 to 50 feet. Foundation borings on the island have reflected a consistent vertical pattern of lithologic units. The strata consist of two layers of sand separated by a layer composed predominantly of mud, with some minor lenses of sand.

Barrier Island Sand -- The uppermost sand unit, which is exposed at the surface, represents the barrier island and tidal inlet deposits of South Padre Island. This barrier island sand is about 10 to 15 feet thick, not counting the height of any dunes. The sand dunes and other sand features of South Padre Island were derived from the beach as the result of storm-washover and eolian effects.

Rio Grande Delta Mud -- The intermediate layer of sediments is composed predominantly of mud with some minor lenses of sand, and was deposited by the Holocene Rio Grande Delta several thousand years ago. These muddy sediments are found at depths ranging from 10 to 50 feet below sea level. The sand bodies within the mud deposits are discontinuous, and prediction of their location is difficult because their thickness and width are highly variable.

Marine Sand -- Beneath the muddy delta deposits is a layer of sand that occurs at a depth of about 50 to 60 feet below sea level. Often referred to as marine sand or distributary channel and delta front sand, lithologic descriptions indicate that this sand layer was deposited in the Gulf of Mexico on the continental shelf by an older (late Pleistocene) Rio Grande delta, which was then reworked by marine processes as sea level rose. This sand layer is about 25 to 30 feet thick and appears to be relatively continuous beneath the island, extending landward to Port Isabel, and over a wide area offshore of South Padre Island.

South Padre Island and the inner continental shelf continued to shift (transgressed) landward, filling the Laguna Madre progressively with storm-washover sediments and wind blown deposits. At the same time, the Laguna Madre has shifted to a lesser extent over the subsiding Pleistocene and Holocene coastal plain. Consequently, the Laguna Madre

has become progressively narrower and shallower, as Padre Island has become thinner and increasingly erosional. Broad wind tidal flats have developed along the over the eastern margin of the Laguna Madre along Padre Island, where washover sands and wind-blown sands are filling the lagoon. Along the western margin of the Laguna Madre, wind tidal flats mark the gradual subsidence and transgression of the Rio Grande delta plain. Ultimately, the Laguna Madre will be filled, and the Gulf shoreline will impinge directly upon the coastal plain.

The Modern Environments of South Padre Island

The active processes of the wind, waves, and currents on the barrier island and adjacent lagoon have created and continue to shape the natural environments. Each of the environments that presently composed the barrier and lagoon systems has a unique set of physical and biological characteristics. These distinguishing characteristics are related to sediment texture and composition, sedimentary structures, density and types of vegetation, topography, position on the island and in the lagoon, size, areal configuration, relation to other environments and sea level, and the types of processes affecting the environments. The following is a description of the natural environments of South Padre Island. For ease of discussion, they have been divided between the offshore system, the barrier system, and the lagoon system.

The Offshore System:

The area gulfward from the lowest part of the forebeach is included in the offshore system, and includes the shoreface and the inner continental shelf. The shoreface is the gulfward section of South Padre Island that extends seaward from mean sea level to about the 7-fathom line, or about 42 feet deep. Along the island, the shoreface is between 1.3 to 1.4 miles wide. It rests on Pleistocene and Holocene Rio Grande fluvial-deltaic deposits, especially along the upper shoreface (generally less than 15 feet deep) where breaking waves have constructed a series of breaker bars that be in an echelon or may be approximately parallel to the shoreline.

The greatest wave intensity occurs in areas where waves begin to touch bottom to a zone along which they finally break. Waves begin to break when wave height is about 0.8 times that of the water depth. Normal wind-driven waves are about 2 to 4 feet high and break on the upper part of the shoreface. The upper shoreface extending from near sea level to a depth of 12 to 15 feet is a zone where waves, driven by the prevailing southeast winds and by northeast winds that accompany polar fronts, touch bottom and break. Only during storms, when wave heights are great, do waves break on the lower shoreface. The absence of breaking waves, except during storms, and the slow rate of sediment accumulation on the lower shoreface, results in mixing of suspension load (clay and silt) and traction load (sand) materials in this zone. Accordingly, biologic activity is dominant over physical processes; hence the lower shoreface is characterized by extensively burrowed (mottled) sand and muddy sand.

The inner continental shelf begins at 5 fathoms, or 30 feet deep, with the transition

between the inner continental shelf and the shoreface beginning at about 7 fathoms, or 42 feet deep. This transition is marked by a decrease in slope. In the offshore areas of South Padre Island, the accumulation of modern sediments on the inner continental shelf is rather slow and the area is floored principally by relict Holocene sand, shelly sand, muddy sand, mud, and sandy mud. Modern and Holocene deposits are thin, with only inches of Modern-Holocene sediments overlying Pleistocene deposits. Distributed patchily throughout the inner shelf in an area south of the Port Mansfield Channel are Pleistocene deposits exposed on the seafloor.

The Barrier System:

The Beach -- Of all island environments, the beach is perhaps the most familiar to visitors, but the South Padre Island beach is certainly not just one long stretch of shoreline with uniform conditions. A journey from north to south along the beach will show the visitor marked difference in the amount of shell material, the kinds of shells, and the beach profile and width.

The beach environment lies between the submerged upper shoreface (breaker and surf zones) and the fore-island dunes. The beach can be divided into two zones -- the forebeach and the backbeach. The forebeach slopes seaward and is subject to the daily swash and backwash of the waves. Beach cusps are common features of the forebeach. The backbeach, which includes a berm normally constructed and affected during spring and storm tides, is separated from the forebeach by the berm crest. Generally, the backbeach is either horizontal or gently landward sloping, creating a shallow trough between the berm crest and fore-island dunes.

The primary sedimentary structures in the forebeach are predominantly parallel, inclined layers that dip toward the Gulf of Mexico at an angle of approximately 5 degrees. These sedimentary structures are accentuated by dark heavy minerals that have been concentrated in the forebeach deposits by swash and backwash. These heavy mineral deposits have been concentrated according to grain density. Backbeach deposits are texturally similar to the forebeach deposits; however, the backbeach may be locally covered with a shell pavement representing lag, or wind-deflation deposit. Stratification of the backbeach deposits consists of (1) parallel layered sand and shell, (2) trough-filled cross strata, (3) ripple cross-layers, and (4) local channel-fill deposits.

Most of the sediment composing the South Padre beaches is classed as fine sand, which coarsens slightly from north to south. The sand consists primarily of quartz, but it also contains feldspar, rock fragments, and heavy minerals such as hornblende, pyroxene, garnet, staurolite, rutile, zircon, and tourmaline. In addition to land derived sediments, shell and shell fragments make up varying percentages of the total beach sediment.

Obvious variations in beach profiles occur along South Padre Island. Beaches in the southern portion of the community, near the ship channel jetties, are accreting. These beaches are characterized by a profile that is relatively flat with a very low berm, if any. Further north, because of the differences in shoreline processes and sediment availability,

the beaches are in an erosionary state, characterized by steeper, narrower forebeaches and higher berms.

Biologically, the most easily recognized form of animal life is the "ghost crab," *Ocypode quadrata*, a small white creature which lives in burrows in the backbeach and upper part of the forebeach. Primary inhabitants of the forebeach include the mud or ghost shrimp (*Callianassa islagrande*), snails (*Olivella and Terebra*), and the clam, *Donax*, which hurriedly burrows into the beach sediment after the backwash of each wave. Other animals living in the beach environment are various species of polychaete worms and mole crabs (*Lepidopa* and *Emerita*). The beach is relatively barren of plant life, although spreading vines of goat-foot morning glory (*Ipomoea pescaprae*), sea purslane (*Sesuvium portulacastrum*), and fiddleleaf morning glory (*Ipomoea stolonifera*) are among the salt-spray tolerant plants that occupy the backbeach.

The beaches on South Padre Island are mostly in an erosional condition. Geomorphic analysis of aerial photographs and sub-bottom surveys of the inner continental shelf reveal that South Padre Island has experienced a long, but sporadic, history of migration. The entire landform abruptly moves landward during major storms, but remains relatively stable during non-storm periods. South Padre Island beaches are being eroded because of several factors: (1) there is a deficit of sand; (2) for given wave or storm conditions, South Padre Island erodes more rapidly than do other segments of Padre Island because South Padre Island is a thin sand body; (3) waves generated by the dominant southeast winds strike the shoreline at a high angle, setting up strong longshore currents that move sand northward out of the area; (4) the dominant southeast winds and hurricanes carry sand from the beach zone onto the wind-tidal flats and into the Laguna Madre, thereby effectively removing a large volume of sand from the buffer zone; and (5) the Rio Grande deltaic muds continue to undergo compactional subsidence, which causes a relative rise in sea level, and a landward shift in the shoreline.

The Fore-Island Dune Ridge -- Immediately landward of the backbeach, and parallel to the shoreline, is a row of high, grass-covered dunes called the fore-island dune ridge. The dune ridge is the product of sands blown by the wind from the backbeach, toward the Laguna Madre, and are stabilized by a moderate cover of salt-tolerant grasses and vines. Fore-island dunes are best developed where there is a balance between persistent onshore winds to deflate backbeach sands, and where there is sufficient rainfall, or other fresh water sources, for vegetation to stabilize the dunes, which in turn promotes vertical accretion of these eolian deposits. This fore-island sand ridge protects the barrier island from the full force and impact of the hurricane tidal-surge.

Wind is an important factor that determines the volume of sand transported yearly from the backbeaches to the fore-island dunes. For example, on the upper and part of the middle coast of Padre Island, winds from the two north quadrants tend to transport sand from the fore-island dunes and the backbeach areas into the Gulf of Mexico. Whereas, south of central Padre Island, the constant onshore wind transports sand from the backbeach to the fore island dune. Along South Padre Island, the low rainfall, high evaporation rate, and persistent onshore winds tend to prevent the stabilization of wind-

blown sand by vegetation, thereby hindering the development of high fore-island dunes.

The oldest, reliable topographic maps (1867) and aerial photographs (1937) all show that the dunes on South Padre Island were discontinuous and separated by wide washover channels before the island was developed. The types of eolian dunes that have developed landward of the backbeach north of the current city limits are examples of the same sort of dunes that existed in the southern portion of the island development.

The fore-island dunes of South Padre Island have undergone numerous changes caused by droughts in the late 1800's and early 1900's, overgrazing when the island was ranched, numerous hurricanes that breached the island, and development. All of these activities tended to destroy either the vegetation that stabilized the dunes or the dunes themselves. The fore-island dunes were virtually destroyed by droughts and overgrazing, and succeeding, younger dunes were readily destroyed by hurricanes and tropical storms. During the early development phase of South Padre Island, many dunes were graded out to elevate adjoining building sites, to provide unobstructed, direct access to the beach, or to improve views. In many areas, a sharp demarcation between the beach and the other barrier island environments no longer existed.

In the past two decades, however, largely due to efforts of the municipal government, the fore-island dunes have been re-established in many areas, and the chain is once again being established. Additionally, as a result of the irrigation of yards and other landscaping, water sources from fish cleaning tables, and beach shower facilities, this unforeseen side effect of development, has caused a local increase in the water supply available for the sustenance of vegetation on these dunes.

The fore-island dunes consist of fine, very well-sorted sand that has been blown from the beach and stabilized by vegetation. In addition, fairly coarse pieces of shell are carried onto the foredunes. Internally, the dune ridge is composed of well-sorted sand arranged in steeply dipping eolian crossbeds displaying a complex history of deflation and deposition. Sands blown from the beach will slowly accrete the ridge gulfward, while high storm or hurricane tides may erode the dune ridge many feet. Under natural processes, it may take many years for the ridge to heal and return itself to its pre-storm position.

Types of plants constituting the important vegetative cover of the ridge are generally zoned according to their elevation on the dunes. Marshhay cordgrass (*Spartina patens*), morning glory (*Ipomoea* spp.), and sea purslane (*Sesuvium portulacastrum*) are common on the lower parts of the dunes. Middle and upper parts of the dunes support sea oats (*Uniola paniculata*), bitter panicum (*Panicum amarum*), and gulf croton (*Croton punctatus*). Seacoast bluestem (*Andropogon scoparius littoralis*) is a grass generally limited to the more protected and better vegetated back sides of the foredunes.

Vegetated Barrier Flat -- Behind the fore-island dune ridge lies barrier flats vegetated by various types of grasses and small shrubs. This environment, constitutes a minor environment on South Padre Island. On parts of the barrier islands of the upper and central Texas coast, the barrier flats are characterized by ridge and swale topography,

and are quite extensive. Density of vegetation within the barrier flat environments decreases southward, and on South Padre Island the vegetation cover locally is sparse. Where vegetation cover is sparse, the area that would normally be occupied by the barrier flat environment has been replaced by wind-deflation troughs, storm runnels, hurricane washovers, and back-island dunes. Ridge-and-swale topography, which is the record of rapid seaward accretion of barrier islands, is not present south of northern Mustang Island, possibly because these features, if ever present, have been obliterated by wind and storm activity.

Some sediment is carried by the storm waters parallel to the shoreline along the wind deflation flats. Excess water in the Laguna Madre moves parallel to the Gulf shoreline through these low areas until either a storm channel, a natural inlet, or a man-made inlet is reached; then the water moves back to the Gulf through these accessways. Because the wind-deflation flats, storm runnels, and washover fans are normally connected to the wind-tidal flats, the boundary between them is not always clearly defined.

Sand and shell, most of which has been washed or blown from the fore-island dune area, lies beneath the vegetative cover. Coarse and fine material is transported from the shoreline by floodwaters during large storms. Winds move fine sand from the fore-island area and from nearby dunes. Beneath these recent surface deposits, however, are older sediments that are exposed in places, particularly in the younger deflation scars that have not been healed by vegetation or covered by a new layer of wind- and water deposited sand.

The long strips of vegetated barrier flat served historically as cattle rangeland. Although cattle no longer graze on the island, the barrier flats are still permanent homes for various wild animals, such as pocket gophers, moles, weasels, ground squirrels, mice, and snakes. Other animals that may occupy the island include coyotes, shrews, bats, raccoons skunks, rats, jackrabbits, and armadillos. In addition, insects abound on the barrier flats; during spring and summer, mosquitoes may make themselves obvious to the visitor. These insects thrive in the ephemeral fresh-water marshes that occur in wind-deflation troughs following rains.

Wind-Deflation Flat, Storm Runnel and Washover Fan -- Barren flats, generally parallel to the Gulf shoreline, occur landward of the barrier flat environment. These wind deflation flats are created when sand and finer sediments are scoured by the wind. In the northern parts of Padre Island, the deflation flats have become vegetated. In the south, however, the drier climate prevents the vegetating of the deflation flats, which occupy a large part of the undeveloped area of the island. These flats serve as runways for the excessive water that is pumped into the Laguna Madre by hurricanes and tropical storms.

Wind-deflation flats and storm runnels are floored with interbedded shell, sand, and clay-algal mat layers. Shell and shelly sand display crude graded bedding and trough cross-bed in the lower parts of wind-deflation flats and ripple cross layers in their upper parts. A vertical sequence of graded shell and sand, trough crossbedded sand and shelly sand, and ripple cross-layered sand records a single depositional event, such as the passage

of a hurricane. Following the passage of a hurricane, water collects in low areas for a few days or several weeks. Within these ponds, blue-green algae flourish. This algae binds clay that settles from suspension and sand that is blown by the wind into the ponds. The final fill of these deflation troughs and storm runnels is with sand that is transported by the wind.

During hurricanes, storm surge tides breach South Padre Island in many places. Storm currents erode channels through the thin barrier island sands and transport sand and shell to the lagoon side (actually onto the wind-tidal flats) where it accumulates as washover fans. Numerous washover channels occupying approximately 8 square miles have been mapped on South Padre Island. These fans are very low-relief lobes of sand and shell deposited where the washover channels widen and the storm waters lose velocity. Much of the broad wind-tidal flat area on South Padre Island derived its sand directly or indirectly from hurricane washover fans. Within South Padre Island, at least 12 washover channels have served as conduits through which sediment moves from the shoreface and beach onto the wind-tidal flats.

