Appendix A

GOALS AND OBJECTIVES

Prepared by

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GOAL STATEMENT

The following text forms a goal statement to guide the future development of Mission Bay Park as an aquatic park, planned and designed to serve citizens of and visitors to San Diego.

Goals for Land Use

Mission Bay Park is a truly unique public coastal resource. The world's largest urban water-recreation park, its 2,100-acre land area supports a diversity of land and water uses including water-oriented public recreation, commercial and resort enterprises, and wildlife habitat.

The public recreational use of land in Mission Bay Park has traditionally been focussed on passive parkland that supports the enjoyment of the waterfront setting as well as access to the water for wading and a variety of boating activities. The strip of land immediately adjacent to the water is, of course, especially valuable as a recreation resource along with the bicycle and pedestrian paths that provide access to it.

Commercial recreation amenities in Mission Bay Park form a vital constituent of the Park's extensive use and include a marine theme Park, and a number of resort hotels and marinas. Many people enjoy the Bay through the use of these facilities, which also provide revenue for the park's operations and maintenance.

Once a huge marsh with a dramatic diversity and richness of natural and wildlife resources, Mission Bay has been gradually dredged to form the current bodies of land and water. Remaining natural resources in Mission Bay have tended to be valued primarily for their biological function. In recent years, however, as public awareness of environmental issues has grown, there has been a rise in the perception of natural areas also as key recreational and aesthetic amenities.

In the light of these issues, Mission Bay Park should be:

Land Use Goal 1

An aquatic-oriented park which provides a diversity of public, commercial and natural land uses for the enjoyment and benefit of all the citizens of San Diego and visitors from outside communities.

1.1 A park in which all public recreation land use areas are designed and managed to maximize uses that benefit from the bay's unique environment.

1.2 A park where the waterfront is designed and managed for public access to the greatest extent possible.

1.3 A park which supports commercial and non-profit lease areas, with priority given to water-oriented leases, on up to 25 percent of the total land area of the Park.

1.4 A park which provides certain natural areas for passive recreation, with limited public access to certain natural areas for passive recreation, aesthetic enjoyment, and education, while enhancing, and protecting from public access if necessary, other more sensitive natural areas to maximize their biological value.

1.5 A park which provides a continuous, safe, and enjoyable network of recreational pathways for pedestrians, joggers, cyclists, roller skaters, and other approve non-motorized recreational users to enjoy and access the park's recreation environments.

Mission Bay serves the recreation needs of adjacent neighborhoods as well as city and regional constituencies. For this reason, the park functions, in effect, as a system of different parks, or "parks within a park," serving the various user groups, including biotic conservation interests. Accordingly, Mission Bay park should be:

Land Use Goal 2

A park in which land uses are located so as to avoid negative impacts on adjacent areas, providing for ease of access, and according to the particular qualities of different parts of the Bay.

2.1 A park which provides aquatic-oriented neighborhood recreational amenities to serve adjoining neighborhoods.

2.2 A park which provides easily accessible regional recreation areas serving various user groups while minimizing conflicts between them.

2.3 A park which integrates the various park areas into a coherent whole, principally through paths, shore access and landscape management & certain unified design elements.

Mission Bay Park has a defined boundary, but is nevertheless connected to a number of other important open space resources which link throughout San Diego. There is an opportunity for the Park to function as a hub uniting citywide recreational, aesthetic, and environmental areas. Accordingly, Mission Bay should be:

Land Use Goal 3

A park which enhances the viability and use of other connected open space areas so as to promote the creation of a comprehensive, integrated open space system.

3.1 A park which is connected by recreational trails and pathways to the San Diego River, Tecolote Creek and Canyon, Rose Creek and Canyon, San Clemente Canyon, and the ocean beaches.

3.2 A park in which biological values are enhanced through the integration of the Bay's natural resources with those of Famosa Slough, the San Diego River, Tecolote Creek and Rose Creek.

Goals for Water Use

Mission Bay's development as a park has, from the beginning, held the provision of water recreation as a primary goal. Accordingly, Mission Bay Park should be:

Water Use Goal 1

A park in which the water areas are allocated and maintained to support the diverse aquatic interests of those visiting Mission Bay.

1.1 A park in which provision is made for the interests of all users including power boaters, sail boaters, competition and recreational waterskiing, boardsailors, rowers, jet skiers, personal watercraft users, swimmers, bird watchers, persons fishing and future unidentified users.

Water Use Goal 2

A park which provides adequate and safe access to the waters of Mission Bay.

2.1 A park in which shoreline design and maintenance are managed to maximize water access within the context of shoreline stabilization needs, land use designations, environmental resources and regulations, aesthetic concerns, and public safety.

Water Use Goal 3

A park in which the water areas are maintained to assure the maximum enjoyment of aquatic activities consistent with safety, aesthetic, and environmental concerns.

3.1 A park in which the highest water quality is maintained, and in which water access facilities and water recreation designations are appropriately designed and located with respect to aesthetic and environmental goals, and consistent with the maintaining public safety.

Water Use Goal 4

A park in which water areas are maintained to assure continued navigability for designated uses, and in which adequate shoreline access for water use is maintained.

4.1 A park in which the consistent utilization of appropriate methods to maintain usability of water recreation designated areas is a primary goal of park planners and managers.

Goals for Circulation and Access

Circulation, transportation and access to and around the park plays a key role in how the park is used and enjoyed. Transportation policy and design with regards to the park also affects adjacent

neighborhoods, particularly through congestion and parking impacts, and the surrounding region with regards to air quality. Circulation and access should be addressed and planed to comprehensively meet the needs of activities within the park, and to avoid as far as possible conflicts between park user groups and neighboring communities. Special consideration should be given to transportation systems which provide for park access and which promote enjoyable use of the park, support ongoing business concerns, minimize adverse environmental and residential impacts, maximize public safety, and provide motivations for use of transportation modes other than the private automobiles. Accordingly, Mission Bay should be:

Circulation and Access Goal 1

A park which promotes and ensures safe and enjoyable access for all park users and minimizes negative transportation-related impacts on surrounding neighborhoods.

1.1 A park which provides maximum public pathway access to the waterfront.

1.2 A park which utilizes strategies to eliminate congestion on major roads so that pubic access is not impeded or significantly discouraged.

1.3 A park which minimizes conflicts between through traffic and park-related traffic.

1.4 A park which provides and encourages the use of alternative forms of transit for access to and circulation within the park, including but not be limited to shuttle bus and water taxi service to key recreational areas during the peak season and bike access to the park.

1.5 A park which ensures priority access to emergency vehicles to all areas during all seasons.

1.6 A park in which groups sponsoring major special events are required to provide alternative modes of transportation including, but not limited to, remote parking lots which can be used by shuttle busses.

Circulation and Access Goal 2

A park that addresses the competing parking needs of area residents, employees, and visitors to Mission Beach, Pacific Beach, and Mission Bay Park, provides necessary parking for park users, and utilizes strategies for protecting neighboring areas from adverse parking impacts.

2.1 A park in which the approach to parking is compatible with regional management plans and goals.

2.2 A park in which peak season and special event parking needs are addressed in a cost effective manner that does not compromise surrounding neighborhood and recreational uses.

Circulation and Access Goal 3

A park which provides a complete, clearly defined and safe (Class 1) bike path that ties in with the existing bicycle network for adjoining neighborhoods.

3.1 A park which is served by public transit which provides racks for transporting bicycles.

Circulation and Access Goal 4

A park which provides a path system designed and managed so as to safely accommodate both pedestrian and non-motorized wheeled circulation.

4.1 A park which is connected to surrounding neighborhoods by safe pedestrian and bicycle path and routes.

4.2 A park which provides complete accessibility for persons with disabilities throughout Mission Bay.

4.3 A park which includes separate paths for pedestrians and non-motorized, wheeled circulation where possible and necessary to maximize safety and enjoyment of the path network.

Goals for Economics

Mission Bay Park is an economic entity as well as a public park. It hosts a variety of commercial enterprises which serve tourists and residents and generate income for businesses, investors, and the City of San Diego. There is a symbiotic relationship between the City and Mission Bay Park businesses. As Mission Bay Park private enterprises prosper, the City and Park benefit financially, through lease revenue, taxes, and fees. These revenues help fund public improvements and maintenance made to the park, and in turn, the Park business benefit from these improvements. As an important economic resource, Mission Bay Park should be:

Economic Goal 1

A park where private enterprise within appropriate designated areas can prosper in order to support and enhance public use, access, and enjoyment of the Mission Bay Park.

1.1 A park which encourages land-lease tenants to maintain and upgrade their facilities in order to remain competitive, attract visitors, and generate revenue, within the context of the master plan's design and land use guidelines.

1.2 A park which is cooperatively marketed to promote business activity related to recreation, particularly during the non-peak times of the year.

1.3 A park which is safe, well-maintained, and has adequate public and private infrastructure to serve visitors.

1.4 A park which does not place incompatible uses next to each other, potentially diminishing the value of each use.

Economic Goal 2

A park which generates sufficient revenue to the City to cover public operations and maintenance costs associated with the park, and helps finance and maintain public improvements within the park.

2.1 A park where land and water lease rates reflect the market value for the particular use unless the use meets other public objectives deemed important to the City.

2.2 A park which generates additional fiscal revenue from increased business activity.

2.3 A park in which commercial land leases are strategically placed to enhance commercial tenants' ability to earn revenue, thereby increasing the City's land value and fiscal revenue, unless other public uses at such locations better serve the public good.

2.4 A park which is managed so that fiscal revenue and costs associated with the park can be monitored on an annual basis.

2.5 A park where all land and water lease revenue generated in the park are spend on needed park maintenance, operations and capital improvements.

Economic Goal 3

A park which uses economic approaches to efficiently manage use of public areas.

3.1 A park in which permits and user fees, at rates consistent with the park's public service function, may be used for certain areas during peak periods to control overcrowding, maintain public safety, and encourage use during less crowed periods.

3.2 A park which has designated improved areas for organized events and parties which can be reserved from the City for a fee.

3.3 A park which provides opportunities during non-peak periods for the City to generate additional revenue from special events, organized programs, and public recreation targeting specific user groups.

3.4 A park in which user fees are structured to differentiate between public gatherings or events and commercial or business gatherings or events.

Economic Goal 4

A park which fairly attributes funding responsibility to those who benefit from the facility or services that is funded.

4.1 A park whose management policy assigns the cost of expenditures for private benefit to

those private entities or individuals who benefit.

4.2 *A park whose management policy assigns the cost of expenditures for public benefit to the public group who benefits.*

4.3 *A park whose management policy calls for sharing the cost of expenditures which benefit both private and public groups.*

4.4 *A park whose financing policy attempts to spread the cost burden over time when the facility financed will serve several generations.*

The way in which the environment is planned, designed, and managed has economic, as well as environmental implications. It should be recognized that, in some cases, the use of ecologically sustainable construction, operation and maintenance practices can have positive long term economic benefits through the avoidance of future health and pollution problems and through the reduction of energy consumption. Accordingly, Mission Bay Park should be:

Economic Goal 5

A park in which information regarding ecologically sustainable design and management practices are assessed and used as appropriate.

5.1 *A park which incorporates energy and water efficient design measures, thereby reducing operations and maintenance costs for both public and private entities.*

5.2 *A park in which management practice seeks to minimize the use of toxic materials, to minimize the use of imported potable water, and to maximize the use of recycling.*

Goals for the Environment

Mission Bay was until recently a huge marsh area with a dramatic diversity of natural and wildlife resources. In its conversion to a water recreation playground, Mission Bay has lost much of its original biological diversity. In recent years there has been a growth in public awareness and concern over the need for man to better conserve the natural environment and to learn to coexist in a more symbiotic manner with wildlife.

With the rise of environmental consciousness, people have begun to appreciate - and demand - the opportunity to interact with nature as a recreational activity. While natural habitat park areas may once have been seen as a wasted resource, natural habitat areas in parkland are often now viewed as aesthetically pleasing, and recreationally and educationally significant. Accordingly, Mission Bay should be:

Environmental Goal 1

A park in which aquatic wildlife and natural resources are a major recreational attraction for park users.

1.1 A park in which aquatic biological ecosystems are identified and managed to improve their recreational and aesthetic resource value.

1.2 A park in which public access to wildlife and natural habitats is optimized within the constraints of maintaining habitat viability and protection of wildlife.

1.3 A park in which interpretive information is provided to allow visitors to develop an understanding of the importance and fragile nature of the Bay's natural resources.

Since much of the original biodiversity of the Bay has been lost due to its conversion to an active water recreation playground, Mission Bay should be:

Environmental Goal 2

A park in which biodiversity is sustained and enhanced through the protection of natural resources and the expansion of habitat areas for sensitive species.

2.1 A park in which habitat restoration projects focus on re-creating ecosystems which were historically present in the Bay and on enhancing biodiversity.

2.2 A park in which habitat restoration projects include habitat for appropriate species which are afforded regulatory protection as well as other sensitive species.

2.3 A park in which adequate buffers exist to protect sensitive environmental resources from incompatible land uses.

2.4 A park which plays an increasingly important role as part of the Pacific Flyway and the California halibut fishery.

As the need to manage and restore coastal habitats increases, Mission Bay has the potential to play an important role in understanding how nature "works." The Bay's remnants of natural habitat will serve as models for future restoration projects both within the Bay and throughout Southern California. The Bay is one of only six fully tidal coastal embayments in the region; hence, studies of the Bay's resources would yield important information about species that require access to the ocean such as the California halibut. The Bay provides unique learning opportunities for the public and students of all ages. Thus, Mission Bay should be:

Environmental Goal 3

A park which supports ongoing education and research related to the Bay's natural resources.

3.1 A park where users can study a variety of environmental issues, including long term issues such as the effects of global warming, and the relationship of these issues to park planning, design and, management.

3.2 *A park where users can study the functional equivalency of restored and natural habitats to see if they work as intended.*

3.3 *A park which teaches how native species are linked to the Bay's habitats.*

3.4 *A park which allows research by students of all ages to interpret nature and generally educates the public.*

Mission Bay Park has had problems in the past with water pollution leading to closure of parts of the water body to prevent bodily contact. The contamination of water in the Bay has negative effects on environmental resources, on recreation, and on public perception regarding the desirability of Mission Bay as a recreational and leisure destination. Potential sources of contaminants are vehicle/boat exhaust, fueling activities, bottom paint, cleansers/solvents, bilge pumping, sewage, pesticides/herbicides/fertilizer in runoff, automotive-related chemicals in runoff, dry-flow contaminants, and fireworks. Accordingly, Mission Bay should be:

Environmental Goal 4

A park in which achieving the highest possible water quality is a planning, design, and management priority.

4.1 *A park in which water quality is regularly monitored to assure maintenance of acceptable standards.*

4.2 *A park in which water quality is protected by upgraded sewer mains and storm drains in surrounding areas and by a complete interceptor system to eliminate surface contaminants from entering the Bay.*

4.3 *A park which provides adequate restroom, marina, water-based, and land-based waste-handling facilities so as to minimize illegal recreation-user contamination of water.*

4.4 *A park in which septic tank flushing by private boats is carefully regulated and in which flushing regulations are strictly enforced.*

4.5 *A park in which educational information is provided to boat and recreational vehicle users regarding impacts to water quality of illegal flushing/dumping and regarding regulations and locations available for legal sewage disposal.*

4.6 *A park in which the ability of the water body to carry various pollutants is compared to the cumulative pollutant loading of existing and future park uses prior to the approval of future uses.*

4.7 *A park in which water quality is enhanced through a watershed and water use plan that identifies the pollutants that typically contaminate the Bay and includes regulations and public education programs to minimize such contaminants.*

The physical environment in Mission Bay incorporates a number of components in addition to biological and water resources. Traffic and noise impacts affect users within the Park as well as adjacent residential areas. As a regional tourist and recreation destination, Mission Bay Park generates a substantial level of transportation demand. The heavy use of private automobiles to

reach the Park forms part of a regional cumulative negative impact on air quality. Accordingly, Mission Bay should be:

Environmental Goal 5

A park in which traffic, noise, and air pollution sources, particularly those that are not directly related to the aquatic resources of the park, are reduced to the greatest extent possible.

5.1 A park which provides adequate public services, and in which rules and regulations are enforced, so as to protect human health and public safety.

5.2 A park in which land and water uses which are not dependent on a water-oriented setting and which degrade the natural resource or recreational values of the Bay are excluded.

5.3 A park in which users are protected through the enforcement of rules, ordinances, and laws.

Goals for Aesthetics and Design

The natural and recreational histories of Mission Bay Park are water-bound, from the former and extant marshes and tidal flats to the current water bodes, island fills and shoreline configurations. The park represents first and foremost the adaptation of an aquatic environment for recreational purposes. As a unique and limited coastal resource, Mission Bay Park should be:

Aesthetics and Design Goal 1

A park whose image, as defined by its landscape architecture, and public works manifests and magnifies its unique and distinctive aquatic nature.

1.1 A park in which views to the water and/or aquatic environments are maximized, particularly from entrance and perimeter roads and gateways.

1.2 A park where public's exposure to the water from land recreation areas is enhanced through grading, planting, the placement of structures, and the location of paths and recreational facilities.

1.3 A park in which a substantial portion of the vegetation is recognized as belonging to the waterfront environment, including native vegetation associated with marsh and aquatic communities, and plantings on the land which are aesthetically associated with water.

1.4 A park in which the architecture can be identified as appropriate to the southwestern United States marine environment and which is supportive of the context of Mission Bay Park's landscape.

1.5 A park in which the architecture avoids extreme or exaggerated thematic designs.

Within the "aquatic" identity umbrella, Mission Bay Park contains a variety of environments. For example, five distinctive types of water bodies have been identified, each with a unique spatial characteristic: channel, lake, cove, basin, and lagoon. Likewise, the parkland alternates from narrow strips in close proximity to the water to wide areas more removed from the shore. This diversity of environments enables the park to satisfy many different recreation needs. For this reason, Mission Bay Park should be:

Aesthetics and Design Goal 2

A park comprising an interconnected system of diverse recreational environments, or "parks within a park."

2.1 *A park in which the waterfront and circulation pathways have common design elements which serve to aesthetically unify the various recreation and open space areas.*

2.2 *A park in which each discrete recreation area manifests a coherent and uniquely appropriate aquatic-oriented image according to its function and context.*

2.3 *A park in which a comprehensive art program reveals the special qualities, physical and/or historical, environmental and/or cultural of each recreation area.*

2.4 *A park in which a comprehensive and coordinated signage and lighting system informs and directs the public to the various public and commercial recreation areas, their facilities and recreation programs.*

2.5 *A park in which an interpretive signage program informs visitors about the significance and historical narrative of the landscape of the Bay.*

With its unique water setting, its significant expanse, its location close to downtown and adjacent to major freeways, and its dual role as a local and regional park as well as a premier tourist destination, Mission Bay plays a unique role in defining San Diego's image. This role is fulfilled both by experiencing the park up close and from afar -- from within the park;s boundary and from distant vantage points outside the park. The preceding goals address the near view. Of equal importance, however, are the images gathered from roadways, bluffs, hilltops, and airplane and the manner in which the long view yields to the near view along the park's entrance roads and gateways. Accordingly, Mission Bay Park should be:

Aesthetics and Design Goal 3

A park that extends beyond its boundaries by offering "image bytes" or encapsulated views of its open waters and landscape to surrounding roadways, neighboring streets and distant viewing points.

3.1 *A park that maximizes its exposure to the freeways, particularly in the vicinity of the De Anza Cove, where the bay waters are within 300 feet of Interstate 5.*

3.2 *A parks that preserves water view corridors and maximizes its exposure from surrounding neighborhood streets and hillside vantage points.*

3.3 A park whose buildings and landscape enhance the enjoyment of city, ocean, and sky views from the surrounding neighborhoods.

3.4 A park whose entrances clearly mark the passage from the far to the near view through a comprehensive system of gateways that guide and direct visitors to the various recreation areas.

3.5 A park where adjacent neighborhoods which have strong visual connections to the water also have easy and direct physical access for pedestrians, bicycles, and other non-vehicular means of reaching the bay.

Goals for South Shores

Comprising 152 acres, South Shores is one of the two key remaining unimproved areas of Mission Bay Park. South Shores is located contiguous to an intensively developed area of the Park which includes Sea World, Dana Landing, Dana Inn, and the various uses around Quivera Basin. South Shores has a hard rip-rapped edge, as opposed to the beach which provides for the best passive recreational amenity, and has a north-facing shoreline which is less suitable for passive waterfront uses such as picnicking.

South Shores enjoys convenient access to and from regional freeways (I-5, I-8) and major city arterials (Friars Road, Sea World Drive, Pacific Highway). Due to the high traffic volume on these roadways, the area is also highly visible.

When combined, these factors make South Shores uniquely suitable to a high intensity of recreation use, both public and commercial; it also places on the area the burden of encapsulating the park's aquatic identity for the benefit of people who may rarely or never actually use the Park as a recreational amenity. Accordingly, South Shores should be:

South Shores Goal 1

An intensively used park area that attracts visitors to a variety of public and commercial recreation venues yielding, in aggregate, a summary view of the park's grand aquatic identity.

1.1 A destination which balances intensive water-oriented recreation uses with the provision of public access to the shore for passive recreation purposes, such as a pedestrian and bicycle pathway.

1.2 The area where the view from the roadway confluence at the eastern end of South Shores greet visitors as a primary gateway capturing near and long views of the aquatic environment, natural marsh areas, and adjacent recreation areas.

1.3 An area which provides bicycle and pedestrian paths allowing for recreational use and connecting to other park destinations.

1.4 An area which includes safe access to a path along the San Diego River floodway providing access to its rim for passive recreation purposes and viewing of the river and its resources.

The level of recreation intensity envisioned for South Shores may be compromised by the existing landfill in terms of suitability for foundations and toxic hazards. The costs required to mitigate its impact on development should be weighed against the potential fiscal and recreation benefits of such development. Regardless of the its level of development intensity, South Shores should be:

South Shores Goal 2

A toxic-free recreation area posing no hazard to the health and safety of current and future park users.

Goals for Fiesta Island

Comprising 465 acres, Fiesta Island is one of the two key remaining unimproved areas of Mission Bay Park. The shores of Fiesta Island face three very different water bodies and recreational zones of Mission Bay Park. The eastern shore faces a collection of lagoons, especially suited for non-motorized boating use and wading, and forms a complementary land mass to the East Shores area of the Park. In addition, the east shore of the Island is a critical area in terms of the Park's image to the City because of its exposure to views from the east including from the I-5 freeway. The west shore of Fiesta Island faces Fiesta Bay, the Park's largest water body, which is dominated by motorized boat use and special aquatic events. The west shore of the Island is also highly visible from Ingraham Street, Ski Beach, and the Crown Shores area. The south shore faces across South Pacific Passage to South Shores and Sea World. This diversity of contexts provides a basis for the use of the Island as a multifaceted recreation area.

It should also be noted that Fiesta Island does not abut any residential neighborhoods and can be freely accessed by road from the southeast corner of the Park which in turn in readily accessible to the regional serving freeways. In these regards Fiesta Island is well suited to accommodate significant portions of the regional passive recreational demand.

As one of the few remaining unimproved areas in the Park, Fiesta Island also offers a particular opportunity for natural resource management and enhancement uses. The Mission Bay Park Natural Resource Management Plan recognizes that opportunity through the identification of the southwestern portion of the Island as a potential future resource enhancement preserve area.

Based on these issues, Fiesta Island should be:

Fiesta Island Goal 1

An area which supports a diversity of regional-serving public and nonprofit recreation and natural resource management and enhancement uses.

1.1 An Island whose east side provides for citywide and regional-serving passive recreation uses, forming a unit with North Pacific Passage and the East Shores area of the Park.

1.2 An Island whose west side focuses on the wide beach and its relationship to the water uses on Fiesta Bay, allowing for informal public use of the beach and permitting temporary use as a controlled access special-event view area.

1.3 An Island where the landscape design of the east and west sides respects their significance in terms of defining the Park's image to passing and through traffic as well as to Park users.

1.4 An Island which provides for the operation of special events both on land and on adjacent water bodies.

1.5 An Island whose southern side provides for public recreational uses complementary to the water use in South Pacific Passage and Hidden Anchorage, and the land use at the South Shores area of the Park.

1.6 An Island which includes a substantial new resource enhancement area, located to the southwest facing across the water to Sea World, displacing the current sludge drying beds.

1.7 An Island which provides for bicycles, other non-motorized forms of circulation, pedestrian circulation, and connection to other park areas.

1.8 An Island on which pedestrian and other non-motorized circulation is prioritized over automobile circulation.

1.9 An Island on which special emphasis is placed on using natural landscapes within recreation areas.

1.10 An Island on which the land is graded to increase the area with strong visual connection to the water.

1.11 An Island to which the access bridge(s) and/or causeway(s) form an appropriate gateway and aesthetic statement.

Appendix B-1

HYDROLOGY - Feasibility of A Constructed Wetland at the Mouth of Rose Creek

Prepared by

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I. INTRODUCTION

The 1990 Natural Resources Management Plan (NRMP) for Mission Bay Park included creation of 110 acres of wetland habitat on the Fiesta Island sludge beds. Wallace, Roberts and Todd (WRT) is recommending that this proposed habitat be relocated to the mouth of Rose Creek to take advantage of water quality improvements that could be provided by wetlands in this vicinity, and to maximize habitat values. A number of questions were raised by this proposal. This investigation was requested to provide a brief feasibility check on three principal elements of the wetlands restoration effort:

1) Flooding: Will the marsh increase flood hazards on the Rose Creek floodplain?

2) Viability: Can a wetland created at the mouth of Rose Creek survive high velocity flood flows and sediment deposition?

3) Water Quality: What water quality improvement benefits could be provided by a constructed wetland at this location?

II. FLOOD HAZARDS

Local flood control agencies are concerned that the creation of a marsh at the mouth of Rose Creek would increase the backwater effect of Mission Bay on flood elevations in Rose Creek. The marsh would be created by excavating surrounding uplands to elevations appropriate for marsh development. The final wetland design would incorporate some means of diverting and treating the lower flow events on the marsh plain, while allowing flood flows to pass through the marsh in a main distributary channel. In addition, the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) flood profile (Figure 1) for Rose Creek shows a starting water surface elevation, representing backwater at Mission Bay, of approximately 4.1 feet NGVD. The marsh would be constructed at an elevation of approximately 3 ft NGVD, approximately Mean Higher High Water. The elevation of the marsh would, therefore, be below the current assumed backwater elevation, and so would not increase upstream water surface elevations. In addition, the marsh should be designed to be "off-line". A high-flow channel would convey flows greater than the marsh treatment design flow directly to Mission Bay with a minimum of disturbance to the marsh, or impact on flood elevations upstream (Figure 2 and Figure 3). Therefore, the marsh will not be subject to high sediment loads which would raise its elevation and increase flood risk.

This is discussed further in the section on Marsh Viability.

III. MARSH VIABILITY

There has been some concern that a marsh created at the mouth of Rose Creek would be damaged or destroyed by high velocity flows in the creek during flood events, or would be buried by the sediment carried in Rose Creek. In California, marshes typically form at the mouth of coastal streams subject to flood flows and sedimentation. Virtually all of the southwest streams have developed with a salt marsh located at the mouth of the channel. The marsh evolves on the stream delta, in dynamic equilibrium with the flow of sediment and freshwater from the creek, and the tidal regime and coastal sediment dynamics of the area.

The predicted 100-year flow velocity at the mouth of Rose Creek is approximately 9-11 feet per second (fps) (USACOE 1966). Rick Engineers has suggested that this velocity is high enough to cause erosion of vegetated cohesive soils and would require some form of channel bank protection. This would be true in a situation which required a stable channel. However, erosion of the main distributary channel is part of the natural dynamics of the marsh and stabilization of the channel is not desirable. PWA has developed enhancement plans for many of the local San Diego fluvial systems which include wetlands at their confluence with the ocean or San Diego Bay. These include the Tijuana River, Otay River, Sweetwater River, Los Penasquitos Creek, and the San Dieguito River. These marshes are adapted to a wide range of flow regimes and are able to recover from sedimentation and erosion during extreme events.

Sediment yield from the Rose Creek watershed has been estimated to be approximately 14,300 cubic yards per year (WCC 1986). This volume of sediment is consistent with sediment yields of other coastal systems. Coarse sediments appear to be deposited upstream between Highway 5 and Garnet Ave where the flow regime changes from supercritical to subcritical and the velocity drops. The sediment reaching the inlet of Rose Creek would be finer sediments which were not trapped upstream. The delivery of sediment is episodic, corresponding to larger rainstorms and runoff events. Large volumes of sediment associated with infrequent floods would be carried through the marsh in the major distributary channel, while some fine sediment will be deposited on the marsh, a natural phenomenon and one that is not detrimental to the health of the marsh ecosystem.

IV. WATER QUALITY

The primary water quality problem in Mission Bay is bacterial contamination which results in closure of parts of the Bay to water contact. While it is evident that flow in Rose Creek contributes to the problem, the exact source of the contamination has not been identified

(Karen Henry, per comm). The construction of a marsh at the mouth of Rose Creek will not solve the water quality problems in Mission Bay. Rather, the marsh should be viewed as an important component of an overall watershed management program that identifies the sources of pollution, reduces pollution discharge to Rose Creek, and maximizes pollutant removal along the flow path.

Two projects, constructed and planned, are designed to prevent contaminated water from discharging into Mission Bay. The East Mission Bay Peak Interceptor Peak Period Storage and Pumping Facility, constructed in 1989, has reduced sewage spills into the bay. Phase I of The Mission Bay Dry Weather Interceptor System is diverting dry weather runoff from the west side of Rose Creek into the sanitary sewer system (up to approximately 50 gallons per minute), and Phase V, scheduled for construction in the Spring of 1993 will divert dry weather flows from the east side. These projects are not designed to handle the larger runoff volumes generated during winter storm events.

San Diego County is currently involved in the Municipal Stormwater Discharge permitting process under the National Pollution Discharge Elimination System (NPDES) requirements of the Clean Water Act. The Regional Water Quality Control Board (RWQCB) recommends a comprehensive approach to pollution abatement, including retrofitting of existing stormwater facilities to improve stormwater quality (Thomas Mumley, per comm). A constructed wetland at the mouth of Rose Creek can be an important component of an integrated watershed management approach to pollution reduction.

Wetlands provide water quality improvements through a combination of physical, chemical, and biological processes. Constructed marshes can be designed to enhance these processes to provide more treatment than would be available in a "natural" wetland. Most constructed wetlands for water quality improvement are freshwater marshes. While saltmarsh vegetation is being used to treat wastewater, we are not aware of examples saltmarsh wetlands specifically designed to treat freshwater urban runoff. There is no biological reason such marshes would not be as effective as freshwater marshes (Gersberg 1992). The Palo Alto Flood Basin is a subsided tidal saltmarsh used for floodwater storage. Its value for water quality improvement is currently being evaluated. The natural estuarine environment is one where freshwater mixes with salt water. The climate of Southern California produces many marsh systems where intermittent flow of fresh water inundate tidal salt marsh systems.

The area of marsh needed to treat urban runoff varies with the degree of water quality improvement desired. The "hydraulic residence time" is the factor most directly associated with the potential for improvement. The residence time is the average time that the inflowing water is retained on the marsh. This is the time available for sunlight penetration, settling of suspended sediment, and chemical and biological processes to take place. The residence time is defined by the following relationship between area, depth, and flow:

$$\text{Residence Time} = \frac{\text{Area} \times \text{Depth}}{\text{Flow Rate}}$$

Dr. Gersberg has indicated that a 20-hour residence time would provide 90% removal of suspended solids and coliform, but that a 6-hour residence time (a tidal cycle) could still provide significant benefits. One acre of marsh, ponded to a depth of 1 foot, for 24 hours would provide a high level of treatment for a peak flow of 0.5 cubic feet per second (cfs). At the other end of the scale, one acre of marsh ponded 1.5 feet deep for 6 hours would provide some level of treatment for a peak flow of 3 cfs. Thus, a 100 acre marsh could provide treatment for between 50 and 300 cfs.

Detailed information on frequent, low flow events in Rose Creek is not currently available. Based on an analysis of rainfall data (WCC 1989), the average storm in San Diego is 0.51 inches, or 0.052 inches/hour. The "first flush" from a rainstorm which can carry up to 90% of the pollutant load is generally associated with up to the first 1 inch of rainfall and 0.5 inches of runoff. Rick Engineers has estimated that the first inch of rainfall would produce 0.5 inch of runoff and a peak flow of 3,000 cfs on Rose Creek. This is greater than the 10-year peak flow of 2,700 cfs estimated for the FEMA study. For the average storm in San Diego, the peak flow on Rose Creek would be on the order of 600 cfs. Therefore, 100 acres of marsh could provide some water quality benefits for up to the peak flow from the average storm. More information on the shape of the low-flow hydrograph for Rose Creek, and how the pollutant load is distributed in the hydrograph could provide much needed information to assess the level of water quality improvement potentially available.

IV. DESIGN CONSIDERATIONS

As the purpose of this review is to provide a "reality check" on the feasibility of marsh creation, specific design factors are beyond the present scope of study. However, a few observations are appropriate. Most wetland treatment marshes are designed as freshwater systems with enclosing levees to control water flow. While it is widely recognized that salt marshes provide many of the same benefits, data to quantify these benefits is sparse.

Providing sufficient detention time on the marsh may require constructing levees around the marsh perimeter to pond the runoff water. These levees will need water control structures, such as bladder dams or culverts with tide gates, which can be closed to provide retention time, and opened to release impounded water and to allow full tidal action when there is no runoff. The levees may be designed to provide upland habitat in lieu of islands on the marsh plain as originally proposed.

If the saltmarsh is bermed, it would be an "off-line" facility. This means that the low flows which would normally pass down the main distributary channel without flowing onto the marsh plain would need to be conveyed to the marshplain by a secondary distributary channel system. Ideally, low flows would be diverted from Rose Creek at a location where the channel invert is above the marsh plain elevation and the water can flow by gravity though a vegetated swale to the marsh. This would provide a buffer area to increase the residence time and treatment available, and potentially reduce the frequency of freshwater flows onto the saltmarsh (very low flows would be evapotranspired and infiltrated into the soil). This may be difficult on Rose Creek as the channel gradient is very flat at the downstream end. Based on the FEMA profile (Fig. 1), the channel invert does not reach 4 feet NGVD until approximately 300 feet downstream of Balboa Ave, and it may be difficult to construct a low flow bypass from this location to the Park. An alternative would be to construct an inflatable "bladder dam" across the Rose Creek channel in the vicinity of Grand Ave to raise the water surface elevation sufficiently to divert flow to a pipe which would then daylight upstream of the golf course, and flow in a swale through the golf course to the marsh.

VI. OTHER ISSUES

There will be some tradeoffs to balance between the "naturalness" of the constructed wetland and its water quality improvement function. These will include the need for water control structures, management of the tidal regime, and the availability of the wetland for recreational uses, and the type and quality of the recreational experience. In addition, the regulatory agencies may have concerns regarding the mitigation value of a wetland that is designed primarily for water quality improvement.

The construction of a saltwater wetland to provide treatment of freshwater runoff will require the construction of control structures and the development of an operation, maintenance, and monitoring plan. Proper management of the system may include automatic gates which can be controlled remotely, and a system for manual backup should the automatic system not function properly. Important issues will be keeping sufficient volume available on the marsh for fresh water treatment, the ability to drain the water so that the marsh does not drown in freshwater, the ability to open the gates if the runoff is lower than expected and the ponding depth is not necessary. Monitoring of the water and sediment quality on the marsh will be needed to determine the impact of the water quality improvement function of the marsh on its habitat values.

VII. FURTHER STUDIES AND ISSUES

If the City wishes to pursue the concept of a wetland at the mouth of Rose Creek, the next step would be the development of a conceptual plan for the facility. This would include refinement of the design, and a cost/benefit analysis for the project. The conceptual design would cover biological, hydrologic, engineering, water quality, land-use planning and economic issues. The specific conceptual plan topics might include:

1. Existing Conditions: Detailed site mapping (100 scale with 1 ft contour interval), hydrology, soils, topography, vegetation, wildlife use, land-use, transportation, water quality, etc.

2. Opportunities and Constraints Analysis

3. Goals and Objectives

4. Design Alternatives

5. Preferred Conceptual Plan

6. Implementation (costs, permits, phasing, responsibilities, etc.)

Some of the specific topics of concern would include the following:

A. HYDROLOGY

There is not currently available sufficient information on the low flows in Rose Creek to evaluate the frequency of flows that can be treated to an acceptable extent by the area of marsh available. The ALERT system gage on Rose Creek is not designed to monitor low flows (Carey Stevenson, per comm). A new gage at Grand Ave may provide more useful information on low flows near the mouth, and would include the urbanized area of Pacific Beach within the watershed. An analysis of rainfall records for the watershed to determine the frequency and depth of precipitation associated with pollutant loads is an important element of the management plan.

B. POLLUTANT SOURCE AND LOADING

Some information on the pollutant loads in Rose Creek is available, but this information is not well correlated with flows or rainfall. A monitoring program to measure pollutant loads

at several locations along the creek would help to identify the pollutant source and indicate the best solutions to the source problem. Correlation of rainfall data with pollutant loading will aid in design of the marsh treatment system to achieve the necessary balance between water quality improvement and habitat functions.

C. INTEGRATION INTO THE NPDES PERMIT PROCESS

The treatment marsh should be integrated into a basin-wide plan to control the source of pollutants and reduce pollutant loads at various locations along the stream. The basin-wide plan should be part of the County of San Diego municipal and construction permits for NPDES.

D. MANAGEMENT PLAN

A Management Plan is needed to assure that the marsh functions properly to provide the multiple benefits of water quality improvement and wildlife habitat. The plan should include regulation of the water control structures, backup and emergency plans for water level control, and maintenance of water control structures, including levees, dams and gates. Any maintenance activities, such as dredging or sediment removal need to be justified based on criteria established in the management plan.

E. MONITORING PLAN

A monitoring plan is needed to evaluate the effectiveness of the marsh at meeting its water quality improvement function and to evaluate the effect of this function on wildlife habitat values. Monitoring of the evolution of the biological values of the habitat is also needed.

F. REGULATORY ISSUES

The concerns of the regulatory agencies regarding the use of a water quality marsh for habitat mitigation must be determined by close communication with representatives of those agencies.

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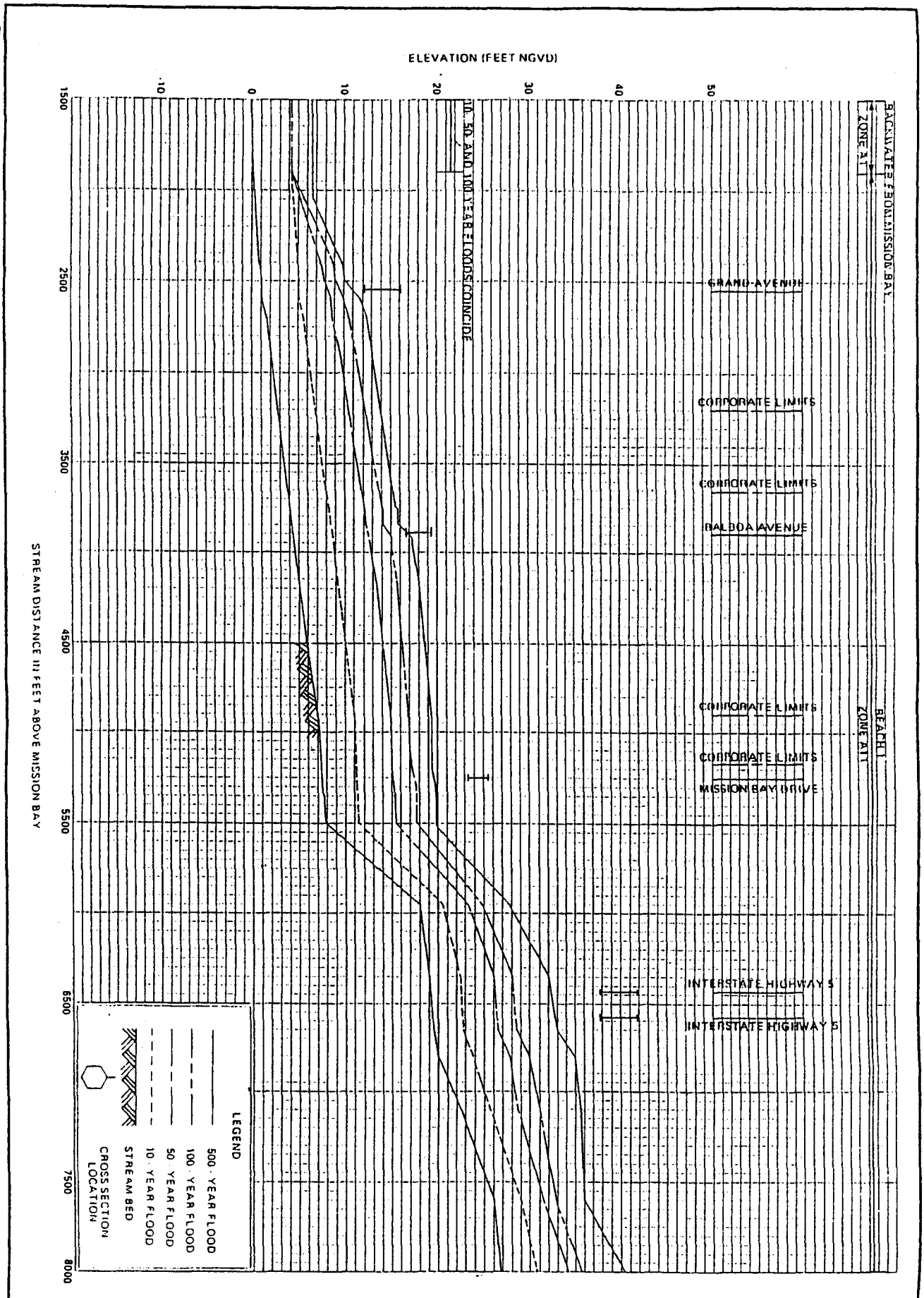


Phillip Williams & Associates, Ltd.

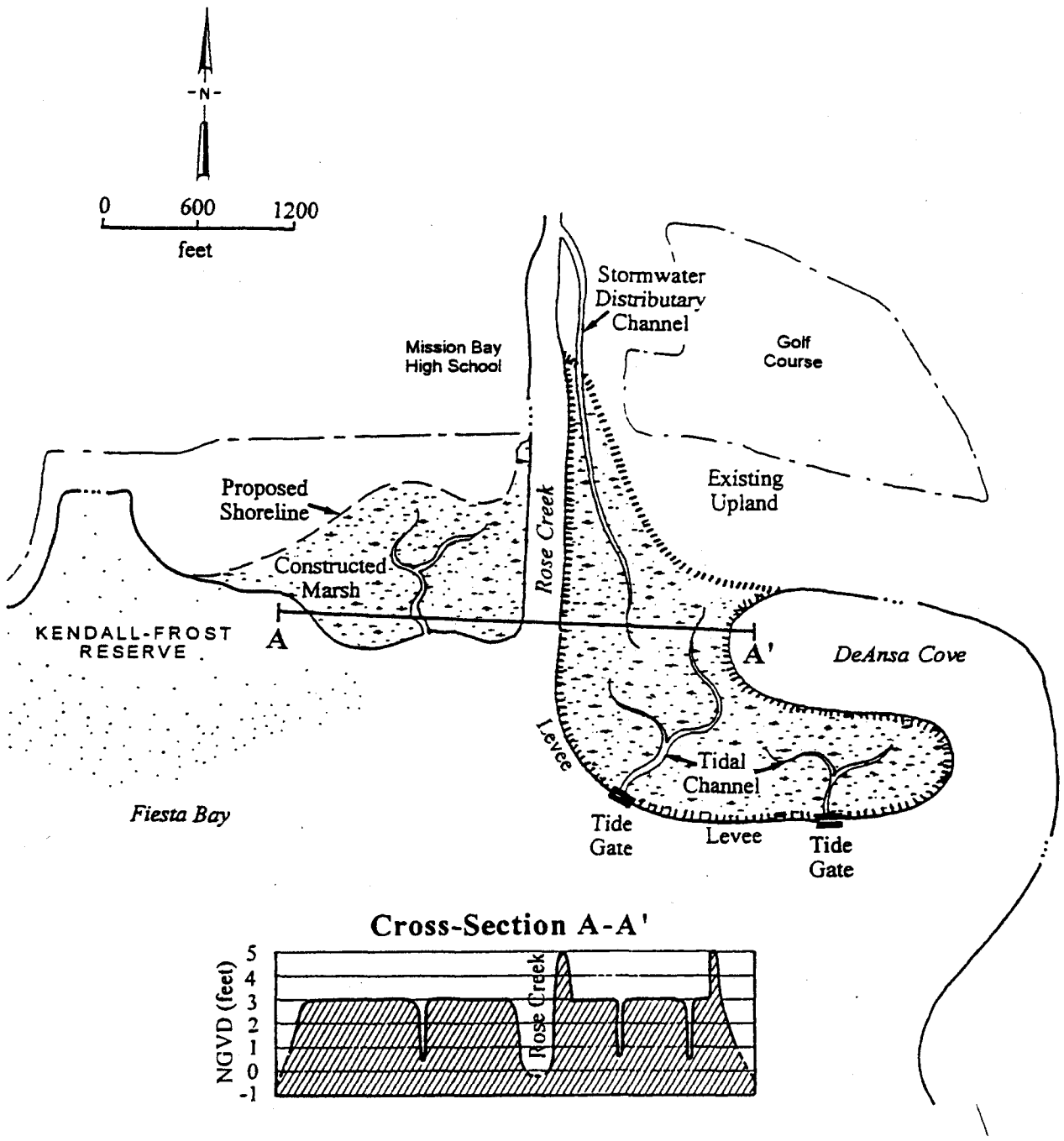
Figure 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

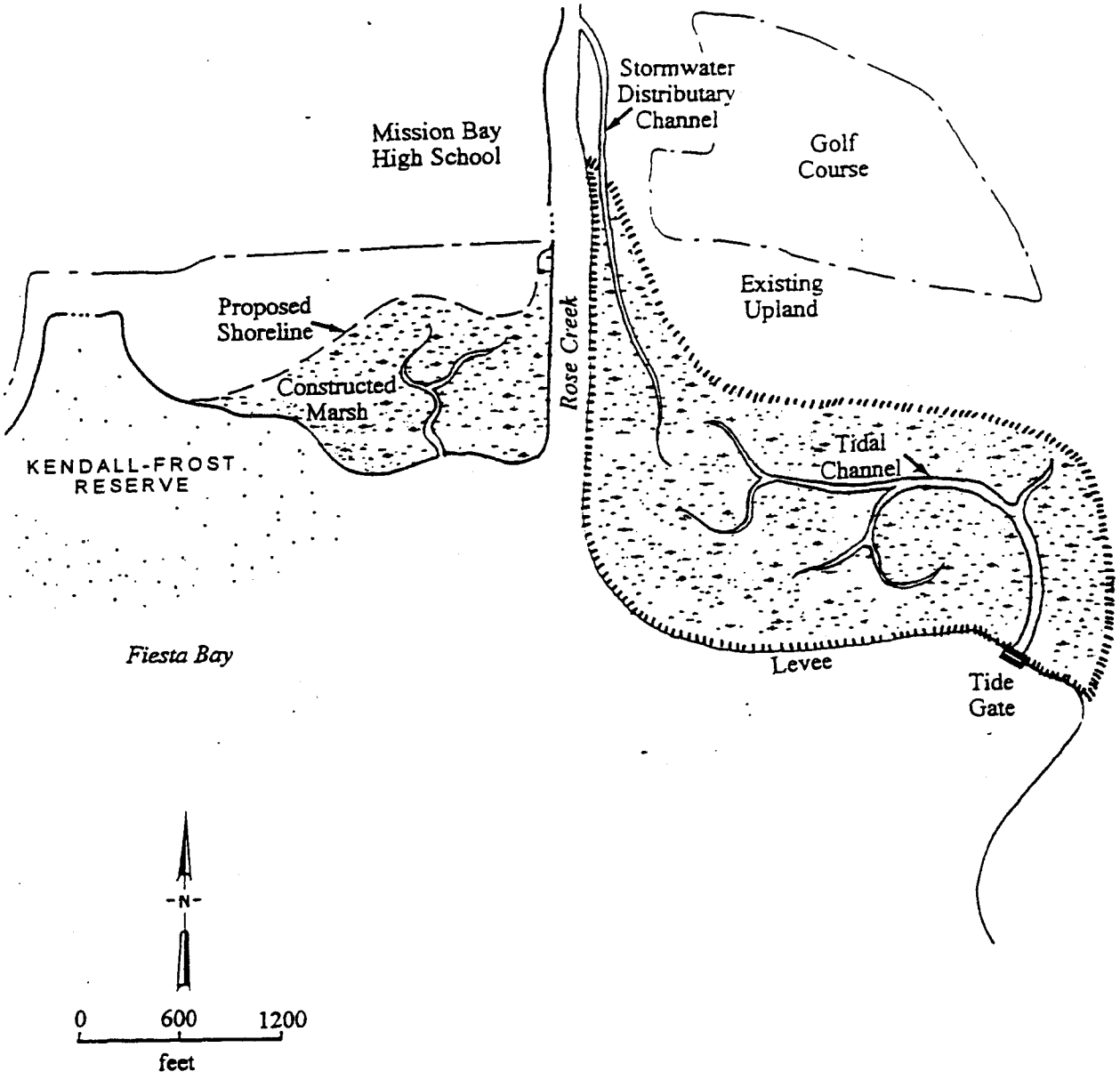
CITY OF SAN DIEGO, CA
(SAN DIEGO CO.)

