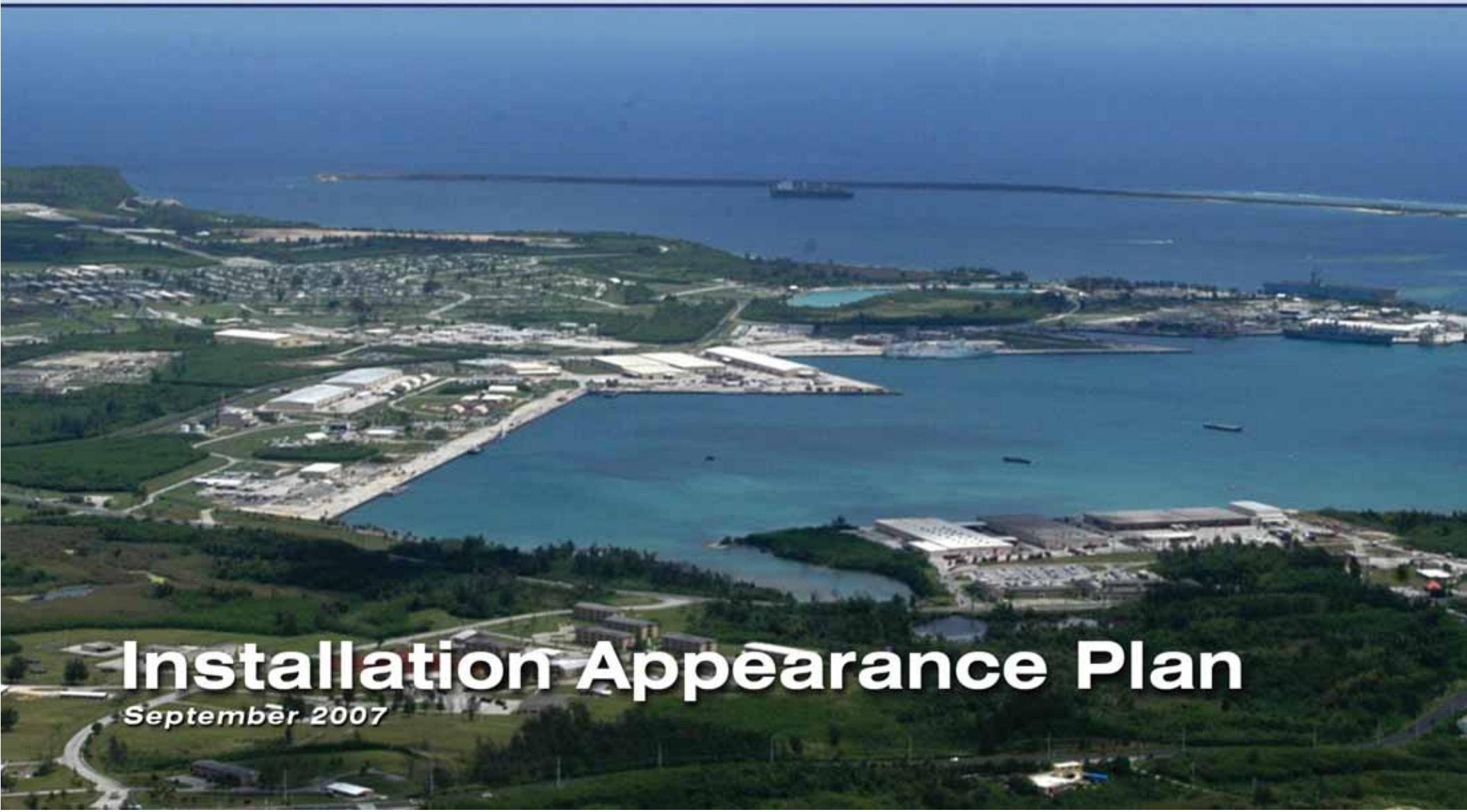
COMMANDER
U.S. NAVAL FORCES MARIANAS



Installation Appearance Plan

September 2007

DEPARTMENT OF THE NAVY
Naval Facilities Command, Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134

11010
Ser BD12/ 836
03 OCT 2007

From: Commander, Naval Facilities Engineering Command, Pacific

Subj: COMNAVMARIANAS INSTALLATION APPEARANCE PLAN

Encl: (1) Final COMNAVMARIANAS Installation Appearance Plan of Sep 2007

1. We are forwarding the final COMNAVMARIANAS Installation Appearance Plan as enclosure (1) for your use.

2. Review comments on a draft report of April 2007 have been addressed and incorporated as appropriate.

WESLEY ISHIZU
By direction

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Commander, U.S. Naval Forces Marianas

Installation Appearance Plan

Prepared with oversight of:
Commander
Naval Facilities Engineering Command, Pacific
Pearl Harbor, Hawaii

September 2007

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LIST OF ACRONYMS

AAFB	Andersen Air Force Base
AASHTO	American Association of State Highway and Transportation Officials
AD	Anno Domini
ADA	Americans with Disabilities
ADAAG	Americans with Disabilities Act Architectural Guidelines
AT/FP	Anti-Terrorism/Force Protection
BC	Before Christ
BMP	Best Management Practices
BOS	Base Operation Service
BQ	Bachelor Quarters
CFR	Code of Federal Registration
CMU	Concrete Masonry Unit
COMNAVMAR	Commander, Naval Forces Marianas
CRI	Color Rendering Index
DeCA	Defense Commissary Agency
DoD	Department of Defense
DoDEA	Department of Defense Education Agency
EFS	Exterior Finish System
FACD	Functional Analysis Concept Development
IAP	Installation Appearance Plan
IDQ	Indefinite Quantity Contracts
in	Inch
INRMP	Integrated Natural Resources Management Plan
ISA	International Society of Arboriculture
KV	Kilovolt
LEED	Leadership in Energy and Environmental Design
M	Meter
MAP	Maintenance Action Plan
MILCON	Military Construction
mm	Millimeter
MPH	Miles per Hour
MRACS	Marianas Region Architectural & Construction Standards
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
MWR	Morale, Welfare and Recreation
NAVHOSP	Naval Hospital Guam
NAVMAG	Ordnance Annex
NCTS	Naval Computer and Telecommunications Station
NEX	Naval Exchange
POL	Petroleum, oil and lubricant
PVC	Polyvinyl Chloride (pipe)
QOL	Quality of Life
RHW	Radiological Hazard Warning
RICRMP	Regional Integrated Cultural Resources Management Plan
ROM	Rough Order of Magnitude
RSIP	Regional Shore Infrastructure Planning
SST	Stainless Steel
U.S.	United States

UFAS	Uniform Federal Accessibility Standards
UFC	Unified Facilities Criteria
USDA	U.S. Department of Agriculture
USGBC	U.S. Green Building Council
UV	Ultraviolet
WWII	World War II
WWTP	Wastewater Treatment Plant

Executive Summary

EXECUTIVE SUMMARY

INTRODUCTION

Installation appearance is an important element in providing the highest quality working and living environment for Navy personnel. Quality base appearance sends a strong positive message and demonstrates pride and professionalism to all personnel residing at or visiting Navy Region Marianas.

To ensure quality base appearance service-wide, the Navy has issued the following documents: the *Commander, U.S. Pacific Fleet (COMPACFLT) Facilities Excellence Guide* (2002) provides general appearance guidance. This *Commander U.S. Naval Forces Marianas (COMNAVMAR) Installation Appearance Plan (IAP)* provides guidance tailored to Guam's unique island history and environment.

The IAP is comprised of an introductory discussion of objectives, study area, existing conditions, historical background, sustainability, and the installation architectural theme. Five chapters contain design guides and a final chapter presents an implementation plan.

DESIGN GUIDES

Design Guides provide recommendations for new projects, renovations, and maintenance to ensure a unified look throughout the installation, and are intended to be used by COMNAVMAR staff and contractors.

Design Guide chapters establish consistent standards for:

- Site Design
- Architecture
- Building Color
- Landscaping
- Site Elements

IMPLEMENTATION

The implementation chapter addresses the application of the Design Guides through an IAP Review Process, funding sources for base appearance improvements, and proposed base appearance projects.

All projects are subject to applicable Design Guides. A structured review process with a qualified IAP Review Team will be important to improving base appearance consistency and quality.

A project hierarchy is used to prioritize project implementation based upon their potential to improve base appearance in highly visible areas. The recommended priority projects for COMNAVMAR are all located at Naval Base where they have the most impact. These projects include:

- Marine Drive Improvements
- Visitor Orientation Area
- Waterfront Arrival Area
- Community Support Pathways
- Polaris Point Gate Improvements
- Exchange Road Improvements
- Marine Drive Improvements
- NEX Entrance Improvements
- Commissary Improvements

Recommendations are also presented for smaller scale base appearance improvements throughout the Region.

CHAPTER 1: Introduction and Overview

1. INTRODUCTION AND OVERVIEW

This chapter presents the overall context for the *Commander Naval Forces Marianas (COMNAVMAR) Installation Appearance Plan (IAP)* by describing IAP goals and objectives, study area and functional districts, environmental setting, historical background, a brief overview of the installation's natural resources, views and open space, and an assessment of visual assets and liabilities.

Overall considerations and installation themes are presented to set the stage for the design guidelines *(Chapters 2-6)* and implementation projects *(Chapter 7).* Sustainability is a key consideration to all IAP efforts at COMNAVMAR, and a discussion is provided in this section on sustainability during major natural occurrences (storm/earthquake). The installation theme, "legacy of cultural diversity" is described and examples of implementation are presented.

This IAP should be used in conjunction with *Marianas Region Architectural & Construction Standards (MRACS)*.

Under development at time of this IAP publication is a COMNAVMAR Signage Plan. For this reason, the IAP refers to the soon to be released signage plan for all signage guidance. In the interim, the signage portion of the MRACS should continue to be used as guidance.

IAP OBJECTIVES

This COMNAVMAR IAP is intended to be a working document that will provide direction to improve the visual environment with positive impacts on the morale, pride, and quality of life for all who live and work at COMNAVMAR installations. The IAP also serves to preserve, protect, and educate others regarding the Region's natural and cultural resources.

The objectives of the IAP are as follow:

- Assess and document the Region's visual assets and liabilities.
- Propose specific actions to address the visual liabilities.
- Identify and strengthen formal site planning elements such as activity centers, connections, and edges.
- Improve wayfinding for installation occupants, customers, and visitors by developing and reinforcing a hierarchy of roadways and pedestrian paths, and establishing visual wayfinding elements (including a signage system).
- Develop site design, architectural design, and landscape design guidelines that address existing visual liabilities and guide future development in consideration of the unique environmental characteristics of the Region.
- Establish a process for implementing IAP design guidelines.

IAP guidelines and process shall be applied during the development, design, and review of all new construction and renovation projects in the Region.

STUDY AREA

The IAP study area consists of several non-contiguous Navy-owned lands on Guam, including Naval Base, Ordnance Annex (NAVMAG), Nimitz Hill, Naval Hospital Guam (NAVHOSP), Naval Computer and Telecommunications Station (NCTS) Finegayan, NCTS Barrigada, and fuel storage areas (Sasa Valley and Tenjo Vista) as shown on *Figure 1.1*.

IAP guidance shall apply to all Navy installations on Guam. CNIC has determined that all family housing and field training areas are specifically excluded from IAP consideration.

Naval Base

Navy operations on Guam are centered at the Naval Base at Apra Harbor, located on the southwest coast of Guam.

Most of the Naval Base is located south of the Main Gate, but some waterfront areas (Polaris Point and Echo/Delta Wharves) are accessed from roadways intersecting Marine Drive outside of the Main Gate.

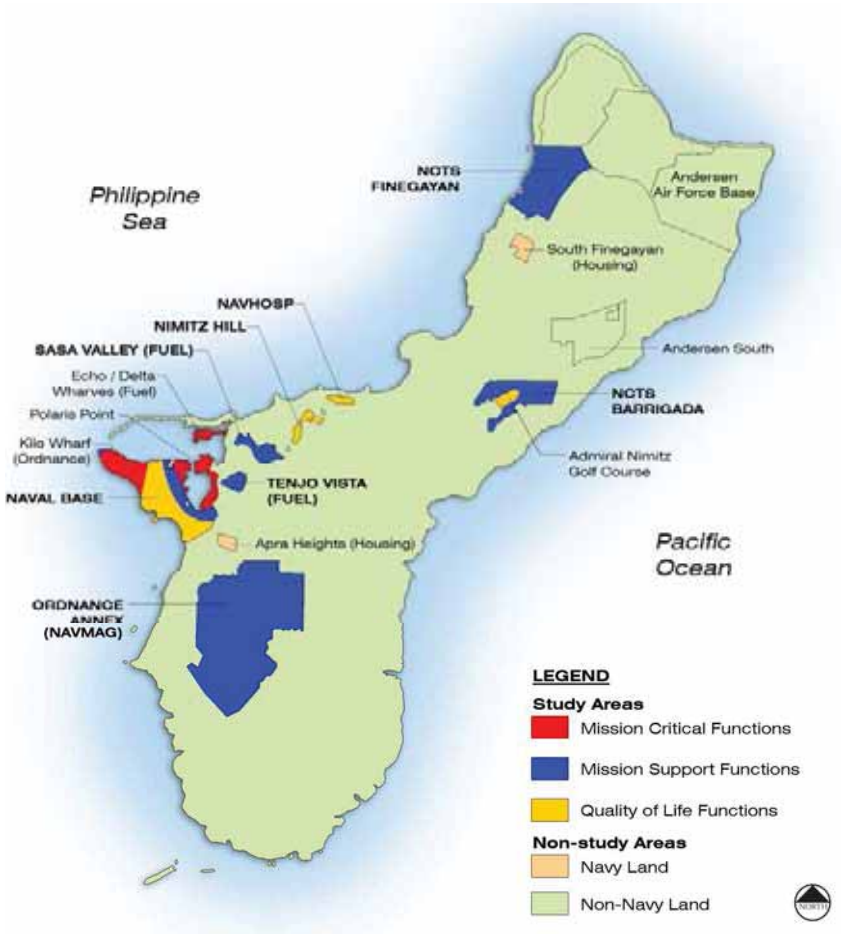


Figure 1.1 Study Area

Ordnance Annex (NAVMAG)

The Ordnance Annex is located southeast of Naval Base in Guam's mountainous inland area. Explosive safety arcs encumber most of the area. In addition to the ordnance facilities, there are bachelor housing, associated community support, and field training areas.

Nimitz Hill

Nimitz Hill is located west of the capitol city of Hagatna. The existing Department of Defense Education Agency (DoDEA) high school is located at Nimitz Hill. The remainder of the site is officer family housing and transient officer quarters.

NAVHOSP

NAVHOSP is the only Department of Defense (DoD) critical care hospital on Guam and the primary Navy healthcare provider for active duty and retired personnel. There are also enlisted and officer family housing neighborhoods and associated community support facilities at the hospital site.

The hospital is programmed for demolition and replacement at NAVHOSP. A new DoDEA high school is under construction adjacent to the hospital.

NCTS Finegayan

The Finegayan NCTS (Communications Annex) is located at the northwestern end of Guam. Andersen Air Force Base (AAFB) property is adjacent to the Annex to the north. Proposals to relocate DoD forces from Okinawa to Guam would require retention of Finegayan land and facilities.

NCTS Barrigada

The NCTS Barrigada (Communications Annex) is used primarily for Navy and other Federal high frequency transmitters. It is located at the island's only Navy golf course, the Admiral Nimitz Golf Course.

Fuel Storage: Sasa Valley and Tenjo Vista

Petroleum, oil and lubricant (POL) storage facilities of Sasa Valley and Tenjo Vista are less than 2 miles to the northeast and east, respectively, from Naval Base. Sasa Valley is located on Marine Drive with the entrance and storage tanks readily visible from the road. Tenjo Vista is accessed from a minor unmarked roadway and is not visible from Marine Drive.

FUNCTIONAL DISTRICTS

For the purposes of establishing design guidelines, facilities are categorized by function:

- ***Mission Critical*** which includes waterfront, aviation, and training facilities.
- ***Mission Support*** which includes communications, ordnance, fuels, administration, maintenance, supply/ warehousing and utilities facilities.
- ***Quality of Life (QOL)*** which include bachelor and family housing, and community support (e.g., medical, dental, recreation, education, Navy Exchange (NEX), and Commissary).

COMNAVMAR functional areas are defined in the *Regional Shore Infrastructure Planning (RSIP) Overview Plan (2001)*. Outlying areas tend to have one predominant functional use, while the Naval Base supports all three.

The ideal land use plan 1) clusters facilities of similar function and 2) provides greatest geographic separation between the "work" (Mission Critical and Mission Support) areas and "living" (QOL) areas. The three major functional areas should be visually distinguishable from each other to avoid monotony. It is especially important to those who live and work on base that their work and living areas are geographically and aesthetically distinct.

Spatial separation of land use functions at the Naval Base is generally consistent with the land use planning ideal. Mission Critical waterfront activities are located on the edges of Apra Harbor. Mission Support functions tend to be located inland of Mission Critical uses and QOL uses are generally clustered and located at the greatest distance from the Mission Critical uses.

ENVIRONMENTAL SETTING

Guam has a maritime tropical climate with daytime temperatures averaging mid-80's degrees Fahrenheit and little seasonal variation. There are two distinct seasons based on rainfall. During the wet season, between July and October, 63-66 % of the average annual rainfall occurs. The remainder of the year is the dry season, during which the mean annual rainfall is approximately 89 inches. There is considerable rainfall variation among years. Humidity during the day is generally 70%. The ambient water vapor salt content is high and corrosive.

Guam is subject to tropical depressions, storms, and typhoons. The last super typhoon which directly impacted Guam, Pongsona, occurred in 2002. Super typhoons have sustained windspeeds of 150 miles per hour or greater. An average of three tropical storms and one typhoon pass within 180 miles of Guam every year.

These environmental conditions have a direct impact facility construction, repair, and landscaping recommendations in this IAP.

HISTORICAL BACKGROUND

This historical background section is summarized from the *Regional Integrated Cultural Resources Management Plan for COMNAVREG Marianas Lands (RICRMP),* prepared in December 2005.

Island History

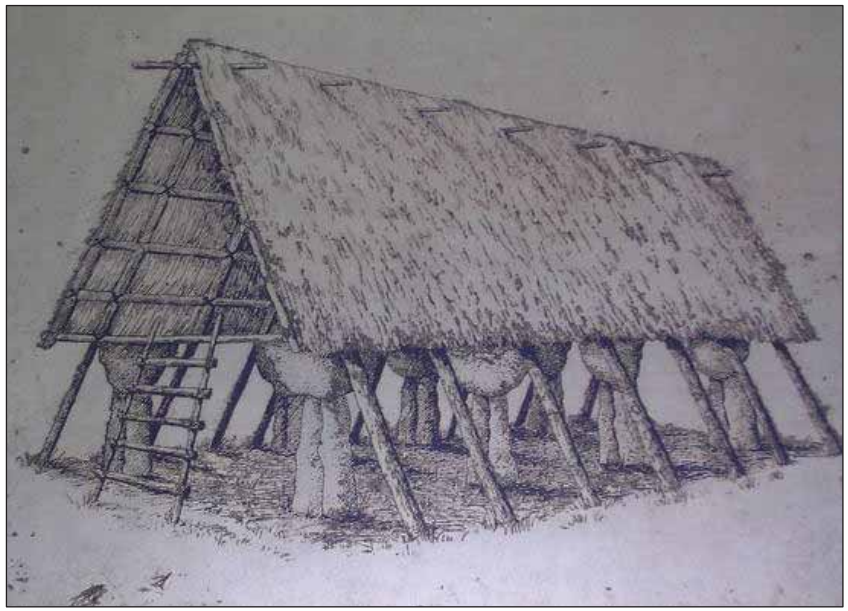
The Mariana archipelago was settled at least 3,500 years ago (1500 BC) by people sailing from the islands of Southeast Asia. The first colonists were most likely the ancestors of the people who came to be called Chamorro.

The basic historic sequence is divided between pre-Contact and post-Contact eras, defined by the first European contact in 1521 when the Mariana Islands were brought to world recognition by the Magellan expedition.

Pre-Contact Era (1500 BC to 1621 AD)

Latte stone pillars and capstones are the most obvious and prominent expression of the latter part of the Pre-Contact Era. Latte sites consist of one or more sets of latte stones. The stones are large upright shafts of limestone (rarely basalt), termed haligi, each topped by a semi-hemispherical capstone, called tasa. These pillars (varying from 50 cm to 5 m in height) were placed in two parallel rows with 6, 8, 10, or, less commonly, 12 uprights forming a single set. These stones served as foundations for house structures of varying size *(Figure 1.2).*

Villages for 100 to 1,000 people consisted of groupings of latte houses used for residences and storage, and ritual purposes. Other structures were built on the ground or on wooden latte-like supports.



source: http://www.travelpod.com

Figure 1.2 Latte Structure

Post-Contact Era (1521 AD to present)

The Post-Contact era brought much change and the impacts of this era continue to present.

The Spanish Period

By the time of Western contact, villages were established along the shorelines at the foot of each river valley. In 1670, Guam contained 180 villages, with an island population of at least 20,000.

Epidemics in 1688 and 1700 decimated the native population to less than 1,600.

In 1898, during the Spanish-American War, the United States took control of the island. More than a year later, formal American rule was established.

World War II

Limited arming of Guam by the U.S. began in 1940 and early 1941, but had not progressed far when WWII hostilities broke out. On the morning of December 8, 1941, Japanese bombardment of the lightly defended island began and ended within a few hours when the American governor surrendered. Many islanders deserted the towns for the countryside.

On the morning of July 21, 1944, the Americans came ashore at Asana and Agat, just north and south of Apra Harbor. The island was declared "secure" by U.S. forces on August 10, 1944. The U.S. transformed Apra Harbor into "Lion Six" (code name for the naval base on Guam), the largest facility west of Pearl Harbor.

Guam's status today is that of an organized, unincorporated territory of the United States.

Navy Region Marianas Cultural Resources

Guam's rich history is reflected in its remaining historic and cultural resources. The RICRMP (2005) does not identify Historic Districts[1], however, numerous historic buildings, structures[2], objects[3], or sites have been identified on Navy Region Marianas lands. Many of these facilities are considered culturally significant in that they are 1) on, 2) nominated to be listed on, 3) eligible for listing on, or 4) potentially eligible for listing on the National Register of Historic Places. Tables of significant historic properties are included in the RICRMP.

Currently, there are plans to relocate the Command Historical Exhibit that focuses on World War II, currently in Building 3268, to a building outside the Main Base entrance where it may be viewed by members of the military and the general public. A self-guided historic trail brochure (circa 1994) is available from the Public Affairs Office.

All proposed major construction and major renovation activities are reviewed during the DD1391 development process to ensure protection of significant historic facilities as described in the RICRMP. Buildings may be eligible for the National Historic Register depending on age and historic significance. Section 106 of the National Historic Protection Act provides eligibility guidance.

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[1] *"Historic District", per 36 CFR Part 60, National Register of Historic Places, defined as an area that possesses a significant concentration, linkage or continuity of sites, buildings structures or objects united historically or aesthetically by plan of physical development..*

[2] *"structure" is a constructed facility that is not a building or an object (e.g., bridges, dams, roads).*

[3] *"object" is a constructed feature that is primarily artistic in nature.*

NATURAL RESCOURCES, VIEWS AND OPEN SPACE

The *COMNAVMARIANAS Final Integrated Natural Resources Management Plan for Navy Lands (INRMP)* (November, 2001) identifies important natural resources that impact physical development. All proposed major construction and major renovation activities on base are reviewed during the DD1391 development process to ensure natural resources are protected in accordance with the INRMP and federal regulations. *Table 1.1* summarizes key natural resources identified by the INRMP.

Views are considered significant if they are generally unobstructed, relatively panoramic, and offer memorable impressions. Within COMNAVMAR, views of the coastal areas and marine waters are valued. There are no scenic points from the interior of the Naval Base, but there are vantage points near the coastline. Specifically, there is a view of Inner Apra Harbor from Marine Drive just inside the Main Gate. The high elevations of Nimitz Hill and NAVHOSP provide the most sweeping views to the west. Finegayan, Barrigada, NAVMAG, and the fuel areas provide limited to no ocean views.

Open space, either maintained or naturally vegetated, provides visual relief at all COMNAVMAR installations. At the Naval Base there are protected wetlands near the base entrance and an ecological reserve area on Orote Peninsula's south coast. The interior of the Naval Base has a considerable amount of managed (mowed) land area. Stands of tangantangan forest provide important visual separation between the Mission Critical waterfront areas and QOL areas.

Location	Ecological Reserve	Wetlands	Federally Protected Species[1]
Naval Base	X	X	X
Finegayan	X		X
Barrigada			X
NAVMAG		X	X
Sasa Valley/ Tenjo Vista			X

[1] *evidence of or potential habitat for federally protected species*

Table 1.1 Natural Resources

COMNAVMAR Views and Open Space

VISUAL ASSETS AND LIABILITIES

Key visual assets are coastal views and prevalence of open space (managed and natural) at COMNAVMAR installations. Vegetative or open space separation between working and living areas are important visual elements. The lawn and landscaped areas of Echo/Delta Wharves, Tenjo Vista, and the Ordnance Annex provide visual relief from operations.

Positive architectural design examples at Naval Base are the Chapel (Building 1984), the new Bachelor's Quarters (Building 20) and recreation area, the Commissary (Building 275), and the main gate.

The Child Development Center (Building 10) and Chapel (Building 61) at NAVHOSP are visual assets in that they have unique design features. At Nimitz Hill, the Visitor Quarters' landscaping, pavilion, and scenic views are positive visual elements.

Chapel, Building 1984

Region-wide, visual liabilities outnumber the assets, which is not surprising considering the harsh natural environment and age of most structures. The following visual liabilities are most readily apparent:

- There is little architectural variation among buildings. The predominant architecture is the concrete "pill-box" structure with a flat roof.
- There is little color variation on base, which is uncharacteristic of a tropical island. Facility exterior paint color is typically beige with brown trim.
- Wayfinding is a challenge due to signs that are too numerous, illegible, poorly sited, and inconsistent in style.
- Major and minor roadways appear similar; they lack visual clues as to the established roadway hierarchy.
- Storage, delivery, and industrial areas are visible from the primary roadway, Marine Drive.

Installation Roadways

SUSTAINABILITY

COMNAVMAR and this IAP identify Sustainability as a key consideration in base improvements. Sustainability is a practice that incorporates protection of the environment (e.g., use of recycled materials) and reduction of life cycle costs (e.g., use of renewable energies, reducing the amount of materials or labor required for maintenance). The climate of Guam has a significant impact on life cycle costs and facilities are constructed to resist wind damage and corrosion due to salt air and humidity.

Given the challenging environmental conditions of Guam with seasonal storms and periodic earthquakes, the definition of sustainability also includes the ability of base buildings and surroundings to best weather natural conditions and events.

This can entail site planning, building design features and selection, and placement of plants.

The U.S. Green Building Council (USGBC) developed a rating system entitled Leadership in Energy and Environmental Design (LEED) that provides a framework for assessing building performance and attaining sustainability goals. The LEED system outlines criteria for assigning LEED credit for sustainable facility or site planning and design.

Regarding installation appearance, the LEED principles that are encouraged at COMNAVMAR include:

- Decreasing the amount of paved surfaces.
- Maximizing open space.
- Using indigenous plants.
- Designing for water conservation.
- Using recycled materials.
- Reducing radiant heat with trees.

For more information visit the USGBC website at www.usgbc.org.

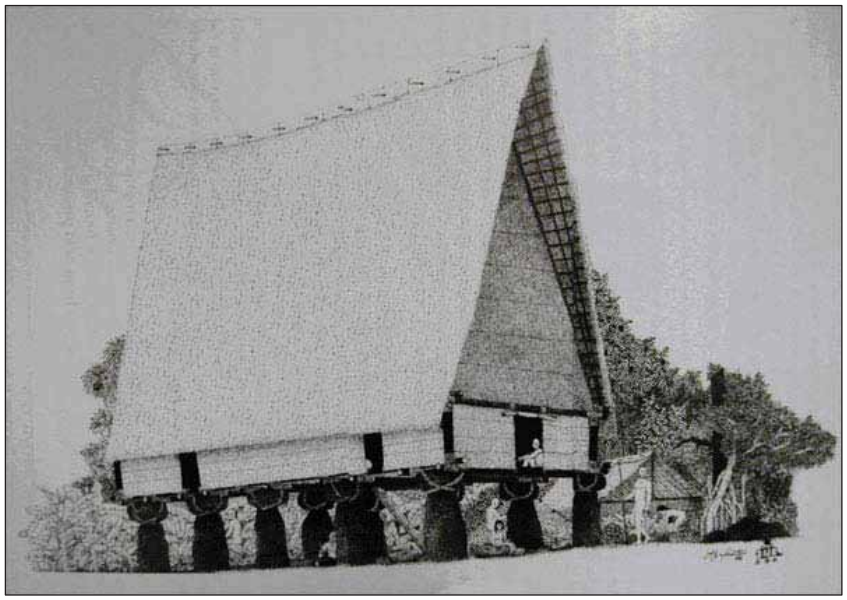
INSTALLATION ARCHITECTURAL THEME

"Legacy of Cultural Diversity", is the overall installation architectural theme that sets the framework for design guidelines and standards presented in this IAP.

Guam has a rich history of cultural diversity, some of which is evident in new architecture and architecture that has survived typhoons. The resident and transient populations of the island are multi-cultural and perpetuate their cultural diversity through customs, beliefs and art.

Of all the cultures present on Guam, the most notable architectural elements represented in the community are from the indigenous Chamorro and historic Spanish cultures. The key elements of the Chamorro architecture are the latte stone structures supporting a raised floor and steep sloped roofs. Other features of Chamorro culture that are not typically incorporated into architectural design but could be, include: the canoe with single outrigger and asymmetrical hull, large stone mortars (lupang) for grinding rice, and woven patterns in mats *(Figures 1.3 and 1.4)*.

