SAIPAN LAGOON USE MANAGEMENT PLAN

FINAL DRAFT

VOLUME II

LAGOON AND SHORELINE USE
MANAGEMENT PLAN

Prepared for
Coastal Resources Management Office
Commonwealth of the Northern Mariana Islands

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COASTAL ZONE
INFORMATION CENTER

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PART ONE
INTRODUCTION

CHAPTER I - PURPOSE AND SCOPE OF VOLUME II

A. STATEMENT OF INTENT

The SAIPAN LAGOON USE MANAGEMENT PLAN is the Commonwealth's first comprehensive analysis and PLAN for managing the Saipan Lagoon and its shoreline. Volume I of the PLAN analyzes both original data as well as previously collected information about the Lagoon itself and on-shore environs between the coastline and Beach Road, in addition to Managaha Island. In Volume II plans, programs, policies and projects are recommended for managing the various uses and resources associated with this project area. Where appropriate, legislation, rules and regulations, and budgets are included to implement the recommendations. Volume III is a six-sheet set of maps which portray the PLAN's project area and depict both the existing data and planned uses. An Executive Summary of this PLAN is presented as Volume IV.

Volume I and II of the SAIPAN LAGOON USE MANAGEMENT PLAN are relatively complex documents, because, by their nature, both breadth and depth of data are required to accurately portray the project area. This PLAN encompasses an area roughly one-third the size of Saipan Island and reflects such divergent uses and resources as energy facilities siting; tourism; commerce; residential, commercial, industrial and public land uses; infrastructure; public recreation and facility maintenance; lagoon water quality; critical habitats; beach erosion control; and soil erosion control. In short, these two Volumes are not written for the public-at-large but, rather, intended to guide more technical applications of resource management by various agencies of the Government of the Northern Mariana Islands. Chapter XXIV specifically addresses the budgetary and scheduling aspects of the PLAN in order to serve as a framework for implementing the various recommendations. In many cases, the documents are also useful to developers contemplating projects within the Saipan Lagoon area.

B. PROJECT AREA AND RELATIONSHIPS TO OTHER PLANNING

While this PLAN studies lagoon and coastline issues more broadly and more deeply than any other previous project, it is, nonetheless, improper to think of development within

this project area as totally separable from the remainder of Saipan's physical and social development.

In fact, not one of the PLAN's recommendations for improvement can be contained exclusively within the lagoon and coastline area. The impact of each proposed recommendation ultimately reaches beyond those geographical boundaries to influence both social and economic development of all Saipan. Some recommendations have an indirect effect on the Commonwealth as a whole. Nor is it correct to think of this PLAN's influence only in terms of the Lagoon's integrated relationship with the island of Saipan to the east. The Lagoon's harbor also serves as the only maritime link between Saipan and other islands of the CNMI, surrounding deep-water resources and oceanic commerce to the west and beyond.

It can become difficult, therefore, to strike the exact balance of which data, analyses and existing plans are relevant to such an amorphous project area and, conversely, which are not. For example, fishing within the Lagoon, per se, can be quantified and qualified, but those data are insufficient to understand the importance of fishing's contribution to family subsistence or as a second-income generator within the Saipanese economy. Likewise, recommendations for providing Lagoon-oriented recreation opportunities to tourists must be gaged by the anticipated growth of Saipan-bound tourists, a brand of market forecasting which relies heavily on international economics. Additionally, the allocation of resort land-base and support infrastructure for Saipan's largest economic sector is subject to a myriad of supply and demand factors that comprise the volatile, price-sensitive industry of tourism.

Exactly how much Saipan-wide or Commonwealth-wide social and economic data should be incorporated into this PLAN becomes a matter of good planning judgment and report editing of existing documents. Volume I, "Data and Analysis" does not repeat much of Saipan's basic historical and current data relating to political status, commerce and trade, natural resources, governmental services and private sector development. While those subjects are naturally considered as integral to any planning for Saipan, their data are incorporated by reference into this PLAN from such documents as listed below.

"Socioeconomic Development Plan for the Northern Mariana Islands, 1978 to 1985 - Volume I and II"
"Physical Development Master Plan (1978) Volume II - Saipan"
"1980 Census of Population - Northern Mariana Islands"
"Coastal Land and Water Use Plan, CNMI, May 1979"
"Annual Reports - Marianas Visitors Bureau"

"Overall Economic Development Strategy, 1981, 1982 and 1983"
"Proceedings - Year of the Pacific Conference, 1984, South Pacific Conference"
"Annual Report to the United Nations in the Administration of the Trust Territory of the Pacific Islands," (Various Years)

In addition to buttressing this PLAN with a data base from those documents, other plans which have been proposed for the Lagoon and its coastline are also incorporated. Specifically, the following proposed projects and programs are integrated into this PLAN at appropriate places, although not always without certain qualifications and changes.

"Zones and Land Use Districts Study for Saipan, Tinian and Rota, 1984"
"Garapan Flood Control Project, 1984"
"Chalan Kanoa/Susupe Redevelopment Project, 1979"
"Small Boat Harbor-Saipan CNMI, 1971"
"Saipan Water System Study,1982"
"Wastewater Facilities Plan for the Island of Saipan, 1978"
"Port and Harbor Study of Saipan, CNMI, 1980"
"Lake Susupe Flood Control, 1981"
"American Memorial Park - General Management Plan and Comprehensive Design, 1980"

Finally, the data and analyses presented in Volume I of the Plan, including the significant contributions and valuable insights by the participants of SALAPAT (Saipan Lagoon Planning Advisory Teams), provided the bulk of this volume's technical and general planning data.

C. PURPOSES

The primary purposes of Volume II, SAIPAN LAGOON USE MANAGEMENT PLAN are threefold:

1) To synopsize the Volume I data analyses and identification of problems into six major elements.

   * Land Use Element
   * Lagoon Use Element
   * Beach Park and Recreation Element
   * Lagoon Water Quality Management Element
   * Rare, Threatened and Endangered Habitats Management Element
   * Energy Facilities Siting Criteria Element

2) To recommend appropriate plans, programs, policies and projects for managing the various uses and resources within each Element of the PLAN.

3) To determine administrative requirements and cost estimates for implementing the recommendations.

D. MAPS OF EXISTING DATA AND PLANS FOR IMPROVEMENTS

Volume III is a six-sheet set of maps (one for each Planning Area, except the Tanapag Harbor and Managaha Island Planning Areas are combined on one sheet) which graphically portrays much of the existing data for the project area in addition to the planned improvements. These maps serve as a basic reference for both Volume I and Volume II of the PLAN.

These maps are:

Sheet 1 - Puntan Magpi
Sheet 2 - Tanapag Harbor
Sheet 2 - Managaha Island
Sheet 3 - Puntan Muchot
Sheet 4 - Garapan Lagoon
Sheet 5 - Puntan Susupe
Sheet 6 - Puntan Afetna

E. ADOPTION OF THIS PLAN

This Volume of the PLAN recommends specific legislation, rules and regulations, plans, programs, projects and policies for managing the Saipan Lagoon and its on-shore environs. Legislative adoption of the PLAN shall be construed as formal CNMI legislative support for the recommended laws, rules and regulations, plans, programs, projects, and policies herein.

Table I-1 serves as an index to this PLAN's recommendations.

TABLE I-1
INDEX TO PLAN'S RECOMMENDATIONS

EXHIBIT (E) No. FIGURE (F) No. TABLE (T) No. SECTION (S)	SHORT TITLE	FORM OF RECOMMENDATION
(S) IV.B	Zones and Land Use District Act of CNMI	Legislation
(S) IV.B.1	Amendment to Section 9 of Zones and Land Use District Act	Legislation
(S) IV.B.2	Expansion of Village Zone, San Antonio-Zones and Land Use District Act	Legislation
(S) IV.B.3	Paupau Resort Zone in Northern Saipan-Zones and Land Use District Act	Legislation
(E) V-1	Shoreline Setbacks	Regulations
(T) V-1	Property Setbacks, Structure Heights and Densities	Regulations
(E) V-2	Lot Coverage for Commercial and Resort Zones	Regulations
(E) V-3	Setback and Height Regulations for Commercial and Resort Zones	Regulations
(E) V-4	Shoreline Fencing Regulations	Regulations
(E) VI-1	Landscaping Guidelines	Government Policy
(E) VI-1	Regulations for Dredging, Diking and Landfilling along Coastal Areas	Regulations
(E) VI-2	Regulations for Structures located on Near Shore and Beach Strand Ecological Zones	Regulations
(E) VI-3	Regulations for Mining along Coastal Strand	Regulations

(S) VI.E	Beach and Shoreline Restoration Plan	Design & Construction
(T) VII.B.1	Shoreline Water Facilities Planning	Design & Construction
(S) VII.B.2	Groundwater Management Task Force	Government Program
(S) VII.C.1	Shoreline Wastewater Facilities Planning	Design & Construction
(S) VII.D.1	Storm Drainage Design Criteria	Policy
(S) VII.E.	Planning Criteria for Evaluating Development Impacts	Policy
(S) IX.B	Recreation Use Zones for Saipan Lagoon	Improvements Plan
(S) IX.B.5	Water Recreation Advisory Board	Government Program
(S) IX.C	Water Safety Information Program	Government Program
(S) X.B	Hazards Removal Plan	Contractual Service
(S) X.D	Marine Nuisance Abatement Plan	Government Program
(S) XII.B	Saipan Outdoor Recreation Plan	Master Plan
(T) XIII-4	Improvements for Beach Parks - Natural	Design & Construction
(T) XIII-5	Improvements for Beach Parks - Developed	Design & Construction
(S) XIV.B	Afetna Beach Park Improvements	Design & Construction
(F) XV-7	Bicycle Route Improvements	Preliminary Engineering
(T) XVI-1	Recreation Facilities and Maintenance Schedule	Program
(S) XVII.B	Soil Erosion and Sedimentation Control Technical Manual	Policy

(E) XIX-1	An Act to Protect Important Habitats	Legislation
(S) XIX.C	Important Habitats Management Plans	Master Plan
(S) XX.C	Energy Facilities Siting Criteria	Policy

CHAPTER II - SUMMARY OF PLAN

This PLAN recommends the following plans, programs, policies and projects to address the problems identified within each of the Elements.

* Amendments to Saipan's Zones and Land Use Districts, as well as to the rules and regulations to be promulgated thereto.
* Regulations governing shoreline setback; property coverage ratios; property setback/height limitations; and shoreline fencing.
* Landscaping guidelines for property development.
* Regulations for shoreline landfilling, diking and dredging.
* Regulations for constructing shoreline structures.
* Beach restoration structures.
* Water facilities planning for future shoreline uses.
* Wastewater facilities planning for future shoreline uses.
* Stormwater drainage facilities design criteria.
* Planning criteria for evaluating development impacts on infrastructure.
* Recreation use zones for the Lagoon.
* Water safety information program.
* Plan for removal of lagoon hazards.
* Plan for abating marine nuisances.
* Outdoor recreation plan for Saipan.
* Improvements for existing beach parks and playgrounds.
* New beach parks Puntan Afetna.

* Shoreline bicycle route plan and improvements.

* Maintenance program for beach facilities.

* Technical manual for soil erosion and sedimentation control.

* Important habitats management plan.

* An act to protect important habitats.

* Criteria for siting coastal energy facilities.

* Administrative, financial and legal requirements to implement recommended plans, policies, programs and projects.

PART TWO
LAND USE PLAN ELEMENT

CHAPTER III - LAND USE PLAN

A. SYNOPSIS OF DATA ANALYSES FROM VOLUME I DATA AND IDENTIFICATION OF PROBLEMS

Land use planning for Saipan is in its embryonic stage. Two different land use plans now exist in the form of the "Physical Development Master Plan" prepared in 1978 for the Office of Transitional Studies and Planning and the "Zoning and Land Use Districts Report" prepared for the Costal Resources Management Office in 1984. While both plans are basically compatible, neither carries the necessary enforcement and regulatory authority for bona-fide implementation. Without a legally adopted and enforceable land use plan and associated regulations, public and private development will continue to determine land use on an incremental, project-by-project basis. The legislative adoption of this PLAN will enact the land use zoning plan recommended in this Part Two.

The project area encompassed by this SAIPAN LAGOON USE MANAGEMENT PLAN is especially vulnerable to disjointed land use planning decisions because the coastline comprises a mix of development ranging from Saipan's rural to most urban, and includes residential, village, commercial, resort, industrial and public uses. Infrastructure and other community support facilities are, for the most part, planned as a reaction to existing demands and development pressures, rather than as a guide to the growth of social and economic resources in accordance with a preconceived plan. This situation is, of course, not unusual for Micronesia in general, nor for most developing regions. However, this need not be the case; and the SAIPAN LAGOON USE MANAGEMENT PLAN is an appropriate vehicle for strengthening land use planning and supporting regulations for the project area.

Land use planning does occur, de facto: individual site planning decisions for private and public projects, extending infrastructure to new areas, resizing and improving existing infrastructure, and islandwide program planning and promulgation of regulations by such agencies as the Marianas Public Land Corporation and the Department of Public Health and Environmental Services all function, cumulatively, as "land use planning". Unfortunately, this

occurs with sometimes self-defeating results. For example, public subdivision development, leasing of public lands for resorts, government-guaranteed loans for commercial projects, and new public facilities must be inextricably coordinated with islandwide land use planning, timely infrastructure improvements and increases in maintenance and support operations. Otherwise, piecemeal improvements will be negated by the inevitable problems they create through placing impossible burdens for public services into the hands of the local Government.

The basic land use pattern for Saipan, enabling legislation, and rules and regulations now under consideration by the Legislature, (see "Zones and Land Use Districts for Saipan, Rota and Tinian",March 1983), are generally endorsed by this SAIPAN LAGOON USE MANAGEMENT PLAN. Some of those proposed zones and land use districts within the project area must be adjusted to conform with land use planning goals and objectives established by this PLAN. Additionally, supportive rules and regulations dealing with landscaping, fencing, set-backs, height and property coverage must be revised or, in some cases, established for the first time.

Due to the interdependent nature of land use planning and infrastructure development, it is necessary to supplement this project area's Land Use Plan Element with an infrastructure plan that provides for an adequate capacity of sewer, water and roads as well as design criteria for storm drainage facilities. The last aspect of this Land Use Plan Element involves a Beach Erosion Control Plan to remedy seashore erosion along the Lagoon's shoreline.

B. OBJECTIVES

As a result of analyzing data and problems from Volume I, several objectives were identified relating to land use zones and regulations, infrastructure planning, infrastructure maintenance, and beach erosion control. Those objectives have been consolidated into six basic plans which collectively comprise the Land Use Plan Element.

* A Zoning Plan which adopts, in part, and adjusts the Government's now proposed "Zones and Land Use Districts Study". Two major purposes of adjusting the proposed land uses are to distribute the Resort Zone to another location along the Lagoon shoreline and to segregate public recreation uses from other Zones within the Urban Land Use District.

* Regulations encompassing property coverage ratios, set-backs, fencing, and height limitations, established with an environmental sensitivity towards preserving view corridors and an open, non-congested profile of shoreline development. The proposed landscaping regulations, which already accompany the Government's "Zones and Land Use Districts Study" are customized to the project area by this PLAN through including references to Saipan-specific flora.

* An Infrastructure Plan is needed to accommodate the projected utility requirements generated by the Land Use Plan Element. The Infrastructure Plan must update (or establish) the Government's existing facility plans for water and sewer so that future CIP projects are designed to accommodate the preferred land use patterns.

* A maintenance program must address the Government's long standing efforts to wrestle control over its ponderous responsibility of maintaining public recreation facilities with pitifully inadequate resources of trained manpower, reliable equipment and sufficient materials.

* A Beach Erosion Control Plan must account for stabilization and preservation of the Beach Strand and Near-Shore Ecological Zones. Shoreline erosion is now occurring, and the likelihood of additional development mandates immediate attention to regulating fill and excavation operations; dredging, diking and landfilling; structures; and beach restoration projects.

* Lastly, planning criteria for assessing the impacts by residential, commercial and industrial projects on public infrastructure and other resources must be developed in order to better evaluate the anticipated impact of proposed projects.

CHAPTER IV - ZONING AND LAND USE DISTRICTS PLAN FOR THE SAIPAN LAGOON PROJECT AREA

A. STATEMENT OF INTENT

The intent here is to amend, in part, and then have enacted the Government's land use patterns as proposed in its "Zones and Land Use Districts Study" for the Saipan Lagoon shoreline areas covered by this PLAN. The amendments provide for a Resort Zone along a portion of the project area's northern shoreline, expanding the Village Zone of San Antonio, and providing for a Recreation Zone in the Urban District. With the exception of these amendments to the text and official zoning and land use districts map for Saipan, the Commonwealth's proposed Zoning and Land Use District boundaries and regulations meet the goals and objectives of this SAIPAN LAGOON USE MANAGEMENT PLAN. The recommended zones are depicted on the applicable sheets of the six-sheet set of Plans in Volume III.

B. ADOPTION OF PROPOSED ZONES AND LAND USE DISTRICTS

In April 1984, the Commonwealth Government completed a study which recommended zoning and land use districts for Saipan, Rota and Tinian. The proposed legislation and accompanying maps, regulations and procedures are now undergoing legislative and public review as part of their ultimate enactment.

In general, the proposed zones, districts and regulations are compatible with the SAIPAN LAGOON USE MANAGEMENT PLAN; and, with the three exceptions described below, the Government's proposal is endorsed by this PLAN.

1. Segregation of Public Recreation Areas from Residential Zones

The "Zones and Land Use Districts Study" proposes that parks, playgrounds and recreation areas are classified as permissable uses within the zones of residential, commercial, resort, and industrial. In the village zone, open-space and recreation are listed as a principle use.

While this system of land-use classification is fully satisfactory for accommodating the park and recreation uses as one of several aspects of community development, it does not provide for open space

and public recreation as a primary land use. This PLAN finds that the importance of open space and public recreation to be so significant that it deserves recognition as an exclusive zone for those large areas relegated to such uses. Of course, park and recreation uses should continue to be designated as permissible or principle uses in the other zones, as originally proposed.

It is recommended, therefore, that the following amended language be included into the Commonwealth's "Zones and Land Use Districts Act". The new language is underlined.

SECTION 9 URBAN DISTRICT: ZONES, USES, CHANGES

(a) Zones. The Urban District shall be subdivided into <u>six</u> zones: Residential, Commercial, Resort, Industrial, Village <u>and Recreation</u>. The permissible land and building uses for each zone are described below.

(g) <u>Recreation Zone Uses. The purpose of the Recreation Zone is to provide for public open space, park and recreation uses. While such uses are also encouraged in other zones as either permissible or principal, this Recreation Zone is intended primarily for larger parcels of land (generally larger than one acre) which are exclusively designated for passive or active recreation purposes.</u>

(1) <u>Principal uses of the Recreation Zone.</u>
<u>(aa) Public Parks.</u>
<u>(bb) Public open space.</u>
<u>(cc) Public sports and recreation facilities.</u>

(2) <u>Permissible uses of the Recreation Zone.</u>
<u>(aa) Private concessions.</u>
<u>(bb) Parking.</u>
<u>(cc) Historical and culturally significant sites.</u>
<u>(dd) Community halls.</u>
<u>(ee) Non-conforming uses</u>.

(3) <u>Conditional Uses of the Recreation Zone.</u>
<u>(aa) Flood plains.</u>
<u>(bb) Storm drainage percolation basins.</u>

(cc) Government and quasi-government facilities.

(dd) Any permitted use located in an Area of Particular Concern as depicted on Coastal Resources maps or regulations.

(ee) Other uses in consonance with the zone's purpose and character, as determined by the Zoning Administrator.

(4) Prohibited Uses of the Recreation Zone.

(aa) All uses other than those specified as principal, permissible, or conditional are prohibited for the Recreation Zone

These changes to the Government's proposed zones are reflected in the six sheet Plan for Improvements, enclosed in this Volume.

2. Expansion of Village Zone, San Antonio

This PLAN recommends the northern expansion of San Antonio's Village Zone to include the 30 to 40 structures which now comprise the northern portion of the community. This expansion is also reflected in Figure IV-1 and should be incorporated into the official CNMI Zone Map for Saipan.

3. Additional Resort Zone in Northern Saipan

This third and last proposed amendment is described in Section C, Resort Zones along the Saipan Lagoon Shoreline. This new zone is reflected in Figure IV-2 and should be incorporated into the official CNMI Zone Map for Saipan.

C. RESORT ZONES ALONG THE SAIPAN LAGOON SHORELINE

Recognizing the importance of Saipan's tourist industry to CNMI's overall economic development, proper land use planning must provide for adequate land base, infrastructure support and protection as well as enhancement of environmental quality for both resorts and tourist-related development. Within guidelines that promise to enhance the Commonwealth's natural resources, while simultaneously raising the standard of living through more and better-paying jobs, tourist industry development is beneficial and fostered by this SAIPAN LAGOON USE MANAGEMENT PLAN .

Presently, two Resort Zones are proposed for Saipan: in Garapan, approximately 40 acres in size, and in

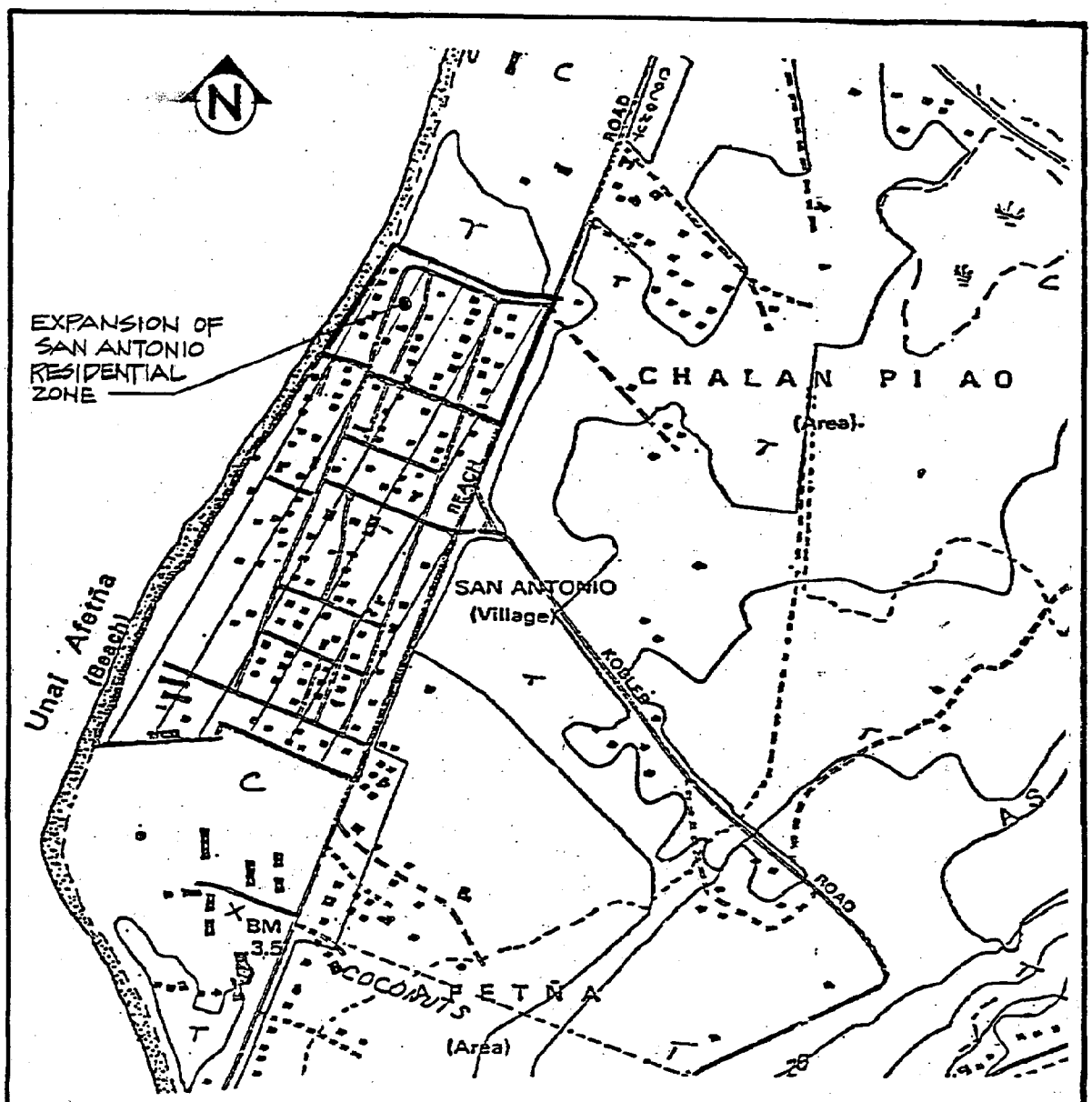


FIGURE IV-1

EXPANSION OF
SAN ANTONIO
RESIDENTIAL ZONE

Susupe/Chalan Kanoa, about 30 acres, refer to Plan for Improvements, Puntan Muchot Planning Area and Puntan Susupe Planning Area. Long term tourist arrival projections, coupled with the anticipated ancillary businesses which proliferate around hotels and resorts, indicate a need for additional land use designated as Resort zone.

The question of expanding Garapan's and Susupe's Resort Zones verses that of designating other areas along the shoreline must be evaluated in terms of tourist preferences, opportunities for peripheral development, and general planning policies. The general planning policy expressed by SALAPAT participants is that the Saipan Lagoon shoreline should provide for tourist industry development more or less uniformly, as opposed to continuing the concentrated development in only Garapan and Susupe. While Garapan will serve as Saipan's commercial/tourist center for the foreseeable future, that municipality is also the Island's major residential sector. Already the peripheral tourist-related businesses have usurped the majority of former, downtown Garapan residences on the Lagoon side of Beach Road and spurred a transition of substantial downtown redevelopment. While this is not necessarily detrimental to the community's development (and certainly not unexpected) a limit does exist after which tourist-related development enroaches upon and consumes other beneficial characteristics of a community. This PLAN recognizes that such a limit will be reached for Garapan when the area now contained by the proposed Resort Zone becomes fully saturated with tourist industry development.

Likewise, Susupe is the Commonwealth's seat of Government as well as a major residential area; and the existing, proposed Resort Zone, while far from reaching it's point of development saturation at this time, is permanently boxed-in by other well established land uses.

Not much data has been collected and analyzed in order to evaluate and articulate visitor preference from among Saipan tourists. As with Guam's case, sun, sand and surf are likely to rank among the highest desirable attributes of Saipan as a destination. Additionally, Saipan's major role in Japan's pre-WWII and WWII eras contributes an historical preference by tourists from Japan.

Close proximity to the Lagoon waters and shoreline is always an important criterion for siting resorts and for designating additional resort land base. This effectively eliminates expanding the Resort Zone in Garapan since that zone's shoreline is blocked to the north by the American Memorial Park and to the south by Government land as well as by successively-narrowing beach front property.

While it can be argued that all but a few peripheral businesses to hotels and resorts are community assets, the opportunity for indirect economic growth in the form of retail shops of all kinds, restaurants, grocery stores, entertainment and rentals are often common around resort areas in small communities; and this business translates into local employment, higher property values and an expanding tax base. To date, Garapan is the only municipality which has been able to fully capitalize on this peripheral aspect of economic growth for Saipan's tourist industry, although some evidence of this type of peripheral growth is also beginning in Susupe. Distributing such opportunities among other shoreline villages is consistent with the aforementioned policy of balanced growth.

Two significantly large, undeveloped tracts of shoreline still exist: one in the Tanapag/San Roque area and one in the San Antonio vicinity. Additionally, both the Hopwood Junior High School site as well as the San Antonio Elementary School site have been offered for lease by MPLC to prospective resort developers on the condition that the respective schools be first reconstructed at a different, suitable location. As for the northern Tanapag/San Roque area, enough vacant land is available between Tanapag and San Roque as well as north of San Roque to support full scale resort development. As for developed land along the Lagoon's southern shoreline, the former US Coast Guard Station (now CNMI land) is large enough to support resort development.

This PLAN recommends that north Saipan be targeted as the next location for decentralizing the shoreline's existing resort development. The general (but not unanimous) consensus to retain publicly owned shoreline lands, such as the former Coast Guard Station, for public use precludes this area from being leased to a private developer. On the other hand, nearly all of the northern shoreline lands within the PLAN's project area are in private ownership and, therefore, not subject to public use.

D. PAUPAU RESORT ZONE

In northwestern Saipan a new Resort Zone is recommended for the shoreline project area directly north of San Roque, see Figure IV-2 and refer to Exhibit I-1. Basically,only two choices present themselves for new resort development within this portion of the project area: the relatively undeveloped stretch of land between Tanapag and San Roque which is bounded by the shoreline and Beach Road; and the area being recommended, north of San Roque.

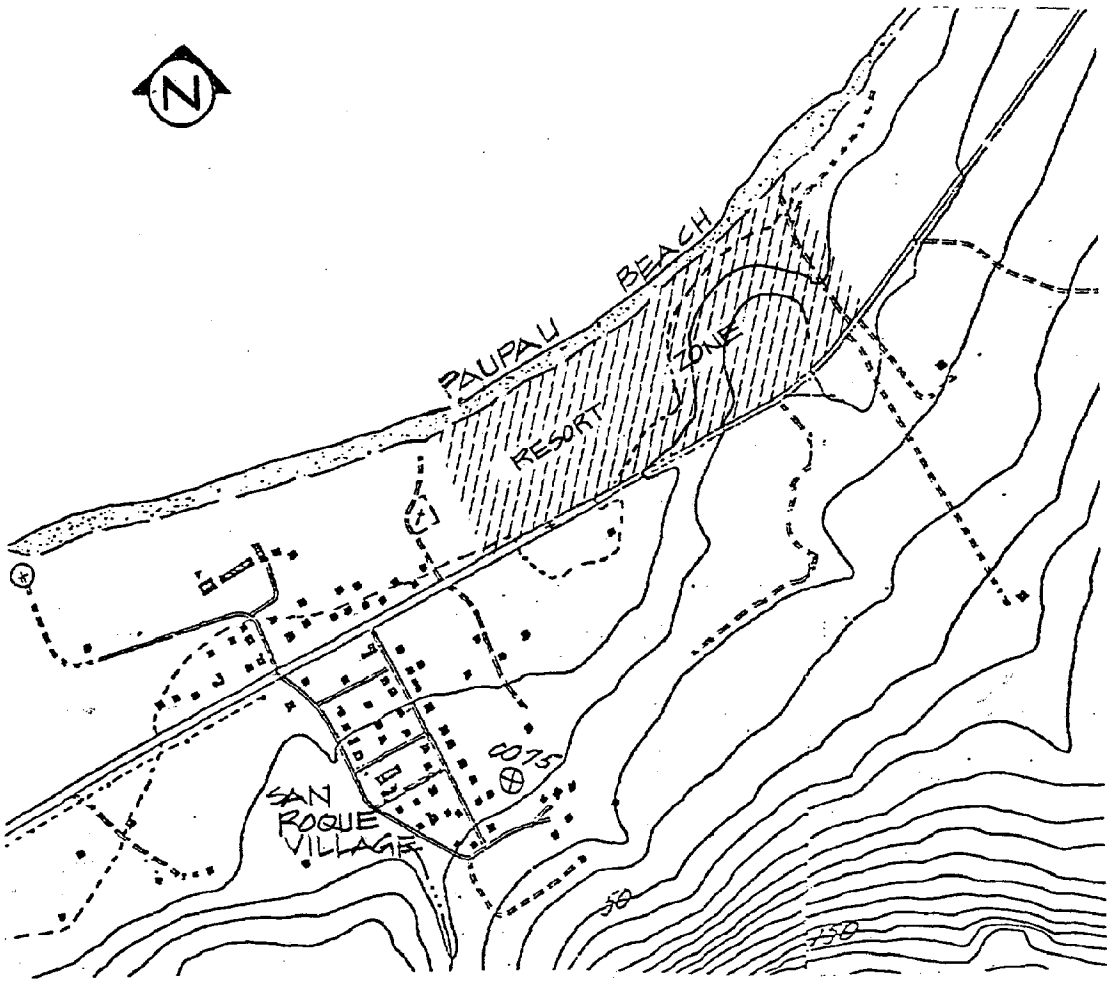


FIGURE IV-2

NEW PAUPAU RESORT ZONE

The area lying between Tanapag and San Roque, which is proposed by the "Zones and Land Use Study" as a Rural District, comprises approximately 50 acres of easily developable land with prime beach frontage. However, this area is unsatisfactory as a Resort Zone for the following reasons.