FLOOD PROFILES

ROSE CANYON CREEK



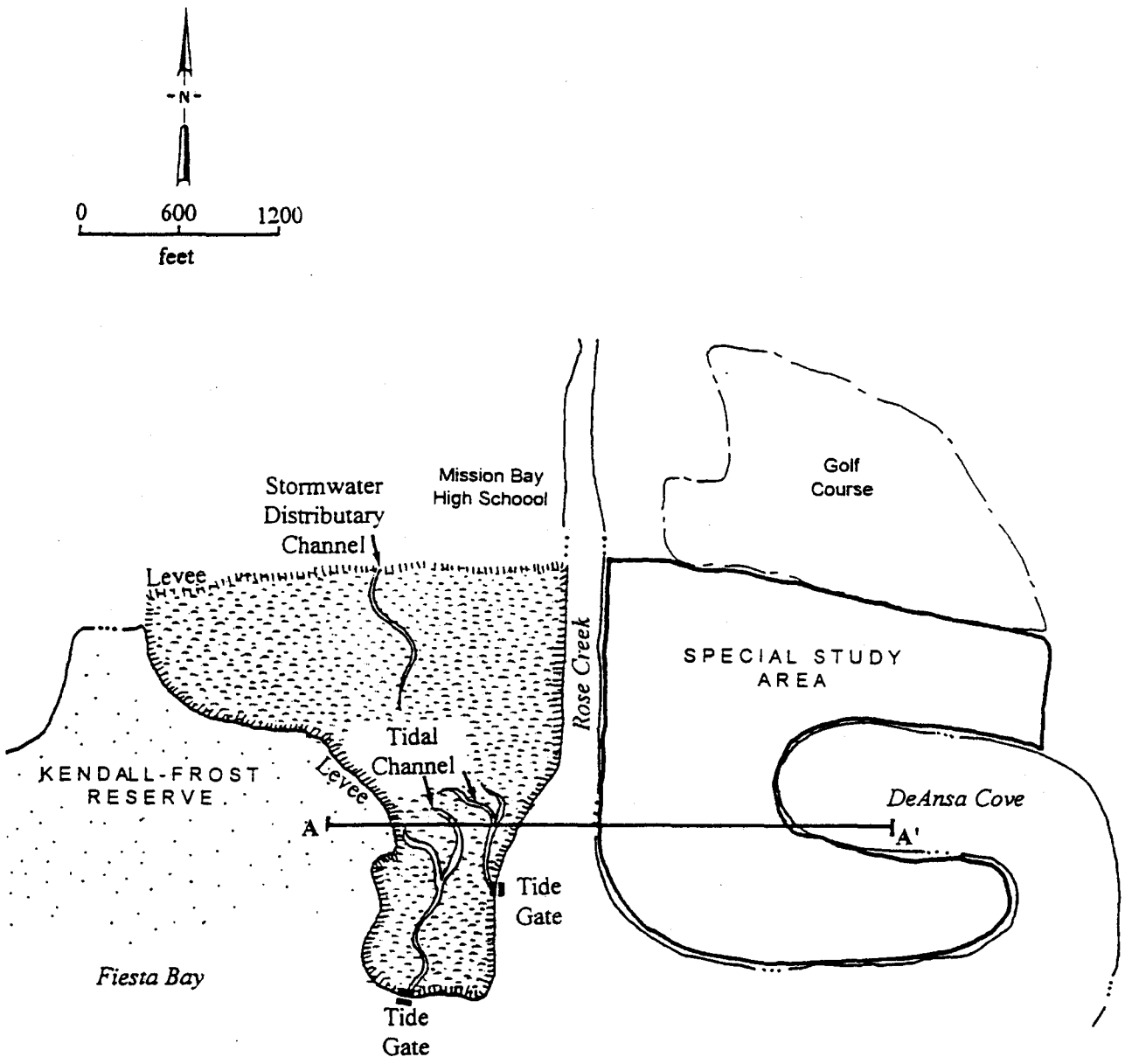
Philip Williams & Associates, Ltd. Consultants in Hydrology	San Diego Mission Bay Park **Conceptual Design I**	Figure 2



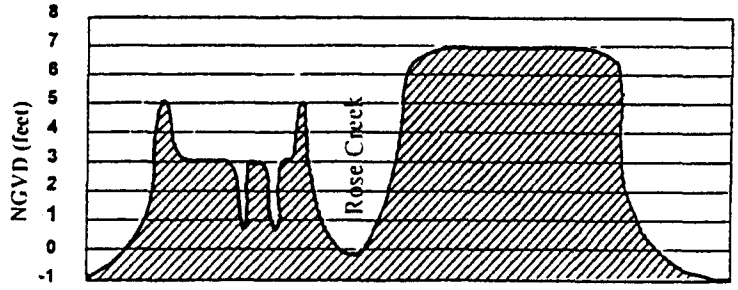
Philip Williams & Associates, Ltd.
Consultants in Hydrology

San Diego Mission Bay Park
Conceptual Design II

Figure
3



Cross-Section A-A'



Philip Williams & Associates, Ltd. Consultants in Hydrology	**San Diego Mission Bay Park** Conceptual Design III	Figure 4

Appendix B-2

HYDROLOGY - Use of Created Wetlands for Stormwater Treatment in Mission Bay

Prepared by

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USE OF CREATED WETLANDS FOR STORMWATER TREATMENT IN MISSION BAY, CA

Richard M. Gersberg, Ph.D
San Diego State University

INTRODUCTION

Wetlands are an essential part of nature's stormwater management system. Important wetland functions include conveyance and storage of stormwater, which dampens the effect of flooding; reduction of velocity of stormwater, which increases sedimentation; and modification and removal of pollutants carried in stormwater. Accordingly, there is a great amount of interest in the incorporation of natural or constructed wetlands into stormwater management systems. This concept provides an opportunity to use one of nature's systems to mitigate the effects of runoff associated with urbanization. In addition, by using wetlands for stormwater management, wetlands can be restored and revitalized, and opportunities for wildlife enhancement and esthetic enjoyment can be maximized.

DESIGN CONSIDERATIONS

Relations between hydrology and wetland ecosystem characteristics must be included in the design to ensure long-term effectiveness. The source of water and it's quality, velocity and volume, hydraulic retention time, and frequency of inundation all influence the chemical and physical properties of wetland substrates which, in turn, influence species diversity and abundance, pollutant removal rates, and nutrient cycling. Hydrology ultimately influences sedimentation, biological transformation, and soil adsorption processes. Critical factors which must be evaluated include velocity and flow rate, water depth and fluctuation, hydraulic retention time, circulation and distribution patterns, seasonal, climatic, and tidal influences, and soil permeability.

POLLUTANT REMOVAL IN WETLANDS

Reducing the loading of pollutants into Mission Bay requires an innovative solution. Created wetlands serving the drainage area of the Rose Creek basin can be relied upon to mitigate a major source of contamination. In Mission Bay, microbial contamination (as reflected in elevated counts of both total and fecal coliform bacteria) resulting from stormwater runoff, poses a major public health problem. During the 1991-92 rainy season, the waters of Mission Bay had to be posted (by the San Diego County Department of Health) on a number of occasions, and both the perception and the

reality of degraded water quality in Mission Bay is now affecting the recreating public, Mission Bay leaseholders, and other concerned parties alike.

Regional stormwater systems using created wetlands have been constructed in Tallahassee, FL (Livingston, 1986), and Fremont, CA (Silverman, 1989). These systems have been shown to significantly reduce pollutant loads including suspended solids, total nitrogen and total phosphorus, and BOD. Created wetlands have also been shown to have the capability to reduce bacterial and viral levels by 90-99% (Gersberg et al.,1989), and also have a high capacity for the retention of toxic heavy metals (Sinicrope et al., in press).

POLLUTANT REMOVAL BY SALTMARSHES

Natural tidal saltmarshes have been shown to have use in wastewater purification applications. The U.S. Environmental Protection Agency investigated BOD and suspended solids removal in a salt marsh treating food processing wastewater (U.S. EPA, 1986). Guida and Kugelman (1989) investigated saltmarsh polishing of effluent from activated sludge treatment of shrimp processing wastewater. They found BOD removal ranged from 29-100%; total suspended solids removal , 58-108%, total N removal; 69-98%; and total P removal, 30-73%. These investigators also found that a short residence time(6 hr) of wastewater in the saltmarsh due to tidal hydrology did not preclude effective treatment in the tidal marsh system, even at near-freezing temperatures. The pollutant removal in these tidal saltmarshes was comparable with the performance of other freshwater marsh polishing systems. This similarity of treatment effectiveness is not surprising since the mechanisms of pollutant removal whether in a freshwater or saltwater wetlands are remarkably similar. For example, suspended solids are removed mostly by physical processes (filtration and sedimentation), heavy metals are mainly removed via chemical adsorption and precipitation reactions, while bacteria and viruses are removed through a combination of physico-chemical and biological processes, including adsorption, sedimentation, ultra-violet radiation inactivation, filtration, predation (by zooplankton), chemical antagonism, and antibiosis. It is important to note here that all of these processes proceed independently of the vegetation type (saltwater versus freshwater), and are more dependent on hydrology than the actual marsh type or salinity levels.

AREAL REQUIREMENTS FOR WETLAND TREATMENT

Most water quality effects from stormwater result from the "first flush." In the early stages of a storm, accumulated pollutants in the watershed, especially on impervious surfaces such as streets and parking lots, are flushed clean by rainfall and resulting runoff. The first flush typically equates to the fist inch or so of precipitation which carries 90% of the pollution load of a storm event. Treatment of this fraction of the runoff will help mimimize the water quality effects of stormwater runoff.

In order to attain efficient treatment performance by stormwater treatment wetlands, sufficient hydraulic retention time is required. If we assume that 200 acres of wetlands are available for treatment in Mission Bay, and these wetlands can be designed to hold a water depth of 0.5m during a rain event, then the storage volume equals about 400,000 cubic meters. Assuming a 200 cfs (cubic feet per second) flow in Rose Creek, then the hydraulic retention time would be nearly 20 hours, a value which should be sufficient for good suspended solids and coliform removal efficiencies (90%). Storm events involving much larger flows than those above would receive lessor treatment due to the shortened residence times.

BENEFITS OF CREATED WETLANDS

A wetlands developed in Fremont, CA as part of the Coyote Hills Regional Park serves as a prototype for a created stormwater treatment wetlands (Silverman, 1989). Before development into the urban runoff treatment wetlands, the site contained an abandoned agricultural field, a dense willow grove, an area of pickleweed (Salicornia virginica), and a meandering slough with no surface outlet, which drained a small agricultural area. Water was diverted onto the site from Crandall Creek, draining a 12-km^2 area characterized by 75% suburban/residential development and 25% agrucultural and open space.

Three distinct systems were incorporated into the wetlands to test performance of different designs. Influent is diverted fairly equally into two initial systems. One is a long, narrow pond containing a long island. Considerable area was devoted to shallow edges to encourage growth of rooted aquatic vegetation (mainly cattails, Typha latifolia). The other system is more complex, using a spreading pond draining into an overland flow sytem (innundated only during storms), followed by a pond with berms supporting rooted aquatic vegetation. This system allows testing of water quality effects of overland flow characterized by different vegetation and flow patterns than those of the pond and effects of "combing" water through cattail strands.

These systems drain into a common third system, which provides an area of shallow, meandering channels, maximizing contact with various types of wetlands vegetation. The discharge is into another section of Coyote Hills Regional Park and flows back into the channel that Crandall Creek discharged into before diversion. Hydraulic considerations included sizing the diversion structure and channels to accommodate the 10-yr, 6-hr storm, with greater flows causing diversion structure failure with most of the flow remaining in Crandall Creek.

Development of stormwater wetlands has a number of benefits. Attractive wetlands may be created in an urbanized region needing additional "natural" areas, and a facility to research the potential and future designs for urban runoff treatment systems can be provided. Another important benefit is the practical demonstration for implementation of other wetlands development

projects.

A created wetlands in Mission Bay provides an outstanding opportunity to improve Bay water quality while providing a multitude of other benefits to the recreational, esthetic and ecological environment of the urban Mission Bay.

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Appendix B-3

HYDROLOGY - Mission Bay Physical Model

Prepared by

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Mission Bay Physical Model

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Abstract

A scale physical model of Mission Bay is used to test changes in circulation patterns on the east side of Fiesta Island and DeAnza Cove. The horizontal scale is 1/2000 and the vertical scale is 1/100. Water is cycled in and out scaled to the tides. Removing the Fiesta Island causeway combined with one-way flapper valves are found to significantly improve the circulation in the east end. These changes with a cut in the DeAnza Cove peninsula will improve circulation in DeAnza Cove.

1. Introduction

The water exchange in Mission Bay is very poor on the east side of Fiesta Island and in DeAnza Cove. In order to improve this situation, proposals have been made to alter the circulation through structural and engineering solutions. A physical model was constructed and operated to test efficacy of proposed changes. The results are describe in this report.

Mission Bay is a tidally flushed lagoon which means that there is little fresh water input and the salinity in the Bay is near that of the coastal ocean. Tidal forces along the coast cause the water level to have a spring tide range of 1.2 m. The area is about 4 km on a side. Most of the bay away from the mouth has a rather uniform depth of around 2.1 m.

The shape of the bay sets the stage for the circulation. At the mouth, the maximum spring tide ebb and flood currents is 2.3 km/hour (McNabe, Holmes and Dorman, 1978). Currents are slower in the larger bays, but the circulation is persistent and the water is moving. On the other hand, the currents are very weak in the narrow channels in the east end and the circulation is extremely poor. The worst circulation is on the east side of Fiesta Island to the north of the causeway.

2. Physical Theory

The essential dynamics of the model is governed by Froude theory (Fisher, et al, 1979; Von Arx, 1962). Shallow water gravity waves dominate the circulation in the Bay and in the model. The

time for a shallow water gravity wave to traverse from the front to the back of the bay is proportional to time for a shallow water gravity wave to traverse from the front to the back of the model. Once the vertical and horizontal scales of the model are chosen, other model factors are set by Froude theory. Since the model used here has a horizontal scale of 1/2000 and the vertical scale of 1/100, the scale of speed is 1/10 and the scale of time in the model is 1/200. Thus, the time between two high tides in the model is 3.725 minutes instead of 12 hours and 25 minutes in the Bay.

The interpretations of the results of a Froude model is related to the scale distortion. The scale distortion is the ratio between the vertical and the horizontal scales. It is generally accepted that circulation patterns are faithfully replicated in models with scale distortions up to 1/20 which is the value for the model used here. Therefore, this model may be used to study the effect of changes in the geometry on the circulation pattern in the Bay.

3. Model Construction and Operation

The model is constructed in styrofoam. The scaled shape of the Bay was cut out of 4X8 foot sheets that were sandwiched together and then glued side by side so that the finished model is 8X8X0.5 feet. The styrofoam was sealed and painted.

Tidal variations are generated by the raising and lowering of a reservoir over a 3.725 minute cycle. Water is exchanged between the model and the reservoir by a syphon. The effect of this system is to cycle water in and out of the mouth of the model duplicating the effect of the spring tidal range.

Tests show that the model comes to equilibrium after three tidal cycles. After any changes in the model configuration or exchanging of water, the model was cycled at least three times before any measurements were taken.

4. About One-Way Gates

It was the suggestion of one of us (Johnson) that one-way gates would be more effective in forcing circulation through the weak exchange areas. In the model, this is a "flapper valve" formed from a 1/4 inch screen with a plastic film hanging down loosely on one side, so that water moving one direction flows through and pushes the film back. Water moving the opposite direction pushes the film against the screen, closing the "valve" and preventing flow. There are six different geographical positions for flapper valves in the model that are designated by a "Gate" number. Gate 2, extending between Vacation Island and Fiesta Island, was tried with the flapper covering 100%, 75%, 50% and 25% of the opening, extending from the eastern side. Except for the 100% covering, the remaining portion was open so that water could move freely in either direction.

The full scale flapper valve gate in the Bay has not been designed nor is there a working model as far as we know. This would have to be developed by engineers and prototypes tested. We envision this device to possibly be a window shade type, with

vertical strips that rotate open or closed depending upon the water direction. Another possibility is down hanging doors are pushed open or closed by the current against a fixed vertical structure. A solid structure such as a bridge or pier would support the one way valve structure(s). If there is insufficient velocity to open and close the valves, a low power motor could open and close them as they would not be moving against the current.

The auto bridge to Fiesta Island could located over the flapper valve at gate 4 or 6 so as to provide the structural support. For gates off the east and south sides of Fiesta Island, provisions could be made to allow small boats to pass. One example would be to have a shallow draft channel opening on one side covering less than 10 % of the total channel area so that shallow draft boats could pass through at any time.

Between Fiesta Island and Vacation Island, a pier could extend partway out into the channel that would be the structural support for the flapper valve. As it will be shown later, a flapper valve extending across 50 % of this channel from the east side would improve the circulation on the east side of Fiesta Island. Navigation across the western half of the channel would be unimpeded and wide enough to handle the traffic. The pier would support navigational markings, provide access for maintenance of the flapper valve system and might be used for recreational purposes. Configurations 7 and 9, which have a partial gate between Fiesta Island and Vacation Island and a gate at the present causeway site, would allow the same navigation as is in the present Bay configuration.

Gates in Configuration 12, that included flapper valves across the two main channels on the east and west side of Vacation island, was not considered realistic because they would interfere with navigation and other configurations would do the job. This was included to show an extreme case that would generate very rapped flow around Fiesta Island.

5. Data Collection

To test the circulation in the model, dye was injected only at one point for a particular run. Three dye spots were used, two on the east side of Fiesta Island and one in De Anza Cove (Fig. 1). The dye path movement was recorded by video and still photo. For consistency, die was injected at maximum ebb, and recorded on video for at least three tidal cycles. Still photos were taken at least at every maximum ebb.

Velocity measurements were made for selected cases for quantitative comparison. This was done by measuring the distance a small paper dot floating on top of the water and in the center of the channel would travel in 10 and 20 seconds. Velocities were measured at two sites on the east side of Fiesta Island simultaneously. These sites corresponded with the two dye spots on the east side of Fiesta Island.

Sixteen different model configurations were tested. The first 11 concentrated on the circulation on the east side of Fiesta Island. Of these, the first 4 were passive in nature, and any changes were cuts. Number one was the present configuration with

the solid Fiesta Island Causeway in place. The causeway was removed for configuration Number 2. Configuration 3 was # 2 with a proposed cut through the northern third of Fiesta Island. Configuration 4 was # 3 with an additional proposed cut through the southern third of Fiesta Island.

The next series of modifications included one-way flapper valves. Configuration 5 was with no causeway, a north opening flapper valve (gate 6) and a southwest opening flapper valve covering 100 % the narrows between Fiesta Island and Vacation Island (gate 2), the sum of which forced a counterclockwise circulation around Fiesta Island. Configuration 6 was as 5 except that the flapper valve at gate 2 covered 75% of the narrows while the remaining 25% on the western end was open. Configuration 7 was as 5 except that the flapper valve covered 50% of the narrows while the remaining 50 % on the western end was open. Configuration 8 was as 5 except that the flapper valve covered 25 % of the narrows while the remaining 75% on the western end was open. Configuration 9 was as 7 except that the flapper valves were reversed, being south opening on gate 2 and north opening on gate 3 which forced a clockwise circulation around Fiesta Island. Configuration 10 is with no causeway but two Fiesta Island flapper valves opening east (gate 4) and north (gate 5) between Fiesta Island, forcing a counterclockwise flow around Fiesta Island. Configuration 11 is the same as configuration 10 except that the flapper gates are reversed so as to force a clockwise flow around Fiesta Island. Finally, configuration 12 consisted of gate 1 with flapper valve south opening was across the channel to the west of Vacation Island, gate 2 flapper valve south opening between Vacation Island and Fiesta Island, and gate 3 flapper valve east opening between Fiesta Island and the mainland which forced a strong counterclockwise flow around Fiesta Island on the flood tide.

The remaining configurations concentrated on the De Anza cove area. Configuration 13 was the present configuration with the Fiesta Island causeway but there was a cut across the De Anza Cove peninsula. Configuration 14 was as 11 (no causeway and two flapper valves causing counterclockwise flow around Fiesta Island) plus the De Anza cut. Configuration 15 was as 14 except the valves were reversed causing clockwise flow around Fiesta Island.

6. Observations.

Run 1. Set up: Configuration 1 - present configuration.
Dye Injection: Site 1
Results: Little dye movement, very stagnet.

Run 2. Set up: Configuration 1
Dye Injection: Site 2
Results: Dye is difused south into Enchanted Cove and toward the causway. Most dye remains on the east side of Fiesta Island. A little moves around the north end of Fiesta Island.

Run 3. Set up: Configuration 1
Dye Injection: Site 1

Results: Little dye movement, very stagnet.

Run 4. Set up: Configuration 2 - no causeway
Dye Injection: Site 1
Results: Dye is moved around the south end of Fiesta Island. Removing the causeway improves the circulation at this spot.

Run 5. Set up: Configuration 2 - no causeway
Dye Injection: Site 2
Results: Dye is moved a little to the south, into Enchanted Cove, but not to Site 1. A new stagnet null point is set up inbetween site 1 and 2.

Run 6. Set up: Configuration 2 - no causeway
Dye Injection: Site 1
Results: Similar to run 4.

Run 7. Set up: Configuration 2 - no causeway
Dye Injection: Site 2
Results: Similar to run 5.

Run 8. Set up: Configuration 3 - N.F.I. cut, no causeway
Dye Injection: Site 1
Results:

Run 9. Set up: Configuration 3 - N.F.I. cut, no causeway
Dye Injection: Site 2
Results:

Run 10. Set up: Configuration 4 - N.&S. F.I. cut, no causeway
Dye Injection: Site 1
Results: Results compromised by dye at room temperature, not comparable with other runs.

Run 11. Set up: Configuration 4 - N.&S. F.I. cut, no causeway
Dye Injection: Site 1
Results: Dye tended to remain near release site. A little was swepted around the southern end of Fiesta Island. This configuration does not significantly improve all circulation in the east end.

Run 12. Set up: Configuration 4 - N.&S. F.I. cut, no causeway
Dye Injection: Site 2
Results: Most dye is spread between release points 1 and 2 and stagnates around the new null point on the east side of Enchanted Island. This configuration does not significantly improve all circulation in the east end.

Run 13. Set up: Configuration 5 - causeway gate (6), north opening; gate 2, 100%, south opening

Dye Injection: Site 1
Results: Dye is moved northward and into the northern end of Fiesta Bay. At the end of the first cycle, dye had reached the northern end of Fiesta Island. At the end of the second cycle, weak concentrations of dye had reached the little islands in the northern portion of Fiesta Bay. By the end of the third cycle, most of the dye had been cleared out of the east side of Fiesta Island. A substantial improvement in circulation on the east side of Fiesta Island.

Run 14. Set up: Configuration 5 - causeway gate (6), north opening; gate 2, 100%, south opening
Dye Injection: Site 2
Results: Similar to Run 13 except no significant amount of dye is moved south of the injection point, and the dye is more quickly spread throughout Fiesta Bay. Little dye remains in the Fiesta Island channel after the 3rd cycle. A substantial improvement in circulation on the east side of Fiesta Island.

Run 15. Set up: Configuration 6 - causeway gate (6), north opening; gate 2, 75%, south opening
Dye Injection: Site 1
Results: Similar to Run 13 in general details. Perhaps a little weaker in circulation on the east side.

Run 16. Set up: Configuration 6 - causeway gate (6), north opening; gate 2, 75%, south opening
Dye Injection: Site 2
Results: Similar to Run 14. Hard to tell the difference.

Run 17. Set up: Configuration 7 - causeway gate (6), north opening; gate 2, 50%, south opening
Dye Injection: Site 1
Results: Similar to 13 and 15, except the dye in not distributed quite as far. A leaky gate 6 allowed some faint dye to move to the south. At the end of the 3rd cycle a significant portion of the dye is in the east side of Fiesta Island channel two-thirds of the distance from the release point to the northern tip of Fiesta Island.

Run 18. Set up: Configuration 7 - causeway gate (6), north opening; gate 2, 50%, south opening
Dye Injection: Site 2
Results: Similar to 14 and 16, except the dye is not

distributed quite as far into Fiesta Bay. Dye concentration is greatly reduced in the Fiesta Island channel on the east side of the Island.

Run 19. Set up: Configuration 8 - causeway gate (6), north opening; gate 2, 25%, south opening
Dye Injection: Site 1
Results: Similar to 17 in general pattern. However, the dye is not quite spread as far. At the end of the 3rd cycle a significant portion of the dye is in the east side of Fiesta Island channel one-third of the distance from the release point to the northern tip of Fiesta Island.

Run 20. Set up: Configuration 8 - causeway gate (6), north opening; gate 2, 25%, south opening
Dye Injection: Site 2
Results: Similar to 18.

Run 21. Set up: Configuration 10 - gate 4, east opening; gate 5, north opening, gate edges not sealed
Dye Injection: Site 1
Results: Dye is rapidly mixed and spread into the northern end of Fiesta Bay south of the little islands. Dye left on east side of Fiesta Island significantly diluted with some streaks remaining. A substantial improvement in circulation on the east side of Fiesta Island.

Run 22. Set up: Configuration 10 - gate 4, east opening; gate 5, north opening
Dye Injection: Site 2
Results: Dye is mixed and spreads further initially into Fiesta Bay. Dye remaining on east side of Fiesta Island significantly diluted with some streaks remaining. A substantial improvement in circulation on the east side of Fiesta Island.

Run 23. Set up: Configuration 11 - gate 4, east opening; gate 5, north opening
Dye Injection: Site 1
Results: Similar to 21

Run 24. Set up: Configuration 11 - gate 4, west opening; gate 5, south opening
Dye Injection: Site 2
Results: Dye is quickly moved south and some reaches Vacation Island by the end of the first ebb cycle. Successive cycles carry dye out the mouth. This set up has about the same dye disperison as configuration 10 in the east side

but the dye is mostly carried out the mouth rather than first going into the northern portion of Fiesta Bay.

Run 25. Set up: Configuration 12 - gate 1, south opening; gate 2, south opening; gate 3, east opening
Dye Injection: Site 1
Results: Dye is quickly moved around north around Fiesta Island and through out all of Fiesta Bay by the end of the first cycle. Little dye is left in the east channel by the end of the third cycle. This set up is a forceful method of causing rapid exchange of the water and very high velocities in the east end of the bay.

Run 26. Set up: Configuration 11 - gate 4, west opening; gate 5, south opening;
Dye Injection: Site 2
Results: Similar to run 24.

Run 27. Set up: Configuration 9 - causeway gate (6), south opening; gate 2, 50%, north opening
Dye Injection: Site 2
Results: Dye is moved south and some is carried to the mouth of the bay by the end of the third cycle. Remaining dye east of Fiesta Island is being rapidly diluted. This configuration causes significant improvement in the circulation in the east bay with the additional advantage that flushed water goes more directly to the mouth.

Run 28. Set up: Configuration 7 - causeway gate (6), north opening; gate 2, 50%, south opening
Dye Injection: Site 1
Results: Problem with causeway gate not functioning properly, result compromised.

Run 29. Set up: Configuration 7 - causeway gate (6), north opening; gate 2, 50%, south opening
Dye Injection: Site 1
Results: Similar to run 17.

Run 30. Set up: Configuration 7 - causeway gate (6), north opening; gate 2, 50%, south opening
Dye Injection: Site 2
Results: Similar to run 18.

Run 31. Set up: Configuration 1 - present
Dye Injection: Site 3
Results: Dye stays in DeAnza cove with little dilution and exhange with rest of bay.

Run 32. Set up: Configuration 13 - DeAnza cut and causeway

Dye Injection: Site 3
Results: Null point remains in DeAnza Cove behind new "island" where most of the dye stagnates. Not much improvement in DeAnza Cove circulation over present configuration.

Run 33. Set up: Configuration 14 - DeAnza cut, no causeway, gate 4, west opening; gate 5, south opening, clockwise flow around Fiesta Island.
Dye Injection: Site 3
Results: Pulses of dye out of DeAnza Cove on west entrance or counterclockwise sence around the DeAnza island. This is caused by gates forcing increased eastbound flow around the northern end of Fiesta Island. This configuration improves the exchange in the DeAnza Cove area.

Run 34. Set up: Configuration 14 - no DeAnza cut, no causeway, gate 4, west opening; gate 5, south opening, clockwise flow around Fiesta Island.
Dye Injection: Site 3
Results: Most of the dye stays in DeAnza Cove with only weak improvement.

Run 35. Set up: Configuration 11 - no DeAnza cut, no causeway, gate 4, east opening; gate 5, north opening; counterclockwise flow around Fiesta Island.
Dye Injection: Site 3
Results: Similar to run 34.

Run 36. Set up: Configuration 15 - DeAnza cut, no causway, gate 4 east opening; gate 5 north opening; counterclockwise flow around Fiesta Island.
Dye Injection: Site 3
Results: Similar to run 33. Dye pulses out of DeAnza Cove on west entrance or counterclockwise sence around the DeAnza island. This is caused by gates forcing increased westbound flow around the northern end of Fiesta Island. This configuration improves the exchange in the DeAnza Cove area.

7. Conclusions.

Consider first the circulation on the east side of Fiesta Island. Passive changes such as cuts in Fiesta Island does not eliminate the null point where the water stagnates, but just relocates it. Removing the Fiesta Island causeway moves the null point a little north to the Hilton hotel area. Cuts in Fiesta Island shift the null point to be east of the Enchanted Cove area. None of these changes would significantly improve the total circulation on the east side of Fiesta Island although it may be imporved in some specific areas.

The one-way gates will eliminate the null point by forcing a continuous circulation around the Island. Configurations with gates 4 and 5 or gates 2 and 3 can be oriented to cause flows oriented in either direction. A clockwise flow will move the east Fiesta Island water out into the main channel, whence it is quickly mixed and carried out the mouth. A counterclockwise flow will carry the Fiesta Island water into the northern end of Sail Bay, where it would take longer to be ultimately removed from Mission Bay. The gate 4 & 5 combination results in somewhat greater circulation and more control of the velocities in the east end than gates 2 & 3. However, both configurations and directions will significantly improve the total circulation of the east end of the bay.

Configuration 12 with the three one-way gates is an extreme case. Although providing rapid refreshment of the water, the greatly increased velocities on the east side of Fiesta Island would be so great as to be sure to cause severe erosional problems in this area.

Turning to the DeAnza Cove area, the model studies show that the DeAnza cut by itself would not significantly improve circulation in this area. However, the DeAnza cut with the flapper gates 4 and 5 oriented in either direction will significantly improve the water exchange in the DeAnza Cove. Although not directly tested, any other flapper gate configuration that causes increased flow around Northern Fiesta Island with the DeAnza cut (such as the 50 % gate 2 with the causeway gate) should cause a similar improvement in the DeAnza Cove.

8. Recommendations:

We recommend that configurations 7, 10 and 11 with the flapper valves be considered for improving the circulation on the east side of Fiesta Island. Additional large scale (1/1000 or greater) physical modelling should be done of the eastern side of the bay when design plans are narrowed to test refinements and make quantitative measurements of the flow velocities induced by these changes. This in turn could be used to estimate the areas most sensitive to scouring and erosion. Estimates on the erosion caused by wave action and currents should be examined through a combination of large scale physical modelling with scale distortions (the ratio of the vertical scale to the horizontal scale, which is 1/20 in this model) of 1/3 to 1/5 combined with field studies.

A cut in the DeAnza cove peninsula should be considered for improving the circulation in the cove. On the other hand, if this area is to be made into a marsh habitat, then this would be unnecessary.

Acknowledgments:

This project was supported by Wallace Roberts & Todd of San Diego.

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Appendix C

CIRCULATION & PARKING RECOMMENDATIONS

Prepared by

Wilbur Smith Associates

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TABULATIONS

ILLUSTRATIONS

APPENDIX C

Circulation and Parking Recommendations

Introduction

The provision of uncongested safe circulation and adequate and convenient parking are key elements in maintaining Mission Bay Park as one of San Diego's preferred recreation destinations. The following report presents our recommendations for correcting existing circulation and parking deficiencies and for providing the circulation and parking infrastructure necessary to support the Master Plan's land use recommendations.

Land Use Preamble

Because transportation and land use are integrally linked elements of the Master Plan, both elements should be addressed with the other in mind. For the purposes of this Master Plan, transportation was seen both as a response to land use needs and as a constraint to park development. The land use element of the Master Plan Update proposes several changes to the existing development pattern within Mission Bay Park. These changes work to provide for future Park growth, while at the same time providing for the best possible circulation and access within the Park.

In the existing condition report, three primary areas of congestion within the park were identified. These areas included the Bahia Point/Bonita Cove, De Anza Cove and Crown Point Shores. Parking and circulation in these areas were at or over capacity during peak season times. Over capacity parking and circulation at Crown Point shores led to spillover parking and increased congestion within the adjacent neighborhood.

Master Plan land use recommendations strive to ameliorate these conditions by shifting regional recreation use away from these congested areas to the South Shores Area which exhibits superior regional access characteristics such as direct access to I-5 and I-8. Specifically, regional park uses such as group picnicking are to be removed from Crown Point Shores and the area is to be redesigned to more of a neighborhood park function. At Bahia Point, regional recreation land would also be reduced. At De Anza Cove, a portion of the land currently occupied by Campland and the De Anza Trailer Resort are targeted for rehabilitation into a wetland/wildlife area. The 45-acre De Anza Trailer Resort lease area would be moved back from the point and into a portion of the area currently used for public recreation and parking. Campland would be relocated to the east side of Rose Creek. All regional recreation lands lost by these land use changes would be replaced within the South Shores/Fiesta Island area of the Park.

Circulation

The implications of these land use changes on park circulation are not expected to be dramatic, however, they will better able the Park to meet the access needs of a growing population. Shifting existing and future regional recreation use to the South Shores/Fiesta Island area has several advantages with regard to circulation. A primary advantage is that South Shores can be accessed directly from I-5, I-8 through

the I-5 connection, Pacific Coast Highway and Friars Road. Another advantage is its proximity to MTDB's planned rail extension on the eastside of I-5. Yet another advantage is that improvements to Sea World Drive, the primary facility serving South Shores, can be implemented without disturbing existing recreation areas.

In other areas of the Park, with the exception of De Anza Cove, recommended roadway improvements are minor and relate to improved signage. At De Anza, because of marshland rehabilitation, roadways are removed from the point. These improvements are shown on Figure 1. Also indicated on Figure 1 is a reconfiguration of the Fiesta Island loop road and a new secondary park road serving the South Shores area.

In response to South Shores being designated as the primary location for recreation expansion, the circulation analysis focused on developing a set of improvement alternatives for Sea World Drive. The Sea World Drive improvements are intended to serve three functions. The first function is to minimize the flow of commuters on park roads. The second function is to minimize the impact of Sea World-bound traffic on other park users.

The third function of the park roadways on South Shores would be to serve a proposed 4,300 peak-day parking lot on the southeast corner of the park. During peak days, park users would be directed to this lot and use a tram or trolley service to reach their destinations. The lot is intended to 1) reduce park traffic during peak days, 2) reduce the areas devoted to parking around the park, and 3) afford more efficient and effective control and treatment of parking area surface runoff.

Alignment Options

Three options were generated to provide the above functions ranging from comparatively the least to the most costly.

Option A -- This option, shown in Figure 2, is the least-cost option. No changes to existing roads would be required. Improvements would be limited to a grade separated crossing off of Sea World drive between Friars Road and Pacific Highway to provide right-turn access into the peak-day parking lot.

Pros: Least cost.

Cons: Configuration of peak-day parking lot is inefficient and too distant from Fiesta Island; a large number of pedestrians would be forced to cross Sea World Drive; the tramway would be impacted by the grade-separated loop; retention of Pacific Highway ramp to Sea World Drive would isolate the area of the park to the north of PH; park traffic would still have to use Sea World Drive or, as an option, would parallel Sea World Drive, impacting potential parkland area.

Option B -- This option, shown in Figure 3, is moderate in cost. Existing I-5 southbound on- and off-ramps on Tecolote Road would be deleted and replaced by new ramps further to the north. Sea World Drive would be routed as close to I-5 as possible. A new park road would parallel South Shores. The Pacific Highway ramp would be removed. Sea World Drive's boulevard character would be extended to the new I-5 ramps.

RECOMMENDED ROADWAY IMPROVEMENTS

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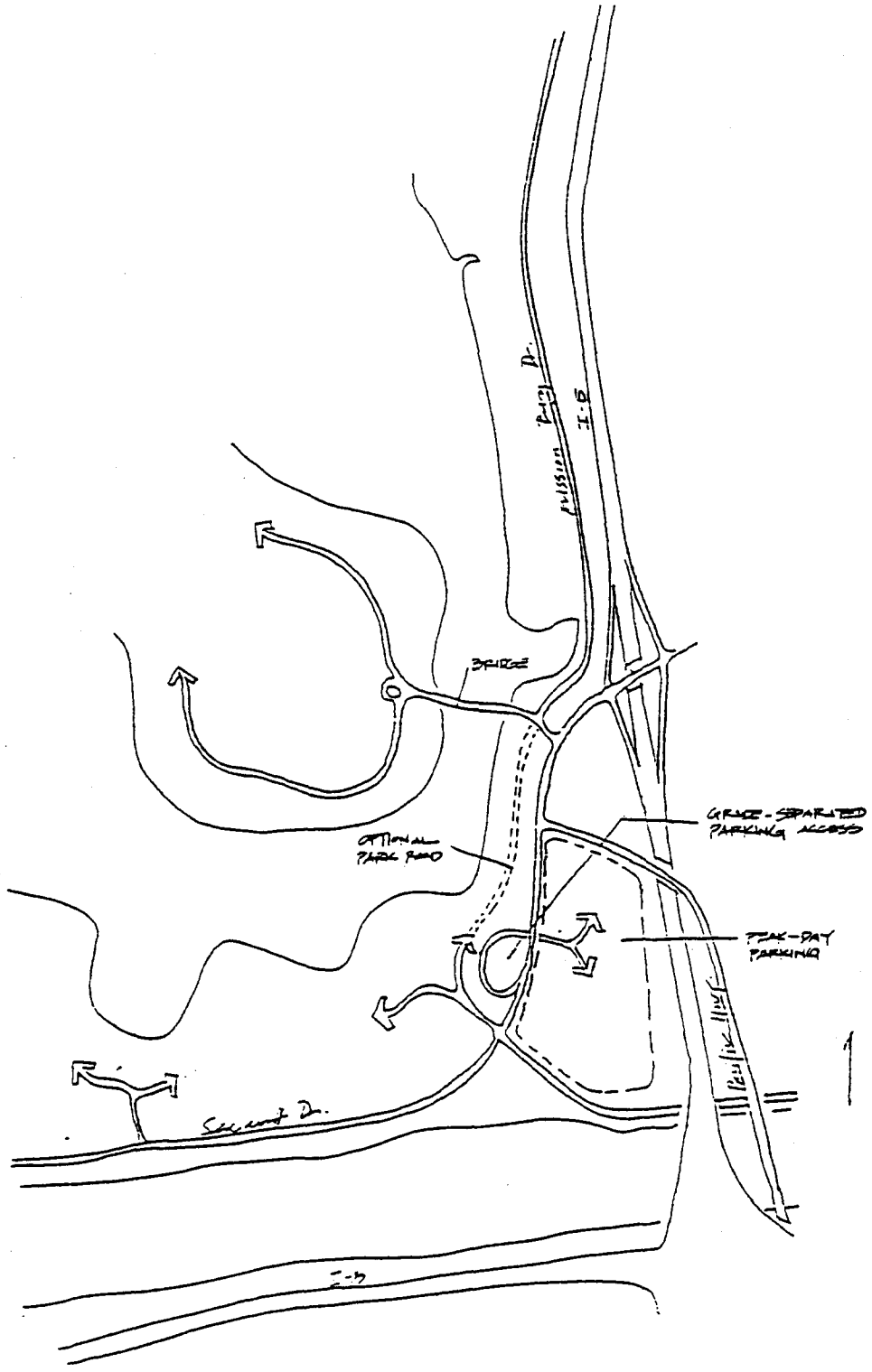

SOUTH SHORES ROADWAY OPTION A

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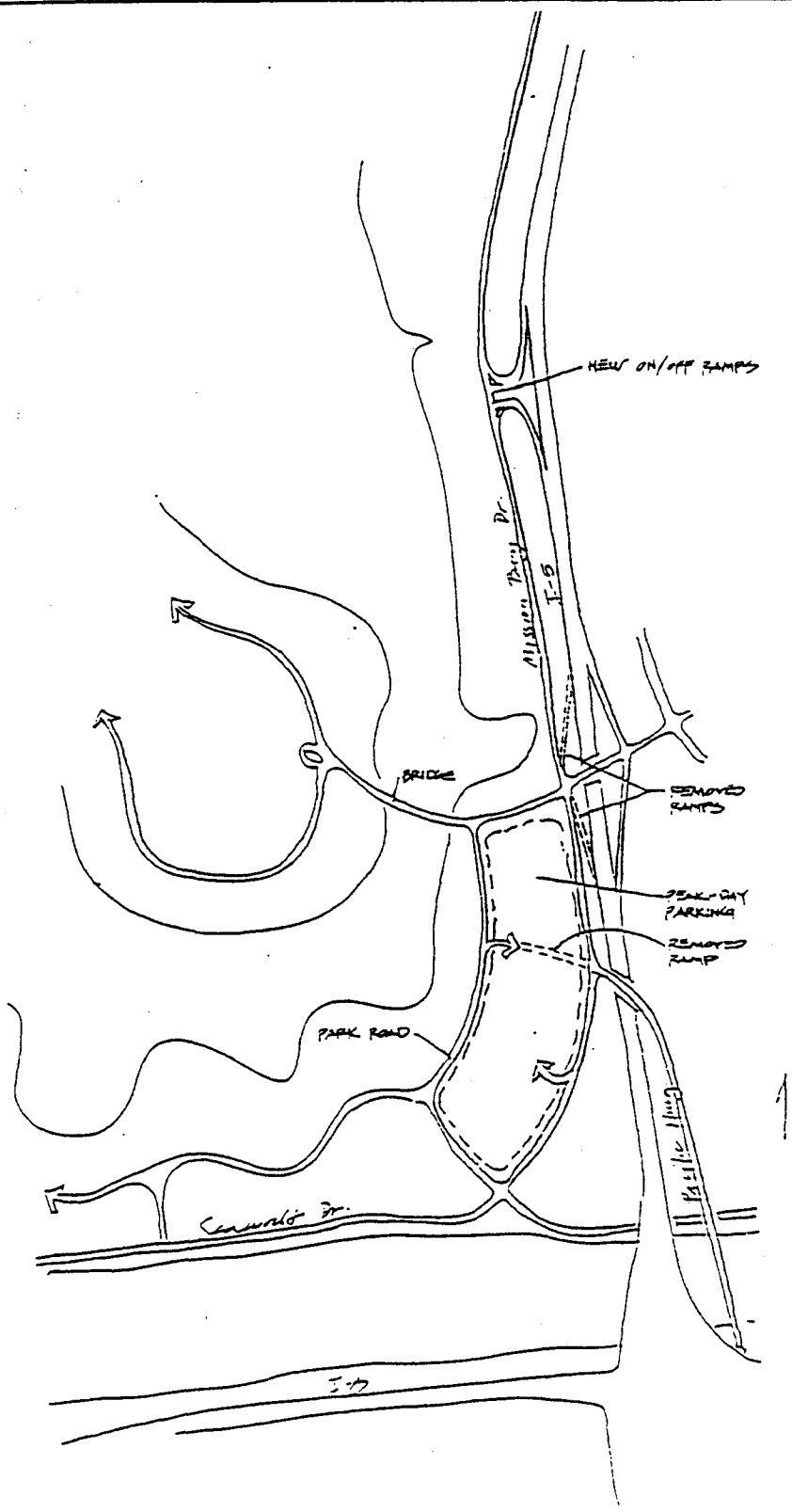

SOUTH SHORES ROADWAY OPTION B

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Pros: Sea World traffic is separated from Park traffic in the zone of maximum congestion; at-grade right-turn movements into the peak-day parking lot are facilitated from both Sea World Drive and the park road; the peak-day parking lot is as close as possible to Fiesta Island; the configuration of the lot is efficient, limiting the maximum distance pedestrians would walk to the tram to a standard city block; pedestrians from the peak-day parking lot would cross the park road rather than Sea World Drive, allowing for a larger number of safe potential crossings; the tramway could use the park road.

Cons: New freeway ramps would direct traffic onto the southern portion of East Shores. However, this could be mitigated by treating this portion of Mission Bay Drive like a boulevard, with a planted median and left-turning pockets to access the existing parking areas.

Option C -- This is the highest-cost option. As shown in Figure 4, flyover exit ramp from I-5 would be built over Sea World Drive, allowing Mission Bay and Sea World Drives to meet under it. Sea World Drive would be routed as close to I-5 as possible. A new park road would parallel South Shores. The Pacific Highway ramp would be removed.

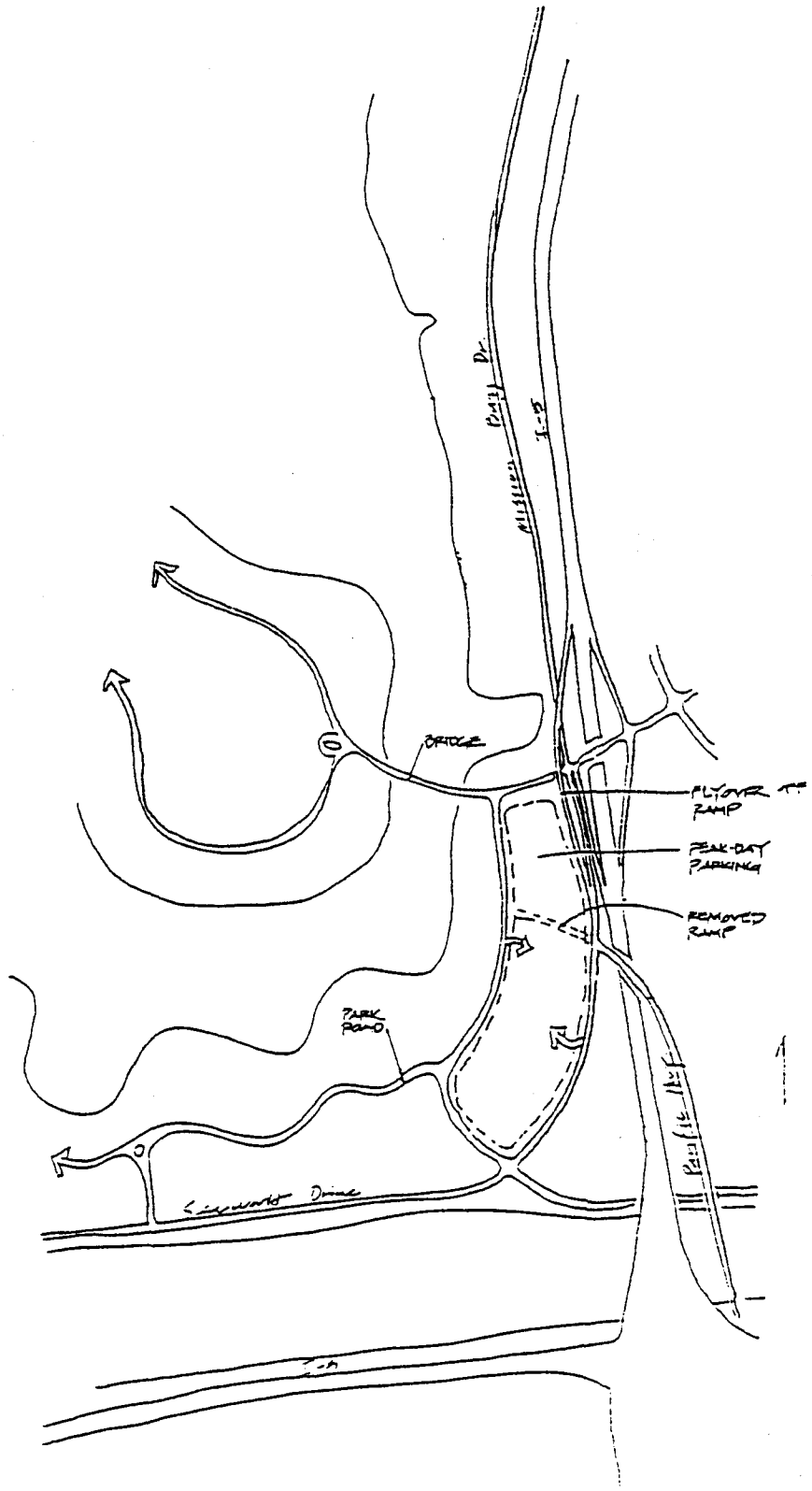
Pros: Southbound entrance ramp to I-5 ramps remains in place; overlaps between park-bound traffic and Sea World-bound traffic is eliminated; peak-day parking lot retains efficient configuration.

Cons: Flyover ramp expensive, requiring a bridge of about 600 to 800 feet. The ramp would impact views of Mission Bay from Tecolote Road, one of the park's major arrival points.

Recommendations

Of the three improvement alternatives presented, Option A was the only one deemed acceptable by both Caltrans and the City Engineering staff. This option was deemed acceptable because it left existing I-5 ramps, the Pacific Coast Highway overpass and the Sea World Drive alignment unchanged while directing traffic to the overflow lot through a looping overpass crossing Sea World Drive. The overpass, however, would occupy valuable parkland and its elevation would block important views of the water from the main entrance roads. For these reasons, this option was modified, resulting in the preferred alternative as shown in Figure 5. The cost estimate for this preferred alternative is shown in Table 1. This preferred alternative proposes the following:

- Building underpasses at Tecolote Road and Pacific Highway, as close to the Park boundary as possible;
- Extending a road from East Mission Bay Drive through the underpasses, to serve as primary access to the overflow parking;
- Widening Sea World Drive and the curling portion of East Mission Bay Drive to permit continuous, right-hand turns into the overflow parking from Sea World Drive; and



SOUTH SHORES ROADWAY OPTION C

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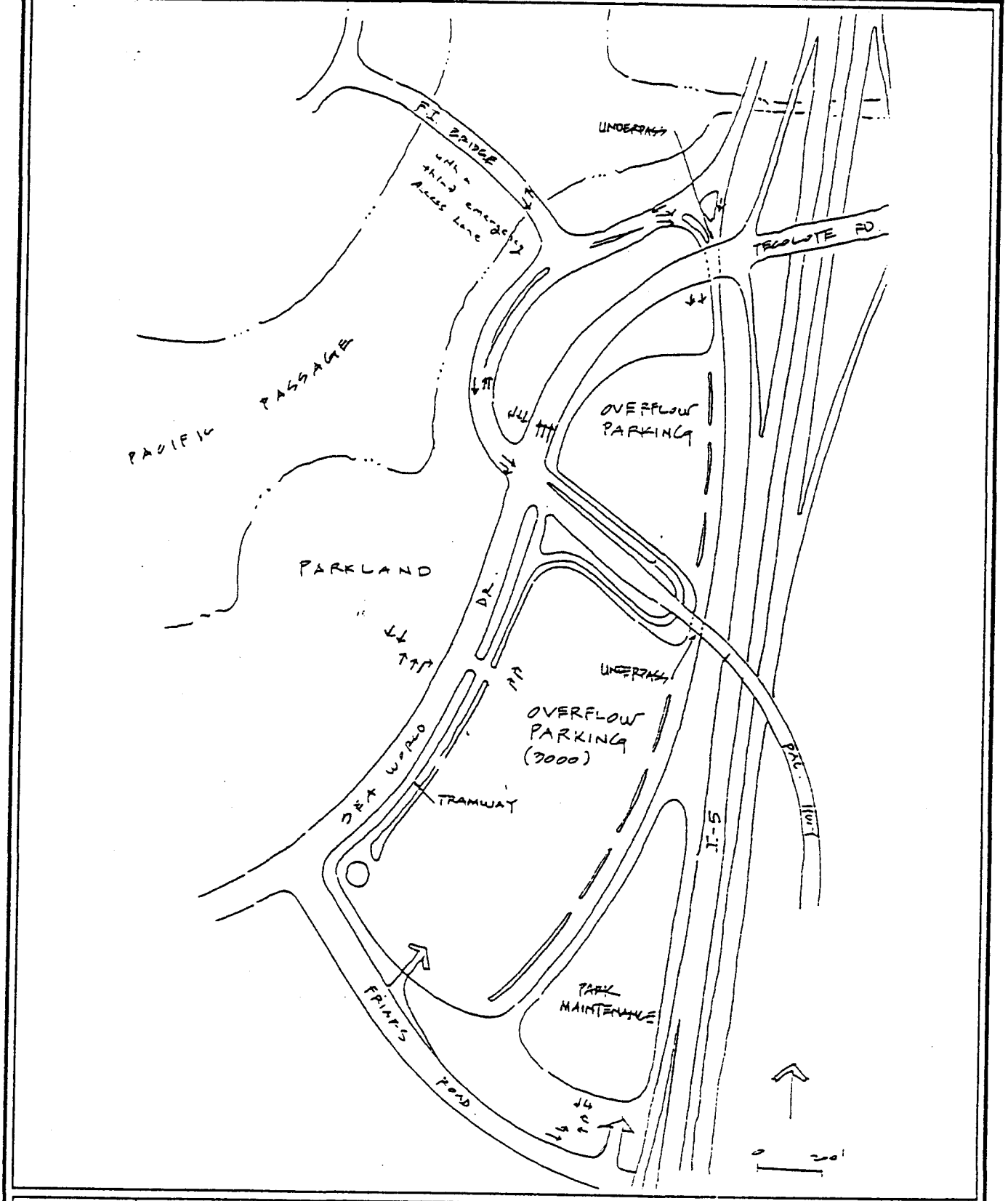

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SOUTH SHORES ROADWAY PREFERRED ALTENATIVE

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Table 1
PREFERRED ALTERNATIVE COST ESTIMATES
Mission Bay Master Plan

	Cost	Unit	Quantity	TOTAL COST (a)	Notes
Site Preparation					
Clearing (medium density)	$340	Acre	28.1	$9,554	
Earthwork					
Excavating	$2	CY	29000.0	$47,850	
Utility trench	$1	LF	900.0	$900	
Fill	$2	CY	0.0	$0	
Boring (sandy soil)	$13	LF	3850.0	$51,783	
Lighting					
High pressure sodium, 400 watt	$885	ea.	20.0	$17,700	
Aluminum pole, 12' high	$415	ea.	20.0	$8,300	
Bracket arms	$105	ea.	20.0	$2,100	
Electric Sitework	$16	ea.	20.0	$317	(b)
Road gutter					
Curbs	$6	LF	15050.0	$90,300	
Road pavement					
Base course (12" deep)	$10	SY	137572.2	$1,375,722	
Soil stabilization	$7	SY	68386.1	$478,703	
Retaing wall (8' high, 33° slope embankment)	$215	LF	900.0	$193,500	
Roadway appurtenances					
Guide Rail	$12	LF	4500.0	$54,000	
Signs (20SF, high intensity)	$19	SF	500.0	$9,475	
Pavement Markings	$1	LF	2500.0	$1,400	
Furnishings					
Benches, 8' long	$745	ea.	10.0	$7,450	
Landscaping					
Lawns and grasses	$40	MSF	49.0	$1,960	
Shrubs and trees	$62	ea.	30.0	$1,860	
Signals					
Sea World Drive & East Mission Bay Drive	$37,500	ea.	1.0	$37,500	
North Entrance & East Mission Bay Drive	$37,501	ea.	1.0	$37,501	
SUBTOTAL				$2,427,874	
Contingency @ 25%				$606,969	
TOTAL EST. COST				$3,034,843	
SAY				$3,000,000	

Notes
(a) Includes costs for material, labor, and equipment
(b) Includes 6 ducts @ 4" diameter, PCV type
(c) Includes forms (4), reinforcing, for average subtructure, and simple design.
MSF = Thousand Square Feet
Source: "Means Site Work Cost Data, 1990"

Wilbur Smith Associates, November 1992.

