# ROTA WEST HARBOR MASTER PLAN

Commonwealth Ports Authority

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In Association With | PEGS and Micronesian Environmental Services, Inc.

# ROTA WEST HARBOR MASTER PLAN

For: Commonwealth Ports Authority

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# Glossary of Acronyms and Abbreviations

| | |
|---|---|
| **ASCE** | American Society of Civil Engineers |
| **BECQ** | Bureau of Environmental and Coastal Quality |
| **BIG** | Bridge Investment Group |
| **CNMI** | Commonwealth of The Northern Mariana Islands |
| **Corps, USACE** | U.S. Army Corps of Engineers |
| **CPA** | Commonwealth Ports Authority |
| **cy** | Cubic Yard |
| **CZMA** | Coastal Zone Management Act |
| **DFW** | Division of Fish and Wildlife |
| **DOD, DoD** | Department of Defense (U.S.) |
| **DSCR** | Debt Service Coverage Requirement |
| **EA** | Environmental Assessment |
| **EPF** | Expeditionary Fast Transport Vessel |
| **EIS** | Environmental Impact Statement |
| **ESA** | Endangered Species Act |
| **ft** | Feet |
| **ITB** | Integrated-Tug-Barge (cargo vessel) |
| **kg** | Kilograms |
| **LAT** | Lowest Astronomical Tide |
| **m** | Meters |
| **M&N** | Moffatt & Nichol |
| **MARFORPAC** | Marine Corps Forces, Pacific |
| **MHW** | Mean High Water |
| **MLLW** | Mean Lower Low Water |
| **mm** | Millimeters |
| **MMPA** | Marine Mammal Protection Act |
| **MSC** | Military Sealift Command (U.S.) |
| **MSL** | Mean Sea Level |
| **NEPA** | National Environmental Policy Act |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NPDES** | National Pollutant Discharge Elimination System |
| **Ro-Ro** | Roll-On, Roll-Off |
| **ROM** | Rough Order of Magnitude |
| **TEU** | Twenty-foot Equivalent Unit |
| **USACE** | U.S. Army Corps of Engineers |
| **USCG** | United States Coast Guard |
| **USEPA** | U.S. Environmental Protection Agency |
| **USFWS** | U.S Fish and Wildlife Service |
| **UXO** | Unexploded Ordnance |
| **WIS** | Wave Information Study |
| **WGS84** | World Geodetic System 1984 |
| **WQC** | Water Quality Certification |

# Executive Summary

**Introduction**

The Commonwealth Ports Authority engaged Moffatt & Nichol to develop a master plan for Rota West Harbor that would accommodate reasonable demand-driven growth and improve the island economy. The master plan includes provision for commercial harbor operations, recreational boating and upland commercial development. It is presented here as a comprehensive study of the port that includes short, medium, and long-term plans for repair, maintenance and development of the port and associated upland areas. Short term recommendations include improvements that should planned and initiated this year as they are needed now. Medium term improvements should be planned and funded now and constructed over the next five years to meet the needs of the island.


Given the population and economic projections for Rota, long term improvements to Berth 1 will be needed later if cargo growth materializes. A harbor layout was developed as shown below that will accommodate all of the commercial traffic in the coming 20-year planning horizon as well as allow for future growth and increased use of the harbor. Key to the development plans is the approval and construction of a new breakwater and current training wall by the U.S. Army Corps of Engineers.

The West Rota harbor development plan accommodates future upland, non-port activities on CPA and non- CPA parcels located farther from the harbor. The shift in island demographic, on-dock and near-dock activities generates the following recommended upland development needs:

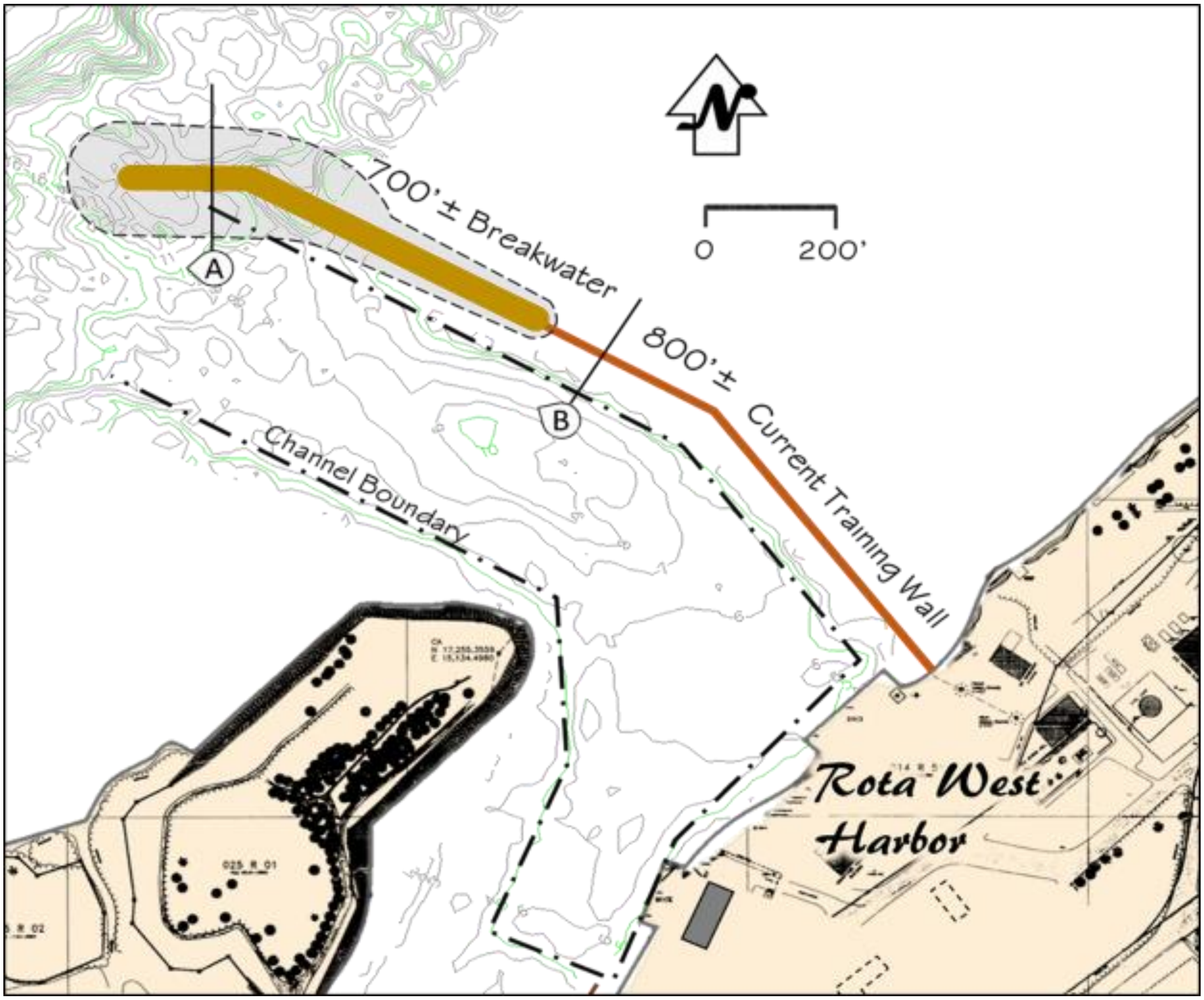
1. Breakwater and training wall to allow safe harbor entry and to reduce harbor wave agitation.
2. Expansion of Berth 2 with improved/repaired or replaced fender units and mooring bollards.

3. New commercial float with cargo storage and transfer facilities.
4. Expanded public marina facilities with upland amenities that include a boat ramp, parking, comfort station, and fish cleaning stations.
5. Designated public access and commercial recreational areas.

These recommended improvements are illustrated in the following diagram:


West Harbor operations are conducted within a relatively sheltered basin that is protected on the west by a small barrier island and further protected on the north by a fringing reef. An entrance channel through the fringing reef leads to a small turning and berthing area. Prior to 1983, cargo was handled at Berth 1 that faces the turning basin. Normal wave action can enter the channel and make this location difficult to use. Following significant typhoon damage in 1976 and a seven-year reconstruction effort, a new wharf Berth 2 was constructed behind the barrier island. At the same time, the turning basin was enlarged to accommodate this new facility. Despite the shelter provided by the fringing reef and the Island, deep ocean waves can enter the harbor at times and cause excessive vessel movement at the wharf.

During these periods navigation and use of the harbor are seriously hindered. Consequently, this master plan recommends design and construction of a breakwater and current training wall as conceptually depicted in the figure below:




Onshore improvements are proposed to be phased over 20 years as funds become available and demand dictates. Total construction costs for Phases 1, 2, & 3 are estimated at $29.2 (2016 dollars). The largest single cost is the expected local cost share ($20M) for the breakwater.

This Master Plan provides a framework to guide future port development that forms a cost-effective program to satisfy projected future demand, while considering potential environmental and socioeconomic impacts.

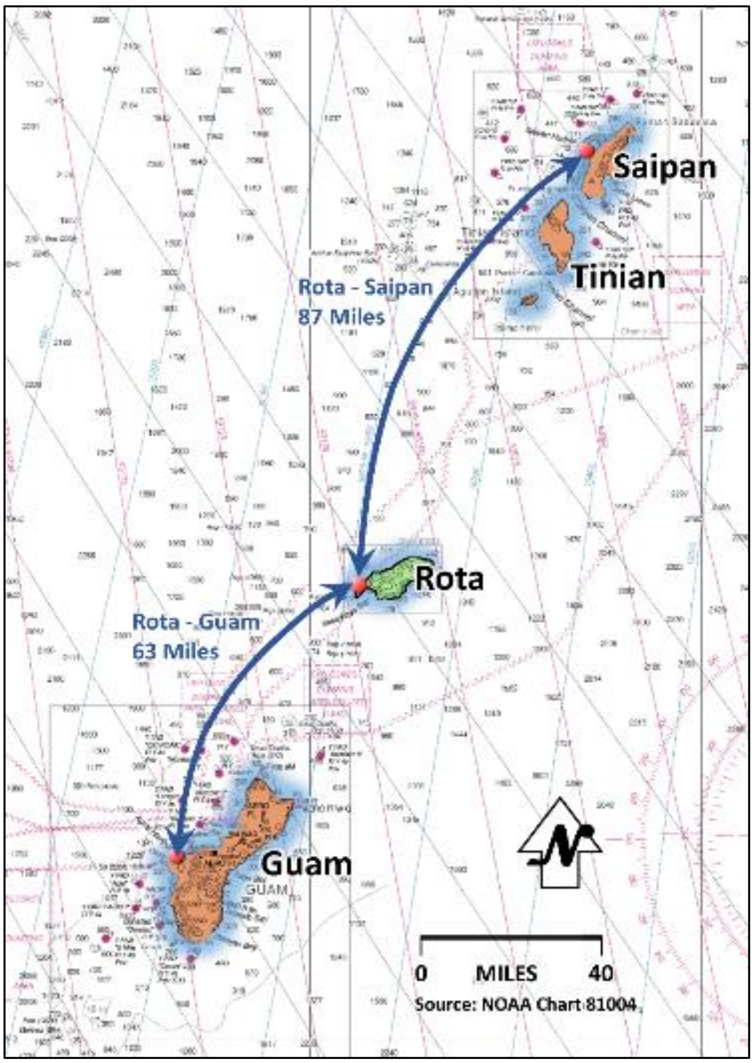
# 1.0 Introduction

## 1.1. Background

### 1.1.1. Location and General Demographics

Rota is one of the three principal islands of the Commonwealth of the Northern Mariana Islands (CNMI) and one of the four constituent municipalities of the Northern Marianas. Approximately half of the residents live in Sinapalu, Rota's largest village. The island has a land area of 33 square miles, with its highest elevation at Mount Sabana at 1,628 feet. It had a population of 2,477 as of 2010, corresponding to four percent of Northern Mariana Island residents, at a population density of 75 people per square mile. About half of the inhabitants identify as Chamorro, with a significant minority of Filipino, and those who consider themselves of mixed race[1].

*Figure 1-1: Rota CNMI Location*




[1] https://en.wikipedia.org/wiki/Rota, U.S. Census Bureau

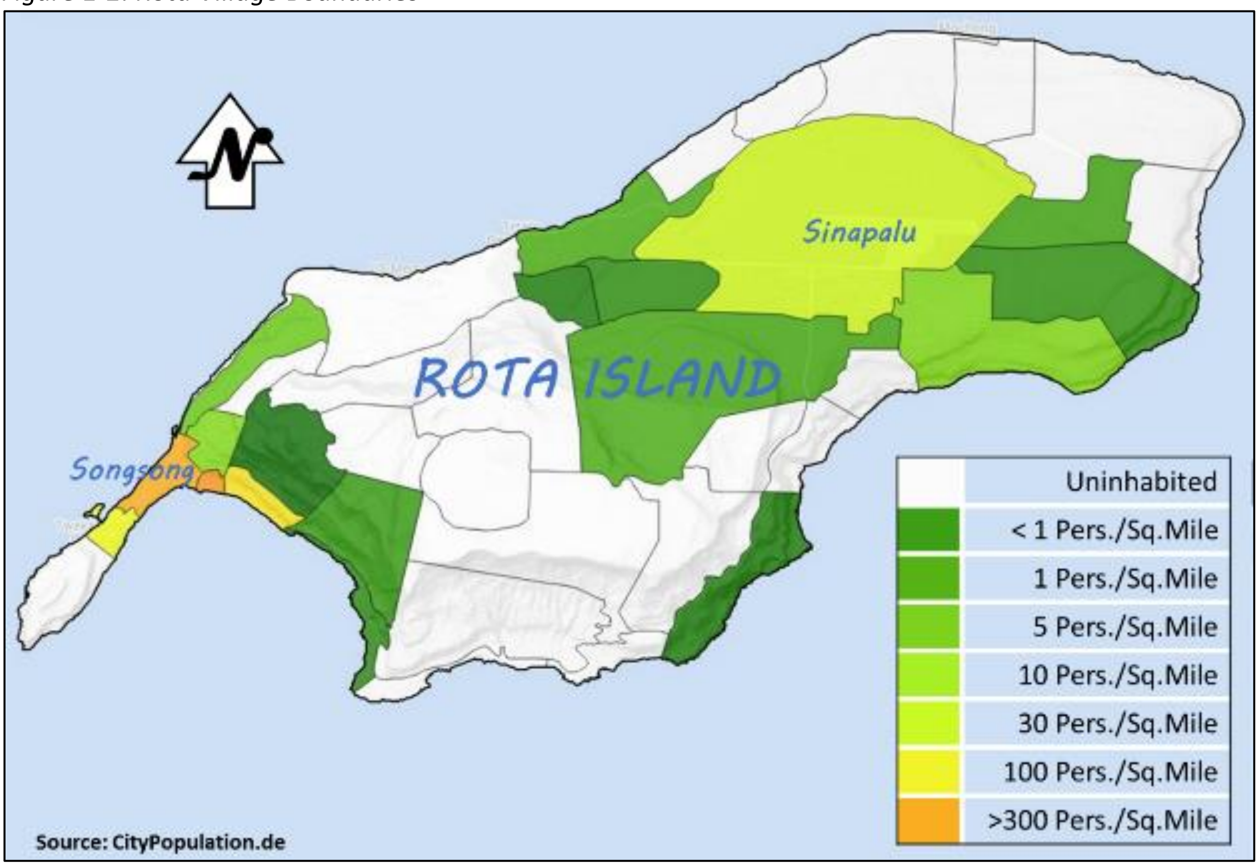
### 1.2. Location

The island of Rota is about 70 miles southwest of Saipan, and 38 miles northeast of Guam. However, Rota Harbor is approximately 87 miles by sea from Tanapag Harbor on Saipan, and 63 miles northeast across the Philippine Sea from Apra Harbor on Guam (Figure 1-1). Rota is the southernmost of the CNMI islands and the closest commercial port is Apra Harbor. Therefore, Rota sees significant informal trade with Guam, which is legally subject to CNMI customs and harbor dues. Collection of these fees and regulation of trade from outside of CNMI is currently a point of contention for Rota residents.

#### 1.2.1. Political Subdivision

The 1976 Covenant creating the CNMI established jurisdiction of U.S. laws, agencies, and programs; provided for a CNMI Constitution, an elected government and defined self-rule; and granted U.S. citizenship to CNMI residents. Unlike Guam, Saipan and Tinian, the Island of Rota was never occupied by the U.S. military before the end of World War II. Therefore, Rota does not have a history of U.S. Armed Forces presence and there are no present or planned military facilities.

*Figure 1-2: Rota Village Boundaries*




The U.S. Census Bureau recognizes 40 named villages on Rota. However, only 12 villages have more than one or two households. The majority of households established on the northern part of the island are located in Sinapalu, near the airport. Those to the south are in Songsong, near Rota Harbor.

### 1.2.2. Economy

The largest single employer on the island is the Commonwealth Government, with about 35% of the employment in the Public Administration, Education, Health Care, and Social Services fields. About 18% of the population is employed in the hospitality and tourism industry, comprising the second largest field of employment on the island. The total Rota Island trade (as a stand-in for GDP) reported in 2007 was $10.6 million, and this grew to $19.5 million in 2012, reflecting a compound annual growth rate of 13% for that time period.

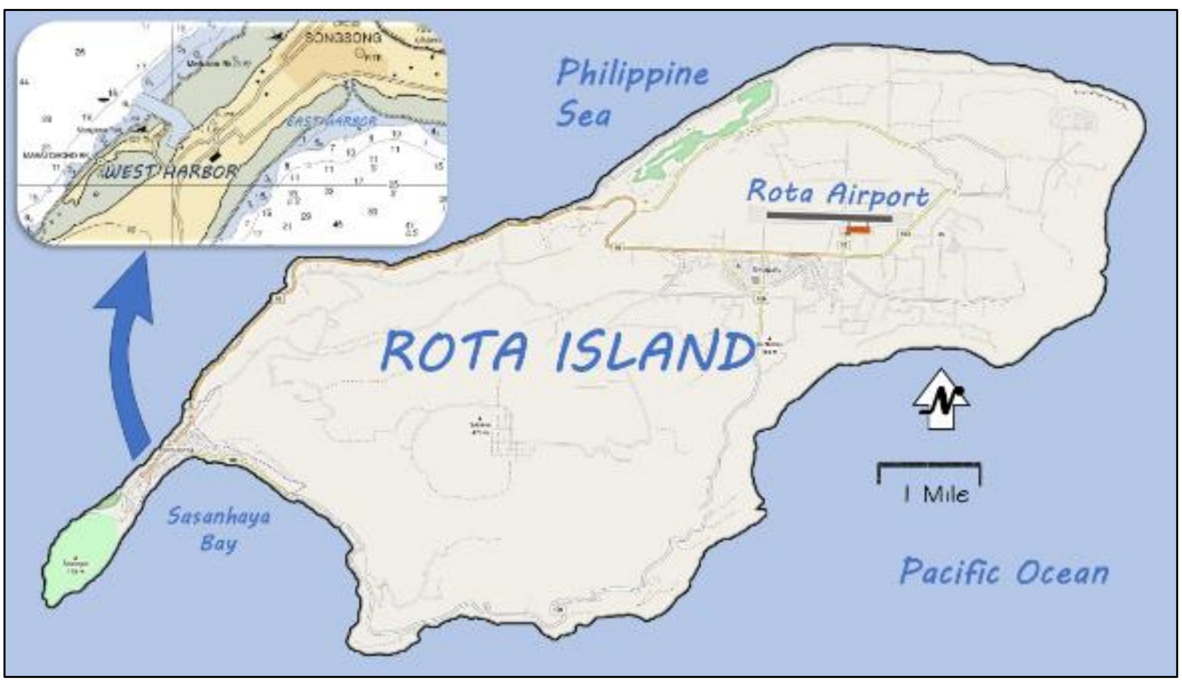
### 1.2.3. Commercial Airport

With a 7,000-foot runway, Rota Airport is large enough for Boeing 737 class aircraft as well as Airbus 320 and smaller 330 class planes. These aircraft are commonly used for local domestic and international flights. However, the airport is normally open only to shuttle flights from Guam and Saipan. Passenger facilities include roughly 42,000 square feet of arrival, departure, and administration spaces; in addition to parking and passenger vehicle lanes. There is no airport taxi service or other public transportation on the island, but cars are available for rent at the airport[2].

The air terminal is attended from 6:00 a.m. to 8:00 p.m., with other hours available by arrangement with the airport manager. However, there is no air traffic control at the airport, and aircraft control is conducted from Guam. Flights arriving at Rota must go on to Guam or Saipan to refuel. Immigration and customs agents are available during scheduled operations. At other times, prior arrangements must be made with the Chief of Immigration on Saipan.

### 1.2.4. Rota West and East Harbors

*Figure 1-3: Rota Harbor Locations*

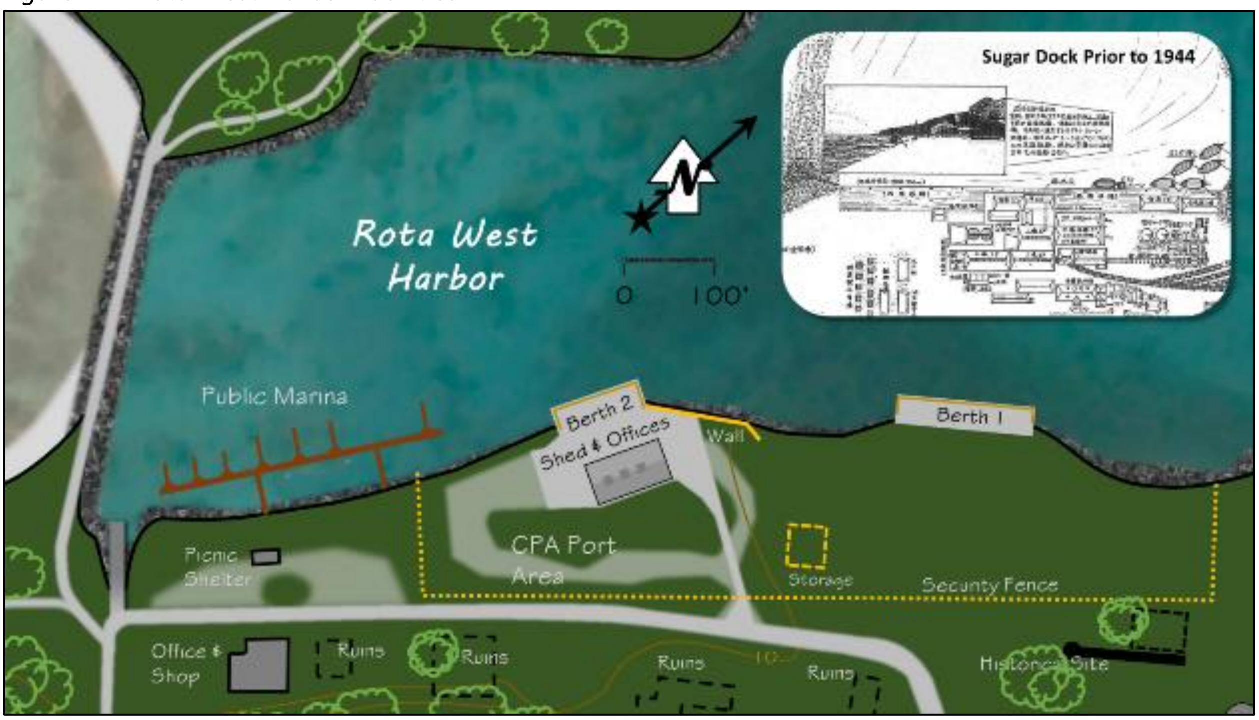



[2] Source: AirNav.com

Rota Island is served by two harbors at Songsong Village. These comprise the only harbor facilities serving the island. The Rota West Harbor is owned and controlled by the Commonwealth Ports Authority (CPA) and is primarily used for import of commercial goods for the island. Prior to 1983, West Harbor Berth 1 was the only working berth on the island. It was constructed at the site of earlier (pre-1944) sugar export docks adjacent to the Nanyo Kohatsu Kabushiki Kaisha sugar mill, now a historic site. In 1976, Typhoon Pamela damaged the harbor and Berth 1. A 1979 U.S. Army Corps of Engineers (USACE) report recommended harbor expansion and construction of a second berth. This construction was completed by 1983 and Berth 2 has been in continuous use since then.

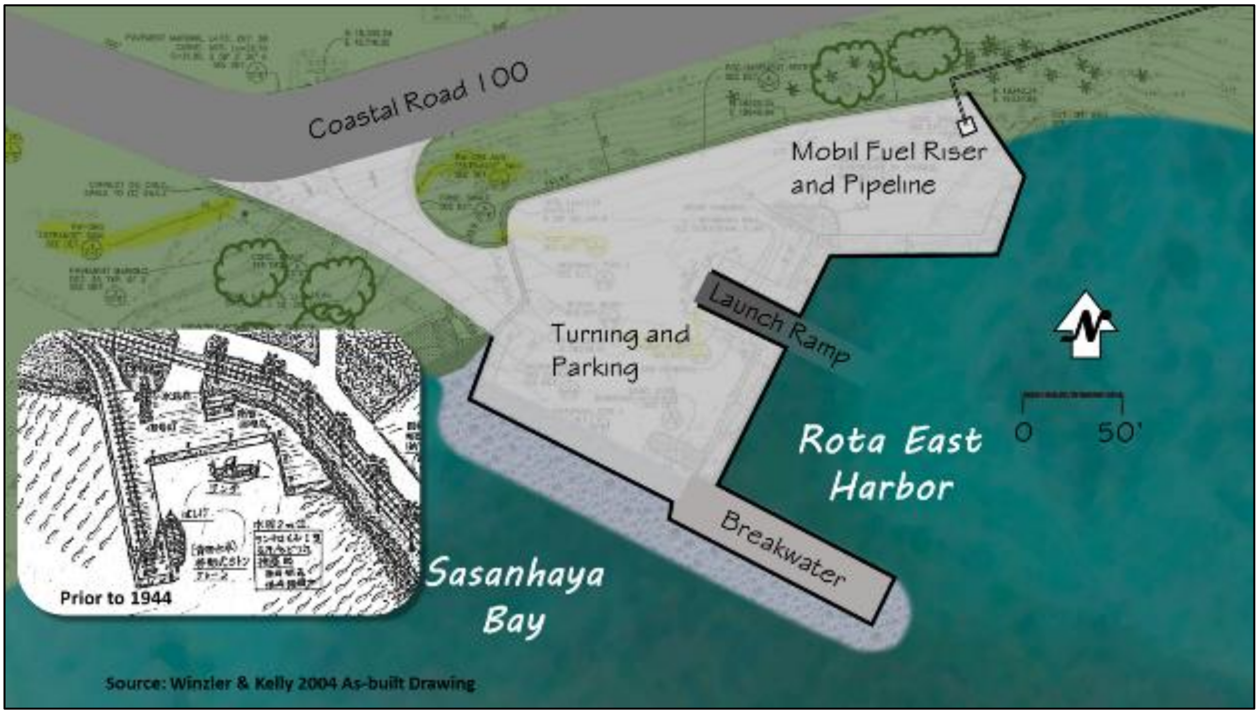
In 2005, a small public marina facility was expanded through a grant from the Sport Fish and Recreation program. It is under control of the Department of Lands and Natural Resources and is co-located at the West Harbor by lease agreement with the CPA.

*Figure 1-4: Rota West Harbor Facilities*




The Rota East Harbor, located on Sasanhaya Bay, is administered by the CNMI Department of Public Lands and is not part of the CPA properties. It was constructed in 2004 on the site of an earlier (pre-1944) Japanese small boat and lightering facility. The East Harbor consists primarily of a public launch ramp and small basin protected by a 110-foot breakwater. Mobil Mariana Islands Inc. owns and operates a land-based fuel oil storage facility and offshore mooring in Sasanhaya Bay, adjacent to the East Harbor. This private facility is the only source for imported fuel to operate Rota's power generation plant and motor vehicles. While Rota East Harbor is included in this report for completeness, it is not part of the project scopes or development recommendations.

*Figure 1-5: Rota East Harbor Facilities*




## 1.3. Master Plan Objectives

The Rota West Harbor Master Plan has been developed to create a framework to guide future port rehabilitation and improvement projects. This plan is designed to provide a cost-effective approach to improving harbor reliability and maintaining services vital to the residents of Rota Island. An assessment of future demand for cargo handling capacity has been incorporated into the recommended improvements, along with the need for flexibility to accommodate new economic opportunities.

Our understanding of the environmental value and fragile nature of coral reef building organisms has changed significantly since the previous West Harbor Master Plan was prepared in 1997. The cost and environmental impacts of the development plan suggested at that time are too high to justify its construction now. However, the socioeconomic impacts of a “no action” alternative preclude that option as well.

Therefore, the Rota West Harbor Master Plan developed a number of options, including a variation on the 1997 plan, and considered the cost, the potential environmental impacts, and the economic benefits. In all cases, avoiding environmental impacts and minimizing construction costs was given the highest consideration in evaluating the alternatives. Potential mitigation measures are also discussed as they apply to the recommended plan.

The planning process was initiated with a program of on-site meetings to establish the issues that the proposed development will address. Suggested measures to resolve these issues were evaluated against on-site investigation of weather and ocean conditions, harbor bathymetry, and both above-water and underwater engineering inspection. The alternatives developed were also discussed in a collaborative process with USACE, as well as with CPA management and operating staff.

The Master Plan includes a financial plan that is based on the CPA and the Commonwealth's capability to bear additional construction debt. There are a few improvements that should be made in the very near term. These drive the first phase of the project and appear to be financially feasible under the current CPA budget. A schedule has been established that is driven by the capital improvement program, CPA financials, and by necessary permit review and environmental entitlements.

Concurrent with the Rota West Harbor Master Plan, USACE is preparing its own plan for improving navigation conditions at the harbor entrance. This plan has the potential to impact both the harbor improvement construction schedule and the CPA's financial capacity to perform the improvements.

Since environmental evaluation, mitigation and permitting will have a strong influence on schedule and costs, the Master Plan includes a level of detail necessary to define the environmental entitlements that must be considered and addressed prior to construction. In this way, the Master Plan provides the preliminary documentation to initiate local, state, and Federal permit processes.

## 1.4. Public Information and Stakeholder Input Meetings

The following sections include a recapitulation of notes and meeting minutes collected during a series of client and stakeholder meetings held in 2016. The notes reflect the opinions, thoughts, experiences, and input of the meeting participants and are, therefore, simply records of statements not necessarily supported by findings of the project team.

A second set of meetings were held in March 2018 to present the draft Rota West Harbor Master Plan to the public and other stakeholder groups and to receive feedback on the Master Plan draft.

The following sections provide a summary of the salient points from the 2016 meetings. The complete *Notes of Meeting* documenting the 2016 and 2018 meetings can be found in Appendix E.

### 1.4.1. USACE Public Scoping Meeting: 18 July 2016

The most recent USACE study focused on operations and maintenance of the existing facility. Surveys are done every few years as needed. Repair of the revetted mole took place in 2007. No need is presently seen for harbor deepening. Depths and width are adequate for current and future uses. Future actions will address wave action and navigation. This study is looking at:

- Expansion of turning basin
- Breakwaters offshore
- Interior harbor structure
- Non-structural solutions

***USACE Alternatives Under Consideration[3]:***

**Alternative 1** – Construction of revetted offshore mole built of rubble material. The 1997 CPA master plan included a larger breakwater and turning basin expansion. Since that plan was scaled back, and the turning

[3] Since the 18 July 2016 USACE Public Scoping Meeting, the Corps has changed its alternatives under consideration. A discussion of current alternatives can be found in Section 6.2.

basin would not be expanded, a smaller breakwater would accomplish the same effort for the harbor. Ease of navigation also considered. Breakwater would be exposed to typhoon waves.

**Alternative 2** – New breakwater on north side of channel. This would slow down current in entrance channel and break up waves entering the harbor. New breakwater may also be combined with Alternative 1.

**Alternative 3** – Expansion of turning basin. Original layout has changed. Environmental resources such as coralline algae and unique habitat are to be avoided. Removing existing revetted mole and rebuilding further west (includes demolishing and rebuilding causeway). Port authority landside facilities would need to be relocated to the south west. Also, could contain parts of Alternative 1 and/or 2.

***Integrated F/EIS***

Components Include: Engineering, cost, economics, land, and environmental, with an optimal balance of all the items. There will be a 45-day review of draft EIS with comments to be addressed in a final report. A separate review will include a Washington level review between all offices. The report will go on to Congress for authorization and USACE will seek funding for construction.

***Cost Share Project***

The cost of the current phase (USACE Authorization Study) is split 50/50 — CNMI and USACE each spent \$1.5 million. Design and construction phase depends on channel depth – if it remains 20 ft., then 90% federal, 10% local with O&M at 100% federal. If channel depth is greater than 20 ft. but less than 45 ft., 75% fed, 25% local. The project can be phased if full funding is not available. Construction in Rota is estimated to be several times costlier due to the harbor wave and wind conditions.

***East Harbor***

Previous federal (USACE) or CNMI administrations conducted a study of the East Harbor, with the recommendation that suitable harbor improvements can be built with \$15 million that would accommodate future vessels. The West Harbor is not currently usable November through February. Wave action should be less than two feet of wave for use. Although the West Harbor channel and basin are federally maintained, the East Harbor basin is not. Therefore, USACE navigation improvement funds would only apply to West Harbor, regardless of benefit.

Concern was raised that fuel offloading at East Harbor requires a fuel tanker to fill Mobil tanks next to the school and requires a hose to be floated across the marine preserve. To date, no accidents (leaks or fire) have occurred. However, the benefits of enabling a fuel tanker to navigate into the West Harbor, thus allowing for the relocation of the Mobil tanks away from East Harbor to a more industrial area (away from residents and schools), were raised.

***Weather***

On the east side, storm wave run-up goes up to the highway during typhoons. Improvements to the west were not implemented for proper vessel access…known as “cemetery of vessels.” A breakwater would be helpful in the west, while navigable as it is, entrance is difficult. When waves exist, it is impossible to navigate outside. Current weather reports that were previously not available aid in navigation decisions. A breakwater would be immediately beneficial to navigation and safety. A ship such as MV Luta is unable to make uninterrupted calls which will prevent Rota from responding to a state of emergency due to harbor access issues.

***Marina Expansion***

There is public concern for marina capacity since marine sports events are held at Rota, and some boats were turned away due to lack of dock space. Alternative 3 looks to displace the marina and would need to be coordinated with the Department of Lands and Natural Resources (DLNR) that provided the grant for marina construction. At Rota, it is difficult to distinguish recreational from commercial uses of the small boat marina. Commercial uses include tours, sport-fishing and dive charter.

Small boat marina may be relocated if Alternative 3 is implemented, and may be moved farther inland. A benefit of expansion would be increased space for small boat operations, which may lead to an increase in tourism activities and would boost the economy. The movement of ships should be considered in small boat harbor design. A Marianas Trench visitor's center is also being considered.

### 1.4.2. CPA Kickoff Meeting: 25 October 2016

***CPA's vision for master plans for Rota West Harbor***

The master plan must address the active wave and current environment of the harbor and the ongoing challenges with safe cargo delivery and offloading. There is also concern for erosion at the southwest corner of Berth 2, where the current may be undermining the quay wall.

The Rota West Harbor Master Plan must also address the functions of the East Harbor (non-CPA jurisdiction) for such things as Ro-Ro cargo and small boats. A future need may include Best Sunshine's yacht service from Saipan (two yachts are already in Saipan; the company plans to purchase three more).

USACE is evaluating new breakwater or channel reconfiguration projects. However, these improvements may encounter significant environmental challenges due to potential impacts on marine life, coral, etc. Overall, the issue of harbor funding must be considered.

***Stakeholders and Key Interests***

It would be favorable to identify all key stakeholder, public and special interest groups early in the master planning process so potential key issues and concerns of those groups may be anticipated and considered throughout the master planning process. The following stakeholder meetings have been scheduled for the Rota West Harbor Master Plan:

- Meeting with Mayor Efraim M. Atalig
- Coordination Meeting with Rota Ports Manager
- Rota West Harbor On-Site Meeting and Walk Through
- Public Information Meeting
- CNMI Harbor Commercial Users Meeting
- CPA Master Plans Coordination Meeting

- GHD, CPA's consultant for the Saipan Master Plan
- CPA Out-Brief Meeting

***Data and record gathering***

Cargo data and other information needed to prepare the cargo and passenger projections, the port financial data and funding options needed for the financial analyses, and a copy of the recently enacted wharfage law disallowing collection of wharfage fees for cargo offloaded in Rota and Tinian which originated in Saipan, were requested from CNMI.

Additional information requested include CAD files of survey maps and other drawings and parcel maps of the Rota West Harbor properties and adjacent properties that may be affected by future harbor development.

Since the CPA currently has sufficient unused land for future development, it will not be acquiring properties outside of those it currently owns for future harbor development/expansion. However, CPA leases land to others which it could reacquire, if necessary. CPA will identify those lands and provide a copy of the lease agreements.

***Project schedule (dates cited are for Saipan, CNMI)***

Since the USACE's Feasibility Study will only be reaching *Decision Point 2 – Concurrence on its Tentatively Selected Plan* on 13 June 2017 based on the schedule provided by the USACE, M&N suggested that postponing the completion of both master plans until after concurrence of the USACE's Tentatively Selected Plans may be a good idea so CPA and M&N have an opportunity to consider the USACE's plans before the CPA master plans are finalized.

CPA requested a written request to adjust the schedule to better align with the USACE's schedule. A proposed revised schedule should accompany the written request. If advanced copies of the Tentatively Selected Plans can be provided to CPA and M&N by USACE as the plans are discussed and finalized, it would help to coordinate the CPA's master plan.

***Miscellaneous items of discussion and notes***

- Rota West Harbor Pier 1 is used for homeporting the MV Luta
- Vessels offloading cargo at Rota West Harbor are required to clear its cargo at Berth 2

### 1.4.3. Meeting with Mayor Efraim M. Atalig: 26 October 2016

Offloading of light vessels typically carrying cargo from Saipan and Guam must be performed at the CPA commercial port. Cargo cannot be offloaded at the DLNR small boat marina at Rota West Harbor. Enforcement of cargo off-loading at the commercial port is the responsibility of the CNMI central government, not the Municipality of Rota. Primary concerns are:

- Agricultural inspections and quarantine of cargo entering Rota to avoid introduction of invasive species (e.g., brown tree snake).

- Wharfage and other fees not collected on cargo discharged at the marina that would otherwise be paid for cargo offloaded at the commercial port.
- The master plan for Rota West Harbor should consider and accommodate safe offloading of cargo from light vessels at the CPA commercial harbor. Currently, there are concerns with safe offloading of cargo due to the freeboard height, especially during low tide.
- Although establishment of a more reliable commercial cargo delivery service to Rota in the future could decrease the number of light vessels carrying cargo to the island, the actual result is uncertain.
- The small boat marina should only be used by sports fishing boats, and other vessels with a "PU" (Personal Use) license. Heavier loaded vessels carrying cargo and offloading at the marina are also suspected of causing damage to the marina docks.
- A new access road and operations area expansion project at the small boat marina, including a new comfort station, has been funded and designed.

### 1.4.4. Coordination Meeting with Rota Ports Manager: 26 October 2016

***Port of Rota comments***

The priority for the port and island of Rota is to achieve reliable cargo delivery. The challenge to this is an active wave and current environment of the harbor and the on-going problems with safe cargo delivery and offloading.

A new breakwater would help decrease the wave activity in the channel, the harbor basin, and at the berths. Dredging and widening the channel and harbor should be considered to allow deeper draft vessels to call the port. Also, a new entrance channel at the north end of the harbor should be considered to facilitate easier access to the harbor, and especially, Berth 1. A project to replace the mooring bollards at both Berth 1 and Berth 2 is currently underway. Due to the need to keep the port operational and the lack of laydown space, any development would have to be phased.

***Small Boat Marina at Rota West Harbor***

A boat repair facility at the port would be beneficial. The facility would need a way of removing vessels from the water such as a boat haul out, crane, boat ramp with hydraulic trailer, etc.

A new access road to the DLNR small boat marina at Rota West Harbor is currently being planned. CPA noted that consideration should be given to utilizing the excess soil leftover from the site regrading to accommodate the proposed new road for landfill cover by the CNMI Department of Public Works.

CNMI customs has issued a notice to boaters that all offloading of cargo shall be performed at the CPA commercial port and no cargo shall be offloaded at the DLNR small boat marina at Rota West Harbor. Concerns include unmonitored and uncontrolled offloading of cargo including the importation of illegal and contraband goods (e.g., illegal drugs), invasive species (e.g., brown tree snake), and the potential risk of losing U.S. federal funding used to develop, operate and manage the marina facilities.

Vessels were previously allowed to bring cargo into Rota through the small boat marina, bypassing the commercial port, since Rota was suffering from unreliable commercial cargo service and residents needed supplies.

***Miscellaneous information***

- Seabridge previously ran regular service between Guam, Saipan and Rota with the MV Super Shuttle but service was halted a few years ago.
- Original purpose of Berth 1 is unclear.
- Bulk manganese was previously exported from the port.
- Based on anecdotal observations, 75% of the waves entering the harbor come out of the northeast.
- Captain Lino Mendiola piloted the MV Fidel and MV Celeste that called the port.
- Tugs that have called the port include the MT Chamorro and MT Mangilao.
- CPA is seeking a federal Port Security Grant for the installation of new lighting, security cameras and fencing, and for a snake control program.

### 1.4.5. Rota West Harbor On-Site Meeting and Walk Through: 26 October 2016

***Port of Rota Operations***

Shifting the Grove mobile crane during cargo offloading operations requires a significant amount of time. Furthermore, in order to offload containers on the outboard side of a vessel, the vessel may need to be spun around due to the limited reach of the Grove mobile crane. The estimated offload time for a delivery of four containers takes half a day; a delivery of 15 containers takes 3 days.

Rota currently has eight 20-foot chassis and two 40-foot chassis on the island to receive imported containers and deliver empties.

Due to limited coverage of the existing wharf lighting, cargo operations are not currently performed at night. Port representatives noted that there are dark zones on vessels after sunset, which pose a safety concern during cargo operations.

***Repair Projects***

Although manufactured arch fenders were installed along both berths, most are missing or damaged, so tractor tires are currently hung along the wharves for fendering at both berths. A project to replace the mooring bollards at Berth 1 is currently underway. The existing bollards have been removed and new anchor bolts have been installed in preparation for mounting of new bollards that are already on-site. The Berth 2 bollards will be replaced after the Berth 1 bollard replacement is completed. The new bollards are steel with concrete infill.

***Weather Impacts***

During high wave conditions, seawater has reached 30’ upland; under typhoon conditions, water has encroached up to the existing port access road.

### 1.4.6. Public Information Meeting: 26 October 2016

The public information meeting was intended to gather information from the public and other stakeholders. M&N noted that the master plan is still in its early stages of data gathering and information review, and initial public input is part of this first phase. MES will identify the permits and environmental entitlements that will be needed to implement the master plan once a plan is established. Cargo forecasts and future harbor operations will be projected and a development plan will be prepared as part of the master planning process. Development of a realistic vision for the master plan is essential to the master planning process and especially critical to assessing expenditures and a capital improvement budget. Therefore, input from the public and stakeholders is important at this early stage of the master plan.

***Key Issues Raised for Rota West Harbor***

1. Issues and concerns about small vessels that were offloading at the marina but now being required to offload at the commercial port.
2. Existing wind and wave operational constraints and coordination with the USACE, which is conducting a separate Feasibility Study of the harbor.
3. Current depth of the harbor and whether the harbor depth is adequate or if additional dredging is needed to accommodate vessels calling the port.
4. Structural inspection of the existing wharves and whether near-term repairs need to be considered.
5. Potential new opportunities for the port upland and in water:
    - Ferry and/or cruise service
    - Maximize the utility of existing vacant port land
    - Other opportunities for future economic development and tourism

***Immediate needs***

Immediate improvements are needed to address current problems, but studies need to be completed first. It is important that further improvement on the harbor should be based on sound engineering studies and not speculation, so it is important to approach the master plan step-by-step.

Previous studies on the Rota West Harbor and Rota East Harbor should be considered. There were discussions about bringing large vessels into Rota East Harbor.

***Existing Problems, Challenges and Potential Opportunities***

If cargo cannot be offloaded at the small boat marina and will have to be offloaded at the commercial port, a safe and viable method for offloading cargo from small vessels at the commercial port is needed. This should be included in the master plan.

The existing channel is too narrow, however, widening of the channel alone may not solve the problem. A meeting participant suggested that widening the channel could even cause the conditions within the harbor to worsen, since strong wind and current is always a challenge. Concern was also raised about the impact to the marina. It was noted that USACE is also developing a plan for the channel and construction of a new breakwater.

The wave and current instrumentation that will be installed in Rota West Harbor will gather data to help assess the existing wave and current conditions and guide any recommendations. USACE will coordinate the ongoing Feasibility Study with the Rota West Harbor Master Plan.

Existing docking facilities are insufficient. Space is adequate for current cargo operations but future ferry or cruise service cannot be accommodated. Navigating barges and small vessels during high swells and bad weather is a challenge.

***Financing the Cost of Improvements***

The proposed improvements would be financed from local taxes, revenue bonds, grants, and other sources. The study will offer recommendations to CPA and once a plan is known, funding options will also be reviewed. However, cargo volumes are not being realized and the economics will not be able to justify significant capital investment in the harbor. It was stated that a vessel call needs at least eight containers just to break even. Project justification will have to be driven by the need to be able to reliably supply Rota's residents with subsistence cargo, especially food and other necessities.

***Cultural Resources***

Annual activities take place at the small boat marina and on Mayor Prudencio Taisacan Manglona Harbor Island Park (Manglona Park), such as the Annual Fishing Derby during the San Francisco De Borja Fiesta and the seasonal fish runs. Sports divers also use the boat ramp to get to and from various local dive spots, and sports fishermen from Guam, Tinian and Saipan also deliver local produce for family and friends.

***Landside Opportunities***

It was suggested that Manglona Park could be developed with a fish market, restaurants, etc. to serve as a destination for visitors and locals alike. Also, a small boat repair/dry docking facility is needed to service and repair local boats.

### 1.4.7. Meeting with Tinian and Rota West Harbor Commercial Users: 28 October 2016

***Rota West Harbor Condition and Operations***

There is a large rock at the north end of Pier 2 that should be removed. It was also suggested that new engineered fenders and bollards along Berth 1 and Berth 2 would make berthing and mooring safer for vessels and vessel and port personnel during cargo operations.

Additional wharf lighting would be beneficial since CPA currently does not allow cargo to be loaded/offloaded at night. For tug and barge operations, the tug could light the "dark" side of the barge, but CPA still would not allow cargo to be offloaded at night.

***Rota West Harbor Navigation***

Navigating the harbor is only done during daylight hours, from dusk till dawn; navigating at night is not done due to safety concerns.

Swells greater than approximately three feet make it difficult to navigate the channel and harbor. It was suggested that tidal circulation pipes that penetrate the causeway at the rear of the harbor may affect the currents within the commercial harbor.

The decision of whether to bring a vessel into the harbor is dependent on observations of the ship's crew, communication with port personnel on shore, and largely on the experience and feel of the vessel pilot. The MV Luta has bow thrusters only, but is more capable of entering the harbor.

### 1.4.8. CPA Out-Brief Meeting: 28 October 2016

CPA is in favor of a new breakwater for the harbor but is concerned about the cost, time to permit and construct, and the environmental challenges with building a new breakwater. Given those concerns, consideration should be given to planning as small a breakwater as possible — i.e., USACE Public Scoping Meeting Project Alternative 1 Offshore Breakwater — that will still mitigate the wave energy in the harbor and channel but carry the least cost and impose the least environmental impact as possible.

CPA is beginning to enforce CNMI customs policy that all offloading of cargo shall be performed at the CPA commercial port and no cargo shall be offloaded at the DLNR small boat marina at Rota West Harbor. Concerns about unmonitored and uncontrolled offloading of cargo include the importation of illegal and contraband goods (e.g., illegal drugs), invasive species (e.g., brown tree snake), and the potential risk of losing U.S. federal funding used to develop, operate and manage the small boat marina facilities. In addition, CPA does not collect wharfage and other fees when cargo from Guam is offloaded at the DLNR small boat marina.

The U.S. Transportation Security Administration (TSA) and U.S. Customs and Border Protection (CBP) do not currently maintain a presence at Rota West Harbor.

A second set of meetings were held om March 2018 to present the draft Rota West Harbor Master Plan to the public and other stakeholder groups and to receive feedback on the Master Plan draft. No substantive comments affecting the draft Master Plan were received during the March 2018 meetings. Notes from those meetings can be found in the *Notes of Meeting* provided in Appendix E.

### 1.4.9. Second Public Information and Stakeholder Meetings

A second set of meetings were held in March 2018 to present the draft Rota West Harbor Master Plan to the public and other stakeholder groups and to receive feedback on the Master Plan draft. No substantive comments affecting the draft Master Plan were received during the March 2018 meetings. Notes from those meetings can be found in the *Notes of Meeting* provided in Appendix E.

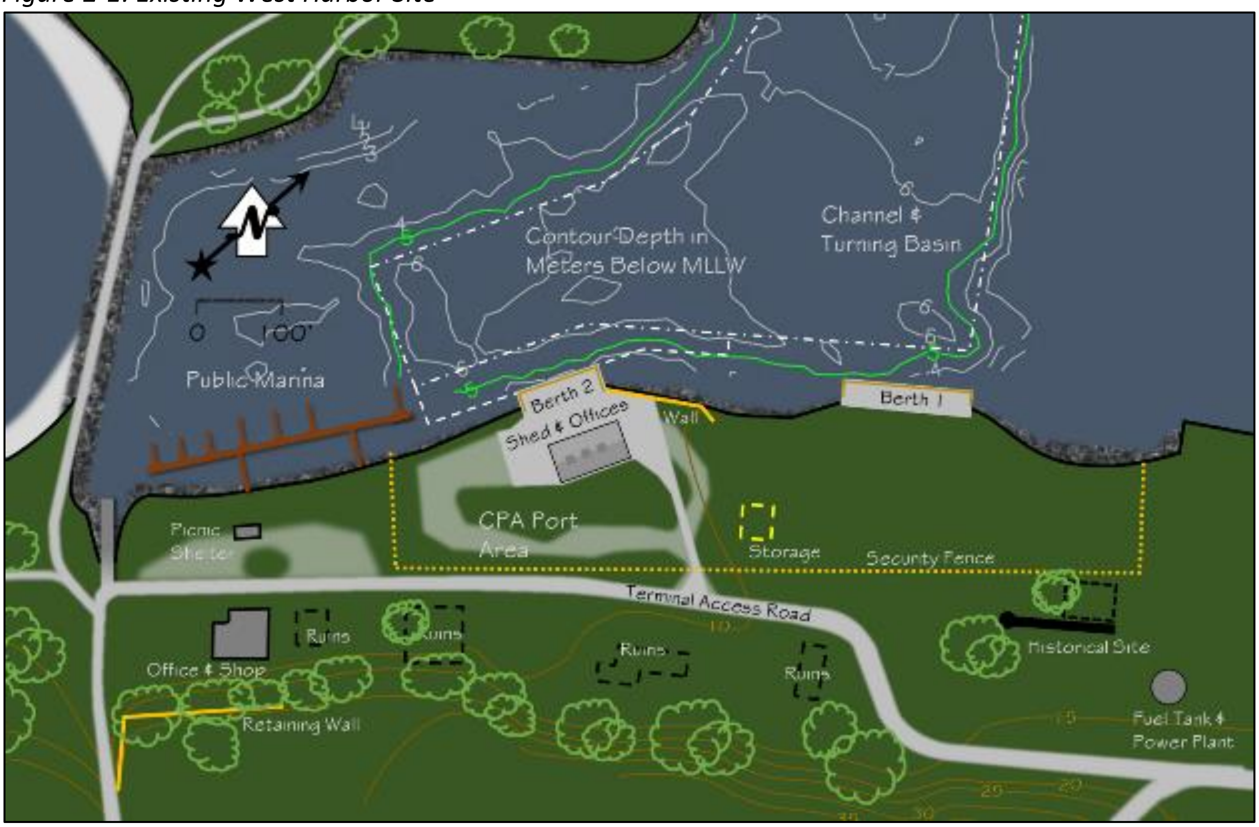
# 2.0 Existing Physical Conditions

## 2.1. General Site Configuration

Rota West Harbor cargo handling operations are conducted within a relatively sheltered basin that is protected on the west by a small barrier island that has been augmented and revetted on the north side. The harbor is protected on the north by an existing fringing reef. An entrance channel has been dredged through the fringing reef that leads approximately 1,000 feet to a small turning and berthing area. Prior to 1983, cargo had been handled at a 150-foot wharf (Berth 1) that faces the turning basin. However, normal wave action can enter the channel and make this location difficult to use.

Following significant typhoon damage in 1976 and a seven-year reconstruction effort, a new 100-foot wharf (Berth 2) was constructed. At the same time, the turning basin was enlarged to accommodate this new facility. Despite the shelter provided by the fringing reef and island, deep ocean waves can enter the harbor and cause damage to shoreline facilities and results in excessive vessel movement at the wharf.

*Figure 2-1: Existing West Harbor Site*




The West Harbor includes a concrete shed with approximately 80 feet X 40 feet for storage of cargo or equipment, and approximately 20 feet X 40 feet of office space at the north end. Cargo on the port is handled by a Grove Model TM875, 80-ton, extendable boom mobile crane. Although small container ships have called at Rota West Harbor in the past, containerized cargo presently arrives by barge.

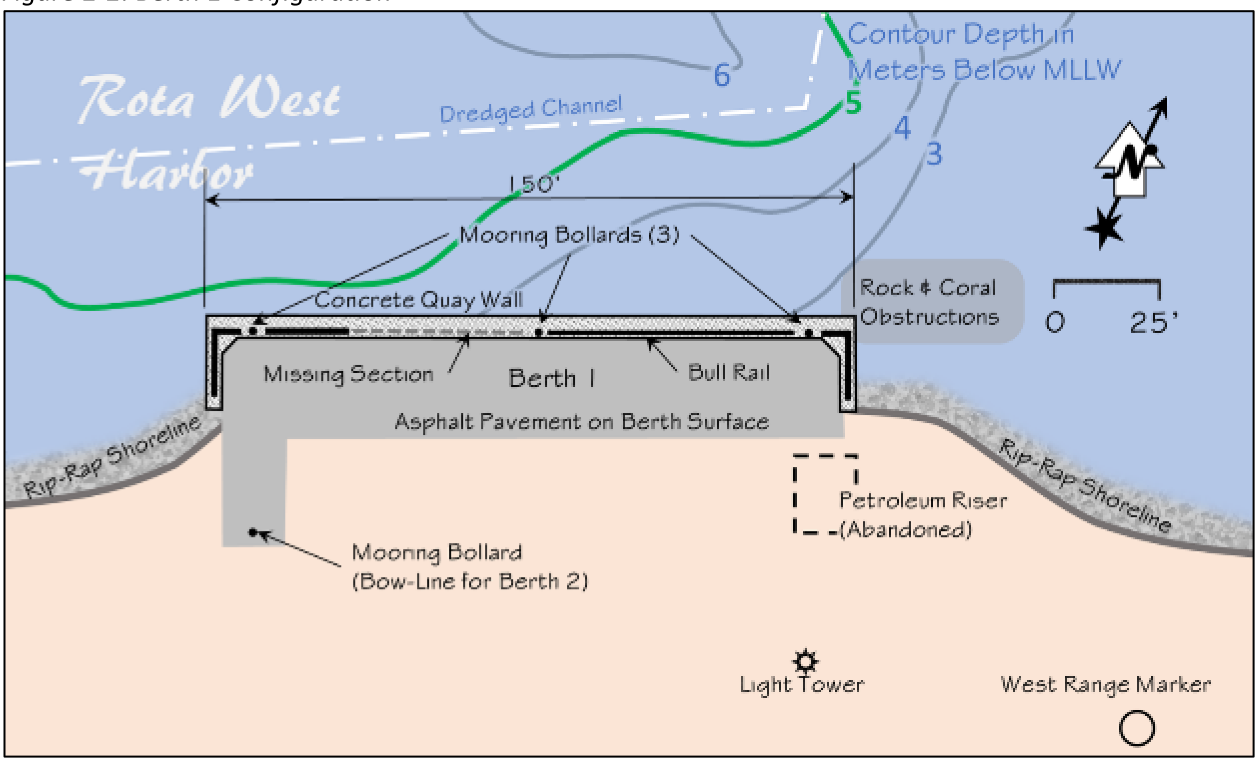
When wind and wave conditions permit, the barge is maneuvered alongside the West Harbor Berth 2, where containers are lifted off by the crane. Because the barge is 140 to 200 feet in length, frequent shifting can be necessary to position containers for lifting. Additionally, the crane in use can only lift a 20-ton to 25-ton container from most locations on the barge. Therefore, some containers must be light-loaded for delivery to Rota[4]. During unfavorable weather conditions, the barge will often bypass Rota on its weekly cycle. Therefore, delivery of containerized cargo to Rota is both costly and unreliable.

## 2.2. Harbor and Berthing

### 2.2.1. Berth 1

Berth 1 replaced a marginal quay wall that had been constructed in the 1930s to serve a sugar refinery operated by the Japanese. The original quay was designed to accept shallow-draft lighters from larger vessels anchored offshore. Its location at the south end of the channel often makes Berth 1 unusable during even moderate wave activity.

*Figure 2-2: Berth 1 Configuration*



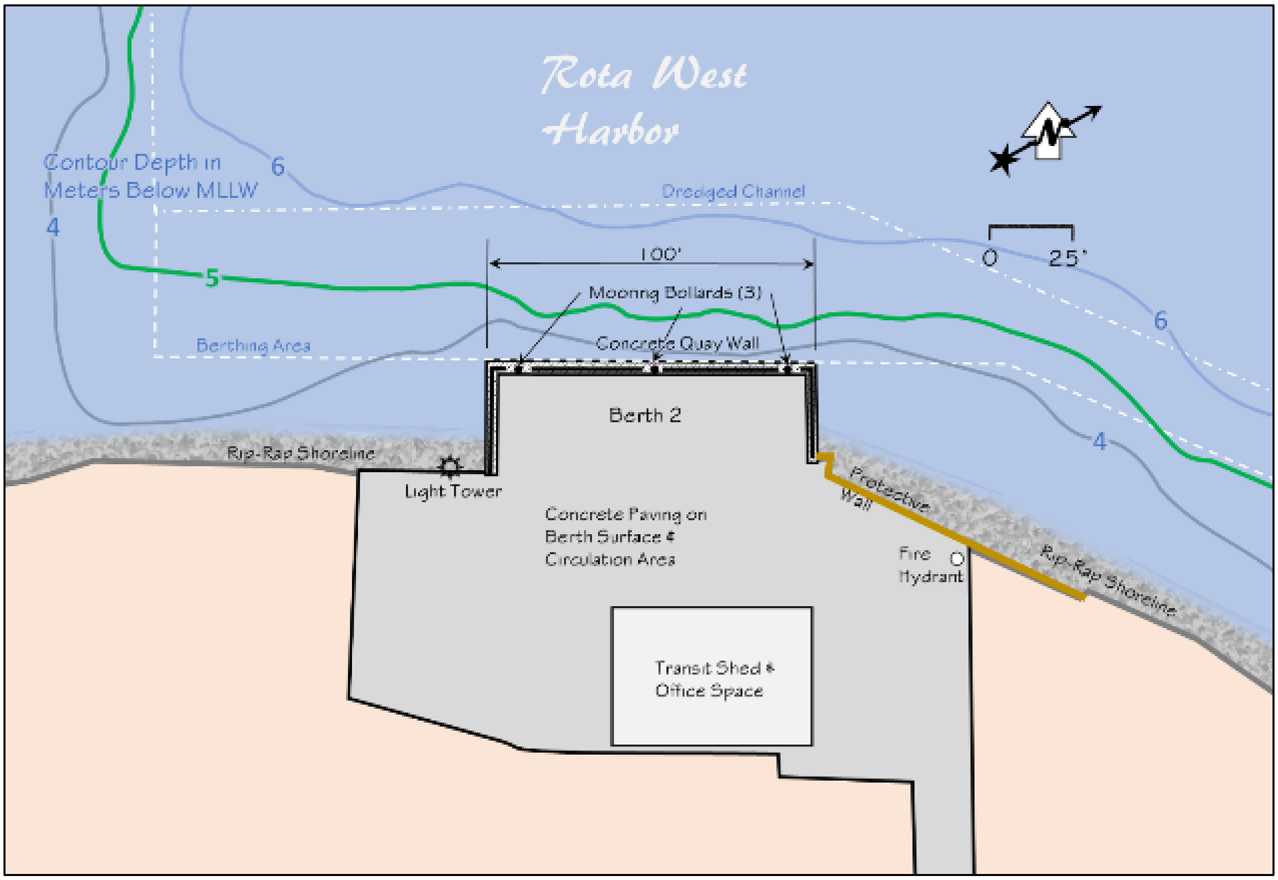

Although most cargo now lands on Rota at Berth 2, Berth 1 is still used for landing construction equipment and bulk materials, as well as export of scrap metal. Fuel for the island power generation station came in through Berth 1 until the tank-farm and anchorage was constructed at Sasanhaya Bay on the East Harbor. Although Berth 1 once served vessels up to 200 feet in length, coral and stone debris now blocks the northeastern end of the quay.

[4] Light-loaded containers are charged at the same rate as full ones. A recent estimated cost was $4,000 to ship a 40' container from Guam to Rota. Source: 2013 personal communication.

### 2.2.2. Berth 2

Berth 2 was constructed in the 1980s to provide a more sheltered mooring location than Berth 1. It too was designed for vessels up to 200 feet, however, the berth face itself is only 100 feet long. In operation, much of the vessel is allowed to hang past the north and the south ends of the quay.

*Figure 2-3: Berth 2 Configuration*



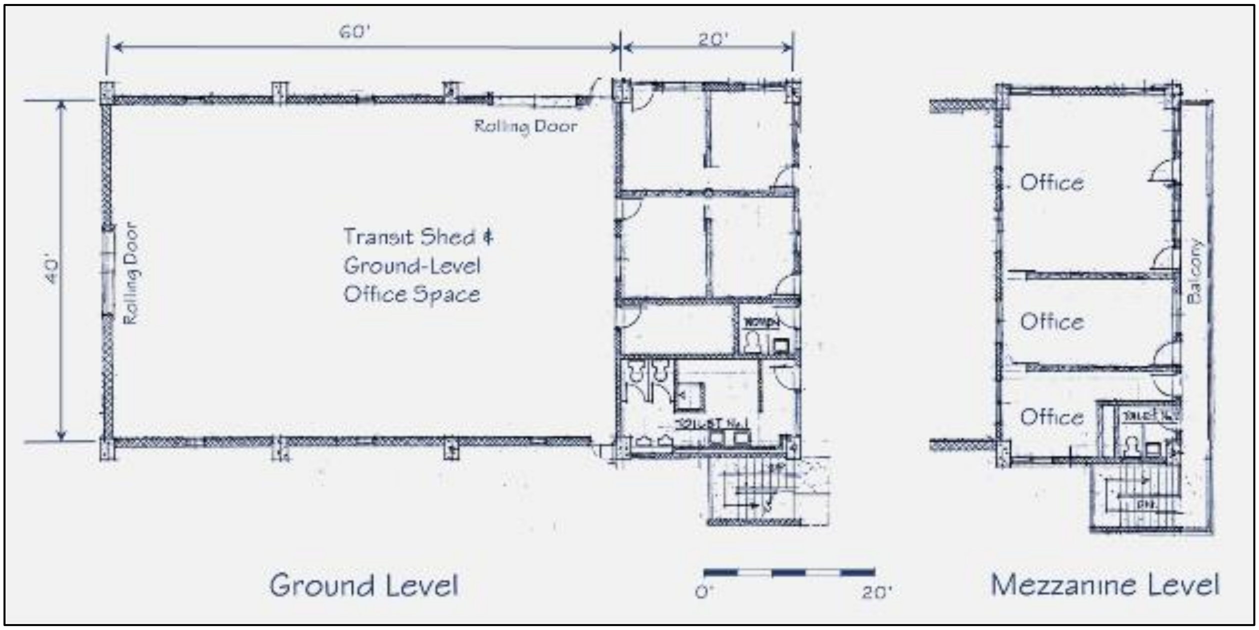

Cargo on the port is handled by a Grove Model TM875, 80-ton, extendable boom mobile crane. Although small cargo ships have called at Rota West Harbor in the past, containerized cargo presently arrives by barge. When wind and wave conditions permit, the barge is maneuvered alongside the West Harbor 100-foot wharf where containers are lifted off by the crane. Because the barge can be 140 to 200 feet in length, frequent shifting may be necessary to position containers for lifting. Additionally, the crane in use can only lift a 20 to 25-ton container from most locations on the barge. Therefore, some containers must be light-loaded for delivery to Rota.

The West Harbor Berth 2 includes about 0.3 acres of paved storage and circulation, plus a 80 foot X 40 foot office and transit storage building. Flood-lights are located around the perimeter of the building to permit night-time operation and a light tower is located at the south end of Berth 2 to illuminate the vessel. A protective wall was constructed on the north side of Berth 2 to help prevent wave overtopping of the shore.

### 2.2.3. Transit Shed and Port Operating Area

General cargo arriving at Berth 2 can be stored at the CPA transit shed set which is approximately 70 feet behind the face of the berth. The shed was constructed of concrete masonry units (CMU) at about the same time that Berth 2 was built in the mid-1980s. The first level has a concrete floor at elevation +9.2 feet that can flood during typhoon close-passage events.

*Figure 2-4: Transit Shed Floorplan*



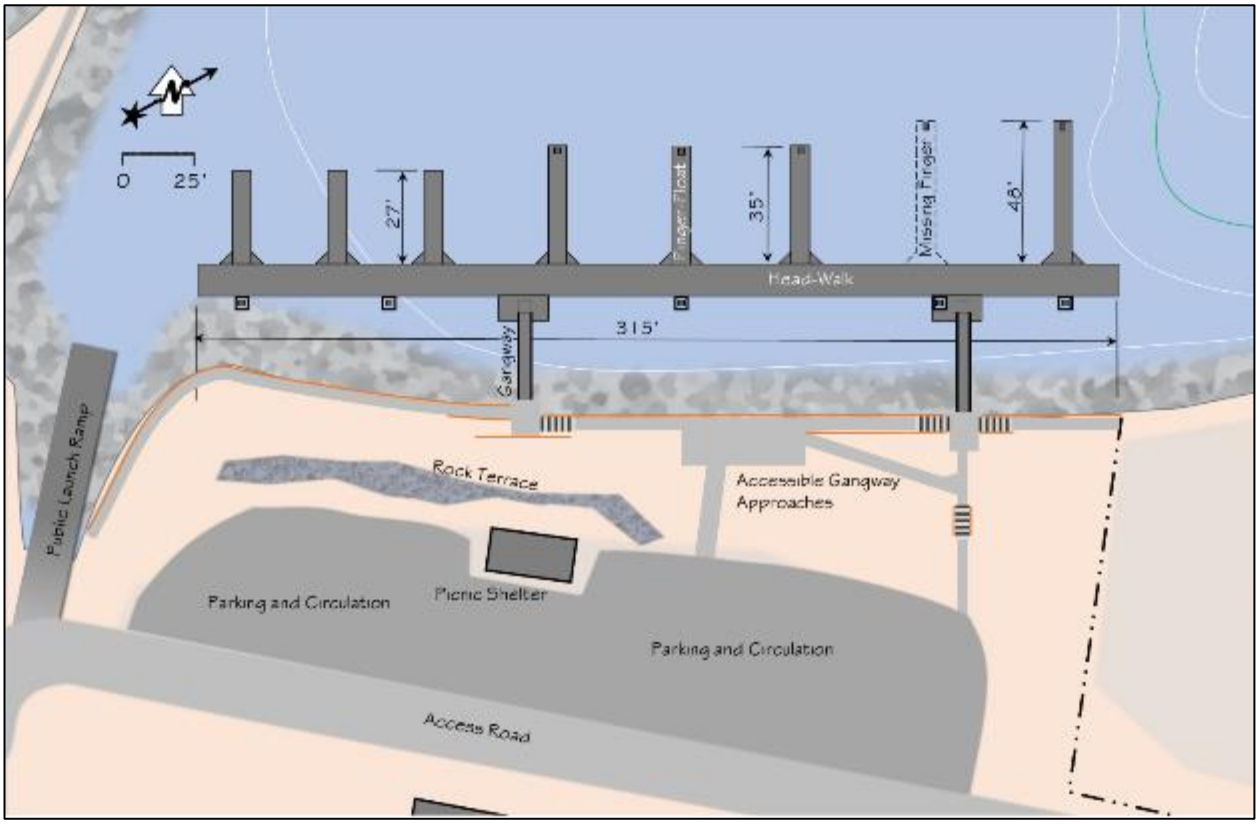

The transit area has two rolling doors for cargo arriving from the wharf or being delivered. On the same level, restroom facilities are provided for dock workers. The ground level spaces also provide storage for spare parts and stevedoring supplies. At approximately 2,400 square feet of working space, the transit shed could handle approximately 300 tons per vessel call.

### 2.2.4. Public Access and Small Boat Facilities

Rota West Harbor includes a small boat marina with floating docks for about 14 vessels ranging in size from 27 to 48 feet. As originally designed, the marina had eight finger floats with the capacity for two additional 48-foot boats. However, one of those fingers has been removed. The docks are positioned by concrete guide-piles; five on the back side of the head-walk and five at the ends of the longer finger floats.

The small boat marina has two aluminum access gangways that are hinged at a lower level to reduce the slope and the span (the northern most access gangways were observed to be missing during a March 2018 site visit). The shore end of each gangway connects to a complex of stairs and ramps that allow both pedestrian and wheel chair access according to standards set by the Americans with Disabilities Act (ADA).

*Figure 2-5: Public Boating Facilities*




Approximately three quarters of an acre of upland have been terraced and leveled to provide marina parking and space for a small shelter. A public launch ramp has been constructed at the southwest end of the marina. However, the ramp lacks a boarding float to allow safe launching. The upland public areas also lack restroom facilities.

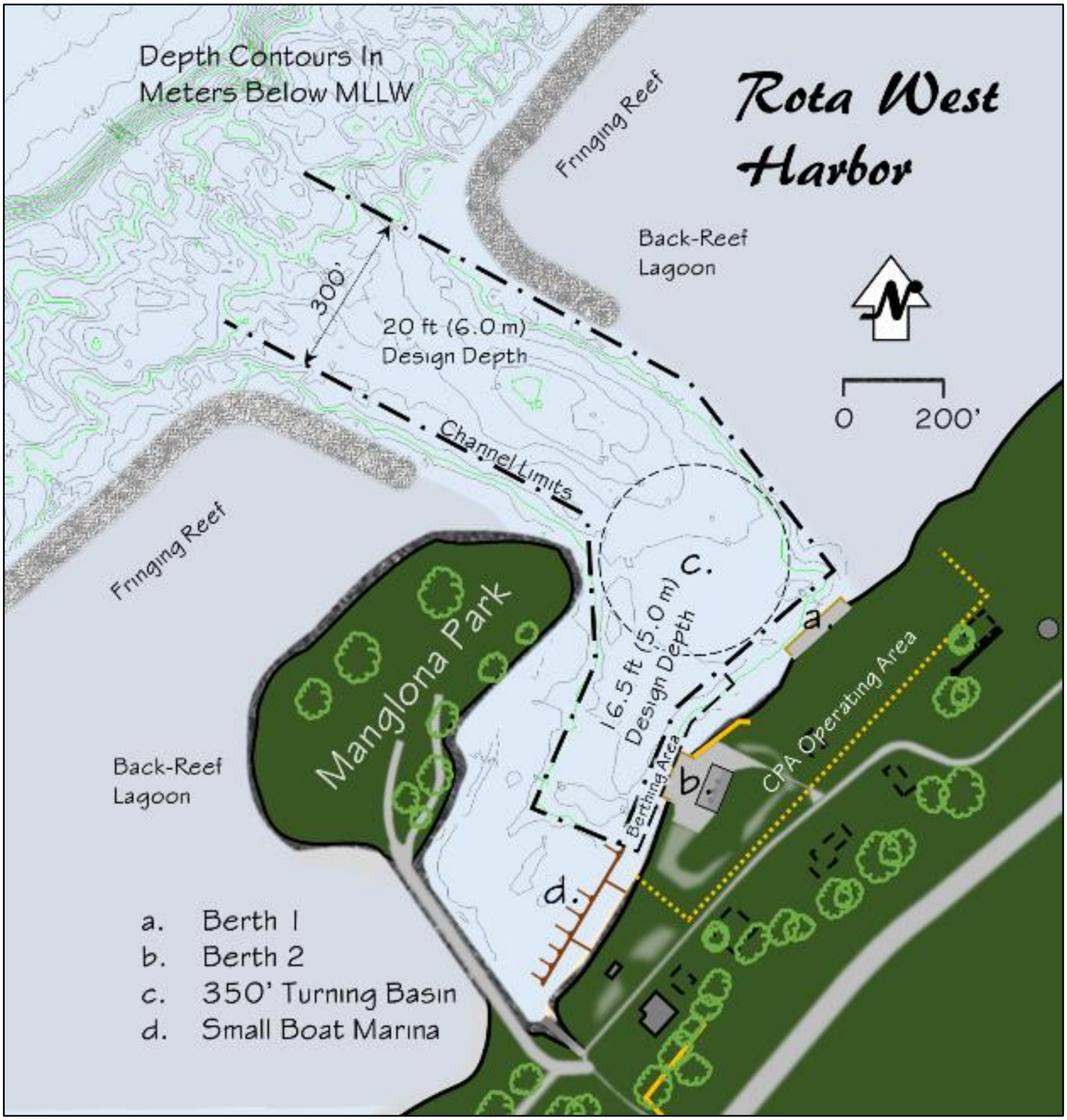
A causeway adjacent to the launch ramp leads to public areas on Mayor Prudencio Taisacan Manglona Harbor Island Park (Manglona Park), a portion of the fringing reef that has been enhanced by fill and shore protection. Manglona Park is outside of the CPA jurisdictional area, but represents a significant recreational site in the vicinity of the West Harbor. Although the island has road access and informal parking areas, it remains largely undeveloped. Typhoon damage to infrastructure and natural landscape features is an ongoing issue at Manglona Park.

CPA port property extends approximately 250 feet southwest of the launch ramp and the Manglona Park island causeway. This property adjoins Tewksbury Park and includes an attractive sand beach along a very shallow inner lagoon. Although the shallow depth and coral-rock lagoon bottom precludes water activities, this could also be an attractive area for waterfront recreation.

## 2.3. Navigation Channel and Turning Basin

Rota West Harbor entrance channel was dredged in the 1970s and enlarged to its present 300-foot width in the 1980s. The present channel is approximately 800 feet long from the edge of the reef to the center of the turning basin. It was lengthened at that time in conjunction with the construction of Berth 2.

*Figure 2-6: Rota West Harbor Channel and Turning Basin*




The design depth of the Rota outer channel is 20 feet (6 meters) below mean lower low water (MLLW) for the first 600 feet of channel, with the remainder of the harbor dredged to 16.5 feet (5 meters). Recent soundings show that the channel maintains its depth in the center and has scoured a hole that is over 30 feet deep. Most of the shoaling is confined to the berthing area near Berth 2 and to an area that had not been recently dredged at Berth 1. Presently, maintenance of the dredged channel is the responsibility of USACE. However, the 50-foot wide berthing area adjacent to Berth 2 is a responsibility of the CPA.

## 2.4. Upland Uses and CPA Property

### 2.4.1. Property Boundaries

*Figure 2-7: Approximate Property Boundaries*


The CPA controls property on Rota that is comprised of multiple leases and sub-leases dating to the original grant of approximately 7.5 acres from the Marianas Public Land Corporation in 1984. This grant coincided with construction of Berth 2 and the CPA transit shed building. A second grant was made in 1994 by the DLNR that added about 13.2 acres.

The fenced port area is under lease to Rota Terminal and Transfer Company (RTT) including the transit shed and both Berth 1 and Berth 2. RTT has sublet portions of this property to smaller entities for storing materials. The CPA has sublet a 2.5-acre portion of their property to the Commonwealth Utilities Corporation for operation of their electrical power generating plant. Adjacent to the Power Plant, approximately .75 acres is dedicated as a historical site (pre-war sugar refinery).

A 15-year permit was granted to the DLNR for a one-acre parcel (including water and land) under a 2005 memorandum. This parcel was developed to include the present-day small boat marina and public launch ramp. Other portions of the CPA property have been leased in the past for various buildings and uses. However most of these structures have fallen into disrepair.

### 2.4.2. Road Access

Access from all of Rota to the West Harbor passes through Songsong Village. The main route is the paved two-lane Terminal Access Road (informal name) that branches from San Francisco de Borja Street. Another route is via Saint Ignacio Street that passes Rota High School. Figure 2-7 shows these routes, including the coral stone road that descends from Saint Ignacio Street to the small boat marina and Manglona Park island causeway.

# 3.0 Waves, Weather, and Tectonic Environment

## 3.1. Coastal Processes

The Marine Climatological Summary (MCS) prepared by the Japan Meteorological Agency contains statistical summaries of prevailing wind conditions. Offshore wind data was collected for the grid sector, which includes Rota over a 10-year period (1971-1980). Typical trade wind speeds were found to be 10 to 20 knots, with winds speeds in excess of 21 knots occurring less than 11 percent of the time. The MCS also collected statistical summaries of annual deep-water wave conditions for Rota and the vicinity. The wave data was obtained through direct synoptic observation by shipboard personnel in the area, and represents data observed during the 10-year period of 1971-1980. Because the MCS data was obtained from vessels that would typically avoid regions of impending storms, the data does not represent the extreme storm wave events.

This 10-year data set has been used for the previous coastal modeling efforts by USACE and other consulting groups. However, local conditions had not been measured prior to this study. Local nearshore and inshore wave measurements can be used to model the conditions directly and can also be used to calibrate the offshore data to provide a more accurate statistical model of local wave conditions.

To better understand the nearshore and inshore conditions at Rota West Harbor, three wave gages were deployed by RPS Evans-Hamilton to measure the surface waves and water currents from December 2, 2016 to March 3, 2017. An onshore meteorological station was also installed at the harbor to collect wind data. Figure 3-1 illustrates the three wave gage locations and the meteorological station location. At the offshore wave gage and inshore (channel) wave gage, the directional surface waves and currents at each layer were measured. At the basin wave gage, only non-directional surface waves were measured.

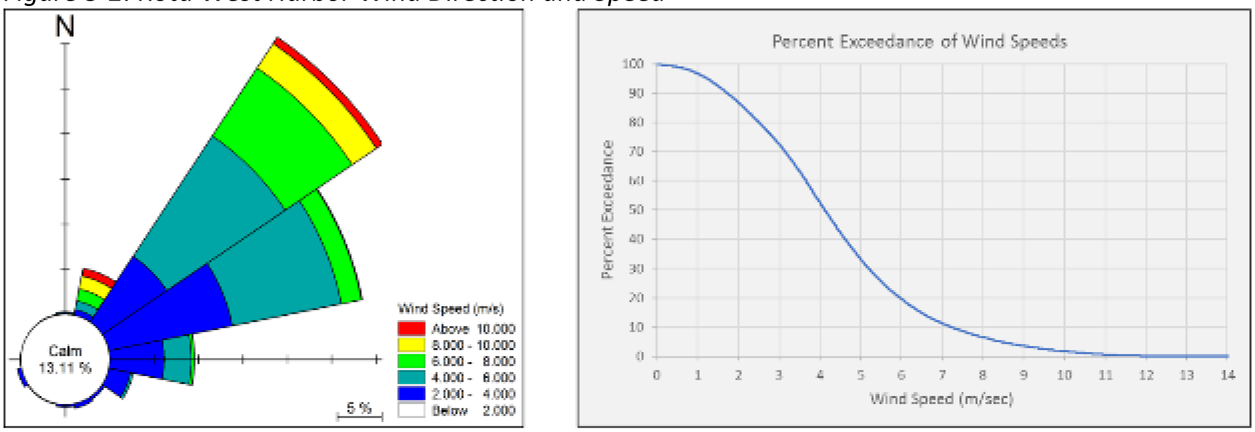
*Figure 3-1: Instrument Locations*


*Source: Google Earth ©Digital Globe 2017*

### 3.1.1. Prevailing Winds

The wind conditions at Rota West Harbor were collected by instruments mounted on the CPA transit shed. Based on this data, a wind rose was developed based on the three-month period from December 2016 through March 2017. Figure 3-2 shows that the prevailing winds are from northeast and east-northeast which predominate over 71.6 percent of the time. The wind speed of 1-percent exceedance is approximately 10.6 m/sec (21.2 knots).

*Figure 3-2: Rota West Harbor Wind Direction and Speed*




### 3.1.2. Wave Measurements

***Nearshore***

The nearshore wave measurements were taken at the water depth of approximately 13 meters. The statistical wave conditions are illustrated in Figure 3-3. The prevailing near-shore waves are from north-northwest which predominate over 82.7 percent of the time. The occurrence of wave periods between 8 seconds and 12 seconds is approximately 83.9 percent of the time.