The channels are floored by sand and shell that, during storms moves as dunes and sand waves through the breach. The washover channel not only carries the storm surge tide from the Gulf into the lagoon, but as the hurricane moves inland, water from the lagoon returns to the Gulf through the washover channels. This ebb flow, which is caused by excessively high tides in the lagoon, returns some sediment to the Gulf. Within a few weeks after the passage of a storm, hurricane channels are sealed at their seaward end by sand that is transported onshore by breaking waves, and parallel to the shore by longshore drift. Once the channel is sealed at its Gulf terminus, clay and silt settle from suspension and drape the bottom of the channel. This fine-grained sediment will be eroded if the channel is reactivated with the passage of another hurricane.

Two washover fan types have been identified on South Padre Island. One type is vegetated, the other is barren. Vegetated fan deposits have been severely altered by wind activity and are not recognizable in the field as washover deposits. Instead, they more closely resemble eolian deposits as they exhibit hummocky, locally dense vegetation, and attain heights greater than 6 feet. The vegetated washover fans are, in effect, low vegetated dunes.

Unvegetated washover fans are low sandy shell, shelly sand, and sand lobes that accumulated where the hurricane channel opens out onto the wind-tidal flats. Between storms, wind processes erode and redistribute some of the sands of the washover fans, thereby nourishing the back-island dune fields and wind-tidal flats. Unvegetated washover fans exhibit two patterns: (1) distinct, individual lobes which have developed at the lagoonward terminus of washover channels that transect back-island dunes, and (2) more-or-less continuous sheets of sand where back-island dunes are missing and the washover channels are unconfined.

Back-Island Dune Fields -- Those parts of the fore-island dune ridge that become devegetated naturally or through the actions of man are vulnerable to erosion by the

strong southeasterly winds. Sand is blown from the dune ridge, over the barrier flat in a northwesterly direction. The result is a blowout dune complex, which may consist of several types, including parabolic, transverse, and barchan dunes. The South Padre Island back-island dunes are mostly of the transverse type, although small barchan dunes are common features of interdune areas. However, most dune forms change rapidly with changes in wind direction and intensity. Additionally, the areal extent and distribution of these large fields of bare, shifting sand dunes change continuously. The sediment composing these blowout dunes is mostly fine, well sorted sand.

Back-island dunes eventually may migrate into the Laguna Madre, where lagoonal currents redistribute the sand into subaqueous bars along the lagoon margin. However, normally on South Padre Island, these dunes tend to break up into smaller bodies that are in turn destroyed, and the sand is transported by the wind across the wind-tidal flat as a thin traction carpet.

The Lagoon System:

The various environments composing the lagoon system form two broad categories: lagoon-margin environments and lagoon-center environments. Environments of the central part of the lagoon are subaqueous. The lagoon-margin includes both shallow subaqueous environments and subaerial environments developed as part of the shoreline complex. Waves and currents are critical in controlling lagoon-margin environments

Subaerial Lagoon-Margin Environments -- The principal subaerial lagoon-margin environments include mainland beaches, relict berms and accretionary lagoon-margin deposits, frequently flooded wind-tidal flats, and marginal eolian and transitional environments.

Mainland Beaches -- are poorly developed along the margins of the Laguna Madre and its associated bays. The beaches are erosional, and deposits are principally related to storm deposition of shell debris and some sand eroded from Modern-Holocene and Pleistocene bluffs. Mainland beaches are small and discontinuous, with most of the mainland shoreline being bound by low, erosional escarpments cut into the Modern-Holocene or Pleistocene sediments.

Sub-Aerial Lagoon-Margin Sand and Shell Berms -- These environments are located along the mainland shore and along the lagoonward side of Padre Island, occupying about 2 square miles. Mainland berms, formed by the action of storm waves and currents, are generally narrow, elongate features 2 or 3 feet above mean sea level. Some of the mainland berms are relict, and most actively accrete only during storms, when high energy waves are generated by northern and southeastern wind regimes. Several of the berms in the Brownsville-Harlingen area, such as those east and south of Rattlesnake Island, however, are probably no longer accreting. Construction of islands and shoals from dredged spoil along the Intracoastal Waterway has reduced the fetch of predominant winds blowing across the Laguna Madre, thereby reducing the wave energy impinging on the

berms. No longer actively accreting, these berms are likely to be eroded and incorporated into the adjacent wind-tidal flats or subaqueous lagoon-margin sand.

Wind-Tidal Flats -- Broad, flat, barren, virtually featureless wind-tidal flats, generally less than 3 feet above mean sea level, occur along the lagoon margins adjacent to both the mainland and South Padre Island. These wind-tidal flats are frequently inundated by lagoonal waters that are driven by the wind; thus, giving these flats their name. Wind-tidal flats adjacent to the mainland are irregularly shaped and patchily distributed. On the mainland side of the Laguna Madre, the wind-tidal flats are developed upon the subsiding Holocene Rio Grande delta plain. The two areas of maximum development are in the vicinity of Arroyo Colorado and the South Bay-Bahia Grande area. The sediment that underlies the mainland wind-tidal flats is mostly clay and silt derived from ephemeral streams that drain the mainland, from erosion of clay dunes that occur along the flats, and from the Laguna Madre. Wind-tidal flats associated with South Padre Island range from about 0.2 to 4 miles in width, and form a continuous band about 39 miles long. Sediment supplied to the flats associated with South Padre Island is derived from the shoreface, beach, and dune areas, which is then transported to the flats by hurricane storm surge and/or the prevailing southeast winds.

Wind-tidal flats are flooded rapidly, mostly by wind-driven water, but flooding may also result from a drop in barometric pressure. Flooding of the mainland flats occurs when winds blow from the southeast, and when north winds accompany polar fronts. Flats associated with South Padre Island are similarly flooded by north winds and by south and south-southeast winds. East and southeast winds drive water off the flats, thereby exposing the flats to the atmosphere.

The frequency of inundation, controlled by slight differences in elevation, determines the types of wind-tidal flats that will develop in a given area. Along South Padre Island, three main types of wind-tidal flats have been identified: (1) flats with loose wind-blown sand forming small dunes, (2) flats with finer sand and mud, and (3) flats covered with extensive algal mats. There are, however, many varieties and transitional types.

The higher or upper wind-tidal flats are less frequently flooded than the middle and lower flats. Mainland wind-tidal flats, and many of the flats associated with South Padre Island are higher flats. Only strong north winds drive lagoonal waters onto the upper flats on South Padre Island, while the upper most portions of the mainland flats rarely flood. Because these upper flats infrequently flood, the sand there dries for long periods between high wind tides and remains loose enough to be blown into small dunes that migrate rapidly across the flats. In most places, there is not sufficient loose sand to cover the flat completely, however, and the dunes migrate over the firm, wet sand or over local algal mats developed in depressed, moist areas. The wind-blown sand in the small dunes is fine and well-sorted. Thin clay layers may be deposited on these tidal flats during the rare tidal inundations.

Wind-tidal flats containing extensive algal mats are present throughout the middle flats associated with South Padre Island and on the mainland flats between Four Mile Slough and Stover Cove, and along the Brownsville Ship Channel in areas of South Bay, Los Montes, Bahia Grande, and San Martin Lake. The central or middle flats associated with South Padre Island are slightly lower in elevation than the upper flats and consequently are flooded more frequently. The surface of these flats is characterized by a continuous cover of blue-green algae. These algae exhibit several morphological types, including rope-like ridges, dome-like gas-filled features up to 3 feet in diameter and 3 inches tall, irregular-shaped tufts, and desiccation polygons. Within the middle flats are numerous small, shallow depressions, which commonly are sites of mud accumulation. Sediment underlying the middle flats is dominately well-sorted, fine grained sand derived the beaches and dunes of South Padre Island. Interbedded with the sand are thin beds of algal-bound mud and sandy mud. Commonly associated with the algal-bound mud and sandy mud are layers of white aragonitic carbonate mud. Equivalent mainland wind-tidal flats are predominately mud with minor amounts of sand. The surfaces of these flats are covered with blue-green algae, and desiccation cracks are common.

Unlike the upper and middle parts of the wind-tidal flats associated with South Padre Island, the lower flats do not exhibit desiccation features because the lower flats are less frequently exposed and therefore do not dry as readily as do the upper and middle flats. Water is commonly 0.5 feet deep on these lower flats. Surface sediments consist of light brown to light gray mud and sand. The sand is well-sorted and fine grained, while the mud occurs primarily as silt-to-sand sized aggregates or pellets. Blue-green algae are common sediment binders in these lower wind-tidal flats, but they assume a different form from the algae on the middle flats. The algae form a thin, continuous layer, but since they seem to always be covered by a millimeter or more of sediment, the algae can only be observed by excavation. The clam *Pseudocyrena floridana* is abundant on the lower flats and in depressions on the middle flats.

Interestingly, bladelike crystals and rosettes (clusters of crystals resembling a rose) composed of the mineral gypsum (calcium sulfate) have been found in the sediments of the wind-tidal flats. Gypsum rosettes have also been reported in dredged spoil. It has been theorized that the crystals are formed by waters of high salinity that periodically flood the wind-tidal flats. As the mineral-laden water seeps into the underlying sediment, gypsum is created, forming the crystals which grow larger with each successive period of infiltration and precipitation.

Transitional Environments -- These environments are closely associated with the extensive wind-tidal flats of the South Texas coastal region. They are considered part of the lagoon system because their origin is closely tied to wind-tidal processes. This transitional zone is composed of wind-tidal flats containing many remnants of the deflated margin of the sand sheet, numerous clay dunes which have accreted windward of these erosional features,and large landward-trending

blowout depressions intermittently flooded by wind tides. These mixed wind-tidal and eolian elements are only present on the mainland.

Subaqueous Lagoon-Margin Environments -- The submerged margin of the Laguna Madre is characterized by marginal shallow-water environments composed of narrow lagoon-margin sand, broad low-energy areas of muddy sand with sparse to absent marine grass, and grassflats which extend from the lagoon margin into the lagoon center. Submerged lagoon-margin environments occur in less than 3 feet of water.

Lagoon Margin Sand -- Lagoon margin sands occupy a narrow fringe along the mainland side of the lagoon, extending from Port Isabel northward to the Arroyo Colorado Cutoff. In the sand deficient area between the Arroyo Colorado Cutoff to a point about 2 miles north of Mullet Island, this marginal environment has been replaced by marine grassflats, which are the predominate subaqueous lagoon-margin environment. Lagoon-margin sands occur along South Padre Island just north of Brazos Santiago Pass. North of this area, the island's lagoon margin is characterized by marine grassflats and lagoon-margin muddy sand.

Detailed sampling of lagoon bottom sediments in 1979 showed that areas along the mainland shore mapped as lagoon-margin sand has a relatively high mud content. This contrasts with the lagoon-margin along South Padre Island, which is predominately mud. Mainland lagoon-margin sands are derived from eroded Modern-Holocene deposits along the mainland shore. Longshore transport along the lagoon shoreline continually redistributes this winnowed sediment. Onshore waves generated by southeasterly and northerly winds move the sand landward into shallow subaqueous bars and berms. Lagoon-margin sands along South Padre Island are derived from sediment transported across the island by storm-surge tides and wind processes.

Lagoon Muddy Sand -- This environment is restricted to areas of low wave nd current energy, and locally supports sparse marine grass. In the Laguna Madre, this muddy sand substrate occurs primarily along the margin of South Padre Island, and between Arroyo Colorado and Four Mile Slough along the mainland. Between Arroyo Colorado and Four Mile Slough, lagoon muddy sand occurs in relatively narrow sinuous channels that are mostly restricted from the Laguna Madre by broad wind-tidal flats. The channels connect to mainland drainage systems that, under normal conditions, contribute negligible amounts of fresh-water inflow. As a result, marshes have become established along the channels in recent years. These restricted, low-energy inlets may have evolved from relict channels that were associated with once-active delta distributaries. In the South Bay, muddy sand substrates underlie much of the shallow bay area. The muddy sand environment grades lagoonward into grassflats, and water depths are generally less than 3 feet.

The sedimentary substrate within this environment is variable. Recent sampling of lagoon sediments shows this unit has a much higher mud content in South Bay and between Arroyo Colorado and Four Mile Slough, than along the margin of

South Padre Island, where it is predominately sand. The sediments are mixed by burrowing organisms, including clams. Recent studies of molluscan distribution in the Laguna Madre indicate that live mollusks are more abundant in a mixed substrate of mud, sand, and shell than in a substrate composed of predominantly one sediment type such as sand. Because marine grasses grow to the edge of the Laguna Madre, it is difficult to identify a unique molluscan assemblage that is characteristic of the marginal muddy sand environment. Analysis of samples take from the margin of the lagoon along South Padre Island show a live mollusk community that includes the clams *Laevicardium*, *Chione*, *Anadara*, *Mulinia*, *Tellinia*, *Tagelus*, and *Ensis*. *Ensis* was the only species collected exclusively in margin sediments. In the South Bay, where a relatively wide muddy sand substrate surrounds a central area of grassflats, the live molluscan assemblage is characterized by the clams *Chione*, *Macoma*, *Mulinia*, *Andara*, *Laevicardium*, and others. Unique in the South Bay area is the oyster *Crassostrea*, which has been commercially harvested. South Bay contains the only significant occurrence of *Crassostrea* south of Corpus Christi.

Grassflats -- In shallow, quiet areas of the lagoon, away from the high-energy shorelines, are broad, subaqueous flats upon which thrive marine grasses and a variety of invertebrates. The grassflats are generally covered by less than 4 feet of water, and the shallowest parts commonly are exposed at the lowest tides. The water depth, as well as the salinity and turbidity, determines the types of grasses that grow on the muddy sand and shell bottom.

Five species of marine grass occur in the Laguna Madre and South Bay: Shoalgrass (*Halodule* {*Diplanthera*} *wrightii*), manatee-grass (*Cymodocea manatorum*), widgeongrass (*Ruppia maritima*), turtlegrass (*Thalassia testudinum*), and clovergrass (*Halophila engelmannii*). Shoalgrass and manatee-grass are the two most common grasses, occurring over much of the total grassflat environment, largely because they can withstand the highest salinity and turbidity. It is usually shoalgrass that can be seen washed onto the tidal flats, where it dries in carpet-like mats. Turtlegrass is relatively rare, growing primarily at the south end of the Laguna Madre and in South Bay. Clovergrass occurs sparingly in various parts of the lagoon, and widgeongrass primarily along the Intracoastal Waterway north of Three Islands. Variations in the density of marine grass communities occur seasonally, with maximum growth occurring in the spring and summer months, and with growth essentially static in the fall and winter.

In addition to the marine grasses, algae, such as the leafy calcareous *Acetabularia*, thrive within the grassflat areas. A variety of fish and invertebrates, especially shrimp and crabs, spawn within the grassflat environment, where there is food and protection for larvae and fingerlings. The grassflat environment is the habitat for a large number of mollusks, such as the clams *Cumingia*, *Tellinia*, *Tagelus*, and *Mysella*, and the snails *Bittium*, *Caecum*, and *Mitrella*. The grassflat environment exhibits very high biologic productivity, as evidenced by its contributing large amounts of biomass to the ecosystem -- a role occupied by the extensive marsh

system along the upper Gulf coast. It is also an environment that is tenuously balanced by such conditions as salinity, turbidity, and water depth.

Subaqueous Lagoon Center Environments -- Two environments, lagoon center mud and lagoon center sand shoals, occupy deeper water lagoon centers in the Laguna Madre and Redfish Bay. Because the lagoon center sand shoals only occur in a 2 square mile area in and around Redfish Bay at Port Mansfield, the discussion will focus on the lagoon center mud environment.