Table 1 (cont.)
PREFERRED ALTERNATIVE COST ESTIMATES
BRIDGE STRUCTURES
Mission Bay Master Plan

	Cost	Unit	Quantity	TOTAL COST (a)	Notes
Concrete structure: cast in place					
Fiesta Island Bridge	$190	CY	2666.7	$506,667	(c)
Fiesta Island Bridge (footings demolition)	$3	LF	1200.0	$3,600	
Fiesta Island Bridge (floor demolition)	$4	SF	18000.0	$72,000	
Fiesta Island Bridge (dredging)	$8	CY	13333.3	$100,000	
Fiesta Island Bridge (lighting)	$1,421	ea.	6.0	$8,526	
Fiesta Island Drive Reconstruction	$191	CY	533.3	$101,867	(c)
Fiesta Island Dr Reconstruct (footings demolition)	$3	LF	300.0	$900	
Fiesta Island Dr Reconstruct (floor demolition)	$4	SF	4500.0	$18,000	
SUBTOTAL				$811,559	
Contingency @ 25%				$202,890	
TOTAL EST. COST				$1,014,449	
SAY				$1,000,000	

Notes
(a) Includes costs for material, labor, and equipment
(b) Includes 6 ducts @ 4" diameter, PCV type
(c) Includes forms (4), reinforcing, for average subtructure, and simple design.
MSF = Thousand Square Feet
Source: "Means Site Work Cost Data, 1990"

Wilbur Smith Associates, November 1992.

- Providing signaled pedestrian crossings at the Sea World Drive with Friars Road and Pacific Highway intersections.

The City is already planning the widening of the Pacific Highway bridge over I-5, a project which can easily incorporate the recommended underpass serving the overflow lot, saving Park development costs.

Commuter Traffic Mitigation

The only available solution to divert commuter traffic from park roads is the construction of a new west-bound off-ramp from I-5 to I-8, and a new on-ramp northbound from I-8 to I-5. If this solution is ever implemented, the existing I-5 southbound exit and entrance ramps would need to be relocated as there would be insufficient weaving distance between the existing I-5 on-ramp at Tecolote Road and the new off-ramp from I-5 to I-8. Option B above would then need to be implemented as well. Given the substantial cost of these ramps (possibly over $100.0 million), Caltrans has suggested that other options be considered, including widening Sea World Drive to accommodate traffic between I-5 and Ingraham Boulevard. If this option is ultimately implemented, Option C should be considered as part of this plan.

Parking

The detailed explanation of expected parking demand and the recommended parking supply enhancements are provided in the main body of the Master Plan Update. The recommendations consist of constructing a 3,000 space overflow parking lot in South Shores, developing a series of small lots on Fiesta Island, and removing one parking lot from Bahia Point and another from De Anza Cove. Figure 6 shows the location of these recommended improvements. Table 2 shows the ADA accessible parking requirements that must be adhered to.

Transit Options

This section provides an overview of potential transit options for the Mission Bay Park Master Plan. Included is a planning level analysis of route options for a primary route as well as two expansion possibilities. The route options are presented in terms of service area, distance, route times and estimated headway requirements. Operating costs, service management, funding sources, operating schedule and equipment options are also presented.

To aid in the analysis, two agencies that are currently providing recreation/tourist transit service were contacted. The San Diego Park and Recreation Department, through an operating agreement with the Old Town Trolley Co., provides service within Balboa Park. This service has been in operation for 18 months and has carried approximately 300,000 passengers to date. Long Beach Transit, the second agency contacted, provides a "Runabout" service in the CBD and along the waterfront. This service was established about two years ago and is operated by the transit authority.

Route Options

Transit service linking the proposed Fiesta Island remote parking lot to Fiesta Island is considered the primary route. This route, once established could be expanded to provide service to the northeast and southwest sections of the park. To maximize access to Mission Bay Park it is recommended that tram linkages eventually be made to the existing San Diego bus routes serving the Park, the Planned Pacific

Beach Shuttle, and the proposed MTDB rail station at the Pacific Cost Highway. Service linking the proposed Pacific Coast Highway MTDB station could be achieved by expanding the primary route. Table 3 shows the round trip distance, time and estimated headway for three potential transit routes originating from the proposed Fiesta Island remote lot. The primary route is shown as Route A and Route A1 indicating two possible Fiesta Island roadway configurations. As shown in Table 1, the primary route could be used to link the service to the proposed MTDB station, carrying passengers to the remote lot which would serve as a hub for Routes B and C.

Route Descriptions

Route A – As shown in Figure 7, this route would serve Fiesta Island from the remote parking lot. The total distance would be 3.4 miles. It is estimated that a round trip would take 41 minutes to complete. Headway of approximately 10 minutes could be achieved on this route configuration with four vehicles. The number of vehicles could be reduced to three if 15 minute headways are used.

Route A1 – As shown in Figure 8, this route would also serve Fiesta Island from the remote parking lot. The total distance would be 3.7 miles and the time needed to complete one round trip is estimated at 45 minutes. Headway of approximately 11 minutes could be achieved with four vehicles. Using only three vehicles would cause headways to increase to 15 minutes.

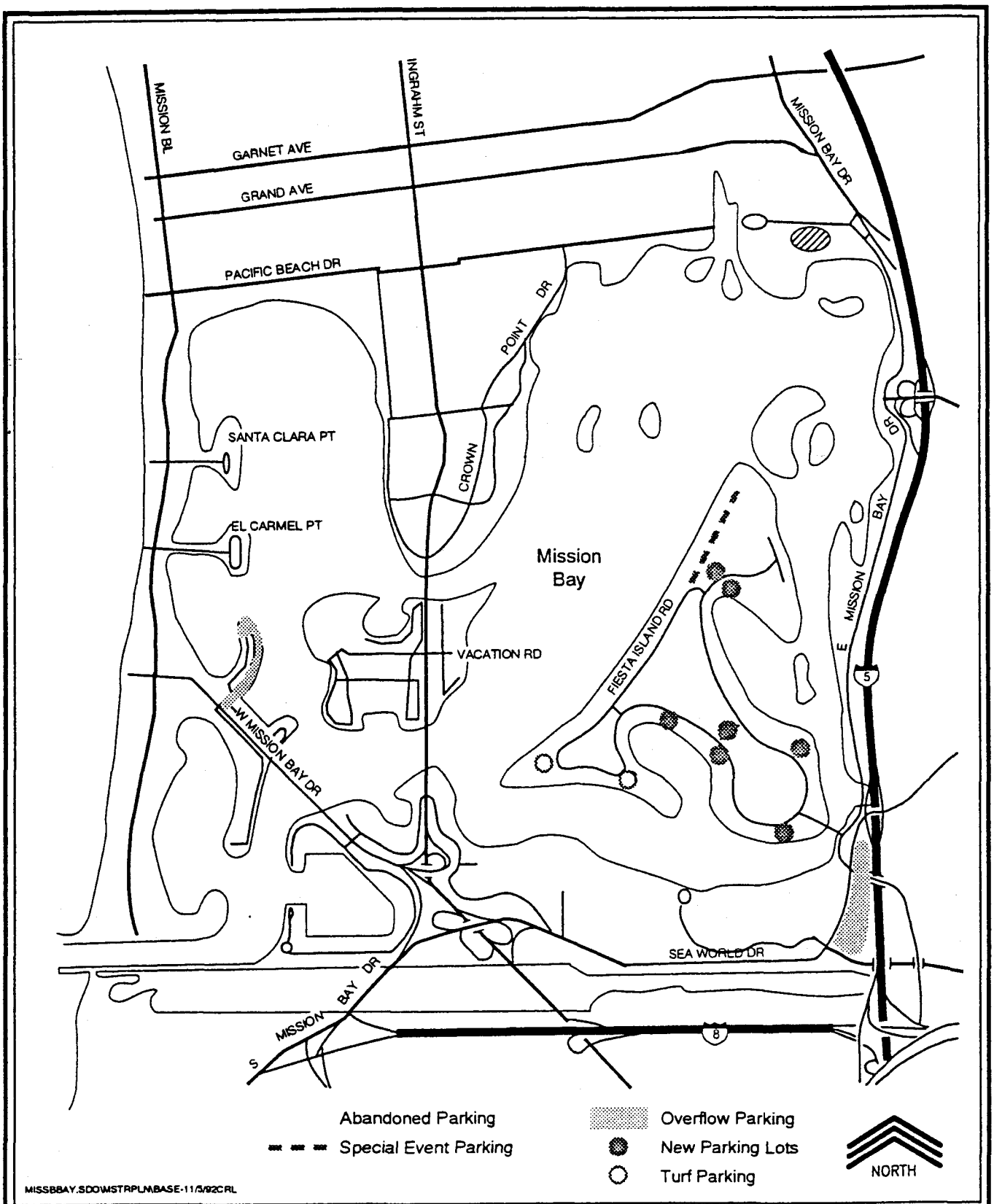
Route B – As shown in Figure 9, this route would provide service to the northeast quadrant of the park. It would travel parallel to I-5 and link the Fiesta Island remote lot to the parking lot located north of De Anza Cove, making several stops between the two lots. The total route distance is estimated at 4.8 miles and total round trip time would be 58 minutes. A minimum of five vehicles would be necessary to maintain 11 minute service headways. Four vehicles would increase headways to 15 minutes.

Route C – As shown in Figure 10, this route would provide service to the west of the Fiesta Island remote lot along Sea World Drive and travel north on Ingraham Street to the Vacation Village/Ski Beach area. The total route distance is estimated at 5.6 miles and round trip travel time would be approximately 1 hour and 7 minutes. This route would require six vehicles in order to provide 11 minute headways. Five vehicles would provide 13 minute headway service.

Level-of-Service

Transit service would most likely be operated on a daily basis during the peak summer season between the hours of 9:00 AM and 6:00 PM. During Summer holidays (Memorial Day, July 4, Labor Day) and special events, additional vehicles could be added to the routes. During the off season, transit service could be provided for special events.

The appropriate vehicles for the envisioned service must be wheelchair accessible and should provide seating for a minimum of 30 passengers. Ideally, the vehicles would be equipped with easy load bicycle racks and provide storage space for large picnic coolers and other recreational equipment.



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PARKING RECOMMENDATIONS

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Table 2

ADA ACCESSIBLE PARKING SPACE REQUIREMENTS
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Total Parking in Lot	Required Minimum Number of Accessible Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2 percent of total
1,001 and over	20 plus 1 for each 100 over 1,000

ATBCB Regulation 4.1.2(5)(a)

Wilbur Smith Associates; November 1992.

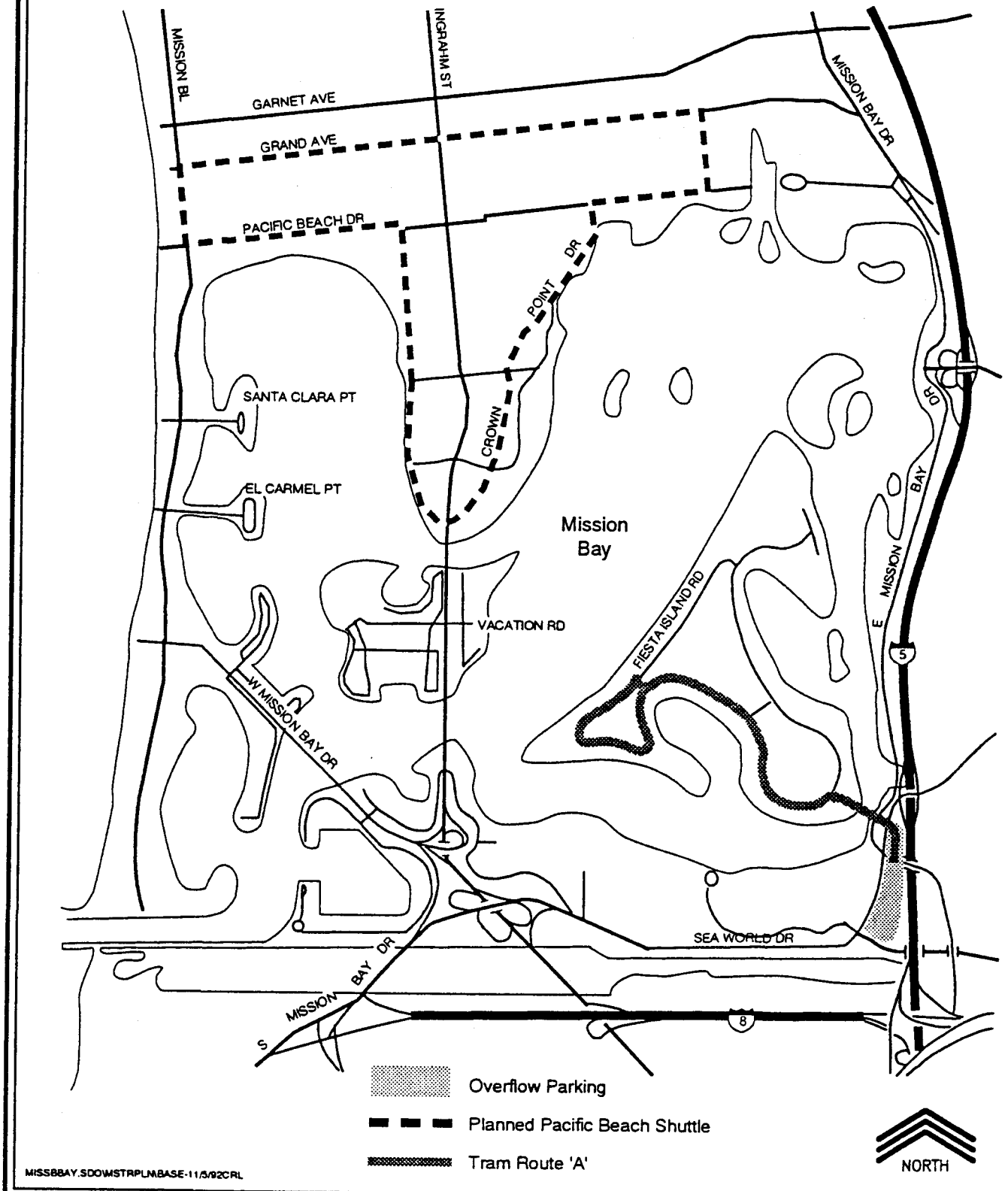
Table 3

TRANSIT ROUTE OPTIONS
Mission Bay Park Master Plan Update - Appendix C

Route	Round Trip Distance (miles)	Time(1) Hour/Minute	<-- Service Headway per Vehicle -->			
			# of Vehicles	Minutes	# of Vehicles	Minutes
Fiesta Island - Remote Lot						
A(2)	3.4	0/41	3	14	4	10
A1(3)	3.7	0/45	3	15	4	11
B	4.8	0/58	4	15	5	11
C	5.6	1/07	5	13	6	11
MTDB Station						
A(2)	4.9	0/59	4	15	5	11
A1(3)	5.2	1/02	5	12	6	10

(1) Time based on travel speed of 5 mph. This speed accounts for on and off loading at transit stops.
(2) Route A = Two lane island road, small loop west end of island.
(3) Route B = Large loop road on island.

Wilbur Smith Associates; November 1992.

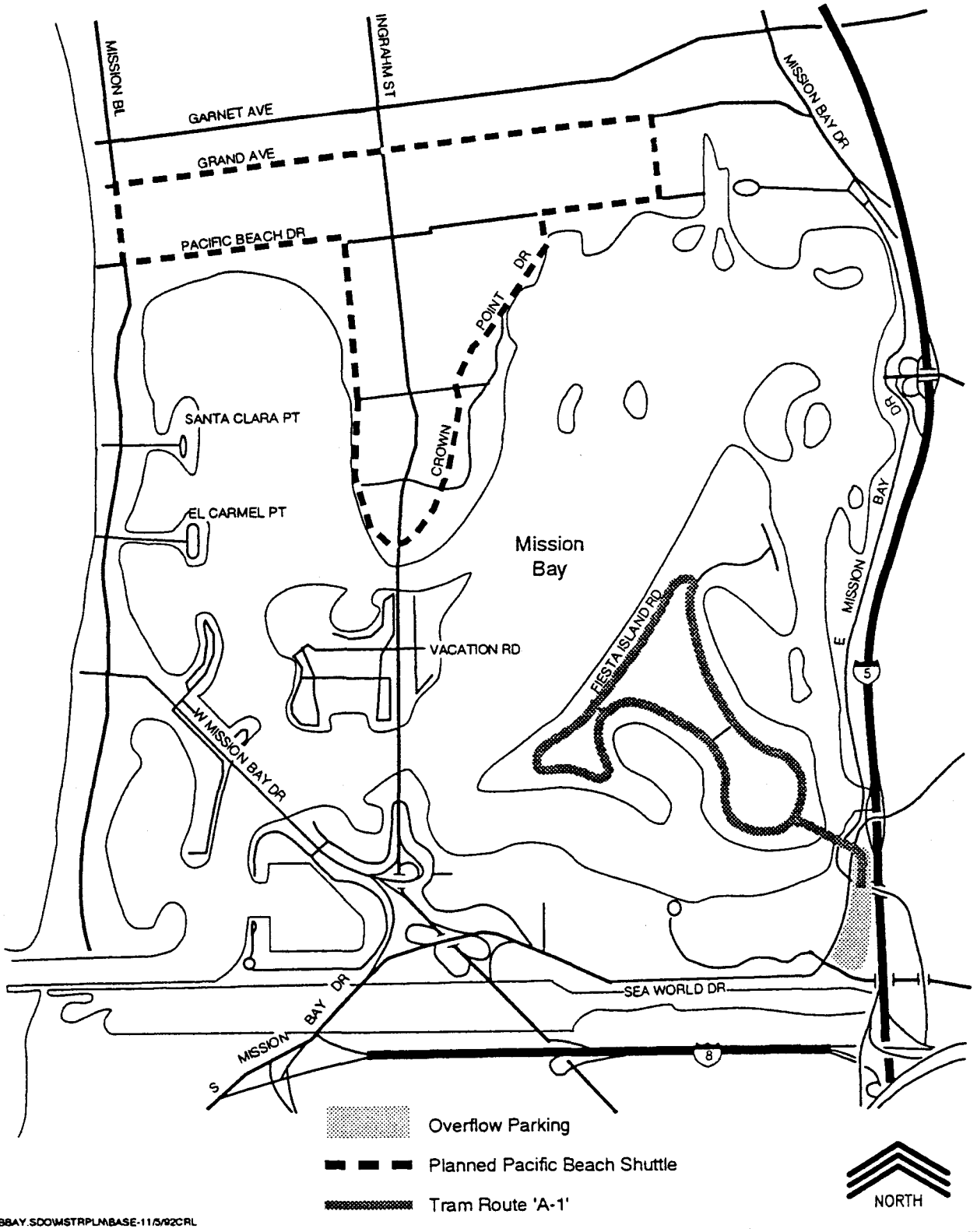


WSA

TRAM ROUTE 'A'

Mission Bay Park Master Plan Update - Appendix C

7

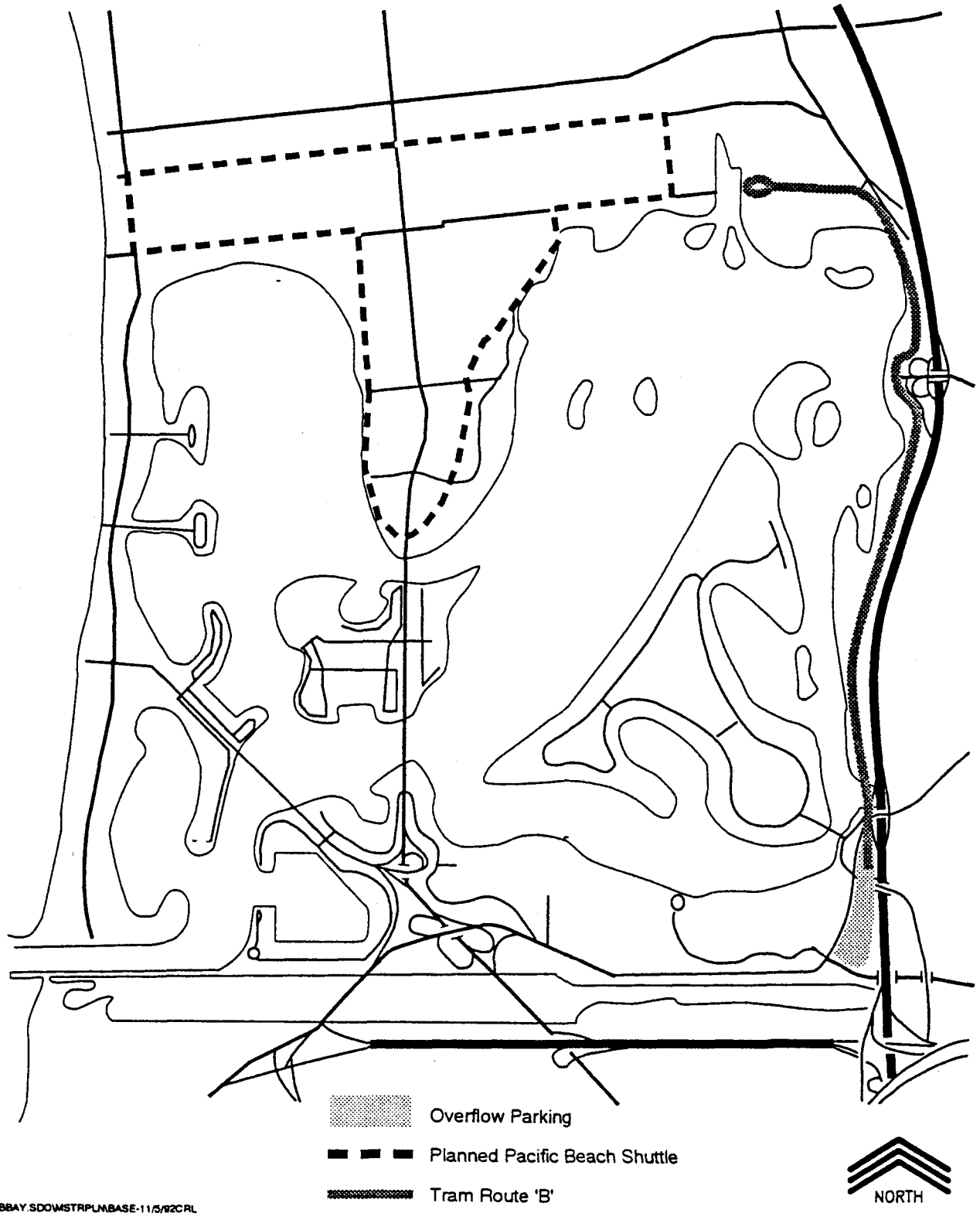


WSA

TRAM ROUTE 'A-1'

Mission Bay Park Master Plan Update - Appendix C

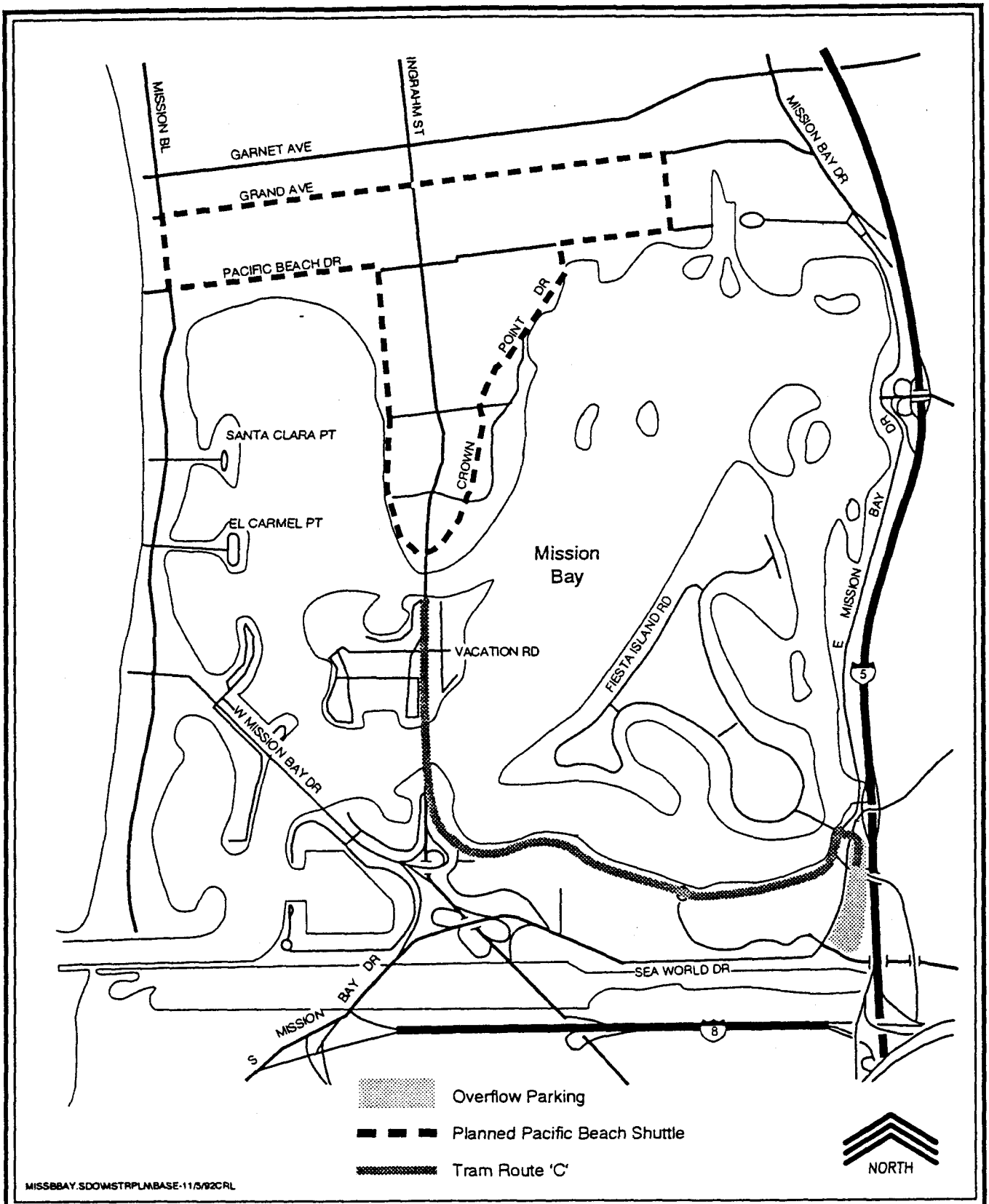
8



TRAM ROUTE 'B'

Mission Bay Park Master Plan Update - Appendix C

9



TRAM ROUTE 'C'

Mission Bay Park Master Plan Update - Appendix C

10

Funding and Operations

The Long Beach "Runabout" service is owned and operated by the City transit authority. Service for three routes is provided with 15 vehicles. The vehicles are manufactured in Canada (Orions), provide 24 seats and are propane gas powered. The Balboa Park "Trolley" service is operated by a private vendor under contract to the San Diego Park and Recreation Department. This service is provided with three vehicles that resemble old fashioned trolley cars. The vehicles seat 30 and are propane gas powered. Both of these systems were funded in part by matching Federal Funds for alternative fuel use. Other funding sources include, but are not limited to, local sales tax measures and City general operating funds as well as state funding. Both the Long Beach and San Diego services are provided free to the user. It is recommended that any tram service implemented in Mission Bay Park also be free of charge.

Cost

To provide general understanding of the costs involved in operating a system of this nature, the most recent operating costs for two similar recreation transit systems are provided. The Long Beach Transit "Runabout" operating cost per vehicle service hour (vsh) for FY 1991 is $50.98. The cost associated with providing the Balboa Park "Trolley" service from November 1991 through October 1992 was $203,153 exclusive of the cost of fuel. The cost per vehicle mile (pvm) for this period ranged between $2.90 and $6.70 (pvm) depending on seasonal level of service.

Appendix D

MISSION BAY PARK
RESIDENT OPINION & USAGE SURVEY

Prepared by

Rea & Parker, Incorporated

INTRODUCTION

The City of San Diego is in the process of preparing a plan for Mission Bay Park. Accordingly, the City is interested in resident opinions concerning some important issues regarding the future development of Mission Bay Park. A telephone survey of San Diego County residents was conducted in order to seek these opinions in April 1992.

Rea & Parker, Incorporated was subcontracted to conduct this telephone survey. A total of 812 households was randomly selected throughout the County for interview. This sample size implies that there is a 95% certainty that the results are accurate within $\pm$ 3.5%. The questionnaire was designed to ensure that gender, age, and geographic location were adequately represented.

A summary of the survey results is presented in this report. A copy of the questionnaire is included in the Appendix. This questionnaire also serves as a "master data sheet" which includes the absolute frequencies associated with the response categories for each question.

The following summarizes the key survey findings.

- The general profile of the County of San Diego as reflected by the survey respondents is as follows: The median age of survey respondents is

36.7 years and the median household income is $39,844. The sample was 51.1% male and 48.9% female and over 75% of the population is White (non-Hispanic). In terms of home ownership, 61.5% own their own home. Almost 20% of the population has children 0-4 years of age and slightly more than 20% has children 5-11 years of age.

- About 60% of the County population are non-users of Mission Bay Park; the remaining 40% use the Park at least a few times per year.
- Generally speaking, there are very few differences between users and non-users of the Park in socioeconomic/demographic terms. Those few differences which occur are geographic or income related--with higher income related to higher use.
- County residents do not visit Sea World very often, with 63.9% indicating that they visit Sea World seldom or never.
- There is agreement among County residents that the unique water setting of the Park should influence land use and that permits in high use areas should be required. On the other hand, there is disagreement with a proposal to ease

certain height restrictions in the Park as well as increasing commercial land lease areas.

- Heaviest usage of Mission Bay Park facilities is found in picnic areas and pedestrian/bike trails. Only 33.0% of Park users avail themselves of water sports and boating activities.
- Important issues among Park users are water quality, safety/crime, sewage on Fiesta Island, and air pollution/odor. Park users perceive parking, streets, and sidewalks as being particularly crowded.
- Non-users of Mission Bay Park cite distance from the Park as their primary reason for not using it. They largely make use of other parks and the beaches as alternative recreational sites.

DEMOGRAPHIC PROFILE

Table 1 indicates the distribution of the population according to their relative usage of Mission Bay Park. Nearly 60% of the population indicates that they seldom or never use Mission Bay Park, and these respondents are considered "non-users" of the Park for purposes of this analysis. The other 3 categories of responses represent the "users" of the Park.

Tables 2-9 portray various socioeconomic data pertaining to the survey sample. Prior to a discussion of the opinions and preferences expressed by the survey respondents, it is particularly useful to examine the respondents' demographic profile as it reflects the general profile of the County of San Diego. It is of further importance to elaborate upon the demographic distinctions between Park users and non-users. Therefore, Tables 2-9 contain a breakdown of the total population into Park user and Park non-user categories.

Table 2 portrays the age distribution of the adult population sampled and indicates that the median age of the survey respondents is 36.7 years. The sample was 51.1% male and 48.9 female (Table 3), and the median household income is $39,844 (Table 4). Over 75% of the population is White (non-Hispanic), as shown in Table 5, and 61.5% of them own their own homes (Table 6).

Table 1

How Often Does Respondent Use Mission Bay Park?

Frequency	#	%
Once per week or more	56	6.9
Once or twice per month	101	12.4
A few times per year	177	21.8
Seldom or never	478	58.9
Total	812	100.0

Table 2

Age of Respondent

Age	Total		User		Non-User	
	#	%	#	%	#	%
18-24	131	16.3	54	16.2	77	16.2
25-34	246	30.4	113	34.0	133	28.0
35-49	246	30.4	103	30.9	143	30.1
50-64	105	13.0	39	11.7	66	13.9
65 and over	80	9.9	24	7.2	56	11.8
Total	808	100.0	333	100.0	475	100.0

median = 36.7 years

Table 3

Gender of Respondent

Gender	Total		User		Non-User	
	#	%	#	%	#	%
Male	415	51.1	188	56.3	227	47.5
Female	397	48.9	146	43.7	251	52.5
Total	812	100.0	334	100.0	478	100.0

Table 4

Annual Household Income

Income	Total		User		Non-User	
	#	%	#	%	#	%
Under $15,000	83	13.1	22	7.8	61	17.4
$15,000-$24,999	94	14.8	40	14.2	54	15.4
$25,000-$34,999	109	17.2	48	17.0	61	17.4
$35,000-$44,999	96	15.2	45	16.0	51	14.5
$45,000-$59,999	111	17.6	56	19.9	55	15.7
$60,000-$79,999	73	11.5	41	14.5	32	9.1
$80,000 and over	67	10.6	30	10.6	37	10.5
Total	633	100.0	282	100.0	351	100.0

median = $39,844

Table 5

Ethnicity of Respondent

Ethnicity	Total		User		Non-User	
	#	%	#	%	#	%
Hispanics/Latinos	107	13.3	14	12.3	66	13.9
African-Americans	43	5.3	16	4.8	27	5.7
White (non-Hispanic	615	76.2	256	77.2	359	75.6
Asian/Filipino/ Pacific-Islander	33	4.1	15	4.5	18	3.8
Other	9	1.1	4	1.2	5	1.0
Total	807	100.0	332	100.0	475	100.0

Table 6

Does Respondent Own or Rent Place of Residence?

Response	Total		User		Non-user	
	#	%	#	%	#	%
Own	491	61.5	204	62.2	287	61.1
Rent	305	38.2	124	37.8	181	38.5
Other	2	0.3	0	0.0	2	0.4
Total	798	100.0	328	100.0	470	100.0

Approximately 20% of the population has children 0-4 years of age and about 20% has children 5-11 years of age. Only 9.3% has children between the ages of 12-15 and 5.6% between 16 and 18 (Table 7). Table 8 indicates that nearly 70% of the population has voted within the past 2 years.

For purposes of analysis, the County has been disaggregated into six geographic areas, as indicated in Table 9. The "Vicinity of Mission Bay Park" area comprises the neighborhoods from Point Loma on the south to La Jolla on the north and extends eastward from the Pacific Ocean to Interstate 805 (north of Mission Valley). This area contains 16.6% of the population. "South Bay" is an area consisting of the southern portions of Coronado and all other communities south of National City to the International Border--it includes 10.6% of the population. "East County" contains all areas east of La Mesa including the mountain and desert areas of the County--12.7% of the population can be so classified. The central portion of the City of San Diego was divided into two parts--"South of I-8," which also includes National City, La Mesa, and Lemon Grove, containing 22.2% of the population, and "North of I-8," which extends from I-805 (north of Mission Valley) on the west to the I-15 corridor on the east and north to

Mira Mesa/Scripps Ranch, comprising 11.1% of the population. The largest population concentration is found in the "North County" area from Del Mar and Rancho Penasquitos north. This area contains 26.8% of the population.

There are very few differences between users and non-users in socioeconomic/demographic terms when tests of statistical significance are applied. Statistically significant differences do occur, however, with regard to income and geography. For example, users of the Park tend to enjoy higher incomes than non-users. Among those who earn under $15,000, 73.5% are non-users as opposed to 49.4% of those who earn $45,000 or more. As expected, "The Vicinity of Mission Bay Park" is the area in which the highest proportion of users is found (63.0%). The next highest source of users is the "Central City-North of I-8" area, which contains 55.6% of users. All other areas contain approximately 40% or fewer users.

Table 7

Respondents with Children in Various Age Groups

Age Group of Children	All Respondents					
	Yes		No		Total	
	#	%	#	%	#	%
0-4	153	19.0	652	81.0	805	100.0
5-11	163	20.2	642	79.8	805	100.0
12-15	75	9.3	730	90.7	805	100.0
16-18	45	5.6	760	94.4	805	100.0

Age Group of Children	Users						Non-Users					
	Yes		No		Total		Yes		No		Total	
	#	%	#	%	#	%	#	%	#	%	#	%
0-4	57	17.2	275	82.8	332	100.0	96	20.3	377	79.7	473	100.0
5-11	65	19.6	267	80.4	332	100.0	98	20.7	375	79.3	473	100.0
12-15	33	9.9	299	90.1	332	100.0	42	8.9	431	91.1	473	100.0

Table 8

Has Respondent Voted in the Last Two Years?

	Total		User		Non-User	
Response	#	%	#	%	#	%
Yes	565	69.9	236	71.1	329	69.1
No	243	30.1	96	28.9	147	30.9
Total	808	100.0	332	100.0	476	100.0

Table 9

Area of City Where Respondents Reside

	Total		User		Non-User	
Area	#	%	#	%	#	%
Vicinity of Mission Bay Park	135	16.6	85	25.4	50	10.5
South Bay	86	10.6	32	9.6	54	11.3
East County	103	12.7	43	12.9	60	12.5
Central City (South of I-8)	180	22.2	73	21.9	107	22.4
Central City (North of I-8)	90	11.1	50	15.0	40	8.4
North County	218	26.8	51	15.2	167	34.9
Total	812	100.0	334	100.0	478	100.0

GENERAL OPINIONS REGARDING MISSION BAY PARK

The responses to questions 17-21 have been summarized in Tables 10-17. These questions represent general opinions about the Park and were to be answered by all respondents--both users and non-users. Respondents were asked how frequently they visit Sea World. Table 10 shows that 63.9% of them visit Sea World seldom or never. In fact, only 4.4% of the population visit Sea World once a month or more. Middle income respondents ($25,000-$64,999) tend to visit Sea World more frequently than higher and lower income groups, with 42.4% of the middle income respondents attending at least a few times per year compared to 30.3% for the other groups.

Table 10

How Often Do Respondents Visit Sea World?

Frequency	#	%
Once per week or more	9	1.1
Once or twice per month	27	3.3
A few times per year	256	31.7
Seldom or never	516	63.9
Total	808	100.0

Table 11 demonstrates that 96.7% of the population rates the importance of preserving and enhancing the natural resources of Mission Bay Park as either very important or somewhat important. The preservation and enhancement of Mission Bay Park's natural resources is less important to middle and upper income groups (94.6% importance with incomes of $35,000 and more) than it is to lower income groups (99.6% importance with incomes of under $35,000). Women indicate that the preservation and enhancement of these resources is very important more than do men (75.7% versus 68.0%). Respondents were asked about their degree of agreement or disagreement on four key issues:

- land use should be related solely to the Park's unique water setting
- certain height restrictions should be raised from 30 feet to 5 stories
- commercial land lease areas should be increased
- permits should be required for water activities in high use areas

Tables 12-15 present the responses of the survey population. There is substantial agreement with the land use/water setting relationship (Table 12) as well as the notion of requiring permits in high use, crowded areas (Table 15). On the other hand, there is a majority which

disagrees with easing height restrictions and with increasing commercial land lease areas (Tables 13-14).

Table 11

Respondents' Rating of the Importance of Preserving and Enhancing Natural Resources in Mission Bay Park

Rating	#	%
Very Important	545	71.7
Somewhat Important	190	25.0
Not at All Important	25	3.3
Total	760	100.0

Table 12

Respondents' Opinion on the Following Statement: "The Land in Mission Bay Park Should Be Exclusively Used for Activities Which Are Dependent on the Park's Unique Water Setting."

Opinion	#	%
Strongly Agree	245	32.6
Somewhat Agree	263	35.0
Undecided/Neutral	101	13.4
Somewhat Disagree	81	10.8
Strongly Disagree	62	8.2
Total	752	100.0

Table 13

Respondents' Opinion on the Following Statement: "The City Should Allow Some Hotels in Appropriate Locations to Increase Their Height Above the Thirty Foot Limit Up to about 5 Stories so That the City Can Earn More Land Lease Revenues to Improve Mission Bay Park."

Opinion	#	%
Strongly Agree	90	11.5
Somewhat Agree	166	21.3
Undecided/Neutral	82	10.5
Somewhat Disagree	130	16.7
Strongly Disagree	312	40.0
Total	780	100.0

Table 14

Respondents' Opinion on the Following Statement: "The City Should Increase Commercial Land Lease Areas in the Park to Earn More Revenue for City and Mission Bay Park Services and Public Improvements."

Opinion	#	%
Strongly Agree	78	10.1
Somewhat Agree	182	23.7
Undecided/Neutral	83	10.8
Somewhat Disagree	146	19.0
Strongly Disagree	280	36.4
Total	769	100.0

Table 15

Respondents' Opinion on the Following Statement: "The City Should Require permits for Water Activities in High Use Areas Such as Water Skiing, Jet Skiing, Sailing and Boating for the Purpose of Controlling Overcrowding."

Opinion	#	%
Strongly Agree	320	41.5
Somewhat Agree	193	25.0
Undecided/Neutral	41	5.3
Somewhat Disagree	86	11.1
Strongly Disagree	132	17.1
Total	772	100.0

With regard to the relationship between land use and the unique water setting of Mission Bay Park, 42.2% of individuals age 50 and over strongly favor the exclusive use of the Park for water-related activities, whereas only 29.7% of those under age 50 feel similarly. Particular support for this issue occurs among those in the $45,000-$54,999 income group (77.4% either strongly agree or somewhat agree in contrast to an overall 68.8%).

People who live in the South Bay and in the vicinity of Mission Bay Park tend to be less in favor of requiring permits for water activities than the overall population (57.6% South Bay agreement--58.7% vicinity agreement--66.5% overall agreement). Men disfavor the permit

requirement more so than women by a 35.7% to 20.1% margin.

The relaxation of height restrictions are favored more by younger groups (38.0% of those under age 35) than by older ones (23.3% of those age 50 and over). In the $35,000-$64,999 income group, there is more disapproval of the height restriction proposal than in higher and lower income groups, with 66.2% disagreeing with the proposal compared to 51.9% among the other income groups. Again, men and women differ on these issues, with 37.3% of the men in favor of easing height restrictions, but only 27.9% of the women.

With regard to increasing commercial land lease areas, respondents 18-24 years of age are the only age group which does not disagree with the proposal--40.6% disagreement. Disagreement increases in each succeeding age group up to a 65.8% disagreement among those 65 years of age and older. White and Asian ethnic groups, in particular, strongly disagree with the commercial land lease issue (39.6% strong disagreement among Whites--35.5% among Asians--31.0% among Blacks--and 23.2% among Hispanics). Disagreement with this proposal is less strong among those earning less than $35,000 (28.8% strong disagreement) than it is among those who earn $35,000 or more (43.8% strong disagreement).

Table 16 shows that 57.9% of the population does not want to pay a special tax to improve the Park. Those households earning $25,000-44,999 slightly favor the concept of such a tax (47.5% "yes" to 44.6% "no"). All other groups are strongly opposed. Among the 31.6% who are willing to pay such a tax, a substantial majority wish to pay no more than $20 per year (Table 17).

Overall, there is not much difference between users and non-users of the Park in terms of their general opinions other than a slight tendency for non-users to disagree less with the possibility of increasing commercial land leases in Mission Bay Park. Users of the Park do tend to be more willing to pay a special tax than do non-users (41.2% versus 24.6%).

Table 16

Are Respondents Willing to Pay a Special Tax to Improve Mission Bay Park?

Willingness	#	%
Yes	244	31.6
No	447	57.9
Maybe	81	10.5
Total	772	100.0

Table 17

How Much of a Special Tax Are Respondents Willing to Pay Annually?
(Based upon Those Who Are Willing to Pay Such a Tax)

Tax	#	%
Less than $20	175	58.5
$20 and less than $40	85	28.4
$40 and less than $60	23	7.7
$60 and less than $80	4	1.4
$80 and less than $100	5	1.7
$100 or more	7	2.3
Total	299	100.0

OPINIONS AND USAGE OF PARK FACILITIES (PARK USERS ONLY)

Tables 18 through 29 reflect information concerning the behavior and preferences of Mission Bay Park users regarding the Park itself. Table 18 demonstrates that the heaviest usage of Park facilities occurs in picnic areas and pedestrian/bike trails. It is noteworthy that only 33.0% of Park users avail themselves of water sports and boating activities. Tables 19-21 examine this water sports participation in greater detail.

Table 18

Facilities in Mission Bay Park Used by Respondent Users within the Last Year

Facility	Yes		No		Total	
	#	%	#	%		
Water Sports/ Boating	110	33.0	223	67.0	333	100.0
Picnic Areas	260	78.5	71	21.5	331	100.0
Pedestrian/ Bike Trail	209	63.1	122	36.9	331	100.0
Playgrounds/ Ballfields	152	46.1	178	53.9	330	100.0
Hotels/ Restaurants	129	39.0	202	61.0	331	100.0

Table 19 demonstrates that water skiing, swimming, and sailing are the most frequently engaged in water activities while boat racing, kayaking/canoeing, and rowing rank at the bottom. Water sport participants indicated that poor water quality was the single most important problem at Mission Bay Park (Table 20) and they agree with the proposition that the activities now allowed should continue as such ranging from 94.5% approval of sailing to 80.0% approval of jet skiing (Table 21).

White respondents participate in water sports more so than other ethnic groups (38.0% versus 18.1%). As expected, upper income groups ($55,000 and over) participate more heavily in water sports (52.9%) than the lower income groups (28.4%). People with young children, age 0-4, tend not to be water sports participants--19.3% compared to 35.8% without young children. People who live in the vicinity of the Park and those who live in the Central City-South of I-8 area are the heaviest users of bike and pedestrian trails (76.5% and 66.7%, respectively). Next in terms of usage is the Central City-North of I-8 area, with a 61.2% usage factor. The highest usage of ballfields and playgrounds occurs in the 35-49 age group (55.0%), whereas the lowest occurs in the 50-64 group (21.1%). People with children age 0-11 use

the playgrounds and ballfields more than those without children in this group (75.8% in contrast to 39.4%). Also of note is that respondents with children 0-4 years of age tend to participate in kayaking/canoeing more frequently and that families with children 12-15 tend to boat race more often. In terms of water skiing, men participate in this activity more than women (54.3% to 35.0%).

In terms of problems experienced by Mission Bay Park users, difficulties with shoreline access and access to water were encountered significantly more by those who live in the Central City-South of I-8 (45.0%) and North County (36.0%) than by the overall population (26.4%). Men tend to be more in favor of allowing continued water skiing and jet skiing than women (95.7% and 86.6%, respectively, for men versus 82.1% and 68.4% for women). Families with children 16-18 are significantly less in favor of allowing jet skiing and water skiing, and families with children 0-4 are less in favor of allowing windsurfing. Special race events are particularly popular among those who have voted in the past two years (92.5% versus 74.1% non-voters).

Table 19

How Often Do Respondent Users of Mission Bay Park Water Sport Facilities Participate in Such Activities?

Water Sport Activity	Often		Sometimes		Never		Total	
	#	%	#	%	#	%	#	%
Water Skiing	17	15.5	35	31.8	58	52.7	110	100.0
Rowing	4	3.6	14	12.7	92	83.7	110	100.0
Jet Skiing	13	12.0	24	22.2	71	65.8	108	100.0
Sailing	14	12.7	36	32.7	60	54.6	110	100.0
Swimming	16	14.5	43	39.1	51	46.4	110	100.0
Kayaking/Canoeing	6	5.5	11	10.0	93	84.5	110	100.0
Windsurfing	8	7.3	14	12.7	88	80.0	110	100.0
Boat Racing	6	5.5	9	8.2	95	86.3	110	100.0
Fishing	14	12.7	32	29.1	64	58.2	110	100.0

Table 20

Problems Experienced by Respondent Users of Mission Bay Park Water Sport Facilities

Problems	Frequency of Occurrence							
	Often		Sometimes		Never		Total	
	#	%	#	%	#	%	#	%
Boat Launching	4	3.6	19	17.3	87	79.1	110	100.0
Waterway Congestion	17	15.5	42	38.2	51	46.3	110	100.0
Shoreline & Access to Water	7	6.4	22	20.0	81	73.6	110	100.0
Poor Water Quality	50	45.8	33	30.3	26	23.9	109	100.0
Inadequate Water Depth	7	6.4	24	22.0	78	71.6	109	100.0
Inadequate Facilities	8	7.3	22	20.0	80	72.7	110	100.0
Conflicts with Other Users	8	7.3	29	26.4	73	66.3	110	100.0
Other	6	6.5	17	18.3	70	75.2	93	100.0

Table 21

Opinion of Respondent Users of Mission Bay Park Concerning Whether Certain Water Activities Should Be Allowed

	Frequency of Occurrence					
	Yes		No		Total	
Activity	#	%	#	%	#	%
Water Skiing	99	90.8	10	9.2	109	100.0
Rowing	103	93.6	7	6.4	110	100.0
Jet Skiing	84	80.0	21	20.0	105	100.0
Sailing	104	94.5	6	5.5	110	100.0
Swimming	89	83.2	18	16.8	107	100.0
Paddle Sports (e.g., canoeing)	101	91.8	9	8.2	110	100.0
Windsurfing	101	92.7	8	7.3	109	100.0
Special Race Events (e.g., power boat races)	94	87.9	13	12.1	107	100.0

Table 22 rates the issues which are important to respondent users in their ability to enjoy the Park. Prominent among these issues in terms of being labelled "very important" are water quality (86.5%), safety/crime (80.2%), sewage on Fiesta Island (75.7%), and air pollution/odor (75.4%). Least important, as indicated by responses of "not at all," are noise (18.4%) and access (16.0%). Younger groups and males are less bothered by noise than other groups. Men also find crime/safety less important than women (76.1% versus 85.5% "very important"), and women are much more bothered by air pollution and odor than men (85.6% to 67.6%). Among the other problems, people 50 years of age and older find parking to be less important than other age groups, and overcrowding seems to bother females and those in the 35-49 age group.

Table 22

Rating of Issues by Respondent Users of Mission Bay Park Related to Their Ability to Enjoy the Park

	Rating							
	Very Important		Somewhat Important		Not at All Important		Total	
Issue	#	%	#	%	#	%	#	%
Water Quality	289	86.5	39	11.7	6	1.8	334	100.0
Biological Habitat	213	65.7	95	29.3	16	5.0	324	100.0
Noise	118	35.5	153	46.1	61	18.4	332	100.0
Air Pollution/Odor	252	75.4	65	19.5	17	5.1	334	100.0
Overcrowding	148	44.6	144	43.4	40	12.0	332	100.0
Traffic	154	46.1	139	41.6	41	12.3	334	100.0
Parking	178	53.5	118	35.4	37	11.1	333	100.0
Access	156	47.1	122	36.9	53	16.0	331	100.0
Safety (Crime)	267	80.2	42	12.6	24	7.2	333	100.0
Public Service/Amenities	188	56.6	120	36.2	24	7.2	332	100.0
Sewage on Fiesta Island	244	75.7	44	13.7	34	10.6	322	100.0

Table 23 indicates those facilities for which Park users are willing to pay a fee in order to maintain and improve the Park. Camping is so favored by 61.3% of the users and parking by 51.5%. Lowest in willingness to pay is windsurfing (37.9%).