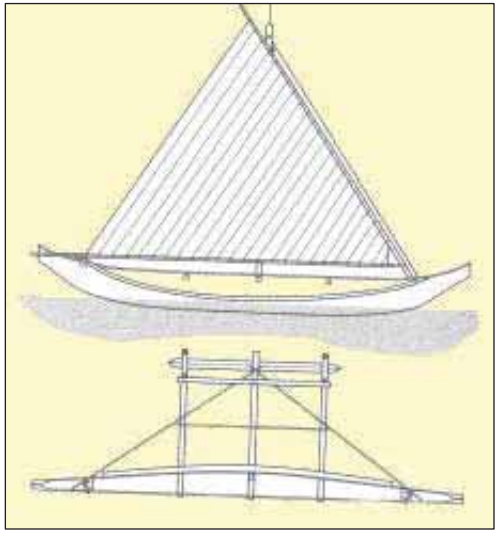
Spanish architectural influence is characterized by terra cotta roof tiles, arches (often in a series of three representing the holy trinity) *(Figure 1.5)*, covered walkways, and deep eaves. Elements of both architectural styles are evident at the Main Base entrance, the Government of Guam office complex, and Andersen Air Force Base.



Representation of Latte Stone Structure (Source: Collection of Richard F. Taitano Micronesian Area Research Center)

Woven Mats (Source: http://www.pacificworlds.com/guam/stories/story3.cfm)

Figure 1.3 Examples of Chamorro Culture



Outrigger Canoe (Source: http://www.janeresture.om/micronesia_chamorro/)

Stone Mortar (Lupang)

Figure 1.4 Examples of Chamorro Culture

Trinity Arches

Pass and ID Office with Spanish Style Roof

Courthouse

Figure 1.5 Examples of Spanish Architecture

Following the Spanish period, World War II, and Typhoon Karen (1962) that destroyed 90 percent of the buildings on Guam, the predominant architectural style was concrete "pill box" buildings with concrete flat roofs. While these buildings are typhoon-proof and prevalent on base and in the community, they are not recommended to be emulated.

To the extent practical, significant new buildings should incorporate both the Chamorro and Spanish design elements. Culture should also be considered in the design of smaller structures. For example, traffic bollards in specific areas could be the shape of Latte stones as evident at Andersen Air Force Base (AAFB). Bus stop shelters could have terra cotta roof tiles and arched openings *(Chapter 6: Site Elements)*.

For an optimum roof design that is typhoon resistance and reduced maintenance, steep concrete with integral color and Spanish tile pattern is preferred where cost effective.

The architectural theme is not intended to eliminate flexibility in design and may not be appropriate for all uses (warehouses), but represents an opportunity to acknowledge Guam's cultural history and diversity.

Cultural sensitivity can be further reinforced through use of native plants and interpretive signage.

CHAPTER 2: Site Design

2. SITE DESIGN

The objective of site design is to relate facilities in a positive way to their site and to adjoining sites, and to establish clear connections between places on base. It involves thinking beyond individual construction or renovation projects. By planning for the connectivity of places, base appearance can be improved incrementally with each project that is guided by an overarching vision for the larger area.

Typically, base improvements are considered building by building, whereas a base is actually viewed in its entirety by visitors and residents. Greater forethought in building siting and in planning common spaces, such as installation entrances, streetscapes, walkways, and parking areas, can provide an integrated vision that enhances base appearance.

Site design guidelines are presented here in a hierarchy of their potential to highly impact the existing visual environment.

First in the hierarchy are **installation boundaries and gates** for two reasons. First, impressions of an installation are often formed at a base entrance. Second, base entrances are common entry and exit points seen by everyone - visitors, residents, daily commuters, and members of the public who do not necessarily enter the base. As such, base entrances provide primary opportunities to create an attractive and welcoming appearance.

Second in the hierarchy are **major vehicular, bicycle, and pedestrian thoroughfares**. These are routes that are frequently traveled by people who live and/or work on base, and provide an important means of visual orientation. One or more of them will also serve as VIP routes for visiting dignitaries. Making these streetscapes, bikeways and walkways attractive, safe and convenient is important for everyone using the base.

Third in the hierarchy are **activity centers** and **individual buildings**, which draw large numbers of people from a variety of areas on and off of base. Examples include training centers, headquarters buildings, food courts, and personnel support areas. Improvements to these facilities provide benefits to a significant but smaller portion of installation residents and visitors than the previous two categories.

In addition, the following types of facilities are located extensively throughout any installation and have the potential to greatly affect base appearance in a positive or negative manner: **parking, service areas,** and **utilities.**

INSTALLATION GATES AND BOUNDARIES

As the first and dominant impression, base entries establish the overall character of an installation while insuring their primary function of security and control.

Design for Navy Region Marianas base entries should:

- Create an attractive and welcoming appearance while ensuring safety and security.
- Provide flexibility for variable security levels and needs.
- Facilitate orientation and wayfinding through the use of signage and barrier placement. Installation and major commands should be identified at this point.
- Provide safe vehicle and pedestrian access.
- Integrate Anti-Terrorism/Force Protection (AT/FP) features permanently into the design.
- Incorporate Chamorro and Spanish design components in guard houses and other entry structures.

The current Naval Base primary entrance design successfully incorporates Chamorro and Spanish design elements *(Figure 2.1)*. Permanent integrated AT/FP traffic barriers in the form of crash-resistant walls or combination of ditches and berms should replace the "temporary" moveable barrier segments.

Secondary gates/entrances in the Region include Polaris Point, Echo/Delta Wharves, Tenjo Vista and Sasa Valley, Nimitz Hill, NAVHOSP, Barrigada and Finegayan entrances. A prototypical design for these secondary entrances incorporates the above guidelines, and is presented as *Project # 5, Polaris Point Entrance (Chapter 7: Implementation).*

Tertiary entrances are associated with smaller groups of buildings such as the USS Frank Cable compound at Polaris Point and the EOD compound at Naval Base. Design for such locations is largely dictated by security requirements.

All gates should be regularly maintained for neatness of appearance and installation image.

Adjacent to entry gates and surrounding all military installations, perimeter fencing must be designed first and foremost to meet physical security and AT/FP requirements (see fencing design guidelines in *Chapter 6: Site Elements).* Appropriate physical security clear areas (both inside and outside the installation) and patrol paths are to be incorporated in installation boundary design.

Figure 2.1 Naval Base Primary Entrance

ROADWAYS/VEHICULAR CIRCULATION

Primary vehicular circulation routes are the framework of organization for any installation. The roadway hierarchy, based on the level of traffic, is shown generically in *Figure 2.2* and specifically for Naval Base in *Figure 2.3*.

The circulation hierarchy should be improved through the use of landscaping, lighting, signage, and site elements. Improvements to these elements also enhance the streetscape, or overall appearance of individual streets for a more improved installation appearance and quality of life for roadway users. Specific street landscaping guidance is provided in *Chapter 5* and site furnishing and lighting recommendations are in *Chapter 6*.

In general, the following guidance should be adhered to when designing and implementing roadway improvements:

- Use locally available paving materials when practical.
- Provide tree plantings, light poles, signs, and other design elements along roadways that are in keeping the scale of the corridor; larger for wide busy roads, smaller for small intimate scale roads.

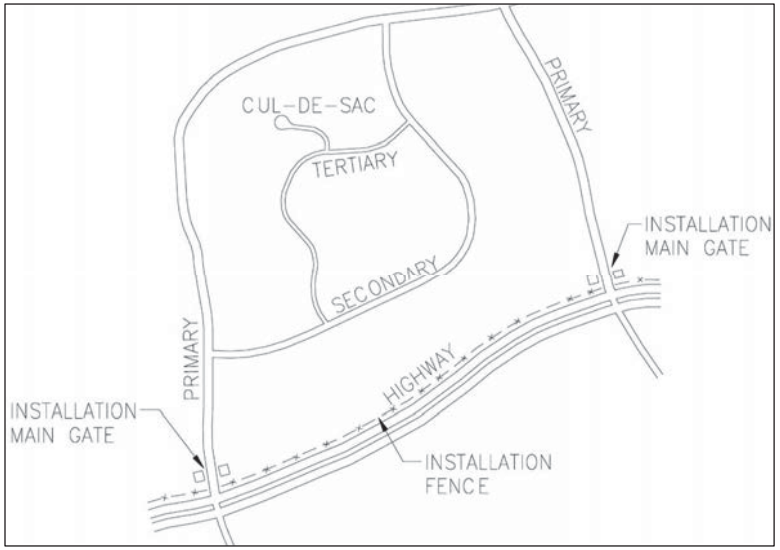


Figure 2.2 Primary, Secondary and Tertiary Roadways (Generic)

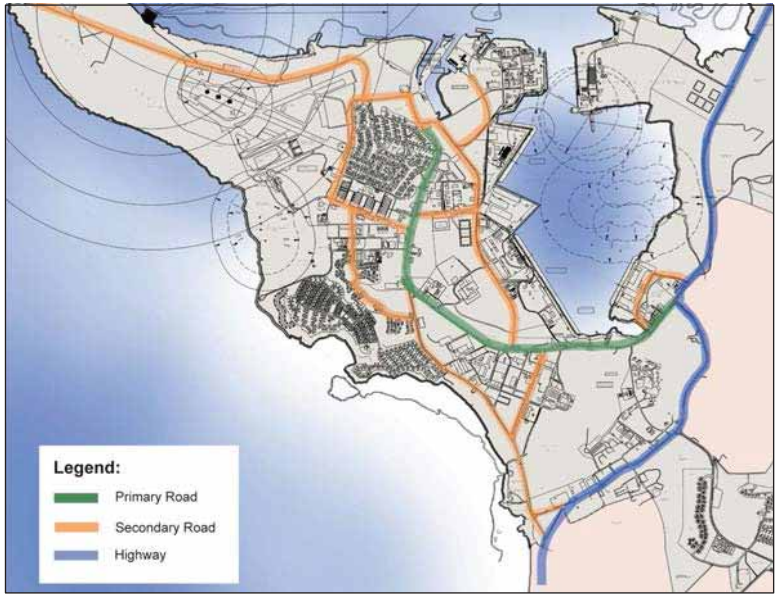


Figure 2.3 Naval Base Main Roadways

While it may not be practical to fund a project solely for the purpose of instituting these standards on existing roads, the standards should be considered and implemented during utility and other projects affecting the roadway, especially for Marine Drive, the naval base's primary roadway. The guidelines should be implemented consistently for all new roadway projects.

Streets

- Provide sidewalks on at least one side of every street and between facilities.
- Assure proper markings for safe and efficient circulation.
- Traffic control and other signs within the "clear zone" of the roadway, as defined by the American Association of State Highway and Transportation Officials (AASHTO), shall meet all requirements of the Manual on Uniform Traffic Control Devices (MUTCD).
- Traffic control and other signs outside the "clear zone" shall be hardened to withstand typhoon force winds.

Curbs

- Increase the life span of streets and parking lots with curbs. Curbs prevent erosion and reduce the need for extensive repairs by minimizing stresses on pavement edges.
- Minimize painted curbs as they are difficult to maintain.
- Ensure handicapped access is provided at intersections and crosswalks.

Project #1, Marine Drive Improvements (Chapter 7: Implementation), incorporates several features designed to elevate the visual appearance of the roadway consistent with its role as the single primary roadway at the Naval Base. Proposed improvements include the addition of landscaping, including signature plantings at key intersections, extension of walkways, and installation of night lighting.

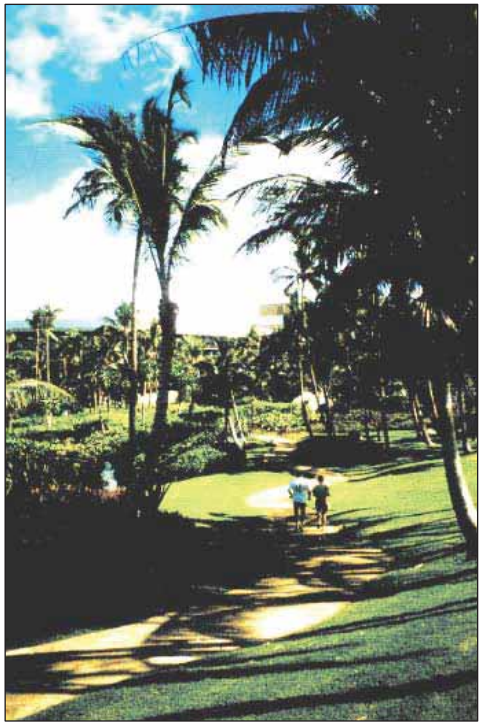
WALKWAYS AND BIKEWAYS

A network of meandering multi-use (e.g., pedestrian, bike, stroller, jogging) pathways and sidewalks will provide safe connectivity between housing areas, recreation areas, and work areas for pedestrians and bicyclists. Additional benefits are the promotion of health and fitness, enhanced sense of community, and reduced use of non-renewable resources. These pathways are distinct from the dedicated bike paths aligned in roadways but can provide additional connectivity for bicyclists. To encourage their use as an alternative means of circulation, pedestrian walkways should be designed to be:

- Adequate in width.
- Convenient in routing between destinations.
- A comfortable and enjoyable experience.

Proposed route alignments will be coordinated with Morale, Welfare, and Recreation (MWR) and connect with existing paths. *Project #4, Community Pathways (Chapter 7: Implementation),* presents a prototype design for a multi-use pathway. Existing substandard pathways should be upgraded throughout the Region's installations over time.

While stamped concrete or paver blocks are attractive, smooth surfaces facilitate stroller use and are preferred. Pedestrian crossings shall be clearly marked to distinguish them from the roadway. Night lighting and bike racks shall be provided and all pathways will be Americans with Disabilities (ADA) accessible.



Meandering Walkway

ACTIVITY NODES

Activity nodes are definable areas that support high concentrations of activity. They generally coincide with major facility landmarks or buildings that house important and highly populated functions such as headquarters. Activity nodes can also occur in areas where a high level of vehicular or pedestrian traffic converges and interacts within spaces between facilities. Nodes can occur outside facilities in plazas, courtyards, entrances, or other exterior spaces. Recreation and commercial functions can also generate high levels of activity and are commonly indicated as nodes.

When designing or renovating an activity node, care should be taken to:

- Orient signage to users.
- Scale elements for pedestrian use and design them in character with the surrounding architecture and landscape palette.
- Minimize or remove impermeable surfaces to reduce radiant heat.
- For plazas and courtyards, include signature features such as monuments, static displays, fountains, etc.

Depending on anticipated level and times of use, supporting features may include: 1) shelter from the sun during the day (shelters or shade trees); 2) lighting to encourage evening use when ambient temperatures are lower; and 3) amenities such as water fountains and restrooms.

Project #2, Visitor Orientation Area (Chapter 7: Implementation), is envisioned as a key activity node, particularly for visitors to the Naval Base.

Single Sailor Sanctuary

Gab Gab Beach

BUILDING SITING AND DISTRICT SEPARATION

The key to successful site planning is to think beyond the individual project and plan to the greatest extent possible for the most beneficial use of a total area. Building siting and district separation should be optimized to preserve views, conserve energy, and to create public spaces around and between buildings for plazas, courtyards and landscaping. AT/FP setbacks, required for safety, can provide areas for these public spaces and amenities.

The following should be considered when siting buildings:

- Consult the *COMNAVMAR RSIP Overview Plan* land use plan and become familiar with existing and planned land uses in order to assure functional compatibility of new facilities.
- Maintain and encourage definable elements that separate mission critical, mission support and QOL functional areas or districts. These edges can be open spaces, rows of trees, water bodies or landforms. An edge attains significant visual strength if it has long lateral visibility and is impenetrable to cross movement. An example might be a stand of trees.
- Use the natural terrain as a major determinant of layout and form for facilities on the installation. Maintain a natural slope and avoid steep slope development wherever possible. Strive for a balance of cut and fill with new development.
- Promote natural drainage to reduce the need for large storm drainage infrastructure. Natural drainage such as a stream or river must incorporate protective measures in residential housing areas and other areas frequented by children.

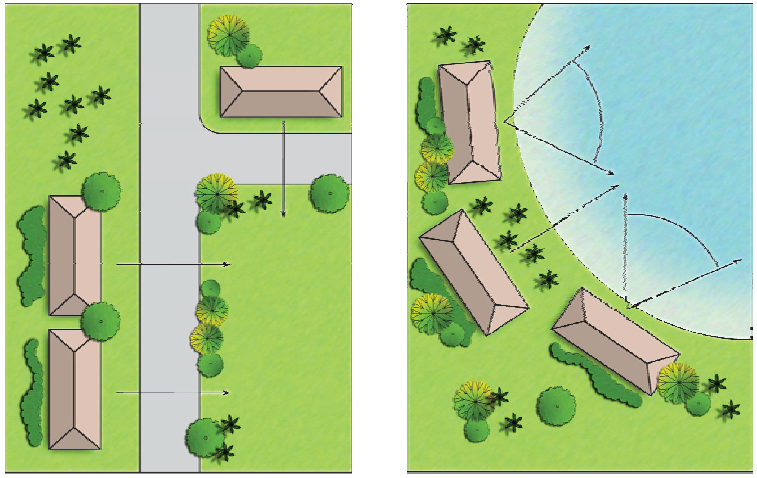
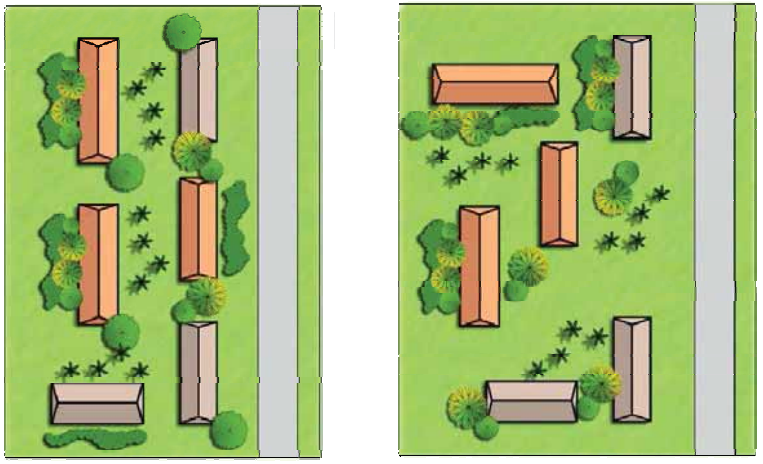


Figure 2.4 View Preservation



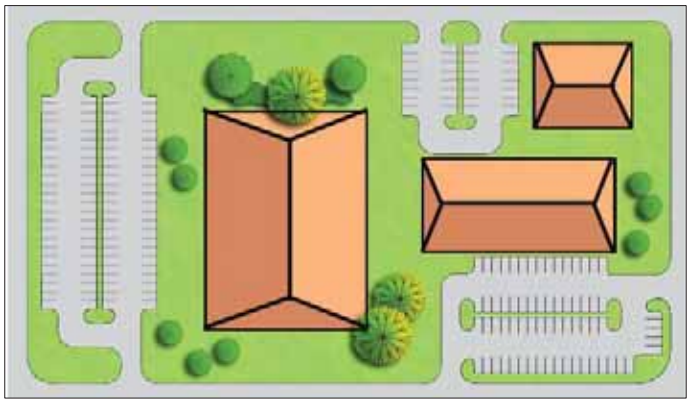
"Wall Effect" (Not Recommended)

Proper Siting (Recommended)

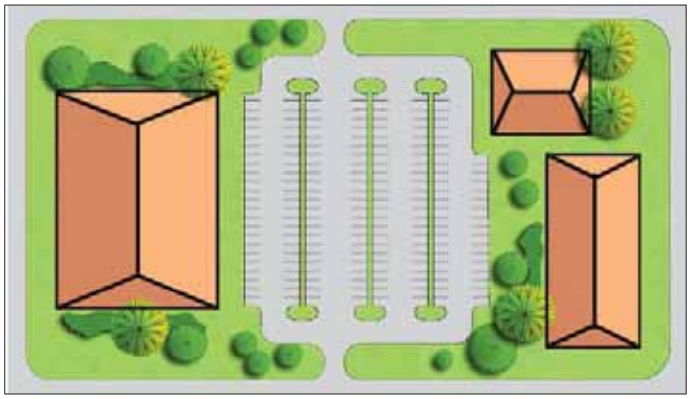
Figure 2.5 Siting Comparison

- Preserve and enhance scenic views and vistas and screen off unattractive views. *(Figure 2.4)*
- Assure compliance with *DoD Minimum Anti-terrorism Standards for Buildings*.
- Orient the main entrance of a building toward the primary public space such as courtyard, lawn, parking lot, or street from which users will approach the building. Site service and storage areas away from high visibility locations. Buildings should be oriented to reduce heat gain and energy consumption.
- Minimize the 'wall effect' when siting new buildings near existing buildings. When properly sited, light, ventilation and view planes are enhanced, and adequate landscaping spaces between buildings are provided. *(Figure 2.5)*
- Mitigate existing inappropriately sited buildings through landscaping, decorative concrete walls, paint patterns (in the case of massive structures), or relocation of laydown/delivery areas away from primary roadway side of building.
- Preserve existing trees and major plantings wherever possible.
- Consider proposed adjacent uses and how parking lots, building entrances, and service areas relate to and can be shared by existing and future developments in order to achieve the most efficient land use. *(Figure 2.6)*

Although there may be a span of several years between projects, building locations and design should be in accordance with the plan for the larger area, with each project's construction essentially being a phase in the completion of an overall concept.



"Piecemeal" Design



Holistic Design

Figure 2.6 Building Placement and Circulation Considerations

PARKING

Parking lots at COMNAVMAR tend to lack landscaping are visually unattractive and can be quite hot throughout the year. Several lots, including those at the NEX and Commissary are expansive in size. With proper siting, design and landscaping, existing and new surface parking lots can be visual assets instead of visual liabilities.

The following techniques should be used to create more aesthetically pleasing parking lots *(Figure 2.7):*

- Locate parking lots between and behind buildings where possible to reduce the visual impact of vehicles.
- In large parking areas, provide landscaped islands between rows of parking and include shade trees. Provide planting areas for canopy trees at the ends of all rows of parking spaces and in islands to soften the visual expanse of the parking lot and provide cooling shade.
- Screen parking areas from adjoining roadways by installing a hedge, landscape strip, or berms.
- Use the space provided by required AT/FP setbacks for plantings and sidewalks.
- Dimensions of parking stalls shall conform to relevant Unified Facilities Criteria (UFC).
- Curb parking lots to avoid the use of wheel stops/bumper blocks.

Parking space requirements for individual facilities may be reduced by allowing the sharing of parking with adjacent activities *(Figure 2.6).* Also, sharing parking lots between facilities with different peak demand times reduces the total number of spaces required.

Small parking lots are visually preferable to larger lots because they increase the percentage of landscaped area to paved area and allow better blending with the natural topography. However, where large parking areas must be provided, their appearance can be improved by including of large planting islands.

On-street parking is common on most military installations. It is recommended that on-street parking be allowed on tertiary streets and cul-de-sacs only. On-street parking along major arteries and secondary streets should be avoided because it reduces the vehicular carrying capacity of the street, is unattractive, and is unsafe for vehicles and pedestrians.

Project #7, NEX Entrance Improvements, and *Project #8, Commissary Improvements (Chapter 7: Implementation),* incorporate measures to improve existing large parking lots at Naval Base by adding signature landscaping and replacing select paved areas with landscaping to reduce radiant heat.

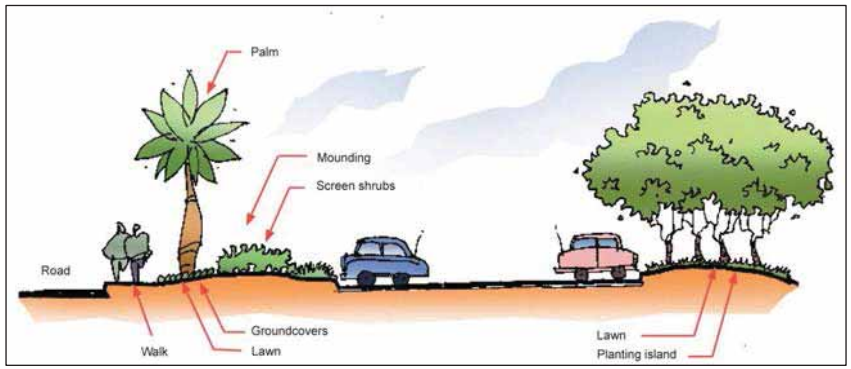


Figure 2.7 Parking Lot Cross-section

SERVICE AREAS

Service areas include among others, utility equipment (e.g., air conditioning, transformers), loading docks, and trash enclosures. While critical to the function of many facilities, they are often unattractive and special care must be taken to screen these areas from public view.

The following shall be considered in the design of new facilities and renovation projects:

- Support easy access to loading docks exclusively for vehicles servicing buildings requiring pickup and deliveries.
- Locate service areas on non-prominent sides of buildings away from public thoroughfares and gathering places.
- Use landscaping or decorative concrete walls to screen service areas from view *(Chapter 6: Site Elements).* Ideally, the screening wall would be incorporated into the first floor design as an extension of a first floor wall.
- Where possible, consolidate service areas for multiple facilities.
- Incorporate AT/FP requirements in all designs. *(Note: trash dumpster locations are subject to AT/FP setback requirements.)*

Above Ground Utilities (not recommended)

UTILITIES

While utilities provide basic infrastructure requirements necessary for the operation of the installation, the visual and environmental impacts of these facilities must be minimized and mitigated. The planning and design of power, communications, water, and sewer services should consider not only functional priorities but aesthetic factors as well. In Guam, typhoon and earthquake-resistance and material selection must also be incorporated in design.

General recommendations provided below should be considered in utility project design.

- Utility lines and piping should be located (or relocated) underground.
- Where undergrounding is not possible, adverse visual impacts should be mitigated through the following:
  - Align overhead utilities along the edges of land use areas to avoid dividing land uses and disrupting future contiguous land uses.
  - Avoid alignments in scenic areas.
  - Avoid alignments along hillcrests and steep grades.
  - Avoid alignments along major transportation corridors by using secondary roadways.
- Alternative energy sources are encouraged.
- Appurtenances such as transformers, substations, and generator sheds should be screened to blend in with the surrounding environment. Screening materials may include landscaping, berms, and/or walls. Walls and enclosures should be designed to protect equipment from flying debris and secured against child access.

- In densely developed areas, curbs, gutters and underground pipelines should convey storm drainage. In low density areas, drainage swales and ditches compatible with the natural landform should be utilized for stormwater.
- Drainage inlet/outlet structures shall be provided with bars to preventing children from entering the culverts.

CHAPTER 3: Architecture

3. ARCHITECTURE

The architecture for military bases should be functional and economical, have good visual appeal, and present a positive, professional image. At Naval Region Marianas, building design should be consistent with the installation architectural theme, "Legacy of Cultural Diversity", as feasible *(Chapter 1: Introduction and Overview)*.

Most buildings at Naval Region Marianas are "pill-box" structure with a flat roof. This structural system strongly influences and becomes a controlling factor in shaping the building form. Other architectural design controlling factors are the environmental conditions; due to the periodic typhoons.

The environmental conditions and existing architecture, combined with the cost constraints often present for new projects, tend to reduce architecture to the most functional and economic form.

This chapter provides guidance to promote the highest possible standard of building design and adherence to the installation architectural theme, while allowing creativity on the part of designers. It addresses architectural components that contribute to overall building appearance and use. This chapter also addresses the relationship of a building to adjacent buildings and its environment.

Architectural guidance found in this chapter covers the following:

- Balance of Variety and Consistency
- Scale
- Massing
- Building Entrances and Covered Walkways
- Roofs
- Texture
- Fenestration and Rhythm
- Electrical and Mechanical Equipment
- Building Accessibility
- Building Renovations and Additions

Overall, these guidelines are intended to help create an architecturally appropriate environment, a key component of the overall base appearance at COMNAVMAR.

BALANCE OF VARIETY AND CONSISTENCY

Diverse architecture is inherent to military bases. Because design follows function there are a variety of building architectural forms and styles. A warehouse building, for example, will look different from an administration building because of its function.

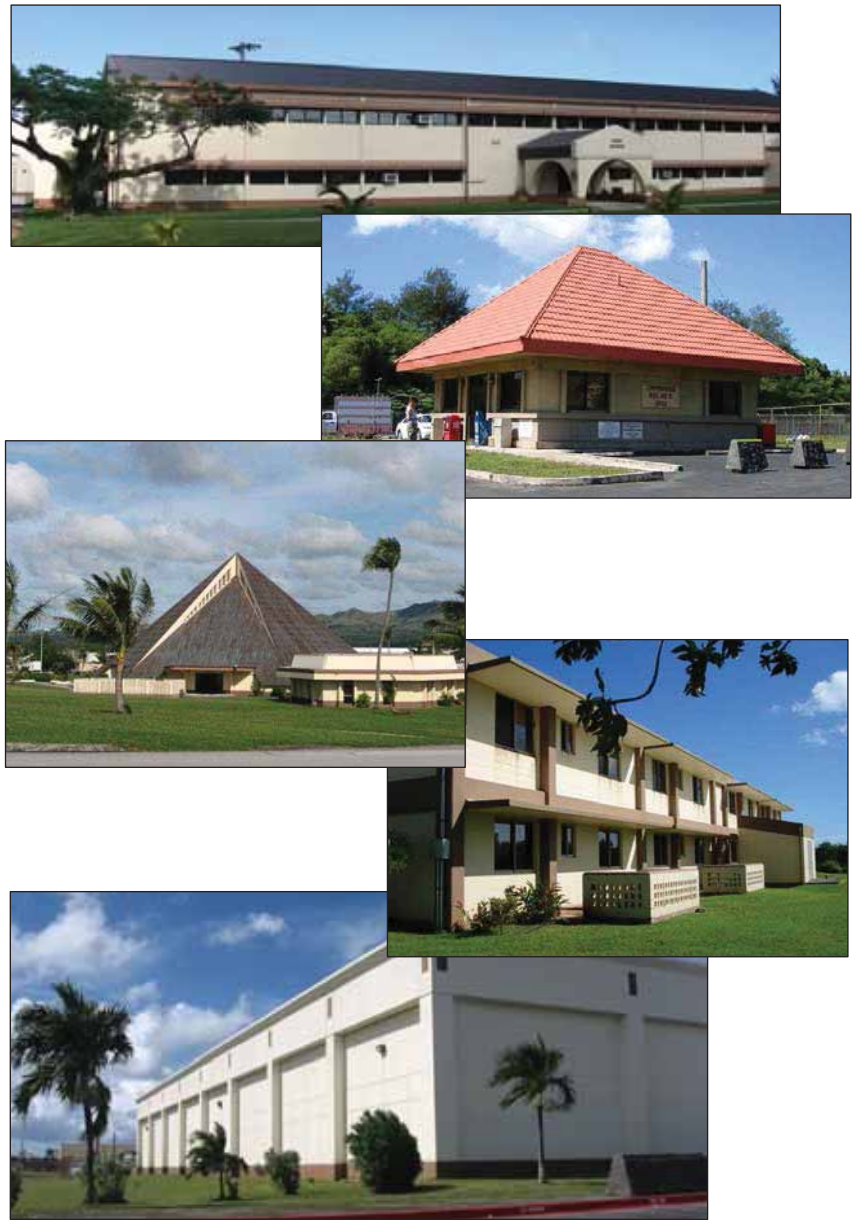
The majority of buildings use concrete as the predominant building material.