Lagoon Center Mud -- Like the grassflats, this environment occupies broad areas of the lagoon. The environment is the site of mixed mud and sand deposition. Below a depth of about 3 feet, circulation is partially inhibited within the disconnected and closed bathymetric depressions that underlie the center of the lagoon. The substrates beneath this deeper water environment are not subjected to significant wave and current energy, except perhaps during hurricanes and severe tropical storms. As a result, the lagoon center is the site of suspension sedimentation. Suspended organic matter, brought to the lagoon by streams during floods and by lagoon waves and currents, slowly settles to the lagoon floor. The turbidity of the lagoon water limits the growth of marine grass below a depth of 3 feet, but a relatively abundant fauna inhabits the muddy sand bottom. Burrowing organisms move slowly through the substrate in search of food and shelter, and produce a mottled texture in sediments by destroying the sedimentary layers.

At the south end of the Laguna Madre, the tidal influence of the Brazos Santiago Pass contributes to a different molluscan population than that found in the more restricted and more saline area of Redfish Bay, further north. The area near Port Isabel is characterized by a relatively diverse inlet-related fauna, which includes the clams *Chione* and *Nuculana*, and the snail *Anachis*. In the more saline area of Redfish Bay, the molluscan assemblage is less diverse, and is characterized by the clams *Mulinia* and *Anomalocardia*. Recent lagoon bottom samples shows a high number of *Anomalocardia* shells, but few live specimens. This may be indicative of changing conditions in the Laguna Madre.

Other Subaqueous Environments -- Inlet Related Shoals -- Natural breaks between barrier islands and peninsulas, through which there is tidal exchange between the lagoon and the Gulf of Mexico are called tidal inlets or tidal passes. Artificial cuts have been made through barrier islands and peninsulas on the Texas coast to facilitate ship and barge traffic, or to enhance water exchange between the lagoon and the Gulf. Irrespective of the purpose for which an artificial cut was made, the cut functions similarly to a natural pass in water and sediment movement. Two inlets through South Padre Island accommodate boat and barge traffic and serve as avenues of water and sediment exchange between the Gulf and the south Laguna Madre. Both inlets are jettied, and depths are maintained by dredging.

The northernmost inlet, the Port Mansfield Channel, was cut through South Padre Island

in 1957. By 1961, this inlet was closed at its seaward side by a sandbar. Storm surge associated with Hurricane *Carla* in 1961 effected the removal of the sandbar. Following Hurricane *Carla*, a new jetty system was constructed at this inlet. The channel that connects Port Mansfield with the Gulf of Mexico currently has a maintained depth of 12 feet.

Brazos Santiago Pass, the southernmost inlet, is a natural pass that was jettied in 1937, and has a maintained depth of 40 feet to accommodate shipping traffic to and from the Brownsville area through the Brownsville Shipping Channel. Although there are two inlets between the south Laguna Madre and the Gulf of Mexico, the volume of water exchange between the Gulf and the lagoon is small. Most of the sand that would normally move from the Gulf of Mexico through these inlets into the south Laguna Madre is now trapped by the jetty systems.

Sand accumulates within these inlets, totaling 0.8 square miles of inlet-related sand shoals. Sand that accumulates in the inlets is transported by longshore currents within the shoreface environment; consequently, inlet-related sands have properties similar to those of shoreface sands.

Physical Properties

Physical properties grouping is a regional approach to defining how land may be used. This approach is designed to provide regional data for a variety of potential land uses by evaluating not only the areal extent of common physical features and properties, but also their vertical extent to significant depths below the land surface. Some groups, such as Group XI lands have distinctive physical properties only to the depth of the water table, while other land groups have properties that are reasonably distinctive to depths of several tens of feet.

Within the Brownsville-Harlingen area, the many geologic, biologic, and active processes have been group by the Bureau of Economic Geology of the University of Texas--Austin, into twelve major groupings. South Padre Island contains four of these groupings, Groups II, VI, VII, and XI, each of which will be discussed in detail later. Each of the groups were evaluated for potential suitability for six broad uses that are by no means the only potential uses, but are generally considered the major ones. These are: road construction, fill material, foundation construction, subsurface construction, excavation, waste disposal, and water storage.

"Road construction" includes use of the land groups for miscellaneous earthen structures and for general fill along road right-of-ways, use of materials as a base or foundation for paved or improved roads, and use of the material as fill to establish the grade upon which the base and overlying pavement are laid. "Fill material" includes fill for nonconstruction purposes such as top soil for general landscaping and subsoil for miscellaneous fill not designed to withstand extreme loads. "Foundation suitability" of different land groups is subdivided into heavy construction or large structures such as major industrial complexes or large office buildings, and light construction, principally one- or two-family dwellings and

other single-story construction. "Subsurface construction" encompasses large underground installations, such as basements and tunnels, as well as the burial of cables and pipelines. "Excavatability" of the various land groups is controlled by the degree of consolidation, presence of caliche, moisture content, and similar factors affecting ease of digging with conventional machinery. Use of lands for "waste disposal" includes septic-system waste disposal, solid-waste disposal, and unlined liquid-waste retention ponds on the land surface. Use of land groups for surface "water storage" includes dams or dikes to impound water, unlined surface reservoirs fed by surface waters, and unlined surface reservoirs that intersect the groundwater table.

South Padre Island includes four of the twelve major physical properties groups designated in the Brownsville-Harlingen area. These groupings are Group II, VI, VII, and XI lands, and have the following general characteristics:

Group II Lands -- Materials of this group are dominately fine-grained clean sands. In the Brownsville-Harlingen area, these sand form a major part of the Modern South Padre and Brazos barrier islands, including the beach, foredunes, washover channels, washover fans, wind-deflation troughs and storm runnels, and vegetated barrier flats. Also included in Group II lands are small areas of subaerial bay-margin sand along the mainland shoreline of the Laguna Madre.

Materials and lands classed in this physical group have high to very high permeabilities. The sands are surrounded, underlain, and contained by tight, impermeable muds, making them discrete, shallow, perched aquifers. Possible occurrence of local groundwater supplies and the high permeability of sands make this group highly unsatisfactory for solid or liquid waste disposal. In addition to direct contamination of the aquifer, wastes are readily transmitted through these permeable materials and may be discharged at the surface at lower elevations, or directly into the waters of the Laguna Madre or the Gulf of Mexico. Group II sands have a low water holding capacity and a rapid internal drainage. Owing to insignificant amounts of clay-sized sediments, Group II materials have low compressibility, low shrink-swell potential, high shear strength, and low plasticity. Accordingly, for physical use, areas underlain by these sands provide suitable sites for nearly all kinds of construction; however, surface recharge is local, and extensive construction would limit the amount of groundwater recharge.

Group VI Lands -- These lands include both wind-tidal flats and salt marshes, both developed along the coastlines of bays and lagoons and subject to frequent, periodic inundation by salt water. Salt marshes occur along the mainland in the tributaries of the Arroyo Colorado and Fourmile Slough. Wind tidal flats, inundated primarily by wind-generated tides, are well developed along the back side of South Padre Island, in lowlands around the lagoon shore, at the mouth of major drainages entering the lagoon, and in the lowlands of the Bahia Grande area north of the Rio Grande. Although mainland flats have become vegetated with salt-

marsh vegetation, most of the island wind-tidal flats are barren sandflats that support little or no marsh vegetation. Blue-green algae are common on the flats. Some mud is deposited on the wind-tidal flat from suspended sediment transported onto the flat by flood tides. Algal laminations are common in the shallow subsurface layers and reflect the frequent development of algal mats in response to flooding by tidal inundation. Parts of wind-tidal flats may be emergent long enough to become desiccated. At this time, the flats are exposed to intensive wind activity and to eolian transport of the dried surface, composed of quartz sand and sand- and silt-sized clay pellets. Depressions on the wind-tidal flats, which locally accumulate muddy sediment, tend to remain soft and pond water that may reach extreme hypersalinities. Lack of stabilization and repeated flooding of these lands preclude most types of physical use.

Group VII Lands -- Lands composing this physical group include subaerial spoil heaps, subaerial reworked spoil, subaqueous spoil, and "made land." The principal occurrence of dredged spoil banks is along the artificially constructed Intracoastal Waterway, the Mansfield Channel, the Brazos Santiago Pass, the Long Island area south of Port Isabel, and the Brownsville Ship Channel. Small areas of made land occur at Port Mansfield, along the bay shoreline of southernmost South Padre Island, and in the area just west of Long Island near Port Isabel. Physical properties of such spoil areas and made land are highly variable and are dictated in part by the kind of natural material dredged or utilized. Excavation generally leaves materials less compact than they were in their original state and increases permeability. Most spoil areas are unvegetated and subject erosion and reworking. Their utilization for physical purposes should be approached with caution and with adequate site testing.

Group XI Lands -- Lands classed in this group are areas of sand dunes having unstable, migrating surfaces influenced by onshore winds. These lands occur primarily along the gulf-side of South Padre Island as the fore-island dune ridge, and along the landward side of the island as back-island dune fields, coppice mounds, and sand-flats. High permeability and low water-holding capacity make these lands unsuitable for waste disposal of any kind. Instability owing to active migration renders such lands unsuitable for road and foundation construction, and poses potential problems for any pipes, cables, or other installations buried beneath their surface. Ease of excavation and high shear strength are physical properties favoring use of these lands as a source of fill material; however, current State laws regulating the disturbance of sand dunes generally prevent the active use of these lands for such purposes.

TABLE ____
NATURAL SUITABILITY OF PHYSICAL PROPERTIES GROUPS
TOWN OF SOUTH PADRE ISLAND
1995

ACTIVITIES AND USES	GROUP II	GROUP VI	GROUP VII	GROUP XI
Road Construction			H	
Earthen Structures	+	-	I	+
Base Material	+	-	G	+
Grade Material	+	-	H	+
Fill Material			L	
Topsoil	0	-	Y	-
Below Topsoil	+	-		-
Foundation			V	
Heavy	+	-	A	-
Light	+	-	R	-
Underground Inst.	+	-	I	0
Buried Cables/Pipe	+	-	A	0
Excavability	+	-	B	+
Waste Disposal	-	-	L	-
Water Storage	-	-	E	-

+ = SUITABLE - = UNSUITABLE 0 = POSSIBLE PROBLEMS

SURFACE SUBSIDENCE AND FAULTING

Problems of land-surface subsidence and surface faulting affect, in varying degrees, substantial parts of the Texas Coastal Zone. Subsidence from compaction and the erosion of sediments is a natural, on-going process along the Gulf coast, as previously discussed in this report. In the Port Isabel area, a relative sea level rise of about 1.6 feet per century is attributable to land subsidence. Withdrawal of fluids from subsurface reservoirs can also cause subsidence. Both subsidence and surface faulting are most pronounced in the Houston area where large volumes of groundwater are withdrawn. The potential for land subsidence and surface faulting on the planning area will be discussed in the following sections.

Land Subsidence -- Land surface subsidence, beyond the natural process of sediment compaction, is closely related to water level declines (declines of the piezometric surface) in the Upper Coastal Zone. Groundwater usage and water level declines in the Brownsville-Harlingen area have, however, been minimal. Water needs for irrigation, industrial, and municipal purposes are met principally with surface water supplied by the Rio Grande river.

Groundwater that is used in the Brownsville-Harlingen area is supplied primarily by three aquifers: Pliocene sands and Modern-Holocene alluvium at various depths along the Rio Grande in the western half of Cameron County, extending into Hidalgo County; Pleistocene sands less than 100 feet deep in extreme southern Willacy County, extreme eastern Hidalgo County, and northwestern Cameron County; and Pliocene Goliad sands

at approximately 600 to 1,500 feet below the surface in Kenedy County and Willacy County.

Although groundwater quality is highly variable, in general, the trend in South Texas is toward slight salinity, slight alkalinity, and high sulfate, chloride, and sodium content. The poor quality of the groundwater is, of course, a factor that limits its use. Estimates by the Texas Water Development Board of groundwater pumpage in the Brownsville-Harlingen map area up to the year 2030 suggest that water level decline, and related land surface subsidence as a result, will be insignificant.

Although subsidence is caused predominantly by groundwater withdrawal, local subsidence may result from other activities. Oil production and related withdrawals of water and sand have resulted in subsidence at the Goose Creek oil field and in the Corpus Christi area. Sulfur production has also caused local subsidence. In addition, proposed production of potential geothermal resources in the Coastal Zone may result in fluid withdrawals on a scale that may cause eventual subsidence.

Surface Faulting -- The most severe area of known active surface faulting in the Texas Coastal Zone is in the Houston area and at least one active fault occurs in the Corpus Christi area. Studies in the Upper Coastal Zone demonstrate a close relationship among trends of linear anomalies recognized from aerial photographs and known active and inactive faults. These associations suggest that all of these features are related and are products of natural geologic processes.

Approximately 1,004 linear miles of surface lineations were mapped from aerial photographs of the Brownsville-Harlingen area by the Bureau of Economic Geology of the University of Texas at Austin. These lineations were identified on the basis of linear color variations on black-and-white photomosiacs. Such variations generally reflect linear anomalies involving straight segments and right-angle bends in the otherwise natural patterns of drainage, vegetation, and geologic surfaces. These lineations are undoubtedly of a structural nature, and probably represent faults or joints and fractures that may become faults.

No active surface faults are currently known in the Brownsville-Harlingen area. Geophysical surveys show that potentially active faults intersect the seafloor immediately offshore in areas mapped as shelf mud, sand and shell. Movement along some of the faults has apparently occurred within the recent geologic past and reactivation is eventually probable.

Although Coastal Zone faults are a product of natural geologic processes and existed long before man, there is clear indication that certain of man's activities, such as fluid withdrawal, cause increased activity of surface fault movement. Because current and predicted groundwater withdrawals in the Brownsville-Harlingen area are not expected to cause significant water level declines and land surface subsidence, activation of surface faults owing to fluid withdrawal will probably not be a major problem.

Wetlands

Wetlands are known by many names -- swamps, marshes, bogs, sloughs, bottomlands, wet meadows or prairies, and wind tidal flats. All have in common that they are frequently or continually flooded, the water is shallow, and they support plants and animals that have adapted to living in areas that are wet all or part of the year.

These areas were, at one time, generally considered wastelands -- sources of mosquitos, flies, and unpleasant odors. Most people believed that wetlands were places to be avoided or eliminated. In addition to conversion to farmland, wetlands were filled for housing developments and industrial facilities, and used as receptacles for both household and hazardous wastes. Wetland drainage and reclamation were beneficial to the agricultural economy, and many people believed that destroying swamps was in the best interest of the general public.

As wetlands have disappeared, their many environmental and economic benefits have been recognized. Wetlands act as nature's sponges. They absorb large amounts of stormwater run-off and release it slowly in to nearby waterways. This action of wetlands has important benefits. First, it reduces the chance of flooding by slowing and storing stormwaters, thereby reducing flood peaks and increasing the duration of flow. This is particularly important in urban areas where flooding can cause millions of dollars of damage and where enginneering solutions can be quite costly. Secondly, as the water slows in the wetlands, soil sediments that would otherwise be carried to, and ultimately fill, the primary waterway drop out. Finally, in slowing the water many excess fertilizer nutrients and pesticide residues are filtered out, resulting in cleaner water. Nitrogen and phosphorus are the two main nutrients recycled by wetlands. these two chemicals effect water quality by promoting the growth of algae and other undesirable plants which remove the air from water habitats, ultimately "killing" that habitat.

Beyond these important economic benefits, wetlands also provide many environmental benefits as well. Wetlands are important to many fish and wildlife species. They provide food, cover, and habitat for a variety of purposes. Wetlands support breeding and nesting areas, and are a vital element in the food chain. Wetlands are particularly valuable for non-game and endangered wildlife. Some species of rare birds and animals depend on wetland areas for survival and the loss of wetlands can have a drastic effect on the populations of these animals.

Legislative History:

Recognizing the importance of wetlands, legislation has been enacted and regulations changed, at both the State and Federal levels, to protect wetlands from development. This has not occurred "overnight." The legislative history of government involvement in wetlands protection has been long and evolutionary, dating back to the turn of the century.

In 1899, the Federal government passed the Rivers and Harbors Act (RHA) to regulate

the dredging, filling, and obstruction of U.S. navigable waters. The term "navigable waters" in the RHA, included only those used for interstate commerce and below the high-tide mark. Any dredging, filling, or obstruction of such waters requires a Section 10 permit from the U.S. Army Corps of Engineers. Initially, neither environmental concerns nor wildlife conservation was considered when permits were issued.