Table 23

Willingness of Respondent Users of Mission Bay Park to Pay User Fees for Various Facilities in Order to Improve and Maintain the Park

Facility	Yes		No		Total	
	#	%	#	%	#	%
Sports Fields	138	42.6	186	57.4	324	100.0
Water Skiing	143	44.0	182	56.0	325	100.0
Sailing	139	43.2	183	56.8	322	100.0
Parking	168	51.5	158	48.5	326	100.0
Camping	201	61.3	127	38.7	328	100.0
Group Picnic Facilities	163	49.4	167	50.6	330	100.0
Jet Skiing	140	43.2	184	56.8	324	100.0
Boating	148	45.3	179	54.7	327	100.0
Windsurfing	124	37.9	203	62.1	327	100.0

The amount of a user fee which users are willing to pay is reflected in Table 24, with a median fee of $4.10. Parking fees are opposed only by those who live in the vicinity of Mission Bay Park (66.3%)--all other regions support the idea, with North County particularly in support at 70.6%. Camping fees are strongly opposed by those 65 years of age and older (62.5% versus 38.8% overall). South Bay residents are the only geographic contingent which oppose fees for camping (51.6% opposition). Strongest support comes from East County (76.2% support) and North County (73.5%). Voters demonstrated a stronger support pattern for camping fees than non-voters (64.5% to 52.6%). Concerning some of the less noteworthy fee proposals, water skiing and jet skiing fees are favored by those in the 18-24 age group, with those 50 years of age and older strongly in opposition. East County and North County residents support water skiing and jet skiing fees. Lower income groups are particularly opposed to fees for picnic facilities. With regard to sailing, residents in the Central City-North of I-8 and North County residents support fees for sailing. East County and North County residents favor boating fees, but, again, people 50 years of age and older are opposed to both boating and sailing fees. Low income groups are also opposed to boating fees.

Table 24

Amount of User Fee Respondent Users Are Willing to Pay during a Typical Day at Mission Bay Park (Based upon Those Willing to Pay a User Fee at All)

User Fee	#	%
Under $2	46	17.7
$2 - $3.99	82	31.6
$4 - $6.99	90	34.6
$7 - $9.99	25	9.6
$10 and over	17	6.5
Total	260	100.0

median fee = $4.10

Table 25 indicates that 66.6% of Mission Bay Park users are willing to use a shuttle service once inside the Park. Of those willing to use such a service, Table 26 shows that 87.1% are willing to pay a fee to cover the cost of the shuttle's operations. All geographic areas show majority support for using the shuttle, with the strongest support among North County residents (82.0%), those in the vicinity of Mission Bay Park (77.1%), and South Bay residents (74.2%). As would be expected, however, lower income people are less in favor of a fee proposal than higher income groups.

Table 25

Willingness of Respondent Users of Mission Bay Park to Use a Shuttle Service Once Inside the Park

Willingness to Use	#	%
Yes	217	66.6
No	109	33.4
Total	326	100.0

Table 26

Willingness of Respondent Users to Pay a Fee to Cover Tram Operation

(Based Upon Those Willing to Use Shuttle Service)

Willingness to Pay	#	%
Yes	182	87.1
No	27	12.9
Total	209	100.0

Table 27 examines users' perceptions of crowdedness at various Park facilities. Parking (64.3%), streets (57.6%), and sidewalks (54.7%) loom largest in terms of the perception of being "very crowded." Water ski areas, by far, are considered not at all crowded (65.5%), followed by fire pits (32.5%). Those people 50-64 years of age do not find parking to be as crowded as other age groups, with this group being the only one which did not contain a majority of respondents indicating "very crowded" parking conditions. The 25-34 age group finds sidewalks to be more crowded than other age groups do (65.5% "very crowded"), and people living in the vicinity of the Park also find sidewalks very crowded (71.4%). Although the majority of respondents are not concerned with fire pit crowding, Blacks do seem to be, with 50.0% of them indicating a "very crowded" condition for this facility. East County residents also seem to find the fire pits more crowded than the overall County population.

Table 27

Crowdedness at Various Facilities in Mission Bay Park
According to Respondent Users of the Park

	Degree of Crowdedness							
	Very Crowded		Somewhat Crowded		Not at All Crowded		Total	
Facility	#	%	#	%	#	%	#	%
Group picnic areas	91	27.3	196	58.9	46	13.8	333	100.0
Grassy areas	119	35.7	186	55.9	28	8.4	333	100.0
Fire pits	62	18.7	162	48.8	108	32.5	332	100.0
Beach	131	39.4	148	44.6	53	16.0	332	100.0
Water ski areas	39	11.7	76	22.8	218	65.5	333	100.0
Sidewalks	182	54.7	132	39.6	19	5.7	333	100.0
Parking	214	64.3	103	30.9	16	4.8	333	100.0
Streets	191	57.6	112	33.7	29	8.7	332	100.0

A clear majority of users of Mission Bay Park rate the quality of maintenance, landscaping, and public facilities at the Park as "good" (56.2% - Table 28).

Table 28

Respondent Users' Rating of the Quality of Maintenance, Landscaping, and Public Facilities at Mission Bay Park

Rating	#	%
Good	184	56.2
Fair	115	35.2
Poor	28	8.6
Total	327	100.0

Table 29 indicates that only a slight majority (52.2%) of Park users would consider dedicating acres of the Park for natural resource preservation or enhancement. The groups most opposed to such a dedication are older users (65 and older--79.2%) and people who have children in the 12-15 age bracket (69.7%). Of those who responded to the question, "Which areas would you designate for natural resource preservation or enhancement?", 43.8% indicated Fiesta Island. Other responses were mixed and generally not categorizable.

Table 29

Respondent Users' Opinion Concerning Dedicating Areas of the Park for Natural Resource Preservation or Enhancement

Opinion	#	%
Yes	163	52.2
No	149	47.8
Total	312	100.0

RECREATIONAL FACILITY USAGE AND OPINIONS AMONG PARK NON-USERS

Tables 30-32 provide information concerning reasons why non-users do not frequent Mission Bay Park, the type of recreational facilities they do visit, and the recreational activities which they tend to enjoy elsewhere. Table 30 shows that an overwhelming plurality of non-users indicated that they do not use the Park because they live too far away (49.3%). Secondarily are such reasons as the absence of time for park recreation (10.9%) and the observation that Mission Bay Park does not fulfill their recreational needs (9.3%). Distance from Mission Bay Park was a particular problem for individuals 25-34 years of age and for those who have children between the ages of 5 and 11. Voters cite the distance factor more frequently than non-voters (51.1% to 45.0%) as do individuals living in the South Bay (61.2%), North County (59.5%), and East County (57.4%). The Park does not fulfill the needs of people in the 50-64 age bracket, especially, and for those people living in the Central City-North of I-8. People with children between the ages of 5 and 11 also cite the Park's facilities as being unfulfilling. Pollution, which received 6.8% of the total responses, is of particular concern to those living in the vicinity of the Park (22.9%). Those who

visit Sea World often are more sensitive to the pollution problems, with 36.8% of those who attend Sea World at least twice per month citing this as a significant deterrent to their use of the Park and 9.4% of those who attend Sea World at least "a few times" per year indicating the same.

Table 30

Reasons for Not Using Mission Bay Park More Often
(Respondent Non-Users Only)

Reasons	#	%
Live in different area/too far	217	49.3
Pollution	30	6.8
Crowded/rowdy/congestion	26	5.9
New to area/don't know Park location	33	7.5
Do not go to parks	6	1.4
Mission Bay does not fulfill recreational needs/go other places	41	9.3
No time for parks/busy	48	10.9
Other	39	8.9
Total	440	100.0

Among non-users, 28.7% of them frequent parks other than Mission Bay Park and 15.1% cite the beaches of San Diego County as their most frequented recreational destination (Table 31). Non-user residents of South Bay tend to go to other parks (37.0%). Non-user residents in the vicinity of Mission Bay Park tend to use the beaches (19.1%). Non-user residents of the Central City, both north and south of I-8, use Balboa Park (20.0% and 15.4%, respectively). The recreational activities preferred by non-users of the Park, as depicted in Table 32, are diverse, including such activities as playgrounds/ ballfields/tennis courts (23.3%), picnic areas (19.6%), water sports/boating (18.1%), and pedestrian/bike trails (15.7%). Among non-users, those in the 35-64 age group tend to enjoy water sports more than the general population does. The 35-49 age group enjoys picnic areas, those 50 and over enjoy pedestrian/bike trails, and those under 35 enjoy playgrounds and ballfields.

Table 31

Family-Oriented Recreational Facilities
Respondent Non-Users Visit Most Often

Recreational Facility	#	%
Balboa Park	34	8.2
Other Parks	120	28.7
Beaches	63	15.1
Various Lakes	17	4.1
Desert	4	1.0
Indoor Gyms	11	2.6
Sea World	14	3.2
None	74	17.7
Other recreation (pools, miniature golf, hiking)	81	18.4
Total	418	100.0

Table 32

Recreational Activities Enjoyed by Respondents
Who Used Facilities Other Than
Mission Bay Park
(Non-Users of Mission Bay Park)

Activity	#	%
Water Sports/Boating	60	18.1
Picnic areas	65	19.6
Pedestrian/bike trail	52	15.7
Playgrounds/ballfields[b]	77	23.3
Other	77[a]	23.3
Total	331	100.0

[a]includes 7 movies, 7 museums, 7 zoo/animals
[b]includes tennis courts

Appendix E

MISSION BAY PARK NATURAL RESOURCE MANAGEMENT PLAN

Prepared by

Development and Environmental Planning,
Planning Department, City of San Diego

SAN DIEGO CITY COUNCIL

Maureen O'Conner, Mayor

Abbe Wolfsheimer, District 1
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San Diego Park and Recreation Department

George Loveland, Director
David Twomey, Assistant Director
Terri Carroll, Deputy Director, Coastal Division
Mike Behan, District Manager
Art Belenzon, District Manager

San Diego Planning Department

Robert Spaulding, City Planning Director
Ann Hix, Principal Planner
Robin Stribley, Senior Planner
Tom Huffman, Senior Planner

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SUMMARY

The Natural Resource Management Plan recognizes the presence of natural resources in Mission Bay Park and provides guidelines and programs for the protection, enhancement, and management of these resources. The intent is that no net reduction of wildlife habitat will be allowed and that the overall quality of habitat will be improved. The Plan provides a framework to allow the continued improvement and maintenance of Mission Bay Park and still ensure viable productivity and protection of the Park's natural resources. Use of the Plan can help bridge what can sometimes be a gap between the requirement of human activities and the need to protect and manage natural resources. The Mission Bay Park Natural Resource Management Plan helps to clarify expectations for the protection of natural resources in the Park and to facilitate the granting of federal, state, and local permits for projects in the Park.

The guidelines for development and mitigation provided in the Management Plan include: dredging; methods of construction to minimize impacts to natural resources; beach maintenance restrictions; construction methods to reduce impacts to water quality; scheduling constraints; buffer zones, mitigation location restrictions; habitat replacement ratios such as 1:1 ratio for eelgrass, salt pan, salt marsh, and any coastal strand habitat supporting sensitive species; eelgrass mitigation options; mitigation plans; and mitigation monitoring plans.

A nesting site management program for the endangered California least tern proposes: coordination with resource agencies and regional experts; provision of suitable nesting substrate free of unnecessary vegetation; placement of least tern decoys; implementation of predator control; inclusion of chick protection devices; maintenance and installation of signs, gates, and fences; and provision for one person once a week for four months a year to aid in monitoring least tern nesting sites. Two of the seven least tern nesting sites in Mission Bay Park are proposed for alternate uses. These changes are considered to be significant adverse impacts but will be mitigated.

The western boundary of the Southern Wildlife Preserve in the Flood Control Channel is proposed for western expansion to a point in line with the east edge of Hospitality Point. Non-motorized watercraft would be allowed to utilize the area west of Ingraham Street Bridge from April through September by permit only. A maximum of 10 permits for any given day would be issued by the Park and Recreation Department. Fishing would only be allowed from Dog Beach. In additin to the salt marsh expansion at Crown Point Shores, previously discussed, another wildlife perserve is proposed for the approximately 110 acres of land currently occupied by sludge beds, south of the road on Fiesta Island. A variety of habitats would be created as part of the preserve. This preserve would also include an embayment for the planting of eelgrass. The eelgrass embayment, as well as the new preserve areas, would be considered a mitigation "bank". The bank would provide mitigation credit for future projects.

Educational and research opportunities are provided for in the Management Plan. Regular eelgrass surveys (every 3 years), general bird surveys (every 5 years), and least tern foraging studies (2 consecutive years) are proposed. Efforts to cooperate in sharing of information with universities and individuals is encouraged with the goal of maintaining a current data base. Educational signs are proposed and would be strategically placed for maximum benefit without creating negative environmental impacts. A small nature center and boardwalk system is proposed for either the new preserve expansion at Crown Point Shores or the northwestern corner of the new preserve for Fiesta Island. The nature center complex would include a small structure (about 1,000 square feet), interpertive displays and signs, observation platforms, and a nature trail boardwalk system. The nature center design would be unobtrusive and blend with the preserve. It would serve as a focal point for nature enthusiasts, school and community groups for educational tours, and a focal place for natural resource management meetings.

The Mission Bay Park Natural Resource Management Plan - Technical Appendices is available for referencing the most recent eelgrass, bird and least tern data, as well as resource agency information pertinent in developing mitigation plans. The Appendices will be periodically updated to keep the data current and expanded as data becomes available for other resources.

INTRODUCTION

PURPOSE

The primary purpose of the Mission Bay Park Natural Resource Management Plan is to allow the continued improvement and maintenance of Mission Bay Park and still ensure viable productivity of the Park and its various natural resources. This Plan is intended to not only recognize the presence of natural resources, especially sensitive natural resources, but also provide for the protection, enhancement and management of these resources. The Natural Resource Management Plan provides for comprehensive management of sensitive biological resources, and ensures that these resources are properly considered during the planning and development of projects and master plan areas in Mission Bay Park.

Preparation of the Mission Bay Park Natural Resource Management Plan involved close coordination with affected agencies, including the California Coastal Commission, California Department of Fish and Game, National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the University of California Natural Reserve System. A comprehensive plan specifying the future character of Mission Bay Park's natural resources will facilitate the review of individual permit applications by these agencies. Under the present system, assessment of the collective impacts and the effectiveness of mitigation for individual project proposals is difficult. With the Natural Resource Management Plan, a comprehensive approach to habitat protection can help clarify development expectations, and facilitate granting project permits which are in conformance with the Management Plan.

The purpose, goals, and objectives of the Natural Resource Management Plan are established as long-range, 100-year goals. The guidelines outlined in the Plan will be updated at least every eight to ten years with input from resource and trustee agencies and technical experts.

The Mission Bay Park Natural Resource Management Plan is viewed as a tool to bridge what can sometimes be a gap between the requirements of human activities and the need to protect and manage natural resources in Mission Bay Park. The resource agencies are charged with the singular mission of protecting all biological resources in the Park to the fullest extent possible. This mission can conflict with recreational interests who cite the following reasons in support of recreational use in the Park: the artificial nature of the Bay created from an extensive dredging program; the original intent of the Park development for recreation; and the demonstrated need and desire for additional recreational development.

A major goal of this Natural Resource Management Plan is to demonstrate the City's recognition of the rich and varied biological resources of the Park. The Plan highlights the recreational fishing, bird-watching, and aesthetic enjoyment provided by these resources, and recognizes them as an integral part of Mission Bay Park.

Another goal of this Plan is to designate environmentally sensitive habitats and establish requirements for: 1) enhancement and restoration activities; 2) maintenance programs; and 3) appropriate buffer areas or other restrictions on urban encroachments that conflict with protection of sensitive resources. The Plan provides for agreements between the City and resource agencies as to the maintenance responsibilities for regional natural resources, such as least terns and eelgrass.

OBJECTIVES

The objectives of the Natural Resource Management Plan are:

1. To establish management practices to preserve and protect biological resources while providing for future recreational development, maintenance, and land use in Mission Bay Park.

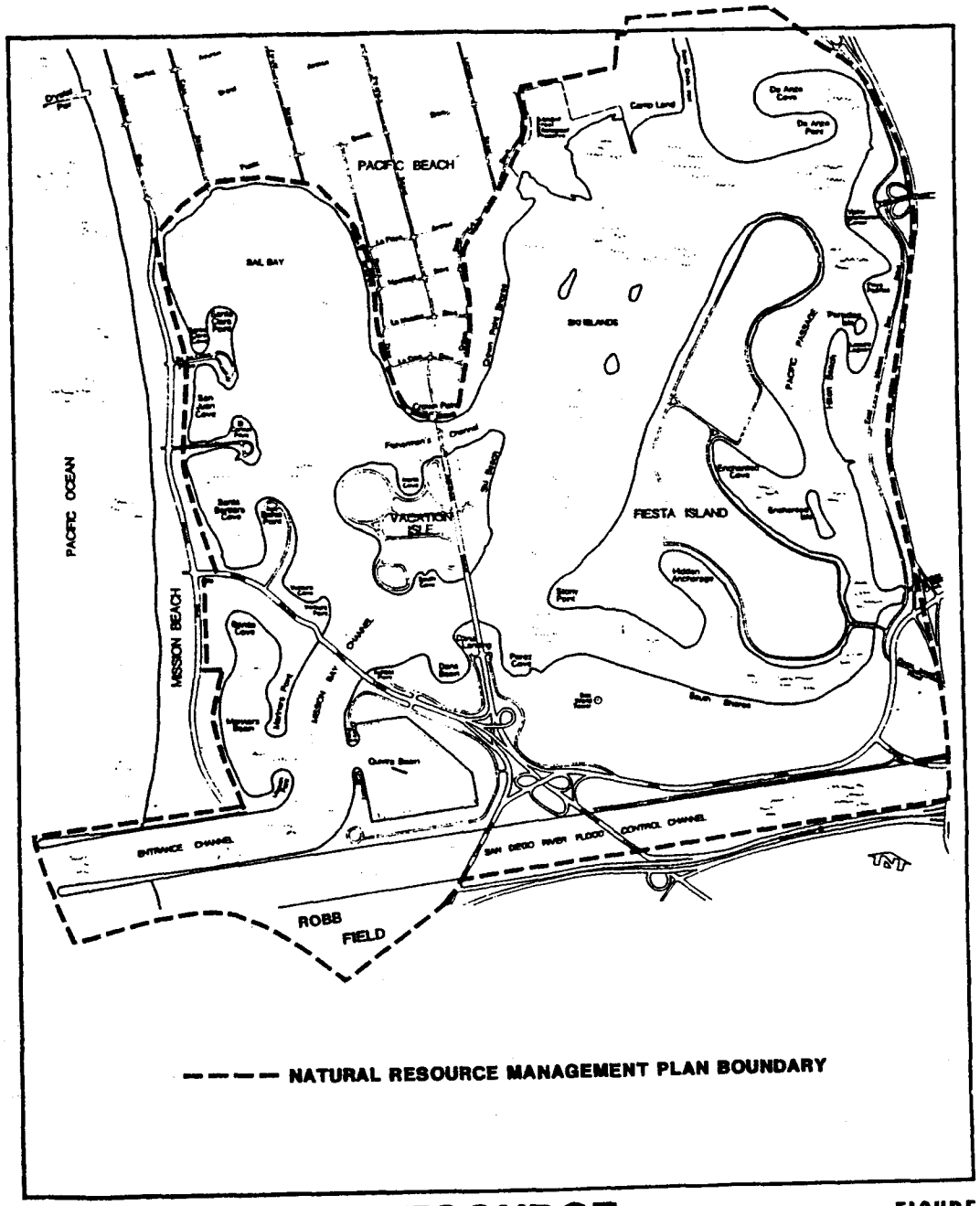
2. To provide a framework for mitigation acceptable to the City and resource and permitting agencies.

3. To provide opportunities for innovative resource enhancement in Mission Bay Park.

4. To establish a foundation for increased educational and research opportunities in the Park.

HISTORY

Until the late 1940's, Mission Bay was a shallow, unnavigable backwater supporting saltwater marsh, swamp, and mud flat habitats. A federally approved project for flood control of the San Diego River and for small boat navigation in Mission Bay began in 1946. As part of this project, dredging activities occurred from 1946 to 1961 until Mission Bay and the San Diego River Flood Control Channel reached their current configuration (Figure 1). Extensive public and private funding supported development of most of Mission Bay's shoreline. Fiesta Island and portions of South Shores are the only major areas yet to be developed or designated for particular land use (Figure 1).



NATURAL RESOURCE MANAGEMENT PLAN SETTING

FIGURE 1

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT

AGENCY JURISDICTION AND APPLICABLE CITY PLANS

AGENCY JURISDICTION

A number of agencies have direct or indirect involvement with land use planning and permit approvals for Mission Bay Park. The primary agencies and their degrees of involvement with activities in the Park are as follows:

City of San Diego: The day-to-day management of Mission Bay Park is the responsibility of the Park and Recreation Department, operating under the authority of the City Manager. The Coastal Division of the Park and Recreation Department performs tasks such as repairing eroded shorelines, cleaning and grooming beaches, maintaining landscaped and ecological areas, and maintaining recreational facilities. Lifeguard Services is also a division of the Park and Recreation Department. The lifeguards provide law enforcement and promote aquatic safety on the Bay. The Coastal Division, Mission Bay Park Manager, and lifeguard office is located on Hospitality Point near the Entrance Channel.

Other City departments involved in Mission Bay Park include the Water Utilities Department, Planning Department, Property Department, Police Department, Fire Department, and General Services Department. Water Utilities involvement is focused on Fiesta Island, where City sludge drying beds are located. Water Utilities currently operates the sludge beds and maintains two least tern sites on the island. The involvement of Water Utilities will dissipate once the sludge beds are removed. Responsibility for that portion of Fiesta Island and the tern sites will then revert back to the Park and Recreation Department.

A primary involvmenet of the Planning Department is centered around the environmental review process. It is through this process that the agencies and the public become involved in the decisionmaking process for master plan and individual project proposals. The Planning Department serves as a liaison between the City, the public, and the agencies. A Mission Bay Park steering committee headed by the Planning and Park and Recreation departments allows for interdepartmental communication and planning for Mission Bay Park. The Planning Department also has a Resource Management Division whose primary purpose is the protection of environmental resources within the City of San Diego. The Long-Range Planning Division of the Planning Department is responsible for updating the Mission Bay Park Master Plan and developing other Specific Plans for areas, such as Fiesta Island, of Mission Bay Park.

California Coastal Commission: The California Coastal Commission (CCC) is charged with administering the California Coastal Act of 1976. This Act requires local governments to prepare a Local Coastal Program (LCP) for those areas located within the Coastal Zone. The LCP is intended to bring the local government's planning process into conformance with the policies

and provision of the Coastal Act. All LCP's include a Land Use Plan (LUP) and implementing ordinances. This Natural Resource Management Plan outlines resource policies and could serve as an element of the LUP for Mission Bay Park.

The Coastal Commission retains authority for all development projects within the Coastal Zone until the LCP is adopted. Once the LCP is implemented, permit authority reverts to the local agency. All projects within Mission Bay Park currently are under the CCC jurisdiction until the City adopts the LCP. Much of Mission Bay Park, however, will remain in the CCC jurisdiction since much of the Bay area is classified as tidelands. Under the Coastal Act, permit actions on tideland areas can be appealed to the CCC even if the LCP is adopted and being implemented. Thus, development proposals will be subject to CCC review indefinitely.

U.S. Army Corps of Engineers: The Army Corps of Engineers (ACE) exercises permit authority in Mission Bay Park for projects which require permits under either Section 10 of the River and Harbor Act of 1899 or Section 404 of the Clean Water Act. Projects which involve activities (e.g., dredging or placement of structures) in navigable water need a Section 10 permit. Projects which involve the discharge of fill or dredge material into waters of the United States must secure a Section 404 permit.

California Department of Fish and Game: Involvement of the California Fish and Game Department (CDFG) occurs one of two ways. For projects involving alteration of a streambed, a permit must be issued pursuant to Sections 1601-1606 of the CDFG Code. Within Mission Bay Park, this type of permit would be required for development or maintenance activities in Rose Creek, Tecolote Creek, or the San Diego River Flood Control Channel.

The second type of involvement would occur with the CDFG serving in an advisory capacity to the CCC or ACE.

U.S. Fish and Wildlife Service: The U.S. Fish and Wildlife Service (USFWS) acts in an advisory role with projects which require an ACE permit (Section 10 or Section 404). The USFWS also serves in an advisory capacity regarding CCC permits and other permit actions. Of particular importance to the USFWS is the status of plants and animals which occur on the List of Endangered and Threatened Species, which are protected under the Endangered Species Act of 1973. Two federally-listed, endangered species, California least tern and light-footed clapper rail, nest in Mission Bay Park.

National Marine Fisheries Service: The National Marine Fisheries Service (NMFS) is involved in a similar capacity as the USFWS. NMFS provides comments on ACE permits, CCC permits, and other permits, as appropriate.

Regional Water Quality Control Board: The Regional Water Quality Control Board (RWQCB) issues permits for activities in Mission Bay. Generally, a permit is required for any project involving dredging or filling of 5,000 cubic yards of material within the Bay waters. The RWQCB serves in an advisory capacity to the CCC and other agencies.

Other Agencies: Other agencies with jurisdiction in Mission Bay Park include the State Lands Commission and U.S. Coast Guard. The involvement of these agencies with natural resources in Mission Bay Park is limited.

CITY PLANS APPLICABLE TO MISSION BAY PARK NATURAL RESOURCES

The two major planning documents pertaining to Mission Bay Park are (1) the Mission Bay Park Master Plan for Land and Water Use (1978); and (2) the Local Coastal Program Addendum to the Mission Bay Park Master Plan for Land and Water Use (1982).

The following 1978 Master Plan recommendations affect natural resources:

> Establish a carrying capacity for natural resources and public facilities within the Park, and develop a management program to prevent overuse of the areas as the demand for outdoor recreation increases. (page 82)
>
> Limit or restrict the public's physical access to each area of the Park only for safety or environmental considerations.... (page 84)
>
> The Rose Creek Channel should no longer be dredged more than the minimum depth required for flood control purposes. (page 54)
>
> Monitor the use of the very northwestern portion of Fiesta Bay to insure that power boat activities do not unduly disturb the Northern Wildlife Preserve. (page 85)
>
> Restrict activities in the Flood Control Channel primarily to the area west of the Sunset Cliffs Boulevard Bridge, and require that any noise generating aquatic event in the Channel have the prior approval of the Park and Recreation Director. (page 85)
>
> Provide signing, fencing, and use restrictions in adjacent areas to protect the Northern and Southern Wildlife preserves. (page 89)
>
> Continue the existing water quality sampling program in Mission Bay, and expand monitoring activities to include factors relevant to the preservation of wildlife. (page 89)
>
> Establish an ongoing environmental monitoring program to provide periodic data on the status of the wildlife reserves and other sections of the Park. It is suggested that an agreement be established between the City and local colleges and universities, or an environmental consultant be retained on a continuing basis, to provide the service. (page 89)
>
> Develop a program with the Regional Water Quality Control Board to mitigate the possibly adverse effects of boating activities through spilled fuels, non-use of holding tanks, and dumping. (page 89)

> Rechannel the storm drains emptying into Mission Bay and Tecolote Creek to an environmentally suitable outfall. (page 89)
>
> Continue to set aside habitat essential to the preservation of rare and endangered species. Of special importance is the City's continued participation in the Least Tern Recovery Team, a multi-agency project to coordinate efforts for protection and enhancement of least tern nesting sites in San Diego. Public posting of all existing wildlife preserves should be instituted. (page 89)
>
> Limit dredging of Mission Bay waters to... 4) wildlife refuge habitat restoring and managing; and 5) restoring water circulation. Dredging shall be planned, scheduled, and carried out to avoid undue disruption to fish and bird breeding and migrations, marine habitats, and water circulation. (page 90)

The Local Coastal Program Addendum (1982) incorporates recommendations outlined in the 1978 Master Plan and further clarifies and reinforces those recommendations. The LCP adds the following clarifications:

> "The restoration of the Rose Creek/Northern Wildlife preservation should be part of a resource management program (work program for such a management program submitted as a separate document) to be developed to address the protection and restoration of sensitive habitats... A determination concerning the addition of Campland to the Northern Wildlife Preserve and excavation of the site to allow for marsh reestablishment, should be part of this program. The Coastal Conservancy should be involved in this as a restoration project." (page 20)
>
> The Least Tern Management Program is called out in the LCP as "a primary element of a more comprehensive Resource Management Program... Other management elements proposed include programs for the Kendall-Frost/North Reserve/Rose Creek Complex, San Diego River Flood Control Channel...". (page 27)

EXISTING CONDITIONS

Mission Bay Park is a 4,600-acre recreational park in southern California. Figure 1 shows the Park location northwest of downtown San Diego, bounded by Interstate 5 to the east, the community of Pacific Beach to the north, Mission Beach to the west, and Ocean Beach to the south.

The existing conditions outlined in this section are summarized primarily from the Mission Bay Park Shoreline Restoration and Stabilization Project Environmental Impact Report (1989).

BIOLOGICAL RESOURCES

Biological resources in Mission Bay Park include a wide range of marine habitats, a prime example of coastal salt marsh, and a variety of birds, including endangered species.

MARINE RESOURCES

Five different marine communities occur in Mission Bay: sand bottom, mud bottom, hard bottom, eelgrass meadows, and open water.

Sand Bottom: Sand bottom habitat is found along shoreline intertidal zones (area between extreme high and low tides) and in high energy water movement areas, such as the Entrance Channel, the Bay bridge channels, and at the mouth of the Flood Control Channel. The dominant invertebrates in this habitat include polycheate worms, armored sand stars (Astropecten armatus), swimming crabs (Portunus xantusii), sea pansy (Renilla kollikeri), and sea pen (Stylatula elongata). The population of sand dollars (Dendraster excentricus) in Mission Bay has fluctuated in the past but is currently dense in the Entrance Channel. Fish associated with sand bottoms in the Bay are California halibut (Paralichthys californicus), diamond turbot (Hypsopsetta guttulata), barred sand bass (Paralabrax nebulifer), and spotted sand bass (Paralabrax maculatofasciatus).

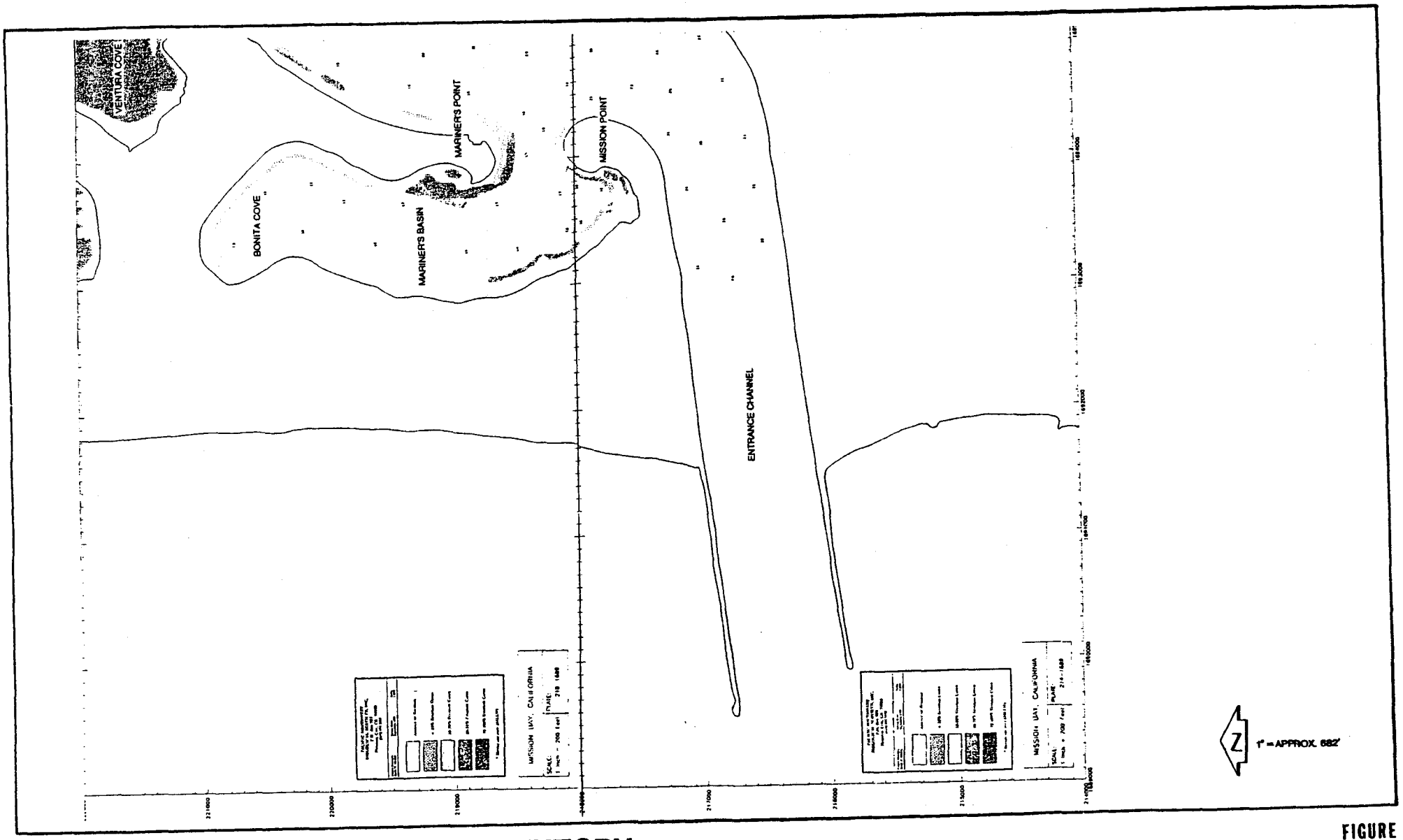
Mud Bottom: The dominant subtidal (below the area of tidal fluctuation) habitat in Mission Bay Park is mud bottom. Mud bottom habitat, however, also occurs from intertidal mudflats in the Northern Wildlife Preserve to the deepest part of the Bay and in the Southern Wildlife Preserve. This habitat is a more stable substrate and has a higher organic content than sand. It is present in areas of slow water movement and seasonal sediment deposition. Typical species found in this habitat are moon snails (Polinices and Natica spp.), California bubble snail (Bulla gouldiana), polycheate worms, swimming crabs, ghost shrimp (Callianassa spp.), mud shrimp (Upogebia pugettensis), a tubicolous anemone (Pachycerianthus spp.), and light-bulb tunicate (Clavelina hunstsmani). Fleshy stalked bryozoan (Zoobotryon verticillatum) densely populate some areas during the summer. Fish frequenting mud bottom habitat include California halibut, diamond turbot, bat ray (Myliobatis californica), butterfly ray (Gymnura

marmorata), and long-jawed mudsucker (Gillchthys mirabilis). Round rays (Urolophus halleri) are abundant in this habitat. Shallow (less than three feet), protected subtidal areas with either mud or sand bottoms, are important as nursery habitat for juvenile California halibut.

Hard Bottom: Hard bottom habitat in Mission Bay is associated with manmade hard substrate, such as riprap, bridge and pier pilings, docks, and concrete storm drains. Organisms in the Entrance Channel, west of West Mission Bay Drive Bridge, are found in greater numbers than in other hard substrate areas of the Bay. This is due to the preference for the cooler, less turbid water, the more intense water motion, and the less variable salinity conditions found in the Entrance Channel. Species commonly occurring in this habitat include: low-growing coralline algae (Corallina vancouveriensis, Bossiella orbignina, Gigartina spp.); giant kelp (Macrocystis pyrifera); sea fans (Muricea californica and M. fruticosa); sea stars (Pisaster giganteu P. ochraceus); sea urchins (Strongylocentrotus franciscanus and S. purpuratus); and mollusks (Astraea undosa, Aplysiavaccaria spp., Haliotis spp.). Fish associated with the Entrance Channel riprap are garibaldi (Hypsypops rubicundus), kelpfish (Gibbonsia spp.), giant kelpfish (Heterostichus rostratus), and kelp surfperch (Brachyistius frenatus). Other hard substrate habitat in the Bay is dominated by bay mussel (Mytilus edulis), rock scallop (Hinnites multirugosus), barnacles (Tetriclita squamosa and Balanus amphitrite), algae (Egregia laevigata and Gigartina, spp.) and macroalgae (Sargassum muticum and Codium fragile). Fish associated with hard substrate in the Bay include kelpbass (Paralabrax clathratus), barred sand bass (Paralabrax nebulifer), California scorpionfish (Scorpaena guttata), and opaleye (Girelle nigricans).

Eelgrass Meadows: Eelgrass (Zostera marina) is an aquatic grass which grows on the low intertidal to high subtidal slopes in Mission Bay and the Flood Control Channel. Eelgrass plays a particularly important role in the marine ecology of bay and channel waters. Eelgrass is a direct food source for some fish and bird species. Invertebrates attached to eelgrass serve as a food source for many fish species inhabiting eelgrass beds. Disintegrating eelgrass supports amphypods and phyloplankton populations, which are sources of food for fish in the water column. In addition to a primary and secondary food producer, eelgrass plays an important role by providing a structural component to bay and channel bottoms. Eelgrass beds also provide protection for shrimps, crabs, scallops, and juvenile fish.

Substantial eelgrass habitat is present in Mission Bay and the Flood Control Channel, second in area only to mud bottom habitat (EIR 1989, PCBS 1988). Eelgrass meadows graduate into mud bottom. Eelgrass distribution in Mission Bay during 1988 is shown in Figures 2A to 2F. Future eelgrass surveys updating the 1988 data will be available in the Mission Bay Park Natural Resource Management Plan - Technical Appendices, a separate document.



MISSION BAY EELGRASS INVENTORY

FIGURE 2A

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SOURCE: PACIFIC SOUTHWEST BIOLOGICAL SERVICES, 1988

MISSION BAY EELGRASS INVENTORY

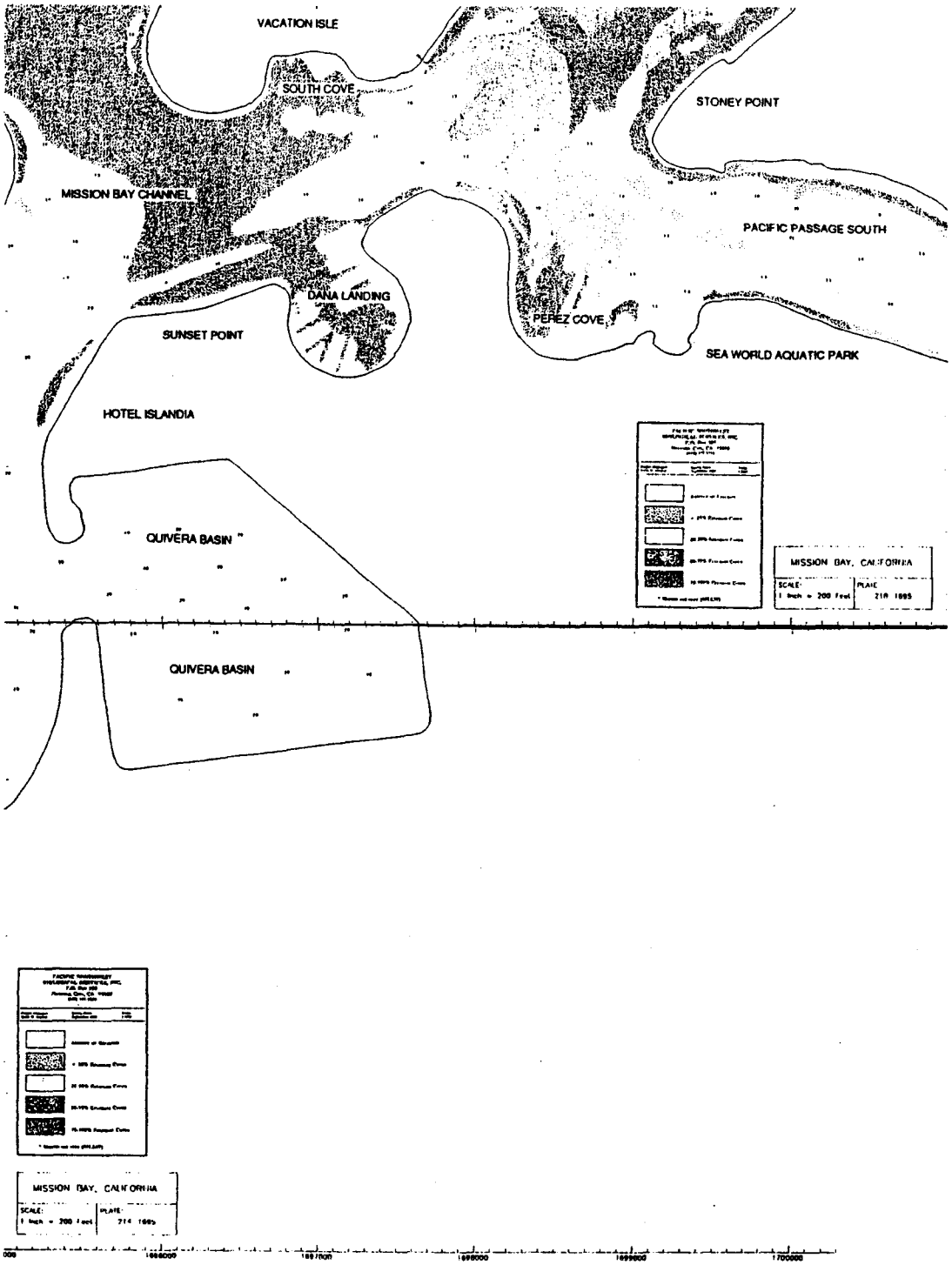
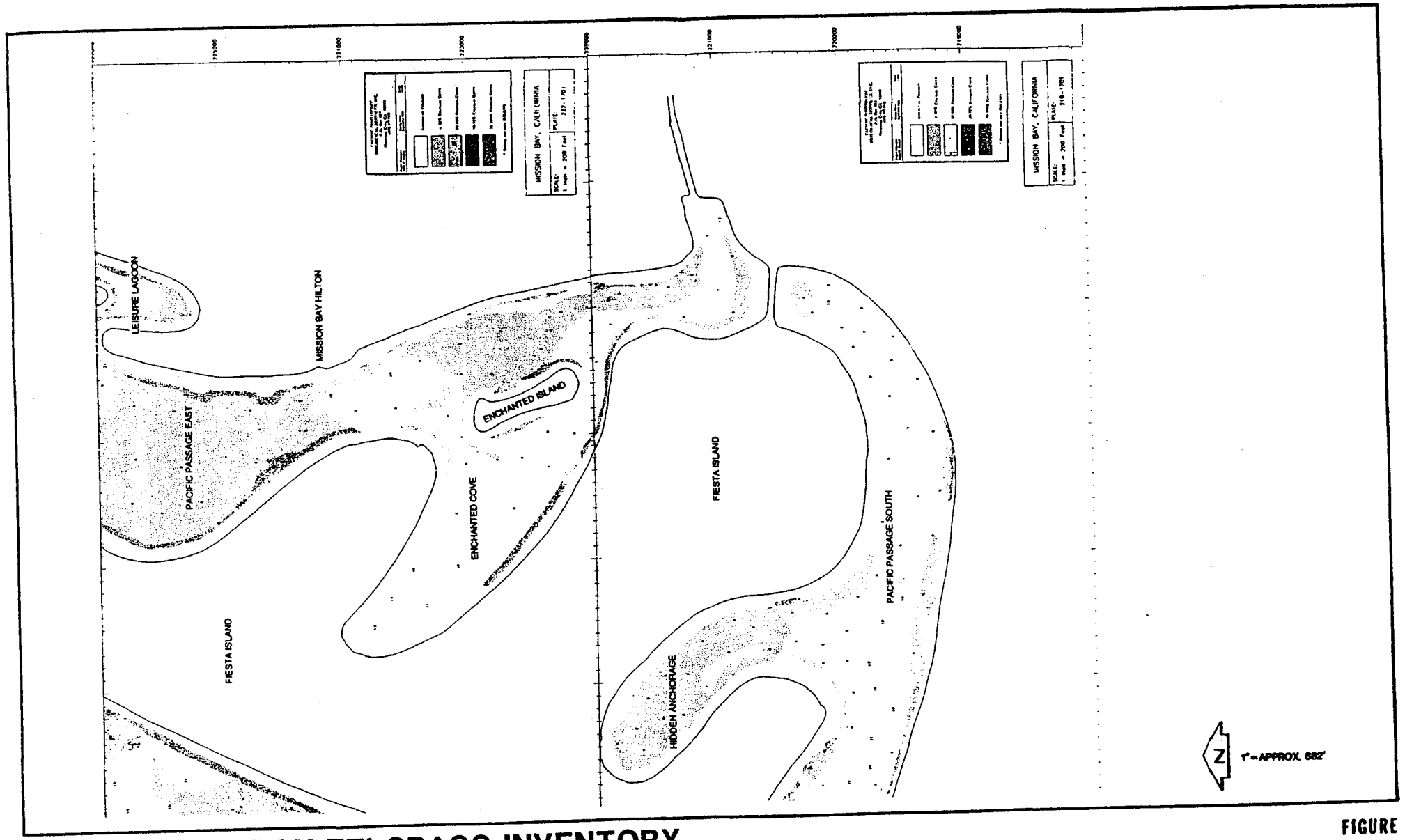


FIGURE 2B

CITY OF SAN DIEGO · PLANNING DEPARTMENT
Environmental Quality Division



MISSION BAY EELGRASS INVENTORY

FIGURE 2C

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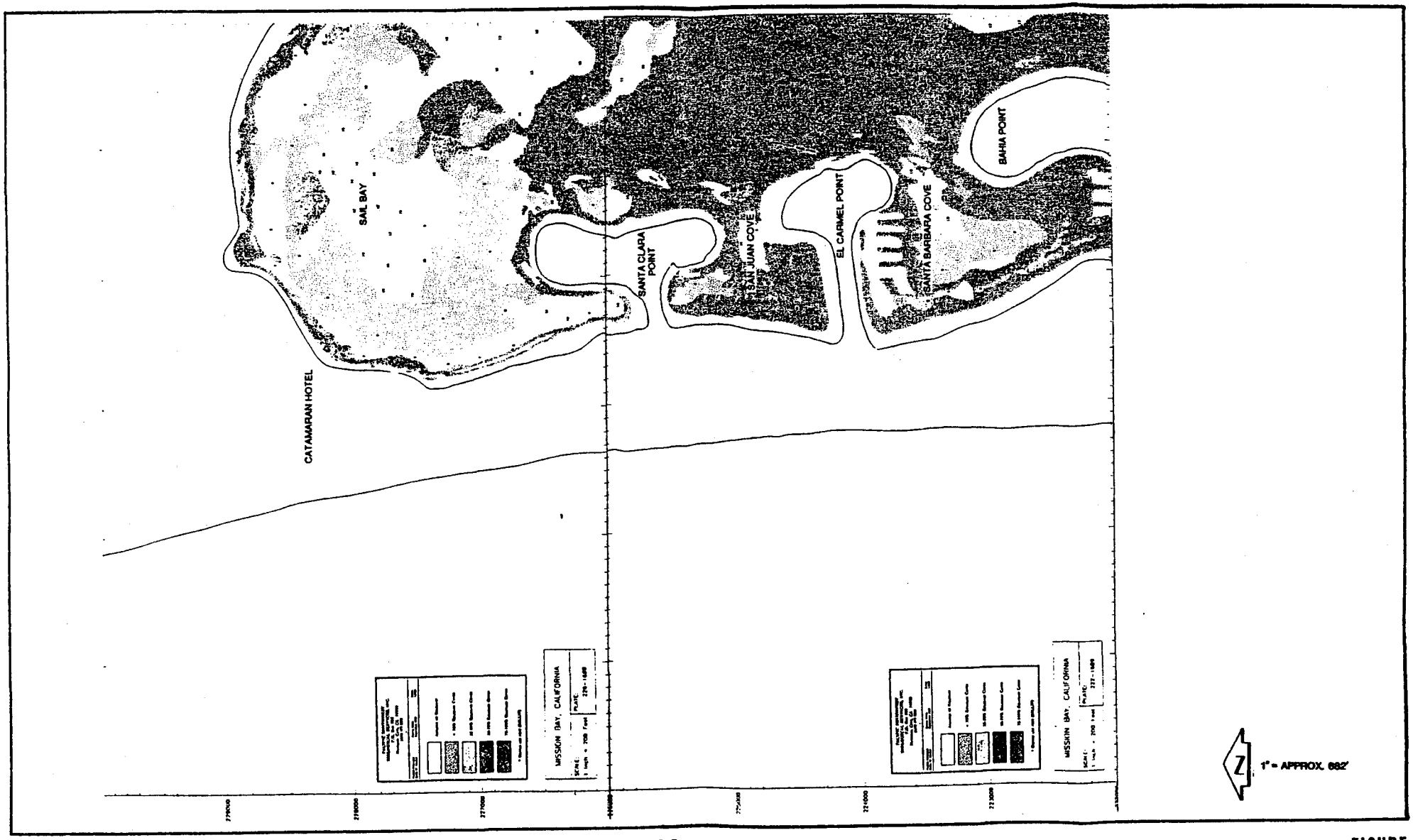
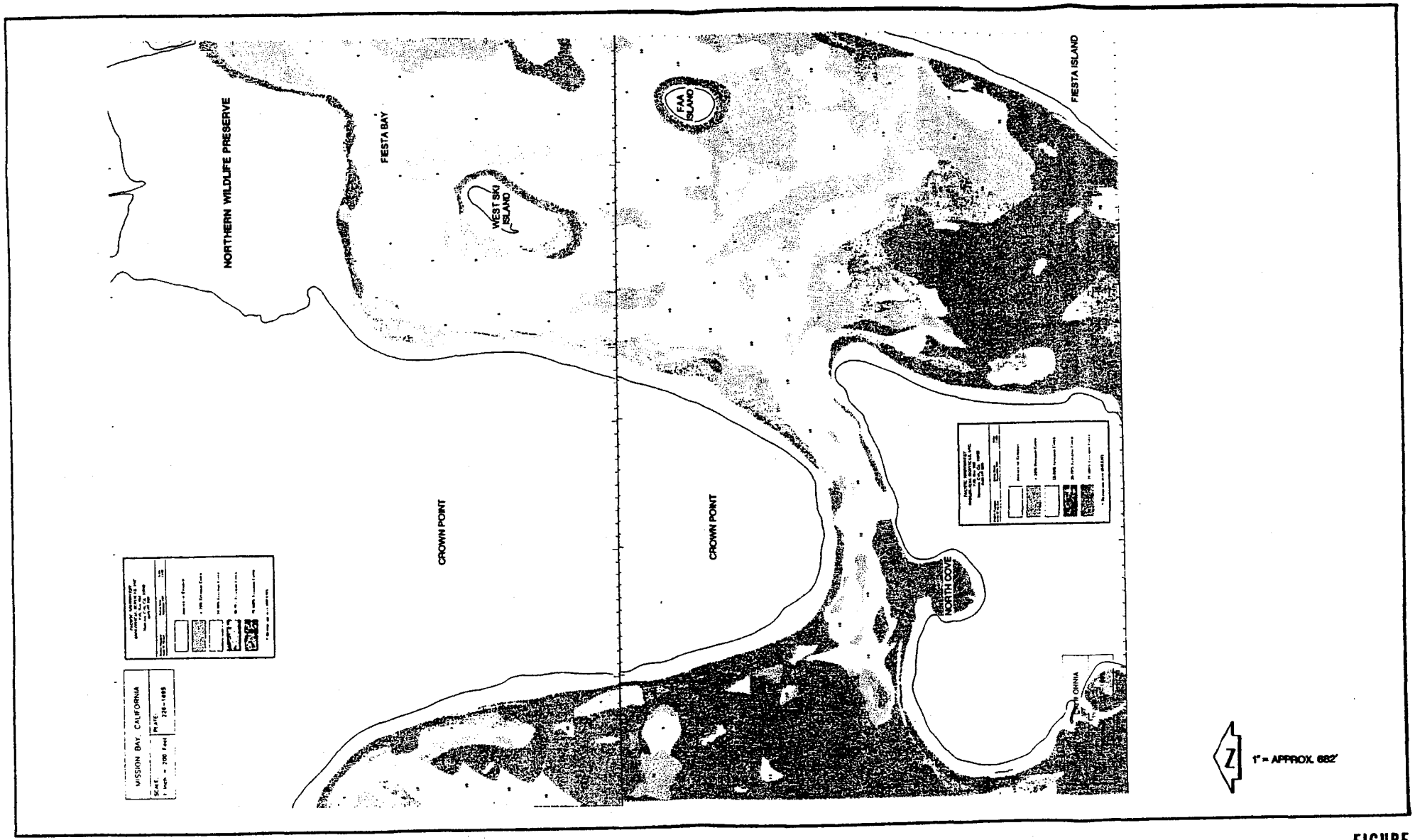
CITY OF SAN DIEGO · PLANNING DEPARTMENT



MISSION BAY EELGRASS INVENTORY

FIGURE
2D

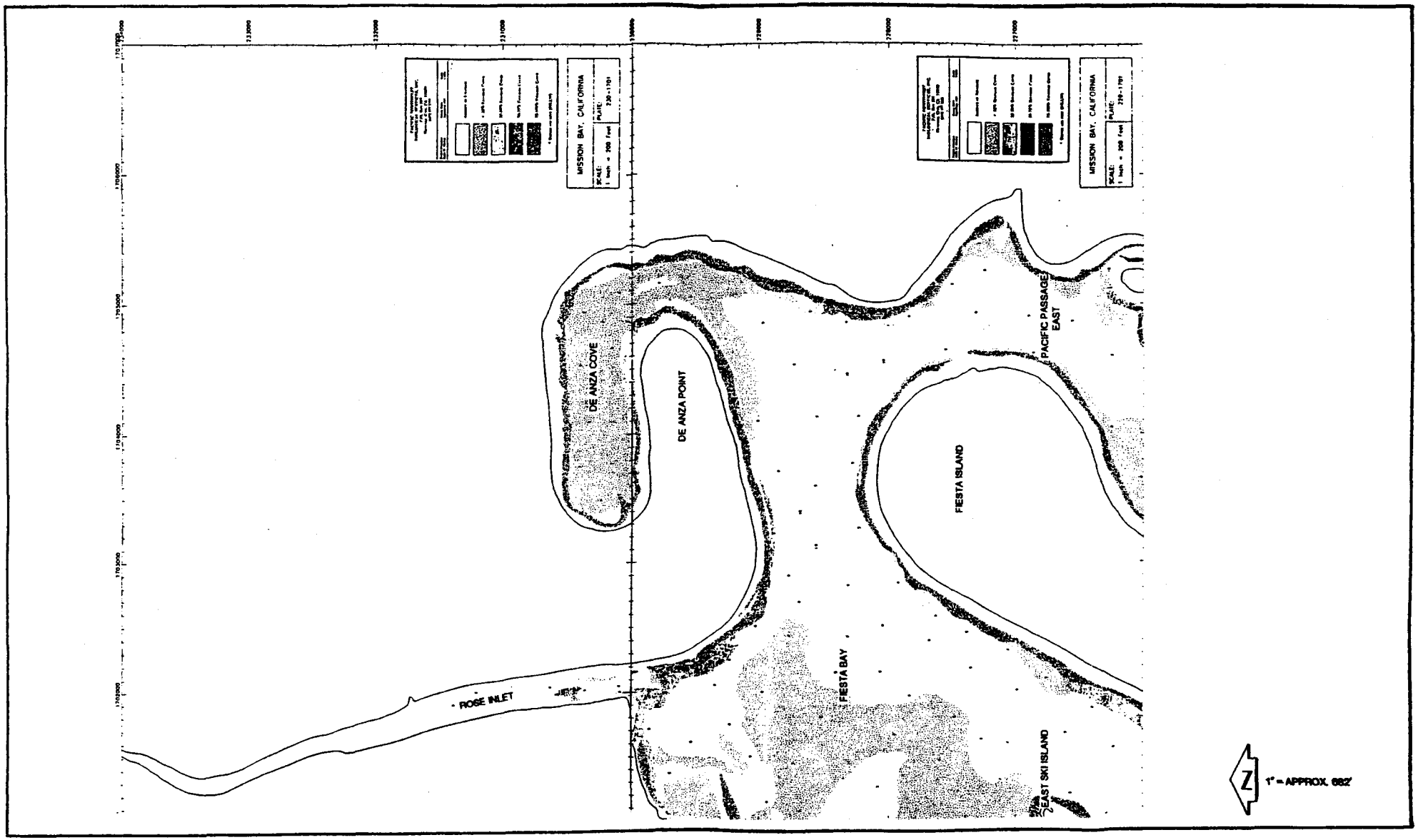
Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT



MISSION BAY EELGRASS INVENTORY

FIGURE 2E

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT



MISSION BAY EELGRASS INVENTORY

FIGURE
2F

Environmental Quality Division
CITY OF SAN DIEGO · PLANNING DEPARTMENT

The extent of eelgrass beds in Mission Bay and the Flood Control Channel fluctuates in response to seasonal conditions and water quality. Factors which affect eelgrass distribution include light, water quality (turbidity), and substrate. Eelgrass grows in water as shallow as +1 Mean Lower Low Water (MLLW) down to -6MLLW where the water temperature is warm and the light is good. At depths between -6 and -9MLLW, eelgrass scatters widely across the bottom due to marginal conditions. In deeper water, eelgrass does not receive the temperature and light needed for growth. Years of heavy rainfall create more turbid conditions and discourage eelgrass growth. Shading from dock structures and boats has been shown to prevent eelgrass growth in the Bay. Turbidity caused by propeller action in shallow water may also impact normal growth. Eelgrass distribution is also impacted by dredging and construction activities in shallow areas. The last major eelgrass beds in southern California are found in Mission Bay and San Diego Bay. This limited distribution increases the importance of the eelgrass habitat in Mission Bay.