***Inshore***

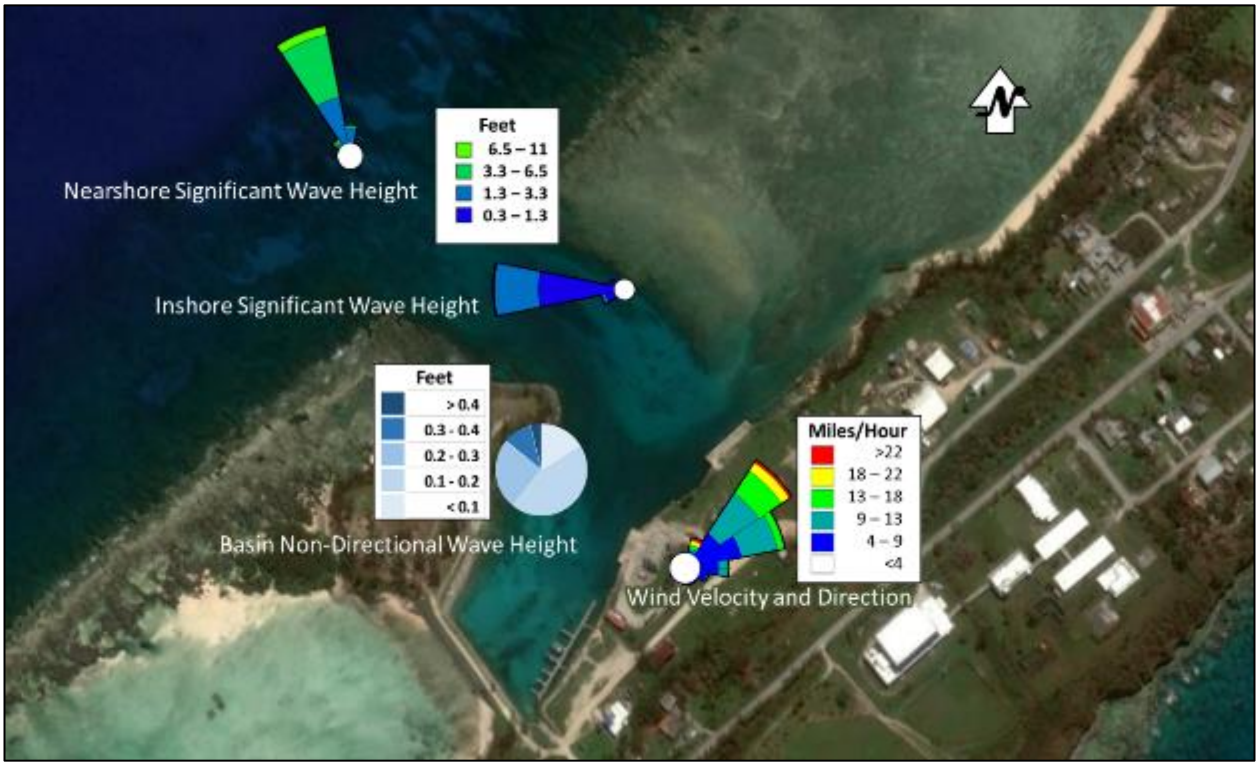
The inshore wave gage measurements were taken immediately to the northeast side of the entrance channel at the water depth of approximately 30 feet. The prevailing waves in the channel are from west which predominate over 87.6 percent of the time. The occurrence of wave periods between 8 second and 12 second is approximately 90.8 percent of the time. The occurrence of the wave periods longer than 12 seconds has approximately 25.8 percent of the time. Inshore wave heights of three feet or more were recorded about one percent of the three-month interval.

***Basin***

The basin non-directional wave gage is located at the water depth of approximately 15 feet. The measured basin wave conditions are illustrated in Figure 3-3. The occurrence of wave periods between 8 seconds and 12 seconds is approximately 96.6 percent of the time. The occurrence of the wave periods longer than 12 seconds has approximately 14.2 percent of the time. The basin significant wave heights occurring 1-percent of the time are higher than 0.5 feet.

Wave measurements show that at the channel entrance, waves of over three feet and up to eleven feet in height can occur approximately 50 percent of the time. These waves are attenuated by the channel entrance configuration to within a range of one to three feet. In the shelter of the Manglona Park island, reflected waves are normally 0.5 feet or less. These findings are illustrated in Figure 3-3.

*Figure 3-3: Measured Wind and Wave Conditions*




**Wave Impacts on the Harbor**

Although most waves are attenuated at the harbor entrance, long period waves, such as those having a return period of 12 seconds or more, often make it past Berth 2 and impact the small craft marina. These waves are difficult to control and must be considered in the harbor design. Damage to the small craft marina is described in Section 4.1.3. Much of this damage can be attributed to wave movement. Additionally, container unloading can be delayed by excessive barge movement at Berth 2 that is due to long period waves entering the harbor.

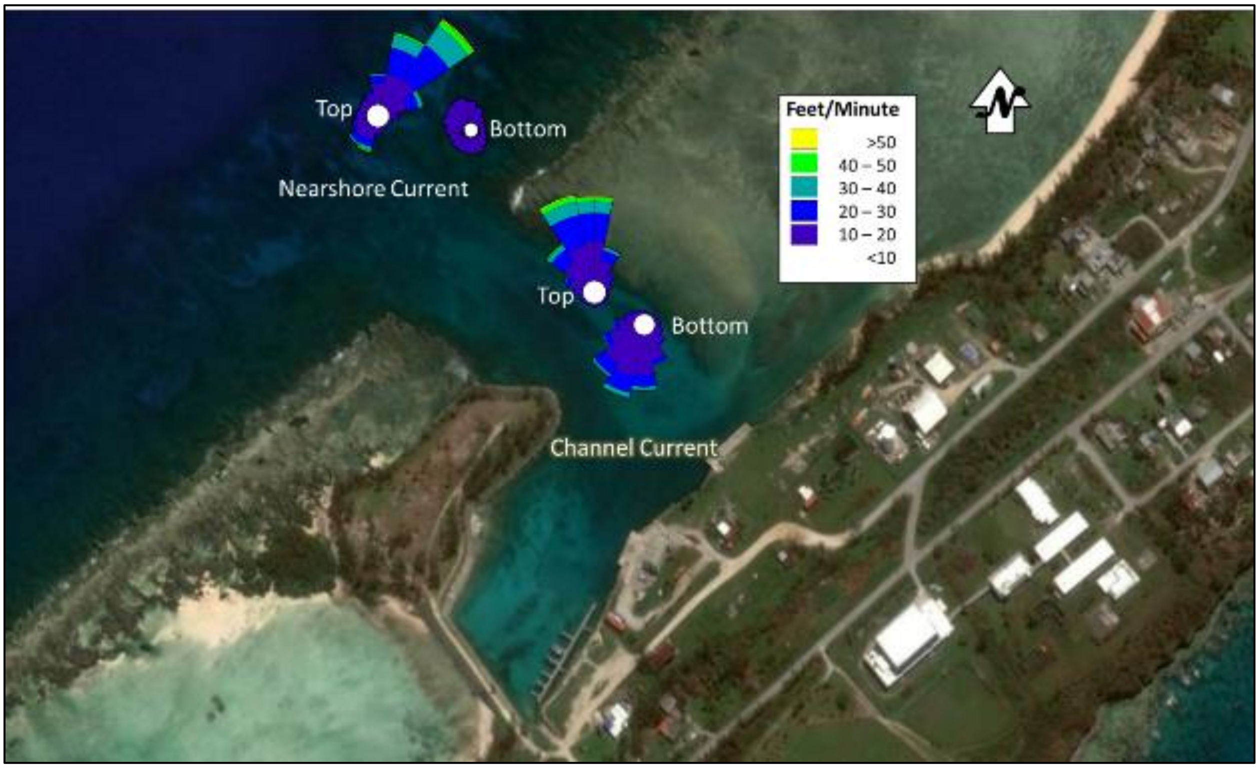
### 3.1.3. Channel and Harbor Currents

The current speeds at the nearshore gage location were collected at a vertical interval of 1.5 feet. The surface currents were analyzed at a depth of six feet and the bottom currents at a depth of 35 feet. At the water surface, most of the currents are from north-northeast and northeast. The surface current speeds occurring 1-percent of the time were found to exceed 45 feet per minute. At the bed, the current speeds are relatively lower compared with current speeds at water surface. Measured currents are depicted graphically by the current-rose diagrams in Figure 3-4 (note that top and bottom currents were measured at the same locations, but offset for graphical clarity).

The current speeds at the inshore channel gage location were collected at a vertical interval of 1.5 feet and the surface currents were analyzed at a depth of three feet and the near bottom currents at a depth of 15 feet. At the water surface, most of the currents are from north-northwest and north. The surface current speeds occurring 1-percent of the time are higher than 45 feet per minute.

Very little bottom current was measured by the nearshore instrument. However, inshore channel current measurements revealed a strong bottom current at approximately 215-degree difference compared to surface currents. This counter current reveals a pronounced vertical component to the current-induced water movement in the channel.

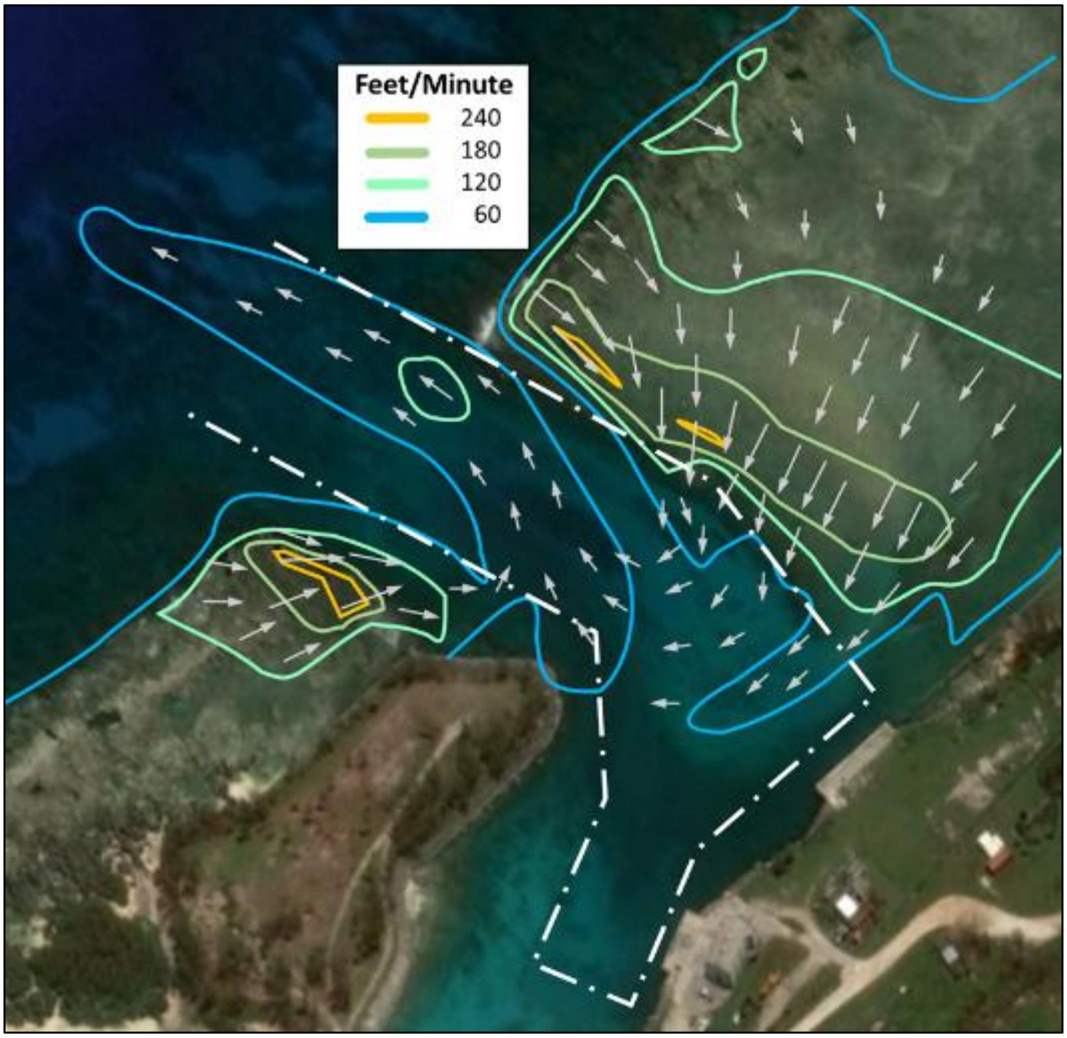
*Figure 3-4: Measured Currents*




As part of their ongoing investigation of the Rota Channel, USACE has performed current modeling on the reef and Rota West Harbor channel area. A graphic depiction of the model results appears in Figure 3-5. Under four-foot wave height conditions arriving from the northwest, the USACE model predicted a maximum current over the reef of more than 200 feet per minute with channel currents exceeding 50 feet per minute (approximately 5 knots).

The USACE model provides a 2-dimensional output that did not take into account the vertical current component observed by the emplaced instrumentation. However, the general current direction and magnitude agrees very closely with field measurements. The USACE model also shows a persistent eddy near the channel bend. With the introduction of a vertical current component, it is likely that the current regime would be unstable, with eddies forming and moving within the channel. Considering that a tug and barge travel at an average five to seven knots, a five-knot channel current would preclude entry by a barge and could be hazardous to other vessels as well.

*Figure 3-5: Wave-Induced Current Field*




*Data Source: USACE Wave-Induced Current Field for Rota Harbor*

### 3.1.4. Channel and Harbor Bathymetry

A multi-beam hydrographic survey was performed on November 30, 2016 at the channel and harbor basin of Rota West Harbor. A local boat was chartered for this work and fitted with a R2Sonic 2020 Multibeam Transducer, a Trimble SPS461 Differential GPS, and a Marine Star DGPS Heading Sensor.

Vertical Control was based on the NOAA Achagma benchmark with an elevation of 6.2 feet MSL (+6.9 MLLW). This elevation was to a temporary benchmark Y-cut at the pier edge using approximate leveling. Estimated vertical accuracy is ± 0.3 feet. Depths were recorded and charted in meters at a 10-meter shot depth of the 1 meter average sort, according to the USACE Hydrographic Surveying Manual EM-1110-2-1003.

Portions of the survey area near the reef and at the channel edge could not be surveyed due to shallow depth and grounding hazard. However, the entire channel limits were surveyed as well as the nearshore area out to beyond the 30-meter contour.

*Figure 3-6: Rota West Harbor Bathymetry*

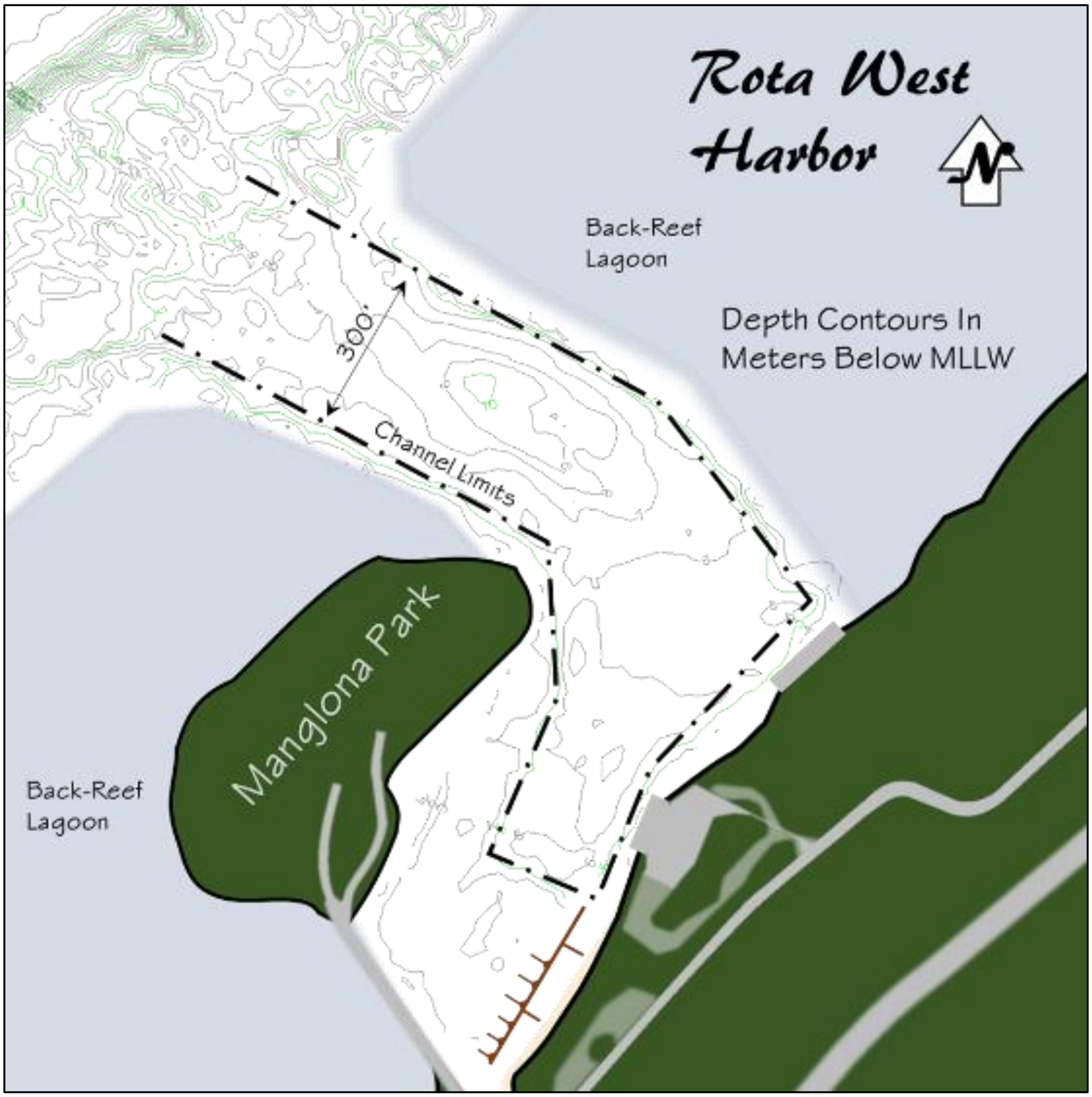



Figure 3-6 illustrates the measured depth contours in meters relative to the designated channel and shoreline features. The inner harbor is found to have a depth of five meters (16.4 feet) to the permitted dredging limits. Within the margin of error, this is the design depth when the inner harbor was originally dredged.

Much of the inner harbor, and all of the entrance channel, is six meters (19.7 feet) or more in depth. The center line of the entrance channel was found to reach 10 meters (32.8 feet) in depth at one point. These soundings indicate that there has been little shoaling within the dredging limits and that current scour may have deepened the entrance channel from its design depth of 20.0 feet since it was last dredged in the 1980s.

The Berth 1 berthing area, outside of the dredging limits, has shoaled to less than four meters (13.1 feet) at its northeast end. This is consistent with reports of an underwater obstruction in that area. The Berth 2 berthing area, designated for dredging by the CPA, is also about four meters deep for its full length.

## 3.2. Climate, Tidal Elevations, and Cyclonic Storms

### 3.2.1. Normal Climate Variations

The Northern Mariana Islands have a tropical marine climate moderated by seasonal northeast trade winds from November to March and easterly winds from May to October. The average year-round temperature is 84° F with an average humidity of 79%. The seasonal variation in mean monthly temperature is less than 3.5 degrees F. The dry season runs from December to June, and the rainy season from July to November. The mean annual rainfall is approximately 83.8 inches, but rainfall varies from year to year. At times, the islands experience droughts generally during the period from December through June.

The annual mean cloudiness in the Marianas averages 6.7 on a scale of 0 for a cloudless sky, to 10 representing a completely overcast sky. Cloudiness is greatest from July to September with an average of 19 cloudy days per month. The Marianas experience three wind patterns. These are trade winds, doldrums and typhoons. The islands lie near the border between the Asiatic monsoon and the belt of northeast trade-winds. Easterly winds prevail about 45 percent of the time at an average annual wind velocity of 10.5 mph. Light thunderstorms occur occasionally throughout the year, particularly during the months of June to October.

The oceanic and atmospheric event known as “El Nino” can change weather patterns within the Pacific and along its eastern coastlines in both the Northern and Southern Hemispheres. It is related to a reversal of the equatorial undercurrent in the western Pacific. This equatorial undercurrent is about 275 miles wide and extends across the Pacific flowing eastward at the equator at about one mile per hour, however, at times it has been measured flowing in the opposite direction. However, the cause of the start and end in this change of direction of the current is unknown. The phenomenon appears to run in cycles which recur every four to seven years. It warms the waters of the eastern Pacific and produces droughts throughout the area including the Pacific islands.

### 3.2.2. Normal Still-Water Elevations

The tides in Rota are semi-diurnal with pronounced diurnal inequalities. Tide data published by International Marine (1996), shows that the mean tide range is 1.2 feet and diurnal range is 2.1 feet. Tidal data for Rota Island is presented in Table 3-1.

*Table 3-1: Tidal Data*

| Water Elevation | Reference MSL (ft.) | Reference MLLW (ft.) |
|---|---|---|
| **Mean Higher High Water (MHHW)** | 0.6 | 1.3 |
| **Mean High Water (MHW)** | 0.5 | 1.2 |
| **Mean Sea Level (MSL)** | 0.0 | 0.7 |
| **Mean Low Water (MLW)** | -0.7 | 0.0 |
| **Mean Lower Low Water (MLLW)** | -1.5 | -0.8 |

### 3.2.3. Typhoons, Maximum Waves, and Storm Surge

*Table 3-2: Storm Wave Forecast*

| Return Period (Years) | Significant Height (Feet) |
|---|---|
| **1** | 13.58 |
| **2** | 16.53 |
| **5** | 20.43 |
| **7** | 21.86 |
| **10** | 23.38 |
| **15** | 25.11 |
| **20** | 26.33 |
| **25** | 27.28 |
| **30** | 28.06 |
| **40** | 29.28 |
| **50** | 30.23 |

The CNMI is situated some 600 miles east of an area in the western Pacific where cyclonic disturbances often form. As a result, it is in what is known as "weather condition four" at all times, which means that 40 mile per hour winds are possible within 72 hours. These cyclonic disturbances can develop quickly and bring typhoon force winds of up to 120 miles per hour, with gusts of 160 miles per hour or more. Typhoon season runs from July to January, and the islands of the CNMI are usually subject to at least one typhoon each year. The season of most serious storms is from August to mid-December. This is the period of the most frequent occurrence of tropical disturbances. Flooding and wind-damaged vegetation are a common result of frequent storms with winds above 60 mph.

Historical data shows that 32 typhoons and 22 severe tropical storms have passed within 30 miles of Rota between 1950 and 2012 according to the U.S. Navy Joint Typhoon Warning Center[5]. Statistical forecasting tools yield a range of storm wave heights ranging from an annual occurrence of 13.6 feet to a 50-year wave of over 30 feet. Table 3-2 lists the forecasted, probable wave heights impacting Rota Harbor, based on probable recurrence interval. The maximum offshore wave experienced in recent years was recorded in 2002 at over 28 feet significant height.

Barometric pressure drop associated with cyclonic storms will also raise the still-water elevation. Based on barometric records from two recent storms, a water-level increase of 2.1 feet can be expected during a strong typhoon. Therefore, high water due to storm surge must be considered at +3.5 feet above the forecasted diurnal high tide.

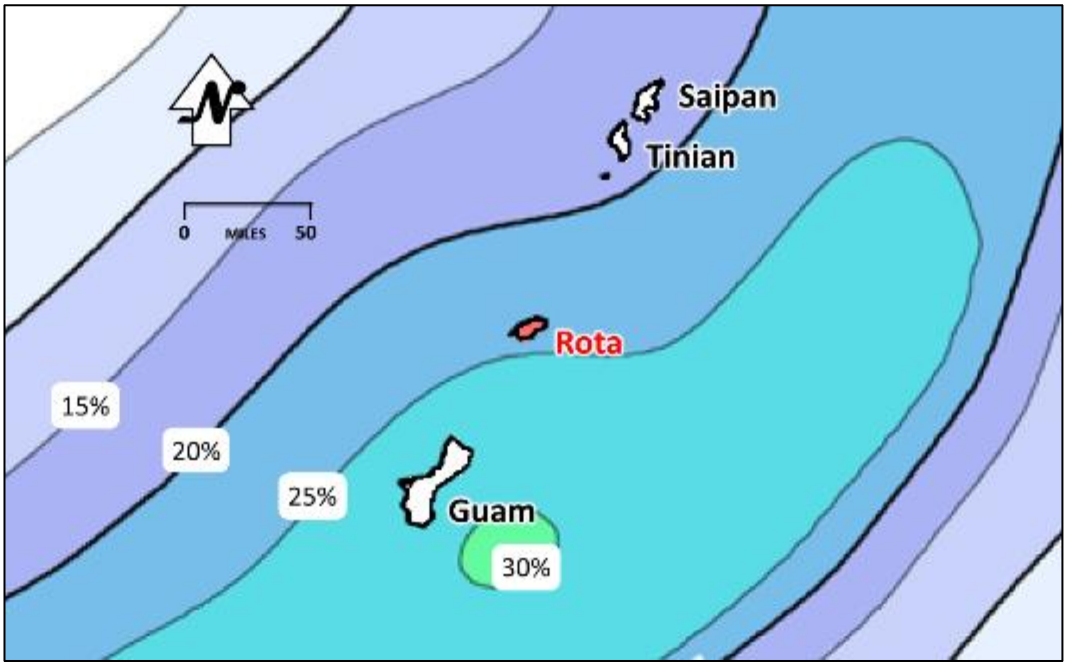
## 3.3. Seismic Activity, Volcanos, and Tsunamis

Tectonic activity within the Mariana Trench can generate significant earthquakes; 23 tremors registering 7 or more on the Richter scale have been recorded since 1900. In 1993, an earthquake occurred on Guam, 60 miles south of Rota, which caused considerable damage. The earthquake history of Saipan (80 miles to the north) since 1800 records two major events, one in 1849 and the other in 1902. Actual magnitudes are not known. While earthquakes can occur at any time in the Commonwealth, no serious damage has yet been documented on Rota.  Throughout the Marianas, earthquakes with a magnitude of 4 to 5 on the Richter scale occur once or twice a year and there are weekly tremors which cannot be observed without instruments.

The epicenters of most earthquakes are located beneath the sea-bottom at the Mariana Subduction Zone and intensities generally diminish before reaching the Mariana Islands themselves. As the Pacific plate moves westward, earthquake frequency trades off with depth and distance from the islands, with the result that seismicity at different depths can dominate the hazard at different locations.

[5] Navy Meteorology and Oceanography Command – Joint Typhoon Warning Center, Best Track Archives

*Figure 3-7: Percent Probability of Ground Acceleration Exceedance*




*Source: US Geologic Survey; Seismic Hazard Assessment for Guam and the Northern Mariana Islands; 2012*

Figure 3-7 shows that the seismicity hazard at Rota is controlled by nearby shallow sources, whereas seismicity at Tinian and Saipan results from deeper events, farther away. Overall, the probabilistic ground motions within the Mariana Chain can be significant, reflecting the high rates of activity and relative proximity of the seismic-zone sources, as well as their large maximum magnitudes.

In April 1990, an underwater earthquake measuring 7.5 on the Richter scale was recorded as occurring 225 miles northeast of Guam and 100 to 150 miles southeast of the island of Anatahan. All the islands within the archipelago experienced the tremor, but no damage or injuries were reported. Tinian experienced a series of 10-foot tsunamis from that event. This earthquake took place at a time of increased volcanic activity on Anatahan.

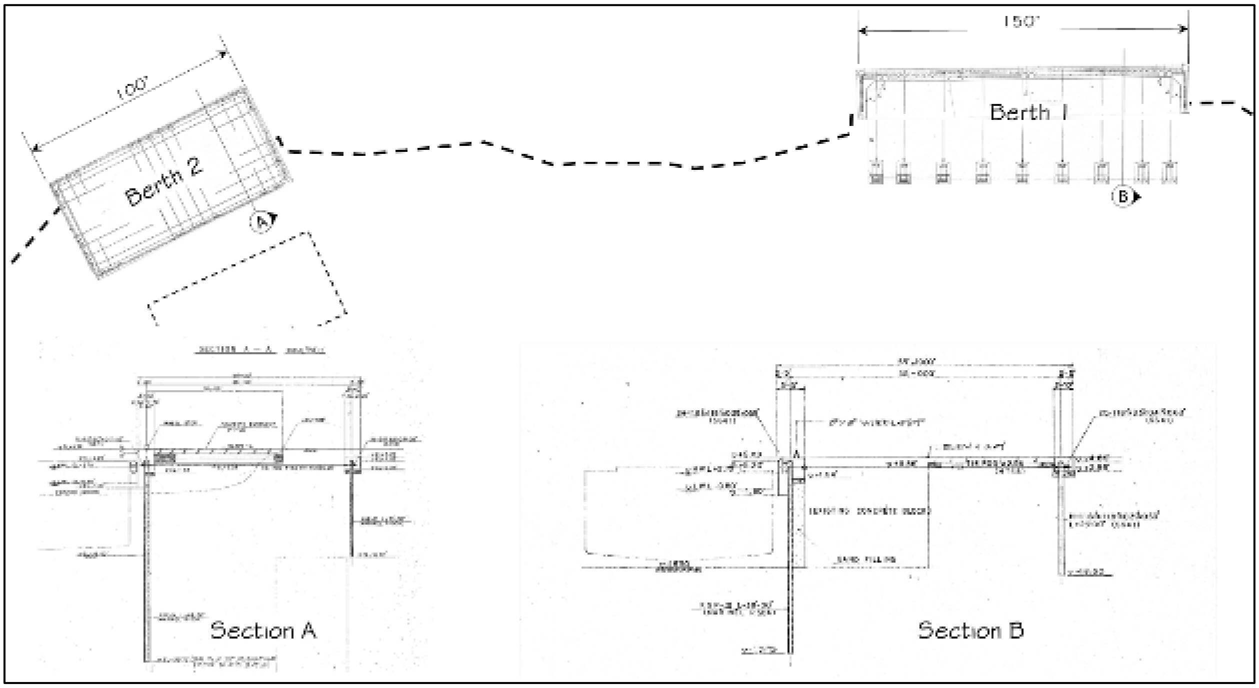
According to U.S. Geological Survey, islands north of Farallon de Medinilla are vulnerable to future volcanic eruptions. Esmeralda Bank, 60 miles north of Rota, is the southern most active volcano in the Mariana Arc and is one of the most active vents in the western Pacific. It rises to within 100 feet of sea level and is considered to be an area of potential eruption or a "hot spot." In the early part of the 20th century the banks were reported to be above sea level but disappeared below water as a result of an earthquake.

# 4.0 Needs Assessment

## 4.1. Structural Condition[6]

Berth 1 is a 150-ft-long auxiliary structure and is used when weather conditions allow. Vessel docking and cargo handling primarily takes place at Berth 2. Berth 2 is a 100-ft long marginal wharf constructed from steel sheet pile and a concrete cap bulkhead located to the south of the turning basin and in front of the Port Operations Building. Stationing was used to record the location of defects. The station begins on the southern corner on the face of each berth and extends north. Stationing for the sides of the pier start on each northwest and southwest corner and extend eastward.

*Figure 4-1: Berth 1 & 2 Structures*




Source: International Bridge Corporation, New + Old Dock As-Built Drawings, ca. 1985

The top of the steel sheet-piles used as a bulkhead to construct Berths 1 and 2 are tied-back to anchors below grade. The bulkheads are backfilled with fill material retrieved from local sources. The drawings for the original Berth 1 construction show that an older concrete block retaining structure preexisted the steel sheet piling. The exposed steel sheet pilings face the concrete block retaining structure. The record drawings show asphalt concrete (AC) deck paving over the fill extending 55-ft back from the face, however Portland cement concrete (PCC) paving was observed.

Berth 2 has PCC paving extending approximately 50’ back from the face of the wharf to the tie-back anchors. Cargo is usually transferred at Berth 2 by a Grove 80-ton mobile truck crane (Model TM875). This crane travels on rubber tires and is braced by outriggers extending to the paving when in use.

[6] A structural inspection of the Rota West Harbor wharf facilities was performed on 29 October 2016. The inspectors report is appended to this document.

### 4.1.1. Berth 1

***Sheet Pile***

Berth 1 is a tied-back sheet-pile structure with deadman anchors placed approximately 60 feet behind the berth face. It was constructed over top of an older concrete and coral stone structure that may have been part of the 1930s-era sugar export dock. Berth 1 has cold-formed steel sheet on the front face with a continuous row of interlocking steel H-Piles on the north and south faces. The steel sheet piles are continuously submerged and are visible below the concrete cap at 1.8 below MLLW. The sheet piles are in satisfactory condition.

Typical corrosion losses were estimated to range between 4% and 20%. Heavy pitting and higher levels of corrosion were typically noted just below the cap. A 10-inch 18-inch void was noted in the web of the corner H-Pile at the northwest corner of Berth 1 near the mudline.

***Concrete Cap***

The concrete cap at Berth 1 is in poor condition. Poorly consolidated concrete at the bottom of the cap was noted throughout which has exposed the reinforcing bar. Erosion damage has also raveled aggregate away over time leaving rock pockets, typical at the north and south corners of the Berth 1 concrete cap. Corrosion spalling and rebar rust “bleeding” can be seen throughout the south face of the concrete cap. Berth 1 also shows widespread abrasion damage along the top edge of the cap due to friction of hanging wires suspending the tire fenders and erosion damage has resulted in cement particle/aggregate loss on the lower portion of the cap.

***Mooring Hardware***

During the October 2016 field visit, it was observed that the three bollards of Berth 1 had been removed but were not inspected. The bollard foundation bolts at Berth 1 were cleaned with 75% of the threads intact and sticking out of the cap approximately 2.5-in. The surrounding concrete and bolts were in satisfactory condition. New bollards with solid base plates were staged on the pier for installation.

***Concrete Deck***

The concrete deck extends from the concrete cap back approximately 20-ft. at Berth 1 and is in fair condition. The deck surface is heavily worn with minor cracks and subsidence observed. Areas of subsidence and ponding were noted directly behind the cap. This subsidence is minor and no evidence of fines percolating through the steel sheet piles was observed.

***Concrete Curbs***

12 in. X 12 in. concrete curbs cast on the top of the concrete pile cap are in fair condition. Corrosion spalling was observed on the edges of the curbs throughout. A 40-foot section of curb has been removed to facilitate past Ro-Ro functions.

***Fender System***

The fender system – V-type extruded arch fenders on the berth face – is in critical condition. These fenders have all failed and remaining portions of the fender system are left hanging from stainless steel anchor bolts and inserts. Makeshift fenders using tires are currently in use, suspended by wire fastened to pad eyes embedded in the top of the concrete cap and to the concrete curb. Significant abrasion damage was observed on the corner of the concrete cap from the wire rope and chains. In some instances, the cap was abraded down to exposed reinforcing steel. The tires provide little standoff distance and energy absorption, resulting in direct contact of the ship with the concrete cap.

***Needs***

- Repair damaged steel piles and install a cathodic protection system to prevent further corrosion.
- Re-face the concrete cap to extend the service life of the berth.
- A mooring and berthing analysis should be performed to determine the required capacity of the mooring hardware and associated fendering.
- Replace tires with an engineered fender system.
- Repair subsided deck areas.
- Repair concrete cap where spalls have occurred and reinforcing steel is exposed, corroded, or bleeding.
- A removable curb should be installed at Berth 1 to comply with safety requirements and still permit Ro-Ro operations.

### 4.1.2. Berth 2

***Sheet Pile***

Berth 2 was constructed as a cross-tied sheet pile caisson 100 feet long and 40 feet wide. The landside portion of the caisson is not visible for inspection. Sheet piles are visible on three sides and thickness readings were taken at two places on the front face and one location on the north face. The south face was inaccessible due to coverage by the rock and coral revetment adjacent to the berth. The steel sheet piles are continuously submerged and are visible below the concrete cap. The sheet pile is in satisfactory condition. Typical corrosion losses were estimated to range between 4% and 20%.

The most significant amount of section loss of the Berth 2 bulkhead was identified at Station O+OS North face just under the concrete pile cap encasement, where only 57% of the original thickness remains. At this location, an additional reading was taken two feet below the top reading where 89% of the original thickness remains.

The inspection team found no evidence that any sort of cathodic protection has been installed.

***Concrete Cap***

The concrete cap at Berth 2 extends below the water to -1.8 MLLW and is in fair condition. The Berth 2 concrete cap shows erosion damage where the aggregate has “raveled” away over time, leaving rock pockets. This damage is typical of north and south corners on each berth.

***Mooring Hardware***

The bollards at Berth 2 are in poor condition, with advanced deterioration, overstressing, or breakage significantly affecting the load-bearing capacity of primary structural components. The welds around the horns are severely corroded and have up to 100% section loss. However, the surrounding concrete is in satisfactory condition.

***Concrete Deck***

The concrete deck extends from the cap upland to the Port Operations Building at Berth 2. The deck surface exhibited moderate wear and minor cracks with more prominent subsidence observed and associated cracking. Areas of subsidence up to 30-in. wide and 5-in. deep were noted directly behind the cap.

Port personnel indicated that a typhoon washed out the soil behind Berth 2 and in front of the Port Operations Building 10-15 years ago. Repairs included placement of compacted fill and a PCC slab from behind Berth 2 up to the building.

***Fender System***

The fender system at Berth 2 is in critical condition. V-type extruded arch fenders, 3.7-ft high by 1-ft deep, were originally installed at 4.6-ft on-center. These fenders have all failed and remaining portions of the fender system are left hanging from stainless steel anchor bolts and inserts. As with Berth 2, makeshift fenders using tires are currently in use.

***Needs***

- Repair damaged steel piles and install a cathodic protection system to prevent further corrosion.
- A mooring and berthing analysis should be performed to determine the required capacity of the mooring hardware and associated fendering.
- Although the bollards at Berth 2 are also scheduled for replacement, the capacity of the proposed mooring hardware should be back-calculated using engineering design principles.
- Replace tires with an engineered fender system.
- Repair subsided deck areas.
- Repair concrete cap where spalls have occurred and reinforcing steel is exposed, corroded, or bleeding.

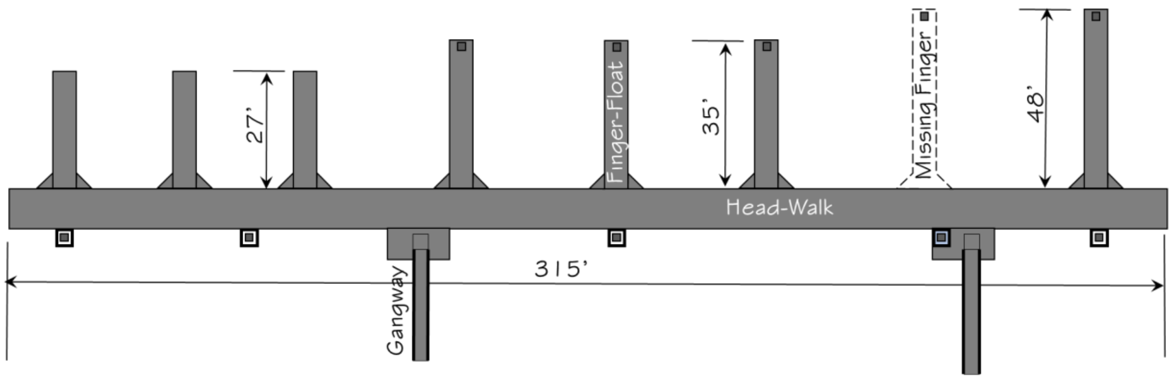
### 4.1.3. Small Boat Harbor[7]

The Rota West Harbor small boat marina has berthing for 14 vessels ranging in size from 27 feet to 48 feet. As originally designed, the marina had eight finger floats with capacity for two additional 48-foot boats. Two finger floats had been damaged and removed; one of the damaged floats was replaced. The

[7] A visual walk-through observation of Rota West Harbor small craft marina was performed on 26 October 2016 as part of the master plan initial site visit.

West Harbor Marina is constructed of aluminum-framed walkways (headwalk and finger-floats), plastic flotation units, concrete guide piles, and aluminum gangways.

*Figure 4-2: Marina Configuration*




| Berth Length | Number of Berths |
|---|---|
| 27 feet | 6 |
| 35 feet | 6 |
| 48 feet | 2 (Previously 4) |

In addition to the missing finger float, visible damage to the marina includes broken pile-guides, broken deck boards, broken cleats and fendering, damage to the wing gussets, and finger separation from the headwalk. Considering the marina was constructed in the 2003 – 2004 timeframe and Typhoons Tingting, Chaba, and Dolphin passed over or near Rota since then, the damage observed was relatively minor. However, not all the damage can be attributed to storms or wave action.

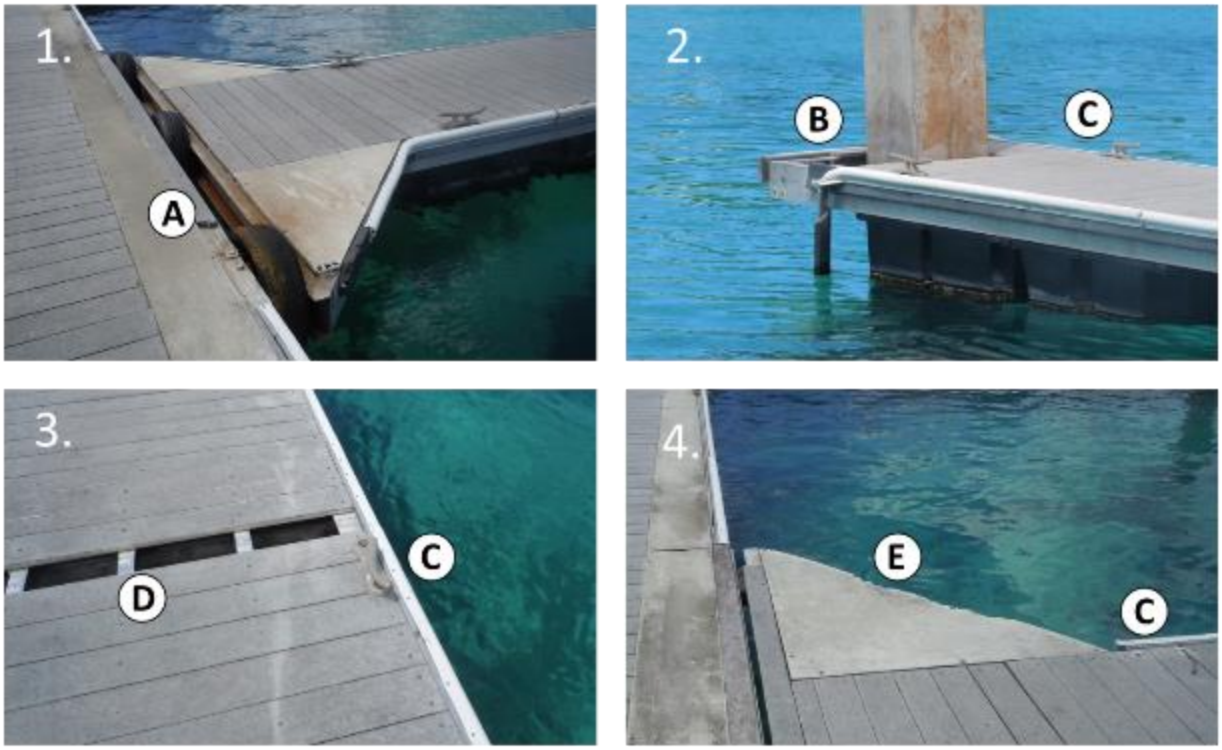
Figure 4-3 illustrates some of the damage found. Image 1, Item A shows the separated finger connection and repair method used. Image 2 shows a broken pile-guide on the 48-foot finger with damaged fendering. Item C on Images 2, 3, and 4 show broken or missing cleats. Item D is one of several broken deck boards observed and Item E shows damage to the wing-gusset.

In assessing the source of this damage, the broken pile-guide and separated finger connections were likely caused by wave action within the harbor with the condition possibly exacerbated by large vessels tied to the docks. However, damaged cleats are usually caused by vessel strikes, where a large boat with overhanging rub-rail or bow-chine strikes the horn of the cleat. Fender damage is also generally caused by a large vessel arriving without deploying its own fendering to protect the dock.

The damage and missing fender material shown on Image 4, Item E is a typical indicator of a large vessel berthed stern-to in a slip that is too short for the vessel. Under this condition, the stern transom edge bears directly against the face of the wing-gusset, wearing and damaging it. This is often done to facilitate loading or unloading a vessel.

Broken deck boards, mostly in the vicinity of the larger berths, indicate that heavy loads, likely on dollies or hand-trucks, were transported on the floats.

*Figure 4-3: Marina Condition*




At times when commercial shipping to Rota is disrupted by weather, some sustainment cargo arrives by smaller commercial vessels such as trawlers. These boats are too small to safely use the commercial dock and have tied to the marina floats instead. However, the marina floats were designed for smaller pleasure boats and not trawlers, and were not designed to support the berthing, mooring, nor deck loads of a cargo operation.

***Needs***

- Designated new commercial float that is part of the CPA commercial cargo facility.
- General maintenance of the recreational floats.
- Future expansion of the recreational marina to provide more capacity for sportfishing and other recreational boating activities.

### 4.1.4. Shore Protection and Berthing Area

***Adjacent Riprap***

A conglomerate of rock and coral provides rip rap-type shore protection extending along the shoreline to the north and south of each berth. A 5-ft wide by 4-ft high by approximately 10-ft deep void was observed directly adjacent to Berth 1 on its north side, towards the bottom of the rip rap revetment.

Adjacent to Berth 2 on the north and south sides, voids were observed near the bottom of the rip rap revetment, approximately 4-ft high by 2-ft wide by 6-ft deep and 2-ft high by 4-ft wide by 6-ft deep, respectively.

***Bottom Condition***

The bottom condition at Berth 1 was hard rock and coral. A buildup of a rock and coral conglomerate was typically found at the bottom of Berth 1. A wider, denser and more pronounced buildup was noted at the face of the berth. The rock/coral buildup in front of the berth face in these sections started at -5 feet, and projected out from the face of the sheet piles approximately three feet. At -9 feet the rock/coral conglomerate extended as much as six to eight feet out from the face of the berth. This poses a potential navigational hazard for berthing vessels. It is possible that this material is debris from the original quay wall that has been deposited in the harbor by typhoon wave action. The mudline depth at 10 feet out from the face of Berth 1 varied from -15 feet to -10 feet at the north end. A bollard and tire were also noted on the bottom near the face of the berth.

The bottom condition at Berth 2 was mostly hard sandy bottom. The bottom at the face of the berth was approximately -14 feet and -17 feet at 10 feet away from the bulkhead. Debris encountered included a five-foot diameter tire, and a 20 in. square concrete pile approximately 15 feet long at the northwest corner.

***Needs***

- Rip-rap repair at the ends of both the Berth 1 and Berth 2 wharf structures.
- Remove rock and debris in front of Berth 1 and remove pile and tire from Berth 2.

### 4.1.5. Port Operations Area

Port operations are carried out in a 3.5 acre fenced area that comprise Berth 1 and Berth 2, the transit shed and port offices, and a 0.3 acre paved operations and storage area (including the Berth 2 working surface). The remainder of the 3.5 acres is either surfaced with crushed coral stone or unsurfaced.

*Figure 4-4: Container Staging Area*

Containers landed on Rota are mounted on a chassis and held within the fenced area until cleared by the CPA (and CNMI customs if needed). Empty containers can be grounded on-terminal prior to loading for export. Figure 4-4 shows empty containers on the crushed coral surface, ready for loading at the next barge call. The storage and circulation areas are satisfactory for the level of cargo volume and storage required to support the Island of Rota.

*Figure 4-5: Transit Shed*

The transit shed and paved operations area as shown in Figure 4-4 are in good condition and show little distress or deterioration. Repair is needed of the rolling door track on the west side of the shed.

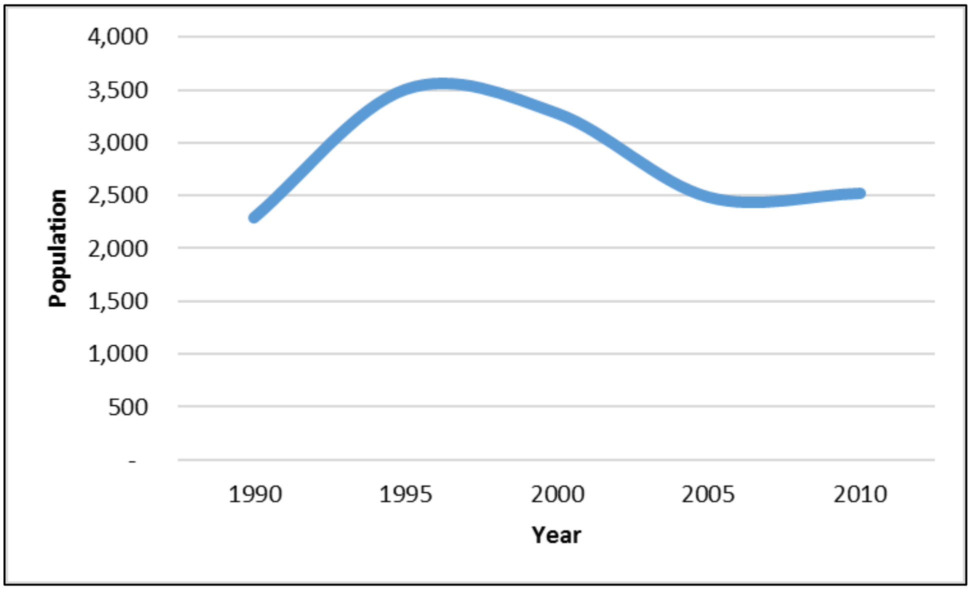
***Needs***

Some items were noted needing minor repair, including filling and patching of the concrete pavement at Berth 2. Otherwise, the port operations area is satisfactory for the type and volume of cargo handling anticipated for Rota.

## 4.2. Cargo and Vessel Service Needs

As Rota has no manufacturing and few exports; cargo services are largely driven by the island population's consumption needs. Rota's population peaked at 3,500 in the late 1990s and has stabilized at about 2,500 in recent years. Most stakeholders feel that a lack of employment on Rota has caused much of the population to relocate to Saipan or Guam. Although a casino development and other projects have been discussed from time to time, there is no indication of actual planned projects so a population upswing in the next five to ten years is not anticipated. Therefore, cargo service demand is also predicted to remain flat.

*Figure 4-6: Rota Population Trend*




### 4.2.1. Containers and General Cargo

Container and general cargo traffic, including construction material and vehicles, averages around 6,600 tons per year or 550 tons per month, mostly import. At an average of ten full containers per month import, approximately 200 tons of containerized cargo is received. The remainder is non-containerized building material and bulk cargo such as concrete.

***Needs***

There is presently sufficient berth capacity, container lay-down and staging capacity, and transit shed capacity to accommodate the current and forecasted cargo volumes.

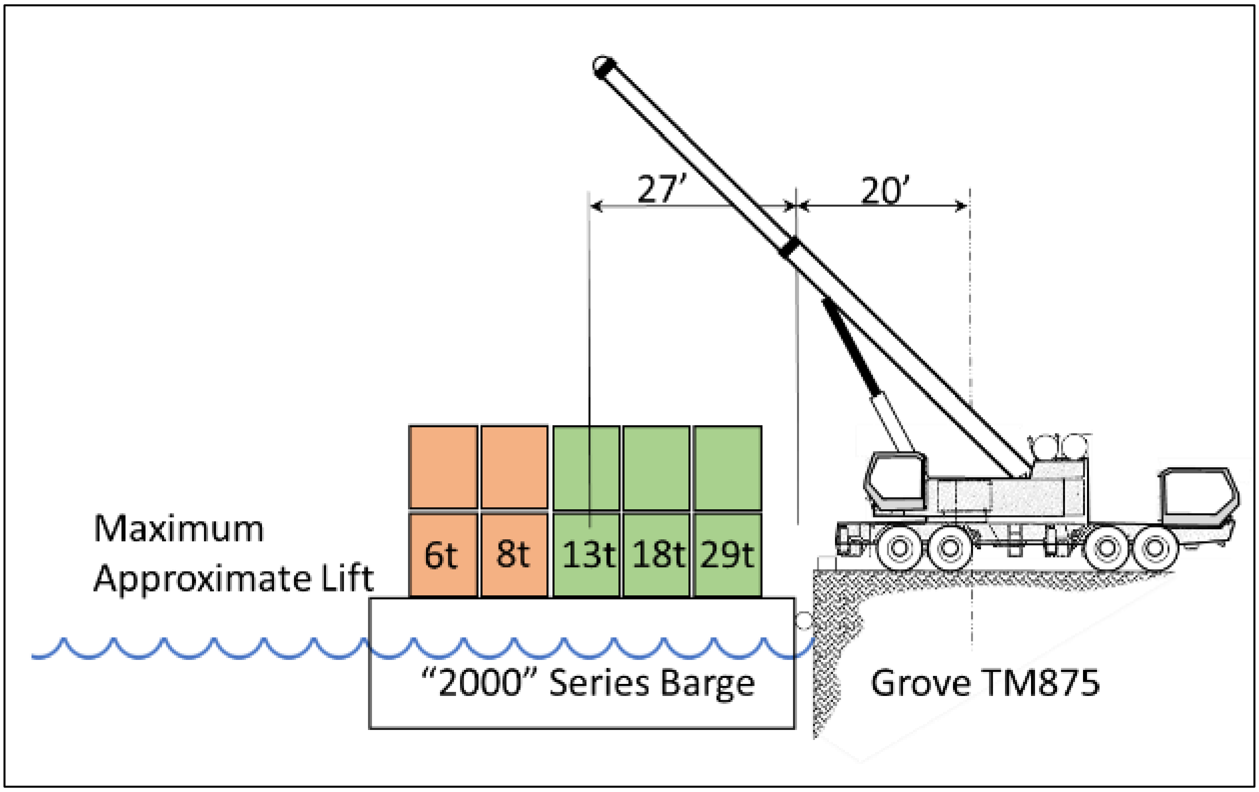
### 4.2.2. Harbor Operations Analysis

Containers handled (on plus off, 20-ft and 40-ft containers) at Rota West Harbor average about 20 per month and range from none in months with excessive bad weather, to over 60 in other months. During a typical barge call, ten containers are lifted off and ten loaded on. Barges also carry construction material and other bulk cargo.

Unloading and loading the barges is accomplished by a Grove 80-ton truck crane with hydraulic boom. Because the berth is only 100 feet long and the barges can exceed 200 feet, unloading generally requires shifting the barge along the wharf face and may require rotating the barge. The Grove crane at Rota can only lift a full container from the wharf side of the crane, and the maximum gross container weight (cargo + tare) must not exceed approximately 29 tons[8].

[8] Grove TM875 Load Chart

*Figure 4-7: Grove Cargo Crane*




Additionally, cargo transfer sometimes must halt when harbor wave activity exceeds safe working conditions. Therefore, the tug and barge combination may remain in port for several days to transfer cargo.

During times of peak cargo transfer, there may not be enough chassis on the island to receive all the inbound containers. At this time, containers are grounded within the secure port area and mounted on chassis later for delivery. The only equipment available for mounting and grounding containers is the Grove crane. Therefore, barge unloading may have to halt while the Grove crane handles ground-to-chassis transfers.

***Needs***

- A second crane, with greater lift capacity and reach on both.
- Deploy existing crane to mount and ground containers, and to function as backup.

## 4.3. Recreational and Upland Development Needs

Rota West Harbor includes the only small boat marina facilities on the island. Residents use it for recreational boating, subsistence fishing, and informal trade with Guam. The existing small boat harbor includes a marina, a small picnic shelter and a launch ramp. However, it lacks amenities such as a public comfort station, fish cleaning stations, boat wash-down area, adequate parking and nearby boat storage. Users have stated that more slips are needed, especially during fishing tournaments and seasonal fish runs. Recreational boating is important to the Rota Island residents, and provides an opportunity for increasing tourist excursion boating, charter fishing businesses and scuba charters.

***Needs***

- A public comfort station to accommodate visitors and boaters.
- A public fish cleaning area to prevent use of the picnic tables for fish cleaning.
- Improved boat wash-down, trailer parking and a fenced storage area.
- Expanded picnic and outdoor activities area with lighting for evening use.
- Launch ramp improvements and expanded small boat marina facilities.

## 4.4. Navigation Improvement Needs

Harbor users (Angyuta Shipping Company, LTD. and Rota Terminal and Transfer Company, Inc.) reported the relatively frequent occurrence of wind and wave action in the harbor, which poses a risk to vessel navigation and berthing, as well as hampers cargo handling at the dock. These problems are summarized below.

### 4.4.1. Wave Action at the Channel Entrance

Problems with waves at the entrance increase with larger wave heights, however, harbor users report that wave action at the entrance typically does not preclude safe entry by the vessels currently using the harbor.

### 4.4.2. Wind and Current in Turning Basin

Transport of water onto the reef flat by breaking waves induces a current in the channel and turning basin as it returns to sea. This, coupled with the prevailing winds blowing parallel to the coast, presents a significant hazard to slow moving vessels maneuvering in the turning basin. Because the turning basin is surrounded by shallow water and hard reef rock, there is considerable risk of damage or grounding if the vessel is pushed by the wind and currents.

### 4.4.3. Wave Action at the Dock

The berthing and docking areas are exposed to incident wave energy entering the harbor. Refracted and diffracted wave crests approach nearly parallel to the dock, resulting in vessel movement that can damage the vessel and make cargo handing difficult and dangerous. The often-rough berthing conditions require extra lines and fenders in order to prevent damage to the vessel and dock.

# 5.0 Design Vessels

Prior to WWII, Rota was served primarily by lighters, shallow draft boats that would convey cargo out to a larger vessel at an anchorage established beyond the reef. Both Rota West Harbor and the Sasanhaya Bay East Harbor still have designated anchorages for that purpose. Remains of the old quay wall used for loading sugar at the West Harbor are still visible north of Berth 1.

Berth 1 and Berth 2 were designed to take small shuttle vessels serving Rota from Guam. The harbor design depth of -16.5 feet MLLW, along with the turning circle diameter of 300 feet, limit the calling vessel length to about 200 feet. There are no plans to expand the West Harbor channel and basin beyond these limits. Therefore, the design vessels are determined largely by the harbor dimensions.

## 5.1. Tug and Barge

Consumer goods, building materials, and commercial supplies are currently imported by barge. Rota does not support the volume needed to justify regular calls by an ocean-going ship. Therefore, sustainment cargo needs on Rota will continue to be served via smaller inter-island barge of less than 100 TEU or 3,000 ton capacity for the foreseeable future.

*Figure 5-1: Tug Chamorro and 2000 Series barges*

*Source: Saipan Stevedore Company Inc.*

Figure 5-1 illustrates the ocean-going tug and deck-barge currently used for container and break bulk material transport from Saipan or Guam to Rota. In transit, the tug will tow the barge on a cable for most of the voyage. On arriving at the Rota, the tug will slack the cable and “jackknife,” taking the barge alongside or “on the hip.”

Section 3.1 and Section 4.4 describe some of the navigation problems associated with approaching the Rota West Harbor. In many instances, the tug captain decides that the channel is too hazardous for a tug/barge combination and passes Rota without stopping.

Table 5-1 lists the harbor design parameters of the tug and barge combination currently in use. Channel and harbor depth and dimensions are suitable for this type of vessel under current conditions.

*Table 5-1: Tug and Barge Characteristics*

| Principal Dimensions | "2000" Series Barge Only | Tug *Chamorro* Only | Tug with Barge (jackknifed) |
|---|---|---|---|
| **Length** | 200 feet | 105 feet | 210 feet |
| **Beam** | 55 feet | 27 feet | 82 feet |
| **Draft** | n/a | 14 feet | 14 feet |

## 5.2. Landing Craft

A variety of landing craft operate in the Mariana Islands, generally in support of island construction projects. Landing craft service between Guam and Rota has been proposed. Vessels currently in service range from 68 feet to 110 feet in length and can carry one or two truck trailers. A landing craft would probably have to make two calls per week to sustain 550 tons of imported cargo per month.

*Table 5-2: Landing Craft Characteristics*

| Principal Dimensions | Design | Minimum | Maximum |
|---|---|---|---|
| **Length** | 110 feet | 68 feet | 110 feet |
| **Beam** | 45 feet | 30 feet | 45 feet |
| **Draft** | 6.0 feet | 4.0 feet | 6.0 feet |

## 5.3. Container Ship

*Figure 5-2: MV Super Shuttle and MV Luta*


The *MV Super Shuttle*, a 670-ton container ship, operated between Guam, Saipan, and Rota until about 2010 when it was taken out of service for economic reasons. In 2016, the *MV Luta* was put in service between Guam and Rota. However, financial problems closed the operation before the end of the year. Currently both *Luta* and *Super Shuttle* are idle, and their return to service remains in question.

*Table 5-3: Container Ship Characteristics*

| Principal Dimensions | Design | Minimum | Maximum |
|---|---|---|---|
| **Length** | 220 feet | 157 feet | 220 feet |
| **Beam** | 45 feet | 38 feet | 45 feet |
| **Draft** | 14 feet | 14 feet | 14 feet |

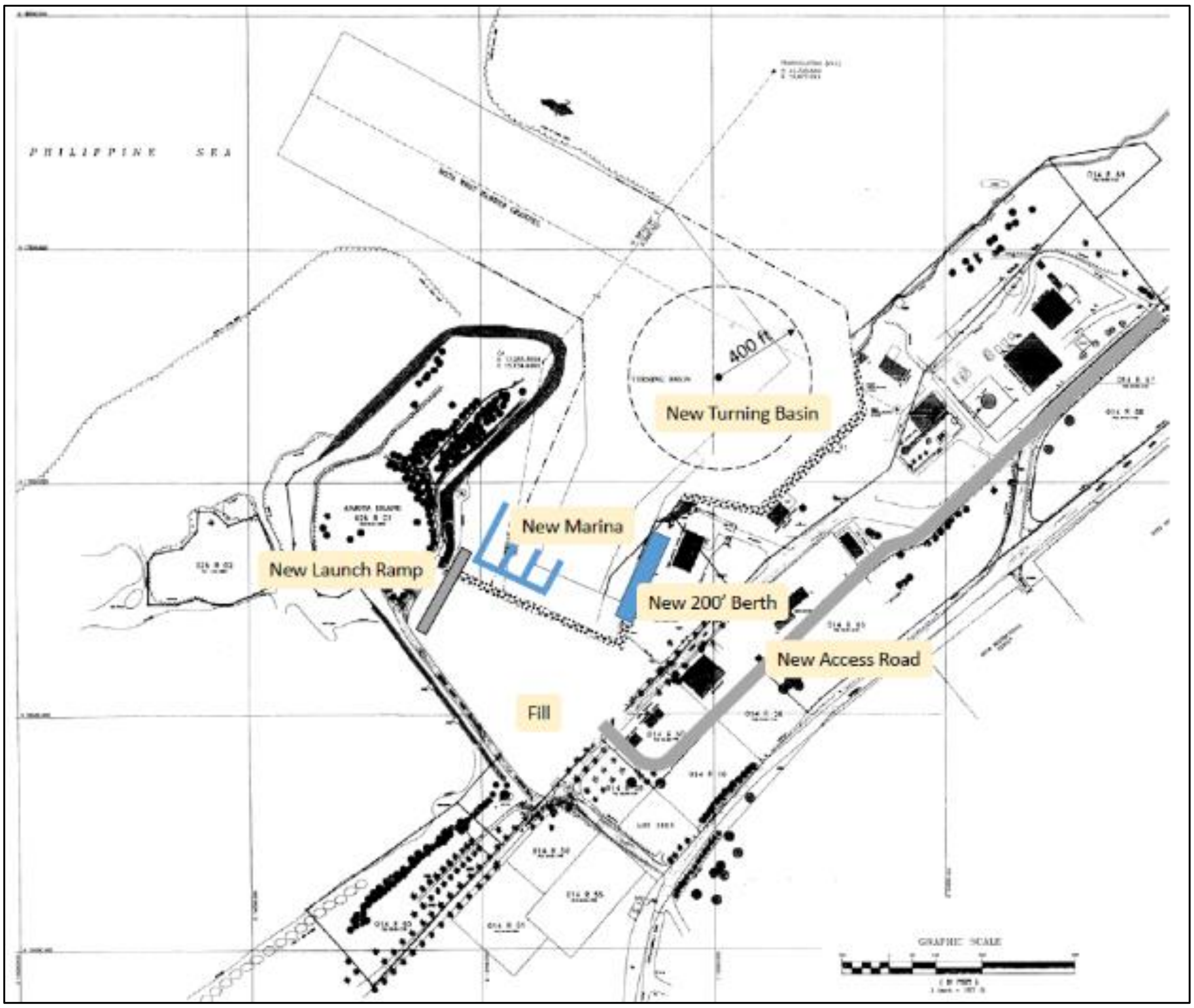
# 6.0 Rota West Harbor Master Plan

## 6.1. Commercial Harbor

### 6.1.1. Harbor Layout Alternatives

For this Master Plan, an initial concept was developed based on preliminary site observations and on previous master plan recommendations. This concept enlarged the turning basin to allow vessels to enter under speed and stop when they were within shelter of the island. It also increased port area by fill within the basin to develop additional operational area.

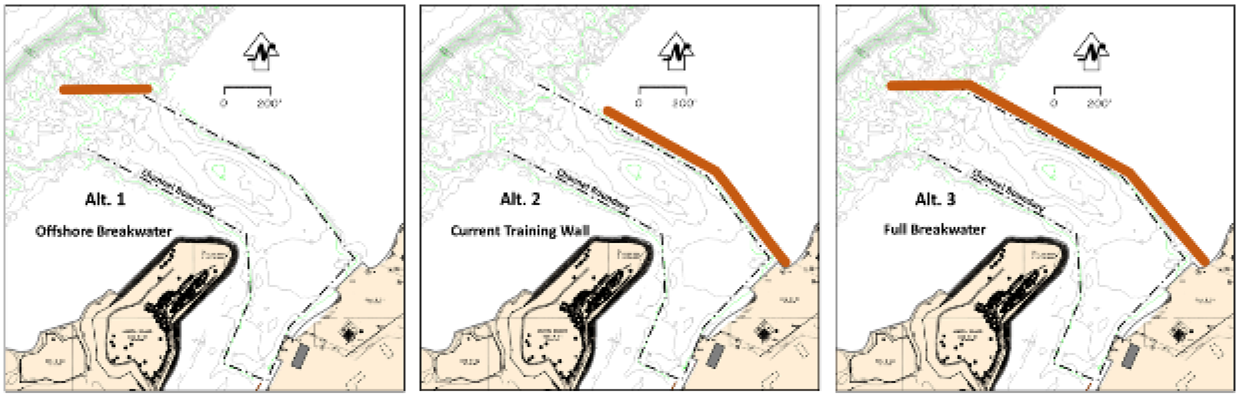
*Figure 6-1: Initial Concept (Not Recommended)*




This configuration was abandoned due to environmental permitting issues, cost, and terminal needs. Subsequent coastal engineering analysis of wave and current monitoring data showed that an enlarged turning basin would not improve vessel navigation. Cargo forecasts also showed that additional backland terminal area would not be needed to support the commercial port operation at Rota West Harbor.

Based on current vessel forecasts and additional coastal engineering, the Rota West Harbor Master Plan team determined that a breakwater structure would be necessary to improve navigability, precluding the need for an enlarged turning basin. Therefore, three additional alternatives were developed to explore wave protection options, as shown in Figure 6-2.

*Figure 6-2: Breakwater Alternatives*




1. Breakwater Alternative 1 consists of an isolated offshore breakwater to deflect waves entering the channel. This reduces the instances of breaking waves, but does not limit the current. Some concern was raised that current eddies at the end of the breakwater could make the channel entrance difficult.
2. Breakwater Alternative 2 is a current training wall constructed on top of the existing shallow lagoon bottom. It would deflect currents running off the backreef. Alternative 2 would not reduce wave action in the channel, and potentially strong eddies could develop at the seaward end of the wall.
3. Breakwater Alternative 3 combines the two concepts to fully enclose the north edge of the channel. This would be the costliest alternative, but is expected to relieve channel safety problems.

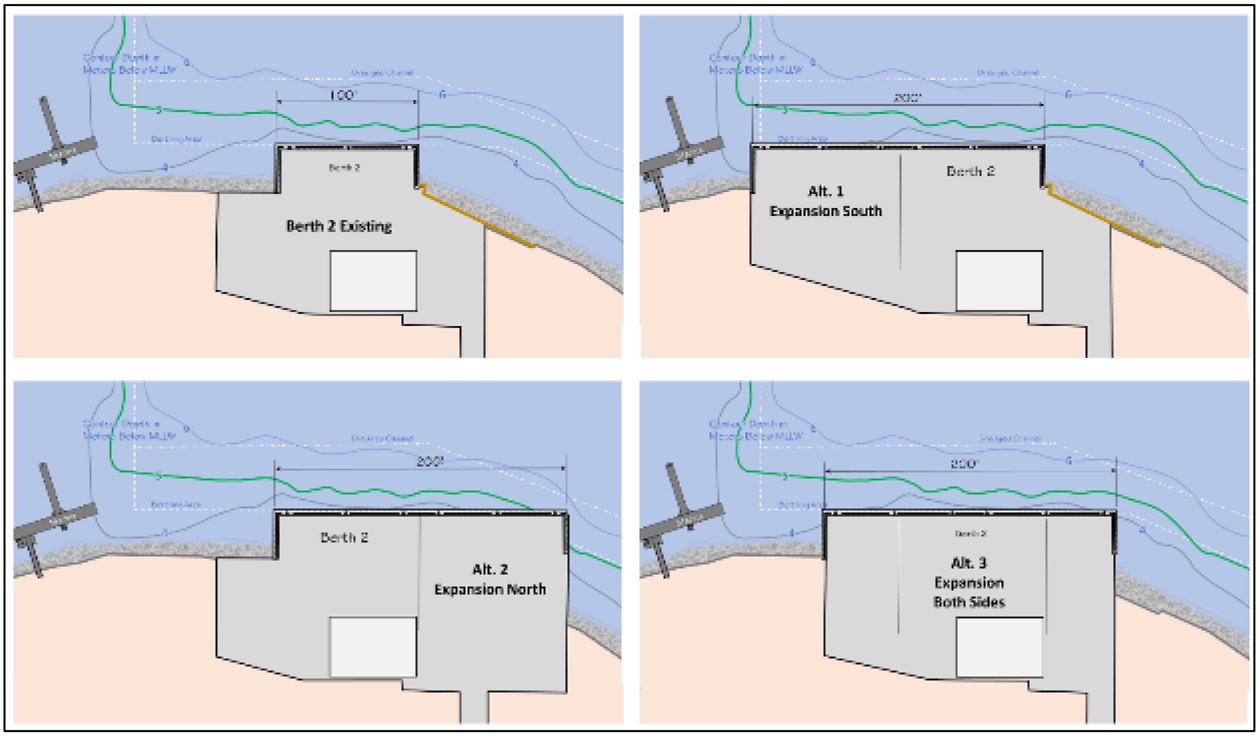
With sufficient additional wave protection to allow safe navigation, there will likely be reduced wave agitation within the mooring basin, particularly at Berth 2. Therefore, a significant reconfiguration of the harbor, including dredging, will not be necessary if the breakwater is constructed.

At 100 feet in length, Berth 2 is not adequate for the size of barge and ship traffic calling at Rota West Harbor. Although a full reconfiguration of the harbor may not be necessary, near term improvements and expansion of Berth 2 will increase the speed and safety of cargo transfer. Three alternatives considered for this expansion are shown in Figure 6-3.

1. Berth Expansion Alternative 1 expands the berth face to the south end of the dredged harbor basin. This alternative has the advantage of moving the center of operation somewhat farther from the turning basin. It also uses the existing level area within the port limits. Alternative 1 is likely to be the lowest cost construction of the three alternatives, as it uses the least sheet pile and results in the least fill. However, it encroaches on the public marina and shallow water areas.

2. Berth Expansion Alternative 2 expands north toward Berth 1 and provides an opportunity to create a consolidated Berth 1-2 operations area. However, Alternative 2 would require the most fill and would likely be the highest cost option.
3. Berth Expansion Alternative 3 expands both ends of Berth 2. It keeps the shed centered in the operations area and maintains adequate spacing with the existing marina to allow development of a new commercial small craft float.

*Figure 6-3: Berth 2 Expansion Alternatives*




### 6.1.2. Alternatives Evaluation

***Channel Improvement Alternatives***

The three breakwater alternatives were analyzed using field data collected by the three wave and current monitoring devices recovered in March of 2017, as well as modeling results released by the Corps in July 2017. This evaluation revealed that a complex current regime can occur within the channel when the nearshore significant wave heights reach four feet or more. At the channel entrance, rapid outflow encounters incident waves resulting in chaotic wave patterns as reported by local vessel operators. Additionally, a strong eddy was modeled within the channel that could be hazardous to vessels having reduced maneuverability. Evaluation of the alternatives resulted in the following recommendations:

1. Breakwater Alternative 1 does not attenuate the strong currents entering the channel from the northern back-reef lagoon. It also could cause additional chaotic wave conditions due to a strong nearshore current trending from the northeast.
2. Breakwater Alternative 2 would block current flow off the lagoon, but would not attenuate waves entering the channel from the northwest. Additionally, strong currents and eddies could develop at the shallow-water, western termination of the training wall.

3. Breakwater Alternative 3 combines wave attenuation with control of the currents. Flow off the back-reef lagoon would be trained away from the harbor entrance. However, Alternative 3 is the costliest of the options.

Based on this evaluation, Breakwater Alternative 1 could improve wave conditions within the harbor but would not attenuate cross-currents in the channel. Breakwater Alternative 2 would control currents, but would leave the channel vulnerable to offshore wave action. Therefore, the highest cost Breakwater Alternative 3 is likely to be the most effective of the three options explored in this report.

A non-structural alternative would be to serve Rota West Harbor with a vessel capable of entering the harbor under conditions that the current tug and barge are not designed to handle. However, recent business failure of the *MV Luta* suggests that a dedicated vessel may not be economically viable given the level of cargo demand on Rota and the competing service from other carriers.

***Berthing Expansion Alternatives***

The three alternative berthing improvements focused on Berth 2 as it is the newest berth, in the best location. Berth 2 can also be improved and would be beneficial even prior to implementation of the breakwater improvements. Expanding the wharf face to a full 200 feet, allows a more distributed load on the fendering and better positioning of the mooring lines. This will better stabilize the vessel, and will reduce damage to the fenders or the vessel rail if wave action increases while a ship is at port. A longer wharf face will also allow crane positioning to reach more containers without moving the barge or the ship.

1. Berth Expansion Alternative 1 was considered the most attractive from a cost standpoint. Only one wing-wall is needed and it ties back a short distance to the shore. Alternative 1 also uses existing port container storage areas without additional grading. However, it prevents development of a small commercial float without significant disruption of the existing marina. It also puts larger vessel very close to the dredged channel limits, risking grounding or propulsion damage to nearby small craft.
2. Berth Expansion Alternative 2 is likely to be the most expensive to construct and mitigate. Beyond its proximity to the Berth 1 storage areas, Alternative 2 offers few advantages and was not considered further.
3. Berth Expansion Alternative 3 splits the expansion, north and south. This keeps the transit shed centered on the wharf and 'squares-up' the open paved storage. It also retains sufficient clearance on the south side to allow construction of a dedicated commercial float for small vessels arriving from Guam.

Berth Expansion Alternative 3 is recommended for further development as it provides the best operational configuration and it allows construction of a small vessel float adjacent to the existing marina.

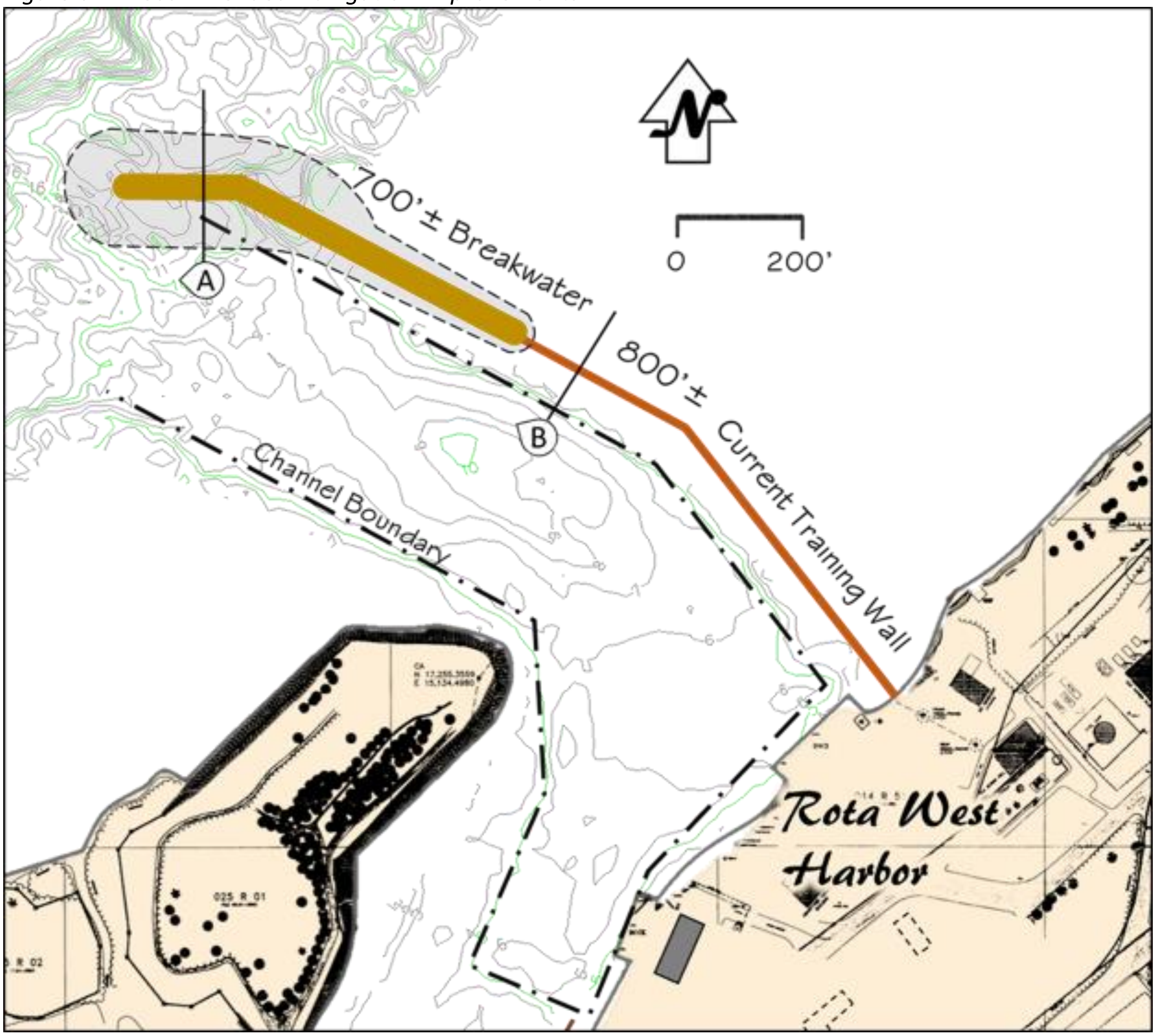
## 6.2. Breakwater, Training Wall, and Navigation Improvements

Wave, current, and weather conditions were investigated at the West Harbor, and analysis of primary data was performed for harbor entrance conditions. This analysis is summarized in Section 3 and shown in more detail in Appendix B. Based on this analysis, and on the experience of local mariners using the West Harbor, prevailing ocean conditions prevent safe use of the entrance channel for as much as three months out of the year.

Therefore, an offshore breakwater will be necessary if regular marine traffic is to call at Rota West Harbor. Additionally, currents originating from the back-reef lagoon, north of the West Harbor channel, should be attenuated by a "training wall" along the north edge of the channel. These improvements are shown in schematic form in Figure 6-4.

Breakwater design will require a detailed survey of the site and additional coastal engineering modeling to confirm the size and configuration of the structure. It must have substantial armor to prevent typhoon damage and it must be located so as to minimize impact to the local coral reef system.