In 1959, the Fish and Wildlife Coordination Act was passed. This required federal agencies to coordinate their work with both State and Federal fish and wildlife agencies in any activity affecting water resources and involving Section 10 permits.

In 1969, the National Environmental Protection Act (NEPA) was passed. the enactment reflected increasing national concern about environmental issues. NEPA requires all Federal agencies, including the Corps, to consider environmental amenities and values in their decisions.

In 1972, the Federal Water Pollution Control Act Amendments (FWPCA) were passed. Today, Section 404 of the legislation (Public Law 92-500) is known as the Federal Wetlands Act. This section is codified in the Federal law as Title 33, U.S.C.A. Section 1344.

Two important items were established by the wetlands act. First, section 404 redefined "navigable waters" to include "the waters of the United States, including the territorial seas. Second, Section 404 permits were required to discharge,dredge, or fill material into any U.S. waters. The newly define "waters" was later interpreted to include present-day wetlands.

Despite the 1972 amendments, the Corps did not use its regulatory authority to protect what are known today as wetlands. Instead,Section 404 permits for the discharge of dredge or fill material were limited to tidally influenced waters, waters below the mean high-tide mark, waters used for interstate commerce, and water bodies.

In 1975, a Federal District Court required the Corps to publish final regulations recognizing the full regulatory mandate of the Wetlands Act. The directive included implementation of Section 404 permits for wetlands (National Resources Defense Council, Inc. v Callaway, 392 F. Supp. 685 [1972]).

In 1977, President Carter issued Executive Order 11990, entitled "Protection of Wetlands," that clarified the national policy regarding wetlands loss. the purpose of the policy was to "avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." The order, in effect, prohibited the use of Federal funds by Federal agencies on projects detrimental to wetlands. Also in 1977, Congress amended Section 404 to exempt normal agricultural, forestry, or ranching operations.

In 1985, the first Federal legislation specifically using the term "wetlands" was passed.

The Food Security Act of 1985, better known as the 1985 Farm Bill, contained a "swampbuster" provision. It denied Federal subsidies to farmers who grew crops in lands converted from wetlands. The bill was changed slightly in 1991 to exempt cropland converted from wetlands prior to 1985.

In 1988, the National Wetlands Policy Forum was formed at the request of the Environmental Protection Agency (EPA), to make recommendations on reducing wetlands loss. Based upon its recommendations, President Bush announced a national goal of "no net loss" of wetlands. The same year, the RHA was made a part of the Clean Water Act.

This forum's Domestic Policy Council's Task Force on Wetlands solicited and received comments and public input on how to implement the national goal. The comments, published in the Federal Register (56 Fed. Reg., Vol. 40, pp. 8560-8576), indicated general dissatisfaction with the current regulatory process. The complaints mentioned lack of clear requirements for acquiring a permit, delays and inconsistencies among the Corps' various offices, lack of coordination among federal agencies and enforcement personnel, and inadequate personnel training. The most prevalent complaint cited the lack of a clear definition of wetlands.

Wetland Definitions:

In essence, the Federal government attempted to tailor an old statute dealing with the preservation of navigable waters to meet a new environmental directive. Primarily, this involved modifying the definition of "navigable waters" to include "all waters of the United States." However, the phrase "all waters of the United States" was never defined by Congress, but evolved by other means.

Regulations extended the phrase to include "intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect interstate or foreign commerce." (See 40 C.F.R. Section 230.3[s][3] and 33 C.F.R. Section 328.3[a][3].) Wetlands bordering or adjacent to navigable waters, which include isolated wetlands separated from other waters of the United States by constructed dikes or barriers, natural river berms, beach dunes, and similar features, also are navigable waters for the purposes of Section 404 and are subject to the Corps' permitting jurisdiction. (See 33 C.F.R. Section 328.3[a] 7, [c].)

The previously mentioned National Wetlands Policy Forum estimated that federal agencies have defined "wetlands" at least 50 different ways. The most important definition comes from Section 404 of the FWPCA. It is used by the EPA and the Corps; it defines "wetlands" as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." (See 33 C.F.R. 328.3[b].) Courts later expanded the definition to include artificially constructed wetlands. (See *Leslie Salt Co. v U.S.*, 896 F. 2d 354 [1990] and *U.S. v Ciampatti*, 583 F. Supp. 483 [1984].)

No consistent definition exists among the Federal agencies administering programs involving wetlands. For instance, the Soil Conservation Service (SCS) considers wetlands to be "...areas that have a predominance of hydric soils that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions, except lands in Alaska identified as having a high potential for agricultural development and a predominance of permafrost soils." (See U.S. Department of Agriculture's *National Food Security Manual.*) Hydric soils are originally formed under water.

The U.S. Fish and Wildlife Service (FWS) adopted the following definition: "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year." (See L. Cowardin, *Classification of Wetlands and Deepwater Habitats of the U.S.*, U.S. Department of the Interior, FWS, Office of Biological Services [1979].) This definition allows considerable subjective interpretation.

These various definitions may lead to problems for real estate developers. The SCS and the Corps may concede that an area has no wetlands according to their definitions. However, the FWS may place 50 percent of the area in wetlands under their definition. The FWS's determination is enough to support a finding of "adverse impact" and deny any federally backed funding for any projects undertaken by a developer in the area in question.

In 1989, the EPA, the FWS, and the Corps attempted to reduce this confusion by jointly adopting a federal manual to identify and delineate wetlands. This manual emphasizes three elements in identifying wetlands: vegetation, hydric soils, and hydrology.

> *Wetland Vegetation*: According to the 1989 manual, an area is considered to contain wetland vegetation if, under normal circumstances, more than 50 percent of the dominant plant species from all strata are either *obligate wetland*, *facultative wetland* or *facultative species*, or if a frequency analysis indicates a prevalence of these species. Nearly 5,000 plant types in the United States may occur in wetlands. For example cattails, bulrushes, cordgrass, sphagnum moss, bald cypress, willows, mangroves, sedges, rushes, arrowheads, and water plantains usually occur in wetlands. Other indicators of plants growing in wetlands include trees having a shallow root system, swollen trunks, or roots growing from the plant stem or trunk above the soil surface.
>
> *Hydric Soils:* These are soils that are "...saturated or flooded long enough during the growing season to develop anaerobic conditions in the upper parts." In other words, these soils have characteristics that indicate they were developed in

conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season. There are approximately 2,000 named soils in the United States that may occur in wetlands. The National Technical Committee for Hydric Soils (NTCHS) has developed criteria for determining the presence of hydric soils, and maintains a list of soils considered to be hydric in various regions of the country.

Hydrology: Wetland hydrology refers to the presence of water at or above the soil surface for a sufficient period of the year to significantly influence the plant types and soils that occur in the area. Under the 1989 manual, seven or more days of saturation during the growing season is required to indicate wetland hydrology.

For an area to be determined a wetland, the area must display at least one or more of these wetlands attributes.

The Necessity for a Permit and the Risk of Noncompliance:

The statutory language is clear: any discharge of dredged or fill material into an area designated as a wetland requires a permit from the Corps. The definition of "fill material" is general. It includes "any material used for the primary purpose of replacing an aquatic area with dry land or changing the bottom elevation of a water body." (See 33 C.F.R. Sections 323.2[d], [e], and [f].) Consequently, any project should be scrutinized carefully to determine whether any discharge of fill material may occur, even if only temporarily. The Fifth Circuit Court, which covers Texas, has held that extensive land-clearing operations that involve the redeposit of vegetation and land-leveling constitutes the discharge of fill prohibited by the wetlands act. (See *Avoyelles Sportsmen's League v Alexander*, 715 F. 2nd 897 [1983], in which the court held that the clearing of a bottomland forest required a Section 404 permit because fill material is discharged when roots are pulled out of the ground and redeposited elsewhere.)

The burden placed on landowners and developers planning construction activities involving wetland areas is extensive. The application for a permit invites potential public scrutiny, an examination by Federal and State agencies, potential changes to the project to minimize wetland losses, and possible costly mitigation. Ultimately, the permit may be denied.

However, the cost for noncompliance is also high. The wetlands act, 33 U.S.C.A. Section 1344(s)(4), authorizes civil penalties up to $25,000 per day of violation. In determining the severity of the fine, the court will consider the seriousness of the violation(s), the economic benefit to the violator, if any, resulting from the violation(s), the history of such violations by the offender, any good-faith efforts undertaken by the offender to comply with requirements, the economic impact of the penalty on the violator and other matters the justice deems relevant.

In addition to civil sanctions, criminal fines up to $25,000 per day of violation, imprisonment for not more than one year, or both may be imposed for negligent

violations. Any subsequent negligent violation carries up to a $50,000 per day fine, not more than two years in prison, or both (33 U.S.C.A. Section 1319 [c][1]).

Because agencies and the courts have asserted that a "day of violation" includes not only the day that the actual discharge takes place, but also each day that the discharged material is allowed to remain, the penalties for unauthorized discharges may be enormous.

Criminal sanctions also may be imposed for misrepresentation when filing for a permit or when providing information required by the Corps. It is a violation of 33 U.S.C.A. Section 1319(c)(4) for any person to knowingly make a false material statement, representation, or certification on any application, record, report, plan, or other document filed or required to be maintained; or to knowingly falsify, tamper with, or render inaccurate any required monitoring device or method. A conviction is punishable with a fine up to $10,000 per day of violation, up to two years in prison, or both. Any subsequent violation carries a fine of up to $20,000 per day of violation, up to four years in prison, or both.

Mitigation:

As previously noted, the penalties for unauthorized discharges may be enormous; however, appropriate and practical steps can be taken as part of the permitting process to minimize the potential adverse effects of development on the aquatic environment. These steps in sequential order, include:

A. Avoiding the action altogether.

B. Minimizing the impact by limiting the size or scope of the proposed activity.

C. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

D. Reducing or eliminating the impact using preservation and maintenance operations.

E. Compensating for the impact by replacing or providing substitute resources or environments, better known as "compensatory mitigation."

The role of mitigation in Federal wetlands permit decisions was clarified by the 1990 Memorandum of Agreement between the Corps and the EPA. Essentially, the Corps requires an applicant to avoid adverse impacts where possible and then mitigate unavoidable impacts to the extent appropriate and practicable. Mitigation requires the applicant to compensate for lost aquatic resources by creating new wetlands or by preserving and enhancing existing wetlands.

The memorandum requires that compensatory mitigation result in a one-to-one functional replacement. Generally, artificially created or enhanced wetlands are not considered to

be the functional equivalent of those destroyed. Consequently, the amount of compensatory mitigation required may greatly exceed the actual amount of the environment destroyed. Because the existing wetlands are already protected, the Corps may not accept the set-aside of existing wetlands as compensatory mitigation. As a general rule, compensatory mitigation requires both the proposed construction project and the off-setting mitigation to occur within the same jurisdictional region or district of the Corps.

Compensatory mitigation may be accomplished using "mitigation banking." Although not defined in the memorandum, the concept generally means that if an appropriate accounting procedure can be established, excess points, acres, or units created by one mitigation project may be used as credits against future compensatory mitigation requirements. This system allows anyone facing continuing mitigation requirements to establish on major mitigation plan to cover multiple projects.

Although mitigation banking is in the formative stages, expanding the concept has been considered. For example, a local government undertakes a major mitigation project in a region. The local government, in conjunction with the Corps, determines that the project earns or enhances the environment "x" number of points, acres, or units according to the jointly agreed upon accounting system. The local government may then sell the points, acres, or units to others in the region that are required to mitigate other projects.

Texas Initiative on Wetlands:

Wetlands received special recognition by the 72nd Texas Legislature in 1991. Both Senate Bill 1054 and House Bill 1622 were passed, establishing a goal of no net loss of wetlands on state-owned land. The new initiative is coadministered by the Texas Parks and Wildlife Department and the General Land Office. The two agencies are preparing a State wetlands conservation plan for public lands as required by this legislation.

Certain coastal dunes and wetlands areas are protected to some degree under both the Texas Natural Resources Code and the Texas Administrative Code. The establishment of a dune protection line for barrier islands and peninsulas is provided for in the Texas Natural Resources Code Sections 63.001 et. seq. Sections 33.231 through 33.328 provide for the ranking of coastal wetlands for acquisition purposes. Finally, the protection of coastal dune areas adjacent to the Gulf of Mexico is mandated through 31 Texas Administrative Code Sections 15.41 through 15.46.

Conclusions:

Based upon this background, it is evident that the presence of a wetland can constitute a relatively significant development constraint. Due to the location of the Town on a barrier island, there are a number of wetland areas identified upon the National Wetlands Inventory Map, both within and beyond the current municipal limits. At this time, the Town has no official policy or position relating to wetlands beyond leaving it a matter to be resolved between the individual property-owner and the various State and Federal

agencies involved. The Town may wish to evaluate exactly what its position is as it relates to the issue of wetlands, as well as whether the current regulatory approach is either the most appropriate or efficient means to achieve those objectives.

Floods and Floodplains

Some seven percent of the Nation's land area is subject to flooding. Such areas, located mostly along rivers, lakeshores, and seacoasts, contain a disproportionately large share of the Nation's population and wealth. These flood-prone lands, or "floodplains" are found in every State. The unwise use of such lands makes flood -- or the threat of floods -- a perennial fact of life in thousands of communities. The devastating effects of floods have accounted for approximately 75 percent of all presidential declarations of disaster areas and of approximately 90 percent of all damages from natural disasters.

The principal flooding sources for South Padre Island are the Gulf of Mexico and the Laguna Madre. Hurricane flood problems within the South Padre Island area are not as acute as those of other portions of the Texas coast, primarily due to the undeveloped character of the area. South Padre Island is, however, just as susceptible to hurricanes as others along the Texas coast, and as future development continues, increased construction will result in an increased potential for flood damage.

Storms in 1857 and 1867 hit the Texas coast in the South Padre Island area. During July and August of 1933, three hurricanes crossed the Texas coastal area. The first, in early July, caused a 5-foot storm surge in the South Padre Island area; the second, in early August, caused a 4.5-foot storm surge; and the third, in late August, crossed the coast at Port Isabel, and caused an 11-foot storm surge and $12 million dollars in damages.

Hurricane Beulah, which struck in September of 1967, has been one of the most severe storms to hit the south Texas coast. Torrential rains (as much as 30 inches in less than a week) caused run-off which inundated 1.4 million acres of the Rio Grande Plain. The storm surge alone inundated 630,000 acres of the coastal lowlands as it reached elevations of around 7.5 feet above the National Geodetic Vertical Datum (NGVD). Major flooding occurred on over 50 streams. Beulah's winds reached speeds of greater than 120 mph and 115 tornadoes were spawned by the hurricane. Due to a lack of natural drainageways and the saturation of the ground, standing water was in evidence for several weeks. It caused damage to roadways, interfered with traffic and created a health hazard. A total of 29 counties in southern Texas were declared disaster areas as a result of Hurricane Beulah.

Hurricane Allen began as a low-pressure system over West Africa and became the season's first hurricane on Sunday, August 3, 1980. Before making landfall near Brownsville one week later, the storm had churned its way from the Caribbean to Texas' doorstep as a Category 5 hurricane, the most severe classification. Fortunately for the anxious residents of the lower coast, the storm suddenly weakened just hours before it moved inland. However, it was still strong enough to cause almost $300 million dollars in damage and alter the landscape for years. Hundreds of families in coastal

communities and inland towns lost their homes to the wind and storm surge, or suffered severe flood damage from the torrential rain accompanying the storm. Nine counties in south Texas were declared major disaster areas by President Carter.