COMNAVMAR buildings and facilities should have a uniform "Tropical" appearance. This generally includes the look of stucco walls, sloped roof, and deep overhangs, which addresses conditions of Guam's unique climate.

Building design on an installation should be coordinated to the maximum extent possible to provide a consistent and coherent "sense of order" and "sense of place" that will be more comfortable and welcoming to users.

However, bases run the risk of looking too much the same if variety is not considered. Having very similar building designs and/or coloration can create a monotonous look that is visually unappealing and disorienting to the user.

Effort should be made to provide variety and interest for inhabitants and visitors, and to establish a distinguishing character and identity for areas within the base. Some variety, especially between functional areas, creates relief and interest. The key is to find a balance between consistency and variety.



Typical Architecture at COMNAVMAR

SCALE

The current trend in the construction of new military facilities is to have larger buildings with consolidated functions. While economical, large consolidated buildings detract from the overall base appearance because they are not typically in keeping with a "human scale".

Scale in the design context refers to the size of a building façade in relation to people or as perceived by the viewer. Buildings with predominant vertical facades that dwarf the individual are defined as monumental in scale. Buildings with horizontal facades that relate more to the size of the human figure are defined as human scale *(Figure 3.1)*. Because human scale buildings relate more to the dimensions of the human body they are more user friendly.

The scale of most buildings on installations should be more human than monumental. Possible places where a monumental scale would be appropriate include signature buildings such as installation headquarters and chapels.

The ground floors of buildings should be designed to be at a pedestrian or human scale and create visual interest. This is especially important for community support buildings. They should appear inviting, incorporate shade, and integrate with the surrounding landscaping. This can be achieved by various means, including arcades and projected overhangs *(Figure 3.2)*.

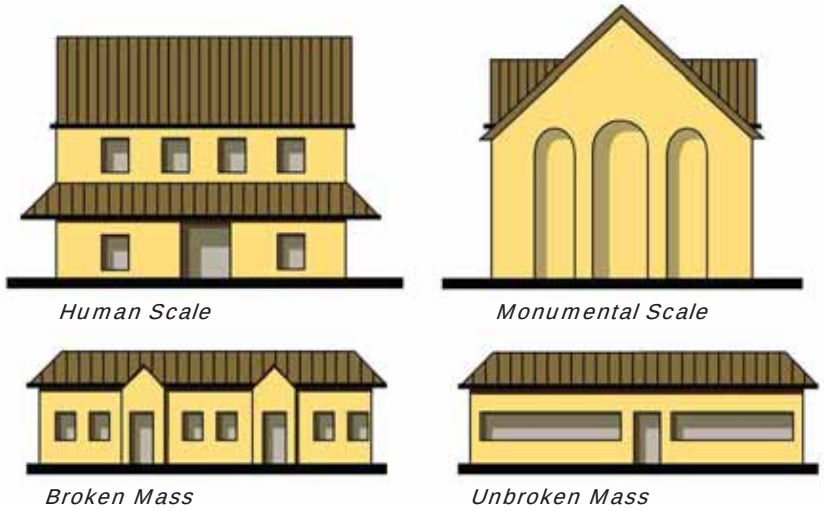


Figure 3.1 Scale and Massing

Commissary

Figure 3.2 Reinforced Human Scale Using an Arcade

MASSING

The overall bulk or volume of a building or buildings is referred to as massing. The size and proportion of the individual buildings in a grouping of buildings should be designed to be compatible with the adjacent structures.

Horizontal and vertical elements *(Figure 3.3)* help to break up the mass into smaller "human scale" modules. In these examples, the use of bold vertical elements created by the exterior columns and the horizontal lines reduce the perception of a large building mass. Different paint colors can be used to further emphasize these elements.

Features such as roof and entrance articulation can also decrease a building's mass *(Figure 3.1 and 3.3)*. Departing from the typical rectangular building footprint is another method to reduce mass. I-shaped, L-shaped and U-shaped buildings provide opportunities to introduce courtyards and landscape features that greatly improve the appearance of a building while reducing mass.

Using different methods to break up mass will create a variety of well-designed building types on base.

Commissary

Building 103

Figure 3.3 Massing Examples

BUILDING ENTRANCES AND COVERED WALKWAYS

Building entrances are a primary feature of building design that draws people into a building and should be designed to invite and attract their users.

Entrances should be detailed and recognizable as obvious points of entry. The main entrance to a building should be in a prominent location and oriented toward the primary public space such as a courtyard, lawn, parking lot, or street where users will approach the building.

Entrances also present a good opportunity for articulation of the façade to provide human scale while providing shade and protection from the rain.

Permanent concrete canopies at entrances are preferred over canvas due to possible storm conditions. The entrance canopy design should be consistent with the overall building design. For upgrades and maintenance of existing facilities where replacement of canvas is too expensive, use ultraviolet rated solar canvas. The color of the canvas should complement the IAP color schedule for the building's function *(Chapter 4: Building Color)* and be approved by COMNAVMAR.

When designing a complex, consider having covered walkways between buildings in the same complex to provide protection from the elements *(Figure 3.4)*.

Army Reserve Center

Bachelor Housing

NAVFAC Marianas

Figure 3.4 Covered Walkway Examples

Examples to Emulate

An entrance canopy is a suitable and frequently used method of highlighting the building entrance. Building entrances can also bring the mass of the building down to human scale and add visual interest. Examples of good building entrances are shown in *Figure 3.5*.

The extended arcade at the Commissary is an excellent example of a building entrance. The arcade brings down the perceived scale of the building and provides protection from the elements while guiding the cusomters to the entrance. The building entrance is well integrated with the arcade so it apppears as a natural extention and has the same arch form and roof style.

The NAVFAC Marianas building has a clearly marked entrance with a projected covered entrance. The planters along the edges blend well as natural extensions of the building base. The entry design may have been improved by integrating the entry roof into the building's first story line/roof.

Examples That Fall Short

The NEX entrance is almost undistinguished from the rest of the building except for the entrance sign. There are no other clear visual clues to guide or welcome customers into the building. *Project #7, NEX Entrance Improvements (Chapter 7: Implementation)* provides suggestions for improving the overall experience of the NEX entrance and parking lot *(Figure 3.6).*

Commissary

NAVFAC Marianas

Figure 3.5 Good Examples of Building Entrances

NEX

Figure 3.6 Less Successful Building Entrance

ROOFS

Roofs can have a strong visual impact on building style and appearance.

Roofs are an excellent way to incorporate the installation theme of “Legacy of Cultural Diversity”. The Spanish architecture is characterized by roofs with terra cotta roof tiles and deep eaves; Chamorro roofs are traditionally steeply sloped.

For optimum typhoon resistance and reduced maintenance, steep concrete with integral color and Spanish tile pattern is preferred where cost effective *(Figure 3.7).* Historically, this is only economical for large projects. Authentic or concrete Spanish tile systems are acceptable if engineered to comply with wind speed criteria. Simulated roof tile heavy gauge metal panels are acceptable.

Pass and ID Office

PWC/OICC

Figure 3.7 Sloped Roof Examples

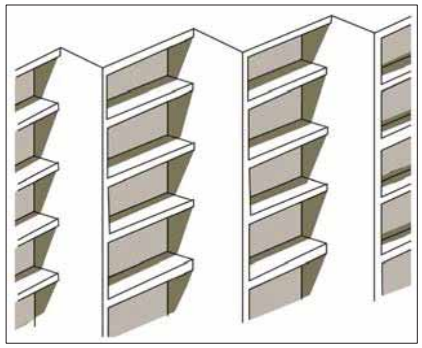
TEXTURE

Articulation of exterior building surfaces is referred to as building texture and is encouraged to "soften" their appearance and reduce mass.

Architectural elements such as projections and recesses provide shadow and depth *(Figure 3.8)*. Horizontal projections function as reflective light shelves to provide indirect natural daylight into the building. Deep overhangs and sun shades for windows are recommended for Guam's environmental conditions.

Articulating the structural columns on the building exterior is another way of creating shadow and depth. This type of articulation can be enhanced by painting the columns and pilasters in slightly different color tones to highlight the features *(Figure 4.6, Chapter 4: Building Color)*. Pilasters are rectangular supports resembling flat columns which project slightly from the building.

There are a number of ways to employ texture to improve building design. For example, building texture can be enhanced using columns outside the building or by adding sun shades. Each building can incorporate these features but they should vary somewhat from building to building to avoid a monotonous look on base.



The horizontal and vertical projections shown in this Bachelor Quarters example cast shadows that create visual interest and contribute to the overall building texture.

Figure 3.8 Projections for Building Texture

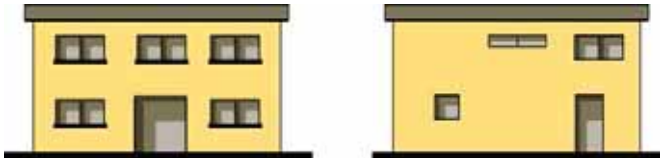
FENESTRATION AND RHYTHM

Features such as doors, windows (also called fenestration), and building decoration or details help establish a rhythm and proportion to the building exterior. A balanced rhythm and proportion is more comfortable and pleasing to the viewers' eye than a random placement. For the most part, maintaining alignment of features horizontally and vertically provides a sense of order *(Figure 3.9)*.

During the building design process functions of individual spaces are sometimes given a higher precedence than the exterior aesthetic and overall building function. The result of individually planned spaces can be a chaotic exterior and an interior with little flexibility for future reconfigurations and/or use by other functions *(Figure 3.10)*.

The placement of windows needs to be coordinated to work for both the interior and exterior of the building. Window placement is normally done in plan view initially. It also needs to be evaluated in elevation view and adjusted as necessary to result in a well-organized pattern.

A good example of fenestration and rhythmic balance is the new Bachelor's Quarters *(Figure 3.10)*, where the window and shutter placement adds rhythm and interest to the building design.



Balanced *Random*

Figure 3.9 Balanced Rhythm and Proportions Vice Random

Example of random window and door placement

Good example of rhythm using fenestration (Bachelor Quarters)

Figure 3.10 Fenestration and Rhythm Examples

ELECTRICAL AND MECHANICAL EQUIPMENT

Mechanical and electrical appurtenances are often overlooked on the exterior of a building. The placement of ventilation hoods, louvers, conduits and electrical devices left to their respective disciplines should be reviewed by the architect rather than the left to their respective disciplines for review. It is important that the architect review these items and either arrange them in an aesthetically pleasing manner or screen them.

Louvers should be designed to minimize water infiltration during typhoons. Vents, flashing and sheetmetal should be finished to match or complement adjacent building surfaces *(Figure 3.11)*. All building-mounted mechanical and electrical equipment should be screened from public view *(Figure 3.12)*. When screening these items, use a design and materials that are compatible with the overall building design and sensitive to adjacent structures.

Figure 3.11 Unfinished Vents

Figure 3.12 Excessive Mechanical Equipment Needs Screening

BUILDING ACCESSIBILITY

Offices, community support facilities, and transient accommodations units must be designed to be accessible and usable by persons with disabilities. New construction and alterations to existing facilities of the above types must be designed to meet the requirements of the Americans with Disabilities Act Architectural Guidelines (ADAAG) and the Uniform Federal Accessibility Standards (UFAS), with the most stringent standards applied in the event of conflicts.

Where possible, handicap ramps should complement and not disrupt the integrity of the original architecture. They should be designed as an integral part of the building and not appear added on as an afterthought.

Handicap ramp design and installation should include the following:

- Ramp design should complement the existing architectural character.
- Finish colors should match existing building colors.
- Finish materials should match or complement existing materials.
- Landscaping should be used to buffer the visual impact of the ramp.
- Ramp layout should follow existing pedestrian circulation patterns as much as possible.

BUILDING RENOVATIONS AND ADDITIONS

When existing buildings are renovated or additions are constructed, the architectural character of the renovation or addition should be compatible with the character of the existing building and adjacent buildings *(Figure 3.13)*.

Recommended *Not Recommended*

Figure 3.13 Building Additions

CHAPTER 4: Building Color

4. BUILDING COLOR

Building color is one of the most visible aspects of a building and one of the easiest characteristics to change. A coat of paint is the fastest and least expensive way to dramatically improve a building's appearance.

The objective of the Building Color Design Guide is to provide guidance for making building color selections and for their application and maintenance.

COLOR CHOICE

Carefully chosen building colors can enhance the appearance of buildings, contribute to the overall image of the installation, and achieve cost savings through the use of appropriate colors and materials that reduce maintenance.

The Color Schedule considers the existing colors on base and the desire to project a professional and timeless appearance consistent with the Navy's rich heritage.

The following criteria guide building color selection.

Compatibility with the Natural and Built Environment

The color selections presented in the attached schedules:

- Are appropriate with the environment, landscaping, and ocean colors.
- Are suitable in Guam's high glare environment.

Use of Multiple Colors

- Improves the visual definition of the architectural environment.
- Helps to reduce the apparent mass of a building and create a more human scale.
- Reflects people's preference for visual differentiation between where they work and live.
- Provides clues as to building function and location on base.

Reduced Maintenance Costs

- Considers fading due to the sun and other weather impacts.
- Appropriate color selection reduces maintenance costs.
- Resists soil contamination.
- Provides a "timeless" appearance, so repainting is required only for maintenance and not to replace out-of-date colors.

COMNAVMAR Existing Building Colors

COLOR ASSIGNMENTS

The COMNAVMAR Color Schedule provides more color variation than the existing conditions *(Figure 4.3)*. Different color combinations are proposed for industrial/waterfront/support, administrative, Quality of Life, bachelor housing facilities.

The trim/accent colors designated for each functional use are designated by CNIC for Navy-wide application. The IAP incorporates these accent/trim colors, and proposes complementary body and kicker colors for Guam application. Effort was made to simplify the color schedule while maintaining visual interest and compatibility with the existing color schedule.

The recommended Facilities Color Schedule Diagram is provided in *Figure 4.1.* The row headings represent generic architectural building components. The column headings functional areas found on base. NAVFAC and this IAP specifies use of the Pantone for Fashion and Home color system.

Color assignments should be reviewed by the IAP Review Team and/or a designated color lead person *(see Chapter 7: Implementation)* for verification and to create a cohesive yet varied base look.

Significant and unique facilities such as headquarters, hospitals, churches, and schools should be granted flexibility in assigning colors to the extent the color schemes are compatible with adjacent facilities' color. To the extent practical, these facilities should incorporate the Spanish and Chamorro design components and the bachelor housing/ Spanish-influenced color schedule would apply.

This IAP specifically excludes family housing; however, it is recommended that a color schedule with options for body trim and accent colors be developed for each neighborhood and that each neighborhood be distinct in color schedule from other neighborhoods.

Color schedules are proposed for the following types of building functions:

- Industrial/ Waterfront/Support: includes wastewater treatment plant, fuel farms, ordnance annex, warehouses, communications *(Figure 4.4)*
- Administration: includes mission critical and mission support uses of administration facilities *(Figure 4.5)*
- Quality of Life: includes bowling alley, restaurants, theater, NEX, gym, etc. *(Figure 4.6)*
- Bachelor Housing/Spanish-Influenced: includes old and new bachelor housing *(Figure 4.7)*

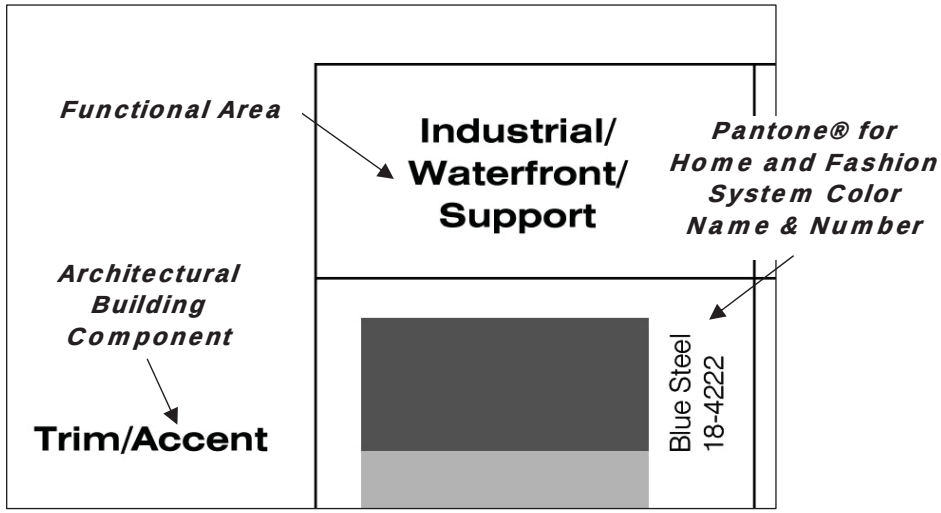


Figure 4.1 Facilities Color Schedule Diagram

COLOR CATEGORIES

The Color Schedule lists building colors based on the architectural components categories to which they are applied. Architectural components for each category are shown in *Figure 4.2* and described below.

Trim (T) / Accent (A)

Typical trim includes doors, window sash elements, sills, railings, fascia, and canopies.

Typical accents are flashings and fascia and can also include such items as doors, handrails, shutters, and signage.

Roof colors can be selected from trim/accent colors.

Body, Primary (B:P) or Secondary (B:S)

The dominant surface mass of a structure is the body. Large buildings can benefit from having two body colors, primary and secondary, to create depth. Primary body color is used on most of the body mass and the secondary body color may be used to a lesser extent or not at all.

Buildings with no expansion joints or other horizontal components should have one body color. A darker primary body color on large buildings can have a minimizing effect on buildings, while lighter “advancing” body colors highlight important buildings. Secondary body colors are applied to spandrels and pilasters.

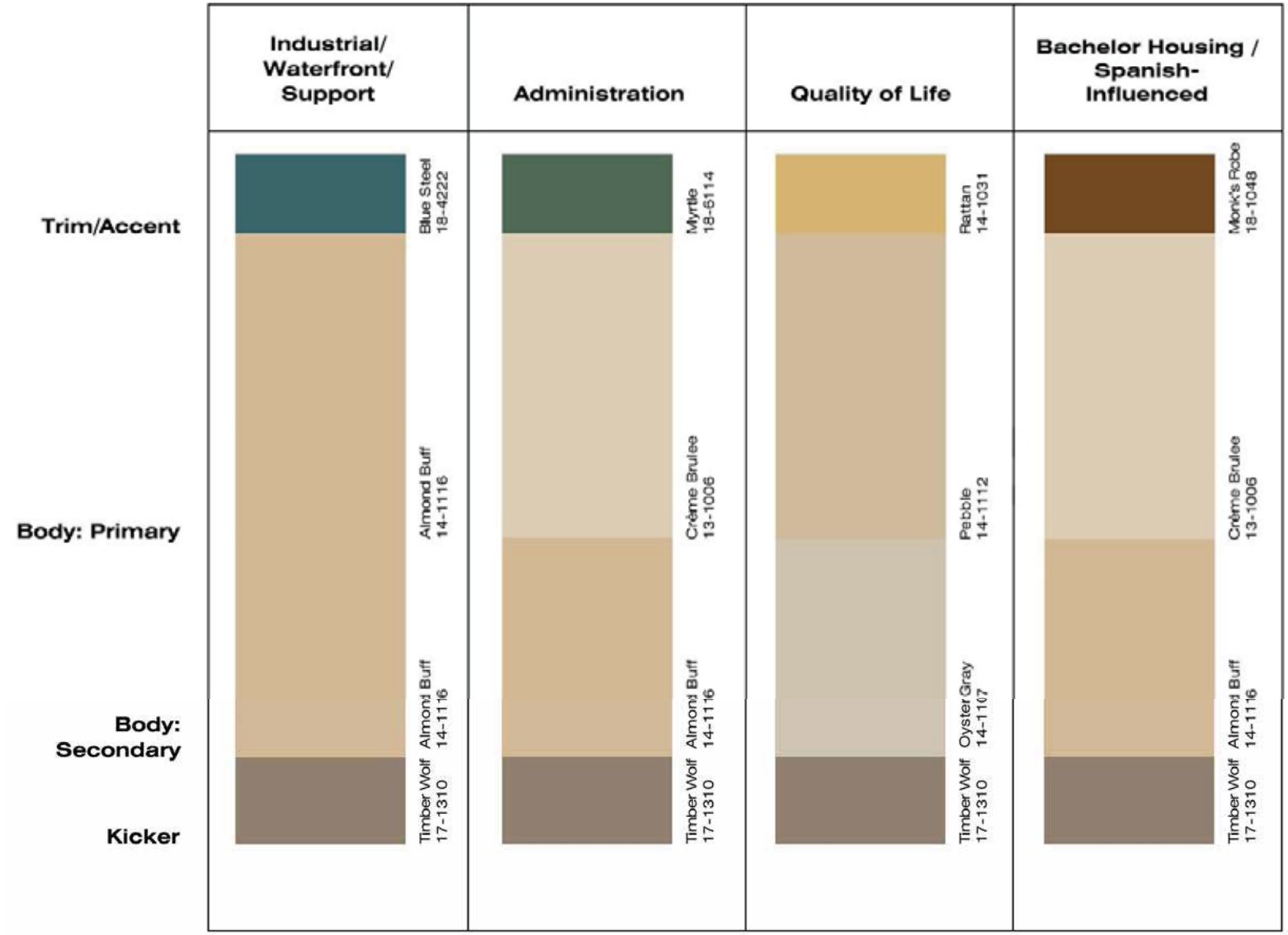
Base or Kicker (K)

The kicker area refers to the area at the base of a wall subject to dirt accumulation. Kicker or base colors are used for planter walls, kicker (exterior ‘wainscot’), and finishes.

Utility Colors

Utilities should be painted a neutral or receding color in order to blend into the landscape.

Figure 4.2 Component Categories



Reference: Pantone® for Fashion and Home Color Guide (2003)

Do not rely on printed colors. Match to Pantone® for Fashion and Home color samples. Add TPX suffix to all colors.

Figure 4.3 COMNAVMAR Color Schedule

Building 3169

Do not rely on printed colors. Match to Pantone® for Fashion and Home color samples. Add TPX suffix to all colors.

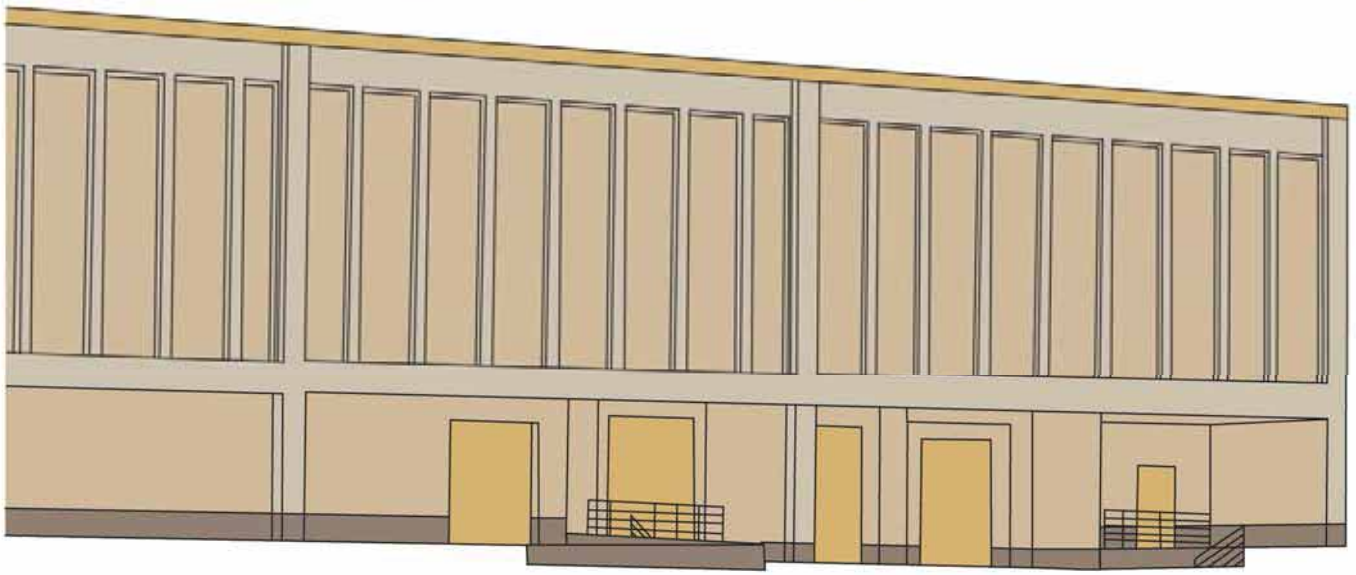
Figure 4.4 COMNAVMAR Industrial/Waterfront/Support Building Example

COMNAVMAR Headquarters

Do not rely on printed colors. Match to Pantone® for Fashion and Home color samples. Add TPX suffix to all colors.

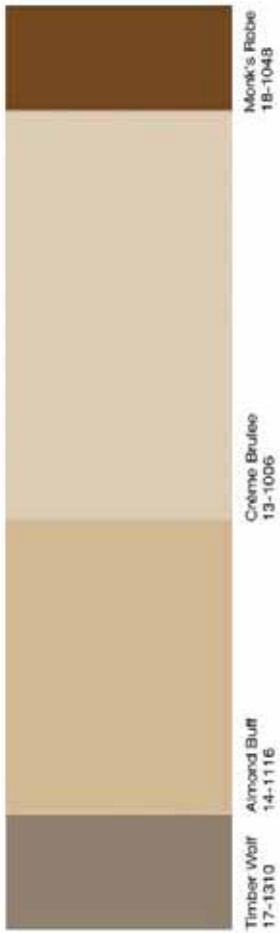
Figure 4.5 COMNAVMAR Administration Building Example

NEX



Do not rely on printed colors. Match to Pantone® for Fashion and Home color samples. Add TPX suffix to all colors.

Figure 4.6 COMNAVMAR Quality of Life Facility Example



Bachelor Housing

Do not rely on printed colors. Match to Pantone® for Fashion and Home color samples. Add TPX suffix to all colors.

Figure 4.7 COMNAVMAR Bachelor Housing/Spanish-Influenced Building Example

TECHNICAL APPLICATION

This section identifies critical factors and procedures in the proper application of building color.

Color Samples

Review of color samples is an important step in ensuring that the selected colors are the intended colors. Color boards should be submitted to the IAP Review Team and/or designated color lead person to assure the continuity of color, product quality and correct architectural component designations from the painting contractor. A visual field assessment with color board(s) provided by the contractor is part of this process.

All paint selections should also be tested on the building before final selection and before allowing the painting contractor to proceed.

Paint System

The existing surface conditions must be considered when selecting a specific paint system. The type of paint or product ultimately used will vary with the type of substrate.

A semi-gloss paint is recommended for building bodies. Flat paint should not be used except for soffits, which should be painted the recommended lighter body color.

The current quality of paint used on base will last approximately 5 years in Guam's environment.

Anodized aluminum, copper and stainless steel should not be painted. Fire sprinkler lines in unfinished spaces, such as above suspended ceilings, shall be painted red. Fire sprinkler lines in finished spaces can be painted to match the color of adjacent surfaces instead of entirely red; however, pipes shall be marked with two (2) inch wide red bands every 20 feet for identification. Valves shall be painted red.

Due to general surface conditions such as dirt, heat and moisture, surface and subsurface material conditions require cleaning and filling prior to primer and/or finish application.

Primers must be compatible with existing or new materials. Finish coatings should be selected to withstand and compensate for the general area, weather, and surface impact conditions such as salt and soil accumulation.

Application

Proper techniques and tools are to be specified to meet manufacturer's conditional warranties and general requirements for the best possible finish.

The method of application will vary depending on the type of material - e.g. stucco, concrete, wood, laminate, metal (sheet or corrugated). The processes or methods of applications required, such as spray (airless or compressor), roll or brush applications, will also vary as to the above condition, and according to the element, location, amount (mass) and square foot coverage required.

Spray applications are not generally recommended as paint spray can stray onto nearby trees and facilities. A written request to apply paint by spray application should be submitted to Base Development for approval prior to beginning work.

During all phases of preparation and finish application, the weather and surface conditions are vital considerations in ensuring that the product will adhere properly.

Manufacturer's recommendations concerning acceptable weather and surface conditions must be followed.

Inspections

The painting contractor and client should periodically examine all surfaces, as each phase of work progresses. This is important to determine that each phase has been executed according to standard practices and manufacturer's recommended procedures.

Workmanship and Warranties

The best possible workmanship should be provided in accordance with project specifications and manufacturer's recommendations. A warranty for workmanship and/or applied installation is typically one year. Product warranties for topcoat paints are typically five to seven years, contingent upon following the manufacturer's recommended use and product application.

All documents regarding installation warranties and manufacturer's product warranties should be obtained from the contractor prior to final project completion.