*Figure 6-4: Recommended Navigation Improvements*




### 6.2.1. Breakwater and Training Wall Concept

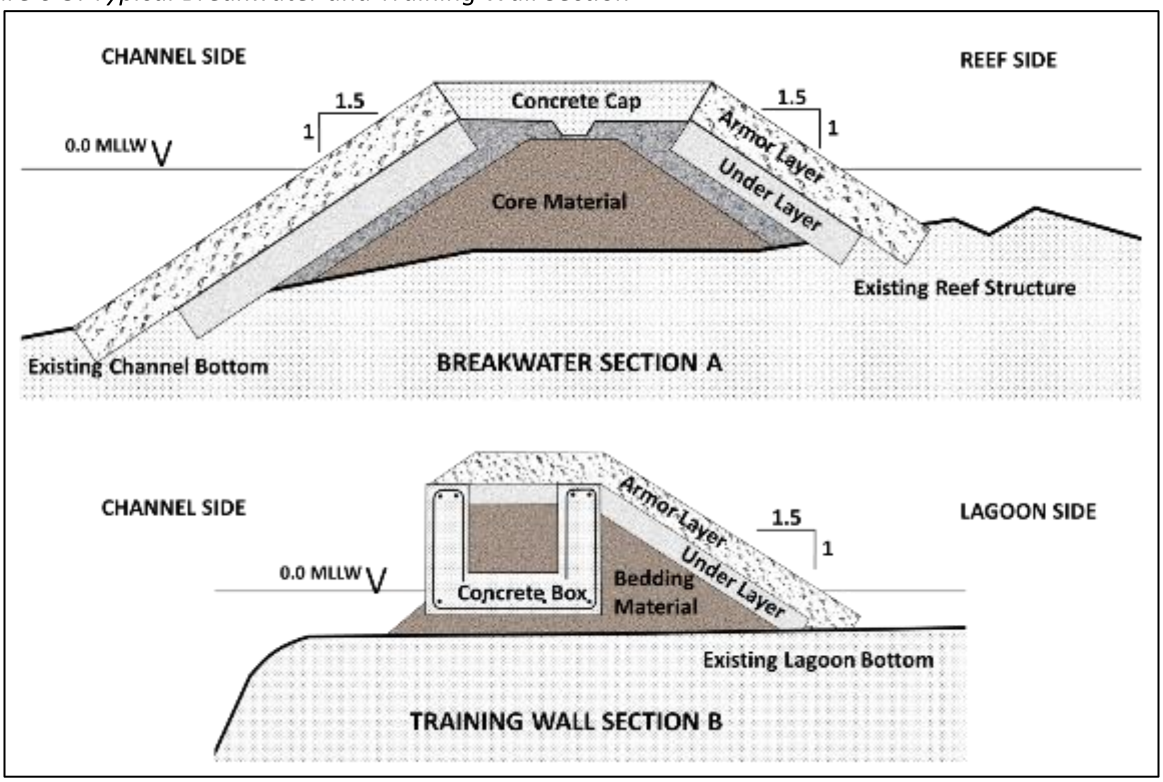
Considerable additional engineering, surveying and environmental research will be needed to develop a construction plan for the breakwater and training wall. Aside from preliminary survey information, detailed bottom condition and geotechnical data has not been developed. Therefore, a rough, theoretical breakwater and training wall concept was created for discussion purposes. This concept will be subject to considerable change once more information has been collected on the site.

The primary wave protection for Rota Harbor is the barrier island. This island has been over-washed several times during previous typhoon events, notably Typhoon Pamela and Typhoon Chaba. Therefore, the West Harbor cannot be used as a harbor of refuge, and vessels would leave prior to a typhoon's arrival.

Figure 6-5 illustrates the working concept used for evaluating this project. Since the West Harbor is not a harbor of refuge, breakwaters can be sized to allow overtopping in extreme weather events. Therefore, a lower structure profile can be used as long as the cap and armoring is sufficient to protect it from typhoon conditions.

As the training wall is set well behind the fringing reef, it will not encounter wave conditions expected at the channel entrance. In addition, the lagoon bottom supporting the training wall is very shallow and often exposed at low water.

*Figure 6-5: Typical Breakwater and Training Wall Section*




### 6.2.2. Construction Sequence

Figure 6-6 shows the back-reef lagoon at a low tide level and calm conditions. Much of the bottom is exposed with small coral heads visible at the channel's edge. This condition allows construction to begin from the shore. Initially, coarse bedding material consisting of quarry-run coral rock would be staged near Berth 1 and used to build a temporary causeway along the channel edge. This would allow heavy equipment to move directly on to the breakwater site for the construction. The general construction sequence could be similar to this:

1. Stockpile coral rock and other material behind Berth 1
2. Build a causeway of bedding material approximately 16 feet wide for the length of the training wall
3. Begin to stockpile armor material at Berth 1
4. Build a temporary staging and turning area at the head of the causeway
5. Continue building the breakwater from the staging area using heavy equipment to set the armor
6. Stockpile precast concrete box caisson units at Berth 1
7. Finish the breakwater by pouring or setting the cap
8. Remove staging area material and begin setting the training wall box units from the outer end
9. Work back toward shore, setting box units, filling and armoring.

*Figure 6-6: Lagoon Conditions*


Several variations on the concepts illustrated in Figure 6-5 are possible including tribar armor units on the breakwater face, stone or armor on the breakwater cap, a conventional core and stone section for the training wall, or a combination of alternatives. Construction would have to be timed to correspond with the calmer summer months and a substantial contingency built into the schedule for typhoon weather events. Many details such as water circulation and environmental mitigation measures remain unresolved.

### 6.2.3. Other Alternatives

The breakwater and training wall structures present significant financial, engineering, and regulatory challenges. In the Western Pacific, typhoon conditions, remote construction sites, and sensitive environments can substantially increase project costs. Therefore, alternatives to the recommended breakwater structure should be considered.

**Reduced Project** – A smaller project may be possible that would improve access to Rota Harbor, if not yield all the benefits of the recommended plan.

**Vessel Subsidy** – A long-term minimum cargo commitment by the CPA could be developed to ensure that a self-propelled vessel with bow-thrusters was maintained in the Rota service.

**Warehousing Logistics** – A logistics center could be developed to maintain a 60-day supply of sustainment goods during periods of bad shipping conditions, or in the event of typhoon damage to the Port.

### 6.2.4. Navigation Improvements

Rota West Harbor entrance channel is well marked with lighted range markers located behind Berth 1. When the breakwater is constructed, a lighted marker will be needed at the head to guide vessels into the channel. With a breakwater and training wall in place, the 20-foot channel depth and 300-foot width will be sufficient to serve the design vessels under one-way traffic conditions.

Prevailing wind and waves are such a significant factor in governing harbor entrance conditions that addition of an anemometer to the roof of the transit shed and harbor operations building would help the vessel operator decide when to enter and when to bypass Rota harbor. Similarly, a video camera could be mounted on one of the range towers to monitor channel conditions in advance of vessel arrival.

## 6.3. Upland Development

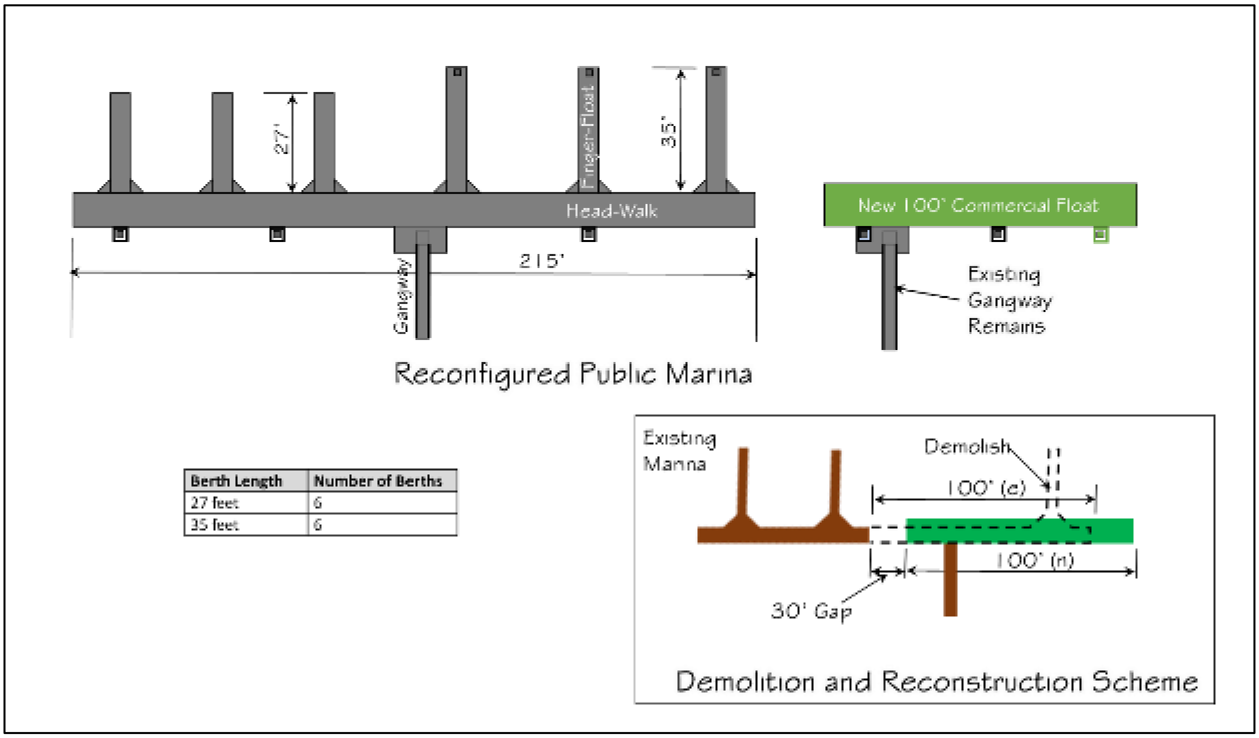
### 6.3.1. Key Drivers

Upland development of CPA Rota West Harbor property is primarily driven by the community need for waterfront access and marina facilities. Rota holds several sport fishing events that contribute to the tourism sector of their economy. Rota also has excellent snorkel and scuba diving sites that draw visitors to the island.

To accommodate small commercial vessel traffic, the CPA seaport needs a heavy commercial float that is within the Port secured boundaries. Figure 6-7 illustrates how a portion of the existing marina would be converted for commercial use by replacing approximately 100 feet of marina head-walk with a heavy duty commercial small boat landing[9]. This development would eliminate the remaining 48-foot finger pier and so reduce available berthing in the marina. Since this facility was constructed under a memorandum with the DLNR, a revised agreement will be necessary to modify the public marina head-walk to construct the commercial float.

[9] A site visit on 3/15/18 found that the gangway at this location has been removed. Replacement of the gangway would be necessary as part of the commercial small boat landing.

*Figure 6-7: Commercial Float*

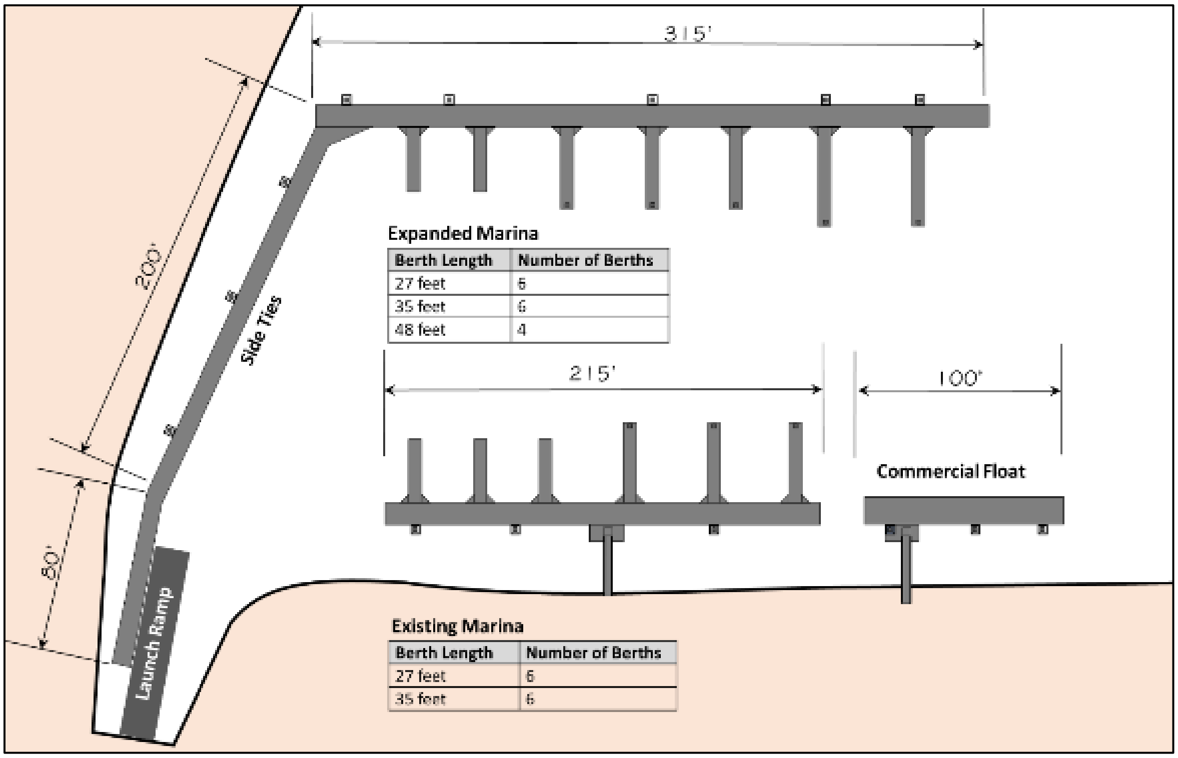



### 6.3.2. Small Boat Harbor

Accommodations for smaller commercial vessels are needed at the seaport and will displace the larger slips in the existing marina. Therefore, an expanded marina should be constructed to replace the lost berthing capacity and to accommodate more boats during seasonal events. Access to the marina expansion would be via a new, 80-foot boarding float at the existing launch ramp. The float should be designed with a non-slip walking surface, and at low water, should not reach an angle steeper than that of the marina gangways.

Figure 6-8 illustrates one concept for small boat marina expansion that would fill the need for additional slips and temporary mooring (side ties) for visiting boats. As bottom conditions within the West Harbor vary considerably, additional evaluation will be needed to design the guide piles and to survey the harbor depth. Marina expansion should not take place until a breakwater is installed along the harbor channel entrance to control harbor wave agitation.

*Figure 6-8: Marina Expansion Concept*




### 6.3.3. Public Access

A portion of the existing public area at Rota West Harbor will revert to CPA control when the commercial float is constructed since it will have to be incorporated into the secured terminal area, within the security fence. However, this area is generally underutilized and is primarily vehicle parking that could be located elsewhere. Future development of the CPA property south and east of the commercial harbor should include improved public access and waterfront amenities such as comfort station and fish cleaning stations.

Figure 6-9 illustrates a very general concept for improving public access at West Harbor. This concept is primarily for discussion of area needs and spatial arrangement. Specific elements should be developed as need arises and funding becomes available.

Since typhoon storm surge can periodically inundate the port area, public improvements and commercial recreational developments in this area should be designed to withstand flooding of the lower levels. Lower value structures such as picnic shelters should be roofed with thatch or other natural materials that can be sacrificed in typhoon events and replaced at a relatively low cost.

*Figure 6-9: Public Access*


The CPA controls additional land south of the Manglona Park island causeway, as well as land surrounding the historical sugar mill site. This property could also be improved for commercial or public recreational uses if needed.

## 6.4. Recommended Harbor Improvements

The needs assessment and interviews show that Rota West Harbor has sufficient land and transit shed space to accommodate all forecast cargo through 2030. Therefore, upland expansion should be done on an incremental basis as needed by specific future cargo developments. A small expansion south of Berth 2 will be necessary to incorporate the commercial float into the secured terminal area.

On the water side, Berth 2 requires fender repair and expansion to safely accommodate the 200-foot design vessel, whether a barge or a small ship such as the MV Luta. Expansion of Berth 2 will entail some fill in the harbor that will require environmental mitigation. Figure 6-10 illustrates the primary features of the recommended master plan harbor improvements:

1. Breakwater and training wall to allow safe harbor entry and to reduce harbor wave agitation.
2. Expansion of Berth 2 with improved/repaired or replaced fender units and mooring bollards.
3. New commercial float with cargo storage and transfer facilities.
4. Expanded public marina facilities with upland amenities that include comfort station and fish cleaning stations.
5. Designated public access and commercial recreational areas

*Figure 6-10: Master Plan Harbor Development*


## 6.5. Phasing Plan

Development of Rota West Harbor is needed in the near-term to address the immediate needs of Rota residents for reliable ocean cargo service. As population and economic growth are seen to be modest over the next 20 years, the renovated port will have sufficient capacity to serve local needs in that time period. Therefore, an accelerated phasing plan is proposed to answer the island's need in the near term.

Phase I (see 6.5.1) is designed to stabilize the wharf structure and to improve berth and cargo handling operations as much as possible without new harbor wave and current improvements. Phase I could start in 2018 when funds are allocated and would continue for two years of permitting, bidding, and construction.

Phase II (see 6.5.2) is intended to complement construction of a new breakwater and current training well. However, the Berth 2 improvements should be implemented whether a breakwater is complete or not. Phase II could begin in 2020 when the funds are allocated and would take place over two to three years for permitting, bidding and construction. As it will take considerably longer to fund, permit and construct, Phase II is assumed to extend until 2025 when reduced harbor wave agitation allows expansion of the public marina.

Phase III (see 6.5.3) is considered a post-breakwater phase, although Berth 1 improvements may take place earlier to facilitate breakwater construction. Timing of Phase III will be determined mostly by demand and funding availability. For this analysis, it is assumed that Phase III funding will be committed in 2025.

### 6.5.1. Phase I Improvements

**New fenders on Berth 2 –** The existing wharf face at Berth 2 is fendered with equipment tires hung from the bull rail. These tires have little energy absorption capability and result in damage to the rail, the wharf and the calling vessel. New trapezoidal rubber fenders, at least three feet long, are needed on the wharf face.

**Demolish 100' of marina dock and piles and construct new commercial float** – Small vessels in the 100-foot range call at the West Harbor delivering consumer goods in an informal trade with Guam and the other islands. This trade should take place from a suitably heavy float, within the harbor secure area. A loading and storage area will be needed as well as an extended security fenced area.

**Material handling equipment** – The Grove TM875 crane currently in use is under-sized for the reach requirements of barges calling Rota West Harbor. A newer and larger crane delivered to Rota was estimated at about $1.8 million in 2013. The new equipment would require less vessel repositioning and could lift heavier containers, resulting in lower shipment costs to Rota (since containers can be more fully loaded) and faster vessel service times.

### 6.5.2. Phase II Improvements

**Extensions of Berth 2** – The 100-foot Berth 2 is inadequate for mooring the 200-foot vessels that call Rota West Harbor. One of the reasons the original fender system failed was that too much load was placed against a short berthing area. By extending Berth 2, the fendered surface can be designed to be compatible with the vessel class using the port. It will also allow a better mooring pattern to be used and will allow full access to the vessel by the port's cargo crane.

**New Public Marina Floats and Launch Ramp Boarding Float** – The existing public marina is said to be too small for seasonal fishing events, guest yachts and fishing vessels. Additionally, the existing launch ramp lacks a boarding float and loading area. Additional slips in Phase II will replace those lost to development of the commercial float and increase overall berthing capacity. Access to the new marina would be via a proposed launch ramp float.

**Breakwater and Training Wall** – At this time, the Corps is completing their study of the Rota West Harbor channel and breakwater improvements. With environmental review, permitting, mitigation, and funding, it is possible that the breakwater could be constructed during the Phase II time-frame.

### 6.5.3. Phase III Improvements

**Berth 1 Rehabilitation and Secure Contractor's Storage Area** – On completion of the USACE breakwater and training wall, Berth 1 could be repaired and fitted with new fenders for use by local contractors importing bulk materials and construction equipment. The existing wharf should be retro-fitted with a removable bull-rail section to allow transfer of Ro-Ro cargo from landing craft and other inter-island vessels. In the backland area, approximately 0.5 acres would be leveled and paved with crushed coral stone for contractor's equipment storage. (Note: Partial Berth 1 rehabilitation may be required beforehand to facilitate construction of the breakwater and training wall).

**Boat Repair and Storage with Marine Supplies and Charters –** When visitor traffic to Rota grows to the point that dive charters and excursion boat operators use the West Harbor, there will be a need for upland storage, boat and engine repair, as well as fishing supplies and charter booking support.

**Picnic Areas with Shelter and Comfort Station –** Expanded public use of the West Harbor marina will require comfort station amenities as well as family-use facilities. All construction near the harbor will have to be resistant to typhoon flooding and winds, or easily repaired.

**Restaurants and Entertainment –** If sufficient commercial demand for waterfront entertainment develops, the area east of the Port Access Road and Manglona Park island causeway could be developed as a site for informal dining and evening entertainment. Any such development must consider that Manglona Park island will over-wash in a typhoon and low-level improvements are subject to flooding.

*Figure 6-11: Phased Development Plan*


## 6.5.4. Phase I Repair Recommendations

**Berth 1 –** The tire fenders should be removed to prevent further erosion of the bull-rail and wharf face. If Berth 1 is needed, temporary fenders can be deployed by the arriving vessel operator. A passive cathodic protection system should be installed for Berth 1 at the same time it is installed for Berth 2.

**Berth 2 –** The tire fenders should be replaced with an engineered fender system. Concrete spalls should be patched and repaired where reinforcing steel is exposed, or where rebar "bleeding" is evident. Damaged steel sheet piles should be repaired and a passive cathodic protection system should be installed. Berth 2 should be swept for in-water debris when the steel sheet piles are being repaired.

**Public Marina –** General maintenance on the broken deck boards, cleats, and fenders should be performed as part of the Phase I commercial float construction project.

**Storage –** The transit shed door track should be removed and replaced. All area lighting should be maintained to allow evening cargo operations.

### 6.5.5. Phase II Repair Recommendations

**Berth 2** – In conjunction with the Berth expansion, subsided Berth 2 deck areas should be filled and repaved.

### 6.5.6. Phase III Repair Recommendations

**Berth 1** – The damaged concrete cap should be re-faced to extend the service life of the berth. Remaining concrete spalls should be patched and repaired where reinforcing steel is exposed, or where rebar "bleeding" is evident. Damaged steel sheet piles should be repaired and rip-rap repaired or replaced at both ends of the berth. Stone and debris build-up near the wharf face should be surveyed and removed. Subsided deck areas should be filled and repaved. (Note: Berth 1 reconstruction may be required earlier than Phase III to support the U.S. Army Corps of Engineers' breakwater and training wall project. If so, the USACE contractor could be required to make these improvements as a condition of using Berth 1.)

### 6.5.7. Phased Cost Estimates

For Phase I, approximately $2.93 million should be allocated in 2018 to fund the repair and improvements of Berth 2. Of this allocation, approximately $2.0 million will be for the container handling crane. As purchase of a new crane will not be necessary until after berth upgrades have been completed, it can be deferred until later in the Phase I cycle. However, Rota should purchase a second crane for the terminal by 2020.

| Item | Phase I | Cost |
|---|---|---|
| 1 | Berth 2 Upgrades | $195,000 |
| 2 | New Commercial Float | $465,000 |
| 3 | Storage Yard Improvements | $170,000 |
| 4 | Miscellaneous Repairs and Improvements | $99,000 |
| 5 | Container Handling Crane | $2,000,000 |
| | **TOTAL** | **$2,929,000** |

The Phase II allocation of $24.1 million includes the Commonwealth contribution to breakwater and training wall costs. As the cost of construction is relatively high in the CNMI, and as significant mitigation costs are anticipated, a very conservative $20 million is allocated for breakwater construction. That amounts to 20 percent of the $100 million rough cost estimate given by USACE and assumes an 80-20 federal-local costs share split.

This estimated contribution is deliberately conservative and could be as much as two times the amount required. Therefore, budgeting for Phase II will hinge on the final recommendation of the Corps' current evaluation. Additionally, the CNMI contribution may not be required until several years after the Phase II funding allocation date of 2020.

| Item | Phase II | Cost |
|---|---|---|
| **1** | Berth 2 Upgrades | $2,248,000 |
| **2** | Marina and Boarding Float | $1,804,000 |
| **3** | Breakwater and Training Wall (CPA estimated contribution to federal project) | $20,000,000 |
| | **TOTAL** | **$24,052,000** |

Construction costs for Phase III are a rough estimate that can be used for future planning, but may occur almost any time during the 20-year planning horizon. Berth 1 upgrades and repairs may be needed as part of the breakwater construction project, and should not be delayed later than 2025.

| Item | Phase III | Cost |
|---|---|---|
| **1** | Berth 1 Upgrades | $966,000 |
| **2** | Upland Improvements | $3,208,000 |
| | **TOTAL** | **$4,174,000** |

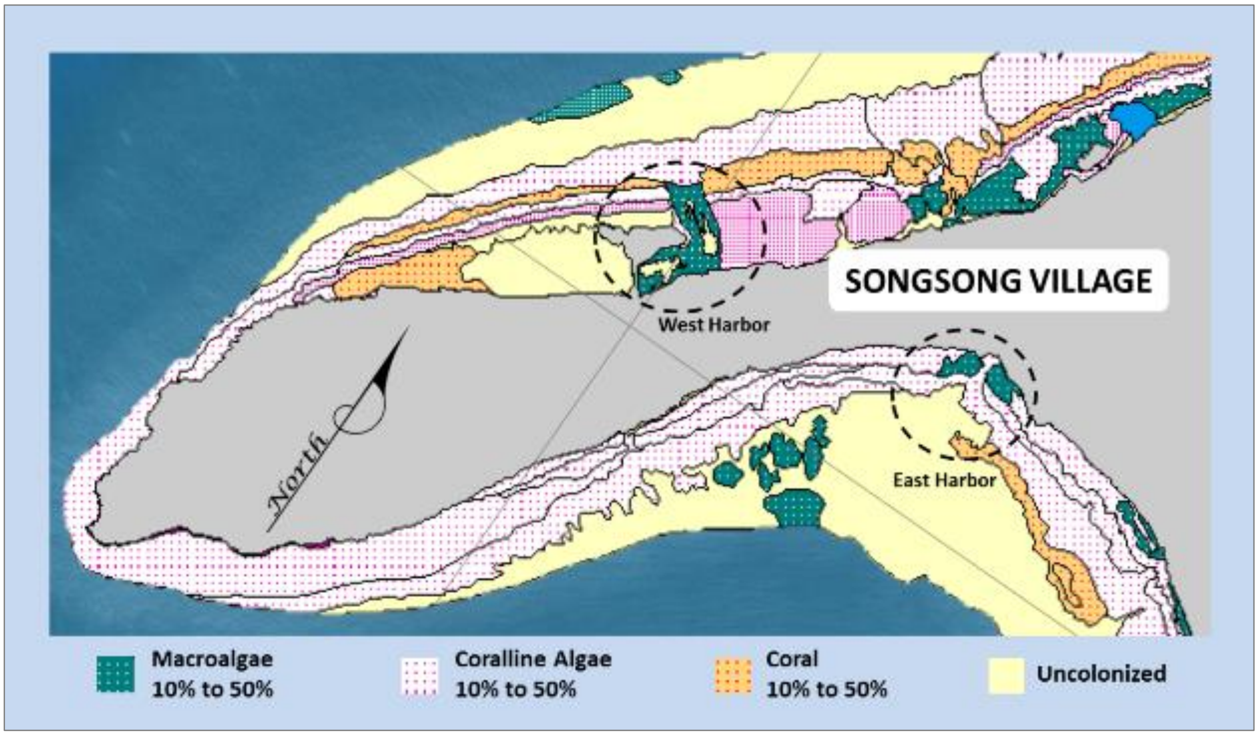
# 7.0 Environmental Conditions and Permitting

## 7.1. Background and Setting

Rota Island is generally surrounded by well-developed coral reefs and reef breakdown sediments. Songsong Village, at the southern end of Rota, is bordered on the northwest by extensive reef formations. Within Sasanhaya Bay, on the southeast end, coral is less prominent, with the exception of the far eastern side of the bay where a particularly well-developed formation, known as the Coral Gardens, has been designated as a Marine Protected Area (MPA).

Figure 7-1 illustrates four of the most important bottom substrates found in the littoral and sub-littoral zones adjacent to the West Harbor[10].

*Figure 7-1: Near Shore Marine Environment*




*Data Source: NOAA Technical Memorandum NOS NCCOS 8*

- **Macroalgae** – Substrates with 10 percent or greater coverage of any combination of numerous species of red, green, or brown macroalgae. Usually occurs in shallow back reef and deeper waters on the bank/shelf zone. More commonly known as "seaweed," macroalgae are not to be confused with seagrass, a marine flowering plant.
- **Coralline Algae** – An area with 10 percent or greater coverage of any combination of numerous species of encrusting or coralline algae. May occur along reef crest, in shallow back reef, relatively shallow waters on the bank/shelf zone, and at depth.

[10] NOAA, Atlas of the Shallow-Water Benthic Habitats of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands, January 2005

- **Coral** – Substrates colonized by live reef building corals and other organisms. Habitats within this category have at least 10% live coral cover.
- **Uncolonized** – Substrates not covered with a minimum of 10% of any biological cover types. This habitat is usually on sand or mud structures.

It is important to understand that the sub-littoral zone can be a rapidly changing environment and that most of the available survey information is based on aerial or satellite data. Therefore, field verification of local conditions will be necessary for design and permitting of any project at the West Harbor.

## 7.2. Construction Related Impacts

Improvement of the West Harbor facilities will result in more vessel calls and possibly larger vessels calling at the West Harbor. The expanded harbor will also need to protect existing uses, including the existing marina and small boat ramp used by residents to launch boats with trailers.

The following types of construction activities are proposed for the West Harbor that may result in both temporary and long-term impacts on existing environmental, historical and cultural, transportation, recreational and socioeconomic resources:

- Demolition or modification of the existing dock and launch ramp.
- Reconstruction of small boat access facilities.
- Upland excavation and fill activities to develop shoreline protection, road access and utilities infrastructure.
- In-water fill for wharves, piers and harbor protection.

## 7.3. Upland and Marine Cultural Resources

The latest National Register of Historic Places (NRHP) has been consulted to determine whether there are known historic or prehistoric sites in the vicinity of the West Harbor. No historical or archaeological sites listed on the NRHP (or considered eligible for inclusion) are located at or immediately adjacent to the West Harbor. The nearest listed historical building is the old sugar mill adjacent to the CPA West Harbor and the Japanese Hospital ruins from the pre-war era located within Songsong Village, approximately 0.25 miles east of the West Harbor site[11]. A site review and interviews with local municipal leaders did not reveal evidence of unlisted cultural resources in the vicinity of the West Harbor.

## 7.4. Biological Environment

A literature review shows that Rota hosts several rare upland plant and animal species, including the fire tree (*Serianthes nelsonii*), federally listed as endangered under the Endangered Species Act (ESA). Other endangered or threatened upland species include the Mariana fruit bat (*Pteropus mariannus*), the Mariana crow (*Corvus kubaryi*), Rota bridled white-eye (*Zosterops rotensis*), and the Mariana common moorhen (*Gallinula chloropus guami*).

Among the aquatic species found near Rota, the green sea turtle (*Chelonia mydas*), and the hawksbill turtle (*Eretmochelys imbricata*) are both listed as endangered. A number of whales are federally listed and

[11] National Park Service, National Register of Historic Places, Record No. 385444, *Japanese Hospital*, 16 April 1981

known to occur off CNMI and Guam in deeper waters. Additionally, live coral is likely to be encountered near or within the West Harbor site and impacts to the sub-littoral zone coral habitats must be minimized.

Most of these species of plants and animals are not anticipated within the immediate development footprint of the West Harbor. The most likely impacts will be to near shore coral colonies. These areas will have to be surveyed prior to permitting and a plan developed for minimizing or mitigating any potential impacts.

### 7.4.1. Terrestrial Fauna and Flora

The U.S. Fish and Wildlife Service (USFWS) has identified 30 threatened/endangered species within the Commonwealth of the Northern Mariana Islands (CNMI): two mammals, six birds, four reptiles (three sea turtles, one skink), three insects, three gastropods, and 12 plants. This list does not include the experimental Guam Rail (*Rallus owstoni*) population on Rota that receives no formal protection under the ESA. General jurisdiction of the USFWS includes terrestrial and freshwater wildlife, while the National Marine Fisheries Service's (NMFS) primary responsibility is marine wildlife species. Enforcement of the ESA for sea turtles is shared between the USFWS (Department of Interior) and the NMFS (Department of Commerce).

The CNMI Government passed a law on 15 January 1991 identifying locally threatened/endangered species. This original list includes 14 species from the entire CNMI: two mammals, seven birds, three reptiles, and two plant species. The CNMI law did not differentiate between threatened and endangered categories and are thus jointly classified. The CNMI threatened/endangered species list contains two species not officially recognized as either threatened or endangered by the Federal Government; these are the Micronesia Saw-tailed Gecko (*Perochirus ateles*) and Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*).

*Table 7-1: Federal and Commonwealth of the Northern Mariana Islands (CNMI) listed threatened/endangered terrestrial species that may occur or have historically occurred on Rota*

| Listed Species | Federal | CNMI |
|---|---|---|
| **Mammals** | | |
| Mariana Fruit Bat (*Pteropus m. mariannus*) | T | T/E |
| Pacific Sheath-tailed Bat (*Emballonura semicaudata rotensis*) | E | T/E |
| **Avifauna** | | |
| Mariana Crow (*Corvus kubaryi*) | E | T/E |
| Rota White-eye (*Zosterops rotensis*) | E | T/E |
| Micronesian Megapode (*Megapodius l. laperouse*) | E | T/E |
| Mariana Common Moorhen (*Gallinula chloropus guami*) | E | T/E |
| Mariana Swiftlet (*Aerodramus bartschi*) | E | T/E |
| **Herpetofauna** | | |
| Mariana Skink (*Emoia slevini*) | E | NR |
| Micronesia Saw-tailed Gecko (*Perochirus ateles*) | NR | T/E |
| Green Sea Turtle (*Chelonia mydas*) | T | T/E |
| Hawksbill Sea Turtle (*Eretmochelys imbricata*) | E | T/E |
| Leatherback Sea Turtle (*Dermochelys coriacea*) | E | NR |

| Listed Species | Federal | CNMI |
|---|---|---|
| **Insects** | | |
| Mariana Wandering Butterfly (*Vagrans egistina*) | E | NR |
| Rota Blue Damselfly (*Ischnura luta*) | E | NR |
| **Gastropods** | | |
| Humped Tree Snail (*Partula gibba*) | E | NR |
| Fragile Tree Snail (*Samoana fragilis*) | E | NR |
| **Plants** | | |
| Berenghenas Halomtano (*Solanum guamense*) | E | NR |
| Cebollo Halumtano (*Bulbophyllum guamense*) | T | NR |
| Cycad (*Cycas micronesica*) | T | NR |
| *Dendrobium guamense* | T | NR |
| Hayun Lagu (*Serianthes nelsonii*) | E | NR |
| *Maesa walkeri* | T | NR |
| *Nervilia jacksoniae* | T | NR |
| *Nesogenes rotensis* | E | NR |
| *Osmoxylon mariannense* | E | NR |
| *Tabernaemontana rotensis* | T | NR |
| *Tuberolabium guamense* | T | NR |
| Ufa-halomtano (*Heritiera longipetiolata*) | E | NR |
| Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*) | NR | T/E |

**Key**: E = Endangered, T = Threatened, NR = Not Recognized

Although the list of protected terrestrial species shown in Table 7-1 is extensive, most of the species are not found in the area of the Rota West Harbor project site.

A species summary for each of the federally listed species is provided by Micronesian Environmental Services (MES) in its report "Rota West Harbor Master Plan Project Permitting & Environmental Mitigation," November 2017 (see Appendix C). A preliminary effects determination, based on the species' life history characteristics, habitat requirements, historical knowledge of the project site, the known resources, and the potential impacts from the proposed action, as it relates to ESA Section 7, is also provided. However, this does not preclude the need for additional resource surveys that will be needed as part of future environmental entitlement actions that will be required to implement the projects proposed under the Master Plan.

Based on the preliminary effects determination in Appendix C, a no "effects" determination is anticipated for all terrestrial species.

See Section 7.4.2 for the preliminary effects determination for the green sea turtles (*Chelonia mydas*) and hawksbill sea turtle (*Eretmochelys imbricate*).

### 7.4.2. Marine Fauna and Flora

The NOAA Pacific Islands Regional Office (Honolulu, HI) listed a total of 39 marine species (or Distinct Population Segments) in the Marianas archipelago; 28 marine mammals; 5 sea turtles, 3 fish and 3 corals

(Table 7-2). There are no Candidate or Proposed for Listing species for the Marianas. However, there are several Candidate species going through a status review for consideration in listing. It should be noted that all marine mammals are also protected under the Federal Marine Mammal Protection Act and those species present in the Marianas are also listed in Table 7-2.

*Table 7-2: Federal and Commonwealth of the Northern Mariana Islands (CNMI) listed threatened/endangered aquatic species that may occur or have historically occurred in the waters of the Mariana archipelago and therefore, Rota*

| Listed Species | Federal ESA | CNMI |
|---|---|---|
| **Marine Mammals** | | |
| Blue Whale (*Balaenoptera musculus)* | E | NR |
| Blainville's Beaked Whale (*Mesoplodon densirostris*) | E | NR |
| Bryde's Whale (*Balaenoptera edeni*) | NR | NR |
| Cuvier's Beaked Whale (*Ziphius cavirostris*) | NR | NR |
| Dwarf Sperm Whale (*Kogia simus*) | NR | NR |
| False Killer Whale (*Pseudorca crassidens*) | NR | NR |
| Fin Whale (*Balaenoptera physalus*) | E | NR |
| Humpback Whale (*Megaptera novaeangliae*) | E | NR |
| Killer Whale (*Orcinus orca*) | NR | NR |
| Long-finned Pilot Whale (*Globicephala melaena*) | NR | NR |
| Longman's Beaked Whale (*Indopacetus pacificus*) | NR | NR |
| Melon-Headed Whale (*Peponocephala electra*) | NR | NR |
| Minke Whale (*Balaenoptera acutorostrata*) | NR | NR |
| Pygmy Killer Whale (*Feresa attenuate*) | NR | NR |
| Pygmy Sperm Whale (*Kogia breviceps*) | NR | NR |
| Sei Whale (*Balaenoptera borealis*) | E | NR |
| Short-Finned Pilot Whale (*Globicephala macrorhynchus*) | NR | NR |
| Sperm Whale (*Physeter microcephalus*) | E | NR |
| Bottlenose Dolphin (*Tursiops truncates*) | NR | NR |
| Common Dolphin (*Delphinus delphis*) | NR | NR |
| Fraser's Dolphin (*Lagenodelphis hosei*) | NR | NR |
| Pantropical Spotted Dolphin (*Stenella attenuate*) | NR | NR |
| Risso's Dolphin (*Grampus griseus*) | NR | NR |
| Rough-toothed Dolphin (*Steno bredanensis*) | NR | NR |
| Spinner Dolphin (*Stenella longirostris*) | NR | NR |
| Striped Dolphin *(Stenella coeruleoalba*) | NR | NR |
| Dugong (*Dugong dugon*) *Dugongs are under the jurisdiction of the USFWS.* | E | NR |
| Northern Elephant Seal (*Mirounga angustirostris*) | NR | NR |
| **Sea Turtles** | | |
| Green Turtle, Central West Pacific DPS (*Chelonia mydas)* | E | T/E |
| Hawksbill Turtle (*Eretmochelys imbricatea)* | E | T/E |
| Leatherback Turtle (*Dermochelys coriacea)* | E | NR |
| Loggerhead Turtle, North Pacific DPS (*Caretta caretta)* | E | NR |

| Listed Species | Federal ESA | CNMI |
|---|---|---|
| Olive Ridley Turtle (*Lepidochelys olivacea)* | T | NR |
| **Fish** | | |
| Scalloped Hammerhead Shark, Indo-West Pacific DPS (*Sphyrna lewini)* | T | NR |
| Giant Manta Ray (*Manta birostris)* | PT | NR |
| Oceanic Whitetip Shark (*Carcharhinus longimanus)* | PT | NR |
| **Corals** | | |
| Coral; no common name *(Seriatopora aculeata)* | T | NR |
| Coral; no common name *(Acropora globiceps)* | T | NR |
| Coral; no common name *(Acropora retusa)* | T | NR |

**Key**: E = Endangered, PT = Proposed Threatened, T = Threatened, NR = Not Recognized

Although the list of protected marine species shown in Table 7-2 is extensive, most of the species are pelagic, found offshore, and do not occur in the shallow nearshore waters of Rota. The list of potentially affected species narrows even further when only the Rota West Harbor site is considered.

A species summary for each of the federally listed species is provided by MES in its report "Rota West Harbor Master Plan Project Permitting & Environmental Mitigation," November 2017 (see Appendix C). A preliminary effects determination, based on the species' life history characteristics, habitat requirements, historical knowledge of the project site, the known resources and the potential impacts from the proposed action, as it relates to ESA Section 7, also is provided. However, this does not preclude the need for additional resource surveys that will be needed as part of future environmental entitlement actions that will be required to implement the projects proposed under the Master Plan.

The following is a summary of the preliminary effects determination for marine fauna and flora presented in the 2017 MES report (Appendix C):

- Based on local knowledge, green turtles (*Chelonia mydas*) have been observed in Rota West Harbor, therefore a "may effect" determination is anticipated.
- Although hawksbill turtles (*Eretmochelys imbricate*) are much less abundant than the green turtle in the nearshore waters, a "may effect" determination could also be anticipated for the hawksbill turtle.
- In its review of the proposed Master Plan, the USFWS (via letter dated 6 November 2017) identified *Acropora globiceps* as occurring within Rota Harbor. Therefore, a "may effect" determination would be appropriate. Additional quantitative surveys that would be conducted for the Biological Assessment associated with future environmental entitlement actions should determine whether the proposed actions are likely to affect this species.
- Due to the dearth of knowledge on the distribution of *Seriatopora aculeate*, specific surveys will have to be conducted prior to making an effects determination on this coral species.
- Based on the preliminary effects determination in Appendix C, a "no effects" determination is anticipated for most other marine species for the proposed projects covered under the Rota West Harbor Master Plan.

## 7.5. Potential Impacts to Important Natural Resources

Six special aquatic sites are identified in the CWA Section 404(b)(1) Guidelines that require special consideration and mitigation prior to being impacted by dredge and fill activities: sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes.

Significant project related impacts to these habitats will need to address the requirements outlined in the 2008 Compensatory Mitigation Plan as jointly promulgated by the USEPA and USACOE. Those special aquatic sites that occur in the vicinity of the Rota West Harbor area are sanctuaries/refuges and coral reefs. Further surveys will have to be conducted to determine the presence of seagrasses.

### 7.5.1. Sanctuaries and Refuges

The Anjota Island Preserve, located on Mayor Prudencio Taisacan Manglona Harbor Island Park, is connected by a causeway to the mainland and lies between Rota West Harbor and Tweksberry Park. The small island is used as a picnic area by locals and tourists alike.

The master plan is expected to have minimal impact to Anjota Island Preserve as the seaward shoreline and entrance channel is protected by armor stone. This island was used as an upland dredge disposal area during the last maintenance dredging event in the 1990's.

### 7.5.2. Vegetated Shallows

Tsuda, et al. (1977) listed three species of seagrasses that are known from the CNMI; *Enhalus acoroides, Halophila minor,* and *Halodule uninervis.* A fourth species of sea grass, *Halophila ovalis*, was recently discovered during a sea turtle assessment study on Saipan (Kolinski, et.al., 2001). Only three islands in the CNMI are known to have seagrasses; Saipan, Tinian and Rota.

Historically, the sea grass *Enhalus* occurred in Rota West Harbor. During harbor improvements in the 1980's, a small area of seagrass was transplanted off-site from the harbor to other areas. Some of those transplanted sea grasses survive today.

### 7.5.3. Coral Reefs

Coral colony growth is locally abundant within the shallow harbor proper and dominated by *Pocillopora damicornis*; a very common branching coral. This is the general area where the floating docks would be constructed. Impacts will occur through construction generating sediment plumes (likely minimal), noise related to hydraulic jack-hammering of pilings, and possible shading effects of floating docks. The magnitude of the impact will have to be determined at a later date when additional information becomes available on dock siting relative to the location of benthic resources.

In contrast, the fringing reef lying adjacent and east of the turning basin has a high density of coral grow and well-developed back reef, reef crest and fore reef habitats. Species diversity is greater in this area when compared to the harbor proper.

Impacts to corals and other non-motile benthic resources from construction of the approximate 800-foot training wall and approximate 700-foot breakwater would be relatively immense. The footprint of these two structures are projected to cover over 2.0 acres of coral reef habitat. These unavoidable impacts will be considered significant and the USACE will likely require a compensatory mitigation plan to be implemented. Mitigation could include on-site in-kind coral transplantation that may include monitoring and the meeting of performance standards.

Maintenance dredging of the turning basin and entrance channel will likely affect some corals, however slow moving benthic invertebrates that occur in sandy substrate will be most affected.

## 7.6. Brown Tree Snake

Sometime after World War II, the brown tree snake (*Boiga irregularis*) was transported from its native range in the South Pacific to Guam, where it reproduced quickly, preying on native forest vertebrates. Since Guam is a major transportation hub in the Pacific, there is the ongoing potential for the brown tree snakes to be further spread to smaller islands such as Rota. Sightings of this species have been reported on other islands, and an incipient population is probably established on Saipan[12].

The commercial port facility at the West Harbor will be required to maintain a system of inspections and barriers to prevent the spread of brown tree snakes from Guam. Barriers can be concrete walls, wire mesh, vinyl panels or other permanent or moveable enclosure at the port. Visual and canine inspections and trapping can also be used to interdict snakes that could be hiding in containers and airplane bodies. These barriers and containment measures must be compatible with other West Harbor activities, including public access to the marina and launch ramp.

## 7.7. Environmental Entitlements and Permitting, Cost Estimates, and Schedule

Avoiding impacts to marine resources starts during the project design phase when engineers strive to adopt the least environmentally damaging structures that still accomplish the stated objectives. For example, instead of constructing solid causeways out into harbor waters to moor vessels, elevated piers would be designed to meet the vessel mooring demand.

As the Master Plan goes through the NEPA process, avoidance, minimization, and mitigation measures will be identified based on the type and magnitude of impacts to aquatic resources. This process will also explore several alternatives of meeting the same objectives, through slightly different approaches and each alternative will be analyzed against the other. The preferred alternative is typically selected when mitigation measures are able to minimize the sum total of impacts to the marine resources. Unavoidable impacts to marine resources will require development of a mitigation plan that would follow the 2008 Federal Compensatory Mitigation for Losses of Aquatic Resources regulations.

Development of best management practices (BMPs) and mitigation measures prior to a NEPA analysis is preliminary, however there are several agencies that have previously developed mitigation measures that are applied to all issued permits. The most extensive list of mitigation measures was developed by the U.S. Army Corps of Engineers and will be used as a planning guide for purposes of this Master Plan.

12 Information Source: Fritts, T.H.; D. Leasman-Tanner; The Brown Treesnake on Guam; U.S. Department of the Interior; 2001

The following tables provide an overview of required permits, anticipated level of difficulty and estimated costs. The tabulated summary does not include costs for the NEPA consultation and analyses and assumes the Master Plan will be implemented in phases.

Compliance with NEPA was not included in the itemized costs analysis as it is dependent upon several variables that strongly influence costs: whether the Master Plan will be implemented by phase, if an EA or EIS would be pursued, and the NEPA requirements of the Federal action agency. If the entire Master Plan would go through the NEPA process at one time, it is estimated that costs for a NEPA EA/EIS alone could range from $250K to $500K.

### 7.7.1. Phase I

The proposed actions for Phase 1 of the Rota West Harbor Master Plan include the construction of new fenders on Berth 2, the demolition of 100 ft. of marina and piles; a new commercial float; a small boat landing area, and an extended port security fence.

The sections below describe the permits needed for these construction activities, the impacts construction will have on the environment; the potential efforts to undertake to mitigate those impacts, and the associated costs.

***Required Permits:***

- U.S. Army Corps of Engineers – Rivers & Harbors Act of 1899; Section 10 permit
  - Endangered Species Act; Section 7 consultation with NOAA Fisheries and U.S. Fish and Wildlife Service
  - Magnuson-Stevens Act; Section 305 Essential Fish Habitat review by NOAA Fisheries
  - Fish and Wildlife Coordination Act review by the U.S. Fish and Wildlife Service
  - National Historic Preservation Act; Section 106 review with CNMI Historic Preservation Office
- CNMI Division of Coastal Resources Management – CZM Federal Consistency Determination or Ports and Industrial Areas APC permit and Major Siting Permit
- CNMI Division of Environmental Quality - Earthmoving and Erosion Control Permit
  - Administrative review by the Division of Fish and Wildlife
  - Administrative review by the Historic Preservation Office
  - Administrative review by the Division of Coastal Resources Management Office
- CNMI Division of Environmental Quality – CWA; Section 401 Water Quality Certification

***Impacts:***

- Turbidity generated from the demolition of existing piles and dock and installation of new commercial dock may impact non-motile benthic resources, such as corals.
- Potential for noise related impacts depending upon methodology used to drive new dock piles.
- Potential for shading of non-motile benthic resources (e.g., corals or sea grasses) may occur with installation of the floating commercial dock.
- Terrestrial runoff from earthmoving activities associated with the small boat loading area and security fence extension.

***Potential BMPs and Mitigation (does not include the numerous USACE permit conditions):***

- Ensure that construction material and debris does not fall into harbor waters during the construction period.

- Install silt curtains to contain sediment plumes and provide daily maintenance inspections to ensure they are functioning properly. Design and implement a daily turbidity monitoring regime in cooperation with the DEQ under the CWA Section 401 WQC. Have an environmental specialist oversee turbidity compliance monitoring efforts and address additional mitigation measures if water quality violations occur.
- Keep watch for the presence of the threatened green and hawksbill sea turtles. If a turtle swims into the work area, stop work until the turtle leaves the area on its own volition.
- Temporarily cease in-water activities for 21 calendar days during the largest annual coral spawning event in May or June.
- Relocate slow-moving benthic resources (e.g., sea cucumbers, sea stars, sea urchins, etc.) away from immediate work areas prior to commencement of in-water work.
- Ensure proper implementation of all conditions for every permit issued for Phase I activities.

*Table 7-3: Phase I Estimated Regulatory Costs*

| Phase I Permits or Authorizations | Action or Level of Investigations | Anticipated Level of Difficulty | Estimated Permitting / Survey Costs |
|---|---|---|---|
| **USACE Section 10; Rivers and Harbor Act** | USACE application development assuming compensatory mitigation will not be required | Medium | $50K |
| | Biological Assessment that would address ESA and EFH issues assuming informal Section 7 and Section 305 consultation | Medium | $40K |
| | Archeological Report for NHPA Section 106 review | Low | $20K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K |
| | Major Siting Permit | Medium | $35K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Low | $20K |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Medium | $25K |

### 7.7.2. Phase II

The proposed actions for Phase 2 of the Rota West Harbor Master Plan include the construction of two 50 ft. extensions to Berth 2, new public marina floats, and a new launch ramp boarding float.

The sections below describe the permits needed for these construction activities, the impacts construction will have on the environment; the potential efforts to undertake to mitigate those impacts, and the associated costs.

***Required Permits:***

- U.S. Army Corps of Engineers – Clean Water Act; Section 404 permit/Rivers & Harbors Act of 1899; Section 10 permit
    - Endangered Species Act; Section 7 consultation with NOAA Fisheries and U.S. Fish and Wildlife Service;
    - Magnuson-Stevens Act; Section 305 Essential Fish Habitat review by NOAA Fisheries;
    - Fish and Wildlife Coordination Act review by the U.S. Fish and Wildlife Service; and
    - National Historic Preservation Act; Section 106 review with CNMI Historic Preservation Office.
- CNMI Division of Coastal Resources Management - CZM Federal Consistency Determination or DCRM Ports and Industrial Areas APC permit
- CNMI Division of Environmental Quality - Earthmoving and Erosion Control permit
    - Administrative review by the Division of Fish and Wildlife
    - Administrative review by the Historic Preservation Office
    - Administrative review by the Division of Coastal Resources Management Office
- CNMI Division of Environmental Quality - CWA; Section 401 Water Quality Certification

***Impacts:***

- Adverse direct impacts to slow-moving and non-motile benthic resources in the footprint of the Berth II dock extension.
- Turbidity generated from the installation of additional piles and dock and expansion (dredge and fill) of Berth II may impact near-by benthic resources, such as corals.
- Potential for noise related impacts depending upon methodology used to drive new dock piles.
- Potential for shading of non-motile benthic resources (e.g., corals or sea grasses) may occur with installation of the new public marina floats and launch ramp boarding float.

***Potential BMPs and Mitigation (does not include the numerous USACE permit conditions):***

- Ensure that construction material and debris does not fall into harbor waters during the construction period.
- Install silt curtains to contain sediment plumes and provide daily maintenance inspections to ensure they are functioning properly. Design and implement a daily turbidity monitoring regime in cooperation with the DEQ under the CWA Section 401 WQC. Have an environmental specialist oversee turbidity compliance monitoring efforts and address additional mitigation measures if water quality violations occur.
- Keep watch for the presence of the threatened green and hawksbill sea turtles. If a turtle swims into the work area, stop work until the turtle leaves the area on its own volition.
- Temporarily cease in-water activities for 21 calendar days during the largest annual coral spawning event in May or June.
- Relocate slow-moving benthic organisms (e.g., sea cucumbers, sea stars, sea urchins, etc.) away from immediate work areas prior to commencement of in-water work.
- Impacts to “special aquatic resources” (e.g., corals or sea grasses) may require the development and implementation of a compensatory mitigation plan, as required by USACE regulations.
- Dredge and fill activities should cease during times of small craft warnings or high surf advisories, as issued by the EMO or U.S. Coast Guard.

*Table 7-4: Phase II Estimated Regulatory Costs*

| Phase II Permits or Authorizations | Action or Level of Investigations | Anticipated Level of Difficulty | Estimated Permitting / Survey Costs |
|---|---|---|---|
| **USACE Section 10; Rivers and Harbor Act/Section 404 Permit; Clean Water Act** | USACE application development assuming compensatory mitigation will be required | High | $60K |
| | Biological Assessment that would address ESA and EFH issues assuming informal Section 7 and Section 305 consultation | Medium | $45K |
| | Archeological Report for NHPA Section 106 review | Medium | $20K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K |
| | Major Siting Permit | Medium | $55K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Medium | $20K |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Medium | $15K |

### 7.7.3. Phase III

The proposed actions for Phase 3 of the Rota West Harbor Master Plan include Berth I rehabilitation, the construction of a secure contractor's storage area, boat repair and storage, marine supplies and charters, restaurants and entertainment, public parking, and picnic areas with shelter and comfort station.

The sections below describe the permits needed for these construction activities, the impacts construction will have on the environment; the potential efforts to undertake to mitigate those impacts, and the associated costs.

***Required Permits:***

- U.S. Army Corps of Engineers – Rivers & Harbors Act of 1899; Section 10 permit
  - Endangered Species Act; Section 7 consultation with NOAA Fisheries and U.S. Fish and Wildlife Service;
  - Magnuson-Stevens Act; Section 305 Essential Fish Habitat review by NOAA Fisheries;
  - Fish and Wildlife Coordination Act review by the U.S. Fish and Wildlife Service; and
  - National Historic Preservation Act; Section 106 review with CNMI Historic Preservation Office.
- U.S. Environmental Protection Agency – CWA; Section 402 General Construction Permit (NOI)
- CNMI Division of Coastal Resources Management - CZM Federal Consistency Determination or DCRM Ports and Industrial Areas APC permit
- CNMI Division of Environmental Quality - Earthmoving and Erosion Control permit
  - Administrative review by the Division of Fish and Wildlife
  - Administrative review by the Historic Preservation Office

  - Administrative review by the Division of Coastal Resources Management Office
- CNMI Division of Environmental Quality – CWA; Section 401 Water Quality Certification

***Impacts:***

- Terrestrial runoff into adjacent waters from earthmoving activities associated with construction of the secure contractor's storage area, boat repair and storage area, marine supplies and charters site, restaurants and other entertainment, public parking, and picnic area with shelter and comfort station.

***Potential BMPs and Mitigation (does not include the numerous USACE permit conditions):***

- Install silt containment fences to prevent surface runoff from entering the harbor waters. Provide daily inspection, maintenance, and repair to ensure silt containment fences are functioning properly.
- Ensure that construction material and debris does not fall into harbor waters during the construction period.
- Keep on watch for the presence of the threatened green and hawksbill sea turtles. If a turtle swims into the work area, stop work until the turtle leaves the area on its own volition.

*Table 7-5: Phase III Estimated Regulatory Costs*

| Phase III Permits or Authorizations | Action or Level of Investigations | Anticipated Level of Difficulty | Estimated Permitting/Survey Costs |
|---|---|---|---|
| **USACE Section 10; Rivers and Harbors Act/Section 404 Permit; Clean Water Act** | USACE application development assuming compensatory mitigation will not be required | Medium | $45K |
| | Biological Assessment that would address ESA and EFH issues Assuming informal Section 7 and Section 305 consultation | Medium | $35K |
| | Archeological Report for NHPA Section 106 review | Medium | $20K |
| **USEPA CWA Section 402 NPDES Construction General Permit NOI** | NOI | Low | $20k |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K |
| | Ports & Industrial Area APC Permit | Low | $15K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Medium | $35K |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Low | $10K |

### 7.7.4. Breakwater

The proposed actions by the U.S. Army Corps of Engineers include the construction of a combined breakwater and training wall and channel dredging.

The sections below describe the permits needed for these construction activities, the impacts the construction will have on the environment; the potential efforts to undertake to mitigate those impacts, and the associated costs.

***Required Permits:***

- U.S. Army Corps of Engineers – Clean Water Act; Section 404 permit/Rivers & Harbors Act of 1899; Section 10 permit
  - Endangered Species Act; Section 7 consultation with NOAA Fisheries and U.S. Fish and Wildlife Service;
  - Magnuson-Stevens Act; Section 305 Essential Fish Habitat review by NOAA Fisheries;
  - Fish and Wildlife Coordination Act review by the U.S. Fish and Wildlife Service; and
  - National Historic Preservation Act; Section 106 review with CNMI Historic Preservation Office.
- CNMI Division of Coastal Resources Management - CZM Federal Consistency Determination or DCRM Ports and Industrial Areas APC permit
- CNMI Division of Environmental Quality - Earthmoving and Erosion Control permit
  - Administrative review by the Division of Fish and Wildlife
  - Administrative review by the Historic Preservation Office
  - Administrative review by the Division of Coastal Resources Management Office
- CNMI Division of Environmental Quality - CWA Section 401 Water Quality Certification

***Impacts:***

- Adverse direct impacts to slow-moving and non-motile benthic resources in the footprint of the breakwater and training wall.
- Proposed structures would alter existing water flow and currents.
- Turbidity generated from dredging and construction of the breakwater and training wall may impact near-by benthic resources, such as corals.
- Conversion of natural coral reef habitat to artificial rock rip-rap habitat and sand habitat.

***Potential BMPs and Mitigation (does not include the numerous USACE permit conditions):***

- Impacts to “special aquatic resources” (e.g., corals or sea grasses) will require the development and implementation of a compensatory mitigation plan, as required by USACE regulations.
- Ensure that construction material and debris does not fall into harbor waters during the construction period.
- Install silt curtains to contain sediment plumes and provide daily maintenance inspections to ensure they are functioning properly. Design and implement a daily turbidity monitoring regime in cooperation with the DEQ under the CWA Section 401 WQC. Have an environmental specialist oversee turbidity compliance monitoring efforts and address additional mitigation measures if water quality violations occur.
- Keep watch for the presence of the threatened green and hawksbill sea turtles. If a turtle swims into the work area, stop work until the turtle leaves the area on its own volition.
- Temporarily cease in-water activities for 21 calendar days during the largest annual coral spawning event in May or June.
- Relocate slow-moving benthic organisms (e.g., sea cucumbers, sea stars, sea urchins, etc.) away from immediate work areas prior to commencement of in-water work.
- Dredge and fill activities should cease during times of small craft warnings or high surf advisories, as issued by the EMO or U.S. Coast Guard.

*Table 7-6: Navigation Improvements/Breakwater Estimated Regulatory Costs*

| Phase IV Permits or Authorizations | Action or Level of Investigations | Anticipated Level of Difficulty | Estimated Permitting/ Survey Costs |
|---|---|---|---|
| **USACE Section 10; Rivers and Harbor Act/Section 404 Permit; Clean Water Act** | USACE application development assuming compensatory mitigation will be required | High | $85K |
| | Biological Assessment that would address ESA and EFH issues assuming formal Section 7 consultation | High | $85K |
| | Archeological Report for NHPA Section 106 review | Low | $20K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K |
| | Major Siting Permit | High | $65K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Low | $20K |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | High | $25K |

### 7.7.5. Permitting Schedule

Table 7-7 presents a conceptual, general timeline assuming environmental entitlement and permitting efforts for all four phases of the Rota West Harbor Master Plan occur simultaneously, including the NEPA EA/EIS. It is assumed that design plans are at a minimum 75% complete and ready for initial agency review at the start of month one. The time includes data collection, agency coordination, public hearings, and finalization of permit or document.

*Table 7-7: Conceptual Environmental entitlements and permitting schedule*

| Permit or Authorization | | Time in Months | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| **NEPA** | **EA Option** | | | | | | | | | | | | | | | | | | | | | | | | |
| | **EIS Option** | | | | | | | | | | | | | | | | | | | | | | | | |
| **USACOE Section 10/404 Permit** | **Biological Assessment & ESA Section 7 consultation** | | | | | | | | | | | | | | | | | | | | | | | | |
| | **Archeological Report and NHPA Section 106 review** | | | | | | | | | | | | | | | | | | | | | | | | |
| | **MSA Essential Fish Habitat review** | | | | | | | | | | | | | | | | | | | | | | | | |
| | **Fish and Wildlife Coordination Act review** | | | | | | | | | | | | | | | | | | | | | | | | |
| **USEPA Section 402 NPDES NOI** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **DCRM** | **Major Siting Permit Option** | | | | | | | | | | | | | | | | | | | | | | | | |
| | **Federal Consistency Option** | | | | | | | | | | | | | | | | | | | | | | | | |
| **DEQ EM&EC Permit** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **DEQ CWA Section 401 WQC** | | | | | | | | | | | | | | | | | | | | | | | | | |

# 8.0 Economic Overview

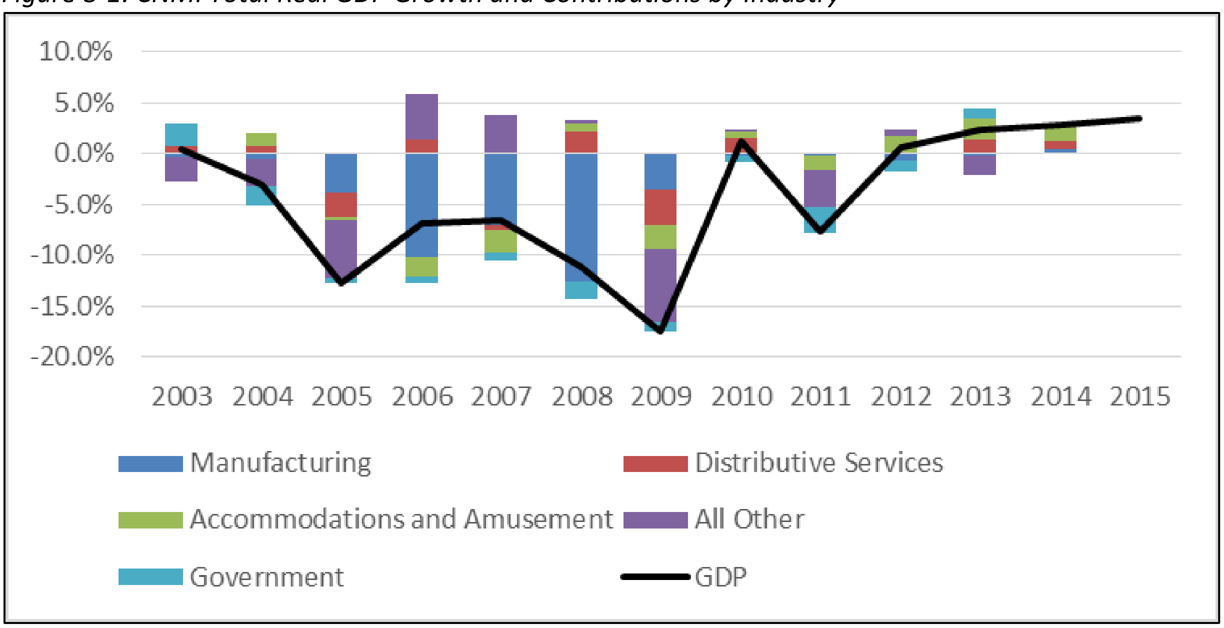
Chapters 8 and 9 of this Master Plan are focused on the economic overview of the CNMI as a whole, and the financial performance of the CPA (seaport and airport operations combined) respectively. The reason for examining the performance of the CNMI and CPA (as opposed to just Rota and the seaport operations) is that many of the factors that ultimately influence the demand for maritime port infrastructure on Rota, and the ability to fund it, is contingent on the performance of Saipan. This is because so much of the CNMI's economic activity is currently concentrated in Saipan and thus trade demand, vessel routing/deployment preferences, and CPA revenue generation is closely associated with the performance of the island.

The projections presented in this analysis, therefore, are first developed for the CNMI and then allocated to Rota. The CNMI real gross domestic product (GDP) declined in the years following the loss of the local garment manufacturing business, as illustrated in Figure 8-1. This industry had employed Chinese contract labor, and been a major driver of population growth and exports in CNMI until a combination of labor lawsuits and regulatory changes resulted in a seven-year decline in factory operations. The last garment factory using Chinese labor closed in 2009 at the nadir of the Global Financial crisis.

The permanent resident population of the islands fell over the same ten-year time period, roughly 1999 to 2009. However, since economic recovery began, population growth has resumed, approaching 2% per annum. The 2010 census estimated island population at: Saipan approximately 50,000 residents; Tinian approximately 3,500; and Rota approximately 3,300.

More recently, economic growth has been led by private investment in the accommodation and amusement sector (hotels, casinos and tourism). This sector in particular will be a key determinant of economic and trade performance in the foreseeable future.

*Figure 8-1: CNMI Total Real GDP Growth and Contributions by Industry*



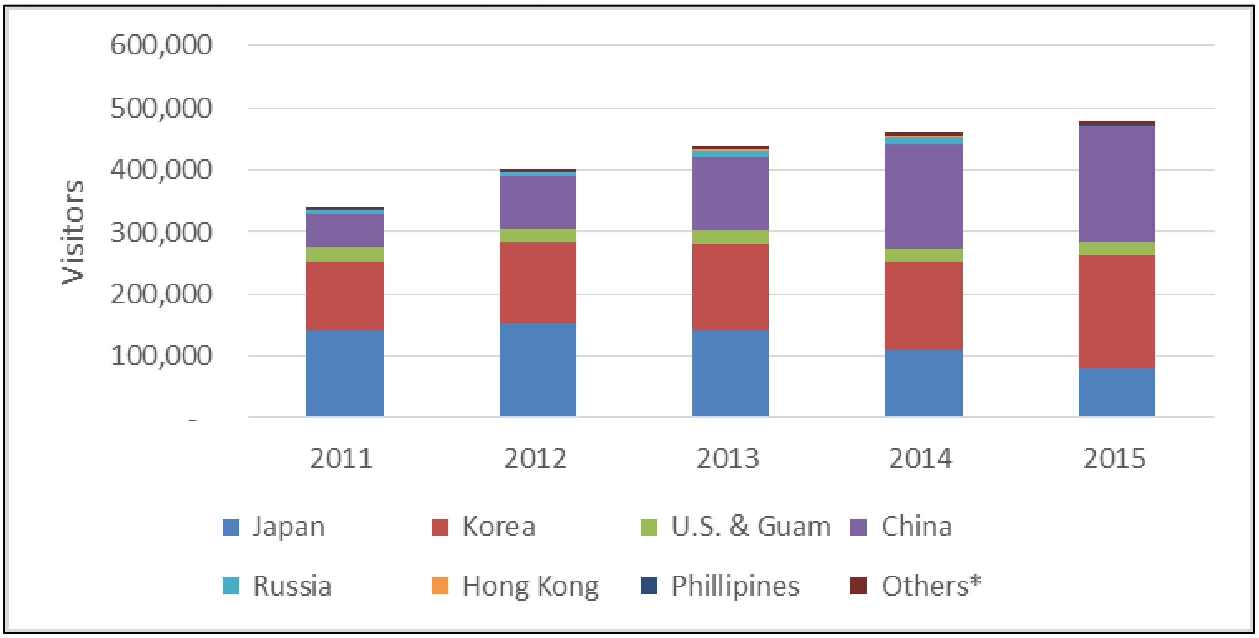

*Source: Bureau of Economic Analysis*

Total visitors to the CNMI totaled over 500,000 in 2016 with tourists outnumbering the local population by a factor of 10. Therefore, the volatility in passenger and freight movements (in aggregate) to/from the islands will continue to mirror movements in the total number of visitors. Continued investment in fixed infrastructure (roads, hotels and casinos, and commercial-industrial sites) will support demand for construction related material imports, which will fluctuate with the number and scale of such projects. Demand for other consumer related products including foods and beverages, clothing, and electronics will also vary relative to the level of tourists entering CNMI.

## 8.1. Passenger and Freight Review

Total visitors, as measured by visitor arrivals to CNMI have been increasing at an average rate of 8.8% annually since 2011, as presented in Figure 8-2. This robust growth has been driven by Chinese tourists (186,509 in 2015) which have displaced the Japanese (80,832) and Koreans (182,622) on a percentage basis as the dominant source-origins. Other fast growing markets have been the Southeast Asian nations, including the Philippines albeit at a much lower level. Visitor levels from Guam tend to be steady at roughly 20,000 per annum, probably tied to local family relationships as opposed to international tourism.

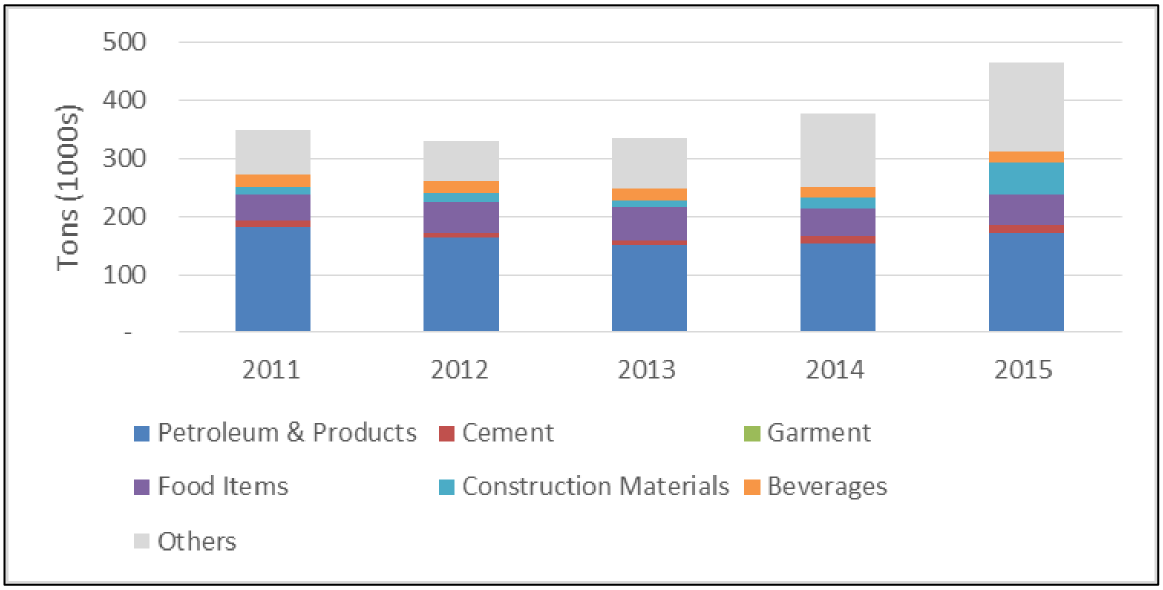
*Figure 8-2: Passenger Arrivals to CNMI by Origin*




Source: CNMI

The increase in visitors has helped support overall growth in demand of imported commodities (Figure 8-3). The largest volume in terms of tonnage is petroleum products that support a number of energy-related needs including electricity generation, and fuel for autos, airplanes and vessels. However, the strongest growth in recent years has come from construction related materials, including raw cement, which underscores the impact this sector has had on the overall economy of CNMI.

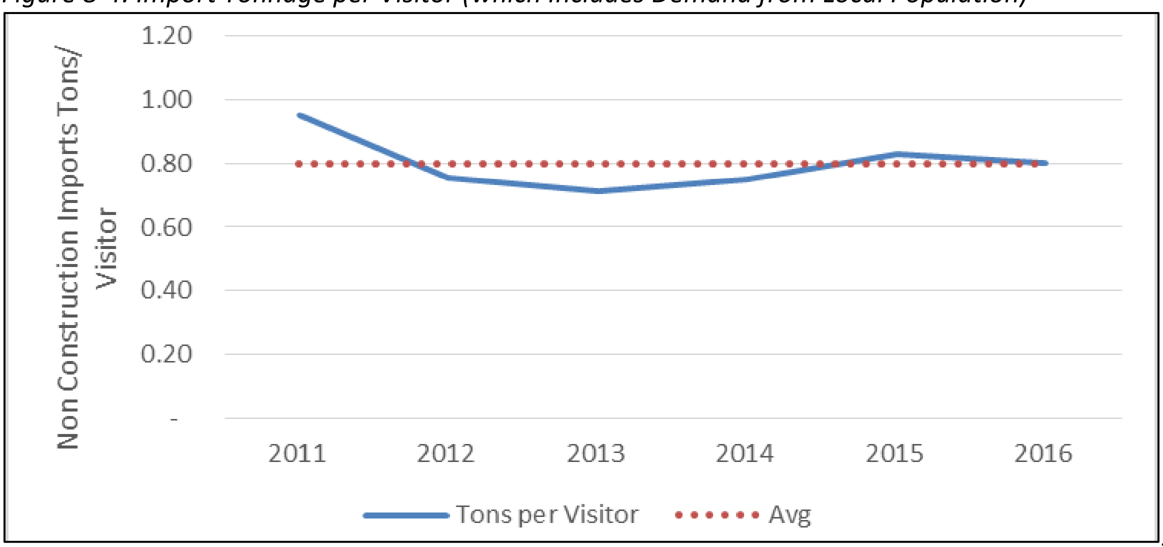
*Figure 8-3: Imported Freight Volumes*




*Source: CPA*

On visitor per-capita basis, import tonnage of non-construction materials has historically ranged from 0.9 to 0.7 tons per person, as illustrated in Figure 8-4. The average over the past five years has been 0.8 tons per capita. Embedded in this per-capita measure is the demand generated by the local population. It reflects total demand for energy products, food, beverages, vehicles and other goods that have not been classified as "Construction" by the CNMI. This measure is used as an input into the cargo projections developed for the CNMI and Rota, presented in Section 8.2 of this report.

*Figure 8-4: Import Tonnage per Visitor (which Includes Demand from Local Population)*

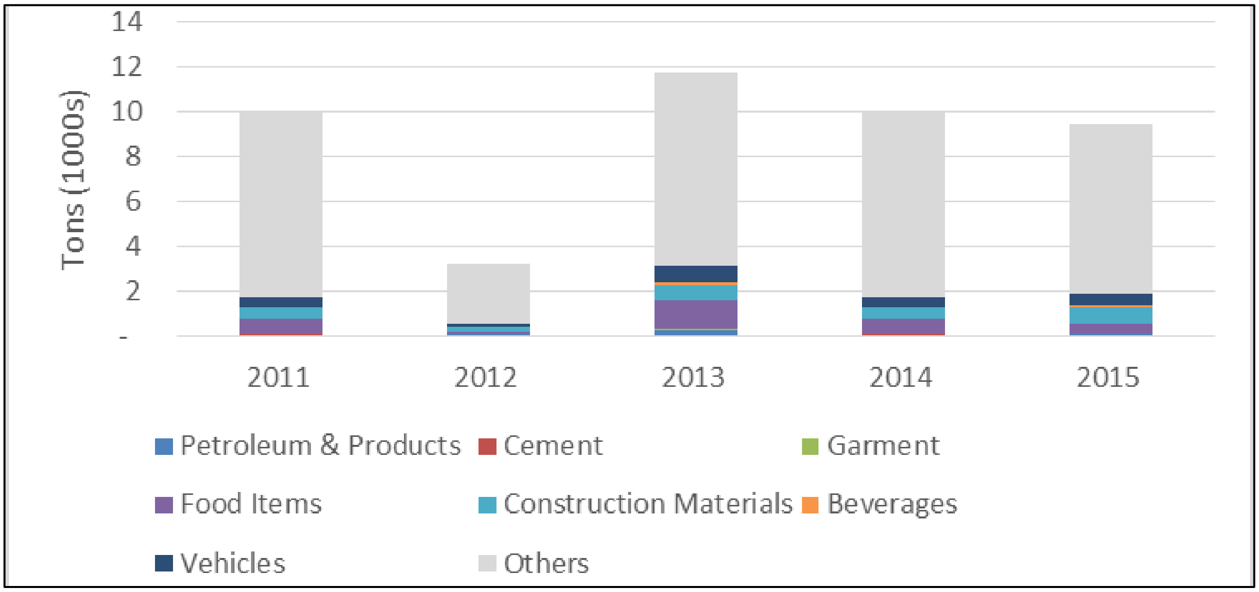



*Source: CPA, M&N*

The export volumes shown in Figure 8-5 are marginal by comparison with imports. Of the identifiable products, the largest weights include food products, construction materials and beverages. The majority

(80%) of the export tonnage is identified as “other” which is presumably waste paper/packaging that is returned in empty containers.

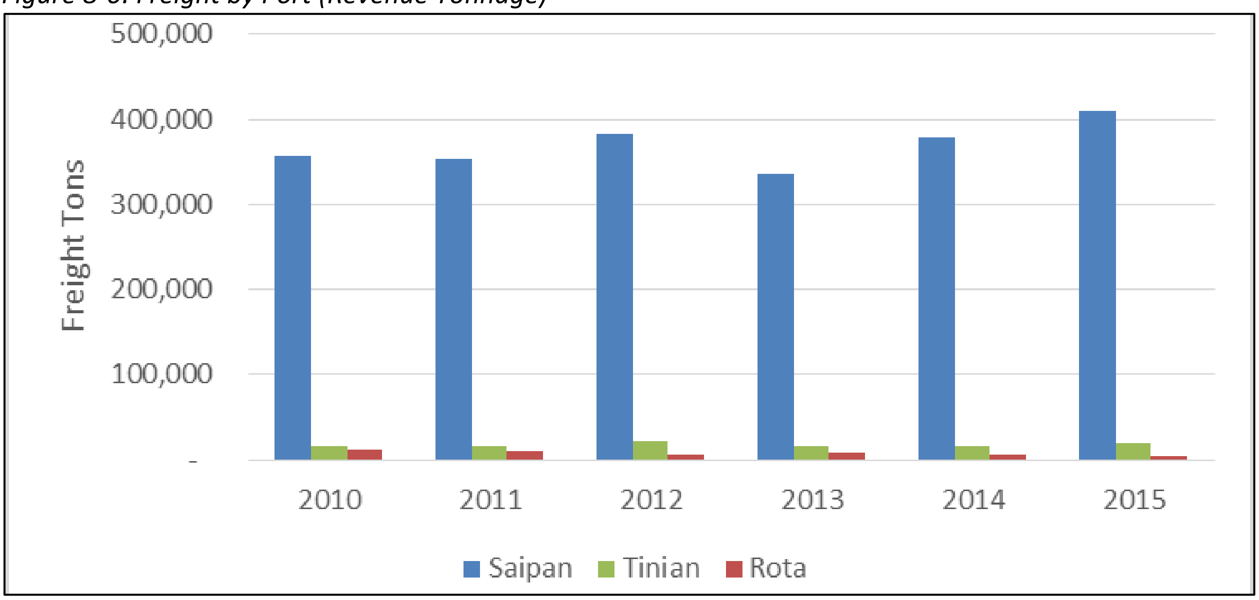
*Figure 8-5: Export Freight*




*Source: CPA*

Of the three commercial ports in CNMI, Saipan is undoubtedly the largest (Figure 8-6), being the population and economic center of the Commonwealth. Rota accounts for the smallest tonnage, roughly 2% of the CNMI total. The Port of Saipan serves as the transshipment hub for much of the cargo destined to and from Rota and Tinian. Saipan is estimated to have handled approximately 28,000 TEU in 2016, with approximately half as empty exports (historically, the empty incidence [share of empty containers] of export containers has averaged 85%).