Hurricane Gilbert, the most recent hurricane to impact the South Padre Island area began as a low-pressure system on September 8, 1988, about 400 miles east of the island of Barbados, and was designated a hurricane on September 10. At this point, Gilbert was located 225 miles southeast of Santo Domingo in the Dominican Republic and was moving on a west northwest track from which it never deviated. At 6:00 p.m., on September 13, the central pressure in Gilbert dropped to 885 millibar or 26.13 inches of mercury, giving it the distinction of being the most severe or intense hurricane on record in the Atlantic, Caribbean, or the Gulf of Mexico. This low pressure reading exceeded that of the great Florida hurricane of 1935, Hurricane Camille of 1969, and Hurricane Allen of 1980. As the mighty storm moved across the Yucatan Peninsula in Mexico on the 14th, the land mass took energy out of the storm that was never regained. Gilbert remained a Category 3 storm across the southern and southwestern Gulf of Mexico until it made landfall on the northern Mexican coast near the fishing village of La Pesca on September 16. This position was about 125 statute miles south of Brownsville, Texas.

The direct effects of Gilbert on the Texas coast can be described as minimal. Gilbert dealt gently with Texas in almost ever way but one: it triggered a total of 29 confirmed tornadoes that struck ground in either south or south central Texas. The storm that at one point was the most intense hurricane ever observed shed some beneficial and badly-needed rainfall in south Texas without prompting any serious flooding. The heaviest storm rainfall occurred in the Lower Valley, where Adams Garden measured a storm rainfall of 6.40 inches. Much farther upstream, rains of 4 to 5 inches were noted in western Val Verde County. Straight-line wind damage traceable to Gilbert was virtually non-existent in Texas.

Because 90 percent of all damages from natural disasters result from flooding, the Federal government has been involved with flooding from its earliest days. Through re-channeling, or through dams and levees, restricting the flow of waters, as well as through the development of hydroelectric power and irrigation, the Federal government has attempted to address the effects of flooding. But in spite of all of these actions, vast sums of money have had to be expended through the response mechanism of Federal Disaster Assistance.

In 1968, the Congress embarked upon a new course of action and focused upon ways in which flood damage could be avoided or reduced by making the public aware of its potential exposure to flooding and by providing, through the authorization of the Federal Flood Insurance Program (NFIP), an incentive to encourage communities to adopt floodplain management ordinances that would reduce the effects of flooding on new construction.

Because the availability of government flood insurance without any kind of hazard mitigation would only have increased the potential for flood damage by encouraging

unwise construction, the Federal Insurance Agency was directed under the 1968 act to conduct studies throughout the United States to determine in each community the location of areas of special flood hazard and to issue Flood Hazard Boundary Maps (FHBM) and Flood Insurance Rate Maps (FIRM) showing the location of these flood-prone areas.

Eligibility for the purchase of flood insurance was made available only to those individuals or corporations whose insurable properties were located within a community that had agreed with the Federal government to adopt ordinances that would reduce the impact of future flooding. The most significant of these required ordinances are those which condition the issuance of building permits for new residential construction in a areas of special flood hazard upon the requirement that the building be constructed so that the lowest floor will be constructed above the base flood elevation.

Special flood hazard areas are determined with reference to the "100-year" flood standard, which is the national standard on which the NFIP regulations are based. It is also the standard adopted by virtually every Federal agency and most State agencies for the administration of their floodplain management programs. The 100-year flood, also referred to as the "base flood," is defined as the flood having a 1 percent probability of being equalled or exceeded in any given year.

Although necessary for applying floodplain management requirements and establishing uniform flood insurance rates, the term "100-year flood" can be misleading. Although it represents the long-term *average* recurrence interval for a flood of this magnitude, such floods may be experienced in any given year. There have been numerous instances since the establishment of the NFIP where communities have sustained two and even three, 100-year or greater floods within a several year period. In fact, the risk of experiencing a 100-year or greater flood statistically increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood in any 30 year period (the duration of the standard home mortgage) is about 26 percent. Over a 50 year period, the risk increases to about 40 percent. While over a 90 year time frame, the risk increases to about 60 percent. This should show that although the "100-year flood" standard is a valuable tool for measuring exposure to the base flood, it is not for predicting the timing of floods. The 100-year flood might be more properly termed the "1 percent annual chance flood," which represents its true probability of being equalled or exceeded in any given year.

Special flood hazard areas include only those areas which are within the 100-year floodplain. The delineation of these areas subject to such inundation, is determined by the Federal Emergency Management Agency (FEMA) through engineering studies. Special flood hazard areas are usually refined into Zones A, AO, AH, AE, A99, VO, VE, or V. The term "special flood hazard area" does not include areas outside the 100-year floodplain, which are referred to as moderate to minimal risk, and are designated Zone X. These various zone designations are, defined as follows:

Zone "A" No base flood elevation determined.

Zone "AE" Base flood elevations determined.

Zone "AH" Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

Zone "AO" Flood depths of 1 to 3 feet(usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

Zone "A99" To be protected from the 100-year flood by Federal flood protection system under construction; no base flood elevations determined.

Zone "V" Coastal flood with velocity hazad (wave action);no base flood elevations determined.

Zone "VE" Coastal flood with velocity hazard (wave action); base flood elevations determined.

The Flood Insurance Study for the Town of South Padre Island was initially completed by FEMA on March 15, 1983, and was later revised on May 4, 1992. This study determined that the Town has base flood elevations established within the AE and VE zones. In other words, the entire Town lies within the 100-year floodplain FEMA standard. This is not surprising as the entire island was inundated by the storm surge of both Hurricanes Allen and Beulah.

In coastal areas affected by wave action, base flood elevations are generally maximum at the normal open shoreline. These elevations generally decrease in a landward direction at a rate dependant on the presence of obstructions capable of dissipating the wave energy. This is certainly reflected in the flood elevations established on the South Padre Island FIRM map. The open Gulf shoreline of the Town falls within a VE zone with a base flood elevation of 13 feet. Moving west from the shoreline, properties between the shoreline, but east of Gulf Boulevard, are also within the VE zone, but have base flood elevations of 11 feet, reflecting the additional distance from the water and the protection of sand dunes. Properties located in this same area east of Gulf Boulevard, but that are protected by existing seawalls, are designated in the AE zone with an elevation 8 feet. Although these properties are the same distance from the water, this reflects the recognition by FEMA of the additional storm damage protection afforded by such structures. The remainder of the Town west of Gulf Boulevard also lies within the AE zone, but that portion between Gulf Boulevard and Padre Boulevard has a base flood elevation established at 7 feet, while that portion of the Town from Padre Boulevard on west to the Laguna Madre has a base flood elevation established at 6 feet.

Obviously, the fact that the entire Town of South Padre Island falls within a special flood hazard area, as determined by FEMA, is a development constraint; however, it is almost a moot one. In more conventional mainland communities where flood hazard areas typically make up only small portions of the total community, development would normally

be channelled away from the flood hazard areas into the other parts of the community where the construction requirements are less stringent than in the Flood zone. In the case of South Padre Island, because the entire Town lies within the flood hazard zone, all construction within the community must meet the construction requirements of the Town's Master Flood Hazard Control Ordinance. In addition, because the Town does lie on an island, there are no other locational options for anyone who wants to live here, but does not wish to meet those construction requirements. Although these requirements do add substantially to the cost of construction, the desire to live in a scenic setting near the Gulf appears to have overcome this development constraint as reflected by the level of construction that has taken place within the community.

Of greater concern to the long-term planning and future development of the community, is the effect of the Coastal Barrier Resources Act (COBRA). While ordinarily almost any building in a community that is participating in the NFIP is eligible for flood insurance, there is one significant situation in which the Federal government has chosen to deny eligibility for flood insurance. The Coastal Barrier Resources Act, Public Law 97-348, was adopted by Congress in October of 1982, to amend the National Flood Insurance Act of 1968, by adding Section 1321 (42 USC 4028). Section 1321 prohibits the NFIP from providing flood insurance protection for structures built after October 1, 1983, in any of the areas designated by the Department of the Interior as an undeveloped coastal barrier. The final Congressional designation included 187 undeveloped portions of 134 coastal communities.

At this time, area of the Town of South Padre Island, as contained within the current municipal limits, *is not* subject to COBRA. Therefore, all new construction, or repairs and additions to existing construction within the current Town limits are still eligible for Federal flood insurance. Unfortunately, the remainder of the actual island north of the existing Town limits has been designated a COBRA zone. As a result, no construction within this area is eligible for flood insurance.

This is a serious development constraint. Although lenders are not prohibited by the law from making conventional loans with respect to uninsurable property within a COBRA zone, the assessment of the flood risk by lenders has effectively pre-empted the decision to grant such loans. Since the adoption of COBRA, although construction has continued at a steady pace within the Town limits, no construction has occurred within the COBRA zone, outside of the development of public structures at Andy Bowie Park by Cameron County.

Clearly this is an issue that is already having a serious effect on the potential for future development. How the community elects to respond to this issue strikes to the heart of the future planning of the community. Should the Town look to more temporary uses in this area like the horse riding operations already located there or recreational vehicle parks? Should the Town look to more creative forms of development, like a public-private partnership with a major developer involving some form of self-insurance? Should the Town actively pursue the removal of the COBRA zone designation from this area, or perhaps an amendment to the law allowing its removal as the Town annexes? Or should

the Town forget about the COBRA zone, turn in upon itself and put together a plan that focuses more on the redevelopment of existing properties within the existing community? Obviously this is a key issue that must be explored, and resolved, in the development of the "Future Plans" element of this Comprehensive Plan.

Chapter 3

CHARACTERISTICS OF THE POPULATION

Introduction

Analysis and projections of population are at the base of all major planning decisions. Population size gives an overall indication of the dimensions of the physical environment, and provides a basic yardstick for the estimation of land use space needs. Population composition extends this analysis to such quantitative considerations as age groups, household size, and income levels. Thus studies of population composition assist in estimating residential space needs for various dwelling types consistent with existing and anticipated family sizes, income levels, and the needs of each segment of the life cycle. They assist in determining the amount of space needed for recreational areas, schools, and other community facilities for all segments of the population. Finally, investigations of population distribution provides clues as to how these various land uses and facilities should be located around the urban area.

The analysis of South Padre Island's population, in terms of historic trends, age composition, and projected future growth or decline, is an important part of the planning process. Such analysis not only provides additional insight into the Town's history, but also provides a better understanding of the trends affecting the Town. The potential for growth and the economic welfare of South Padre Island is of prime importance in preparing plans for the future. Public policy must follow, in large measure, the limitations, probabilities, and opportunities the future may contain. Unfortunately, no one can predict with absolute certainty the outcome of future events. Yet, the unpredictability of future growth does not eliminate the need for examining, evaluating, and projecting. If absolute certainty in projecting growth cannot be obtained, reasonable approximations can still prove valuable.

The largest problem in discussing population trends for South Padre Island is the basic nature of the community as a resort destination. The U.S. Census, the most comprehensive available source of information on population, focuses primarily on a community's *permanent* population. Unfortunately, as a resort destination, the actual population of South Padre Island may be several times that of the "permanent" population reflected in the Census, due to the transient population of vacationers that is constantly recycling through the community. This transient population is important because policy decisions based solely upon projections of the "permanent" population would seriously undercount the demand that would ultimately be placed on community facilities and services.

However, unlike the Census, there is no easy source of information available that can be used to identify the parameters of this transient population. As a result, this study will focus on "symptomatic" data to try and develop a rough estimate of the transient population. "Symptomatic" data consist of information which are found to bear a close

relationship to the population under study. For example, civil engineering studies have determined that the average person uses 200 gallons of potable water a day. Therefore, by determining the total water usage for the community over a discrete time period, a rough estimate of the total population can be established for that time period. Other sources of information include economic data such as bridge crossings and sales tax expenditures, land use data such as seasonal housing units versus permanent housing units, and so forth.

In approaching this issue, this Chapter will be divided into three sections: (1) a review of the characteristics of the permanent population as reflected in the U.S. Census; (2) development of an estimate of the effect of the transient population; and, (3) development of population projections that will adequately reflect the impact of both segments of the population.

Characteristics of the Permanent Population

Trends in Total Population:

One of the most important aspects of a geographic area is its population. The number of people, the rate at which they are increasing or decreasing, and a knowledge of the past and present population growth is of basic importance when attempting to formulate future population projections so as to determine future growth needs and shape public policy.

Table ____, illustrates the population of South Padre Island for the period from 1970 through 1995, as derived from a variety of sources. Data for 1980 and 1990 were drawn from the respective censuses done in those years by the Bureau of the Census of the United States Department of Commerce. A U.S. Army Corps of Engineers estimate was used for 1970, since this pre-dated the incorporation of the Town and Census data is not available. The 1995 figure was developed by the South Padre Island Planning Department based upon new residential units developed since the completion of the 1990 Census.

Over the 25-year period studied, the Town has experienced a dynamic level of growth, more than doubling over each decade from 1970 through 1990. In 1970, based upon the estimate developed by the Corps of Engineers, there were 350 permanent residents of South Padre Island. By 1980 this figure had more than doubled to 727 permanent residents, for an increase of 377 new residents, or a 108 percent increase in population. In 1990, the permanent population of the Island had increased again to 1,677 persons, for an increase of 950 new residents, or a 131 percent increase in population.

Estimates of population growth beyond 1990, become more tenuous in nature because they are based on assumptions which, as they vary in magnitude, may impact the validity of the estimate. Between March of 1990, when the collection of data for the Census was closed out, and August of 1995, 264 new residential dwelling units were constructed. Unfortunately, it cannot be assumed that all of these dwelling units will translate into new

TABLE _____
TRENDS IN TOTAL POPULATION
SOUTH PADRE ISLAND, TEXAS
1970 - 1990

YEAR	POPULATION	NUMBER CHANGE	PERCENT CHANGE
1970	350*	---	---
1980	727	377	+108
1990	1,677	950	+131
1995**	1,784	107	+ 6

Source: U.S. Census of Population and Housing, 1980 AND 1990

* U.S. Army Corps of Engineers Estimate - 1970

permanent residents due to the significant impact of tourism on the community. An example of this is the fact that even though the 1990 Census identified a total of 4,082 dwelling units within the community, the same Census also identified only 1,677 permanent residents.

The 1990 Census revealed that of the 4,082 total dwelling units, approximately 19.90 percent represented permanent, owner occupied housing, while 59.30 percent represented seasonal/recreational housing, and 20.80 percent represented housing that was vacant at the time of the Census. Based upon the assumption that the ratio of owner occupied, seasonal/recreational, and vacant dwelling units from the 1990 Census are still valid, then of the 264 new dwelling units constructed, 53 represent owner occupied units, 156 represent seasonal/recreational units, and 55 represent vacant units. Again, assuming that the average household size of 2.02 persons per household reflected in the 1990 Census for owner occupied housing is still valid, then the 53 new owner occupied units would represent 107 new persons, or a 6 percent increase since 1990.

In reviewing this information, it must be kept in mind that it does represent a mid-Censal estimate in that it only reflects five years of growth. Nonetheless, the data would seem to indicate some slowing in growth. If it is assumed that the same level of growth will be maintained over the remaining five years of the decade, then only a 12 percent increase in population would be anticipated by the year 2000, a substantial reduction from the plus 100 percent growth of the previous two decades.

Obviously, any changes in the various assumptions used to reach this estimate could have an impact on the end result. If the ratio between the owner occupied, seasonal/recreational, and vacant units goes up or down, if the average household size increases or decreases, or if the rate of construction in the final five years of the decade increases or decreases over the rate of construction during the first five years, each would effect the actual growth in population experienced by the year 2000. However, it should be noted that even if it were assumed that all 264 dwelling units constructed between 1990 and 1995 were permanent, owner occupied dwelling units, this would still only extrapolate a 32 percent increase in population for the five year period, and a 64 percent increase over the decade.

Perhaps of greater interest, with the completion of the Census in 2000, will be the actual increase in the number of people. Clearly, as a community grows, it becomes more and more difficult to double its population every ten years due to the sheer numbers of people and dwelling units involved. The Census in 2000 may have a lot to say about the "normal" level of community growth. If the 1995 population estimate is close to reality, an increase of 200 - 300 new persons would indicate a level of growth more in line with the earlier 1970 - 1980 decade, indicating that the higher level of growth between 1980 - 1990 may have been more of a "spike" resulting from the large number of multi-unit condominium projects that went on line during that period.