CHAPTER 5: Landscaping

5. LANDSCAPING

The Landscaping Design Guide is organized into three main areas: Landscape Planning, Plant Material, and Landscape Maintenance.

The overall objective of landscaping is to enhance the visual character and environmental quality of the installation. This can be achieved by using plant material to:

- Blend the built environment with the natural environment.
- Provide scale and comfort to pedestrian environments.
- Reinforce the hierarchy of the circulation systems.
- Screen unsightly views or elements.
- Buffer incompatible land uses.
- Reduce heat in parking lots and other large paved areas.

Having appropriate and attractive landscaping at each installation will promote a unified Region look. Due to geographic sub-climates, the landscaping will differ slightly from installation to installation and between micro-climates.

Banalo, Rosewood (Thespesia populnea)

Niyoron (Cordia subcordata)

LANDSCAPE PLANNING

Good landscape planning can positively affect the visual environment of the installation and reduce maintenance costs. Choosing appropriate plant material for a given location and properly locating the plants are key in creating excellent landscaping.

Landscape planning elements discussed in this section include:

- Sustainability
- Plant Protection and Preservation
- Design for Minimal Maintenance
- Minimizing Wind Damage

Daog, Daok, Palomaria (Calophyllum inophyllum)

Daog, Daok, Palomaria (Calophyllum inophyllum)

Sustainability

Landscaping should be sustainable through such efforts as:

- Emphasizing the native culture
  - Use native plants and design elements.
- Maximizing open/green spaces
  - Create outdoor plazas and gathering spaces for both active and passive activities.
  - Provide connectivity between adjacent areas.
- Reducing the heat island effect
  - Provide canopy trees at parking lots, roads, walkways and plazas/courtyards.
- Conserving energy
  - Use trees to protect west and south-facing building exposures.
- Providing a mature tree canopy
  - Protect and maintain existing trees.
  - Provide canopy trees, especially at parking lots and walkways.
- Minimizing irrigation water demand
  - Use primarily native and adapted plants.
- Applying integrated pest management principles
  - Select plants that are pest-resistant and adapted to the environment.

Fadang, Cycad (Cycas circinalis)

Plant Protection and Preservation

An important element of landscape planning is protecting and preserving appropriate existing plant resources. The following guidance should be applied:

- Preserve existing trees that are in good health.
- Wherever possible, plan construction to preserve significant trees, and protect trees from damage during clearing and construction.
- Transplant existing significant trees that cannot be preserved in their present location to a different location on-site or elsewhere.

Significant trees are determined on a case-by-case basis. Typically, significant trees are a tree, or grove of trees, with historic or cultural value, or which by reasons of age, rarity, location, size, esthetic quality or endemic status are worthy of preservation.

In areas where only some of the plant resources can be saved, the following guidance should be applied to maintain the landscaping design:

- Replace diseased, deteriorating, or dying mature trees with the same species, as appropriate.
- Replace vegetation with mature stock whenever feasible to maintain uniformity with neighboring trees and shrubs.

Freedom Trees – planted in honor of those killed in action during the Battle of Orote Peninsula (July 1944)

Design for Minimal Maintenance

Maintenance can be reduced through the choice of appropriate landscaping material, careful siting, and proper installation. The landscape planning phase is the ideal time to make decisions that can greatly reduce maintenance costs.

The following guidelines should be applied to ensure that landscape projects are designed for minimal maintenance:

- Install high quality plant material of the appropriate size.
- Use plants that are native, drought-resistant, low maintenance and pest-resistant wherever possible. Often the best plants are native plants that occur naturally in the area and are capable of surviving on natural rainfall.
- Allow plants to conform to their natural shape. This allows the plant to mature in a healthy manner, and saves on resources required for trimming.
- Select plants that physically fit within the area to be landscaped, not only at the time of planting but during the entire life of the adjacent structures.
- Plant trees instead of shrubs whenever possible for maximum effectiveness with the lowest required upkeep.
- Install root control barriers for trees with aggressive root systems to protect roads, sidewalks, curbs and utilities from root intrusion.
- Limit higher maintenance shrubs and groundcovers to high impact areas.

High maintenance landscaping (not recommended)

Natural shrub form does not require pruning

- Do not plant shrubs too close to sidewalks.
- Limit the amount of annuals.
- Plant groundcover on slopes greater than 3:1 for easier and safer maintenance.
- Plant groundcover or install mulch in shady areas where grass will not grow well.
- Provide a break and/or barrier between turf and groundcover areas to prevent turf from encroaching.
- Use mulch beds and weed barrier fabrics to inhibit the growth of weed and grasses, reduce the need for pesticide use, conserve moisture, and buffer soil temperature.
- Provide a minimum 600 mm (2 feet) wide concrete maintenance strip around the perimeter of buildings. This maintenance strip may double as a walkway if the width is increased to 900 mm (3 feet).
  - Allows room for building painting, window washing, and other regularly scheduled maintenance procedures.
  - Provides increased air circulation around the building, which will reduce the occurrence of mold and rot.
  - Keeps plants away from the buildings, thereby reducing easy access for termites, cockroaches and other insects.
  - Allows for visual inspection for the entry points of insects and pests into the buildings.
- Add organic matter into the soil to retain moisture and allow for good drainage.
- 'Zone' or group plants together according to their watering requirements.

Maintenance of lawn on steep slopes

Minimizing Wind Damage

There is no way to protect trees from storm damage as they are only adapted to the average wind climate. Tree species vary in their ability to withstand typhoons with wind resistance generally dependent on the interrelation of:

- Strength of wood.
- Shape and size of crown.
- Extent and depth of the root system.
- Previous moisture conditions.
- Shape of the hole.

Gagu, Gago, Ironwood (Casuarina equisetifolia)

Pre-Storm

In order to ***minimize*** storm damage:

- Plant trees that have a higher wind tolerance. In general, wind resistant trees tend to:
  - Be native species.
  - Be slow growing trees.
  - Be young to middle age trees.
  - Be very healthy and vigorous.
  - Be well-maintained.
  - Have a strong, deep penetrating, radial root system.
  - Have a low center of gravity.
  - Have an open branching character.
  - Have small, fine textured leaves.
- Plant trees in groupings rather than as single trees. Trees in the inside of groupings are more sheltered than those at the perimeter.
- Plant trees where their roots will have room to spread. Trees planted in small spaces, too close to structures, and in shallow or compacted soils tend to fall over more easily.
- Allow trees to adjust to the wind environment. If newly planted trees need to be staked, loosely tie the tree where the stem can bend and move with the wind. Ensure that no girdling occurs by continuing to loosen the ties as the tree grows.

- Keep trees as healthy as possible.
  - Healthy trees adjust more quickly to changes in the environment and are more wind firm.
  - Pest damage and old wounds are structurally weaker than normal solid wood.
  - Roots that are constrained, diseased or damaged during construction are subject to greater stress as the top of the tree increases in size.
- Do not over fertilize the tree with nitrogen or over water the soil. Both of these practices can increase crown surface area and decrease the rooting area.
- Practice proper pruning techniques.
- Eliminate co-dominant branches. Co-dominant branches (forks) are structurally weak and subject to split and cracks.
- Eliminate lopsided crowns. More wind load on one side produces twisting which weakens the crown and stem.
- Prune trees to have one main stem. Eliminate branches with tight or narrow crotches which are potential weak spots.
- Remove all limbs overhanging utility lines and structures.
- Prevent damage to the trunks of palms from line trimmers. Wounds to the trunks of palms do not heal over as in trees, thereby weakening the trunk.
- Remove weak and diseased trees and palms as part of the landscape maintenance program.

Prevent damage to the trunks of palms

Remove dead trees to minimize storm damage

Post-Storm

Much of the damage caused by storms is to vegetation. Basic tree care after a storm includes:

- Prune broken limbs to minimize the risk of decay entering the wound. Prune smaller branches at the point where they join larger ones. For larger branches, prune back to the trunk or a main limb.
- Repair torn bark to eliminate hiding places for insects and help wounds heal faster.

Many trees have an outstanding ability to recover from storm damage. In general:

- Mature, healthy trees can survive the loss of a major limb.
- Young trees can sustain quite a bit of damage, yet still heal quickly.
- A healthy tree can be saved even though it has been damaged if enough strong limbs remain.
- For marginal trees, resist the temptation to immediately cut them down. Remove the damaged limbs and monitor the trees' health.
- Remove the damaged tree if:
  - It has already been weakened by disease.
  - The trunk is split.
  - The tree has lost its crown.

After a storm, trees that have been wholly uprooted with the rootball intact may be encountered. These trees may be saved by:

- Covering the exposed roots as soon as possible with wet burlap, sand, mud or other material to keep the roots from drying out before they can be righted.
- Trimming the shattered roots, if any, just before righting the tree.
- Installing guy wires to hold the tree in place, after it is restored to its original position, until the root system can regenerate.
- Watering the tree well; water slowly for a long period.
- Monitoring for insects and diseases.

PLANT MATERIAL

This section contains the Recommended Plant List *(Table 5.1)* to be used in landscaping plant selection for installation projects. Guidance on the size and installation of plant material is also given to help ensure the plants selected will have a better chance of survival.

Recommended Plant List

The Recommended Plant List identifies a variety of plant materials that are appropriate for Naval Region Marianas and compatible with existing plant materials.

The Recommended Plant List is divided into the following categories:

- Trees
- Palms
- Shrubs
- Groundcovers
- Grasses

The Recommended Plant List summarizes the possible uses, characteristics, cultural requirements, and description of the plants. Refer to the most recent *Tropical Landscaping and Plant Selection Guide for Hawaii, Guam and the Pacific Islands* for detailed descriptions and photographs of the plant materials.

The Recommended Plant List is not exclusive; it has been established to assist the landscape architect in selecting plants appropriate to the installation. The landscape architect must use his/her personal judgment in selecting the appropriate materials for each specific situation.

Breadfruit (Artocarpus spp.)

Tiare (Gardenia taitensis)

Native Plants

Native plants are not only beautiful and practical, but beneficial to the environment. They have adapted to survive in climatic conditions that exist in the area and often require less water, care, and maintenance.

Native plants are also an important part of a region's cultural heritage. These plants were intertwined with the daily lives of the indigenous people as they served as sources of medicine, fiber, fuel, food,and wood.

The planting of native trees will enhance the architectural theme of "The Legacy of Cultural Diversity" by serving as a means through which people might learn about the Chamorro culture. For example, the planting of Pahong *(Pandanus dubius)* and Ifit *(Intsia bijuga)* will provide materials for the traditional Chamorro arts of weaving and wood carving.

Wind Tolerance

Due to the frequent occurrence of typhoons, plants that have a higher wind tolerance should be selected for exposed areas. A rating for wind tolerance is provided for each plant on the Recommended Plant List. Plant tolerances are rated as high, medium, or low.

Salt Tolerance

Plants that can survive and flourish near the ocean in salty conditions should be selected for coastal areas. A rating for salt tolerance is provided for each plant on the Recommended Plant List. Plant tolerances are rated as high, medium, or low.

Size of Plant Material

Plant material needs to be of sufficient size for impact and high survival rates.

The use of larger plants that are spaced further apart rather than smaller plants located closely together is preferred for this region.

Plant material recommended sizes at time of installation:

- Trees: 2.5 M (8') high, 1.5 M (5') spread, 50 mm (2-inch) caliper
- Single Trunk Palm: 1.8 M (6') brown trunk height
- Multi-trunk Palm: 1.5 M (5') tall, 5 cane/trunk
- Shrubs: 600 mm (2') high

Pandanus spp.

TREES

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Acacia confusa	Formosa koa	Sosugi	40	30	⊙	⊙	○	○	○	⊙	⊙	⊙	⊙	○	⊙	✕ ❁ ✱ ●	Ornamental, light open appearance. Withstands severe pruning.	
Artocarpus altilis	Seedless Breadfruit	Lenmai	50	30	⊙	⊙	○	⊙	◖	⊙	◖	◖	◖	◖	⊙	✕ ∴ ● ▣	Bright green, glossy, deeply lobed leaves with yellow veins. Sticky, white latex. Root shoots	I
Artocarpus mariannensis	Seeded/ Micronesian Breadfruit	Dokdok Dukduk Dugdug	50	30	⊙	⊙	○	⊙	◖	⊙	◖	◖	◖	◖	⊙	✕ ∴ ● ▣	Leaves are smaller and not as deeply lobed as A. altilis. Staple food of Chamorros. Wood used for canoes.	E
Barringtonia asiatica	Fish kill tree	Puting	50	40	⊙	⊙	⊙	○	○	○	⊙	⊙	⊙	⊙	⊙	✕ ✱ ●	Indigenous tree. Very tough. Bouyant fruit was used to poison fish.	I
Bauhinia blakeana	Hong Kong Orchid		35	35	⊙	⊙	◖	◖	◖	⊙	◖	⊙	○	○	⊙	✕ ❁ ✱	Purple, orchid-like flowers. Multiple trunks. Fragrant.	
Calophyllum inophyllum	Palomaria	Daok Daog	60	50	○	⊙	⊙	⊙	◖	⊙	⊙	⊙	⊙	○	⊙	✱ ●	Withstands severe pruning. Excellent beach tree. Slow growing.	I
Cananga odorata	Ylang-Ylang	Alangilang	40	30	⊙	⊙	⊙	○	○	○	◖	◖	○	○	⊙	✕ ❁ ● ♦	Very fragrant greenish-yellow flowers turn deep yellow when mature. Greenish-black, olive-like fruit.	
Casuarina equisetifolia	Ironwood	Gagu Gago	70	20	⊙	⊙	○	○	◖	⊙	⊙	⊙	⊙	○	⊙	∴ ⊘	Rough, deeply furrowed bark. Very fast growing. Fixes nitrogen. Excellent wind break.	I
Clusia rosea	Autograph tree		40	30	○	⊙	○	⊙	○	⊙	⊙	⊙	⊙	◖	⊙	✱ ●	Good at beach. Withstands severe pruning. Pods decorative.	

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
⊙	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

✕	Accent/Specimen	❁	Color/Flower	∴	Screen/Buffer	✱	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	▣	Climber	▣	Color /Fruit

Table 5.1 Plant List

TREES

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Conocarpus erectus	Silver Buttonwood		20	20	○	⊙	○	◖	○	○	⊙	⊙	⊙	○	⊙	✕ ⊕ ∴ ✱ ▣	Excellent at beach. Withstands severe pruning. Silvery foliage.	
Cordia subcordata	Kou	Niyoron	30	25	⊙	⊙	⊙	⊙	◖	⊙	⊙	⊙	⊙	○	⊙	✕ ⊕ ✱ ●	Orange, bell-shaped flowers. Green fruit that turns black.	I
Delonix regia	Flame tree		40	50	⊙	◖	⊙	○	⊙	○	⊙	⊙	◖	⊙	⊙	✕ ⊕ ✱ ●	Orange to orange-red summer color. Long seed pod. Very wind resistant.	
Elaeocarpus joga	Blue Marble Tree	Yoga	50	25	⊙	⊙	○	◖	○	○	○	◖	○	○	◖	✕ ● ▣	Reddish young growth. White flowers. Blue, round fruits.	E
Ficus retusa	Chinese Banyan		60	90	⊙	⊙	○	◖	⊙	◖	⊙	⊙	⊙	⊙	⊙	●	Excellent container tree when growth controlled.	
Guettarda speciosa	Zebrawood	Panao	30	20	◖	⊙	◖	◖	○	⊙	◖	◖	⊙	○	⊙	✕ ⊕ ♦	Small, fragrant, jasmine-scented, tubular white flowers.	I
Hernandia nymphaeifolia	Lantern Tree	Nonak Nonag	60	30	◖	⊙	◖	◖	○	⊙	⊙	⊙	⊙	○	⊙	✕ ✱ ● ▣	Fruit has a white to red, translucent outer casing like a balloon. Hard, black, ribbed nut inside.	I
Hibiscus tiliaceus	Sea Hibiscus	Pago	25	25	⊙	⊙	◖	⊙	◖	○	⊙	⊙	⊙	⊙	⊙	∴ ●	Excellent at beach. Withstands vigorous pruning.	I
Intsia bijuga	Ifil, Ifel	Ifit	50	30	○	⊙	◖	◖	○	⊙	⊙	⊙	⊙	⊙	⊙	✕	Almost impervious to termites. Wood used in traditional carving. Territorial tree of Guam. Buttress roots.	I

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
⊙	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

✕	Accent/Specimen	⊕	Color/Flower	∴	Screen/Buffer	✱	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

TREES

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Morinda citrifolia	Indian Mulberry	Lada	25	10	◉	◉	○	◉	◖	◉	◉	◖	◉	○	◉	✕	Ovoid, fleshy greenish-yellow fruit. White, five-pointed flowers.	I
Neisosperma oppositifolia		Fagot Fago	50	30	◉	◉	◉	◖	○	◖	◉	◉	◉	○	◖	✕ ⊛ ∴ ♦	Highly typhoon resistant. White, fragrant flowers in dense clusters. Edible seeds.	I
Pandanus dubius	Screw Pine Pandanus	Pahong Pahon	20	20	○	◉	◖	○	◖	○	◉	◉	◉	○	◉	✕ ▣	Edible seeds. Entire fruit cluster used in fiesta decoration. Waxy leaves for weaving mats. Broad leaves come to an abrupt point.	I
Pandanus tectorius	Screw Pine Pandanus	Kafu	20	20	○	◉	◖	○	◖	○	◉	◉	◉	○	◉	✕ ▣	Pineapple-like fruits used in decoration. Excellent beach tree. Prop roots. Thorny leaves.	E
Pterocarpus indicus	Narra		60	30	◉	◖	◖	◖	○	○	◖	◉	◖	○	◉	✕ ⊛ ✱ ●	Graceful tree with drooping branches. Winged fruit. Timber has rose-like fragrance. Showy yellow flowers.	
Terminalia catappa	Tropical Almond	Talisai	70	80	◖	◖	○	◉	◉	◖	◉	◉	◉	◉	◉	∴ ●	Good at beach. Prune after fruiting. Beetles. Messy fruits and leaves.	I
Thespesia populnea	Rosewood	Binalo Banalo Kiluk	30	30	◉	◉	◉	◖	◉	◉	◉	◉	◉	○	◉	∴ ●	Yellow, hibiscus-like flowers, all year. Round, woody seed pods.	I
Tournefortia argentea	Tree Heliotrope, Velvet Leaf	Hunek Hunik	20	20	◖	◉	◉	◖	○	◉	◉	◉	◉	○	◉	✕ ∴ ● ⊘	Silvery leaves with very fine gray-green hairs. Bunches of tiny white flowers.	I

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
◉	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

✕	Accent/Specimen	⊛	Color/Flower	∴	Screen/Buffer	✱	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

PALMS

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Foliage	Flower	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Archontophoenix alexandrae	Alexander Palm		60	10	○	○	◖	○	◖	○	◖	○	○	⊙	⌘ ✱ ✖	Good ornamental palm.	
Areca catechu	Betel Nut Palm	Pugua'	40	8	◖	⊙	○	○	⊙	○	○	○	○	⊙	⌘ ✖	Slender single trunk palm with gray rings. Yellow to orange to red ovoid fruit. "Nut" chewed as a stimulant.	I
Chrysalidocarpus lutescens	Areca Palm		20	10	◖	⊙	○	○	⊙	○	◖	◖	○	⊙	∴	Clumping palm with inconspicuous, white flowers. Yellow, date-like fruit.	
Cycas circinalis	Cycad	Fadang Federico	18	10	○	⊙	○	○	◖	◖	◖	◖	○	◖	⌘	Palm-like. Susceptible to scale.	I
Cycas revoluta	Sago palm		15	4	○	○	○	◖	⊙	⊙	⊙	⊙	○	⊙	⌘	Excellent container palm. Dwarf variety available.	
Livistonia chinensis	Chinese Fan Palm		40	10	○	⊙	○	○	⊙	⊙	◖	◖	○	⊙	⌘ ✖	Single trunk plam with inconspicuous flowers. Blue-green, olive-like fruit.	
Phoenix roebelenii	Dwarf Phoenix Palm		10	8	○	⊙	○	○	⊙	⊙	⊙	◖	○	⊙	⌘ ∴	Small, graceful palm with incon-spicuous cream-colored flowers. Occasional red fruit.	
Pritchardia pacifica	Fiji Fan Palm		30	10	○	⊙	○	○	⊙	◖	⊙	⊙	○	⊙	⌘ ✖	Single trunk palm with fan-shaped leaves. Insignificant flowers.	
Roystonea oleracea	Caribbee Royal Palm		80	20	◖	⊙	○	○	⊙	◖	⊙	◖	○	⊙	⌘ ✖	Stout, single trunk palm. Inconspicuous flowers. Date-like fruit.	
Veitchia merrillii	Manila palm		20	5	⊙	○	◖	○	⊙	◖	◖	⊙	○	⊙	⌘ ✱ ✖	Single trunk plam. Neat, compact crown of feather-like fonds.	
Wodyetia bifurcata	Foxtail Palm		30	10	⊙	⊙	○	○	⊙	◖	⊙	◖	○	⊙	⌘ ✖	Slender, gray trunk, swollen at base. Circular arrangement of leaflets provides a full appearance.	

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
⊙	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

⌘	Accent/Specimen	⊛	Color/Flower	∴	Screen/Buffer	✱	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

SHRUBS

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Allamanda cathatica	Yellow Allamanda		12	-	◖	⊙	⊙	○	⊙	◖	◖	○	⊙	✕ ❁ ⁂ ⊘ ♦ ✠	Large, bright yellow flowers. Informal climber.	
Alpinia purpurata	Red Ginger		8	4	⊙	⊙	⊙	○	⊙	○	○	○	◖	✕ ❁ ⁂	Showy, spike of red bracts. Upright stalks in clumps.	
Carissa macrocarpa	Natal plum		9	4	◖	⊙	◖	○	⊙	◖	⊙	⊙	⊙	❁ ⁂ ▣	Edible fruits. Good at beach. Severe pruning.	
Codiaeum variegatum	Croton		10	5	○	○	⊙	○	⊙	⊙	⊙	⊙	⊙	✕ ❁ ⁂	Many varieties of leaf sizes, shapes and colors. Withstands pruning.	
Cordyline fruticosa	Ti		10	4	◖	○	⊙	○	○	◖	○	○	◖	✕ ❁ ⁂	Numerous varietis available. White and lilac flower clusters in fall and winter.	
Crinum asiaticum	Spider lily		6	5	⊙	⊙	⊙	○	◖	◖	⊙	⊙	⊙	✕ ⁂	Good at beach. White flowers, year-round.	
Duranta repens	Yellow duranta		2	2	◖	○	○	○	⊙	⊙	◖	○	◖	✕ ❁ ▣	Orange berries.	
Gardenia taitensis	Tiare		12	6	◖	⊙	◖	○	◖	◖	◖	⊙	⊙	✕ ❁ ⁂ ♦	Good ornamental shrub. Fragrant, star-like, white flowers.	

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
⊙	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

✕	Accent/Specimen	❁	Color/Flower	⁂	Screen/Buffer	✸	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber up to 20ft	▣	Color /Fruit

Table 5.1 Plant List (continued)

SHRUBS

Botanical Name	Common Name	Chamorro Name	Height (ft.)	Spread (ft.)	Growth Rate	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Exposure	Uses	Remarks	E=Endemic I= Indigenous
Heliconia psittacorum	Parrot's beak		4	3	◉	◖	◉	◖	◖	◖	◖	◖	◖	✕ ⊛ ⊘	Several color forms. Excellent cut flowers.	
Hibiscus rosa-sinensis	Red Hibiscus	Gumamela	15	8	◉	◉	◖	◖	◖	○	◉	◖	◉	✕ ⊛ ∴	Excellent for hedges. Large, red flowers, all year. Numerous cultivars available.	
Ixora spp.	Ixora		6	3	◖	◉	○	○	◖	○	◖	○	◉	✕ ⊛	Year round color. Withstand pruning. Many varities availabe.	
Pseuderanthemum reticulatum	Golden Eldorado		4	3	◉	◉	◖	○	◉	○	◖	◖	◉	✕ ⊛ ∴	Yellow and green leaves. Upright stalks of small white flowers with purplish dots.	
Rhaphiolepis spp.	Rhaphiolepis		3	3	○	◖	◖	○	◉	◉	◉	◉	◉	✕	Compact shrub, very tough.	
Scaevola taccada	Naupaka/ Half-flower	Nanaso	10	3	◉	○	◖	○	◉	◉	◉	◉	◉	∴ ⊘	Excellent at beach. Withstands severe pruning. Small, white flowers. Whte, round fruit.	I
Strelitzia reginae	Bird of Paradise		5	5	○	◖	◉	○	◉	◉	◖	◖	◉	✕ ⊛ ∴	Orange and blue flowers, all year. Stiff banana-like leaves.	

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure
◉	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade

Uses:

✕	Accent/Specimen	⊛	Color/Flower	∴	Screen/Buffer	✸	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

GROUNDCOVERS

Botanical Name	Common Name	Chamorro Name	Height (in.)	Spread (in.)	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Traffic Resistance	Uses	Remarks	E=Endemic I= Indigenous
Arachis pintoi 'Golden Glory'	Golden glory		6	72	◉	◉	◉	◖	○	◉	◉	◉	○	◉	◉	◉	⌘ ✖ ⊘	Use on slopes. Tolerant of low fertility. Yellow, pea-like flowers.	
Carissa macrocarpa 'Prostrata'	Prostrate natal plum		18	18	◉	◉	○	◖	○	◉	◉	◉	◉	○	◉	○	⊘	Tough low growing shrubs. Thorns. White, star-like flowers.	
Catharanthus roseus	Periwinkle	Chichirica	24	12	◉	◉	◉	○	○	◖	○	◖	◖	◉	◉	○	⌘ ⊕	Easily grown. Re-seeds itself.	
Ipomoea pes-caprae	Beach morning glory	Alalag Tasi	12	180	◉	◉	◉	◉	○	◉	◉	◉	◉	◉	◉	◉	⌘ ✖ ⊘	Use on beach areas. Purple, funnel-shaped flower.	I
Lantana montevidensis	Trailing Lantana		24	36	◉	◉	◉	○	◖	◉	◉	◖	◖	◉	◉	◖	⌘ ⊕ ⊘	Recommended for use on slopes. Small, lavender flowers, all year.	
Ophiopogon jaburan 'vittatus'	White grass		24	12	○	◉	○	○	○	◉	◖	◖	◉	○	○	○	⌘ ✖	Accent or border.	
Phymatosorus scolopondria	Laua'e Fern	Kahlao	36	36	◖	◉	○	◖	○	◉	◖	◖	◖	◉	◖	◖	⊘	Grows in full sun or partial shade. Leaves smell like Maile.	I
Rhoeo spathacea	Rhoeo		12	6	◖	◉	○	◉	○	◉	◖	◉	◖	○	◖	◖	⌘ ⊕ ✖	Bright purple foliage color. Small, white flowers.	
Ruellia spp.	Ruellia		12	12	◖	◉	◖	○	◖	◉	○	◖	◖	○	○	◖	⌘ ⊕ ✖ ⊘	Use on slopes/level areas. 18-24" spacing. Avoid areas where trash/ litter accumulate.	
Russelia equisetiformis	Firecracker plant		48	36	◖	◉	◉	○	○	○	◖	◖	◖	○	◉	◖	⌘ ⊕	Cascading flowers and foliage.	
Vitex rotundifolia	Beach Vitex	Lagundi	36	72	◉	◉	◉	◖	○	◉	◉	◉	◉	◉	◉	◖	⌘ ⊕ ⊘	Violet flowers on short spikes at ends of leaves. Fragrant leaves.	I

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Traffic Resistance
◉	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun	High
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable	Medium
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade	Low

Uses:

⌘	Accent/Specimen	⊕	Color/Flower	∴	Screen/Buffer	✸	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⊘	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

GRASSES

Botanical Name	Common Name	Chamorro Name	Growth Rate	Texture	Maintenance	Pest	Drought	Salt	Root	Exposure	Traffic Resistance	Uses	Remarks	E=Endemic I= Indigenous
Cynodon dactylon	Common Bermuda grass		⊙	○	◖	⊙	⊙	⊙	⊙	⊙	⊙	✖⃠	Fast recovery from damage. Does not do well in shade.	
Paspalum vaginatum	Seashore paspalum		⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	⊙	✖⃠	Very drought tolerant. Does not do well in shade. Tolerates saline conditions.	
Pennisetum clandestinum var. 'AZ-1'	Kikuyu grass 'AZ-1'		⊙	○	◖	⊙	◖	◖	◖	◖	⊙	✖⃠	Moderate shade tolerance.	
Zoysia japonica 'El Toro'	Zoysia 'El Toro'		⊙	◖	⊙	⊙	⊙	◖	⊙	◖	◖	✖⃠	Very drought tolerant. Resists normal wear. Tolerates shade.	
Zoysia japonica x tenuifolia 'Emerald'	Zoysia 'Emerald'		⊙	◖	⊙	⊙	⊙	◖	⊙	◖	◖	✖⃠	Shade tolerant Zoysia. Resists wear.	

	Growth Rate	Foliage	Flower	Texture	Maintenance	Pest	Drought	Wind	Salt	Root	Exposure	Traffic Resistance
⊙	Fast	Evergreen	All year	Coarse	High	High	High	High	High	Aggressive	Full sun	High
◖	Moderate	Semi-deciduous	Periodic	Medium	Medium	Medium	Medium	Medium	Medium	Semi-aggressive	Adaptable	Medium
○	Slow	Deciduous	Periodic/ insignificant	Fine	Low	Low	Low	Low	Low	Non-aggressive	Partial shade	Low

Uses:

✖	Accent/Specimen	⊛	Color/Flower	∴	Screen/Buffer	✸	Street Tree	✖	ATFP Unobstructed Space
●	Shade Tree	⃠	Erosion Control	♦	Fragrance	✠	Climber	▣	Color /Fruit

Table 5.1 Plant List (continued)

LANDSCAPE MAINTENANCE

Proper maintenance of landscape materials is critical to sustaining the contributions they make to installation appearance. A successful maintenance program will:

- Ensure clean and orderly appearance of grounds.
- Protect the health and safety of users.
- Maintain the design intent of the landscaping.
- Operate efficiently and within cost constraints.