*Figure 8-6: Freight by Port (Revenue Tonnage)*



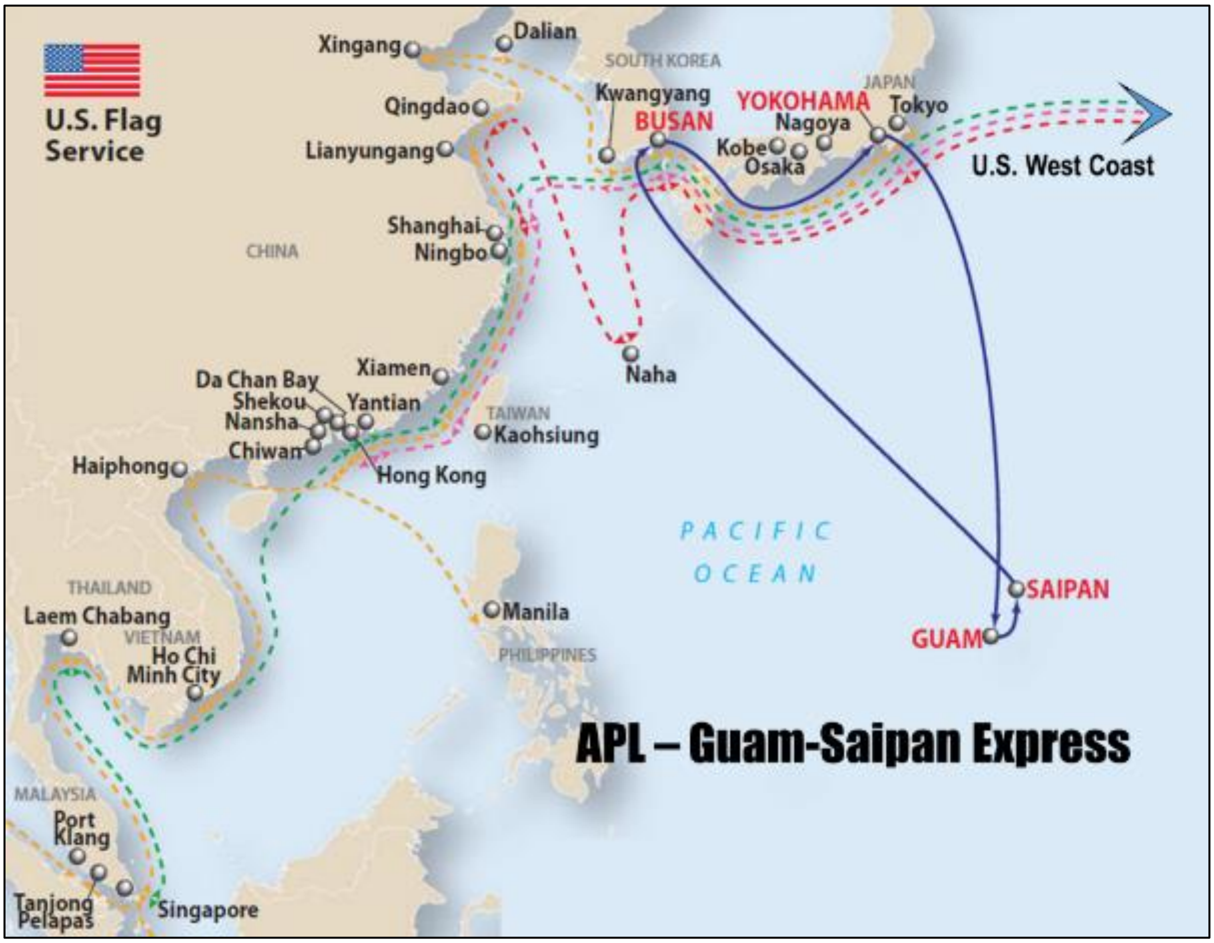

Source: CPA

Saipan is currently served by three, regular scheduled container services. These include:

- APL GSX Service – Two vessels 1,100 and 1,600 TEU capacity
- MELL – MXS Service: Four vessels average 1,090 TEU capacity
- Swire Shipping – North Asia Loop 2: Two vessels average 2,080 TEU capacity

Only the APL service operates U.S. flagged vessels which means it can carry freight from Guam/CNMI to the U.S. under the Jones Act regulations (See Figure 8-7). The other services carry international freight whose origin is non-U.S. and which is shipped directly to Saipan. Tinian and Rota are not served by these scheduled international services.

*Figure 8-7: Indicative Service Calling Saipan*




Source: APL

## 8.2. Passenger & Freight Projections

Passenger and freight projections are derived from trend expectations of the growth in visitors, based on the economic growth within the respective origin countries. Added to this is incremental growth stemming from increased capacity for tourist accommodation (i.e. new hotels and resorts) on the islands that will attract additional visitors above trend growth.

For the initial source of growth "trend projections", economic growth within the core market is estimated to support trend growth in the number of visitors of 3.3% annually throughout the balance of the 15-year forecast period (2022 - 2037), following a higher 5% annual growth over the near-term (2017-2021). The supplementary source of growth, "incremental growth," is derived from resort development. This is based on the assumption that over the next ten years, an additional 1,500 rooms in the CNMI will be available for tourist activity.

Real GDP growth in the nations which account for the majority of visitors to CNMI, namely China, Japan, Korea and Russia (the core nations) is projected to grow by a weighted 4.5% annually between 2017 and 2021. Assuming that the number of visitors continues to grow at 1.1-times the rate of GDP growth (the multiplier, average over the last three years) this would imply visitor growth of 5.0% annually. Longer-term, GDP growth is expected to slow to 3.0%, which would imply visitor growth to an average 3.3% annually over the period.

*Table 8-1: Visitor Nation GDP and Visitor Growth*

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016E | 2017E | 2018E | 2019E | 2020E | 2021E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **China** | 10.6% | 9.5% | 7.9% | 7.8% | 7.3% | 6.9% | 6.6% | 6.2% | 6.0% | 6.0% | 5.9% | 5.8% |
| **Japan** | 4.7% | -0.5% | 1.7% | 1.4% | 0.0% | 0.5% | 0.5% | 0.6% | 0.5% | 0.7% | 0.1% | 0.6% |
| **Korea** | 6.5% | 3.7% | 2.3% | 2.9% | 3.3% | 2.6% | 2.7% | 3.0% | 3.1% | 3.0% | 3.0% | 3.0% |
| **Russia** | 4.5% | 4.0% | 3.5% | 1.3% | 0.7% | -3.7% | -0.8% | 1.1% | 1.2% | 1.5% | 1.5% | 1.5% |
| **Core GDP** | **8.2%** | **6.4%** | **5.8%** | **5.5%** | **4.9%** | **4.3%** | **4.6%** | **4.6%** | **4.5%** | **4.6%** | **4.5%** | **4.5%** |
| **Visitors** | | 340,957 | 401,219 | 438,908 | 459,240 | 478,592 | 506,762 | | | | | |
| **Visitor YOY%** | | | **17.7%** | **9.4%** | **4.6%** | **4.2%** | **5.9%** | **5.0%** | **5.0%** | **5.1%** | **5.0%** | **5.0%** |
| **Implied Multiplier** | | | **3.1x** | **1.7x** | **0.9x** | **1.0x** | **1.3x** | **1.1x** | **1.1x** | **1.1x** | **1.1x** | **1.1x** |

*Source: IMF, CNMI, M&N*

In addition to these trend projections, there is likely to be incremental jumps in the number of visitors associated with number of new resorts and casinos opening on the islands. There are potentially three large scale developments that are considered in the visitor projections. These developments include:

*Table 8-2: CNMI Resort Developments (Saipan & Tinian)*

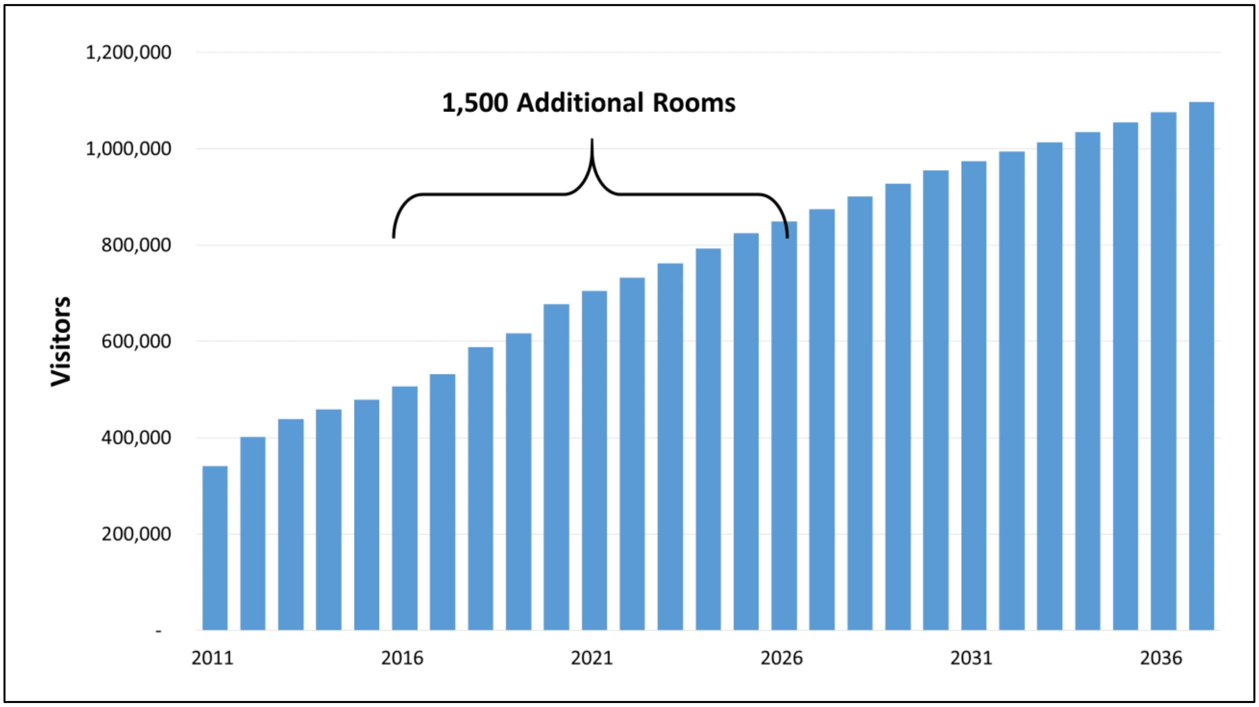
| Project | Size | Completion Date |
|---|---|---|
| **Grand Mariana** | 373 Rooms | 2018 (completed) |
| **Honest Profit** | 300 Rooms | 2018 |
| **Puntan Diablo** | 750 Rooms (Phase 1) | 2021 |
| **Titanic** | 450 Rooms | TBD – Still under permitting |

Source: M&N

The identified projects add approximately 1,500 rooms to the existing base (including the Grand Mariana). M&N has assumed that every 500 new rooms of additional capacity, translates into an extra 29,000–30,000 visitors, based on a 6-7 day duration.

The combination of the estimated trend growth (based on the GDP multiplier) and the addition of new capacity/visitors results in the visitor projections presented in Figure 8-8. Under these assumptions CNMI's total visitors is projected to double from 2016's 506,000 to 1.1 million by 2037.

*Figure 8-8: Visitor Projections CNMI Tonnage*

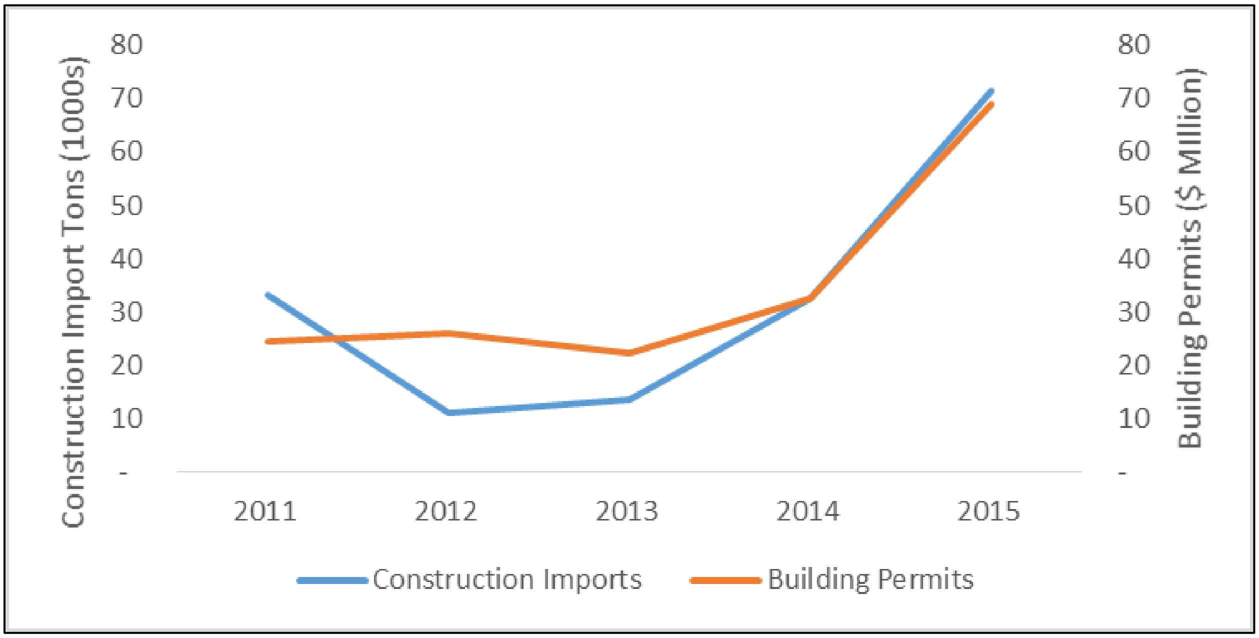



Source CPA; M&N

Based on the outlook for visitor growth to the islands, projections of freight demand can be extrapolated. This is achieved through using an estimate of freight volume (tonnage per passenger). Historically, this volume has equated to 0.8 tons per visitor (import tonnage excluding construction related products – forecasted separately), based on the data provided by CPA.

To estimate the demand for construction related imports, these tonnages have been associated with future estimates of building permits. This analysis is based on the CNMI data which provides the historical value of building permits, and CPA's data of "Construction Materials" and "Cement." As can be observed in Figure 8-9, there has been a close correlation between the increases in the value of building permits (higher construction activity) with the increases in the volume of construction-related imports. Logically, as the level of construction activity rises, so should import requirements for building-related products.

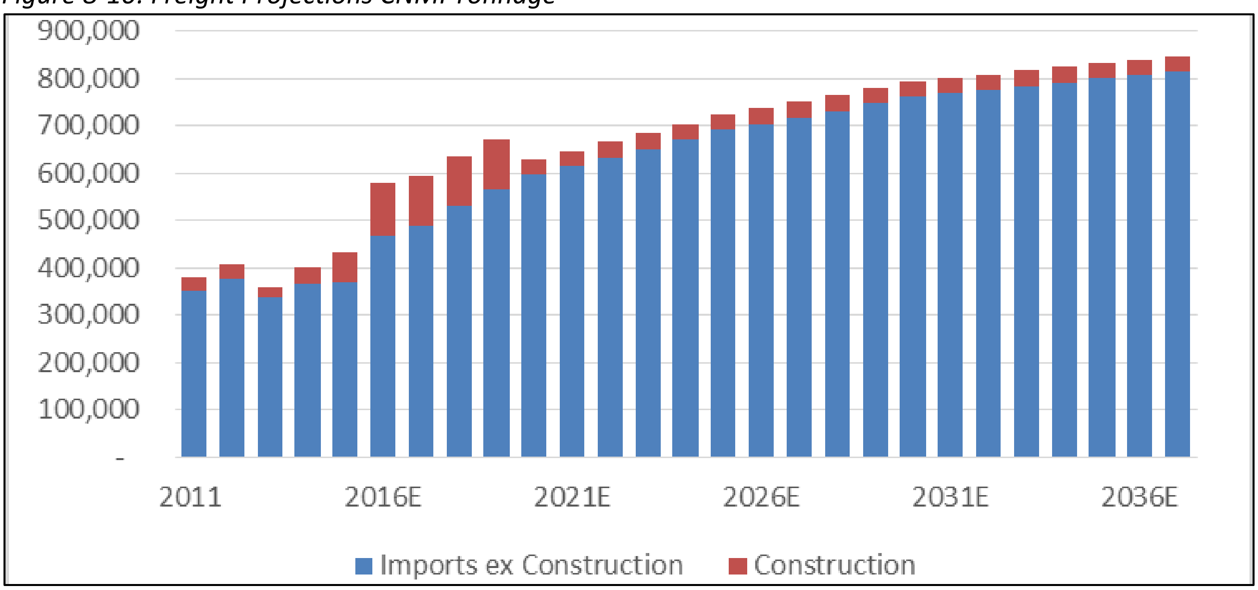
*Figure 8-9: Construction Imports and Building Permits*




Source: CNMI; CPA; M&N

The combined volume-growth of the projected import excluding construction and construction-related tonnage is presented in Figure 8-10. There are several years within the near-term in which construction related imports spike. This trend is indicative of the assumed 1,500 rooms of additional capacity coming on-stream. The trend growth thereafter suggests that total import volumes (tonnage) destined to CNMI will increase from 2016E's 500,000 tons to 850,000 by 2037.

*Figure 8-10: Freight Projections CNMI Tonnage*




Source: CPA; M&N

## 8.3. Passenger & Freight Projections Sensitivities

As part of the analysis M&N has produced a series of sensitivities (Base, High and Low) to the visitor projections and corresponding cargo volumes. The sensitivities are reflective of varying trends in organic visitor growth (related to economic performance in source nations) and number of new developments (additional rooms) which support incremental increases in visitor traffic. Additionally, M&N considered the forecasts being developed by GHD[13] as a potential scenario to be analyzed. These forecasts are part of GHD's master planning effort for the Port of Saipan. In general the GHD projections appear to be more conservative than M&N's and therefore for the purpose of this study they have been identified as the "Low-GHD" estimates of visitor and cargo volumes.

Table 8-3 presents a summary of the four scenarios being tested. The High sensitivity includes a 3.9% average projected increase in underlying organic visitor traffic. This coupled with an additional 3,000 rooms being constructed in the near-to-midterm (before 2025) would support total visitor traffic of 1.5 million by 2037 and corresponding cargo tonnage of roughly 1.1 million tons to CNMI as a whole. This assumption maintains the roughly 0.7 tons per visitor capita that has historically been observed in the islands.

*Table 8-3: Summary of Sensitivity Assumptions*

| | Organic Visitor Growth (20-year Average) | Number of New Rooms by 2025 | 2037 Visitors (Estimated) | 2037 Tonnage (Estimated) |
|---|---|---|---|---|
| **High** | 3.9% | 3,000 | 1,546,635 | 1,061,523 |
| **Base** | 3.3% | 1,500 | 1,226,386 | 848,533 |
| **Low-M&N** | 2.6% | 500 | 787,013 | 556,316 |
| **Low-GHD** | NA | 6,000 | 1,221,415 | 469,401 |

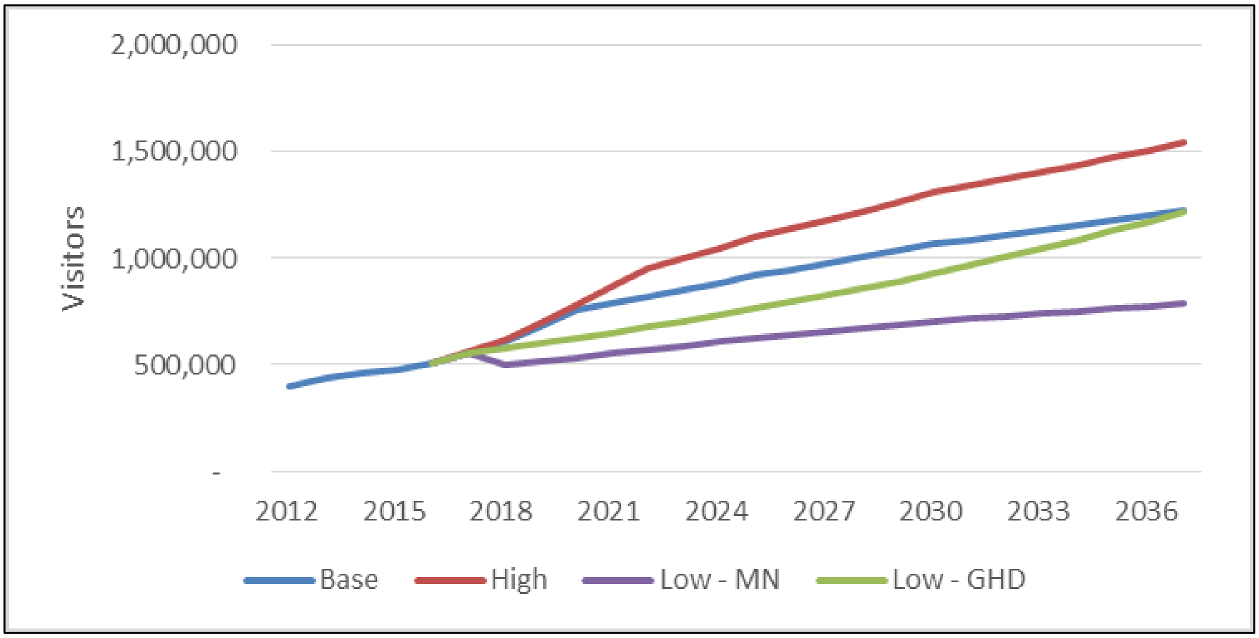
Source: M&N, GHD

The Low-M&N sensitivity includes a 2.6% average increase in underlying visitor traffic, and 500 additional rooms with no new development after 2017, reflecting a capital crisis in the funding nations. Passenger totals, by 2037, would reach roughly 787,000 and cargo tonnage 560,000 tons. The Low-M&N forecast maintains the base assumption of roughly 0.7 tons per visitor.

The Low-GHD estimate of freight is the most conservative. It shows two distinct periods of contraction, 2018 and 2026, indicative of declines in resort construction activity. These on average remove about 100,000 tons from the total tonnage. The four scenarios for CNMI in total (Base, High, Low-M&N and Low-GHD) for visitors and cargo are illustrated in Figures 8-11 and 8-12, respectively.

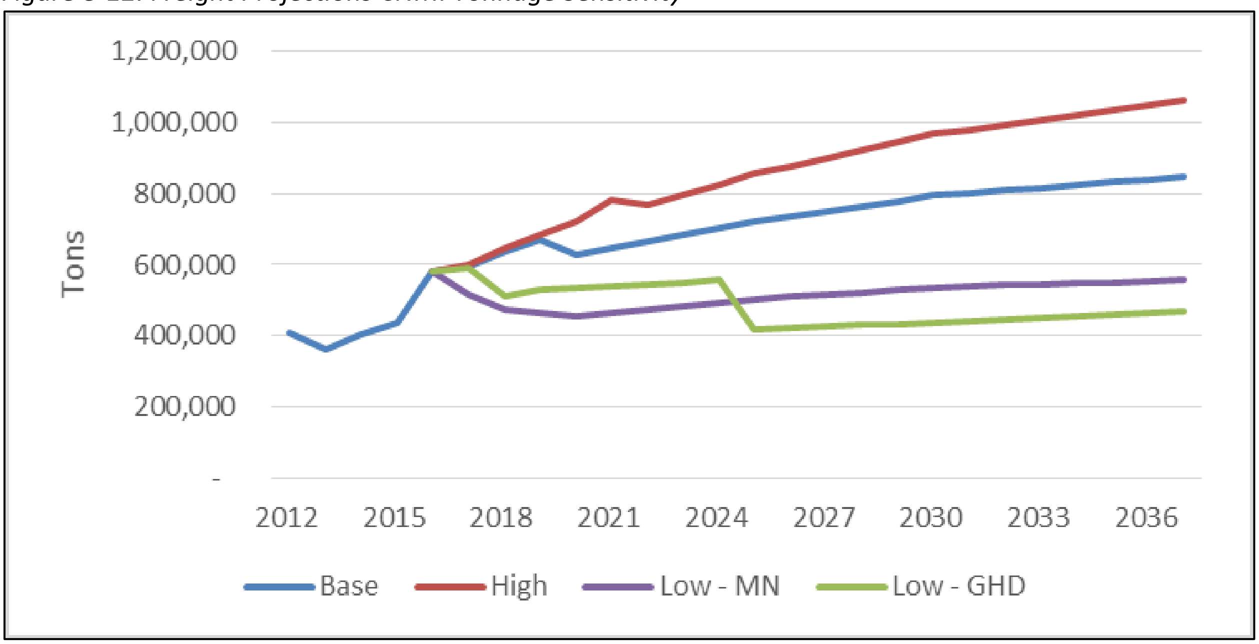
[13] *GHD projections are through 2032, and M&N has extrapolated their 2032 growth rates out through 2037 for the purpose of comparison.*

*Figure 8-11: Visitor Projections CNMI Sensitivity*




Source: CPA, M&N, GHD

*Figure 8-12: Freight Projections CNMI Tonnage Sensitivity*




Source: CPA, M&N, GHD

## 8.4. Implications on Rota

As identified in Figure 8-6, Rota has historically accounted for roughly 2% of the CNMI's total trade volume. Unlike on Saipan and Tinian, there are currently no major large-scale hospitality developments underway which would directly add incremental demand for consumer and construction related cargo. As such, the demand for goods will likely trend with the growth of the local population, as well as indirect growth in the number of visitors, which trends with the overall outlook for growth of CNMI as a whole. The local population of Rota is not projected to grow significantly or at all given the lack of a large scale development planned for the island.

Existing trade equates to 6,575 tons total (2016 revenue tons) at Rota West Harbor. Based on the data provided, there is only a small volume of Petroleum, Oils, Lubricants (POL) handled at the West Harbor, with the vast majority of liquid bulk handled at the East Harbor (privately operated by Mobil). For the purpose of the analysis presented below these liquid bulk tons have been removed. The liquid bulk at West Harbor has historically accounted for less than 1% of the total weight

The majority of cargo (by weight) is comprised of inbound shipments of food product, construction materials, vehicles, equipment and machinery. Excluding the estimated liquid bulk tonnage, this would equate to roughly 6,500 tons of containerized, break bulk, dry bulk and Ro-Ro in 2016.

On average the Port appears to handle between 15 – 25 containers per month. The inbound containers, which account for the vast majority of loaded volume of containerized weight, tend to be heavier, averaging from roughly 15 to 30 tons per container (7.5 to 15 tons per TEU), suggesting that some containers appear to be densely packed and/or used to transport heavier products including construction equipment. In general, containerized tonnage accounts for approximately 40-60% of the total inbound weight handled at West Harbor in a given month.

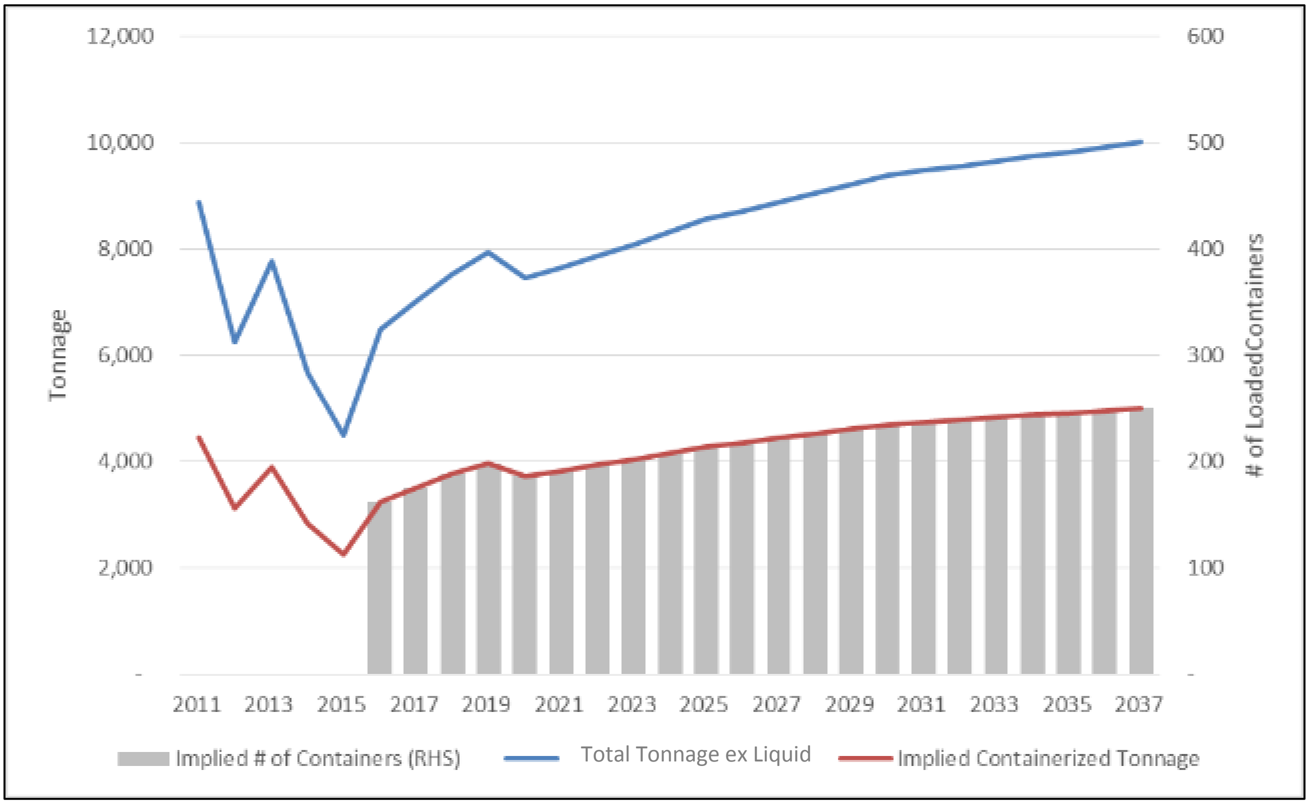
Based on the trend projections for CNMI's volume growth as a whole (Figure 8-10), and applying those growth rates to a base 6,500 tons at Rota, the projected volume of total non-liquid tonnage at West Harbor is projected to grow to roughly 10,000 per annum by 2037, as illustrated in Figure 8-13.

Included in the projection is the assumption that containerized volumes continue to account on average for 55% of the total tonnage. This would suggest that by 2037, tonnage of containerized cargo would be roughly 5,000 tons by 2037; and assuming that the average weight per container remains at 20 tons/container (10 per TEU), this would imply annual loaded import containers of roughly 250, up from an existing estimate of 163 (2016). Loaded containers have historically accounted for approximately 65% of total container counts (which, in addition to loaded imports, includes empty imports, loaded exports and empty exports). Therefore, the estimated count for total containers increases from an estimated 250 in 2016 (21 per month) to 385 (32 per month) by 2037.

Given the high share of cargo which is transported in containers to/from Rota, it will continue to be important that the West Harbor facilities remain as accommodative and efficient for handling the cargo. This will include the proper water-facing and landside infrastructure and equipment including cranes.

As discussed, Figure 8-13 presents the projected dry tonnage, including containerized weight to be handled at Rota West Harbor. The local population of Rota is not projected to increase significantly, if at all, barring a singular manufacturing and or hospitality operation which would require additional workers to relocate. Therefore, the assumption is that total demand within the island will trend with the CNMI as a whole. As more visitors come to developments at Saipan and Tinian, this will likely lead to increased foot traffic on Rota, as either day visitors or shorter duration stays.

*Figure 8-13: Projections of Total and Dry Tonnage at Rota West Harbor*




Source: CPA, M&N

Of the remaining tonnage, based on the data available, much of this appears to be vehicles, construction materials and “other”. It would appear that “vehicles” imports into Rota average roughly 60 tons per month; and at say an average 2-tons per vehicle this would imply 30 vehicles per month or 360 vehicles per year. This would appear a bit high given the island’s population of 2,500. It could be that some of these are in fact containerized and, and are included in the containerized tonnage estimate, but not the container counts themselves. Break bulk items, including those transported on pallets, also could represent a range of products, from food stuffs to construction materials. Therefore, it will be important that the Rota lift equipment remain capable of handling both containerized and break bulk cargo.

# 9.0 Financial Feasibility Evaluation

## 9.1. Financial Review Key Assumptions and Observations

For the purpose of evaluating the financial feasibility[14] of redeveloping the commercial port facilities of Rota, only the first phases of the project are considered. These first phases appear sufficient to accommodate future freight and passenger traffic in the near term, and provide the flexibility of expanding operating capacity in a phased program to grow as demand warrants. The following analysis places the projected cost of the respective developments within the available (existing and projected) financial resources the CPA has in place.

Projected revenues generated by the port operations of Rota are insufficient to cover the cost of the respective development projects. Therefore, revenues generated by the CPA's seaport operations in its entirety (Saipan, Tinian and Rota) should be considered.

## 9.2. Projected Revenues and Expenses

### 9.2.1. Revenues

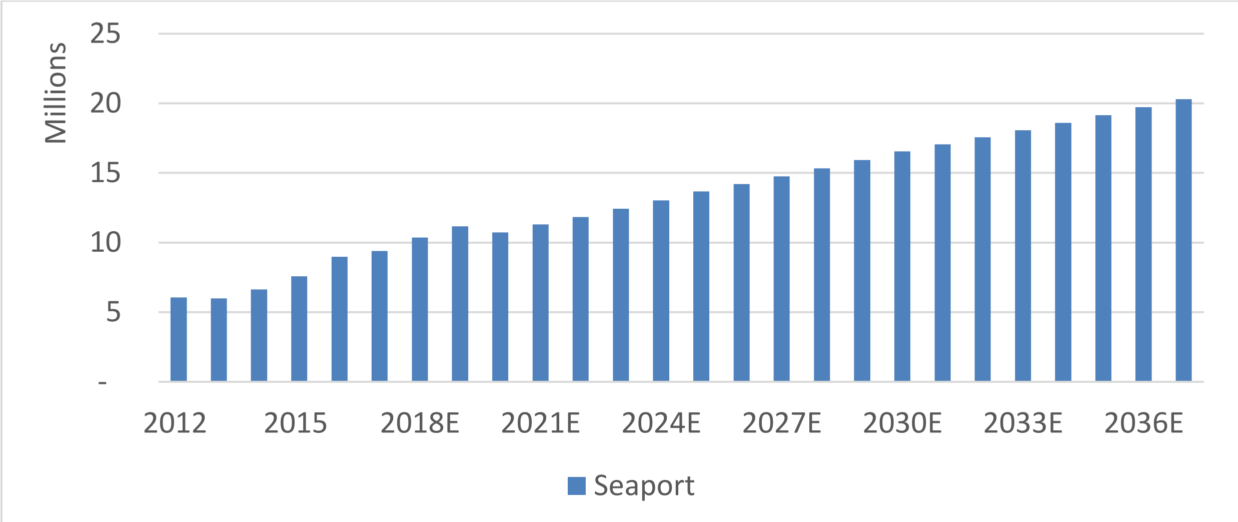
The CPA generates revenue from maritime port operations. These facilities serve as the gateways for freight and, to a lesser extent passenger, traffic destined to/from the CNMI. As discussed in Section 8.1, the growth in future freight and passenger volumes is projected to be heavily influenced by continued development within the tourist industry, including the underlying organic growth in the tourist resident economies (of Asia and Guam) and incremental increases due to new large-scale resort/casino developments.

To estimate future revenues, M&N has relied on the audited financial statements obtained from the CPA to calculate the seaport revenue on a per ton freight basis. In 2015, the seaport division generated $7.6 million from handling 434,013 tons or $17.47 per ton. It is assumed that future revenue projections are based on these per unit rates grown by U.S. inflation (an assumed 2% per annum) and applied to the respective passenger and freight volume projections.

Based on cargo projections of average 3.6% growth (2017–2037) and inflation of 2%, CPA seaport revenues could increase from $9.0 million in 2016, to $20.0 million by 2037. This is depicted in Figure 9.1, which shows the future development of seaport revenues.

[14] The analysis in Section 9.0 is for illustrative purposes only and is not intended to provide a statement of future affordability and/or guidance as to how the CPA should proceed with their investment program. This can only be provided by a Registered Municipal Advisor. https://www.sec.gov/rules/final/2013/34-70462.pdf

*Figure 9-1: CPA Projected Revenues from Operations*

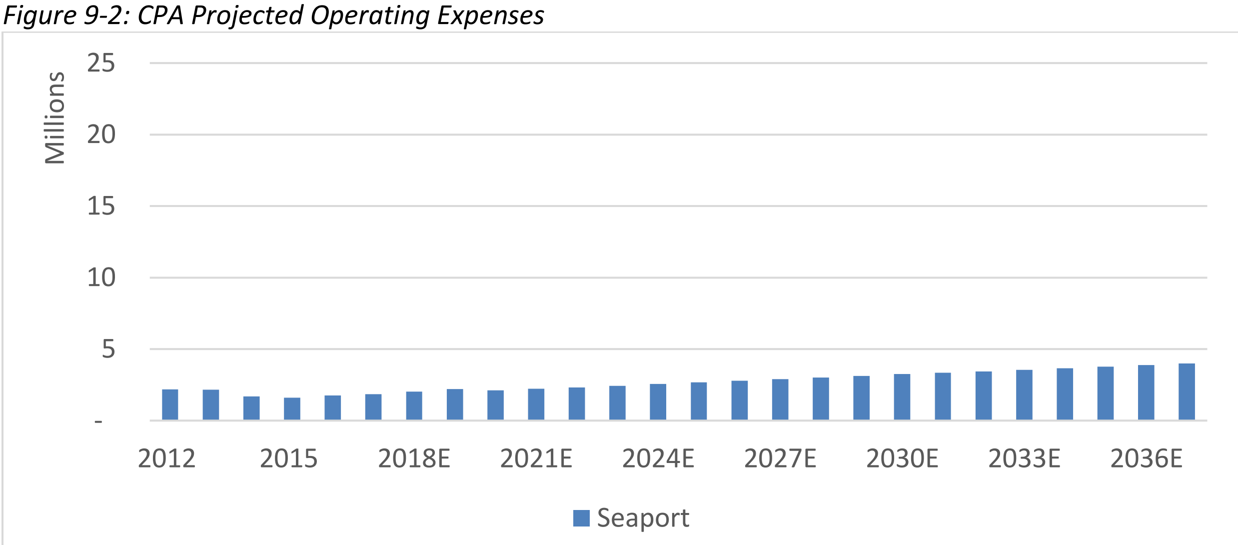



Source: CPA; M&N

### 9.2.2. Expenses

Projected operating expenses[15] are calculated using the same method as the revenues. The audited financial statements are used to calculate existing expenses on a per ton basis. These existing costs are then grown at the same rate of US inflation (2%). M&N recognizes there could be sensitivity to the balance of fixed and variable expenses, but for the purpose of the analysis this approach is satisfactory.

*Figure 9-2: CPA Projected Operating Expenses*




*Source: CPA; M&N*

In 2015, CPA seaport operating expenses per ton equaled $3.68 per ton ($1.6 million in personnel and maintenance/operations expenses from 434,013 tons of cargo). Compared to the $7.6 million in operating

[15] *CPA includes depreciation and amortization within Operating Expenses, M&N excludes depreciation and amortization.*

revenue generated by the seaports, the associated $1.6 million indicates a relatively low cost operation (just 22% of revenues; M&N would note that as recently as 2011, expenses were 40% of revenues).

For forecasting purposes it is assumed that the per ton expense will grow at inflation. Thus the projected increase in volume (2017 – 2037) drives total operating expenses to $4.0 mm by 2037 (20% of projected revenues).

### 9.2.3. Funds Available for Debt Coverage

For the purpose of the analysis, M&N has considered Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) as the measure of income available for servicing CPA's existing and future debt obligations. It is equal to operating revenues less operating expenses. The CPA does not calculate EBITDA but notes:

*"Management of CPA has determined that gross revenues consist of total operating revenues, other grant revenue and contributions, interest income and passenger facility charges to meet the indenture requirements."*

Capital contributions and grant funding are difficult to quantify and therefore, estimated EBITDA is a proxy. As presented in Table 9-1, EBITDA in 2015 totaled an estimated $6.0 million, and is projected to grow to $15.4 million by 2035. This level of income, on an annual basis, is what is assumed to be available to cover CPA's debt service requirements.

*Table 9-1: Summary of Projected CPA Revenues, Expenses and EBITDA*

| | 2015 | 2016E | 2017E | 2018E | 2019E | 2020E | 2021E | 2022E | 2023E | 2024E | 2025E | 2030E | 2035E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue | 7.58 | 8.98 | 9.38 | 10.35 | 11.17 | 10.73 | 11.29 | 11.84 | 12.42 | 13.03 | 13.66 | 17.55 | 19.16 |
| Expenses | 1.60 | 1.76 | 1.84 | 2.03 | 2.19 | 2.11 | 2.22 | 2.33 | 2.44 | 2.56 | 2.68 | 3.25 | 3.76 |
| EBITDA | 5.98 | 7.21 | 7.54 | 8.32 | 8.98 | 8.63 | 9.08 | 9.52 | 9.98 | 10.47 | 10.98 | 14.30 | 15.39 |

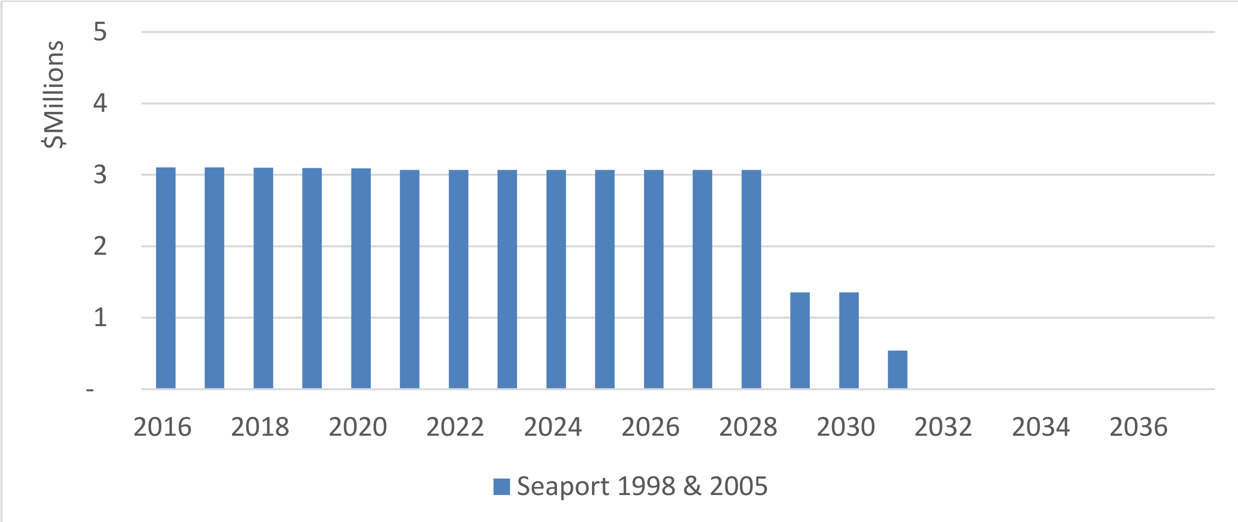
Source: M&N

### 9.2.4. Existing CPA Debt Requirements

The CPA's existing debt obligations[16] consist of two outstanding bond issues the 1998 Seaport Revenue issue ($33.78 million) and 2005 Seaport Revenue issue ($7.23 million). Combined, the debt requirement will total $3.1 million per annum between 2017 and 2025, at which point the 1998 seaport issue is retired in 2028 followed by the 2005 issue in 2031.

[16] Does not include subordinated Promissory Note

*Figure 9-3: CPA Existing Debt Schedule*

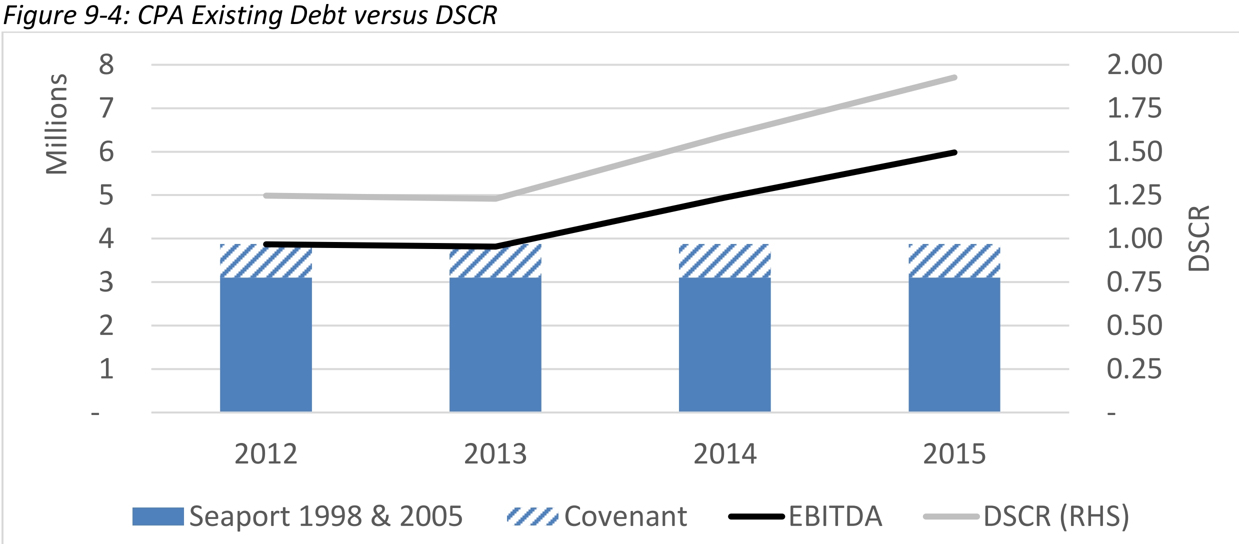



Source: CPA

Recent revenues and expenses generated by CPA seaport operations appear to be supportive of the existing debt service coverage ratio (DSCR). The debt covenant states that monies available to cover debt payments must be 1.25 times the level of the payment in a given year. As illustrated in Figure 9-4, the EBITDA generated from seaport operations in 2012, 2013, 2014, and 2015 achieved DSCR of 1.25 or greater. In 2015, operations produced an estimated 1.9 times DSCR, well above the required 1.25 times. This is reflective of an existing sizable buffer between monies available to cover the annual debt obligations, supported by a strong upswing in volume growth in 2014 and 2015.

MN would note however, that as recently as 2012 EBITDA generation was just sufficient to cover the debt requirement in that year (including the covenant). This had been a weaker year in terms of visitors as volume growth, still in the last years of the recession-recovery, and underscores the sensitivity of EBITDA generation during times of low economic growth.

*Figure 9-4: CPA Existing Debt versus DSCR*




Source: CPA

## 9.3. Rota West Harbor Financial Review

### 9.3.1. Phased Borrowing Needs

As addressed in Section 6.5, the development of Rota West Harbor would follow a three-phased approach, with each subsequent phase adding more handling capacity. Based on the concept proposed, estimated costs for the respective phases are:

- Phase I (2018) – $2.93 million (Berth 2 upgrades, crane, new commercial float, storage yard improvements, misc. repairs and improvements)
- Phase II (2020) – $24.1 million (Berth 2 upgrades, marina and boarding float, plus $20 million estimated cost share for breakwater)
- Phase III (2025) – $4.2 million (Berth 1 upgrades)

Note: These estimates include partial funding by CPA for breakwater and dredging improvements. However, the projects are expected to be majority funded by the Corps.

For the purpose of this analysis, the years listed next to the respective phases (Phase I = 2018, for example) is not necessarily the year at which the phases become operable. It is the year in which it is assumed that the large majority of capital allocated for the respective projects is committed. This includes pre-construction activities including studies, permitting, as well as the bidding process. It will be important for the CPA to be able to demonstrate to potential bidders and other project participants that the capital is in place to support the completion of the project.

*Table 9-2: Illustrative Borrowing Needs ($Millions)*

| | Phase I | Phase II | Phase III |
|---|---|---|---|
| Project Date | 2018 | 2020 | 2025 |
| 2016 U.S. Dollar Cost | 2.9 | 24.1 | 4.2 |
| Inception Date U.S. Dollar Cost[17] | 3.7 | 31.6 | 6.1 |
| Illustrative Bond Rate | 10.0% | 10.0% | 10.0% |
| Illustrative Term (Years) | 10 | 20 | 10 |
| Estimated Annual Obligation | 0.6 | 3.7 | 1.0 |

Table 9-2 presents the hypothetical annual payments associated with respective development phases. For example, if a revenue bond were issued to cover the cost of the Phase 1 development of $2.9 million, two years from now, the cost of the project + the funds needed to be kept in reserve (estimated at $0.65 million) would result in an annual debt payment of $599,243 in 2018. Similarly, costs associated with Phase 2 ($24.1 million), beginning in 2020 ($31.6M after inflation and including $5.3 million in reserve), and if this were a 20-year bond would require annual payments of $3.7 million. Phase 3, again a smaller

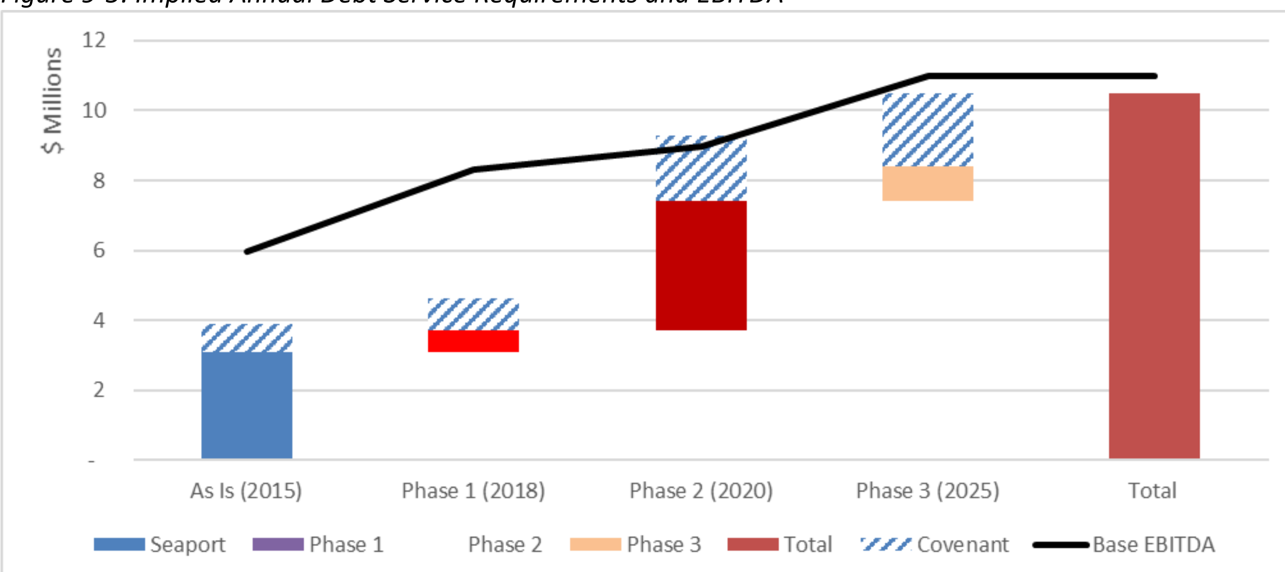
[17] Includes reserve holdings

estimated total is projected to incur an $989,204 annual debt requirement, assuming the parameters listed above.

The CNMI's existing revenue bonds carry interest rates of 6.6% and 5.5% (1998 and 2005 seaport revenue bonds respectively). These rates are lower today than in the late 1990's and mid 2000's, and the CPA's finances appear stronger now than in recent history (as evidence by Fitch's 2015 BB- rating; moderate risk). In *Table 9-2*, the 10% Illustrative bond rate is high, representing the upper limit or worst case in an unknown future scenario. This rate also includes the initial costs of borrowing and the bond underwriter's fee. Therefore, it reflects the all-in *cost* born by the borrower rather than the return seen by the bond-holder. Sensitivity to bond rates is discussed in Section 9.3.3.

In comparing these projected annual payments with the trend projections of EBITDA levels (2018, 2020 and 2025), it would appear that debt coverage (principal + interest payments) will be possible across all phases, assuming base market growth and no additional debt requirements. Under Phase 2 and Phase 3 however, the covenant may be tested in which case additional source of funding may be required.

*Figure 9-5: Implied Annual Debt Service Requirements and EBITDA*



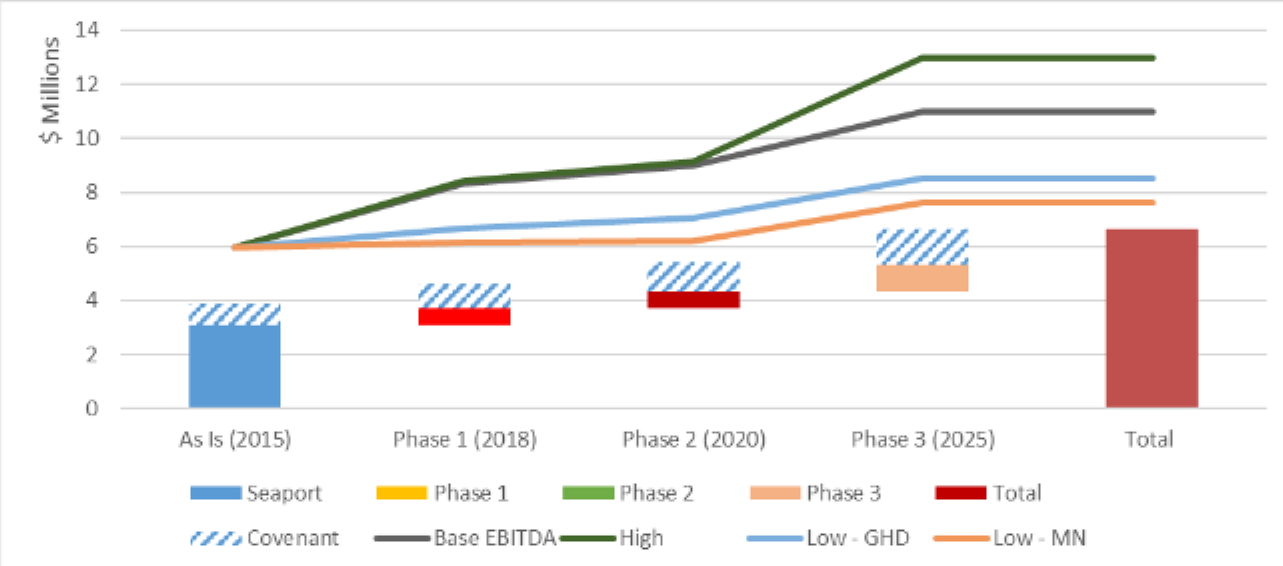

Source: M&N

### 9.3.2. Without Breakwater

Although this plan recommends a breakwater and current training wall to facilitate channel navigation, it is recognized that the U.S. Army Corps of Engineers will be largely in control of breakwater financing and construction. The Corps has estimated roughly $100 million for the necessary breakwater structure, of which $20 million, or 20 percent, would be the responsibility of the CNMI.

However, should the U.S. Army Corps decline to build a breakwater for Rota Harbor, then the budget for Phase 2 of the harbor plan would be reduced by approximately $20 million. Although this would reduce the usability of the harbor, it would not obviate the need for the other recommended improvements. Evaluation of the impact of this budget cost reduction is shown in Figure 9-6.

*Figure 9-6: Debt Capacity by Phase Without Breakwater*



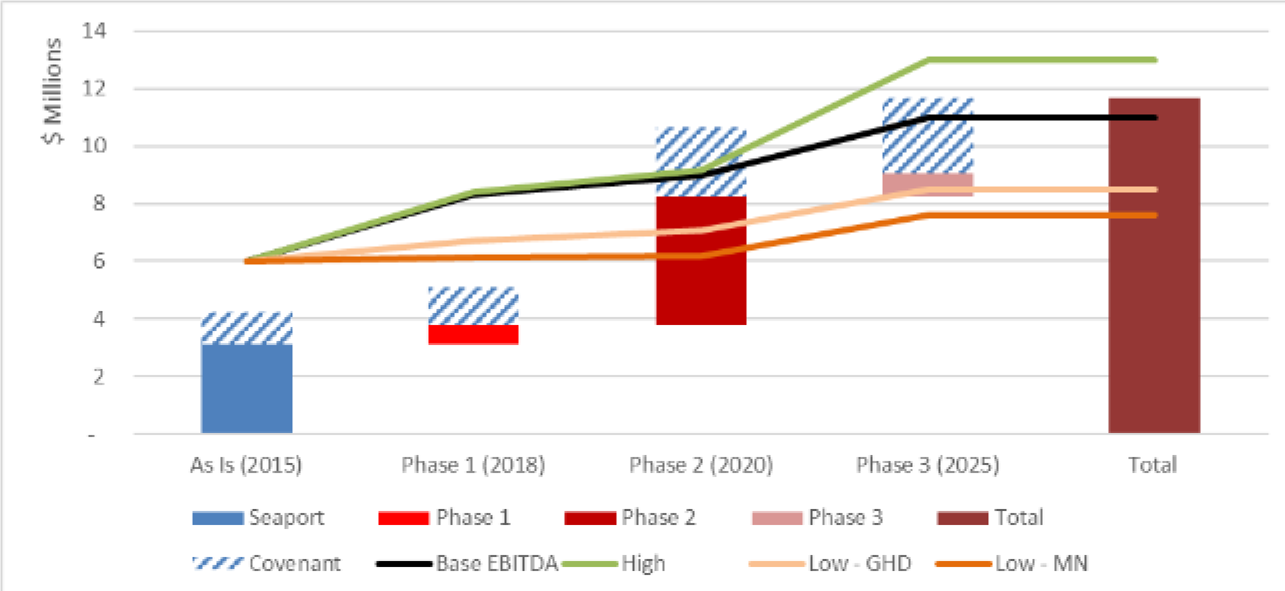

Source: MN

Without the need to contribute to the cost of a breakwater the estimated cost (and associated debt requirement) falls dramatically for Phase 2. Assuming that the $20 million estimated shared fee with the Army Corp is no longer needed, M&N estimates that the total cost for Phase 2 falls to $4.1 million, and the associated debt coverage to $625,373. If this does in fact materialize it would appear that all phases (Phase 1 through Phase 3) should be fundable under projected trend financial performance, including the lowest estimates of growth.

### 9.3.3. Sensitivity Testing

M&N notes that a similar analysis was conducted on the CPA's finances in 2013, and the history shows that during the Global Financial Crisis of 2008/2009 debt coverage became strained as EBITDA declined. This meant that EBITDA levels were not sufficient to meet the 1.25X debt covenant. Whilst the more recent analysis presented appears supportive, it should be noted that during periods of economic weakness, financial conditions can change significantly, impacting investment fundamentals. The sensitivities are illustrated in *Figure 9-7*.

*Figure 9-7: Implied Annual Debt Requirements and EBITDA Sensitivity*




Source: CPA; M&N

These sensitivities are reflective of the Base, High and Low volume projections. As noted, the Phase 2 and Phase 3 appear feasible[18] under the Base and High scenario, but could require additional funding to ensure the covenant is reached. Phase 2 and Phase 3 however, do not appear feasible under the low scenarios. This indicates that debt payments could not be made should weak visitor and cargo volume growth materialize.

In early 2017, 20-year T-bonds were approaching 3%, and 20-year muni-bonds ranged from approximately 100 to 200 bps above the T-bond. Revenue bonds tend to carry a higher risk than general obligation bonds and, therefore, generally leads to higher yield. Additionally, since the strong expectation for the year was for rates to begin rising, the range from 5% to 10% interest appeared inclusive.

To reflect the potential of a lower interest rate, the table below presents the debt obligation using a 7% interest rate as opposed to 10%. Clearly the strongest impact is on Phase II, the most costly construction and highest long-term borrowing requirement. A lower rate would certainly allow for greater coverage of the debt, based on the trend finances.

[18] M&N is not a *Registered Municipal* Advisor and therefore, the analysis is for illustrative purposes only

*Table 9-3: Illustrative Interest Rate Sensitivity ($Millions)*

| | Phase I | Phase II | Phase III |
|---|---|---|---|
| **Project Date** | 2018 | 2020 | 2025 |
| **2016 U.S. Dollar Cost** | 2.9 | 24.1 | 4.2 |
| **Inception Date U.S. Dollar Cost[19]** | 3.7 | 31.6 | 6.1 |
| **Illustrative Term (Years)** | 10 | 20 | 10 |
| **Estimated Annual Obligation (10% Interest)** | 0.6 | 3.7 | 1.0 |
| ***Estimated Annual Obligation (7% Interest)*** | *0.5* | *3.0* | *0.9* |

At a 7% cost of borrowing, Phase I and Phase III debt obligations would be reduced by about $100k annually. The greatest benefit of lower bond costs would be seen in Phase II, where the annual cost would decline by about $700k. It is important to note that these figures are all speculative based on unknown future rates, and that construction costs and final design could have a greater impact on annual obligation than bond costs.

### 9.3.4. Financial Feasibility Conclusions

Without the breakwater costs, all of the other Master Plan recommended improvements for Rota West Harbor appear to be affordable under the CPA Harbor Division's current debt load and projected income. However, if the 25 percent breakwater contribution is considered, then under most scenarios, the additional debt will violate the CPA's bond covenant restrictions.

The development of the breakwater is clearly the most expensive element, but also one of the more critical. Therefore, it is in CPA's best interest to work closely with the Corps to ensure that as much Federal money as possible is made available to support its development. The CPA should also look into other breakwater funding sources including grants and private contributions.

Additionally, M&N would note that the analysis does not take into consideration the cost of other capital improvement projects that the CPA may be considering, either at the ports of Saipan and/or Tinian. Should there in fact be other large-scale infrastructure projects being considered, the ability to fund these may require monies from outside sources as the projected EBITDA may not be enough to cover additional debt requirements.

[19] Includes reserve holdings

# 10.0 Conclusions

The current and forecasted level of cargo volume at Rota West Harbor has not been sufficient in recent years to justify operation of a small container ship. Therefore, almost all cargo arrives by barge. By their nature, barges do not have the maneuverability of a ship and have difficulty entering the Rota West Harbor channel under wave conditions of about four feet or more.

Rota Island requires a channel and harbor that is flexible for a variety of calling vessels and is safe for entry and cargo handling under most local sea conditions. Therefore, this report strongly recommends a combination breakwater and current training wall as has been described by the U.S. Army Corps of Engineers and in Master Plan Section 6. For the purposes of planning only, a conservative figure of $20 million was budgeted for the CNMI share of the Corps project.

This report also recognizes that Berth 2 is too small to adequately moor the calling vessels, whether barge or ship. Therefore, expansion of the berth will be needed to improve mooring safety and vessel service at the wharf. In addition, small craft improvements are needed to accommodate visiting boats as well as small commercial vessels.

Economic evaluation of the project costs and the CPA bonding capacity shows that the Rota West Harbor improvement projects Phase I and Phase II may be feasible. However, the large amount budgeted for breakwater construction will likely require federal or other outside funding sources. Therefore, this report recommends that initial steps be taken to authorize the projects and initiate the Phase I construction, while seeking assistance with harbor navigation improvements.

# Appendices

| | |
|---|---|
| **Appendix A** | **Summary of Underwater and Above Water Inspection, Rota West Harbor Master Plan, prepared by Moffatt & Nichol, February 21, 2017** |
| **Appendix B** | **Rota Island Harbor – Coastal Engineering Analysis, prepared by Moffatt & Nichol, June 23, 2017** |
| **Appendix C** | **Rota West Harbor Master Plan Project Permitting & Environmental Mitigation, prepared by Micronesian Environmental Services, November 2017** |
| **Appendix D** | **Rota West Harbor Master Plan, Opinion of Probable Construction Cost – Conceptual Design Level, dated April 05, 2018** |
| **Appendix E** | **"*Notes of Meeting*" for Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)** |
| **Appendix F** | **Disclaimer and Acknowledgement** |
| **Appendix G** | **References and Previous Reports** |

# Appendix A Summary of Underwater and Above Water Inspection, Rota West Harbor Master Plan, prepared by Moffatt & Nichol, February 21, 2017

**Rota West Harbor Rota, CNMI, USA.**

# SUMMARY OF UNDERWATER AND ABOVE WATER INSPECTION

# ROTA WEST HARBOR MASTER PLAN

Project No. CPA-RS-001-15

Prepared By:

moffatt & nichol

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**February 21, 2017**

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February 21, 2017

Commonwealth Ports Authority (CPA)
Francisco C. Ada / Saipan International Airport
P.O. Box 501055
Saipan, MP 96950-1055

Attention: Mr. Christopher Tenorio, Executive Director

Subject: Summary of Underwater and Above Water Inspection
Rota West Harbor Master Plan
Project No. CPA-RS-001-15
Rota, CNMI, USA

Dear Mr. Tenorio,

In accordance with the contract Scope of Work, field investigation and assessment of the subject facility has been completed. Moffatt and Nichol (M&N) personnel performed a Waterfront Facility Inspection (WFI) of the Rota West Harbor bulkhead structures on the dates of October 28 – 30, 2016. The field investigation was performed under the supervision of Mike Breitenstein, P.E., Team Leader, with Amanda Del Bello, P.E., Engineer-Diver, and Jeff Gazarek, Diving Technician. The effort included inspection of above water and submerged (underwater) structural components. This WFI report is part of a larger project that will identify potential harbor repairs and upgrade options to be made in conjunction with the Rota West Harbor Master Plan.

## PERTINENT DOCUMENTS

The following documents were considered prior to conducting this investigation:

1. Record drawings titled "New-Old Dock, Rota Harbor", prepared by International Bridge Corporation. The drawings are not dated, but it is believed that the construction dates to the mid-1980s.
2. Report titled "Final Report: Rota Harbor Master Plan Sea Side", prepared by Sea Engineering, Inc., and in association with Efrain F. Camacho Engineers and Architects, dated May 1997.

## BACKGROUND AND DESCRIPTION OF FACILITIES

Moffatt & Nichol was retained by the Office of the Governor to perform an assessment of Rota West Harbor, Rota Island, Commonwealth of the Northern Mariana Islands (CNMI). Rota harbor is owned and operated by the Commonwealth Ports Authority (CPA). Rota West Harbor is located on the west end of the Island of Rota, on the west side of the Taipingot Peninsula and to the southwest of Songsong Village. See Figure 1 for Rota Harbor Features.

The harbor was developed by the Japanese prior to World War II. The present facilities were constructed as a joint U.S. Army Corps of Engineers and CNMI project in 1985. The harbor is protected by a shallow reef to the north and a low elevation offshore island to the south. A 685-ft long by 300-ft wide Entrance Channel is located between the reef and island geographical features. The Channel was dredged to a 20-ft Mean Lower Low Water (MLLW) depth in 1985 (MLLW is assumed based on no other information available). The channel provides access to a 440-ft long by maximum 440-ft wide turning basin that is dredged to 16.5-ft MLLW. A basin extension is located southwest of the turning basin and provides access to Berth 2.

In 1976, Typhoon Pamela damaged the harbor and Berth 1, the only berth in existence at that time. The port was repaired in 1980. Exposure to wave action precludes the use of Berth 1 during approximately 25 percent of the year. A 1979 Corps of Engineers report recommended harbor expansion and construction of a second berth. This construction was completed in 1985 and Berth 2 has been in continuous use since that time. Additional maintenance dredging was accomplished in 1990. Typhoon Pongsona caused significant damage to Rota in 2002 and the port has performed multiple repairs to storm damage since that event.

A General Site Plan is shown on Figure 2. Berth 1 is a 150-ft-long auxiliary structure (see Photo 1) and is used when weather conditions allow. Vessel docking and cargo handling primarily takes place at Berth 2 (Photo 2). Berth 2 is a 100-ft long marginal wharf constructed from steel sheet pile and concrete cap bulkhead located to the south of the turning basin and in front of the Port Operations Building. Stationing was used to record the location of defects. Station begins on the southern corner on the face of each berth and extends north. Stationing for the sides of the pier start on each northwest and southwest corner and extend eastward.

The top of the steel sheet-piles used as a bulkhead to construct Berths 1 and 2 are tied-back below grade. The bulkheads are backfilled with fill material retrieved from local sources. The drawings for the initial Berth 1 construction show that an older concrete block retaining structure preexisted the steel sheet piling. The exposed steel sheet piling encase the concrete block retaining structure. The record drawings show asphalt concrete (AC) deck paving over the fill extending 55-ft back from the face, however portland cement concrete (PCC) paving was observed.

Berth 2 has PCC paving extending approximately 50’ back from the face of the wharf to the tie-back anchors. Cargo is usually transferred at Berth 2 by a Grove 80-ton mobile truck crane (Model TM875). This crane travels on rubber tires and is braced by outriggers extending to the paving when in use.

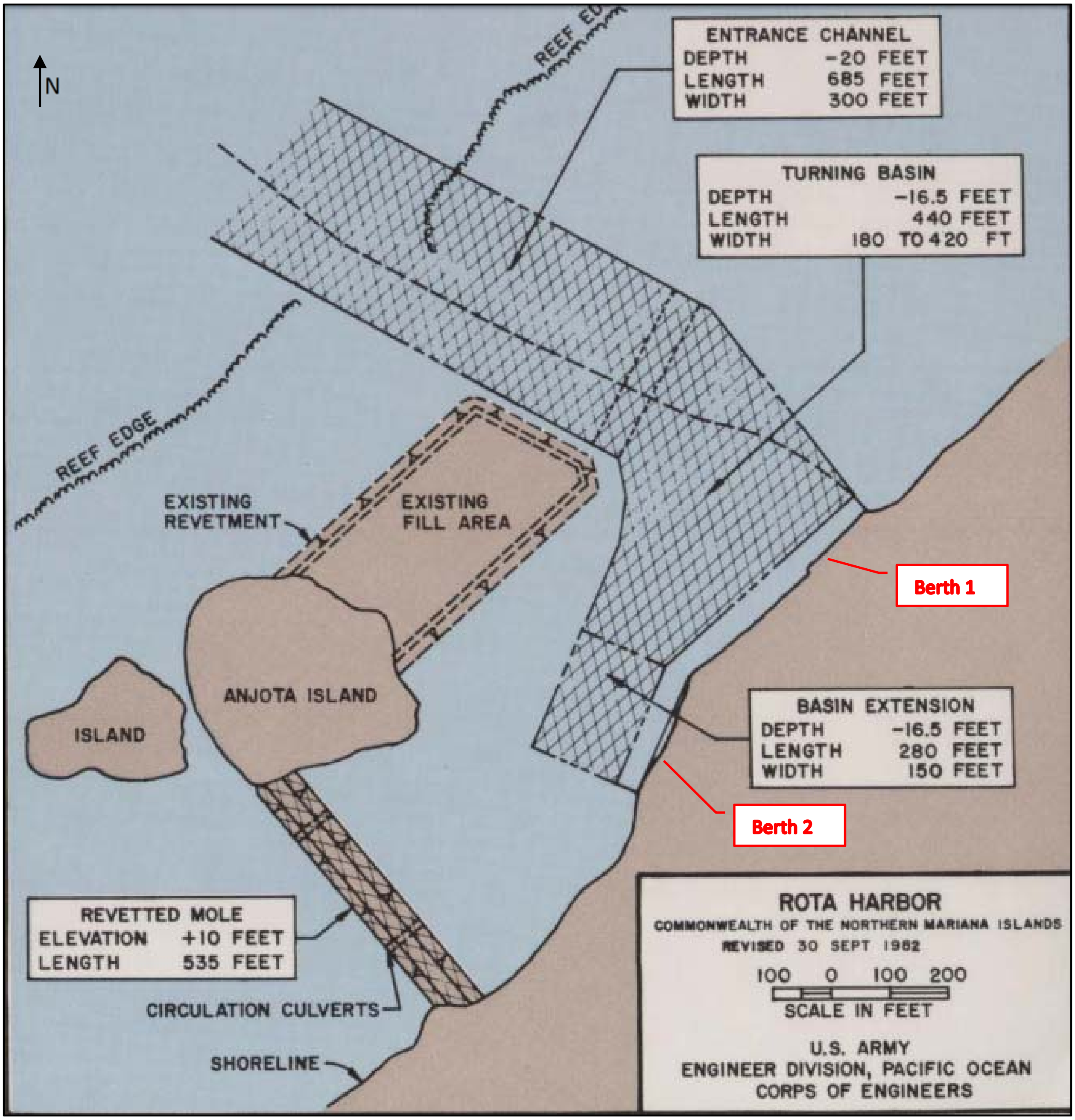


**Figure 1. Rota Harbor Features (from Pertinent Document 2).**

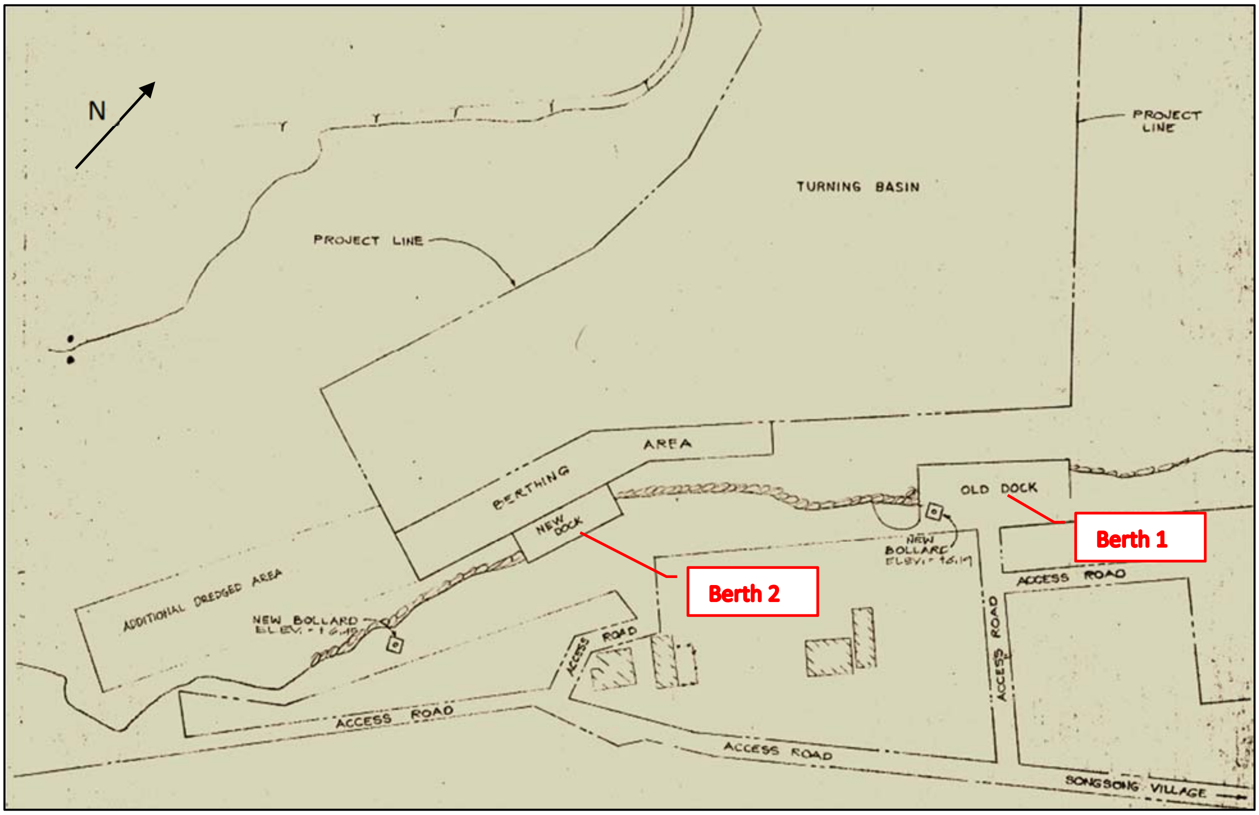


**Figure 2. Rota Harbor Site Plan (from Pertinent Document 1)**

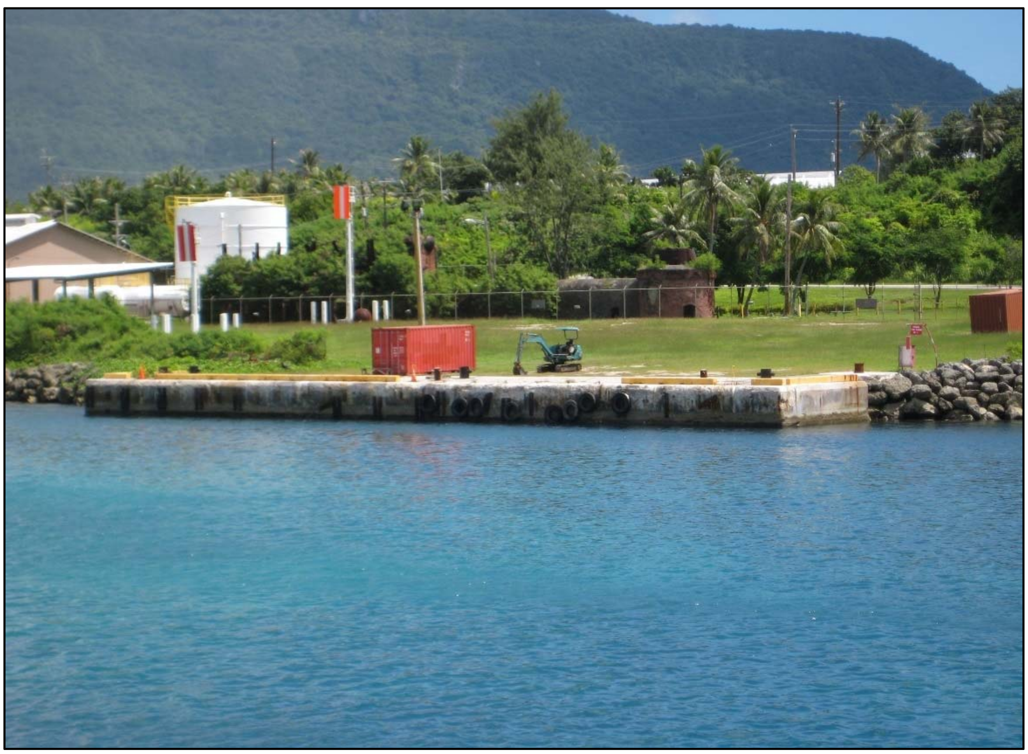

**Photo 1. Berth 1 or "Old Dock" seen from the offshore island looking east.**


**Photo 2. Berth 2 or the "New Dock" with the Port Operations Building is seen from the offshore island looking southeast.**

## INSPECTION SCOPE OF WORK

The Scope for this effort included underwater inspection services for the Rota West Harbor Berth No. 1 and Berth No. 2. A three man commercial SCUBA dive crew was deployed to Rota to perform 100% Level I, 10% Level II and 5% Level III Inspection (in accordance with ASCE Manual 130 WFI) of approximately 250 LF steel sheet pile bulkhead. Specific requirements for the effort are as follows:

- *The Level I inspection will include a close visual (only) examination of the entire submerged structure at sufficient detail to detect obvious damage or deterioration. This inspection will assess the integrity of the members and detect undermining or exposure of normally buried elements.*
- *The Level II inspection will be a detailed inspection where portions of the structure are cleaned of marine or aquatic growth to inspect the condition of the underlying metal. For sheet-pile structures, a 6-inch to 12-inch-high band will be cleaned at designated locations, generally near low water, near the mudline, and midway between low water and the mudline.*
- *The Level III inspection will be a highly detailed inspection of critical structural elements where extensive repair or possible replacement is contemplated. The purpose of this type of inspection is to detect hidden or interior damage, loss in cross-sectional area, and material homogeneity. This level of inspection includes extensive cleaning, detailed measurements, and selected ultrasonic material thickness testing.*

- *A letter report with photographs and up to three sheets of line drawings will be prepared that describes the findings of the underwater inspection. A draft report will be submitted within two weeks of inspection.*

## CONDITION ASSESSMENT RATINGS

The Naval Facilities Engineering Command (NAVFAC) has developed an overall condition rating system that provides standard condition rating classifications for all waterfront facilities. In the use of this system, each facility is given an overall rating based on the observed conditions. The six terms used to describe the conditions of a structure are described below and will be used in describing structural elements in this report.

- **"Good"** – No problems or only minor problems noted. Structural elements may show some very minor deterioration, but no overstressing observed.
- **"Satisfactory"** – Minor to moderate defects and deterioration observed, but no overstressing observed.
- **"Fair"** – All primary structural elements are sound, but minor to moderate defects and deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the load-bearing capacity of the structure.
- **"Poor"** – Advanced deterioration or overstressing observed on widespread portions of the structure.
- **"Serious"** – Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible.
- **"Critical"** – Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur.

## GENERAL REPAIR AND SERVICE LIFE DISCUSSION

It is appropriate to consider the following definitions developed by the US Navy and currently being used in regards to waterfront facilities repair:

> ***Sustainment*** *- Maintenance and repair activities necessary to keep a typical inventory of facilities in good working order. Sustainment includes regularly scheduled maintenance as well as cyclical major repairs or replacement of components that occur periodically over the expected service life of the facility. Due to obsolescence, sustainment alone does not keep facilities "like new" indefinitely, nor does it extend their service lives. A lack of full sustainment results in a reduction in service life that is not recoverable in the absence of recapitalization funding.*
>
> ***Restoration*** *- Restoration of real property to such a condition that it can be used for its intended purpose. Includes repair or replacement work to restore facilities damaged by inadequate sustainment, excessive age, natural disaster, fire, accident, or other causes.*

***The key difference between sustainment and restoration is "service life." If the facility <u>has not exceeded</u> its service life and is being repaired; it is "sustainment." If the facility <u>has exceeded</u> its service life and is being repaired; it is "restoration."***

***Modernization** - Alteration or replacement of facilities solely to implement new or higher standards (typically regulatory changes), to accommodate new functions, or to replace structure components that typically last more than 50 years.*

In this case, the short term and maintenance repair recommendations fall within the "restoration" category, i.e., "…repair or replacement work to restore facilities damaged by inadequate sustainment, excessive age…" The long-term recommendations fall within the "sustainment" category.

The expected service life for this type of construction is approximately 40 years. The common definition of service life used in reference to an engineering structure is - "Service life – the length of time during which a structure, or facility, can be used economically before emergent damage causes increasing interruptions in facility operations or becomes a threat to public health and safety." Assuming the berths were constructed in the early 1980s, the structures are approaching the end of their service life. Given the costs associated with increasing frequency and expense of repairs, and presuming the availability of capital, at some point it becomes more cost effective to replace the facilities entirely. This is particularly true when operational modernization of the berths is considered. It is beyond the scope of services for this investigation and report to consider total facility replacement, therefore the following paragraphs will consider short-term and long-term repairs as defined below.