* Recognizing the future growth of both Tanapag and San Roque between the shoreline and Beach Road, a gradual residential infilling will likely take place along Unai Achugao. Tanapag's growth potential to the south is eventually constrained by the Tanapag Harbor and Industrial Area which is developing northward, towards the village, as well as by other potential uses in this vicinity such as aquaculture. Tanapag's growth inland, across Beach Road is always possible; but Saipanese communities display a clear propensity for coastal development rather than inland, wherever sufficient coastal land base is available.

* Furthermore, land such as the area between Tanapag and San Roque should not be designated for such incongruous uses as resort and tourist-commercial development between two relatively similar and historically well-established residential communities. Acres of hotels, shopping centers and enclaves of tourists situated between Tanapag and San Roque are akin to building a sociological barrier that will forever separate the community and cultural comradery which now bonds these two "north Saipan" sister villages.

* Lastly, the peripheral economic and infrastructure amenities that accompany a major resort development will not extend to San Roque if the new Resort Zone is situated south of San Roque. Because the major centers of business, government, transportation and infrastructure are located in central and southern Saipan, the orientation from Tanapag and San Roque is generally directed southward towards the major population centers. Both Tanapag and San Roque can avail themselves of an equitable degree of economic growth opportunities only if that development is designated northward of San Roque.

Therefore, the area between Tanapag and San Roque should be reserved for longterm future municipal growth of both municipalities; and a new coastal Resort Zone should be designated beyond that area of the two Villages' common influence.

The proposed new Resort Zone, designated Paupau Resort Zone, is approximately 30 acres in size and parallels the northern stretch of Unai Paupau. It is to be subject to the same land use regulations prescribed for the other Resort Zones, as established in the "Zones and Land Use Districts Study". This new zone should be incorporated into the official CNMI Zone Map for Saipan.

E. ESTIMATED COST FOR ZONE AND LAND USE DISTRICT AMENDMENTS AND ENACTMENT

Because these amendments are incidental to the CNMI Zones and Land Use Districts Act, no special costs are identified for this Plan. The budget for implementing the proposed CNMI zoning program was developed as part of the "Zones and Land Use Districts for Saipan, Tinian and Rota" project at an annual cost of approximately $150,000. This cost is not reflected in the implementation costs for the SAIPAN LAGOON USE MANAGEMENT PLAN.

CHAPTER V - LAND USE REGULATIONS

A. STATEMENT OF INTENT

The intent of this chapter of the PLAN is to propose new regulations for shoreline setbacks, property coverage ratios and height limitations, shoreline fencing, and supplement the Government's existing proposed regulations for landscaping with examples of Saipan indigenous plants.

Section 5 (h) of the proposed Zoning and Land Use Act, "Zones and Land Use Districts Study", authorizes the Zoning Administrator to promulgate rules and regulations to carry-out the intent and purposes of the Act. The Land Use Regulations recommended in this Chapter should be promulgated under that proposed Act. During the interim, however, these Regulations could be promulgated by the Coastal Resources Management Office under the authority of Public Law 3-47.

B. SHORELINE SETBACK REGULATIONS

Exhibit V-1 presents the recommended shoreline setback regulations.

EXHIBIT V-1
REGULATIONS
SHORELINE SETBACKS

(A) Authority. Section 5(f) of the Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

(B) Scope of Regulations. The shoreline setback regulations herein prescribed apply to all coasts of the Commonwealth for all districts and zones, except for Village Zones, where only Shoreline Setbacks A and A1 shall apply and except for Industrial Zones where no shoreline setback regulations shall apply. Shoreline setbacks shall be measured inland from the mean high water level contour as determined by a Registered Land Surveyor of the Commonwealth.

(C) Shoreline Setbacks

Shoreline Setback A, from 0-35 feet	Beach reservation zone for use as public access and recreation. Generally, structures are prohibited. Any proposed development within this

Shoreline Setback B, from 35-75 feet	No vertical construction which will obstruct the visual openness and continuity of the beach area is permitted. Open space, rest and recreation areas, swimming pools, terraces, landscaping and related outdoor improvements are allowed. Parking areas are not permitted.
Shoreline Setback C, from 75-100 feet	Single-story structures, covered porches, trellises and similar improvements not to exceed 12-feet in height measured from the natural grade line. Parking is permitted.
Shoreline Setback D, from 100-feet or more	Building height based on Property Setback/Height Regulations.

For any lot where thirty percent (30%) or more of the land area is affected by the mandatory shoreline setback above, such seashore setback regulations are modified as follows:

Shoreline Setback A-1, from 0-20 feet	Beach recreation zone for use as public access and recreation.
Shoreline Setback B-1, from 0-20 feet	Shall be open space with no vertical construction or parking permitted.
Shoreline Setback C-1, from 60-100 feet	Single and two-story structures only, with the total height not to exceed 20 feet.

Shoreline Setback D-1, from 100-feet or more	Building height based on proposed Property Setback/Height Regulations.

Figure V-1, Shoreline Setback/Height Graph, graphically depicts Shoreline Setbacks A,B,C and D.

C. PROPERTY COVERAGE RATIO/PROPERTY SETBACKS/HEIGHT REGULATIONS

Setbacks, lot coverage ratios and height limitations are interdependent functions of property development. The minimum setbacks and maximum heights and lot coverage ratios presented in Table V-1 are established by the Commonwealth's proposed Zoning and Land Use Act.

These proposed regulations were established with the purpose of applying to all Zones within all of the Commonwealth's Urban Districts; therefore, they cannot be expected to exemplify any unique features or requirements of the Saipan Lagoon project area, per se. With the data analysis from Volume I of this project and SALAPAT as a background, however, the property setback, property coverage, and height limitations for the Commercial Zone and the Resort Zone can be improved to reflect more design flexibility for developers while protecting the project area's natural beauty and openness.

1. Lot Coverage Ratios

Lot coverage for structures means the "footprint" of buildings on the site and does not consider the floor area of upper floors or the overall density of the development. Where the first floor is elevated above the ground level, its lot coverage ratio shall be based on the proposed use for the area below the structure.

The lot coverage ratio for open space is considered to include plazas, terraces, decks and other outdoor areas which are not covered or walled, landscaped areas, recreation and open space, improved or unimproved natural areas, covered storm water disposal areas, and pedestrian walkways. The continuity, conservation and maintenance of open space must be provided for; any later modification must be first approved as a variance.

FIGURE V-1

SHORELINE SETBACK AND HEIGHT GRAPH

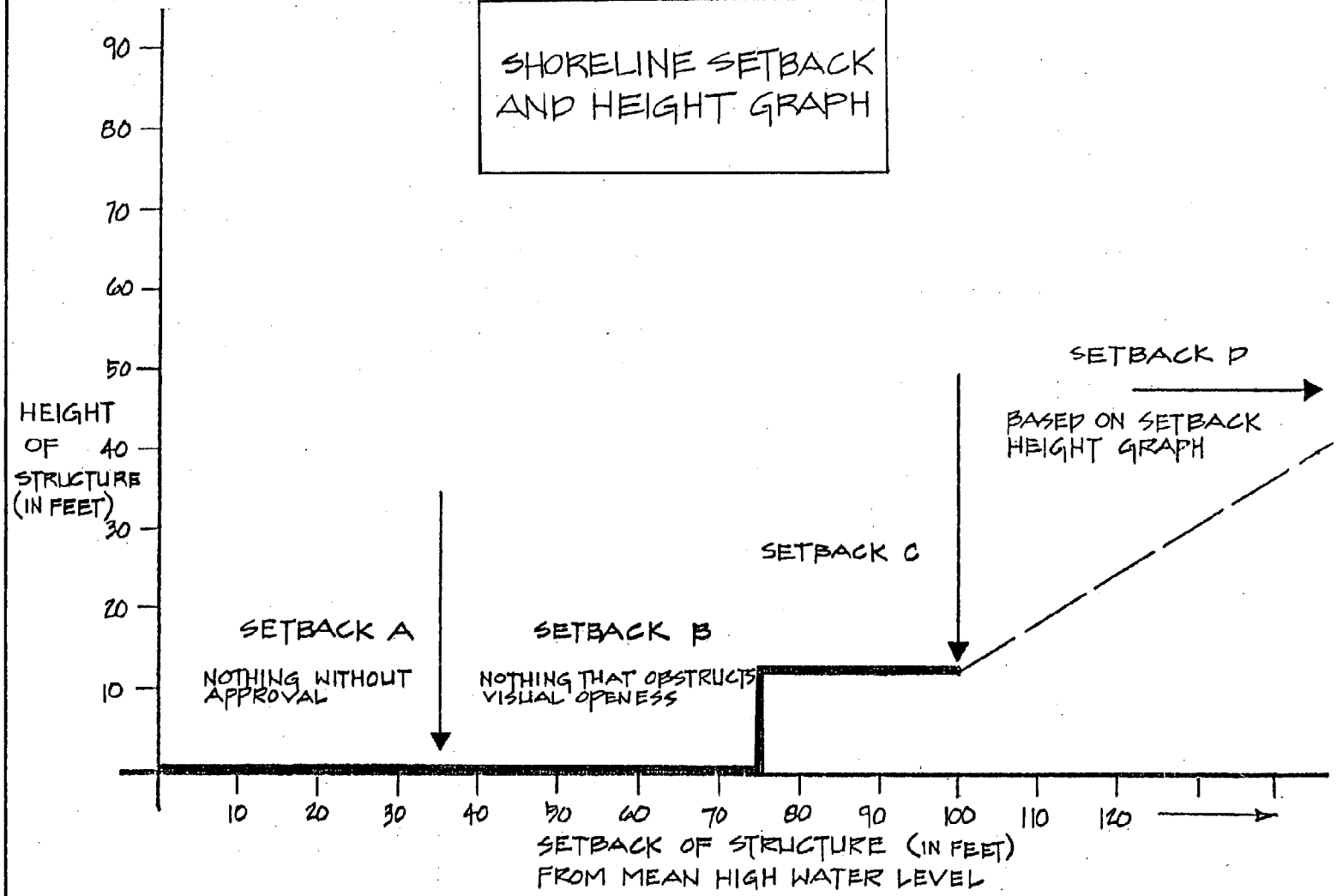


TABLE V-1

MINIMUM PROPERTY SETBACKS, MAXIMUM STRUCTURE HEIGHTS AND DENSITIES FOR ZONES, PER PROPOSED ZONING AND LAND USE ACT

ZONE	MINIMUM PROPERTY SETBACK FOR STRUCTURE	MAXIMUM HEIGHT FOR STRUCTURES	MAXIMUM DENSITY OF DEVELOPMENT
Residential	20' from primary and secondary roadways. 10' from collector roadways. 4' (front yard) and 5' (rear yard) for tertiary roadways.	None, per se, except that a single or multi-family residential structure shall not exceed a height that inhibits access to sunlight for adjacent lots.	6 units/acre for single and two-family dwelling units. Lot coverage of 40% for non-sewered lots for single-family units. Lot coverage of 50% for non-sewered and 60% for sewered lots for multi-family units.
Commercial	None	25'	None
Resort	20' side yard	85' or eight stories	20 guest units/acre
Industrial	None	45'	None
Village	None	None	None

EXHIBIT V-2
LOT COVERAGE REGULATIONS FOR
COMMERCIAL AND RESORT ZONES

(A) Authority. Section 5(f) of the Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

(B) Scope of Regulations. These regulations apply to the Commercial Zone and to the Resort Zone as established by Section 9(c) and (d), respectively of the Zoning and Land Use Act, Commonmwealth of the Northern Mariana Islands.

Commercial Zone	-	Maximum lot coverage by structures - 25% Maximum lot coverage for parking, roads and service entries - 45% Minimum lot coverage by for open space - 30%
Resort Zone	-	Maximum lot coverage by structures - 20% Maximum lot coverage for parking, roads and service entries - 35% Minimum lot coverage for open space - 45%

2. Setback and Height Regulations

The major considerations when evaluating property coverage ratios and setback-height standards are light, air, open space, compatibility with adjacent uses, preservation of scenic views and the overall aesthetics and character of the area. The objective with such regulations is to devise a formula which, on one hand, safeguards environmental design principles without, on the other hand, imposing burdensome and restrictive standards on a developer.

Recognizing, therefore, the potential and the need for economic development in CNMI as well as the imperativeness for general site design standards, the following regulations (Exhibit V-3) are recommended for commercial and resort zones to replace those now proposed in the "Zones and Land Use Districts Study."

EXHIBIT V-3
SETBACK AND HEIGHT REGULATIONS FOR
COMMERCIAL AND RESORT ZONES

(A) Authority. Section 5(f) of the Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

(B) Scope of Regulations. These regulations apply to the Commercial Zone and Resort Zone as established by Section 9(c) and (d), respectively , of the Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

(C) Setback and Height Regulations. A height-setback graph is provided for each zone. These curves reflect the relationship between the height and the space between buildings. Additionally it is recommended that taller buildings be clustered in a manner to minimize the impact of each individual tower. Certain concessions in the setback-height standards can be proposed where a desirable concept of clustering is possible.

(D) Height/Setback Graph. See Figure V-2.

D. SHORELINE FENCING REGULATIONS

While indiscriminate shoreline fencing is not now a significant problem along the Saipan Lagoon shoreline, the Commonwealth should promulgate specific regulations to prevent any undesirable situations where such fences may create access or aesthetic problems. Exhibit V-4 proposes such regulations.

EXHIBIT V-4
SHORELINE FENCING REGULATIONS

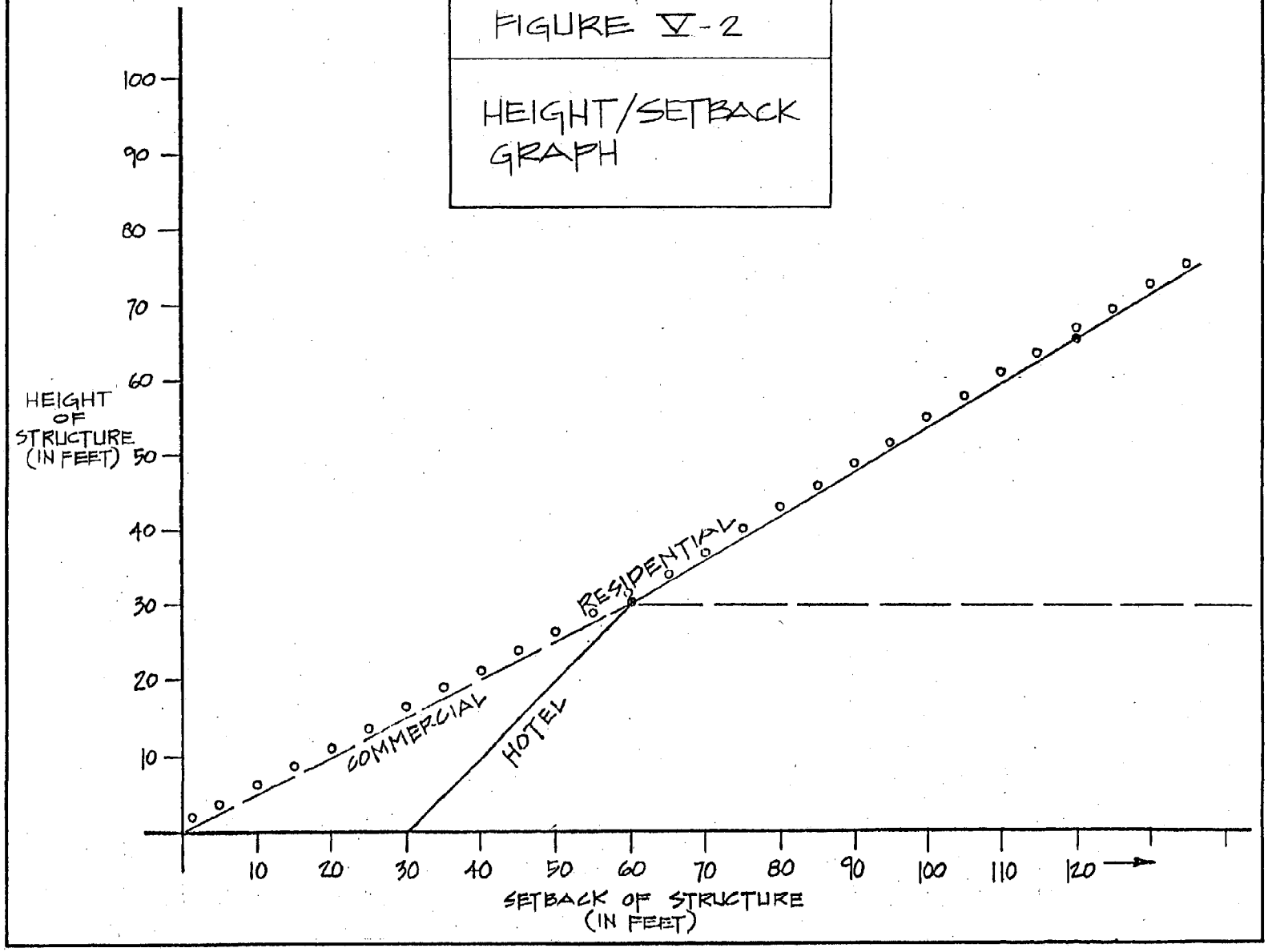
(A) Authority. Section 5(f) of the Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

(B) Scope of Regulations. These regulations apply to all properties within the first 75 feet landward from the mean high water level.

(C) Conformity With Other Regulations. Shoreline Setbacks A and B as established by the Commonwealth's duly promulgated Shoreline Setbacks are hereby incorporated into the Shoreline Fencing Regulations.

FIGURE V-2

HEIGHT/SETBACK GRAPH



(D) Supplemental Regulations to Shoreline Setback Regulations A. The Zoning Review Board and the Coastal Resources Management Office shall not approve any construction for fences in this 0-35 feet setback.

(E) Supplemental Regulations to Shoreline Setback Regulations B. In the event that fencing is permitting by the Zoning Review Board and the Coastal Resources Management Office within the 35-75 feet shoreline setback such fencing must comply with all of the following criteria:

1. Such fencing shall not exceed 30" (thirty inches) in height or 24" (twenty-four inches) in width.

2. Such fencing shall not extend seaward beyond a point which is 25'(twenty-five feet) from the mean high water level contour.

3. Such fencing shall be primarily constructed of indigenous materials. Barbed wire is especially prohibited.

4. Such fencing shall not be used as a foundation for any objects extending vertically or horizontally from the fencing itself.

5. Such fencing which is lying perpendicular or askew of the coastline shall be provided with either ground level openings or with steps, both of sufficient size and convenience to accommodate easy pedestrian access.

E. LANDSCAPING GUIDELINES

Exhibit V-5, below, is adopted from the "Zones and Land Use Districts" report and supplemented with species of indigenous vegetation that are suitable for the respective landscaping guidelines.

EXHIBIT V-5

GUIDELINES FOR LANDSCAPING

The Authority for these regulations is Section 5(f) of the proposed Zoning and Land Use Act, Commonwealth of the Northern Mariana Islands.

GUIDELINE No. 1 Development should promote the lagoon's scenic qualities.

Variations in the natural coastline, beaches, and reef should be visually accessible.

Lagoon and beach activities should be visually featured.

On-shore topography and natural vegetation should be retained.

Areas of particular concern should continue to be protected by legislation. Unique ecological areas and significant stands of tropical limestone vegetation should be preserved through site development plans which protect such areas and vegetation from degradation by nearby construction.

GUIDELINE No. 2 Establish complementary relationships between development and the lagoon shoreline.

Maintain continuity of land form, topography and transitions to the beach. Minimize the use of retaining walls, dikes and seawalls. Design seawalls to also serve as benches and soften their appearance by providing tropical landscaping such as Hibiscus hedge, Panama Cherrytree, Coconut Palm, Beach Morning Glory and various beach grasses.

Maintain, define and develop beach access points. Provide for continuous beach walkways and incorporate beach walkways into all shore development, including the provision of benches, trash receptacles, low-level lighting and other conveniences. Public access to the beach should be established through pedestrian arcades and public corridors.

Maintain a open-view corridors to the Lagoon. Orient buildings perpendicular to the shoreline to allow view corridors between buildings. Open buildings at the ground level to permit views.

Parking adjacent to shoreline areas is subject to the prevailing Seashore Setback Regulations. Screen all views of parking in order to promote the natural Lagoon and shoreline setting.

Preserve stands of Coconut Palms, Ironwood, Flame, Kapok, Breadfruit, Barringtonia, Banyan and other mature trees. Clearing of low-level scrub such as tangan-tangan, and various grasses within and adjacent to the shoreline is encouraged to enhance views and provide for public security. Existing, tall Palm, Barringtonia, Ironwood, Banyan, Kapok, Breadfruit, Messerschmidia and Flame trees should not be damaged or removed.

GUIDELINE No. 3 Encourage accessibility to community assets which provide a sense of orientation, recognition and visual interest.

Maintain and improve the quality of open space areas and access to them for recreational purposes.

Maintain and improve accesses from the beach to park and recreation facilities.

Relate proposed developments visually and functionally to adjacent roadways and pedestrian walkways. Provide amenities such as rest areas, landscaping of natural flora, lighting, and appropriate street furniture. Plantings of low vegetation such as the Beach Sunflower, Dwarf Poinsettia, Beach Morning Glory or other common ground cover within rights-of-way are encouraged.

Relate proposed developments to nearby historic areas.

GUIDELINE No. 4 Development shall promote a positive visual image and impression of Saipan's character.

Resort, hotel or tourist industry facility environments should reflect a feeling of relaxation and leisure. The intensive building, congestion and activity of urban settings are discouraged.

Emphasize recreation, and pedestrian activity and landscaped open space.

Consideration should be given to preservation and improvement of the natural beauty of the proposed project site with emphasis on open space, water features, natural land form, and vegetation such as that found in the limestone forest, beach strand or savannah.

Consolidation of properties into the largest possible parcel is encouraged. Subdivision of property into smaller parcels is discouraged unless justified by an overall site master plan to be implemented through specific construction in consonance with the projected development of the basic lot.

Utilize green areas for on-site disposal of stormwater. Landscaped percolation basins, grass covered ponding basins, recreation and open-space areas and areas of natural vegetation will provide capacity for recharge of stormwater run-off. Ponding areas covered with various short grass such as Bluegrass Japanese grass or other appropriate types can be used.

Adequate lighting should be provided for outdoor areas. Lighting should have a precisely defined purpose and not be disruptive to the adjacent surroundings or to the overall environment. Light poles should be no more than 15-feet in height, with underground electrical service.

Screen all service and mechanical areas by using natural vegetation hedges such as Hibiscus, Crotans or close-cropped Ironwood.

Create hills and berms to integrate overall land and building forms. Accentuate natural land form in order to define the character of development and to promote the natural setting.

Provide underground, covered or screened parking. Screened parking is easily accomplished by hedges of Hibiscus, Crotons or Ironwood.

GUIDELINE No. 5 Use design elements to express function, use and tropical setting.

Provide variety in building envelope, wall plane and roof shape. Break structures into related components, with distinctive appearance.

Link buildings and activities through the use of vestibules, covered passages, terraces and arcades.

Promote indoor-outdoor relationships. Public spaces can be open to the outside to allow for natural breezes and the experience of the tropical environment.

Utilize recessed entries as shaded transitions.

Promote natural ventilation of spaces. Orient for maximum wind exposure. Provide breezeways to capture cooling breezes.

Give consideration to treatment of entry, windows, cornices and other building elements that contribute to style.

Consult architectural and construction references for energy-conscious design features.

Balance the use of concrete and masonry with the use of natural materials. Naturally-weathering materials provide a pleasant appearance with minimal maintenance requirements.

Permanent structures are encouraged. Temporary structures such as mobile homes and pre-engineered steel buildings and structures made of corrugated metal sheeting are not desirable for the long term appearance of the Lagoon area.

Utilize distinctive ground textures for visual character and continuity.

The nature, size, shape, style and lighting of all signs should be in harmony with the Lagoon setting and in conformance with prevailing Sign Regulations.

Signs should be subordinate to buildings and fit within existing features of the structure.

GUIDELINE No. 6 The proportion and scale of buildings should relate to human scale.

Structure should not dominate adjacent streets, pedestrian spaces and neighboring properties. Pedestrian viewpoints should relate to both the size and detail of buildings.

Provide for transitions between building scale and street scale through the use of plazas, trellises with overhanging plants such as epiphytic ferns from the limestone forest, street furniture, landscaping and other outdoor features which relate to human scale.

Extend form and relieve the massiveness and/or height of structures through the use of transitional elements. Ancillary structures such as entrance canopies, trellises, porches, stairs, terraces, plazas, gardens and other exterior spaces provide shade and inviting spaces, while enhancing the human scale of buildings.

Soften the bulk of structures by breaking them into smaller components. Examples include the use of several, connected structures in lieu of one large

imposing structure and provision of lower, ancillary buildings which surround tower structures.

Vary the wall plane, height and fenestration to provide an interesting configuration and silhouette.

Use roof forms which enhance the structure's overall scale; also, blend various forms.

Soften the bulkiness of structures through the use of landscaping with local vegetation like Coconut and

Betel Nut Palm, Hibiscus, Bamboo, Panama Cherrytree, Soursap, Papaya, Pandanus, Flame tree and other appropriate flora incorporated within the form of buildings.

GUIDELINE No. 7 Promote continuity of a proposed development with adjacent areas.

A structure's scale adjacent to the street shall relate to pedestrian scale.

Provide a variety of setback and exterior spaces separating adjacent developments.

Provide adequate open space as a component of the project.

Provide transitions between the structure's heights and the boundaries of the site. Construction at a corner site shall be less imposing in order to diffuse and open-up intersections.

Use special care in siting of high-density residential buildings where they are located adjacent to low-density residential developments.

The effect of tall structures on natural air circulation and wind turbulence should be considered. Building shadows should not interfere with neighboring activities.

A building significantly taller than its surroundings can experience high wind loads and create pedestrian-level winds.

Provide unobtrusive parking, walkway and landscape lighting for safety and public security.

GUIDELINE No. 8 Integrate infrastructure and service elements in an unobtrusive manner.

The underground installation of power, telephone and television service within the site are strongly encouraged.

Locate automobile and bus parking areas to the rear of buildings whenever possible. Screen parking areas at boundaries and break-up large, paved areas with islands that are land scaped in a natural setting.

GUIDELINE No. 9 Protect existing landscaping and design new landscaping around existing vegetation, especially mature trees and planting.

Existing trees and groupings such as coconut Palm, Ironwood, Barringtonia, Flame, Banyan, Pandanus, Papaya, Panama Cherry, Soursap, established in their natural condition, should be retained and protected during construction.

Selective pruning and removal are desirable in order to open specific vistas, to give shape and dimension to vegetative groupings, to create functional open space, and to frame architectural elements.

Prune and shape existing vegetation for viewing and to preserve mature Coconut Palm, Ironwood, Barringtonia, Flame, Banyan, Pandanus, Papaya Cherry, Soursap trees.

Parking area layouts should incorporate existing trees to the greatest extent possible.

Buildings should be located with respect to preserving large stands of mature trees.

Maintain visual continuity of existing vegetation by replacing cleared areas with new landscaping of similar species composition.

GUIDELINE No. 10 Utilize landscaping as functional solutions to site development.

Utilize landscaping for traffic and circulation control to screen objectional views of service and mechanical areas and to provide privacy by utilizing hedges of various Hibiscus species or thick Ironwood.

Buffer and shade parking areas with Coconut Palm, Banyan, Barringtonia, Ironwood, Breadfruit or other large trees to provide relief from sun glare and to reduce surface temperature of paved areas. Large paved areas are hot and uninteresting, landscaping cools and shades parking lots.

Utilize landscaping of appropriate height vegetation in order to enchance building line and form, to unfold an attractive vista or to frame a view. Islands of interspersed landscaping with a glimpse of the ocean may be more effective than a block-view or a sweeping panorama of horizon.

Utilize ground cover of varying heights and types to shade, cool and direct breezes, to absorb unpleasant sounds, smells and dust, and as erosion control on steep banks.

In some cases, plantings themselves become a focal point of development. Large planting groups representing natural tropical settings such as the limestone forest or beach strand, are strong determinants of spatial form.

Provide other landscape elements including rock forms, water and sculptures.

Landscape storm-water percolation basins with local ground cover such as the Beach Sun Flower or common grasses, to ensure attractive and maintained open space.

GUIDELINE No. 11 Utilize informal landscaping techniques to enhance the natural setting of the Lagoon area.

Random planting and naturalness should be created by planting to blend with the natural environment, like that which is found in the limestone forest, savannah or beach strand.

Plant in mass. Large trees such as Coconut, Breadfruit, Pandanus, and other natural forms of large and small plants should be grouped into clusters as simple landscape elements.

Consider seasonal variation of color, loss of leaves and susceptibility to pest attack. Transient floral aspects, no matter how striking, should not be the sole basis of selection unless the specimen is also a sound selection when not in flower.

Landscaping lighting shall be low level. Underlighting of plantings can serve also as walkway lighting. Limit any illumination spotting to specimen trees and to dominant landscape forms.

F. ESTIMATED COST OF PROMULGATING NEW LAND USE REGULATIONS AND DISSEMINATING LANDSCAPING GUIDELINES

Provisions for promulgating new or amended land use regulations are prescribed in the Zones and Land Use Districts Act. This procedure would be carried-out by staff of the proposed Zoning Administration Office staff as provided by the Act or, in the interim, by the Coastal Resources Management Office, and involve a period for becoming familiar with the materials, coordination among other agencies, and public hearing expenses. The Landscaping Guidelines should be printed for dissemination to prospective developers. The estimated cost for promulgating the regulations and printing the guidelines is $2,000.

CHAPTER VI- BEACH RESTORATION PLAN

A. STATEMENT OF INTENT

The intent of this section of the PLAN is to recommend both regulatory as well as preliminary plans for structural and non-structural improvements for protecting the beach along Saipan Lagoon. The regulatory measures address three activates which now affect the beach strand and near-shore ecological zones. They are:

* Regulations for dredging, diking and land-filling along coastal areas;
* Regulations for mining along coastal areas; and
* Regulations for structures which are located within the near-shore or beach strand ecological zones.

Appropriate structural and non-structural remedial measures for protecting and restoring beach erosion sites are adapted to the Lagoon's coastline and specific measures are recommended.

B. REGULATIONS FOR DREDGING, DIKING AND LANDFILLING ALONG COASTAL AREAS

Exhibit VI- 1, below, contains these proposed regulations.

EXHIBIT VI-1
REGULATIONS FOR DREDGING, DIKING AND LANDFILLING ALONG COASTAL AREAS

1. Authority. Public Law 3-47, Commonwealth of the Northern Mariana Islands.

2. Prohibited dredging, diking and landfilling along coastal areas. The dredging, diking or landfilling of coastal wetlands is prohibited.

3. Conditions for permitting landfilling, diking and dredging. Landfilling, diking and dredging shall be permitted only as part of a wetland or esturine restoration plan and under the auspices of a permit approved by by the Coastal Resources Management Office, Commonwealth of the Northern Mariana Islands and

of a permit approved by by the Coastal Resources Management Office, Commonwealth of the Northern Mariana Islands and

a) as part of an approved maintenance dredging project; or

b) as part of a port expansion; or

c) as part of an energy facility for which there is no alternative location that would result in less environmental damage.