Detailed guidance on landscape maintenance is provided in *Appendix A*. Maintenance personnel should be trained and supervised to ensure compliance with program objectives.

Tree protection from maintenance machinery (Sasa Valley)

Good example of parking lot screening (Sasa Valley)

CHAPTER 6: Site Elements

6. SITE ELEMENTS

Site elements include items such as lighting, paving, bollards and AT/FP barriers, fences and screening, shelters/pavilions, static displays and flag poles, and site furniture (including benches, tables, bike racks and trash receptacles).

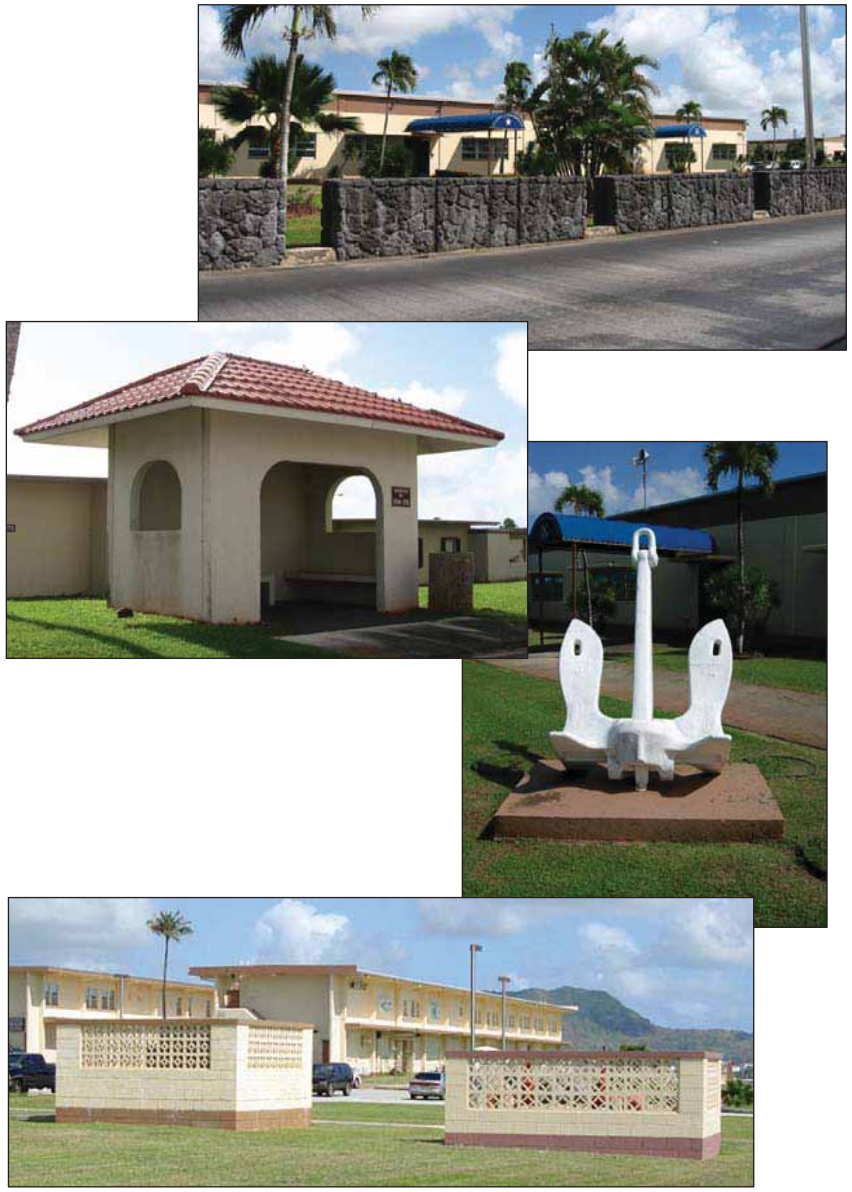
Site elements should be part of an established, coordinated system that provides consistency and continuity throughout the installation. As such, the design and location of site elements should express an image, character and scale appropriate to the installation.

The number of different site elements should be minimized and their design should be simple to avoid visual clutter. Whenever possible, they should be grouped together and be multi-functional.

The Color Schedule in *Chapter 4* provides possible colors for site elements. In general, the darker brown colors are most appropriate for site element finishes as it minimizes their appearance and requires less maintenance.

Whenever possible, site elements should be made of recycled materials. Durability is also an important feature of site elements to minimize maintenance costs.

A signage plan for COMNAVMAR is currently underdevelopment and will provide the guidance for signage design. In the interim, the signage portion of the MRACS should continue to be used as guidance. Additionally, **only one electronic sign per installation is allowed.**



Site Furnishings at COMNAVMAR

LIGHTING

The primary purpose of exterior lighting is to provide a safe and secure nighttime environment. The goal of this guidance is to create a visually appealing nighttime atmosphere and to do so in an efficient manner with the use of energy efficient light sources *(Figure 6.1)*.

Considerations

- Use lighting to convey a sense of organization throughout the installation. Illuminate signage and landmark features to aid nighttime orientation.
- Identify the boundaries of the site and use. Minimize unwanted light spillage or glare with proper mounting height, spacing, shielding, and correct lamp wattage.
- Promote and enhance security with appropriate illumination levels.
- Provide a comfortable and safe illumination level for roads, walks, bikeways, recreation and parking areas that comply with applicable illumination requirements.
- Be appropriate to the scale of an area. Roadway lighting design should vary with the volume and type of traffic.
- Choose energy efficient lighting fixtures including solar powered where possible and appropriate.
- Minimize operational maintenance and repair costs by selecting light fixtures that are rustproof and that can meet typhoon and earthquake standards.

Figure 6.1 Typical Installation Lighting

Lighting Scale

The scale of lighting fixtures should be compatible with their use. Smaller scale poles or bollards are appropriate for pedestrian areas while larger scale poles are appropriate for roadways.

Below are listed main types of lighting standards and their typical heights.

- **Low Level Lighting** – Lighting is provided by fixtures mounted at heights below eye-level and typically used for special pedestrian walkways such as stairways, ramps, or secondary pathways *(Figure 6.2)*.
- **Walkway and Plaza Lighting** – This type of lighting is provided by fixtures located between 12 to 15 feet high and is used mostly to light primary pedestrian walkways and plazas *(Figure 6.2)*.
- **Parking and Roadway Lighting** – This type of lighting is used in large recreational areas, parking lots, and roadways. The fixtures are mounted an average of 30 to 50 feet in height *(Figure 6.2)*.

Other Considerations

- Use matte finishes and earth tone colors compatible with the colors in *Chapter 4: Building Color.*
- Use shielded fixtures wherever possible to avoid interference with migratory birds.
- Consider the use of appropriately designed light poles and fixtures in historically sensitive areas.
- For small facilities such as signs, fitness trails, bus stops, and pavilions, research the latest available technology for solar-powered lighting.
- Provide underground power supply to exterior lighting to reduce the visual clutter of overhead wires and power poles and reduce potential typhoon damage.

Electrical hardening projects throughout the Naval Base have resulted in massive concrete poles once used for both power distribution and light fixtures. If poles are replaced, the new poles should be more appropriate in scale and consistent across the installation. Solar-powered technology should be considered.

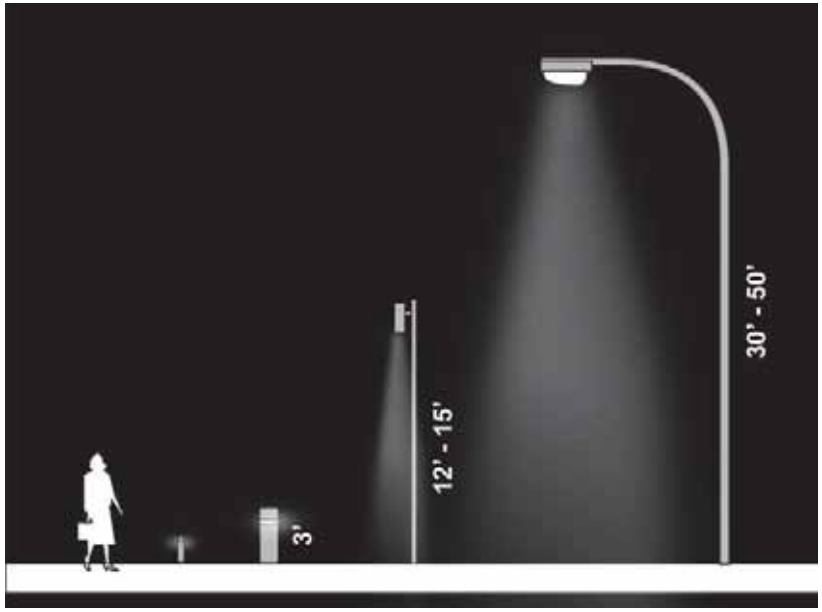


Figure 6.2 Lighting Standard Types

AT/FP SITE ELEMENTS

High visibility and redundancy in barriers, gates and other obstacles may be appropriate in certain applications, but less so in others. Integrated security measures that are both effective and aesthetic should be provided where possible. Examples include:

- Flagpoles, planters, and site furniture may be hardened to serve as barriers.
- Terraces, berms, and planting beds may be used as stand-off devices.
- Bollards, planters and site furnishings may be used to limit vehicular access through pedestrian access points.

While there are many constraints due to AT/FP requirements, they also create opportunities for landscaping. As facility setback areas are designed into new projects, these areas can be used to create attractive and safe settings with landscaping and site furnishings.

The most current *Department of Defense Minimum Antiterrorism Standards for Buildings* is used in the design of new facilities and in major renovations of existing facilities.

Main Gate

BOLLARDS

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas. On base they also are used to establish the perimeter of AT/FP setback areas.

Bollards designs should have a clean, utilitarian design *(Figure 6.3)*. In general, bollards and barriers should be a natural limestone color, stainless steel or concrete and not require painting. Use of reflective tape should be avoided.

Decorative concrete bollards/planters are to be used in recreation areas and other gathering places and may be custom-designed for the context in which they will be used. Decorative pedestrian bollards should also have lighting incorporated into the design to minimize the number of structures in an area *(Figure 6.4).* Caution is advised against the overuse or poor execution of latte motifs. *Figure 6.5* shows latte bollards for limited use.

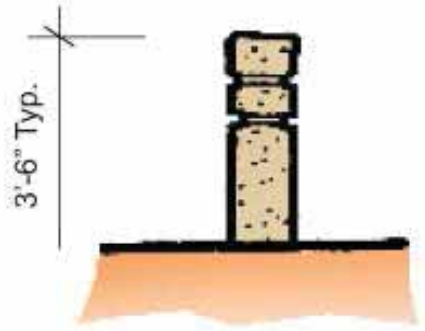


Figure 6.3 Concrete Bollard Example

Figure 6.4 Bollards with Lighting

Andersen Air Force Base

Figure 6.5 Latte Bollards for Limited Use

WALLS AND FENCES

Screen walls, fences and hedges redirecting focus away from dumpsters, utilities and parking lots. Fences prohibit entry into certain areas and serve to keep activities separated. Screens, fences and hedges should be attractive and consistent in terms of size, details and colors.

In general, walls and fencing should be:

- Consistent for use and be compatible with adjacent architecture and landscape design features.
- Unobtrusive and almost invisible when there is a vista.
- Transparent so you can see through it. Solid fencing is acceptable if an area is visually unattractive and/or needs to be screened.
- Dark or neutral in color. The exception is in industrial areas where some fences must have bright coloring for safety reasons.
- Articulated with pillars bases and caps along long walls to provide visual interest. Caps should be provided on all masonry walls.
- Perimeter fences should be made of decorative metal, concrete, masonry, or a combination thereof. Materials compatible with the local climate should be used for the lowest maintenance needs. *Figure 6.6* shows the prototype with that is part of *Project #5 Polaris Gate Improvements (Chapter 7: Implementation).*

Chain link fencing will likely continue to be used as a fencing material due to its relatively low cost and availability. However, its use should be limited to security fencing, general boundary fencing, and ball field screens. Where space, AT/FP and security guidelines permit, a screening hedge should be planted on either side of chain link fencing to improve appearance.

AT/FP standards require visibility through security fencing. Base perimeter fencing will be 9-guage galvanized steel chain link with five-strands of barbed-wire outriggers on posts spaced 10 feet on center. Fencing for facilities and compounds within the installation security gate will be similar to base perimeter fencing, but only three strands of barbed wire outriggers are required.

Examples of fences at COMNAVMAR

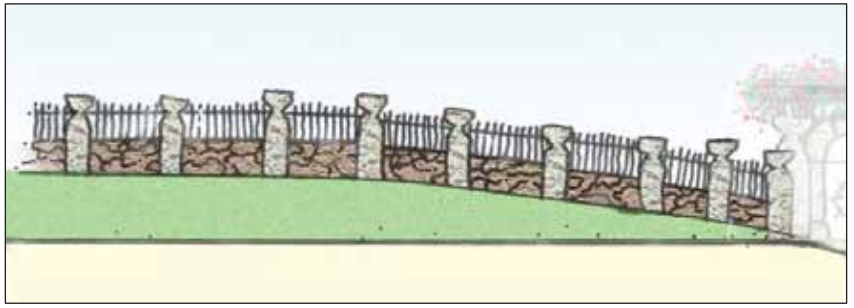


Figure 6.6 Entrance Gate Fencing Prototype

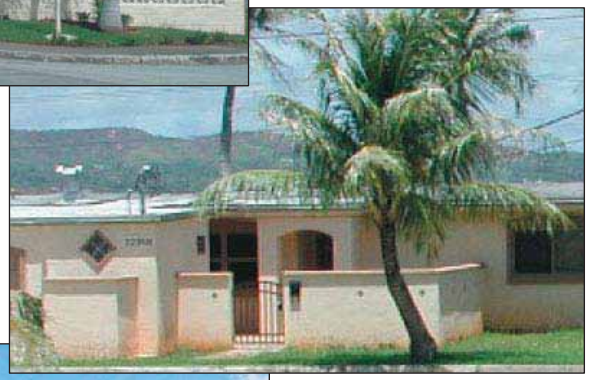
Screen Walls and Landscaping

The various screening options are shown in *Figure 6.7.*

In general, use the following guidance when creating a screened area:

- Screen unwanted views of utilities, service areas, rubbish bins and other unattractive features from high traffic public areas.
- Use appropriate style and height of wall / fence based on needed function particularly in community support areas.
- Use landscaping and landscaped berms as attractive, cost-effective methods for screening areas. Landscaping is also encouraged in conjunction with walls and fences to provide a visual screen.
- Use low maintenance and slow growing landscape along walls and fences to minimize labor intensive trimming.

Typical Screening Wall



Screening Wall for Privacy

Screening Hedge

Figure 6.7 Examples of Screening Walls and Landscaping at COMNAVMAR

SHELTERS

Shelters are used to provide protection from the sun and rain. The two main uses are for picnic areas and bus stops. Guidance on the design of these two shelter types is provided below.

Picnic Pavilions

Pavilions provide recreational spaces for outdoor food preparation and eating. The pavilion in *Figure 6.8* is the picnic prototype with a sloped concrete roof with Spanish tile style and should be used for all future construction. The prototype for the cast-in-place concrete columns is shown in *Figure 6.9.*

In general, picnic pavilions should be:

- Strategically located and sized for shared use to discourage a proliferation of small pavilions scattered throughout the installation.
- Placed in areas with scenic vistas or near outdoor gathering areas.
- Landscaped with trees to soften their look and to add a more park-like atmosphere. Trees are ideal for landscaping since at mature size they do not block vistas.
- Utilities should be placed on the implied backside of the pavilion, away from primary views.

Pavilions should have concrete furniture, BBQ facilities, trash receptacle, and night lighting (solar preferred). If practical, a water spigot/fountain should be provided nearby.

Picnic pavilion design can vary slightly based on location. It is important that clusters of shelters be consistent. For example, the Sumay Point shelters have natural rock pillars/façade and the recommended design is for concrete.

Temporary (cloth) shade structures and flat roof "pillbox-like" structures should not be allowed.

Figure 6.8 Recommended Pavilion Design

Figure 6.9 Recommended Pavilion Pillars

Bus Shelters

The installation-wide shuttle bus is an important mode of transportation for COMNAVMAR. Bus shelters provide comfort and protection from weather for users.

Bus shelters should be:

- Located where warranted by the degree of use and need for weather protection.
- Adjacent to paved sidewalks.
- Of simple, unobtrusive, and consistent design throughout the installation.
- Sited to provide those waiting in them sight lines to approaching buses. If the shelter has side walls, transparent openings should be provided for visibility and safety.
- Designed with landscaping that provides shade in the summer but does not block the sight lines of approaching buses.

The prototype for bus shelters is shown in *Figure 6.10*. It is constructed of cast-in-place concrete walls and has a sloped concrete roof with Spanish tile styling. Concrete seating, trash receptacles and solar night lighting are provided. Arched windows provide ventilation and visibility to roadway traffic.

Existing pillbox bus stops *(Figure 6.11)* could be retrofitted to this prototype.

Figure 6.10 Bus Shelter Prototype

Figure 6.11 Existing Bus Shelter Design (not recommended)

PAVERS AND PAVING

The type of pavement can contribute to the overall appearance of an area, and some types of pavement can be environmentally-friendly by allowing water to flow through the material into the ground instead of running off into drainage systems.

Where practical (e.g., overflow parking, emergency access areas), use a permeable landscaped surface supported either by concrete grid Grass-crete or Grasspave *(Figure 6.12).* Where permeable paving is not practical, use asphalt or concrete. Asphalt is recommended for vehicle parking areas and concrete for sidewalks and curbs.

Use a change in paving materials to distinguish between pedestrian and vehicular circulation areas or to mark a pedestrian crossing in high traffic areas.

Unit pavers or concrete stamping should be considered for courtyards, plazas, entrances and pedestrian street crossings (herringbone pattern) *(Figure 6.13).*

Street and building sidewalks should be concrete with broom finish and smooth troweled edges.

Figure 6.12 Grass-crete and Grasspave

Herringbone Paver Pattern

Building Entry Type Pavers

Figure 6.13 Paver Examples

STATIC DISPLAYS/FLAG POLES

Static displays, flag poles and memorials can provide visual interest and be educational *(Figure 6.14)*.

Static displays offer the opportunity to convey history, pride, honor, and celebration of events and achievements from the past. These images promote a unique positive appearance on the installation. Displays should be considered as sculpture and placed within an area of appropriate scale, space, and context. When a number of dissimilar items are close together their individual importance and significance is diminished.

Featured items should be placed on an elevated base that matches the materials used in the surrounding area. Plaques or other informational signage should be an integral part of the display, rather than being added as an afterthought.

Dark colors are suitable only when viewed against a light-colored background such as an expansive of pavers or a light colored building for contrast. A dark static display against a landscaped area can virtually disappear. White can be a good color for highlighting static displays but may require an increased level of maintenance over other colors.

The flagpole and yardarm, often flanked by anchors, is one of the consistent visual elements present on any Navy installation. Therefore, due to its universal appeal, acceptance, and recognition as a "Navy" signature, this element shall be presented at installation main entries to further the branding of the Navy. Such displays should avoid visual conflict with light poles, utilities, and signage.

Polaris Point Static Display

COMNAVMAR Quarterdeck

Flagpole at NAVFAC Marianas Building

Figure 6.14 Static Display and Flag Pole Examples

SITE FURNITURE

Attractive and appropriately-located benches, picnic tables and trash receptacles serve aesthetic and social functions. See *Figure 6.15* for recommended specifications for site furnishings.

Outdoor tables and seating shall generally be pre-cast concrete with durable exterior finish. Their style should be consistent with vicinity and or use (e.g., bus stop seating versus recreational area seating). Recycled plastic furniture is consistent with sustainability goals and is encouraged. Site furniture that is not concrete should be securely fastened to the ground.

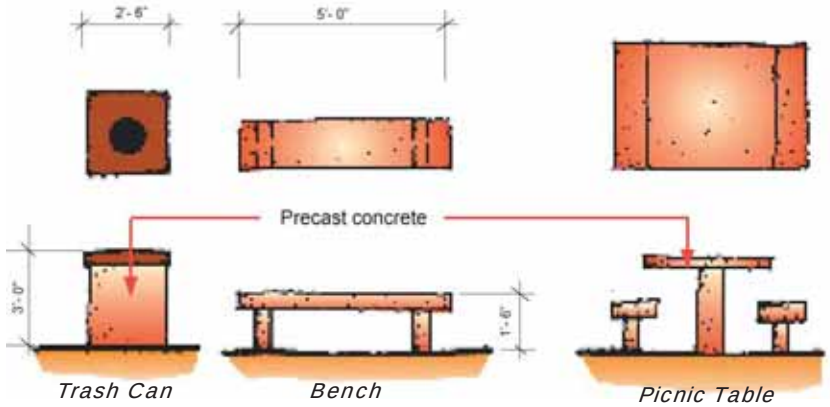


Figure 6.15 Recommended Site Furnishing Specifications

Benches

- Locate seating at bus stops and adjacent to paved walkways, entryways, plazas, and stairways where people may need to wait or want to stop and rest.
- Where longer-term sitting occurs, design seats with back supports, contoured seats and armrests.
- Use smooth seat surfaces constructed of materials that tend not to retain heat or splinter. Surfaces should also be pitched or slotted to shed water *(Figure 6.16)*. Consider using recycled plastic lumber.
- Use dull and light colored materials for seating surfaces that will be in direct sunlight to minimize heat retention. Use dark and shiny surfaces only in shaded locations.

Figure 6.16 Examples of Recommended Benches

Picnic Tables

- Avoid table tops with recesses that might hold water or food particles. The tables used for the outdoor seating area at the Galley are an excellent choice *(Figure 6.17)*.
- Locate tables with seating for socializing, relaxing or eating in spaces with a pleasant setting and attractive views.
- Vegetation near seating walls should not interfere with pedestrians or people that are sitting. Avoid plant species that are injurious, shed, or have staining debris.

Trash Receptacles

Trash receptacles should be attractive and of a consistent design throughout the installation.

Trash receptacles shall be pre-cast concrete exterior with pebble stone unpainted finish with dark brown trim, retractable bin and heavy duty-cover *(Figure 6.18)*. They shall be placed on paved surfaces.

The following guidance should be applied in the selection, placement and screening of trash receptacles:

- Consider weather protection, odor containment, and the need for insect-proofing when selecting a trash receptacle design.
- Trash receptacles for litter control should be visible and easily accessible. For example, receptacles should be located conveniently and strategically along sidewalks, near major walkway intersections, vending machine areas, and recreation and picnic areas.
- Trash receptacles should be of neutral or dark colors.

The screening walls in *Figure 6.8* are excellent way to screen unsightly dumpsters. Ideally; however, the dumpster should be fully enclosed with doors. Landscaping can also be used for screening. Proper access must be maintained for dumpster users and garbage collectors.

Figure 6.17 Recommended Picnic Tables

Figure 6.18 Recommended Trash Receptacles

Bicycle Racks

Bicycle racks and shelters are an important element of a bikeway circulation system as discussed in *Chapter 2: Site Design*.

Bicycle racks shall be located near secondary building entrances not primary entrances.

Bicycle racks should be consistent in design and color *(Figure 6.19)*. One style of rack should be selected and used for all future bicycle rack installations. They shall be installed on paved surfaces and constructed of polished stainless steel.

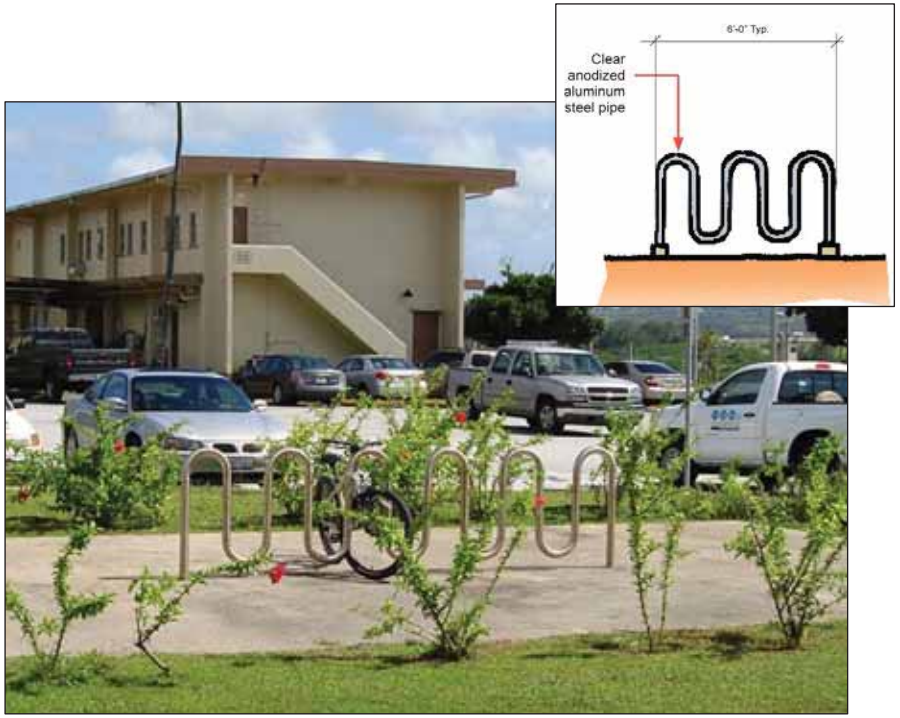


Figure 6.19 Typical Bicycle Rack

CHAPTER 7: Implementation

7. IMPLEMENTATION

This chapter addresses the implementation of the IAP design guides described in previous IAP chapters. Key components of this section are:

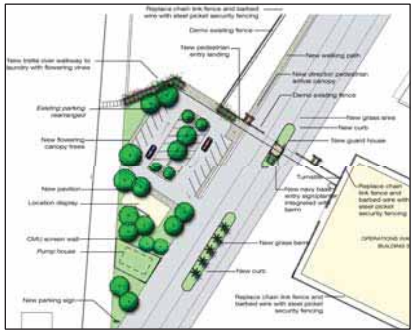
Project Hierarchy provides guidance for prioritizing base appearance projects.

IAP Review Process suggests how to incorporate the design standards in all base appearance projects proposed at Navy Region Marianas.

Priority Projects are proposals for improving key areas at Naval Base. Eight priority projects are described.

Recommendations are other projects to address visual liabilities identified at existing facilties.

IAP Updates and Funding Opportunties address keeping the plan current and discusses obtaining resources to implement IAP projects and recommendations.



Commander, Naval Forces Marianas Projects

PROJECT HIERARCHY

The primary criterion used to select base appearance projects for implementation is their potential to improve the existing visual environment. The following hierarchy should be used to guide the selection process. The higher the project is in the hierarchy, the greater the potential visual impact.

- *Priority #1 Projects:* Provide the greatest positive impact to the most people, colloquially stated as "the biggest bang for the buck." These typically include entry gates, primary and secondary roadways, and gathering place improvements.
- *Priority #2 Projects:* Improve wayfinding on vehicular and pedestrian routes, including implementation of the signage plan, improving the appearance of streets, and implementing a lighting plan.
- *Priority #3 Projects:* Improve building appearance through routine maintenance and renovations, or new construction. Although new buildings are generally the costliest expenditure, simple maintenance of the exterior of buildings will greatly improve appearance.

Other factors affecting the order in which the projects are executed include the cost and source of funding and/or labor. If a project can be accomplished by volunteer, self-help, or Seabees labor at low cost and in a short period of time, that project would be constructed prior to more expensive or complex projects.

IAP REVIEW PROCESS

As opportunities for improving installation appearance arise through building construction, demolition and maintenance projects, an effective process for applying the IAP guidance is critical. This will ensure that buildings are well-designed, building colors are correctly selected and applied, and appropriate landscaping and signage are included.

The key component in creating an IAP Review Process is to establish an IAP Review Team. The IAP Team needs to include members who have expertise in architecture, landscape architecture, and exterior building coloration. In addition, periodic training is recommended to keep Base Development informed and aware of the IAP vision and base appearance issues, requirements and guidelines.

Together the IAP Review Process and Team provide continuity and vision to implement the base appearance standards. Experience shows that bases that have an installation appearance review process for all maintenance and new projects have the most consistent and positive installation appearance impacts.

The IAP design standards are applicable to all construction and renovation projects that affect the exterior environment. IAP design standards shall be incorporated into all Navy Region Marianas project proposals regardless of contract type and funding [e.g., design-bid, design-build, Military Construction (MILCON), Special Projects, Self–Help]. All Requests for Proposals to contractors shall incorporate as appendix or by reference the IAP.

All proposed construction should also be evaluated for consistency with the ICRMP and RINRMP and federal regulations to protect significant cultural and natural resources.

Architecture

Architecture in particular should be subject to review in the early stages. Single-line diagrammatic conceptual floor plans developed at the installation level too often can become the final building layouts without proper design critique. Frequently, these layouts are done based on very specific square foot requirements for each function that will occupy a building, but with insufficient review of the exterior aesthetic and overall siting considerations.

Divergent spaces and floor plans for a single building can result in a random and discordant pattern of window placement and, in some cases, an irregular building shape. This approach only offers a short-term benefit since space requirements, and even the functions themselves, change over time. Simpler and more regular building forms are more flexible over the long term. They have a balanced and well-proportioned window pattern that enhances the appearance at little or no added cost.

Critical to this process is having a well-developed vision and consistency with IAP principles at the Functional Analysis Concept Development (FACD) stage and ensuing design reviews.

A thorough IAP review of the FACD and design phases should include assessment of a site plan, conceptual floor plan, exterior elevations, and longitudinal and cross sections.

Building Color

The guidance and colors provided in the IAP are a starting point for the IAP Review Team or designated color lead person. This person or one more team members should have an eye for color and experience in how exterior colors are viewed on a building depending on surroundings, size of building, etc. so that they are able to ensure a balance of consistency and interest in building color application.