## FINDINGS AND RECOMMENDATIONS

Reference is made to the photos, which provide general description for findings of this WFI. The photos will be used as the basic framework for this report with additional supplemental discussion provided as necessary. Recommendations are divided into two categories:

- Short-term Repairs –complete repairs within 12 months. Those defect items that have been identified as "critical" or "serious" should be monitored closely until repair has been completed.
- Long-term Recommendations – A low-priority repair or a major repair activities trend towards ultimate replacement or significant repair. Components should continue to be monitored with follow-on inspections every six years.

### Item 1 – Steel Sheet Piles

A Level I (visual) investigation was performed throughout, and Level II and Level III (UT measurements) examinations were taken at four places on Berth 1, two on the front face, one on the north face, and one on the south face. Berth 1 has KSP III cold-formed steel sheet (see Figure 3) on the front face with a continuous row of interlocking KSP-H steel H-Piles (11.8"x11.8"x0.4"x0.6") on the north and south faces.

At Berth 2 KSP IV sheet piles were used on all three sides and readings were taken at two places on the front face and one location on the north face. The south face was inaccessible due coverage by the rock and coral revetment adjacent to the berth.

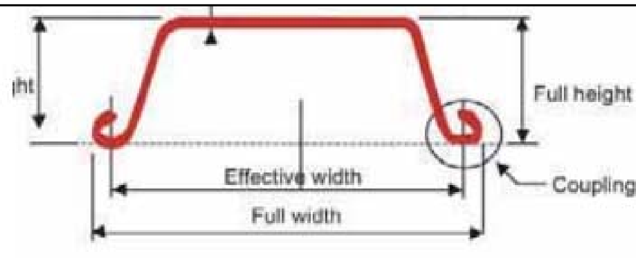


**Figure 12 – KSP Steel Sheet Piles: Dimensions**

| Section | Dimensions width w | height h | thickness t | Section Area A | A/m | Unit weight M | M/m | Moment of Inertia I | I/m | Modulus of section $Z_y$ | $Z_y$/m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | mm | mm | mm | cm$^2$ | cm$^2$/m | kg/m | kg/m$^2$ | cm$^4$ | cm$^4$/m | cm$^3$ | cm$^3$/m |
| **KSP I$_A$** | 400 | 85 | 8.0 | 45.21 | 113.0 | 35.5 | 88.8 | 598 | 4,500 | 88 | 529 |
| **KSP II** | 400 | 100 | 10.5 | 61.18 | 153.0 | 48.0 | 120 | 1,240 | 8,740 | 152 | 874 |
| **KSP II$_A$** | 400 | 120 | 9.2 | 55.01 | 137.5 | 43.2 | 108 | 1,450 | 10,600 | 162 | 880 |
| **KSP III** | 400 | 130 | 13.0 | 76.42 | 191.0 | 60.0 | 150 | 2,320 | 17,400 | 232 | 1,340 |
| **KSP III$_A$** | 400 | 150 | 13.1 | 74.40 | 186.0 | 58.4 | 146 | 2,840 | 22,800 | 253 | 1,520 |
| **KSP IV** | 400 | 170 | 15.5 | 96.99 | 242.5 | 76.1 | 190 | 4,670 | 38,600 | 362 | 2,270 |
| **KSP IV$_A$** | 400 | 185 | 16.1 | 94.21 | 235.5 | 74.0 | 185 | 5,300 | 41,600 | 400 | 2,250 |
| **KSP V$_L$** | 500 | 200 | 24.3 | 133.8 | 267.6 | 105 | 210 | 7,960 | 63,000 | 520 | 3,150 |
| **KSP VI$_L$** | 500 | 225 | 27.6 | 153.0 | 306.0 | 120 | 240 | 11,400 | 86,000 | 680 | 3,820 |
| **KSP II$_W$** | 600 | 130 | 10.3 | 78.70 | 131.2 | 61.8 | 103 | 2,110 | 13,000 | 203 | 1,000 |
| **KSP III$_W$** | 600 | 180 | 13.4 | 103.9 | 173.2 | 81.6 | 136 | 5,220 | 32,400 | 376 | 1,800 |
| **KSP IV$_W$** | 600 | 210 | 18.0 | 135.3 | 225.5 | 106 | 177 | 8,630 | 56,700 | 539 | 2,700 |

**Figure 3. KSP Steel Sheet Piles: Section sizes and properties (www.consteel.com). KSP III (red box) t=0.512-in. KSP IV (yellow box) t=0.610-in. No information was found for the flange thicknesses.**

The steel sheet piles are continuously submerged and are visible below the concrete cap at El.-1.8-ft Mean Lower Low Water (MLLW), see Photo 3. A typical cleaned section of the web is seen in Photo 4 at Berth 2 and in Photo 5 of the flange at Berth 1.

The sheet piles are in satisfactory condition. Typical corrosion losses were estimated to range between 4%-20%. Heavy pitting and higher levels of corrosion were typically noted just below the cap. The most significant amount of section loss was noted at Berth 2 (Station 0+05 North face) just under the concrete pile cap encasement where 57% of the original thickness remains. At this location an additional reading was taken two feet below the top reading where 89% of the original thickness remains. The inspection team found no evidence that any sort of cathodic protection has been installed. Inspection data from Berths 1 and 2 are summarized in Table 1. No manufacturer's data for the thickness of the flange could be found and was therefore estimated to determine remaining thickness.

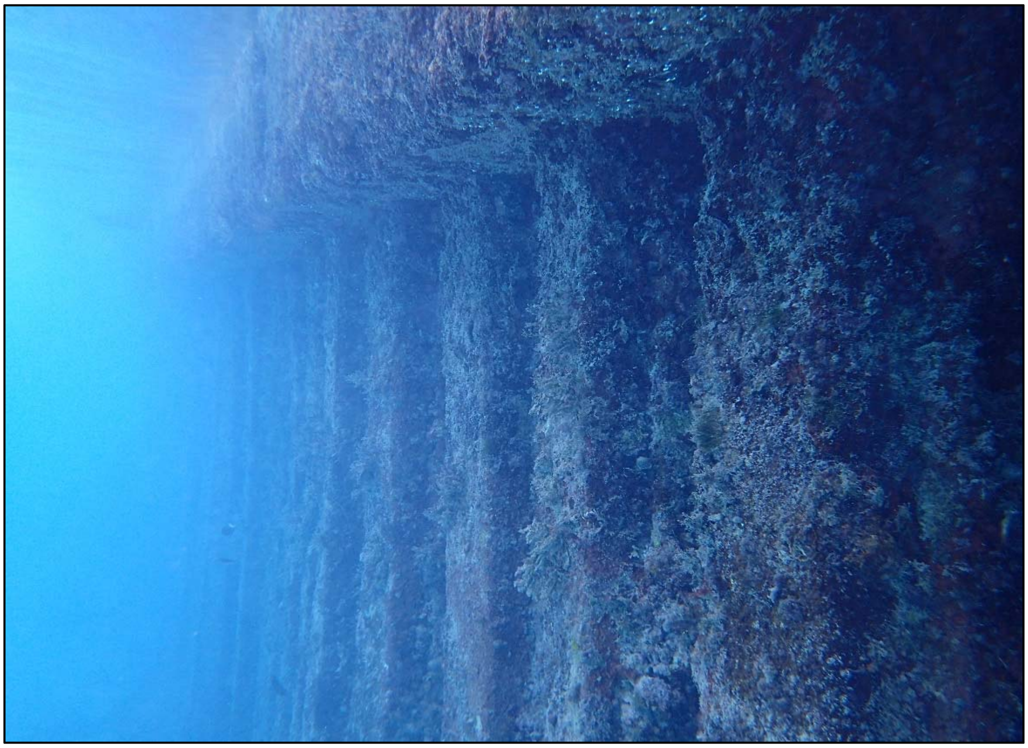

**Photo 3. Berth 2 front face sheet pile elevation below water. The pile cap can be seen at the top of the sheet piles.**

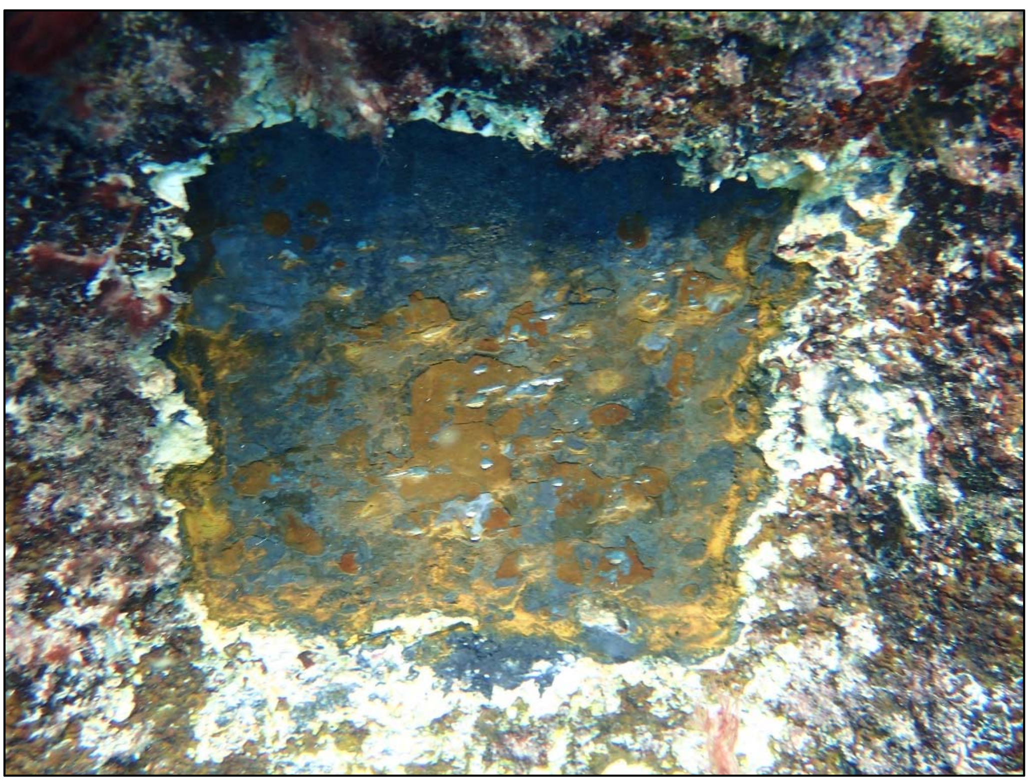

**Photo 4. A 12-in. by 12-in. cleaned section of sheet pile web at Station 0+14, south face of Berth 1. The face of the web is approximately 12-in. wide.**

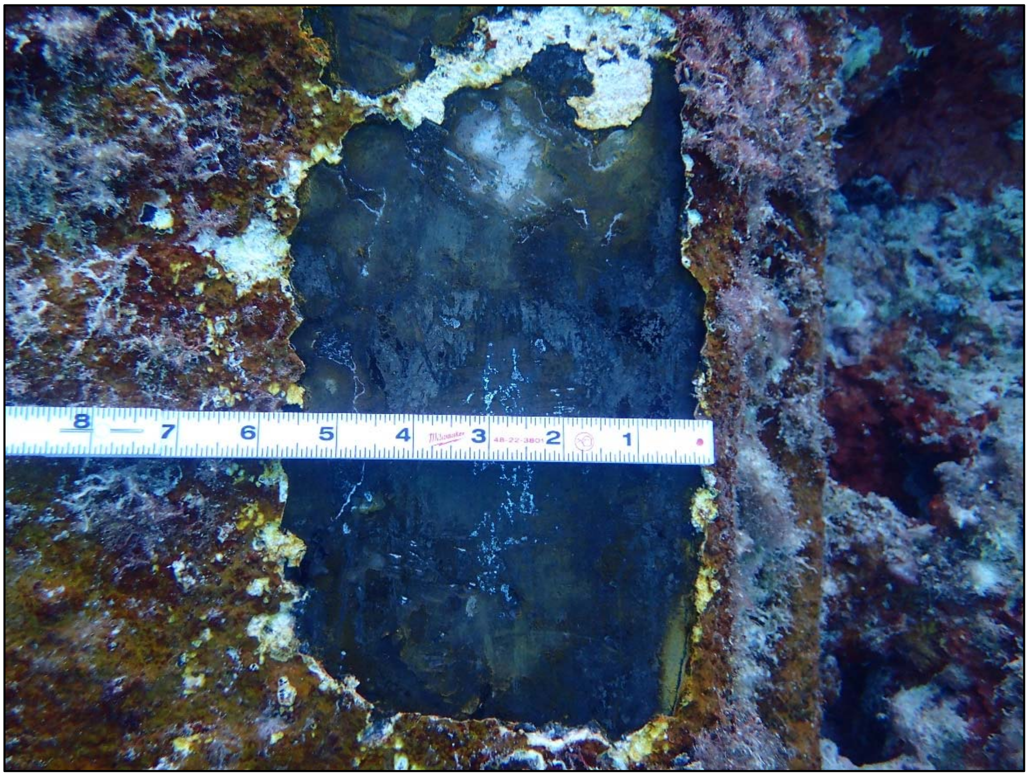


**Photo 5. Cleaned section of sheet pile flange at Station 0+20, front face of Berth 2.**

**Table 1: Ultrasonic Thickness Measurements**

**ULTRASONIC THICKNESS MEASUREMENTS, STEEL SHEET PILES**

**Location:** Rota Island, CNMI | **Facility Name:** Rota West Harbor | **Level of Inspection:** III | **Dates:** October 28-30, 2016 | **Inspectors:** M. Breitenstein, J Gazarek, A Del Bello

| Facility | Station | Remaining Thickness WEB | | | Avg "t" | % Remaining | Remaining Thickness FLANGE | | | Avg "t" | % Remaining | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Top | Middle | Bottom | | | Top | Middle | Bottom | | | |
| Berth 1 - South Face | 0+14 | - | - | - | - | - | 0.515 | - | 0.525 | - | - | H-Pile |
| Berth 1 - Front Face | 0+30 | 0.410 | - | 0.495 | 0.453 | 88% | 0.320 | - | 0.370 | 0.345 | 95% | KSP III |
| Berth 1 - Front Face | 1+20 | 0.450 | - | 0.465 | 0.458 | 89% | 0.340 | - | 0.330 | 0.335 | 93% | KSP III |
| Berth 1 - North Face | 0+05 | - | - | - | - | - | 0.540 | - | 0.510 | - | - | H-Pile, web not accessible for reading |
| Berth 2 - Front Face | 0+20 | 0.580 | - | 0.570 | 0.575 | 94% | 0.395 | - | 0.395 | 0.395 | 96% | KSP IV |
| Berth 2 - Front Face | 0+80 | 0.540 | - | 0.550 | 0.545 | 89% | 0.385 | - | 0.400 | 0.393 | 96% | KSP IV |
| Berth 2 - North Face | 0+05 | N/R | 0.560 | 0.580 | 0.570 | 93% | 0.235 | 0.365 | 0.395 | 0.332 | 81% | KSP IV. Moderate pitting at top |
| **Least "t" Remaining** | | 0.410 | - | 0.550 | - | - | 0.235 | - | 0.330 | - | - | |
| **Least % Remaining** | | 80% | - | 90% | - | 91% | 57% | - | 91% | - | 92% | |

General Notes:

1. "t" = thickness of steel; N/R = no reading obtained.
2. Ultrasonic thickness readings were taken with a Cygnus 1 Underwater Hand-Held Single Probe Digital Ultrasonic Thickness Gauge.
3. Estimated original thickness for KSP III sheet piles: Web t=0.512, Flange t=0.362
4. Estimated original thickness for KSP IV sheet piles: Web t=0.61 Flange=0.41
4. Estimated original thickness for H-Piles: Flange=0.6
5. "Top" reading is taken below the cap and "bottom" near the mudline, due to shallow depths middle reading not taken

## Steel Sheet Pile Defects

A 10-in. wide by 18-in. high void was noted in the web of the corner H-Pile at Station 1+50 (northwest corner of Berth 1) near the mudline. The H-piles on the north face are driven in a row and are linked together at the flanges. The hole was found in the H-Pile at the outboard end of the row (northwest corner) so the depth of the void is 12-in. to the web of the adjacent H-pile. The northwest flange has also experienced 100% section loss from the mudline up 18-in. See Photo 6, Photo 7, and Figure 4 for further explanation.

Small holes were noted on the web at almost every sheet pile at both berths just below the cap and sometimes eight feet below the cap. The 2.5”Wx4.5”H holes are typically filled with rock and coral and extend up to 3-in. deep. The holes do not appear to have grown due to corrosion and do not allow fill material to percolate through. They are likely manmade pick up or handling holes for transportation or construction purposes. Typical holes are seen in Photo 8 and Photo 9.

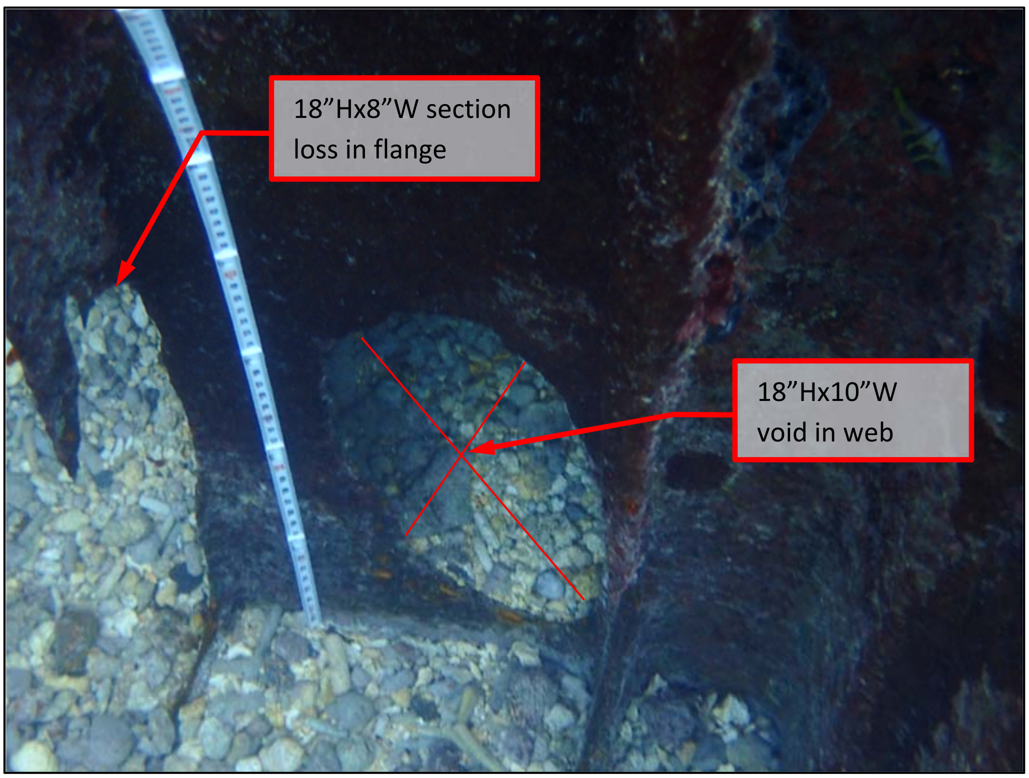


**Photo 6. Berth 1. An oval shaped opening in the web of the H-pile and section loss in the flange at the northwest corner.**

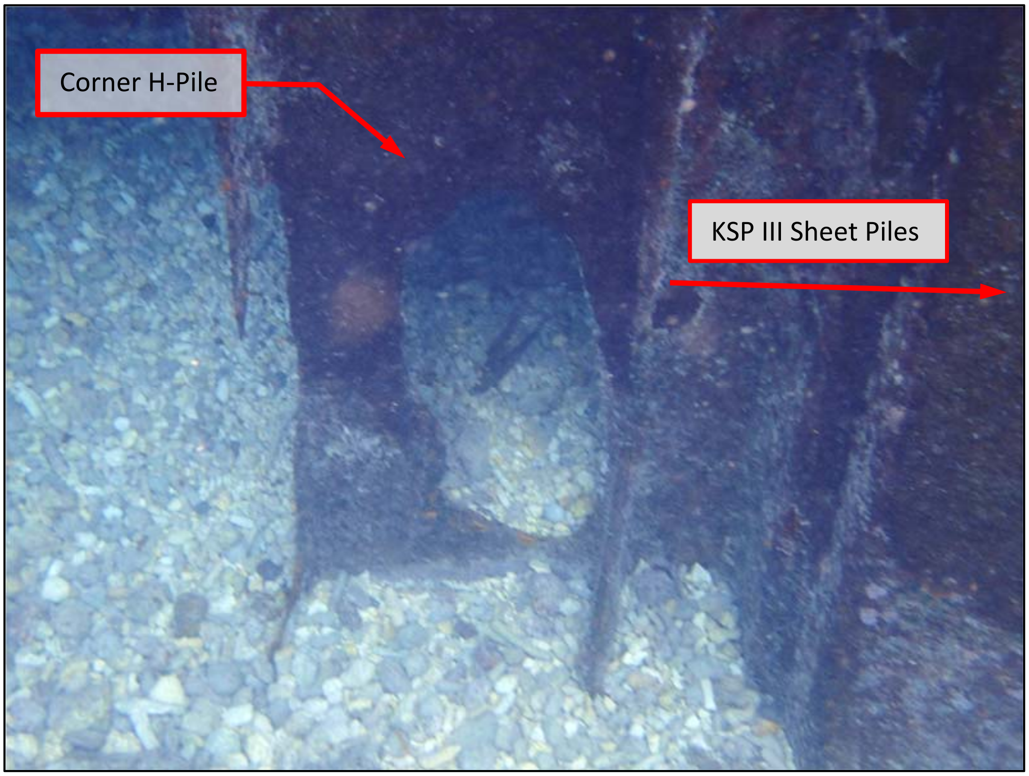


**Photo 7. Berth 1. The corner H-pile and KSP III sheet piles connection. See Figure 4 for detail.**

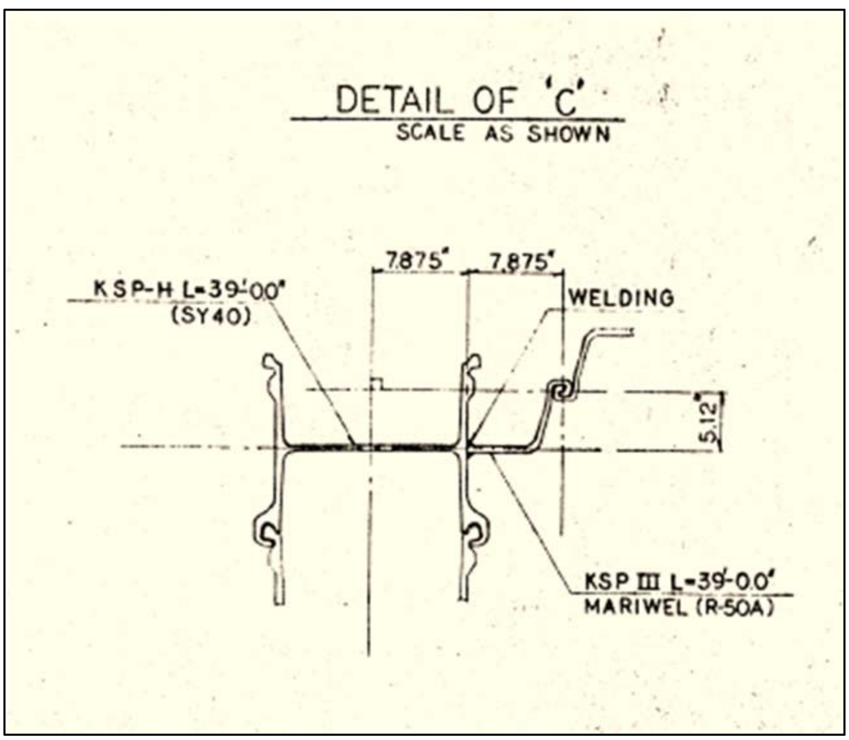


**Figure 4. Detail C from Pertinent Document 2 details the corner connection of the front face KSP III sheet pile line to the south face KSP-H pile, at the southwest corner of Berth 1. The mirror image of this arrangement is seen in Photo 6 and Photo 7.**

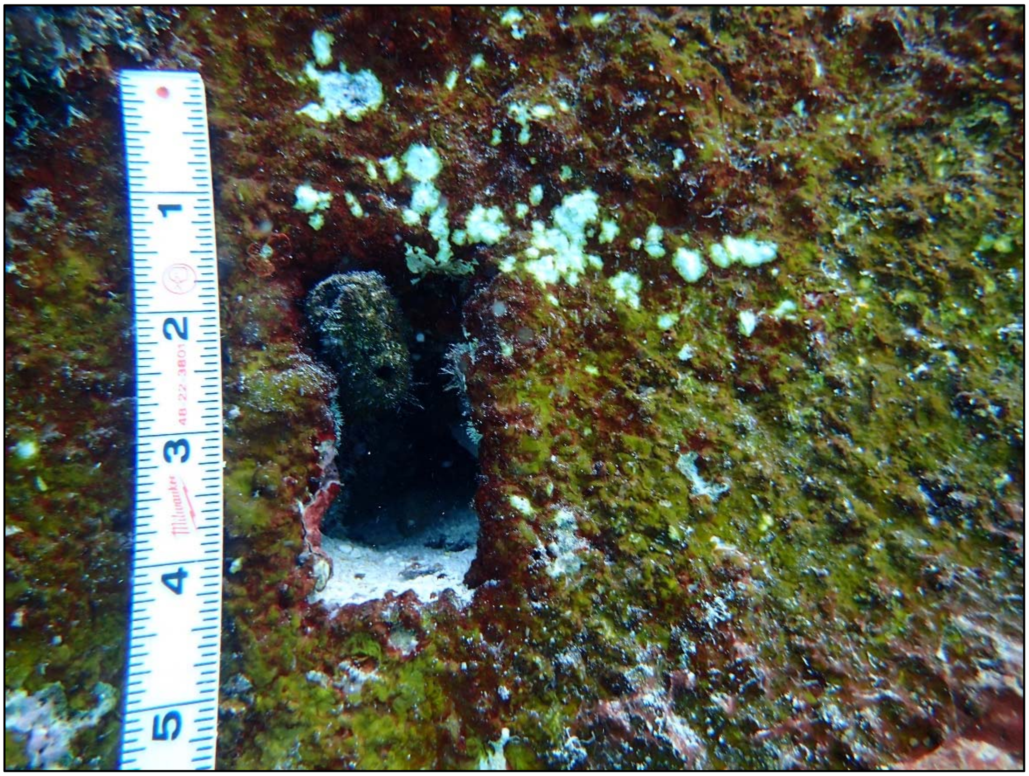

**Photo 8. Typical manmade hole found at Berth 1.**

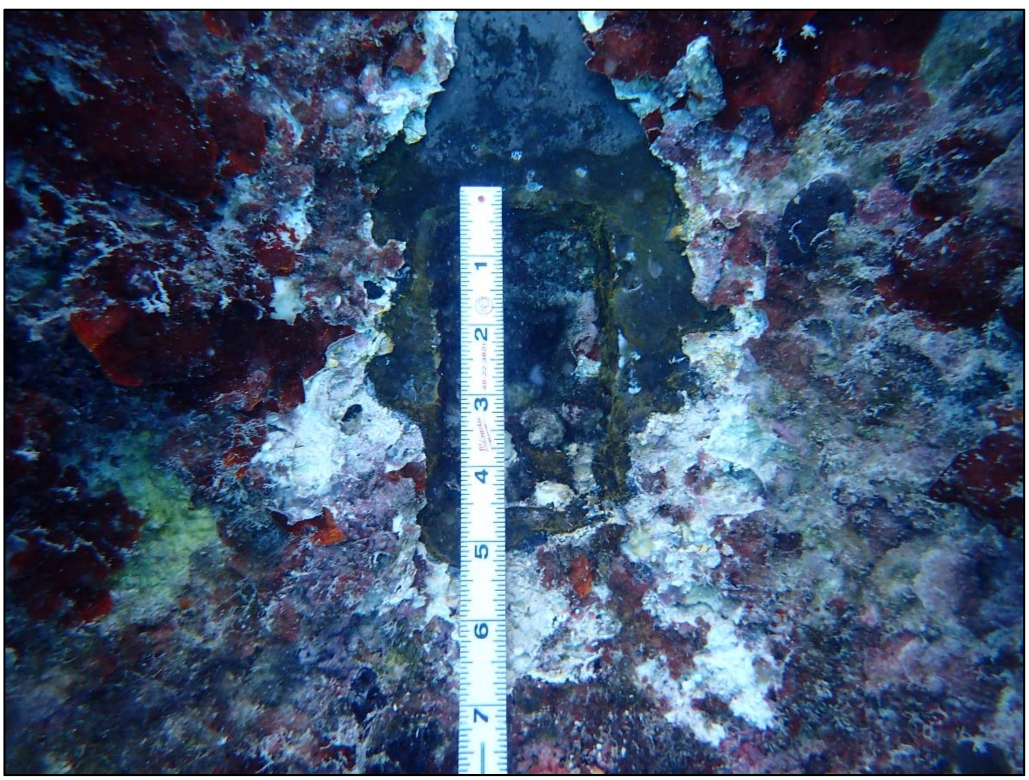

**Photo 9. Typical manmade hole found at Berth 2 where the marine growth has been removed.**

**Recommendation(s)** – Repair H-pile at northwest corner of Berth 1 by welding a cover plate over the void (long-term repair recommendation).

To extend the service life of the steel sheet piles, long-term consideration should be given for design and installation of a cathodic protection system. Cathodic protection works on submerged portions of steel sheet piles. Because the concrete cap extends below MLLW, the sheet piles are continuously submerged and will be 100% protected.

## Item 2 – Concrete Pile Cap

The concrete cap at Berths 1 and 2 extend below the water to -1.8-ft MLLW. The cap at Berth 1 is in poor condition. The cap at Berth 2 is in fair condition. The following defects were noted:

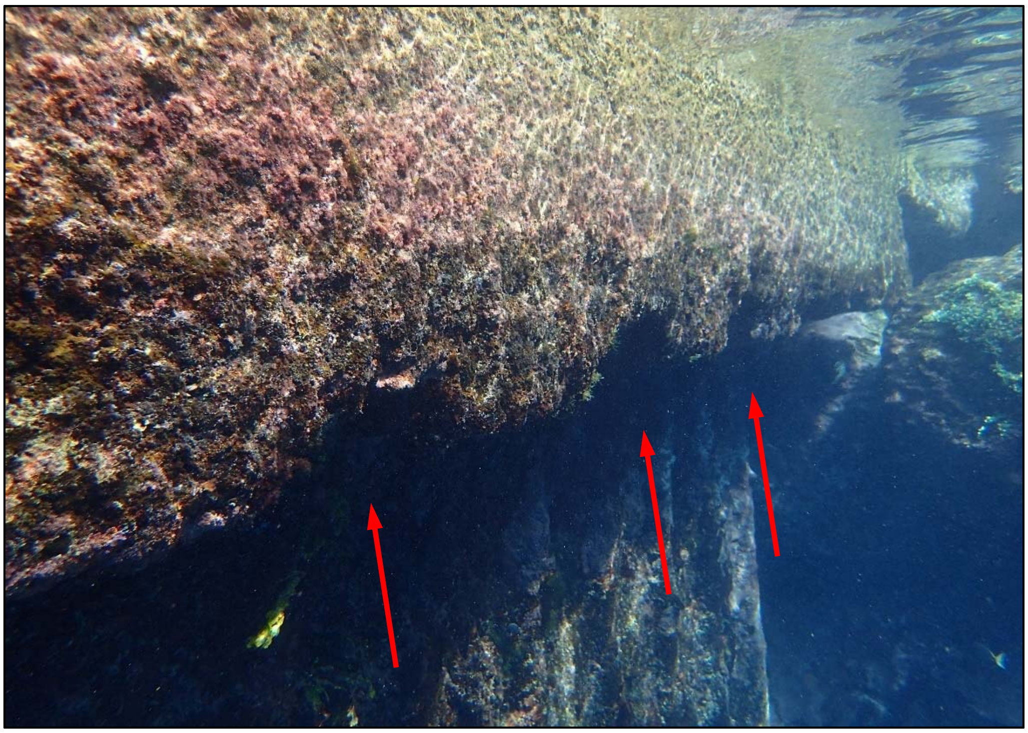

**Photo 10. Bottom of concrete cap, south face of Berth 1. Poorly consolidated concrete at the bottom of the cap was noted throughout Berth 1. See Attachment B for further discussion of concrete deterioration.**

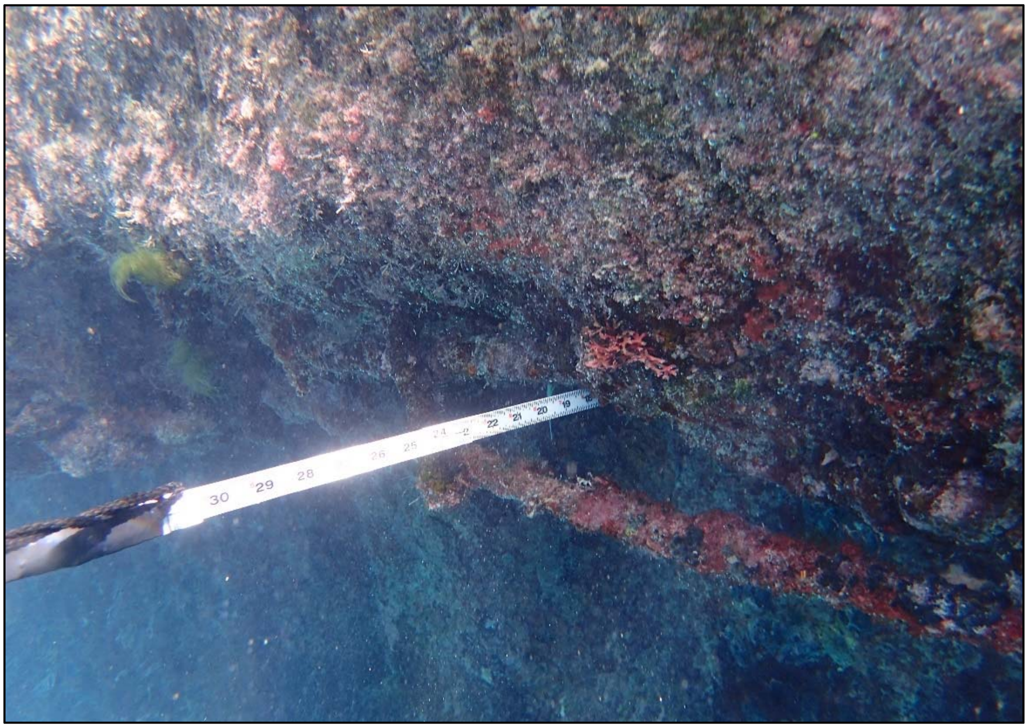

**Photo 11. Berth 1 concrete cap. Poorly placed and poorly consolidated concrete at Station 0+96 exposes three longitudinal bars, with up to 100% section loss, and six vertical bars. The section of concrete loss is 4-ft long, 2-ft deep and 1-ft high. See Attachment B for further discussion of concrete deterioration.**

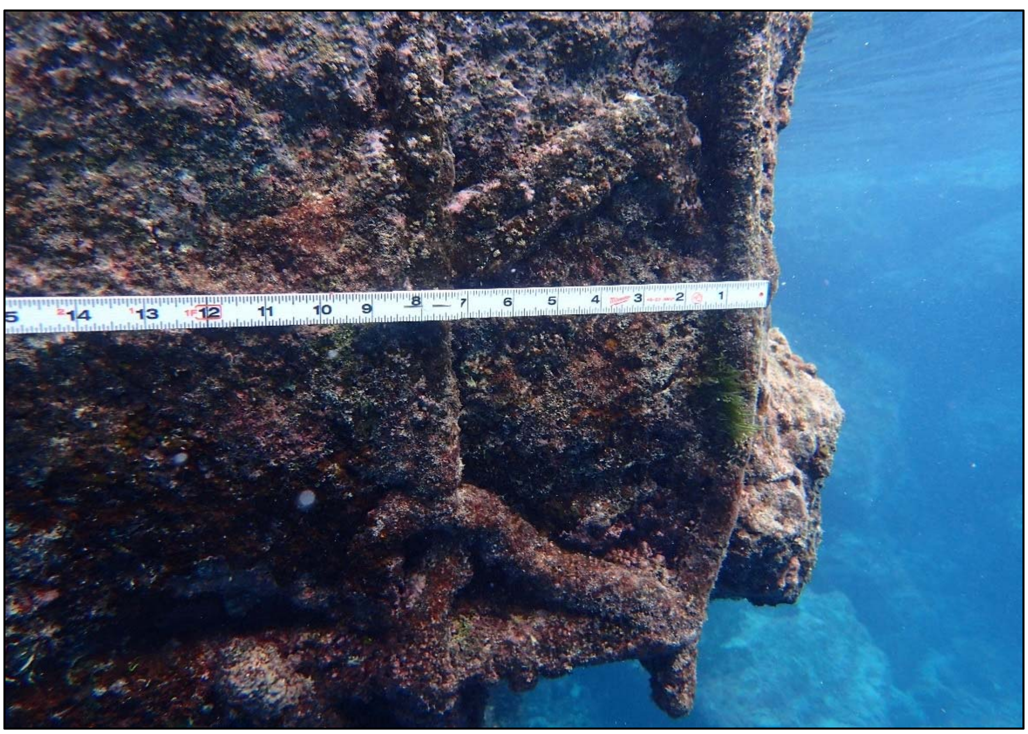

**Photo 12. Berth 1 concrete cap. Damage found at the southwest corner seen from below water. Two vertical and one horizontal bars are exposed with minor steel section loss observed.**

**Photo 13. Berth 2 concrete cap. Erosion damage coupled with insufficient concrete cover over the reinforcing steel found at Station 0+00 seen from below water. This damage is typical of north and south corners on each berth.**

**Photo 14. Berth 1 concrete cap. Typical erosion damage where the aggregate has "raveled" away over time leaving rock pockets, found at the southwest corner above the damage seen in Photo 11. This damage is typical of north and south corners on each berth.**

**Photo 15. Berth 1 concrete cap. Corrosion spalling and bleeding noted throughout the south face. See Attachment B for further discussion of concrete deterioration.**

**Photo 16. Berth 1 concrete cap. Widespread abrasion damage due to friction on the top of the cap and erosion damage resulting in cement particle/aggregate loss on the lower portion of the cap.**

**Photo 17. Berth 2 concrete cap. Typical condition of the face of the cap at Berth 1. The concrete is in satisfactory condition and less susceptible to abrasion damage than at Berth 2.**

**Photo 18. Berth 1 concrete cap Station 0+30 looking south. Typical abrasion damage seen from above deck from wires and chains used to hang tires for makeshift fenders. This is typical of both berths.**

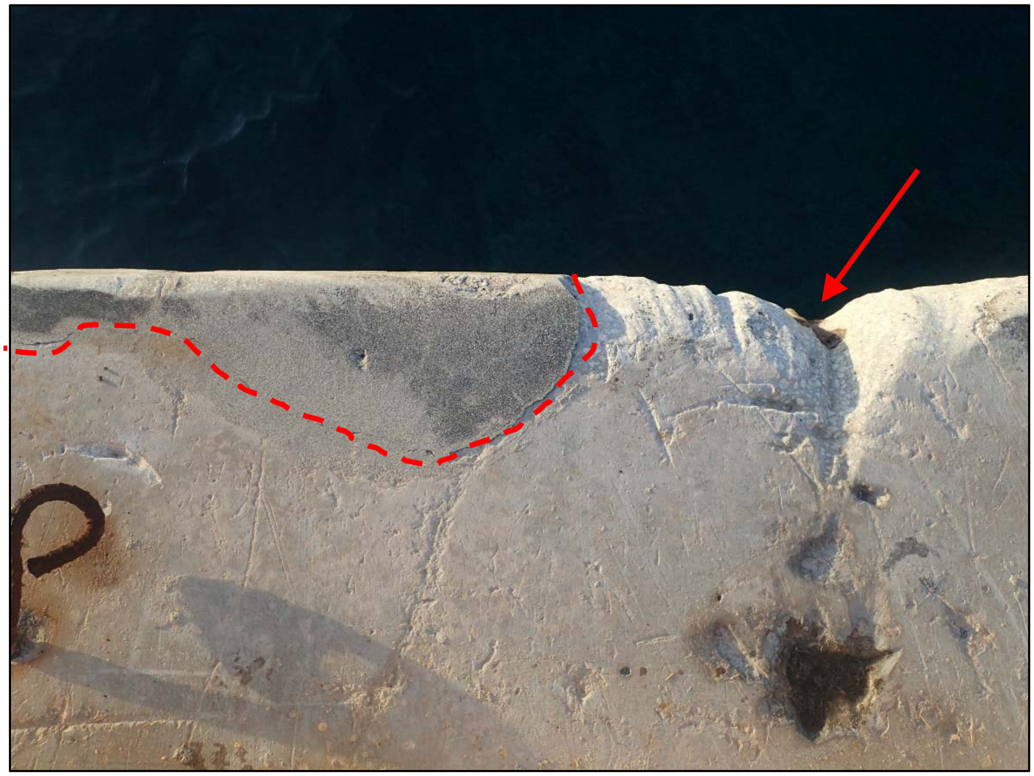

**Photo 19. Berth 1 concrete cap Station 1+05. A repaired spall seen on the left (red dashed line) on top of the cap at Berth 1. There are a total of four repaired spalls at Berth 1. Typical abrasion damage with exposed rebar on the right (red arrow).**

**Recommendation(s)** – The defects noted above and missing concrete at the bottom of the cap do not adversely affect the capacity or overall functionality of the cap to protect the embedded wale and tieback connection or provide a reaction surface for fenders. The cap at Berth 1 is in poor condition overall. Depending on the desired service life for the structure, re-facing of the cap should be considered as part of a long-term strategy to extend the service life of the berth. Re-facing of the cap would include removal of the degraded concrete along the face, top and bottom to expose reinforcing steel, placement of reinforcing dowels and supplemental reinforcing, placement of formwork, and careful placement of concrete to surround the existing deteriorated concrete.

## Item 3 – Mooring Hardware

Mooring hardware was inspected in accordance with US Government Unified Facilities Criteria (UFC) Manual UFC 4-150-08 "Inspection of Mooring Hardware". A summary of the inspection findings is presented in Table No. 1. Mooring fitting condition ratings are provided in *Attachment A – Mooring Hardware Evaluation.*

Berth 1 is designed with four single bollards, and Berth 2 has three single bollards. At the time of inspection the three bollards on the face of Berth 1 had been removed and were not inspected, see Photo 21. The bollard foundation bolts at Berth 1 were cleaned with 75% of the threads intact and sticking out of the cap approximately 2.5-in. The surrounding concrete and bolts are in satisfactory condition. New bollards with solid base plates were staged on the pier (presumably for installation).

The bollard installed approximately 50-ft behind the southwest corner of Berth 1 (Photo 22), exhibited heavy corrosion around the base. The 18-in. diameter bollard cylinder is anchored in a 20-in. diameter sleeve cast in a 13-ft by 13-ft concrete footing. There is no flashing or grout pad protecting the perimeter of the steel to concrete interface allowing for water intrusion.

The bollards at Berth 2 are in serious condition with "advanced deterioration, overstressing, or breakage significantly affected the load-bearing capacity of primary structural components, local failures are possible." The welds around the horns are severely corroded and have up to 100% section loss, see Photo 23. The bollard at Station 0+90 is missing one horn, see Photo 24. The bollards are anchored to the cap with 12 - 1.5-in. diameter bolts cast in the concrete cap. The foundation bolts exhibited severe corrosion. The surrounding concrete is in satisfactory condition.

**Table No. 1: Mooring Hardware Inspection Record**

| Hardware ID No. | Location / Type | Sta. | Condition Rating, (1 to 4) | | Comments |
|---|---|---|---|---|---|
| | | | Fitting | Base | |
| 1 | Berth 1- 18" Dia. Single Bollard | Behind Berth | 3 | 1 | Heavy corrosion |
| 2 | Berth 1-Single Bollard | 0+10 | - | 2 | No bollard installed |
| 3 | Berth 1-Single Bollard | 0+75 | - | 2 | No bollard installed |
| 4 | Berth 1-Single Bollard | 1+40 | - | 2 | No bollard installed |
| 5 | Berth 2 - 12" Dia. Single Bollard | 0+10 | 3 | 2 | Severe corrosion |
| 6 | Berth 2 - 18" Dia. Single Bollard | 0+50 | 3 | 2 | Severe corrosion |
| 7 | Berth 2 – 12" Dia. Single Bollard | 0+90 | 4 | 2 | 1 missing horn |

**Recommendation(s) –** It is understood the bollards at Berth 2 are also scheduled for replacement. Consideration should be given to the installation of the new bollards and reuse of the existing foundation bolts. In the absence of a proper berthing and mooring analysis, the demand superimposed loads (tension and shear) are unknown. Nevertheless, the capacity of the proposed mooring hardware should be back-calculated using engineering design principles. The existing anchor bolts should be pull-tested to a safe working load with appropriate factors of safety. The design should ensure that the mooring and connection do not fail in a sudden tension-related failure mode.

A mooring and berthing analysis should be performed as part of a long-term recommendation. The study should identify a design vessel and environmental loading in order to determine the required capacity of the mooring hardware and associated services.

Short-term repairs are recommended at the bollard cast in concrete footing at Berth 1 (Photo 22) and include the following: Remove corrosion and apply two coats of primer and a corrosion inhibiting topcoat. The interface between the mooring hardware and steel insert foundation should be sealed with a caulking-type sealant around the base.

**Photo 20. Layout of mooring bollards at Berth 2. Red arrows point to the single bollards at the face of the berth.**

**Photo 21. Berth 1 Station 0+10 where a bollard has been removed and the anchor bolts remain.**

**Photo 22. An 18-in. diameter bollard approximately 50-ft behind the face of Berth 1.**

**Photo 23. Berth 2, Sta. 0+50. Severe corrosion noted at the weld of the horn to the bollard cylinder. The hammer penetrates an area where there is 100% section loss of the weld material. The mooring bollard should be replaced.**

**Photo 24. The bollard at Berth 2 Sta. 0+90 is missing a horn (red dashed line). The mooring bollard should be replaced.**

## Item 4 – Concrete Deck

The concrete deck extends from the concrete cap back approximately 20-ft at Berth 1 and from the cap up to the Port Operations Building at Berth 2. The concrete decks are in fair condition. The deck surface at Berth 1 (Photo 25) is heavily worn with minor cracks and subsidence observed. The deck surface at Berth 2 exhibited moderate wear and minor cracks with more prominent subsidence observed and associated cracking (Photo 27).

Areas of subsidence were noted directly behind the cap at both piers. Ponding at Berth 1 was noted at Station 0+39 (5' long x 18" wide x 0.5" deep) and Station 0+60. The ponding at Station 0+60 was 15-ft long, 18-in. wide, and 0.5-in. deep and is seen in Photo 26. The area of subsidence at Berth 2 was from Station 0+20 to Station 0+64 and was up to 30-in. wide and 5-in. deep (Photo 28). Subsidence is minor and no evidence of fines percolating through the steel sheet piles was observed. Subsidence is likely a result of compaction over the years.

Port personnel indicated that a typhoon washed out the soil behind Berth 2 and in front of the Port Operations Building (10-15 years ago). Repairs included placement of compacted fill and a PCC slab from behind Berth 2 to the building.

**Recommendation(s) –** Repair subsided areas as part of a short-term repair. The following is the recommended repair process: Remove soil and organic matter, saw cut around the perimeter and remove approximately 1-in. thickness of concrete. Place a suitable mortar or concrete, install per manufacturer's recommendation. Monitor areas behind the cap for future ponding and subsidence.

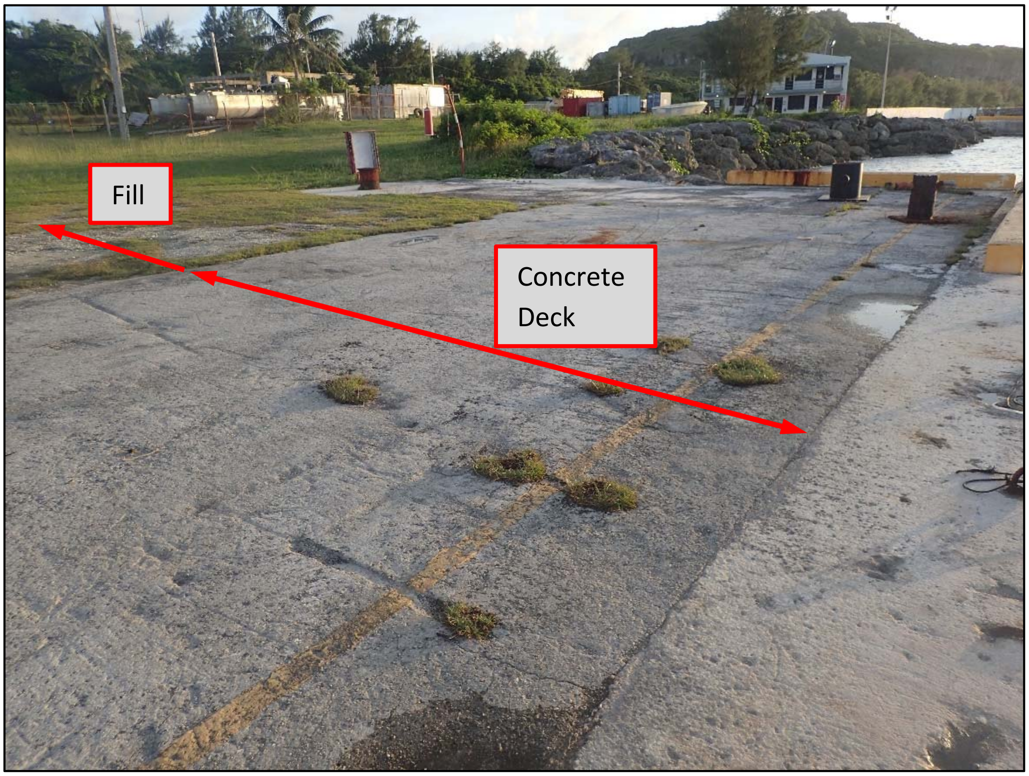


**Photo 25. Concrete deck at Berth 1 looking south.**

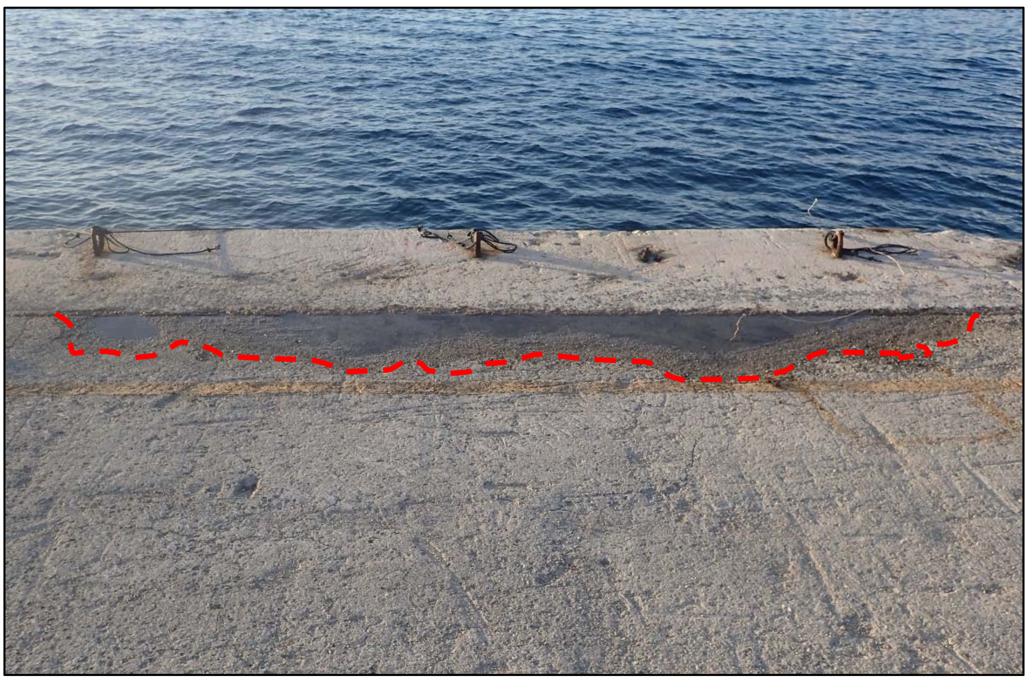

**Photo 26. Ponding from deck surface subsidence noted at Berth 1 Station 0+60.**

**Photo 27. Subsidence behind the concrete cap at Berth 2 looking south.**

**Photo 28. Berth 2. Soil and water collects behind the cap at an area of deck subsidence. The resultant depression is 3-in. deep at Sta. 0+58 and up to 5-in. deep in other areas.**

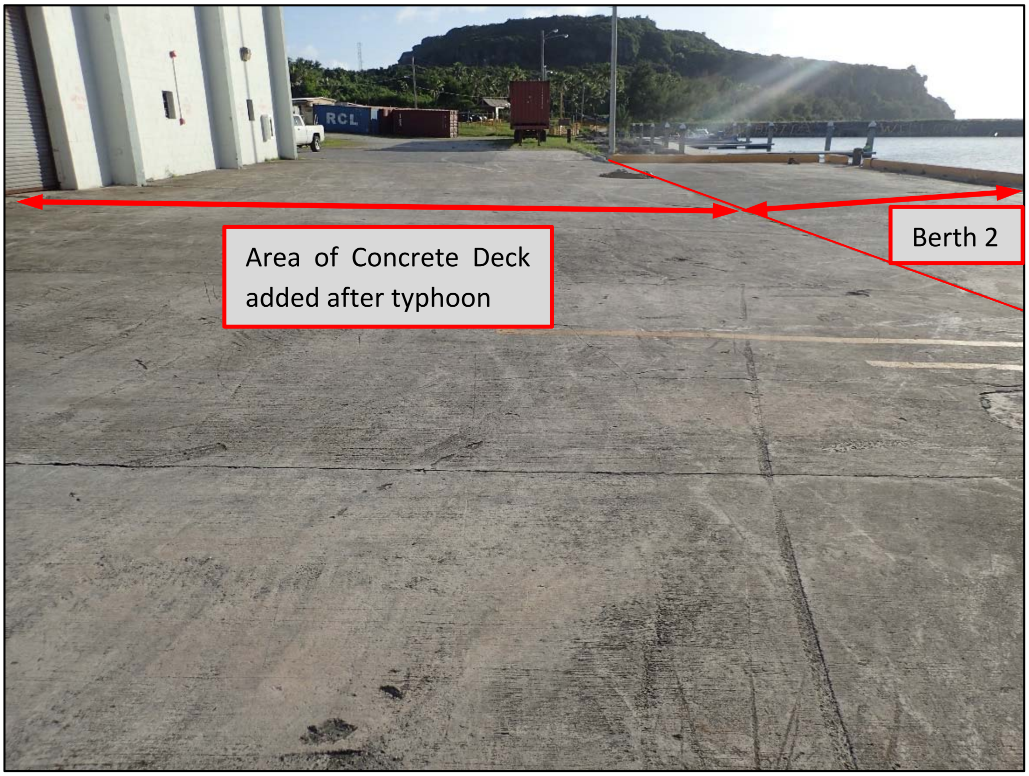


**Photo 29. Berth 2. Section between Berth 2 and the building which was added after the subsoil was washed out by a typhoon.**

### Item 5 – Concrete Curbs

Concrete curbs (12" wide x12" high) are cast on the top of the concrete pile cap and extend around the perimeter of each berth. The curbs are in fair condition. Corrosion spalling was observed on the edges of the curbs throughout, see Photo 30 and Photo 31. At Berth 1 there was a section from Station 0+33 to 0+75 where the curb had been removed (Photo 32); Port personnel indicated that this was to facilitate past roll-on roll-off function.

**Photo 30. Berth 1. An example of closed corrosion spalling indicated by the orange staining and cracks at the edges of the curb on the south side.**

**Photo 31. Berth 2. Typical corner spalls (oval) and rust bleeding (arrows) from Sta. 0+64 to 0+80.**

**Photo 32. A section of curb was removed at Berth 1 from Station 0+33 to 0+75.**

**Recommendation(s) –** Repair spalls where reinforcing steel is exposed, cracked, or bleeding as part of a long-term repair using the following criteria (Consideration should be given that it may be cheaper to replace the curbs rather than repair them):

1. Sound-out, locate, and mark-out the damaged areas.
2. Saw cut the concrete around the perimeter of the affected area.
3. Remove cracked and damaged concrete to a depth of ¾ in. behind reinforcing steel.
4. Remove all corrosion from steel reinforcing.
5. Restore all reinforcing steel that has lost more that 20 percent of its original cross-sectional area.
6. Place embedded sacrificial galvanic anodes.
7. Place formwork as necessary.
8. Place concrete and cure repaired concrete.

Occupational Health and Safety Administration (OSHA) 2232 requires that a bull rail (at least 10-in. high) be installed on bulkheads where vehicles are permitted. The curb at Berth 1 should be reinstalled in the section that it is missing. If the curb was removed for facilitating loading and unloading or for use of roll-on/roll-off then a removable curb should be considered.

### Item 6 – Fender System

The fender system is in critical condition. V-type extruded arch fenders, 3.7-ft high by 1-ft deep, were installed at 4.6-ft on-center on the front face of Berths 1 and 2. These fenders have all failed and remaining portions of the fender system are left hanging from stainless steel anchor bolts and inserts.

At Berths 1 and 2 makeshift fenders using tires are currently in use, see Photo 33 through Photo 36. The tires are fastened to pad eyes embedded in the top of the concrete cap (Photo 37) and to the concrete curbs (Photo 38) with polypropylene lines, wire rope, or chains. The pad eyes are severely corroded. Significant abrasion damage was observed on the corner of the concrete cap from the wire rope and chains. In some instances, the cap was abraded down to exposed reinforcing steel, see Photo 39. The intent of the fender system is to protect the structure, absorb energy, and protect the hull of the ship. The “spring” provided by the fender system is missing by using the tires, so very little energy is absorbed. The standoff distance provided by the tires also may be inadequate resulting in direct contact of the ship with the concrete cap.

**Recommendation(s)** – Remove remaining portions of fender system to prevent falling into harbor as part of a short-term repair. A mooring and berthing analysis for an envelope of design vessels (present and future) should be developed as part of long-term continued use of the facilities. The existing mooring hardware should be evaluated for overall capacity. A new fender system can then be designed as part of a long-term repair project.

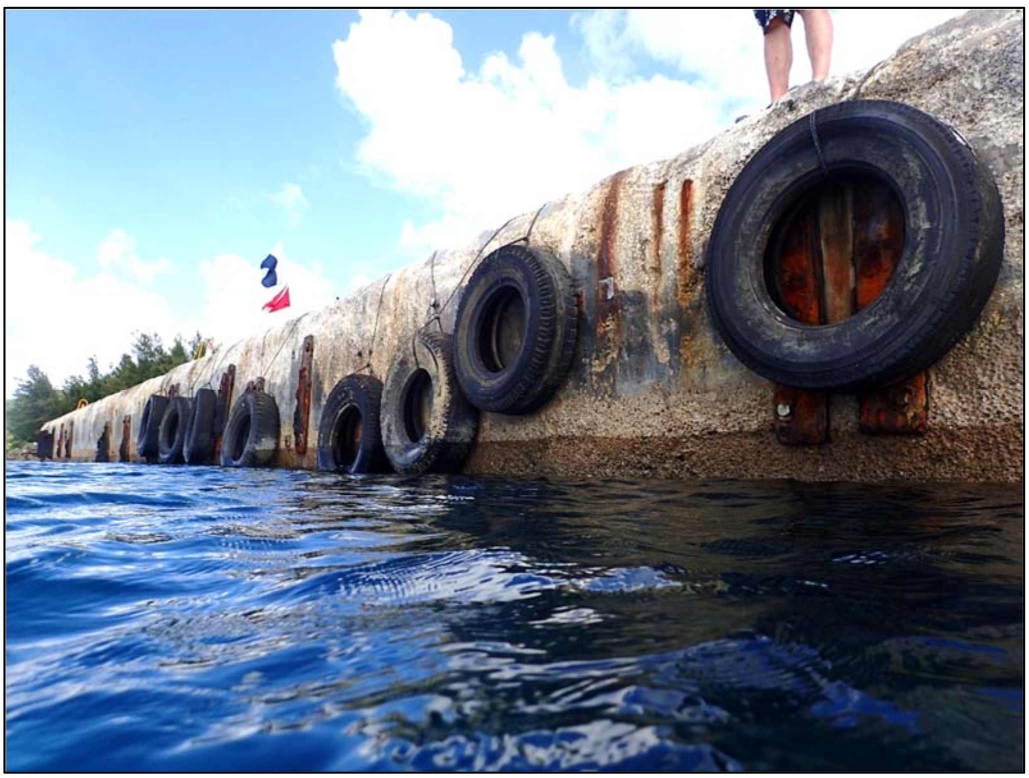

**Photo 33. Berth 1. Remnants of failed V-fenders and tires found on the face of Berth 1.**

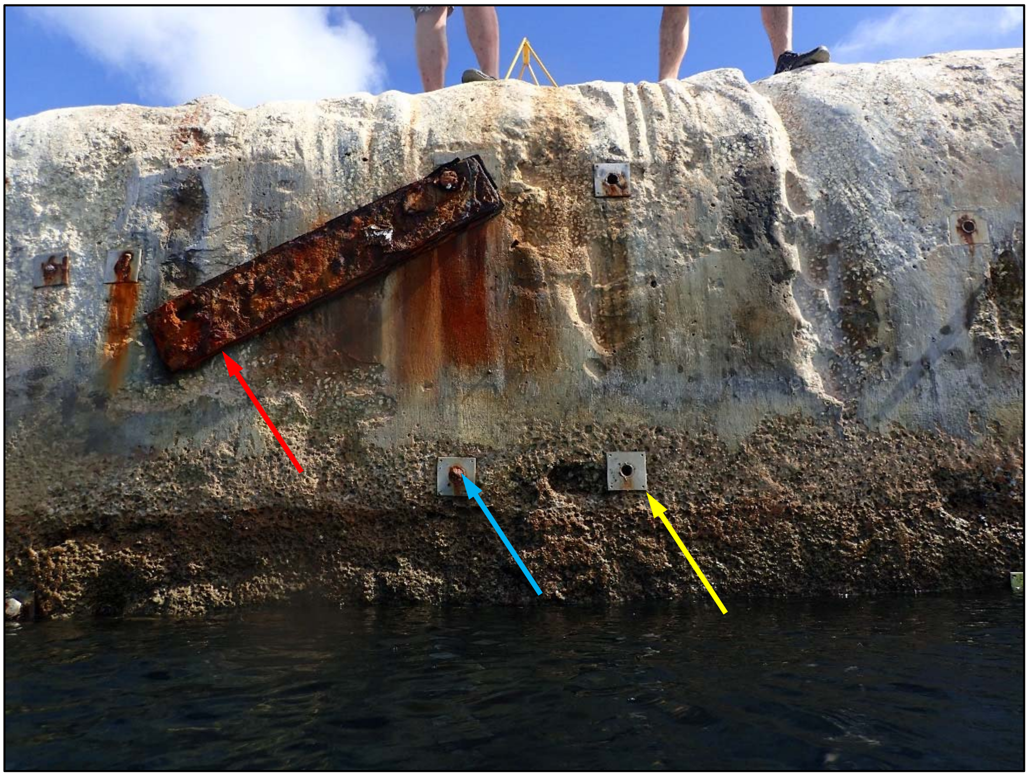

**Photo 34. Berth 1. A remnant of the V-fender (red arrow), stainless steel inserts (yellow arrow) and bolts (blue arrow) remain.**

**Photo 35. View of the V-fender remnants and added tires suspended from the curbs and cap at Berth 2.**

**Photo 36. Close up of the V-type fender remnants and suspended tires at Berth 2.**


**Photo 37. Berth 1 Sta. 0+60. Tires are tied to a pad eye with a polypropylene line.**

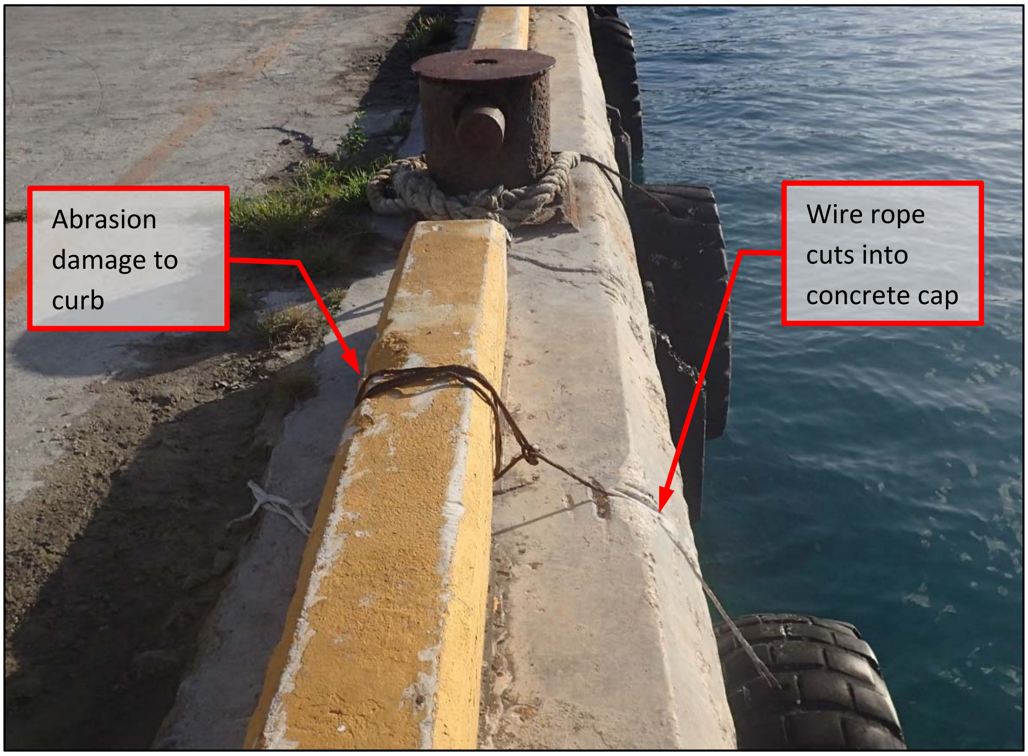


**Photo 38. Berth 2 Station 0+55. Wire rope is used to fasten the tire to the curb resulting in abrasion damage to the curb and the corner of the concrete pile cap.**

**Photo 39. Berth 1 Sta. 1+05. Abrasion damage from hanging tire fenders resulting in exposed reinforcing steel in the concrete cap.**

## Item 7 – Adjacent Riprap

A conglomerate of rock and coral provide rip rap-type shore protection extend along the shoreline to the north and south of each berth. Directly adjacent to Berth 1 on the north side, a 5-ft wide by 4-ft high by approximately 10-ft deep void was observed towards the bottom of the rip rap revetment.

Adjacent to Berth 2 on the north and south sides, voids were observed near the bottom of the rip rap revetment, approximately 4-ft high by 2-ft wide by 6-ft deep and 2-ft high by 4-ft wide by 6-ft deep respectively.

**Recommendation(s) –** As part of a long-term repair, adding riprap adjacent to the berth should be considered. There are no records or cross-sections available for the installation of riprap. It is assumed the riprap was not part of an engineered design. A study should be performed to determine the proper slope for the existing riprap and how much rock should be added to achieve the desired level of protection. Environmental permitting will be required for the in-water portions of work.

**Photo 40. Rock revetment seen from Berth 1 looking south towards Berth 2.**

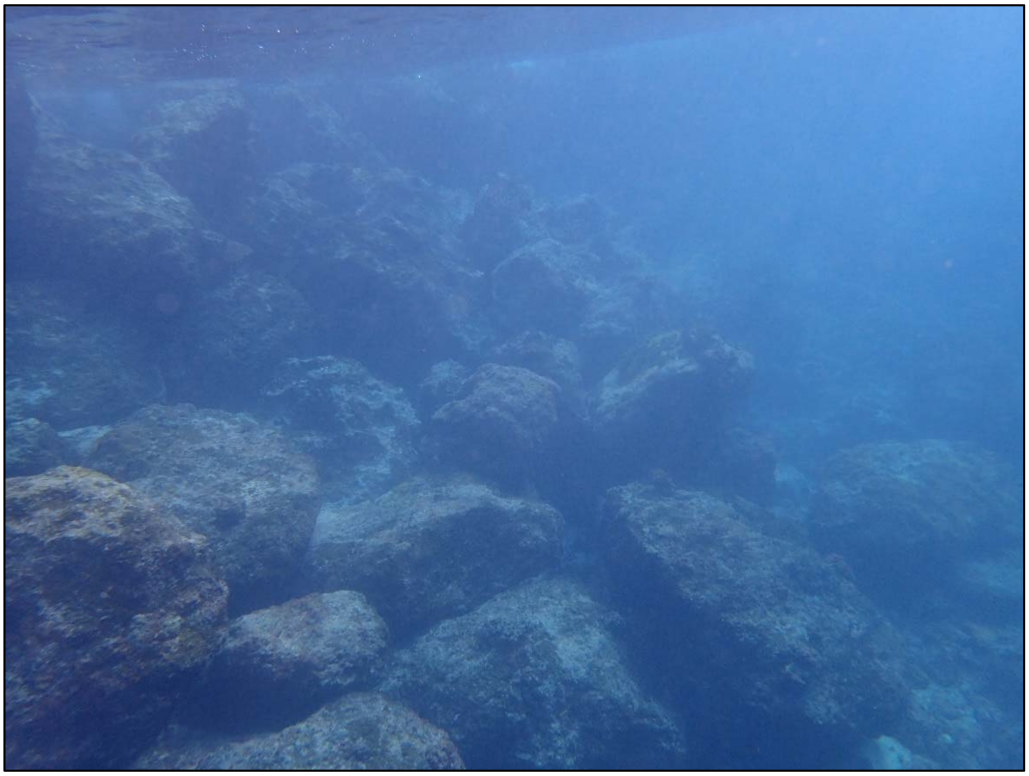

**Photo 41. The revetment between Berths 1 and 2 seen below water.**

## Item 8 – Bottom Condition

The bottom condition at Berth 1 was hard rock and coral. A buildup of a rock and coral conglomerate was typically found at the bottom of Berth 1. A wider, denser and more pronounced buildup was noted at the face of the berth from Station 1+20 to 1+40 and Station 0+80 to 0+90. The rock/coral buildup in front of the berth face in these sections started at 5-ft deep and projected out from the face of the sheet piles approximately 3-ft at 7-ft deep. At the bottom (9-ft MLLW) the rock/coral conglomerate extended 6-ft to 8-ft out from the face of the berth. This poses a potential navigational hazard for berthing vessels. The mudline depth at 10-ft out from the face of Berth 1 varied from 15-ft at Station 0+65 to 10-ft MLLW at Station 1+50. A bollard and tire were also noted on the bottom at Station 0+65.

The bottom condition at Berth 2 was mostly hard sandy bottom. The bottom at the face of the berth was approximately 14-ft MLLW and 10-ft away from the face of the bulkhead was 17-ft MLLW. Debris encountered included a 5-ft diameter tire at Station 0+40 (Photo 42), and a 20-in. square concrete pile approximately 15-ft long at the northwest corner.

**Recommendation(s) –** Post sign above rock pile at Berth 1 to advise of shallow depth at berth/navigation hazard as a short-term recommendation. If the rock/coral conglomerate needs to be removed for long term functionality, the process may have certain environmental permitting requirements.

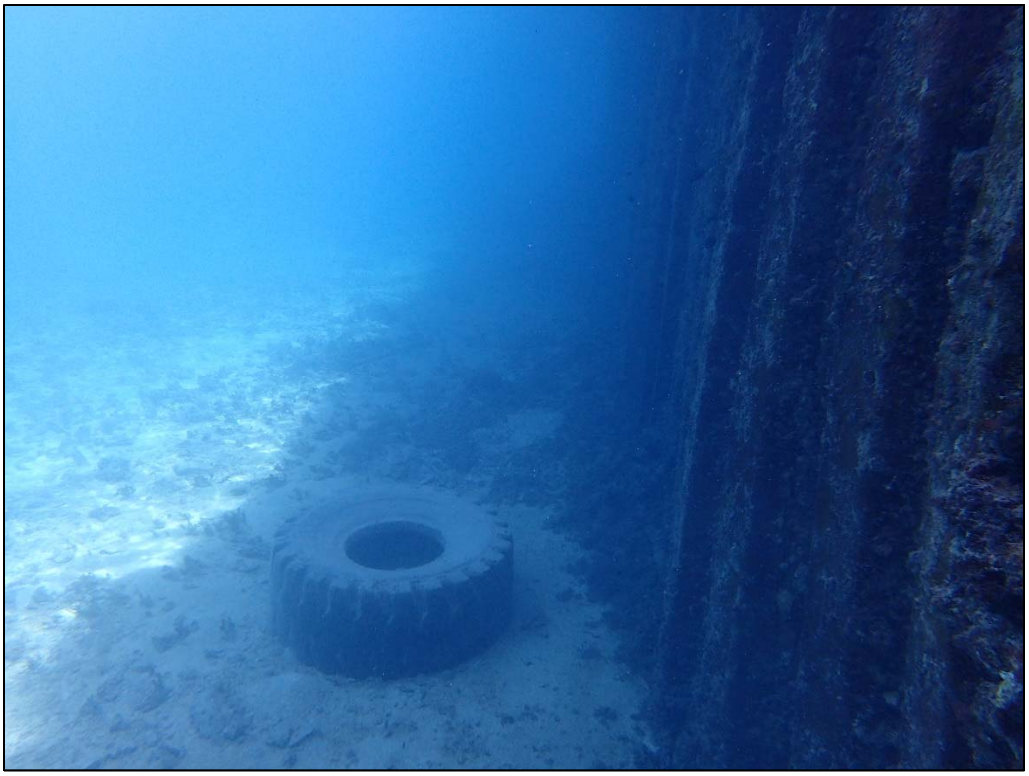

**Photo 42. The bottom condition and a tire at Berth 2 Station 0+40.**

## CONCLUSION

This inspection and assessment was performed to support the development of repair recommendations for the berths. The repair recommendations are presented below in a prioritized manner considering severity of damage, operational use of the facilities, and limited funding. No attempt has been made to discuss environmental permitting requirements at this time. The following is a summary of significant findings and recommendations listed on a prioritized basis as relates to the urgency of proposed repairs.

- Post navigational hazard sign above shallow area at Berth 1 (short-term).
- Remove failed portions of fender system (short-term).
- Re-install curbs in missing section at Berth 1 (short-term).
- Repair damaged curbs at both berths (long-term).
- Repair subsided areas in the deck at both berths (short-term repair).
- Perform Mooring and Berthing Analysis (long-term solution).
- Design appropriate fender system (long-term solution).
- Verify capacity of existing (to be installed) mooring hardware (long-term project).
- Weld cover plate over void at northwest corner at Berth 1 Station 1+50 (long-term repair).
- Design and install cathodic protection system at Berth 1 and 2 (long-term project).
- Consider long-term plan for replacement/major repairs to concrete pile cap at Berth 1.
- Perform shore protection study and consider adding riprap adjacent to berths (long-term).

The opportunity to be of assistance in this matter is very much appreciated. Should there be any questions in regards to this information, please do not hesitate to call.

Very truly yours,

Moffatt & Nichol

Mike Breitenstein, P.E.

Amanda Del Bello, P.E.

ADB:MNM:adb

# Attachment A – Mooring Hardware Evaluation

## *MOORING HARDWARE INSPECTION*

Each piece of hardware was rated using the criteria described below.

**Condition Rating**

A condition rating was assigned to each mooring hardware and, as applicable, the supporting structure, based on the numbering and color criteria described in Unified Facilities Criteria (UFC) 4-150-08, "Inspection of Mooring Hardware." The criteria used are summarized below:

Mooring Hardware Condition Rating

#1 No Defects (Green)

- New coating (minor blemishes and corrosion on less than 10% of surface area)
- No wear marks
- No visible corrosion of fasteners
- Bolt countersinks sealed

#2 Minor Defects (Blue)

- Minor surface corrosion (10% to 25% of surface area)
- Minor wear marks on fitting surface less than 3.125 mm (.0125 inches) deep
- Minor corrosion of fasteners

#3 Moderate Defects (Yellow)

- Heavy corrosion with loose scale (greater than 25% of surface area)
- Noticeable corrosion of fasteners
- Significant surface wear marks up to 7.8125 mm (0.3125 inches) deep

#4 Severe Defects (Red)

- Severe corrosion, heavy scale, noticeable surface pitting, and 25% or greater loss of area at critical section
- Displaced or rotated fitting
- Broken or cracked fitting components
- Noticeable corrosion and section loss of fasteners
- Loose fasteners

Mooring Support Structure Condition Rating

#1 No Defects (Green)

- Surface clean and smooth
- No cracking
- No noticeable deterioration

#2 Minor Defects (Blue)

- Weathering of concrete or wood
- Minor corrosion of steel (no significant section loss)

- Hairline cracking of concrete due to thermal expansion and/or age

#3 Moderate Defects (Yellow)

- Noticeable cracking of concrete due to age
- Corrosion of steel with section loss
- Timber cracked and check3ed, weathered, susceptible to dry rot

#4 Severe Defects (Red)

- Cracking or spalling as a result of overload under hardware base
- Dry rot on timber members
- Significant corrosion of steel members
- Displacement or yielding of any supporting members
- Loss of full bearing under hardware

It should be noted that the condition ratings, as defined here, have no relation to mooring fitting capacity. A mooring analysis is required in order to define the mooring capacities as relates to given loading conditions related to specific vessels under defined wind and current limits.

# Attachment B – Background Information

## STEEL DETERIORATION

To the observer the appearance of corrosion underwater in seawater is different than it is in the open air. Usually the surface of the metal is covered with marine growth which can be easily scraped away to reveal a crust which is composed of hematite ($Fe_2 0_3$), reddish-gray in color, and magnetite ($Fe_3 0_4$), which is gray-black in color. This crust is stiff and requires a hammer or a scraper for its removal. Beneath the crust is a soft black substance which can be rubbed off with the gloved hand, leaving bright metal. This material is Ferric Oxide (FeO). The presence of the FeO is a fortunate circumstance for the underwater photographer, as bright metal, so easily revealed, can enhance the corrosion edge of a hole or pattern and clearly outline the shape of the lost material.

The corrosion rate of steel in seawater is reported to be approximately 5-mil (0.005 in.) per year. This figure is much quoted and can lead to an erroneous conclusion as the rate may vary considerably. Laque relates that the corrosion rate at a test site at Kure Beach, North Carolina was a maximum of 0.025 in. per year in the splash zone for each exposed surface.

A number of factors influence the rate at which steel piling corrode in seawater. The following contribute to the corrosion process to varying degrees:

- Water temperature
- Concentration of oxygen in the seawater
- Ph value of sea water
- marine fouling on steel substrate
- Salinity of the seawater
- Velocity of the water flow around the structure
- Abrasive material in the water
- Galvanic effect of unlike metals

Piling in fresh or salt water can also be subject to loss of area due to chemical attack and abrasion. The corrosion process can further be enhanced by the presence of dissimilar metals with differing electrical potential that results in current flow and ion transfer. That is, one metal component acts anodically to another, much the same as a sacrificial anode - resulting in loss of steel by ion transfer.

The term 'galvanic action' is generally restricted to the changes in normal corrosion behavior caused by the current generated when one metal is in contact with a different one and the two metals are in a corrosive solution. However, the same effect can be caused by a differing electrical potential between areas of different stress levels in the same piece of metal. For instance, the head and tip of a common nail can act anodically to a cathodic stem.

*"Oxygen's role in seawater corrosion is a complex one. With some materials such as steel, it accelerates corrosion by serving as a cathodic depolarizer, with others, such as stainless steel, it retards corrosion by the development and repair of oxide films responsible for passivity. In addition to such direct effects, variations in oxygen concentration from point to point on a metal surface can generate corrosion currents. The surfaces with the smallest oxygen concentration suffer accelerated corrosion as anodes in a differential aeration or oxygen concentration cell."*

Such a cell can be developed at the mud line with the higher oxygen content in the water and the lower content below the mud line. In effect, the cell operates to remove metal below the mud line.

The normal profile of corrosion of unprotected steel, as in the case of piling or the supporting legs for offshore oil drilling structures is shown in Figure K-1 based on measurements of the distribution on corrosion of test piling exposed in a partially enclosed basin at Kure Beach, North Carolina.

A similar attack distribution was reported by the U.S. Army Engineers based on a survey of steel piling deterioration in several installations along the East Coast of the United States.