4. Conditions upon approval for dredging. When dredging is allowed in accordance with Section 3, above, such dredging shall:

a) avoid unnecessary disruption to biological communities and water circulation through planning and scheduling of dredging operations;

b) shall avoid the dredging of toxic bottom materials; and

c) shall provide for the isolation and treatment of spoils material or for its disposal on land so as to prevent pollution of marine, surface and underground waters.

5. Disposal of dredged material. Dredged material which is suitable for beach replenishment shall be transported to appropriate beaches designated by the Coastal Resources Management Office. After a thorough assessment of potential disposal sites, all other dredge spoils shall be disposed at either:

a) dry land in authorized fill sites; or

b) in marine areas where studies demonstrate that it can be used with minimal environmental impact; or

c) in deep ocean areas subject to Federal and/or Commonwealth guidelines and at sites chosen so as to minimize adverse impacts to marine organisms.

EXHIBIT VI-2
REGULATIONS FOR STRUCTURES LOCATED IN
NEAR SHORE AND BEACH STRAND ECOLOGICAL ZONES

1. Authority. Public Law 3-47, Commonwealth of the Northern Mariana Islands.

2. Conformance with other regulations. These regulations shall supplement other prevailing applicable regulations for structures located in near shore and beach strand ecological zones such as those regulations administered by the U.S. Army Corps of Engineers.

3. Prohibited structures. Structures on the open beach strand shall be prohibited except for those necessary for public health, safety or welfare.

4. Conditions for approval. Near-shore and beach strand structures shall be permitted only when required:

   a) to maintain and serve public recreation areas or necessary public service facilities where there is no less environmentally harmful alternative; or

   b) to protect existing developments where the Coastal Resources Management Office determines that the public interest would be better served by such protection than instead, by protecting the natural shoreline processes.

5. Repair of structures. Repair, replacement or reconstruction of shoreline structures shall be planned and designed to protect and enhance marine life conditions. Existing shoreline structures which cause water pollution and fish habitat degradation shall be required to conform with these regulations within one year of the effective date of these regulations.

D. REGULATIONS FOR MINING ALONG COASTAL AREAS

Exhibit VI-3, below, contains these proposed regulations.

EXHIBIT VI-3
REGULATIONS FOR MINING
ALONG COASTAL STRAND

1. Authority. Public Law 3-23, Commonwealth of the Northern Mariana Islands.

D. REGULATIONS FOR MINING ALONG COASTAL AREAS

Exhibit VI-3, below, contains these proposed regulations.

EXHIBIT VI-3
REGULATIONS FOR MINING
ALONG COASTAL STRAND

1. Authority. Public Law 3-23, Commonwealth of the Northern Mariana Islands.

2. Mining along beach strand. Mining activities within the beach strand ecological zone are prohibited.

3. Mining along other coastal areas. Mining may be permitted in other coastal areas if it can be demonstrated that:

   a) such extractions cannot be feasibly supplied from inland locations; and

   b) such extractions will not have substantial or longlasting adverse impact on coastal zone resources; and

   c) the sand supply at the extraction site is sufficient to allow mining without adverse impact; and

   d) buffer areas are provided to screen in-land mining from coastal areas; and

   e) mined areas will be reclaimed and replanted; and

   f) mined and dirty surface water pollution and waste materials and spoils disposal are controlled to minimize adverse impacts.

4. Mining along coastal streams. Excavations affecting coastal streams shall be permitted only when necessary for flood control and only if consistent with approved Commonwealth plans. Such excavation requires mitigation measures to:

   a) maintain sand transport capability;

   b) replace all fish, wildlife and habitat values; and

   c) protect recreational values.

E. BEACH AND SHORELINE RESTORATION PLAN

The Saipan Lagoon shoreline suffers from beach erosion at several sites, see Figure VI-1. In most cases, this erosion has been a progressive, long-term effect; however, periodic storm waves have accelerated some beach changes, especially when accompanied by high tides.

The causes of these beach erosion areas have not been studied and are not well understood at this time. Engineering investigation of existing coastal geology and oceanography processes must occur before major restoration projects are undertaken. However, several types of remedial measures are already well developed by the U.S. Army Corps of Engineers; and their general planning applications and design principles are appropriate for certain Saipan Lagoon beach erosion sites. Such recommended measures are not to be construed as a substitute for professional engineering services which are prerequisite to properly designed shoreline restoration. Rather, they are described and recommended as guidelines for those restoration plans.

1. Typical Remedial Measures for Beach Erosion

Various methods can be employed to protect property from beach erosion and other wave-induced damages and to replenish eroded beaches. Understanding the causes of erosion and the principles of design are the two keys in selecting the proper remedial measure. Established design principles include:

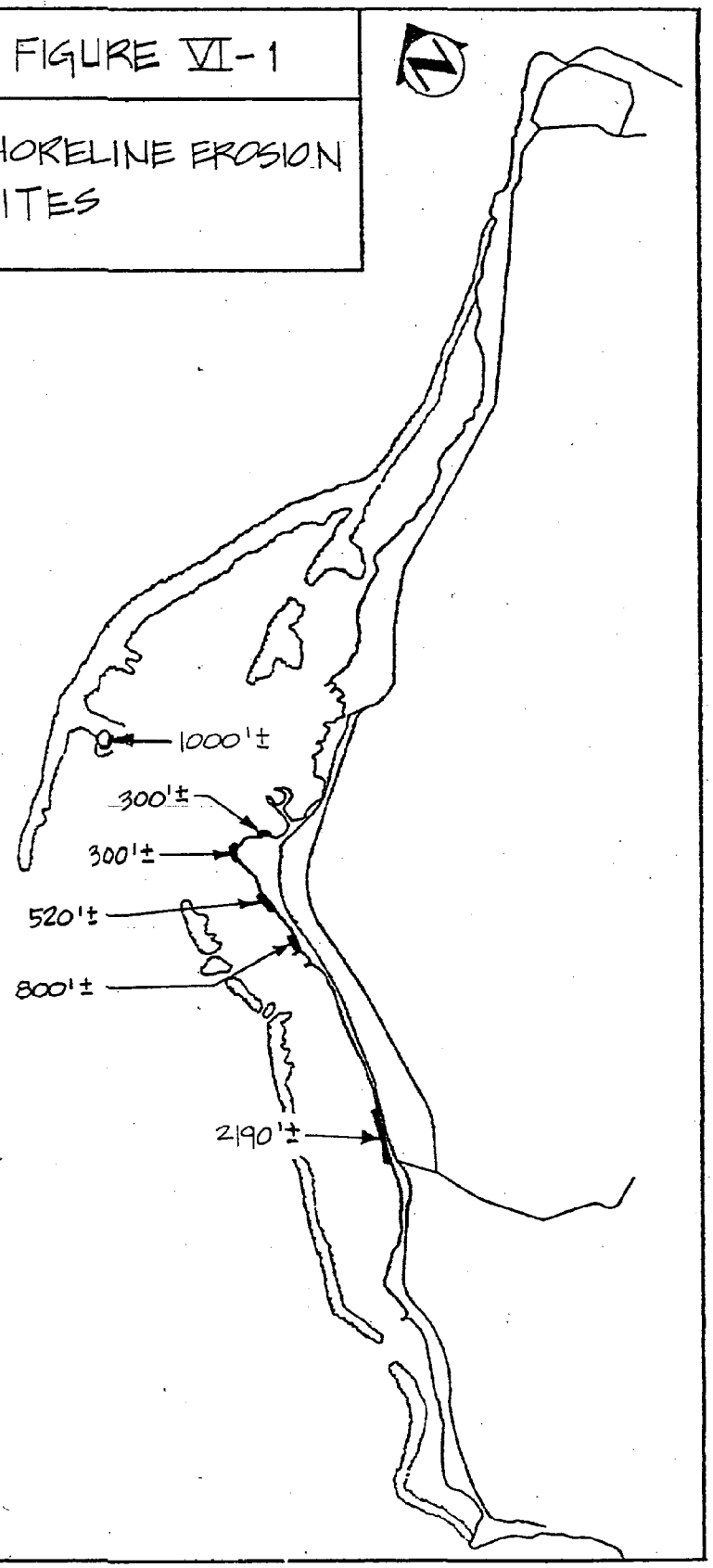
* adequate bedding for structural foundations;
* flank protection of revetments by return walls;
* structural stability of bulkheads or other structural devices;
* stone underlayers and filters beneath armour stone; and
* adequate elevation to prevent severe overtopping by waves.

Erosion control measures are categorized as either non-structural or structural. Non-structural measures may include:

* taking no action (not considered in this PLAN);
* regulation of shoreline uses;
* relocation of existing buildings and roads away from eroding land;
* beach fill and nourishment;
* piling supports for structures; and
* planting vegetation.

FIGURE VI-1

SHORELINE EROSION SITES



Structural measures should be considered only when non-structural measures cannot achieve the required shoreline protection. Structural measures may include:

* revetments;
* seawalls;
* other devices which protect the shoreline from direct erosion by waves;
* groins;
* offshore breakwaters; and
* other devices which protect the shoreline by controlling sand transport.

2. Non-structural Measures

Obviously, some measures have interchangeable and/or multiple functions; but serious consideration is always given first to non-structural measures because they require the least effort (expense) and generally have the least adverse impact on the environment.

Three types of appropriate non-structural measures for the Saipan Lagoon shoreline are described below.

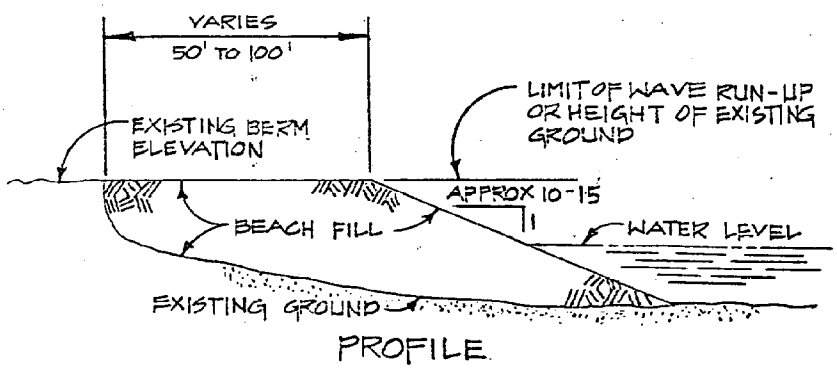
a) Shoreline Management. This is the remedial measure employed most fully. Preserving existing vegetation, strategic planting of erosion-resistant vegetation and requiring buildings and other structures to be located landward of erosion constitute the most effective measures for protecting property from coastal damages. This measure is implemented by virtue of the Seashore Setback Regulations proposed in the Land Use Plan Element of this SAIPAN LAGOON USE MANAGEMENT PLAN.

b) Beach Fill and Nourishment. A sandy beach provides natural protection against wave attack; but continuous erosion will eventually result in the long-term loss of sand. If that loss is replenished with new material, the beach recession can be abated. Such nourishment measures require medium to coarse gravel sand compatible with that being replaced, to be successful. The sand fill can be dumped in a continuous blanket directly upon the eroded area, in stock piles at regular intervals along the beach, or on a feeder beach updrift of the eroding beach, allowing for wave action to distribute the material.

Beach nourishment simulates a natural erosion control measure, and the resulting beaches are

aesthetically pleasing and provide recreation opportunities. However, this may become an expensive measure because the capacity of waves to remove sand could be so great as to preclude economic feasibility. Furthermore, a sand beach without some sort of structural back-up may not provide adequate protection against waves generated by periodic tropical storms and typhoons. Also, the regular displacement of sand from one area to another may be injurious to marine habitats.

See Figure VI-2, Typical Beach Fill, for the cross-section view of this measure.



TYPICAL BEACH FILL

c) Vegetation. Although planting vegetation is most commonly associated with erosion protection of sand dunes (which do not occur along the Saipan Lagoon shoreline) this remedial measure does offer some value to the project area.

Vegetation counteracts erosion because root systems bind the soil and also forms protective mats which resist erosion. Low-growing grasses and coastal shrubs that spread thickly and have extensive root systems are useful, such as Wedelia biflora; Beach Morning Glory, Ipomoea pes-caprae; and Scaevola taccada. Trees such as ironwoods are effective as coastal windbreaks.

Of course, few species of vegetation can survive a constant onslaught of inundation by seawaters; and it takes considerable time to establish a dense growth, even under ideal conditions. Consequently, the vegetation which does exist along the Saipan Lagoon shoreline serves a valuable, time-tested purpose and must be preserved and nurtured.

3. Structural Measures

Four types of structural measures are appropriate for the Saipan Lagoon shoreline. They are stone revetments, masonry gravity walls, bulkheads and sand grabbers.

a) Stone Revetments. A revetment is nothing more than a protective facing which covers a slope from direct erosion by waves. Properly designed, revetments are time-proven measures for shore protection. They can be constructed of various materials, but large coral boulders (armour stones) are the most economical for Saipan. The armour stones must be large enough or interconnected in order to resist dislodging by waves. Also, armour stone revetments require:

* proper filter material to prevent loss of slope material through the voids between stones;
* bedding stone to distribute the weight of the armour stones; and
* protection of the slope's toe and flanks.

Generally the slope of revetments should not be steeper than 30%; and the quarry stones should be clean and free of cracks and cleavages. The largest stone should be not greater in size than three times smallest stone, ruling out the use of broken asphalt or concrete rubble as armour material.

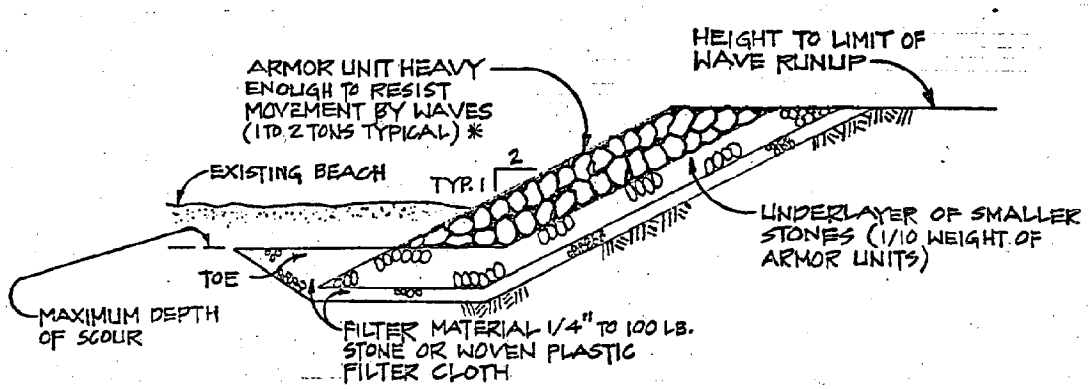
Advantages of revetments as remedial measures for shoreline erosion include:

* high resistance to wave damage;
* flexibility in that they can settle into underlying soils and experience minor damage but still function without major repairs; and
* resistance to wave run-up and overtopping due to their rough surface.

The disadvantages of revetments include:

* the heavy equipment and special skills needed to place armour stones;
* relative expense of quarried coral which is suitable for armour stone; and
* the large area required to construct the structure; and
* unaesthetic appearance compared to non-structural measures.

See Figure VI-3 for a typical revetment section.



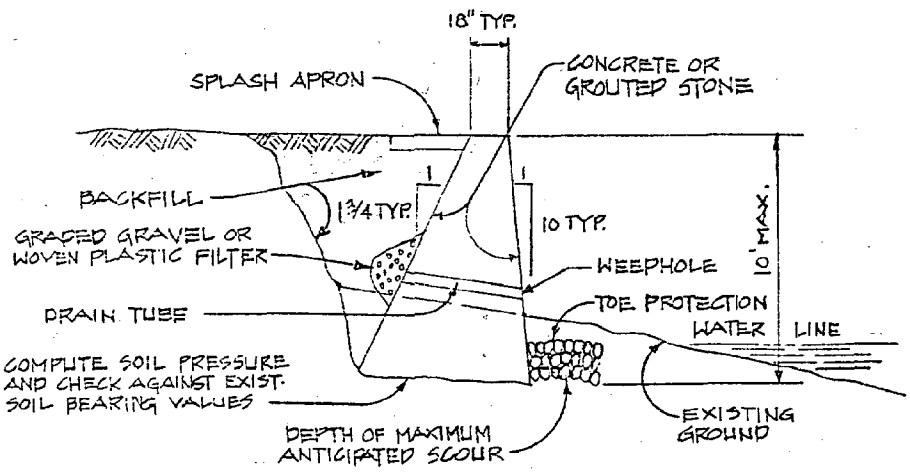
TYPICAL REVETMENT SECTION

b) Masonry Gravity Walls. Masonry gravity walls are common shoreline protection structures along coastal beaches. The wall must be designed so as

to resist the pressures of the retained saturated soil that tends to topple the wall seaward. This normally is accomplished by providing a broad base and by battering the backface of the wall away from the shore (See typical cross section in Plate VI-4).

An engineering design analysis is needed to assure that the wall is structurally stable. The base of the wall must be well below the maximum anticipated scour on its seaward side; and adequate toe protection is required to prevent undermining by waves reflected off the wall. An aggregate backfill and weepholes are required for draining saturated soils. A splash apron behind the wall's crest will prevent overtopping waves from washing-out the backfill.

The masonry gravity wall is a proven, moderately-priced, long-lasting, relatively maintenance free remedial measure. However, these walls do require an experienced mason, and structural failures are difficult to repair.



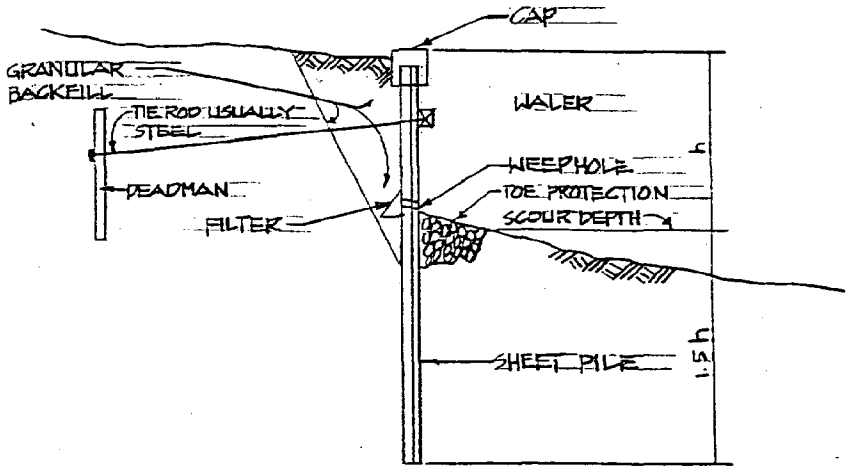
TYPICAL CONCRETE OR GROUTED MASONARY GRAVITY WALL

c) Bulkheads. A bulkhead is a vertical seawall, constructed of sheetpiles that are driven into the ground or seabed, and stabilized by tie-backs. Sheetpiles are normally constructed of either

steel, concrete or timber. The length of the sheets are determined by a ratio of being embedded to a depth of 1.5 to 2.0 times the height of the wall above the scour depth. A tie-back is needed to anchor the top of the bulkhead against soil pressures tending to topple the wall seaward, although free-standing alternatives, requiring significantly deeper penetration of the piles, can be designed. Bulkheads require substantial toe protection, usually provided by graded quarried stones. Bulkhead seawalls also require considerable soils analysis and engineering design work.

While they provide longterm, maintenance-free protection of uniform appearance, especially for industrial and shoreline-dependent areas where land base is scarce, bulkheads do posses some disadvantages. The long tie-back feature does not adapt well where a building is situated close to the shoreline. Steel sheetpiles have a limited life because of salt water corrosion.

Timber piles are prone to biological decay. The smooth vertical face does not absorb wave energy; and reflected wave energy may result in loss of sand that is seaward of the bulkhead. Repairs can be expensive, and pile-driving is a noisy, objectionable operation. See Figure VI-5.



PROFILE

FIGURE VI-5
TYPICAL BULKHEAD-TIED-BACK CONSTRUCTION

d) Sand Grabber. The Sand Grabber is a patented device constructed of concrete building blocks that are hooked together with steel rods. The devices trap sand behind them as wave action carries water over and through the structure. The slower return-flow of the water that penetrates through the blocks allows the sand to deposit behind the structure. The blocks can also be placed along the shore to form a revetment.

This structure is inexpensive and allows easy access to the beach. However, the steel rods will eventually rust away, thereby allowing the blocks to disassemble. This remedial measure has not been proven functionally effective or structurally adequate over a period of time long enough to judge its life expectancy and maintenance requirements. Therefore, it should be considered as appropriate for a short-term solution only.

Also, without adequate protection, the seaward row of blocks may be undermined by toe scour. These installations must also be protected to prevent flanking failure.

Figure VI-6, below, depicts sectional views of this measure.

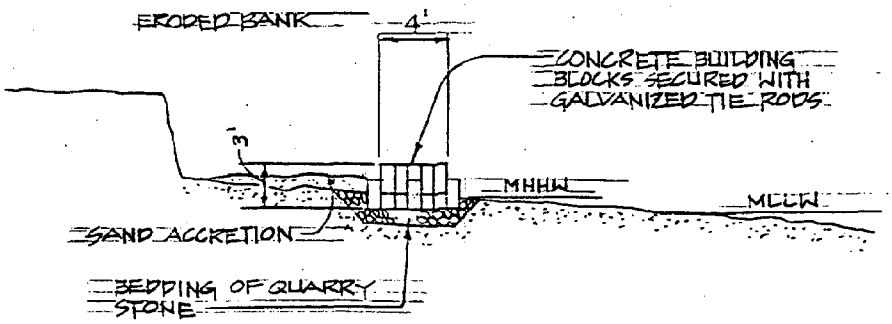


FIGURE VI-6
TYPICAL SAND GRABBER SECTION

F. RECOMMENDED SHORELINE EROSION CONTROL STRUCTURES AND ESTIMATED COST OF STRUCTURES AND PROMULGATING REGULATIONS FOR COASTAL AREAS

Construction of erosion-control works can have both favorable and unfavorable impacts on the Saipan Lagoon coastline: shoreline uses, adjacent properties, plants and wildlife are all affected. Shoreline protection control structures may hamper the natural littoral transport regime by creating a beach on the updrift side while inducing erosion on the downdrift side. A revetment may protect an eroding shoreline, but the material that is being protected no longer becomes available to supply the erosion occurring at downdrift beaches. Construction operations may create temporary turbidity and water quality degradation.

The following erosion control structures (see Table VI-1) are recommended for correcting the shoreline erosion which now occurs at five locations along the Saipan Lagoon shoreline (refer to Figure VI-1).

Additionally, a budget cost estimate is enclosed for the engineering design, plans and construction specifications.

TABLE VI-1
RECOMMENDED SHORELINE EROSION CONTROL STRUCTURES AND COST ESTIMATES

LOCATION	LENGTH OF EROSION (LF)	RECOMMENDED STRUCTURES	ESTIMATED COST OF STRUCTURE
N.E. American Memorial Park	± 300	Sand Grabber Beach Fill	$ 196/L.F. $ 25/Cu.Yd.
W. American Memorial Park	± 300	Sand Grabber Beach Fill	$ 196/L.F. $ 25/Cu.Yd.
Micro Beach/ Hafa Adai Hotel	± 520	Sand Grabber Beach fill	$ 196/L.F. $ 25/Cu.Yd.
North of Garapan Wharf	± 800	Masonry Gravity Wall Stone Revetment	$ 330/L.F. $ 40/Cu.Yd.
North of San Jose	± 2,190	Stone Revetment	$ 360/L.F.
		Subtotal (approx.)	$1,500,000
Plans and specifications for construction			$ 100,000
		TOTAL COST ESTIMATE	$1,600,000

The cost of promulgating the three sets of proposed regulations is similar to other regulation promulgation activities recommended by this PLAN. The estimated cost by CRMO staff is $1,000 for public hearings, promulgation and printing of the three sets of regulations.

CHAPTER VII - INFRASTRUCTURE PLAN

A. STATEMENT OF INTENT

This SAIPAN LAGOON USE MANAGEMENT PLAN establishes, among other things, the preferable development pattern for the Saipan Lagoon project area by virtue of the proposed zones and land uses, regulations, and management policies. Second only to this PLAN achieving those desired uses and growth pattern is the importance of assuring sufficient, reliable infrastructure throughout the project area; because available capacity for water, wastewater and power are determinant forces for managing any development plan.

Infrastructure planning for the Saipan Lagoon project area can occur in either of two forms:

* that of determination where development will (and will not) take place by providing for excess carrying capacity which can accommodate new growth, or, similarly, by extending utilities to areas where new projects have already been announced; or

* a preferred development pattern: that of supporting preconceived regional development plans by providing for excess capacity in accordance with land use projections and, conversely, by not upgrading capacity in those areas where development has reached it determined saturation point.

In the absence of an adopted, enforced land use plan for Saipan and its western shoreline corridor, infrastructure planning has basically taken the course of the first form: excess capacity being provided in the absence of land use planning or in reaction to proposed major projects which require extending and enlarging of utilities in order to service water, wastewater and power requirements. This results in land use planning at its worst because the public facilities are reactionary to private development decisions.

The Government's existing water and wastewater facilities plans are based on several sources of land use development and population projections. They have relied on the best (only) data available to date. With the adoption of this SAIPAN LAGOON USE MANAGEMENT PLAN, however, a realistic land use growth and development pattern will be established for the Saipan Lagoon shoreline geographical area; and infrastructure planning should be revised to account for this

information. Otherwise, the existing water and wastewater facilities plans will be fostering public investment in infrastructure which is out-of-step, and in some cases contradictory to, the land use development which is adopted by this PLAN.

Another aspect of infrastructure development, stormwater drainage and disposal, also suffers from inadequate planning and technical adaptation for Saipan. As with proper planning for water and sewer utilities, stormwater drainage facilities should be properly sized and designed to efficiently handle the intensity, volume and quality of the Island's stormwater runoff. Presently, however, the CNMI government has not adopted design criteria and construction standards to guide the placement of stormwater drainage and disposal facilities. A design criteria manual is necessary to standardize these facilities (which become the responsibility of Public Works to maintain) and to assure that the design parameters reflect Saipan's climatological and hydrological characteristics.

The intent of this Infrastructure Plan, therefore, is to recommend detailed scopes of work for updating the Saipan water and wastewater facilities plans for the Saipan Lagoon project area, to recommend a scope of work for developing a storm drainage criteria manual for guiding the design of Saipan drainage works in order to handle the runoff into the Lagoon in an environmentally acceptable manner; and to develop infrastructure planning criteria to assess the impact of future development within the established land use zones that are recommended for the PLAN's project area. In addition to these new recommendations this Plan also endorses many existing recommendations for on going programs and for infrastructure improvements which are presented in other reports.

B. WATER FACILITIES PLANNING FOR FUTURE SHORELINE USES

The primary purposes of this section are: 1) to update and revise the existing water facilities planning to reflect the newly established land use and development plans established for the Saipan Lagoon project area as well as to correct the water consumption demands used as a basis for design in the 1982 Saipan Water System Study; and, 2) to endorse the Government's existing plans for establishing a Groundwater Management Plan Task Force. This water system planning shall determine the necessary water production and transmission system to support the overall development objectives and plan elements for the SAIPAN LAGOON USE MANAGEMENT PLAN.

1. Scope of Work

In the Volume I, Chapter VIII, Section B.1.a "Problems associated with the Water System", it was disclosed that the planned water system improvements are under-designed by the year 1988. The following Scope of Work is recommended to correct that projection by upgrading the systemwide plans to accommodate the future Lagoon shoreline development based on current planning data.

This projection deficiency in the 1982 Saipan Water System Study does not discount the many other recommendations for both system upgrading and operations/maintenance improvements, which are still appropriate. It is unnecessary to repeat all of those recommendations (many of which are now being implemented by the Government) in this PLAN; however, their overall importance to implementing this PLAN certainly justifies inclusion by this reference.

The specific tasks embodied by the scope of work for this Facilities Plan Amendment are listed below.

a) Description and characteristics of the project area

- Topography
- Geology
- Land use development pattern
- Population projections
- Economic projections

b) Existing water facilities

- Water production facilities
- Water distribution facilities
- Water system evaluation
  - Management
  - Operations
  - Maintenance
  - Sanitary survey requirements

c) Water consumption requirements

- Historical production and demands
- Unaccounted-for water
- Per capita use
- Future public requirements
- Future commercial requirements
- Islandwide future water requirements

d) Design criteria

Design period
System pressures
System demands
Pipelines
Storages
Supply
Treatment

e) Water Quality

Water quality criteria for domestic uses
Water quality criteria for industry uses
Water quality monitoring program

f) Water supply and treatment alternatives

Groundwater quality management
Water reclamation
Desalination
Saltwater plumbing systems
Recommendations

g) Proposed water distribution and system improvements

General
Storage
Distribution
Hydraulic analysis
Proposed improvements
Cost estimates

2. Groundwater Management Task Force

Inherent to this PLAN's focus on water facilities planning is the assumption that an adequate quality and acceptable supply of potable water is available to the project area. The CNMI Government has embarked on a program to protect its groundwater resources and to plan for their future use on a sustainable yield basis. This PLAN endorses those efforts and specifically proposes that a Groundwater Resources Manager position be established to implement objectives of the Task Force.

3. Estimated Cost and Project Schedule

The estimated cost of the Water Facilities Planning is $85,000 and is not eligible for US EPA funding. This project will take approximately six months to complete.

The annual salary of a Groundwater Resources Manager is $30,000, plus an additional $10,000 for office administrative support, not including office space itself.

C. WASTEWATER FACILITIES PLANNING FOR FUTURE SHORELINE USES

The primary purpose of this section is to update and revise the existing wastewater facilities planning to reflect the newly established land use and development plans established for the Saipan Lagoon project area as well as to correct the wasteload projections used as a basis for design in the 1977 Wastewater Facilities Plan. This wastewater facilities planning shall determine the necessary wastewater collection, transmission, treatment and disposal system to support the overall objectives and plan elements of the SAIPAN LAGOON USE MANAGEMENT PLAN for the island's southern wastewater system, which data analysis from Volume I showed to be under-designed by the year 1988. There is no intent to amend Saipan's Wastewater Facilities Plan but, rather, to address the southern system's service area, which does not provide for the capacity that must be accommodated for additional tourist facilities now under construction and proposed.

Aside from the necessity to adjust future wastewater planning projections so as to reflect the land use development pattern and development proposals presented in Volumes I and II of the PLAN, the most pressing need for this utility is its general upgrading, in consonance with other existing plans and recommendations. Improvements to the physical system, as presented by the 1977 Wastewater Facilities Plan, and, particularly, improvements to operations and maintenance of the system as presented by both that Facilities Plan as well as by supplementary studies, rank as two of the Commonwealth's most urgent problems. It would be redundant for this PLAN to repeat those Wastewater Facility Plan recommendations; however, they are incorporated by reference as prerequisites to the full implementation of this lagoon use management PLAN.

The need for these operators and maintenance improvements are well understood by the Government, of course; and much

effort, but not enough funds, are already invested towards remedial action. The Saipan Lagoon and its planned shoreline uses cannot develop to their economic potential without the basic infrastructure improvements that is now budgeted in the Commonwealth's CIP and O&M requests.