Signage

Review of signage is also a task for the IAP Review Team after the Signage Plan is finalized. This would be especially helpful in preventing a proliferation of unneeded and uncoordinated signage. An application with sign type and proposed location should be submitted to the IAP Review Team for approval each time new signage is proposed.

Landscaping

The IAP Review Process should ensure appropriate landscaping is included with each project. This should include projects involving improvements to streetscapes and public areas, as well as individual facility improvements.

PRIORITY PROJECTS

Eight IAP Priority Projects are proposed for Navy Region Marianas, all of which are located at the Naval Base as shown on the map in *Figure 7.1*. Each project is assigned a number and presented in order of relative priority, with "1" being the highest priority.

Discussion of each project includes:

- Description of existing conditions.
- Brief statement of the project goal.
- Description of the project including site plans, renderings, and a rough order of magnitude (ROM) cost estimate (cost estimate details are provided in *Appendix B).*

Priority Project Sites

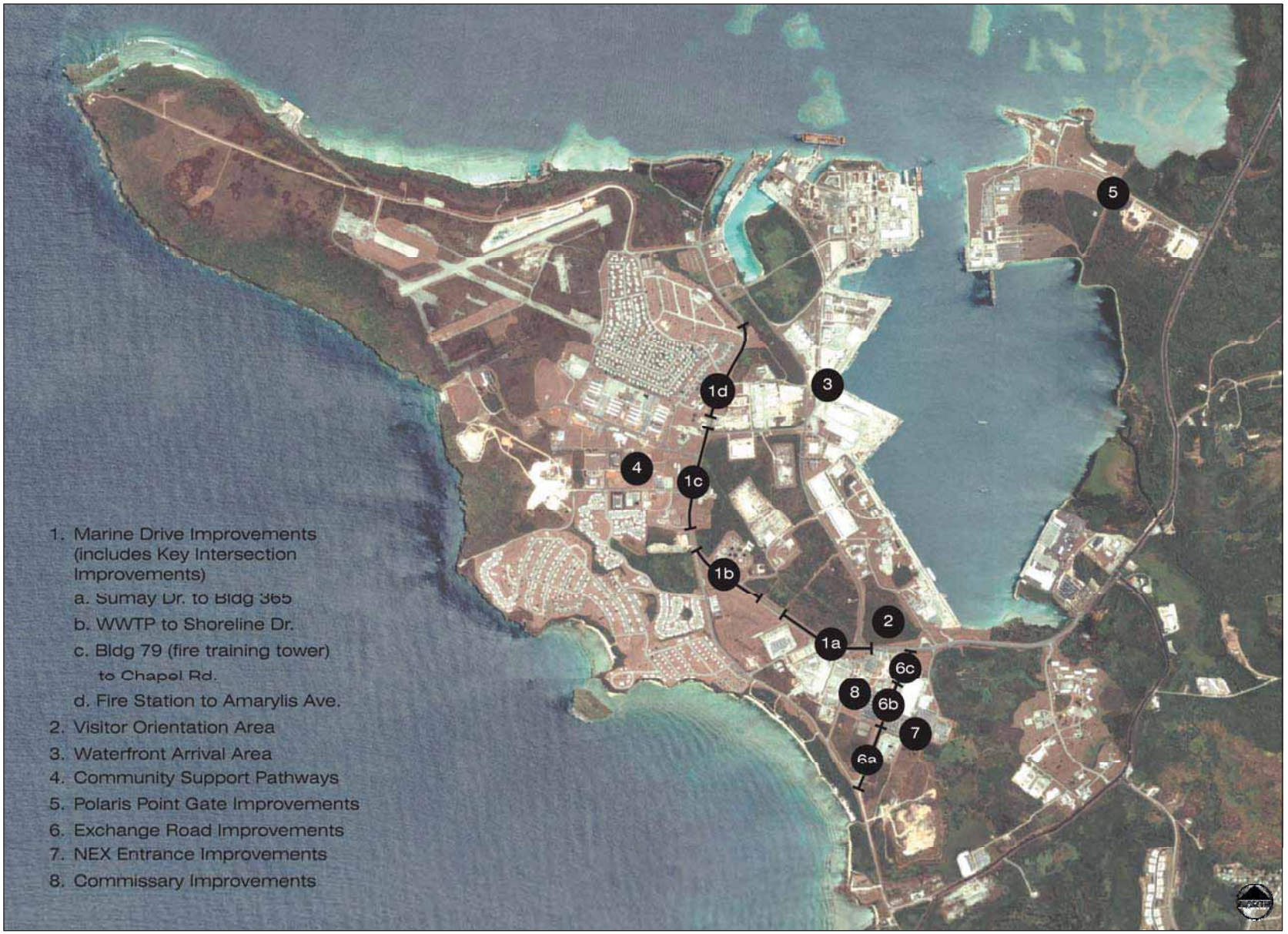


Figure 7.1 Priority Project Location Map

PROJECT #1
MARINE DRIVE IMPROVEMENTS

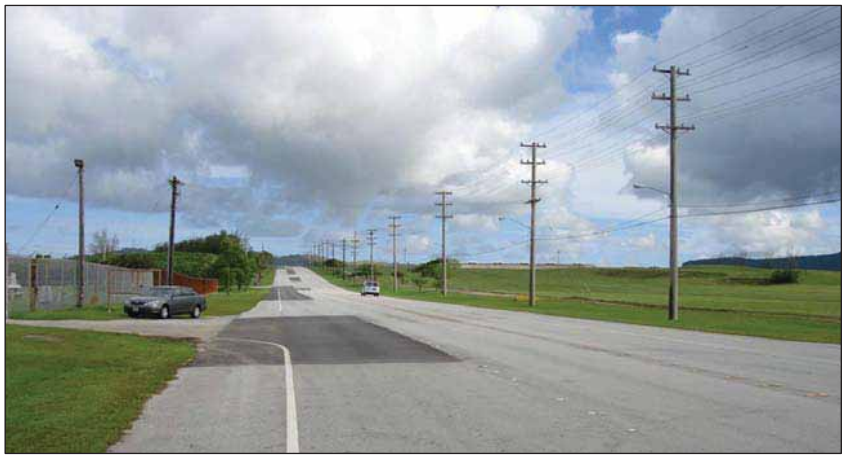
Existing Conditions: Marine Drive is Naval Base's primary roadway leading from the Main Gate through community support, bachelor housing, and family housing areas and connecting operational areas. The roadway is stark, with little vegetation or clear wayfinding clues.

Goal: Improve the appearance of Marine Drive and distinguish it as the installation's primary roadway.

Project Description/Details *(Figures 7.2 to 7.5)*

- Screen visual liabilities, e.g., wastewater treatment plant (WWTP), vacant warehouses, warehouse storage/ laydown areas.
  - Relocate building storage away from Marine Drive.
  - Strategically plant canopy and other trees.
- Enhance walkability of Marine Drive.
  - Extend and improve walking/jogging path.
  - Install solar night lighting.
  - Install crosswalks connecting walking/jogging paths.
- Plant shade trees (Royal Poinciana) to elevate Marine Drive as a primary roadway and provide comfort for pedestrians.
- Plant canopy trees to provide screening and privacy for family housing areas.
- Emphasize key intersections with signature landscaping (Palm groupings).
- Minimize large impermeable surfaces to reduce radiant heat and glare, improve drainage, and improve appearance. This includes removing unnecessary pavement areas and/or minimizing plans for new or increased paved areas.
  - Remove expanses of paving adjacent to Buildings 365, 641, and 634.
  - Add medium canopies trees at parking lots.

Estimated Cost (includes all four segments): $20 million



Marine Drive

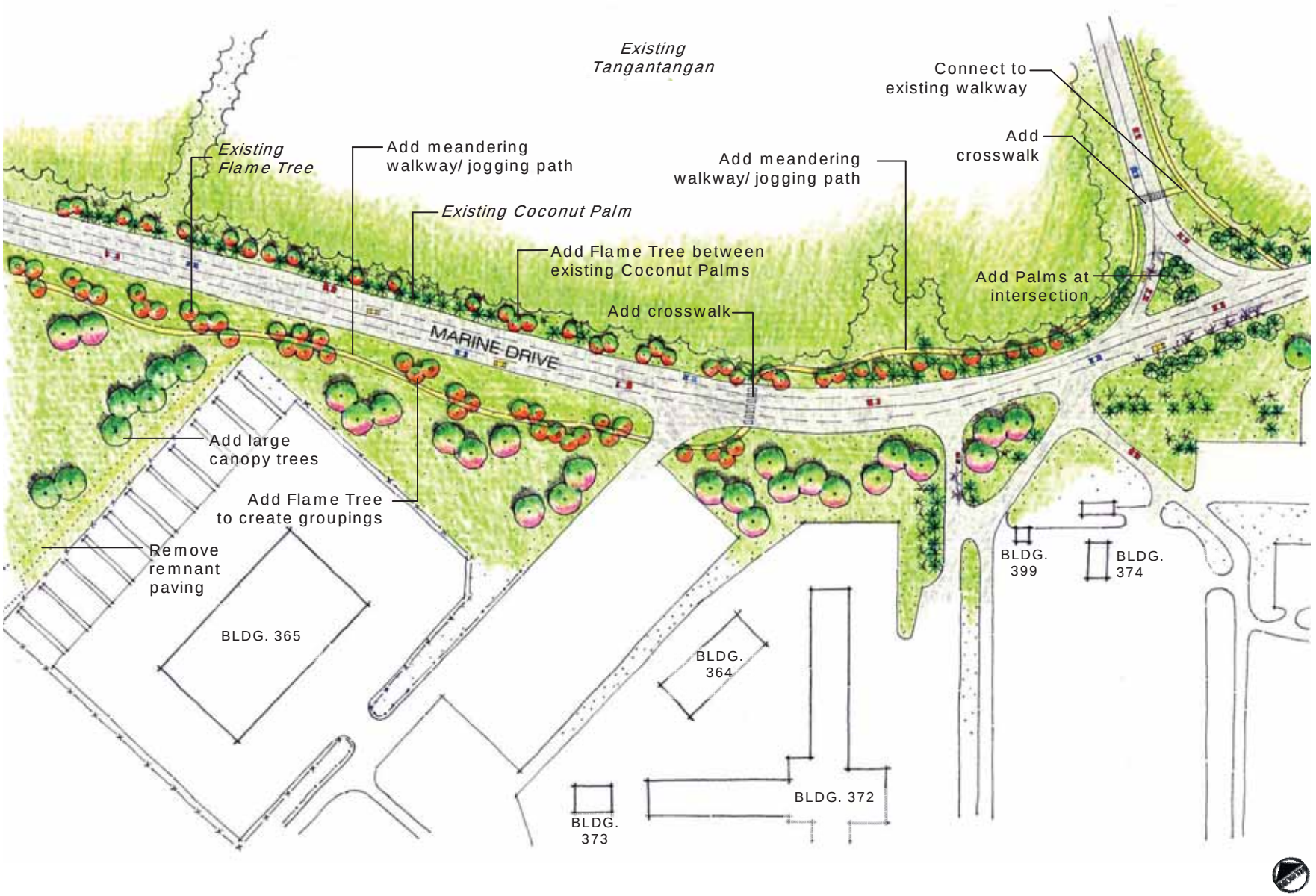


Figure 7.2 Project #1 Marine Drive Improvements: Segment A – Sumay Drive to Building 365

Figure 7.3 Project #1 Marine Drive Improvements: Segment B – WWTP to Shoreline Drive

Figure 7.4 Project #1 Marine Drive Improvements: Segment C – Building 79 to Chapel Road

Figure 7.5 Project #1 Marine Drive Improvements: Segment D – Fire Station to Amarylis Avenue

PROJECT #2
VISITOR ORIENTATION AREA

Existing Conditions: The existing signage and anchor display offer a passive and subtle monument at a key visible area along Marine Drive.

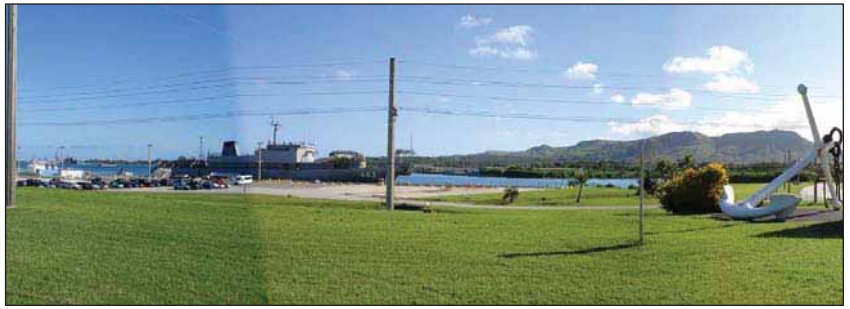
Goal: Create an active and well-used visitor area near the Main Gate with scenic views, seating area, orientation map, and introduction to the cultural and natural resources of the installation.

Project Description/Details *(Figures 7.6 to 7.9)*

- Create a comfortable gathering place and scenic view point with seating for pedestrians and visitors arriving by vehicle.
- Erect a location map display as a means of improving wayfinding on base.
- Increase awareness of cultural and natural resources on base with dual-sided display up to 44 inches by 96 inches *(Figure 7.9)*. The display might explore cultural resources on one side and natural resources and invasive species interpretive signage on the other.

  Note: The design of display signs will be in accordance with the new installation signage plan (pending). Displays should include solar lighting and be easy to replace/update.
- Create a focal point with a new "sail" sign, anchor and U.S. Naval Base Guam seal signage. Lettering should be raised and replaceable in accordance with the signage plan
- Provide one-way access road, parking, wheelchair access ramp, and vehicle pull-out area, maintaining vehicle flow on Marine Drive.
- In keeping with the design theme of "Legacy of Cultural Diversity", incorporate Chamorro basket weaving pattern in paving or stamp large concrete pavers with Chamorro symbology (e.g., petroglyphs, canoe, latte stones).
- In accordance with the guidelines and plant material selections identified in *Chapter 5: Landscaping*, install native landscaping to complement the gathering place.
- Consider adding distances and direction to foreign locations on edge of concrete display pedestal (e.g., Los Angeles, Tokyo, Sydney, Saipan etc.).

Estimated Cost: $1.0 million

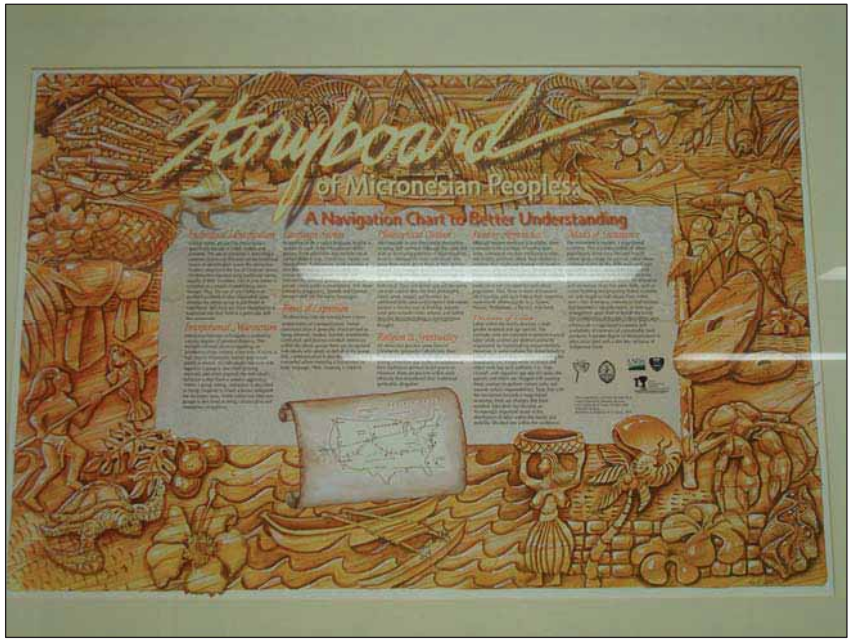


Proposed Visitor Orientation Area Location

Figure 7.6 Locations of Main Gate and Visitor Orientation Area

Figure 7.7 Proposed Focal Point

Figure 7.8 Project #2 Visitor Orientation Area



The Collection of Richard F. Taitano Micronesian Area Research Center

War in the Pacific National Historic Park

Figure 7.9 Examples of Cultural Interpretive Signage

PROJECT #3
WATERFRONT ARRIVAL AREA

Existing Conditions: The secure waterfront is a functioning operational area with few amenities for visiting sailors and those that come to Naval Base to greet them.

Goal: Create a welcoming and attractive introduction to Naval Base for disembarking sailors.

Project Description/Details *(Figure 7.10)*

- Create a landmark arrival point.
  - Design new security and pedestrian gates to incorporate Spanish and Chamorro design features.
- Provide a bus stop shelter or pavilion serving the area.
- Create a comfortable pick-up/drop-off station with shelter outside the restricted waterfront area.
  - Construct location map display under shelter to improve wayfinding for new arrivals to the installation.
  - Consider multiple displays to introduce cultural and natural resources. Displays could be mounted directly to wall of pavilion, eliminating the cost of pedestals.
- Improve parking and traffic circulation for people meeting visiting sailors.
- Provide a path from the waterfront through the gate to a new sailor center that includes laundromat, telephones, computer center, and vending machines.
- Screen emergency generator from view with screen wall *(see Chapter 6: Site Elements)*
- Eliminate redundant fencing at gate.
- Provide landscaping, to including grassing, palms in medians, and trees in the parking area.

Estimated Cost: $700,000

View to Restricted Waterfront Area

Proposed Waterfront Arrival Area

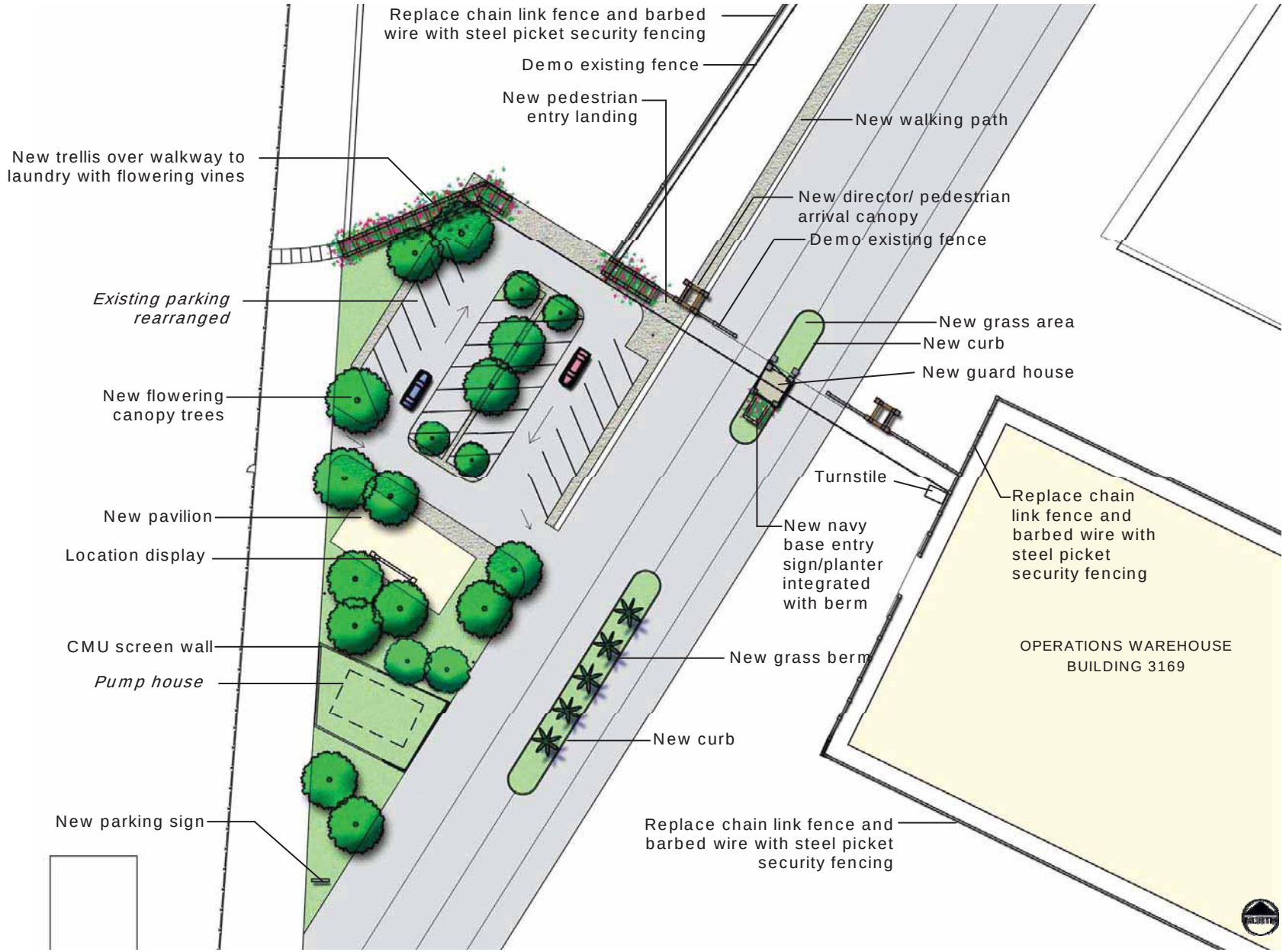


Figure 7.10 Project #3 Waterfront Arrival Area

PROJECT #4
COMMUNITY SUPPORT AREA IMPROVEMENTS

Existing Conditions: The recreation core of the Naval Base is well-located to bachelor housing, family housing and work areas. While centrally located, the area is not well connected via walkways and is needlessly bisected by roadways.

Goal: Create a park-like setting with amenities, including multipurpose pathways connecting existing and proposed MWR facilities and adjacent housing (family and bachelor) areas.

Project Description/Details *(Figure 7.11)*

- Demolish and remove interior roadways and remnant impermeable surfaces.
- Restrict parking to the perimeter of the recreation core, enhancing safety for pedestrians and park users, especially children.
- Enhance and expand the walkway system which provides connectivity between MWR facilities, surrounding housing areas and existing pathways.
  - Provide additional amenities such as benches, water fountains, and bike racks.
  - Install solar night lighting.
- Add pavilions at key activity areas (see *Chapter 6: Site Elements* for pavilion prototype).
  - One large and two small pavilions near the Skate Park.
  - Two pavilions at Ebbets Field.
- Create a special event area with open space and larger circular pavilion (see example below for pavilion).
- Incorporate landscaping to create much-needed shady areas and focal points.

Note: The new fitness center and swimming pool are proposed military construction projects. Pathways plans are flexible and will be adjusted to any site plan changes for these or other projects.

Estimated Cost: $4 million

Example of Circular Pavilion

Existing Walkway System (View North)

Figure 7.11 Project #4 Community Support Area Improvements Site Plan

PROJECT #5
POLARIS POINT GATE IMPROVEMENTS

Existing Conditions: Polaris Point is a distinct area of U.S. Naval Base Guam, accessed directly from Marine Drive outside of the installation's Main Gate.

Goal: Provide prototype for a Navy Region Marianas secondary gate design that incorporates cultural design features and welcomes visitors arriving on foot and by vehicle.

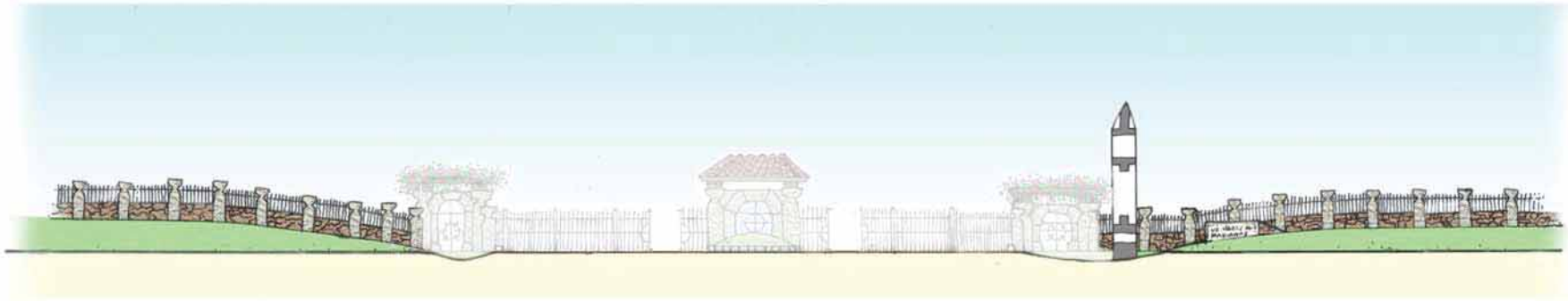
Project Description/Details *(Figures 7.12 and 7.13)*

- Create an attractive and secure entry to Polaris Point in compliance with *UFC for Entry Control Facilities/Access Control Points* (UFC 4-022-01, 25 May 2005).
- Replace temporary AT/FP barriers, ditches and berms with a permanent crash wall (with limestone veneer) and AT/FP curbing.
- Incorporate Spanish and Chamorro design elements in gate design.
- Extend pedestrian pathway through gate.
- Employ landscaping to create shade and visual interest.
- Retain Polaris Point Missile to provide a focal point at Marine Drive entrance.
- Re-align the existing jog path, if necessary, based on final site plan.
- Incorporate pending signage plan recommendations.

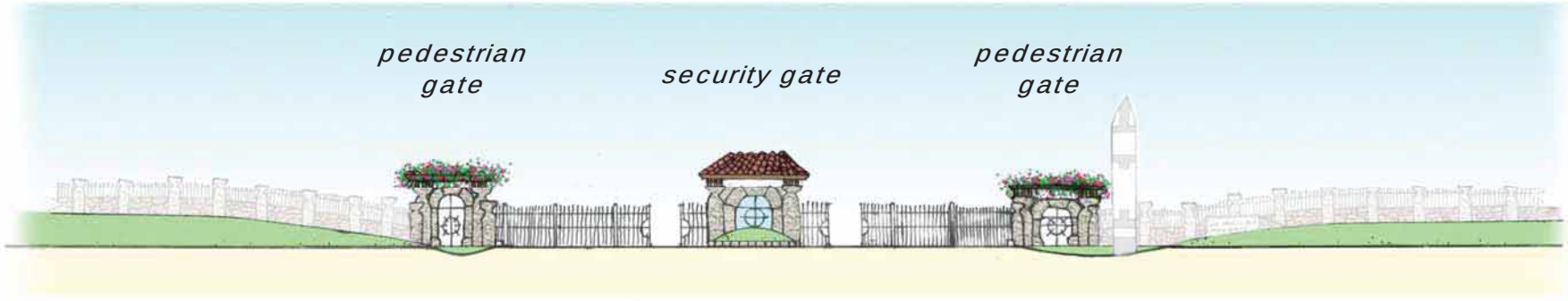
Estimated Cost: $1.3 million

Polaris Missile at Marine Drive Entry

Existing Security Gate



Foreground: angled walls and berms



Background: recessed security gate

Figure 7.12 Project #5 Proposed Polaris Point Gate Improvement Elevations

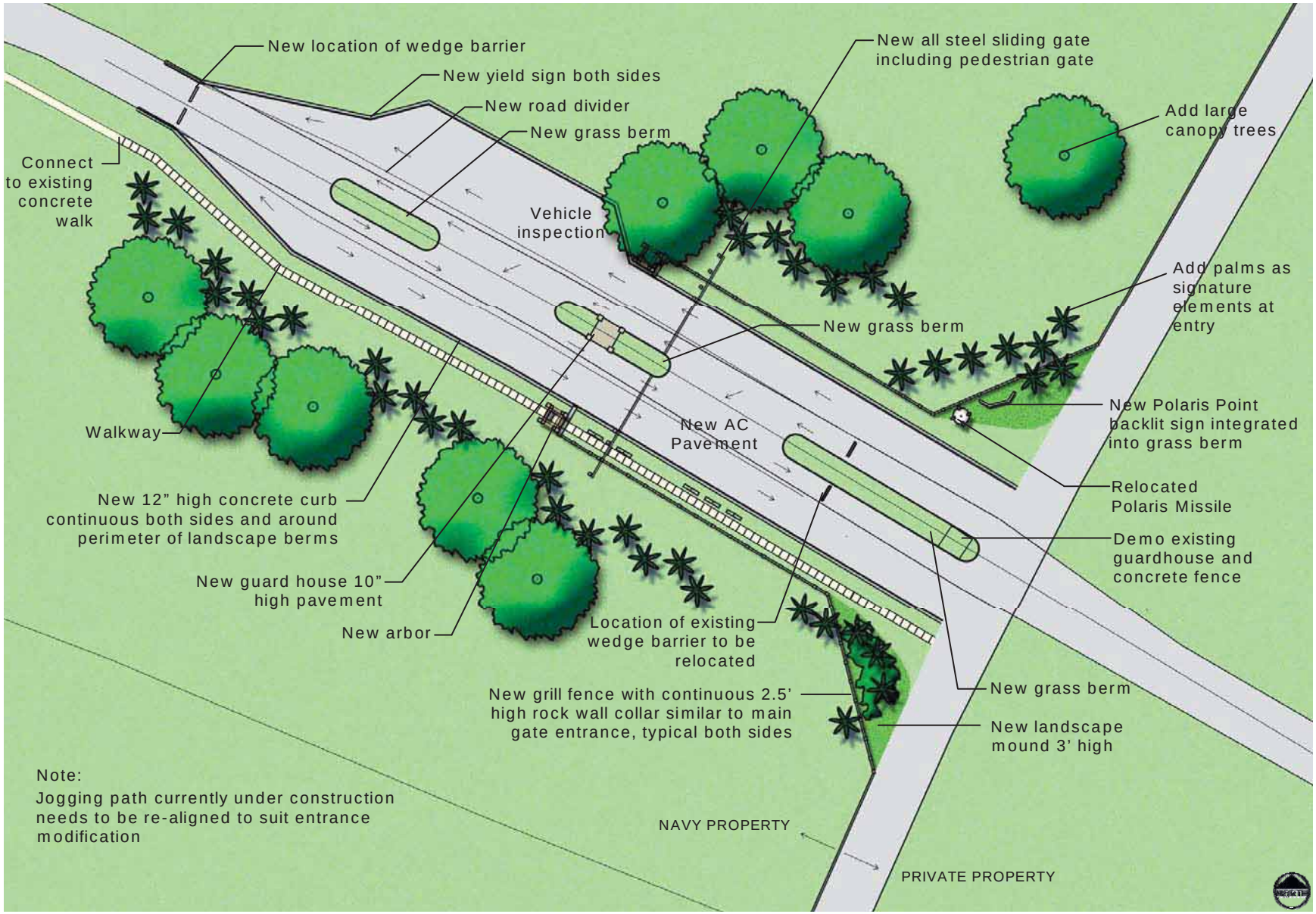


Figure 7.13 Project #5 Polaris Point Gate Improvements Site Plan

PROJECT #6
EXCHANGE ROAD IMPROVEMENTS

Existing Conditions: Exchange Road spans between Marine Drive and Shoreline Drive, and serves the installation's Shopping District (Commissary and NEX main store and ancillary facilities). It is currently characterized by poor signage, limited landscaping and uninviting pedestrian access.