Dominant organisms found in eelgrass beds include algae (Ceramium flaccidium), stalked bryozoan (Zoobotryon verticillatum), epiphytic bryozoan (Membranipora spp.), and broad-eared scallop (Leptopecten latiauratus). Small gastropods (such as chink snail, Lacuna marmorata, and painted limpet, Notacmea depicta) graze in the epiphytic (attached to but causing no harm) growth on the eelgrass blades. Sea hares (Aplysia californica) graze in the eelgrass. Twenty species of fish have been found in Mission Bay eelgrass beds. The most abundant species are gobies (Gobidae spp.), topsmelt (Atherinops affinis), and California halibut (Paralichthys californicus). Other representative species include bay pipefish (Syngnathus griseolineatus), dwarf surfperch (Micrometrus minimus), giant kelpfish, and bay blenny (Hysoblennius gentilis).

Open Water: Many organisms are not restricted to specific habitats in the Bay and the Flood Control Channel; these are called pelagic or water column species. Phyloplankton and zooplankton (microscopic plants and animals which move passively with the tides) in Mission Bay include diatoms, dinoflagellattes, polychaete and gastropod larval, copepods, cladocerans, and uerochordates. High densities of moon jelly fish (Aurelia aurita) have been documented periodically in Mission Bay. Pelagic fish in the Bay and the Channel include schools of topsmelt, striped mullet (Mugil cephalus), anchovies (Engraulis mordax and Anchoa spp.), and queenfish (Seriphus politus).

Several sportsfish, including California halibut, kelpbass, barred sand bass, California barracuda (Sphyraena argentea), and Pacific bonita (Sarda chiliensis), inhabit Mission Bay.

WETLAND RESOURCES

Only one type of wetland habitat occurs in Mission Bay Park: coastal salt marsh.

Coastal Salt Marsh: Considered one of the best examples of coastal salt marsh remaining in southern California, the Northern Wildlife Preserve is located at the northeastern section of Mission Bay Park (Figure 3). The Preserve is comprised of about 15 acres of City-owned land and 16 acres owned by the University of California at San Diego (UCSD) and known as the Kendal-Frost Mission Bay Marsh Reserve. This Northern Wildlife Preserve is the last remnant of salt marsh in Mission Bay. The marsh vegetation is influenced by runoff and tidal action. Lower elevations are dominated by cordgrass (Spartina foliosa); mid elevations by saltwort (Batis maritima) and pickleweed (Salicornia virginica and S. bigelouvii); and higher elevations by Suaeda californica, alkali-theatu (Frankenia grandifolia), and sea lavender (Limonium californicum). Two invasive species, river mangrove (Aegiceras corniculatum) and manawa (Avicenia marina resinifera), planted in the Preserve in 1966-69 threaten the integrity of this habitat. Annual attempts by UCSD to erradicate these species has reduced the numbers of these species and effectively removed their intrusion.

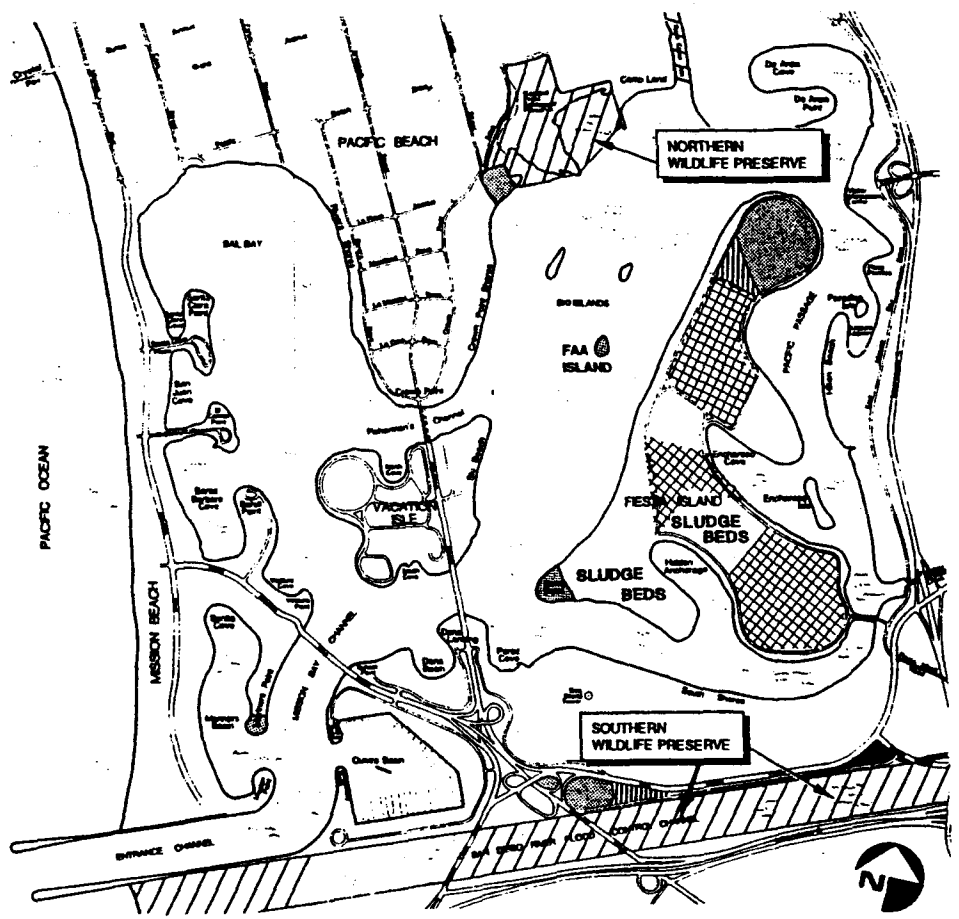
Rose Creek inlet is not included in a Preserve but contains small patches of marsh habitat along both sides of the creek channel north of Pacific Beach Drive. At the mouth of the Creek, near Grand Avenue bridge, patches of cordgrass grow and further up the creek pickleweed is present. The creek vegetation changes to brackish, disturbed wetland midway between Grand and Garnet avenues. This overgrown, weedy vegetation includes mulefat (Bacharris glutinosa), castor bean (Ricinus commonis), and willow (Salix, spp.).

The Southern Wildlife Preserve salt marsh is located in the Flood Control Channel (Figure 3). This salt marsh is a less diverse marsh than that present in the Northern Preserve due to the fluctuations in salinity. These fluctuations result from the introduction of large volumes of fresh water released from upstream reservoirs or created during flood events. The dominant vegetation in the Preserve and the rest of the Flood Control Channel shifts depending on the degree of freshwater influence. The primary species currently found in the salt marsh are pickleweed, cord grass, and salt wort. The eastern end of the Channel (near Interstate 5) includes more brackish or freshwater species, such as cattails (Typha spp.) and spiny rush (Juncus acutus).

TERRESTRIAL RESOURCES

Natural habitat is limited in Mission Bay Park. Most of Mission Bay Park is parkland and maintained beaches. The majority of natural habitat in the Park is part of a preserve system (Figure 3). A 'preserve' designation in Mission Bay Park indicates an area set aside and maintained by the City of San Diego for the purpose of protecting and enhancing wildlife, wildlife habitat, or other natural resources. These preserves include:

- Northern Wildlife Preserve, including the University of California San Diego's Kendall-Frost Mission Bay Marsh Reserve, located in the northern part of the Bay, east of Crown Point Shores (discussed under Wetland Resources).



TERRESTRIAL HABITAT AND WILDLIFE PRESERVE SYSTEM

Environmental Quality Division

CITY OF SAN DIEGO · PLANNING DEPARTMENT

FIGURE 3

- o Southern Wildlife Preserve located in the San Diego River Flood Control Channel east of West Mission Bay Drive Bridge (discussed under Wetland Resources).

- o Seven least tern nesting sites (FAA Island, North Fiesta Island, Stony Point, Cloverleaf, South Shores, Crown Point Shores, and Mariner's Point).

- o Two salt pan habitat preserves: North Fiesta Island, adjacent and west of the least tern site, and South Shores, adjacent and east of the South Shores least tern site.

- o Coastal Strand/Nuttall's Lotus Preserve south of Sea World and Friars Road intersection.

The following is a discussion of the three terrestrial habitat-types found in the Park: salt pan, coastal strand, and disturbed habitats. Mammals, reptiles, and birds inhabiting or frequenting Mission Bay Park are also discussed.

Salt Pan: Salt pan habitat is actually higher elevation marsh habitat. In Mission Bay Park, salt pan habitat is found within the Northern Wildlife Preserve, on North Fiesta Island adjacent to the least tern nesting site, and on a ten-acre site next to the least tern nesting site between Sea World and the Flood Control Channel (Figure 3). This habitat is drier in nature than the marsh and the ponding that occurs on-site is seasonal. Vegetation growing in a salt pan is tolerant of the high salinity remaining in the soil as the seasonal water evaporates. The dominant species is pickleweed. Other species found include sea rocket (Cakile maritima), and goldenbush (Haplopappus spp.). This habitat is important for the state-listed, endangered Belding's savannah sparrow (Passercalus sandwhichensis spp. beldingi) which feeds solely on pickleweed. Some federally-listed, endangered California least terns (Sterna antillarum spp. browni) have been known to nest on salt pan habitat.

Coastal Strand: Coastal strand is a native habitat type which invades unstable habitats. It historically occurs on sandy beaches and dunes along the entire coast of California. Recreational use of coastal beaches in San Diego has virtually eliminated this habitat. Coastal strand habitat in Mission Bay Park is found on the sandy soil in the central portion of Fiesta Island, north of the Over-the-Line Tournament area, in the southern end of Fiesta Island, and in the South Shores area on a seven-acre habitat preserve (Figure 3). Much of the coastal strand habitat found on Fiesta Island is growing on old dredge spoil and is poor quality habitat.

The loose sand, sea salt, and other unusual conditions allow coastal strand species to develop where other plants have difficulty. Plant species found in the central portion of Fiesta Island include bur sage (Ambrosia chamissonis), sand verbena (Abronia maritima, A. umbellata), sand beach evening primrose (Oenothera spp.), Atriplex leucophylla, and the non-native

sea rocket. The Nuttall's lotus (Lotus nuttalianus), historically found in native coastal strand habitat, is not found in central Fiesta Island. This annual species is not officially listed by federal or state wildlife agencies. It does, however, appear on the U.S. Fish and Wildlife Services' listing of taxa under consideration (USFW, 1988). The California Native Plant Society (1988) lists this species as sensitive. Nuttall's lotus grows in the southern end of Fiesta Island and within the South Shores area on hard-packed, non-sandy soil in association with pampass grass (Cortaderia selloana, C. atacamensis), broom baccharis (Baccharis sarathroides) and other invasive species. The only other coastal strand species typically found with Nuttall's lotus is the beach evening primrose. The seven-acre habitat preserve in South Shores is provided for the reestablishment of coastal strand habitat including bur sage, sand verbena, beach evening primrose, and Nuttall's lotus.

Disturbed Habitat: The last remaining terrestrial habitat in Mission Bay Park is ruderal (growing in disturbed areas) upland vegetation. This vegetation has invaded the dredge spoil deposits on Fiesta Island and portions of South Shores (Figure 3). The prominent plant on Fiesta Island is broom baccharis, a native species which is a common invader of disturbed areas. The troublesome pampass grass is also firmly established in the southern end of Fiesta Island. Brome grasses (Bromus spp.) and other weedy species are common in this area. The soil where these plants are established tends to be a harder packed soil, containing more fine particles than the beach sand which characterizes other parts of Fiesta Island. This soil type also is evident on South Shores, where vegetation includes broom baccharis, pampass grass, deerweed (Lotus scoparius), and Myoporum laetum. In some sandy areas on Fiesta Island and South Shores, sea rocket and the spring annual Chrysanthemum coronarium dominate with elements of coastal strand habitat also evident.

Mammals and Reptiles: A very limited number of mammal and reptile species occur in Mission Bay Park due to the limited area of undeveloped land. Five species of mammals have been observed in the Park: desert cottontail (Sylvilagus audubonii), black-tailed jack rabbit (Lepus californicus), California ground squirrel (Spermophilus beecheyi), western harvest mouse (Reithrodontomys megalotis), and house mouse (Mus musculus). Only two reptile species are found in the Park: western fence lizard (Sceloporus occidentalis) and side-blotched lizard (Uta stansburiana). Western harvest mice are found primarily in salt marsh habitat. The other mammal species and two lizard species usually occur in any vegetated, undeveloped area in Mission Bay Park.

Avifauna: Birds comprise the majority of the terrestrial wildlife resources in Mission Bay Park. The Park is located within the Pacific Flyway and, therefore, is an important regional habitat for resting, feeding, and, to a lesser extent, migrating birds. Residents birds also use the available habitat for feeding, resting, and breeding. The most significant habitat areas for birds include the Northern Wildlife Preserve (including Kendall-Frost Marsh Reserve) and the Southern Wildlife Preserve.

Open water areas provide resting and, for wintering ducks, feeding areas. In the Park, wintering ducks concentrate in the coves and shoreline areas around Fiesta Island, and, to a lesser extent, other coves around Mission Bay and some parts of the Flood Control Channel. Upland habitat on Fiesta Island, South Shores, and other areas support a limited number of terrestrial bird species.

The City of San Diego currently is conducting a Park-wide bird survey. The results from the first quarter (October-December) are available in Appendix B of the Mission Bay Park Natural Resource Plan - Technical Appendices (separate document). Prior to this survey, bird censuses were conducted by Reiger and Beauchamp in 1975 for the whole Park and by Sitro (1979) for the Northern Wildlife Preserve.

Birds have three principal activities (feeding, resting and breeding) which require certain habitats. The following discussion identifies which habitats support these activities in Mission Bay for shorebirds (including terns and gulls), waterfowl, terrestrial birds, and sensitive species.

Shorebirds: Shorebirds feed in the intertidal areas of Mission Bay Park exposed during low tides. The mudflats of the Northern and Southern Wildlife preserves expose the greatest area during low tide and provide feeding habitat for large numbers, about 60 percent, of the shorebirds (City of San Diego, 1989). Other areas in the Bay do not have such large numbers due to the narrow intertidal shoreline and high level of human disturbance. The tidal action in the Flood Control Channel is one to two hours behind Mission Bay. This out-of-sync timing allows mudflat exposure at different times, thereby providing an alternative area for shorebirds to use when the other areas become inundated. The most numerous shorebird species are western sandpiper (Calidris mauri), semipalmated plover (Charadrius semipalmatus), black-bellied plover (Pluvialis squatarola), least sandpiper (Erolia minutilla), American avocet (Recurvirostra americana), marbled godwit (Limosa fedoa), willet (Catoptrophorus semipalmatus), killdeer (Charadrius vociferus), dowitchers (Limnodromus spp.), sanderling (Crocethia alba), and red knot (Calidris canutus). The most frequently observed gulls and terns are California gull (Larus californicus), ring-billed gull (Larus delawarensis), Bonaparte's gull (Larus philadelphia), and Forster's tern (Sterna forsteri). The California least tern (Sterna antillarum browni), a federally-listed endangered species, is a visitor in the Park from April to September. The City of San Diego is conducting a foraging study, from May through August 1989. The study results will be inserted in Appendix C of the Mission Bay Park Natural Resource Plan - Technical Appendices, a separate document.

During periods of mudflat inundation, resting areas outside the two preserves are required. Potential resting areas available in Mission Bay Park include the North Fiesta Island salt pan and least tern site, Mariner's Point, other portions of Fiesta Island (Stony Point, eastern and southern shorelines), Crown Point, Riveria Shores, and various other shorelines in the Park.

Only a few shorebirds breed and nest in Mission Bay Park. The most notable nesting species, the California least tern and light-footed clapper rail (Rallus longirostrus levipes), are discussed under sensitive species. Another bird nesting in salt pan and salt marsh area is the Belding's sacannah aparrow (Passerculus sandwishensis belding). Breeding by shorebirds in the Park is greatly restricted due to the small amount of vacant land with minimal disturbance. Low numbers of black-necked stilt (Himantopus mexicanus), American avocet, and killdeer have nested on the salt pan areas of South Shores. A successful great blue heron (Ardea herodias) rookery is located on South Shores across the Bay from Stony Point.

Waterfowl: Waterfowl are present in Mission Bay Park in great numbers during the winter months. Censuses in Mission Bay indicate the Park supports at least ten thousand waterbirds during winter (Mission Bay Park Shoreline Restoration and Stabilization Project EIR, 1989). The most common species or groups of waterfowl are scaup (Aythya spp.), American wigeon (Anas anerucabys), ruddy duck (Ovyura jamaicensis), northern pintail (Anas acuta), brant (Branta bernicla), bufflehead (Bucephala albeola), northern shoveler (Spatula clypeata), surf scoter (Melanitta perspicillata), gadwall (Anas strepera), cinnamon teal (Anas cyanoptera), green-winged teal (Anas carolinensis), canvasback (Aythya valisineria), mallard (Anas platyrhynchos), and merganser (Mergus spp.). The Northern and Southern Wildlife preserves support the highest concentrations of waterfowl. The large expanse of these areas and the relative isolation provide the best resting and feeding areas during high tides. When low tides limit the open space in these areas, the waterfowl must move to other open water areas in Mission Bay and the Flood Control Channel. These open water areas are most heavily used during nighttime hours and weekdays when human disturbance levels are low. Hidden Anchorage and the open water along South Shores has had substantial waterfowl use in the past; however, the introduction of intensive personal motorized watercraft use has displaced the birds to other areas (Rieger and Beauchanop, 1975).

Eelgrass beds in the open water are especially significant as feeding areas for waterbirds. Most waterfowl species, such as brant, feed on eelgrass. The large number of fish associated with eelgrass beds also attracts fish-eating birds, such as the least tern and California brown pelican (Pelecanus occidentalis californicus).

Waterfowl are not known to breed or nest in Mission Bay Park because they are not present in the Park during their breeding season.

Terrestrial Birds: Three categories of terrestrial bird species occur in Mission Bay Park: species nesting in upland habitats; migrating species,such as raptors, using open areas for foraging; and urban species inhabiting developed areas around the Bay.

Upland species inhabiting areas of ruderal (growing in disturbed areas) vegetation on Fiesta Island and South Shores include house finch (Carpodacus mexicanus), horned lark (Eremophilia alpestris), western meadowlark (Sturnella neglecta), mourning dove (Zenaidura macroura), and burrowing owl (Athene cunicularia). Observed on Fiesta Island are loggerhead shrike (Lanius ludovicianus), and golden-crowned sparrow (Zonotrichia atricapilla).

Several raptor species utilize the open, disturbed upland areas as foraging habitat. These species include marsh hawk (Circus cyaneus),red-tailed hawk (Buteo jamaicensis), prairie falcon (Falco mexicanus), and American kestrel (Falco sparverius). The raptor population is limited due to human presence and the limited number of trees or other tall structures which raptors use for perches. The Park supports few, if any, nesting raptors.

Urban species, adapted to and inhabiting developed areas in and around Mission Bay Park include: house sparrow (Passer domesticus), starling (Sturnus vulgaris), and rock dove or pidgeon (Columba livia).

SENSITIVE SPECIES

Sensitive species using Mission Bay Park fall into three categories: species officially listed by federal and state wildlife agencies; species listed as candidates for official listing by these agencies; and species considered unique, limited in distribution, or thought to be undergoing regional population decline.

Nuttall's lotus, discussed earlier under Coastal Strand habitat, is the only rare plant listed by the California Native Plant Society (CNPS, 1988) in Mission Bay Park. The City of San Diego has created a seven-acre preserve for this plant along Sea World Drive (Figure 3).

Three endangered bird species (California least tern, Belding's savannah sparrow, and light-footed clapper rail) nest in Mission Bay Park.

California Least Tern: The California least tern is both federally- and state-listed as endangered. As a migratory bird, the least tern is present in Mission Bay Park only during its breeding and nesting season, approximately April to September.

Least terns nest colonially and prefer open areas with sandy, shell substrate and little, if any vegetation. Historically, the least terns have used eleven different sites in Mission Bay Park for nesting. Since the early 1980's, however, least terns have nested every year on FAA Island and on Mariner's Point in 1989. In 1988, 50 fledgings produced from 79 nests were found on FAA Island. In 1989, 30 fledglings produced from 125 nests were found on FAA Island and no fledglings were found from the four nest on Mariner's Point.

The City has maintained seven least tern nesting sites as part of the Mission Bay Park California Least Tern Nest Site Management Team effort (Figure 3).

Five of the seven total nesting sites are designated "permanent" sites and were productive least tern nestings in the past. In 1986, the City entered into a verbal agreement with the U.S. Fish and Wildlife Service to set aside two other nesting sites, Mariner's Point and Crown Point Shores, for a five-year period. Mariner's Point has not supported least tern nesting since 1970 but was included for its nesting potential. Crown Point Shores has never been a least tern nesting site but is considered to have good potential as a site due to its proximity to the Northern Wildlife Preserve.

The original agreement with the Fish and Wildlife Service stated that if least terns have not nested on these sites during the agreed five-year period (1986-1990), sites can be released from the least tern nesting site designation according to the 1986 agreement. Four nests were found on Mariner's Point during the 1989 season; therefore, the Mariner's Point site loses its temporary status and is now a permanent site. This makes a new total of six permanent sites in Mission Bay Park. Crown Point Shores is still a temporary site.

The Mission Bay Park Least Tern Management Team is primarily comprised of representatives from California Department of Fish and Game; U.S. Fish and Wildlife Service; City of San Diego (Planning, Park and Recreation, and Water Utilities Departments); U.S. Army Corps of Engineers; California Coastal Commission, and University of California at San Diego; and the San Diego County Least Tern Recovery Team Coordinator (i.e., Elizabeth Copper in 1989). Each February, the team meets to decide what site preparation to undertake prior to April and the beginning of the next least tern season. Recommended treatments may include clearing of vegetation, importation of new substrate, fence and/or sign repair, installation of a chick protection fence, and placement of roof tiles for chick protection. Human intrusion and predators are ongoing problems and believed to have impacted nesting success. Increased vigilance by City personnel and least tern census takers in addition to keeping existing fences and signs in good repair is expected to help manage the human disturbance element. The City will be aiding the U.S. Fish and Wildlife Service and Department of Fish and Game in a predator control program.

California least terns feed on small fish, such as anchovy and topsmelt, in the upper one to two inches of open water habitats. The actual foraging areas in Mission Bay are unknown. A currently ongoing California least tern foraging study will hopefully indicate tern foraging habitat areas. The first year of the study is scheduled for completion in September 1989. It's hoped to have two more years of survey data to determine least tern foraging locations in Mission Bay Park.

Belding's Savannah Sparrow: The Belding's savannah sparrow, listed as a state endangered subspecies, is a small songbird endemic to California salt

marsh. This songbird typically nests in pure stands of Salicornia in coastal salt marsh and coastal strand habitats. Three locations in Mission Bay Park support Belding's savannah sparrow populations: the Northern Wildlife Preserve; the Southern Wildlife Preserve; and FAA Island, even though Salicornia is limited on the island. The Belding's savannah sparrow feeds on the tender tips of the Salicornia and on insects.

Light-Footed Clapper Rail: The light-footed clapper rail is listed as a federal and state endangered species. These secretive birds nest soley in coastal salt marsh habitat, particularly where cordgrass is abundant. Most of the clapper rails in California in 1980-1984 were concentrated in six marshes: Carpiteria Marsh, Anaheim Bay, Upper Newport Bay, Northern Wildlife Preserve (Kendall-Frost Marsh Reserve), Sweetwater Marsh, and Tiajuana Marsh. During the period from 1980 to 1985, the Northern Wildlife Preserve had an average of 16.8 pairs each year making it one of the most significant clapper rail habitats. In 1984, the number of nesting pairs peaked at 24. The Southern Wildlife Preserve supported an average of 1.8 pairs. In 1988, a University of California at San Diego's census found four individuals, probably not pairs, in the Northern Wildlife Preserve and one individual in the Southern Wildlife Preserve.

Other Sensitive Species: In addition, the California brown pelican, a state- and federally-listed endangered species, forage (search for food) in various parts of Mission Bay Park. This species occurs in coastal salt water and open ocean just offshore. The nearest breeding site is the Los Coronados Islands.

Three species found in Mission Bay Park are considered uncommon and declining in population. The burrowing owl inhabits grassland, agricultural land, and coastal areas. In recent years, one or two pairs of burrowing owl have nested in Mission Bay Park on Fiesta Island, the eastern segment of South Shores and near Robb Field. As a result of predation on least tern chicks on FAA Island, predator removal measures were instituted by other agencies in the late 1970's against loggerhead shrikes and burrowing owls on Fiesta Island. The snowy plover (Charadrius alexiandrinus nivosos) nests primarily on sandy ocean beaches and around drying margins of lagoons. The only snowy plover nesting recorded since 1975 is a single nest was reported in a University of California at San Diego survey in 1977. The third species, the American avocet is a common winter visitor. In Mission Bay Park, this species nested in low numbers near the sludge beds on Fiesta Island, within the salt pan areas of South Shores, and within the Flood Control Channel. American avocets only recently colonized San Diego County, and the local breeding population are not considered critical to the long-term success of this species.

LAND USE AND RECREATION

Mission Bay Park is a unique and valuable recreational resource because of its size, its urban coastal setting, and its diversity of uses. The Park is over seven square miles and 4,600 acres in size. The Mission Beach and

Pacific Beach communities bound the Park to the west and north, respectively (Figure 1). Interstate 5 is adjacent to the eastern portion of the Park and the southern edge just south of Robb Field, is bordered by the community of Ocean Beach. The Park has about 1,900 acres of land, 2,500 acres of water and 200 acres of preserve. The largest share (45 percent) of the parkland is public park and shoreline. Areas designated for lease development total about 492 acres (25 percent of the parkland) and are focussed primarily in the south, central (Vacation Isle), and western parts of the Bay. There is also a lease area on Tecolote Shores (Hilton Hotel) and the northeastern corner of the Park (De Anza trailer park and resort). The only industrial use in the Park is the City-owned sludge bed operation on south Fiesta Island. These sludge beds are scheduled for removal in 1995. In addition, Government Island is leased to the Federal Aviation Administration (FAA) for the purpose of maintaining airway control facilities. The remaining land is parceled among the 12 wildlife preserves (Figure 3) and vacant land still found in some areas of South Shores and the majority of Fiesta Island.

Much of the popularity of Mission Bay Park is due to the wide variety of available recreational activities. The Park serves more than 12 million people each year (80,000 people on an average peak day). The heaviest recreational use period is from Memorial Day through Labor Day. Areas along the eastern portion of Mission Bay Park tend to be used more intensively due to the proximity to Interstate 5. Land-based recreational activities include bicycling, skateboarding, golf, tennis, bird-watching, boat race viewing, baseball, camping, jogging, volleyball, use of playground equipment, over-the-line, walking, rollerskating, kite-flying, picnicking, sunbathing, and fishing. The 2,500 acres of water in Mission Bay Park support additional recreation such as waterskiing, rowing, fishing, kayaking, yachting, towing inflatables, general power boating, swimming, personal motorized watercraft (i.e., Jetskis), board sailing, sailing, the annual hydroplane and crew races, and regular power boat and sailboat races. Both public and private commercial recreational developments support these activities.

SAND

Mission Bay is located within the Mission Bay Littoral Cell, a 13.5-mile-long section of San Diego coastline located between Point Loma (to the south) and Point La Jolla (to the north). The San Diego River fed new sand material into Mission Bay until about 1946, at which time the river was channelized by the construction of levees. These levees contained the river until its discharge into the ocean, thus substantially reducing the influx of sand into Mission Bay. The current sources for sand within Mission Bay originate from occasional discharges from both Rose and Tecolote creeks, and from erosion of parklands within the Bay. The range in sand size found throughout Mission Bay varies from 0.16mm to 0.4mm, with an average grain size of approximately 0.2mm.

WATER QUALITY

Mission Bay Park's focal point is Mission Bay. Mission Bay is connected to the Pacific Ocean via the riprap-lined Entrance Channel (Figure 2). The Bay is a relatively small and shallow body of water of complex shape. Water depths below the 3.2-square-mile surface area of the Bay range from 7 to 20 feet.

POLLUTANTS

In recent years, Mission Bay experienced a lowering of water quality. In response, the City has undertaken a corrective program. Partially because of its complex shape, flushing and circulation conditions induced by tidal action are inadequate to transport pollutants out of the Bay. This is especially true of the eastern portion of Mission Bay. Runoff carrying pollutants and sediments enters the Bay through storm drains, drainage channels, and other discharge points. Currently, a total of 69 storm drains empty into the Bay. Major watersheds draining into Mission Bay include Rose Creek/San Clemente Creek watershed and Tecolote Creek watershed.

Contaminants, such as nitrates, nitrites, phosphorous, potassium, and heavy metals, have been identified in the Bay water. Many of these are urban contaminants deposited in the Bay via runoff but, apparently, levels are not yet excessively high (Tetra Tech, Inc., 1983).

In addition to urban runoff pollutants, sewage effluent enters the Bay as a result of sewer overflows or storm drainage. Sewage can also enter the Bay directly from boats, recreational vehicles, animals etc. This deposition results in high levels of coliform bacteria which indicate that disease causing organisms may be present. The presence of coliform bacteria is the most serious water quality problem in Mission Bay. Closures of sections of the Bay have occurred on several occasions for public health reasons due to high coliform bacteria levels.

The inability of Mission Bay, once contaminated, to rid itself of pollutants prompted the City to retain Tetra Tech, Inc. Tetra Tech studied the water quality problems in the Bay with particular emphasis on the poorly flushed eastern area. The results of the Tetra Tech Study (Water Quality Control Studies for Mission Bay Park, Tetra Tech, Inc., 1983) indicated that changing the Bay configuration would not appreciably improve flushing and circulation. Tetra Tech recommended constructing a system of interceptors for the major storm drains emptying into the Bay. This interceptor system would divert up to and beyond the minimum capacity of 100 gallons per minute (gpm) of polluted runoff and limited sewage flows from entering the Bay during dry weather. This runoff would be diverted into the sanitary sewage system. At the completion of all phases, this diversion project would intercept approximately 76 drain outlets.

The City has completed the East Mission Bay Storm Drain Interceptor System. The project area included the eastern shore of Mission Bay from Rose Creek Channel to Tecolote Creek Channel. All three phases have been completed. The City is also currently implementing a four-phase sewage interceptor system. Phase 1 is currently under construction in the Crown Point Shores and Sail Bay area. Phase 2 is scheduled for late 1989 for outlets in the Flood Control Channel, Quivera Basin, and Dana Basin. Phase 3 intercepts storm drains along the western shores of Mission Bay. Phase 4 includes storm drains in Ventura Cove, Riveria Shores, and additional interceptors in Rose Creek.

The Flood Control Channel drains the San Diego River watershed and serves as a control for a 100-year flood event. Six storm drains presently empty into the portion of the Flood Control Channel within Mission Bay Park. Occasional pollutant problems from runoff or sewage spills exist in the Flood Control Channel. Maintaining high water quality in the Channel is important due to the presence of sensitive wildlife habitat.

SEDIMENTATION

Rose and Tecolote creeks contain high concentrations of organically rich, fine sediment that aggravates the silting problem in the Bay (Tetra Tech, Inc., 1983). Rose Creek inlet required dredging to remove accumulated silt deposits. The dredging activities, which were necessary to maintain navigability for boaters from Mission Bay Boat and Ski Club, resulted in adverse impacts to marsh and riparian habitats growing on the shallow deposits. Although the impact to recreation will be lessened by the proposed relocation of the Boat and Ski Club to South Shores, the relatively rapid accumulation of silt if left unchecked could present long-term maintenance problems.

Tetra Tech, Inc., proposed two ways to reduce sedimentation problems in Mission Bay. Construction of a desilting basin at the mouth of Rose and Tecolote creeks would trap the sediment previously destined for Mission Bay. The sediment would be removed later from the basin as part of an ongoing maintenance program. The City of San Diego originally planned to address the sedimentation problem from Rose and Tecolote creeks through construction of desilting basins in these watersheds. Construction of a desilting basin, however, would impact the aesthetics of the canyons and do nothing to treat the source of the erosion problem.

The other solution Tetra Tech proposed for the sedimentation problem was construction of various erosion control measures and implementation of a watershed management program. The measures proposed included such items as revegetation of denuded areas and protection of stream banks to reduce the sediment yield from the watershed.

Woodward-Clyde Consultants was retained by the City to study the feasibility and effectiveness of erosion control measures. Erosion processes in Tecolote Canyon include streambank erosion, gully erosion, and

overland erosion. Additional problems in Tecolote Creek include damage to low water crossings, as well as damage to sewer lines. The study identified 41 areas within the watershed where improvements could be made to reduce the amount of erosion occurring in Tecolote Canyon. The implementation of erosion control measures in Tecolote Canyon would reduce the volume of sediment reaching Mission Bay by 40-50 percent by treating the cause of sediment production. A desilting basin would reduce the amount of sediment reaching Mission Bay by treating the effect of sediment production. The study indicates that by implementing a watershed management program as well as the sediment basin proposed by Tetra Tech, the sediment yield could be reduced by approximately 70 percent of its current value. The City of San Diego implemented these recommendations in 1988-1989.

The City had a similar study prepared for the Rose Creek/San Clemente Creek watershed in order to determine erosion problems and sediment yields. Approximately two-thirds of the Rose/San Clemente watershed lies east of Interstate 805 and is federal land (Miramar Naval Air Station). Erosion patterns and problems were found to be uniform throughout the entire watershed. No specific problem areas were identified. Only about seven percent reduction in sediment would result from proposed erosion control measures implemented at a cost of approximately $900,000. No further action has been taken to date due to the poor cost-benefit ratio.

STATEMENT OF PROBLEM

Planning in Mission Bay Park must consider a variety of land use interests with differing needs and objectives all sharing in Mission Bay Park. These needs and objectives are often in conflict, especially the human versus wildlife element. These interests include commercial development, public recreation, and environmental protection.

LEASE DEVELOPMENT

There is a need for visitor-oriented and marine-related services in Mission Bay Park. Of the 1,900 acres of land in Mission Bay Park, up to 492 acres (25 percent) are available for lease. Approximately 41 acres, of which 39 acres are in the South Shores area, are still potentially available for lease. Existing lease holders, especially hotels, are feeling pressure to expand and/or renovate their facilities to accommodate the growing demand for their services.

PUBLIC RECREATION

Mission Bay Park provides significant aesthetic, educational, and recreational opportunities. There are 27 miles of shoreline, 15.6 miles of which are for public use, and 2,500 acres of open water supporting various aquatic recreation. Continual erosion of the shoreline from tidal surge, boat waves, storms, and wind waves create the potential for visitor and boating accidents due to uneven beaches and shoaling in navigable waters. Safety is the number one priority in public parks. Restoration and maintenance of the Park's beaches to smooth, even slopes and elimination of submerged "holes" which are not visible to waders must be done on a continuous basis. Sand shoals increasing in size must be removed to avoid navigation hazards.

With the population of San Diego and visitors to San Diego increasing, the pressure on existing recreation areas increases. The number of available recreational water-oriented activities and the coastal location make Mission Bay Park a unique recreational resource much in demand. There is constant competition among the wide variety of recreation activities (e.g., sailing, motorboats, personal motorized watercraft) for the available open water.

ENVIRONMENTAL PROTECTION

Federal and state regulations mandate the protection and management of valuable wetland areas and sensitive natural resources. On the federal level, the primary directives are found in the Clean Water Act and the Endangered Species Act. Various sections of these Acts outline specific means for regulating the discharge of dredge and fill materials and the human interaction with federally listed endangered species. Other federal regulations relate to preservation of wetlands, coastal zone management, and flood control.

The State of California has measures in effect to protect state environmental resources. The California Department of Fish and Game Commission has a policy for protection of wetlands and requires measures to protect fish and wildlife. The California Coastal Act also protects wetlands in coastal zones.

The U.S. Army Corps of Engineers, California Coastal Commission, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game exercise permit and agreement authority over most projects in Mission Bay Park. These agencies are charged with the protection of wetlands and carrying out federal and state regulations previously discussed. Mitigation for impacts to natural resources in Mission Bay Park has been on a project-by-project basis. This piecemeal approach does not ensure that protection of the overall Bay and river systems in the Park are given proper consideration. The agencies have found it increasingly difficult to grant approvals to projects which impact wetlands without a comprehensive plan for Mission Bay Park.

Increasing urban pressures in San Diego County and specifically adjacent to and within Mission Bay Park are impacting available habitat, wildlife foraging, and successful wildlife reproduction. In addition, studies indicate the sea level is rising at a faster rate than in the past due to global warming. Future rises in sea level could further impact coastal habitats, such as salt marsh, which involve tidal interaction. Human, cat, and dog intrusion on habitat preserves has become an increasingly severe problem as preserve areas are of limited space and wildlife has less chance to evade the increasing feline predation, canine disruptions, and human pedestrian and vehicle presence.

CONSTRAINTS AND OPPORTUNITIES

Mission Bay Park offers an opportunity to combine recreational and community planning with the protection and enhancement of biological resources.

The Mission Bay Park Natural Resource Management Plan recognizes the following constraints:

- The extent of existing development and recreational pressures in Mission Bay Park preclude ever returning all of Mission Bay to the salt marsh it was originally.
- The primary purpose of this Management Plan is to protect, preserve, and enhance natural resources in Mission Bay Park. Since, however, the Park is in an urban setting, the Park must serve multiple purposes and cannot serve solely as wildlife habitat.
- Protection of natural resources, as required by state and federal law precludes certain human activities (e.g., construction, dredging, recreation) from certain areas and during certain seasons (e.g., least tern nesting season).
- Undeveloped land remaining in the Park is limited.
- Area available for marine habitat mitigation in the Park is extremely limited.

Opportunities for preserving wildlife habitat and maintaining a valuable recreational resource include the following:

- Comprehensive planning can provide adequate protection measures for natural resources.
- Wetland habitats can be established in areas where they do not currently exist.
- Areas of degraded habitat exist which can be restored to improve the overall natural resource system in the Park.
- Habitat improvement or conversion can be used as mitigation for future losses.
- The Park and Shoreline land use designation and most recreational activities are relatively compatible with most natural resources.
- The Park preserve system can be used for educational and research purposes.

LAND USE PROPOSALS

Scheduled future land use projects in Mission Bay Park fall into two categories: City projects and private development projects. Most future development in the Park involves City projects such as roadway improvements, storm drain interceptors, development of park uses, and shoreline stabilization and maintenance. Private development proposals are less extensive involving primarily refurbishing and/or expansion of existing facilities within a leasehold and the approximately 41 remaining acres are available for lease. For both City and private development projects, compliance with the Mission Bay Park Natural Resource Management Plan and mitigation of impacts to natural resources will be the responsibility of the developer. Mitigation programs should incorporate the guidelines set forth in this Plan, as appropriate. The following list includes only those projects known at this time. Future additional projects will undoubtedly be initiated during the life of this Plan.

CITY PROJECTS

1. Dock refurbishment at De Anza Cove and Dana Landing (Park and Recreation Department) - in design.

2. Harbor patrol dock replacement at Hospitality Point (Park and Recreation Department) - in preliminary planning.

3. New boat ramp at the De Anza Cove (Park and Recreation Department) - in design.

4. Sail Bay continuing improvements: bicycle and pedestrian walkway and landscaping between Verona Court and Moorland Drive (Park and Recreation Department) - in design.

5. New comfort station at Santa Clara point (Park and Recreation Department) - out for bids.

6. Comfort station replacement at Ventura Cove and De Anza Point (Park and Recreation Department) - in design.

7. Small children's play area at Santa Clara Point (Park and Recreation Department) - budgeted for fiscal year 1990.

8. Shoreline Restoration and Stabilization Project (Park and Recreation Department) - master plan and environmental impact report in approval process.

9. Open channel drainage replacement with drain pipe at southern Crown Point Shores (Park and Recreation Department) - begin construction in September 1989.

10. Replace comfort stations at Bahia and El Carmel points and Crown Point Shores (Park and Recreation Department) - in design.

11. South Shores Development: nine-acre Bay and related development (Park and Recreation Department) - construction interrupted; project is being rebid.

12. South Shores Development: ten-acre seasonal wetland to be constructed on Fiesta Island as mitigation for South Shores development (Park and Recreation Department) - in design.

13. Sail Bay continuing improvements: pedestrian bridge across Briarfield Cove (Briarfield Boardwalk) to connect sidewalks (Park and Recreation Department) - in design.

14. Sail Bay Mitigation Program: reestablishment of offshore eelgrass beds (Park and Recreation Department) - second year of five-year monitoring program.

15. Mission Beach Drain Improvements (Engineering and Development Department - Storm Drains) - in contract negotiation.

16. Sunset Cliffs Boulevard Bridge Bike Path (Engineering and Development Department - Streets) - design review.

17. North Ingraham Street Bridge widening (Engineering and Development Department - Streets) - under construction.

18. Offshore Breakwater Project (City Manager's Office with U.S. Army Corps of Engineers) - project under consideration.

19. Sewer Pump Stations 11, 14, 15, and 16 redevelopment (Water Utilities Department) - in design.

20. Mission Bay Storm Drain and Sewage Interceptor System (Water Utilities Department) - in design.

21. Sewage Management Master Plan (Water Utilities Department) - in design.

22. Sidewalk along street adjacent to Northern Wildlife Preserve (Park and Recreation Department) - in design.

23. Handicapped play area at Tecolote Shores (Park and Recreation Department) - in design.

24. Tecolote Shores public parking lot adjacent to handicapped play area (Park and Recreation Department) - in design.

25. Fence replacement and viewing platforms at Northern Wildlife Preserve (Park and Recreation Department) - in design.

26. Signs at wildlife preserves (Park and Recreation Department) - in design.

PRIVATE DEVELOPMENT PROJECTS

1. Bahia Resort: Complete redevelopment of resort on existing leasehold - in design.

2. Princess Resort: Expansion of existing facilities within leasehold, possible future expansion of marina facilities and docks - in design.

3. De Anza Trailer Park Redevelopment: replacement of trailer park with hotel/shopping/recreation complex, may include a bridge joining Pacific Beach Drive across Rose Creek - in design.

4. Dana Inn Redevelopment (Dana Basin): waiting for City Council approval prior to beginning construction.

5. Carmel Point Rowing Center: new rowing facility, includes bulkhead - in design.

6. Youth Aquatic Facility: boat launch on Fiesta Island - in design.

7. Sea World: marina expansion - unknown status.

8. Seaforth Sportsfishing (Quivira Basin): redevelopment into hotel/ restaurant complex - in design.

9. Marina Village (Quivera Basin): redevelopment - under study.

10. Catamaran Hotel: extension of dock - in design.

BEACH MAINTENANCE

The City of San Diego needs to maintain Mission Bay Park shoreline areas for safety, sanitation, and shoreline stabilization reasons. Three types of beach maintenance activities occur in Mission Bay Park: grooming and cleaning of dry sand areas; removal of intertidal debris; and smoothing of intertidal sand.

Beach areas in the Park are groomed to smooth irregularities in the sand. The sand is also sifted through large sieves to remove trash and broken glass. These activities occur in the dry sand on a regular basis above Mean Higher High Water (MHHW). During the summer when human activity is high the sand is cleaned and groomed on a weekly basis. Cleaning and grooming occur less often, about twice a month, during winter months. The trash is taken to an area on Fiesta Island until enough is collected for hauling to a dump site.

Debris, including marine plants and animals washed ashore, is removed from the intertidal area of the beaches about twice a month and after a storm event. Removal is done after an extreme high tide occurs and the debris is washed to the highest elevation. Equipment enters the intertidal area only to move the debris out of the intertidal zone. The decaying marine plant and animal debris is brought to a site away from the public on Fiesta Island where it is allowed to decay. Any sand which can be retrieved is stockpiled for later use in replenishing sand beaches where erosion or storm events have depleted the beach.

Regular smoothing of cliffs created by storms, tidal action and, boat waves in the intertidal area is not currently done in Mission Bay Park. Such a maintenance program, however, is proposed in the Mission Bay Park Shoreline Restorative and Stabilization Project Plan to minimize erosion and excessive on Mission Bay beaches. Without regular maintenance to make beach slopes smooth and consistent, the tidal action would do its own smoothing of shoreline irregularities, carrying much of the sand into the Bay. If the water does the smoothing instead of beach equipment, sand is lost and cliffing begins to occur causing erosion and accretion problems.

Occasional beach replenishment is needed in Mission Bay Park. The additional sand is needed after a storm event has carried away an existing beach. Currently, additional sand is also placed on some beaches where sand has been lost by erosion before summer to accommodate the increase in visitor activity. The Mission Bay Park Restoration and Stabilization Project Plan proposes softscape methods which would reduce the frequency of need for beach replenishment. California Coastal Commission and U.S. Army Corps of Engineers permits are required for beach replenishment activity.

Some unavoidable accretion occurs in the Bay which can only be removed by periodic dredging. The Park and Recreation Department, Coastal Division, is proposing to undertake dredging in six areas of the Bay to remove submerged navigable hazards and accretion zones. Navigable hazards are present in Fisherman's Channel, west of Ingraham Street Bridge, and in the Entrance Channel, between South Vacation Isle and Dana Basin. As mudflats in the Northern Wildlife Preserve accrete more material, they extend further into the Bay. To avoid navigational problems, the City proposes to dredge the outer boundary, as defined in the attached bathymetry report, of the Northern Wildlife Preserve as needed to maintain the existing boundary. (Appendix A).

DEVELOPMENT GUIDELINES

The following guidelines and requirements are provided for the protection of sensitive natural resources. These requirements and guidelines should be incorporated into impact analysis and mitigation planning for any proposed project in Mission Bay Park, including City and private developer sponsored projects.

CALIFORNIA LEAST TERN

As a federally-listed, endangered species, the California least tern and its habitat are protected by the Endangered Species Act of 1973. The requirements listed conform with the Endangered Species Act to protect the least tern during its breeding season in Mission Bay Park. Limitations on human activity on or adjacent to designated least tern nesting sites are necessary for maintaining the attractiveness of the sites for breeding and nesting. Maintenance of good water quality will ensure that the least terns will be able to forage in Bay waters. Least tern nesting sites are designated on Figure 3.

1. No in-water construction or dredging will be permitted in Mission Bay or the Flood Control Channel from April 1 through September 15, the least tern breeding season. If in-water construction is required during this time, exceptions are possible, upon approval of the City, California Department of Fish and Game, and U.S. Fish and Wildlife Service. Any exception would have to meet the following criteria to preserve least tern nesting and foraging: use of silt curtains or similar devices around in-water construction activity; use of noise reduction or low noise equipment; and use of timing and location restrictions on activity to avoid interfering with breeding sites or major least tern foraging areas.

2. No direct impacts to permanently designated least tern nesting sites are permitted. The only exception is the Cloverleaf site, which may be converted in the future to landscaping if no least terns use the site. This land use change would require the approval of a mitigation replacement site by the resource agencies.

3. The following buffer zones for each least tern nesting site will be free of new structures with heights of over six feet, including fencing around the site. This will keep raptors from using a high vantage point to prey on least tern chicks.

   Permanently Designated Sites

   North Fiesta Island - 150 feet

   FAA Island - 150 feet

   Stony Point - 150 feet

   South Shores - 150 feet

   Cloverleaf - 100 feet

   Mariner's Point - 150 feet

   Temporarily Designated Sites

   Crown Point Shores - 100 feet

4. Special Use Permits for activities on Mariner's Point will require that the 150-foot buffer zone north of the least tern nesting site be free of all formal activities and activity structures (e.g., tents, stages, bands).