1. Scope of Work

The specific tasks embodied by the scope of work for this Facilities Plan Amendment are listed below.

a) Description of the project area and wastewater system service areas

b) Environmental inventory of the project area

- Natural environment
- Land and lagoon
- Plants and animals
- Areas of particular concern and critical habitats
- Manmade environment
- Demographic projections
- Land use development patterns
- Economic development

c) Water quality criteria

- Water quality objectives
  - Water quality standards for lagoon and reef margin
  - Wastewater system parameters
  - Wastewater treatment requirements
  - Sources of pollution

d) Existing wastewater loadings and facilities

- Identification and characterization of wastewater loadings
  - Flows
  - Loadings
  - Characteristics
- Existing wastewater facilities
  - Collection systems
  - Transmission systems
  - Treatment and disposal systems
  - Maintenance and operations

e) Planning factors and wastewater design criteria

- Demography, land use and zoning
- Environmental and water quality considerations

Historical and archaeological considerations
Identification and characterization of future wastewater loadings
Identification of potential wastewater treatment and disposal sites

f) Wastewater system alternatives

Collection system alternatives
Transmission system alternatives
Treatment and disposal system alternatives
Efficient disposal alternatives
Innovative/alternative system approaches
Sewage sludge disposal

g) Evaluation of alternatives

Preliminary screening for methodology, technical application and selection of alternatives
Construction impacts
    Natural environment
    Manmade environment
Operational impacts
    Natural environment
    Manmade environment
Operational and maintenance manpower, skills and availability of supplies
Cost for capital replacement, O & M and life cycle costing
Final Evaluation
    Environment impacts
    Social impacts
    Present-worth costs
    Cost effectiveness
Prioritized ranking of alternatives

h) Review by CNMI Government and incorporation of appropriate comments

i) Final evaluation and recommendation of selected wastewater systems plan

j) Implementation plan and schedule

Sub-projects schedule
Capital improvements schedule
Phased development for systemwide operations

k) User charge rates

Operational costs
Capital costs
User statistics
Cost per user

2. Estimated Cost and Project Schedule

This wastewater facilities plan for the shoreline area of the southern wastewater system will cost approximately $40,000 and take about four months to complete by a professional engineering firm that is familiar with Saipan. This work is not eligible for US. EPA funding.

D. STORM DRAINAGE DESIGN CRITERIA MANUAL

The purpose of such a Storm Drainage Design Criteria Manual is to technically guide storm drainage planning and design throughout Saipan. General hydrologic and hydraulic practices as well as drainage design problems in Saipan must be addressed in detail. The primary thrust of the Manual is be to treat storm drainage as an infrastructure subsystem of the total urban infrastructure system. Likewise, drainage management should be considered as an integral part of Saipan's entire water resources management effort. Planning for interdisciplinary resources and other community infrastructure must be related to drainage policies wherever possible in order to achieve an overall, better environment.

The contemplated use of this Manual will be for Commonwealth of the Northern Mariana Islands designers, engineers and planners, consulting engineering firms, and other agencies or organizations having development responsibilities in the Commonwealth. The Department of Public Works shall have the design criteria adopted by Legislative resolution as CNMI policy.

1. Scope of Work

The Scope of Work to prepare this Manual must stress three primary purposes.

* Give direction to the Commonwealth Government agencies in order to support and assist private decisions about drainage, plans and improvements.

* Give direction to the Commonwealth Government agencies for guiding and regulating private developers in regards to drainage matters.

* Provide a framework for all public agencies in the Commonwealth to manage flooding and drainage problems.

The specific tasks embodied by the Scope of Work for this Manual are listed below.

a) Establish storm drainage policies and planning principles adopted by the Commonwealth and recommend amendments or additions as necessary.

b) Compile all applicable Commonwealth and Saipan laws, ordinances and regulations which relate to storm drainage.

c) Conduct a rainfall data analysis to determine:
general characteristics of frequency;
basic precipitation data; and frequency-intensity-duration analyses.

d) Recommend methods to improve the availability and reliability of precipitation data.

e) Describe the use of the Rational Method of statistical analysis for determining runoff and its application to Saipan-specific precipitation.

f) Recommend appropriate design procedures for storm drains on Saipan, including:

    sizing of storm drain systems;
    hydraulic design of storm drains;
    design standards and criteria; and
    sample problems for storm drain design calculations.

g) Recommend appropriate design procedures for storm water drainage from streets, including:

    design criteria for urban streets;
    design criteria for rural streets; and
    design criteria for intersections.

h) Establish policies for street drainage and facilities maintenance.

i) Determine types and sizes of appropriate storm drainage inlets, including:

    procedures for selection and use of various types of inlets;
    design of curb opening inlets; and
    design of grated and combination inlets.

j) Determine appropriate design procedures for major drainage works including:

open channels;
box culverts;
large pipe culverts;
riprap; and
sediment control.

k) Determine appropriate design criteria for hydraulic structures, including:

energy dissipaters;
channel drops;
bridges;
acceleration chutes;
bends; and
baffle chutes.

l) Determine appropriate design criteria, capacity charts and nomographs for inlets and culverts, including:

concrete box culvert inlets;
long conduct inlets; and
trash racks.

m) Determine appropriate design criteria for upstream and downstream storage facilities, including maintenance procedures.

n) Determine appropriate design criteria for storm water disposal alternatives including:

discharge to streams;
discharge to lagoons;
discharge to the ocean; and
discharge by means of infiltration.

o) Recommend appropriate means of floodproofing against storm water drainage, including:

non-structural alternatives;
structural alternatives; and
construction procedures.

2. Estimated Cost and Project Schedule

A project of this scope will require up to twelve months to complete complete and cost between $45,000 to $60,000 (depending on the amount of data available or furnished by the Government) by a professional engineering consultant.

E. PLANNING CRITERIA FOR EVALUATING DEVELOPMENT IMPACTS ON INFRASTRUCTURE

New development and changing uses along the Lagoon's shoreline will exact certain impacts on the project area. These impacts vary in nature and degree with the types of new development and uses that are introduced. Hotels, multi-unit residential complexes, industrial facilities and energy-related facilities can be expected to create the most significant shoreline and lagoon impacts. Park and recreation areas, conservation areas, commercial sales and services, and single-family residences generally create less severe and more easily manageable impacts.

The targets of such impacts also vary with respect to the types of new development and uses that are introduced. Impacts from people-intensive activities, such as hotels and apartments or condominiums, will strain the Commonwealth's water, sewer, power and telecommunications systems. Commercial establishments of the types most typically found in the PLAN's project area, on the other hand, contribute more heavily to the congestion of Saipan's transportation facilities than to community utilities. Industrial and energy-related facilities are most likely to impact on air quality and on the Lagoon's water quality.

It is important to understand the impacts that can be reasonably anticipated by new development and uses within the Saipan Lagoon project area. By intelligently anticipating the cumulative effects of these impacts it is possible to invoke mitigating measures where appropriate and/or plan for additional community infrastructure to accommodate the eventual need for increased demands. The purpose of this Section is to develop criteria and an impact rating system to evaluate the impact of large-scale proposed development within the project area.

The most likely type of new, large-scale coastline developments are hotels and multi-unit residential complexes. The most significant impacts of such projects affect the following infrastructure.

* Water service
* Sewer service
* Electrical power
* Storm drainage system
* Telecommunications
* Roads and parking

1. Water Service

The Saipan Water System Study calculated average residential water consumption at 130 gallons per capita per day (gcd). This is a projected rate, based on 24-hour water service. While apartment houses and condominiums are not particularly profilic on Saipan, the typical multi-family unit has two bedrooms and is occupied by 4 people (2 adults and 2 children). The water demand for each such typical unit is, therefore, 520 gallons per day.

The demand for water by hotels must be calculated somewhat differently, however. On the whole tourists are more mobile than residents; and their demand for water is more distributed throughout the island such as at parks, shopping areas and other tourist attractions.

Additionally, tourists do not generate all of the typical water uses of residents such as for laundry, car washing, irrigation, etc. For purposes of this analysis, therefore, a tourist is assigned a water use factor of 80% that of a resident, or 104 gcd. Since the average occupancy of a hotel room is 2 guests, the average water demand, per guest room, is calculated as 208 gallons per day. It must be remembered that these calculations for water demand are based on consumption and, therefore cannot be translated into water production requirements without accounting for water loss in the system due to leakage. Consumption plus leakage equals water production that is necessary.

An ancillary water demand by hotels and multi-unit residences is required for fire fighting capacity (fire flow). According to the Saipan Water System Study, the fire flow capacities are calculated by population. For communities the size of Chalan Kanoa and Garapan, for example, the flow in gpm is 1750 for a duration of seven hours. For the smaller villages such as San Roque, Tanapag and Susupe the fire flow is 100 gpm for a duration of four hours.

2. Sewer Service

Assuming mandatory connection to a public sewer system (a reasonable assumption for large scale developments) the demand generated for sewer service is computed as a factor of water usage. It can be reasonably assumed that water consumption and sewage flow are equal since non-sewered water such as for landscaping, irrigation, car washing, exterior maintenance of building and walk-ways are negligible. In short, then, average daily

generated sewage flows are 216 gallons per hotel guest room and 520 gallons per apartment/condominium unit. However, demand analysis of a sanitary sewer system must take in account the peak flows which are likely to occur. Peak flows reflect the day-to-day living patterns of residents and tourist and result in a multiplier effect of 3.5 over the average flow quantities.

3. Electrical Power Service

A standard basis for design to provide electrical power for hotels and multi-unit residential complexes is 13.8 KV distribution and

* 30 amps for a 200 room hotel
* 10 amps for a 50 unit residential building

4. Telecommunications

A standard basis for design to provide telephone service for hotels and multi-unit residential complexes is:

* one private line per 10 hotel guest rooms, plus 10 additional lines
* one private line per residential unit.

5. Roads and Parking

Only a small percentage of Saipan tourists rent vehicles or mopeds. Consequently, the major traffic generators by hotels are buses, delivery vehicles, employee vehicles, and local guests.

Because few activities are available to Saipan tourists by walking, tour buses are used for sightseeing tours, shopping, airport transportation, entertainment and eating. It is likely that, on the average, each tourist uses a bus once a day. Of course, not every 40-passenger bus is fully occupied, because the trips are pre-arranged as optional transportation services. Based on 50% ridership on each bus, each 200 room hotel would generate 10 primary round trips (once leaving the hotel and once returning); but that trip generation can be doubled to account for shuttling the empty buses to and from the hotels. For planning purposes, therefore, each 200-room hotel can be expected to generate approximately 40 vehicle traffic counts at a hotel each day.

Delivery vehicular traffic is a function of goods and services purchased by the hotel.

Employee traffic can be calculated at two vehicle trips per employee per day, based on the average hotel employment ratio of one employee per room.

Minimum parking requirements for commercial and resort developments have been established in the "Zones and Land Use Districts Act" within Section 9, subsection c(5) and subsection d(5), respectively. For commercial developments, minimum parking space requirements are one space for every 200 square feet of commercial floor area and for restaurants and bars the requirement is one parking space for every four customer seats. For resort developments the minimum parking requirements are one space for every five guest rooms, plus one parking space for every four customers seats in a hotel's restaurant and bar.

F. IMPACT EVALUATION BY MATRIX

While it is important to accurately judge the anticipated impact to infrastructure from hotels and multi-unit residential complexes, other types of impacts (and other types of projects) must also be included when evaluating any proposed project's overall impact.

Many types of methods are available for evaluating impacts. Because the environmental assessment process often produces a large volume of unorganized new, data, impact evaluation methodologies should achieve the following results.

* organize a heterogeneous mass of data
* summarize the data
* aggregate the data into smaller sets (with minimum loss of data)
* extract salient features
* display both the new data and the derived information in a meaningful way.

Of the 70 or so data evaluation techniques in use today, some of the most popular ones include averaging, correlation, cost/benefit analysis, curve-fitting from benchmarks, Delphi technique, factors analyses, flow charting, indices and indicators, mapping, matrices, networks, overlay techniques, preferential ordering, public meetings, regression techniques, trend extrapolation/projection, and utility assessment.

Because of inherent limitations in manpower and data collection techniques within the Coastal Resources Management Office, the most appropriate assessment methodology at this time appears to be the matrix. Matrices can be structured to build on data which are generally obtainable by CRMO from sources such as:

* a project report describing the proposed development;
* a visit by the site investigator; and
* a review of existing plans and studies dealing with the site in question.

The more sensitive type of matrix will record not only the types of impacts that can be anticipated but also the intensity of those impacts. Most matrices, however, emphasize the inescapability of the need for impressionistic ratings because:

* many criteria do not lend themselves to numerical or other forms of objective analysis;
* even where numerical data or indices are readily available, they are often relevant to only a part of the particular rating; and
* the very large number of matrix cells usually required will preclude extensive data acquisition and analysis for each cell, any one of which might be expandable into a complex study of its own.

Such weighting schemes must be recognized as solely judgmental, because it is impossible to assess any multi-criteria issue without such subjective analysis. Initial judgments can generally be made about a proposed project, and then the final conclusion can be tested for sensitivity over the full range of value weights. Obviously, this method encourages (and relies on) the use of expert judgment.

Table VII-1 depicts the matrix recommended for use by the Coastal Resources Management Office. This cause-effect matrix is adapted from the U.S. Geological Survey's Circular 645.

This matrix method includes an "importance value" for each impact in addition to the "magnitude value". The importance value is intended to encompass the subjective evaluation assigned to each criterion by CRMO. For example, in evaluating a proposed beachfront project on Saipan, CRMO would probably consider the Lagoon's quality (impact "Lagoon, d") to be more important, relatively, than the value of beach sand at the project site (impact "On-shore, a"). Thus, CRMO can determine a numerical weighting to establish the relative difference in importance between these two (and the other) particular impacts. The magnitude value, of course, represents the severity of the impact as a result of a specific proposed development and alteration to the existing environment.

The list of actions can, of course, be expanded as experience and circumstances dictate; although it is now comprehensive enough to indicate the general type of actions to consider and to stimulate further discussion. The first step in this procedure is to check each column corresponding to an action that is associated with a particular project. For each column that is marked, the boxes corresponding to the impacts are examined. For each box, a magnitude and importance are specified on a scale of 1 to 10. These two numbers are placed in the box and separated by a slash. Each project would have a separate matrix, and the basis for assessing the activities and the values associated with the project are based on the professional judgment of the Coastal Resource Management Office planners and/or of other designated staff.

TABLE VII-1

IMPACT EVALUATION MATRIX

		PHYSICAL AND CHEMICAL CHARACTERISTICS																																		BIOLOGICAL CONDITIONS																	
		ONSHORE							LAGOON								ATMOSPHERE				PROCEEDS										INFRASTRUCTURE						FLORA										FAUNA							
	PROPOSED ACTIONS	a. MINERAL RESOURCES	b. SOILS	c. LAND FORM	d. WETLANDS	e. MANGROVES	f. BEACH	g. OTHER	a. SURFACE	b. SUBMARINE	c. SUB-BED	d. QUALITY	e. TEMPERATURE	f. RECHARGE	g. CURRENTS	h. OTHER	a. QUALITY	b. MICRO-CLIMATE	c. TEMPERATURE	d. OTHER	a. FLOODING	b. EROSION	c. DEPOSITION (SED./PRECIP.)	d. SOLUTION	e. SORPTION (ION EXCHANGE, COMPLEXING)	f. COMPACTION AND SETTLING	g. STABILITY (SLIDES)	h. STRESS-STRAIN (EARTHQUAKE)	i. AIR MOVEMENTS	j. OTHER	a. WATER SYSTEM	b. SEWER SYSTEM	c. STORM DRAINAGE	d. TELECOMMUNICATION	e. POWER	f. ACCESS	a. TREES	b. SHRUBS	c. GRASSES	d. CROPS	e. MICROFLORA	f. AQUATIC PLANTS	g. ENDANGERED SPECIES	h. BARRIERS	i. CORRIDORS	j. OTHER	a. BIRDS	b. LAND ANIMALS INCLUDING REPTILES	c. FISH, SHELLFISH	d. BENTHIC ORGANISMS	e. INSECTS	f. MICROFAUNA	g. ENDANGERED SPECIES	h. OTHER
MODIFICATION OF ECOLOGICAL ZONE	a. EXOTIC FLORA OR FAUNA INTRODUCTION																																																					
	b. BIOLOGICAL CONTROLS																																																					
	c. MODIFICATION OF HABITAT																																																					
	d. ALTERATION OF GROUND COVER																																																					
	e. ALT. OF GROUND WATER HYDROLOGY																																																					
	f. ALTERATION OF DRAINAGE																																																					
	g. IRRIGATION																																																					
	h. BURNING																																																					
	i. SURFACING OR PAVING																																																					
	j. NOISE AND VIBRATION																																																					
	k. OTHER																																																					
	l. OTHER																																																					
TRANSFORMATION OF ECOLOGICAL ZONES	a. HOTELS OR MULTI-UNIT RESIDENCES																																																					
	b. INDUSTRIAL SITES AND BUILDINGS																																																					
	c. SINGLE-FAMILY RESIDENCES																																																					
	d. COMMERCIAL																																																					
	e. ROADS																																																					
	f. TRAILS																																																					
	g. TRANSMISSION LINES, PIPELINES																																																					
	h. BARRIERS, INCLUDING FENCING																																																					
	i. DREDGING																																																					
	j. CHANNEL REVETMENTS																																																					
	k. CANALS																																																					
	l. PIPES, SEAWALLS																																																					
	m. OFFSHORE STRUCTURES																																																					
	n. RECREATIONAL STRUCTURES																																																					
	o. BLASTING AND DRILLING																																																					
	p. CUT AND FILL																																																					
	q. OTHER																																																					
	r. OTHER																																																					
RESOURCE EXTRACTION	a. BLASTING AND DRILLING																																																					
	b. SURFACE EXCAVATION (SAND OR CORAL)																																																					
	c. SUBSURFACE EXCAVATION																																																					
	d. WELL DRILLING & FLUID REMOVAL																																																					
	e. DREDGING																																																					
	f. COMMERCIAL FISHING & HUNTING																																																					
	g. OTHER																																																					
	h. OTHER																																																					

PART THREE
LAGOON WATERS USE PLAN ELEMENT

CHAPTER VIII - LAGOON WATERS USE PLAN

A. SYNOPSIS OF DATA ANALYSES FROM VOLUME I AND IDENTIFICATION OF PROBLEMS

Visual observations and analysis of data gathered through questionnaire interviews indicated that existing recreational uses within the lagoon are numerous, particularly in view of the growing tourist industry on Saipan. The Saipan Lagoon represents a substantial recreation arena and major recreational uses within it include the following:

* Swimming
* Snorkeling
* Scuba Diving
* Boating (power and sail)
* Water Skiing
* Surfing
* Spear Fishing
* Gathering

The Lagoon's massive expanse of water spans the entire west coast of Saipan and represents a vast open space. Its constant change of color and texture creates unlimited visual attractions and sets the stage for one of Saipan's more exciting recreational activities: to face the challenge of wind and waves or to submerge into an underwater world of tranquillity and mystery. It is the promise of the unspoiled experience of these qualities which attracts visitors to the Saipan Lagoon.

These waters also contain great economic resources: fish, shell-fish, crustaceans, algae and seagrass and other valuable marine organisms which are collected for daily subsistence and retail sale.

The survival of these activities and resources is in jeopardy. Lagoon resources adjacent to population centers are being endangered or destroyed because of insufficient environmental planning and forethought. Sedimentation in estuaries, bays and lagoons from accelerated man-induced erosion and surface runoff related to construction, land clearing and landfilling have always been a problem in developing areas. It is probably the greatest environmental threat to all emerging Pacific nations today. The impact of

suspended silt and deposited sediments on the reef flat and near-shore coral reef communities are potentially devastating and can be irreversible.

Ocean and lagoon conservation measures cannot focus solely on the marine environment to the exclusion of the terrestrial or coastal environment. Since the ratio of coastline to land is high on a small island, uncontrolled land use or poor land management practices can directly impact nearshore and lagoon marine resources. Thus, conservation measures directed at the marine environment must necessarily address potential developmental problems associated with adjacent shoreline areas.

The physiographic transition from terrestrial to coastal to the marine environment must not be viewed as separate zones but rather as a continuum, with an interchange of physical and biological attributes occurring between the various habitat areas. The assault against any one of these three physiographic environments may be expected to produce accompanying changes in the remaining two and, ultimately, on the entire marine environment.

The Saipan lagoon and, in particular, the Tanapag Harbor area have been extensively modified by dredging and shoreline construction activities. All this has, no doubt, produced impacts to benthic flora and fauna. Fish dynamiting and cloroxing have also damaged extensive areas of patch reefs.

Saipan has the largest lagoon of the entire Northern Marianas Archipelago. Seaward from the long west-coast beach is a shallow lagoon of approximately 20 square miles which is walled-off from the Philippine Sea by a barrier reef that lies approximately two miles offshore at the harbor entrance but approaches the shore with a fringing reef at its northern and southern ends. Just north of the harbor entrance is the small islet of Managaha, consisting of loose limestone that extends to only eight or ten feet above mean tide level. Excellent reefs are found along the south and west sides.

Some of Saipan's "fringing reefs" are actually sealevel benches composed of volcanic material with an appreciable organic component at the submerged face. At the south end of Saipan, however, are " true" fringing reefs with depressed reef flats that support extensive growth in a typical lagoon environment.

Access between the lagoon and deep oceanic water is by several natural and a few manmade channels. The main channel is the Tanapag Harbor entrance at mid-island. Two

small boat channels have been built into the boat docks at Garapan and Chalan Kanoa. There are also two natural surge channels located at the south end of the reef and near San Jose Village. These latter channels are used by boats in emergencies only and are generally navigated only during daylight and under very calm conditions.

With such diverse natural and man-made résources, excellent accessibility and scenic beauty, the Saipan Lagoon becomes a focal point for recreation within the CNMI and particularly to Saipan. It is a valuable resource in itself as noted in Volume I and apart from daily use by local residents,tourism accounts for the largest single use of the beaches and lagoon recreational resources. All tourists spend time on the beaches and swim in the near-shore lagoon waters of both Saipan and Managaha. Tourist related boating activity accounts for a larger part of daily water borne traffic flow in the Saipan lagoon. The majority of this activity occurs near-shore between the Hafa Adai and Hyatt Hotels, on the west coast of Managaha and on a rather direct line between these points. Larger boats dock in Smiling Cove and operate in the channel to Managaha. Water-borne traffic on these routes is composed of five types of craft:

* Small to large ships
* Glass Bottom Boats (25-40 ft)
* Motorboats (16-25 ft)
* Sailboats (14-80 ft)
* Wind Surfers

Adequate facilities do not exist for the safe operation of boats in proximity to swimmers or other lagoon users. For example, of the six docking/loading facilities on Saipan four do nothing to discourage swimming in the same general area and two of these (Hafa Adai Hotel, Hyatt Regency Hotel) are in direct conflict with tourist swimming beaches. The prime concern here is boating traffic patterns around waters where swimmers congregate. Such conflicts exist in three separate areas: Managaha Island, Micro Beach and in the vicinity of Puntan Susupe. Recent deaths of tourists due to motorboating accidents indicate a serious problem.

Boating traffic patterns in the Saipan Lagoon reflect general congestion in the central Tanapag Harbor area. Glass bottom boats take passengers to and from Managaha Island on a regular schedule and usually stop to view underwater wrecks on their morning runs. These boats position themselves over the submerged wreck and sit idle for a few minutes before moving on. Small sailboats, Hobie Cats and other small catamarans sail between Saipan and Managaha Island regularly. An 80 ft catamaran sails regularly

between Saipan and Tinian. Wind surfers use the shallow lagoon just off Micro Beach and Managaha Island. Motorboats operate between a few docks on Saipan and Managaha Island carrying passengers. Other small motor boats pull water skiers in the lagoon near Micro Beach and in shallow water of Managaha Island. Jet skiers and other small motorized, single-person speed boats operate in an oval area just off the main hotel beaches. Large ships (cargo and passenger) operate in the main Tanapag Channel between the harbor entrance and Charlie Dock. Small to medium sized fishing and pleasure boats operate in the vicinity of Charlie Dock and Smiling Cove, moving across to the harbor and harbor entrance.

Numerous areas within the lagoon are considered excellent diving spots either for fishing, gathering or just exploring. These include shallow patch reefs near the lighthouse, Paupau Beach and near Managaha Island. Underwater wrecks are dived regularly in the outer lagoon, particularly near Managaha Island.

B. OBJECTIVES FOR LAGOON USE PLAN ELEMENT

The objectives for this PLAN element follow those objectives identified in the SALAPAT planning sessions. They are summarized as follows:

* Water Recreation Zone Plan
  a. Recreational use zones for Saipan Lagoon
  b. Water safety information program
  c. Water Recreation Advisory Board

* Water Hazards and Marine Nuisance Abatement Plan
  a. Removal of lagoon hazards
  b. Abatement of marine nuisances

CHAPTER IX - WATER RECREATION ZONES PLAN

A. STATEMENT OF INTENT

The various recreational uses and port traffic patterns in the Saipan Lagoon (Figure IX-1) suggest a complex use pattern that requires serious evaluation in order to protect individual users from accidents. This is obvious from recent accidents where tourists were seriously injured or killed by boats. The intent of this water recreational zone plan is to design a water recreation zoning scheme that will allow all acceptable water uses in specific areas where they are compatible.

B. RECREATION USE ZONES FOR SAIPAN LAGOON

Recreational zones are established to eliminate the congestion of multi-uses in specific areas of the Saipan Lagoon. These areas, noted in Figure IX-2 involve shallow lagoon water in front of Micro Beach, Puntan Susupe and Managaha Island. It is not possible to zone all lagoon uses such as diving, sailing or surfing. However, it is possible to zone swimming areas and the various motorboating activities like parasail operation, general motorboat travel, jet skies and waterskiing. The following section identifies the various lagoon recreational uses and establishes standards to insure the concurrent safety of all uses.

1. Swimming Zones

Swimming zones should be established by hotel policy and roped-off from other uses in the following areas, as depicted in Figure IX-3.

* Royal Taga/Grand Hotel
* Hafa Adai Hotel
* Intercontinental Hotel
* Hyatt Hotel
* Paupau Beach
* Managaha Island

These areas do not have to be large: they can be 100x100 feet. However, they must be roped-off with buoys in order to keep all other uses out of the area. Swimmers who venture outside of this area swim at their own risk. Boaters who operate boats in the vicinity of these swimming areas must do so cautiously, move not greater than 5 mph and keep a watchful eye for swimmers. Swimming zones should be marked as such and, if possible, patrolled by a qualified lifeguard.