Goal: Improve the appearance of Exchange Road for pedestrians and drivers.

Overview of Exchange Road at Marine Drive

Project Description/Details *(Figures 7.14 to 7.16)*

- Screen visual liabilities, e.g., NEX delivery areas, with screen walls and landscaping.
- Mitigate massive appearance along Exchange Road of NEX with 2 body paint colors and stenciling per *Chapter 4: Building Color*.
- Emphasize key intersections with signature landscaping (Palms).
- Employ landscaping along road edges.
- Mitigate the radiant heat and glare from large impermeable surfaces by replacing select paved areas with landscaping.
- Remove remnant building pads.
- Extend sidewalks/pathways as planned in ongoing CNIC project along Exchange Road.
- Extend pathway from Exchange Road to Victor Wharf to provide connection between shopping district and transient ship pier.
- Remove chain link fencing where possible.

Estimated Cost: $1.3 million

Figure 7.14 Project #6 Exchange Road Improvements: Segment A - Building 151 to NEX/Commissary

Figure 7.15 Project #6 Exchange Road Improvements: Segment B - Building 151 to NEX/Commissary

Figure 7.16. Project #6 Exchange Road Improvements: Segment C - NEX/Commissary to Marine Drive

PROJECT #7
NEX ENTRANCE IMPROVEMENTS

Existing Conditions: The NEX is fronted by an expansive paved parking area and unattractive temporary AT/FP barriers.

Goal: Improve Shopping District appearance/ experience and reduce heat and glare from large areas of paving.

Project Description/Details *(Figure 7.17)*

- Create welcoming gathering place (plaza) at entrance.
  - Expand limits of entrance area to AT/FP stand-off distance.
  - Use planters and permanent walls as attractive AT/FP barriers. Remove temporary AT/FP bollards.
  - Employ an attractive paving pattern and landscaping to improve entrance appearance and comfort for users.
- Emphasize key intersections with signature landscaping (Palms).
- Mitigate the radiant heat and glare from large impermeable surfaces by replacing select paved areas with landscaping.

Estimated Cost: $1.1 million *(Note: NEX may be responsible for funding improvements of its facilities.)*

AT/FP bollards at NEX Parking Lot

NEX Parking Lot

Figure 7.17 Project #7 NEX Entrance Improvements Site Plan

PROJECT #8
COMMISSARY IMPROVEMENTS

Existing Conditions: The Commissary is fronted by an expansive paved parking area and unattractive temporary AT/FP barriers.

Goal: Improve Shopping District appearance / experience and reduce heat and glare from large areas of concrete.

Project Description/Details *(Figure 7.18)*

- Create welcoming gathering place (plaza) at entrance.
  - Expand limits of entrance area to AT/FP stand-off distance.
  - Use planters and permanent walls as attractive AT/FP barriers. Remove temporary AT/FP barriers.
  - Employ an attractive paving pattern and landscaping to improve entrance appearance and comfort for users.
- Emphasize key intersections with signature landscaping (Palms).
- Mitigate the radiant heat and glare from large impermeable surfaces by replacing select paved areas with landscaping (relocate Manila Palms along Exchange Road into groupings in parking lot).

Estimated Cost: $900,000 *(Note: Defense Commissary Agency (DeCA) may be responsible for funding improvements of its facilities.)*

View of Commissary entrance from parking lot

AT/FP barriers at Commissary entry

Figure 7.18 Project #8 Commissary Improvements Site Plan

OTHER RECOMMENDED PROJECTS

In addition to the Priority Projects described above, there are numerous other projects that could be undertaken to improve base appearance. Some of these recommended projects are listed in *Table 7.1,* which is organized by geographic area and type of improvement recommended. Cost estimates and detailed project descriptions will be developed as funding sources are identified and projects approach implementation.

Sumay Cove rusting sheet metal along shoreline

Location	Improvement Type		Recommendation
Throughout Study Area			
	Architecture	-	Replace flat roof bus stop shelters with IAP design, prioritize along major roadways
	Architecture	-	Retract fully all typhoon shutters when not in use
	Architecture	-	Discontinue the use of temporary structures (i.e.. Gas Station at Finnegayan and Gym at Camp Covington)
	Architecture	-	Replace existing white window air conditioners with anodized brown units as they expire; no window A/C units on new construction
	Signage	-	Develop and implement signage plan
	Signage	-	Remove temporary signs on roadways
	Signage	-	Do not allow new electronic message board signs
	Signage	-	Update Historic Trail Brochure and signage
	Signage	-	Update and install Natural Resources Educational Signage (i.e., protected species, invasive animals and plants)
	Site Design	AT/FP	Remove AT/FP barriers where there are berms (i.e. Top O' The Mar)
	Site Design	Building Siting	Remove concrete pads from demolished buildings or where there is no programmed use (i.e., NEX Home Improvement Shop area)
	Site Design	Roadways	Include paved shoulders in all new construction and reconstruction projects on roadways used by more than 1,000 vehicles per day
	Site Design	Walkways/Bikeways	Incorporate bicycling and walking facilities into all transportation projects unless exceptional circumstances exist
	Site Elements	Lighting	Develop and implement a lighting plan
	Site Elements	Screening/Fencing	Assess all chain-link fencing, demo redundant (i.e. along road at wharves fronting new laundromat) and replace rusty or dilapidated fencing.
	Site Elements	Shelters	Remove remnants of shade superstructures that are no longer in use (i.e., Sumay Marina and Sailor Sanctuary should be removed); base appearance can be significantly improved by replacing and upgrading existing pavilions.
Naval Base			
Camp Covington	Architecture	-	Re-design façade of Camp Covington Building 556
Camp Covington	Landscaping	-	Add landscaping at Camp Covington BQ area
Camp Covington	Site Design	Activity Nodes	Rehabilitate and expand recreational activities area behind BEQs
Chapel Road	Site Design	Roadways	Plant shade trees and median strip along Chapel Road
Echo / Delta Wharves	Site Elements	Focal Points	Paint rusty anchors
Gab Gab	Landscaping	Maintenance	Remove rocks from grass area near ocean swim pool
Gab Gab	Signage	-	Replace safety signage at pool with concise list of rules
Gab Gab	Signage	-	Remove obsolete sign posts
Gab Gab	Site Design	Activity Nodes	Rehabilitate ocean swimming pool at Gab Gab Beach
Gab Gab	Site Design	Activity Nodes	Rehabilitate Gab Gab Beach historic fortification structure
Gab Gab	Site Design	Activity Nodes	Replace gate around swim pool at Gab Gab Beach and add doors to gate
Gab Gab	Site Design	Activity Nodes	Replace temporary shelters with permanent shelters in beach areas
Gab Gab	Site Design	Activity Nodes	Relocate children's jungle gym away from the street to a more pedestrian friendly area

Table 7.1 Recommendations

Location	Improvement Type		Recommendation
Naval Base (continued)			
Gab Gab	Site Elements	Screening/Fencing	Relocate trash dumpsters from parking lot to a screened area
Orote Point	Landscaping	-	Replace lost Freedom Trees (contact Freedom Trees for potential support)
Orote Point	Site Design	Activity Nodes	Rehabilitate historic Japanese WWII Amphitheatre to create gathering place
Orote Point	Site Design	Parking	Landscape parking lot at Orote Point BOQ (Building 2000)
Polaris Point	Landscaping	-	Landscape and add shade trees
Polaris Point	Signage	-	Remove and disallow all temporary signs on fences and gates
Polaris Point	Site Design	Activity Nodes	Create recreation destination: beach, cabanas, and playgrounds
Polaris Point	Site Design	Activity Nodes	Conduct beach clean-ups
Polaris Point	Site Design	Circulation	Construct sidewalk and curbing along primary roadways
Polaris Point	Site Design	Gates/Boundaries	Improve AS-40 entrance
Polaris Point	Site Design	Walkways/Bikeways	Plant shade trees along fitness trails
Polaris Point	Site Design	Walkways/Bikeways	Provide night lighting for fitness trails
Polaris Point	Site Design	Walkways/Bikeways	Improve pathways to exercise equipment
Polaris Point/Camp Covington	Site Elements	Screening/Fencing	Relocate trash bins to a less trafficked area and enclose with screen wall
Rumor's Club	Site Elements	Bollards	Eliminate the latte structures next to anchor at the entrance
Rumor's Club	Site Design	Activity Nodes	Redesign to be inviting from southern side to tie into pedestrian walkway; create outdoor evening seating
Rumor's Club	Site Design	Building Siting	Create a clear primary entrance at Rumor's Club (Building 75)
San Luis Beach	Architecture	-	Create permanent bathroom structure, update showers and sink
San Luis Beach	Site Design	Activity Nodes	Separate recreational activity space from parking, roads, and driveway areas at beaches
Sumay Cove	Site Design	Activity Nodes	Remove remnant concrete pads from demolished buildings, reduce extensive paving and add grass at Sumay Cove
Sumay Cove	Site Design	Activity Nodes	Repair broken cement piers and provide additional floating finger piers
Sumay Cove	Site Design	Gates/Boundaries	Repair/replace rusting (unsafe) sheet metal along shoreline (consider reuse of concrete utility poles resulting from utility hardening)
Sumay Cove	Site Design	Walkways/Bikeways	Construct sidewalk/ bike paths linking Sumay Cove Marina & San Luis Beach with adjacent family housing
Victor Wharf	Site Design	Activity Nodes	Create welcome center for visiting sailors, include location map display, shade and amenities
Waterfront	Site Design	Activity Nodes	Add permanent shaded picnic area near the docks
Waterfront	Site Design	Circulation	Assess parking/laydown requirements. Create formal parking lots as need with repaved surfaces and stripping. Eliminate unnecessary pavement.
Ordnance Annex Entrance			
	Signage	-	Consolidate wayfinding signage at front entrance into one sign
	Site Design	Activity Nodes	Create permanent shaded bench area near Building 1004
	Site Design	Gates/Boundaries	Relocate front gate entrance to better align with public roadway (requires traffic analysis) and eliminate redundant fence lines, signage, and utility poles
	Site Design	Utilities	Construct screening walls around air conditioning units and other utilities
	Site Elements	Focal Points	Relocate anchor from behind installation area sign

Table 7.1 Recommendations (continued)

Location	Improvement Type		Recommendation
Nimitz Hill			
	Architecture	Building Entrance	Re-design Nimitz Hill Visitors BQ Entrance
	Site Design	Roadways	Continue to add shade trees and landscape primary road
	Site Elements	Lighting	Use lighting that is flush with the ground for static displays (i.e. installation entrance monument sign)
Top O' The Mar	Signage	-	Remove redundant Top O' The Mar monument signs
Top O' The Mar	Site Design	Building Siting	Relocate entrance into Top O' The Mar from southern end of parking lot rather than northern end, which is the service end of the facility and less attractive; current entrance should serve as service entrance and exit from the parking area.
Top O' The Mar	Site Design	Building Siting	Screen views of ancillary structures from the parking lot area
Top O' The Mar	Site Design	Building Siting	Screen trash bins
Top O' The Mar	Site Design	Parking	Re-paint parking stall striping, curbing, and guardrails
Top O' The Mar	Site Design	Roadways	Re-design entrance taking into consideration AT/FP standards and remove the obsolete circle drive; landscape entrance and parking lot of Top O' The Mar
Top O' The Mar	Site Elements	Lighting	Improve night lighting at Top O' The Mar to accent front façade architectural features
Top O' The Mar	Site Elements	Paving	Re-pave outdoor concrete area using an architectural feature, i.e. step, where the grade changes
Top O' The Mar	Site Elements	Site Furniture	Update outdoor benches taking into context the buildings architectural style
Top O' The Mar	Site Elements	Site Furniture	Replace wood deck with low maintenance material such as concrete
Finnegayan Communications Annex (limited list pending Master Planning for area)			
	Signage	-	Remove directional signs from median strip on main road
	Site Design	Building Siting	Screen views of parking lot areas creating a visual barrier between the building and the parking lot (i.e. swimming pool facility parking lot)
	Site Design	Gates/Boundaries	Remove redundant gates and fences not needed for security or safety purposes
	Site Design	Roadways	Paint rusted guardrails and pedestrian bridges
	Site Design	Roadways/Parking	Landscape primary roads and parking lots
Barrigada Communications Annex-Golf Course			
	Architecture	Building Construction	Use uniform windows, window color, and door types on buildings
	Architecture	Building Entrance	Renovate Clubhouse entrance
	Architecture	General	Create a design theme to apply to overall beautification of golf course and ancillary structures
	Site Design	Focal Points	Remove white, red, and blue paint from anchor at access road
	Site Design	Focal Points	Remove chain link low fence around anchor at access road entrance
	Site Design	Parking	Landscape parking lot
	Site Elements	Screening/Fencing	Screen "power plant" cluster from road
	Site Elements	Site Furniture	Update/modernize benches tees for a consistent look

Table 7.1 Recommendations (continued)

FUNDING OPPORTUNITIES

There is limited funding available to make positive base appearance improvements. This section lists some funding opportunities for base appearance projects and discusses the importance of planning for them.

Special Project funds are typically used for small-scale base appearance projects. Examples are new pavilions, sidewalks, tree plantings, monuments, etc. These funds have somewhat flexible timelines and short implementation periods.

Planning ahead is important to access periodically available funds. Having base exterior architecture projects ready for data calls prepares the installation to access funds that might otherwise not be available. Including needed services in the annual ***Indefinite Quantity Contracts (IDQ)*** ensures the ability to implement these projects.

Pairing base improvements with ***Military Construction (MILCON)*** projects is one way to implement larger scale base appearance change. Operational, base safety and AT/FP improvements are frequently-funded MILCON projects and should include base appearance components from the very beginning.

MWR, NEX, Commissary, Bachelor Housing, and tenant commands on base have their own funding sources and may support projects with base appearance components. For example, NEX funds might be used for entrance and parking lot improvements (Project #7). Demolition funds might be available to remove remnant paving.

In addition to traditional project funding sources, partnering with community groups offers another opportunity for implementing IAP projects. The following examples may apply throughout the Region:

- *Cultural and Historic Resources* - There are numerous important cultural and historic resources within the study area that are associated with similar resources outside the base perimeter. Veterans associations may be interested in "adopting" historic sites and contributing to their maintenance.
- *Landscaping/Tree Planting* - The Freedom Trees is a national non-profit organization that planted over 100 trees along the road to Gab Gab Beach entrance. Additionally, the U.S. Department of Agriculture (USDA) has historically provided funding grants, often contingent on matching funds and incorporation of an educational component, for street tree planting and maintenance.
- *Tree Planting* – If a school class or other organization wants to plant a tree for Earth Day or other commemoration, they could plant a tree in a location indicated in one of the priority projects.

Other sponsoring organizations and funding mechanisms should be researched and employed to implement base appearance goals for all Navy Region Marianas installations.

INCENTIVES

Facility Excellence awards programs including the Installation Excellence Award and Naval Facilities Engineering Command Design Awards Program that recognize facility improvement efforts. These awards provide motivation and positive reinforcement to personnel who consistently make installation appearance a priority.

MAINTENANCE

The BOS contractor is responsible for maintenance of existing infrastructure and is preparing a "Maintenance Action Plan" (MAP). Regional Base Development will review the MAP when complete to ensure consistency with the IAP.

Included in the MAP is a 5-year painting plan. Buildings are painted as a geographic cluster. Minor facilities and structures are painted at the same time as the nearest primary building. Possible exceptions to the 5-year cycle occur due to unforeseen circumstances and self-help projects, but these painting projects must be approved by Base Development. Other IAP recommendations such as phasing out of window air conditioning units are addressed through the MAP.

IAP UPDATES

This IAP is a work in progress. The following steps are recommended to keep the IAP current in the interim between formal IAP updates:

1) Base Development liaison or designee conducts an annual windshield tour of the base to assess visual assets and liabilities. This may or may not coincide with an annual maintenance check of the buildings and grounds. The liaison could also review the project and recommendation lists and update as needed.
2) During project development, encourage research into new products and systems that best meet the key design considerations of sustainability, and typhoon and corrosion resistance. As new products are identified, incorporate them into the IAP.

Periodically, the IAP will be revised to formally incorporate all the design standards that were identified in the interim.

APPENDICES

APPENDIX A: Landscape Maintenance

APPENDIX A. LANDSCAPE MAINTENANCE

Lawns

- Mow once a week or as needed depending on the type of grass. Mowing should be performed in a manner that prevents scalping, bruising, uneven and rough cutting.
- Reel mowers are preferred for cutting turf grasses at heights less than 25 mm (1 inch).
- Rotary mowers are preferred for cutting turf grasses at heights greater than 25 mm (1 inch).
- Raise the cutting height 30-50% on shaded sites to compensate for more upright growth of leaves under reduced light.
- Exercise care to avoid 'girdling' trees located in turf areas. Girdling is the cutting away of the bark and cambium of a plant in a ring that can kill the plant by interrupting the circulation of water and nutrients.
- Edge the perimeter of planter bed edges, sidewalks, driveway, curbs, and other paved surfaces at least twice monthly or as needed for neat appearance.
- Provide a clear-cut division line between planter beds, turf, and ground cover.
- Fertilize and renovate based on the requirements of the specific grass type. Verticut to remove thatch, and aerate and topdress to alleviate compaction and increase water and air movement through the soil.
- Minimize the amount of vehicular traffic, especially when wet.

Marine Drive

Exercise Care to Avoid 'Girdling' Trees in Turf Areas

Groundcovers

- Thin or renovate planter beds as necessary to ensure a healthy stand. Weed control should be done by hand-pulling or selective post-emergent herbicide. Pre-emergent herbicides may be used during establishment and after renovation or thinning.
- Maintain a definite break between turf and ground cover areas. Do not allow ground cover to encroach into turf areas.
- Replace dead and missing plants.
- Apply a 25 mm – 75 mm (1 to 3-inch) layer of compost as a landscape mulch to conserve moisture, buffer soil temperature, reduce erosion, provide nutrients and discourage the establishment of weeds.
- Fertilize based on the requirements of the specific groundcover. The total nitrogen required should be apportioned equally to the number of fertilizer applications, usually 4 times a year. Apply minor elements as required.

Rhoeo (Rhoeo spathacea)

Alalag Tasi, Beach Morning Glory (Ipomoea pes-caprae)

Shrubs

- Trim and prune shrubs for health, safety and aesthetic appearance. Do not allow shrubs to obstruct vision at intersections, entranceways, or pedestrian walkways. Prune shrubs that grow against or over structures.
- Trim and maintain hedges adjacent to roadways at a height of 900 mm (36 inches) or less. Hedges should not be placed within 9 M (30 feet) of a major intersection.
- Prune shrubs not identified as hedges to even form to match its natural growth characteristics. Water shoots, suckers, and branches not conforming to the desired shape and size should be removed.
- Some overgrown plants can be pruned to within 100 to 150 mm (4 to 6 inches) of the ground as they will resprout, producing a thick growth of new shoots. Knowledge of the plant material and its response to pruning is essential. Renovate selected overgrown plants over several months by removing a portion (one-third) of the old growth at each of three major prunings. Removing all of the old growth over time will restore the natural appearance and retain the use of the plant in the landscape.
- Shear formal hedges so they are wider at the base than at the top. Frequency of shearing hedges depends on species, desired height and width, and design intent. Shearing has a longer effect if performed after a flush of growth has ceased. Shear to one to three new leaves and buds. Timing is based on the amount and cycle of growth. Upper corners of the sheared hedges can be rounded or square-cut, depending on preference. Visible stubs and branches shattered or split by shears should be removed with a clean cut with hand pruners.
- Selectively prune informal hedges and screens by hand to control height but retain a natural, softer appearance.
- If a hedge or screen has outgrown its desired size or becomes unkempt, ragged or leggy (open at the base), cut back to one-half of the existing height and width. The height and form will redevelop to that desired after shearing a few times. Renovation pruning is best accomplished just before a flush of growth so that the hedge is bare for the shortest period of time.

Yellow Allamanda (Allamanda cathatica)

- Apply a 25 mm – 75 mm (1 to 3-inch) layer of mulch to conserve moisture, buffer soil temperature, reduce erosion, provide nutrients and discourage the establishment of weeds. Avoid placing mulch against the stems to avoid potential disease and insect damage. Apply from near its stem(s) to the dripline for individual shrubs.
- Fertilize based on the requirements of the specific shrub. The total nitrogen required should be apportioned equally to the number of fertilizer applications, usually 4 times a year. Avoid dense piles of fertilizer at the crown or base of shrubs. Apply minor elements as required.

Gagu, Gago, Ironwood (Casuarina equisetifolia) hedge

Trees

- Periodically inspect stakes, ties, guy supports and turnbuckles and adjust as needed to avoid girdling and promote natural development. Remove as soon as they are no longer needed, and no later than 12 months after installation.
- Have a certified arborist complete or oversee tree pruning.
- Prune trees according to the latest International Society of Arboriculture (ISA) Pruning Guidelines.
- Selectively prune trees for safety and health reasons.
- Trim trees to leave a clear height of 20 feet over streets, 8 feet over sidewalks and footpaths, and as necessary to clear power lines and other types of obstructions.
- Allow trees to grow to their mature heights and sizes according to their species. Topping ruins the natural form of the tree and increases the hazard potential of the plant. At no time should any tree be 'topped', 'stubbed', or 'hat racked' (pruning of all major branches to a uniform height or removal of all lateral or side branches). Special pruning techniques such as 'heading back' (drastic shortening of major branches to a uniform level) or 'elevating' (removal of significant portion of the lower branches to a uniform height) should be considered only when no other alternative is available.
- Prune canopy trees to encourage healthy growth and prevent wind damage to the trees.

- Pruning Frequency: Most routine pruning (removal of weak, diseased or dead limbs) can be done at any time. The pruning of flowering or fruit trees may delay, reduce or eliminate the production of fruits and flowers during the following season, but causes no damage to the plant. Avoid pruning any tree that is under stress.
- Remove storm damaged and diseased or hazardous growth as soon as possible after discovery.
- Pruning wounds do not need to be covered with a pruning seal or paint. These materials do not prevent entry of disease or insects and may reduce closure of the wound.
- Prune roots of trees as needed. Only one side of the tree should be pruned per year and root pruning should not start until three years after the tree has been planted.

Daog, Daok, Palomaria (Calophyllum inophyllum)

If tree guards are installed, inspect them every year to ensure that they are not restricting the growth of the trees. Adjust any tree guards that constrict the trunk or branches. Leave room for air to circulate.

- If mulch is applied around trees to provide nutrients and for weed suppression, moisture conservation, reduction of soil compaction, and buffering of soil temperature:
  - Use a 50 mm (2-inch) layer for soils that are not well drained, and up to 100 mm (4-inches) if drainage is good.
  - Do not use excessive applications of finely textured mulch, which may cause oxygen deprivation. Use a 25 to 50 mm (1 to 2-inch) layer only.
  - Do not pile mulch directly against the trunks and stems of trees which may cause inner bark (phloem) stress, fungal and bacterial diseases, and make trees more susceptible to borers. Keep mulch 75 to 150 mm (3 to 6-inches) away from the trunks of young trees and 200 to 300 mm (8 to 12–inches) away from the trunks of mature trees.
  - Do not use mulch that is not properly composted.
  - Do not use mulch in perpetually wet soils which need as much oxygen as possible.
  - Mulch out to the tree's dripline.

- Trees located in lawn areas where the grass receives regular and adequate fertilization do not typically need additional nitrogen fertilization. A good turfgrass fertilization program supplies adequate amounts of nitrogen for the grass and trees. Additional nitrogen is not necessary unless deficiency symptoms are observed or in special situations. Other elements should be applied based on the results and proper interpretation of a soil test.
- Trees in areas not receiving regular fertilization applications to associated turfgrass, shrub or ground cover plantings will benefit from regular applications of nitrogen. Mature trees benefit from fertilization every three to four years.
  - For landscape situations without a turf or landscape fertilization program, apply 1.8 to 3.6 kilograms (4 to 8 pounds) of nitrogen per ninety square meters (one thousand square feet) of the crown area annually.
  - Apply the fertilizer in four equal quarterly applications.
  - Do not apply more than 0.9 kilograms (2 pounds) of actual nitrogen per ninety square meters (one thousand square feet) in a single application as it can damage turf or other understory plants.
  - The fertilizer should contain at least 50 percent slow-release nitrogen. Higher levels of nitrogen should be applied as soil injection or subsoil fertilization methods.

Palms

- Prune palms to remove dead, dying, diseased, damaged or unwanted fronds, seed pods and fruit clusters.
  - Remove petiole frond bases, shave trunks and form a sheath bowl at the base of remaining fronds.
  - Frond should be pruned to a 180-degree angle above the horizontal plane.
  - All tools should be disinfected with a 50 percent chlorine bleach solution or an approved disinfectant where a possible transmission of disease between individual palms exists.
- If mulch is applied around palms to provide nutrients and for weed suppression, moisture conservation, reduction of soil compaction, and buffering of soil temperature:
  - Use a 50 mm (2-inch) layer for soils that are not well drained, and up to 100 mm (4 inches) if drainage is good.
  - Do not use excessive applications of finely textured mulch, which may cause oxygen deprivation. Use a 25 to 50 mm (1 to 2-inch) layer only.
  - Do not pile mulch directly against the trunks of palms to avoid potential disease and insect problems. Keep mulch 150 mm (6 inches) away from the trunks of palms.
  - Do not use mulch that is not properly composted.
  - Do not use mulch in perpetually wet soils which need as much oxygen as possible.
  - Mulch out to the palm's dripline.
- Fertilize palms with a material formulated for palms or a 'palm special' fertilizer according to manufacturer's instructions.

Fiji Fan Palm (Pritchardia pacifica)

Coconut Palms

- Remove fronds below horizontal, fruits, seed pods and fruit stalks three times a year or as required. Cordon off area below pruning to create a safe pedestrian way.
- Remove palms that have large wounds in the trunk, are penciling (pronounced tapering of trunk), have excessive trunk narrowing in an hourglass shape, have excessive root damage near the base of the palm, have termite damage, are leaning excessively , or are in the 65-70' height range, even though they look healthy.

Niyok, Niyog, Coconut Palm (Cocos nucifera)

- If mulch is applied around palms to provide nutrients and for weed suppression, moisture conservation, reduction of soil compaction, and buffering of soil temperature:
  - Use a 50 mm (2-inch) layer for soils that are not well drained, and up to 100 mm (4 inches) if drainage is good.
  - Do not use excessive applications of finely textured mulch, which may cause oxygen deprivation. Use a 25 to 50 mm (1 to 2-inch) layer only.
  - Do not pile mulch directly against the trunks of coconut palms to avoid potential disease and insect problems. Keep mulch 150 mm (6 inches) away from the trunks of coconut palms.
  - Do not use mulch that is not properly composted.
  - Do not use mulch in perpetually wet soils which need as much oxygen as possible.
  - Mulch out to the coconut palm's dripline.
- Coconut palms located in planting areas where the groundcover receives regular and adequate fertilization do not typically need additional nitrogen fertilization. A good fertilization program supplies adequate amounts of nitrogen for the groundcover and coconut palms.

APPENDIX B: Cost Estimates

APPENDIX B. COST ESTIMATES

These are rough estimates and more detailed plans and cost estimates will be needed before implementing the projects discussed in *Chapter 7: Implementation.*

Cost estimates were largely based on the *Guam Cost Data Book, January 2005*. An estimated 2% per year inflation cost was added to the 2005 values for 2006, 2007 and 2008, which is equivalent to a 6% increase. Where costs were not described in the cost data book, costs were obtained from Guam Navy personnel with cost estimating experience and internet product costs were tripled for use in Guam.