*"The maximum severity of corrosion in the splash zone just above the high tide level is accounted for by the fact that surfaces in this zone are in continuous contact with highly aerated seawater. The minimum corrosion within the tidal zone is due to the differential aeration cell protective effect just described. The secondary peak of corrosion just below low tide is also due to the differential aeration cell action in which the surfaces below low tide become anodic to the tidal zone surfaces. This peak is more evident in shallow water because of the smaller area below low tide".*

*"Steel piles which extended from 3 ft below the mud line into the atmosphere above the tidal range were exposed at six naval harbors for periods ranging from 13 to 27 years. At each of the sites the piles corroded at a higher rate in a zone located above the mud line than at the mud line level and below. The greatest corrosion generally occurred in the area of the splash zone above the high water mark. The corrosion rates at the 1 ft and 3 ft levels (below the mud line varied only slightly from those which occurred at the mud line, except at San Diego where a high corrosion rate was found 3 ft below the mud line."*

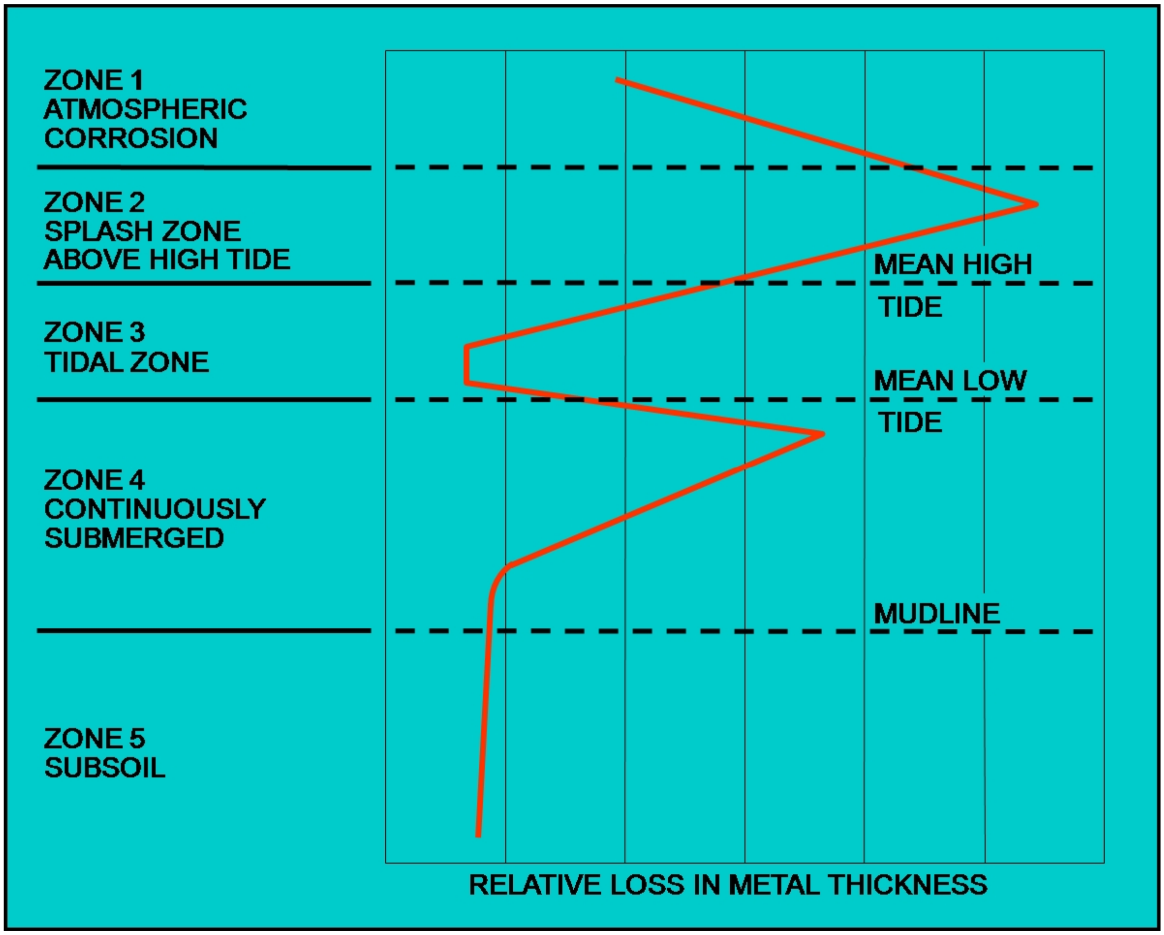


**Figure B-1. Steel Corrosion Rate Profile for Marine Structures**

## CONCRETE DETERIORATION

### Corrosion of Reinforcing Steel

Concrete deterioration in the marine environment takes on many forms. The most prevalent of these is corrosion of the steel reinforcing within the concrete structure. As steel corrodes, it undergoes a volumetric expansion, swelling to more than nine times the original volume. Since the steel is restrained by the surrounding concrete, an outward pressure is exerted on the concrete. This outward pressure is inherently a tensile force, and as concrete is relatively weak in this mode of loading; cracks and "spalling" of the concrete eventually occurs. Spalling leads to exposure of the reinforcing steel to the marine environment, which exacerbates the problem.

Mechanism of Steel Corrosion. Corrosion of steel reinforcing is governed by two processes - the first of these being the pacification of the highly alkaline concrete composition. The second process is the actual corrosion of the reinforcing bar by oxidation.

When first placed, concrete has a high pH value usually ranging from 12.5 to 13.2. This highly alkaline environment allows an oxidized film ($Fe_2O_3$) to form on the reinforcing steel. This film provides a protective layer around the steel, minimizing the potential for reactions with chloride ions from sea water. Above a pH of 13, the protective film is retained. However, the alkalinity is pacified over time by two processes - the ingression of sea salts and/or by carbonation of the concrete. Sea salts penetrate the concrete through capillary action, and therefore the time to pacification is dependent on the porosity of the concrete. Carbonation is a chemical reaction by which carbon dioxide reacts with calcium hydroxide, the alkaline compound found in fresh concrete, to form calcium carbonate. Calcium carbonate is a neutralized (pH=7) compound, and therefore reduces the high pH concrete environment needed to maintain the beneficial oxidized iron film.

Once the concrete structure has been pacified to the depth of the reinforcing steel, and the oxidized iron film is destabilized, the reinforcement is allowed to corrode. This corrosion is a continual oxidation of the steel bars and is dependent on the availability of oxygen. Since corrosion requires pacification as well as oxidation, the corrosion critical areas of any structural concrete in the marine environment will be those elements in the tidal or splash zones. These areas provide a constant supply of both aggressive salts and oxygen needed for a sustained corrosive attack. All concrete elements located in the marine environment however are susceptible, with varying rates of corrosion based on the level of exposure to corrosive elements.

As stated in the introduction, steel reinforcement expands as it corrodes. The volume of the oxidized iron product can be more than nine times that of the parent material. The pressure induced by the expansion of corroded steel eventually leads to cracking of the concrete. A condition known as "staining" or "bleeding" is usually apparent when deterioration of this sort is encountered, and consists of red rust leaching out of the concrete cracks. As the corrosion of the reinforcing continues, and outward pressure increases, the concrete covering the reinforcing bar eventually spalls out (See Figure I-2). The loss of cover over the bar leads to increased rate of corrosion, and loss of cross-sectional area of the bar.

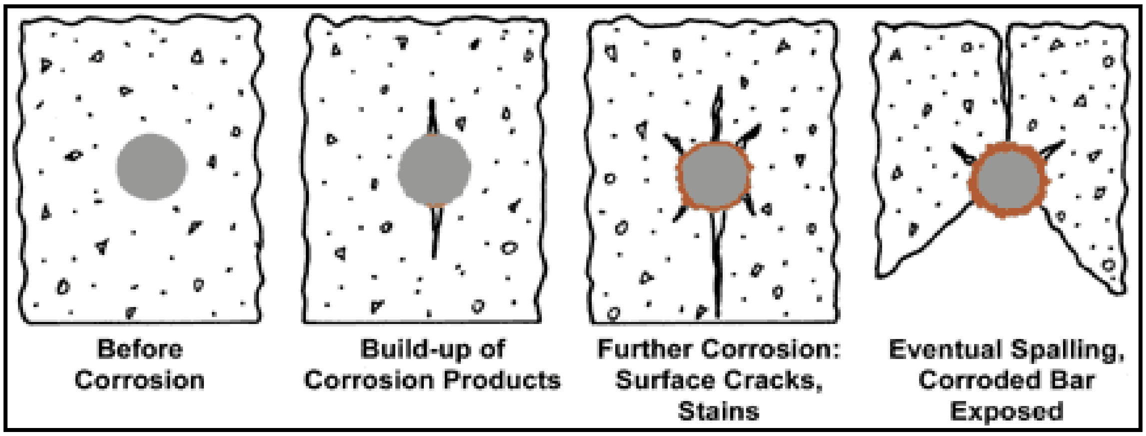


**Figure B-2 – Process of Steel Corrosion-Related Concrete Damage**

Deterioration of concrete marine structures may be caused by physical and/or chemical interaction with seawater. "If the structure is fully immersed, the attack on the material by seawater is essentially chemical. In alternating immersion and exposure conditions, the attack is of chemical and physical nature. The mechanical action of the waves, the swelling and shrinkage caused by the alternate saturation and drying, atmospheric conditions (wind, exposure to the sun, freezing) and the electrochemical corrosion of steel reinforcement are physical processes which add to the chemical destruction processes."

Submerged deterioration of the concrete as observed by this firm has been limited to what has been identified as secondary ettringite formation, sulfate attack, alkali-silica reaction and corrosion. The electrochemical corrosion of the reinforcing steel is most active in the tidal range and splash zone where both oxygen and the chloride ion are readily available. Below water, the concentration of chlorides and oxygen are less than in the splash zone. However, in time it will reach the reinforcing steel and initiate corrosion.

"The mechanism of concrete corrosion (deterioration) is extremely complex for it depends on a certain number of parameters which are not always easy to isolate and which react in varying degrees according to the composition and the exposure of the material."

## Secondary Ettringite Formation

Secondary ettringite formation is defined as ettringite formed by reaction of sulfate ion and aluminate in concrete that has hardened and developed its intended strength. The sulfate which fuels the reaction is supplied from within the concrete. The reaction has also been referred to as "delayed ettringite formation" in the literature.

Ettringite is formed when sulfates (SO3) react with the free lime (calcium hydroxide (CaOH2) to form gypsum (CaSO4). The gypsum then reacts with tricalcium aluminate (CaAl2) and water to form ettringite (Ca6Al2(SO4)3(OH12)). Many of these reactants are in the cement and/or seawater.

There are two theories as to the mechanism of expansion caused by this phenomenon. In the swelling theory ettringite forms by a through-solution mechanism. In a saturated CH environment ettringite crystals are gel-like and colloidal in size. The high surface area results in adsorption of significant quantities of water and strong swelling pressures develop. It has been observed that a higher proportion of ettringite is found at the transition zone between the aggregate and steel than in the bulk matrix. This finding supports the through-solution mechanism of expansion, since constituents must dissolve and diffuse towards the steel/aggregate surface where the ettringite is precipitated. In the crystal growth theory, expansion is caused by the formation of ettringite at the surface of the reactant grains. The growth of this inner layer pushes other particles out and thus causes expansion. Estimates of crystal growth pressures have been as high as 35,000 psi.

There is some experimental evidence into the various causes and rate of ettringite formation. Some of the components which may affect ettringite formation are elevated temperatures during curing, (SO3)/(Al2O3) ratios, geometry and humidity.

It appears that sufficiently high heat treatment, temperatures above 60-70o C, contributes to the secondary ettringite formation. When concrete is cured at elevated temperatures, ettringite disappears into a calcium-sulfate-hydrate gel and/or monosulfate, this results in the sulfate being unusually bound. The bond is such that it allows a later slow release of the sulfate ion into the pore solution which then combines with tricalcium aluminates to produce ettringite.

The ratios of the aluminum oxide (Al2O3) and sulfur trioxide (SO3) in the cement have shown potentials for expansion when the (SO3)/(Al2O3) is greater than 0.67. Later experiments indicate that the sulfur trioxide may have a greater contribution to the expansion. Therefore, the ratio indicating the potential for expansion has been adjusted to (SO3)2/(Al2O3) greater than 2.

Other items which could contribute to expansion are geometry and humidity. 10x40x160 mm cubes produced much earlier expansions than 40x40x160 mm cubes and specimens in a water soak had earlier expansions than specimens in 60% humidity.

Air-entrainment of the concrete has been shown to reduce the observed expansions due to secondary ettringite formation when comparison is made to non-entrained concrete. The air voids allow the formation of ettringite within the void and prevents the associated microcracking caused by expansion in the paste. In a similar fashion, the addition of silica fume has found to be beneficial by increasing the density of the paste in the transition zone at the aggregate/matrix interface.

It should be mentioned that ettringite formation is part of the hydration process used to make concrete. This formation of ettringite is while the concrete is in a plastic state and helps the concrete develop strength - therefore, this formation is beneficial. This reaction is often referred to as “primary ettringite formation”.

## Sulfate Attack

Sulfate attack is a type of secondary ettringite formation. It results from the reaction of sulfate ions and aluminates in hardened concrete. The sulfate is typically from an external source - in the case of marine structures the sulfate is in the seawater It is generally accepted that the primary aggressive constituents of seawater, relative to attack upon the cementitious matrix of portland cement concrete, are magnesium and sulfate ions.

"Magnesium sulfate also reacts with aluminates that are a constituent of the portland-cement, primarily tricalcium aluminate, with consequent production of ettringite (high sulfate calcium sulfoaluminate, 3Ca0.Al203.3CaS04.31H20). Formation of ettringite as a solid-state reaction within the cement-paste matrix can be highly destructive to portland cement concrete because of the increase of solid volume that accompanies the process. Contrariwise, formation of ettringite by a through-solution process whereby the crystals are precipitated within pre-existing openings, such as air voids and cracks, is not harmful."

This reaction can be accompanied by considerable expansion, which causes cracking and spalling of the concrete.

## Alkali-Silica Reaction

In the alkali-silica reaction, the alkalis are the metal alkalis sodium and potassium, both of which are present in seawater. For the reaction to occur, reactive silica, sodium and potassium alkalis and water must all be present. It is primarily a reaction between the hydroxyl ions in the pore water of a concrete and certain forms of silica which occasionally occur in significant quantities in aggregate.

"In the alkaline environment within a concrete, an acid/alkali reaction occurs at the accessible surfaces of the silica forming a hydrous silicate. Hydroxyl ions are imbibed into the silica particle and some of the silica oxygen linkages are attacked, weakening the bonding locally. Sodium and potassium cations then diffuse to maintain an electrical neutrality and attract water to form gelatinous alkali-metal-ion hydrous silicate."

The gelatinous silicate increases the solid volume of the concrete. This can cause microcracking and macrocracking, which is destructive to the concrete. If the gel forms in pre-existing air voids, water voids, or when the concrete is in the fresh state, the reaction is not harmful. If the gel forms in the hardened solid concrete, the reaction is harmful.

Sodium and potassium ions and water, two of the constituents of this reaction, are present in seawater. If reactive silicas are present in the concrete, the alkali-silica reaction can occur. However, if the reactive silica content is low and gel growth after the concrete has hardened is of insufficient intensity to induce cracking, the “gel growth occurs without any adverse effect on the concrete. When the reactive silica content is above this level, cracking induced by the gel occurs.

The width of the macrocracks induced by alkali-silica reaction at the exposed surface of a concrete member can range from less than 0.004 in. to 0.40 in. in extreme cases. The macrocracks are generally located within 1-2 in. of the exposed surface of a concrete member and are aligned perpendicular to the exposed surface. However, there are exceptions, in the case of a prestressed column a crack depth of approximately 4 ¾" has been recorded.

One example of severe alkali-silica deterioration has occurred at the Friant Dam, constructed during the period 1939 to 1942. In 1980, Boggs noted that alkali-aggregate reaction had occurred to some extent since construction but that the reaction progress appeared to have accelerated from excellent-looking concrete in the late 1960's to wide cracks on the crest and the appurtenant structures in 1980. Deterioration has not yet reached the point of jeopardizing the safe operation of the dam but eventually will.

"Cracking due to ASR (alkali-silica reaction) has been observed within 3 months in one batch of concrete specimens containing a UK (United Kingdom) aggregate stored under water at 20o C, whereas a similar concrete stored in the open took approximately 3.6 years to crack."

This is only one observation; however, it affirms the observed underwater crack predominance. If it is presumed that the observed rate of dry cracking to underwater cracking (14:1) is correct, than the underwater cracks caused by the alkali-silica reaction should occur in a shorter period of time compared to cracks forming above water – given the same concrete material.

During a previous underwater investigation in San Diego, cracks were observed during the initial inspection of the piles. The inspected piles were approximately 12 years of age. Using the above-mentioned 14:1 rate, this would correlate to above water cracks becoming visible at 168 years of age. This would indicate that it is possible for an aggregate to have a good above water history and not be acceptable for underwater use.

This reaction can be accompanied by considerable expansion, which causes cracking of the concrete, a reduction in the concrete compressive strength and a reduction in the modulus of elasticity.

"Alkali-silica reactivity by itself seldom results in the need to rebuild the structure but, rather, it may weaken or degrade the condition of the structure to the extent that other factors, such as traffic loading, cause premature failure.

# Appendix B Rota Island Harbor – Coastal Engineering Analysis, prepared by Moffatt & Nichol, June 23, 2017


# Rota Island Harbour
# - Coastal Engineering Analysis

Presented to:

Commonwealth Ports Authority (CPA)

*June 23, 2017*

Prepared by:

moffatt & nichol

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# 1. Introduction

Moffatt & Nichol (M&N) was retained by the Commonwealth Ports Authority (CPA) to conduct a coastal engineering study for the Rota West Harbor. Rota Harbor is located on the west end of the Island of Rota, in the Commonwealth of the Mariana Islands, on the west side of Taipingot Peninsula and adjacent to Songsong village. It is the only harbor serving the Island, and is operated by the Commonwealth Ports Authority.

The harbor was originally developed by the Japanese prior to World War II, and the present harbor facilities were constructed as a joint Federal (U.S. Army Corps of Engineers) and CNMI project in 1985. Existing harbor features include an entrance channel and a turning basin and berthing area dredged into the 1,000-foot-wide shallow fringing reef, with protection provided by a low elevation offshore island. Vessel docking and cargo handling is primarily accomplished at a 100-foot-long solid fill concrete dock adjacent to the basin extension, with an older 145-foot-long dock located landward of the entrance channel serving as an auxiliary dock during low incident wave conditions. Cargo containers are loaded and unloaded by a truck crane.

The exposure of the existing harbor to wind, waves and currents in hazardous navigation and berthing, and the lack of adequate dock space and limited cargo handling and storage facilities limits growth of waterborne cargo. Economic growth requires a harbor facility which can safely and efficiently accommodate both present and future cargo demands.

Navigation problems include wave action and currents in the channel and basin, as well as wave energy at the dock due to inadequate sheltering by the offshore island, and inadequate depth and maneuvering room for even the 160-foot-long supply boat which presently serves the island.

The present study includes review available reports, studies, and record documents, including existing bathymetric, wind / wave / current studies and historic studies. The collected wind, wave and current data from an emplaced sensor array of three units within and near the entrance to Rota West Harbor. This data collection took place over a three-month period and were correlated with barge movement during the same time. Analysis of the three months of field data collected in Rota, along with freely available regional wind and wave data sets, to develop a working summary of wind, wave and current climate influencing the harbor and navigation channel.

# 2. Previous Data and Report Review

Previous data presented in the technical report of "Rota Harbor Master Plan, Sea Side" prepared by Sea Engineering, Inc. in 1997 was reviewed. The problems for the existing harbor and the oceanographic characteristics based on the data collected during 1971 and 1980 were summarized as below.

## 2.1. Problems for the Existing Harbor

Harbor users (Angyuta Shipping Company, LTD. and Rota Terminal and Transfer Company, Inc.) report the relatively frequency occurrence of wind and wave action in the harbor which poses a risk to vessel navigation and berthing, as well as hampering cargo handling at the dock. These problems are summarized below:

Wave Action at the Channel Entrance – Problems with waves at the entrance increase with larger wave heights, however harbor users report that wave action at the entrance typically does not preclude safe entry by the vessels currently using the harbor.

Wind and Current in Turning Basin – Transport of water onto the reef flat by breaking waves induces a current in the channel and turning basin as it returns to sea, and this, coupled with the prevailing winds blowing parallel to the coast, presents a significant hazard to slow moving vessels maneuvering in the turning basin. Because the turning basin is surrounded by shallow water and hard reef rock, there is considerable risk of damage or grounding if the vessel is pushed by the wind and currents.

Wave Action at the Dock – The berthing and docking areas are exposed to incident wave energy entering the harbor. Refracted and diffracted wave crests approach nearly parallel to the dock, resulting in vessel movement that can damage the vessel and make cargo handing difficult and dangerous. The often rough berthing conditions require extra lines and fenders in order to prevent damage to the vessel and dock.

## 2.2. Oceanographic Characteristics

The project site is directly exposed to wind, waves and storms, and these parameters serve as primary factors influencing the layout and configuration of the harbor, as well as providing the basis for protective structure design.

### 2.2.1. Tide

The tides in Rota are semi-diurnal with pronounced diurnal inequalities. Tide data published by International Marine (1996), shows that the mean tide range is 1.2 feet and diurnal range is 2.1 feet. Tidal data for Rota Island is presented in Table 1.

*Table 1: Tidal Data*

| | |
|---|---|
| Mean Higher High Water (MHHW) | 0.6 feet |
| Mean High Water (MHW) | 0.5 feet |
| Mean Sea Level (MSL) | 0.0 feet |
| Mean Low Water (MLW) | -0.7 feet |
| Mean Lower Low Water (MLLW) | -1.5 feet |

### 2.2.2. Wind

The Marine Climatological Summary (MCS) prepared by the Japan Meteorological Agency contains statistical summaries of prevailing wind conditions. Table 2 presents the MCS wind data for the grid sector which includes Rota for a 10-year period (1971-1980). Typical tradewind speeds are 10 to 20 knots, with winds speeds in excess of 21 knots occurring less than 11 percent of the time. A wind rose is shown on Figure 1.

*Table 2: Percent Frequency of Deepwater Winds (Data Period: 1971-1980; Data Source: Marine Climatological Summary)*

| SPEED (M/S) | DIRECTION (*10 DEG.) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CALM/ VAR. | 35-01 | 02-04 | 05-07 | 08-10 | 11-13 | 14-16 | 17-19 | 20-22 | 23-25 | 26-28 | 29-31 | 32-34 | TOTAL |
| 0.0-0.5 | 1.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.12 |
| 0.5-1.5 | 0.00 | 0.33 | 0.27 | 0.20 | 0.40 | 0.23 | 0.33 | 0.08 | 0.08 | 0.10 | 0.07 | 0.05 | 0.13 | 2.28 |
| 2.1-3.1 | 0.00 | 0.45 | 0.86 | 1.48 | 1.74 | 1.14 | 0.68 | 0.50 | 0.37 | 0.29 | 0.18 | 0.14 | 0.35 | 8.18 |
| 3.6-5.1 | 0.00 | 0.49 | 1.68 | 5.02 | 6.13 | 3.18 | 1.53 | 0.80 | 0.47 | 0.43 | 0.36 | 0.33 | 0.43 | 20.86 |
| 5.7-8.0 | 0.00 | 0.57 | 2.78 | 0.7 | 11.99 | 4.62 | 1.57 | 0.87 | 0.60 | 0.49 | 0.33 | 0.28 | 0.34 | 35.23 |
| 9-11 | 0.00 | 0.34 | 1.93 | 8.28 | 7.05 | 1.93 | 0.52 | 0.29 | 0.39 | 0.31 | 0.11 | 0.11 | 0.14 | 21.39 |
| 11-14 | 0.00 | 0.11 | 1.00 | 3.96 | 2.26 | 0.46 | 0.25 | 0.17 | 0.20 | 0.23 | 0.05 | 0.09 | 0.05 | 8.84 |
| 14-17 | 0.00 | 0.03 | 0.28 | 0.65 | 0.31 | 0.12 | 0.05 | 0.10 | 0.04 | 0.08 | 0.04 | 0.02 | 0.04 | 1.77 |
| 18-21 | 0.00 | 0.01 | 0.02 | 0.04 | 0.03 | 0.02 | 0.01 | 0.00 | 0.03 | 0.09 | 0.02 | 0.00 | 0.00 | 0.26 |
| 21-24 | 0.00 | 0.01 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.05 |
| 25-28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 29-33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 33< | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| TOTAL | 1.12 | 2.35 | 8.83 | 30.44 | 29.93 | 11.71 | 4.94 | 2.81 | 2.18 | 2.02 | 1.15 | 1.04 | 1.49 | 100.00 |

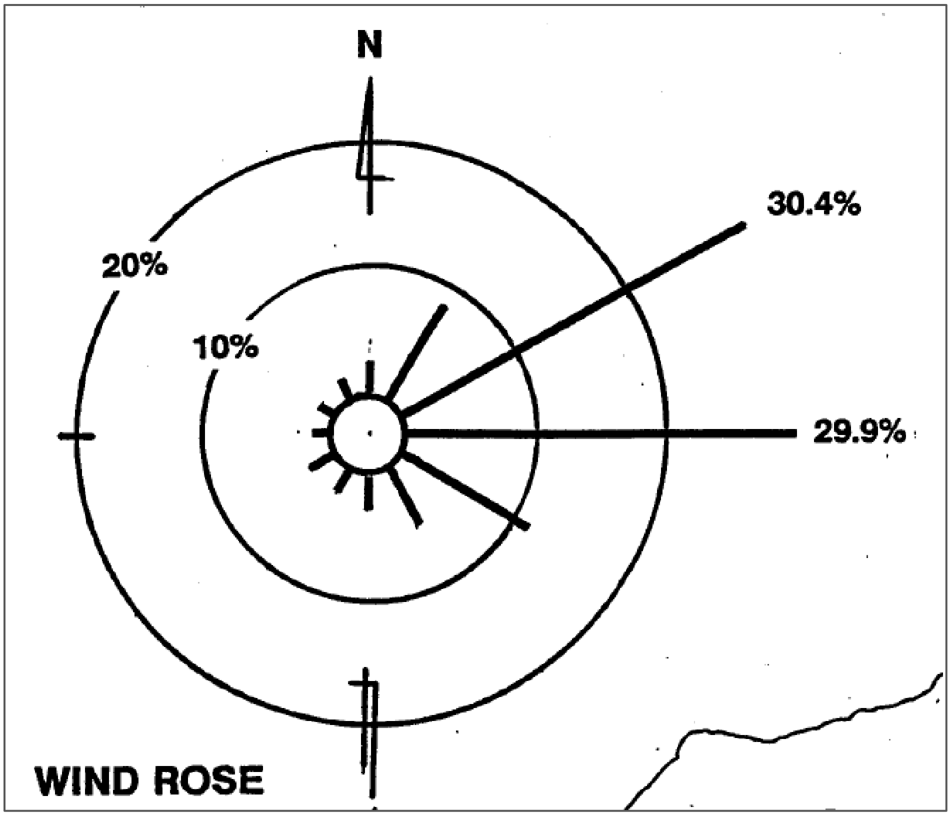


*Figure 1: Wind Rose at Deepwater Area*

### 2.2.3. Wave

The marine Climatological Summary (MCS) contains statistical summaries of annual deepwater wave conditions for Rota and the vicinity. The wave data was obtained through direct synoptic observation by shipboard personnel in the area and represents data observed during the 10-year period of 1971-1980. Because the MCS data was obtained from vessels that would typically avoid regions of impending storms, the data does not adequately represent the extreme storm wave events.

Table 3 through Table 5 present the MCS wave data; wave height versus wave direction, wave period versus wave direction and wave height versus wave period. Prevailing waves are 3 to 8 feet (1 to 2.5 meters) with wave periods of 6 to 9 seconds. A general wave rose is shown on Figure 2. Approximately 80 percent of the prevailing waves approach from the north-northeast through the southeast.

*Table 3: Percent Frequency of Deepwater Wave Heights versus Wave Directions (Data Period: 1971-1980; Data Source: Marine Climatological Summary)*

| HEIGHT (MTRS) | DIRECTION (*10 DEG.) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 35-01 | 02-04 | 05-07 | 08-10 | 11-13 | 14-16 | 17-19 | 20-22 | 23-27 | 26-28 | 29-31 | 32-34 | IND. | TOTAL |
| <0.5 | 0.40 | 0.58 | 1.27 | 1.73 | 1.17 | 0.51 | 0.17 | 0.21 | 0.09 | 0.21 | 0.06 | 0.21 | 0.41 | 7.02 |
| 1-1.5 | 1.76 | 3.82 | 8.93 | 11.42 | 5.85 | 1.17 | 0.62 | 0.53 | 0.79 | 0.92 | 0.76 | 0.69 | 0.00 | 37.26 |
| 2-2.5 | 1.47 | 4.49 | 9.45 | 10.14 | 3.51 | 0.69 | 0.26 | 0.48 | 0.64 | 0.82 | 0.53 | 0.44 | 0.00 | 32.91 |
| 3-3.5 | 0.65 | 1.78 | 3.66 | 2.54 | 0.54 | 0.13 | 0.08 | 0.33 | 0.41 | 0.39 | 0.31 | 0.26 | 0.00 | 11.08 |
| 4-5.5 | 0.18 | 0.59 | 1.04 | 0.58 | 0.08 | 0.08 | 0.05 | 0.11 | 0.17 | 0.27 | 0.08 | 0.07 | 0.00 | 3.30 |
| 6-7.5 | 0.00 | 0.02 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.11 |
| 8-9.5 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | 0.01 | 0.00 | 0.05 |
| 10< | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| IND. | 0.50 | 0.80 | 2.36 | 2.31 | 0.86 | 0.42 | 0.33 | 0.15 | 0.11 | 0.07 | 0.13 | 0.13 | 0.07 | 8.24 |
| TOTAL | 4.98 | 12.08 | 26.74 | 28.76 | 12.01 | 3.00 | 1.51 | 1.82 | 2.23 | 2.71 | 1.88 | 1.80 | 0.48 | 100.00 |

*Table 4: Percent Frequency of Deepwater Wave Periods versus Wave Directions (Data Period: 1971-1980; Data Source: Marine Climatological Summary)*

| PERIOD (SEC.) | DIRECTION (*10 DEG.) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 35-01 | 02-04 | 05-07 | 08-10 | 11-13 | 14-16 | 17-19 | 20-22 | 23-25 | 26-28 | 29-31 | 32-34 | IND. | TOTAL |
| < 5 | 0.86 | 2.48 | 6.21 | 7.70 | 3.89 | 1.24 | 0.57 | 0.55 | 0.51 | 0.45 | 0.35 | 0.61 | 0.39 | 25.81 |
| 6- 7 | 1.51 | 4.62 | 9.17 | 10.07 | 4.52 | 0.83 | 0.34 | 0.64 | 0.87 | 0.89 | 0.58 | 0.48 | 0.00 | 34.51 |
| 8- 9 | 0.89 | 2.57 | 4.64 | 5.03 | 1.74 | 0.27 | 0.21 | 0.31 | 0.51 | 1.04 | 0.66 | 0.33 | 0.00 | 18.19 |
| 10-11 | 0.21 | 0.32 | 0.63 | 0.58 | 0.26 | 0.08 | 0.03 | 0.08 | 0.12 | 0.11 | 0.07 | 0.08 | 0.00 | 2.57 |
| 12-13 | 0.13 | 0.16 | 0.14 | 0.25 | 0.03 | 0.05 | 0.02 | 0.08 | 0.06 | 0.05 | 0.02 | 0.02 | 0.01 | 1.01 |
| 14< | 0.07 | 0.07 | 0.20 | 0.14 | 0.08 | 0.03 | 0.00 | 0.01 | 0.02 | 0.03 | 0.01 | 0.02 | 0.00 | 0.67 |
| IND. | 1.32 | 1.88 | 5.75 | 5.00 | 1.49 | 0.49 | 0.35 | 0.15 | 0.14 | 0.13 | 0.20 | 0.26 | 0.08 | 17.23 |
| | 4.98 | 12.08 | 26.74 | 28.76 | 12.01 | 3.00 | 1.51 | 1.82 | 2.23 | 2.71 | 1.88 | 1.80 | 0.48 | 100.00 |

*Table 5: Percent Frequency of Deepwater Wave Heights versus Wave Periods (Data Period: 1971-1980; Data Source: Marine Climatological Summary)*

| HEIGHT (MTRS) | PERIOD (SEC.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | < 5 | 6 - 7 | 8 - 9 | 10-11 | 12-13 | 14 < | IND. | TOTAL |
| <0.5 | 5.34 | 0.67 | 0.58 | 0.05 | 0.08 | 0.04 | 0.27 | 7.02 |
| 1-1.5 | 14.11 | 14.09 | 5.25 | 0.61 | 0.23 | 0.34 | 2.63 | 37.26 |
| 2-2.5 | 5.53 | 15.05 | 7.37 | 0.93 | 0.25 | 0.13 | 3.66 | 32.91 |
| 3-3.5 | 0.76 | 3.82 | 3.66 | 0.65 | 0.22 | 0.06 | 1.90 | 11.08 |
| 4-5.5 | 0.03 | 0.80 | 1.32 | 0.30 | 0.23 | 0.09 | 0.52 | 3.30 |
| 6-7.5 | 0.02 | 0.05 | 0.01 | 0.02 | 0.00 | 0.01 | 0.02 | 0.11 |
| 8-9.5 | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 |
| 10< | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 |
| IND. | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 8.22 | 8.24 |
| TOTAL | 25.81 | 34.51 | 18.19 | 2.57 | 1.01 | 0.67 | 17.23 | 100.00 |

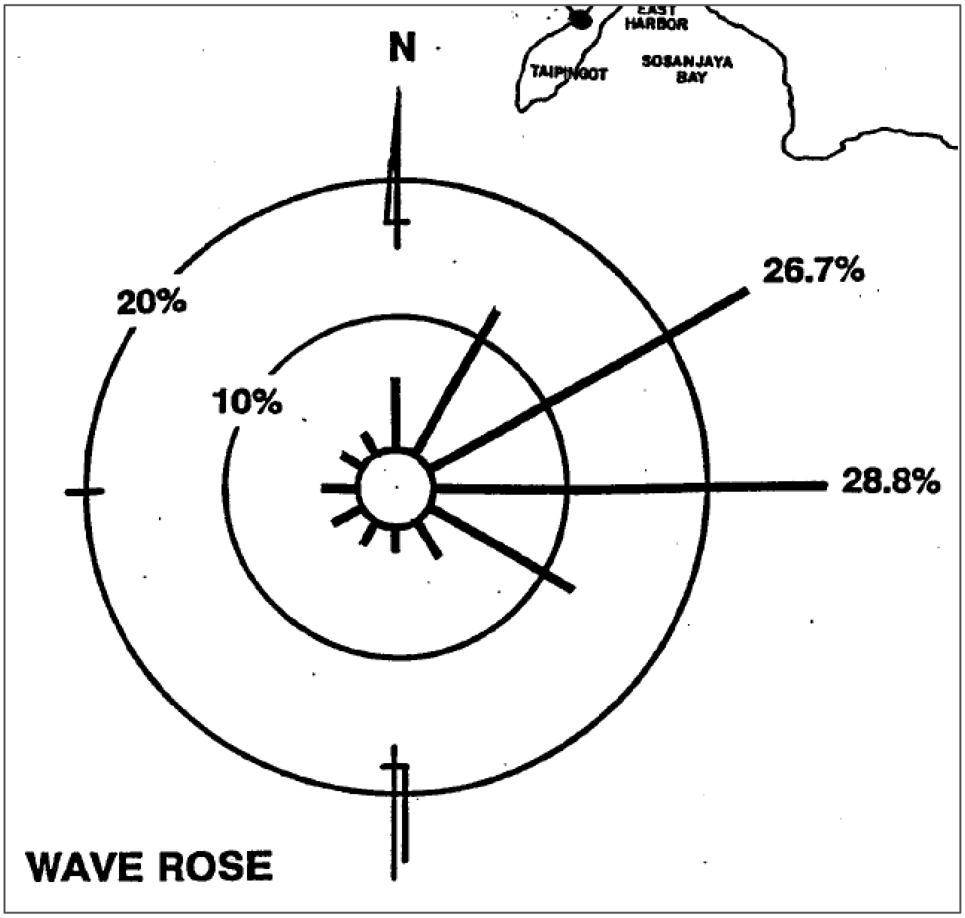


*Figure 2: Wave Rose at Deepwater Area*

# 3. New Field Data Analysis

In order to understand the environmental conditions at Rota Island Harbor, three wave gages were deployed by RPS Evans-Hamilton to measure the surface waves and water currents during December 2, 2016 through March 3, 2017. A met station was installed to collect wind data. Figure *3* illustrates the three wave gage locations and the met station location. At offshore wave gage and inshore wave gage, the directional surface waves and currents at each layer were measured. At basin wave gage, only non-directional surface waves were measured.


Figure 3. Wave Gage Locations at Rota Island Harbor (Dec. 2, 2016 through Mar. 3, 2017)

## 3.1. Winds

The wind conditions at Rota Island Harbor were analyzed and a wind rose was developed based on the three month data (see Figure *4*). The prevailing winds are from northeast and east-northeast which predominate over 71.6 percent of the time. The wind speed of 1-percent exceedance is approximately 10.6 m/sec (21.2 knots) (see Figure *5*).

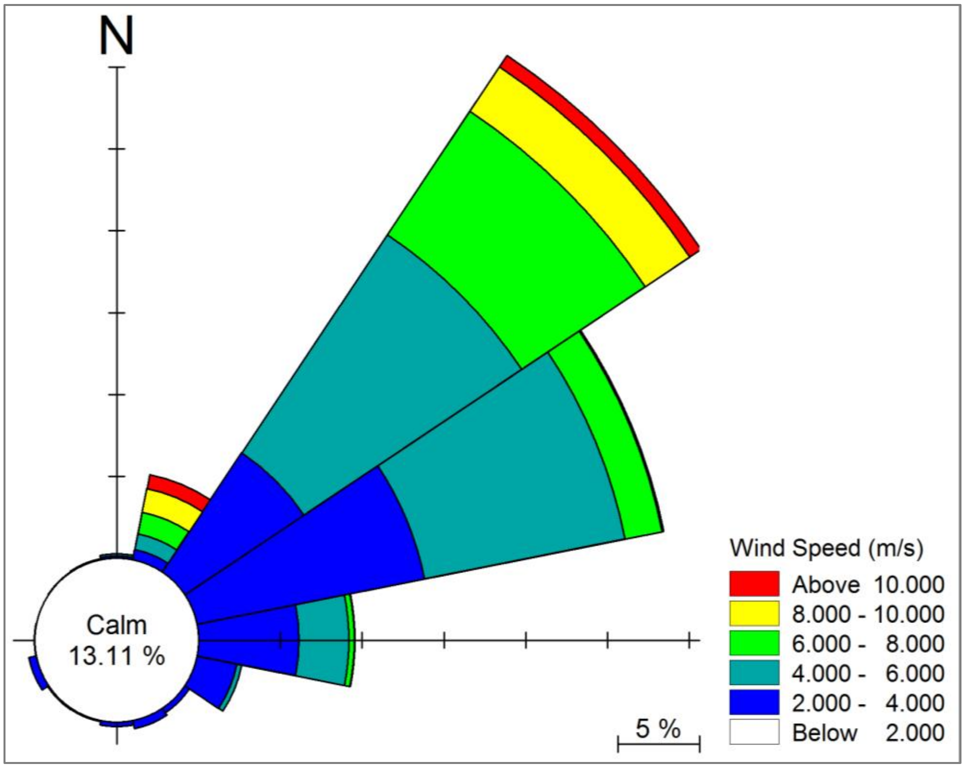


Figure 4. Wind Rose (Dec. 2, 2016 through Mar. 3, 2017)

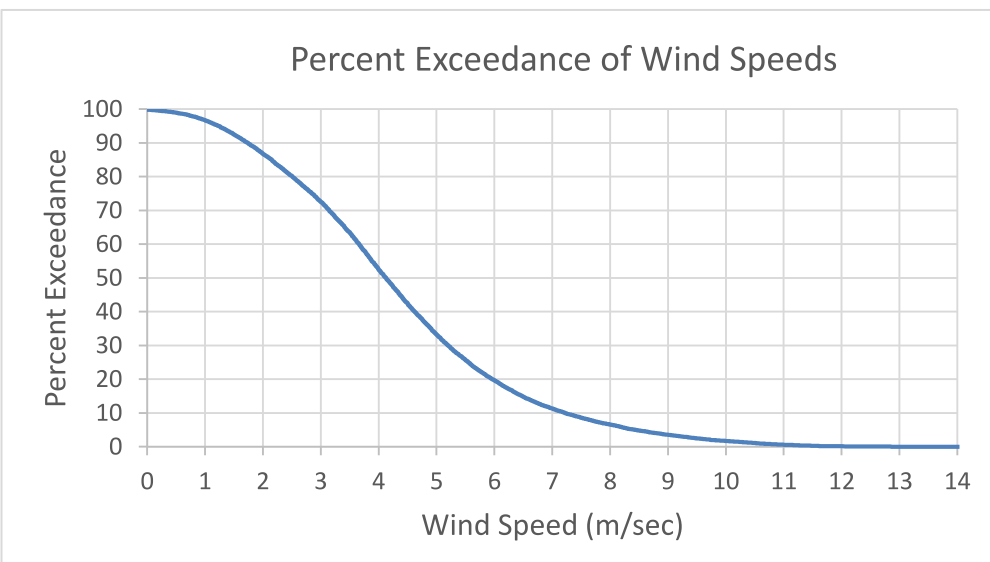


Figure 5. Percent Exceedance of Wind Speeds (Dec. 2, 2016 through Mar. 3, 2017)

## 3.2. Waves at Offshore Location

The offshore wave gage station is located at the water depth of approximate 13 meters measured at deployment. The statistical offshore wave conditions are illustrated in Figure *6* and Figure *7*. The prevailing offshore waves are from north-northwest which predominate over 82.7 percent of the time. The occurrence of wave periods between 8 sec and 12 sec is approximately 83.9 percent of the time. The offshore significant wave heights occurring 1-percent of the time are higher than 2.33 m (see Figure *8*).

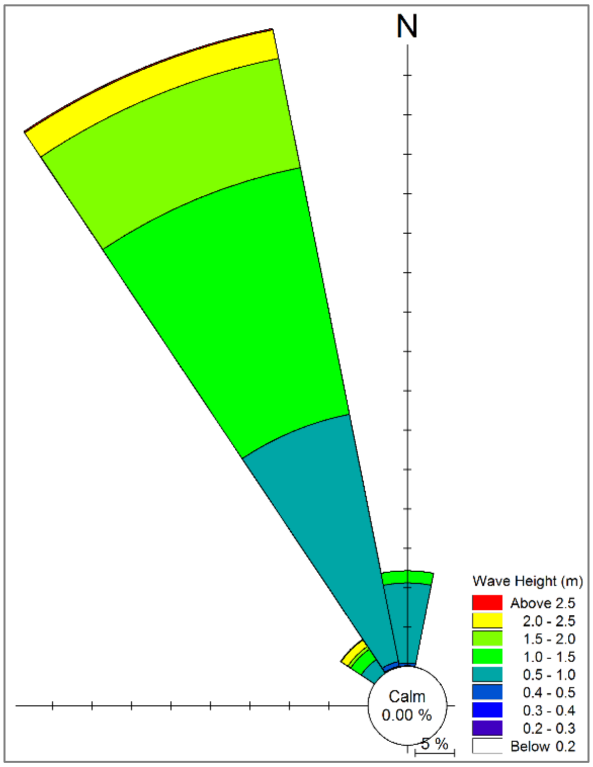


Figure 6. Wave Rose at Offshore Location (Dec. 2, 2016 through Mar. 3, 2017)

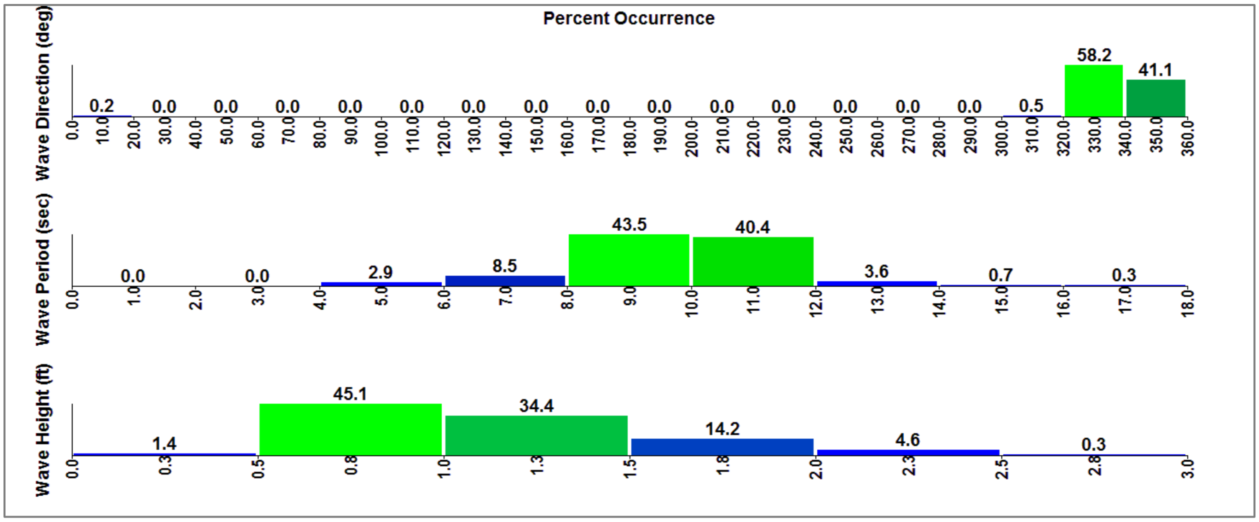


Figure 7. Measured Wave Conditions at Offshore Location (Dec. 2, 2016 through Mar. 3, 2017)

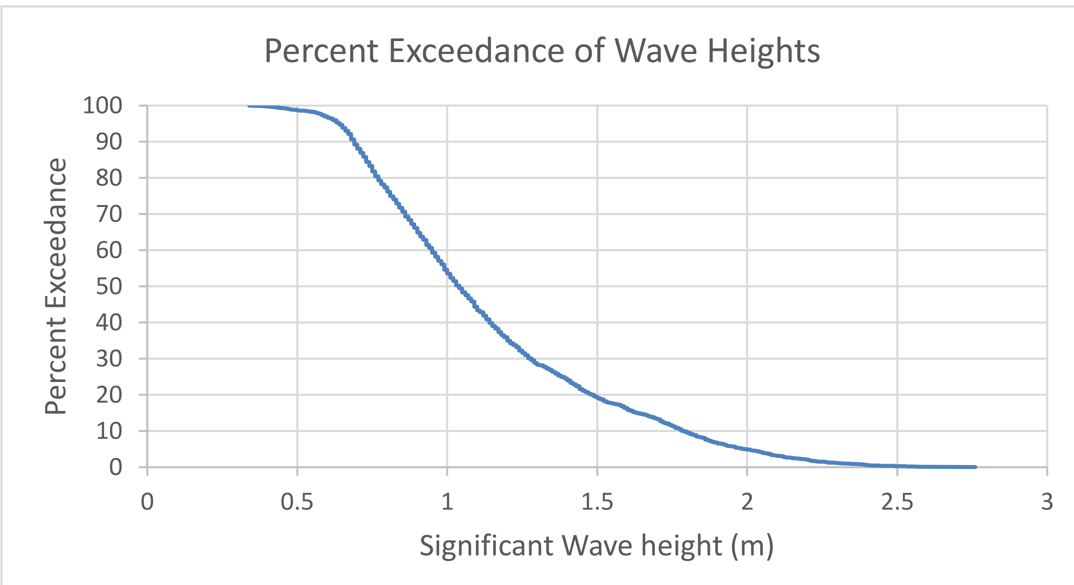


Figure 8. Percent Exceedance of Wave Heights at Offshore Location (Dec. 2, 2016 through Mar. 3, 2017)

## 3.3. Waves at Inshore Location

The inshore wave gage station is located at the water depth of approximate 10 m measured at deployment. The statistical inshore wave conditions are illustrated in Figure *9* and Figure *10*. The prevailing offshore waves are from west which predominate over 87.6 percent of the time. The occurrence of wave periods between 8 sec and 12 sec is approximately 90.8 percent of the time. The occurrence of the wave periods longer than 12 sec has approximately 25.8 percent of the time. The inshore significant wave heights occurring 1-percent of the time are higher than 0.80 m (see Figure *11*).

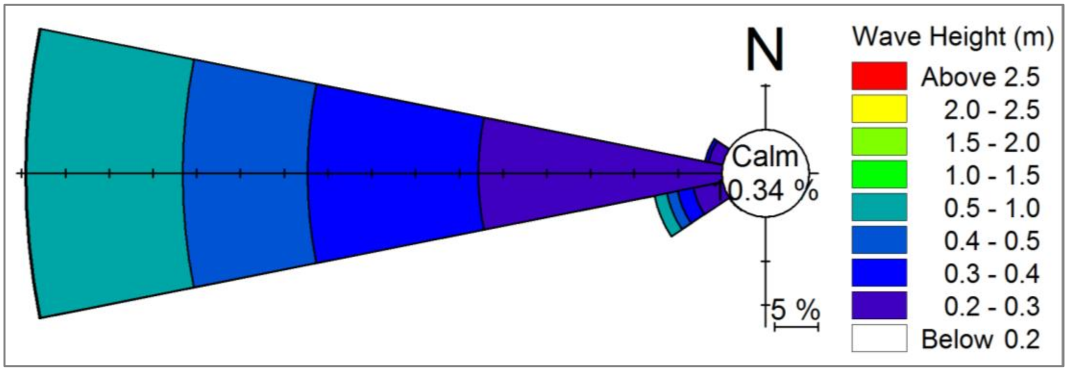


Figure 9. Wave Rose at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

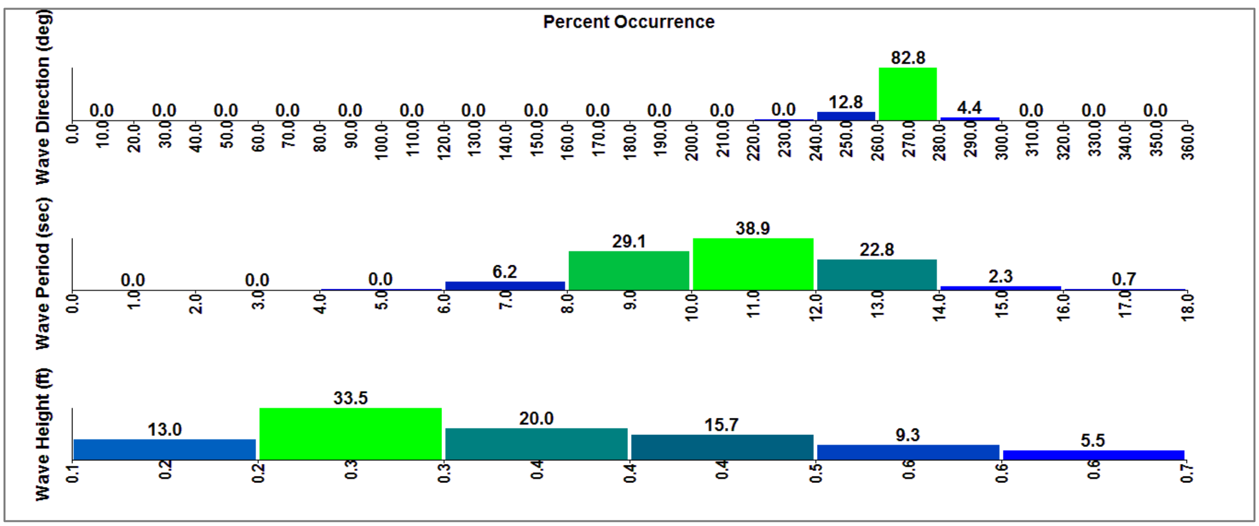


Figure 10. Measured Wave Conditions at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

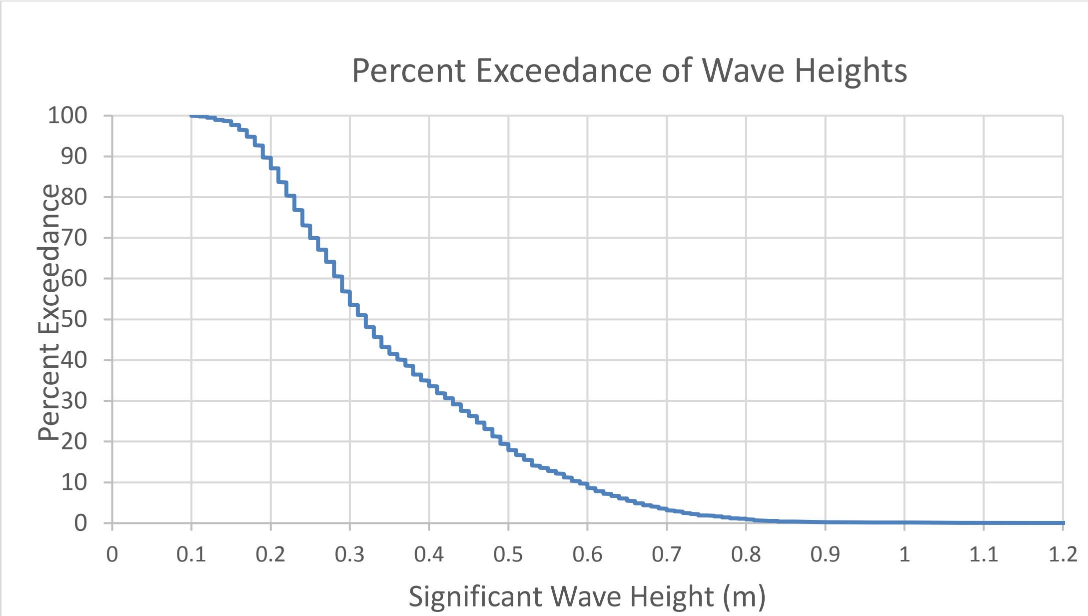


Figure 11. Percent Exceedance of Wave Heights at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

## 3.4. Waves at Basin Location

The basin non-directional wave gage station is located at the water depth of approximate 4 m measured at deployment. To be able to conduct the wave data analysis, the wave direction of 40 degree was assumed. The measured basin wave conditions are illustrated in Figure *12* and Figure *13*Figure *13*. The occurrence of wave periods between 8 sec and 12 sec is approximately 96.6 percent of the time. The occurrence of the wave periods longer than 12 sec has approximately 14.2 percent of the time. The basin significant wave heights occurring 1-percent of the time are higher than 0.46 m (see Figure *14*).

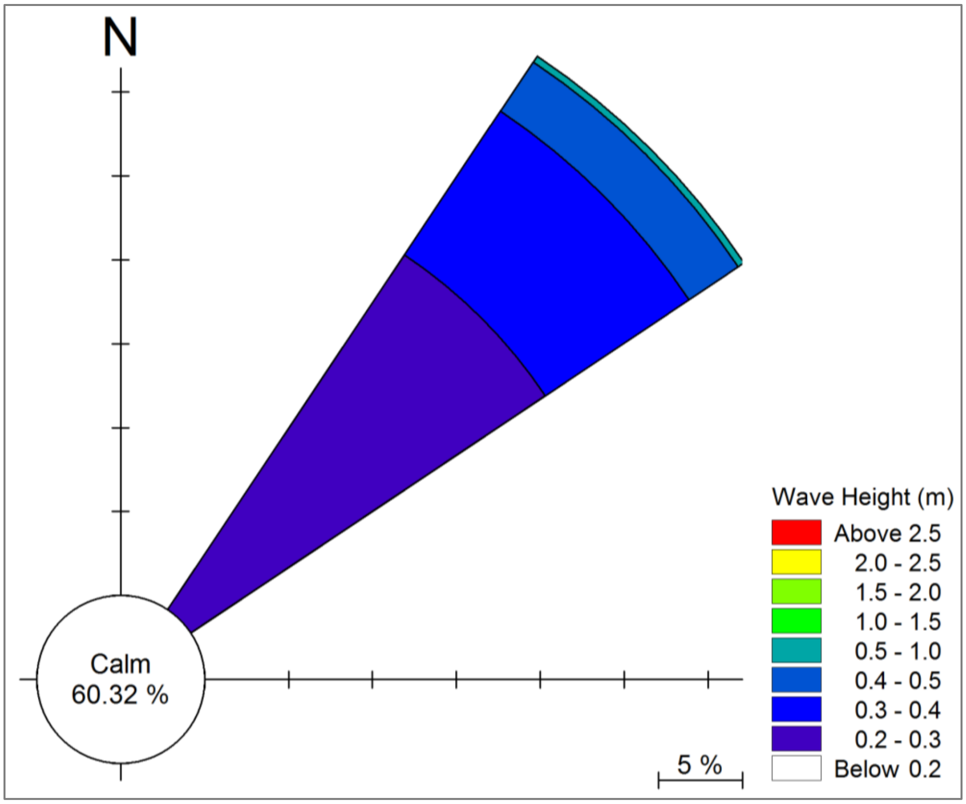


Figure 12. Wave Rose at Basin Location (Dec. 2, 2016 through Mar. 3, 2017)

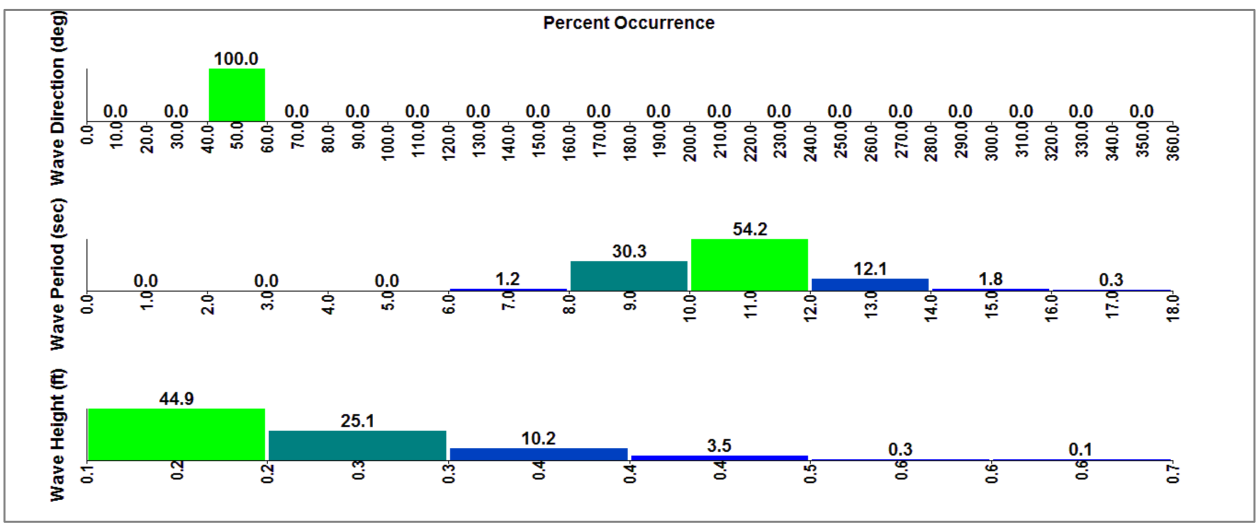


Figure 13. Measured Wave Conditions at Basin Location (Dec. 2, 2016 through Mar. 3, 2017)

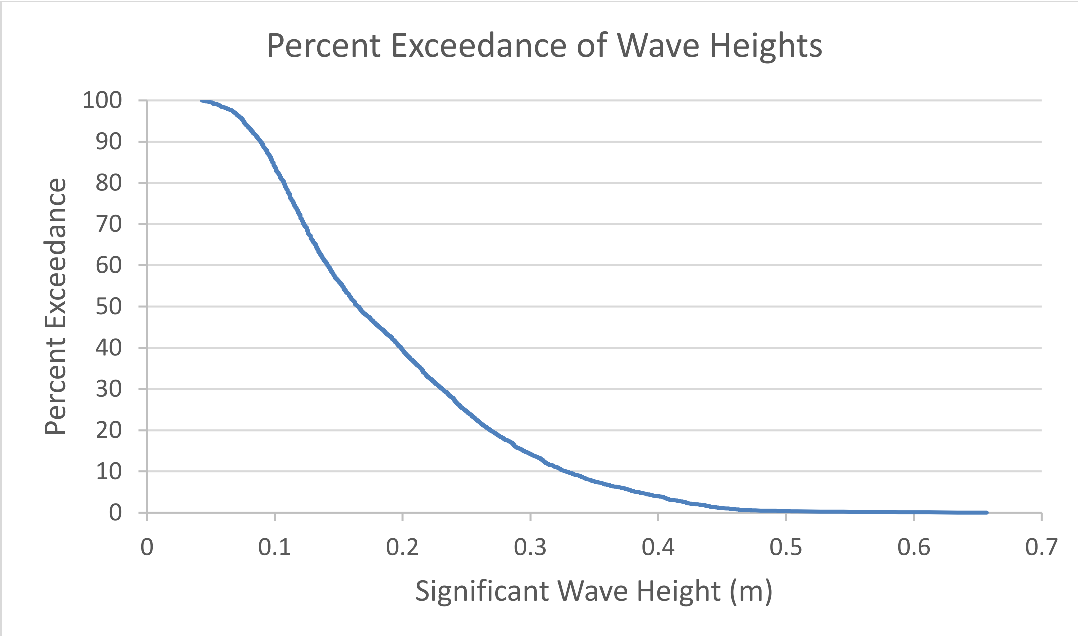


Figure 14. Percent Exceedance of Wave Heights at Basin Location (Dec. 2, 2016 through Mar. 3, 2017)

### 3.5. Currents at Offshore Location

The current speeds at offshore gage location were collected at vertical interval of 0.5 meter. The surface currents at depth of 1.7 meters and the bottom currents at depth of 10.2 meters were analyzed. The current roses at water surface and bottom are illustrated in Figure *15* and Figure *16*.

At water surface, most of currents are from north-northeast and northeast. The surface current speeds occurring 1-percent of the time are higher than 22.6 cm/sec (see Figure *17*). At sea bottom, the current speeds are relative lower compared with current speeds at water surface.

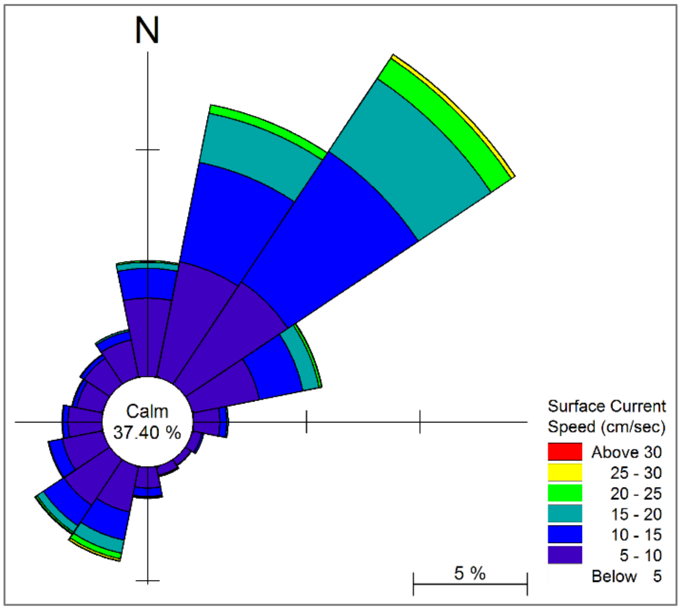


Figure 15. Surface Current Rose at Offshore Location (Dec. 2, 2016 through Mar. 3, 2017)

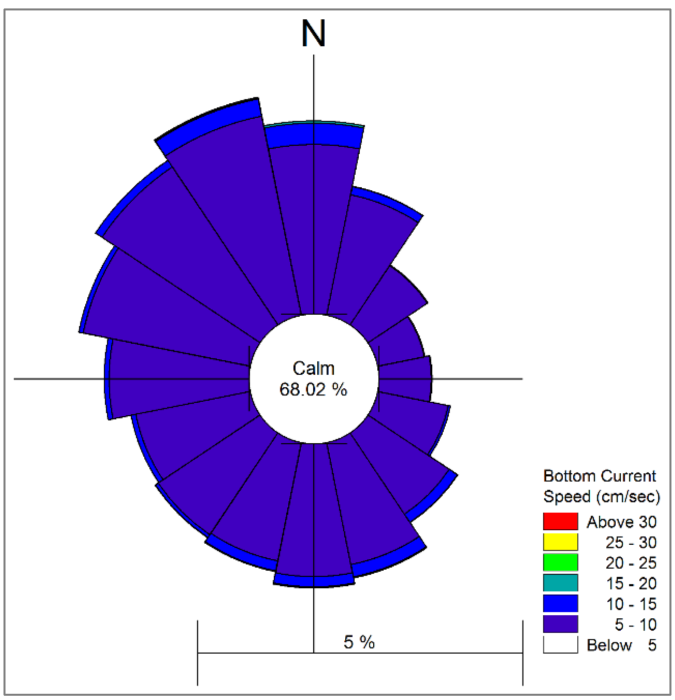


Figure 16. Bottom Current Rose at Offshore Location (Dec. 2, 2016 through Mar. 3, 2017)

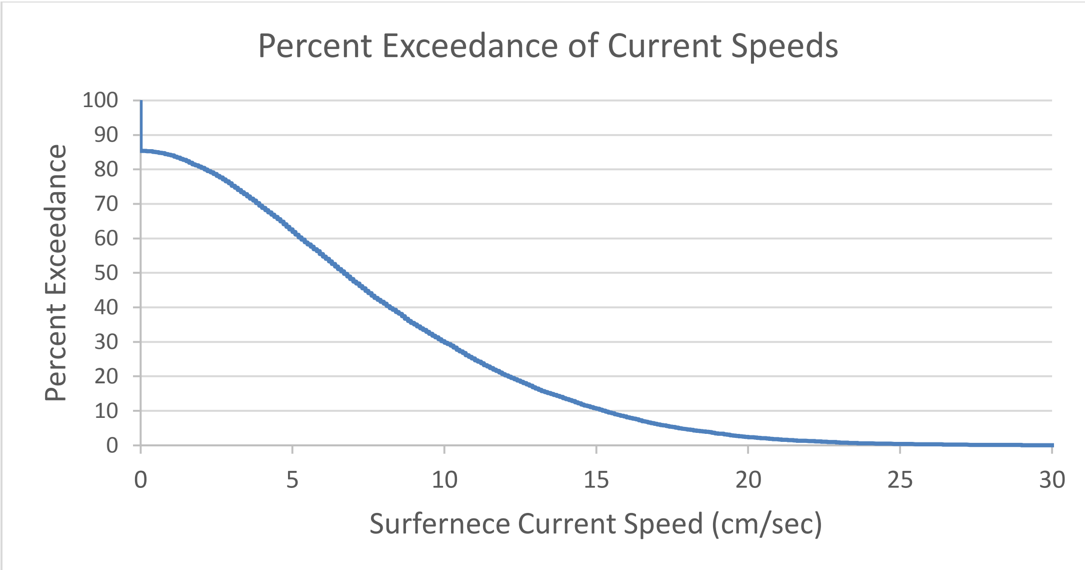


Figure 17. Percent Exceedance of Surface Current Speeds at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

## 3.6. Currents at Inshore Location

The current speeds at inshore gage location were collected at vertical interval of 0.5 meter. The surface currents at depth of 0.9 meters and the bottom currents at depth of 4.4 meters were analyzed. The current roses at water surface and bottom are illustrated in Figure *18* and Figure *19*.

At water surface, most of currents are from north-northwest and north. The surface current speeds occurring 1-percent of the time are higher than 23.0 cm/sec (see Figure *20*). At sea bottom, the currents have approximately 215 degree difference compared to surface currents. A typical vertical eddy existed at the inshore location.

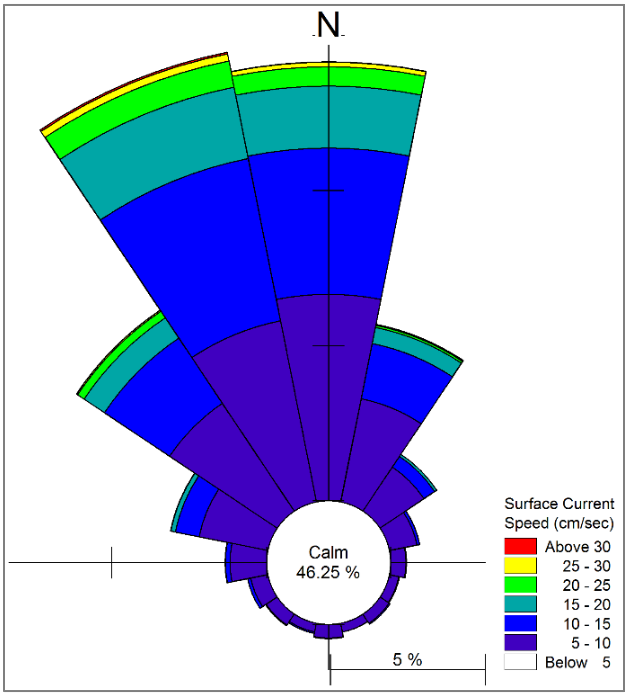


Figure 18. Surface Current Rose at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

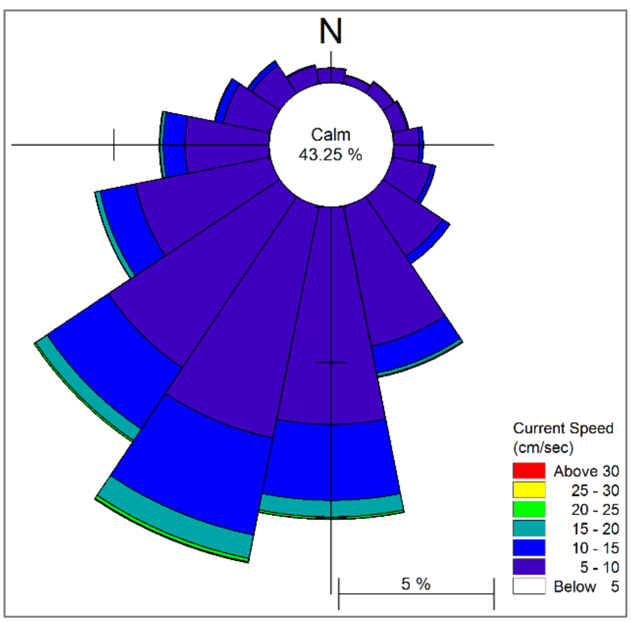


Figure 19. Bottom Current Rose at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

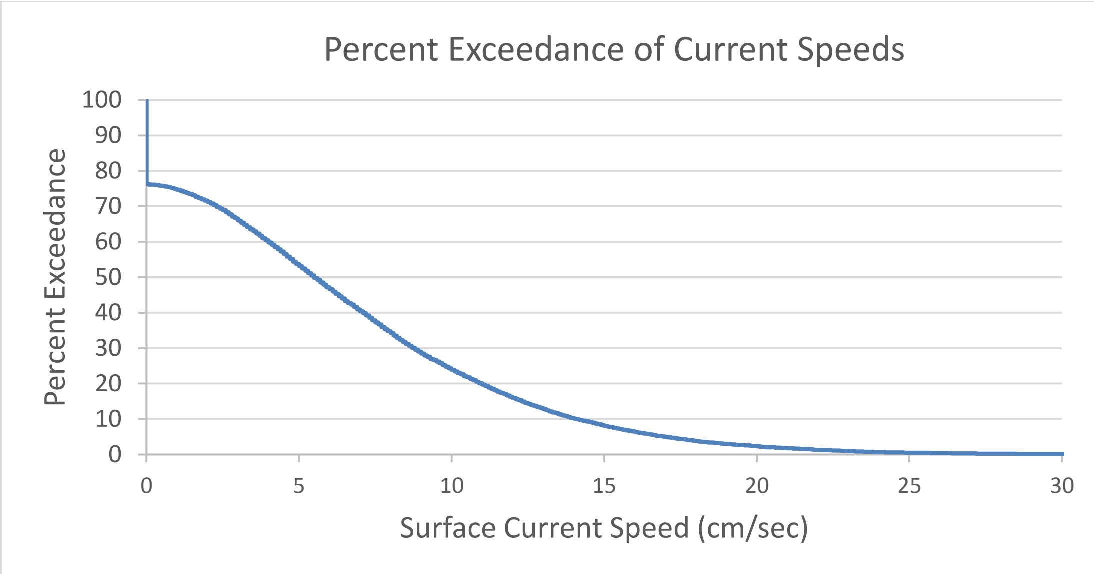


Figure 20. Percent Exceedance of Surface Current Speeds at Inshore Location (Dec. 2, 2016 through Mar. 3, 2017)

## 3.7. Discussion

Based on existing report review, harbor users reported that hazardous wind, wave and current conditions occasionally resulted in delays of several days for attempting to transport cargo to or from Rota. The wave actions at the entrance typically did not preclude safe entry by the vessels currently using the harbor. Because the turning basin is surrounded by shallow water and hard reef rock, there is considerable risk of damage or grounding if the vessel is pushed by the wind and currents. The often rough berthing conditions require extra lines and fenders in order to prevent damage to the vessel and dock.

The barge "2006" has length of 61 meters. The design vessel has vessel dimension of 210 feet long (64 m) with a 20-foot (6.1 m) draft. The existing turning basin of the Rota Island Harbor has the basin diameter of approximately 1.5 times of the vessel length.

The wind speed of 1-percent exceedance is approximately 10.6 m/sec (21.2 knots). The surface current speeds occurring 1-percent of the time at inshore location are higher than 23.0 cm/sec (0.46 knots). At the turning basin, the vessel is pushed by the winds and currents (see Figure *21*).

The updated wave data during December 2, 2016 and March 3, 2017 (see Figure *22*) indicate that the prevailing waves at offshore location are 0.5 meter to 2.0 meters with wave periods of 8 to 12 seconds, and the prevailing waves at inshore location are 0.2 meter to 0.5 meter with wave periods of 8 to 14 seconds. The wave data at deep water during 1971 and 1980 indicate that the prevailing waves are 1 meter to 2.5 meters with wave periods of 6 to 9 seconds. The new wave data have longer wave periods compared to the old wave data. The longer wave periods can result ship operation more difficult. The inshore significant wave heights occurring 1-percent of the time are higher than 0.80 m.

A jetty at northeast side of the Rota Island Harbor is recommended to block the currents. An offshore breakwater near channel entrance is recommended to reduce incident waves at turning basin area and berthing area (see Figure *23*).

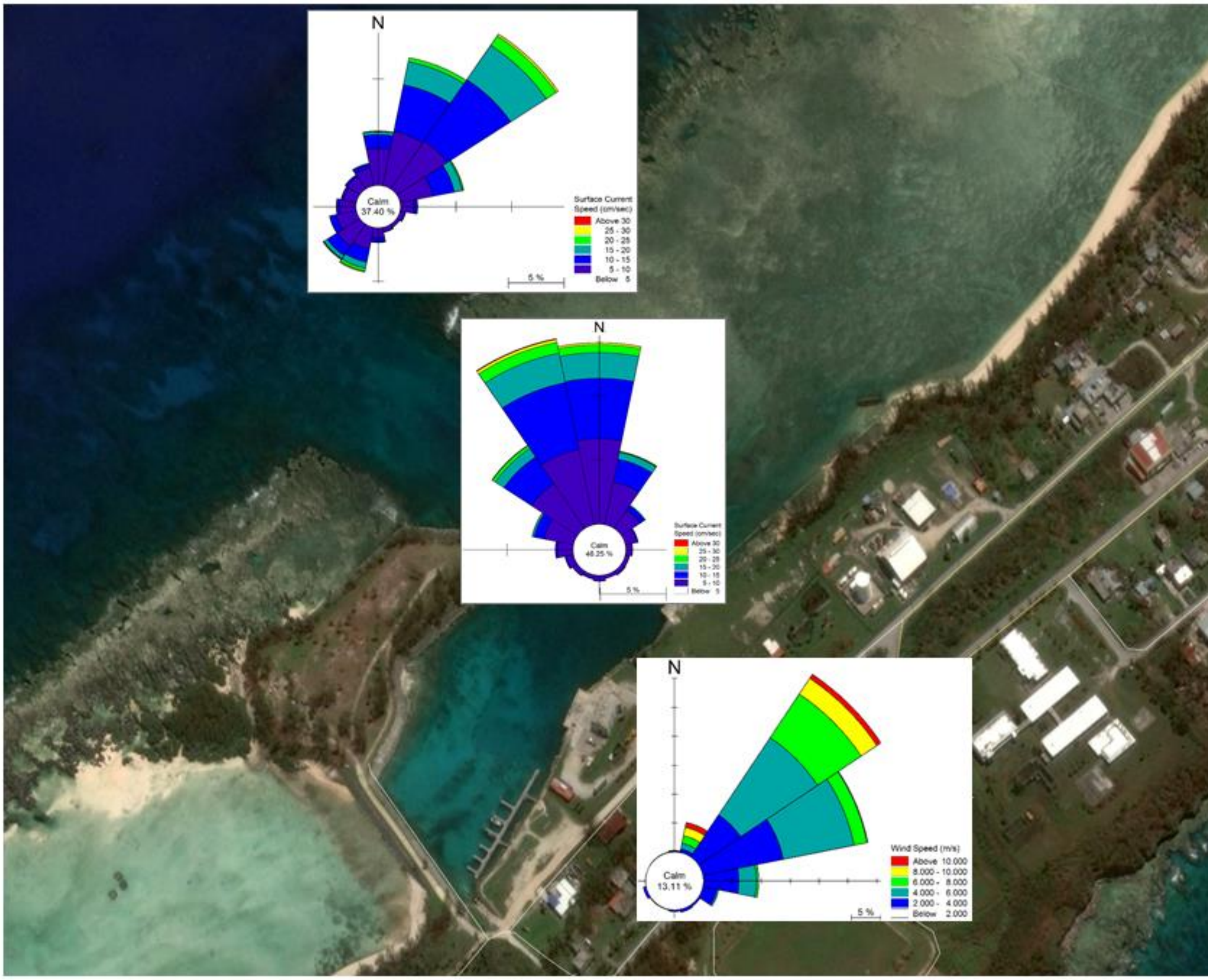


Figure 21. Wind and Surface Current Conditions at Rota Island Harbor (Dec. 2, 2016 through Mar. 3, 2017)

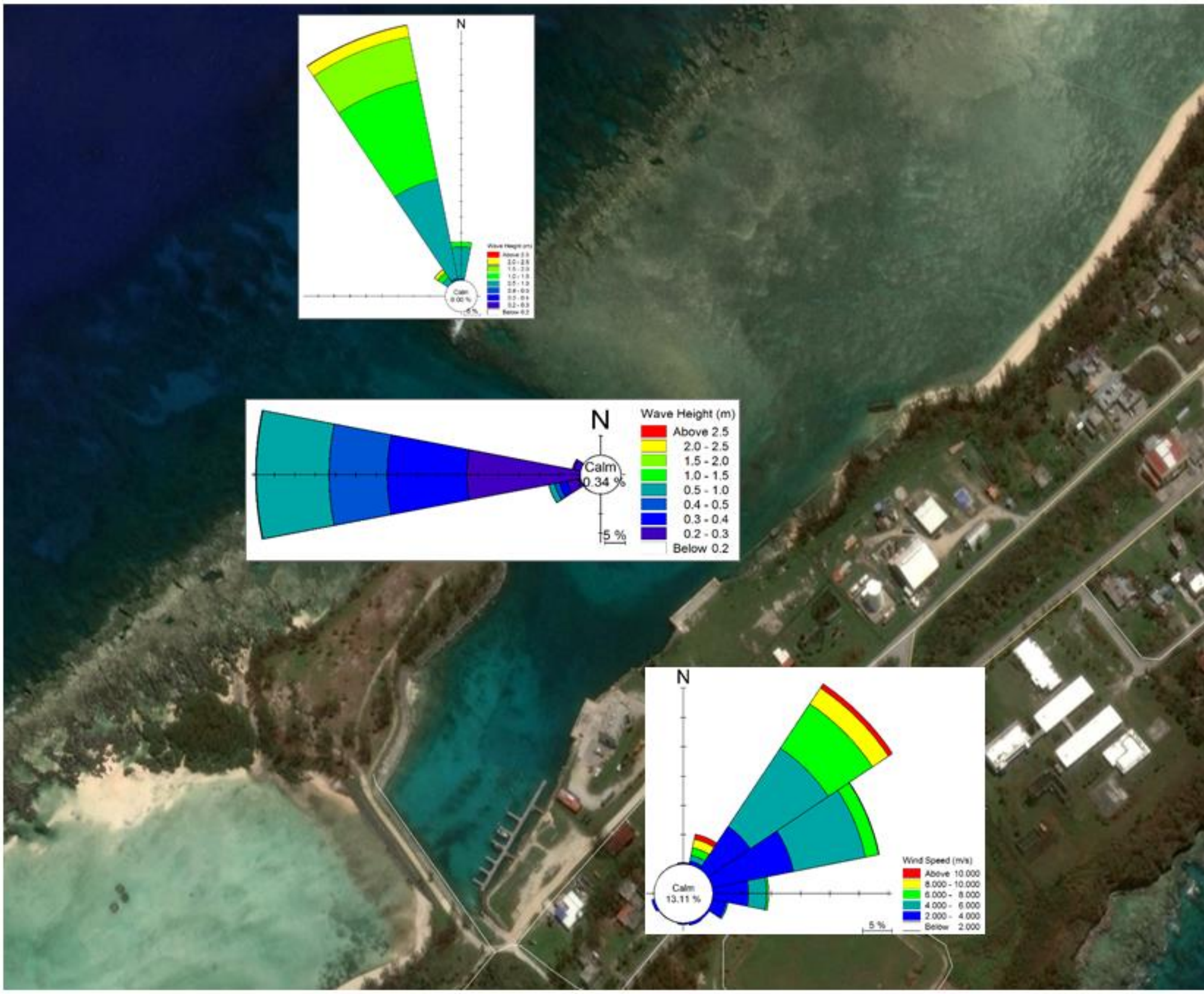


Figure 22. Wind and Wave Conditions at Rota Island Harbor (Dec. 2, 2016 through Mar. 3, 2017)

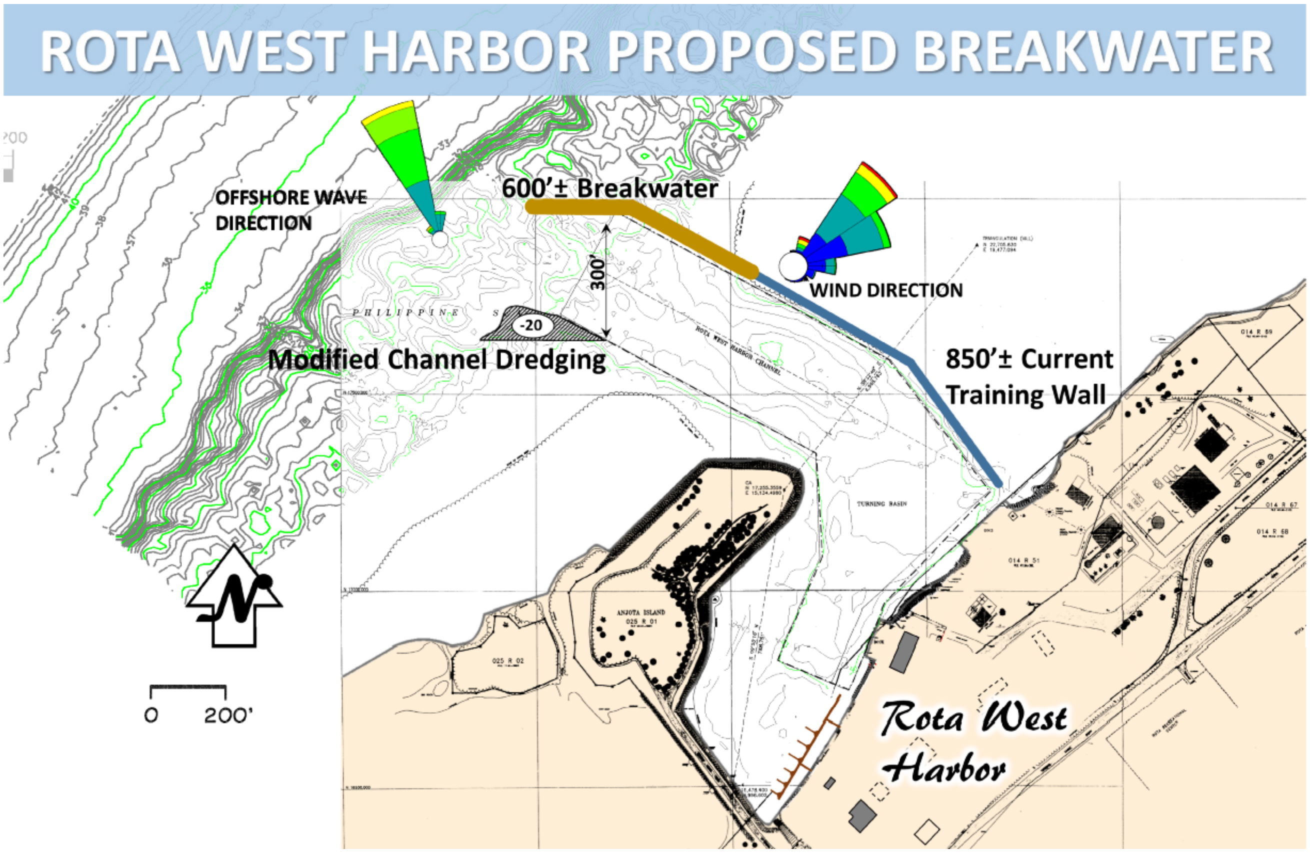


Figure 23. Recommended Rota Island Harbor Improvement

# 4. References

Sea Engineering, 1997. *Final Report: Rota Harbor Master Plan, Sea Side*. Sea Engineering, Inc., Waimanalo, Hawai'i.