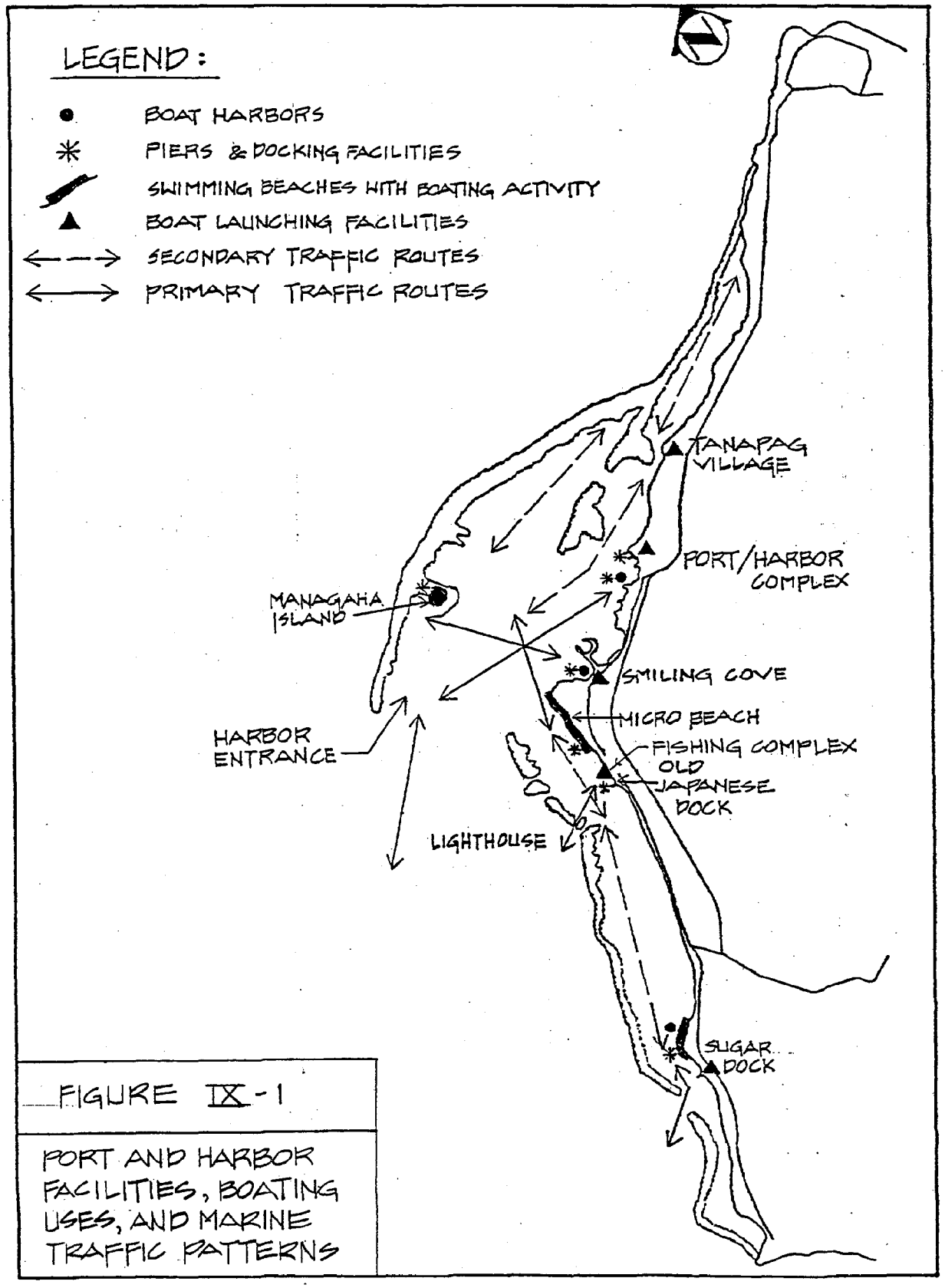


FIGURE IX-1

PORT AND HARBOR FACILITIES, BOATING USES, AND MARINE TRAFFIC PATTERNS

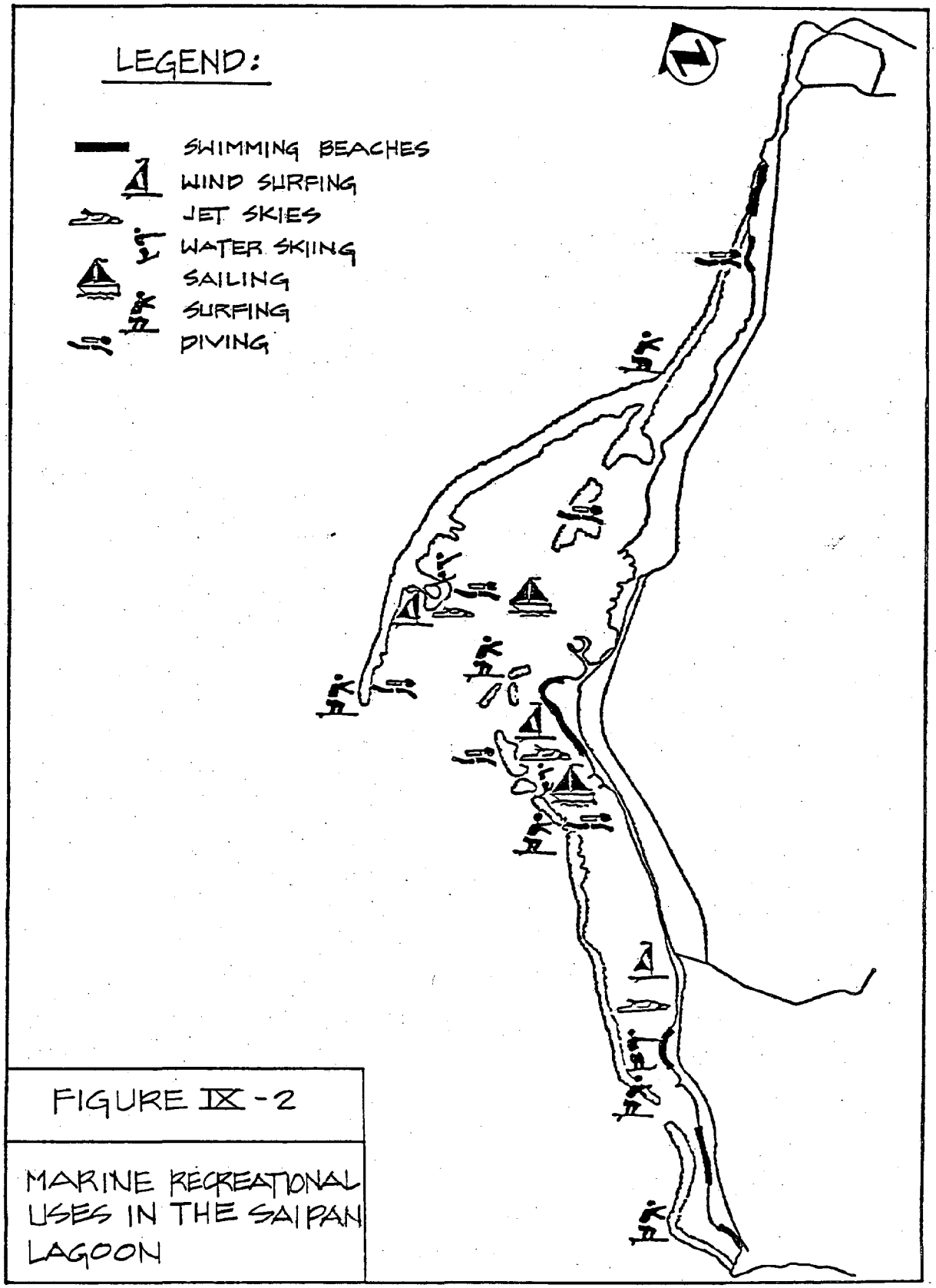


FIGURE IX-2

MARINE RECREATIONAL USES IN THE SAIPAN LAGOON

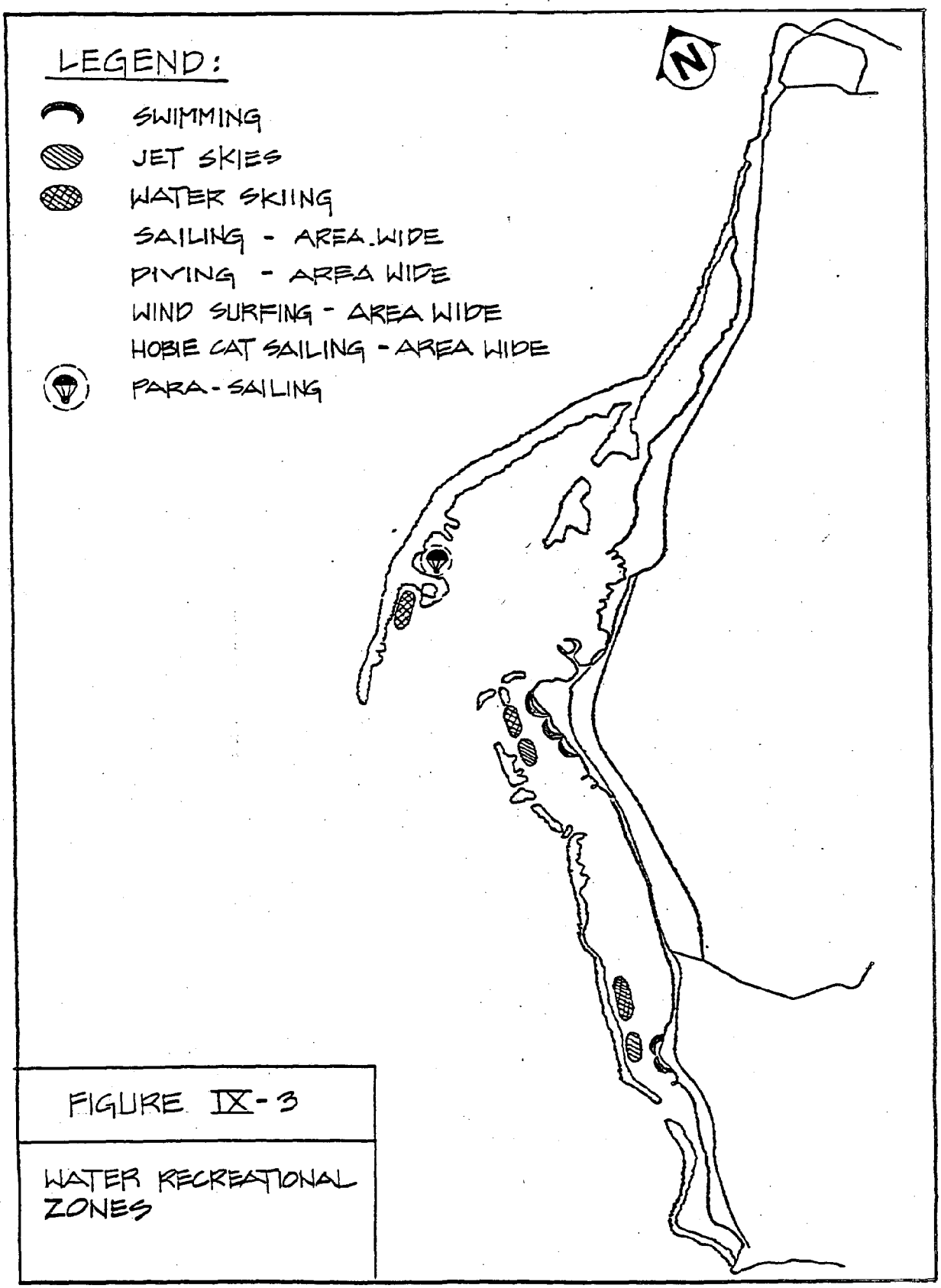


FIGURE IX-3

WATER RECREATIONAL ZONES

2. Diving Zones

Skin and scuba diving usually occurs on off shore reefs or reefs and wrecks within the lagoon, (Figure IX-3). It is not practical to establish diving zones except where marine parks exist such as the proposed underwater trail at the Managaha Island Marine Park. However, for the sake of safety, divers should comply with established safe diving techniques.

The major safety technique for divers involves the use of a "Diver Down" flag, either towed behind the diver on a tube or displayed on the dive boat.

3. Boating Zones

Boating involves numerous kinds of watercraft. This plan does not include a boating zone for the movement of large ships in and out of the main Tanapag channel to the commercial pier at Charlie Dock. Commercial craft including foreign vessels (particularly large ships) are presently controlled by the Coast Guard through the International Shipping Rules and Regulations. Local protection would be redundant and unnecessary. Therefore, this plan deals with smaller boats which utilize the lagoon waters.

a. Jet Skiis. Although jet skiis do not have propellers, they move sufficiently fast to cause serious damage upon collision, and there are some small (single engine) power boats which operates like jet skiis that do have propellers. These craft should be operated only in specific areas. Each hotel or beach concession should define the boundary for their use sufficiently far enough off-shore so as to not pose a threat to swimmers. There is intense competitiveness among the hotels for beach and lagoon recreational uses. As successful ideas are generated by one hotel other hotels usually follow suit. In the same light, if successful safety practices are initiated by one hotel, others will follow. It is best to leave the initiation of such safety precautions to hotel owners, unless a specific problem can be identified and solved by the government in harmony with the hotel owners or hotel association.

An access channel from the beach to the operating area should be defined. The access channel should be roped- off and marked accordingly on the beach.

An offshore jet ski-operational area should be buoyed-off at either end and near the middle to adequately define the area. Swimmers should be aware of these operation areas through warning signs placed at convenient locations on the beach.

b. Water Skiing. Water skiing can be a dangerous sport to both the skier and others in the water if precautions are not taken.

Like jet skiis, water skiing should occur far enough from shore to be completely away from swimming areas. Skiing should take place away from coral or rocks and in deep enough water to prevent injury to the skiers, should they fall. Skiing areas should be designated on beach maps and posted so that all swimmers and other lagoon users know their location. Water skiers should not start their runs from the beach. Ski boats should move safely away from the beach area and begin their run in the designated skiing areas offshore. The Boating Safety Act states that "boats should be 200 yards from shore for more than 5 mph speed." Ski areas are noted on Figure IX-3 for hotels and tourist oriented operations. The CRMO, through the seminar suggestion below, can work with the hotel association to designate these areas and operate within them.

c. Sailing. Sailing encompasses two distinct categories of vessels. The greatest number of sailing vessels involve wind surfers, while the other category involve true sailboats, like small monohulls, Hobie Cats or similar craft.

Sailing is considered an area-wide Lagoon water sport and there is no particular zone for sailing in the Lagoon (Figure IX-3). It is important for the sailor to stay out of and away from swimming zones and away from zones used for other craft like jet skiis or water skiboats. Although this is not possible at all times, it should be stressed that being in the wrong zones will create a risk to the operator of both vessels. Operators of all vessels must understand that sailing craft, under sail power alone, have the right-of-way under International Rules of the Road, except in a confined channel.

The responsibility for boating safety must start somewhere. The Coast Guard already has responsibility. However, with their limited

budget they, like the CNMI government, can only do so much. In this case it is suggested that a seminar be set up between the CNMI government, Coast Guard and Hotels in order to establish safe water craft operational areas.

4. Surfing

There are six surfing sites along the west coast of Saipan. All but one of these are located on the reef. Only one area within the Lagoon offers quality waves for surfing. This is on patch reefs off Micro Beach. Surf does not occur frequently on the fringing and barrier reef but depends on swell patterns usually associated with tropical depressions, storms or typhoons. Given these conditions, however, both locations have excellent surf conditions. Surf zones are not commonly established anywhere, although in heavily populated areas, like California, surfers do have particular spots that swimmers must avoid. Most often, however, surfers must avoid established swimming areas. It is not realistic to establish surfing zones within the Saipan Lagoon. However, it is important for all lagoon users to know where popular surfing areas are located (Figure IX-3) in order to use or avoid them.

5. Water Recreation Advisory Board

There are a number of concerned organization on Saipan that can help to improve the safety of lagoon users. These include: Department of Public Safety through the Boating Law, Marianas Visitors Bureau, Coastal Resources Management Office through their permitting authority, Port Authority and the Hotel Association through their concern for hotel guests. Each element shares a common element, safety of those who use the Saipan Lagoon.

Because of the number of concerned organizations an organized Advisory Board could do much to promote safety of all lagoon users. The board should be comprised of one representative from each of the five aforementioned organizations. Meetings can be held monthly or at a convenient schedule based on necessity. A lead agency can be decided by active members. Tasks can be assigned based on a realistic division of labor and costs can be shared based on level of responsibility.

6. Cost Estimates for Establishing Recreation Use Zones through an Advisory Board.

These costs amount to the following.

Administrative	
Rules and Regulations	$1,000
Zoning Maps	250
Public Education	5,000
Materials	
Beach Signs (Public Works)	1,500
Handouts	500
Maps	500
TOTAL	$8,750

Proposed here is a set of signs designating swimming zones, ski zones, parasail zones and other uses in the water. These could be placed at the appropriate beach sites. In addition, public information handouts designating the areas (zone) on a map with brief explanations should be proposed.

C. WATER SAFETY INFORMATION PROGRAM

A comprehensive Water Safety Information Program is an essential element for water oriented developments along the Saipan Lagoon coastline. Saipanese and Carolinians use the marine environment for subsistence purposes and for recreation. Boating plays an important role with in island environments. The number and type of boats operating in the Saipan Lagoon are quite varied and increasing annually. The number of passengers carried by the larger vessels are also increasing annually, especially those carrying passengers to and from Managaha Island and on sunset/dinner cruises.

Boating safety is not the only important element in a Water Safety Information Program. Residents and visitors alike use the lagoon for a number of other purposes, including swimming, diving and beach combing. Each of these uses carries certain risks that pose hazards to the users. Specific water recreation use zones do much to protect lagoon users from inherent dangers. This section of the Plan deals with some basic water safety information concepts designed to improve user awareness and safety.

The CRMO, as a permitting agency of the CNMI government, has the responsibility to protect coastal resources. Recreational uses are essential resources within the coastal zone. However, this does not necessarily mean that the CRMO should get involved in regulating recreational uses. It is

more important that they help other regulatory agencies like the Department of Parks and Recreation or the Department of Public Safety deal with these problems more effectively. In addition, specific issues like swimming areas and other hotel related recreational areas should be regulated by the hotels. It is the hotel's responsibility to provide safe recreational areas for their visitors.

1. Boating

The U.S. Coast Guard is the basic element of a boating safety information and education program in all U.S. waters. The Coast Guard does have legal jurisdiction within Saipan waters and throughout the CNMI. However, because of a lack of personnel only infrequent visits to Saipan are made by Guam-based Coast Guard personnel. Duties additional to regular station activities include safety inspections and documentation of vessels. These personnel have all jurisdiction to cite vessels for infractions of U.S. Coast Guard Rules and Regulations, inspect boats, license skippers, observe for infractions and monitor for oil spills.

The lack of adequate personnel to patrol these waters poses serious problems in light of the increased boating activity in the area and in regards to the groups of Japanese tourists that utilize water-borne vessels for sightseeing and transportation to and from Managaha Island and throughout the Saipan Lagoon. A boating safety program is essential, particularly on Saipan where various forms of waterborne activities prevail. The Coast Guard is no longer meeting this responsibility regularly. It is now being provided by the local CNMI government through the Department of Public Safety which has a limited budget and cannot meet the demands of the program. However, this does not relieve them of their responsibility, and an emphasis should be set on essential elements of a boating safety program for the Department of Public Safety.

In this light the primary thrust of a boating safety program should be aimed at vessels carrying passengers-for-hire, especially those which move between Saipan Island and other islands like Managaha and Tinian. The essential elements of such a boating safety program are as follows.

Licensing

* Rules of the Road
* Seamanship
* First Aid

* Navigation
* Mechanical Knowledge
* Life Saving
* Fueling
* Knowledge of Local Waters

Inspections

* Equipment
* Certificate of Numbers

Sign Posting

* 5 mph speed limit in selected channels and recreation areas

By making a 5 mph speedlimit in selected channels and recreation areas a requirement for vessels carrying passengers-for-hire to be licensed, private sector support businesses may emerge. These might include services such as teaching courses on basic boat handling, navigation, first aid and other aspects of of boating safety.

2. Swimming

This Plan calls for specific swimming areas to be roped-off, particularly in the vicinity of hotels. This precaution will be a major step toward the prevention of those accidents caused to swimmers by boats. Such swimming zones will not necessarily prevent swimming accidents caused by dangerous marine life such as stone fish, jellyfish or sea urchins or related to hazardous conditions, such as strong currents or riptides. Whatever the hazard, users of the Lagoon need to be informed as to where they occur, how to avoid them, and what to do if they are affected.

One of the most effective methods to generate awareness is a public information program aimed at a large percentage of lagoon users. Presently, the CRM office publishes a newsletter on various aspects of the environment including a section about the Saipan Lagoon. The newsletter is written in English/Chamorro and intended for local residents. This is obviously a beneficial activity. However, much can be done to improve residents' and tourists' knowledge of water safety. Following are some of the most important concepts of a Public Awareness Information Program that CRMO should implement as a part of their program.

* Radio - Initiate public service announcements devoted to basic water safety awareness, using case histories as examples of the right and wrong ways to handle oneself in and around the water.

* Television - 30-second to one-minute spots covering lagoon uses and potential hazards.

Site specific examples, documented cases of injury, explore why these accidents occurred and how they could have been prevented.

* Newspaper - Following current practices, continue to relate stories of importance regarding lagoon hazards and the consequences of misuses. Call attention to other information about water safety.

* Posters - Develop a series of posters depiciting various water safety hazards, consequences of misuse and methods of proper handling or treatment. These should be trilingual English/Chamorro/Japanese and should be posted in hotels and other places where tourists/residents will see them. This could be an annual high school project sponsored by CRMO, with prizes for the winners.

* Brochures - Develop a short brochure that describes lagoon uses, use zones, hazards, consequences of misuse and what can be done for the prevention or treatment in the case of accidents. This document could be placed in each hotel room and/or distributed to each potential user of the lagoon.

* Signs - Post signs along the beach where particular uses are allowed or prohibited. These would include swimming zones, boat docking zones, strong currents, surf, riptide or other such hazards. These signs should be written in English/Chamorro and Japanese.

3. Cost Estimates for Water Safety Information Program

* Media Campaign
  Develop 30 second & 60 second public service announcements on Radio, and TV $1,000

*	Develop Education Articles For Newspaper	500
*	Develop Posters (20)	500
*	Construct and erect signs (10)	1,000
*	Develop Brochure (1000)	3,000
	TOTAL	$6,000

CHAPTER X - WATER HAZARDS AND MARINE NUISANCE ABATEMENT PLAN

A. STATEMENT OF INTENT

The intent of this Plan is twofold. First, it will help to abate the problems of jellyfish, Ancanthaster and other nuisance animals in the Lagoon. Second, it will provide for the removal of water hazards in the Lagoon.

As a result of analyzing personal interviews and field investigations there is a need to establish abatement measures for eliminating common or cyclic nuisances found within the Saipan Lagoon. These nuisances were identified in SALAPAT I & II. The most common nuisances are those that affect lagoon users, particularly swimmers or divers, like jelly fish as well as those nuisances that indirectly affect everyone through the destruction of coral reefs, like the Crown of Thorns starfish.

The proposed Plan also seeks to identify reasonable abatement methods to enhance the safety of lagoon users from hazards such as scrap metal on the beaches and in the water, stinging jelly fish, (particularly the Portuguese man-of-war) and protect the coral reefs from destruction by the Crown of Thorns starfish. The Plan identifies the need for protection from these hazards and nuisances and details a plan of action in the form of lead agencies to carry-out appropriate abatement measures.

B. REMOVAL OF LAGOON HAZARDS

Hazards to lagoon users are found primarily along the beaches and in near-shore waters. These hazards include a substantial amount of scrap metal, classified here as junk, most of which remains from World War II. The impact on the environment from scrap (junk) metal cannot go unmentioned. Besides the aesthetic element, scrap metal rusts and begins to break apart littering the shoreline and water offshore with loose debris. Large rusting hulks discolor the sand and leach metal into the near-shore environment changing ambient conditions to less desirable conditions. Some plants cannot survive in heavy iron situations. Scrap metal on beaches trap sediments and sand which can build into mounds, covering the entire structure. Although the junk may be out-of-sight, this is usually temporary in nature. Large storms can clear these sand deposits in a matter of hours leaving the junk visible and hazardous. Most importantly, scrap metal on beaches is dangerous to beach users, particularly children who like to climb around on the debris. Numerous cuts, often quite bad, result from these

objects. Not only is this junk a hazard to all lagoon users, it is also unsightly and a visual blight on what is otherwise an extremely beautiful beach and lagoon setting.

War-related junk is found along the entire west coast of Saipan. However, the quantity and location a scrap metal at a few areas pose particularly serious problems. Such junk should be removed from the following areas.

North and south of Sugar Dock.
In the vicinity of Garapan Dock.
In the vicinity of the Puerto Rico Dump.
In the vicinity of the Seaplane Ramp and Puntan Flores.

C. LOCATION AND EXTENT OF MARINE NUISANCE ANIMALS

The crown-of-thorns starfish was sighted in water 20 feet deep along the entire outer reef. Numbers were highest in the south and decreased towards the north. Unusually high numbers were observed just inside the harbor entrance at various shallow patch reefs to the southwest of Managaha Island. Very few starfish were observed in shallow lagoon water.

The crown-of-thorns starfish is a pest of major concern. Thomas F. Goreau, noted ecologist, witnessed over 90 percent coral destruction by the starfish on the patch reefs west of Managaha Island in 1969 (Goreau, 1969). Regrowth has been excellent, particularly in light of the 1973 starfish infestation. In only 15 years the majority of the patch reef area has been completely restored.

However, the destruction of the corals within the proposed underwater trail is a threat now. Birkeland's 1983 starfish infestation prediction was extremely accurate, and the animal is well established along Saipan's western reef system (Birkeland, 1982). From the south, the starfish has moved into the Lagoon through the Tanapag Harbor Channel entrance and through depressions in the barrier reef and is making its way north along the inside of the barrier reef directly toward the reefs and a proposed site for the underwater trail.

Preliminary counts estimated the starfish at 250 for the 18 acre (73,000 m2) site. This is a significant and recent increase. Removal of these starfish is especially needed on selected reefs in the vicinity of Managaha Island, specifically at the proposed underwater trail site and nearby reefs. This should be an on-going process to ensure protection of the area.

An Acanthaster removal program, even though limited in scope to only cover the reefs within the proposed Managaha underwater trail area, will likely be labor intensive and and costly. If volunteer help from a local dive club and other concerned citizen groups are not feasible, then the program will require a considerable amount of operational funding. Realistic cost estimates should be calculated after all donated resources can be determined.

This starfish removal program is not designed to eliminate all the starfish in the Saipan Lagoon or even all the animals within the proposed underwater trail area. It is merely a protective measure to ensure healthy coral communities on the patch reefs within the vicinity of the underwater trail. Although the corals eventually regrow in a damaged area, and the species diversity often increases, when the percent of damage is high the beauty and attraction of the underwater trail will be seriously degraded and create a negative impact on the numbers of tourists who want to visit the park.

It is now generally accepted by most contemporary biologists that Acanthaster infestations are cyclic phenomena triggered by periods of drought followed by heavy rainfalls and subsequent runoff from the land. Increased nutrients enter the water and result in a higher survival rate for the starfish, which drift about and filter feed on planktonic organisms during their larval stage. The end result is much greater numbers of adult starfish approximately three years following such an event. Observations support the belief that the Acanthaster outbreaks eventually "run their course" and return to normal populations on the reefs. Since Acanthaster is a natural part of Pacific coral reefs and, therefore, plays a role in the ecosystem as a whole, a credible argument can be made for ignoring the starfish over-population, even if it enters a sensitive area like a marine park. The starfish then become a dynamic part of the coral reef community and, as such, are an "attraction". If they do enter the park area and it becomes obvious that a substantial quantity of corals will be lost, control measures within the park should be considered.

The Stinging Jellyfish and Portuguese Man-of-War are animals with little or no mobility of their own. Although most jellyfish can swim, they usually ride on ocean currents and winds, like the Man-of-War, until reaching shallow water where they wash-up on a beach or rocky coastline.

These animals are a nuisance, since some have powerful stinging cells. They are most dangerous while still in the water where the stinging tentacles are extended into the water column. Swimmers do not usually see these animals and

become draped with the stinging tentacles on virtually any part of their bodies. These animals can also remain dangerous after washing-up on the beach. Children have been stung by sand that carries the remains of stinging cells left from a jellyfish or Man-of-War. Others have been stung on the foot or ankle as they step on these animals during a stroll on the beach.

Stinging Jellyfish or the Portuguese Man-of-War were observed on a number of beaches from Wing Beach south to Micro Beach. Prevailing northeast winds and currents drive these animals to the closest point of land. Very few were observed in the water or on beaches south of Micro Beach.

D. MARINE NUISANCE ABATEMENT PLAN

The objectives here are fourfold.

* Determine the extent of the reef killing threat of the crown-of-thorns starfish.
* Determine whether infestation is a cyclical phenomenon or the result of environmental imbalance.
* Determine what benefits, if any, result from infestation. Determine the ecological significance of the crown-of-thorns starfish.
* Provide ongoing monitoring.

The Plan of Action is as follows.

* The Department of Natural Resources will act as the lead agency for nuisance abatement.
* Through the Division of Fish and Wildlife the Department of Natural Resources will establish a Nuisance Abatement Program.
* Personnel of the Division of Fish and Wildlife will monitor the lagoon and beaches to determine whether the area is experiencing any nuisance like the crown-of-thorns starfish or jellyfish.
* When identified, the Division of Fish and Wildlife will notify the Director of Natural Resources.
* The Department of Natural Resources will then implement the following plan to abate the problem as follows

1. Crown-of-thorns Starfish Nuisance Abatement Plan
   a) Personnel from the Department of Fish and Wildlife having identified areas for potential destruction shall:

* Organize diving teams to remove the starfish from selected areas
* Diving teams should include regular personnel from the Division and special interest groups like dive clubs and other concerned citizens.

b) Abatement methods involve the use of Formalin injection, cutting the central organs from the body or removal of the animal from the water. The best method depends on available funding, equipment and personnel.

c) Abatement will continue only as long as the immediate problem persists in areas where coral destruction is deemed detrimental by CNMI officials.

2. Jellyfish Nuisance Abatement Plan

a) Personnel from the Department of Natural Resources, Division of Fish and Wildlife and the Coastal Resources Management Office will be responsible for identifying the threat of this nuisance during regular monitoring and work activities in near-shore water and on the beaches of the Saipan Lagoon.

b) When a potential nuisance poses a significant health hazard Directors of Natural Resources and CRMO shall be notified.

c) Methods for removal of high concentrations only work when the animal is beached. Crews must shovel or rake the animals into piles and then remove them in containers. While concentrations are high in the water, officials should notify people to stay-out of the water and post warning signs accordingly.

d) Notices shall be displayed in appropriate places so that the potential Lagoon users will be aware of the danger. Notices shall be in bilingual Japanese/English and displayed or announced on:

* Sign posts along the beaches that are affected.
* Radio and TV announcements
* Newspaper articles
* CRMO Newsletter articles

3. Monitoring Program

The Department of Natural Resources through the Division of Fish and Wildlife, monitors marine waters in the CNMI. The monitoring strategy is basic and only weekly supported with personal and budget. The aim is to monitor the marine environment and its changes over time. The strategy should meet the objective. Possibly the program need revision to down-scope the weekly and monthly tasks to fit available personal and budget.

A monitoring program for marine nuisances shall include the following steps:

* Establish six transects along the outer reef, each one mile long.
* Establish six transects along the inner reef, each one mile long.
* Establish at least two transects along the west and southwest side of Managaha Island.
* Monitor these transects at least every 60 days.

E. BUDGET ESTIMATE FOR MARINE NUISANCE ABATEMENT AND HAZARDS REMOVAL PLAN

Nuisance abatement plans and measures require the allocation of time on the part of the Division of Fish and Wildlife through the Department of Natural Resources for monitoring on a regular basis. Monitoring of the entire lagoon from the beaches seaward to the 60 foot contour should be a regular part of the Division of Fish and Wildlife routine.

Monitoring activities for the Crown of Thorns starfish will take approximately 2-3 days for each 60-day period. Similar monitoring activities for other nuisance animals in near-shore water and on beaches will take 1-2 days each 15-day period. Cumulative time for both activities amounts to approximately 2.5 mandays per working month.

Equipment required for monitoring the Crown of Thorns starfish includes a boat, towing sled and scuba equipment. At least two individuals are needed to survey in this manner. Other equipment includes air fills, truck and boat trailer. Monitoring for other nuisance animals near shore and on the beaches involves one person and a vehicle.

Cost of labor would amount to approximately $150 for two workers per month for 2.5 days. Cost of equipment to monitor for the Crown of Thorns starfish would cost approximately $50. Total budget for one month's monitoring

would cost approximately $325 and require no more than two workers and no more than 20 cumulative hours. Total annual cost is approximately $4,000.

Junk Removal for the specified location shall be accomplished as follows:

* Personnel from the CRMO aided by the Historic Preservation Officer will survey areas identified in this PLAN and other areas where scrap metal and other junk exists on the beach or in shallow water.
* Determine which pieces should be removed.
* Findings shall be turned over to the Department of Public Works who will contract for this service.
* The contracted cost of removing this scrap metal is approximately $100,000.

PART FOUR
BEACH PARKS AND RECREATION PLAN ELEMENT

CHAPTER XI - BEACH PARKS AND RECREATION PLAN

A. SYNOPSIS OF DATA ANALYSES FROM VOLUME I AND IDENTIFICATION OF PROBLEMS

Opportunity abounds for public recreation within the Saipan Lagoon and along its shoreline. From the project area's most northern tip at Wing Beach in the Magpi Planning Area to the most southern extremity at Agingan Point in the Puntan Afetna Planning Area, seventeen beach areas are formally recognized as public recreation sites along the Lagoon's shoreline. Additionally, Managaha Island is a very popular recreation destination for residents and tourists. This balanced distribution of shoreline sites averages slightly more than one recreation area per mile: a very favorable ratio.

Table XI-1 depicts the Planning Areas and public beach recreation sites in each Area.

TABLE XI-1
BEACH RECREATION SITES BY PLANNING AREA

Planning Area	Beach Recreation Site
Magpi	Wing Beach Unai Matuis Dikike Unai Paupau Unai Achugua
Tanapag Harbor	Unai Tanapag DPW Beach
Managaha	Managaha Island
Puntan Muchot	American Memorial Park Micro Beach
Garapan Lagoon	Unai Garapan Unai Chalan Laulam

Puntan Susupe	San Jose Beach Civic Center Beach Royal Taga Beach Unai Susupe Unai Chalan Kanoa
Puntan Afetna	Unai Afetna

While beach-oriented public recreation sites are relatively abundant, basic park-type improvements are either non-existent, too few, or substandard at most sites. Consequently, insufficient passive and active recreation opportunities are presently available to the public, despite the ample amount of beach strand and backshore land now designated for these pursuits. An inventory of all parks and beach recreation sites is presented in Volume I. The type of facilities and improvements determined to be most needed generally include:

* Maintained access from Beach Road or some other improved, nearby right-of-way for vehicles and for bicycles.
* Parking areas, large enough to accommodate anticipated requirements but located away from the beach and barricaded to prevent vehicular access to the beaches.
* Maintained, operational restrooms.
* Picnicking facilities, including tables, benches, barbecue pits, trash receptacles and potable water service.
* Permanent pavilions of varying sizes.
* Permanent park benches.
* General recreation areas and playfields for unorganized sports and games.
* Sports facilities such as courts and fields for volley ball, basketball, tennis, softball and touch football.
* Launching facilities for small boats.
* Playground apparatus for pre-school and elementary school-age children.

B. OBJECTIVES

The eight specific objectives that were developed for the public recreation and beach park element of this SAIPAN LAGOON USE MANAGEMENT PLAN, are consolidated into the following four general objectives.

1) Outdooor Recreation Plan.

An Outdoor Recreation Plan for Saipan will provide for

an acceptable level of outdoor public recreation opportunities to serve Saipan's resident and tourist population. (Conceivably, such a Plan should be part of an overall CNMI Outdoor Recreation Plan encompassing Saipan, Tinian and Rota). At least three classifications of parks and recreation sites should be addressed for Saipan.

a) Commonwealth Parks and Forests which commemorate sites and events of historical and/or natural importance and serve all residents of Saipan. The American Memorial Park and the Marpi Commonwealth Forest are examples.

b) Community Parks which primarily serve nearby community and village residents with a full array of passive and active recreation opportunities, although not all types of facilities are located at each site. The size, facilities and proximity of these sites are basically established by the needs and preferences of the village to be served. Unai Paupau is an example of a Community Park for the village of San Roque.

c) Village Parks and Playgrounds which provide special purpose recreation opportunities and are generally smaller in size. Playgrounds and athletic facilities at public schools are typical examples of recreation resources in this category, as well as tot lots and other isolated sports facilities (i.e, public tennis courts and track and field). These types of parks and facilities are sometimes incorporated within Community Parks and the Commonwealth Park, especially along shorelines in conjunction with beach parks. However, playgrounds must be site-dependent on walking distance to residential areas, therefore they will often occur near to housing, independent of other types of parks.

2) Upgrade Beach Parks

Upgrading beach parks and shoreline recreation facilities within the project area must be accomplished to conform to the proposed Saipan Outdoor Recreation Plan. This objective includes designating the seventeen existing sites into an islandwide park and recreation system and, accordingly, to determine the necessary improvements including access and parking, picnicking

facilities, additional trees, more and better maintained restrooms, and upgrading of boat launching facilities, etc.