EELGRASS HABITAT

Eelgrass is important to the Mission Bay ecosystem as food, shelter, and nursery for many marine organisms and fish. Many of these animals provide food for larger marine life and birds. Eelgrass habitat in southern California is rapidly disappearing due to in-water development and increasingly poor water quality. Project impacts to eelgrass are direct (e.g., construction activity) and indirect (e.g., shading from structures or boats). Efforts must be made to maintain the eelgrass habitat available and improve water quality.

1. No net loss of eelgrass meadows is acceptable. A 1:1 replacement ratio of similar density is required for impacts to eelgrass habitat as delineated in the 1988 survey (Figures 2A-2F).

2. Mitigation is required in Mission Bay itself, if the impact occurs in Mission Bay. Mitigation is required in the Flood Control Channel or Mission Bay if the impact occurs in the Flood Control Channel.

3. New sand beaches below Mean Lower Low Water (MLLW) should be replanted with eelgrass whenever the slope is changed by maintenance activities and eelgrass beds are impacted.

4. Replanting efforts are best during low energy tides (late summer - early fall).

5. Any construction or dredging project in Mission Bay or the Flood Control Channel will buoy off areas from which it is restricted prior to the start of activity. This is to limit the extent of direct impacts to existing eelgrass.

6. Any construction or dredging project disturbing the substrate in Mission Bay or the Flood Control Channel will use silt curtains or

similar devices around disturbance areas. This will limit any adverse impact to water quality to the immediate construction area; thereby, reducing impacts to eelgrass and foraging birds.

7. Eelgrass surveys for a project site will be required before and after construction to determine the extent of impact. Mitigation requirements for eelgrass will be based on the amount of actual loss.

8. A mitigation program, including maintenance, would be required for impacts to eelgrass habitat. Requirements for this program are discussed under "Development Responsibilities," Page 48 of this plan.

MARINE AND TERRESTRIAL HABITAT

Salt marsh, salt pan, coastal strand, and open water habitats are important in a diversified, well-balanced wetland ecosystem. Each of these habitats provides for the needs of specific species. The remnants of salt marsh, salt pan, and coastal strand habitats in Mission Bay Park are especially important as these habitats are rapidly disappearing from California's coast. Without the habitat, the plant and animal species indigenous to that habitat will not be able to survive.

1. No net loss to any salt marsh, salt pan, coastal strand associated with a sensitive species, or open water habitat will be permitted without replacement of equal or greater habitat value.

   The healthy salt marsh found in the Northern Wildlife Preserve is the last remnant of the once extensive salt marsh in Mission Bay. The salt marsh in the Southern Wildlife Preserve is also flourishing; however, because of its location in a Flood Control Channel, a high flood event could damage portions of the marsh. Because these salt marsh areas are extremely sensitive to disruptive activities, no direct impact is permitted, unless required for protection or enhancement of the marsh. Should protection or enhancement measures become necessary, they should be done outside of least tern, clapper rail, and savannah sparrow nesting seasons and incorporate measures to contain and reduce the impact. Any proposed measure for the Northern Wildlife Preserve must be approved by the University of California at San Diego and the City joint management committee as well as appropriate resource agencies. Any measure proposed in the Southern Wildlife Preserve requires City and appropriate agency approvals.

2. Buffer zones serve a biological function by providing a separation and screening of wildlife habitat from human activity associated with human development. Land use within buffer areas will be limited to bikeways, walkways, and passive recreation, such as nature study, viewing, and picnicking. Buffer areas should be planted with appropriate vegetation native to southern California and compatible with the adjacent habitat. Measures should be taken to keep run-off from entering habitat reserves.

   Buffer zones around terrestrial habitats in Mission Bay Park which exclude any development are as follows: salt marsh - 100 feet; salt pan - 50 feet; and coastal strand - 50 feet.

   The only exceptions to buffer zone provisions are signs, buoys, boundary fences, and educational or research-oriented structures with City approval on a project-by-project basis. City approval will include environmental review.

DREDGING

Two types of dredging affect open water habitat: maintenance and construction dredging. Maintenance dredging primarily removes navigational hazards or retrieves sand accumulating as sand spits or accretion zones along the shoreline. The City has identified five areas that require periodic maintenance dredging (Figure 4). (For additional information on these areas, refer to the Mission Bay Park Shoreline Restoration and Stabilization Project Plan). Construction dredging is required for projects that require pilings or additional depth clearance.

In addition to requirement number 1 under "Least Terns" and requirement numbers 1, 3, 4, 5 and 6 under "Eelgrass," the following are required for proposed dredging in Mission Bay and the Flood Control Channel.

1. Dredging impacts to marine habitat will require a 1:1 replacement ratio. Impacts from maintenance dredging will require a one-time mitigation for lost resources. Subsequent maintenance dredging for the original location, which has already mitigated the impact, will not require additional mitigation each time it is dredged.

2. All dredging activities should comply with permit conditions of the U.S. Army Corps of Engineers, Regional Water Quality Control Board State Lands Commission, and California Coastal Commission. Permits issued by these agencies may specify additional requirements for timing of in-water construction, spoil disposal methods, and dredge sediment material testing.

3. Sand of good quality retrieved in dredging operation will be stockpiled on a non-sensitive, designated site on Fiesta Island upon approval of the City. This sand will be used later in replenishment if it is of the proper grain size for beach stabilization. If room is not available on Fiesta Island, other arrangements for dredge spoil disposal will need to be made and approved by the City and other appropriate resource agencies.

4. If the sand is determined by a qualified expert to be unclean, to contain toxic material, or to be of poor quality, it will be transported to a permitted landfill. Sand containing toxic material will be taken only to a landfill qualified to handle toxic material.

5. Dredging of the Northern Wildlife Preserve outer boundary as defined on the bathymetry map (Appendix A) is permitted if in the future the outer

boundary moves further into the Bay. The future dredge line will be outside the minus ten mean sea level (MSL) contour to preserve as much

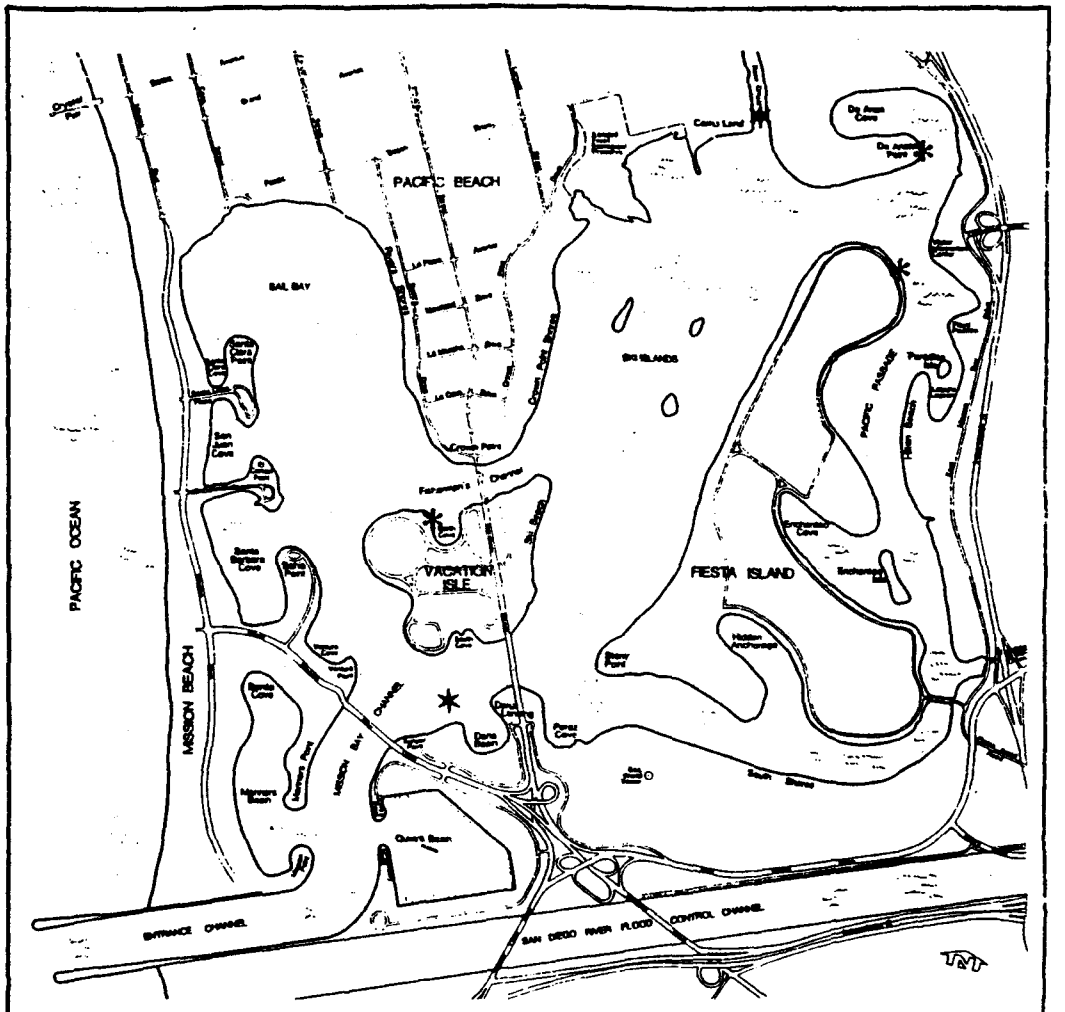
eelgrass and marsh habitat as possible. Spot elevation checks will be done every two years at nine locations along the proposed dredge line, outlined on the bathymetry map. These elevation checks will be the basis for deciding if the boundary needs dredging. Impacts of the dredging operation will be determined and methods used to minimize impacts (e.g., noise reduction, silt curtains, etc.). Timing is especially important to avoid disturbance to nesting birds. Impacts to eelgrass will need to be mitigated the first time the area is dredged but not for subsequent maintenance dredging at the same location.

6. Potential erosion and sedimentation control measures for Rose Creek have been researched (Woodward-Clyde, 1986). This study concluded that no action by the City could eliminate more than seven percent of the sedimentation problem and those measures would have substantial environmental impacts. Dredging of Rose Creek, therefore, is still a necessity for flood control. Dredging of the Rose Creek area within Mission Bay Park will be allowed from Pacific Beach Drive south to the Bay for flood control. Rose Creek will not be dredged north of Pacific Beach Drive to protect mudflat and salt marsh habitats occurring further upstream. Soundings will be taken to determine bottom depths and the need to dredge will be based on low-tide boat draft requirements. Impacts from dredging operations will be determined and methods used to minimize impacts (e.g., noise reduction, silt curtains). Timing is especially important to avoid disturbance of nesting birds. Mitigation of impacts to eelgrass will be required the first time the area is dredged but not for subsequent maintenance dredging for the same location.

7. Sand reclamation and beach grooming and recontouring activity in areas adjacent to eelgrass beds will not require mitigation if silt curtains are utilized to avoid the secondary impact of drifting material and reduced water quality.

BEACH MAINTENANCE

Grooming and cleaning activities (smoothing and removing trash from the sand) in the dry sand above Mean Higher High Water (MHHW) will not require mitigation. Removal of debris washed ashore will not require mitigation if the activity occurs above Mean Lower Low Water (MLLW), removes as little sand as possible, and follows responsible construction practices. Smoothing tidal cuts in intertidal areas will not require mitigation if it is done above MLLW, above eelgrass beds, does not add sand, and follows responsible construction practices. Beach replenishment should be done only to replace sand lost in a storm event or to dress a beach prior to the summer visitor season. The City will not require mitigation for beach replenishment (the adding of sand in depleted areas) if it is done above MLLW, above eelgrass beds, and follows responsible construction practices. Beach replenishment requires an Army Corps of Engineers permit and a California Coastal Commission permit.



MAINTENANCE DREDGING LOCATIONS

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FIGURE 4

WATER QUALITY

1. All erosion and potential erosion areas should be landscaped, with the exception of the cliffs along Riveria Shores where irrigation runoff would aggravate the problem.

2. Irrigation systems should be designed and properly maintained to avoid the creation of erosion.

3. Dry flow interceptor systems should be maintained and operated to minimize dry weather surface contaminants from entering Mission Bay.

4. Runoff should be directed away from the Bay wherever possible.

5. Every effort should continue to be made to improve water quality for preserve areas and the Bay. The University of California Natural Reserve System and City of San Diego joint - management of the Northern Wildlife Preserve would include efforts to regularly monitor water quality in the Preserve.

6. Future changes to stream flows (instream discharge) in the San Diego River Flood Control Channel, Rose Creek, or Tecolote Creek should consider the natural resource management policies in Mission Bay Park.

MITIGATION OPTIONS AND GUIDELINES

TERRESTRIAL HABITAT MITIGATION

Mitigation options for impact to or loss of salt marsh, salt pan, and coastal strand habitats are limited to the creation of new habitat. Mitigation for wetland habitat requires special treatment to ensure the habitat value is offset. Some special requirements are listed below to maximize wildlife value of the newly created habitat. Additional requirements may be added should they be necessary for creation of a viable wetland habitat.

1. The replacement ratio for salt marsh habitat will be determined project-by-project based on the type and degree of indirect impact to the marsh. No direct impact or loss of salt marsh is permitted except as required for protection or enhancement of the marsh, as stated on Page 34.

2. The replacement ratio will be 1:1 for salt pan habitat within Mission Bay Park.

3. Assessment of impacts to coastal strand habitat will include quality of the habitat and identification of any sensitive species. Mitigation for loss of any sensitive species could include replacement at up to a 1:1 ratio.

4. A variety of habitat types should be created to encourage diversity of species.

5. Vertical and horizontal plant diversity should be established.

6. An irregular rather than straight shoreline or border should be created between habitat types to maximize the edge effect.

7. Wildlife areas of concentration should be created where vegetation is especially dense and extensive.

8. Only appropriate plants native to coastal southern California should be used in revegetation.

9. Human impacts should be considered in designing revegetation (e.g., use of thorny shrubs to limit access to sensitive areas).

10. Temporary irrigation, if necessary, should be provided to help establish new vegetation.

11. Any non-native or invader species should be removed on a regular basis.

12. The revegetation site should be monitored regularly and appropriate recommendations should be made for enhancing revegetation efforts.

EELGRASS HABITAT MITIGATION

Mitigation options for impact to or loss of eelgrass habitat is limited in Mission Bay Park. Mitigation banks seem the most economical and viable means of mitigating eelgrass impacts for greater losses. Mitigation banks actually allow for more habitat to be created than is currently required. This allows impacts from future projects to be mitigated without additional habitat creation. A project would "purchase" the area of eelgrass habitat needed to mitigate its impact from the developer of the bank. This is assuming the bank has available the acreage that is required and that the project wishing to purchase the mitigation habitat meets the following criteria: the project is water oriented; the project can only be built in or over the water; and the project is a permitted use. Available mitigation options are as follows:

1. New eelgrass beds could be created by elevating areas of the Bay or Flood Control Channel bottom to an appropriate depth for eelgrass growth.

2. Elevation of portions of smaller islands such as Enchanted Isle could be reduced, to create additional habitat.

3. Three options for mitigation and/or mitigation banks are:

   a. The top of East Ski Island and/or West Ski Island could be removed to form an underwater bench at minus 5 or minus 6 Mean Lower Low Water for eelgrass planting.

   b. Eelgrass could be planted in the South Shores embayment currently under construction.

      This assumes that the Sail Bay eelgrass mitigation has been satisfactorily met in the area designated in Sail Bay. If additional mitigation area is needed to satisfy the Sail Bay mitigation requirement, that mitigation has priority for use of the South Shores embayment.

   c. An embayment could be created in Fiesta Island and planted with eelgrass. This area should be on the western shore of the Island west of the road, where the current sludge beds are (Figure 5), where the new habitat would benefit the most from tidal action and good water quality.

ENHANCEMENT GUIDELINES

The guidelines subsequently outlined are provided for the enhancement and protection of natural resources in Mission Bay Park. The City is responsible for implementing these measures.

CALIFORNIA LEAST TERNS

1. The annual Mission Bay California Least Tern Management Program, a joint-agency effort, should be continued. This Management Team will continue to be comprised of representatives from U.S. Fish and Wildlife Service, California Department of Fish and Game, California Coastal Commission, U.S. Army Corps of Engineers, City of San Diego Park and Recreation Department and Water Utilities Department (until sludge beds are renewed from Fiesta Island), and San Diego County Least Tern Recovery Team Coordinator (e.g., Elizabeth Copper in 1989). Other least tern experts (e.g., private organizations or citizens) may be included. Every year, prior to March, the Management Team will meet to discuss that year's per site preparations for the upcoming least tern season. Preparations may include, but are not limited to Items 2, 3, 4, 5, and 6 listed below.

2. Signs, gates, and fences at least tern nesting sites (Figure 3) should be kept in good repair. New signs should be added and fencing added or replaced as needed.

3. Vegetation should be removed, the site graded, and new sandy, shell substrate should be added as needed.

4. Chick protection devices, such as a chick fence or roofing tiles for cover, should be added when needed.

5. U.S. Fish and Wildlife Service and California Department of Fish and Game should be aided in predator control efforts for nesting sites, especially on Fiesta Island and at South Shores.

6. Decoys should be placed by resource agencies on sites, deemed by the Least Tern Management Team to be safe (i.e., relatively free of predators), to attract least terns to the site(s).

7. One person once a week for sixteen (16) weeks should be provided to aid agencies in monitoring least tern nesting sites during the least tern breeding season.

8. Various City departments (e.g., Lifeguard Services, Police Department) should be alerted on the need to enforce keeping intruders off least tern sites.

EXPANSION OF PRESERVE SYSTEM

The preserve system in Mission Bay Park allows the protection and enhancement of sensitive ecological habitats and natural resources. Except for preserve maintenance, only limited educational and research activities are allowed within a Mission Bay Park preserve. The following recommendations would further protect the existing natural resource system in the Park by providing additional habitat base. Figure 5 illustrates proposed additions to the preserve system. A larger habitat base allows an expansion of population necessary to counterbalance the negative impact of a progressively urban influence and future threat of rising sea levels. Expansion of salt marsh upland habitat is important for balancing the negative effect of potential future rises in sea level. Rising sea level would result in existing intertidal areas becoming subtidal areas; thereby, creating a need for existing upland areas being available to become future intertidal areas. These measures do not conflict with existing recreational use or leaseholder activities in Mission Bay Park.

1. The entire Flood Control Channel should be considered part of the Southern Wildlife Preserve from Interstate 5 west to the point south of the east edge of Hospitality Point (see Figure 5). Waterfowl and shorebirds, in addition to least terns, use this area of the Channel regularly to hunt for food (forage). To minimize disturbance to birds, especially wintering waterfowl, inhabiting the Flood Control Channel, only non-motorized boats will be allowed to use the Channel west of Ingraham Street Bridge from April through September. Obtaining a park use permit from the Park and Recreation Department, Coastal Division, will be required prior to use of the Channel. The Coastal Division will instruct permit applicants on use restrictions and will limit permits to ten for any given day. Signs will be posted to delineate the new boundaries of the Southern Wildlife Preserve. Fishing is allowed in the Flood Control Channel west of Sunset Cliffs Boulevard. Wading in the Channel to fish is permissible only from Dog Beach.

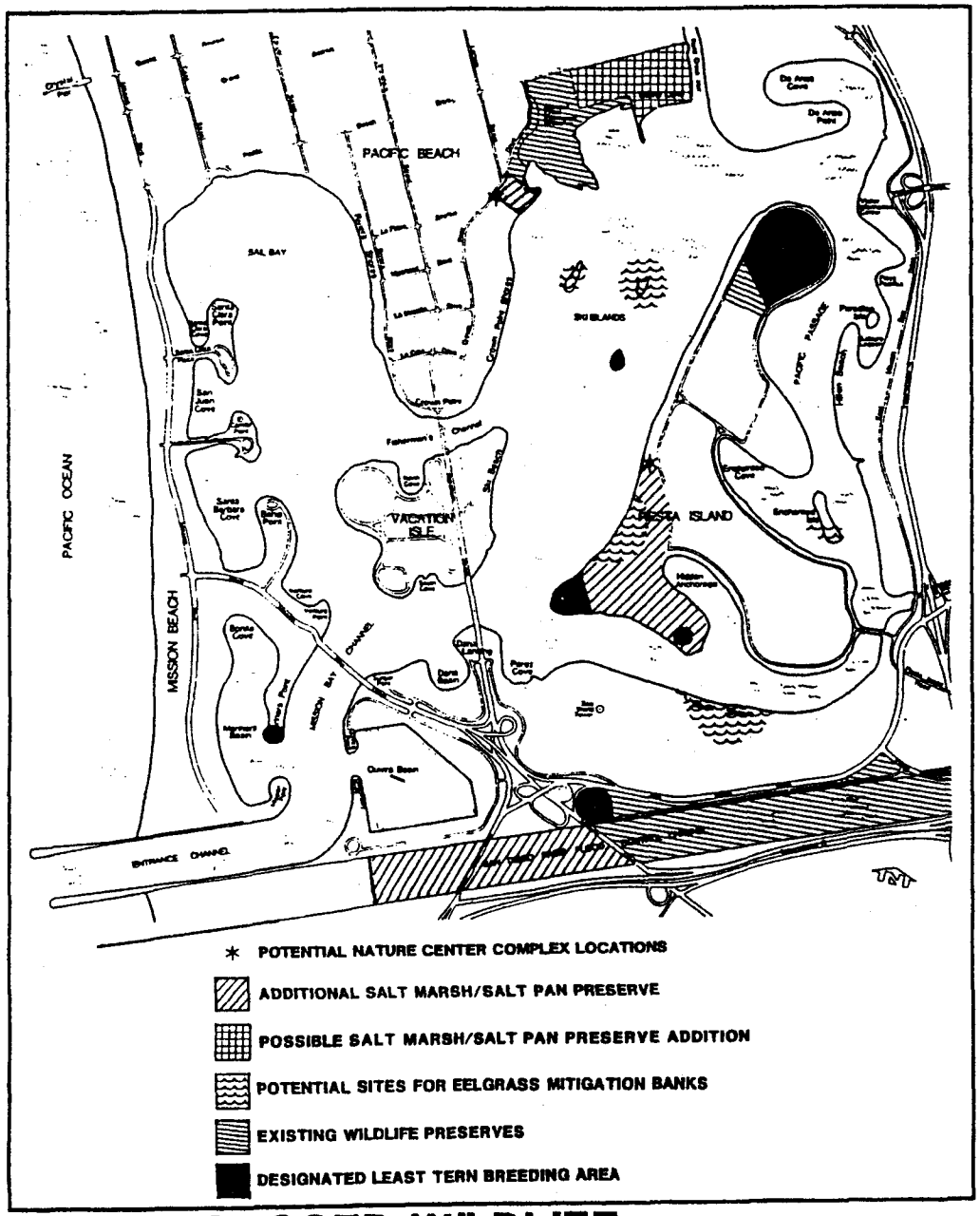
2. The Crown Point least tern nesting site should be made available for salt marsh/salt pan rehabilitation. This is an excellent opportunity to expand one of the most productive salt marshes in the state and the habitat for two other endangered birds (light-footed clapper rail and Belding's savannah sparrow). The use of this site is contingent upon the lack of least tern nesting on the site through the 1990 season. If no nesting occurs by September 1990, the City would have the prerogative of converting this site to wetland habitat. During the fund acquisition and design phase of the marsh restoration, the Crown Point site would continue to be actively managed as a least tern nesting site. If least terns have nested prior to the beginning of restoration, a portion of the site would be retained as permanent least tern nesting habitat. If least terns have not nested, the entire site could be restored to wetland habitat; however, consideration will be given to retaining a portion of the restored wetland area for least tern nesting. The revegetated salt marsh and salt pan habitat would be applied as mitigation credit for any future impacts to the natural habitat. The rehabilitation plan for this site should be designed by a qualified wildlife biologist with experience in successful marsh/wetland rehabilitation.

3. The 1978 Mission Bay Park Master Plan for Land and Water Use states that "consideration should be given to adding this area [Campland lease] to the Northern Wildlife Reserve upon termination of the lease [2017]". The Natural Resource Management Plan supports consideration of an eastern expansion of the Northern Wildlife Preserve to include part or all of the 15-acre Campland lease area. From a resource management perspective, eastern and western expansion of the Northern Wildlife Preserve salt marsh has a high priority. Such expansion would broaden the base for all of Mission Bay Park's natural resources in the face of urban pressure and future threat of rising sea level. Expansion of such a productive salt marsh as the Northern Wildlife Preserve is a unique opportunity in an area of urban development. The proposal to expand the Preserve to the west is dependent on least tern nesting activity and only a portion may be available for marsh expansion. Marsh expansion eastward should be considered, therefore, with other proposed options for future use of the Campland lease area. Consideration should also be given to the acquisition of the two-acre Frost property adjacent to the Preserve for wetland expansion by either the University of California Natural Reserve System or the City of San Diego.

4. The Cloverleaf least tern nesting site is a permanent site which has not been used since 1975, except in 1982. It is surrounded by high traffic roads, is less than an acre in size, and is difficult to maintain and monitor. For these reasons, it is recommended that the Cloverleaf site be released from a permanent nesting site designation and be returned for park use, such as landscaping. To mitigate the loss of the Cloverleaf site, one of the other existing permanent least tern nesting sites would be expanded by the approximate size of the Cloverleaf site.

5. The area (approximately 110 acres) currently supporting sludge beds on Fiesta Island west of the road, should be considered for a new preserve. A variety of habitats, such as salt marsh, salt pan, coastal strand, a least tern nesting area(s), and a small embayment planted with eelgrass would be created within the new preserve. The rehabilitation plan for this site should be designed by a qualified wildlife biologist with experience in successful salt marsh/wetland rehabilitation. This Fiesta Island Wildlife Preserve would serve as a mitigation "bank" for the habitat types created. The bank would provide mitigation credit for future projects. This mitigation credit system is discussed later under Mitigation Options.

6. Should additional least tern habitat be needed in the future because of increased least tern populations, overcrowding of existing sites, or conversion of the Cloverleaf site to park use, the Stony Point or North Fiesta Island least tern sites could be expanded. Areas for future additional least tern nesting sites could be West Ski Island or part of the new wetland preserve proposed on Fiesta Island that could be converted to least tern nesting habitat. Another possible site is the coastal strand habitat preserve (Figure 3) where least tern nesting would be a compatible use.



PROPOSED WILDLIFE PRESERVE ADDITIONS

Environmental Quality Division

CITY OF SAN DIEGO · PLANNING DEPARTMENT

FIGURE 5

NORTHERN WILDLIFE PRESERVE

1. More buoys should be installed to discourage boats and people from entering the Northern Wildlife Preserve from the Bay.
2. The existing fence should be replaced and the interior fence separating City property from University of California property removed.
3. University of California at San Diego is encouraged to continue their efforts to clear mangroves from the Preserve.
4. Viewing platforms should be built at several locations around the perimeter of the Preserve.
5. Pampass grass should be removed wherever possible, as it is an introduced species and provides habitat for predators that feed on least tern chicks.
6. A joint-management team comprised of a University of California, San Diego, representative and a Park and Recreation Department representative will meet regularly to discuss, evaluate, and attempt to solve preserve management problems. This team will also work cooperatively to maintain and/or expand the preserve data base and monitoring efforts.
7. A predator control program jointly sponsored by the City of San Diego and the University of California Natural Reserve System should be implemented for the protection of native, sensitive, and endangered preserve inhabitants.

FIESTA ISLAND

1. Pampass grass should be removed.
2. Where appropriate, native vegetation should be used in landscaping.

FLOOD CONTROL CHANNEL AND SOUTHERN WILDLIFE PRESERVE

1. Continue the removal of pampass grass from the Flood Control Channel banks to maintain flood protection as well as to eliminate an ecologically undesirable plant.
2. Interpretive and informational signs will be placed along the boundaries of the Southern Wildlife Preserve.

MISSION BAY PARK

Landscaping along preserve buffers and in non-public use areas should emphasize native plants.

EDUCATION/RESEARCH

The natural habitat preserve system in Mission Bay Park provides wonderful educational and research opportunities. The following measures are designed to utilize some of those opportunities in a wise, nondisruptive manner.

1. Standard informational, educational, and boundary signs will be developed for least tern, salt marsh, salt pan, and coastal strand preserves.

2. Signs will be strategically placed for maximum benefit and designed or placed to avoid use by foraging raptors.

3. The data base for Mission Bay Park will be kept current. The data base will be updated by January of every year. City-sponsored surveys include:

   a. Eelgrass/underwater habitat survey - every three years using the same methodology as described in the scope of work provided in Appendix A of the Mission Bay Park Natural Resource Plan - Technical Appendices document.

   b. General year-long bird survey - every five years using the same methodology described in the study provided in Appendix B of the Mission Bay Park Natural Resource Plan - Technical Appendices document.

   c. A California least tern foraging study will be conducted annually from 1989-1991. The methodology for the first year (1989) is provided in Appendix C of the Mission Bay Park Natural Resource Plan - Technical Appendices document.

   Data obtained from or in cooperation with other organizations include:

   a. Annual least tern nesting data - Least Tern Recovery Team, U.S. Fish and Wildlife Service.

   b. Fish population studies - National Marine Fisheries Service and Hubbs Research Institute.

   c. Clapper rail and Belding's savannah sparrow population and nesting data and other information collected in the Northern Wildlife and Southern Wildlife Preserves - University of California at San Diego.

   d. Water quality data - Regional Water Quality Control Board.

4. A nature center complex, including a system of nature trails, will be developed in Mission Bay Park. The possible locations are: 1) Fiesta Island as part of the new preserve system, closest to the road; or 2) the western edge of the Crown Point Shores expansion of the Northern Wildlife Preserve (assuming this site is released from the least tern nesting site designation) (Figure 5). The proposed nature center complex will include: a nature trail system along the fringes of the marsh, closest to the nature center; interpretive exhibits and signs; observation platforms; and a small structure (about 1,000 square feet) for lecture, orientation, and meeting purposes. The Nature Center complex design will maintain the integrity of the marsh environment and limit the potential for human disturbance. All structures will be built prior to habitat restoration, excluding dredging of embayment if Fiesta Island site is chosen, to eliminate impacts to newly rehabilitated habitats. A design will be prepared for the Nature Center complex and surrounding preserve by a designer knowledgeable of interpretive centers and salt marsh/salt pan rehabilitation.

5. Zones for educational and research uses will be identified for each preserve as well as buffer areas with no human disturbance.

6. Graduate student proposals for studies to gather unknown information on natural resources will be reviewed by the Mission Bay Park Technical Advisory Committee. The committee will recommend certain studies for funding. Potential funding would come from grants or the City. If the City will be funding a study, the City would have the ultimate choice of which study to fund.

IMPLEMENTATION

FEDERAL AND STATE AGENCY PERMITS AND AGREEMENTS

In addition to City of San Diego permits, any proposed project must obtain a California Coastal Commission Permit and a U.S. Army Corps Engineers 404 and/or Section 10 permits if dredging or deposition of material is proposed. Permit requirements of the State Lands Commission and Regional Water Quality Control Board would also have to be met for dredging activities or inwater construction. This Natural Resource Management Plan was undertaken partly to facilitate and expedite the federal and state permit process. This Plan provides the basis for a common understanding among government agencies, including City of San Diego, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Coastal Commission, California Department of Fish and Game, and private interests, regarding projects affecting natural resources in Mission Bay Park and the manner in which mitigation is to be undertaken.

Representatives from the City and five agencies, listed above, actively participated in the development of this Plan to ensure that the mitigation requirements are consistent with policies of their respective agencies. It is anticipated, therefore, that projects planned in conformance with the Natural Resource Management Plan will meet the requirements of the other permitting agencies, and permit processing can be simplified and the time minimized. This will provide increased certainty to applicants concerned with the granting of permits for their projects and to agencies concerned with the protection of natural resources.

A nationwide permit from the Army Corps of Engineers to cover City shoreline maintenance would further simplify the permitting process. This type of permit would cover all maintenance outlined in the Beach Maintenance section under "Land Use Proposals" for a five-year period and negate having to obtain individual permits for each action. It would be beneficial if a similar arrangement could be made with the Coastal Commission.

Federal and state agencies will be notified of all proposed projects affecting natural resources and the Natural Resource Management Plan. This includes land and water-oriented development proposals. Mitigation plans and mitigation monitoring reports for individual projects will also be submitted to these agencies for their review and comment. If a mitigation plan can be approved concurrent with the City's review process, federal and state permit processing will be expedited.

DEVELOPMENT RESPONSIBILITIES

The Natural Resource Management Plan covers three general categories of proposals: 1) new development or redevelopment of land and water; 2) park and shoreline maintenance activities; and 3) habitat enhancement. It will

be the responsibility of the City or public applicant to plan, implement, maintain, and monitor the mitigation effort. The applicant is also responsible for consulting with state and federal resource agencies early in the planning process. A list of agencies for consultation is included in Appendix D in the Mission Bay Park Natural Resource Plan - Technical Appendices.

Mitigation Planning: For any development plan, the project applicant will have a biological consultant conduct a site-specific field survey. This survey will include underwater habitats, if any water-oriented aspects are proposed, to determine the type and extent of natural resources and to identify possible mitigation requirements. A qualified biologist with wetlands experience must perform the field work and consultation.

If a revegetation plan is required, a biological consultant, who may work with the applicant's landscape architect and/or planner, will outline the mitigation proposal. Revegetation plans will contain the following: a landscape plan which addresses in detail the compensation concept and design criteria; the types and extent of habitats to be developed; grading requirements (if any); plant materials to be used; method of planting; and plans for maintenance and monitoring of the revegetation. The City will review and approve revegetation plans before project approval is granted.

A binding mechanism will be instituted to ensure an applicant will implement, maintain, and monitor the mitigation effort as planned and approved. This mechanism can be a bond or other means of assuring funds will be available to complete the mitigation program. In cases where mitigation habitat area is to be purchased from an already existing City mitigation bank, the acceptability of the project as a participant in the bank will need to be approved by the City and the required mitigation area purchased prior to project development.

Mitigation Implementation: Mitigation programs will be implemented according to mitigation plans preceding or coincident with project construction. This includes the purchase of mitigation area from a mitigation bank. Wherever necessary, exotic or invader vegetation will be removed and an irrigation system will be installed to water plants until they have become established.

After project construction is complete, a second habitat survey of impacted areas will be conducted by a qualified biologist to ensure the success of the mitigation plan.

Mitigation Maintenance: Mitigation and enhancement plans will include a long-term monitoring program to determine the success of the plan and identify maintenance needs. In the first three to five years after plan implementation, monitoring will be conducted and reports made to the Park and Recreation Department on a regular basis. The frequency of monitoring will be determined during the mitigation plan approval process. After the first three to five years, mitigation sites will be monitored to obtain

information regarding species and quantity and quality of their growth. An annual report of the monitoring effort will be prepared and submitted to the Park and Recreation Department. The report will address plant survival, vegetative cover, the success of establishing designated habitats, and recommended actions necessary to accomplish full mitigation. Resource agencies will receive copies of mitigation monitoring reports.

The applicant will be responsible for maintaining revegetated mitigation sites for five years from the date the planting is completed. Replacement of vegetation and elimination of undesirable species will be undertaken as part of the mitigation maintenance program.

Any vegetation that dies or is otherwise damaged within the first few years due to flooding, disease, over-or under-watering, vandalism etc., will be replaced by the applicant. Vegetation should be monitored on a regular basis and replaced as needed to fulfill mitigation plan conditions.

In order for mitigation areas to be successfully established, non-native plants which compete with native plants for light and space must be controlled. Non-native species, such as giant reed (Arundo donax), pampas grass (Cortaderia atacamensis), castor bean (Ricinius communis), and tamarisk (Tamarix spp.) must be removed from all mitigation sites. Any non-native plants should be removed biannually during the five-year maintenance period. Once removed, the plants should be disposed of in a landfill.

CITY RESPONSIBILITIES

Planning for the protection and enhancement of natural resources in Mission Bay Park is an important part of the Mission Bay Park Master Plan, Local Coastal Program Addendum. The Mission Bay Park Natural Resource Management Plan is in conformity with and should be used in conjunction with the Master Plan and the Local Coastal Program Addendum.

The City Planning and Park and Recreation departments are responsible for the administration of the Natural Resource Management Plan. The Planning Department will review all public and City development proposals to determine conformity with the Natural Resource Management Plan. The California Environmental Quality Act (CEQA) process will be applied to determine the environmental impacts of development proposals and identify mitigation measures and alternatives to reduce impacts to Mission Bay Park's natural resources.

The Park and Recreation Department is responsible for conducting maintenance activities in the Park in compliance with the Natural Resource Management Plan. The Park and Recreation Department will review public and City project plans along with revegetation and mitigation plans to ensure the projects meet the requirements and objectives of the Natural Resource Management Plan. Enhancement projects and a current data base are also the responsibility of the Park and Recreation Department. Mitigation bank development will be developed and administered by Park and Recreation.

Funding for enhancement, management, and preserve maintenance for the Park's natural resource system can come from a variety of sources. Items outlined in this management plan are listed below with possible funding sources.

1. Mission Bay Least Tern Management Program

   a. Predator Control - one person for six months (March-September), annually, via contract with USFWS or CDFG or City sources for implementation of a predator control program. Potential funding: operating budget.

   b. Nesting Site Monitor - provide one person once a week for sixteen weeks to help monitor nesting sites. Approximately 130 hours a year. Potential funding: intern program.

   c. Management and Improvements to Sites - Potential funding: operating budget.

2. Expansion of Preserve System

   a. Extension of Southern Wildlife Preserve - no cost to implement.

   b. Extension of Northern Wildlife Preserve to Include Crown Point Shores Least Tern Nesting Site and, possibly, a portion or all of the Campland lease area - grading, revegetation, and fencing required. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; capital outlay fund.

   c. Creation of New Wildlife Habitat Preserve and Embayment in South Fiesta Island - grading, dredging, revegetation, and fencing required. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; cost recovery for embayment as an eelgrass mitigation bank could come from future City and developer projects purchasing mitigation area from the bank; capital outlay fund.

   d. Mitigation Bank in South Shores Embayment - planting of eelgrass and monitoring program. Potential funding: Coastal Conservancy; cost recovery from future City and developer projects purchasing mitigation area from the bank; capital outlay fund.

3. Removal of pampass grass from Fiesta Island and Northern and Southern Wildlife Reserves - Potential funding: operating budget.

4. Placement of Additional Buoys Along Northern Wildlife Preserve - 15 additional buoys to discourage boaters and jet skiers from entering the salt marsh. Potential funding: Environmental License Place Grant; Coastal Conservancy.

5. Informational, Directive, and Educational Signs - additional permanent signage needed for seven least tern and five (possibly six) wildlife preserves, approximately 150 signs. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; operating budget.

6. City-sponsored Surveys

   Eelgrass/underwater habitat survey by consultant (approximately 600 hours and $16,000 (1988 dollars) for equipment and computer time);

   General bird survey by interns or consultants (approximately 500 hours); and

   California least tern foraging study by consultant (annual cost estimate for the three-year (1989-1991) study is $18,000 per year (1989 dollars).

   Potential funding: operating budget.

7. Nature Center Complex- includes nature trails, observation platforms, structure (approximately 1,000 square feet), fence, signs, and interpretive displays. Potential funding: Environmental License Plate Grant; Coastal Conservancy; possible future state bond initiatives; capital outlay fund.

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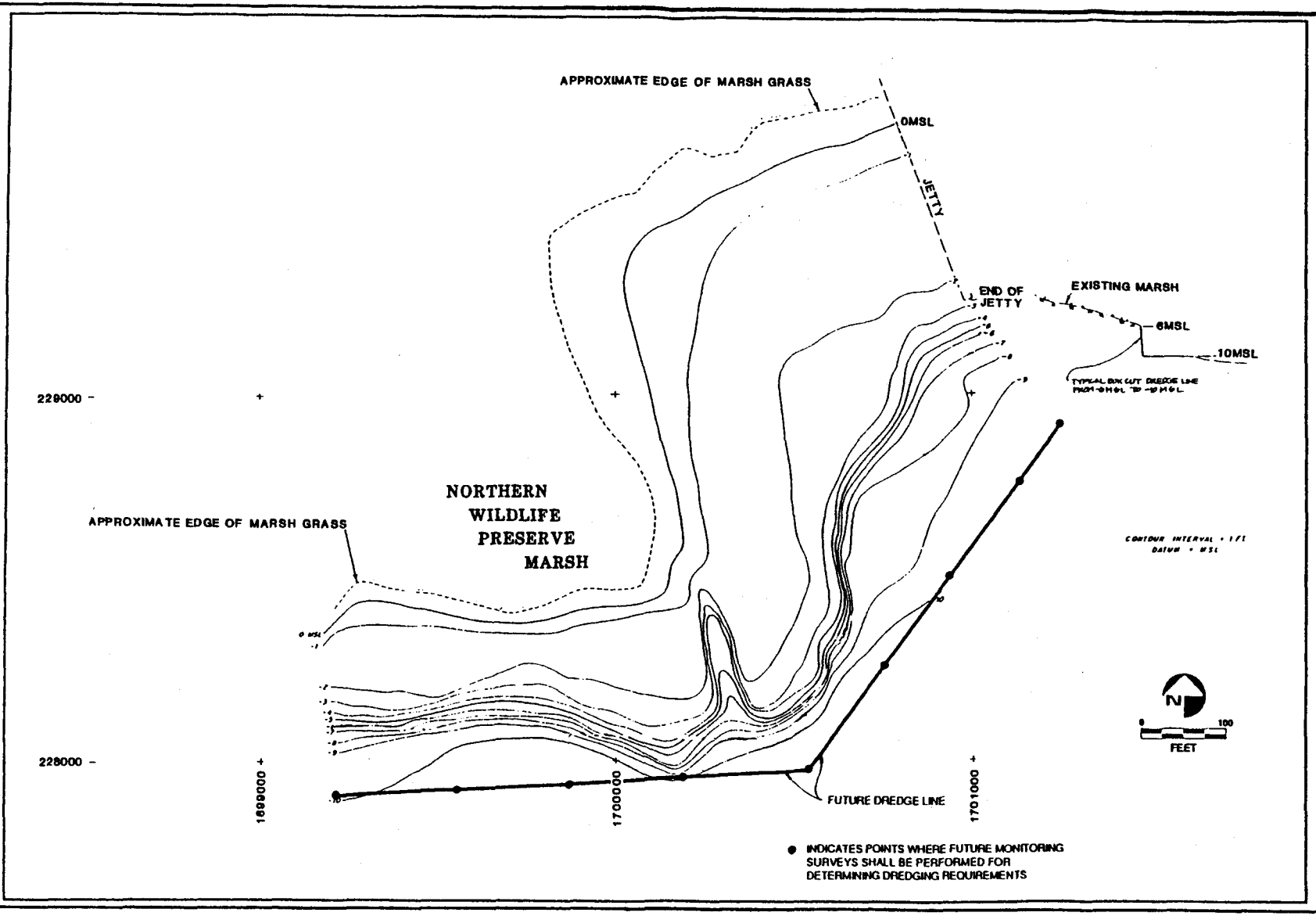


BATHYMETRY MAP AND PROPOSED DREDGELINE FOR NORTHERN WILDLIFE PRESERVE

Environmental Quality Division

CITY OF SAN DIEGO · PLANNING DEPARTMENT

APPENDIX

A

Appendix F

MISSION BAY PARK REGULATIONS

Prepared by

City of San Diego

MISSION BAY REGULATIONS

Speed

BASIC SPEED LAW — Local and State laws prohibit the operation of any vessel or other watercraft at a speed greater than is reasonable and prudent, and at no time at a speed that endangers life, limb or property.
CONTROLLED SPEED AREAS —
(1) Speed limits are posted on buoys and signs throughout the bay, at the entrances and inside controlled areas. Basically, West Mission Bay, all narrow channels, and coves have controlled speed.
(2) The speed limit from sunset to sunrise (night-time) is five nautical miles per hour (5 kts) in all areas of the bay.
(3) The speed limit is five nautical miles per hour (5 kts) in the following areas: (a) within 100 ft. of the shoreline of Mission Bay including the shoreline of Fiesta Island and Vacation Island, (b) within 200 ft. of any dock or landing float to which boats are made fast or is being used for the loading or unloading of passengers; and (c) under any bridges.
(4) The speed limit is limited to steerage way only (no wake) in all marina areas and basins.
(5) The speed limit in Sail Bay is limited to 5 mph from 11:00 a.m. to 5:00 p.m., from May 1st through October 31st.
OPEN SPEED AREA — Fiesta Bay in the eastern half of Mission Bay is the only area with no daytime speed limits, except the specific situations listed above.

Waterskiing

(1) Fiesta Bay in the eastern half of the bay is the main waterskiing area, with three designated beach landing and take-off zones. Beach landings and take-offs are prohibited in all areas not posted with signs for these purposes.
(2) Sail Bay in the northwest part of the bay, between Santa Clara Point and Riviera Shores, has one zone designated for beach landing and take-off; but it is only open for limited waterskiing at the following times:
(a) May 1st through October 31st — sunrise to 11 a.m., and 5 p.m. to sunset; (5 mph from 11 a.m. to 5 p.m.);
(b) November 1st through April 30th — sunrise to sunset (daytime).
(3) Waterskiing is prohibited in all other areas of the bay.
(4) In addition to the operator, every vessel towing a skier must have an observer at least 12 years old. The operator must watch ahead, and the observer must watch the skier and advise the operator of any hazards or when the skier falls. All occupants of the boat must remain seated during operation.
(5) Waterskiing and similar activities are prohibited between sunset and sunrise (night-time).
(6) No waterskier or the towing boat shall operate within 100 ft. of another boat, canoe, paddleboard, float, swimmer or fisherman. Also, no waterskier or the towing boat shall operate within 100 ft. of any beach, except for taking-off and landing in the prescribed areas posted for that purpose by the City.
(7) Motorboats in all waterski areas shall adhere to a counter-clockwise pattern (turning towards port/left) at all times.
(8) Observers or operators must signal with a red ski flag in the air whenever there is a person or hazard in the water adjacent to or in the vicinity of their boat. The operator must cut the motor completely when picking up a person from the water into the boat.
(9) Tow lines must not exceed 75 feet in length.
(10) No person shall use any hang glider, ski kite, parasail, or similar device from the water or land in Mission Bay Park.
(11) No vessel may operate within 200 feet of the shoreline of an area designated for waterski landing or take-off, except a vessel actively involved in towing a waterskier.

Personal Watercraft

Jet Skis, Wet Bikes, Dyna-Foils, Wave-Runners, Wave-Jammers, and similar types of watercraft may use any of the boating areas, following all of the regulations for powerboats. There is a special personal watercraft area at the east end of South Pacific Passage, where boats are prohibited; however, operators using the area must comply with the 5 mph speed zone immediately outside of the area. A second personal watercraft area exists at the south end of North Pacific passage. Between sunset and 9:30 a.m. all craft must travel at less than 5 mph. Operators are also responsible for obeying all other existing safety regulations.

Sailing

(1) Sailboats are permitted in all boating areas throughout the bay; however, the entire West Bay is meant mainly for sailing, with controlled speeds for powerboats. Sail Bay is limited to 5 mph from 11 a.m. to 5 p.m., May 1st through October 31st, and the rest of the West Bay is 5 mph at all times. Sailboats are cautioned to stay away from Waterski Zones and Swimming Areas.
(2) Sailboat operators should check the height of their mast with the vertical clearance markers before attempting to sail under any bridges.

Required Equipment, Registration, and Age Restrictions

(1) All vessels must comply with California and U.S. Coast Guard requirements for minimum safety equipment. The basic items for all boats include Personal Flotation Devices (PFD's or life preservers) for each person on-board, navigation lights for night-time operation, and some sort of sound-signaling device. Powerboats are generally also required to have a fire extinguisher, muffler, back-fire flame control, and ventilation system. Most boats are also required to carry Visual Distress Signals on-board for emergency use. Boat operators should check with the Lifeguard Service, Police or Coast Guard to determine the specific equipment required for their boat.
(2) Boats must comply with California laws for vessel registration. Basically, all undocumented vessels using or on the waters of California must be currently registered in this State, except:
(a) vessels currently registered in another state or federal numbering system, and such vessel is not within California for more than 90 days;
(b) foreign vessels temporarily using the waters of the United States;
(c) public vessels of a city, county, district, state or the United States;
(d) a ship's lifeboat (not used for recreational purposes);
(e) any class of vessels exempted by the state or federal government; and
(f) any sailboat 8 ft. or less in length, and any vessel propelled solely by oars or paddles.
(3) Vessel registration is performed by the Department of Motor Vehicles, and boat owners should contact their local DMV office for more information.
(4) The boat registration certificate/card is required to be carried on-board the vessel at all times, and must be presented to any peace officer upon request.
(5) No person may permit any other person under the age of 12 years old to operate, nor may any person under the age of 12 years old operate:
(a) any motorboat towing any person:
(b) any motorboat designed to carry only one person; or
(c) any motorboat with an engine of more than 10 horsepower, unless an adult (over 18 years old) is on-board; except for using a dinghy between a moored vessel and the shoreline.

Reckless, Negligent, and Intoxicated Operation

(1) No person shall use any vessel, or manipulate any waterskis, aquaplane or similar device in a reckless or negligent manner so as to endanger the life, limb or property of any person. [Misdemeanor.] Endangerment includes, but is not limited to, the following acts:
(a) riding on the bow, gunwales or transom of a powerboat (without adequate protective railing);
(b) any action causing any waterskis, aquaplane or similar device, or the person thereon to collide with any object or person;
(c) maneuvering towed skiers or other devices so as to pass the towline over another vessel or its skier; or
(d) navigating any vessel, skis or other devices between a towing vessel and its tow(s).
(2) No person shall operate any vessel, or manipulate any waterskis, aquaplane or similar device while under the influence of intoxicating liquor, any drug, or the combined influence of intoxicating liquor and any drug; or when addicted to any drug. [Misdemeanor.]
(3) No person shall operate any vessel, or manipulate any waterskis, aquaplane or similar device who has a blood-alcohol level of 0.10% or more. [Misdemeanor.]
(4) No person shall operate any vessel, or manipulate any waterskis, aquaplane or similar device while under the influence of intoxicating liquor, any drug, or the combined influence of intoxicating liquor and any drug; and while so operating do any act forbidden by law or neglect any duty imposed by law for the use of the vessel, waterskis, aquaplane or similar device, which act or neglect proximately causes serious bodily injury to any person other than himself. [Felony.]
(5) Persons lawfully arrested for intoxicated operation must submit to a chemical test of their blood, breath or urine to determine the alcohol or drug content of their blood.

Boating Accidents

(1) The operator and owner of any vessel involved in a collision, accident or other casualty must stop and render any preactical assistance to the other persons involved (without serious danger to his

own vessel or crew), and also to give his name, address, and vessel identification in writing to any injured person or the owner of any property or vessels damaged. Failure to stop and give the required information is a misdemeanor for accidents involving property damage only, and a felony for accidents involving injury, death or disappearance.
(2) Accidents where a person dies or disappears from a vessel must be reported immediately, by the quickest means available, to the nearest enforcement agency.
(3) Written accident reports are required to be filed with the California Department of Boating and Waterways on official forms, which may be obtained from the Lifeguard Service or Police Department:
(a) within 48 hours if: a person dies within 24 hours after the accident, a person disappears, or an injured person requires more than first-aid treatment; and
(b) within 10 days if: a person dies more than 24 hours after the accident, or damage to the vessel and other property totals more than $200.

Anchoring, Mooring, and Beaching

(1) Vessels may be anchored during the daytime anywhere in the bay, except:
(a) Swimming Areas,
(b) Waterski Landing/Take-Off Zones, and
(c) any position that obstructs navigation and/or is prohibited by signs.
(2) Vessels may anchor or moor overnight in North Mariner's Basin only. The time limit for overnight transient/guest anchorage is 72-hours in any seven-day period, and an adult must remain on-board overnight.
(3) Vessels are prohibited from tying to all aids to navigation (buoys) at all times. Vessels are also not allowed to tie up to a private mooring buoy without a permit from the Lifeguard Services Division.
(4) Overnight boat beaching is allowed only in designated areas after obtaining a permit from the Lifeguard Services Division. (Some areas have time restrictions.)
(5) Vessels and trailers shall not be left on the beach overnight in Sail Bay from 10 p.m. to 7 a.m., Sunday through Thursday. Overnight beaching in Sail Bay is only permitted on Friday and Saturday nights and the night before a City holiday.
(6) A permit is required to place, construct or use a mooring in Mission Bay. Any such moorings must comply with the specifications set by the Lifeguard Services Division.
(7) It is unlawful to use, tie up to, or occupy any float, dock or other harbor facility without first obtaining permission from the owner thereof. Use of the public docks is limited to 15 minutes for loading and unloading passengers and supplies on recreational boats; while commercial uses are expressly prohibited.
(8) It is unlawful to beach, anchor, launch, or retrieve boats, vessels or personal watercraft of any type in areas marked by signs prohibiting such actions.
NOTE: Any vessel found in violation of these and other regulations is subject to be impounded by the Lifeguards or Police and fees charged for the impounding; and the operator or owner may be prosecuted if applicable.