# Appendix C Rota West Harbor Master Plan Project Permitting & Environmental Mitigation, prepared by Micronesian Environmental Services, November 2017

# ROTA WEST HARBOR MASTER PLAN

## PROJECT PERMITTING & ENVIRONMENTAL MITIGATION


*Developed for*:

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P.O. Box 502802
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Northern Mariana Islands, USA

**April 2017**

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# EXECUTIVE SUMMARY

The following federal and CNMI permits, authorizations, or consultations will be required for implementing the Rota West Harbor Master Plan:

- National Environmental Policy Act of 1969;
- Rivers and Harbors Act of 1899, section 10 (structures in navigable waters);
- Federal Water Pollution Control Act as amended by the Clean Water Act of 1977, sections 402 (NPDES), and 404 (dredge and fill);
- Coastal Zone Management Act of 1972, Federal Consistency Determination;
- Endangered Species Act of 1973, section 7 consultation;
- Fish and Wildlife Coordination Act;
- Magnuson-Stevens Act; section 305 Essential Fish Habitat review;
- National Historic Preservation Act, section 106 Review;
- Division of Environmental Quality section 401 Water Quality Certification; and
- Division of Environmental Quality Earthmoving and Erosion Control Permit.

At a minimum, the following federal and CNMI agencies will be involved in the permitting of the Rota West Harbor Master Plan:

- Federal action agency (unknown);
- U.S. Army Corps of Engineers (USACOE);
- U.S. Environmental Protection Agency (USEPA);
- U.S. Fish and Wildlife Service (USFWS);
- National Marine Fisheries Service (NMFS);
- CNMI Division of Coastal Resources Management (DCRM);
- CNMI Department of Lands & Natural Resources – Div. of Fish & Wildlife (DLNR-DFW);
- CNMI Division of Historic Preservation (HPO); and
- CNMI Division of Environmental Quality (DEQ).

The U.S. Fish and Wildlife Service and National Marine Fisheries Service has legal responsibility over 66 species listed under the Endangered Species Act (ESA) as threatened or endangered that may occur in the Mariana archipelago. The federal action agency must consult under section 7 of the ESA for those species where the proposed action may affect a listed species. Based upon a review of life history characteristics, distributional data, and optimal habitat requirements, most of the protected species will have a "*no effect*" designation applied with respect to the section 7 consultation. It is possible that a "*may effect*" determination will be made for:

- Green Sea Turtle (*Chelonia mydas*);
- Hawksbill Sea Turtle (*Eretmochelys imbricate*);
- the coral *Seriatopora aculeate;* and
- the coral *Acropora globiceps*.

Project related impacts anticipated from the proposed action follow:

- The creation of sediment or turbidity plumes associated with dredge/fill activities, pile driving, construction of a breakwater and training wall, and terrestrial runoff;
    - may cause behavioral reactions to Federally protected Green and Hawksbill sea turtles that enter the work area;
    - may have a potential for noise related impacts to sea turtles from pile driving activities during construction of the piers, depending upon methodology;
    - may settle and stress or smother corals and slow moving benthic marine resources (depending upon duration and intensity);

    - will increase turbidity levels in vicinity of work areas and possibly violate the CNMI Water Quality Standards;
- Construction of the training wall and breakwater on 2.0 acres of benthic habitat;
    - will adversely impact slow moving non-motile benthic resources (e.g., sea cucumbers, urchins, and corals) during construction by crushing with rock rip-rap;
    - will modify existing shallow water near-shore current patterns;
    - will change existing coral reef habitat (mostly two dimensional) into a three dimensional rock rip-rap structure that will provide an entirely different habitat type;
- Pier construction;
    - May alter habitat characteristics through shading and negatively affect those non-motile benthic resources that require sunlight to thrive (e.g., corals and sea grasses).

General mitigation measures that may be required:

- Ensure that construction material and debris does not fall into harbor waters during the construction period;
- Install silt curtains to contain sediment plumes and conduct daily maintenance inspections to ensure they are functioning properly. Design and implement a turbidity monitoring regime in cooperation with the DEQ as required by the CWA Section 401 WQC;
- Have an environmental specialist oversee turbidity compliance monitoring efforts and to address permit compliance with other environmental permits;
- Keep watch for the presence of the threatened green and hawksbill sea turtles. If a turtle swims into the work area, stop work until the turtle leaves the area on its own volition;
- Temporarily cease in-water dredging activities for 21 calendar days during the largest annual coral spawning event in May or June;
- Relocate slow-moving benthic resources (e.g., sea cucumbers, sea stars, sea urchins, etc.) away from immediate work areas prior on a daily basis prior to commencement of in-water work;
- Impacts to “special aquatic resources” (e.g., corals or sea grasses) will require the development and implementation of a compensatory mitigation plan, as required by USACOE regulations (e.g., the 2008 Compensatory Mitigation regulations);
- Dredge and fill activities should cease during times of small craft warnings or high surf advisories, as issued by the CNMI Department of Homeland Security or U.S. Coast Guard.

Estimated Costs:
Compliance with NEPA was not included in the itemized costs analysis as it is dependent upon several variables that strongly influence costs: whether the Master Plan will be implemented by phase, if an EA or EIS would be pursued, and the NEPA requirements of the Federal action agency. If the entire Master Plan would go through the NEPA process at one time, it is estimated that costs could range from $95K to $200K.

| **Proposed Action** | **Estimated Permitting Costs** *(thousands of dollars)* | **Estimated Post-Permitting Compliance Costs** *(thousands of dollars)* |
|---|---|---|
| **Phase I** | 170 | 95 |
| **Phase II** | 175 | 130 |
| **Phase III** | 180 | 55 |
| **Phase IV** | 250 | 420 |
| **TOTALS** | 775 | 700 |

Scheduling:

Estimating the schedule for a large complex marine oriented project, such as the Rota West Harbor improvements project, is difficult as most of the permitting time will be contingent upon agency review and development of mitigation measures. The applicant will not have any control over agency review time and issuance of required permits. For purposes of this review and assuming a smooth permitting review/processing, the EA process is estimated to take 15 months and the EIS process 21 months.

# I. PROJECT PERMITTING AND ENVIRONMENTAL MITIGATION

This section will address environmental regulatory laws and regulations that may/will be required to implement the Rota West Harbor Master Plan. In addition, discussion will also focus on sensitive biological issues, such as federal and CNMI listed endangered and threatened species, special aquatic sites, and essential fish habitat; issues that will guide project development and mitigation requirements.

The proposed action will require permits/authorizations by the following federal and CNMI agencies; the federal action agency, U.S. Army Corps of Engineers (USACOE), U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), CNMI Division of Coastal Resources Management (DCRM), CNMI Division of Historic Preservation (HPO), Department of Lands and Natural Resources – Division of Fish and Wildlife (DLNR-DFW), and the CNMI Division of Environmental Quality (DEQ). The above list also includes agencies who will be requested to review and comment on the proposed action by those permit-issuing agencies.

However, before any permit applications are submitted for agency review and action, the federal action agency (assuming the project will be federally funded) must comply with the National Environmental Policy Act (NEPA) policy requirements developed for that agency.

## A. National Environmental Policy Act

NEPA requires each federal action agency to develop documentation supporting a level of review appropriate for the environmental, cultural or socio-economic impacts the project is expected to create. The Rota West Harbor Master Plan will require, at a minimum, an Environmental Assessment (EA) or possibly an Environmental Impact Statement (EIS). Although not a permit, the NEPA document will contain much of the information required by various application packages that would be submitted later to federal and CNMI agencies.

For purposes of this discussion, it will be assumed that funding will originate from some federal government agency. This federal nexus will require the funding agency to act as the federal action agency which will require that agency to ensure the proposed action complies with NEPA.

The NEPA document is the primary document used in the federal decision making process and will provide guidance on final design as well as how the project would be implemented. This document will need to be approved by the federal action agency prior to submitting applications for specific federal or local permits.

NEPA compliance can be addressed in several different ways depending upon the approach in implementing the Master Plan and the source of funding. At this point without these details, a thorough discussion of NEPA would likely be more confusing than not.

## B. Federal Permits and Authorizations

Many complex aquatic-based projects, such as the Rota West Harbor Master Plan, will require the two major permits issued by the USACOE; the Clean Water Act (section 404) and the Rivers and Harbors Act of 1899 (section 10). For ease in communication when both permits are required, the USACOE typically notes it as a section 10/404 permit. The USACOE is the lead agency in the issuance of these permits and, in addition, must comply with their agency’s NEPA regulations. Therefore, the USACOE takes the lead in compliance with the ESA section 7 consultation, section 106 NHPA review, MSA section 305 Essential Fish Habitat consultation, and the Fish and Wildlife Coordination Act. All these inter-agency consultations must be completed prior to the USACOE issuing any permits.

Though not directly involved with the day-to-day processing of CWA applications by the USACOE, the U.S. Environmental Protection Agency oversees implementation of the regulatory process.

**1. U.S. Army Corps of Engineers,**

**(a) Clean Water Act, Section 404**

*Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation (e.g., certain farming and forestry activities).*

*The basic premise of the program is that no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded. In other words, when you apply for a permit, you must first show that steps have been taken to avoid impacts to wetlands, streams and other aquatic resources; that potential impacts have been minimized; and that compensation will be provided for all remaining unavoidable impacts.*[1]

Activities such as construction of the training wall and breakwater will require this permit. Depending on the construction details of dock expansion, this permit may also be required.

**(b) Rivers and Harbors Act of 1899, Section 10**

*Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The Secretary's approval authority has since been delegated to the Chief of Engineers*.[2]

This permit will be required for the pier structures, breakwater and training wall, and possibly the dock expansions, depending upon construction design.

**2. Required Interagency Consultations**

**(a) Magnuson-Stevens Act, section 305 Essential Fish Habitat**

On October 11, 1996, the Sustainable Fisheries Act (Public Law 104-297) became law and amended the habitat provisions of the Magnuson Act. The re-named Magnuson-Stevens Act (MSA) calls for direct action to stop or reverse the continued loss of fish habitats. To this end, Congress mandated the identification of habitats essential to managed species and measures to conserve and enhance habitat that these species required. The MSA requires cooperation among National Marine Fisheries Service (NMFS), Regional Fishery Councils, fishing participants, Federal and state agencies, and others in achieving the essential fish habitat goals of habitat protection, conservation, and enhancement.

[1] https://www.epa.gov/cwa-404/section-404-permit-program
[2] https://energy.gov/nepa/downloads/33-usc-403-river-and-harbors-act-1899

Briefly, an Essential Fish Habitat (EFH) consultation is the process of satisfying the Federal agency consultation and response requirements of section 305(b)(2) and 305(b)(4)(B) of the MSA, and the EFH conservation recommendation requirement of section 305(b)(4)(A) of that Act. When completed, an EFH consultation generally consists of: 1) notification to NMFS of a Federal action that may adversely affect EFH, 2) an EFH assessment provided to NMFS, 3) EFH conservation recommendations provided by NMFS to the Federal action agency, and 4) the Federal agency's response to NMFS's EFH conservation recommendations.

The consultation requirements of section 305(b) of the MSA (16 U.S.C. 1855(b)) provide that: Federal agencies must consult with the Secretary of Commerce (i.e., through NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. Federal actions included under this consultation process would include the issuance of Clean Water Act section 10/404 permits by the USACOE. These federal permits would be required for the proposed improvements outlined in the Rota West Harbor Master Plan.

The trigger for an EFH consultation is a Federal action agency's determination that an action or proposed action, funded, authorized or undertaken by that agency may adversely affect EFH. If a Federal agency makes such a determination, then EFH consultation is required. If a Federal action agency determines that an action does not meet the "*may adversely affect"* EFH test (i.e., the action will not adversely affect EFH), no consultation is required.

Adverse effect is defined as any impact that reduces the quality and/or quantity of essential fish habitat. Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). If the USACE determines that an adverse action may occur from the issuance of any particular permit, consultation with the NMFS becomes mandatory. During the consultation process, the Secretary of Commerce (e.g., NMFS) shall provide recommendations (which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH) to conserve EFH to Federal (or state) action agencies for activities that would adversely affect EHF. It should be noted that the consultation requirements only require Federal agencies to consult with NMFS about pending federal actions that may adversely affect EFH; NMFS recommendations are not mandatory.

As defined in section 3(10) of the MSA, EFH are those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Examples of "*waters*" that may be considered EFH include open waters and wetlands, estuarine and riverine habitats, wetlands hydrologically connected to productive water bodies. Water quality is understood to be a component of this definition. EFH should consider water to provide the appropriate parameters of quality such as physical, chemical, and biological properties. This may address nutrient levels, oxygen concentrations, turbidity levels, among others. The interpretation of "*substrate*" includes artificial reefs and shipwrecks if those areas provide EFH. Substrate may also include entirely or partially submerged structures, such as jetties. "*Biological communities*" could include mangroves, tidal marshes, mussel beds, cobble with attached fauna, mud and clay burrows, coral reefs, and submerged aquatic vegetation. Migratory routes such as rivers and passes serving as passageways to and from anadromous fish spawning grounds should be considered EFH. The definition of EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each FMP. Currently, EFH is defined very broadly with fundamentally all habitats and waters being considered EFH, including all habitats in Rota West Harbor.

Presently, the Western Pacific Regional Fishery Management Council is reviewing original EFH designations and is considering available options for refining EFH definitions and policy guidelines. In addition, the USACOE is developing a Programmatic Agreement with the NMFS Pacific Islands Regional Office that would guide EFH consultations in the Western Pacific. It is possible that new policy guidance will be in effect when the Master Plan is implemented.

### (b) Endangered Species Act, Section 7 Consultation

The Endangered Species Act (ESA) was passed by the U.S. Congress in 1973 and has been re-authorized and amended several times since. The purpose of the ESA, as amended, is to conserve "*the ecosystems upon which endangered and threatened species depend*" and recover listed species. The U.S. Federal Government, under authority of the ESA, protects those wildlife species that have been determined to have dangerously low population levels or are in imminent threat of extinction. Populations of those wildlife species requiring federal protection are classified as either endangered or threatened.

*Endangered* is defined in section 3(6) of the ESA as *"...any species [including subspecies or qualifying distinct population segment] which is in danger of extinction throughout all or a significant portion of its range*."

A *threatened* species is defined in section 3(19) of the ESA and is defined as *".... any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."*

Navigating regulatory requirements associated with the presence of threatened or endangered species can become quite involved depending upon the magnitude and nature of the proposed project, and the degree to which early planning and scoping was conducted. Under section 9 of the ESA, it is unlawful to "*take*" a threatened or endangered (e.g., listed) species. The term "*take*" is defined by the ESA as "*to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct*." The term "*harm*" has been further defined to include "*significant habitat modification or degradation*." The term "*harm*" may include significant habitat modification resulting in the killing or injuring of a listed species through impairment of essential behavior (e.g., nesting or reproduction).

Compliance with the ESA "*take*" prohibition in section 9 can be addressed by complying with the requirements identified in sections 7 or 10 of the ESA. Section 7 consultation is for those projects that have a federal nexus and a "*may effect*" determination. The section 10 Incidental Take Permit is for projects that do not have a federal nexus and that "*may effect*" a listed species. Examples of a federal nexus are federal funding sources or the requirement of a federal permit. Endangered species issues for the Rota West Harbor Master Plan will be addressed through the section 7 consultation process; a process where the USACOE will consult directly with the USFWS and NMFS over impacts to federally listed species.

### (c) Fish and Wildlife Coordination Act

First enacted in 1934, the Fish and Wildlife Coordination Act (FWCA) is described by NOAA as a requirement by federal agencies to "*consult with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service and State wildlife agencies for activities that affect, control or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of the Clean Water Act, NEPA or other federal permit, license or review requirements*."

The USACOE will initiate FWCA consultation with the USFWS and NMFS in addressing the NEPA requirements of issuance of a CWA section 10/404 permit. The resource agencies review and comment on the proposed action in a non-binding manner.

#### (d) National Historic Preservation Act, Section 106 Review

*Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by ACHP.*

*The responsible Federal agency first determines whether it has an undertaking that is a type of activity that could affect historic properties. Historic properties are properties that are included in the National Register of Historic Places or that meet the criteria for the National Register. If so, it must identify the appropriate State Historic Preservation Officer/Tribal Historic Preservation Officer * (SHPO/THPO*) to consult with during the process. It should also plan to involve the public, and identify other potential consulting parties. If it determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.*[3]

It is doubtful that the NHPA section 106 review for the Rota West Harbor Master Plan will involve the ACHP as the CNMI Division of Historic Preservation typically can complete the review locally. The USACOE will need to conduct this review prior to issuing any permit.

### 3. U.S. Environmental Protection Agency, NPDES Construction General Permit NOI

Not actually a permit, a Notice-of-Intent (NOI) is to be submitted to the U.S. Environmental Protection Agency in coordination with the DEQ during the application and review phase of the Earthmoving and Erosion Control Permit. The NPDES (CWA section 402) Construction General Permit NOI is required for construction sites greater than one acre in size and requires the development of a DEQ approved Storm Water Pollution Prevention Plan. The applicant is responsible for submitting the application to the USEPA. Along with the DEQ approved Storm Water Pollution Prevention Plan.

## C. CNMI Permits and Authorizations

The Bureau of Coastal and Environmental Quality is comprised of the Division of Coastal Resources Management (DCRM) and the Division of Environmental Quality (DEQ). The proposed action will require two permits from the DEQ and regulatory clearance from the DCRM. Both of these agencies will be heavily involved in the issuance of permits for the proposed action. The applicant will be responsible of obtaining these approvals or permits.

### 1. Division of Coastal Resources Management

The Division of Coastal Resources Management (DCRM) is the federally approved state agency that manages the federal Coastal Zone Management Program in the CNMI. It acts as an umbrella agency for six other CNMI Government agencies; Department of Public Works, Department of Commerce, Department of Lands and Natural Resources, Division of Environmental Quality, Commonwealth Utilities Corporation, and Division of Historical Preservation. Representatives from these agencies constitute the CRM Board of Directors whose responsibility includes the

[3] http://www.achp.gov/106summary.html

review and issuance of permits for development projects that may have an impact on coastal resources.

Assuming the Rota West Harbor Master Plan is federally funded, the federal action agency will likely request the DCRM to review and approve the proposed action through the federal consistency determination process. This authorization will be required prior to the USACOE issuing a federal CWA section 10/404 permit.

#### 2. Division of Environmental Quality

The Division of Environmental Quality (DEQ) will need to issue two permits for the proposed action: an Earthmoving and Erosion Control Permit and a section 410 Water Quality Certification.

Issuance of the Earthmoving and Erosion Control Permit will address surface runoff into adjacent marine waters. A CNMI registered professional engineer must stamp all erosion control plans. In addition, the Storm Water Pollution Prevention Plan must be reviewed/approved by the DEQ and documentation showing that the applicant has complied with the NOI requirements of the Construction General Permit (CWA section 402 NPDES) must be submitted to the DEQ for approval prior to submittal to the USEPA.

With respect to the section 401 Water Quality Certification, the DEQ will require the development of an Environmental Protection Plan. This document will outline specific mitigation and monitoring measures that would help minimize impacts from the turbidity plumes generated from in-water construction activities. The plan will also include a daily monitoring of turbidity levels at pre-determined stations and reporting requirements to the DEQ. In addition, a process to address water quality standard violations must be developed. This authorization will be required prior to the USACOE issuing a CWA section 10/404 permit.

## II. Federal and CNMI Protected Species

### A. Terrestrial Fauna and Flora

The U.S. Fish and Wildlife Service (USFWS) has identified 30 threatened/endangered species within the Commonwealth of the Northern Mariana Islands (CNMI): two mammals, six birds, four reptiles (three sea turtles, one skink), three insects, three gastropods, and 12 plants. This list does not include the experimental Guam Rail (*Rallus owstoni*) population on Rota that receives no formal protection under the ESA. General jurisdiction of the USFWS includes terrestrial and freshwater wildlife, while the National Marine Fisheries Service's (NMFS) primary responsibility is marine wildlife species. Enforcement of the ESA for sea turtles is shared between the USFWS (Department of Interior) and the NMFS (Department of Commerce).

The CNMI Government passed a law on 15 January 1991 identifying locally threatened/endangered species. This original list includes 14 species from the entire CNMI: two mammals, seven birds, three reptiles, and two plant species. The CNMI law did not differentiate between threatened and endangered categories and are thus jointly classified. The CNMI threatened/endangered species list contains two species not officially recognized as either threatened or endangered by the Federal Government; these are the Micronesia Saw-tailed Gecko (*Perochirus ateles*) and Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*).

Table 1. Federal and Commonwealth of the Northern Mariana Islands (CNMI) listed threatened/endangered terrestrial species that may occur or have historically occurred on Rota. Information obtained from USFWS (2011), Liske-Clark (2015), USFWS (2015), and USFWS (2017). Scientific and common names follow USFWS (2011, 2015) (for mammals); Gill and Donsker (2017) (for avifauna); Zug (2013) and USFWS (2017) (for herpetofauna); USFWS (2015) (for gastropods); and Stone (1970) (for plants). T = Threatened, E = Endangered, NR = Not recognized.

| LISTED SPECIES | FEDERAL | CNMI |
|---|---|---|
| **MAMMALS** | | |
| Mariana Fruit Bat (*Pteropus m. mariannus*) | T | T/E |
| Pacific Sheath-tailed Bat (*Emballonura semicaudata rotensis*) | E | T/E |
| **AVIFAUNA** | | |
| Mariana Crow (*Corvus kubaryi*) | E | T/E |
| Rota White-eye (*Zosterops rotensis*) | E | T/E |
| Micronesian Megapode (*Megapodius l. laperouse*) | E | T/E |
| Mariana Common Moorhen (*Gallinula chloropus guami*) | E | T/E |
| Mariana Swiftlet (*Aerodramus bartschi*) | E | T/E |
| **HERPETOFAUNA** | | |
| Mariana Skink (*Emoia slevini*) | E | NR |
| Micronesia Saw-tailed Gecko (*Perochirus ateles*) | NR | T/E |
| Green Sea Turtle (*Chelonia mydas*) | T | T/E |
| Hawksbill Sea Turtle (*Eretmochelys imbricata*) | E | T/E |
| Leatherback Sea Turtle (*Dermochelys coriacea*) | E | NR |
| **INSECTS** | | |
| Mariana Wandering Butterfly (*Vagrans egistina*) | E | NR |
| Rota Blue Damselfly (*Ischnura luta*) | E | NR |
| **GASTROPODS** | | |
| Humped Tree Snail (*Partula gibba*) | E | NR |
| Fragile Tree Snail (*Samoana fragilis*) | E | NR |
| **PLANTS** | | |
| Berenghenas Halomtano (*Solanum guamense*) | E | NR |
| Cebollo Halumtano (*Bulbophyllum guamense*) | T | NR |
| Cycad (*Cycas micronesica*) | T | NR |
| *Dendrobium guamense* | T | NR |
| Hayun Lagu (*Serianthes nelsonii*) | E | NR |
| *Maesa walker* | T | NR |
| *Nervilia jacksoniae* | T | NR |
| *Nesogenes rotensis* | E | NR |

| LISTED SPECIES | FEDERAL | CNMI |
|---|---|---|
| *Osmoxylon mariannense* | E | NR |
| *Tabernaemontana rotensis* | T | NR |
| *Tuberolabium guamense* | T | NR |
| Ufa-halomtano (*Heritiera longipetiolata*) | E | NR |
| Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*) | NR | T/E |

Though the list of protected terrestrial species shown in Table 1 is extensive, most of the species are not found in the area of the Rota West Harbor project site.

The following species summary is provided for each of the federally listed species and concludes with a preliminary effects determination, as it relates to ESA Section 7. Based on the species' life history characteristics, habitat requirements, historical knowledge of the project site, the known resources, and the potential impacts from the proposed action, a preliminary effects determination was made. This does not pre-empt the need for additional resource surveys.

Mammals

Mariana Fruit Bat (*Pteropus m. mariannus*)

The Mariana Fruit Bat (*Pteropus m. mariannus*) is a medium-sized colonial flying fox, with body length 7.7 to 9.8 inches, forearm length 5.3 to 6.1 inches, wingspan 33.9 to 41.9 inches, and body weight 0.7 to 1.3 pounds (USFWS 1990, 2009). This subspecies was federally listed as endangered on Guam in 1984 (USFWS 1984). However, in 2005, the USFWS determined that movement of fruit bats occurs between all islands in the Mariana archipelago, resulting in exchange of genetic material. Consequently, Mariana Fruit Bats on Guam and throughout the CNMI comprise one subspecies and are presently listed as threatened throughout their entire range (USFWS 2005b).

In the Mariana Islands, the Mariana Fruit Bat is known to occur on all islands extending northward from Guam to Maug (Wiles et al. 1989b, Johnson 2001, Vogt 2009). No critical habitat has been designated for this subspecies in the CNMI. The Mariana Fruit Bat was classified threatened/endangered status by the CNMI Government, published in the Commonwealth Register, on 15 January 1991.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Pacific Sheath-tailed Bat (*Emballonura semicaudata rotensis*)

Four subspecies of the Pacific Sheath-tailed Bat are known from islands distributed throughout Micronesia and Polynesia (Wiles and Brooke 2009). The Pacific Sheath-tailed Bat (*Emballonura semicaudata rotensis*) is the only insectivorous bat found in the Mariana Islands. It was once present on the islands of Saipan, Tinian, Aguiguan, Rota, Guam, and possibly Anatahan and Maug, but currently, the only remaining population consists of 359–466 individuals on Aguiguan (Wiles et al. 2011, USFWS 2015).

Observations of small bats (presumably Pacific Sheath-tailed Bats) were recorded on Rota and Aguiguan between the 1940's and late 1960's, and on Saipan, Anatahan, and East Island (Maug) in 1976 (Lemke 1986). This bat was last observed on Guam in 1972 and seemingly disappeared from Rota shortly after the observations in the 1960's (Lemke 1986).

The Pacific Sheath-tailed Bat was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat is designated for this subspecies. This subspecies is recognized as threatened/endangered by the CNMI Government.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Avifauna

Mariana Crow (*Corvus kubaryi*)

The Mariana Crow (*Corvus kubaryi*) is a small (15 inches), forest-dwelling crow endemic to Guam and Rota and is the only corvid in Micronesia (Baker 1951, Jenkins 1983, Pratt et al. 1987). The crow is black with some gloss on the back, wing, and tail (Jenkins 1983). The Mariana Crow was listed as endangered by the USFWS on 27 August 1984 (USFWS 1984). On 28 August 2004, 6,033 acres of critical habitat was designated for the Mariana Crow on Rota by the USFWS (USFWS 2004a). The CNMI classified this species as threatened/endangered, and included it on the CNMI list that was published in the Commonwealth Register on 15 January 1991.

Pratt et al. (1979) considered Mariana Crows to be relatively common on Rota in 1976. The 1982 island-wide survey estimated Rota's Mariana Crow population at 1,318 birds, with the Sinapalo and Tatgua regions comprising 61 percent of this estimate (Engbring et al. 1986). A survey in 1995 resulted in an estimate of 592 crows on Rota, a 56 percent decline since 1982 (Fancy et al. 1999). In 1999, 85 pairs of known Mariana Crows were identified on Rota; however, a total of 117 breeding pairs (or 234 breeding adults) were estimated for the entire island (Plentovich et al. 2005). In 2008, 60 Mariana Crow pairs and 24 unpaired crows were known to occur on Rota (Zarones et al. 2015c). Point-transect surveys conducted on Rota in 2012 yielded a mean population estimate of 81 (95% CI = 30–202) Mariana Crows on the island (Camp et al. 2015). Following surveys carried out in 2013 and 2014, just 46 Mariana Crow pairs were found on Rota and the population was estimated to be 178 subadult and adult crows on the island (Kroner et al. 2017). Key factors in the decline of crows on Rota are thought to be habitat loss, human persecution, predation of adults and juveniles by Feral Cats (*Felis catus*), and potentially predation on nests by rats (USFWS 2005a, Zarones et al. 2015c).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Rota White-eye (*Zosterops rotensis*)

The Rota White-eye (*Zosterops rotensis*) is endemic to Rota and described as being a small (4 inches), flocking passerine whose plumage is *"suffused with yellow throughout*" and *"bill, legs, and feet yellow-orange"* (Pratt et al. 1987). The Rota White-eye was listed as an endangered species by the USFWS on 22 January 2004 (USFWS 2004c). On 12 September 2006, approximately 3,958 acres of critical habitat was designated for the Rota White-eye on Rota by the USFWS (USFWS 2006). The CNMI classified this species as threatened/endangered, and included it on the CNMI list that was published in the Commonwealth Register on 15 January 1991.

Results from the 1982 island-wide survey yielded a total population estimate of 10,763 Rota White-eyes, with 93 percent of the population occurring in the Sabana region (Engbring et al. 1986). However, following a 1996 survey for Rota White-eyes, Fancy and Snetsinger (2001) calculated that there were only 1,165 white-eyes on Rota. From 1982 to 1996, data indicated an alarming 89 percent decline in the white-eye population on Rota (Fancy and Snetsinger 2001). Following surveys in 1998-1999, Amidon (2000) estimated a total population of 1,092 Rota White-eyes, a 90 percent decline since 1982. Point-transect surveys conducted on Rota in 2012 yielded a mean population estimate of 14,384 (95% CI = 5,620–20,961) Rota White-eyes on the island (Camp et al. 2015); a substantial increase since the 1990s.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Micronesian Megapode (*Megapodius l. laperouse*)
The Micronesian Megapode (*Megapodius l. laperouse*) is found in the Mariana and Palau Islands and is comprised of two subspecies: *Megapodius l. laperouse,* which occurs in the Mariana Islands and *Megapodius laperouse senex*, which occurs in the Palau Islands.

The Mariana Islands subspecies of the Micronesian Megapode was listed as an endangered species by the USFWS on 2 June 1970 (USFWS 1970). To date, no critical habitat has been designated for this subspecies. The CNMI Government also classified this subspecies as threatened/endangered, and included it on the local CNMI list that was published in the Commonwealth Register on 15 January 1991.

The Micronesian Megapode is a pigeon-sized, dark brown to blackish land bird that forages on the ground and roosts on tree branches. The most distinct characteristic of this bird is its nest, which is built on the ground in the form of a large mound (with tunnels or burrows). The nest may be made of leaves, soft soil, organic litter, and cinder (Dekker 1990, Stinson 1992). The heat from the mound incubates the eggs laid in its center (Pratt et al. 1987). The incubation period of the Micronesian Megapode is unknown as this subspecies does not actively maintain its nest after egg-laying.

Within the Mariana Islands, the megapode was historically widespread and has been documented on all 15 islands in the Mariana archipelago (USFWS 1998). Populations currently persist on 13 of the islands in the archipelago, excluding Guam and Rota (Falanruw 1975, USFWS 1998).

The Micronesian Megapode is considered extirpated on Guam and Rota (Engbring and Pratt 1985, Reichel and Glass 1991, Stinson 1994, Steadman 1999). Despite intensive avian surveys on Rota in 1982, 1995, 2004, and 2012, megapodes were not recorded (Engbring et al. 1986, Fancy et al. 1999, Amar et al. 2008, Camp et al. 2015). Nonetheless, there have been unconfirmed reports of megapode observations in the Palie, Sabana, and Sinapalo (near Mochon Point) regions of Rota (Engbring et al. 1986).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Mariana Common Moorhen (*Gallinula chloropus guami*)
The Mariana Common Moorhen (*Gallinula chloropus guami*) is a mostly dark to sooty gray waterbird, about 13 inches in body size, possessing a red bill with a yellow tip, red frontal shield, and yellow legs (Baker 1951, Pratt et al. 1987). The *guami* subspecies is limited to the Mariana archipelago and is presently found on Saipan, Tinian, Rota, and Guam (Takano and Haig 2004a). The Mariana Common Moorhen was listed as endangered by the USFWS on 27 August 1984 (USFWS 1984); no critical habitat has been designated. The CNMI Government also classified

this subspecies as threatened/endangered, and included it on the local CNMI list that was published in the Commonwealth Register on 15 January 1991.

The Mariana Common Moorhen relies on both permanent and seasonal freshwater wetland habitats for feeding, nesting, and loafing (USFWS 2012).

In 2001, the adult Mariana Common Moorhen population in the Mariana Islands was estimated at 287, with 154 adult birds present on Saipan, 41 on Tinian, two on Rota, and 90 on Guam (Takano and Haig 2004a). Current populations are estimated at 100 moorhens on Saipan, 50 on Tinian, less than 10 on Rota, and 100-150 on Guam (USFWS 2012). Though the moorhen was considered extirpated from Rota, several individuals were documented reproducing in the waste water treatment ponds located at the Rota Resort in 1995 and 1996 (Worthington 1998). Moorhens were also observed using the water hazard ponds at the resort's golf course in late 1995 (Worthington 1998). Moorhens were detected in the water hazard ponds as recently as August 2016 (CNMI-DFW 2017).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Mariana Swiftlet (*Aerodramus bartschi*)
The Mariana Swiftlet (*Aerodramus bartschi*) is a small (4 inches), mostly sooty-black, slender-winged bird historically found on Saipan, Tinian, Aguiguan, Rota, and Guam (Chantler and Driessens 2000). Presently, the species is found only on Saipan, Aguiguan, and Guam (Cruz et al. 2008). Although historically abundant on Rota at least until the 1940s, the island's population declined until it disappeared in the 1970s. In the following decade, Pratt et al. (1987) suggested Rota's swiftlet population to be extirpated. The Mariana Swiftlet was listed as endangered by the USFWS on 27 August 1984 (USFWS 1984); no critical habitat has been designated. The CNMI Government also classified this species as threatened/endangered and included it on the local CNMI list that was published in the Commonwealth Register on 15 January 1991.

Based on the recovery plan (USFWS 1991b), it appears that Mariana Swiftlets are most threatened by human activities that disturb roosting and nesting caves. Six recovery objectives were identified in the recovery plan: 1) preserve and manage known swiftlet caves; 2) survey for, secure, and manage additional colonies of swiftlets and potentially usable caves; 3) determine reasons for decline; 4) promote population re-expansion into suitable historical habitat; 5) develop suitable criteria for complete delisting; and 6) monitor population. The most important limiting factor for swiftlet recovery appears to be associated with disturbance to active swiftlet caves.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Guam Rail (*Rallus owstoni*): Nonessential Experimental Population (Rota)
The Guam Rail (*Gallirallus owstoni*), known locally as Ko'ko, is a large (11 inches) flightless bird that is endemic to Guam. It has mainly grayish-brown upperparts and black with white barring on the lower breast, abdomen, under tail coverts, and tail (Baker 1951, Pratt et al. 1987). The Guam Rail is the only rail found in the Mariana Islands and known to inhabit mixed woodland, secondary growth, scrub, grassland, and fern thickets (Marshall 1949, Jenkins 1979, Pratt et al. 1987). The Guam Rail was listed as endangered by the USFWS on 27 August 1984 (USFWS 1984); no critical habitat has been designated.

The Guam Rail was formerly distributed throughout most of Guam, but was extirpated by the late 1980s due to predation by the Brown Treesnake (*Boiga irregularis*) (Fritts and Rodda 1998). Guam's Division of Aquatic and Wildlife Resources (GDAWR) is presently spearheading a successful captive breeding program for the ko'ko. In an attempt to establish a breeding population on a "snake-free" island, approximately 670 captive-bred rails were introduced to Rota between 1989 and 2006 (GDAWR 2006). More than 1,200 Guam Rails have been released on Rota since 1989 (Arcilla et al. 2015). The rail population on Rota was estimated to be 125 individuals in 2013 (GDAWR 2006, USFWS 2014). The Guam Rail population on Rota is considered to be nonessential and experimental (USFWS 2014).

Herpetofauna

Mariana Skink *(Emoia slevini*)

The Mariana Skink (*Emoia slevini*), first described in 1972 (Brown and Falanruw 1972), is the only lizard endemic to the Mariana Islands (Zug 2013). It inhabits forested areas, where individuals are known to use leaf litter as cover on the forest floor, as well as low hollows of tree trunks (Brown and Falanruw 1972, GDAWR 2006).

Historically found on the southern Mariana Islands of Guam, Cocos, Rota, Tinian, and Aguiguan, *E. slevini* is believed to be extirpated on all, but Cocos (USFWS 2015). In the Northern Mariana Islands, the Mariana Skink has been recorded on Sarigan, Guguan, Alamagan, Pagan, and Asuncion (GDAWR 2006, Liske-Clark 2015).

The Mariana Skink was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Micronesia Saw-tailed Gecko (*Perochirus ateles*)

The Micronesia Saw-tailed Gecko (*Perochirus ateles*) is indigenous to the Mariana Islands and known from Guam, Cocos, Rota, Tinian, and Saipan (Rodda et al. 1991, Wiles and Guerrero 1996, Perry et al. 1998, Rodda and Dean-Bradley 2000, Rodda et al. 2009). The Micronesia Saw-tailed Gecko inhabits limestone forest and large trees, but has been observed near urban structures (Vogt and Williams 2004).

The Micronesia Saw-tailed Gecko is considered to be extirpated from Guam due to intense predation by the Brown Treesnake (Rodda and Fritts 1992). A *P. ateles* population persists on Cocos (Perry et al. 1998); however, abundance, habitat use, and status information are unknown. Very few Micronesia Saw-tailed Gecko records have been reported from Rota ($n$ = 2) and Tinian ($n$ = 3) (Wiles et al. 1989a, Rodda and Dean-Bradley 2000, Rodda et al. 2009).

The CNMI Government lists the Micronesia Saw-tailed Gecko as threatened/endangered. This species has not been recognized as threatened/endangered by the USFWS.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Insects

Mariana Wandering Butterfly (*Vagrans egistina*)

The known distribution of the nymphalid Mariana Wandering Butterfly (*Vagrans egistina*) is limited to Guam and Rota (Schreiner and Nafus 1996, USFWS 2015). The Mariana Wandering Butterfly is currently considered to be extirpated from Guam (USFWS 2015). On Rota, the Mariana Wandering Butterfly was collected in the 1980s; and in 1995, one population of seven individuals was detected near the I Chenchon Bird Sanctuary (Schreiner and Nafus 1996). It is unknown whether the Mariana Wandering Butterfly continues to exist on Rota or other islands where its host plant is found (USFWS 2015).

The Mariana Wandering Butterfly was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. This species has not been recognized as threatened/endangered by the CNMI Government.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Rota Blue Damselfly (*Ischnura luta*)

The Rota Blue Damselfly (*Ischnura luta*) is endemic to Rota and known from stream habitat (USFWS 2015). This damselfly was first discovered in April 1996, when a few individuals were sighted and one male and female collected near the Talakhaya Water Cave (Polhemus et al. 2000). Total length of both the male and female was 1.3 inches (Polhemus et al. 2000). In 1996, damselfly abundance was estimated to be low and distribution thought to be restricted to the stream and spring habitats in the southern region of Rota (Polhemus et al. 2000, USFWS 2015).

The Rota Blue Damselfly was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. This species has not been recognized as threatened/endangered by the CNMI Government.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is suggested.

Gastropods

Humped Tree Snail (*Partula gibba*)

The Humped Tree Snail (*Partula gibba*) is the most widely distributed tree snail in the Mariana archipelago, originally known from nine islands: Guam, Rota, Aguiguan, Tinian, Saipan, Anatahan, Sarigan, Alamagan, and Pagan (Smith et al. 2008). Currently, the species is present on Guam, Rota, Saipan, Tinian, Sarigan, Alamagan, and Pagan (Hadfield 2010, DON 2014, USFWS 2015). Individuals initially identified as Humped Tree Snails on Rota may be a different species (USFWS 2015).

The Humped Tree Snail was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. This species has not been recognized as threatened/endangered by the CNMI Government.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Fragile Tree Snail (*Samoana fragilis*)

The Fragile Tree Snail (*Samoana fragilis*) is the only member of its genus to occur outside of southeastern Polynesia (Smith et al. 2008). This species was originally considered widespread but uncommon on the islands of Guam and Rota. Historically, this species is known from two populations on Rota and 13 populations on Guam (Crampton 1925, Kondo 1970, Bauman 1996, Smith et al. 2008).

At least two populations of Fragile Tree Snails are known to occur on Rota (Bauman 1996, Smith et al. 2008). One colony was initially documented in 1959, when 16 specimens were collected in the middle of the western half of the island at an altitude of 1,100 feet (Kondo 1970). Island-wide surveys on Rota in 1995 did not locate Fragile Tree Snails (Smith 1995). In 1996, a colony of Fragile Tree Snails was discovered in a previously undocumented location in the Alesna region of the Sabana (Bauman 1996).

The Fragile Tree Snail was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat is designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Plants

Berenghenas Halomtano (*Solanum guamense*)

Berenghenas Halomtano (*Solanum guamense*) is a small shrub in the nightshade family that is endemic to the Mariana Islands (Stone 1970). *S. guamense* may reach a height of 3.2–6.6 feet and is known from limestone cliffs and terraces close to the ocean (Stone 1970). Historically present on Guam, Rota, Saipan, Tinian, Asuncion, Guguan, and Maug, *S. guamense* is currently known from a single individual on Guam (USFWS 2015).

*S. guamense* was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Cebollo Halumtano (*Bulbophyllum guamense*)

Cebollo Halumtano (*Bulbophyllum guamense*) is an epiphytic orchid that is endemic to Guam and Rota (Stone 1970, Raulerson and Rinehart 1992). *B. guamense* occurs in large mats on the upper branches of large and small trees (Raulerson and Rinehart 1992). Presently, *B. guamense* is distributed among three known occurrences totaling less than 250 individuals on Guam, and nine known occurrences totaling ≥261 individuals on Rota (USFWS 2015). CNMI-DFW biologists conducted surveys for *B. guamense* on Rota in November 2014 and February 2015. During these surveys, 261 *B. guamense* individuals were counted along nine of 18 transects surveyed, and nearly 16,000 individuals were estimated to occur in the western third of Rota (Zarones et al. 2015b).

*B. guamense* was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Cycad (*Cycas micronesica*)
Cycad (*Cycas micronesica*) is the only native gymnosperm from the Mariana Islands (Marler and Muniappan 2006). The endemic range for *C. micronesica* includes Guam, Rota, Pagan, Yap, and Palau (Pratt 2010, Marler and Lawrence 2012). *C. micronesica* grows on clay and in strand habitat, but is rather common on limestone (Stone 1970, Raulerson and Rinehart 1991). The sexes are on separate trees; males bear elongated and upright cones, and females produce a central cone-like structure (Raulerson and Rinehart 1991).

A forest inventory conducted on Guam in 2002 found that *C. micronesica* was one of the most abundant tree species on the island (Donnegan et al. 2004). Raulerson and Rinehart *(1991)* considered *C. micronesica* abundant on Rota. The Cycad Aulacaspis Scale (*Aulacaspis yasumatsui*), first observed on Guam in 2003 and on Rota in 2007, is considered the greatest biotic or abiotic threat to *C. micronesica* (Marler and Muniappan 2006, Marler and Lawrence 2012). This scale attacks every part of the leaf, subsequently followed by the petiole, rachis, and abaxial leaflet surfaces becoming completely white (Marler and Muniappan 2006). As of January 2013, the mortality rate of *C. micronesica* on Guam was 92 percent, with individuals on Rota undergoing a comparable fate (USFWS 2015). Presently, on Rota, there are four known occurrences comprising less than 111,500 individuals (Pratt 2010).

*C. micronesica* was listed as federally threatened by the USFWS on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Dendrobium guamense*
*Dendrobium guamense* is an epiphytic orchid historically known from Guam, Rota, Tinian, Saipan, and Agrihan (USFWS 2015). Stems are crowded and can reach 2 feet (Stone 1970). The creamy-white flowers of *D. guamense* only last for a single day (Raulerson and Rinehart 1992). In the 1980s, this species was common in trees on Guam and Rota, with greater than 12 occurrences on Guam and 17 occurrences on Rota (USFWS 2015). Presently, about 1,250 individuals occur among at least 21 known occurrences on Guam (four occurrences totaling less than 250 individuals), Rota (15 occurrences totaling more than 700 individuals), and Tinian (two occurrences with an unknown number of individuals (USFWS 2015).

CNMI-DFW biologists conducted surveys for *D. guamense* on Rota in November 2014 and February 2015. During these surveys, 573 *D. guamense* individuals were counted along 14 of 17 transects surveyed, and nearly 35,000 individuals were estimated to occur in the western region of Rota (Zarones et al. 2015b). On Rota, host trees for *D. guamense* include *Artocarpus altilis, Artocarpus mariannensis, Elaeocarpus joga*, *Ficus prolixa,* and *Hernandia labyrinthica* (Zarones et al. 2015b). Not previously known from Aguiguan, CNMI-DFW biologists recorded three individuals of *D. guamense* on the island in February 2015; two in a *Pouteria obovata* tree and one in a *Terminalia catappa* tree (Zarones et al. 2015a).

*D. guamense* was federally listed as threatened on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Hayun Lagu (*Serianthes nelsonii*)

Hayun Lagu (*Serianthes nelsonii*) is a tree with spreading branches, growing to 66 feet and with a trunk reaching 6.6 feet in diameter (Stone 1970, Moore and Krizman 1981). *S. nelsonii* is endemic to Guam and Rota (Raulerson and Rinehart 1991). This species can be found on limestone and in ravines; it is considered an edge species, and an "attractive" forest and shade tree (Raulerson and Rinehart 1991). Hayun Lagu was listed as endangered by the USFWS on 18 February 1987 (USFWS 1987); no critical habitat has been designated. The CNMI Government also classified this species as threatened/endangered in the Commonwealth Register on 15 January 1991.

Kanehira (USFWS 1993) first reported it from Rota. In the early 1990s, 121 adult trees were present on Rota (Wiles et al. 1996). Currently, only 33 known *S. nelsonii* individuals occur on Rota and Guam (USFWS 2016). Primary threats to Hayun Lagu include habitat degradation by ungulates, invertebrate predation or herbivory, and typhoon damage (USFWS 2016).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Maesa walkeri*

*Maesa walkeri* is a shrub in the primrose family that is endemic to the Mariana Islands (USFWS 2015). *M. walkeri* is historically known from nine and 13 occurrences on Rota and Guam, respectively (USFWS 2015). Presently, there are at least 684 *M. walkeri* individuals distributed across the Sabana on Rota, and two plants known from Guam (USFWS 2015). During just 2.5 hours in February 2015 on Rota, CNMI-DFW biologists counted 671 *M. walkeri* individuals along 9,531 feet of transects, as well as noted 13 incidental sightings of the shrub (Liske-Clark et al. 2015). Thus, there are likely several thousand more *M. walkeri* individuals present on the Sabana plateau and in other locations on Rota (Liske-Clark et al. 2015, USFWS 2015).

*M. walkeri* was federally listed as threatened on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Nervilia jacksoniae*

*Nervilia jacksoniae* is a small herb in the orchid family that is endemic to Guam and Rota (Raulerson and Rinehart 1992). This species can be found on sandy soil or humus within shady locations (Raulerson and Rinehart 1992). Historically, *N. jacksoniae* ranged from northern to southern Guam, and on the Sabana region of Rota (USFWS 2015). Currently, fewer than 200 *N. jacksoniae* individuals are known from two occurrences on Guam, and 13 occurrences comprise ≥320 individuals on Rota (USFWS 2015). However, CNMI-DFW biologists conducted surveys for *N. jacksoniae* on Rota in November 2014; counting 167 individuals along four transects and estimating there to be 929,274 individuals within the *Pandanus* habitat on the Sabana upper plateau (Zarones et al. 2015e).

*N. jacksoniae* was federally listed as threatened on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Nesogenes rotensis*

*Nesogenes rotensis* is a low-growing, herbaceous plant that is endemic to Rota. It was listed as endangered on 8 April 2004 (USFWS 2004b). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered. *N. rotensis* was first collected in 1982 by Derral Herbst and Marjorie Falanruw on exposed limestone at Pona Point, and growing in association with *Bikkia tetrandra*, *Hedyotis strigulosa, Pogonatherum paniceum, Scaevola taccada,* and *Terminalia samoensis* (USFWS 2007). Herbst identified less than 100 plants at Pona Point in 1982; while field surveys conducted by CNMI-DFW in November 2001 identified 579 individual plants (USFWS 2007). *N. rotensis* was not observed at Pona Point in May or November 2003, following super typhoon Pongsona; however, in December 2003, 34 adult plants were reported, and in March 2005, approximately 20 individual plants (seedlings and adults) were documented (USFWS 2007). A second population of *N. rotensis,* approximately 15–20 individual seedlings and adults, was discovered at Puntan Fina Atkos in March 2005 (USFWS 2007).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Osmoxylon mariannense*

*Osmoxylon mariannense* is a soft-wooded tree in the ginseng family (Arialiaceae) that is endemic to Rota (Raulerson and Rinehart 1991). It was first collected in the late 1800s, by the French naturalist Alfred Marche (USFWS 2007). *O. mariannense* was listed as endangered on 8 April 2004 (USFWS 2004b); no critical habitat has been designated. The CNMI Government has not recognized this species as threatened/endangered.

*O. mariannense* grows in the Sabana's limestone forests as an understory species generally in association with *Pisonia umbellifera* and *Hernandia labyrinthica* (USFWS 2007). Between 1980 and 1995, various researchers estimated the *O. mariannense* population at 20 trees, all located in the Sabana region (USFWS 2007). Eight trees from five different locations were documented along the Sabana road in 1998 (USFWS 2007). In 2000, CNMI-DFW biologists identified 11 (six alive, five dead) individual *O. mariannense* trees throughout the Sabana (USFWS 2007). The latest data documented 10 (eight wild, two outplanted) *O. mariannense* trees occurring alongside a series of unimproved roads intersecting the upper region of the Sabana (USFWS 2007).

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Tabernaemontana rotensis*

*Tabernaemontana rotensis* is a slender tree in the dogbane family that reaches 26-33 feet (Stone 1970, USFWS 2015). *T. rotensis* is known from Guam and Rota (Stone 1970). A 2011 genetic study on *Tabernaemontana* specimens from Rota, Guam, Asia, and the Pacific, determined that *T. rotensis* is a genetically distinct and valid species based on both genetic and morphological data (Reynaud 2012). Presently, *T. rotensis* is known from about 21,000 individuals at six sites on Guam (UOG 2007), and 39 (nine naturally occurring and 30 out planted) individuals on Rota (USFWS 2015).

*T. rotensis* was federally listed as threatened on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

*Tuberolabium guamense*

*Tuberolabium guamense* is an epiphytic orchid historically known from Guam, Rota, Tinian, and Aguiguan (USFWS 2015). *T. guamense* is known to flower between September and October, with most plants flowering simultaneously (Raulerson and Rinehart 1992). Presently, one *T. guamense* individual is known to occur on Guam, and ≥239 individuals are known from Rota (USFWS 2015). CNMI-DFW biologists conducted surveys for *T. guamense* on Rota in November 2014 and February 2015. During these surveys, 239 *T. guamense* individuals were counted along six of 18 transects surveyed, and nearly 14,600 individuals were estimated to occur in the western third of Rota (Zarones et al. 2015b). On Rota, host trees for *T. guamense* include *Elaeocarpus joga*, *Hernandia labyrinthica*, and *Premna obtusifolia* (Zarones et al. 2015b).

*T. guamense* was federally listed as threatened on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Ufa-halomtano (*Heritiera longipetiolata*)

Ufa-halomtano (*Heritiera longipetiolata*) is a tree in the hibiscus family, and endemic to the Mariana Islands (Stone 1970, USFWS 2015). *H. longipetiolata* typically occurs in crevices of rough limestone, particularly on cliffs and plateaus, and individuals are often twisted and wind-stunted (Stone 1970, Raulerson and Rinehart 1991). *H. longipetiolata* can reach up to 49 feet in height and can attain a diameter of 39 inches (Kostermans 1959). Ufa-halomtano presently persists in 10 occurrences comprising approximately 200 individuals on Guam, Rota, Tinian, and Saipan (Harrington et al. 2012, USFWS 2015).

*H. longipetiolata* was federally listed as endangered on 1 October 2015 (USFWS 2015). No critical habitat has been designated for this species. The CNMI Government has not recognized this species as threatened/endangered.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*)

Cordon de San Francisco (*Lycopodium phlegmaria* var. *longifolium*) is an epiphytic plant that is native to Guam and Rota (Raulerson and Rinehart 1992). *L. phlegmaria* var. *longifolium* is not recognized as threatened or endangered by USFWS. However, the CNMI Government classified this species as threatened/endangered in the Commonwealth Register on 15 January 1991. Cordon de San Francisco grows in shaded forest to 12-24 inches long, with stems branched one-to-three times (Raulerson and Rinehart 1992). The distribution and abundance of Cordon de San Francisco on Rota is unknown.

Based on the lack of optimal habitat for this species at Rota West Harbor, a "*no effect*" determination is anticipated.

### 1. Critical Habitat

Critical habitat has not been designated nor is currently being proposed in CNMI waters for any listed species under USFWS jurisdiction. However, identification of critical habitat for the listed Green Sea Turtle is currently under development; critical habitat could be designated as early as 2018.

## B. Marine Fauna and Flora

The NOAA Pacific Islands Regional Office (Honolulu, HI) listed a total of 39 marine species (or Distinct Population Segments) in the Marianas archipelago; 28 marine mammals; 5 sea turtles, 3 fish and 3 corals (Table 2). There are no Candidate or Proposed for Listing species for the Marianas. However, there are several Candidate species going through a status review for consideration in listing. It should be noted that all marine mammals are also protected under the Federal Marine Mammal Protection Act and those species present in the Marianas are also listed in Table 2.

Table 2. Federal and Commonwealth of the Northern Mariana Islands (CNMI) listed threatened/endangered marine species that may occur or have historically occurred in the waters of the Mariana archipelago and therefore, Rota. Protected status information obtained (website accessed August 2017) from http://www.fpir.noaa.gov/PRD/prd_marine_protected_species_of_mariana_islands_list.html
PT = Proposed Threatened, T = Threatened, E = Endangered, NR = Not recognized.

| LISTED SPECIES | FEDERAL ESA | CNMI |
|---|---|---|
| **MARINE MAMMALS** | | |
| Blue Whale (*Balaenoptera musculus)* | E | NR |
| Blainville's Beaked Whale (*Mesoplodon densirostris*) | E | NR |
| Bryde's Whale (*Balaenoptera edeni*) | NR | NR |
| Cuvier's Beaked Whale (*Ziphius cavirostris*) | NR | NR |
| Dwarf Sperm Whale (*Kogia simus*) | NR | NR |
| False Killer Whale (*Pseudorca crassidens*) | NR | NR |
| Fin Whale (*Balaenoptera physalus*) | E | NR |
| Humpback Whale (*Megaptera novaeangliae*) | E | NR |
| Killer Whale (*Orcinus orca*) | NR | NR |
| Long-finned Pilot Whale (*Globicephala melaena*) | NR | NR |
| Longman's Beaked Whale (*Indopacetus pacificus*) | NR | NR |
| Melon-Headed Whale (*Peponocephala electra*) | NR | NR |
| Minke Whale (*Balaenoptera acutorostrata*) | NR | NR |
| Pygmy Killer Whale (*Feresa attenuate*) | NR | NR |
| Pygmy Sperm Whale (*Kogia breviceps*) | NR | NR |
| Sei Whale (*Balaenoptera borealis*) | E | NR |
| Short-Finned Pilot Whale (*Globicephala macrorhynchus*) | NR | NR |

| LISTED SPECIES | FEDERAL ESA | CNMI |
|---|---|---|
| Sperm Whale (*Physeter microcephalus*) | E | NR |
| Bottlenose Dolphin (*Tursiops truncates*) | NR | NR |
| Common Dolphin (*Delphinus delphis*) | NR | NR |
| Fraser's Dolphin (*Lagenodelphis hosei*) | NR | NR |
| Pantropical Spotted Dolphin (*Stenella attenuate*) | NR | NR |
| Risso's Dolphin (*Grampus griseus*) | NR | NR |
| Rough-toothed Dolphin (*Steno bredanensis*) | NR | NR |
| Spinner Dolphin (*Stenella longirostris*) | NR | NR |
| Striped Dolphin *(Stenella coeruleoalba*) | NR | NR |
| Dugong (*Dugong dugon*) *Dugongs are under the jurisdiction of the USFWS.* | E | NR |
| Northern Elephant Seal (*Mirounga angustirostris*) | NR | NR |
| **SEATURTLES** | | |
| Green Turtle, Central West Pacific DPS (*Chelonia mydas)* | E | T/E |
| Hawksbill Turtle (*Eretmochelys imbricate)* | E | T/E |
| Leatherback Turtle (*Dermochelys coriacea)* | E | NR |
| Loggerhead Turtle, North Pacific DPS (*Caretta caretta)* | E | NR |
| Olive Ridley Turtle (*Lepidochelys olivacea)* | T | NR |
| **FISH** | | |
| Scalloped Hammerhead Shark, Indo-West Pacific DPS (*Sphyrna lewini)* | T | NR |
| Giant Manta Ray (*Manta birostris)* | PT | NR |
| Oceanic Whitetip Shark (*Carcharhinus longimanus)* | PT | NR |
| **CORALS** | | |
| Coral; no common name *(Seriatopora aculeata)* | T | NR |
| Coral; no common name *(Acropora globiceps)* | T | NR |
| Coral; no common name *(Acropora retusa)* | T | NR |

Though the list of protected marine species shown in Table 2 is extensive, most of the species are pelagic and found offshore and do not occur in the shallow nearshore waters of Rota. The list of potential affected species narrows even further when only the Rota West Harbor site is considered.

The following species summary is provided for each of the federally listed species and concludes with a preliminary effects determination, as it relates to ESA Section 7. Based on the species' life history characteristics, habitat requirements, historical knowledge of the project site, the known resources, and the potential impacts from the proposed action, a preliminary effects determination was made. This does not pre-empt the need for additional resource surveys.

Green Sea Turtle (*Chelonia mydas*)
In response to the original decline in population levels, the green turtle was listed as threatened under the Endangered Species Act, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered, on 28 July 1978 (43 FR 32800).

After a thorough 5-year review and reassessment of the worldwide populations of the green turtle, NMFS and USFWS issued a final rule in May 2016 to list 11 distinct population segments (DPSs) of the green sea turtle under the Endangered Species Act. Based on the best available scientific and commercial data, and after considering comments on the proposed rule, it was determined that three DPSs are endangered species and eight DPSs are threatened species (81 FR 20057). The Central West Pacific DPS occurs in the Mariana Islands and is listed as endangered. Critical habitat is currently being investigated with a draft plan expected in 2018.

After leaving the nesting beach, young sea turtles are believed to occupy open ocean pelagic habitat, perhaps associated with sargassum rafts. It is generally assumed that at this life stage they are omnivorous with a strong tendency toward carnivory. An ontogenetic shift from a pelagic life form to benthic foraging occurs after reaching a carapace size of 20-25 cm in the Western Atlantic or 35 cm carapace length in Hawaii and Australia. A change to a herbivorous diet also occurs during this time, primarily sea grasses and algae, although they also consume jellyfish, salps and sponges (Lutz and Musick 1997).

In an assessment of green turtle populations in the southern five islands of the CNMI, Kolinski, et.al. (2004) found that Tinian contained the highest densities of sea turtles, followed by Saipan, Rota, Aguijan and Farallon de Medinilla. Interestingly, sea turtle densities were not found to be significantly correlated with island and reef perimeters. The near shore sea turtle population around the southern CNMI islands was estimated from 1,000 to 2,000 individuals. Kolinski, et.al. (2004) also noted the predominance of juvenile sea turtles identified from the numerous surveys and suggested further research in tagging and size differentiation be pursued.

Based on local knowledge, green turtles have been observed in Rota West Harbor, therefore a "*may effect*" determination is anticipated.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
Population declines resulted in the hawksbill turtle being listed as endangered on 2 June 1970 (35 FR 8495). Critical habitat was identified by the NMFS on 2 September 1998 (Volume 63, Number 170) as occurring in waters extending seaward 3 nm from the Mean High Water Line of Isla de Mona (Mona Island), and Isla Monito (Monito Island), Puerto Rico. No critical habitat has been designated in the Mariana archipelago.

Hawksbill turtles have a circum-tropical distribution, occurring from $30^0$N to $30^0$S latitude within the Atlantic, Pacific, and Indian oceans. Along the eastern Pacific rim, hawksbills were apparently common to abundant as recently as 50 years ago in near shore waters from Mexico to Ecuador, particular the east coast of Baja California Sur in the vicinity of Concepcion Bay and Paz Bay, Mexico.

What appears to be a better situation occurs in the Central Pacific; nesting is widely distributed and in very low numbers. Foraging hawksbills are observed from virtually all the island groups in Oceania, from the Galapagos Islands in the eastern Pacific to the Republic of Palau in the Western Pacific. Hawksbills nest on the islands and mainland of southeast Asia, from China and Japan, throughout the Philippines, Malaysia, and Indonesia, to Papua New Guinea, the Solomon Islands and Australia (USFWS 1998).

As with other sea turtle species, after leaving the nest the turtle is pelagic. Data indicates that Hawksbills forage most often over coral reef areas and rock outcroppings although they also feed in seagrass meadows in mangrove-fringed bays. Although generally accepted that hawksbill sea turtles are primarily spongivores, other items consumed include: sea grasses, tunicates, bryozoans, coelenterates, molluscs and soft corals. Hawksbills are believed to undergo a period of omnivorous feeding in benthic habitats prior to adopting the specialized spongivory known from larger juveniles and adults (Lutz and Musick 1997).

Although the *Recovery Plan for the U.S. Pacific Populations of the Hawksbill Turtle*(USFWS 1998) reports no nesting of hawksbill turtles in the Northern Mariana Islands, recent nesting evidence on Rota and Saipan supports their inclusion into the USFWS jurisdictional listing (USFWS-Part III, 1996). Additionally, Resources Northwest Consultants (1998) reports that hawksbill turtles are believed to have historically nested on at least six of Rota's beaches: Talakhaya, Two Brother's Point, Mochong, Lalayak, Coconut Village, Teteto and the adjacent Santa Margarita Beaches. However, they have not been observed for "*approximately the last ten years*".

Although hawksbill turtles are much less abundant than the green turtle in the nearshore waters, a "*may effect*" determination would also likely be appropriate for the hawksbill turtle.

Coral (Acropora globiceps)
NOAA listed this coral species as threatened on 10 October 2014. Although presently under development, no critical habitat has been designated at this time. The following species account was taken directly from the NOAA website[4].

*Colonies of Acropora globiceps have finger-like branches. The size and appearance of branches depend on degree of exposure to wave action but are always closely compacted. Colonies exposed to strong wave action have pyramid-shaped branchlets. Colonies can be uniform blue (which may photograph purple) or cream, brown, or fluorescent green in color.*

*Acropora globiceps is a hermaphroditic (having both male and female gametes) spawner with lecithotrophic (yolk-sac) larvae.*

*Based on confirmed observations and strong predictions of occurrence in areas that have not yet been surveyed sufficiently, Acropora globiceps is likely distributed from the oceanic west Pacific to the central Pacific as far east as Pitcairn Islands.*

*Based on the information below we consider Acropora globiceps to occur in Guam, the Commonwealth of the Northern Mariana Islands (CNMI), American Samoa, and the Pacific Remote Island Areas (PRIA).*

*Doug Fenner has a photo from CNMI that shows this species clearly. Veron (2014) lists this species in the "Marianas" but is not specific about whether it is in Guam and/or CNMI. Randall (1995; 2003) does not list it in Guam or CNMI, nor does Burdick (2014), but Randall and Burdick (in preparation) list it from the Mariana Islands, but it is not clear if they list it from CNMI. Brainard et al. (2011) indicate that it has been reported from the "Northern Marianas Islands" by the IUCN Red List. The IUCN Red List indicates it is known from the "Northern Mariana Islands," but does not give the source.*

*Acropora globiceps occurs on upper reef slopes, reef flats, and adjacent habitats in depths ranging from 0 to 8 meters.*

[4] http://www.fpir.noaa.gov/Graphics/PRD/Coral/Acropora_globiceps.pdf

*Relative localized abundance refers to how commonly a species is observed on surveys in a localized area. Veron (2014) reports that Acropora globiceps occurred in 3.2 percent of 2,984 dive sites sampled in 30 ecoregions of the Indo-Pacific. It was given an abundance rating on a scale of 1 (low) to 5 (high) at each site where it occurred, based on how common it was at that site. Acropora globiceps had a mean abundance rating of 1.95. Based on this semi-quantitative system, the species' abundance was characterized as "uncommon."*

*Absolute overall abundance refers to a rough qualitative minimum estimate of the total number of colonies of a species that currently exist throughout its range. These estimates were calculated based on results from Richards et al. (2008) and Veron (2014). The absolute abundance of Acropora globiceps is likely at least tens of millions of colonies.*

*Acropora globiceps is susceptible to the three major threats identified for corals including ocean warming, disease, and ocean acidification, as well as many of the other threats to corals. Despite its distribution from southeast Asia to the central Pacific, Acropora globiceps occurs primarily in a limited depth range of 0 to 8 meters. Shallow reef areas can be physically diverse and complex, but are often subjected to frequent changes in environmental conditions, extremes, high irradiance, and simultaneous effects from multiple stressors, both local and global in nature. Future projections of climate change impacts to coral reef environments indicate that a shallow depth range, in combination with its other biological, demographic, and spatial characteristics, contributes to a risk of extinction within the foreseeable future for Acropora globiceps.*

In their review of the proposed Master plan, the USFWS (via letter dated 6 November 2017) identified *Acropora globiceps* as occurring within Rota Harbor. Therefore, a *"may affect*" determination would be appropriate. Additional quantitative surveys that would be conducted for the Biological Assessment will determine whether the proposed action is likely to affect this species.

Coral (Seriatopora aculeate)
NOAA listed this coral species as threatened on 10 October 2014. Although presently under investigation, no critical habitat has been designated at this point in time. The following species account was taken directly from the NOAA website [5]

*Colonies of Seriatopora aculeata have pencil-thick, short, tapered branches, usually in fused clumps. Colonies are pink or cream in color. The reproductive characteristics of Seriatopora aculeata have not been determined, but other species of Seriatopora are hermaphroditic (having both male and female gametes) brooders (expelling sperm but egg fertilization is internal).*

*Based on confirmed observations and strong predictions of occurrence in areas that have not yet been surveyed sufficiently, Seriatopora aculeata is likely distributed mostly within the Coral Triangle area (the Philippines to Timor Leste and east to the Solomon Islands), as well as adjacent areas in the western Pacific from the Mariana Islands down to New Caledonia.*

*Seriatopora aculeata has not yet been reported from American Samoa and the Pacific Remote Island Areas (PRIA). Based on the information below we consider Seriatopora aculeata to occur in Guam and the Commonwealth of the Northern Mariana Islands (CNMI).*

[5] http://www.fpir.noaa.gov/Graphics/PRD/Coral/Seriatopora_aculeata.pdf

*Randall (1995; 2003) reports it from the Marianas archipelago but does not distinguish Guam from CNMI. Veron (2014) reports it from the "Marianas" but does not distinguish Guam from CNMI. Brainard et al. (2011) write that the IUCN Red List reported it from the "Northern Marianas Islands" but the source was not reported. Houk (P. Houk, pers. comm., 2014) reports that S. aculeata is common around Saipan.*

*Seriatopora aculeata occurs in a broad range of habitats on the reef slope and back-reef, including but not limited to upper reef slopes, mid-slope terraces, lower reef slopes, reef flats, and lagoons in a depth range of 3 to 40 meters.*

*Seriatopora aculeata is susceptible to the three major threats identified for corals including ocean warming, disease, and ocean acidification, as well as many of the other threats to corals. A significant proportion of its current known geographic range is within the Coral Triangle area. This area is projected to have the most rapid and severe impacts from climate change and localized human impacts for coral reefs over the 21st century. Multiple ocean warming events have already occurred within the western equatorial Pacific (which includes the Coral Triangle area) that suggest future ocean warming events may be more severe than average in this part of the world. A range constrained mostly to this particular geographic area that is likely to experience severe and increasing threats indicates that a high proportion of the population of this species is likely to be exposed to those threats over the foreseeable future. This, in combination with its other biological, demographic, and spatial characteristics, contributes to a risk of extinction within the foreseeable future for Seriatopora aculeata.*

Due to the dearth of knowledge on the distribution of this coral species, specific surveys will have to be conducted prior to making an effect determination.

#### 1. Critical Habitat

Critical habitat has not been designated nor is currently being proposed in CNMI waters for any listed species under NMFS jurisdiction. However, identification of critical habitat in the Marianas for the listed coral species and the green sea turtle is currently under development. Critical Habitat for these species could be designated as early as 2018.

## III. Initial Agency Coordination Responses

The following federal and CNMI agencies were requested to provide comments on the proposed action relative to their agencies mandate: U.S. Fish and Wildlife Service (email dated 6 October 2017); National Marine Fisheries Service (email dated 6 October 2017); U.S. Army Corps of Engineers (email dated 6 October 2017); Division of Coastal Resources Management (letter received 22 September 2017); Division of Environmental Quality (letter received 22 September 2017); Division of Fish and Wildlife (letter received 22 September 2017); Division of Historic Preservation (letter received 25 September 2017). Agency responses are included in Appendix 1.

### A. Federal Agencies

#### 1. U.S. Fish and Wildlife Service

The USFWS reviewed the draft harbor Master Plan and submitted their preliminary comments in a letter dated 6 November 2017. The following bullet points highlight their concerns:

- the required USACOE permit would require, at a minimum, consultations under section 7 of the ESA and FWCA, compliance with the federal action agency's guidelines under NEPA, as well as other environmental statues;

- biological surveys were conducted by the USFWS in June 2016 for the USACOE West Harbor feasibility study and will be released in December 2017;
- the federally threatened coral *Acropora globiceps* was documented within Rota Harbor;
- should the turning basin require expansion, the USFWS suggested that alternative plans consider the area to the west and not the reef flat to the east;
- all possible alternatives for construction of the proposed breakwater along the entrance channel should be addressed; and
- a risk assessment study should be developed to address the potential increased risk of invasive species.

### 2. National Marine Fisheries Service

The USFWS reviewed the draft harbor Master Plan and submitted their preliminary comments in a letter dated 3 November 2017. The following bullet points highlights their comments:

- implementation of the proposed action would require consultation under section 7 of the ESA, compliance with the federal action agency's guidelines under NEPA, consultation as required by the FWCA and MSA Essential Fish Habitat;
- development of a Storm water Pollution Prevention Plan, a Biosecurity Plan, and a Spill Prevention, Control and Countermeasure Plan;
- a comprehensive environmental planning document that includes quantitative marine resource assessments and an assessment of runoff and storm water, spills, invasive species, marine debris, sedimentation and turbidity, noise impacts, pile driving impacts and their direct loss of coral growing on existing wharf and pier surfaces.

### 3. U.S. Army Corp of Engineers

The USACOE reviewed the draft harbor Master Plan and submitted their preliminary comments in a letter dated 2 November 2017. The following bullet points highlights their comments:

- the proposed Rota West Harbor expansion plans, as contained in the Master Plan, has been assigned a Department of Army reference number POH-2017-231;
- the purpose of their comments was to provide information regarding the USACOE regulatory program and permit requirements; the USACOE suggested that the proposed action will require some form of a R&HA section 10 and CWA section 404 permit that must comply with the section 404(b)(1) Guidelines.
- For unavoidable impacts to marine resources, compliance with the Federal Compensatory Mitigation for Losses of Aquatic Resources will be required;
- implementation of the proposed action would require consultation under section 7 of the ESA, section 106 of the NHPA, section 307 of the Coastal Zone Management Act, CWA section 401, and MSA Essential Fish Habitat;

## IV. Potential Impacts to Important Natural Resources

Six special aquatic sites are identified in the CWA section 404(b)(1) Guidelines that require special consideration and mitigation prior to being impacted by dredge and fill activities: sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes.

Significant project related impacts to these habitats will need to address the requirements outlined in the 2008 Compensatory Mitigation Plan as jointly promulgated by the USEPA and USACOE. Those special aquatic sites that occur near the Rota West Harbor area are sanctuaries/refuges and coral reefs. Further surveys will have to be conducted to determine the presence of seagrasses.

<u>Sanctuaries and Refuges</u>

The Anjota Island Preserve is connected by a causeway to the mainland and lies between Rota West Harbor and Tweksberry Park. Locals and tourists use the small island as a picnic area alike.

Implementation of the master plan is expected to have minimal direct impact to Anjota Island Preserve as the seaward shoreline and entrance channel are currently protected with armor stone. This island was used as an upland dredge disposal area during the last maintenance-dredging event in the 1990's.

<u>Vegetated Shallows</u>

Tsuda, et.al. (1977) listed three seagrass species from the CNMI; *Enhalus acoroides, Halophila minor,* and *Halodule uninervis.* A fourth species of sea grass, *Halophila ovalis*, was recently discovered during a sea turtle assessment study on Saipan (Kolinski, et.al., 2001). Only three islands in the CNMI are known to have seagrasses; Saipan, Tinian and Rota.

Historically, the sea grass *Enhalus* occurred in Rota West Harbor. During harbor improvements in the 1980's, a small area of seagrass was transplanted off-site from the harbor to other areas. Some of those transplanted sea grasses survive today.

<u>Coral Reefs</u>

The regulatory agencies typically consider any coral growth to be a coral reef. Coral growth is locally abundant within the shallow harbor proper and dominated by *Pocillopora damicornis*; a very common branching coral. This is the general area where the floating docks would be constructed. Impacts will occur through construction generated sediment plumes (likely minimal), noise related to hydraulic jack-hammering of pilings, and possible shading effects of floating docks. The magnitude of the impact will have to be determined at a later date when additional information becomes available on dock siting relative to the location of benthic resources.

In contrast, the fringing reef lying adjacent and east of the turning basin has a high density of coral grow that has well-developed back reef, reef crest and fore reef habitats. Species diversity is greater in this area when compared to the harbor proper.

Impacts to corals and other non-motile benthic resources from construction of the approximate 800-foot training wall and approximate 700-foot breakwater would be relatively immense. The footprint of these two structures are projected to cover over 2.0 acres of coral reef habitat. These unavoidable impacts will be considered significant and the USACOE will require a compensatory mitigation plan to be implemented. Mitigation could include on-site in-kind coral transplantation that would include 5 years of monitoring and the meeting of performance standards.

Maintenance dredging of the turning basin and entrance channel will likely affect some corals, however slow moving benthic invertebrates that occur in sandy substrate will become the primary targets.

## V. Potential Environmental Mitigation Measures

The generally accepted approach in applying mitigation for actions in aquatic environments follows the policy developed by the U.S. Army Corps of Engineers and the U.S. Environmental

Protection Agency (see 1990 Memorandum of Agreement). The three types of mitigation shown below are typically followed in the order presented:

*(1) Avoidance means mitigating an aquatic resource impact by selecting the least-damaging project type, spatial location and extent compatible with achieving the purpose of the project. Avoidance is achieved through an analysis of appropriate and practicable alternatives and a consideration of impact footprint.*

*(2) Minimization means mitigating an aquatic resource impact by managing the severity of a project's impact on resources at the selected site. Minimization is achieved through the incorporation of appropriate and practicable design and risk avoidance measures.*

*(3) Compensatory Mitigation means mitigating an aquatic resource impact by replacing or providing substitute aquatic resources for impacts that remain after avoidance and minimization measures have been applied, and is achieved through appropriate and practicable restoration, establishment, enhancement, and/or preservation of aquatic resource functions and services.*

Avoiding impacts to marine resources starts during the project design phase where engineers adopt the least environmentally damaging structures that would still accomplish the stated objectives. For example, instead of constructing solid causeways out into harbor waters to moor vessels, elevated piers would be designed to meet the vessel mooring demand.

As the Master Plan goes through the NEPA process, avoidance and minimization mitigation measures will be identified based on the type and magnitude of impacts to aquatic resources. This process will also explore several alternatives of meeting the same objectives, through slightly different approaches and each alternative will be analyzed against the other. The preferred alternative is typically selected when mitigation measures are able to minimize the sum total of impacts to the marine resources. Unavoidable impacts to marine resources will require development of a compensatory mitigation plan that would follow the 2008 Federal Compensatory Mitigation for Losses of Aquatic Resources regulations.

Development of mitigation measures prior to a NEPA analysis is preliminary, however there are several agencies that have previously developed mitigation measures that are applied to all issued permits. The most extensive list of mitigation measures was developed by the U.S. Army Corps of Engineers and will be used as a planning guide for purposes of this Master Plan.

The following BMP's and general conditions measures are typically included on USACOE permits issued in the Western Pacific under the Western Pacific Standard Local Operating Procedures for Endangered Species (Pac-SLOPES). Although presented in no particular order, similar measures are grouped together. Not all BMP's or mitigation measures may be applicable to the in-water activities being proposed by the Rota West Harbor Master Plan.

Typical mitigation measures that are expected to be included on any USACOE permit.

- Each permit will contain the requirement that the permittee document and report to the Corps and NMFS, all interactions with listed species, including the disposition of any listed species that are injured or killed. Should an ESA-listed species be adversely affected, all work must stop pending re-initiation and completion of consultation between the Corps and NMFS PRD for that action.