3) Establish New Beach Park

Establishing a new beach park in the southern region of the project area, in the Puntan Susupe/Puntan Afetna Planning Areas is necessary. This site should become a well developed community Beach Park.

4) Bicycle Route

Providing for a Bicycle Route which links the Saipan Lagoon shoreline recreation sites with a safe corridor for bicycle riding is desirable for both local and tourist recreational use.

CHAPTER XII - SAIPAN OUTDOOR RECREATION PLAN

A. STATEMENT OF INTENT

An Outdoor Recreation Plan for Saipan has been established as an objective of the SAIPAN LAGOON USE MANAGEMENT PLAN and as a prerequisite to providing for an acceptable level of islandwide passive and active outdoor public recreation opportunities for residents and tourists. The extent of accomplishing this objective involves:

* Establishing a Scope of Work to guide the formulation of a Saipan Outdoor Recreation Plan; and
* Estimating the cost of such Plan if it was prepared through professional consultant services.

B. SCOPE OF WORK FOR SAIPAN OUTDOOR RECREATION PLAN

The following scope of work highlights the basic tasks to be covered during the formulation of a Saipan Outdoor Recreation Plan.

* Inventory islandwide public outdoor recreation resources.

* Conduct a survey of recreation preferences by residents and tourists.

* Develop a needs assessment to compare the availability of recreation resources with the public's preferences and the established recreation facility standards for Saipan.

* Establish goals and objectives for development of Saipan's outdoor recreation resources.

* Establish a classification of park and recreation area development which addresses:

  Federal/Commonwealth Parks and Forests;
  Community Parks and Recreation Areas; and
  Playgrounds and Sports Facilities

* Prepare a comprehensive development plan for each park and recreation area classification

  Site specific physical improvements
  Site specific program improvements

Cost estimates for improvements, operations and maintenance Cost estimates for necessary land acquisition or/other appropriate development rights

* Prepare a comprehensive management plan for administering and financing the islandwide park and recreation system.

  Managerial responsibility for each classification of area
  Rules and regulations
  Legislation
  Operating and CIP budget forecast
  Opportunities for financial support from the Federal government and other sources

* Present plan alternatives and proposed regulations, administrative guidelines and managerial policies to affected agencies and groups.

* Present proposed Plan to public

* Prepare final Plan for official adoption

C. COST ESTIMATE AND PROJECT SCHEDULE

The cost for such a Plan will range between $30,000 to $50,000 by a private consultant, depending on the amount of basic data collection that is required or provided by the Commonwealth Government. A reasonable project schedule is approximately eight months.

CHAPTER XIII - BEACH PARKS AND SHORELINE RECREATION FACILITIES IMPROVEMENTS PLAN

A. STATEMENT OF INTENT

The existing beach park and shoreline recreation facilities along the Saipan Lagoon need upgrading in order to provide an acceptable level of recreation opportunities to residents and tourists. Physical improvements, new facilities and better maintenance all fall within the scope of upgrading.

The extent of accomplishing this objective involves:

* Designating the existing beach parks and recreation areas into the three classifications of Parks to be established by the proposed Saipan Outdoor Recreation Plan.

* Determining the full complement of facilities and improvements that should be provided at each of the parks.

* Assessing the inventory of existing facilities and improvements now available at each site, as presented in Volume I.

* Establishing the scope of facilities and improvements upgrading that are necessary at each park, including design and construction budget estimates.

B. CLASSIFICATION OF SAIPAN LAGOON BEACH PARKS AND RECREATION AREAS

The general criteria for park classification are outlined in Section C of this Chapter; and more articulate criteria will be developed as part of the proposed Saipan Outdoor Recreation Plan which encompasses islandwide recreation resources. Nevertheless, it is necessary to preliminarily classify the beach parks and shoreline recreation areas within this project area in order to establish the level of improvements and facilities to be provided at each site.

Table XIII-1 presents the classification of beach park and shoreline recreation areas. Those parks which overlap into two classifications must provide recreation opportunities that will serve the intended purposes of each classification. Each classification of parks is also presented on Figure XIII-1.

TABLE XIII-1

CLASSIFICATION OF BEACH PARKS AND SHORELINE RECREATION AREAS

PARK CLASSIFICATIONS

Planning Area	Village Parks and Playgrounds	Community Park	Commonwealth Park or Forest
Magpi	Unai Paupau Unai Achugau	Wing Beach Boomtown Beach Unai Paupau Unai Achugau	Marpi Commonwealth Forest
Managaha			Managaha Island Park
Tanapag Harbor		Unai Tanapag DPW Beach	
Puntan Muchot	American Memorial Park	American Memorial Park Micro Beach	American Memorial Park
Garapan Lagoon		Unai Garapan Unai Chalan Laulau	
Puntan Susupe	Civic Center Beach Unai Susupe Unai Susupe	San Jose Beach Civic Center Beach Royal Taga Beach Unai Chalan Unai Chalan Kanoa	
Puntan Afetna		Unai Afetna	

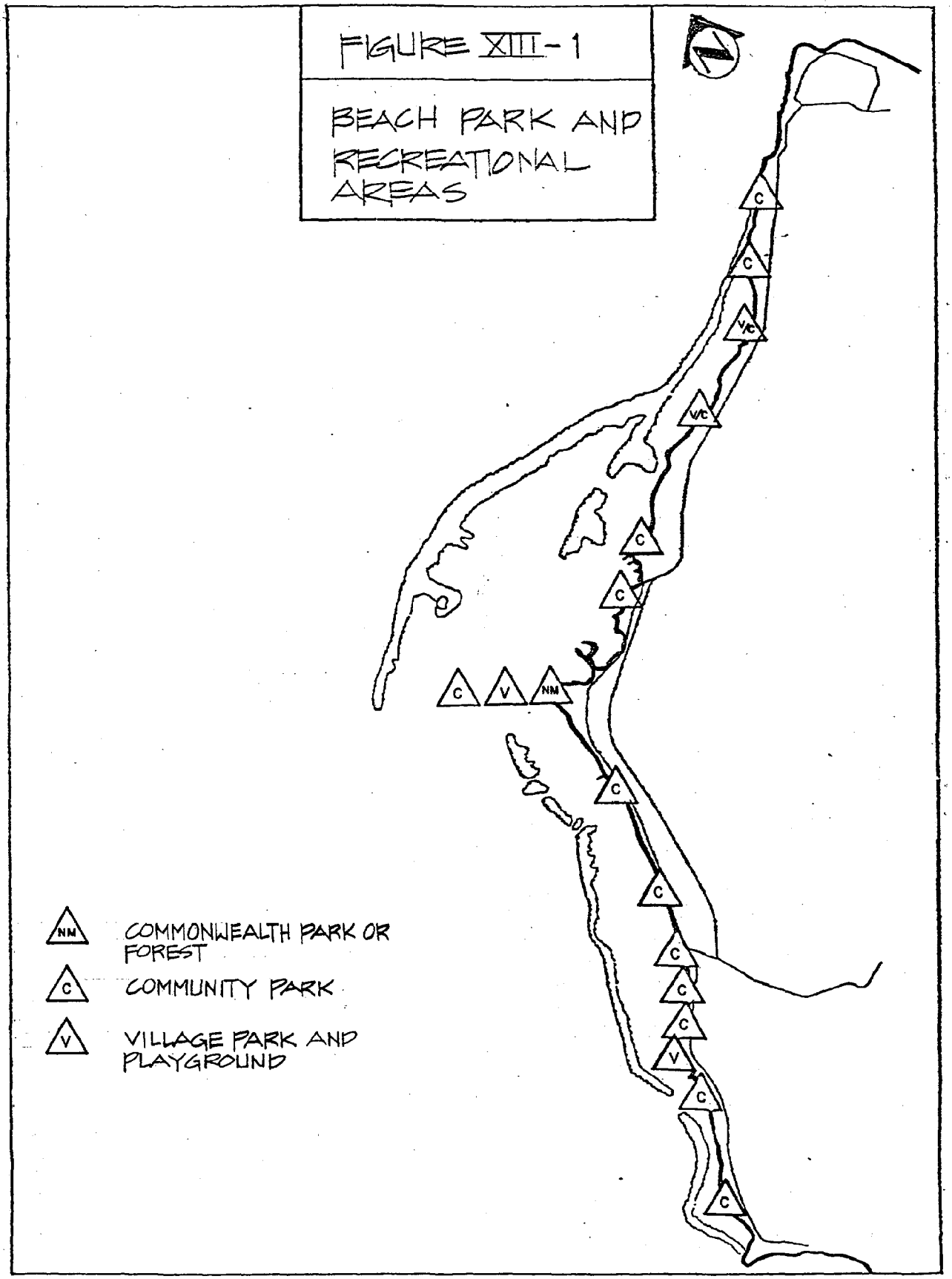


FIGURE XIII-1
BEACH PARK AND RECREATIONAL AREAS
C
C
V/C
V/C
C
C
C
V
NM
C
C
C
C
C
V
C
C
NM
COMMONWEALTH PARK OR FOREST
C
COMMUNITY PARK
V
VILLAGE PARK AND PLAYGROUND

C. PRELIMINARY NEEDS ASSESSMENT AND IMPROVEMENTS PLAN FOR VILLAGE PARKS AND PLAYGROUNDS

Four Village Parks and Playgrounds are associated with beach parks within the project area. They are at:

* Unai Paupau, serving San Roque
* Unai Achugau, serving Tanapag
* American Memorial Park, serving Garapan
* Unai Susupe, serving Susupe

Understandably, these four areas are also parts of other parks within Saipan's islandwide park system, and those uses will be addressed later in this Chapter under improvements for Community Parks and for Commonwealth Parks. Further, these four areas are not necessarily the only Village Parks and Playgrounds to be designated for the respective villages they serve but, rather, the only village parks and playgrounds within the PLAN's project area. Other such village-level parks are likely to be designated by the proposed Saipan Outdoor Recreation Plan and accompanied by site specific improvement plans and budgets.

A Needs Assessment for Village Parks and Playgrounds is generally computed in ratios of standards such as park areas/population or facilities/population, where the population is determined by walking distance from the park. Contemporary standards range from 1.0 to 2.5 acres/1,000 population for "neighborhood" parks, with such typical facilities as playground equipment, multi-purpose court, multi-purpose fields, benches and landscaping. In Saipan villages, as in most residential areas, these types of facilities are usually developed in conjunction with elementary schools. More specialized athletic and sports facilities are usually found on the campus of a junior and senior high school.

While some playground equipment is already available near Unai Paupau (at the San Roque Elementary School) near Unai Achugau (at Tanapag Elementary School) and near the American Memorial Park (at Garapan Elementary School) these facilities are, in whole, inadequate for two reasons:

* The existing facilities are insufficient to meet the needs of the walking distance population at San Roque and at Tanapag; and
* In consonance with one of this Plan's primary goals, "to retain traditional uses and values of the island", recreation areas should have an orientation with the sea; therefore, all parks, including these proposed Village Park and Playground improvements, these should be developed

at the Unai Paupau and Unai Achugua beach parks so that the traditional environment is captured as part of the recreation experience.

The following improvements are recommended at the four sites in order to provide for Village Park and Playground recreation opportunities. Due to the linear, beach strand configuration of Unai Paupau, Unai Achugua, and Unai Susupe, improvements at these three sites must be limited to equipment facilities rather than space-occupying fields and courts.

TABLE XIII-2
VILLAGE PARKS AND PLAYGROUND IMPROVEMENTS

Parks	Improvements
Unai Paupau	Benches, 4-6 Enclosed tot-lot play area, 20'x 30' Playground apparatus, 2-3 types
Unai Achugua	Benches, 4-6 Enclosed tot-lot play areas, 20'x 30' Playground apparatus, 4-6 types
American Memorial Park	Benches, 4-6 Enclosed tot-lot play area, 30'x 30' Playground apparatus, 4-6 types
Unai Susupe	Benches, 4-6 Enclosed tot-lot play area, 20'x 30' Playground apparatus, 2-3 types

D. PRELIMINARY NEEDS ASSESSMENT AND IMPROVEMENTS PLAN FOR COMMUNITY BEACH PARKS

The Saipan Lagoon Shoreline creates some of the most outstanding community park resources in Micronesia. While Community Parks can take on various forms and purposes depending on their size, proximity to residents and tourists, and natural amenities, the 16 community parks within this project area are all properly sub-classified as "beach parks".

It is unnecessary to plan for identical improvements at each beach park inasmuch as a formal needs assessment

conducted as part of the Saipan Outdoor Recreation Plan would reveal that some of these parks should be extensively developed while others should be left, more or less, in their natural state.

For purposes of this Saipan Lagoon Use Management Plan, therefore, these beach parks are divided into two subclassifications: Beach - Park Natural (to be retained basically in its natural state); and Beach Park - Developed (to be improved for more intensive uses). These two sub-classifications are presented in Table XIII-3 as depicted on Figure XIII-2.

TABLE XIII-3
COMMUNITY PARK SUB-CLASSIFICATIONS AS
BEACH PARKS - NATURAL AND BEACH PARKS - DEVELOPED

Beaches Parks - Natural	Beach Parks - Developed
Wing Beach	Unai Paupau
Unai Matuis Dikike	Unai Achagua
Unai Tanapag	DPW Beach
	Micro Beach
Unai Garapan	Civic Center Beach
Unai Chalan Laulau	Unai Chalan Kanoa
San Jose Beach	Unai Susupe
Royal Taga Beach	Unai Afetna

E. DESCRIPTION OF RECOMMENDED IMPROVEMENTS AT BEACH PARKS

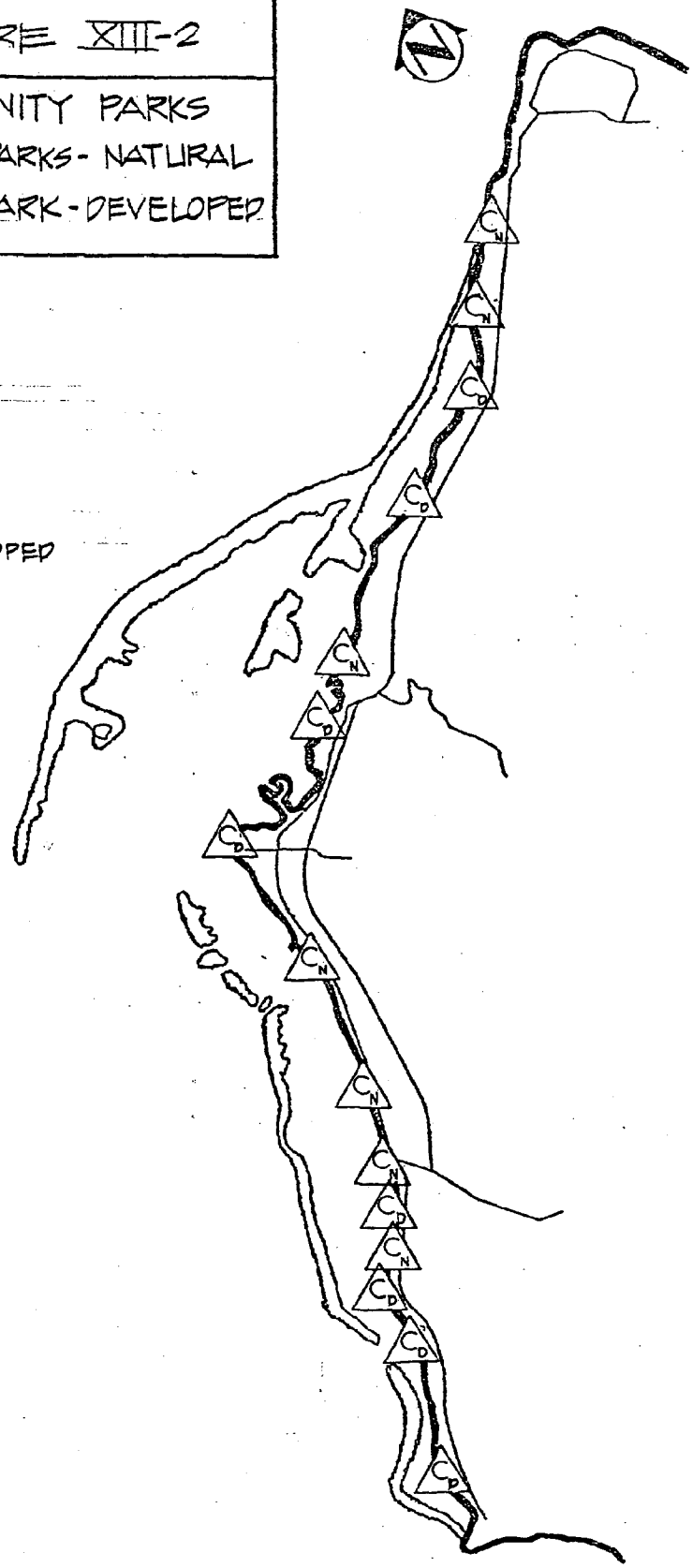
The basic character of Beach Parks - Natural is one of low-intensity development, natural environment and passive recreation opportunities. Unimproved (without asphalt) access roads and parking areas, no public restrooms or picnic facilities and little or no beach maintenance are typical of this category of beach parks.

Table XIII-4 lists the improvements recommended for each Beach Park - Natural.

Table XIII-5 lists the improvements recommended for each Beach Park - Developed

FIGURE XIII-2

COMMUNITY PARKS
BEACH PARKS - NATURAL
BEACH PARK - DEVELOPED



C_N NATURAL
COMMUNITY BEACH PARK - NATURAL

C_D DEVELOPED
COMMUNITY BEACH PARK - DEVELOPED

TABLE XIII-4

IMPROVEMENTS FOR BEACH PARKS - NATURAL

Park	Existing Facilities	Public Improvements Needed
Wing Beach	Access road, compacted coral, 1500 linear feet (lf)	Road maintenance, semi-annually, where needed Mowing and trash clean-up Trees Parking, compacted, coral, for 10 vehicles, with barriers
Unai Matius Dikike	Access road, coral, 1200 lf	None
Unai Tanapag	Pedestrian accesses, two at 300 lf each	Clearing of path for access to beach
	Parking along access road, (back road between Public Works and Tanapag)	Trees Widening of road shoulder to accommodate parking for 10 vehicles
Unai Chalan Laulau	None	None
San Jose Beach	Picnic tables, 3 Playfield	Repair existing tables and add 3 more Barbecue pits, 2 Tables Trash containers
		Trees Parking, compacted coral for 10 vehicles
Royal Taga	None	None, except as may be provided by adjacent resort

TABLE XIII-5
IMPROVEMENTS FOR BEACH PARKS - DEVELOPED

Park	Existing Facilities	Public Improvements Needed
Unai Paupau	Access road, compacted coral, 600 lf Picnic tables, 6 Camping area	Road maintenance semi-annually, where needed Parking, compacted coral for 20 vehicles, with barriers Add 6 picnic tables, Add 6 trash containers Public restrooms at pavilion Trees Benches, 8-10
Unai Achugua	Access road, coral, 200 lf	Picnic tables, 6 Barbecue pits, 4 Benches, 6
DPW Beach	Access road, coral, 400 lf Pavilion	Semi-annually road maintenance where needed Parking, clear for 10 vehicles Picnic tables, 2 Barbecue pits, 2 Benches, 2 Trash containers, 1
Micro Beach	Access road, paved and compacted coral, 1600 lf Public restroom Pavilion Picnic tables, 5 Volley ball court Playground	Pave portion which is presently compacted coral Enlarge parking area to accommodate 40 cars and barricade parking lot boundary Picnic tables, 6 Barbecue pits, 6 Benches, 10
Unai Garapan	Access road, compacted coral, 300 lf	Dock and channel as recommended

	Launching ramp Fishing dock Parking for 6 vehicles and boat trailors	by USACOE Parking, paved for 25 vehicles Picnic tables, 4 Trees
	Play field	Barbecue pits, 2 Benches, 6 Trash containers,3 Upgrade playfield Public restroom
Civic Center Beach Park	Access road, coral, 50 lf Parking for 15 vehicles at north end and for 15 vehicles at south end Picnic tables, 6 Public Restrooms Tennis court	Picnic tables, 12 Benches, 10 Barbecue pits, 12 Upgrade restrooms Trees
Unai Chalan Kanoa	Access road, paved, 150 lf	Parking, compacted coral for 10 vehicles Picnic tables, 5 Barbecue pits, 4 Benches, 5

F. COMMONWEALTH PARKS

The only park of this classification in this PLAN's project area is the American Memorial Park. This park's site improvements are already planned and presented in the September 1983 "American Memorial Park - General Management and Comprehensive Design".

G. ESTIMATED COST OF PARK IMPROVEMENTS

Park improvements budgets are presented in Table XIII-6 for each Park. These budgets were prepared on the basis of unit costs for the various facilities being recommended. Inasmuch as unit costs can vary depending on such factors as field conditions that may be encountered, the number of contractors involved with the improvements and other design-dictated requirements, a lump sum budget estimate is presented for each park. It is recommended, however, to let-out one design contract for all improvements in order to reduce the cost of plan preparation for similar facilities at different parks and for standardizing the design details and construction methodology of the improvements.

The estimated cost of design for all recommended Park improvements is $10,000.

The budget estimate of $90,600 for construction of park improvements is summarized below.

TABLE XIII-6
BUDGET ESTIMATES FOR PARK IMPROVEMENTS

Location	Village Park	Natural Beach Park	Developed Beach Park
Wing Beach	na	$3,000	na
Unai Paupau	$3,400	na	$10,000
Unai Achugua	$4,800	na	$ 3,500
Unai Tanapag	na	$2,000	na
DPW Beach	na	na	$ 3,500
American Memorial Park	$5,200	na	na
Micro Beach	na	na	$15,000
Unai Garapan*	na	na	$18,000
Civic Center Beach Park	na	na	$11,000
San Jose Beach	na	$2,800	na
Unai Chalan Kanoa	na	na	$5,000
Unai Susupe	$3,400	na	na
	$16,800	$7,800	$66,000

* Not including USACOE recommended dock and channel

CHAPTER XIV - AFETNA BEACH PARK PLAN

A. STATEMENT OF INTENT

The southern Saipan Lagoon shoreline has but a dearth of park and recreation improvements. The growing population of southern villages need more park and recreation areas. Such a need, coupled with an overall objective of geographically balancing the Island's developed Beach Parks, have resulted in this Plan for the Afetna Beach Park, located in the Puntan Afetna Planning Area.

The elements of a plan for Afetna Beach Park include improvements and new facilities necessary to design and construct a well developed Community Park along Afetna Beach,at the former US Coast Guard LORAN Station site (now CNMI public land). Because this site holds substantial value for other public or commercial leasehold uses, the Beach Park Plan is concentrated in the southern portion of the property, thereby reserving the remaining northern area for other future uses.

The intent of this SAIPAN LAGOON USE MANAGEMENT PLAN is to recommend a site development plan for the Afetna Beach Park, complete with design and construction costs.

B. AFETNA BEACH PARK IMPROVEMENTS

Presently the Afetna Beach Park area is unimproved, with the exception of two picnic tables and shelters at the beach's southern end, near Agingan Point.

As a well-developed Community Beach Park, the following improvements and facilities should be provided.

* Access road, compacted coral, 1200 lf
* Parking, compacted coral for 20 vehicles
* Picnic tables, 10
* Barbecue pits, 6
* Benches, 8
* Trash containers, 10
* Restrooms
* Outdoor Showers
* Pavilion, 30'x 40'
* Playground apparatus, 3-4 types
* Playfield for soft ball, volleyball
* A general recreation area
* Additional trees

C. COST OF IMPROVEMENTS

Table XIV-1, below, itemizes the cost estimates for Afetna Beach Park Improvements.

TABLE XIV-1

COST OF IMPROVEMENTS
AFETNA BEACH PARK

Facility	Amount	Estimated Cost
Access road, compacted coral	1200 lf	$22,000
Parking, compacted coral	20 vehicles	3,000
Picnic Tables	10	3,000
Barbecue Pits	6	1,000
Benches	8	1,000
Trash containers	10	500
Restrooms with outdoor showers	LS	10,000
Pavilion	30'x 40'	20,000
Playground apparatus	3-4 types	1,500
Playfield for soft ball, volleyball and general recreation area	LS	3,000
Additional trees	50	500
		$65,500
	Contingency	4,500
		$70,000

The surveying costs and engineering design fee should be budgeted at $10,000.

CHAPTER XV - SAIPAN LAGOON SHORELINE BICYCLE ROUTE PLAN

A. STATEMENT OF INTENT

Due in part to the increasing interest being demonstrated by residents and tourists in bicycling on Saipan, a bicycle route is recommended to connect the Lagoon beach parks.

Such a plan must include a defined corridor stretching from Wing Beach to Unai Afetna, along with appropriate improvements and traffic safety features that cater exclusively to the cyclists. This Shoreline Bicycle Route Plan presents the site-specific improvements and their associated costs for implementing the objective.

It is understood that Saipan has more to offer bicyclist`s than only a route linking the Lagoon's beach parks. Those other, islandwide, recreation opportunities for bicycling would be explored and developed as part of the proposed Saipan Outdoor Recreation Plan.

Bicycling offers three types of benefits to Saipan. First, its primary economic return is in providing for a popular pursuit to those tourists who want to rent bikes and peddle their way along the Saipan Lagoon shoreline. Biking is, of course, very common in Japan and represents the the country's most basic means of transportation on a one-person-one vehicle basis. Because nearly every Japanese tourist is so familiar with bicycling, the implementation of a safe and convenient Bicycle Route System creates a significant market for additional tourism industry development.

Second, and of only minor economic importance, are the increased public recreation opportunities provided by using bicycles as the primary means of access to remote or less developed recreation areas. Developing "bike trail" access rather than "auto roadway" access to public recreation sites is considerably less expensive and much more quickly implemented. Even when cost is not a consideration, bike paths require much less right-of-way to construct and, therefore, encourage the possibilities for access easements across privately owned lands instead of the typical requirement of acquiring right-of-way for two auto travel lanes.

The third, and most insignificant economic benefit, is the potential reduction in vehicle traffic as a result of bike ways. It cannot be argued that more people, on fair-weather days, will be inclined to make bike trips rather than auto trips for their transportation needs. This tendency will

yield an occasional net reduction in vehicular traffic flow, but in too few numbers and too inconsistently for factoring into the design of future street and highway facilities.

B. PLANNING CRITERIA FOR THE BICYCLE ROUTE

In general, the bicycle is emerging in western, developed regions as an alternative mode of urban transportation. While very few on Saipanese commute to work by bike or conduct other forms of business in this manner, cycling is becoming increasingly popular among tourists and among local residents as a form of recreation and exercise. Consequently, this aspect of the SAIPAN LAGOON USE MANAGEMENT PLAN provides for "recreational riding" opportunities as a leisure time activity for all ages.

It is well understood that the bicycle does not blend well with other types of pedestrian or vehicular traffic, due mainly to the differential in speeds as well as the contrasting sizes. Consequently, special precautions are necessary in planning and designing bicycle routes so that they are both safe and convenient. Of the four basic types of bicycling (neighborhood, recreational, community, and sport or touring), routes for recreational riding are characterized by a minimum of conflict with vehicular traffic. Also, visual experiences are particularly important; and special attention must be given to providing pleasing visual impressions whenever possible.

The three basic forms of bicycle paths that are planned for this Shoreline Bicycle Route include:

* Class I (Bike Path or Protected Lane)
  A completely separated right-of-way designated for the exclusive use of bicycles.

* Class II (Bike Lane)
  A restricted right-of-way designated for the exclusive or semi-exclusive use of bicycles; through-vehicles are not permitted. Vehicle parking and access to property, as well as pedestrian access to parked vehicles, are allowed.

* Class III (Bike Routes)
  A shared right-of-way designated as such by signs placed on vertical posts or stenciled on the roadway pavement.

C. TYPICAL PROFILES OF BIKE ROUTES

Within the three basic bike path classes variations exist for adapting to field conditions, budget constraints and safety factors. Combinations of all three classes, as well as two variations within each class, are required to implement the Saipan Lagoon Shoreline Bicycle Route.

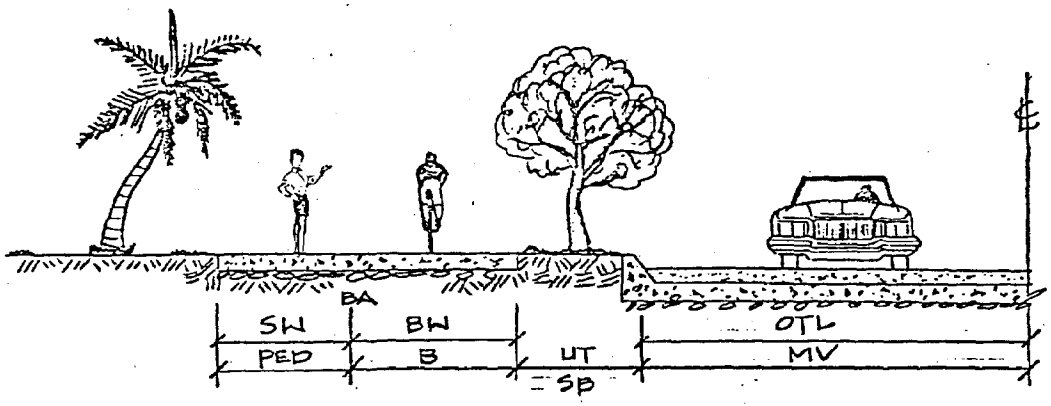
This section presents typical profiles that are incorporated into the proposed Bike Route, along with a brief description of the advantages and disadvantages associated with each class variation. The following code is used to designate various features of the typical profile.

SW -	Sidewalk	BW	- Bikeway
UT -	Utility	OTL	- Outside Travel Lane
SB -	Setback	B	- Bicycle Right-of-Way
BA -	Barrier	PED	- Pedestrian Right-of-Way
PC -	Parking	MV	- Motor Vehicle Right-of-Way

1. Class I Bikeways

These are completely separated right-of-way designated for exclusive use of bicycles. Two variations of Class I Bikeways, Variation A and Variation B, are employed in the Saipan Lagoon Shoreline Bike Route.

FIGURE XV-1
CLASS I BIKEWAY - VARIATION A



a) Bikeway designated exclusively for bicycle use.
b) Striping recommended.
c) Continuous low berm applicable.
d) Minimum two-lane bikeway.

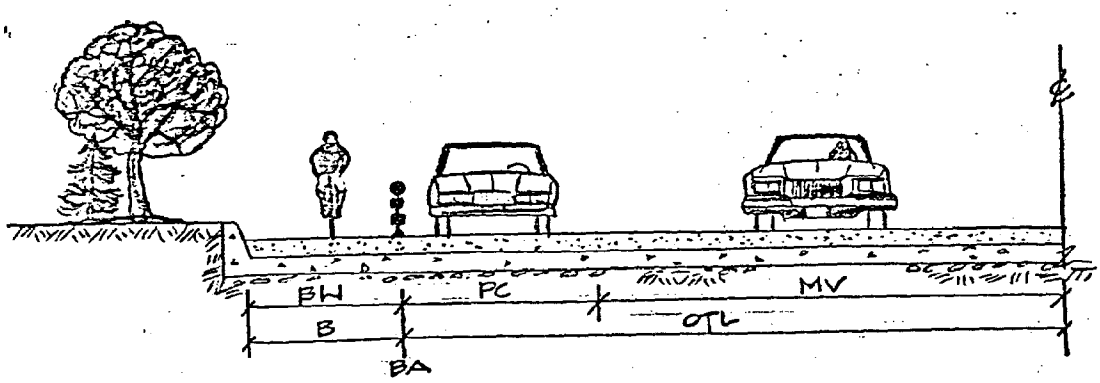
Advantages:

a) Provides horizontal and vertical separation from motorized traffic, thereby eliminating conflicts with an overtaking vehicle, autos parking or entering the traffic stream from their parking positions, and conflicts caused by open cardoors.
b) A barrier is provided to separate pedestrians and bicyclists.
c) Minimum of two-lanes one-way provides adequate passing room for cyclists.