Age and Sex Composition:

Whenever a community is experiencing growth or decline, the distribution of the population by age group can be quite important. By comparing the age group distribution over time, key changes in the nature of the population can be identified. In addition, to a certain extent it can also be determined how much of any population change is attributable to natural increase or migration. By identifying these population changes, needed changes in the types of services provided by the community often become apparent as well.

Table ____ compares the change in age group distribution for the total population between 1980 and 1990, the community's "big growth" decade, and the most recent period for which this type of detailed information is available. This data reflects a fairly "typical" population profile for South Padre Island. Future demographic trends developed by experts for both Texas and the nation as a whole foresee the population aging as the "baby-boom" generation moves into middle and old age. South Padre Island does exhibit a high median age of 37.4 years compared to 25.0 years for Cameron County and 28.2 years for Texas as a whole. However, Tables ____, ____, and ____ reflect that although the population of South Padre Island is aging, is does not completely parallel the experience of the Nation or State.

In the average community, a line graph reflecting the distribution of the population by age is generally similar to the bulge in a "bell curve," with a large number of persons in the middle years (30-54) and smaller groups on either end, due to a lower birth rate and the higher mortality of the aged. The distribution of South Padre Island's population is much "flatter." Each of the three age groupings studied (0-29, 30-54, and 55+), makes up roughly one-third of the resident population. The 0-29 age group makes up 28.5 percent of the population, slightly less that one-third, the 30-54 age group makes up 38.0 percent of the population or slightly more than one-third, and the 55+ age group makes up 33.5 percent, or almost exactly one-third of the resident population.

Returning to the example of the line graph, generally, wherever the "bulge" in the curve may be at in any one point in time, that bulge should move, with the passage of time, as that segment of the population ages. In comparing the 1980 and 1990 Censuses, those persons in the 20-29 age group in 1980 should move into the next "middle age" bracket in 1990, while those persons in the 45-54 age group would move out of the "middle age" group and into the "senior" bracket. Disregarding the effects of migration and mortality for now, comparing the populations of the of the three previously mentioned age groups (0-29, 30-54, and 55+) should reflect the movement of the "bulge."

Over the ten year period reflected by the 1980 and 1990 Censuses, looking at the three age groupings studied, 0-29, 30-54, and 55+, although each group's percentage share has remained virtually unchanged, with the total percentage share shift between the three groups amounting to less than one percent (0.6), it does reflect the movement of the bulge.

TABLE _____
TRENDS IN TOTAL POPULATION BY AGE GROUP
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

AGE GROUP	1980	1990	NUMBER CHANGE	PERCENT CHANGE
Under 1	9	14	5	55.5
1 - 2	0	38	38	3,800.0
3 - 4	6	34	28	466.7
5	0	6	6	600.0
6	0	19	19	1,900.0
7 - 9	25	48	23	92.0
10 - 13	12	26	14	116.7
14	0	4	4	400.0
15	26	15	(-11)	(-42.3)
16	0	14	14	1,400.0
17	14	10	(-4)	(-28.6)
18	14	2	(-12)	(-85.7)
19	6	20	14	233.3
20	23	10	(-13)	(-56.5)
21	0	27	27	2,700.0
22 - 24	41	61	20	48.8
25 - 29	35	129	94	268.6
30 - 34	87	170	83	95.4
35 - 44	74	289	215	290.5
45 - 54	116	179	63	54.3
55 - 59	101	131	30	29.7
60 - 61	14	47	33	235.7
62 - 64	23	100	77	334.8
65 - 74	62	229	167	269.4
75 - 84	39	37	(-2)	(-5.1)
85 +	0	18	18	1,800.0
TOTAL	727	1,677	950	130.7

AGE DISTRIBUTION

Age Group	1980	Percent Total	1990	Percent Total	Number Change	Percent Change
0 - 29	211	29.0	477	28.5	266	126.1
30 - 54	277	38.1	638	38.0	361	130.3
55 +	239	32.9	562	33.5	323	135.2
TOTAL	727	100.0	1,677	100.0	950	130.7

Source: U.S. Census of Population and Housing, 1980 AND 1990

TABLE _____
TRENDS IN TOTAL FEMALE POPULATION BY AGE GROUP
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

AGE GROUP	1980	1990	NUMBER CHANGE	PERCENT CHANGE
Under 1	9	5	(-4)	(-44.4)
1 - 2	0	19	19	1,900.0
3 - 4	6	20	14	233.3
5	0	2	2	200.0
6	0	6	6	600.0
7 - 9	13	42	29	223.1
10 - 13	0	15	15	1,500.0
14	0	2	2	200.0
15	14	9	(-5)	(-35.7)
16	0	11	11	1,100.0
17	0	2	2	200.0
18	0	0	0	0.0
19	0	14	14	1,400.0
20	15	8	(-7)	(-46.7)
21	0	10	10	1,000.0
22 - 24	14	34	20	142.9
25 - 29	17	65	48	282.4
30 - 34	41	84	43	104.9
35 - 44	37	131	94	254.1
45 - 54	61	102	41	67.2
55 - 59	57	69	12	21.1
60 - 61	6	20	14	233.3
62 - 64	15	51	36	240.0
65 - 74	36	109	73	202.8
75 - 84	13	15	2	15.4
85 +	0	14	14	1,400.0
TOTAL	354	859	505	142.7

AGE DISTRIBUTION

Age Group	1980	Percent Total	1990	Percent Total	Number Change	Percent Change
0 - 29	88	24.9	264	30.7	176	200.0
30 - 54	139	39.3	317	36.9	178	128.1
55 +	127	35.8	278	32.4	151	118.9
	354	100.0	859	100.0	505	142.7

Source: U.S. Census of Population and Housing, 1980 AND 1990

TABLE _____
TRENDS IN TOTAL MALE POPULATION BY AGE GROUP
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

AGE GROUP	1980	1990	NUMBER CHANGE	PERCENT CHANGE
Under 1	0	9	9	900.0
1 - 2	0	19	19	1,900.0
3 - 4	0	14	14	1,400.0
5	0	4	4	400.0
6	0	13	13	1,300.0
7 - 9	12	6	(-6)	(-50.0)
10 - 13	12	11	(-1)	(-8.3)
14	0	2	2	200.0
15	12	6	(-6)	(-50.0)
16	14	3	(-11)	(-78.6)
17	14	8	(-6)	(-42.9)
18	6	2	(-4)	(-66.7)
19	8	6	(-2)	(-25.0)
20	0	2	2	200.0
21	0	17	17	1,700.0
22 - 24	27	27	0	0.0
25 - 29	18	64	46	255.6
30 - 34	46	86	40	86.9
35 - 44	37	158	121	327.0
45 - 54	55	77	22	40.0
55 - 59	44	62	18	40.9
60 - 61	8	27	19	237.5
62 - 64	8	49	41	512.5
65 - 74	26	120	94	361.5
75 - 84	26	22	(-4)	(-15.4)
85 +	0	4	4	400.0
TOTAL	373	818	445	119.3

AGE DISTRIBUTION

Age Group	1980	Percent Total	1990	Percent Total	Number Change	Percent Change
0 - 29	123	33.0	213	26.1	90	73.2
30 - 54	138	37.0	321	39.2	183	132.6
55 +	112	30.0	284	34.7	172	153.6
TOTAL	373	100.0	818	100.0	445	119.3

Source: U.S. Census of Population and Housing, 1980 AND 1990

In 1980, the 20-29 age group that should have moved from the "youth" age bracket into the "middle age" bracket in 1990 consisted of 99 individuals. These 99 individuals would represent 0.59 percent of the 1990 population. Again, disregarding the impact of migration and mortality factors, it could be reasonably anticipated that the 0-29 age group would decrease by that amount over the ten year time period under study. In actuality, the 0-29 age group went from 29.0 percent in 1980 to 28.5 percent in 1990, or a decrease of one-half of one percent (0.5).

In the same sense, those persons in the 45-54 age group in 1980, that would be expected to move from the "middle age" bracket into the "senior" bracket by 1990, consisted of 116 individuals, which would represent 0.69 percent of the 1990 population. Based upon this extrapolation, and considering the 0.59 percent of the 1990 population moving into the "middle age" bracket, it could be reasonably anticipated that the "middle age" bracket would lose at least 0.1 percent due to the off-setting influx from the "youth" bracket, while the "senior" bracket could be reasonably anticipated to gain the 0.69 percent lost from the "middle age bracket. In actuality, the 30-54 age group went from 38.1 in 1980 to 38.0 percent in 1990, or a decrease of one tenth of one percent (0.1). While the 55+ age group increased from 32.9 percent in 1980 to 33.5 percent in 1990, picking up the six tenths of one percent (0.6) lost from the other two age groups.

In 1980, the distribution of the population between the male and female components was roughly equal with males slightly outnumbering females 373 to 354, a difference of only 19 individuals. By 1990, the female component of the population had out-stripped the male component 859 to 818, or a difference of 41 individuals. The most obvious conclusion would be that, in accordance with national trends, with the aging of the community's population, the typically better health and resultant longer life span of women had begun to come into play over the ten year period.

Unfortunately, a review of the data reflects that in this case, South Padre Island's population profile does not match that of the State or Nation. In 1990, males outnumbered females in both the 30-54 and 55+ age groups. In the 30-54 age group, there were 321 males to 317, while in the 55+ age group, there were 284 males to 278 females. In fact, in the 85+ age group there were actually 14 males to only 4 females within the community.

Where females actually out-number males is in the 0-29 age group, where females number 264 as opposed to 213 males. This appears to be more a matter of chance than of design. A review of the individual ages sub-sets within this age group reflects that the variance between the number and males and females within the age group can be readily identified by a comparison between 1980 and 1990. During the 1980 Census, no females were counted in 10 of the age sub-sets. In the 1990 Census, females realized growth in all of these sub-sets but one (age 18). As a result, between 1980 and 1990, the number of females increased in 12 sub-sets, decreased in 3 sub-sets, and remained the same in 1 sub-set. Similarly, during the 1980 Census, no males were also counted in 8 sub-sets. However, although males realized growth in all 8 of these sub-sets during the 1990 Census, the number of males decreased in 7 other subsets, and remained the same in

one sub-set (22-24) from 1980.females outnumber males in 8 sub-sets, while males outnumber females in 7 sub-sets, with the sexes being equal in two sub-sets. In addition, in all of the sub-sets where the sexes differ, they generally do not vary by more than 8 persons. The only exception to this is the 7-9 age sub-set, where females outnumber males 42 to 6, for a difference of 36 persons.

Racial Composition of the Population:

The racial makeup of the Town of South Padre Island has changed somewhat over the past decade. Table ___ illustrates the overall racial composition for the Town for 1980 and 1990, drawn from their respective censuses. The white population of the Town is the largest group in absolute numbers (1,430), according to the 1990 Census, followed by Hispanic (229), American Indian (16), and Asian (2). Over the ten year period from 1980 to 1990, the white population experienced the largest growth in absolute numbers, doubling from 713 in 1980 to 1,430 in 1990, an increase of 717 persons or 100.6 percent. Hispanics within the community significantly expanded, growing from 14 members in 1980 to 229 in 1990, and increase of 215 persons, or 1,535.7 percent. No individuals were counted during the 1980 Census for either the American Indian or Asian groups, as a result, their increases, as reflected in 1990, represent total new growth. Although small in absolute numbers, the lack of representative members in 1980 causes their percentage of growth to appear significantly large (American Indian -- 16 -- 1,600%, Asian -- 2 -- 200%). Neither the 1980 or 1990 Censuses reflected any individuals residing within the community representing the black sub-group.

As the data in Table ___ reflects, The Town of South Padre Island is homogenous in it scurrent racial make-up, dominantly white with a strong Hispanic minority. Even though the Lower Rio Grande Valley is predominantly Hispanic, because South Padre Island draws its residents from well beyond the immediate environs of the "Valley," there is little indication that this trend will change in the immediate future.

Level of Educational Attainment:

The educational background of the population assists in measuring the social and economic attainment of the community, and also helps in determining the employment potential of that population. Business emphasizes "trained and trainable" employees. In today's world, the key to business success is twofold. The ability to quickly respond to changes in the marketplace, and the ability to rapidly design and make specialized products. This requires workers that are more flexible, have broader skills, and are capable of functioning in autonomous work groups.

The various levels of educational attainment achieved by the residents of the Town of South Padre Island are reflected on Table ___. This information is shown by number of persons and percent of the population for those persons 25 years of age and older as reflected by the 1980 and 1990 Censuses. This data reflects both positives and negatives.

TABLE ____
RACIAL CHARACTERISTICS
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

RACIAL GROUP	1980	PERCENT TOTAL	1990	PERCENT TOTAL	NUMBER CHANGE	PERCENT CHANGE
WHITE	713	98.1	1,430	85.27	717	100.6
BLACK	0	0.0	0	0.0	0	0.0
AM. INDIAN	0	0.0	16	0.9	16	1,600.0
ASIAN & PACIFIC ISLANDER	0	0.0	2	0.1	2	200.0
HISPANIC	14	1.9	229	13.7	215	1,535.7
TOTAL	727	100.0	1,677	100.0	950	130.7

Source: U.S. Census of Population and Housing, 1980 AND 1990

On the positive side, the number of residents with who had attended college has significantly increased over the past ten period, not only in absolute terms resulting from the general overall growth of the population, but as a percentage of the total population of the community. In 1980, those residents with some college education consisted of 310 residents, or 56.3 percent of the population. By 1990, this groupo had increased to a total of 933 individuals, or 70.2 percent of the population. in short, the number of persons within the community with some college education had increased as a percentage of the population by 13.9 percent.

On the negative side, although

TABLE ___
LEVEL OF EDUCATIONAL ATTAINMENT
FOR AGES 25 AND OVER
SOUTH PADRE ISLAND, TEXAS
1980-1990

EDUCATIONAL LEVEL	1980	% OF TOTAL	1990	% OF TOTAL
Elementary	14	2.5	42	3.2
High School				
1-3 years	7	1.3	88	6.6
4 years	220	39.9	266	20.0
College				
1-3 years	151	27.4	424	32.0
4 years	159	28.9	509	38.2
Total	551	100.0	1,329	100.0

MEDIAN YEARS SCHOOL COMPLETED: 1980 --
1990 --

SOURCE: U.S. Census of Population and Housing, 1980 AND 1990.

TABLE _____
SURVIVABILITY AND MIGRATION IN TOTAL POPULATION BY AGE GROUP
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

AGE GROUP	1980	AGE GROUP	1990	NUMBER CHANGE	PERCENT CHANGE
0 - 4	15	10 - 14	30	15	100.0
5 - 9	25	15 - 19	61	36	144.0
10 - 14	12	20 - 24	98	86	716.7
15 - 19	60	25 - 29	129	69	115.0
20 - 24	64	30 - 34	170	106	165.6
25 - 34	122	35 - 44	289	167	136.9
35 - 44	74	45 - 54	179	105	141.9
45 - 54	116	55 - 64	278	162	139.7
55 - 64	138	65 - 74	229	91	62.9
65 - 74	62	75 - 84	37	(-25)	(-40.3)
75+	39	85+	18	(-21)	(-53.8)
TOTAL	727		1,518	791	108.8

AGE DISTRIBUTION

Age Group	1980	Percent Total	Age Group	1990	Percent Total	Number Change	Percent Change
0 - 24	176	24.2	10 - 34	488	32.2	312	177.3
25 - 54	312	42.9	35 - 64	746	49.1	434	139.1
55 +	239	32.9	65+	284	18.7	45	18.8
TOTAL	727	100.0		1,518	100.0	791	108.8

NEW CHILDREN -- 1990 -- (0 - 9) -- 159

Source: U.S. Census of Population and Housing, 1980 AND 1990

TABLE _____
COMPARATIVE CITY AND COUNTY GROWTH RATES
RIO GRANDE VALLEY, TEXAS
1970, 1980, 1990

UNIT	1970	1980	Number Change	Percent Change	1990	Number Change	Percent Change
Cameron Co.	140,368	209,727	69,359	49.41	260,120	50,393	24.02
Brownsville	52,522	84,997	32,475	61.83	98,962	13,965	16.42
Harlingen	33,503	43,543	10,040	29.97	48,735	5,192	11.92
San Benito	15,176	17,988	2,812	18.52	20,125	2,137	11.88
Port Isabel	3,067	3,769	702	22.89	4,467	698	18.52
Los Fresnos	1,297	2,173	876	67.54	2,473	300	13.81
Laguna Vista	287	632	345	120.21	1,166	534	84.49
Laguna Heights	NA	800	--------	----------	1,671	871	108.88
So. Padre Is.	**350**	**727**	**377**	**107.71**	**1,677**	**950**	**130.67**
Hidalgo Co.	182,535	283,229	100,694	55.16	383,545	100,316	35.41
McAllen	37,636	66,952	29,316	77.89	84,021	17,069	25.49
Edinburg	17,163	24,075	6,912	40.27	29,885	5,810	24.13
Weslaco	15,313	19,331	4,018	26.24	21,877	2,546	13.17
Pharr	15,829	21,381	5,552	35.07	32,921	11,540	53.97
Mission	13,043	22,589	9,546	73.18	28,653	6,064	26.85
Willacy Co.	15,570	17,495	1,925	12.36	17,705	210	1.20
Raymondville	7,987	9,436	1,449	18.14	8,880	(-556)	(-5.89)

Source: U.S. Census of Population and Housing -- 1970, 1980, and 1990.