PROJECT #1 MARINE DRIVE IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	SUMAY TO 365	WWTP	79 TO CHAPEL	AMARYLIS	TOTAL	UNIT PRICE	TOTAL COST
TREES AND PALMS								
Large Canopy Tree SUCH AS TRUE KAMANI	12' high, 10' spread, 6" caliper EACH	31	21	44	55	151	$2,500.00	$377,500.00
Medium Canopy Tree SUCH AS ROYAL POINCIANA	8' high, 6' spread, 2" caliper EACH	68	57	26	6	157	$800.00	$125,600.00
Medium Canopy Tree PINK TECOMA	8' high, 6' spread, 2" caliper EACH		21			21	$800.00	$16,800.00
Single Trunk Palm	8'-12' brown trunk height EACH	23	42	19		84	$2,500.00	$210,000.00
SUBTOTAL TREES AND PALMS								**$729,900.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	SUMAY TO 365	WWTP	79 TO CHAPEL	AMARYLIS	TOTAL	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS								
Grass	Seeded SQUARE METERS	2,700		1,328	598	4,626	$2.00	$9,252.00
SUBTOTAL GRASS AND GROUND COVERS								**$9,252.00**

	SIZE & CONDITION	SUMAY TO 365	WWTP	79 TO CHAPEL	AMARYLIS	TOTAL	UNIT PRICE	TOTAL COST
MISCELLANEOUS								
IRRIGATION SYSTEM, TEMPORARY (FOR GRASS)	SQUARE METERS	2,700		1,328	598	4,626	$11.00	$50,886.00
MAINTENANCE PERIOD	MONTHS					6	$11,310.23	$67,861.36
SCREENED TOPSOIL	CUBIC METERS, 150MM LAYER	405		199	90	694	$60.00	$41,634.00
SOIL CONDITIONERS	CUBIC METERS, 50MM LAYER	135		66	30	231	$85.00	$19,660.50
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	2,700		1,328	598	4,626	$5.00	$23,130.00
SUBTOTAL MISCELLANEOUS								**$203,171.86**

	SIZE & CONDITION	SUMAY TO 365	WWTP	79 TO CHAPEL	AMARYLIS	TOTAL	UNIT PRICE	TOTAL COST
SITEWORK								
REMOVE EXISTING AC PAVING (ROADWAY)	SQUARE METERS	2,700		1,178	463	4,341	$10.00	$43,410.00
REMOVE EXISTING AC PAVING (WALKWAY)	SQUARE METERS			150	135	1,915	$10.00	$19,150.00
REMOVE EXISTING CONCRETE PAVING	SQUARE METERS					2,445	$20.00	$48,900.00
NEW AC PAVING (WALKWAY)	SQUARE METERS			154		154	$50.00	$7,700.00
NEW AC PAVING (ROADWAY)	SQUARE METERS				490	490	$50.00	$24,500.00
NEW CONCRETE CURB	LINEAR METERS					165	$70.00	$11,550.00
NEW CONCRETE WALKWAY (2.5M WIDE)	SQUARE METERS		85		806	5,366	$58.00	$311,228.00
NEW CROSSWALK STRIPING	EACH	2	1		1	4	$500.00	$2,000.00
NEW LIGHTING AT PARKING	LUMP SUM				1	1	$1,500.00	$1,500.00
NEW TRAFFIC SIGNAGE AT PARKING	LUMP SUM (3 @ $350)				1	1	$1,000.00	$1,000.00
SUBTOTAL SITEWORK								**$470,938.00**

PROJECT #1 MARINE DRIVE IMPROVEMENTS (CONTINUED)

	SIZE & CONDITION	SUMAY TO 365	WWTP	79 TO CHAPEL	AMARYLIS	TOTAL	UNIT PRICE	TOTAL COST
ARCHITECTURE								
NEW BUS STOP (10'X15' @ $400/S.F.)	EACH					1	$60,000.00	$60,000.00
SUBTOTAL ARCHITECTURE								**$60,000.00**

SUBTOTAL TREES AND PALMS	$729,900.00
SUBTOTAL GRASS AND GROUND COVERS	$9,252.00
SUBTOTAL MISCELLANEOUS	$203,171.86
SUBTOTAL SITEWORK	$470,938.00
SUBTOTAL ARCHITECTURE	$60,000.00
TOTAL	**$1,473,261.86**
10% CONTINGENCY	$147,326.19
TOTAL CONSTRUCTION COST	**$1,620,588.04**
DESIGN FEES (10%)	**$162,058.80**
SUBTOTAL	**$1,782,646.85**
SIOH (10%)	**$178,264.68**
GRAND TOTAL	**$1,960,911.53**

PROJECT #2 VISITOR ORIENTATION AREA

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Medium Canopy Trees	EACH	22	$800.00	$17,600.00
Single Trunk Palm	12'-15' brown trunk height EACH	48	$2,500.00	$120,000.00
Remove coconut trees that block sign	EACH	6	$200.00	$1,200.00
SUBTOTAL TREES AND PALMS				**$138,800.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SHRUBS				
Various	3 GALLON	10	$30.00	$300.00
SUBTOTAL SHRUBS				**$300.00**

BOTANICAL NAME/COMMON NAME	SIZE AND CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Grass	Seeded SQUARE METERS	1,200	$2.00	$2,400.00
SUBTOTAL GRASS AND GROUND COVERS				**$2,400.00**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
CLEAR AND GRUB	HECTAR	0.1	$2,500.00	$250.00
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	1,000	$11.00	$11,000.00
MAINTENANCE PERIOD	MONTH	4	$1,291.71	$4,650.16
SOIL CONDITIONERS, ROTOTILL IN 150MM DEEP	CUBIC METERS, 150MM LAYER	500	$85.00	$42,500.00
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	1,100	$5.00	$5,500.00
SUBTOTAL MISCELLANEOUS				**$63,900.16**

PROJECT #2 VISITOR ORIENTATION AREA (CONTINUED)

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITEWORK				
repave road and parking, ADA ramp,	SQUARE METERS	650	$50.00	$32,500.00
SPECIAL PAVING TILE (PLAZA)	SQUARE METERS	700	$180.00	$126,000.00
NEW CONCRETE CURBING	LINEAR METERS	70	$70.00	$4,900.00
REMOVE EXISTING SIGN AND CONCRETE PAD	SQUARE METERS	30	$22.44	$673.20
NEW LOGO SIGN (10'diameter)	EACH	1	$5,000.00	$5,000.00
RELOCATE ELECTRIC POLE FROM MIDDLE OF PLAZA	EACH	1	$15,000.00	$15,000.00
new "sail sign" precast concrete (2 forms: 21 x 12=252SF + 15 x 14 = 210SF)	SQUARE METERS	42	$1,249.16	$52,464.72
new "sail sign" granite veneer	SQUARE METERS	90	$1,540.00	$138,600.00
new "sail sign" installation of veneer	SQUARE METERS	90	$770.00	$69,300.00
lettering - raised 15 " tall + installation	LETTER	17	$375.00	$6,375.00
SUBTOTAL SITEWORK				**$450,812.92**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITE FURNISHINGS				
BENCHES	EACH	3	$700.00	$2,100.00
RECESSED LIGHTING SPOTS	EACH	3	$700.00	$2,100.00
interpretive sign/display with recessed lights (44 inches by 96 inches=max)	EACH	2	$4,136.00	$8,272.00
pre-cast concrete support for location display and installation	square feet	162	$400.00	$64,800.00
TRASH CANS	EACH	2	$300.00	$600.00
TRAFFIC SIGNS (ONE WAY)	EACH	2	$350.00	$700.00
SUBTOTAL SITE FURNISHINGS				**$78,572.00**

SUBTOTAL TREES AND PALMS	$138,800.00
SUBTOTAL SHRUBS	$300.00
SUBTOTAL GRASS AND GROUNDCOVERS	$2,400.00
SUBTOTAL MISCELLANEOUS	$63,900.16
SUBTOTAL SITEWORK	$450,812.92
SUBTOTAL SITE FURNISHINGS	$78,572.00
TOTAL	**$734,785.08**
10% CONTINGENCY	$73,478.51
Subtotal	**$808,263.59**
10% Design	$80,826.36
Subtotal	**$889,089.95**
8% Supervision inspection, overhead	$71,127.20
GRAND TOTAL	**$960,217.14**

PROJECT #3 WATERFRONT ARRIVAL AREA

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Medium Canopy Tree	EACH	14	$800.00	$11,200.00
Large Canopy Tree	EACH	0	$2,500.00	$0.00
Single Trunk Palm	12'-15' brown trunk height EACH	7	$2,500.00	$17,500.00
SUBTOTAL TREES AND PALMS				**$28,700.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SHRUBS				
Shrub Bougainvillea	3 GALLON	12	$30.00	$360.00
SUBTOTAL SHRUBS				**$360.00**

BOTANICAL NAME/COMMON NAME	SIZE AND CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Grass	seeded SQUARE METERS	925	$2.00	$1,850.00
SUBTOTAL GRASS AND GROUND COVERS				**$1,850.00**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
CLEAR AND GRUB	HECATRE	0.01	$2,500.00	$25.00
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	950	$11.00	$10,450.00
MAINTENANCE PERIOD	MONTH	6	$1,227.13	$7,362.76
SOIL CONDITIONERS, ROTOTILL IN 150MM DEEF	CUBIC METERS, 150MM LAYER	500	$85.00	$42,500.00
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	950	$5.00	$4,750.00
SUBTOTAL MISCELLANEOUS				**$65,087.76**

PROJECT #3 WATERFRONT ARRIVAL AREA (CONTINUED)

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITEWORK				
Pavillion floor, supports, roof tiles	SQUARE FEET	1,250	$400.00	
Arbor walkway (76' x 7') + ped.gates (2 x 100sf)	SQUARE FEET	732	$300.00	$219,600.00
Repave/stripe parking lot (100 x 115)	SQUARE FEET	11,500	$3.62	$41,630.00
Demo chainlink on road (recover crash cable) & at emergency generator bldg	per 1000 linear feet	1	$640.00	$521.60
Install crash cable in wharf setback chainlink(project area only +100 ft, not entire fenceline)	per 1,000 linear feet	1	$640.00	$384.00
Remove chainlink on laundromat side of road (across project area only)	per 1000 linear feet	1	$640.00	$640.00
New sidewalks/ walkway (455 x 6) + 180 X 10)=	SQUARE FEET	4,530	$4.74	$21,472.20
New security building (impact windows, tile roof, etc)	SQUARE FEET	100	$600.00	$60,000.00
Replace pump station chain-link w/ cmu screen	linear feet	213	$10.90	$2,321.70
Remove chainlink on laundromat side of road (across project area only)	per 1000 linear feet	1	$640.00	$512.00
Curbing (nonAT/FP)	LINEAR FEET	865	$15.00	$12,975.00
Demo cmu & turnstile (10 x 8 x 2)=160	SF	160	$2.10	$336.00
Replace turnstile gap with chainlink	linear feet	12	$25.00	$300.00
Electric operator for gate	each	2	$6,700.00	$13,400.00
Gates x 2 (25')	each	2	$3,804.00	$7,608.00
New security wall (55' + 90')	linear feet	145	$200.00	$29,000.00
SUBTOTAL SITEWORK				**$410,700.50**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITE FURNISHINGS				
location map display with recessed lights (44 inches by 96 inches=max)	each	1	$4,336.00	$4,336.00
pre-cast concrete support for location display,concrete slab, and installation assume 9' x 9'	square ft	81	$400.00	$32,400.00
benches for pavillion	each	8	$700.00	$5,600.00
lights for arbor and pavillion	each	4	$700.00	$2,800.00
traffic signs & parking lot sign	each	5	$350.00	$1,750.00
TRASH CANS	EACH	2	$300.00	$600.00
SUBTOTAL SITE FURNISHINGS				**$10,750.00**

SUBTOTAL TREES AND PALMS	$28,700.00
SUBTOTAL SHRUBS	$360.00
SUBTOTAL GRASS AND GROUNDCOVERS	$1,850.00
SUBTOTAL MISCELLANEOUS	$65,087.76
SUBTOTAL SITEWORK	$410,700.50
SUBTOTAL SITE FURNISHINGS	$10,750.00
TOTAL	**$517,448.26**
10% CONTINGENCY	$51,744.83
Subtotal	**$569,193.08**
10% Design	$56,919.31
Subtotal	**$626,112.39**
8% Supervision inspection, overhead	$50,088.99
GRAND TOTAL	**$676,201.38**

PROJECT #4 COMMUNITY SUPPORT AREA IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Large Canopy Tree SUCH AS TRUE KAMANI	12' high, 10' spread, 6" caliper EACH	50	$2,500.00	$125,000.00
Large Canopy Tree SUCH AS TRUE KAMANI AT CHAPEL ROAD	12' high, 10' spread, 6" caliper EACH	26	$2,500.00	$65,000.00
Medium Canopy Tree SUCH AS ROYAL POINCIANA	8' high, 6' spread, 2" caliper EACH	126	$800.00	$100,800.00
Single Trunk Palm	8'-12' brown trunk height EACH	10	$2,500.00	$25,000.00
SUBTOTAL TREES AND PALMS				**$315,800.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Grass	Seeded SQUARE METERS	45,237	$2.00	$90,474.00
SUBTOTAL GRASS AND GROUND COVERS				**$90,474.00**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
CLEAR AND GRUB	HECTARE	4.5	$2,500.00	$11,309.25
SCREENED TOPSOIL	CUBIC METERS, 150MM LAYER	919	$60.00	$55,116.00
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	45,237	$11.00	$497,607.00
MAINTENANCE PERIOD	MONTHS	6	$58,433.15	$350,598.92
SOIL CONDITIONERS, ROTOTILL IN 150MM DEEP	CUBIC METERS, 50MM LAYER	2,262	$85.00	$192,257.25
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	45,237	$5.00	$226,185.00
SUBTOTAL MISCELLANEOUS				**$1,333,073.42**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITEWORK				
BOLLARDS, REMOVABLE	EACH	15	$500.00	$7,500.00
REMOVE EXISTING AC PAVING (ROADWAY)	SQUARE METERS	5,570	$10.00	$55,700.00
REMOVE EXISTING AC PAVING (WALKWAY)	SQUARE METERS	554	$10.00	$5,540.00
NEW CONCRETE WALKWAY	SQUARE METERS	9,052	$58.00	$525,016.00
NEW CROSSWALK STRIPING	LUMP SUM	1	$500.00	$500.00
NEW PATH LIGHTS (20' O.C.)	EACH	325	$500.00	$162,500.00
SUBTOTAL SITEWORK				**$756,756.00**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
ARCHITECTURE				
EXISTING PAVILION TO BE REMOVED	EACH	1	$2,240.00	$2,240.00
PAVILION, SMALL (10'X20' AT $300/S.F.)	EACH	4	$60,000.00	$240,000.00
PAVILION, LARGE (20'X30' AT $300/SF)	EACH	1	$180,000.00	$180,000.00
SUBTOTAL ARCHITECTURE				**$422,240.00**

PROJECT #4 COMMUNITY SUPPORT AREA IMPROVEMENTS (CONTINUED)

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITE FURNITURE				
BBQ	EACH	6	$1,000.00	$6,000.00
BENCH	EACH	20	$700.00	$14,000.00
BICYCLE RACK	EACH	4	$3,000.00	$12,000.00
CHARCOAL DISPOSAL BIN (CONCRETE)	EACH	10	$500.00	$5,000.00
PICNIC TABLE (RECYCLED PLASTIC LUMBER)	EACH	17	$3,500.00	$59,500.00
TRASH RECEPTACLE	EACH	37	$500.00	$18,500.00
SUBTOTAL SITE FURNITURE				**$115,000.00**

SUBTOTAL TREES AND PALMS	$315,800.00
SUBTOTAL GRASS AND GROUND COVERS	$90,474.00
SUBTOTAL MISCELLANEOUS	$1,333,073.42
SUBTOTAL SITEWORK	$756,756.00
SUBTOTAL ARCHITECTURE	$422,240.00
SUBTOTAL SITE FURNITURE	$115,000.00
TOTAL	**$3,033,343.42**
10% CONTINGENCY	$303,334.34
TOTAL CONSTRUCTION COST	**$3,336,677.77**
DESIGN FEES (10%)	**$333,667.78**
SUBTOTAL	**$3,670,345.54**
SIOH (10%)	**$367,034.55**
GRAND TOTAL	**$4,037,380.10**

PROJECT #5 POLARIS POINT GATE IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Large Canopy Tree	EACH	12	$2,500.00	$30,000.00
Single Trunk Palm	12'-15' brown trunk height EACH	60	$2,500.00	$150,000.00
REMOVE EXISTING COCONUT TREES IN NEW ROA	EACH	34	$100.00	$3,400.00
SUBTOTAL TREES AND PALMS				**$183,400.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SHRUBS				
VARIOUS	3-GALLON	20	$30.00	$600.00
SUBTOTAL SHRUBS				**$600.00**

BOTANICAL NAME/COMMON NAME	SIZE AND CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Grass	seeded SQUARE METERS	5,900	$2.00	$11,800.00
SUBTOTAL GRASS AND GROUND COVERS		**5,900**		**$11,800.00**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
CLEAR AND GRUB	HECTARE	0.6	$2,500.00	$1,500.00
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	5,600	$11.00	$61,600.00
MAINTENANCE PERIOD	MONTH	6	$7,233.58	$43,401.51
SOIL CONDITIONERS, ROTOTILL IN 150MM DEEP	CUBIC METERS, 150MM LAYER	2,600	$85.00	$221,000.00
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	5,600	$5.00	$28,000.00
SUBTOTAL MISCELLANEOUS				**$355,501.51**

PROJECT #5 POLARIS POINT GATE IMPROVEMENTS (CONTINUED)

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITEWORK				
SECURITY BUILDING	square feet	100	$600.00	$60,000.00
SECURITY WALL	linear feet	460	$200.00	$92,000.00
SECURITY GATES (25 FEET UNITS)	linear feet	5	$3,804.00	$19,020.00
SECURITY CURBING	LINEAR METERS	170	$145.00	$24,650.00
CONCRETE CURB, REGULAR	LINEAR METERS	180	$70.00	$12,600.00
ARBORS (2)	SQUARE FEET	200	$300.00	$60,000.00
relocate pop up barriers (2) (12 x 3 x 6'deep?) excavation & backfill	cubic yard	432	$54.66	$23,613.12
reinstallation of popup barriers (24 manhours x $20/hour + $600/day x1 day for equipment	each	2	$1,080.00	$2,160.00
pave widened roadway	square yards	3,504	$39.47	$138,302.88
realign jog path (312 x 4)	SQUARE FEET	1,248	$4.74	$5,915.52
pathway (450 x 6)	SQUARE FEET	2,700	$4.74	$12,798.00
SUBTOTAL SITEWORK				**$451,059.52**

	SIZE & CONDITION	QUANTITY	UNIT PRICE	TOTAL COST
SITE FURNISHINGS				
TRAFFIC SIGNS	EACH	6	$350.00	$2,100.00
ENTRANCE SIGNS	EACH	1	$400.00	$400.00
SUBTOTAL SITE FURNISHINGS				**$2,500.00**

SUBTOTAL TREES AND PALMS	$183,400.00
SUBTOTAL SHRUBS	$600.00
SUBTOTAL GRASS AND GROUNDCOVERS	$11,800.00
SUBTOTAL MISCELLANEOUS	$355,501.51
SUBTOTAL SITEWORK	$451,059.52
SUBTOTAL SITE FURNISHINGS	$2,500.00
TOTAL	**$1,004,861.03**
10% CONTINGENCY	$100,486.10
GRAND TOTAL	**$1,105,347.13**
10% Design	$110,534.71
Subtotal	**$1,215,881.84**
8% Supervision inspection, overhead	$97,270.55
GRAND TOTAL	**$1,313,152.39**

PROJECT #6 EXCHANGE ROAD IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	SHORELINE	151 TO NEX	MARINE	TOTAL	UNIT PRICE	TOTAL COST
TREES AND PALMS							
Large Canopy Tree SUCH AS TRUE KAMANI	12' high, 10' spread, 6" caliper EACH	16	23	21	60	$2,500.00	$150,000.00
Medium Canopy Tree SUCH AS PINK TECOMA	8' high, 6' spread, 2" caliper EACH	16			16	$800.00	$12,800.00
Single Trunk Palm	8'-12' brown trunk height EACH	43		23	66	$2,500.00	$165,000.00
Single Trunk Palm	12'-15' brown trunk height EACH			12	12	$2,500.00	$30,000.00
SUBTOTAL TREES AND PALMS							**$357,800.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	SHORELINE	151 TO NEX	MARINE	TOTAL	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS							
Grass	Seeded SQUARE METERS			8,613	8,613	$2.00	$17,226.00
SUBTOTAL GRASS AND GROUND COVERS							**$17,226.00**

	SIZE & CONDITION	SHORELINE	151 TO NEX	MARINE	TOTAL	UNIT PRICE	TOTAL COST
MISCELLANEOUS							
IRRIGATION SYSTEM, TEMPORARY (FOR GRASS)	SQUARE METERS			8,613	8,613	$11.00	$94,743.00
MAINTENANCE PERIOD	MONTHS				6	$13,114.75	$78,688.48
SCREENED TOPSOIL	CUBIC METERS, 150MM LAYER			1,292	1,292	$60.00	$77,517.00
SOIL CONDITIONER	CUBIC METERS, 50MM LAYER			431	431	$85.00	$36,605.25
SOIL PREPARATION AND FINE GRADE	SQUARE METERS			8,613	8,613	$5.00	$43,065.00
SUBTOTAL MISCELLANEOUS							**$330,618.73**

	SIZE & CONDITION	SHORELINE	151 TO NEX	MARINE	TOTAL	UNIT PRICE	TOTAL COST
SITEWORK							
REMOVE EXISTING AC PAVING (ROADWAY)	SQUARE METERS			8,613	8,613	$10.00	$86,130.00
REMOVE EXISTING CHAIN LINK FENCE	LINEAR METERS			433	433	$30.00	$12,990.00
NEW CMU SCREEN WALL (433M X 1.8M)	SQUARE METERS			433	779	$115.00	$89,631.00
NEW CONCRETE WALKWAY	SQUARE METERS			913	913	$56.00	$52,925.00
NEW CROSSWALK STRIPING	EACH			1	1	$500.00	$500.00
SUBTOTAL SITEWORK							**$242,176.00**

SUBTOTAL TREES AND PALMS	$357,800.00
SUBTOTAL GRASS AND GROUND COVERS	$17,226.00
SUBTOTAL MISCELLANEOUS	$330,618.73
SUBTOTAL SITEWORK	$242,176.00
TOTAL	**$947,820.73**
10% CONTINGENCY	$94,782.07
TOTAL CONSTRUCTION COST	**$1,042,602.81**
DESIGN FEES (10%)	**$104,260.28**
SUBTOTAL	**$1,146,863.09**
SIOH (10%)	**$114,686.31**
GRAND TOTAL	**$1,261,549.39**

PROJECT #7 NEX ENTRANCE IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Medium Canopy Tree SUCH AS ROYAL POINCIANA	8' high, 6' spread, 2" caliper EACH	94	$800.00	$75,200.00
Single Trunk Palm	8'-12' brown trunk height EACH	8	$2,500.00	$20,000.00
SUBTOTAL TREES AND PALMS				**$95,200.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Groundcover	1 G.C. SQUARE METERS	1,344	$25.00	$33,600.00
SUBTOTAL GRASS AND GROUND COVERS				**$33,600.00**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
BOLLARDS, REMOVABLE, SS, 4" DIA.	EACH	32	$500.00	$16,000.00
CLEAR AND GRUB	HECTARE	0.022	$2,500.00	$55.25
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	1,354	$11.00	$14,894.00
MAINTENANCE PERIOD	MONTHS	6	$3,067	$18,399.14
MULCH (AT TREE WELLS IN PARKING LOT)	CUBIC METERS, 50MM LAYER	1.3	$200.00	$250.00
ROOT CONTROL BARRIER	LINEAR METERS	750	$65.00	$48,750.00
SCREENED TOPSOIL	CUBIC METERS, 150MM LAYER	202	$60.00	$12,096.00
SOIL CONDITIONERS	CUBIC METERS, 50MM LAYER	67.2	$85.00	$5,712.00
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	1,344	$5.00	$6,720.00
TREE GRATE, CAST IRON	EACH, 4' SQUARE	7	$3,000.00	$21,000.00
SUBTOTAL MISCELLANEOUS				**$143,876.39**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITEWORK				
REMOVE EXISTING AC PAVING	SQUARE METERS	3,155	$10.00	$31,550.00
REMOVE EXISTING CONCRETE PAVING	SQUARE METERS	200	$20.00	$4,000.00
REMOVE EXISTING REMOVABLE BOLLARDS	EACH	3	$200.00	$600.00
REMOVE EXISTING CMU WALL AT TRASH ENCLOS	SQUARE METERS, 8" THICK, 6' HIG	27	$30.00	$810.00
SAWCUT EXISTING AC PAVING	LINEAR METERS	780	$6.00	$4,680.00
NEW SEATWALL (ROCKWALL)	CUBIC METERS	62.2	$600.00	$37,324.80
NEW SPECIAL PAVING (PAVER TILE ON CONC)	SQUARE METERS (50% OF AREA)	1,104	$235.00	$259,322.50
NEW CONCRETE PAVING (COLORED/ROCK SALT)	SQUARE METERS (50% OF AREA)	1,104	$150.00	$165,525.00
NEW CONCRETE CURB	LINEAR METERS	579	$70.00	$40,530.00
NEW CONCRETE WALKWAY	SQUARE METERS	6	$58.00	$348.00
SUBTOTAL SITEWORK				**$544,690.30**

PROJECT #7 NEX ENTRANCE IMPROVEMENTS (CONTINUED)

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITE FURNITURE				
BENCH	EACH	8	$700.00	$5,600.00
BICYCLE RACK	EACH	1	$3,000.00	$3,000.00
TRASH RECEPTACLE	EACH	4	$500.00	$2,000.00
SUBTOTAL SITE FURNITURE				**$10,600.00**

SUBTOTAL TREES AND PALMS	$95,200.00
SUBTOTAL GRASS AND GROUND COVERS	$33,600.00
SUBTOTAL MISCELLANEOUS	$143,876.39
SUBTOTAL SITEWORK	$544,690.30
SUBTOTAL SITE FURNITURE	$10,600.00
TOTAL	**$827,966.69**
10% CONTINGENCY	$82,796.67
PROBABLE CONSTRUCTION COST	**$910,763.36**
DESIGN FEES (10% OF CONSTRUCTION COST)	**$91,076.34**
SUBTOTAL	**$1,001,839.69**
SIOH (10% OF ABOVE)	**$100,183.97**
GRAND TOTAL	**$1,102,023.66**

PROJECT #8 COMMISSARY ENTRANCE IMPROVEMENTS

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
TREES AND PALMS				
Manila Palm	Existing to be relocated EACH	26	$500.00	$13,000.00
Manila Palm	8' brown trunk height EACH	2	$800.00	$1,600.00
Medium Canopy Tree SUCH AS ROYAL POINCIANA	8' high, 6' spread, 2" caliper EACH	88	$800.00	$70,400.00
SUBTOTAL TREES AND PALMS				**$85,000.00**

BOTANICAL NAME/COMMON NAME	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
GRASS AND GROUND COVERS				
Groundcover	1 G.C. SQUARE METERS	670	$25.00	$16,750.00
SUBTOTAL GRASS AND GROUND COVERS				**$16,750.00**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
MISCELLANEOUS				
BOLLARDS, REMOVABLE, SS, 4" DIA.	EACH	36	$500.00	$18,000.00
IRRIGATION SYSTEM, TEMPORARY	SQUARE METERS	721.4	$11.00	$7,935.40
MAINTENANCE PERIOD	MONTHS	6	$2,363.83	$14,182.99
MULCH (AT PARKING LOT PLANTING AREAS)	CUBIC METERS, 50MM LAYER	1.9	$200.00	$370.00
ROOT CONTROL BARRIER	LINEAR METERS	408	$65.00	$26,520.00
SCREENED TOPSOIL	CUBIC METERS, 150MM LAYER	101	$60.00	$6,030.00
SOIL CONDITIONERS	CUBIC METERS, 50MM LAYER	34	$85.00	$2,847.50
SOIL PREPARATION AND FINE GRADE	SQUARE METERS	670	$5.00	$3,350.00
TREE GRATE, CAST IRON	EACH, 4' SQUARE	10	$3,000.00	$30,000.00
SUBTOTAL MISCELLANEOUS				**$109,235.89**

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITEWORK				
REMOVE EXISTING AC PAVING (ROADWAY)	SQUARE METERS	1,106	$10.00	$11,060.00
REMOVE EXISTING CONC AND TILE PAVING (WALK	SQUARE METERS	543	$20.00	$10,860.00
REMOVE EXISTING BOLLARDS	EACH	9	$200.00	$1,800.00
REMOVE EXISTING CONCRETE CURB	LINEAR METERS	79	$35.00	$2,765.00
SAWCUT EXISTING AC PAVING	LINEAR METERS	676	$6.00	$4,056.00
NEW SPECIAL PAVING (ROADWAY)	SQUARE METERS	460	$175.00	$80,500.00
NEW SPECIAL PAVING (WALKWAY)	SQUARE METERS	1,189	$235.00	$279,415.00
NEW CONCRETE CURB	LINEAR METERS	566	$70.00	$39,620.00
NEW CONCRETE WALKWAY	SQUARE METERS	102	$58.00	$5,916.00
NEW CROSSWALK STRIPING	LUMP SUM	1	$500.00	$500.00
RE-STRIPE PARKING	SQUARE METERS	49	$10.00	$490.00
SUBTOTAL SITEWORK				**$436,982.00**

PROJECT #8 COMMISSARY ENTRANCE IMPROVEMENTS (CONTINUED)

	SIZE & CONDITION	TOTAL	UNIT PRICE	TOTAL COST
SITE FURNITURE				
BENCH	EACH	8	$700.00	$5,600.00
BICYCLE RACK	EACH	1	$3,000.00	$3,000.00
TRASH RECEPTACLE	EACH	4	$500.00	$2,000.00
SUBTOTAL SITE FURNITURE				**$10,600.00**

SUBTOTAL TREES AND PALMS	$85,000.00
SUBTOTAL GRASS AND GROUND COVERS	$16,750.00
SUBTOTAL MISCELLANEOUS	$109,235.89
SUBTOTAL SITEWORK	$436,982.00
SUBTOTAL SITE FURNITURE	$10,600.00
TOTAL	**$658,567.89**
10% CONTINGENCY	$65,856.79
TOTAL CONSTRUCTION COST	**$724,424.68**
DESIGN FEE (10%)	**$72,442.47**
SUBTOTAL	**$796,867.15**
SIOH (10%)	**$79,686.71**
GRAND TOTAL	**$876,553.86**

APPENDIX C: References

APPENDIX C. REFERENCES

Tropical Landscaping and Plant Selection Guide for Hawaii, Guam and the Pacific Islands, August 2000.

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COMNAVMAR RSIP Plan Final Draft Report, January 2001.

Regional Integrated Cultural Resources Management Plan for COMNAV REG Marianas Lands, December 2005.

Integrated Natural Resources Management Plan, COMNAVMARIANAS, November 2001.

Unified Facilities Criteria Installation Design (UFC 2-600-01), 30 June 2000.

Unified Facilities Criteria (UFC) 4-010-01 Department of Defense (DOD) Minimum Antiterrorism Standards for Buildings, 08 October 2003.