Disadvantages:

a) Bicycle crosses pedestrian traffic-flow and conflicts are generated.
b) Since bicyclists are removed from the traffic pattern, intersection and driveway conflicts become critical because of the reduced cautionary attitudes in both motorists and bicyclists.
c) Driveways pose other problems such as stopped vehicles within the bicyclist's path awaiting to enter the traffic pattern.
d) Motorists are likely to back their vehicles into the bike lane rather than into the roadway, which is potentially dangerous for bicyclists.

FIGURE XV-2
CLASS I BIKEWAY - VARIATION B



a) Barrier to be provided between bike lane and parked cars to prevent encroachment from cars which are parking.
b) Potential bicycle/opened cardoor conflicts.
c) Recommended for areas with high parking/low turnover rates.
d) Minimum two lanes for bikes.

Advantages:

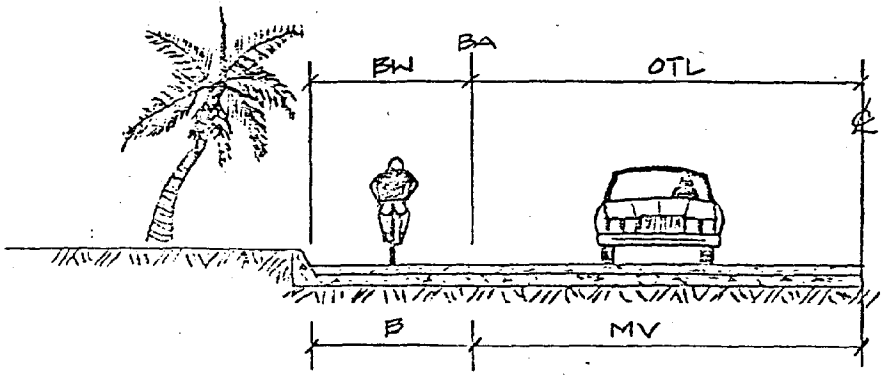
a) Providing a horizontal separation by using parked cars effectively eliminates auto/bicycle conflicts with the addition of protection from out-of-control vehicles.
b) A curb barrier between the parked cars and the bikelane will prevent encroachment by autos attempting to park.
c) Maneuvering room may be inadequate with the minimum recommendation of two lanes for the bikeway.

Disadvantages:

a) Not only does the motorist know the bicyclist cannot drift into the traffic pattern, he will not be able to see the bicyclist, and this aggravates the severity of intersection and driveway conflicts.
b) When the parking lane is ended the bicyclist is exposed to the hazards inherent with motorized traffic and both bicyclists and motorists are unaware of the presence of the other.
c) Motorists entering a driveway or exiting from one effectively "box" the bicyclist within the lane.
d) Bicyclist may drift into the parked cars with the possibilities of injuries.
e) Opened cardoor conflicts are not adequately resolved.
f) Potential conflicts with passengers exiting from parked cars are not resolved.
g) Pedestrians crossing to parked cars create other conflicts with bicyclists.

2. Class II Bikeways
These are restricted rights-of-way designated for the exclusive or semi-exclusive use of bicycles. Through-travel by motor vehicles is not allowed; however, parking may be allowed.

PLATE XV-3
CLASS II BIKEWAY - VARIATION A



a) Pavement markers are the recommended barrier between bikes and autos.
b) When curbs are to be used, access across bike lanes must be prohibited.
c) Minimum of two lanes with a curb barrier.
d) No parking permitted when pavement markers are the barriers used.

Advantages:

a) Providing pavement markers can be deterrent to motorists encroaching upon the bike lane.
b) Relative to curbs and pylons as physical barriers, pavement markers are more desirable barriers since the possibility of a bicyclist spilling from his bike when riding over the markers is reduced.
c) A curb barrier provides the best horizontal separation in terms of eliminating encroachment by motorists altogether. The minimum two-lane requirement for bike lanes provided with curbs is designed to allow maneuvering room for bicyclists.
d) Prohibiting access into driveways alleviates the problem of cross-auto-flow into the bike lane, thereby eliminating these conflicts for bicyclists.

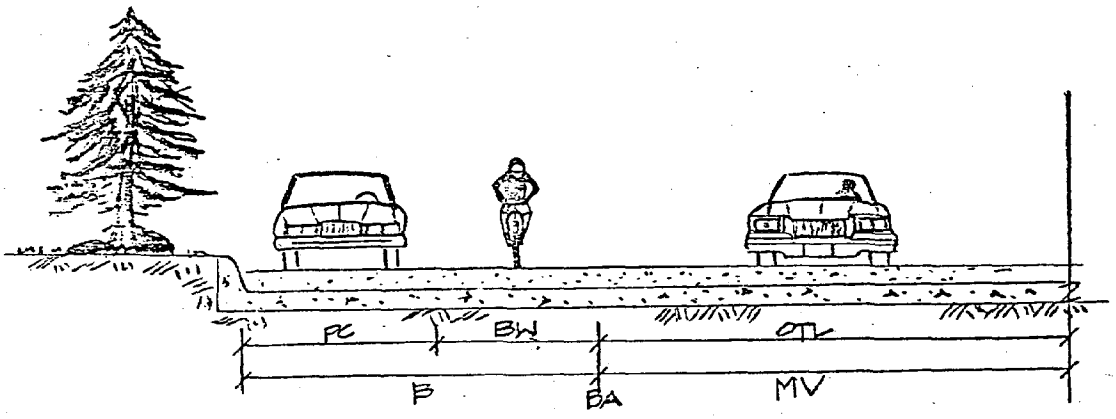
Disadvantages:

a) Possibility exists for bicyclists to drift over or into the barriers with serious consequences.
b) Especially with respect to a curb barrier provided between the outside travel lane and

the bike lane, the motorist is encouraged to think the bicyclist cannot cross into his path and may be caught unaware if this actually occurs.

c) Providing curb barriers intensifies the possibilities of conflicts at intersections where the barriers may be ended.

FIGURE XV-4
CLASS II - BIKEWAY - VARIATION B



a) Striping or pavement markers.
b) Parking restricted during peak bicycle travel hours.
c) One-lane bikeway only.
d) Clearance to outside travel lane and for opened cardoors must be provided.

Advantages:

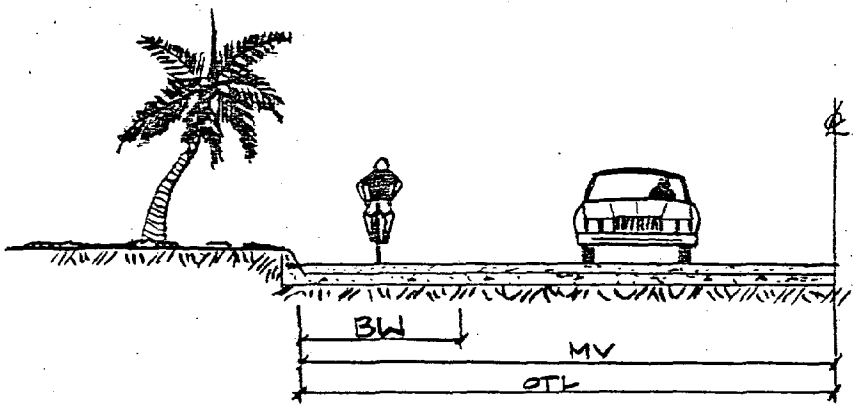
a) Restricted parking during peak bicycle travel hours allows greater room for passing cyclists and adequate maneuvering space.
b) There are no physical barriers such as curbs or pylons which tend to lead motorists and bicyclists to be less cautious.
c) Maneuvering room is provided with clearances from the traffic lanes and parked cars.

Disadvantages:

a) Cross-auto-flow by parking cars generates potential conflicts.
b) Potential pedestrian/bicycle conflicts caused by passengers exiting from parked cars.
c) Cars improperly parked may detract from maneuvering room for bicyclists.

d) Cars entering the traffic stream from their parking positions create further conflicts especially if they wait to enter the stream within the bicyclists' path.

FIGURE XV-5
CLASS III - BIKEWAYS - VARIATION A



a) Signed, shared right-of-way
b) Signs only to designate route.
c) No parking permitted.

Advantages:

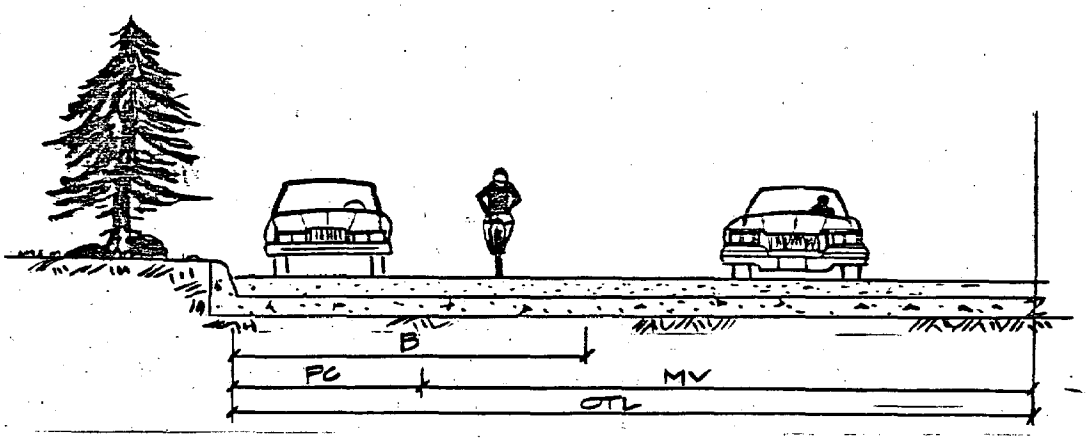
a) The implementation of the Class III route alternative is relatively inexpensive as signing is the only necessary designation.
b) Bicyclists ride within the traffic pattern; consequently, motorists and bicyclists are well aware of the presence of each other.
c) Maneuvering space is only restricted by the presence of other traffic.
d) Since bicyclists are already part of the traffic stream, intersection conflicts and driveway conflicts are less critical.
e) Prohibiting parking can decrease the volume of intentional cross-auto-flow, thereby decreasing the potential for auto/bicycle conflicts.

Disadvantages:

a) Bicyclists within the traffic pattern are vulnerable to serious accidents and injuries; and large volumes of traffic increase the likelihood of serious or fatal accidents.

b) Inherently restricted in speed, the bicyclist may slow traffic and increase traffic tie-ups.
c) Overtaking vehicles and weaving autos are hazardous to bicyclists, especially to inexperienced ones.
d) Bicyclists may be forced by the presence of traffic to ride at relatively high speeds which affect their ability to control their bikes.

FIGURE XV-6
CLASS III BIKEWAYS - VARIATION B



a) Signed, shared right-of-way.
b) Parking permitted.
c) No striping or barrier.

Advantages:

a) Relatively inexpensive to implement requiring only the signing of existing routes.
b) Motorist awareness of the presence of bicyclists is enhanced.
c) Bicyclists are not restricted to the "bikelane", allowing maneuvering space for any necessary evasive actions.
d) Intersection and driveway conflicts are still less critical, as maneuvering space is not restricted.

Disadvantages:

a) Pedestrian/bicycle conflicts are increased.
b) Again, the motorists is not aware of the presence of bicyclists and, therefore, intersection and driveway conflicts become critical.

c) Maneuverability is somewhat restricted, which may be critical especially with the presence of pedestrians.

Table XV-1 presents the minimum space requirements for the Class I,II and III bikeway variations.

D. BICYCLE ROUTE IMPROVEMENTS

Figure XV-7 depicts the types of Bicycle Route improvements that are recommended for the Saipan Lagoon Shoreline Bicycle Route Plan.

Before the construction costs can be established for these bikeway improvements, considerable surveying and preliminary engineering are necessary to determine the exact scope of reconstruction along the route. Anticipating that the total cost for all improvements will be prohibitively expensive, it is recommended that the next step be restricted to a preliminary engineering study which establishes reliable cost budgets for each type of improvement, the extent of cadastral work necessary to accommodate the bikeway and other project aspects such as utility relocations, intersection re-designs and specifying cost-efficient barriers for the Class I, Variation B, bikeway. The cost of such a preliminary study is approximately $25,000.

TABLE XV-1
MINIMUM SPACE REQUIREMENTS FOR
BIKEWAY VARIATIONS

Bikeway Variation	Minimum Bikeway Width	Recommended Minimum Space Required	Remarks
Class I Variation A	3.3'	5.8'	5.8'paved
Class I Variation B	6.8'	7.5'	Type B-3 curb barrier; no door opening allowance given.
Class II Variation A	6.8'	7.5' Including curb barrier; outside traffic lane should provide 1.0' minimum clearance.	Type B-3 curb barrier; 2-lane minimum to allow for passing cyclists.
Class II Variation B	3.3' to 5.3'	13.3' from curb to outer edge of bikeway 13.3' from curb to outer edge of bikeway	Medium to high parking density; off peak; low turnover. Low parking density; off peak.
Class III Variation A	NA	14.1' for outside traffic	Low motor vehicle volumes and speeds.
Class III Variation B	NA	14.1' for outside traffic lane 22.1' for outside traffic lane	Low parking density; through motor vehicle traffic restricted. Medium to high density parking.

CHAPTER XVI - BEACH FACILITIES MAINTENANCE PROGRAM

A. STATEMENT OF INTENT

The Commonwealth Government now maintains many beach park facilities along the Saipan Lagoon shoreline. These facilities range from access roads and parking areas to pavilions, toilets, picnic tables and boat launching ramps. Despite periodic efforts by the Department of Public Works, many of these facilities are not maintained to standards that are acceptable to either the public or the tourists.

The intent of this Chapter is to prescribe a maintenance program for the PLAN area's beach facilities so as to assist Public Works in budgeting and implementing a repair and maintenance program. The Department of Public Works must concern itself with two aspects of its maintenance program for these facilities: periodic maintenance; and as-needed repairs. Since as-needed repairs are scheduled whenever required, such as to repair broken waterlines or acts of vandalism, they are not subject to the regularly scheduled maintenance and up-keep described in this Plan.

B. FACILITY INVENTORY AND MAINTENANCE SCHEDULE

Table XVI-1, below, summarizes the various types of recreation facilities along the Saipan Lagoon shoreline parks which are to be programmed for maintenance.

TABLE XVI-1
SUMMARY OF RECREATION FACILITIES
AND MAINTENANCE SCHEDULE

Facility	Scope of Maintenance (minimum)	Schedule
Access road, compacted coral	Re-grading and compaction where necessary	Biannual: once during mid-rainy season and once at end of rainy season
Access road, paved	Maintenance of roadside drainage	Annual, prior to rainy season
Pavilion, open air, and picnic shelters	Painting, exterior	Every two years

	Concrete roof Seal cracks	Every two years
	Roof, corrugated Check for loose sheets	Annual
	Electrical system Inspect and repair as necessary	Annual
	Plumbing system Inspect and repair pipes as necessary	Annual
	Inspect and repair leaking faucets and showers	Monthly
Restrooms	Paint, exterior	Every two years
	Paint, interior	Annual
	Concrete roof Seal cracks	Every two years
	Electrical system Inspect and repair as necessary	Annual
	Plumbing system Inspect and repair as necessary	Annual
	Inspect and repair leaking toilets and faucets	Monthly
Picnic Tables and Barbecue Pits	Inspect and repair where necessary	Annual
Parking and other paved areas such as multi-purpose athletic courts and ramps	Inspect and repair drainage system as required	Annual, prior to rainy season
	Re-paint lines	Annual, shortly after rainy season
Playfield equipment	Inspect, lubricate and repair as necessary	Annual

CHAPTER XVII - SOILS EROSION AND SEDIMENTATION CONTROL TECHNICAL MANUAL

A. STATEMENT OF INTENT

The intent of this Plan is to prepare a technical manual of soil erosion and sedimentation control techniques and procedures which are appropriate for the Commonwealth. Such a manual will serve as a technical reference for implementing Erosion Plans as now required by permitees under the Commonwealth "Earthmoving and Erosion Control Regulations", promulgated in April 1984. Section 4 of these Regulations outline the requirements for a permit to engage in earthmoving activities. One such requirement is an Erosion and Sediment Control Plan which must present specific measures and practices to control erosion and sedimentation resulting from the proposed project's earthmoving activities.

A technical manual which describes various erosion and sediment control measures appropriate for the Commonwealth is not now available. Such a manual would be useful as a primary reference for Government-approved structural and non-structural erosion/sediment control devices as well as for those vegetative measures which have proven to be successful for different soil types and terrains on Saipan.

This Technical Manual should be prepared under the Government's guidance and be made available to all contractors, designers and other potential Earthmoving permitees.

The following Scope of Work is appropriate for directing the preparation of a Technical Manual for Soil Erosion and Sediment Control in the CNMI.

B. SCOPE OF WORK

1. Outline the Basic Principles of Erosion and Sedimentation

   Definition of Erosion and Sedimentation

   Causes of Accelerated Erosion

   Influencing Factors to Erosion

   Causes of Sedimentation

   Sediment Transportation and Deposition

2. Describe Erosion and Sedimentation Control Planning

Principles for Erosion and Sedimentation Control Planning

Planning Step #1 - Preliminary Evaluation of Site

Planning Step #2 - Preliminary Design

Planning Step #3 - Sub-surface Investigations

Planning Step #4 - Final Design

3. Describe Appropriate Erosion Control Measures

Functions of Erosion Control Measures

Types of Erosion Control Measures

Surface Roughening
Interception and Diversion Practices
Vegetative Stabilization
Non-vegetative Soil Stabilization

4. Describe Appropriate Vegetative Measures for Controlling Sedimentation

Planning for Establishment of Vegetation
Minimum Slope and Surface Requirements
Soil Testing
Clay and Sand and Organic Matter Intermixing
Topsoiling
Liming and Fertilizing
Permanent Seeding
Temporary Seeding
Mulching
Sodding
Maintenance

Planning Guidelines for Preventing Sediment Runoff by the Use of Vegetation

Vegetative Control Measures

Natural Buffers
Installed Vegetative Buffer
Contour Strips
Sod Inlet Filter

Temporary and Permanent Stabilization Through Vegetation

5. Describe Appropriate Structural Measures for Controlling Sedimentation

   Pre-Sediment Pond Techniques

   Sediment Basin Techniques

   Post-Sediment Basin Measures

6. Describe Construction of Erosion and Sediment Control Measures

   Roadway Construction

   Underground Utility Construction

   Building Construction

7. Describe Maintenance of Erosion and Sedimentation Control Measures

   Maintaining Vegetative Measures

   Maintaining Structural Measures

   Removal and Disposal of Sediment from Detention Ponds

C. COST ESTIMATE AND PROJECT SCHEDULE

The cost for such a Technical Manual will be approximately $15,000, including printing. A reasonable project schedule is four months, including review time.

PART FIVE
IMPORTANT HABITATS MANAGEMENT ELEMENT

CHAPTER XVIII - IMPORTANT HABITATS MANAGEMENT PLAN

A. SYNOPSIS OF DATA ANALYSES FROM VOLUME I AND IDENTIFICATION OF PROBLEMS

During the data collection phase of this study important habitats such as mangrove stands selected coral reefs in the lagoon, turtle nesting sites and seagrass beds were identified and a general assessment of the condition of each species was made. Literature related to these habitats was obtained and reviewed in order to determine their relative change over time. This was necessary in order to determine the impact of development on these habitats and to determine the level of protection needed. In general, very little hard data are available for these habitats; and, therefore, a picture of historical change is difficult to compose. Without such data it is impossible to determine what effect development has had on these habitats. Field investigations alone do not give such an insight.

During field investigations no evidence was found regarding specific areas used for shelling or any other purpose other than what is identified in Volume I.

1. Mangrove Stands Habitats

Mangrove stands were surveyed from land and by boat. This resource on Saipan is very small for a tropical island (Figure XVIII-1). However, it is common to find limited mangroves on islands with few small rivers and limited estuaries, such as on Saipan. The extent of mangroves on Saipan is limited to three extremely small stands.

The first stand is in a small tidal estuary at the mouth of a storm drainage basin at Lower Base toward the northern extreme of Puntan Tanapag. The area of tidal influence extends to the road, through a culvert and north along the road approximately 20 meters (65 ft). This area continues along the road another 50 meters (165 ft) as a depressed wetland fed by a natural spring and rainwater runoff. It is only remotely affected by the tides. It has been reported

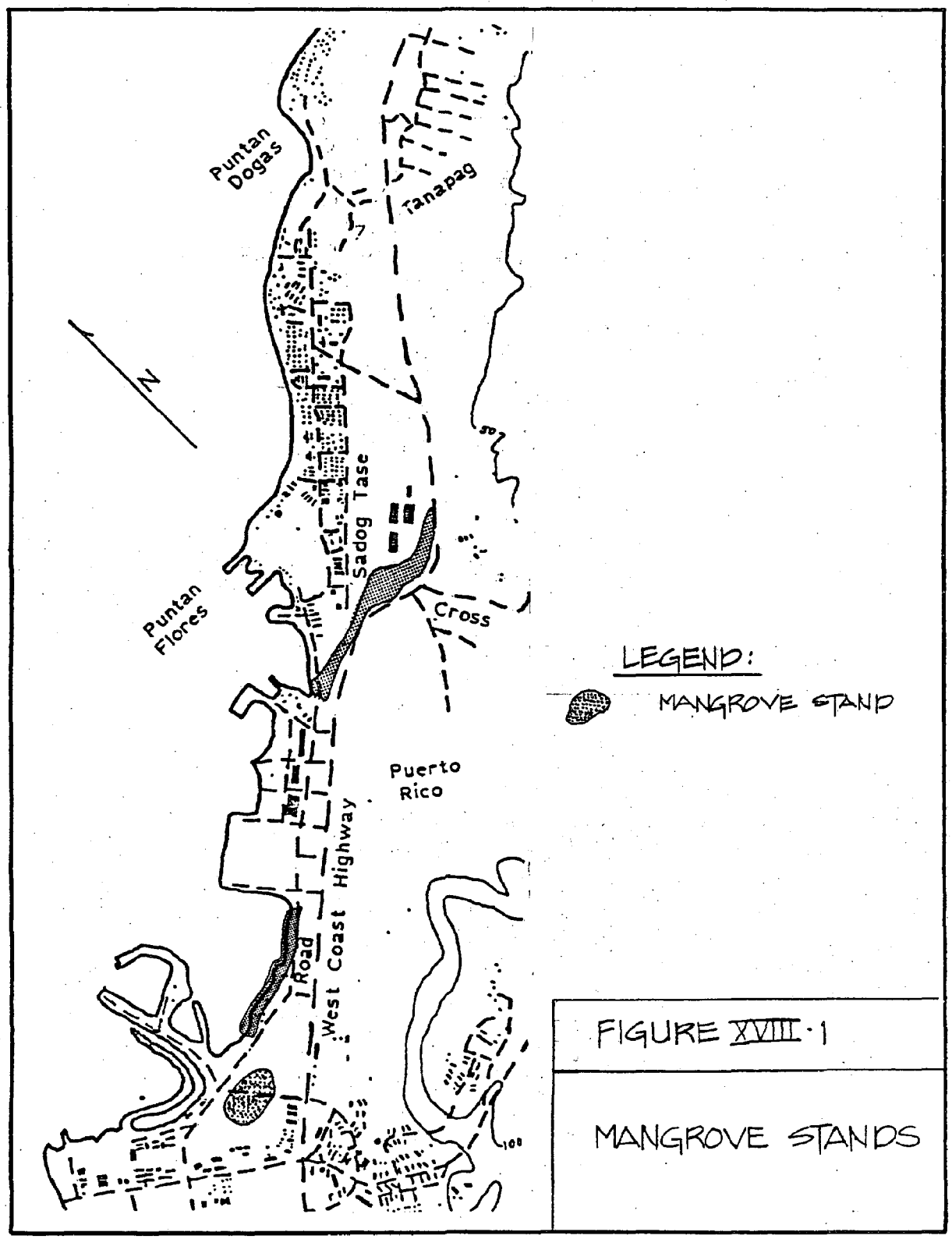


FIGURE XVIII·1

MANGROVE STANDS

that at one time the entire wetland was probably a small bay open to the harbor. However, with the extensive filling from wartime activities and development over the years the outlet has been reduced to a narrow streambed. One estimation puts the mouth of this stream approximately 600 meters (2000 ft) from the harbor. Most likely, the stream drained a large lowland area presently covered by fill and supporting buildings in the vicinity of Puntan Flores.

Only one species of mangrove exists in this limited area, Bruguiera gymnorrhiza. This species extends from the mouth of this estuary along both sides to the bridge. A few mangrove trees can be seen on the opposite side of the road but they dissipate rapidly. Other wetland-type plants in the area are Phragmites karka (Kariso), Hibiscus tilaceus (Pago) Acrostichum aureum (Langayao), Cyperus alternifolius (umbrella sedge), a number of grasses common to these islands like Pennisetum purpureum (elephant grass) and Sporobolus virginius (salt grass). A few small trees exist in the area, such as Pandanus tectorius (Aggak), Pithecellobium dulce (Kamachile) and the common Leucaena leucocephala (Tangan-Tangan). A few small weeds, vine and bushes like Bidens pilosa (Beggars tick), Pluchea indica and Ipomoea pes/caprae (Beach morning glory) round out species composition.

The second small mangrove stand is found just south of the Puerto Rico Dump along a short segment of coastline. The extent of the mangrove area is a patch measuring 300 meters long by 10 meters wide. Bruguiera gymnorrhiza is the only mangrove species in this area. This site is fed by fresh water along the shoreline from a small wetland directly east of Beach Road and to the south 100 meters across from Smiling Cove. Mangroves are also found at this site. Data suggest that the area was likely a poorly-drained marsh. The area is now filling in, a process which is facilitated by expansion of the dump.

The third mangrove stand is located on the east side of Beach Road directly across from Smiling Cove. Bruguiera gymnorrhiza is the only species of mangrove living here and only in isolated stands. It appears that the area was once connected to the ocean because of the wetland appearance. However, no direct connection now exists. The water is definitely estuarine and likely affected by the tides.

Associated vegetation in the vicinity of these sites include the following: Hibiscus tiliaceus (Pago),

Leucaena leucoephala (tangan-tangan), Pluchea indica, Ipomoea pes-caprae (Beach morning glory) and a few weeds like Bidens pilosa (Beggars tick).

2. Coral Patch Reefs Habitats

The Saipan Lagoon is rich in resources particularly those associated with coral reefs. The barrier and fringing reefs form a contiguous reef zone from north to south along most of the West Coast of Saipan. This reef is an important habitat in itself since it provides the homes for all other reef-associated marine biota. This particular habitat is not addressed in detail in this PLAN since it is already protected by existing regulations such as those regarding the taking of coral, trochus and a few other marine species. Promulgated by the Department of National Resources and carried out by the Division of Fish and Wildlife, however, much could be done to improve efficiency in operation.

Three patch reefs within the lagoon, represent a rich resource that require protection. Two of these patch reefs are comprised of one dominant coral, Acropora formosa know as staghorn coral. The largest of these patch reefs is located just inside the reef at the Japanese lighthouse. The second and smallest of these Acropora patch reefs is located at the northern extreme of Paupau beach.

A third patch reef is quite different than the other two with much greater coral diversity. Numerous species of corals can be found here supporting a much greater variety of marine life. This area is located in the central lagoon just north of Tanapag Harbor. Fishermen can often be seen using various fishing techniques around this reef.

These three patch reefs are excellent fishing grounds for spearfishermen and should be protected from illegal activities like cloroxing or blasting. Local spearfishermen use these areas constantly because of their proximity to shore and abundance of resources. The upper portion of the Acropora patch is mostly dead coral with associated incrusting sponge and algae. The lower portions of the reef is alive and teeming with life. However, the patch reef north of Tanapag Harbor is mostly live coral throughout.

3. Managaha Island Underwater Trail Plan

A natural spinoff of the PLAN is the development of a marine park in the vicinity of Managaha Island. One of

the primary interpretative aspects of this park is an underwater trail. This trail involves two coral arcs located in shallow water to the northwest of Managaha Island. The area is characterized as a group of diverse coral heads with a few unique sights.

At this time a Marine Park Management Plan is being developed for this site. An underwater trail has been layed-out, and a management plan with interpretation features is nearly completed. Because of the positive tourist attraction this trail will provide, its protection is essential; although protective legislation is not in place at this time. Before the Marine Park Management Plan is accepted and adopted, a public hearing and legislative action must be taken.

4. Seagrass Beds Habitats

Three species of seagrass exist in the Saipan Lagoon. These are Enhalis accoroides, Halodule uninervis and Halophylla minor. Each of these species has its own geographical range. However, all three live in close proximity in the Garapan Lagoon Planning Area.

Seagrass beds are an important resource in the Saipan Lagoon since they provide protection for juvenile fishes. Thick mats of seagrass are found in shallow waters in the Garapan Lagoon from Puntan Muchot to Puntan Susupe. These beds exist along the shoreline approximately 5 meters from the mean tide line into the lagoon and approximately 200 meters from the shoreline.

Rich coral on the outside barrier reef provides a habitat for adult stages of the various reef fishes. Seagrass beds in shallow near-shore waters provide the habitat for the juvenile stage of the same fishes. Adults bear their young in these thick seagrass beds in order to provide them protection. When the juveniles grow to adult size they migrate to the coral habitat at the edge of the barrier reef and eventually into deeper water.

B. OBJECTIVES FOR IMPORTANT HABITATS MANAGEMENT PLAN ELEMENT

The intent of this PLAN is to prepare a management plan for mangrove stands and selected patch reefs and to prepare legislation which protects these specific areas.

Mangrove forests, selected patch reefs, seagrass beds and the coral reefs designated for this purpose represent important habitats in that they are breeding grounds for a variety of marine and terrestrial wildlife. For this unique reason, these habitats need protection to prevent their destruction. This is particularly true in the Saipan Lagoon which has only three small mangrove stands (two located at the American Memorial Park and one near the Commercial Port), limited patch reefs, seagrass beds and coral reefs in close proximity to land.

The proposed Plan identifies the need to protect these resources through legislation, preserve the resource through a management plan and monitor the resource through an on-going monitoring program within the framework of existing CNMI government agencies.

The specific parts of legislation for protecting important habitats are listed below:

* Develop an act to protect Mangrove stands and patch reefs.
* Identify the lead agency in conjunction with supporting agencies (DEQ, CRMO, and Division of Fish and Wildlife) to provide supporting evidence in the legislative process.
* Obtain the support of Federal Government Agencies (ACOE, US Fish and Wildlife Service, US EPA and others).
* Develop memorandums of understanding between governmental concerns.

Important habitats within the PLAN area are depicted on Figure XVIII-2.

Mangrove forests, selected patch reefs, seagrass beds and the coral reefs designated for this purpose represent critical habitats in that they are breeding grounds for a variety of marine and terrestrial wildlife. For this unique reason, these habitats need protection to prevent their destruction. This is particularly true in the Saipan Lagoon which has only three small mangrove stands (two located at the American Memorial Park and one near the Commercial Port), limited patch reefs, seagrass beds and coral reefs in close approximately to land for tourists to dive at.

The proposed Plan identifies the need to protect these resources through legislation, preserve the resource through a management plan and monitor the resource through an on-going monitoring program within the framework of existing CNMI government agencies.