TABLE _____
AVERAGE DAILY POPULATION BY WATER USAGE
SOUTH PADRE ISLAND, TEXAS
1994

MONTH	MONTHLY WATER USAGE	AVERAGE DAILY USAGE	AVERAGE PERSONS PER DAY PER 200 GAL. OF USAGE
January	34,567,800	1,115,090	5,575
February	35,438,400	1,265,657	6,328
March	62,290,400	2,009,368	10,046
April	45,569,800	1,518,993	7,594
May	45,129,600	1,455,794	7,278
June	68,357,900	2,278,597	11,392
July	87,778,400	2,831,561	14,157
August	71,774,100	2,315,294	11,576
September	52,190,300	1,739,677	8,698
October	38,597,300	1,245,074	6,225
November	37,576,800	1,252,560	6,262
December	34,312,000	1,106,839	5,534
Total Year	613,582,800	1,681,048	8,405

Source: Cameron County Fresh Water Supply District #1
Town of South Padre Island Planning Department

TABLE _____
COMPARATIVE AVERAGE DAILY POPULATION BY WATER USAGE
SOUTH PADRE ISLAND, TEXAS
JANUARY - AUGUST
1993, 1994, 1995

YEAR	JAN. - AUG. WATER USAGE	AVERAGE DAILY WATER USAGE	AVERAGE PERSONS PER DAY PER 200 GAL. OF USAGE
1993	430,686,800	1,772,373	8,861
1994	450,906,400	1,855,581	9,277
1995	440,438,000	1,812,502	9,062

Three Year Average Daily Population For Study Period: 9,066

Source: Cameron County Fresh Water Supply District #1
Town of South Padre Island Planning Department

Chapter 4

The Economy

Introduction

A knowledge of the structure and functioning of the urban economy is fundamental to all land use planning analyses. The destiny of the community is controlled by the extent and character of its productive, or income-producing, activity and by its general vitality. Studies of the economic basis for this activity hold the key to not only how the the community has developed and where it is today, but what its future prospects are as well. More simply, most areas grow because they serve as centers for the production and distribution of goods and services. Production and distribution functions create jobs, and employment opportunities attract people. This may not, at first, appear to be applicable to South Padre Island as a tourist destination; however, even a T-shirt shop is a producer and distributor of goods.

From this standpoint, the urban economy conditions the amount of land development that occurs. An expanding economy holds implications for new business and population growth, meaning more land going into use. Similarly, a leveling off or declining trends in economic activity also exert influences on the pattern of land development. By acquiring a knowledge of the economic trends occurring within the community, the community's leadership is better able to estimate the extent and character of changing land requirements, forming the basis for the land use element of the Comprehensive Plan.

What is termed the "urban economy" here, is defined as a system of production, distribution, and consumption embracing the total productive activity within the community. Productive activity thus refers not just to the more commonly thought of sectors of manufacturing, agriculture, fishing, and extractive activity, in which products are processed and marketed, but rather to trade, finance, transport, government, and other services using the community as its base of operations.

In evaluating the activity and vitality of South Padre Island's urban economy, this Chapter will approach the issue from a variety of perspectives. The initial sections shall evaluate the economy from the standpoint of its basic building block -- the individual citizen. These sections will investigate personal income growth and consumer spending patterns. Later sections will review the status of the Town's labor force, employment patterns, and occupational characteristics. Still later sections will review the activity of the urban economy within its major segments: retail trade, selected services, and wholesale trade. Finally, the vitality and diversity of the urban economy will be investigated through a detailed look at its fundamental structure.

Income

One of the most basic gauges of the economic vitality of a community is the income level

of its inhabitants. Changes in income level indicate changes in the standard of living of the area's residents, impacting the quality of life. There is also a direct relationship between income and consumer spending: The higher the income, the higher the spending. This relationship speaks directly to the economic vitality of the community.

TABLE _____
TRENDS IN HOUSEHOLD INCOME DISTRIBUTION
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

INCOME LEVEL	1980	% OF TOTAL	1990	% OF TOTAL
Less than $4,999	7	2.0	28	3.4
$5,000 to $9,999	73	21.0	57	7.3
$10,000 to $14,999	48	13.8	89	10.9
$15,000 to $24,999	119	34.2	175	21.4
$25,000 to $34,999	41	11.8	113	13.8
$35,000 to $49,999	14	4.0	124	15.1
$50,000 to $74,999	40	11.5	111	13.6
$75,000 or more	6	1.7	119	14.5
TOTAL	348	100.0	819	100.0

1980 Median Household Income = $17,632
1990 Median Household Income = $30,256

TABLE _____
TRENDS IN TYPE OF HOUSEHOLD INCOME
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

TYPE OF INCOME	1980	% OF TOTAL	1990	% OF TOTAL
Wage and Salary Income	272	78	563	68
Nonfarm Self-Employment	81	23	192	23
Farm Self-Employment	7	2	7	7
Social Security Income	103	29	230	28
Public Assistance Income	0	0	10	1
Other Income	112	32	153	18

Source: U.S. Census of Population and Housing 1980 and 1990

TABLE _____
TRENDS IN LABOR FORCE - 16 YEARS AND OVER
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

TOTAL LABOR FORCE	1980	% OF LABOR FORCE	1990	% OF LABOR FORCE	NUMBER CHANGE	PERCENT CHANGE
CIVILIAN						
LABOR FORCE	372	94	947	99.7	575	154.6
EMPLOYED	372	94	906	95.4	534	143.5
UNEMPLOYED	0	0	41	4.3	41	4,100.0
ARMED FORCES	22	6	3	0.3	(-19)	(-86.4)
NOT IN LABOR FORCE	256	NA	523	NA	267	104.3
TOTAL LABOR FORCE	394	100	950	100.0	556	141.1
MALE LABOR FORCE						
CIVILIAN						
LABOR FORCE	218	91	509	99.4	291	133.5
EMPLOYED	218	91	480	93.7	262	120.2
UNEMPLOYED	0	0	29	5.7	29	2,900.0
ARMED FORCES	21	9	3	0.6	(-18)	(-85.7)
NOT IN LABOR FORCE	98	NA	222	NA	124	126.5
TOTAL LABOR FORCE	239	100	512	100.0	273	114.2
FEMALE LABOR FORCE						
CIVILIAN LABOR FORCE	154	100	438	100.0	284	184.4
EMPLOYED	154	100	426	97.3	272	176.6
UNEMPLOYED	0	0	12	2.7	12	1,200.0
ARMED FORCES	0	0	0	0.0	0	0.0
NOT IN LABOR FORCE	158	NA	301	NA	143	90.5
TOTAL LABOR FORCE	154	100	438	100.0	284	184.4

Source: U.S. Census of Population and Housing, 1980 and 1990

TABLE _____
TRENDS IN EMPLOYMENT BY INDUSTRY
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

INDUSTRY GROUP	1980	PERCENT TOTAL	1990	PERCENT TOTAL	NUMBER CHANGE	PERCENT CHANGE
Agriculture, Forestry, Fisheries, & Mining	15	4.3	23	2.5	8	53.3
Construction	64	17.6	54	6.0	(-10)	(-15.6)
Manufacturing	20	5.5	53	5.9	33	165.0
Transportation	27	7.4	61	6.7	34	125.9
Communications & Pub. Utilities	14	3.9	4	0.4	(-10)	(-71.4)
Wholesale Trade	0	0.0	11	1.2	11	1,100.0
Retail Trade	50	13.7	256	28.3	206	
Finance, Insurance, & Real Estate	43	11.8	100	11.1	57	132.5
Services	122	33.6	321	35.4	199	163.1
Pub. Admin.	8	2.2	23	2.5	15	187.5
TOTAL EMPLOYMENT	363	100.0	906	100.0	543	149.6

Source: U.S. Census of Population and Housing 1980 and 1990.

TABLE _____
TRENDS IN OCCUPATION OF EMPLOYED PERSONS
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

OCCUPATION GROUP	1980	PERCENT TOTAL	1990	PERCENT TOTAL	NUMBER CHANGE	PERCENT CHANGE
Exec./Managerial	148	39.8	257	28.4	109	73.7
Prof. Specialty	25	6.7	155	17.1	130	520.0
Technicians	13	3.5	11	1.2	(-2)	(-15.3)
Sales	47	12.6	172	19.0	125	266.0
Admin. Support	51	13.7	80	8.8	29	56.9
Priv. Household	0	0.0	4	0.4	4	400.0
Protect. Services	0	0.0	12	1.3	12	1,200.0
Other Service	12	3.2	125	13.8	113	1,108.3
Farming, Forestry, & Fishing	8	2.2	21	2.4	13	162.5
Precision Production	62	16.7	50	5.5	(-12)	(-19.4)
Operators & Fabricators	0	0.0	1	0.1	1	100.0
Transportation	0	0.0	12	1.3	12	1,200.0
Laborers	6	1.6	6	0.7	0	0.0
TOTAL	372	100.0	906	100.0	534	143.5

Source: U.S. Census of Population and Housing 1980 and 1990.

TABLE _____
TRENDS IN CLASS OF WORKER EMPLOYED
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

CLASS OF WORKER	1980	% OF TOTAL	1990	% OF TOTAL
Private Wage and Salary	293	78.8	612	67.5
Self Employed	41	11.0	164	18.1
Federal Government	14	3.8	12	1.3
State Government	16	4.3	35	3.9
Local Government	8	2.1	58	6.4
Unpaid Family Worker	0	0.0	25	2.8
TOTAL	372	100.0	906	100.0

Source: U.S. Census of Population and Housing 1980 and 1990.

TABLE _____
HOUSING UNITS BY YEAR CONSTRUCTED
SOUTH PADRE ISLAND, TEXAS
1995

YEAR CONSTRUCTED	NUMBER	PERCENT TOTAL
1939 or Earlier	13	0.3
1940 - 1949	7	0.2
1950 - 1959	58	1.3
1960 - 1969	311	7.3
1970 - 1979	1,246	29.1
1980 - 1984	2,143	49.9
1985 - 1990	288	6.7
1991 - May, 1995	222	5.2
TOTAL	4,288	100.0

TABLE _____
HOME OWNERSHIP
TOWN OF SOUTH PADRE ISLAND
1980 - 1990

OCCUPANCY TYPE	1980	PERCENT TOTAL	1990	PERCENT TOTAL	NUMBER CHANGE	PERCENT CHANGE
Owner Occupied	177	27.7	418	10.2	241	136.2
Renter Occupied	139	21.8	395	9.7	256	184.2
Vacant	323	50.5	3,269	80.1	2,946	912.1
TOTAL	639	100.0	4,082	100.0	3,443	538.8

Source: U. S. Census of Population and Housing -- 1980 and 1990
Town of South Padre Island Planning and Building Department

TABLE_____
TRENDS IN GROSS RENT
SOUTH PADRE ISLAND, TEXAS
1980 - 1990

GROSS RENT	1980	PERCENT TOTAL	1990	PERCENT TOTAL	NUMBER CHANGE	PERCENT CHANGE
Less than $100	0	0.0	0	0.0	0	0.0
$100 - $149	0	0.0	2	0.5	2	200.0
$150 - $199	0	0.0	7	1.8	7	700.0
$200 - $249	3	2.1	6	1.5	3	100.0
$250 - $299	9	6.5	12	3.0	3	33.3
$300 - $349	29	20.9	31	7.9	2	6.9
$350 - $399	0	0.0	32	8.1	32	3,200.0
$400 - $499	32	23.0	89	22.5	57	178.1
$500 or More	31	22.3	173	43.8	142	458.1
No Cash Rent	35	25.2	43	10.9	8	22.9
TOTAL	139	100.0	395	100.0	256	184.2
Median Rent			$493			
Mean Rent			$517			

TABLE _____
HOUSING UNITS BY GROSS RENT MORE THAN $500
TOWN OF SOUTH PADRE ISLAND
1990

GROSS RENT	UNITS
$500 - $549	57
$550 - $599	20
$600 - $649	19
$650 - $699	19
$700 - $749	32
$750 - $999	19
$1,000 or More	7
TOTAL	173

Source: U.S. Census of Population and Housing -- 1980 and 1990

TABLE _____
CONSTRUCTION TRENDS BY BUILDING PERMITS
TOWN OF SOUTH PADRE ISLAND, TEXAS
1989 - 1994

BUILDING TYPE	1989	1990	# CHGE	% CHGE	1991	# CHGE	% CHGE	1992	# CHGE	% CHGE
Single-family	27	17	(-10)	(-37.1)	25	8	47.1	26	1	4.0
Two-family	0	2	2	200.0	0	(-2)	(-200.0)	0	0	0.0
Three-family	0	0	0	0.0	0	0	0.0	1	1	100.0
Multi-family	0	0	0	0.0	1	1	100.0	0	(-1)	(-100.0)
Commercial	0	0	0	0.0	0	0	0.0	0	0	0.0
Additions, Etc.	434	475	41	9.5	412	(-63)	(-13.3)	458	46	11.2

BUILDING TYPE	1993	# CHGE	% CHGE	1994	# CHGE	% CHGE
Single-family	25	(-1)	(-4.0)	51	26	104.0
Two-family	1	1	100.0	2	1	100.0
Three-family	0	(-1)	(-100.0)	0	0	0.0
Multi-family	1	1	100.0	1	0	0.0
Commercial	0	0	0.0	3	3	300.0
Additions, Etc.	491	33	7.2	521	30	6.1

Source: Town of South Padre Island, Texas, Planning and Building Department

TABLE _____
POST CENSUS DWELLING UNITS CONSTRUCTED
TOWN OF SOUTH PADRE ISLAND, TEXAS
APRIL, 1990 - JUNE, 1995

YEAR	DWELLING UNITS	NUMBER CHANGE	PERCENT CHANGE
1990, (April - Dec.)	21(12)	----------	----------
1991	35	14	66.6
1992	29	(-6)	(-17.1)
1993	39	10	34.5
1994	105	66	169.2
1995, June	35	(-70)	(-66.6)
TOTAL UNITS	264(255)		

255 Units x .1992* = 51 Owner Occupied Residences

255 Units x .5930* = 151 Seasonal/Recreational Units

255 Units x .2084* = 53 Vacant Units

51 Owner Occupied Residences x 2.07 Persons per Household = 106 persons

Source: Town of South Padre Island, Texas, Planning and Building Department
*U.S. Census of Population and Housing -- 1990

PROCEDURAL STEPS IN ESTABLISHING AN IMPROVEMENT DISTRICT

1. The Board of Aldermen may authorize the establishment of an improvement district upon receiving a **petition** requesting that such a district be created, and complying with the following requirements:

   A. The petition must be signed by enough owners representing at least 50 percent of the total appraised value of all property in the district, **and either** owners comprising at least 50 percent of all the owners in the proposed district **or** the owners of land comprising at least 50 percent of the total land area of the proposed district.