Launching and Removal of Boats

(1) Boats may only be launched and removed at areas designated by the City. There are four concrete public launch ramps at various locations in the bay, and one hard-sand, hand launch area located on El Carmel Point.
(2) It shall be unlawful to launch or remove any vessel over any seawall, sidewalk, street end, public or private property, except at locations or businesses designated for such purposes.

Noise Levels

(1) The exhaust on every motorboat shall be effectively muffled at all times to prevent any excessive or unusual noise.
(2) Motorboats must not exceed the following noise levels (measured at a distance of 50 ft.) based on the manufacture date of their engine(s):
(a) built before January 1976 — 86 dbA;
(b) built on or after January 1, 1976 and before January 1, 1978 — 84 dbA; and
(c) built on or after January 1, 1978 — 82 dbA.

Dogs and Other Animals

(1) No person shall bring any dog, whether leashed or unleashed, on any public beach or public park in the City of San Diego between the hours of 9 a.m. and 6 p.m.; except for seeing-eye guide dogs, and except for on Fiesta Island (not in Youth Camp) and at north Ocean Beach (at the Flood Control Channel). A leash, maximum length of 8 ft., is required at all other times.
(2) It is unlawful to bring, leave, turn loose or allow to go loose, any animal in any beach area or park in the City of San Diego.

Beach Fires, Litter, and Glass

(1) Fires are permitted **only** in the concrete fire rings provided by the City (on most beach areas). Barbecue grills are permitted as long as they do not damage grass or shrubbery, or heat-up the sand/dirt. Hot coals must be dumped into either a fire ring or the special concrete containers designated for that purpose.
(2)It is unlawful to litter, or to deposit waste or rubbish of any kind, or discharge any refuse matter of any description upon the waters, shorelines, beaches or other park areas in the City of San Diego and Mission Bay Park.
(3)Bottles, glasses, cups, and any other glass beverage containers are prohibited on all beach areas, including adjacent sidewalks and park areas.

Swimming

(1) Swimmers should use the designated Swimming Areas, which have lifeguards on-duty daily during the summer season. Swimming and wading is prohibited in all waterski zones, and swimmers should not swim in speedboat areas or far away from shore. If you want to swim a long distance — swim parallel to the shoreline where there are fewer boats and help is close by; do not swim across coves or channels.
(2) It is unlawful to jump or dive from any bridge in Mission Bay; or to swim, dive or play in the Mission Bay Channel.

Fishing

Fishing is permitted in all areas of the bay, except in Swimming Areas, Waterski Landing and Take-Off Zones, Special Events Area, Personal Watercraft Area, and from any bridge. Fishermen in boats should stay away from waterski areas, and are not permitted to anchor in or near the center-span of bridges, or so as to obstruct the free navigation of any area.

Parking

(1) Most public parking lots in Mission Bay Park and the beach areas are closed from 2 a.m. to 4 a.m. daily (with a possible $50 fine); except Dana Basin and West Bonita Cove parking lots. There is a 72-hour maximum limit for parking in all public areas, not otherwise restricted, including streets.
(2) At Santa Clara Point, unattached boat trailers are prohibited between 2 a.m. and 5 a.m. daily.
(3) Parking any vehicles, motorcycles or trailers on any sidewalks, grass, beaches or other park areas not designated for parking is prohibited at all times. Driving off of the paved streets and parking lots is also prohibited.
NOTE: Parking facilities are limited and usually filled during the summer months; for this reason, beach and bay visitors are encouraged to car-pool or use public transportation as much as possible.

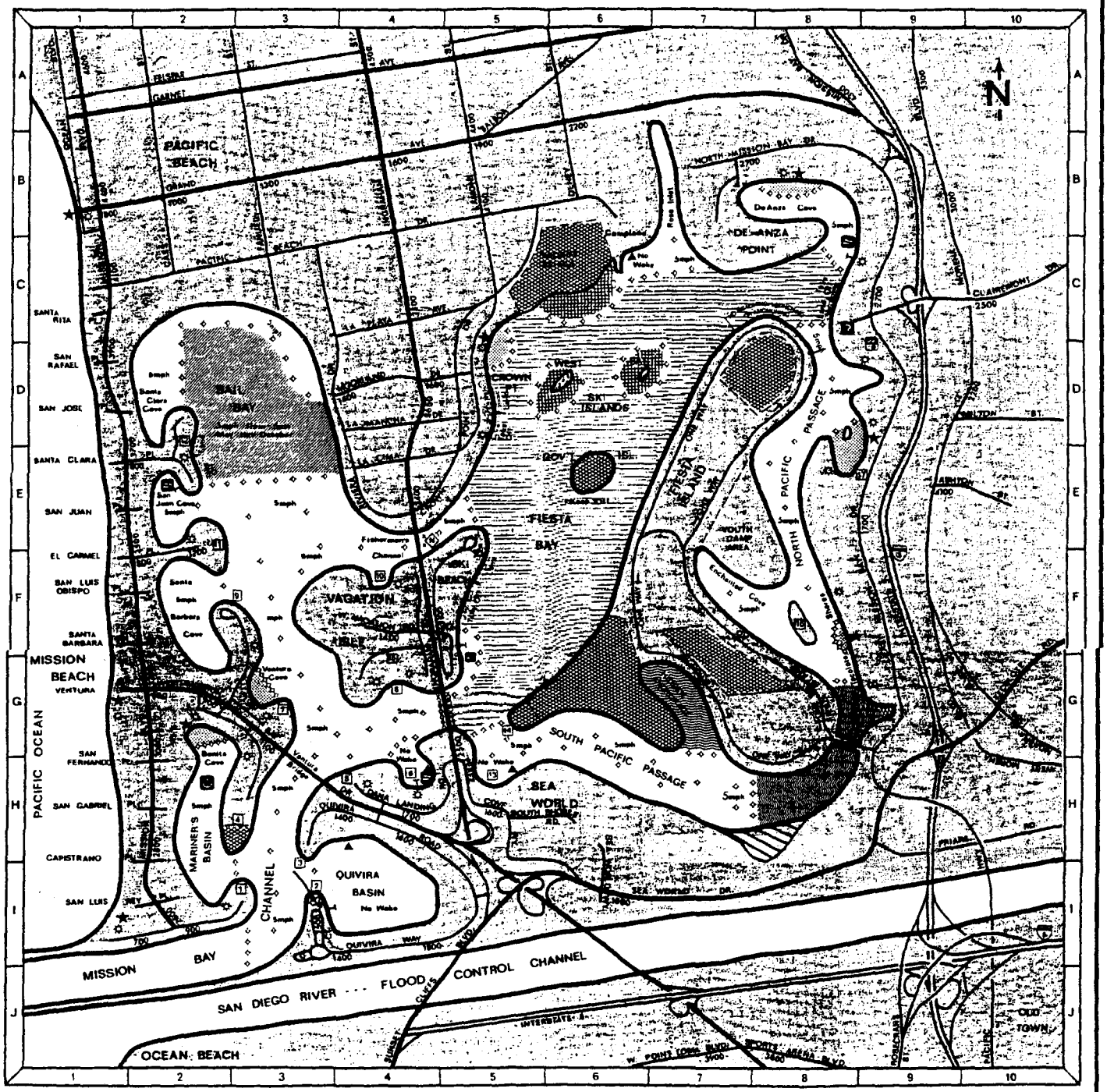
Camping

(1) It is unlawful for any person to camp, sleep or lodge overnight on any public beach or in any public park in the City of San Diego.
(2) It is unlawful to erect, maintain, use or occupy any tent or similar structure on any beach or park area, unless at least two sides are open with an unobstructed view from the outside.
(3) There are two Youth Camp areas provided for organized youth groups, such as Boy Scouts, YMCA, Girl Scouts or similar groups with adult supervision. The areas are located on Vacation Isle and Fiesta Island, with limited availability. A permit (with fee) is required from the Coastal Division office in advance.

Penalties

(1) Any person in violation of "operating under the influence" and doing any forbidden act or neglecting any required duty, which act or neglect causes serious injury to another person, is guilty of a felony and shall be punished by imprisonment in the state prison, or in the county jail for not less than 90 days or more than one year, and by a fine of not less than $250 nor more than $5,000.
(2) Any person in violation of most other boating and park regulations is guilty of a misdemeanor and may be subject to a maximum penalty of imprisonment in the county jail for up to one year, and a fine of up to $1,000, or by both imprisonment and fine. Some violations have lower penalties, and some penalties increase with multiple violations.

MISSION BAY PARK



LEGEND:

- Open Speed/Waterskiing (Daytime Only)
- Waterski Landing/Take-Off Zone (Observe Signs; Counter-Clockwise Direction)
- Sailing Area/Controlled Speed (Read Regulations for Details)
- Special Event Waterski Area (Permit Required for Use)
- Personal Watercraft Area (No Boats)
- Swimming Area (No Vessels)
- Sand Bar (Use Caution)
- Closed Area – Keep Out!

- Mission Bay Park Headquarters (Coastal Division/Lifeguard Services Division)
- Lifeguard Station
- Lifeguard Boating Safety Unit
- S.D. Police Harbor Unit
- Navigational Buoy
- Public Restroom
- Public Dock (15 min. limit)
- Public Launching Ramp
- R. V. Pump-Out
- Transient Vessel Anchorage (72 hr. Limit per Week)
- Visitor Information Center
- Fuel Dock

SPECIAL NOTE: The North Ingraham Street Bridge at Fishermen's Channel is scheduled for re-construction from mid-1988 through mid-1990 and will be closed to vessel passage.

Bridge Clearances: (At Mean Low Tide: 0.0 ft.)

	VERTICAL	HORIZONTAL
Ventura Bridge	42 ft.	116 ft.
So. Ingraham St.	43 ft.	130 ft.
No. Ingraham St.	35 ft.	125 ft.

(See Special Note about construction)

Depths: (At Mean Low Tide; 0.0 ft.)

Mission Bay Channel	20 ft.
Mariner's Basin	20 ft.
Quivira Basin	20 ft.
All Other Areas	8 ft.

Radio Beacon: (North Channel Jetty)

317 MHz "M B" -- ----

Map Locations: (Indicated by Circled Numbers)

NO.	LOCATION	MAP REFERENCE
1	Mission Point	1, 3
2	Hospitality Point	1, 3
3	Islandia/Quivira Point	H, 3
4	Mariner's Point	H, 3
5	Sunset Point	H, 4
6	Dana Basin	H, 4
7	Ventura Point	G, 3
8	South Cove	G, 4
9	Bahia Point	F, 2
10	North Cove	F, 4
11	El Carmel Point	E/F, 2
12	Santa Clara Point	D/E, 2
13	Perez Cove	H, 5
14	Stony Point	G, 5
15	Model Yacht Pond	G, 4
16	Enchanted Isle	F, 8
17	Leisure Lagoon	E, 8

SCALE: 1 in. equals approx. 1200 ft.

0 1200 2400 3600 ft.

0 1 2 3 in.

REVISED JULY, 1988

Appendix G

DESIGN GUIDELINES

Prepared by

Wallace Roberts & Todd

CONTENTS

FIGURES

I. OVERVIEW

This report summarizes the Design Guidelines proposed to guide the continuing development of Mission Bay Park as it further matures into a unique, world-class water-oriented recreation area.

The Design Guidelines address functional and aesthetic issues in the following categories: Site Design, Landscape, Architecture, and Signage. By necessity, the Guidelines are general in nature, not site-specific. As the Park develops, more detailed designs will be conducted on a project-specific basis in accordance with the goals and objectives of the Master Plan Update.

USING THE GUIDELINES

The Design Guidelines should be used as a "baseline" from which to develop project and site-specific design solutions for Mission Bay Park. They provide minimum standards, where necessary, along with specific statements of design intent to help designers generate creative and innovative solutions for all Park improvements.

In the relatively unimproved areas of the Park, namely Fiesta Island and South Shores, the Guidelines should be applied fully as new park improvements are contemplated. In established areas of the Park, the Guidelines should be relaxed where overriding existing conditions preempt their implementation. In such cases, the provisions of the Guidelines should be pursued "to the greatest extent possible," as conditions permit.

SPECIAL PROVISIONS

By virtue of their site layout or level of improvement, some areas of the Park require special design consideration and/ or exemption from Guideline provisions. Reference to such cases is made in the Guidelines under the heading "Special Condition, page 9."

Fig 1: Aerial View of Mission Bay Park
(As described in the Master Plan Update)

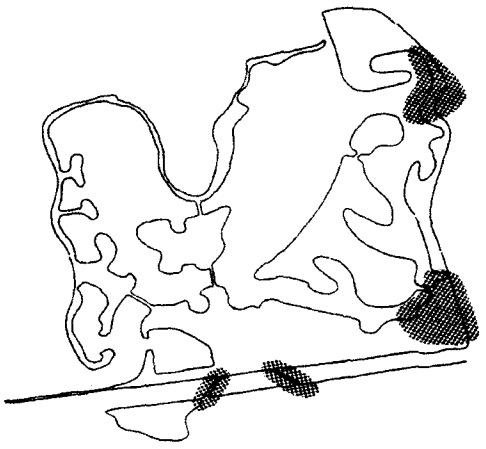
II. SITE DESIGN

Site design includes the overall control of views, the organization of public recreation areas, roads, parking and paths, and the types of furnishings required to support recreational activity. The general intent of the Site Design Guidelines is to ensure optimum, secure, and comfortable visual and physical access to the shore areas and water bodies of Mission Bay.

VIEWS AND ACCESS

Mission Bay Park is highly visible from a number of public roadways. These include the southbound lanes of I-5 between Grand Avenue and Clairemont Drive; the westbound lanes of 1-8; the Friars Road, Pacific Highway, and Mission Bay Drive entrances; the Midway Drive, Ingraham Street and Sunset Cliffs Boulevard bridges; and Clairemont Drive as it descends from the Clairemont hills, among several surrounding roadways. The Park area visible from any one of these vantage points is called a viewshed.

1. Viewshed Controls: To ensure as unencumbered and amenable a view of the bay environment as possible, no structure, earthform, or landscape feature should be constructed within the major public view corridors, or viewsheds, so as to impede, diminish or negatively affect the view of the Bay's environment.



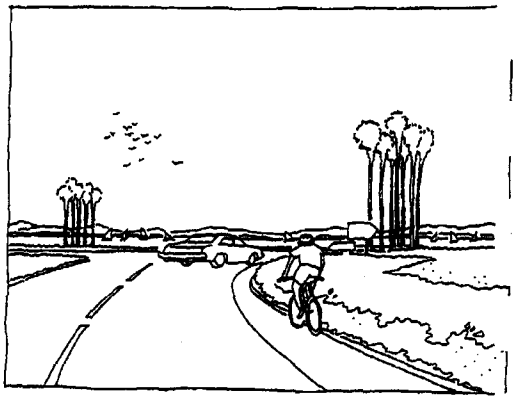
Viewsheds

2. Public Access Corridors: Around Sail Bay and the western coves and basins, views of the Bay from public access corridors should be maintained and enhanced. Palm trees or other landscape features placed along the beach to meet the landscape provisions of these Guidelines should not screen more than half the view of the water as seen one block away from the Park from any of the public access corridors (see Figure 2).

Property owners within 300 feet of any proposed beach improvements affecting private view corridors should be notified and allowed input when such projects are in the schematic design phase.

3. Billboards: Consideration should be given to examining and enforcing the City's billboard policy with the aim of restricting the placement of billboards that block the view of the Park from surrounding roadways and public access corridors.

4. Gateways: It is normal for entrances to urban Parks to be marked or "posted" by signs and special landscaping. However, Mission Bay Park is characterized by its expansiveness, particularly as seen from the approach roads to the Park. Accordingly, the Park's regional gateways (roadways leading to South Shores, East Shores and Fiesta Island) should stress open views into the Bay, containing as little visual clutter and interference as possible. The arrival experience should be felt like a "release," or open view, rather than a "pinch," or framed view. "Welcome to Mission Bay Park" signs should be part of the gateways, but designed as secondary, not primary, features.



Gateway

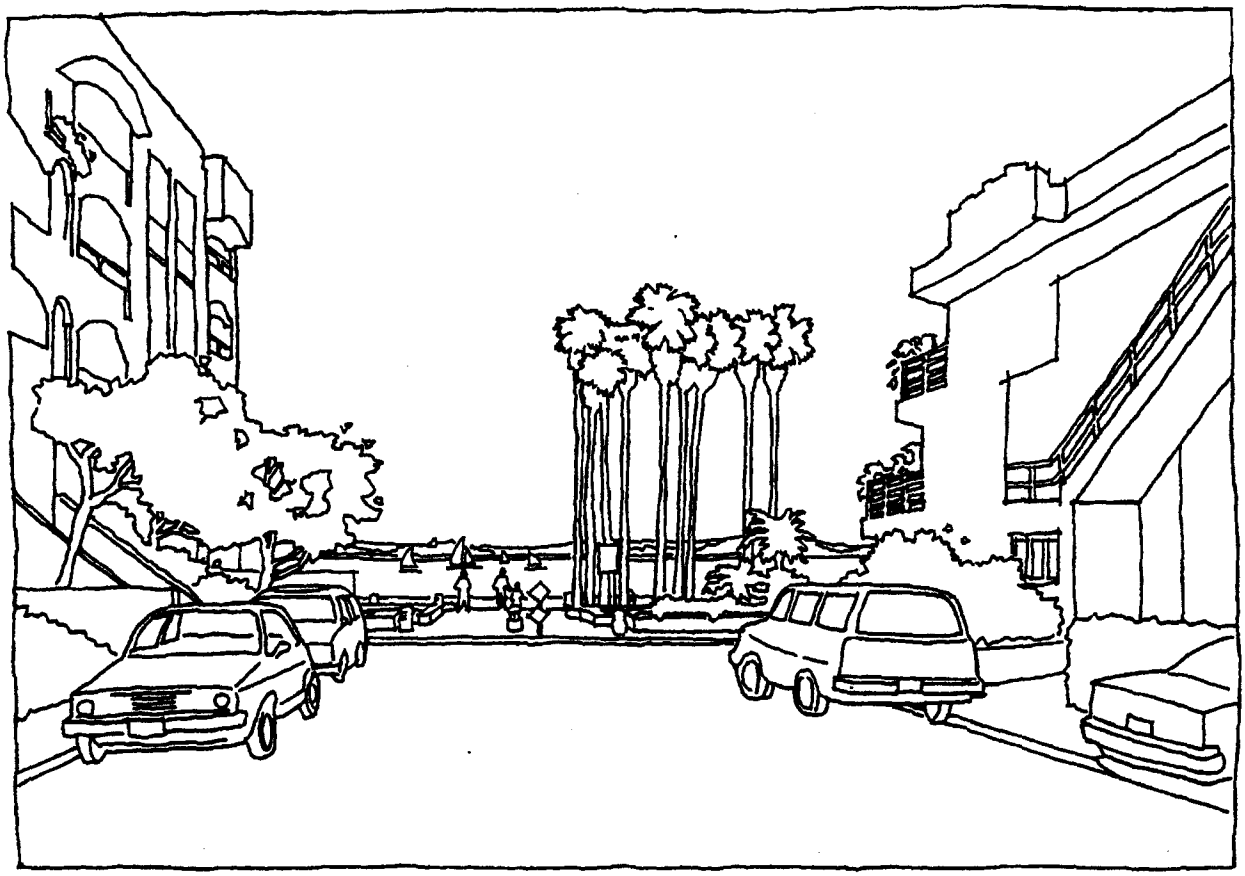
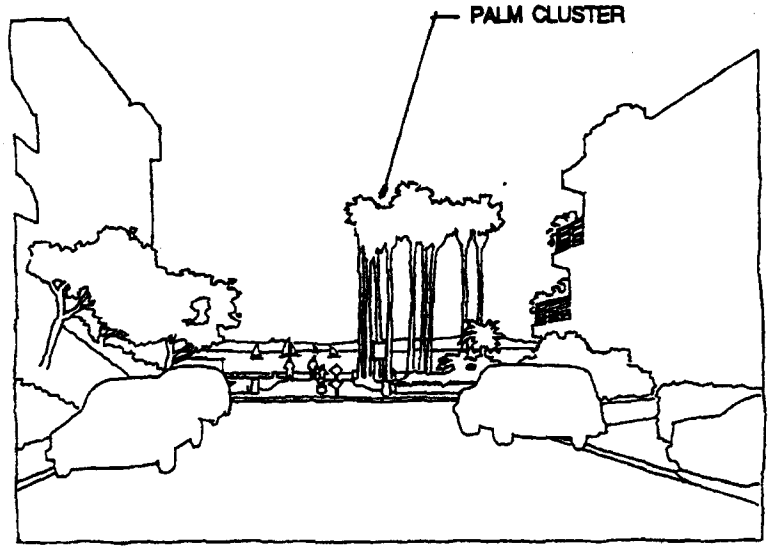


Fig.2: Public Access Corridor

/ EQUAL / EQUAL /
/OPEN VIEW /FILTERED VIEW/



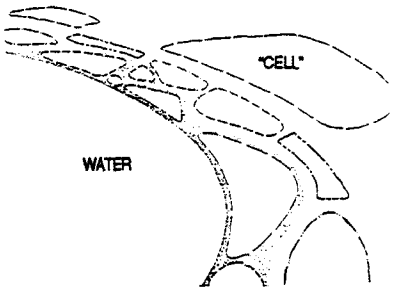
As is discussed further in this report, the perimeter of the Park should have a consistent, naturalistic and coastal-oriented landscape treatment. The intent is for visitors to be aware as they arrive at the Park that they have entered a distinctive area of San Diego. Each entry road, therefore, will function as a gateway, without the addition of artificial, forced "gateway features."

Signage informing visitors of Park events and directing them to their destinations should be part of the Park gateway areas. Such signage, however, should not dominate the view from entrance roadways and paths.

PARKLAND

Parkland is defined as the turfed areas adjacent to the Park's beach and water areas. Parkland areas are used for picnicking, sunbathing, kite-flying, and informal play, and are in very high demand at Mission Bay Park.

5. Water Influence Zone: Following on-site investigations, it has been determined that the primary parkland zone in level areas of the Park lies within 300 feet of the water line. Beyond this distance, the water becomes barely visible and the shore becomes difficult to police. Accordingly, new regional parkland areas should be planned to take maximum advantage of this water-influence zone, providing a variety of recreational environments from wide open beach areas to shady, more intimate picnic groves and open play areas. Roadways and secondary recreation facilities should be planned beyond 300 feet from the shore.



Activity "Cells"

6. Activity "Cells": Within the primary water influence zone, parkland areas should be designed as a series of discrete recreation "cells," each with its own spatial character according to the planned activity it is intended to accommodate. For example, the turfed areas should have both open "cells" for informal play and shaded, palm-planted "cells" more suitable for lounging and picnicking. Some turf areas should be in close proximity to the water, while other areas should be more removed, allowing for a deeper beach.

Similarly, beach areas should contain wide and narrow areas, used, respectively, for play and for sun bathing "out of the line of fire." The "cell" approach will generate a meandering turf frontage offering a variety of views and spaces in what otherwise is a linear, homogenous landscape.

7. Active, Informal Play Areas: Turfed areas lying inward from the park road should be designed to accommodate active, informal play — not scheduled league or tournament activities (excluding Robb Field and the Pacific Beach Athletic Fields). Alternatively, where appropriate, portions of these areas should be mounded or sloped to encourage passive activities with improved views of the water.

8. Restroom Facilities: Restroom facilities should be placed to the rear of the parkland zone, proximate to parking areas for easy service and maintenance and to minimize their obstruction of the water.

SHORE ACCESS

As a water-oriented recreation area, the Park's shore should remain accessible for public use throughout its length. Public access to the shore should be secure and safe, providing sufficient visibility from adjoining facilities and allowing access by patrol and emergency vehicles. In addition, such access should be sufficiently wide to permit the Park's landscape to flow through it, maintaining its continuity along the shore.

9. Public Use Zones: Within leasehold areas, a 150-foot minimum public use zone should be maintained along the beach areas of the shore measured from the mean high water line (elevation +2.01 MSL datum). Along bulkhead or rip-rap areas of the shore, a 50-foot minimum public use zone should be maintained measured from the top of bulkhead or rip-rap. The Park's combined bicycle and pedestrian path should be sited within the public use zone.

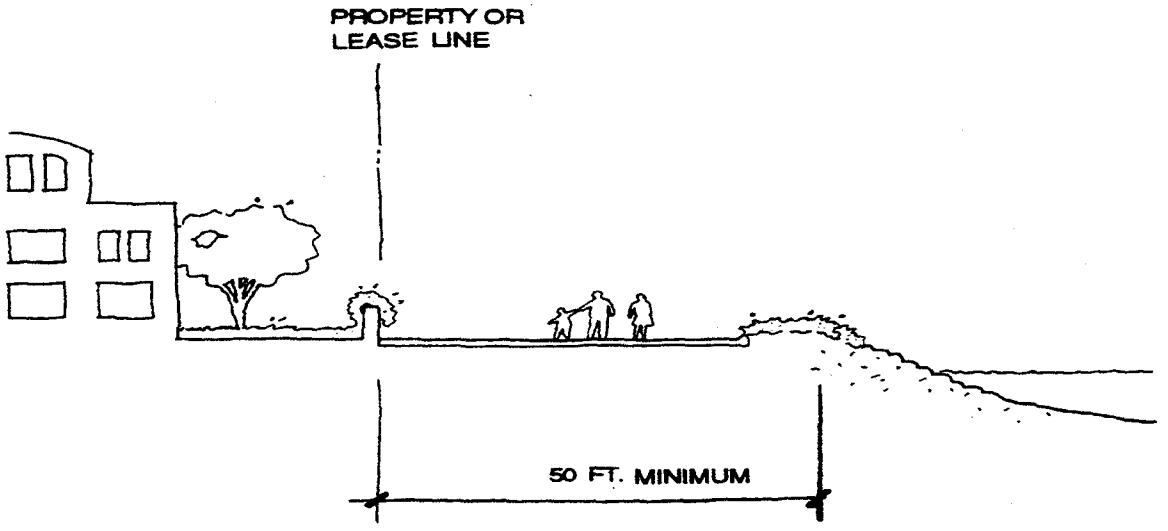


Fig.3: Public Use Zone - Bulkhead/Rip-Rap Areas

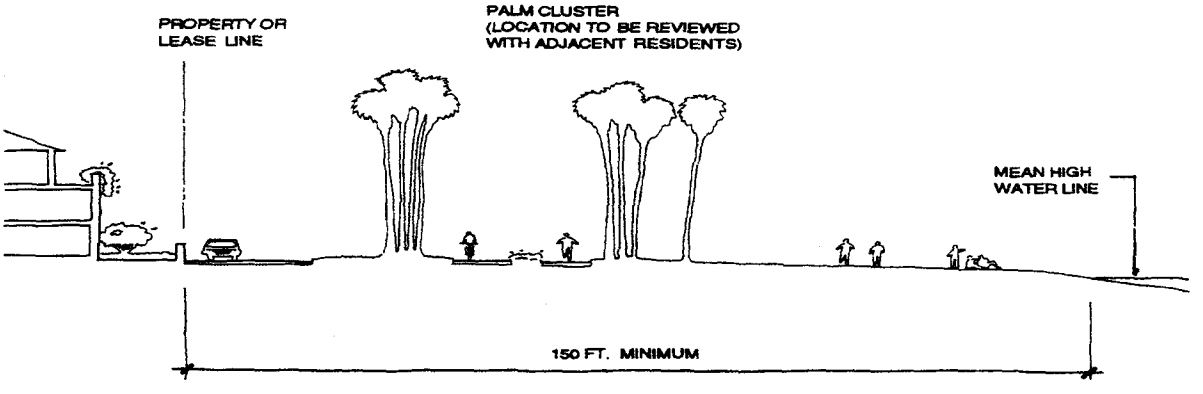
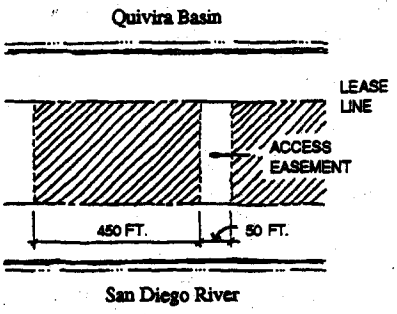


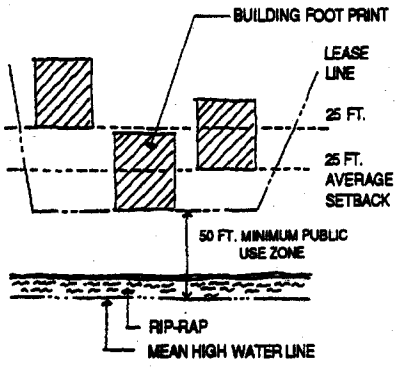
Fig.4: Public Use Zone - Beach Areas

Special Condition - Bahia Point: Because of the narrow land area available for the continuing operation and redevelopment of the Bahia Hotel, the public access zone may be narrower than as stipulated above, so long as a continuous, smooth-curved pathway for bicycles and pedestrians is provided along the entire perimeter of the Point.



Special Condition - Quivira Basin: Due to the proximity of the Bay to the San Diego River in the southern portion of Quivira Basin, access easements between the two shores should be maintained at intervals of not less than 450 feet. For security reasons, and contrary to the public use zone, these would be easements within a leasehold, and should be permitted to be secured after hours. The easements should not be less than 50 feet in width between any proposed buildings.

Special Condition - De Anza Cove: To minimize impact of any proposed development to the envisioned habitat areas at the outfall of Rose Creek, the public use zone should be not less than 100 feet in width on all sides facing the wetland areas, regardless of the shore treatment.



Building Setback

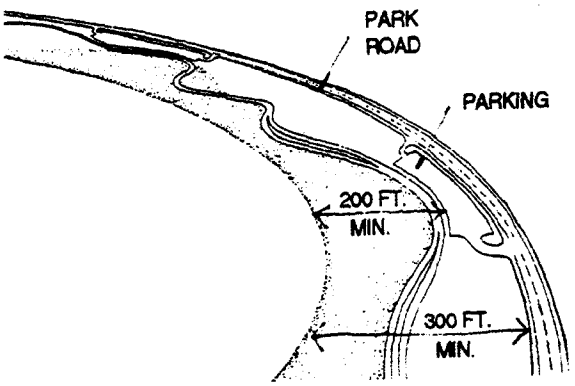
10. Building Setbacks: In leasehold areas, buildings and landscape should be sited with the aim of enhancing the experience and use of the Park's waterfront (see following sections on landscape and architecture). Creating a varied building frontage along the public use zone to allow for landscape planting and other amenities between buildings would support this objective. To this end, buildings shall be set back an average of 25 feet from public use zones.

Swimming pools, terraces, lawn and planting areas should be placed in the setback areas. The intent is to use these setback areas as a means to add interest and visual amenity to the public use zone immediately adjacent to the water . For the purpose of computing the average setback depth, buildings sited beyond 50 feet from the public use zone should not be part of the calculation. This guideline will encourage a varied building frontage ranging from zero to 50 feet, or conversely, a uniform minimum setback of 25 feet from the public use zone.

ROADS & PARKING

The Park's roads and parking areas serve access, emergency and security functions. Such facilities should be conveniently sited to serve the recreation areas of the Park, but without detracting from the landscape, the views, and the physical space required for recreation. Notwithstanding the guidelines that follow, all new roadway and parking improvements should meet design criteria for safety as set by the City's Engineering and Development Department.

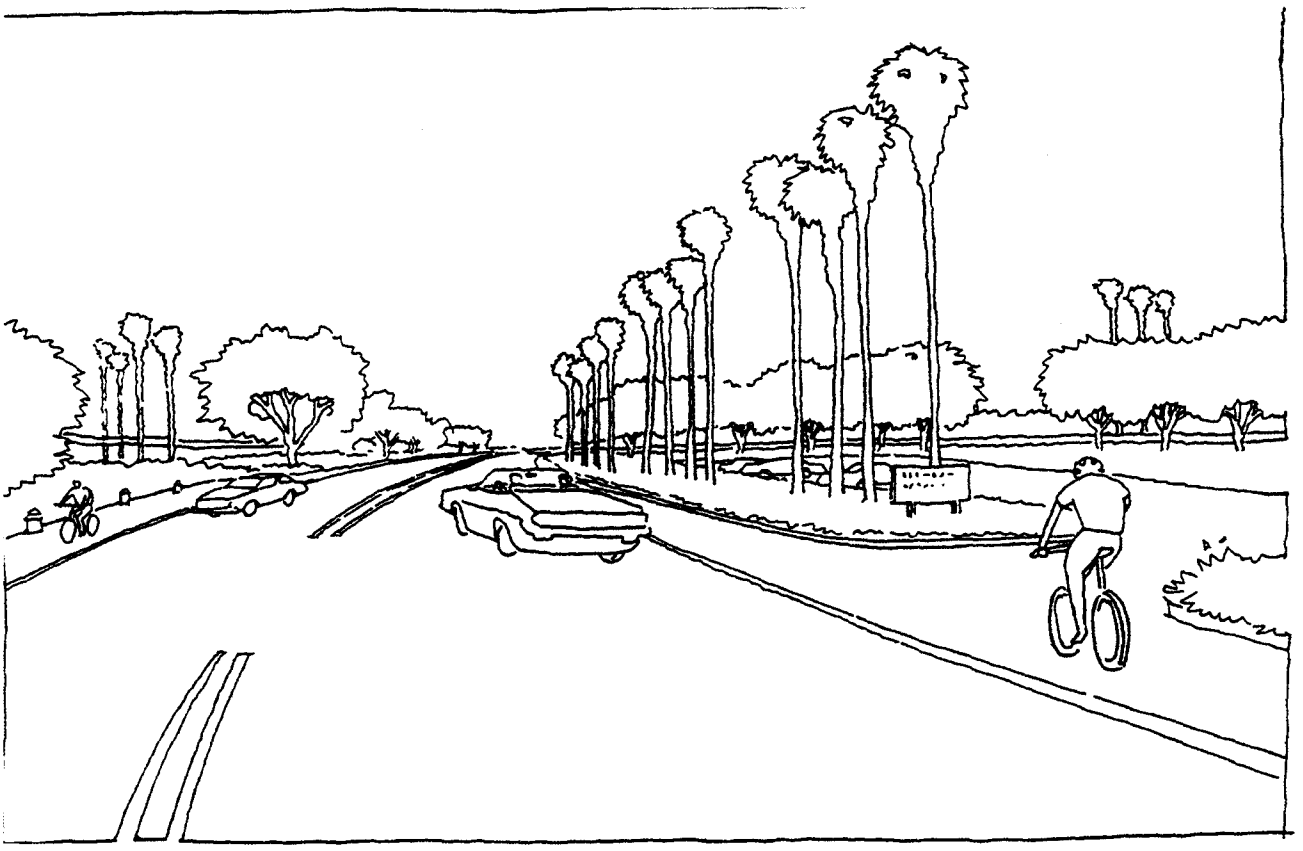
11. Waterfront Clearances: Park roads should be placed outside the 300-foot beach frontage zone wherever possible. Parking lots should be spaced along the road and, where physically possible, not closer than 200 feet from the mean high water line. This guideline will result in a 200 to 220-foot minimum parkland depth, which is adequate for flexible play and recreation and for supervising the waterfront from the park road and parking areas. Parking lots should be limited in size (not continuous) along the park road. This would allow for a greater depth of parkland between the lots, which enhances visual access to the water while creating larger areas for picnics and play.

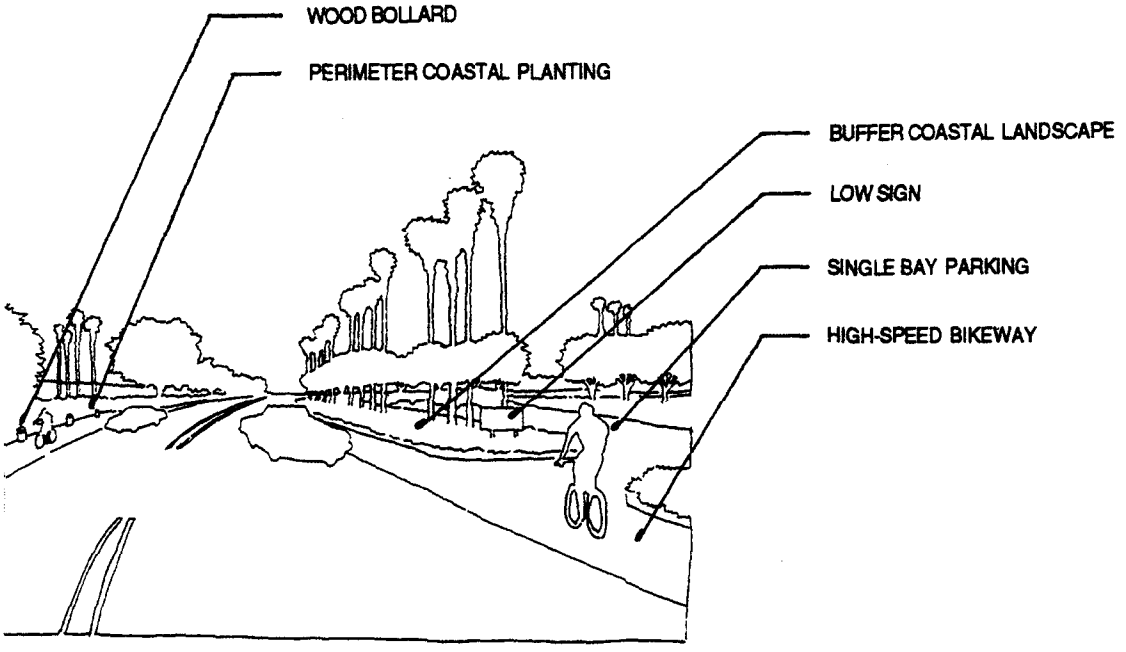


Park Roads & Parking

12. Roadside Parking: To maintain views of the Bay, patrolling of parkland areas, and to enhance circulation safety, curbside parking along the park road should be prohibited in new development areas, and eliminated in existing parkland areas to the greatest extent possible. Any "lost" parking should be regained in the proposed overflow parking area in South Shores, which will potentially be served by a public tram on peak days.

13. Roadway and Parking Design: To reinforce the Park's unique aquatic identity, roadways and parking areas, and all right-of-way features such as lights, signs, curbing, etc. should be uniquely different in material, form, color and texture from that of surrounding city streets. Asphalt paving, for example, should have a coarser texture, or a different stone for aggregate; curbs could be deleted and colorful landscape brought to the edge of the road (where vehicle control is necessary, bollards in place of curbs should be considered); and street lights and signage poles should be of a distinctive style.




WOOD BOLLARD
PERIMETER COASTAL PLANTING
BUFFER COASTAL LANDSCAPE
LOW SIGN
SINGLE BAY PARKING
HIGH-SPEED BIKEWAY

14. Provisions for Persons with Disabilities: The design of parking areas shall comply with the Americans with Disabilities Act of 1992. In addition, water access for persons with disabilities should be provided throughout the Park, where appropriate.

14a. Commercial Parking Standards - The following minimum parking standards shall apply to all new development, additions or redevelopment of existing leaseholds within the Park. Upgrading of existing leaseholds parking facilities can take the form of surface parking, underground parking or parking structure, where appropriate and size requirements permit. The total number of required parking spaces may be relaxed (up to 1/3) where uses overlap within a leasehold and such multiple use is documented by site specific analyses or shared parking studies.

HOTEL	1.0 space per guest room without kitchen 1.0 space per studio unit with kitchen 1.0 space per one-bedroom unit with kitchen 2.0 spaces per two-bedroom unit with kitchen 1.0 space per 300 gross square feet for hotel operations
RESTAURANT	1.0 space per 200 gross square feet, including outdoor dining areas
BANQUET ROOM	1.0 space per 200 gross square feet
MEETING or CONFERENCE FACILITIES	1.0 space per 200 gross square feet
RETAIL	1.0 space per 500 gross square feet
SCIENTIFIC RESEARCH & DEVELOPMENT	1.0 space per 500 gross square feet
MARINA	1.0 space per three boat slips
BOAT MAKING, REPAIR & SALES	1.0 space per 1,000 gross square feet

SPORTS FISHING	20 spaces per charter fishing boat mooring space
AMUSEMENT/THEME PARK	Parking requirements shall be determined by detailed traffic/parking analyses

BIKEWAYS AND PEDESTRIAN PATHS

Recent statewide, as well as localized, surveys on recreation confirm that walking, jogging and bicycling are highly preferred recreation activities in California. This is also the case in Mission Bay Park according to the telephone survey conducted as part of the Master Plan Update. Functionally, the paths should afford the highest possible degree of safety and suitability for moving around the Park. Because of their high use, the paths should be envisioned as a likely target for the Park's art program, both as a means to guide people to art installations and as art works in and of themselves. In the words of artist David Antin, "the paths should be viewed as a vehicle for 'terrain drama,' whereby sections of the walkways, with the use of distinctive materials, could express the unique qualities of every environment in the Park."

15. Types and location of Paths: The Park's paths serve two main user groups: pedestrians, joggers, and other individuals on foot; recreational bicyclists, in-line roller skaters and other individuals on wheels. To meet the needs of each group, each type of path should be designed as a separate and dedicated Park facility.

The conflict between pedestrians and cyclists/skaters primarily involves individuals that ride for exercise and/or commute on bicycles rather than for a casual, relaxed recreation. The first group, or touring cyclists/skaters, prefers to ride on the park road to avoid potential conflict with pedestrians. For this reason, dedicated class 2, paved bicycle lanes should be provided along the park road, while a "combination" pedestrian and bicycle (low-speed) path should be provided within the parkland, beach and waterfront promenade areas of the Park.

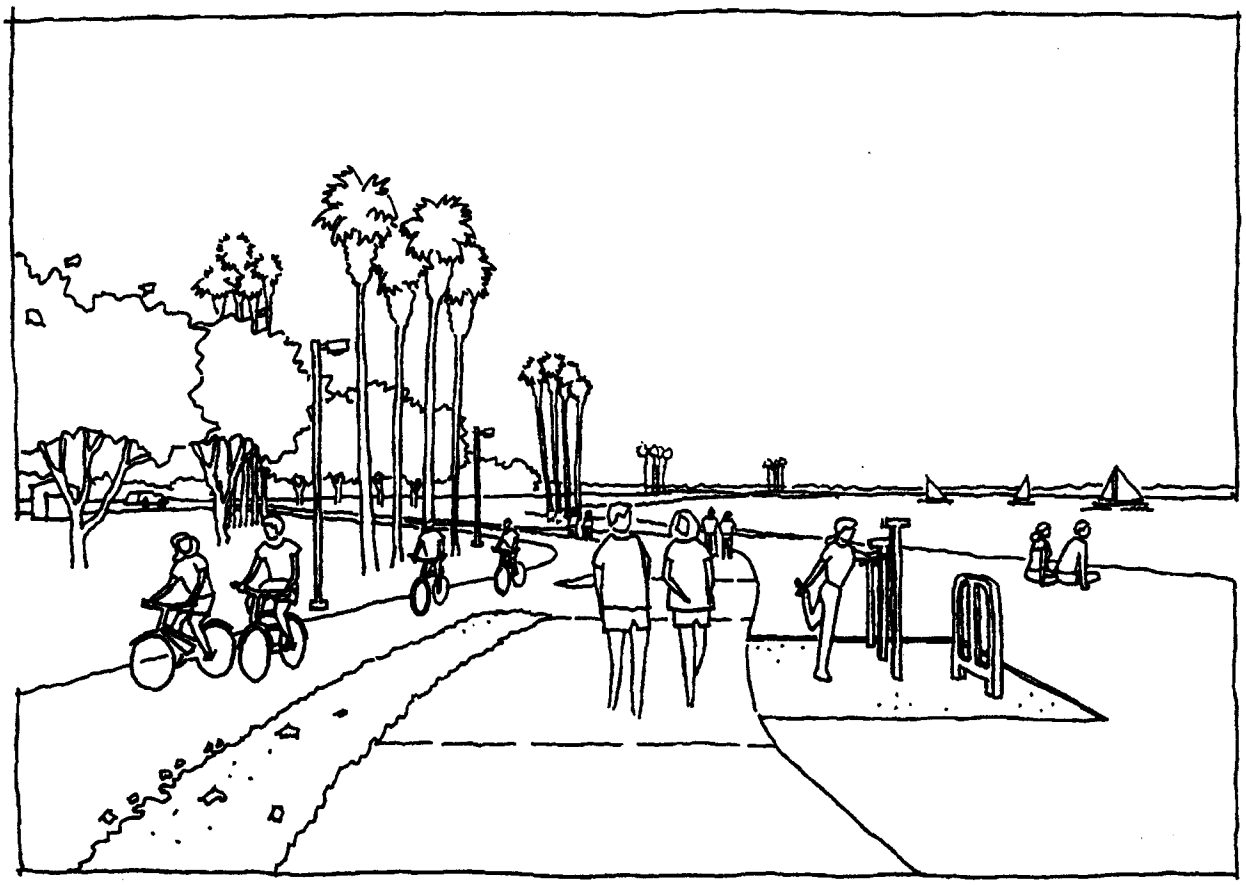
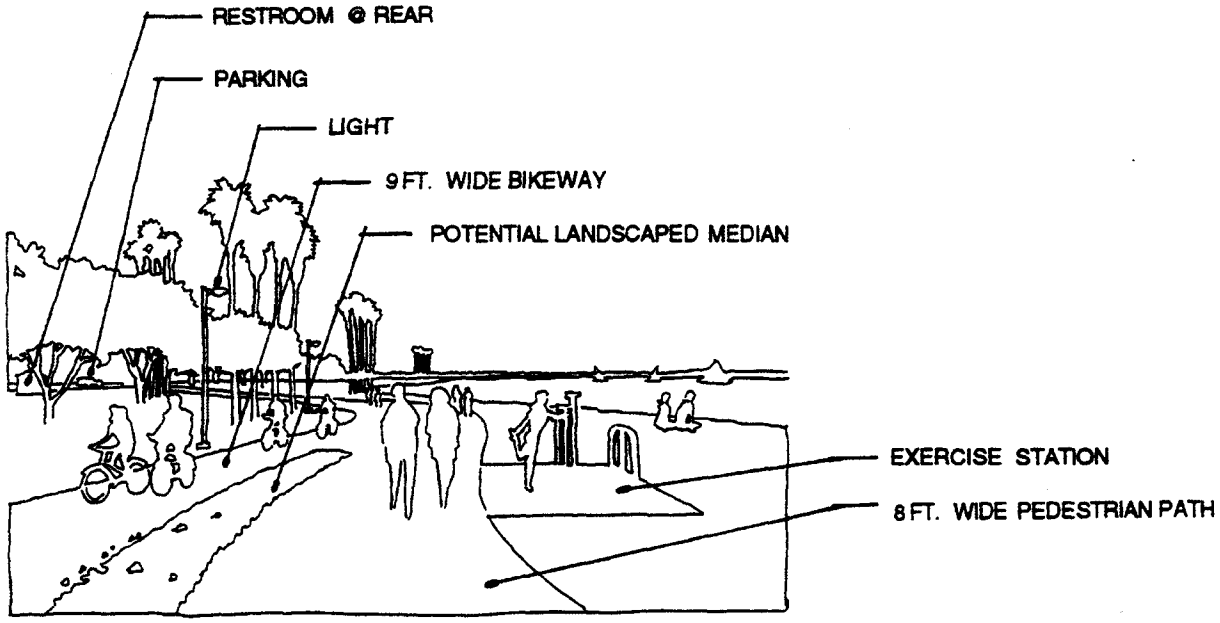
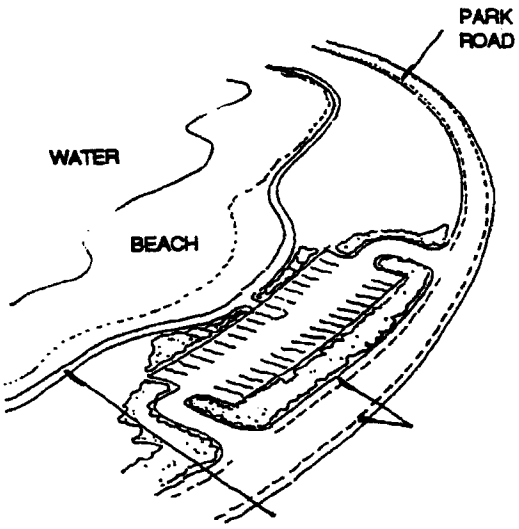


Fig.6: Low-Speed Hikeway and Pedestrian Path





"Combined"Path & High Speed Bikeway

16. "Combined" Pedestrian and Bicycle Path: The combined pedestrian and low-speed (posted 5 m.p.h.) bicycle path should have a minimum width of 17 feet: 9 feet dedicated for bicycles and skaters (and service and emergency vehicles), and 8 feet dedicated for pedestrians. Pedestrians should circulate in the section closest to the water. A four to ten-foot landscape strip should separate the two sections wherever possible. The combined path should also meander along the parkland, varying in proximity to the water to afford as diverse and enjoyable an experience of the Bay as possible.

In constrained, narrow areas of the waterfront, the landscaped median may be dispensed; in such cases, the overall width of the path should not be less than 16 feet, and a painted line should separate the foot path from the bikeway.

In all cases, clearly marked symbols or signage should inform park users of the function of each path.

LIGHTING

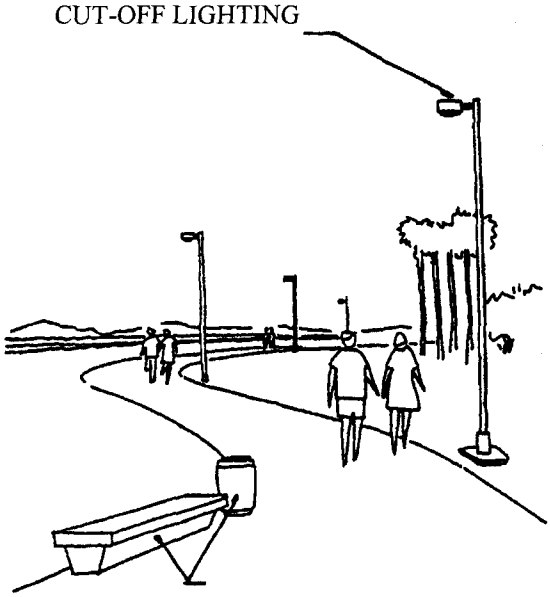
Lighting in the Park serves two functions, security and nighttime use. Currently, no areas of the Park are lit for nighttime use, which encourages the use of illicit or undesirable activities while limiting the Park's potential hours of legitimate operation.

17. Parking and Path Lighting: In recognition of their recreational and functional value, the Park paths and parking areas should receive a continuous level of illumination for nighttime use and security purposes. As nighttime use would be less than daytime use, only a portion of each parking lot should be lighted, preferably that area closest to the water to provide residual illumination into parkland or beach areas.

18. Lighting Standards: Lighting should be provided by cut-off, non-glare pole fixtures. The height of light fixture shall be 12 to 15ft above the adjacent surface of the path. 2-1/2 to 3-1/2ft height bollard-type lights should be used where the combined path fronts residential and/or resort hotel areas so as not to affect the nighttime view of the Bay from residences and guest rooms.

The level of illumination should be a minimum of 1/2 footcandle at ground level. Average to minimum uniformity ratio shall be no greater than 4 to 1 within the paved area. Ambient light supplied by surrounding buildings should be considered when determining the lighting requirements for the Park.