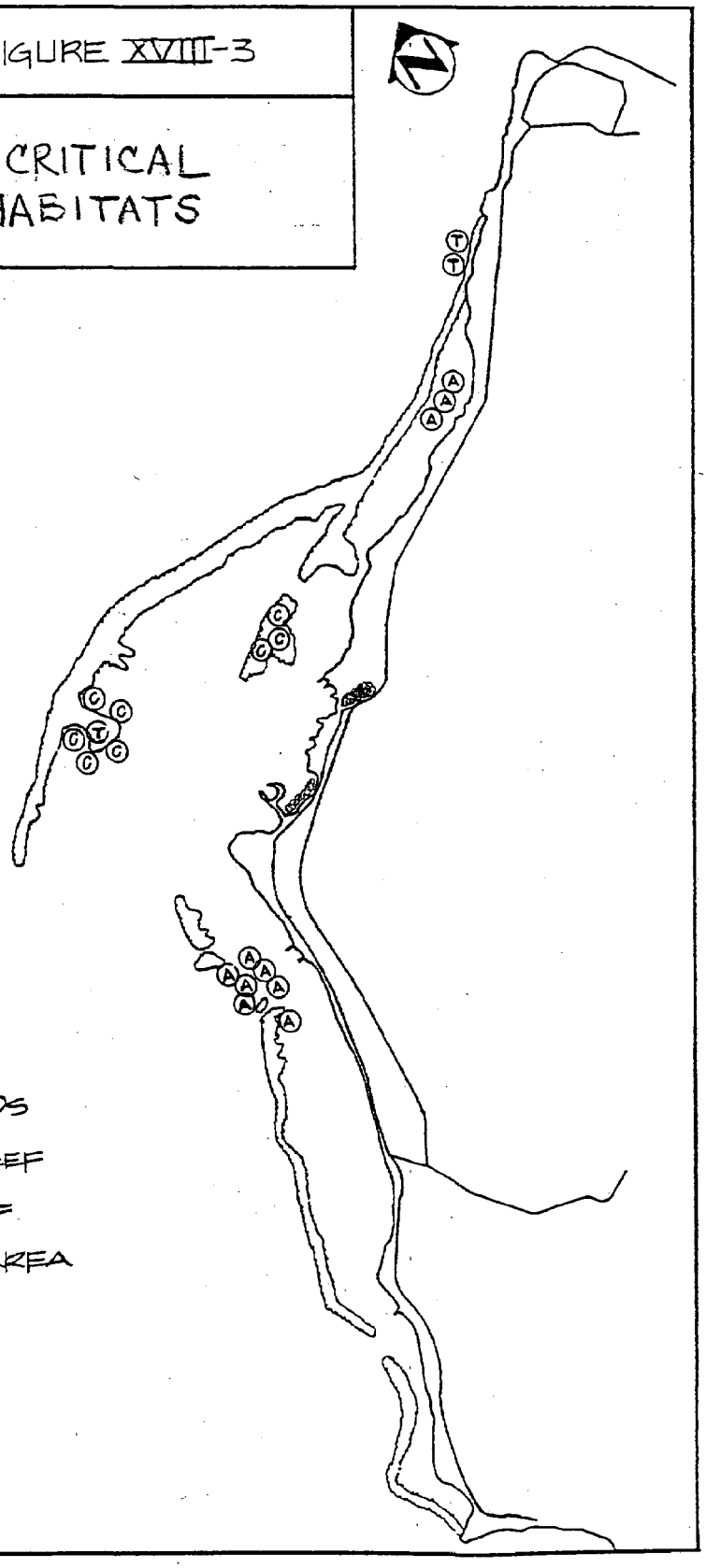
The specific parts of legislation for protecting critical habitats are listed below:

* Develop an act to protect Mangrove stands and patch reefs as rare, threatened and endangered habitats.
* Identify the lead agency in conjunction with supporting agencies (DEQ, CRMO, and Division of Fish and Wildlife) to provide supporting evidence in the legislative process of declaring these areas as critical habitats.
* Obtain the support of Federal Government Agencies (ACOE, US Fish and Wildlife Service, US EPA and others).
* Develop memorandums of understanding between governmental concerns.

Critical habitats within the PLAN area are depicted on Figure XVIII-3.

FIGURE XVIII-3

CRITICAL HABITATS



LEGEND:

- MANGROVE STANDS
- Ⓐ Acropora PATCH REEF
- Ⓒ CORAL PATCH REEF
- Ⓣ TURTLE NESTING AREA

CHAPTER XIX - IMPORTANT HABITATS MANAGEMENT PLAN

A. LEGISLATION FOR THE PROTECTION OF IMPORTANT HABITATS

Exhibit XIX-1 presents proposed legislation to protect important habitats.

EXHIBIT XIX-1
AN ACT TO PROTECT IMPORTANT HABITATS

Commonwealth of the Northern Mariana Islands
Department of Natural Resources

The Department of Natural Resources in conformity with and pursuant to CNMI statutes, and every other law hereunto enabling does hereby adopt the following act for the establishment, protection and regulation of important habitats, Saipan Lagoon CNMI.

PART I

Section 1. Establishment of Important Habitats. Department of Natural Resources does hereby declare and establish the Important Habitats Zone (described in detail in Section 3 of this part).

Section 2. Purpose. It is the purpose of this regulation to preserve, protect and conserve the marine and terrestrial resources and geological factors associated within the boundaries of the zones identied in Section 3 of this part.

Section 3. Important Habitats Zone. These habitats shall include those zones, identified in the siting map (Figure XXI-1) and referenced as follows:

a. Mangrove stands at Lower Base and along Unai Sadog Tasi in the Tanapag Harbor region.

b. Potential Managaha Island Marine Park

c. *Acropora* Patch reef at the light house in Garapan Lagoon

d. *Acropora* patch reef in the vicinity of Paupau Beach.

e. Diverse coral patch reef in Central Lagoon north of Tanapag Harbor.

f. *Seagrass* beds, *Halodule uninervis* particularly, in the vicinity of Garapan Lagoon near-shore.

g. Turtle nesting sites at Wing Beach and San Antonio Beach.

PART II

Section 1. *Activities prohibited*. It shall be unlawful for any person to:

a. Fish for, take, process or remove any fish, mollusk, crustacea, or other marine or terrestrial animal within mangrove stands and associated marine environment except for subsistence purposes.

b. Take, alter, deface, destroy, possess or remove any rocks, coral, sand or other geological features or specimens.

c. Contaminate or otherwise alter the physical, chemical or biological properties of the waters, including change in temperature, taste, color, turbidity or odor thereof, or to discharge, directly or indirectly waste materials of any kind, whether treated or not and whether animal, mineral, or vegetable, and whether liquid gaseous, radioactive or solid including sewage and agriculture and industrial wastes, so as to cause said waters of these habitat zones to be reduced in quality below the established Water Quality Standards as established and amended by the Department of Environmental Quality and any amendments thereto, which are hereby incorporated herein and made a part of these regulations.

d. Construct, install, erect, or place piers, jetties, moorings, utilities or structures of any kind, or sink any type of water craft or other sizable object, or abandon any type of water craft or other sizable object, sunk

or unsunk without permission of proper governmental authority.

e. Operate, anchor or move any vessel in a manner contrary to the Rules and Regulations Governing Boating of the Dept. of Transportation, U.S. Coast Guard, and any amendments thereto, which by reference are hereby incorporated in this Regulation and made a part hereof as though fully recited herein.

Section 2. Exceptions. Notwithstanding any provision of this regulation to the contrary and except as prohibited by any other rules, regulation or law, it shall be lawful for any person to:

a. To fish for, take, possess or remove any marine life by the use of hook and line, spearfishing or trapping except for subsistance purposes. There shall be absolutely no dynamiting or cloroxing as a method for fishing.

b. Take, for scientific, propagation, or other purposes except as approved by the Department of Natural Resources, Division of Fish and Wildlife thereof any fish, corals, mollusks, crustacea and other form of marine animal.

Section 3. Penalty. Any person violating the provision of this regulation shall be fined not more than $500 or imprisoned not more than 90 days or both.

B. IMPORTANT HABITATS MANAGEMENT PLANS

Concurrent with establishing legislation for the protection of mangrove stands and selected patch reefs, it is necessary to develop a Management Plan to ensure their protection in the future. The purposes of this Management Plan are to:

* Maintain the ecological balance;
* Protect fish nursery and stock;
* Provide habitat for selected species;
* Provide protection of Saipan's only Mangrove stands for the sake of education and research;

* Establish standards for the protection and further propagation of mangrove stands in the Saipan Lagoon; and
* Maintain selected patch reefs and seagrass beds for the propagation of such species.

The Plan to manage important habitats for coral patch reefs, mangrove stands and seagrass beds, follows.

* Designate these habitats by legislation
* Designate the Department of Natural Resources as the lead agency, with the Department of Fish and Wildlife as the subordinate agency for monitoring purposes.
* Monitor these habitats on a regular basis to to ensure their protection.
* Levy a penalty for any violations or infractions.

PART SIX
ENERGY FACILITIES PLAN ELEMENT

CHAPTER XX - SITING CRITERIA FOR ENERGY FACILITIES

A. SYNOPSIS OF DATA ANALYSES FROM VOLUME I AND IDENTIFICATION OF PROBLEMS

Volume I of the PLAN outlines the general and specific energy related facilities on Saipan, all of which are located within the Tanapag Harbor Planning Area except for privately owned, back-up equipment (Refer to Volume I, Part B, Chapters II. 2a and VIII. 4). Within this planning area is the 28.8 MW power plant with 10.3 MW back-up generators, pipelines between the Mobil Bulk Oil Plant and DPW Fuel Storage area at Charlie Dock, and the power plant shop bunkering pipelines at Charlie and Baker Docks.

Electrical generating equipment on Saipan barely meets current energy demand. In 1981 peak load was estimated at 15.4 MW and the baseload at 11.6 MW. Old and inefficient equipment and breakdowns account for the short-comings.

Energy users on Saipan have been enjoying a substantial energy subsidy over the years and do not pay their share for energy consumption. The 1982 production cost of electricity (most recent accurate data available) was $.12/kwh. Until 1976, only $.03/kwh was charged to all consumers. Since then, rates have been charged at $.06/kwh for 0-2000 kwh/month, $.07/kwh for 2001-25,000kwh/month, and $.08/kwh for more than 25,000 kwh/month. This rate structure does not meet the $.12/kwh cost of production. In addition, the CNMI Government does not pay for its consumption, and the old TTPI Government pays a flat rate of $400,000 per year. The effective net result of revenue derived from energy consumers in the CNMI is $.02/kwh, or nearly six times less than the 1982 estimated cost of production.

Rising energy costs are also a problem in the CNMI. Continued, increased federal funding is the only way in which the CNMI Government can keep pace with the rising cost of energy production in its oil-based energy dependent society. Besides the economic problems inherent in this situation, other special problems exist, especially if the oil supply were to be depleted or if prices rise dramatically. Both of these situations would stress an already fragile relationship between the energy suppliers and users.

B. OBJECTIVES FOR ENERGY FACILITIES SITING CRITERIA

The primary objective of the energy facilities siting criteria is to determine the elements that should be examined for expansion of existing as well as the development of new energy facilities. Primary elements include physical/environmental as well as social aspects, such as proximity of generating and distributing facilities to residences.

C. SITING CRITERIA

It is important to understand the impacts that can be reasonably anticipated by new or expanding energy development in the PLAN area so that it is possible to invoke mitigation measures by intelligently anticipating the cumulative effects of these impacts. These mitigating measures will lead to more appropriate siting of the facilities and result in less impact on the physical and social environment.

Siting criteria require that the following elements be examined closely.

Physical/Environmental

* Resource requirements
* Water, land and air pollution

Social

* Proximity to residences
* Visual and noise pollution

Within these elements the siting criteria are divided into general and specific aspects for two energy sources: conventional oil and alternate sources (i.e. coal, biomass, and solar salt-gradient ponds).

1. Conventional Oil Fired Energy Facilities Siting Criteria

   * Locate in proximity to a water source (ocean, lagoon) for cooling water supply.

     - Development of a surface cooling water source.
     - Development of a deep water (60 ft. minimum) disposal site for heated effluent.

* Locate in proximity to commercial port for easy transmission of fuel.

* Locate in central proximity to consumers.

* Minimize pollution (air, water, noise, land) on the environment.

2. Coal Fired Energy Facilities Siting Criteria

* Adequate, adjacent land to existing power plant for

  - Expansion of existing facility to accommodate a coal fired plant.

  - Coal stockpiling

* Locate in proximity to commercial port for coal transshipment to energy facility.

* All other issues stated for conventional oil fired energy facility.

3. Biomass Fueled Energy Facilities Siting Criteria

* Adequate, adjacent land to existing energy facility for a biomass conversion plant.

* Proximity to biomass source (residential or business customers) or adequate transportation of fuel feedstock to energy facility.

4. Solar Salt Gradient Energy Facilities Siting Criteria

* Adequate land (2 ha plots), flat and none permeable.

* Shallow lagoon (2 ha plots) which can be bermed for protection.

* Proximity to distribution system for easy connection.

* Protection from inundation by extreme tidal fluctuation or heavy rains.

PART SEVEN
IMPLEMENTATION PLAN ELEMENT

CHAPTER XXI - SUMMARY OF PLAN RECOMMENDATIONS

The purposes of Plan Element Seven are to recap the recommended Plans presented in Plan Elements Two through Six and to present the administrative, financial and legal requirements for implementing each Plan. Also, this Plan Element identifies issues of national significance that relate to the implementation of this SAIPAN LAGOON USE MANAGEMENT PLAN as well as a general assessment of the proposed PLAN's impact on the Saipan community.

Table XXI-1 categories the PLAN recommendations with respect to the following implementation requirements.

Agency with administrative purview over recommendations
- Coastal Resources Management Office
- Zoning Administration Office
- Department of Public Works
- Department of Natural Resources
- Department of Public Health and Environmental Services
- Department of Parks and Recreation

Financial
- Executive Branch Operating Budget
- Capital Improvements Project Budget

Legal
- Public Law for Enactment
- Public Law for Appropriation
- Regulations

TABLE XXI-1
IMPLEMENTATION REQUIREMENTS FOR
PLAN RECOMMENDATIONS

REFERENCE EXHIBIT (E) No. FIGURE (F) No. SECTIONS (S)		PLAN RECOMMENDATIONS (SHORT TITLE)	ADMINISTRATIVE (LEAD AGENCY)	FINANCIAL	LEGAL
(S)	IV.B	Zones and Land Use District Act of CNMI	Zoning Administration Office	Executive Branch Operating Budget	Public Law for Enactment
(S)	IV.B.1	Amendment to Section 9 of Zones and Land Use District	Zoning Administration Office	NA	Public Law to amend Act
(S)	IV.B.2	Expansion of Village Zone of San Antonio-Zones and Land Use District Act	Zoning Administration Office	NA	Public Law to amend Act
(S)	IV.B.3	Paupau Resort Zone in Northern Saipan-Zones and Land Use District Act	Zoning Administration Office	NA	Public Law to amend Act
(E)	V-1	Shoreline Setbacks	Coastal Resources Management Office	NA	Regulations
(T)	V-1	Property Setbacks, Structure Heights and Densities	Zoning Administration Office	NA	Regulations
(E)	V-2	Lot Coverage for Commercial and Resort Zones	Zoning Administration Office	NA	Regulations
(E)	V-3	Setback and Height Regulations for Commercial and Resort Zones	Zoning Administration Office	NA	Regulations
(E)	V-4	Shoreline Fencing Regulations	Coastal Resources Management Office	NA	Regulations
(E)	VI-1	Landscaping Guidelines	Zoning Administration Office	Executive Branch Operating Budget	Appropriation
(E)	VI-1	Regulations for Dredging Diking and Landfilling along Coastal Areas	Coastal Resources Management Office	NA	Regulations

(E)	VI-2	Regulations for Structures located on Near Shore and Beach Strand Ecological Zones	Coastal Resources Management Office	NA	Regulations
(E)	VI-3	Regulations for Mining along Coastal Strand	Coastal Resources Management Office	NA	Regulations
(S)	VI.E	Beach and Shoreline Restoration	Department of Public Works	CIP Budget	Appropriation
(T)	VII.B.1	Shoreline Water Facilities Planning	Department of Public Works	Executive Branch Operating Budget	Appropriation
(S)	VII.B.2	Groundwater Management Task Force	Department of Public Health and Environmental Services	NA	NA
(S)	VII.C.1	Shoreline Wastewater Facilities Planning	Department of Public Works	CIP Budget	Appropriation
(S)	VII.D.1	Storm Drainage Design Criteria	Department of Public Works	Executive Branch Operating Budget	Appropriation
(S)	VII.E	Planning Criteria for Evaluating Development Impacts	Coastal Resources Management Office	NA	NA
(S)	IX.B	Recreation Use Zones for Saipan Lagoon	Department of Parks and Recreation	Executive Branch Operating Budget	Appropriation
(S)	IX.B.5	Water Recreation Advisory Board	Coastal Resources Management Office	NA	NA
(S)	IX.C	Water Safety Information Program	Department of Parks and Recreation	Executive Branch Operating Budget	Appropriation
(S)	X.B	Hazards Removal Plan	Department of Parks and Recreation	CIP Budget	Appropriation
(S)	X.D	Marine Nuisance Abatement Plan	Department of Natural Resources	Executive Branch Operating Budget	Appropriation
(S)	XII.B	Saipan Outdoor Recreation Plan	Department of Parks and Recreation	Executive Branch Operating Budget	Appropriation
(T)	XIII-2	Improvements for Village Parks and Playgrounds	Department of Public Works	CIP Budget	Appropriation
(T)	XIII-4	Improvements for Beach Parks - Natural	Department of Public Works	CIP Budget	Appropriation

(T) XIII-5	Improvements for Beach Parks - Developed	Department of Public Works	CIP Budget	Appropriation
(S) XIV.B	Afetna Beach Park Improvements	Department of Public Works	CIP Budget	Appropriation
(F) XV-7	Bicycle Route Improvements	Department of Public Works	CIP Budget	Appropriation
(T) XVI-1	Recreation Facilities and Maintenance Schedule	Department of Public Works	NA	NA
(S) XIX.B	Soil Erosion and Sedimentation Control Technical Manual	Department of Public Health and Environmental Services	Executive Branch Operating Budget	Appropriation
(E) XIX-1	Critical Habitats Protection Act	Department of Natural Resources	NA	Public Law for Enactment
(S) XIX.B	Critical Habitats Management Plans	Department of Natural	NA	NA

CHAPTER XXII - ADMINISTRATIVE, FINANCIAL AND LEGAL REQUIREMENTS FOR IMPLEMENTATION OF PLANS

The primary responsibilities for implementing this PLAN fall to the following agencies of the Government of the Northern Marianas Islands.

- Coastal Resources Management Office
- Zoning Administration Office (as proposed by legislation now under consideration by the CNMI Legislature)
- Department of Public Works
- Department of Natural Resources
- Department of Public Health and Environmental Services
- Department of Parks and Recreation

Their respective roles for implementing this PLAN are outlined in the following sections of this Chapter.

A. COASTAL RESOURCES MANAGEMENT OFFICE

The responsibilities of CRMO are two-fold with respect to implementing the SAIPAN LAGOON USE MANAGEMENT PLAN. First, as the PLAN's lead agency, CRMO must serve as the Government's primary advocate for implementation. This involves coordinating the various responsibilities for implementation among the respective agencies; helping to resolve the inevitable conflicts that arise among the public, the Executive Branch and the Legislative Branch as implementation takes place; providing financial grant support, wherever possible, to other agencies with administrative responsibilities for implementing aspects of this PLAN; and serving as the spokes-agency for promoting the public benefits and economic growth that evolve from properly managing the Lagoon's resources and from coastal resources planning in general.

The second CRMO responsibility for implementing this PLAN pertains to those particular plans for which the agency has administrative purview to implement. Those plans are extrapolated in Table XXII-1, along with their respective financial and legal requirements for implementation.

The present administrative purview of CRMO could conceivably embrace other PLAN recommendations by virtue of the agency's permitting authority and wide-ranging influence in land use development and lagoon resource management matters. However, this PLAN recommends that only those recommendations pertaining exclusively to shoreline management (e.g., near-shore and beach strand development, etc.) and interagency coordination (e.g., the Water Recreation Agency Board) be assigned to CRMO. Other

agencies with more clearly designated authority for such programs as recreation resources planning, stormwater drainage, erosion control and land use regulations are assigned to those types of plans. One possible exception to this recommended assignment of administrative responsibility involves those plans assigned to the Zoning Administration Office. In the event that such an Office is not yet created by legislation, which is now under consideration by the Legislature, CRMO should assume that proposed Office's responsibilities until such time as the Zoning and Land Use District Act is passed and operational.

TABLE XXI-1

FINANCIAL AND LEGAL REQUIREMENTS FOR IMPLEMENTING PLANS UNDER THE ADMINISTRATIVE PURVIEW OF CRMO

Plan (Short Title and Reference)	Financial Requirements	Legal Requirements
1) Shoreline Setbacks (E) V-1	None required	Promulgate the recommended Regulations
2) Shoreline Fencing (E) V-4	None required	Promulgate the recommended Regulations
3) Diking and Landfilling along Coastal Areas (E) VI-2	None required	Promulgate the recommended Regulations
4) Structures located on Near-Shore and Beach Strand Ecological Zones (E) VI-2	None required	Promulgate the recommended Regulations
5) Mining along Coastal Strand (E) VI-3	None required	Promulgate the recommended Regulations
6) Planning Criteria for Evaluating Development Impacts (S) VIII.E	None required	None required
7) Water Recreation Advisory Board (S) IX.B.5	None required	None required

B. ZONING ADMINISTRATION OFFICE

The Zoning Administration Office was proposed in 1983 by the CNMI Zoning and Land Use Districts Act as the agency to administer the Commonwealth's zoning and land use districts program. Several of the PLAN's recommendations are direct adjuncts to that program and, therefore, should be within the administrative purview of that Office for implementation. Those plans are extrapolated in Table XXII - 2.

It should be noted that the proposed organizational and annual operating budget ($150,000) for the office was previously recommended by the Government as part of its zoning and land use districting program. That operational budget is not included as part to this PLAN's implementation requirements.

C. DEPARTMENT OF PUBLIC WORKS

As the Governments' primary contracting and infrastructure maintenance agency, Public Works has a major responsibility for this PLAN's design, construction and maintenance recommendations. Of course, Public Works must rely on the expertise of other agencies, especially CRMO, Natural Resources and the Division of Environmental Quality in making the final determination for planning data analysis, scopes of work, and construction alternatives for many of these projects.

The Public Works PLAN implementation responsibilities are presented in Table XXII-3.

TABLE XXII-2

FINANCIAL AND LEGAL REQUIREMENTS
FOR IMPLEMENTING PLANS UNDER THE
ADMINISTRATIVE PURVIEW OF THE
ZONING ADMINISTRATION OFFICE

Plan (Short Title and Reference)		Financial Requirements	Legal Requirements
1)	Zones and Land Use Districts Act of CNMI (S) IV.B	None required (see section B, this chapter)	Enactment of the proposed Act
2)	Amendment to Section of Zones and Land Use Districts Act (S) IV.B.1	None required	Public Law to amend Act
3)	Expansion of Village Zone, San Antonio-Zones and Land Use Districts Act (S) IV.B.2	None required	Public Law to amend Act
4)	Paupau Resort Zone in Northern Saipan-Zones and Land Use Districts Act (S) IV.B.3	None required	Public Law to amend Act
5)	Property Setbacks, Structure Heights and Densities (T) V-1	See item #8, below	Promulgate the recommended Regulations
6)	Lot Coverage for Commercial and Resort Zones (E) V-2	See item #8, below	Promulgate the recommended Regulations
7)	Setback and Height Regulations for Commercial and Resort Zones (E) V-3	See item #8, below	Promulgate the recommended Regulations
8)	Landscaping Guidelines	$2,000 for staff expenses and printing costs	None required

TABLE XXII - 3

FINANCIAL AND LEGAL REQUIREMENTS
FOR IMPLEMENTING PLANS UNDER
THE ADMINISTRATIVE PURVIEW OF
PUBLIC WORKS

Plan (Short Title and Reference)	Financial Requirements	Legal Requirements
1) Beach and Shoreline Restoration Plan (S) VI.E	$1,600,000 for design and construction	CIP Appropriation
2) Shoreline Water Facilities Planning (T) VII.B.1	$85,000 for consultant services	Executive Branch Operating Budget Appropriation
3) Shoreline Wastewater Facilities Planning (S) VII.C.1	$40,000 for consultant services	Executive Branch Operating Budget Appropriation
4) Storm Drainage Design Criteria Manual (S) VII.D.1	$60,000 for consultant services	Executive Branch Operating Budget Appropriation
5) Hazards Removal Plan (S) X.B	$100,000 for contractual services	Executive Branch Operating Budget Appropriation
6) Improvements for Village Parks and Playgrounds (T) XIII-2	See item #8, below, plus $16,800 for construction	CIP Appropriation
7) Improvements for Beach Parks - Natural (T) XIII-4	See item #8 below, plus $7,800 for construction	CIP Appropriation

8)	Improvements for Beach Parks-Developed (T) XIII-5	$10,000 for design of improvements for items #6, #7 and #8, plus $66,000 for construction	CIP Appropriation
9)	Afetna Beach Park Improvements (S) XIV.B	$10,000 for design, plus $70,000 for construction	CIP Appropriation
10)	Bicycle Route (E) XV-7	$25,000 for preliminary engineering	CIP Appropriation
11)	Recreation Facilities and Maintenance Schedule (T) XVI-1	To be determined by Public Works	Executive Branch Operating Budget Appropriation

D. DEPARTMENT OF NATURAL RESOURCES

The Department of Natural Resources has prime responsibility for urging the enactment of the proposed Act to protects habitats for rare, threatened and endangered species within the Saipan Lagoon project area and for implementing a program for marine nuisance abatement.

The plans are highlighted in Table XXII-4.

E. DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENTAL SERVICES

This Department's responsibilities accrue from the program authority of its Division of Environmental Quality (DEQ). Many of DEQ's programs already affect the Lagoon; however, only two plans have been recommended for DEQ to improve the management of the Lagoon uses. They are support for the recently developed Groundwater Management Task Force and the preparation of technical manual to guide design and construction solutions for complying with Saipan's soil erosion and sedimentation control regulations.

DEQ also has a secondary role in the implementation of the SAIPAN LAGOON USE MANAGEMENT PLAN. As the Government's watchdog over the quality of the Commonwealth's marine waters, fresh waters and terrestrial resources, DEQ must be included as an official advisor to virtually every

recommendation of this PLAN which impacts on the environment.

The primary PLAN implementation responsibilities of DEQ are presented in Table XXII-5.

F. DEPARTMENT OF PARKS AND RECREATION

By virtue of the Lagoon's many recreation resources, this Department has administrative authority over water recreational areas, as highlighted in Table XXII-6.

TABLE XXII - 4

FINANCIAL AND LEGAL REQUIREMENTS
FOR IMPLEMENTING PLANS UNDER
THE ADMINISTRATIVE PURVIEW OF
THE DEPARTMENT OF NATURAL RESOURCES

Plan (Short Title Reference)	Financial Requirements	Legal Requirements
1) Marine Nuisance Abatement Plan (S) X.D	$4,000 for staff, materials and equipment	Executive Branch Operating Budget Appropriation
2) Important Habitats Protection Act (E) XIX-1	None required	Enactment of the proposed Act
3) Important Habitats Management Plan (S) XXI.B	None required	None required

TABLE XXII - 5
FINANCIAL AND LEGAL REQUIREMENTS
FOR IMPLEMENTING PLANS UNDER
THE ADMINISTRATIVE PURVIEW OF
THE DEPARTMENT OF PUBLIC HEALTH AND
ENVIRONMENTAL SERVICES, DIVISION OF
ENVIRONMENTAL QUALITY

Plan (Short Title and Reference)	Financial Requirements	Legal Requirements
1) Groundwater Management Task Force (S) VII.B.2	None required	None required
2) Soil Erosion and Sedimentation Control Technical Manual (S) XIX.B	$15,000 for consultant services	Executive Branch Operating Budget Appropriation

TABLE XXII - 6
FINANCIAL AND LEGAL REQUIREMENTS
FOR IMPLEMENTING PLANS UNDER THE
ADMINISTRATIVE PURVIEW OF
PARKS AND RECREATION

Plan (Short Title and Reference	Financial Requirements	Legal Requirements
1) Water Safety Information Program (S) IX.C	$6,000 for producing materials	Executive Branch Operating Budget Appropriation
2) Recreation Use Zones for Saipan Lagoon (S) IX.B	$8,750 for printing public education materials and erecting signs	Executive Branch Operating Budget Appropriation
3) Saipan Outdoor Recreation Plan (S) IX.B	$50,000 for consultant services	Executive Branch Operating Budget Appropriation

CHAPTER XXIII - IMPACT ASSESSMENT OF SAIPAN LAGOON USE MANAGEMENT PLAN

The recommendations of every proposed plan should be evaluated in order to assess the positive and negative impacts that can be anticipated. Obviously, the positive impacts must be found to outweigh the negative, or else the plan fails to advance the likelihood of resolving those conflicts and problems that it was to address.

The inherent methodology for formulating this SAIPAN LAGOON USE MANAGEMENT PLAN was designed to assure that it would produce predominatly positive impacts. By convening SALAPAT representatives of the public agencies and private organizations who have resource protection and economic development responsibilities for the PLAN area, the thrust of this master planning was directed towards identifying problems and recommending improvement plans which promote positive changes for all concerned.

While it is impossible to predict, in detail, all of the impacts that may occur from this PLAN, the general ramifications can be isolated. On the negative side, there are basically two: slightly increased costs of public and private development as a result of mandatory compliance to certain new design, pre-construction and construction regulations which protect the Lagoon environment; and reasonable, but nonetheless unprecedented, restrictions on some uses of private properties.

More specifically, increased development costs are to be expected when plans for development along the coastline are challenged by regulations which set limits on construction activities and require additional steps of review and approval before permits are issued. Such procedures are generally decried as "red tape" which accomplish nothing but more headaches and unnecessary costs for developers. While the regulations, etc. proposed by this PLAN are deemed reasonable and requisite to protecting that which makes the Saipan Lagoon one of the Commonwealth's most treasured resources, the Government must always be on the watch for signs which may indicate that its protectiveness is too restrictive and, consequently, self-defeating in the end.

The loss of some private property rights as a result of land-use zoning is an inevitable result of increased development pressures of an urbanizing community. This impact is unusually harsh to those traditional and community property rights which have existed for generations on Saipan. In the final analysis, however, when a government is expected to provide for the health and safety of its residents, some means of organizing the various land uses

becomes necessary in order to achieve a reasonable scale of economy and efficiency.

Because this PLAN proposes strict controls over development within the Lagoon and along its shoreline in addition to supporting the zoning and land use districting legislation now under consideration by the Government, it is reasonable to anticipate that both increased development costs as well as some restriction of traditional property rights will result.

On the positive side of anticipated impacts, this PLAN will create three primary benefits. First, the PLAN serves to enhance tourism as the Commonwealth's keystone to economic progress. By providing for tourist-oriented recreation opportunities within the lagoon waters and along the beach, tourist satisfaction is fostered. By providing for additional hotel development opportunities and supporting infrastructure plans, positive growth for the tourism industry is accommodated for the future.

Second, the Lagoon's natural resources are given additional protection for enjoyment by future generations. The proposed programs, regulations and laws for protecting marine water quality, beach sand, and critical habitats for rare, threatened and endangered species, collectively insure these resources against the inevitable onslaught of development pressures. Because it is not too late to preserve much of the Lagoon's pristine quality, today's children will be able to pass along this environmental legacy to their progeny.

Third, more public recreation opportunities are provided for Saipan residents. Parks, playgrounds and water recreation sports are enjoyed by the whole of Saipan's population; and the PLAN's recommendations would multiply the existing resources by severalfold. The Lagoon is meant for the people of Saipan: beach parks, fishing, swimming and boating are indigenous activities and amply provided for by this PLAN.

VOLUME III

SAIPAN LAGOON USE MANAGEMENT PLAN

FINAL DRAFT

VOLUME III

LAGOON AND SHORELINE USE MANAGEMENT PLAN

Prepared for
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