   B. The petition must state:

      1. The general nature of the improvement(s).
      2. The estimated cost of the improvement(s).
      3. The boundaries of the proposed district.
      4. The proposed method of assessment, including any specific classes of property that will be excluded or included in the assessment.
      5. The proposed apportionment of any costs between the proposed district and the Town as a whole.
      6. *Whether the management of the district is to be by the municipality, the private sector, or a partnership of the two.*
      7. That the persons signing the petition request or concur with the establishment of the district.
      8. *That an advisory body may be established to develop and recommend an improvement plan to the Board of Aldermen.*

2. If the petition complies with the statutory requirements, the Board of Aldermen would then hold a public hearing on the advisability of the improvement(s).

   A. Notice would be given by publishing a notice in the newspaper and sending written notice to all of the property-owners within the proposed district, both to be accomplished at least 15 days before the date of the hearing.

3. After receiving the petition, the Board of Aldermen *may* appoint an advisory body with the responsibility of developing and recommending an improvement plan. The advisory body shall prepare an ongoing service plan and present the plan to the Board of Aldermen for review and approval. The plan must cover at least a 5 year period and must also define the annual indebtedness and the projected costs for the improvement(s), as well as the assessment plan.

4. Authorization:

   A. Findings -- *Within **6 months** following the adjournment of the public hearing*, the Board of Aldermen may authorize an improvement district, <u>if by majority vote</u>, the membership adopts a <u>resolution</u> authorizing the district in accordance with its findings as to the advisability of the improvements. The findings should address the advisability of the proposed improvement(s), its estimated cost, the method of assessment, and the apportionment of any cost between the proposed district and the Town as a whole.

   B. Effective Date -- The authorization does not take effect until it has been published one time in a newspaper of general circulation within the community.

   C. 20-Day Appeal Period -- Actual construction on an improvement may not begin until after the 20th day following the date the authorization takes effect (i.e., the 20th day following the date the notice appears in the newspaper), and may not begin if during that 20-day appeal period, written protests are filed with the City Secretary signed by two-thirds of the owners of record within the proposed district, **or** by owners of property making up two-thirds of the total area of the proposed district.

THE GENERAL NATURE OF THE IMPROVEMENTS

In general, the long range goal of the proposed Improvement District is to support the establishment of a business district focused on entertainment and recreational uses. Implementation of the following improvements will enhance and encourage private investment in the form of new business development, the expansion and upgrading of existing businesses, and provide an increase in employment opportunities.

Funds generated through the improvement district mechanism may be used for the following proposed improvements, as authorized by Chapter 372 of the Texas Local Government Code:

1. Landscaping.

2. The erection of fountains, distinctive lighting, and signs.

3. The acquiring, constructing, improving, widening, narrowing, closing, or re-routing of sidewalks or streets or any other roadways, or their rights-of-way.

4. The construction or improvement of pedestrian malls.

5. The acquisition and installation of pieces of art.

6. The acquisition, construction, or improvement of off-street parking facilities.

7. The acquisition, construction, improvement, or re-routing of mass transportation facilities.

8. The acquisition, construction, or improvement of water, wastewater, or storm drainage facilities or improvements.

9. The establishment or improvement of parks.

10. Projects similar to those listed in Items 1-9, above.

11. The acquisition, by purchase or otherwise, of real property in connection with an authorized improvement.

12. Special supplemental services for the improvement and promotion of the district, including services relating to advertising, promotion, health and sanitation, water and wastewater, public safety, security, business recruitment, development, recreation, and cultural enhancement.

13. The payment of expenses incurred in the establishment, administration, and operation of the district.

ESTIMATED COST

The cost of implementing the proposed improvements generally discussed above has estimated at _____.

THE BOUNDARIES OF THE PROPOSED DISTRICT

The boundaries of the proposed improvement district are as follows:

Beginning at a point, said point being the point of intersection of the centerline of Park Road 100, otherwise locally known as Padre Boulevard, and the south right-of-way of Tarpon Street; proceeding thence to the west, along the south right-of-way line Tarpon Street to a point, said point being the intersection of the south right-of-way line of Tarpon Street and the western municipal limits of the Town of South Padre Island, Texas; proceeding thence to the north,along the western municipal limits line of the Town of South Padre Island, Texas, to a point, said point being the intersection of the western municipal limits line of the Town of South Padre Island, Texas, and the north right-of-way line of Swordfish Street; proceeding thence to the east along the north right-of-way line of Swordfish Street, to a point, said point being the intersection of the north right-of-way line of Swordfish Street and the centerline of Park Road 100, otherwise known locally as Padre Boulevard, proceeding thence south along the centerline of Park Road 100 to the point of beginning.

THE PROPOSED METHOD OF ASSESSSMENT

APPORTIONMENT OF COST BETWEEN THE MUNICIPALITY AND THE PROPOSED IMPROVEMENT DISTRICT

MANAGEMENT OF THE DISTRICT

ADVISORY BODY

An advisory body may be established by the Board of Aldermen for the Town of South Padre Island to develop and recommend a specific improvement plan.

CHAPTER 372

IMPROVEMENT DISTRICTS IN MUNICIPALITIES

1. Authorized improvements may include:

   A. Landscaping.
   B. Erection of fountains, distinctive lighting, and signs.
   C. Acquiring, constructing, improving, widening, narrowing, closing, or rerouting sidewalks, streets, any other roadway, or their rights-of-way.
   D. Construction or improvement of pedestrian malls.
   E. Acquisition, construction, or improvement of libraries.
   F. Acquisition, construction, or improvement of off-street parking facilities.
   G. Acquisition, construction, or improvement of mass transportation facilities.
   H. Acquisition, construction, or improvement of water, wastewater, or drainage facilities or improvements.
   I. The establishment or improvement of parks.
   J. Projects similar to those listed in Items "A" through "I" above.

2. An improvement project may consist of improvements on more than one street or of more than one type of improvement.

3. The Petition -- The governing body of the municipality may authorize the establishment of an Improvement District upon receiving a petition complying with the following requirements:

   A. The petition must state the following:

      (1) The general nature of the improvement.
      (2) The estimated cost of the improvement.
      (3) The boundaries of the proposed district.
      (4) The proposed method of assessment, which may specify included or excluded classes of assessable property.
      (5) The proposed apportionment of the cost of the improvement(s) between the proposed district and the municipality as a whole.
      (6) Whether the management of the district is to be by the municipality, the private sector, or a partnership of the two.
      (7) That the persons signing the petition request or concur with the establishment of the district.
      (8) That an advisory body may be established to develop and recommend an improvement plan to the governing body of the municipality.

B. The petition is considered sufficient if signed by:

(1) The owners of taxable real property representing more than 50 percent of the appraised value of taxable real property liable for assessment under the proposal.

AND

(2) Record owners of real property liable for assessment under the proposal who constitute more than 50 percent of all record owners liable for assessment.

OR

(3) Record owners of real property liable for assessment under the proposal who own taxable real property that represents more than 50 percent of all of the taxable real property liable for assessment.

C. The petition shall be filed with the City Secretary.

4. Public Hearing -- If the petition complies with the statutory requirements, a public improvement district may only be established **after** the governing of the municipality holds a public hearing on the advisability of the improvement.

A. Notice:

(1) Notice of the hearing must be given in a newspaper of general circulation in the municipality at least 15 days before the date of the hearing.

(2) The notice must state:

(a) The time and place of the hearing.
(b) The general nature of the proposed improvement.
(c) The estimated cost of the improvement.
(d) The proposed method of assessment
(e) The proposed apportionment of cost between the improvement district and the municipality as a whole.

(3) Written notice containing the same information must be mailed to all of the owners of property subject to assessment under the proposed improvement district at least 15 days before the date of the hearing. The notice must be addressed "Property-Owner" and mailed to the current address of the owner as reflected on the tax rolls.

5. Authorization:

A. Findings -- Within 6-months following the adjournment of the public hearing, the governing body of the municipality may authorize an improvement district, if by majority vote, the membership adopts a resolution authorizing the district in accordance with its findings as to the advisability of the improvement. The findings should address the advisability of the proposed improvement, its estimated cost, the method of assessment, and the apportionment of cost between the proposed improvement district and the municipality as a whole.

B. Effective Date -- The authorization does not take effect until it has been published one time in a newspaper of general circulation within the municipality.

C. 20-Day Appeal Period -- Actual construction of an improvement may not begin until after the 20th day following the date the authorization takes effect (i.e., the day the notice appears in the newspaper), and may not begin if during that 20-day period, written protests signed by two-thirds of the owners of record within the improvement district, or by the owners of record of property comprising two-thirds of the total area of the district are filed with the City Secretary.

6. Assessment of Improvement Costs:

A. How Shared -- The governing body of the municipality shall apportion the cost of the an improvement to be assessed against property in an improvement district. The apportionment shall be made on the basis of special benefits accruing to the property as a result of the improvement(s). An assessment plan must provide that at least 10 percent of the cost of an improvement be paid by special assessments against property in the improvement district.

B. How Assessed -- The cost of an improvement may be assessed:

(1) Equally per front foot or square foot.
(2) According to the value of the property as determined by the governing body, with or without regard to improvements on the property.
(3) In any other manner that results in imposing equal shares of the cost on properties similarly benefitted.

C. The Assessment Roll -- After the total cost of the improvement(s) is determined, the governing body of the municipality shall prepare a proposed assessment roll. The roll must state the assessment against each parcel of land in the district, as determined by the manner of

assessment chosen by the municipality above.

(1) Public Hearing -- The governing body shall file the assessment role with the City Secretary, which shall then be made available for public inspection. The governing body shall then require the City Secretary to publish notice of the governing body's intention to consider the proposed assessments at a public hearing. The notice must be published in a newspaper of general circulation within the municipality before the 10th day prior to the date of the hearing. The notice shall state:

(a) The date, time, and place of the hearing.
(b) The general nature of the improvement(s).
(c) The cost of the Improvement(s).
(d) The boundaries of the assessment district.
(e) That written or oral objections will be considered at the hearing.

When the assessment roll is filed with the City Secretary, the City Secretary shall mail written notice containing the same information to all of the owners of property subject to assessment under the improvement district. The notice must be addressed "Property-Owner" and mailed to the current address of the owner as reflected on the tax rolls. Failure of the property-owner to receive notice does not invalidate the proceeding.

D. Amendments to the Assessment Roll -- At or on the adjournment of the public hearing, the governing body of the municipality must hear and pass on any objection to a proposed assessment. The governing body many amend a proposed assessment on any parcel.

E. Annual Review -- The amount of assessment for each property owner may also be adjusted each year following the annual review of the service plan (See Item 8C below).

F. Levying the Assessments -- After all objections have been heard by the governing body and passed upon, the governing body shall levy the assessments by ordinance as a special assessment on the property. The ordinance shall specify the method of payment of the assessments and may provide that the assessments be paid in periodic installments. The installments must be in amounts necessary to meet the annual costs for the improvements and must continue for a period necessary to retire any indebtedness on the improvements.

G. Interest on Assessments -- An assessment bears interest at the rate specified by the governing body, but may not exceed a rate of one-half of

one percent above the actual interest rate paid on the public debt sued to finance the improvement(s). Interest on the assessments between the effective date of the ordinance levying the assessment and the date of the first installment shall be added to the first installment. The interest on any delinquent installment shall be added to each subsequent installment until all delinquent installments are paid.

H. Liens -- An assessment with interest, the expense of collection, and reasonable attorney's fees, if incurred, is a first and prior lien against the property assessed, superior to all other liens and claims, except for liens and claims for state, county, school district, or municipal ad valorem taxes, and is a personal liability of and charge against the owners of the property regardless of whether the owners are named. The lien is effective from the date of the ordinance levying the assessment until the assessment is paid, and may be enforced by the governing body in the same manner that an ad valorem tax lien against the real property may be enforced.

I. Payments by Exempt Jurisdictions -- the municipality is responsible for payments or assessments against exempt municipal property in the district. Payment of assessments by other exempt jurisdictions must be established by contract.

8. Payment of Costs -- The payment of costs for an improvement **must** be paid in accordance with the following:

A. A cost payable by the municipality as a whole may be paid from general funds available for the purpose, or other available general funds.

B. A cost payable from a special assessment that is paid in full, shall be paid from that assessment.

C. A cost payable from a special assessment that is to be paid in installments shall be paid by the issuance and sale of revenue or general obligation bonds.

D. While an improvement is in progress, the municipality may issue temporary notes or time warrants to pay for the costs of the improvement, and then issue revenue or general obligation bonds upon its completion.

E. The cost of more than one improvement may be paid from a single issue and sale of bonds without other consolidation proceedings before the bond issue.

F. The cost of any improvement shall include all costs incurred in connection with the issuance of bonds, and may be included in the assessments against the property in the improvement district.

7. Other Important Points:

A. Feasibility Report -- **Prior** to the public hearing, the governing body of the municipality *may* use the services of municipal employees or consultants to prepare a report to determine whether an improvement should be made as proposed by petition or otherwise or whether the improvement should be made in combination with other improvements authorized by the State law. The governing body may also require that a preliminary estimate of the cost of the improvement or combination of improvements be made.

B. Advisory Body -- After receiving the petition, the governing body *may* appoint an advisory body with the responsibility of developing and recommending an improvement plan. The composition of the advisory body **must** include:

(1) The owners of taxable real property representing more than 50 percent of the appraised value of taxable real property liable for assessment under the proposal.

AND

(2) The record owners of real property liable for assessment under the proposal who constitute more than 50 percent of all record owners of property that is liable for assessment under the proposal.

OR

(3) The record owners of real property liable for assessment under the proposal who own taxable real property that constitutes more than 50 percent of the area of all taxable real property that is liable for assessment under the proposal.

C. The Service Plan:

(1) The advisory body **shall** prepare an ongoing service plan and present the service plan to the governing body for review and approval. The governing body *may* assign responsibility for the plan to another entity in the absence of an advisory body.

(2) The plan must cover a period of at least 5 years and must also define the annual indebtedness and the projected costs for improvements, as well as the assessment plan referenced in Item 6 A above. The service plan shall be reviewed and updated annually for the purpose of establishing the annual budget for improvements.

D. The Area of the District -- The area of the public improvement district may be less than the proposed boundaries described in the public notice for the required public hearing. The area of the district may not include any property not described by that notice. The district may only be enlarged beyond the area described in the public notice if an additional public hearing, following additional notice, is held for the expansion.

E. Dissolution of the District -- The governing body to the municipality may dissolve a previously authorized improvement district, if a petition requesting dissolution is filed with the City Secretary containing the signatures of at least enough property-owners in the district to qualify the petition as required to establish an improvement district. The governing body may only take action following a public hearing and the same public notice required to establish an improvement district. Even if the district is dissolved, it shall nonetheless remain in effect for the purposes of meeting the obligations of any indebtedness issued for the improvements.

F. General Obligation and Revenue Bonds -- General obligation bonds issued to pay the costs of the improvements must be issued under the provisions of Chapter 1, Title 22, Revised Statutes. Revenue bonds issued to pay costs under that subsection, may be issued from time to time in one or more series and are payable from and secured by liens on all or part of the revenue derived from the improvements authorized, including revenue derived from installment payments of special assessments.

G. Special Improvement District Fund -- A municipality that intends to create a public improvement district may, by ordinance, establish a special improvement district fund in the municipal treasury.

(1) Tax -- The municipality annually may levy a tax to support the fund.

(2) Uses -- The fund may be used for:

(a) Pay the costs of planning, administration, and an improvement authorized by the improvement district statute.

(b) Prepare preliminary plans, studies, and engineering reports to determine the feasibility of an improvement.

(c) If ordered by the governing body, pay the initial cost of the improvement until temporary notes, time warrants, or improvement bonds have been issued and sold.

(3) The fund is not required to be budgeted for expenditure during any year, but the amount of the fund must be stated in the municipality's annual budget. The amount of the fund must be based upon an annual service plan that describes the public improvements for the fiscal year.

(4) A grant-in-aid or contribution made to the municipality for the planning and preparation of plans for an improvement may be credited to the special improvement district fund.