CUT-OFF LIGHTING



NATURAL COLOR CONCRETE
BENCH & WASTE RECEPTACLE

Lighting & Furniture

FURNISHINGS AND FENCES

Park furniture includes picnic tables, benches, waste receptacles, drinking fountains, lighting, flagpoles, bike racks, hot-coals dispensers and other miscellaneous features. The Park's furniture should be durable and vandal resistant. More importantly, it should be inconspicuous; that is, be a background element that serves its purpose without detracting from the landscape.

19. Furnishing Standards: The Park's furnishings should be reasonably consistent and compatible in style throughout the Park, and of durable materials and forms that blend with the landscape. Light sand blasted, natural color concrete is a durable and inconspicuous outdoor furniture material. It should therefore be predominant in the Park.

To blend with the landscape, any necessary metal furnishings, such as bike racks, for example, should be painted in neutral, matte tones, or be plastic coated. Bike racks should be placed to the land side of the bicycle path. Free-standing, portable, metal waste receptacles should be phased out.

20. Fences and Walls: One of the amenities of Mission Bay Park is its openness. In most areas of the Park, the eye can rove around without being obstructed by walls, screens and other barriers. Some barriers are unavoidable, how-ever, such as fences between public areas and private leaseholds. In such areas, utility or security fences should be as inconspicuous as possible and be screened by landscaping. In no case should barriers, hedges or fences exceed a height of 7 feet; taller fences would become too prominent in the context of the Park and begin to be seen as a visual barrier rather than an access control feature.

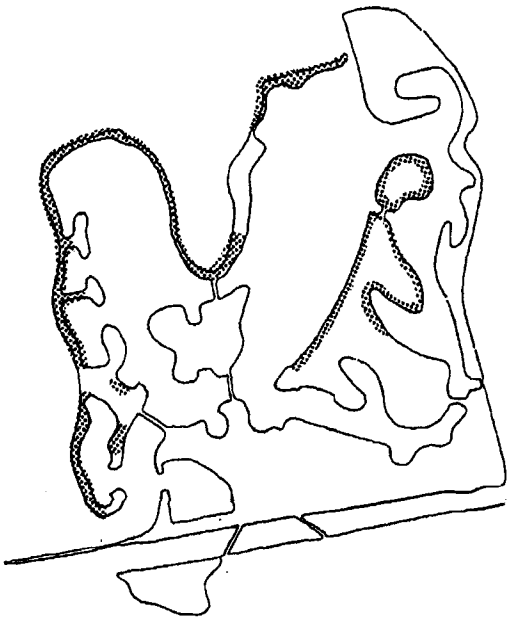
III. LANDSCAPE

The general aim of the Park's landscaping is to help define Mission Bay Park as a special recreation resource, uniquely different from other City parks in form and character, and attuned to the Bay's coastal setting. It is also and objective to reduce the consumption of water for irrigation by emphasizing the use of drought-tolerant plants wherever not in conflict with the Park's recreation and land use functions. To meet these objectives, and to ensure that the Park's landscape efficiently accommodates the various planned recreation activities, tour broad landscape types are recommended: Beach/Coastal Strand; Coastal Sage Scrub; Mediterranean; and Parkland. These landscape types reinforce the overall land use pattern proposed for the Park as defined in the Master Plan.

BEACH/COASTAL STRAND

The Beach/Coastal Strand landscape is associated with the open beach areas, such as in Sail Bay or the west side of Fiesta Island.

21. Coverage and Intent: In the Beach/Coastal Strand landscape, the sandy (beach) areas should be "backed up" by front line dune and strand plants such as Beach Sand-Verbena (Abronia maritima, A. umbellata), Beach Evening Primrose (Oenothera spp.), and Beach Saltbush (Atriplex leucophylla). The placement of these plants should be restricted to buffer areas and non-activity zones like the stretch on Sail Bay between the public path and the residential fencing. The intent is twofold: 1) to add low-scale color and texture to the long stretches of sand, and 2) to create more naturalistic recreation areas emphasizing the native coastal landscape.



Beach/Coastal Strand

The Beach/Coastal Strand landscape should also border the Park's existing and proposed marsh areas so as to establish and ecologically integrated wetland and upland landscape to the greatest extent possible.

22. Use of Palm Trees: Mexican Fan Palms should be among the plants to be considered in the Beach/Coastal Strand landscape. These plants would break the long stretches of sand providing shade and more intimate gathering areas. The palms should be placed in widely spaced clusters, sited to minimize their impact upon the views from adjoining homes, apartments or Park access roads. Palms should not be placed in the vicinity of Least

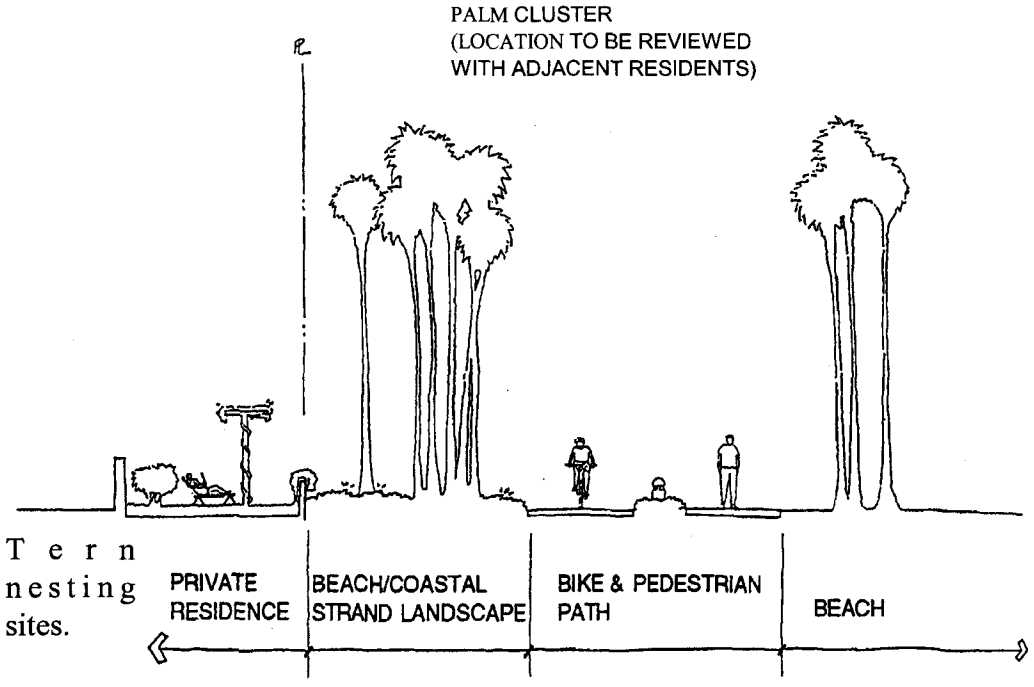


Fig. 7: Beach/Coastal Strand Landscape at Sail Bay

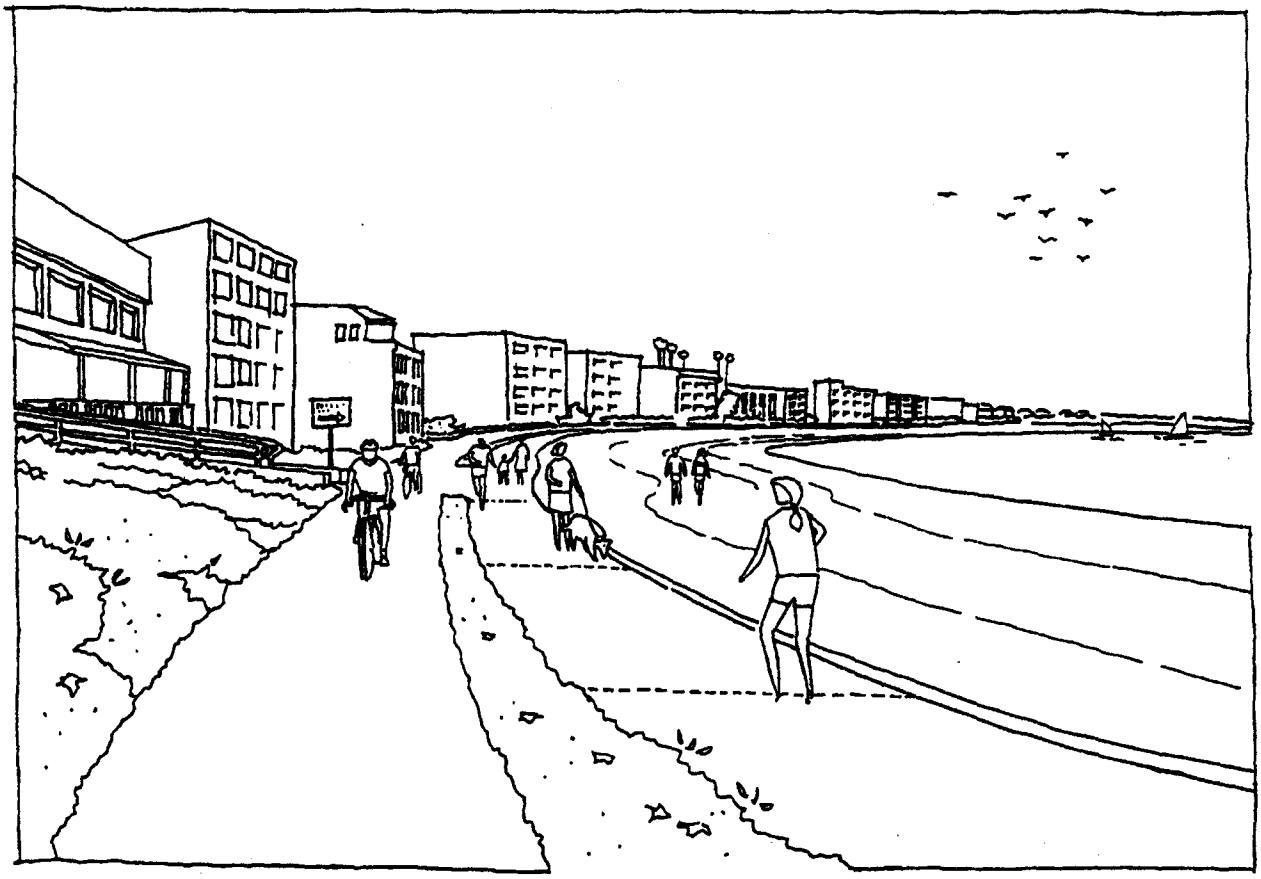
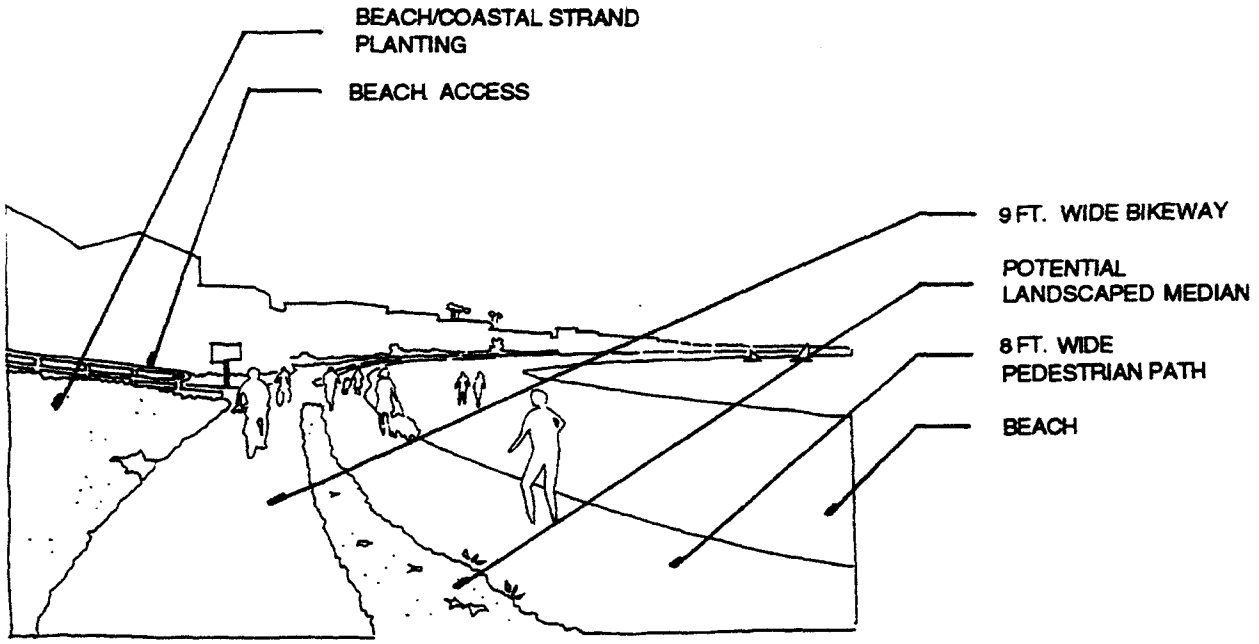


Fig.8: Beach Side Landscape



COASTAL SAGE SCRUB

The Coastal Sage Scrub landscape is associated with the Park's upland habitat areas, buffer and perimeter areas, and non-recreational areas such as roadway berms, parking islands, etc.

Coastal Sage Scrub Landscape (Main Areas)

23. Coverage and Intent: This landscape consists of shrubs, ground cover, palms and trees typical of the coastal environment such as Coreopsis (Coreopsis spp.), Bush Poppy (Dendromecon harfordii, D. rigida), California Sagebrush (Artemisia californica), Wild Lilac (Ceanothus spp.), Hollyleaf Redberry (Rhamnus crocea ilicifolia), Torrey Pine (Pinus torreyana), Coastal Live Oak (Quercus agrifolia) and Coral Tree (Erythrina spp.). These types of plants are drought-tolerant, require little sustained maintenance, and impart a naturalistic character appropriate to a coastal environment. Accordingly, all areas of the Park not directly used and dedicated for active recreation and play should be landscaped with Coastal Sage Scrub plant species. Such areas include upland habitat areas as defined in the Plan, land bordering natural preserves, the stretch of land in East Shores between Mission Bay Drive and I-5, other roadway berms, parking islands, and areas around directional signs, gateways, utility buildings and fences.

The placement of the Coastal Sage Scrub plants should be naturalistic rather than linear or geometric. This will permit the "micro-management" of the landscape to account for special public views, entrances, low or high terrain, etc. Coordination with Caltrans should be exercised to achieve an integrated perimeter landscape between I-5 and Mission Bay Drive.

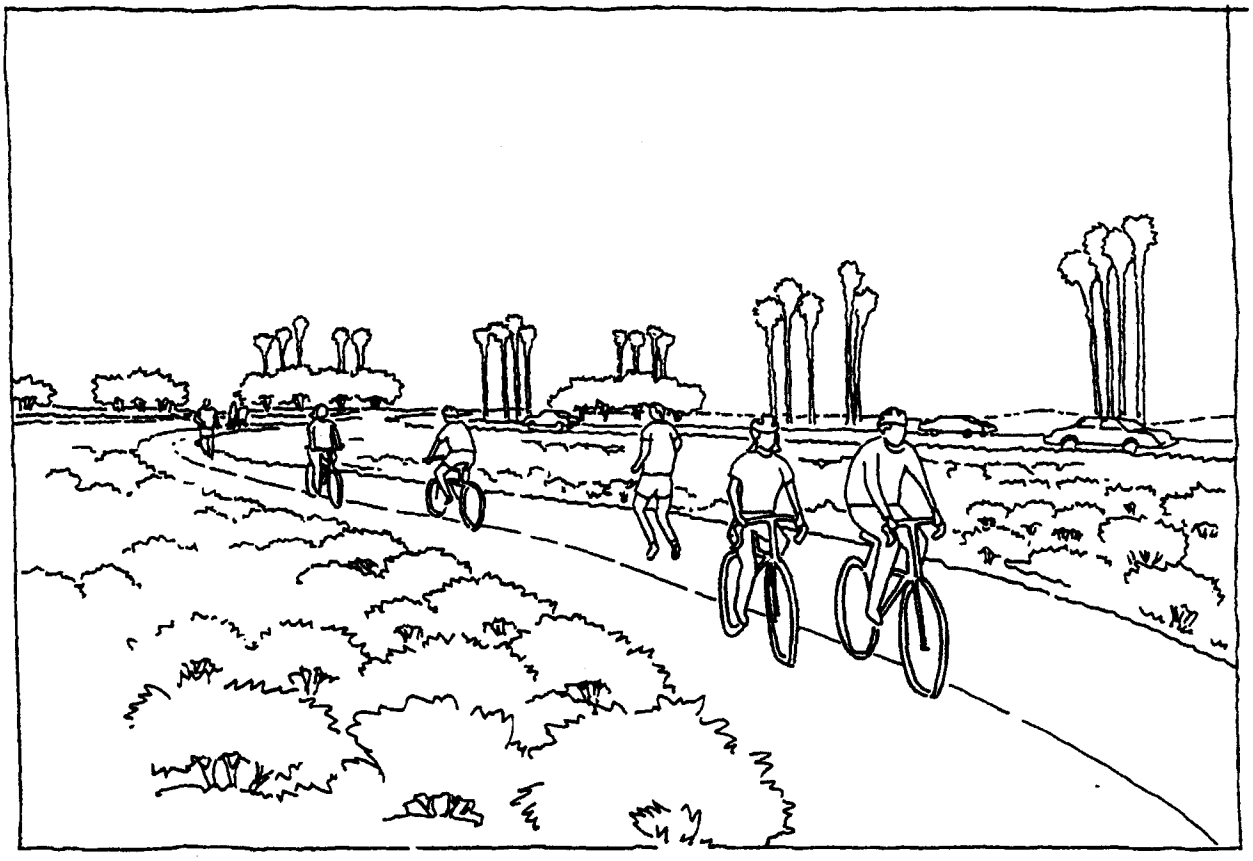
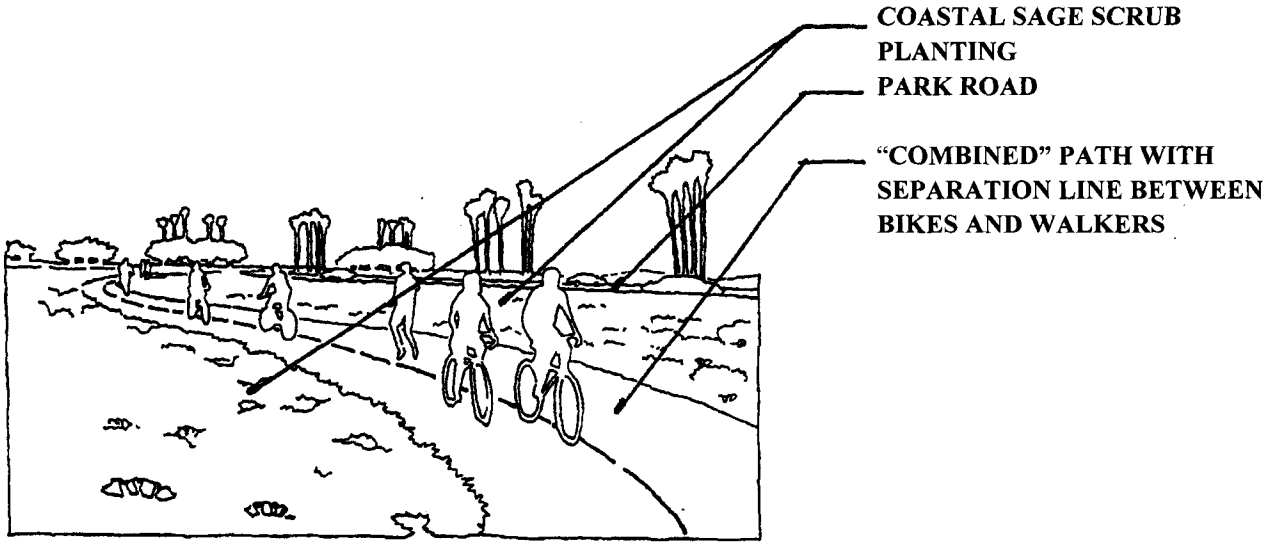
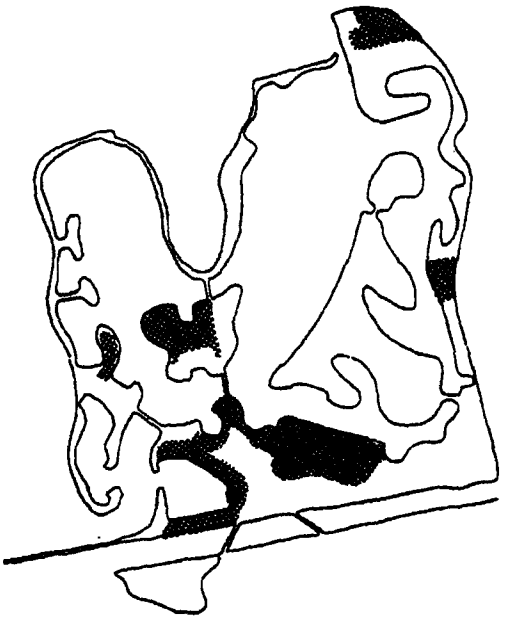


Fig.9: Coastal Sage Scrub Landscape



MEDITERRANEAN

The Mediterranean landscape is associated with the resort hotels, theme park, and other commercial and non-profit lease areas in Mission Bay.



Mediterranean Landscape

24. Coverage and Intent: The Mediterranean landscape consists predominantly of native plants and selected, drought-tolerant species endemic to the world's Mediterranean climates. A typical plantscape would include exotic plants such as Bougainvillea (Bougainvillea spp.), Jasmine (Jasminum spp.), Lantana (Lantana spp.), Jacaranda (Jacar-anda mimosifolia), and Date Palms (Phoenix spp.), and natives such as Aloe (Aloe spp.), Yarrow (Achillea spp.), Lupine (Lupinus spp.) and Mazanita (Arctostaphylos spp.). This class of plants is colorful, attractive, water conserving, and highly appropriate in resort areas, hotels and other pedestrian-intensive areas. Canopy trees like Eucalyptus or non-native conifers are inappropriate to the Bay's coastal setting and should not be permitted. Similarly, plants native to the tropics such as Hibiscus, Philodendron, Musa, etc., should be avoided.

The Mediterranean landscape should also emphasize the use of textured paving, planters, arcades, and pergolas; features that can showcase the plants and mediate between the buildings and landscape.

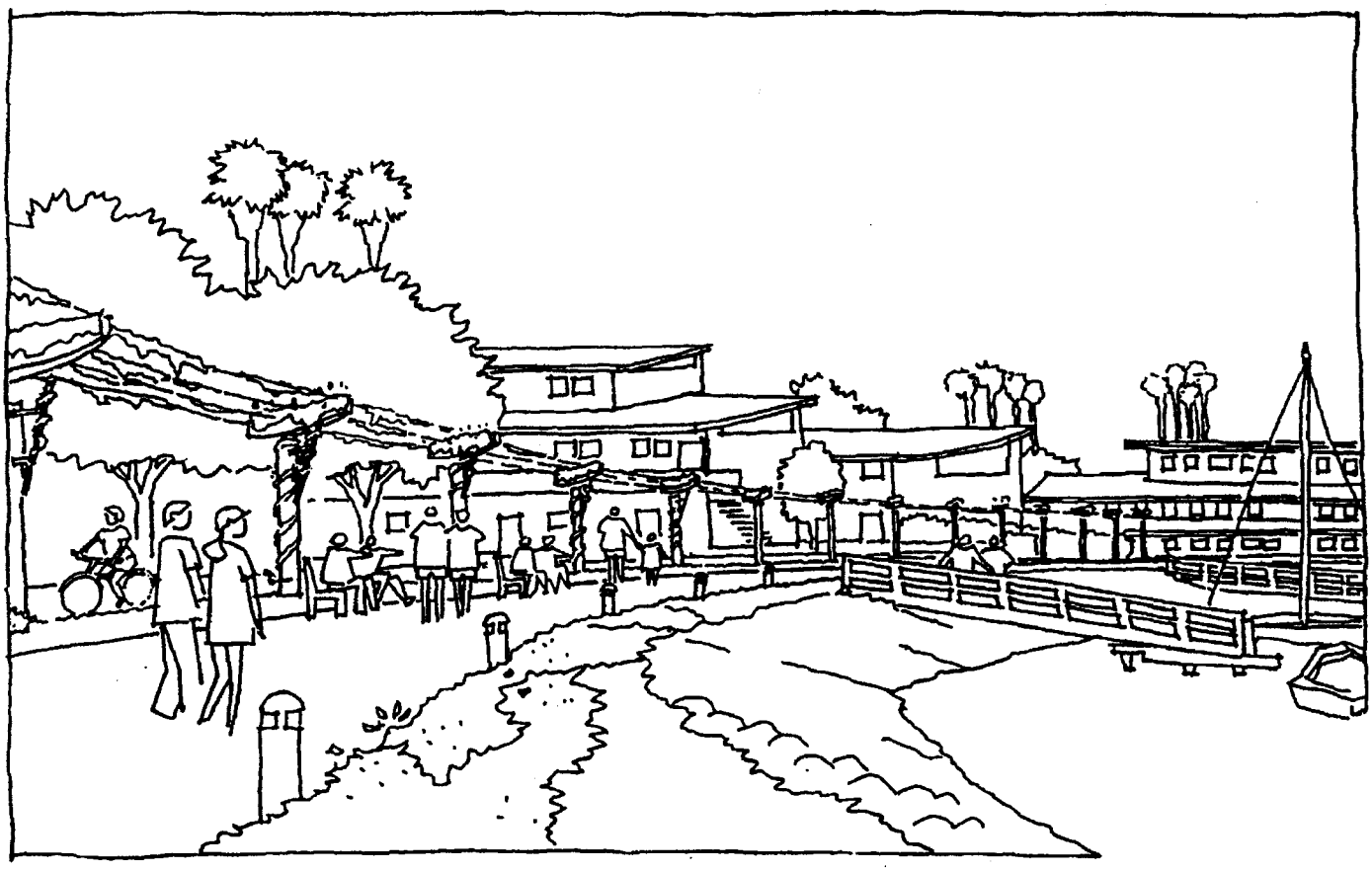
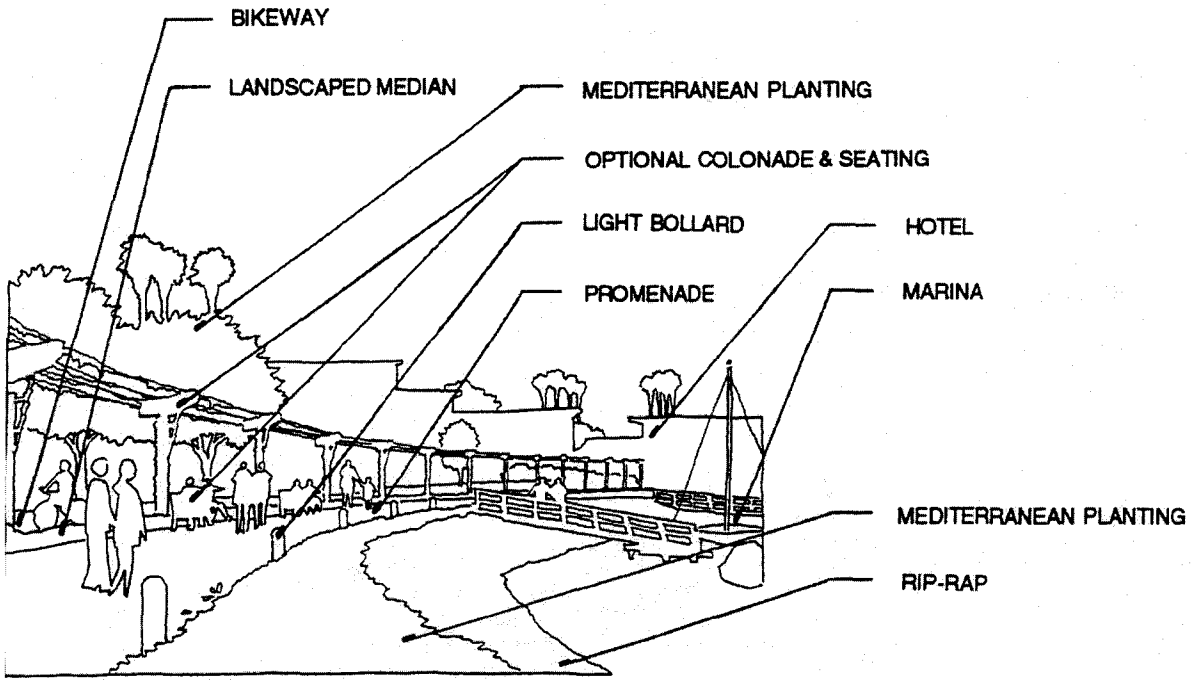
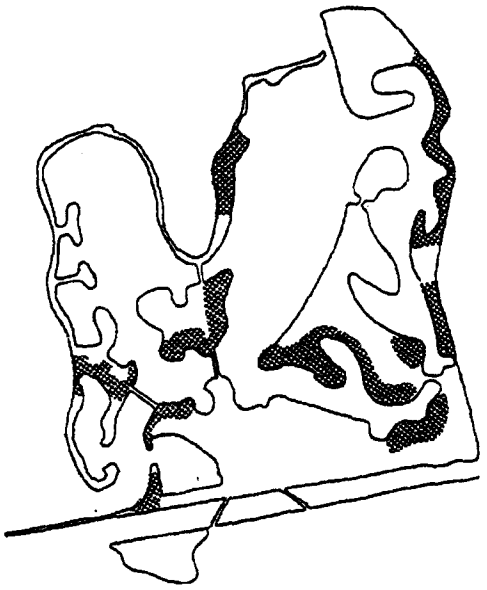


Fig. 10: Mediterranean Landscape



PARKLAND

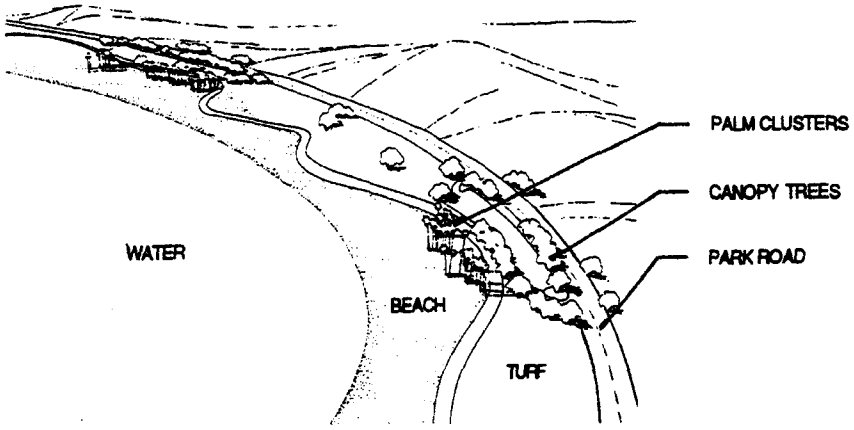
The Parkland landscape is associated with the more intensive recreation areas requiring turf coverage, openness, and proximity to the shore and beach areas.



Parkland Landscape

25. Coverage and Intent: Because turf areas are regularly mowed, fertilized and irrigated, the Parkland landscape is high in maintenance. To minimize the use of water, reduce the use of chemicals and fertilizer that can pollute the Bay waters, and to reduce the Park's overall maintenance burden, turfed areas in the Park should be restricted to the areas planned for picnicking and active play. Edges, buffer zones, parking islands and other non-recreation areas within the Parkland zone should revert to the Coastal Sage Scrub landscape. Swales should be provided in the Parkland areas to channel and collect irrigation and precipitation runoff to the extent possible. This would further reduce the potential for contamination of the Bay waters.

Canopy plants within the Parkland areas should consist mostly of native palms and drought-tolerant trees like the Mexican Fan Palm (Washingtonia robusta), Cork Oak (Quercus suber), New Zealand Christmas Tree (Metrosideros excelsus), Rustyleaf Fig (Ficus rubiginosa) and Coral Tree (Erythrina spp.). Palms and other trees should be arranged in bundled drifts along the length of the Parkland, with the palm trees closer to the shore, and the canopy trees closer to the parking areas and park roads. The intent is to create alternating open and enclosed areas along the Parkland areas, and increasingly open views of the water as the shore is approached. As in the Mediterranean landscape, Eucalyptus trees should not be permitted.



Typical Parkland Area

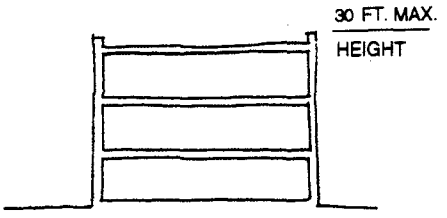
IV. ARCHITECTURE

The architectural guidelines apply to the design of new facilities, as well as to the renovation/rehabilitation of existing ones. In the latter case, however, exemption to the Guidelines should be considered, depending on the degree to which the Guidelines conflict with a project's feasibility or otherwise result in unreasonable design solutions. In such cases, the qualitative spirit of the Guidelines should be followed in lieu of their specific, quantitative provisions. This criterion applies equally to private and public buildings, including restroom buildings and picnic shelters.

OVERALL INTENT

26. Architectural Character: The character of the Park buildings, whether private or public, can contribute significantly to the image of Mission Bay as a water-oriented recreation environment. As the Bay is a unique feature in San Diego, so should be the Park's architecture. For this reason, the Park's architecture should he contemporary and responsive to the aquatic environment, avoiding excessive or exaggerated thematic styles.

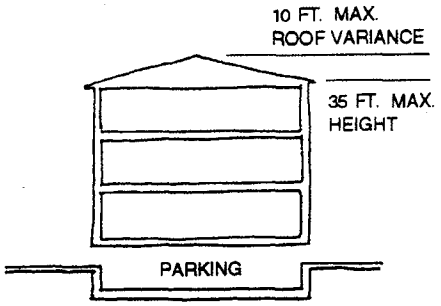
The intent is to preclude from Mission Bay Park a "theme park" architecture. Rather, through the manipulation of building form, details, materials and color, the Park's architecture should aim to capture and express the special marine quality of the Bay. This objective does not intend to establish a uniform aesthetic for the Park nor should it be construed as limiting design creativity. On the contrary, each Park building should strive to achieve a uniquely appropriate interpretation of the Bay's landscape context according to its site, function, and intended user.



CURRENTLY PERMITTED

BUILDING HEIGHT AND MASSING

27. Low Rise Emphasis: Mission Bay is an expansive area with wide and open views of the ocean from the surrounding hillsides. Low-scale buildings reinforce the open quality of the bay while minimally obstructing views to the sky and distant landforms. For this reason, and in recognition of the public mandate for a 30-foot height limit within the City's coastal areas (Municipal Code ~~101.0451~~ 132.0505 [1]), the Park buildings should continue to be low-rise, except in the SeaWorld leasehold where the voter approved amendment to the City's Coastal Zone Height Limit Overlay Zone (Proposition D, 1998) would potentially allows building heights to a maximum of 160 feet, subject to the requirements of the Coastal Act and the Sea World Master Plan. Development within the leasehold shall be governed by the Sea World Master Plan, in addition to the Coastal Act and the Mission Bay Park Master Plan Update.

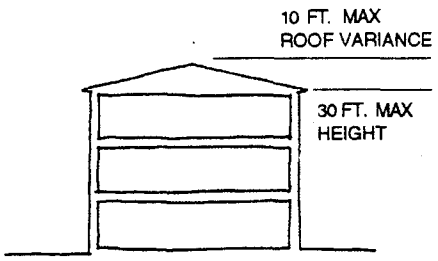


PROPOSED

- QUIVIRA BASIN
- DANA INN

28. Roofscape Variance: Three levels of habitable space can be achieved within the current allowable 30-foot height limit. However, as floors normally require a nine to ten-foot ceiling height, only a flat roof profile is possible under the current height restriction on three story buildings. Given the visibility of the Park from high vantage points (surrounding hillsides, Sea World Tower, airplanes), more varied, appealing roof profiles (sloped roofs, for example) is highly desirable. In addition, if properly designed, sloped roofs can help reduce the mass of buildings and soften their presence in the landscape.

In recognition of the above, a 10-foot "roofscape variance" should be pursued for the Park buildings to promote the design of more interesting and graceful roof profiles.

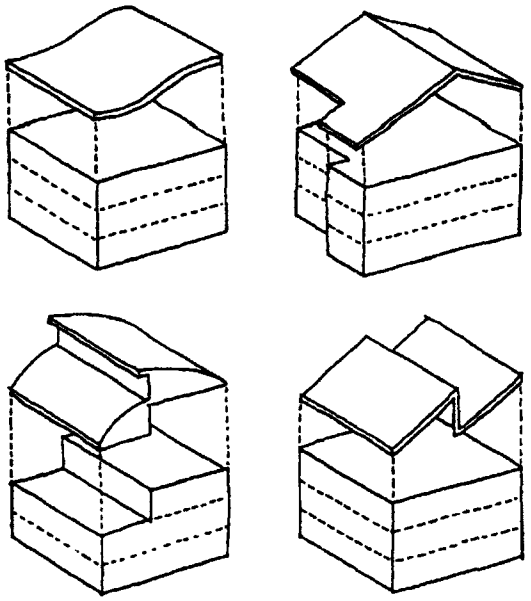


PROPOSED

- BAHIA POINT
- VACATION ISLE
- SOUTH SHORE
- DANA LANDING

Building Height

1. This section was renumbered in the adoption of the Land Development Code on 1/1/2000.

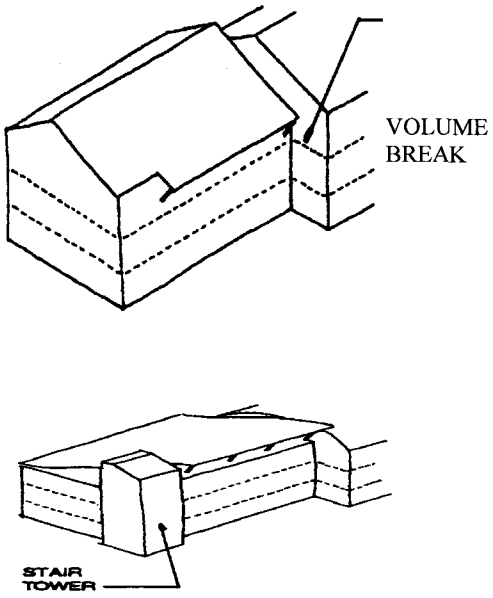


Roofs

Therefore, the maximum building height should be 40 feet. This height increase should be strictly limited to roof forms. No additional habitable space should be gained as a result of this guideline.

Special Condition - Quivira Basin and Dana Inn: Because of the limited land available for development in these lease areas, it would benefit the Park to have one level of parking below any new proposed development. More land would then become available for landscaping and other site amenities. To implement this measure, the overall habitable building height should increase to 35 feet in these two areas, which allows half of a parking level to be placed below grade. With the addition of the 10-foot "roofscape variance," the overall permitted height in Quivira Basin and the Dana Inn would increase to 45 feet.

29. Roofs: Because of the Park's prominence from high vantage points (surrounding hillsides, Sea World Tower, airplanes), buildings should have well conceived, interesting roof profiles that can add grace to the architecture and unify the building masses from above (See Guideline 27). More importantly, roofs can also help express the interaction between land and air inherent to a coastal environment, where the latter transforms itself into condensing currents as it rises over the coastal landform. Roofs, therefore, should be sloped, stepped, curved, or otherwise shaped to provide a graceful transition between the sky and the building massing.



Building Massing

Excessively long and/or repetitive roof profiles should be avoided. Rather, roofs should be "sectionalized" or divided into segments following the breaks in the building massing.

30. Building Massing: Ground level views of the Bay are characterized by horizontal streaks of color corresponding to the Bay's water, rip-rap, sand, marshes, grass and in certain directions the hills surrounding Mission Bay. Buildings can either enhance or detract from the Bay's horizontal visual disposition: if the building's massing is long and uninterrupted, creating a new horizontal band, the character of the landscape will be diminished. Contrarily, if the building massing is interrupted, allowing vertical divisions between building blocks, the landscape streaks will be accentuated and enhanced.

Accordingly, buildings in Mission Bay Park should stand contrast to and accentuate the Bay's inherent horizontal visual character. Building massing should be broken at suitable intervals to establish consistent vertical planes, recesses, openings or projections that can act as counterpoints to the landscape. Vertical features may include building end walls, building side walls at jogs or insets, stair towers, or other special features.

MATERIALS AND FACADE TREATMENT

Building materials have, as all objects do, an "emblematic" value or evocative quality. Stone, for example, is often used in institutional buildings because of its "staid" quality evoking stability and permanence. In Mission Bay Park, the "emblem" is the water, the sky, the shore, and all of the Park's marine components. To this end, building materials, their form, and assemblage should be perceived to accommodate the marine environment, both in function and empathy.

31. Facades: "Heavy," staid materials such as stone or concrete add visual weight to a building. Accordingly, such materials should be used on the lower parts of the buildings, as if to "anchor" the mass to the ground and "stand-up-to" the elements. Conversely, "lighter" materials such as wood, metals, or plaster panels should be used on the upper portions of the building, as if to embrace the elements. The intent is to make the building facades increasingly "lighter" as they rise from the ground. To this end, wall openings and recesses should appear to increase in area, and columns and posts diminish in girth as the facade rises.

32. Roof Materials: Heavily textured, dark-tone roof materials (such as clay barrel tiles) tend to "weigh-down" a building, contrary to the facade treatment intent. To mitigate their visual weight, clay barrel tiles roofs, for example, should terminate on a narrow eave and be suspended on posts or columns rather than rest on wall sections. In addition, the tiles should be buff or pale in tone rather than bright red or dark terra-cotta.

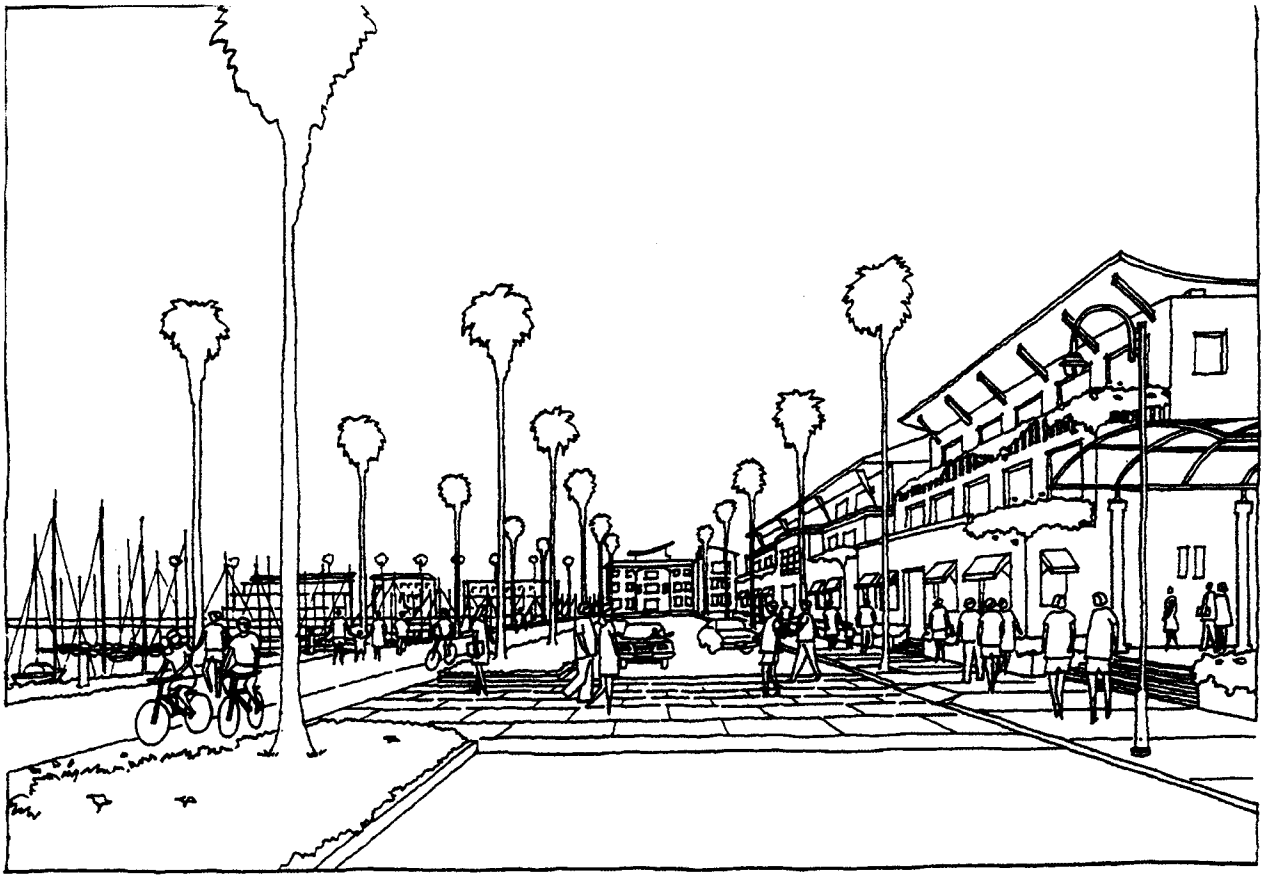
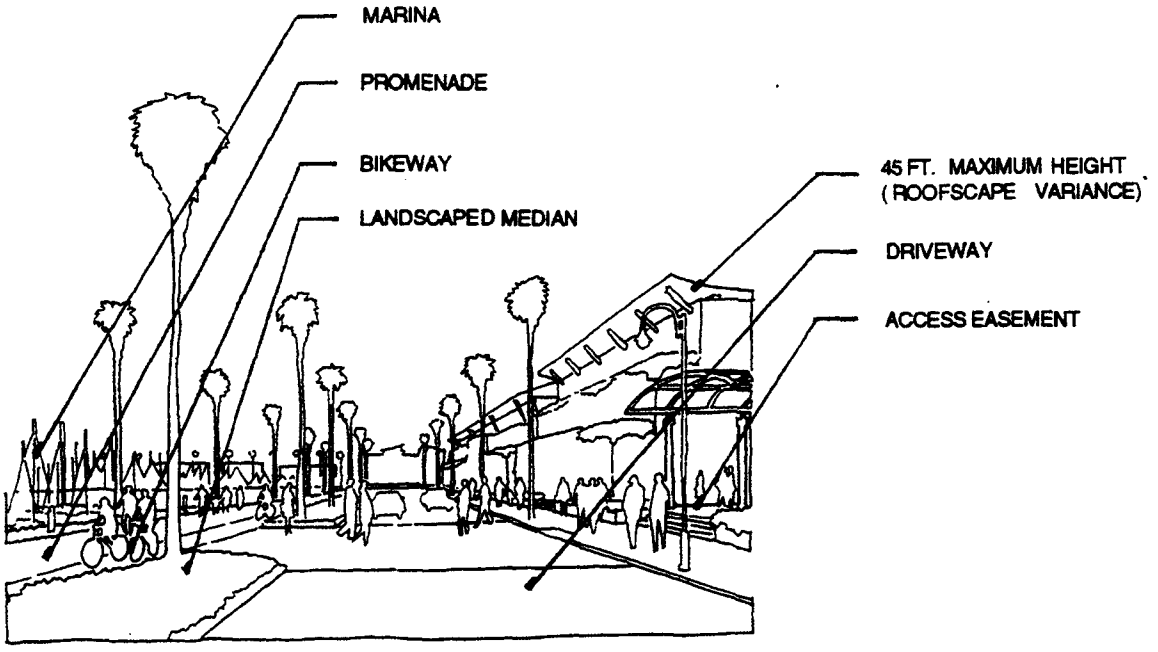


Fig. 11: Potential Development of Quivira Basin



Preferred roof materials should be flat, smooth and light tone tiles, standing seam panels, corrugated metal sheets, fiberglass or wood shingles. Wood trellises and canvas fabric should also be considered appropriate features of the Park's roofscape.

33. Ornamentation: Marine environments require highly efficient organisms. For the Park's architecture to reflect such an environment, the use of materials should, too, be efficient. Efficiency means an "economy of means". Accordingly, superfluous or excessive ornamentation and finishes should be avoided. To this end, materials should remain natural or be painted and stained to retain their natural textures wherever possible.

34. Colors: Because the sky's changing light is one of the key qualities of any coastal environment, how the Park buildings capture its hues throughout the day should be an important design consideration. Dark colors absorb light and remain impartial to the ambient light. Light colors, on the other hand, reflect ambient light and become participants of the natural landscape. If large surfaces need to receive paint, such paint should be light in hue and of varying shades to afford a variety of reflections of atmospheric light.

"Light" colors should not include pure white, which can be highly contrasting and jarring to the eye in a bright, sunny atmosphere. Rather, off-white, amber or limestone hues are appropriate along with light pastels. Bright, more playful colors should be restricted to the detail of the object, not its overall mass.

V. SIGNAGE

Signage is an integral and necessary component of the Bay's landscape. Signage is normally of four types: commercial, informational, interpretive and regulatory. Commercial signage includes, for example, the entrance sign for a resort hotel. Informational signs normally include directories, facility schedules, recreation rules, etc. Interpretive signs provide explanatory information about natural or cultural features, while regulatory signs set legally enforced rules, like speed limits.

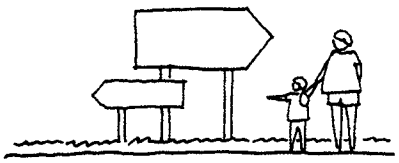
Little coordination has been exercised in the past in the design of all of the Park's signs. The result is a "world" of signs, ach of a different shape, color and character. For this reason a comprehensive and detailed design program should be undertaken for Mission Bay Park with the aim of integrating commercial, informational, interpretive and regulatory signs into a coordinated system unique to the Park.

SIGN STANDARDS

35. Coordination with Existing Signs: The Park signage should be conceived as a system of symbols that set the Park apart from other city environments. The Park's existing wood, teal and white directional signs go a long way in achieving this objective. Other signs should follow suit, employing a similar wood base and bright, contrasting colors.

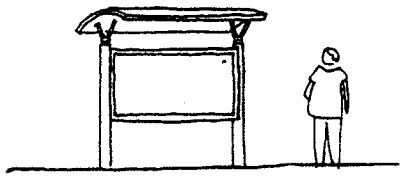
Commercial Sign

36. Sign Placement: If improperly placed, designed or lighted, signs can detract from views and other landscape amenities. Tall signs, for example, can unnecessarily detract from the bay's skyscape. Accordingly, signs should be placed, designed and lighted so as to minimize, on a case by case basis, the visual impact upon significant views of the Park and its surrounding environment.

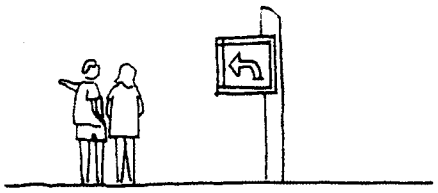


Information Sign

37. Commercial Signs: As a general rule, free-standing commercial signs should be low, close to the ground, shall not exceed eight feet in height and shall be placed in a landscaped setting. An exception may be granted for large resort hotels, to accommodate sign designs or site identification within other architectural features, such as entry walls or gatehouses. When planning such signs near roadways, motorist sight-lines should be kept in mind. Signs attached to buildings should be designed with similar sensitivity, ensuring that the signs blend with the architecture rather than appearing as a billboard. Rooftop signs are specifically prohibited.



Interpretive Sign



Regulatory Sign

38. Information Signs: The colors and materials of the existing Park information signs currently serve the Park well. Park information signs should be maintained and their design be compatible with the new detailed comprehensive sign plan. Adding colorful planting at the base of these signs would further enhance their function.

39. Interpretive Signs: Special sign shelters or kiosks should be designed to house interpretive signs. The kiosks would advertise from afar the presence of an interpretive feature while providing shelter to the public, encouraging their use.

40. Regulatory Signs: Regulatory signs should look special to Mission Bay rather than appear like standard issue. While the actual signs cannot be modified, they can be mounted on poles and bases particular to the Park.

41. Materials: Park signage should conform with the objectives of the Furnishings and Architectural Materials section of these guidelines.

Advertising Commercial Sign

ADVERTISING

42. Commercial Signs: Commercial signage which is visible from public areas of the Park should be restricted to those which directly serves the public interest as related to the Park's primary mission as an aquatic recreation and resort area. This would include directional and entrance signs for the leaseholds. Off-premise advertising signs shall not he allowed (i.e. billboards).

43. Bus Stops: Advertisement on bus stops should be restricted to the business of the Park, namely Park events, special recreation attractions, resort facilities, etc. Bus stop posters could also be used as public information items for city-wide events, conventions, matters of public safety, and public art.