- Projects that would affect structures or substrate with ESA-listed corals attached are excluded from coverage under Pac-SLOPES.
    - For in-water work where ESA corals may occur, structures and substrate that could be affected by the proposed activity must be surveyed by personnel qualified to identify ESA-listed corals.
    - Should ESA-listed corals be present in the project area, but not on the structures or substrate that would be directly impacted by the activity, that activity may be covered under Pac-SLOPES if the activity complies with the conditions and best management practices described in this biological evaluation.
    - To minimize impacts to coral larvae, notably the listed species covered in this programmatic consultation, the permittee shall avoid in-water work during mass-coral spawning times or peak coral spawning seasons. Permittees must consult with local biologists (either NMFS HCD representatives in their respective locations, or the appropriate local government agencies) to determine the exact period and dates when coral spawning would occur for the given year.
- Constant vigilance shall be kept for the presence of non-coral ESA-listed marine species (sea turtles, marine mammals, sharks) during all aspects of the permitted action.
    - A responsible party, i.e., permittee/site manager/project supervisor, shall designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed marine species;
    - Searches and monitoring shall be made prior to the start of work each day, including prior to resumption of work following any break of more than one-half hour. Additional periodic searches and monitoring throughout the work day are strongly recommended;
    - All in-water work will be postponed or halted when ESA-listed marine species are within 50 yards of the proposed work, and will only begin/resume after the animals have voluntarily departed the area, with the following exception: if ESA-listed marine species are noticed within 50 yards after work has already begun, that work may continue only if, in the best judgment of a biologist, the activity is unlikely disturb or harm the animal(s), for example, divers performing surveys or underwater work (excluding the use of toxic chemicals) is likely safe, the use of heavy machinery is not; and
    - Project-related personnel shall NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.
- Project footprints must be limited to the minimum area necessary to complete the project.
- The project area must be flagged to identify and avoid impacts to sensitive resource areas, such as corals, seagrass beds, listed terrestrial plants, and sea turtle nests.
- Work located channel ward of the Mean Higher High Tide Line of navigable water or channel ward of the upward limits of adjacent wetlands must be timed to minimize effects on ESA-listed species and their habitats.
- Project operations must cease under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.
- A storm-water management plan, commensurate to the size of the project, must be prepared and carried out for any project that will produce any new impervious surface or a land cover conversion that will slow the entry of water into the soil to ensure that effects to water quality and hydrology are minimized.
- A pollution and erosion control plan for the project site and adjacent areas must be prepared and carried out. As a minimum, this plan shall include:
    - Proper installation and maintenance of silt fences/curtains, sausages, equipment diapers, or drip pans.

- A contingency plan to control and clean spilled petroleum products and other toxic materials.
  - Appropriate materials to contain and clean potential spills will be stored at the work site, and be readily available.
  - All project-related materials and equipment placed in the water will be free of pollutants.
  - Daily pre-work inspections of heavy equipment for cleanliness and leaks, with all heavy equipment operations postponed or halted until leaks are repaired and equipment is cleaned.
  - Fueling of project-related vehicles and equipment will take place at least 50 feet away from the water and within a containment area, preferably over an impervious surface;
  - A plan will be developed to prevent trash and debris from entering the marine environment during the project.
  - All construction discharge water (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) must be treated before discharge.
- Erosion controls must be properly installed before any alteration of the project area may take place.
- Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.
- Native species suitable for the impacted habitat must be considered for re-vegetation for the purposes of restoring areas temporarily disturbed by the authorized work to their pre-disturbance condition.
- All disturbed areas must be immediately stabilized following cessation of activities for any break in work longer than 4 days.
- Drilling and dredging are restricted to uncontaminated areas, and any associated waste or spoils must be completely isolated and disposed of in an approved upland disposal location.
- You must remain vigilant for the presence of non-coral ESA-listed marine species (sea turtles, marine mammals, sharks) during all aspects of the permitted action.
- A responsible party, i.e., permittee/site manager/project supervisor, shall designate a competent observer to search/monitor work sites and the areas adjacent to the authorized work area for ESA-listed marine species;
- Searches and monitoring shall be made prior to the start of work each day, including prior to resumption of work following any break of more than one- half hour. Additional periodic searches and monitoring throughout the work day are strongly recommended;
- Equipment operators shall employ “soft starts” when initiating work each day and after each break of 30 minutes or more that directly impacts the bottom. Buckets and other equipment shall be sent to the bottom in a slow and controlled manner for the first several cycles before achieving full operational impact strength or tempo;
- Project-related personnel shall NOT attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.
- Project footprints must be limited to the minimum area necessary to complete the project.
- A plan will be developed to prevent trash and debris from entering the marine environment during the project.
- Mooring systems shall employ the minimum line length necessary to account for expected fluctuations in water depth due to tides and waves.
- Mooring systems shall be designed to keep the line as tight as possible, with the intent to eliminate the potential for loops to form.

- Mooring lines shall consist of a single line. No additional lines or material capable of entangling marine life may be attached to the mooring line or to any other part of the deployed system.
- Mooring systems shall be designed to keep the gear off the bottom, by use of a mid-line float when appropriate, with the intent to eliminate scouring of corals or entanglement of the line on the substrate.

Best Management Practices as required by the Western Pacific Standard Local Operating Procedures for Endangered Species.

<u>BMPs required for activity types that may result in collision with vessels</u>:

- Vessel operators shall alter course to remain at least 100 yards from whales, and at least 50 yards from other marine mammals and sea turtles.
- Vessel operators shall reduce vessel speed to 10 knots or less when piloting vessels in the proximity of marine mammals, and to 5 knots or less when piloting vessels in areas of known or suspected turtle activity.
- If approached by a marine mammal or turtle, the vessel operator shall put the engine in neutral and allow the animal to pass.
- Vessel operators shall not encircle or trap marine mammals or sea turtles between multiple vessels or between vessels and the shore.

<u>BMPs required for activity types that may result in direct physical impact:</u>

- Before any equipment, anchor(s), or material enters the water, a responsible party, i.e., permittee/site manager/project supervisor, shall verify that no ESA-listed species are in the area where the equipment, anchor(s), or materials are expected to contact the substrate. If practicable, the use of divers to visually confirm that the area is clear is preferred.
- Equipment operators shall employ "soft starts" when initiating work each day and after each break of 30 minutes or more that directly impacts the bottom. Buckets and other equipment shall be sent to the bottom in a slow and controlled manner for the first several cycles before achieving full operational impact strength or tempo.
- All objects lowered to the bottom shall be lowered in a controlled manner. This can be achieved by the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
- Equipment, anchor(s), or materials shall not be deployed in areas containing live corals, sea grass beds, or other significant resources.

<u>BMPs required for activity types that may result in entanglement:</u>

- Mooring systems shall employ the minimum line length necessary to account for expected fluctuations in water depth due to tides and waves.
- Mooring systems shall be designed to keep the line as tight as possible, with the intent to eliminate the potential for loops to form.
- Mooring lines shall consist of a single line. No additional lines or material capable of entangling marine life may be attached to the mooring line or to any other part of the deployed system.
- Mooring systems shall be designed to keep the gear off the bottom, by use of a mid-line float when appropriate, with the intent to eliminate scouring of corals or entanglement of the line on the substrate.

- Any permanent or long-term deployments shall include an inspection and maintenance program to reduce the likelihood of failures that may result in loose mooring lines lying on the substrate or hanging below a drifting buoy.
- Mooring systems, including those used for temporary markers, scientific sensor buoys, or vessel moorings, shall be completely removed from the marine environment immediately at the completion of the authorized work or the end of the mooring's service life. The only exceptions to this rule shall be mooring anchors such as eyebolts that are epoxied into the substrate and which pose little or no risk to marine life.

BMPs required for activities that may result in exposure to elevated noise levels:

- For any equipment used in undertaking the authorized work (i.e. dredging, minor excavation) a mandatory shut-down range of 50 m will ensure that no ESA-listed marine animals are exposed to sound levels anywhere near the TTS threshold isopleths.
- Maintenance dredging, in-water excavation, movement of large armor stones, and benthic core sampling shall not be undertaken if any ESA-listed species is within 50 yards of the authorized work, and those operations shall immediately shut-down if an ESA-listed species enters within 50 yards of the authorized work.

Marina or Harbor Repair and Improvement Activities:

- No installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer is authorized.
- Replacement decking should be designed to reduce in-water shading to the greatest extent practicable.
- Repair and removal work will be accomplished in a manner that minimizes the potential spread of invasive species that may reside on the pilings such as immediate removal from the water upon extraction or other appropriate approved containment methods.
- Removed materials must be disposed of at an approved upland disposal site.

Piling Installation, Repair, Replacement and/or Removal:

- Repair and removal work will be accomplished in a manner that minimizes the potential spread of invasive species that may reside on the pilings such as immediate removal from the water upon extraction or other appropriate approved containment methods.
- Removed pilings must be disposed of at an approved upland disposal site.
- No installation or proofing of steel or concrete pilings and/or sheet pile via impact hammer is authorized.

Maintenance Dredging:

- With the exception of the actual dredging apparatus (e.g. clamshell buckets, or the scoop and articulated arm of a backhoe, hydraulic head, etc.), heavy equipment will be operated from above and out of the water.
- Use of hydraulic dredging must include the installation of excluder devices adequate to prevent the entrainment or impingement of protected marine species such as sea turtles and juvenile scalloped hammerhead sharks.
- The applicant will not use a Trailing Suction Hopper Dredge (or hopper dredge) to conduct dredges. There have been numerous observed mortalities of sea turtles and sharks associated with these vessels.
- The applicant will not use Dustpan dredges, which use high velocity water jets to loosen material before sucking it into their apparatus. This technique causes high turbidity and the effects of water velocities from water jets to listed species have not been evaluated.

- The applicant may use cutter head dredges that are equipped with suctions heads of 36 inches diameter or less, and a maximum intake velocity of 4.6 meters per second (15 feet per second), and an intake velocity of 95 cm per second (3.1 feet per second) at 1 meter away from the suction head.
- The applicant may use pipeline dredges with openings no larger than 36 inches diameter, and intake velocities of 4.6 meters at the source and 95 cm per second at 1 meter. To avoid lethal entrainment or dismemberment of sea turtles, hammerhead sharks, or marine mammals, suction head openings larger than 12 inches must be either screened with 2-inch mesh or less, operated or monitored by a diver, or behind a barrier (e.g., coffer dams or silt curtains).
- To minimize exposure to listed animals in the water column, the applicant will avoid moving the suction head through the water column while the pump is turned on. The applicant will turn on suction only when the suction heads are at the bottom and in contact with the sediment, and turn it off before lifting the suction head up to the surface.
- In known scalloped hammerhead shark nursery areas, the applicant will conduct all suction dredging behind barriers (e.g., coffer dams or silt curtains), or with a diver operating or monitoring the suction head and screening.
- The portions of the equipment that enter the water will be clean and free of pollutants;
- Appropriate silt containment devices must be used and properly installed to avoid degradation of adjacent coral reefs, and aquatic vegetation.
- Dredged material must be deposited at upland sites, or at EPA designated ocean disposal sites provided sediment standards are met.

Other Minor Discharges and Dredging/Excavations:
- The dredged or discharged material will be free of contamination.
- The site of excavation or discharge will contain no known forage or resting habitat for ESA-listed marine species.

The section 401 Water Quality Certification (401 WQC) is a CNMI permit that is required to validate Rivers & Harbors Act section 10 or Clean Water Act section 404 permits issued by the USACOE. As appropriately named, the section 401 WQC focuses on ensuring in-water construction activities do not violate established CNMI water quality standards. An Environmental Protection Plan is required for the issuance of a section 401 WQC that includes a water quality monitoring plan that monitors and measures turbidity levels outside of an approved mixing zone established by the DEQ. The actual monitoring plan is developed in concert with DEQ staff and will incorporate site specific conditions. Mitigation measures associated with this permit are typically tailored to the in-water work being proposed.

## VI. Permitting, Mitigation Cost Estimates, and Schedule

The following tables (Tables 3, 4, 5, 6, and 7) provide an overview of required permits, anticipated level of difficulty, estimated costs, estimated costs for post-permit compliance with permit conditions and an estimated time line. This does not include costs for the NEPA analyses and assumes the Master Plan will be implemented in phases.

Compliance with NEPA was not included in the itemized costs analysis as it is dependent upon several variables that strongly influence costs: whether the Master Plan will be implemented by phase, if an EA or EIS would be pursued, and the NEPA requirements of the Federal action agency. If the entire Master Plan would go through the NEPA process at one time, it is estimated that costs could range from $95K to $200K.

Table 3: Permitting, Mitigation Cost Estimates, and Schedule for Rota West Harbor Phase I.

| **PHASE I PERMITS *or* AUTHORIZATIONS** | **Action or Level of Investigations** | **Anticipated Level of Difficulty** | **Estimated Permitting/Survey Costs** | **Estimated Cost for Post-permit Compliance** |
|---|---|---|---|---|
| **USCOE Section 10; Rivers and Harbor Act** | USACOE application development *Assuming compensatory mitigation will not be required* | Medium | $50K | $20K |
| | Biological Assessment that would address ESA and EFH issues *Assuming informal section 7 consultation* | Medium | $40K | $20K |
| | Archeological Report for NHPA Section 106 review | Low | $20K | $15K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K | n/a |
| | Major Siting Permit | Medium | $35K | $15K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Low | $20K | n/a |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Medium | $25K | $25K |

Table 4: Permitting, Mitigation Cost Estimates, and Schedule for Rota West Harbor Phase II.

| **PHASE II PERMITS *or* AUTHORIZATIONS** | **Action or Level of Investigations** | **Anticipated Level of Difficulty** | **Estimated Permitting/Survey Costs** | **Estimated Cost for Post-permit Compliance** |
|---|---|---|---|---|
| **USCOE Section 10; Rivers and Harbor Act/Section 404 Permit; Clean Water Act** | USACOE application development *Assuming compensatory mitigation will be required* | High | $60K | $40K |
| | Biological Assessment that would address ESA and EFH issues *Assuming informal section 7 consultation* | Medium | $45K | $20K |
| | Archeological Report for NHPA Section 106 review | Medium | $20K | $10K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K | n/a |
| | Major Siting Permit | Medium | $55K | $15K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Medium | $20K | n/a |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Medium | $15K | $45K |

Table 5: Permitting, Mitigation Cost Estimates, and Schedule for Rota West Harbor Phase III.

| **PHASE III PERMITS *or* AUTHORIZATIONS** | **Action or Level of Investigations** | **Anticipated Level of Difficulty** | **Estimated Permitting/Survey Costs** | **Estimated Cost for Post-permit Compliance** |
|---|---|---|---|---|
| **USCOE Section 10; Rivers and Harbors Act** | USACOE application *Assuming compensatory mitigation will not be required* | Low | $45K | $20K |
| | Biological Assessment that would address ESA/ EFH issues *Assuming informal section 7 consultation* | Low | $35K | $10K |
| | Archeological Report for NHPA Section 106 review | Medium | $20K | $10K |
| **USEPA CWA Section 402 NPDES Construction General Permit NOI** | NOI | Low | $20k | n/a |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K | n/a |
| | Ports & Industrial Area APC Permit | Low | $15K | $10K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Medium | $35K | n/a |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | Low | $10K | $5K |

Table 6: Permitting, Mitigation Cost Estimates, and Schedule for Rota West Harbor Phase IV.

| **PHASE IV PERMITS *or* AUTHORIZATIONS** | **Action or Level of Investigations** | **Anticipated Level of Difficulty** | **Estimated Permitting/Survey Costs** | **Estimated Cost for Post-permit Compliance** |
|---|---|---|---|---|
| **USCOE Section 10; Rivers and Harbor Act/Section 404 Permit; Clean Water Act** | USACOE application *Assuming compensatory mitigation will be required* | High | $85K | $200K |
| | Biological Assessment that would address ESA/EFH issues *Assuming formal section 7 consultation* | High | $85K | $60K |
| | Archeological Report for NHPA Section 106 review | Low | $20K | $10K |
| **CNMI Division of Coastal Resources Management** | Federal Consistency | Low | $15K | n/a |
| | Major Siting Permit | High | $65K | $50K |
| **CNMI DEQ Earthmoving & Erosion Control Permit** | Individual Permit | Low | $20K | n/a |
| **CNMI DEQ Clean Water Act; Section 401 WQC** | Individual authorization | High | $25K | $100K |

Table 7. Estimated general time line for permitting efforts for all four phases of the Rota West Harbor Master Plan simultaneously, including NEPA; it is assumed that design plans are at a minimum 75% complete and ready for initial agency review at start of month one. The time includes data collection, agency coordination, public hearings, and finalization of permit or document.

| **PERMIT or AUTHORIZATION** | | **TIME IN MONTHS** | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| NEPA | EA Option | | | | | | | | | | | | | | | | | | | | | | | | |
| | EIS Option | | | | | | | | | | | | | | | | | | | | | | | | |
| USACOE Section 10/404 Permit | Biological Assessment & ESA Section 7 consultation | | | | | | | | | | | | | | | | | | | | | | | | |
| | Archeological Report and NHPA Section 106 review | | | | | | | | | | | | | | | | | | | | | | | | |
| | MSA Essential Fish Habitat review | | | | | | | | | | | | | | | | | | | | | | | | |
| | Fish and Wildlife Coordination Act review | | | | | | | | | | | | | | | | | | | | | | | | |
| USEPA Section 402 NPDES NOI | | | | | | | | | | | | | | | | | | | | | | | | | |
| DCRM | Major Siting Permit Option | | | | | | | | | | | | | | | | | | | | | | | | |
| | Federal Consistency Option | | | | | | | | | | | | | | | | | | | | | | | | |
| DEQ EM&EC Permit | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEQ CWA Section 401 WQC | | | | | | | | | | | | | | | | | | | | | | | | | |

## VI. Literature Cited

Amar, A., F. Amidon, B. Arroyo, J. A. Esselstyn, and A. P. Marshall. 2008. Population trends of the forest bird community on the Pacific island of Rota, Mariana Islands. The Condor 110: 421–427.

Amidon, F. A. 2000. Habitat relationships and life history of the Rota Bridled White-eye (*Zosterops rotensis*). M.S. Thesis, Virginia Polytechnic Institute and State University, Blacksburg.

Amidon, F. A., A. P. Marshall, and C. C. Kessler. 2011. Status of the Micronesian Megapode in the Commonwealth of the Northern Mariana Islands. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office. Honolulu, HI.

Baker, R. H. 1951. The avifauna of Micronesia, its origin, evolution, and distribution. University of Kansas Publication, Museum of Natural History 3: 1–359.

Bauman, S. 1996. Diversity and decline of land snails on Rota, Mariana Islands. American Malacological Bulletin 12: 13–27.

Brainard, R. E., and coauthors. 2011. Status review report of 82 candidate coral species petitioned under the U.S. Endangered Species Act. U.S. Dept. Commerce.

Brown, W. C. and M. V. C. Falanruw. 1972. A new lizard of the genus *Emoia* (Scincidae) from the Marianas Islands. Proceedings of the California Academy of Sciences 39: 105–110.

Camp, R. J., K. W. Brinck, M. Gorresen, F. Amidon, P. M. Radley, S. P. Berkowitz, and P. C. Banko. 2015. Current land bird distribution and trends in population abundance between 1982 and 2012 on Rota, Mariana Islands. Journal of Fish and Wildlife Management 6: 511–540.

Camp, R. J., T. K. Pratt, A. P. Marshall, F. Amidon, and L. L. Williams. 2009. Recent status and trends of the land bird avifauna on Saipan, Mariana Islands, with emphasis on the endangered Nightingale Reed Warbler *Acrocephalus luscinia*. Bird Conservation International 19: 323–337.

Chantler, P. 1999. Family Apodidae (Swifts). Pages 388–457 *in* J. del Hoyo, A. Elliott, and J. Sargatal (eds.). Handbook of the birds of the world. Volume 5. Barn-owls to hummingbirds. Lynx Edicions, Barcelona, Spain.

Chantler, P. and G. Driessens. 2000. Swifts: A guide to the swifts and treeswifts of the world. 2$^{nd}$ edition. Pica Press, UK.

CNMI-DFW (CNMI-Division of Fish and Wildlife). 2017. Annual performance report FY 2016 (1 October 2015 through 30 September 2016). Pittman-Robertson Federal Aid in Wildlife Restoration Program. Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife, Saipan.

Crampton, H. E. 1925. Studies on the variation, distribution, and evolution of the genus *Partula*: the species of the Mariana Islands, Guam and Saipan. The Carnegie Institution of Washington. Publication No. 228A: 1–116.

Cruz, J. B. S. R. Kremer, G. Martin, L. L. Williams, and V. A. Camacho. 2008. Relative abundance and distribution of Mariana Swiftlets (Aves: Apodidae) in the Northern Mariana Islands. Pacific Science 62: 233–246.

Dekker, R. W. R. J. 1990. Conservation and biology of megapodes (Megapodiidae, Galliformes, Aves). Ph.D. Dissertation. University of Amsterdam, Netherlands.

DON (Department of the Navy). 2014. Final survey report. Terrestrial biological surveys on Tinian in support of the Commonwealth of the Northern Mariana Islands Joint Military Training Environmental Impact Statement/Overseas Environmental Impact Statement (July). Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific.

Donnegan, J. A., S. L. Butler, W. Grabowiecki, B. A. Hiserote, and D. Limtiaco. 2004. Guam's forest resources, 2002. Resource Bulletin PNW-RB-243, USDA Forest Service and Pacific Northwest Research Station.

Eldredge, L. G. and R. H. Randall. 1980. Atlas of the Reefs and Beaches of Saipan, Tinian and Rota. Office of Coastal Resources Management of the Commonwealth of the Northern Marianas.

Engbring, J. and H. D. Pratt. 1985. Endangered birds in Micronesia: their history, status, and future prospects. Pages 71–105 *in* S. A. Temple (ed.). Bird Conservation. Volume 2. The University of Wisconsin Press, Madison.

Engbring, J., F. L. Ramsey, and V. J. Wildman. 1986. Micronesian forest bird survey, 1982: Saipan, Tinian, Agiguan, and Rota. U.S. Fish and Wildlife Service Report, Honolulu, HI.

Falanruw, M. V. C. 1975. Distribution of the Micronesian Megapode *Megapodius laperouse* in the Northern Mariana Islands. Micronesica 11: 149–150.

Falanruw, M. C., T. G. Cole, and A. H. Ambacher. 1989. Vegetation survey of Rota, Tinian, and Saipan, Commonwealth of the Northern Mariana Islands. Resource Bulletin PSW-27, Pacific Southwest Forest and Range Experiment Station, United States Department of Agriculture, Forest Service, Berkeley, CA.

Fancy, S. G., and T. J. Snetsinger. 2001. What caused the population decline of the Bridled White-eye on Rota, Mariana Islands? Pages 274–280 *in* J. M. Scott, S. Conant, and C. Van Riper III (eds.). Evolution, ecology, conservation, and management of Hawaiian birds: a vanishing avifauna. Studies in Avian Biology No. 22. Cooper Ornithological Society. Allen Press, Lawrence, KS.

Fritts, T. H. and G. H. Rodda. 1998. The role of introduced species in the degradation of island ecosystems: a case history of Guam. Annual Review of Ecology and Systematics 29: 113–140.

GDAWR (Guam Division of Aquatic and Wildlife Resources). 2006. Guam comprehensive wildlife conservation strategy. Department of Agriculture. Mangilao, Guam.

Gill, F. and D. Donsker (eds.). 2017. IOC World Bird List (v 7.3). doi: 10.14344/IOC.ML.7.3.

Hadfield, M. G. 2010. Pagan Island tree-snail surveys: a report to the U.S. Fish and Wildlife Service. Kewalo Marine Laboratory, University of Hawaii at Manoa, Honolulu.

Harrington, C. L., A. M. Gawel, and J. A. Kwon. 2012. Southern Mariana Islands rare plant surveys final trip report. Unpublished report to U.S. Fish and Wildlife Service, Pacific Islands Fish & Wildlife Office (PIFWO).

Jenkins, J. M. 1979. Natural history of the Guam Rail. The Condor 81: 404–408.

Jenkins, J. M. 1983. The native forest birds of Guam. Ornithological Monographs No. 311-61 American Ornithologists' Union, Washington, DC.

Johnson, N. C. 2001. A survey of Mariana Fruit Bats in the Mariana Islands, including recent minimum population estimates, July 2001. Pages 49–90 *in* Annual report FY2001. Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife, Saipan.

Jones, R. S., R. H. Randall and R. T. Tsuda. 1974. A candidate marine environmental impact survey for potential U.S. military projects on Tinian Island, Mariana Islands. University of Guam Marine Laboratory Technical Report No. 9. 143 pp.

Kolinski, S. P., D. M Parker, L. I. Ilo, J. K. Ruak. 2001. An Assessment of the Sea Turtles and Their Marine and Terrestrial Habitats at Saipan, Commonwealth of the Northern Mariana Islands. Micronesica 34(1):55-72.

Kolinski, S. P., L. I. Ilo, and J. M. Manglona. 2004. Green turtles and their marine habitats at Tinian and Aguijan, with projections of resident turtle demographics in the southern arc of the Commonwealth of the Northern Mariana Islands. Micronesica 37:95–116.

Kondo, Y. 1970. Some aspects of Mariana Islands Partulidae (Mollusca, Pulmonata). Occasional Papers of Bernice P. Bishop Museum 24: 73–90.

Kostermans, A. J. G. H. 1959. A monograph of the genus *Heritiera* Aiton (Stercul.) (including *Argyrodendron* F. v. M. and *Tarrietia* Bl.). Reinwardtia 4: 465–583.

Kroner, A. and R. R. Ha. 2017. An update of the breeding population status of the critically endangered Mariana Crow *Corvus kubaryi* on Rota, Northern Mariana Islands 2013-2014. Bird Conservation International doi: 10.1017/S0959270917000053.

Lemke, T. O. 1986. Distribution and status of the Sheath-tailed Bat (*Emballonura semicaudata*) in the Mariana Islands. Journal of Mammalogy 67: 743–746.

Liske-Clark, J. 2015. Wildlife action plan for the Commonwealth of the Northern Mariana Islands, 2015-2025. Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife, Saipan.

Liske-Clark, J., L. Zarones, R. Ulloa, and T. Willsey. 2015. Preliminary survey of *Maesa walkeri* on Rota, CNMI. Division of Fish and Wildlife and Department of Lands and Natural Resources.

Lister, J. J. 1911. The distribution of the avian genus *Megapodius* in the Pacific Islands. Proceedings of the Zoological Society of London 52: 749–759.

Lutz P. L. and J. A. Musick, eds. 1997. The Biology of Sea Turtles. CRC Press, 432 pp.

Marler, T. E. and J. H. Lawrence. 2012. Demography of *Cycas micronesica* on Guam following introduction of the armoured scale *Aulacaspis yasumatsui*. Journal of Tropical Ecology 28: 233–242.

Marler, T. E. and R. Muniappan. 2006. Pests of *Cycas micronesica* leaf, stem, and male reproductive tissues with notes on current threat status. Micronesica 39: 1–9.

Maragos, J. E. 1985. Coastal resource development and management in the U.S. Pacific Islands. Office of Technology Assessment, U.S. Congress. Draft.

Marshall, J. T., Jr. 1949. The endemic avifauna of Saipan, Tinian, Guam, and Palau. The Condor 51: 200–221.

Perry, G., G. H. Rodda, T. H. Fritts, and T. R. Sharp. 1998. The lizard fauna of Guam's fringing islets: island biogeography, phylogenetic history, and conservation implications. Global Ecology and Biogeography Letters 7: 353–365.

Plentovich, S., J. M. Morton, J. Bart, R. J. Camp, M. Lusk, N. Johnson, and E. VanderWerf. 2005. Population trends of Mariana Crow *Corvus kubaryi* on Rota, Commonwealth of the Northern Mariana Islands. Bird Conservation International 15: 211–224.

Polhemus, D. A., A. Asquith, and S. Miller. 2000. A new species of *Ischnura* from Rota (Odonata: Coenagrionidae), and a discussion of Zygopteran zoogeography in the insular tropical Pacific. Bishop Museum Occasional Papers 62: 5–12.

Pratt H. D., P. L. Bruner, and D. G. Berrett. 1979. America's unknown avifauna: the birds of the Mariana Islands. American Birds 33: 227–235.

Pratt, H. D., P. L. Bruner, and D. G. Berrett. 1987. The birds of Hawaii and the tropical Pacific. Princeton University Press, Princeton, NJ.

Randall, R. H. 1995. Biogeography of reef-building corals in the Mariana and Palau Islands in relation to back-arc rifting and the formation of the Eastern Philippine Sea. SEA 3(6):6.

Randall, R. H. 2003. An annotated checklist of hydrozoan and scleractinian corals collected from Guam and other Mariana Islands. Micronesica 35(36):121-137.

Raulerson, L. and A. Rinehart. 1991. Trees and shrubs of the Northern Mariana Islands. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands, Saipan.

Raulerson, L. and A. Rinehart. 1992. Ferns and orchids of the Mariana Islands. Coastal Resources Management, Office of the Governor, Commonwealth of the Northern Mariana Islands, Saipan.

Reichel, J. D. and P. O. Glass. 1991. Checklist of the birds of the Mariana Islands. ʻElepaio 51: 176–183.

Reynaud, D. T. 2012. USFWS *Tabernaemontana rotensis* genetics study-final report. Authen Technologies LLC, Albany, CA.

Richards, Z. T., M. J. H. van Oppen, C. C. Wallace, B. L. Willis, and D. J. Miller. 2008. Some Rare Indo-Pacific Coral Species Are Probable Hybrids. PLoS ONE 3(9):e3240.

Rodda, G. H. and K. Dean-Bradley. 2000. Absolute population densities of lizards on Rota, with reference to populations on other Mariana Islands. Unpublished report.

Rodda, G. H. and T. H. Fritts. 1992. The impact of the introduction of the Colubrid snake *Boiga irregularis* on Guam's lizards. Journal of Herpetology 26: 166–174.

Rodda, G. H., T. H. Fritts, and J. D. Reichel. 1991. The distributional patterns of reptiles and amphibians in the Mariana Islands. Micronesica 24: 195–210.

Schreiner, I. H. and D. M. Nafus. 1997. Butterflies of Micronesia. Agricultural Experiment Station, College of Agriculture and Life Sciences, University of Guam, Mangilao.

Smith, B. D. 1995. Status of the endemic tree snail fauna (Gastropoda: Partulidae) of the Mariana Islands. Unpublished report prepared for the U.S. Fish and Wildlife Service, Honolulu, HI.

Smith, B. D. and D. R. Hopper. 1994. The Partulidae of the Mariana Islands: continued threats and declines. Hawaiian Shell News 42: 10–11.

Steadman, D. W. 1999. The prehistory of vertebrates, especially birds, on Tinian, Aguiguan, and Rota, Northern Mariana Islands. Micronesica 31: 319–345.

Stinson, D. W. 1992. Megapodes on Aguiguan: smashing the Glass hypothesis? Pages 43–46 *in* R. J. Craig (ed.). The Aguiguan expedition. Symposium 1 Proceedings: Marianas Research. Northern Marianas College, Saipan, CNMI.

Stinson, D. W. 1994. Birds and mammals recorded from the Mariana Islands. Pages 333–344 *in* Biological expedition to the Northern Mariana Islands, Micronesia. Natural History Research, Special Issue 1.

Stone, B. C. 1970. The flora of Guam. Micronesica 6: 1–659.

Takano, L. L. and S. M. Haig. 2004a. Distribution and abundance of the Mariana subspecies of the Common Moorhen. Waterbirds 27: 245–250.

Takano, L.L. and S.M. Haig. 2004b. Seasonal movement and home range of the Mariana common moorhen. The Condor 106: 652–663.

Tsuda, R. T., F. R. Fosberg and M. H. Sachet. 1977. Distribution of seagrasses in Micronesia. Micronesica 13: 191 – 198.

Tsuda, R.T. & S. Kamura. 1990. Comparative review on the floristics, phytogeography, seasonal aspects and assemblage patterns of the seagrass flora in Micronesia and the Ryukyu Islands. Galaxea 9: 77–93.

UOG (University of Guam) 2007. Survey of *Tabernaemontana rotensis* on Andersen Air Force Base. Final report. Mangilao, Guam.

USFWS (U.S. Fish and Wildlife Service). 1970. Conservation of endangered species and other fish and wildlife. Federal Register 35: 8,491-8,498.

USFWS (U.S. Fish and Wildlife Service). 1984. Endangered and threatened wildlife and plants: determination of endangered status for seven birds and two bats on Guam and the Northern Mariana Islands. Federal Register 49: 33,881–33,885.

USFWS (U.S. Fish and Wildlife Service). 1987. Endangered and threatened wildlife and plants: determination of endangered status for *Serianthes nelsonii* Merr. (hayun lagu or tronkon guafi). Federal Register 52: 4,907–4,910.

USFWS (U.S. Fish and Wildlife Service). 1990. Guam Mariana Fruit Bat and Little Mariana Fruit Bat recovery plan. Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 1991a. Recovery plan for the Mariana Common Moorhen (= gallinule) *Gallinula chloropus guami*. Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 1991b. Recovery plan for the Mariana Islands population of the Vanikoro Swiftlet*, Aerodramus vanikorensis bartschi*. U.S. Fish and Wildlife Service, Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 1993. Recovery plan for *Serianthes nelsonii*. Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 1998. Recovery plan for the Micronesian Megapode *Megapodius laperouse laperouse*. Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 2004a. Endangered and threatened wildlife and plants; endangered status for the Rota Bridled White-eye (*Zosterops rotensis*) from the Commonwealth of the Northern Mariana Islands. Federal Register 69: 3,022–3029.

USFWS (U.S. Fish and Wildlife Service). 2004b. Endangered and threatened wildlife and plants; determination of endangered status and prudency determination for designation of critical habitat for two plant species from the Commonwealth of the Northern Mariana Islands. Federal Register 69: 18,499–18,507.

USFWS (U.S. Fish and Wildlife Service). 2004c. Endangered and threatened wildlife and plants; designation of critical habitat for the Mariana Fruit Bat and Guam Micronesian Kingfisher on Guam and the Mariana Crow on Guam and in the Commonwealth of the Northern Mariana Islands. Federal Register 69: 62,944–62,990.

USFWS, (U.S. Fish and Wildlife Service). 2005a. Draft revised recovery plan for the Aga or Mariana Crow, *Corvus kubaryi*. Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 2005b. Endangered and threatened wildlife and plants; Mariana Fruit Bat (*Pteropus mariannus mariannus*): reclassification from endangered to threatened in the Territory of Guam and listing as threatened in the Commonwealth of the Northern Mariana Islands. 50 CFR Part 17. Federal Register 70: 1,190–1,210.

USFWS (U.S. Fish and Wildlife Service). 2006. Endangered and threatened wildlife and plants; designation of critical habitat for the Rota Bridled White-eye (*Zosterops rotensis*). Federal Register 71: 53,589–53,605.

USFWS (U.S. Fish and Wildlife Service). 2007. Recovery plan for two plants from Rota (*Nesogenes rotensis* and *Osmoxylon mariannense*). Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 2009a. Draft revised recovery plan for the Mariana Fruit Bat or Fanihi (*Pteropus mariannus mariannus*). Portland, OR.

USFWS (U.S. Fish and Wildlife Service). 2011. Guam and Commonwealth of the Northern Mariana Islands animals and plants: updated February 2, 2011. Listed species, as designated under the U.S. Endangered Species Act.

USFWS (United States Fish and Wildlife Service). 2012. Endangered species in the Pacific Islands. Mariana Common Moorhen/ *Gallinula chloropus guami*/ Pulattat. http://www.fws.gov/pacificislands/fauna/marianamoorhen.html (accessed 18 October 2017).

USFWS (U.S. Fish and Wildlife Service). 2015. Endangered and threatened wildlife and plants; endangered status for 16 species and threatened status for 7 species in Micronesia. Federal Register 80: 59,424–59,497.

USFWS (U.S. Fish and Wildlife Service). 2016. 5-year review, short form summary: *Serianthes nelsonii* (Hayun lagu or Tronkon guafi).

Vogt, S. 2009. Micronesian Megapode (*Megapodius laperouse laperouse*) surveys on Farallon de Medinilla, Commonwealth of the Northern Mariana Islands. NAVFAC Pacific, Pearl Harbor, HI.

Vogt, S. R. and L. L. Williams. 2004. Common flora and fauna of the Mariana Islands. WinGuide Saipan, Northern Mariana Islands.

Vogt, S. R., E. W. Campbell, R. Reed, and G. H. Rodda. 2001. New lizard records for the Mariana Islands. Herpetological Review 32: 127–128.

Veron, J. E. N. 2014. Results of an update of the Corals of the World Information Base for the Listing Determination of 66 Coral Species under the Endangered Species Act. Report to the Western Pacific Regional Fishery Management Council, Honolulu.

Wiles, G. J. 1987. The status of fruit bats on Guam. Pacific Science 41: 148–157.

Wiles, G. J. 1998. Records of communal roosting in Mariana Crows. Wilson Bulletin 110: 126–128.

Wiles, G. J., R. E. Beck, and A. B. Amerson. 1987. The Micronesian Megapode on Tinian, Mariana Islands. 'Elepaio 47: 1–3.

Wiles, G. J. and A. P. Brooke. 2009. Conservation threats to bats in the Pacific and Southeast Asia. Pages 405-459 *in* T. H. Fleming and P. A. Racey (eds.). Island bats: evolution, ecology, & conservation. The University of Chicago Press, Chicago and London.

Wiles, G. J. and P. O. Glass. 1990. Interisland movements of fruit bats (*Pteropus mariannus)* in the Marianas Islands. National Museum of Natural History Atoll Research Bulletin No. 343: 1–6.

Wiles, G. J. and J. P. Guerrero. 1996. Relative abundance of lizards and Marine Toads on Saipan, Mariana Islands. 1996. Pacific Science 50: 274–284.

Wiles, G. J. and N. C. Johnson. 2004. Population size and natural history of Mariana Fruit Bats on Sarigan, Mariana Islands. Pacific Science 58: 585–596.

Wiles, G. J., T. O. Lemke, and N. H. Payne. 1989b. Population estimates of fruit bats (*Pteropus mariannus*) in the Mariana Islands. Conservation Biology 3: 66–76.

Wiles, G. J., T. J. O'Shea, D. J. Worthington, J. A. Esselstyn, and E. W. Valdez. 2011. Status and natural history of *Emballonura semicaudata rotensis* on Aguiguan, Mariana Islands. Acta Chiropterologica 13: 299–309.

Wiles, G. J., G. H. Rodda, T. H. Fritts, and E. M. Taisacan. 1990. Abundance and habitat use of reptiles on Rota, Mariana Islands. Micronesica 23: 153–166.

Wiles, G. J., I. H. Schreiner, D. Nafus, L. K. Jurgensen, and J.C. Manglona. 1996. The status, biology, and conservation of *Serianthes nelsonii* (Fabaceae), an endangered Micronesian tree. Biological Conservation 76: 229–239.

Wiles, G. J. and D. H. Woodside. 1999. History and population status of Guam Swiftlets on O‘ahu, Hawai‘i. ‘Elepaio 59: 57–61.

Wiles, G. J. and D. J. Worthington. 2002. A population assessment of Pacific Sheath-tailed Bats (*Emballonura semicaudata*) on Aguiguan, Mariana Islands. U.S. Fish and Wildlife Service Report, Honolulu, HI.

Witteman, G. J. 2001. A quantitative survey and inventory of the Micronesian Megapode and its habitat on Tinian, CNMI. University of Guam, Division of Natural Resources, Mangilao.

Worthington, D. J. 1998. Inter-island dispersal of the Mariana Common Moorhen: a recolonization by an endangered species. Wilson Bulletin 110: 414-417.

Worthington, D. J., A. P. Marshall, G. J. Wiles, and C. C. Kessler. 2001. Abundance and management of Mariana Fruit Bats and feral ungulates on Anatahan, Mariana Islands. Pacific Conservation Biology 7: 134–142.

Worthington, D. J. and E. M. Taisacan. 1995. Fruit bat research. Annual report FY1994, pp. 5-12. Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife, Saipan.

Zarones, L., M. R. Colon, J. C. Ha, and R. R. Ha. 2013. Effects of foliage invertebrate availability and forest structure on the abundance of the critically endangered Rota White-eye *Zosterops rotensis* in Rota, Mariana Islands. Bird Conservation International 22: 454–462.

Zarones, L., J. Liske-Clark, T. Willsey, and P. Perez. 2015a. *Dendrobium guamense* observation on Aguiguan, Commonwealth of the Northern Mariana Islands. Division of Fish and Wildlife and Department of Lands and Natural Resources Report.

Zarones, L, J. Liske-Clark, T. Willsey, and R. Ulloa. 2015b. Preliminary survey of three Mariana Island endemic epiphytic orchids *Dendrobium guamense, Bulbophyllum guamense* and *Tuberolabium guamense* on Rota, CNMI. Division of Fish and Wildlife and Department of Lands and Natural Resources Report.

Zarones, L., A. Sussman, J. M. Morton, S. Plentovich, S. Faegre, C. Aguon, A. Amar, and R. R. Ha. 2015c. Population status and nest success of the critically endangered Mariana Crow *Corvus kubaryi* on Rota, Mariana Islands. Bird Conservation International 25: 220–233.

Zarones, L., T. Willsey, and J. Liske-Clark. 2015d. Observation of Rota Blue Damselfly *Ischnura luta* on Rota, Commonwealth of the Northern Mariana Islands. Division of Fish and Wildlife and Department of Lands and Natural Resources Report.

Zarones, L., T. Willsey, J. Liske-Clark, and R. Ulloa. 2015e. Preliminary survey of *Nervilia jacksoniae* on Rota, CNMI. Division of Fish and Wildlife and Department of Lands and Natural Resources Report.

Zug, G. R. 2013. Reptiles and amphibians of the Pacific Islands: a comprehensive guide. University of California Press, Berkeley and Los Angeles.

# APPENDIX 1

Rota West Harbor Master Plan – Agency comment letters

**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 · Fax: (808) 973-2941

Mr. John E. Gourley
Micronesian Environmental Services
John.e.gourley@gmail.com
PO Box 502802
Saipan, MP 96950

November 3, 2017

Dear Mr. Gourley,

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) received the Micronesian Environmental Services (MES) early coordination request on behalf of the Commonwealth Port Authority (CPA) for the revision of the Rota Harbor Master Plan. CPA is expected to eventually apply for a Department of the Army permit under Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act. The CPA is proposing a three phase plan: Phase I proposes improvements of the CPA facilities;, Phase II (part 1) proposes harbor and marina improvements intended to coincide with construction of a new breakwater for the channel, Phase II (part 2) articulates the preferred breakwater alternative that could potentially be developed by USACE or as part of the Master Plan depending on the results of the ongoing USACE Rota Harbor Feasibility Study and Phase III proposes rehabilitation of Berth 1 for project cargo and construction materials and development of waterfront property for commercial uses.

NMFS PIRO HCD supports the project purpose to adequately meet the need for increased commerce, increased transportation, and to support national security. However, HCD has concerns regarding potential impacts to our trust resources including Essential Fish Habitat (EFH). Planning processes enabled by the National Environmental Policy Act (NEPA) and the Fish and Wildlife Coordination Act (FWCA) would assist the CPA to ensure that the correct information is collected and available to streamline future consultations for EFH under the Magnuson-Stevens Fishery Management and Conservation Act (MSA) and under Section 7 of the Endangered Species Act (ESA). Be advised that CPA will need to complete EFH consultation with PIRO

HCD and separately with the PIRO Protected Resources Division for ESA consultation. Both consultations can be initiated through this email address: EFHESAconsult@noaa.gov.

Based on the information provided, possible project impacts include, but may not be limited to: runoff and stormwater, spills, invasive species, marine debris, sedimentation and turbidity, noise impacts, pile driving impacts and the direct loss of complex coral growing on existing wharf and pier surfaces. Direct and indirect project impacts, including both permanent and temporary loss, should be evaluated empirically and cumulatively as they interact with other proposed activities within the harbor area. Furthermore, if breakwater improvements (dredge and fill activities) are handled as part of the Rota Harbor Master Plan there will be extensive direct and indirect impacts to trust resources within a relatively pristine forereef area.

PIRO HCD expects that the CPA will conduct comprehensive environmental planning (e.g., NEPA and FWCA, if applicable) for the Rota Harbor Master Plan revision in order to develop suitable avoidance and minimization measures to abate the aforementioned threats. The CPA should analyze alternatives for each phase of the plan and coordinate with NMFS throughout the planning process at appropriate milestones, prior to consultations. The planning process should also include the appropriate components that clarify how key threats will be managed: a Stormwater Pollution Prevention Plan, a Biosecurity Plan and a Spill Prevention, Control and Countermeasure Plan should all be developed and reviewed by relevant regulatory authorities. In addition, comprehensive environmental planning will provide early opportunities to discuss unavoidable losses and identify opportunities for suitable offset/mitigation approaches.

Due to the need for compliance under 404 of the Clean Water act and potential for substantial loss of EFH and coral reef resources as a result of implementing proposed Phases I and II, an expanded EFH consultation is expected. The expanded EFH consultation will need to be supported by quantitative marine resource information. Quantitative marine resource assessments should be performed in the project footprint and throughout areas that may be subject to indirect impacts. The CPA should convene an interagency team, including both local and federal partners, to look at project alternatives and provide guidance to CPA on offset/mitigation approaches, especially with respect to sensitive and hard-to-replace EFH, such as coral reef resources.

In conclusion, PIRO HCD greatly appreciates the CPA and MES efforts to effectively coordinate with us early on the proposed Rota Harbor Master Plan and we look forward to working together throughout project planning and in subsequent consultation. PIRO HCD looks forward to the opportunity to discuss more in depth our concerns regarding the potential impacts to NOAA trust resources that may result from this project. Should you have any questions, comments, or when you require additional technical assistance, please contact Steve McKagan in our CNMI Field Office steven.mckagan@noaa.gov or 670-234-0004.

Sincerely,

Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

**DEPARTMENT OF THE ARMY**
**HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS**
**FORT SHAFTER, HAWAII 96858-5440**

November 2, 2017

SUBJECT: Rota West Harbor Master Plan Proposed Modifications, Rota, CNMI; Department of the Army Reference No.: POH-2017-231

Mr. John Gourley
Micronesian Environmental Services
P.O. Box 502802
Saipan, MP 96950

Dear Mr. Gourley:

The Commonwealth Ports Authority is updating the Rota West Harbor Master Plan, Rota, Commonwealth of the Northern Mariana Islands (CNMI). The U.S. Army Corps of Engineers (Corps) received your invitation to review the preliminary harbor modifications relative to the Corps regulatory authorities. We have assigned the proposed action a Department of the Army reference number: POH-2017-231. Please cite the reference number in any correspondence with us concerning this project.

As you noted in your letter dated October 6, 2017, the U.S. Army Corps of Engineers is undertaking a feasibility study for navigation improvements for Rota Harbor. This comment letter is not intended to address any component of that study. The purpose of this letter is to provide information regarding the Corps' regulatory program and permit requirements.

The Rota West Harbor Master Plan is a comprehensive study of the Rota Commercial Harbor that includes short, medium, and long term plans for repair and improvement of the port and Commonwealth Ports Authority (CPA) properties. It provides a framework to guide future port development and currently contains three phases.

Recommendations for Phase 1 modifications include, but are not limited to, the following: new fenders, preventative maintenance of Berth 1 and 2 sheet piles, replacing the public marina with a heavy commercial float, and installing a new commercial float at the commercial terminal area. Phase II recommendations include expanding Berth 2 to 200-feet and expansion of the public marina with a launch-ramp boarding float and new slips as well as construction of an 800-foot breakwater and a 700-foot current-training wall. Phase III includes rehabilitation of Berth 1 and upland infrastructure, services, and amenities.

Based on an initial review of the site plans and aerial photos, many of the proposed actions will require a Department of the Army (DA) permit from the U.S. Army Corps of Engineers (Corps).

Under Section 10 of the Rivers and Harbors Act of 1899, a Section 10 DA permit is normally required for work or structures in or affecting navigable waters of the U.S. This includes work that is in, over, or under navigable waters (e.g., piers, utility lines, subsurface pipes). Under Section 10, our line of jurisdiction is the mean high water mark. Under Section 404 of the Clean Water Act, a DA permit is normally required for the discharge of dredged or fill material (e.g., fill, excavation, or mechanized land clearing) into waters of the U.S., including marine waters, streams, drainages, and wetlands. Under Section 404, our line of jurisdiction is the high tide line in marine waters and the ordinary high water mark in fresh waters. Please read the enclosure entitled *Clean Water Act and Rivers and Harbors Act Extracts and Definitions* (Enclosure 1) which further describes the laws that may apply to the proposed work.

Some of the proposed activities, including the breakwater and current-training wall, would likely require a standard individual permit. In order to use a Nationwide Permit (NWP), we must have a NWP that covers the proposed activity, the activity must have independent utility, and we must determine both individual and cumulative adverse effects of the activity are no more than minimal. Some of the work may qualify for a Nationwide Permit or Letter of Permission; please coordinate with the Corps prior to submitting an application. For all work in marine waters, the high tide line and the mean high water line must be demarcated on project drawings.

Clean Water Act Section 404(b)(1) Guidelines

If the proposed actions are processed as a Standard Individual Permit, the project proponent will need to comply with the Clean Water Act Section 404(b)(1) Guidelines by conducting an alternatives analysis for the project. Under the Guidelines, the discharge of dredged or fill material into waters of the United States is prohibited unless the proposed discharge is the least environmentally damaging practicable alternative capable of achieving the proposal's purpose. For non-water dependent activities associated with discharges in special aquatic sites (i.e., wetlands, coral reefs), practicable alternatives that do not involve discharges in these sites are presumed to be available, unless clearly demonstrated otherwise. For water dependent or non-water dependent activities associated with discharges in special aquatic sites, an additional presumption is that all practicable alternatives that do not require discharges in these sites are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise. The permit applicant has the opportunity to rebut these presumptions for a proposed project.

Enclosed for your information is an *Alternatives Analysis Framework*, a summary of the Section 404(b)(1) process and requirements, which should be carefully read to help you understand this process (Enclosure 2). Although the permit applicant must prepare alternatives information, the Corps reviews and determines all aspects of the alternatives analysis (e.g., project purpose, project criteria, geographic area, etc.). The preparation of an alternatives analysis requires considerable coordination between the permit applicant and the Corps. We ask that the permit applicant coordinate with us to complete our evaluation of potential on-site and off-site alternatives in order to avoid and minimize impacts to waters of the U.S. We recommend an alternatives analysis not be prepared prior to coordinating with the Corps.

<u>Mitigation</u>

All permit applicants are required to avoid and minimize impacts to waters of the U.S. "Mitigation" consists of actions to avoid, minimize, and compensate for impacts from the project. A compensatory mitigation plan is used to compensate for the unavoidable loss of waters of the U.S. and to ensure that those losses minimize adverse effects to the aquatic environment. For permittee responsible compensatory mitigation, mitigation plans should be prepared in accordance with the Federal Compensatory Mitigation for Losses of Aquatic Resources Final Rule (33 CFR Parts 325 and 332, April 10, 2008) which became effective June 9, 2008.

<u>Section 7 of the Endangered Species Act</u>

In the project vicinity, a number of fish and wildlife species have been listed as threatened or endangered under the Endangered Species Act (ESA). Under the Corps' Federal permit program, proposed projects are reviewed for potential effects to threatened and endangered species pursuant to the ESA. The ESA requires that Federal agencies such as the Corps take action as necessary to ensure that we do not authorize, fund, or carry out actions that are likely to jeopardize the continued existence of endangered or threatened species or that would result in the destruction or adverse modification of designated critical habitat. To fulfill our obligations required under the ESA, the Corps, through consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), must evaluate the potential impact of the proposed work on listed species.

Before we can move forward with the required consultations, the project proponent must contact the NMFS and the USFWS to determine what listed or proposed species are present in the action area. The project proponent must then submit a Biological Assessment (BA) to the Corps that addresses impacts to all listed or proposed species present. A qualified biologist, with experience and/or strong understanding of the species of concern and their habitat as it relates to the project, should prepare the BA. Please be advised that during the course of the ESA Section 7 consultation, the project proponent may receive and need to comply with periodic requests from the Corps for additional information or changes in the BA until there is sufficient information in it to be ruled on by the NMFS and the USFWS.

<u>Magnuson-Stevens Fishery Conservation and Management Act, Essential Fish Habitat</u>

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. The MSA requires Federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. The project area includes EFH for multiple Management Unit Species. The project proponents should prepare and submit an assessment of the potential impacts of the proposed work on EFH. The Corps must consult with the NMFS pursuant to the requirements of the MSA for adverse effects to EFH. We recommend early coordination with NMFS so the project can be designed to incorporate measures that will avoid or minimize impacts to EFH.

<u>Section 106 of the National Historic Preservation Act</u>

In accordance with Section 106 of the National Historic Preservation Act, Federal agencies, such as the Corps, are required to take into account the effects of any permitted action to historic properties, which includes both archaeological resources on the surface or below ground, as well as historic buildings and structures that are listed in, or eligible for listing in the National Register of Historic Places (NRHP). Based on available information, the proposed work may have the potential to cause effects to historic properties. If the Corps determines there could be an effect to archaeological resources or historic properties, the project proponent will be asked to conduct a cultural resource assessment for the project site. The assessment must be completed by a qualified archaeologist, architectural historian, or an appropriate historic preservation specialist.

Our regulations at 33 CFR Part 325, Appendix C, list the criteria for the areas that must be included in an assessment. The cultural resources assessment and report must be designed to provide enough information for the Corps to determine the NRHP eligibility of historic properties and to assess the potential effects of the proposed project to those properties. Depending upon the results of this assessment, it is possible that some additional work or evaluative testing may be required. If we determine the proposed project has the potential to adversely affect historic properties, additional consultation will be required to avoid, minimize, or mitigate the adverse effects.

We will consult with the CNMI State Historic Preservation Office at the Department of Community and Cultural Affairs in the Division of Historic Preservation to ensure any direct, indirect, or adverse impacts on a site that is eligible for inclusion in the National Register of Historic Places are addressed through the Section 106 review process.

<u>Section 307 of the Coastal Zone Management Act</u>

Under the Coastal Zone Management Act, all Federal agencies are required to conduct planning, management, development, and regulatory activities in a manner consistent with federally-approved state/territorial coastal zone management programs. Before the Corps can issue a permit, the proposed project must be consistent with the enforceable policies of CNMI's Coastal Management Program. In CNMI, the Bureau of

Environmental and Coastal Quality, Division of Coastal Resources Management (BECQ-DCRM) is responsible for administering the program. Please coordinate with BECQ-DCRM to ensure proposed actions are consistent with CNMI's Coastal Management Program.

Section 401 of the Clean Water Act

When you apply for a Section 404 permit from the Corps, you are required to obtain Section 401 water quality certification from CNMI's Bureau of Environmental and Coastal Quality, Division of Environmental Quality (BECQ-DEQ). Section 401 of the CWA specifically addresses the discharge of pollutants by ensuring compliance with effluent limitation, new source performance standards, toxic pollutant limitations and other appropriate requirements of law or regulation. This authority is delegated directly from the U.S. Congress to the states/territories, and allows each to establish policies to ensure that approved activities will meet applicable water quality standards. Please coordinate with the BECQ-DEQ regarding Section 401 requirements.

Pre-Application Meeting

Well in advance of submitting a permit, I recommend requesting a pre-application meeting with the project proponent, the consultants/agents, and all of the resource agencies responsible for administering Federal and local laws. This will help ensure expectations during the permitting process are clear and the project proponent is aware of relevant laws, regulations, policies, processes, mitigation requirements, timeframes, and agency concerns. Please let me know if I could be of assistance in helping coordinate a pre-application meeting.

If you have any specific questions about the Corps' regulatory program, including jurisdictional limits, whether a permit is required for proposed activities, or what kind of permit may authorize a proposed activity, please contact me at (671) 339-2108 or karen.m.urelius@usace.army.mil. For additional information about our regulatory authorities and permit process, you may also access the Honolulu District's Regulatory website at: http://www.poh.usace.army.mil/Missions/Regulatory/ or our national website at: http://www.usace.army.mil/Missions/Regulatory/.

Sincerely,

Karen M. Urelius

Karen M. Urelius
Project Manager

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2018-CPA-0001
2018-TA-0015

NOV 0 6 2017

John Gourley
Micronesian Environmental Services
P.O. Box 502802
Saipan, MP, 96950

Subject: Technical Assistance for the Revision of the Rota West Harbor Master Plan

Dear Mr. Gourley:

The U.S. Fish and Wildlife Service (Service) received your notice on October 6, 2017, requesting our review of the Commonwealth of the Northern Mariana Islands Port's Authority (CPA) proposed revision of the Rota West Harbor Master Plan. The CPA is currently revising the Rota West Harbor Master Plan to guide future port development, including environmental and socioeconomic considerations. The proposed revisions include three phases. Phase 1 includes immediate improvements to Berth 2 and the addition of a new commercial floating dock. Phase 2 includes the expansion of Berth 2 and the addition of new small vessel slips with gangway. The following are the Service's comments on the materials submitted for the proposed revision:

- No funding sources have been identified but it is assumed that some funds, if not all, would come from the U.S. Federal government. A Department of Army Permit would require consultations with the Service under the Endangered Species Act (ESA), National Environmental Policy Act (NEPA), the Fish and Wildlife Coordination Act (FWCA), and other environmental statutes.

- Our office (Ecological Services) has previously completed biological surveys within and nearby the West Rota Harbor. These surveys were in June, 2016 for the U.S. Army Corps of Engineers' (USACE) Feasibility Study for harbor improvements (Montgomery 2017). The recent surveys were meant to identify impacts to resources from certain proposed modifications to West Rota Harbor. Those modifications included various configurations of new breakwater structures in the eastern side of the channel. The evaluation and reporting was completed by the Service, the National Marine Fisheries Service, and the CNMI's Department of Fish and Wildlife (*Draft Fish and Wildlife Coordination Act Planning Aid Report, Phase 1 Marine Habitat Characterization, Rota*

*Harbor Modification, January 2017*). A new draft report will be released in the next month. These proposed modifications are within our previous surveyed area. Additional evaluation of the new project footprints will likely need to occur, but the existing survey information will be directly applicable to these proposed modifications.

- For your information, we have provided a few figures from the draft report that may be applicable to these proposed modifications. Figure A7 (attached) shows the habitat structures observed during the surveys for USACE Feasibility Study for Rota Harbor improvements. Figure A-14 (attached) shows a qualitative assessment (presence) of ESA-listed corals (*Acropora globiceps*) within Rota Harbor on the benthic substrate. While four ESA-listed coral species have been documented in the Marianas, only one was documented in the areas surveyed in 2016. Based on the observations reported, there is confirmed presence of *A. globiceps* near these new modification areas. Figures A12 (attached) show a qualitative assessment of stony coral abundance within and nearby the harbor. The coral abundance was fairly low in most of the federal channel areas that were surveyed, but some scattered corals were still present. A quantitative evaluation will be necessary to provide the best discussion of any necessary compensatory mitigation and the cost of a mitigation plan for coral or other resources.

- We understand the need for improvements to this harbor. Previous modifications proposed by the USACE included the expansion of the turning basin to the east that would require substantial dredging of the adjacent reef flat. If an expansion of the harbor is under consideration that requires a larger turning basin, we recommend considering alternatives that do not require the adjacent reef flat to be dredged. One alternative that we recommend be considered is the expansion of the harbor to the west into the adjacent lagoon. While the need for shore side construction would be greater, the cost of this construction would be offset by the reduced mitigation costs associated with avoiding dredging the reef flat. We believe this to be potentially a more economical and environmentally beneficial alternative.

- The exhibits show the proposed breakwater along the channel, but this is not part of the revision. We recommend considering all possible alternatives for the construction of this breakwater and include this consideration in the Rota West Master Plan revision.

- An impact analysis or risk assessment will need to be completed in regard to the possible increased risk of arrival of invasive species through enhanced deliveries of goods, and from an increased number of vessels using the harbor facilities. In addition, bringing in heavy equipment and barges from areas outside of Rota Island has the potential to import aquatic and terrestrial invasive species as well.

If you have questions regarding this letter, please contact Marine Biologist Anthony Montgomery (phone: 808-792-9400; email: tony_montgomery@fws.gov) or Mariana Islands Team Manager Jacqueline Flores (phone: 671-989-6744; email: jacqueline_flores@fws.gov).

Sincerely,

for Mary M. Abrams, Ph.D.
Field Supervisor

Cc: CNMI Commonwealth Ports Authority

# Appendix D Rota West Harbor Master Plan, Opinion of Probable Construction Cost – Conceptual Design Level, dated April 05, 2018

**Rota West Harbor Master Plan**

*Opinion of Probable Construction Cost - Conceptual Design Level*

4/5/2018

| PHASE 1 | COST |
|---|---|
| BERTH 2 UPGRADES | $195,000 |
| NEW COMMERCIAL FLOAT | $465,000 |
| STORAGE YARD IMPROVEMENTS | $170,000 |
| MISC. REPAIRS AND IMPROVEMENTS | $99,000 |
| **TOTAL** | **$929,000** |

| PHASE 2 | COST |
|---|---|
| BERTH 2 UPGRADES | $2,248,000 |
| MARINA AND BOARDING FLOAT | $1,804,000 |
| **TOTAL** | **$4,052,000** |

| PHASE 3 | COST |
|---|---|
| BERTH 1 UPGRADES | $966,000 |
| UPLAND IMPROVEMENTS | $3,208,000 |
| **TOTAL** | **$4,174,000** |

**INCLUDES:**

Prime Contractor Home Office Overhead and Profit (15%)
Mobilization/Demob/Field OH (20%)
Contingency (20%)
Environmental Mitigation (5%)
Permitting, EA/EIS/NEPA, Design, Construction Management, Owner Costs (25%)

# Appendix E "*Notes of Meeting*" for Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

moffatt & nichol

1132 Bishop Street, Suite 1595
Honolulu, HI 96813

(808) 533-7000
www.moffattnichol.com

# NOTES OF MEETING

**DATE OF MEETING:** Wednesday, 07 September 2016

**TIME:** 9:00 a.m. CHST

**LOCATION:** via Teleconference

**WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson, D. Cronin)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9538/9539

**SUBJECT:** Kick-Off Meeting / Teleconference

**PARTICIPANTS:** See attached *List of Participants*

**DISTRIBUTION:** Attendees, Maryann Lizama, Christopher Tenorio, Wendi Prater

**REFERENCE DOCUMENTS:** Agenda, Project Schedule (dated 30 August 2016)

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***Communication***<br>Designated points of contact for each harbor for the Master Plan projects:<br>A. Tinian Harbor – Gerry Crisostomo: (670) 433-9294<br>B. Rota Harbor – Rodney Taisacan: (670) 532-9489 or 9497 | | |
| 2 | ***Vision for Master Plans***<br>C. Tinian Harbor<br>1. Larger berths to accommodate cruise ships and ferries.<br>2. Breakwater repair / replacement / modification needed<br>• There is Feasibility Study being prepared by the U.S. Army Corps of Engineers (USACE), Honolulu District, for navigation improvements for both Tinian Harbor and Rota West Harbor. The Feasibility Study for Tinian Harbor is looking into repairs / replacement / modification of the breakwater. The CNMI Lt. Governor's Office is the local sponsor for the Feasibility Studies. Moffatt & Nichol (MN) has scheduled to teleconference with Milton Yoshimoto and Jessica Podoski at the USACE Honolulu District later this week to discuss their project.<br>3. Master Plan should consider how the existing fingers piers are configured in the future – i.e., maintain similar pier configuration, fill-in space between fingers, other?<br>4. Maximize usage of seaport and vacant land<br>a. Two new warehouses and a new operations building will be constructed soon.<br>b. Consider casino on adjacent property.<br>5. Current depth of harbor and channel is a concern<br>a. It would be ideal if harbor could accommodate ships that draft 40 feet (Note: Saipan Harbor dredge depth is -40 feet).<br>b. Tinian Harbor dredge depth is currently -28 feet and channel dredge depth is -35 feet. | | |

- c. USACE is currently looking into a maintenance dredging project for the harbor but the project will only restore the harbor to a dredge depth of -28 feet. This depth should accommodate the military (U.S. Marines).
- d. Tinian Harbor was last dredged in 1943 during construction for the war effort.
- e. A list of cruise ship companies that have previously contacted the Port of Tinian to inquire about harbor depths and access will be sent to MN to research vessels' draft and assess appropriate future harbor and channel depths. — CPA (Crisostomo)

A. Rota West Harbor

1. Construction of a new breakwater to the North is a priority
   - a. Safety concerns exist during typical wind and wave conditions. Just two months ago, a person was thrown overboard during cargo offloading operation due to the wind and wave conditions.
   - b. The port regularly experiences difficulties with cargo offloading during typical wind and wave conditions.
   - c. Cargo barges are often forced to bypass the port due to sea conditions that prevent vessels from entering the harbor.
   - d. The Feasibility Study being prepared by the USACE, Honolulu District, for navigation improvements for Rota Harbor will also address the need for a new breakwater.
2. Dredging
   - a. Current allowable draft in the harbor is 14 feet. This is adequate for current barges that call at the port under calm conditions but swells that enter the harbor during cargo off-loading operations often create safety issues.
   - b. Discussions with USACE have not progressed since their visit in June 2016. It was suggested that the USACE should be included on future calls to discuss the Master Plan and be invited to the October Public and Stakeholder Meetings. — MN (Kokubun)
3. Structural repairs of the existing bollards, fenders and armor stones are already planned.
4. Since Rota Harbor is the only port for the island, it is essential to be able to offload cargo, including building materials, on a regular and reliable basis to support the building industry and help stimulate the economy.
5. Master Plan should consider opportunities for future port development and expansion, economic development, and tourism.
6. Master Plan should consider if / how the harbor could accommodate future ferry and cruise ship visits.
7. MN would like to meet with the vessel and terminal operators during the upcoming visit in October to gain additional insight into navigation issues and input into possible improvements to the harbor and breakwater. The Port can help coordinate this meeting. — CPA (Prater)

3 ***Public and Stakeholder Meetings***

A. CPA recommends having the meetings and opening it up to the public and stakeholders to receive feedback from a broad range of interests.

B. Tentative schedule for the Public and Stakeholder Meetings is the week of 10 October 2016 (Note: Monday is Discovers' Day Holiday); dates need to be confirmed with CPA (Wendi Prater). — MN (Kokubun / CPA (Prater)

| | | |
|---|---|---|
| | C. MN will coordinate invitee list with Wendi Prater. The Lt. Governor's Office shall be included on the invitee list.<br>D. CPA recommended scheduling the Public and Stakeholder Meeting for after work hours (say, 6:00 p.m.) to facilitate maximum participation by the public and stakeholders.<br>E. Rota meeting likely 50+ attendees, Tinian meeting less than 50 attendees. | MN (Kokubun) / CPA (Prater) |
| 4 | ***Rota Harbor Field Work – Metocean Instrumentation, Dive Investigation, Hydrographic Survey*** | |
| | A. Metocean instrumentation will be installed near the channel entrance (but outside areas of navigation) to gather information on the wave and current conditions. The instrumentation will be installed in October 2016 and will remain in place to record data for about 3 months. MN Team will check with the CNMI Bureau of Environmental and Coastal Quality (BECQ) if permits are required for the instrumentation activity. | RFP (Puckette) |
| | B. Port of Rota's on-site crane may be used to lower the metocean equipment into the water. Coordinate with Rodney Taisacan. | RPS (Puckette) |
| | C. Receiving and on-site storage of the metocean equipment may be coordinated with R. Taisacan. | RPS (Puckette) |
| | D. The wind gauge (anemometer) may be installed on the roof of the Seaport Building. Coordinate with R. Taisacan. | RPS (Puckette) |
| | E. MN will be conducting a dive inspection of the harbor in October 2016. The Port would like the Berth 1 and 2 structures to be inspected. A future call with Port of Rota will be scheduled to determine what other structures the Port would like inspected during MN's dive inspection. | MN (Kokubun, Pope) |
| | F. A dive permit is required for the dive inspection. MN to coordinate with R. Taisacan. | MN (Pope) |
| | G. R. Taisacan offered to send to the MN Team the names of companies through which a boat and SCUBA tanks may be rented. | CPA (Taisacan) |
| | H. A hydrographic survey is planned for the harbor in late October / early November 2016. | |
| | I. Metocean instrumentation, dive inspection and hydrographic survey should be coordinated with the local Coast Guard. W. Prater can provide the Coast Guard contact information. | |
| 5 | ***Tinian Harbor Field Work – Hydrographic Survey***<br>A. Existing metocean data and an inspection report from a prior underwater structural investigation conducted by MN for the CNMI Capital Improvement Program Office will be used for the Tinian Harbor Master Plan.<br>B. A hydrographic survey is planned for the harbor in late October / early November 2016.<br>C. Hydrographic survey should be coordinated with the local Coast Guard. | |
| 6 | ***Request for Existing Data from CPA***<br>A. Please provide data listed in Agenda Item 7 as soon as possible so the MN Team may begin reviewing the data. Ideally, MN would like to receive the information well before the upcoming October 2016 Public and Stakeholder Meetings so the information may be used to prepare for the meetings. MN will reach back to CPA (W. Prater) to coordinate the data request.<br>B. The more information that can be provided to the MN Team, the more complete and comprehensive the Master Plans for both harbors can be. | MN (Kokubun) / CPA (Prater) |

| | | |
|---|---|---|
| 7 | ***Project Schedule***<br>• CPA had no comments or requested changes to the attached project schedule at this time. | |
| 8 | ***Other***<br>A. CPA has already been coordinating with the Department of Homeland Security (DHS) and Federal Emergency Management Agency (FEMA) on typhoon and emergency response issues. The master planning process should include coordination with those federal agencies. CPA will send contact information for both federal agencies to the MN Team.<br>B. Port of Rota requested a copy of the Rota East Harbor Master Plan. | CPA (Fermin)<br><br>MN (Matson) |

~ End *Notes of Meeting* ~

TINIAN HARBOR MASTER PLANNING SERVICES (PROJECT NO. CPA-TS-001-15) and ROTA HARBOR MASTER PLANNING SERVICES (PROJECT NO. CPA-RS-001-15)

Kick-Off Meeting / Teleconference - List of Participants

via Teleconference, 07 September 2016, 9:00 a.m. (CHST)

| CHECK | NAME | AGENCY / COMPANY | TELEPHONE | E-MAIL |
|---|---|---|---|---|
| X | FERMIN FLORES | Commonwealth Ports Authority | | ferminf@cpa.gov.mp |
| X | JOY ANN DELEON GUERRERO | Commonwealth Ports Authority | | joydlg@cpa.gov.mp |
| | | | | |
| X | TONY CAMACHO | Commonweath Ports Authority, Port of Tinian | | anthony.camacho@cpa.gov.mp |
| X | GERRY CRISOSTOMO | Commonweath Ports Authority, Port of Tinian | (670) 433.9294 | gkcrisostomo@cpa.gov.mp |
| X | EDWARD MENDIOLA | Commonweath Ports Authority, Port of Tinian | | ebmendiola@cpa.gov.mp |
| | | | | |
| X | LAURA MANGLONA | Commonweath Ports Authority, Port of Rota | | rotaseaport2016@gmail.com |
| X | MARTIN MENDIOLA | Commonweath Ports Authority, Port of Rota | | martinm@cpa.gov.mp |
| X | RODNEY TAISACAN | Commonweath Ports Authority, Port of Rota | (670) 532.9489/9497 | rotaseaport@yahoo.com |
| | | | | |
| X | DEAN KOKUBUN | Moffatt & Nichol | (808) 533.7000 | DKokubun@MoffattNichol.com |
| X | CHRISTOPHER MATSON | Moffatt & Nichol | (757) 628.8222 | CMatson@MoffattNichol.com |
| | | | | |
| X | JESSIE ARIZALA | SSFM CNMI, LLC | (670) 233.7770/2 | jarizala@ssfmcnmillc.com |
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# AGENDA

**Subject:** **Tinian Harbor Master Plan, Project No. CPA-TS-001-15**
**Rota West Harbor Master Plan, Project No. CPA-RS-001-15**
**Post-Award Kickoff (PAK) Meeting**
**Wednesday, 07 September 2016, 9:00 a.m. ChST**

**M&N Job No.:** **9538, 9539**

1. Personnel introductions and discussion of roles / responsibilities (ALL)
   A. Communications lines
   B. Contact information

2. Discussion of vision for master plans for Tinian and Rota West Harbor (led by Commonwealth Ports Authority [CPA]), including:
   A. CPA's expectations for the master plans
   B. Critical issues and priorities for both harbors
   C. New opportunities for both harbors
   D. Time horizon for each master plan
   E. Funding considerations (e.g., sources, limitations, opportunities, etc.) and construction (work-to) budgets for full build out of master plans (if known)
   F. Phasing considerations / key milestones (if any)

3. Saipan / Tinian / Rota West visit pre-planning (led by Moffatt & Nichol [MN])
   A. Kick-Off Meetings with CPA, first Public & Stakeholder Meetings, and field visits tentatively proposed for week of 10 October 2016
   B. Approach to, and schedule for, public and stakeholder meetings
      1) CPA preferred approach to meetings
      2) Preferred meeting time (a.m. / p.m.(?))
      3) CPA to provide venue, public address (PA) system, video projector and screen
   C. Prepare list of invitees to each public and stakeholder meeting with input from CPA
   D. Other administrative considerations

4. Metocean field work for Rota West Harbor (MN)
   A. Points of contact to begin coordination
      1) At a minimum, MN needs to meet with tug captain and other harbor users during first visit
   B. Required permits / permissions for field work(?)
   C. Shipping and storage of two boxes of metocean monitoring equipment
   D. Crane available on site (for lowering metocean equipment into water)?
   E. Identify location for wind instrumentation (anemometer) to be installed
   F. Local boat rental

5. Dive inspection of Rota West Harbor (MN)
   A. Define limits of inspection
   B. Required permits / permissions for inspection(?)
   C. Local dive shops (for filing SCUBA tanks)

6. Hydrographic surveys of Tinian Harbor and Rota West Harbor (MN)
   A. Points of contact to begin coordination
   B. Required permits / permissions for surveys(?)
   C. Local boat rental

7. Request for existing data from CPA (MN)
   A. CPA administrative rules, harbor and land use policies, wharfage and tariff policy, and other policies that govern CPA's use and management of the harbors
   B. Recent and other pertinent documents related to harbor policies, budgets, debt and future spending
   C. Summary of MN data on-hand:
      1) Rota Harbor Master Plan (Sea Engineering, Inc. 1997)
      2) Rota East Harbor Feasibility Study (MN 2013)
      3) Tinian LIDAR bathymetry (2014)
      4) Assessment of the Tinian Harbor (MN 2015)
      5) Rota East Harbor Record Drawings (WK 2004)
   D. Existing CPA / CNMI reports, studies, and record documents, including:
      1) Prior harbor master plans and master plan documents
      2) Existing bathymetric, topographic surveys
      3) Geotechnical borings, reports
      4) Structural condition surveys
      5) Wind / wave / current studies
      6) Mooring and berthing studies
      7) Environmental / hazardous materials / archaeological and historic studies
      8) Record ("as-built") drawings
      9) Electronic CAD files of harbor and harbor properties
      10) Seabridge call records for Rota West Harbor
      11) CPA / Tinian Harbor / Rota West Harbor financial statements, independent auditor's report, and existing long-range financial plans

8. Proposed project schedule (attached) – key dates (subject to change) (MN):
   A. Notice to Proceed: 15 August 2016
   B. Rota West Harbor metocean instrumentation and monitoring: August 2016 – February 2017 (inc. planning, mobilization/demobilization)
   C. Kick-Off Meetings with CPA and first Public & Stakeholder Meetings: week of 10 October 2016
   D. Rota West Harbor condition assessment (dive inspection): 10 October – 31 October 2016 (inc. planning, mob/demob)
   E. Rota West Harbor bathymetric survey: 21 October – 18 November 2016 (inc. planning, mob/demob)
   F. Tinian Harbor bathymetric survey: 28 October – 21 November 2016 (inc. planning, mob/demob)
   G. Draft Tinian Harbor Master Plan submittal: 20 February 2017

H. Draft Rota West Harbor Master Plan submittal: 01 May 2017
I. Second Public & Stakeholder Meetings: week of 15 May 2017
J. Final Tinian Harbor Master Plan and Rota West Harbor Master Plan submittal: 05 June 2017

9. Miscellaneous (ALL)
   A. Business Gross Revenue Tax (BGRT) – paid to consultant or withheld and paid by CPA directly?

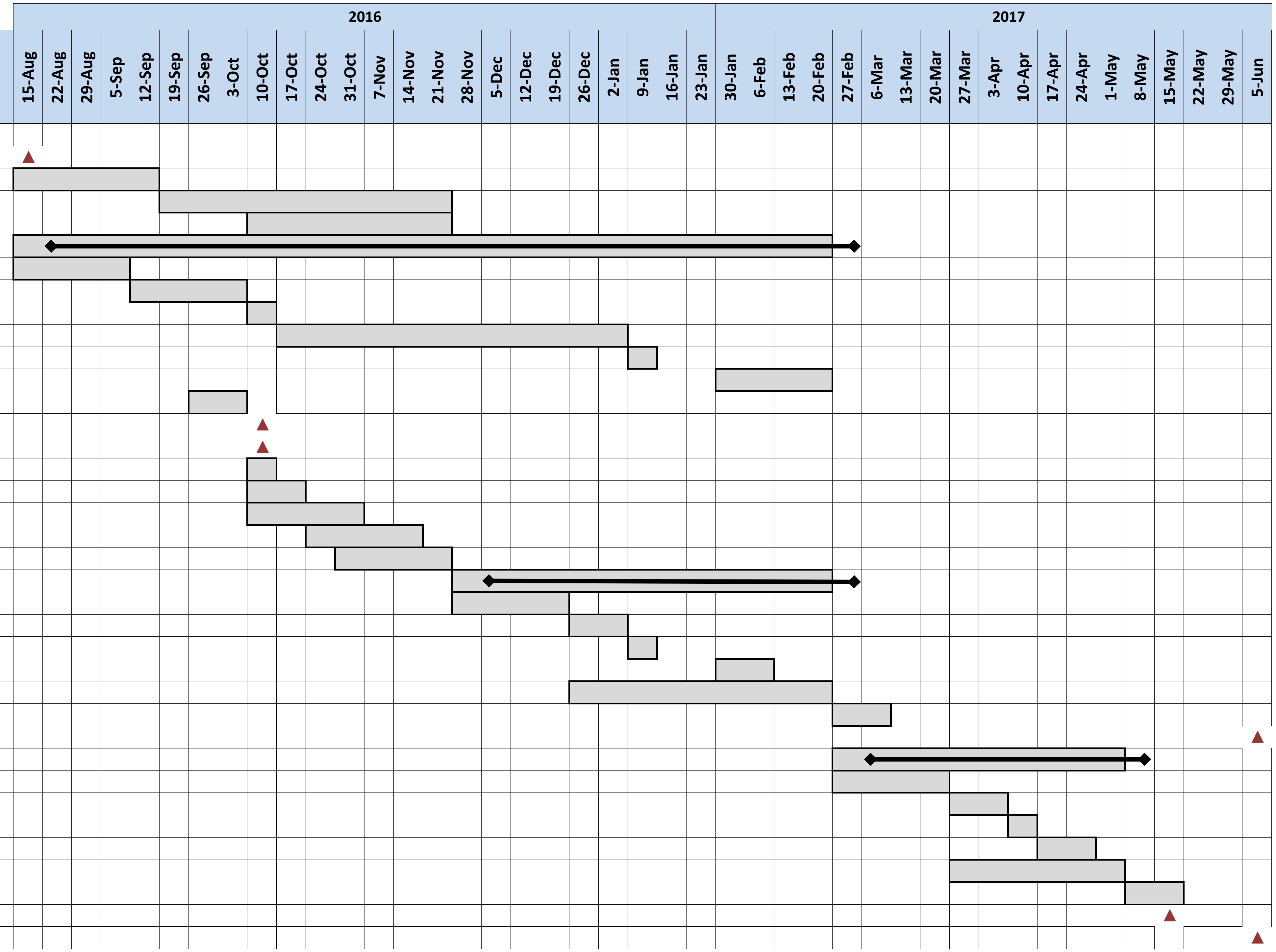
* Dates cited above are for Saipan, CNMI

**Commonwealth Ports Authority (CPA), Commonwealth of the Northern Mariana Islands (CNMI)**

**Master Planning Services for the Tinian Harbor, Project No. CPA-TS-001-15 & Master Planning Services for the Rota West Harbor, Project No. CPA-RS-001-15**

**Schedule Preparation Date:** 30-Aug-16 (v2)
**Project Begin Date:** 15-Aug-16
**Project End Date:** 05-Jun-17 Week of
**Schedule Interval:** 7 Days

| Task | Description | Begin | End | Milestone |
|---|---|---|---|---|
| 1 | Signed Contract | 15-Aug-16 | 15-Aug-16 | X |
| 2 | Initial Data Collection and Review | 15-Aug-16 | 12-Sep-16 | |
| 3 | Cargo Forecast | 19-Sep-16 | 21-Nov-16 | |
| 4 | Environmental Review | 10-Oct-16 | 21-Nov-16 | |
| 5 | Rota West Harbor Metocean (Coastal) Data Collection | 15-Aug-16 | 20-Feb-17 | |
| .1 | Prep and mobilize equipment | 15-Aug-16 | 09-Sep-16 | |
| .2 | Ship equipment to site | 09-Sep-16 | 07-Oct-16 | |
| .3 | Install equipment | 07-Oct-16 | 14-Oct-16 | |
| .4 | Deployment and data collection | 14-Oct-16 | 06-Jan-17 | |
| .5 | Equipment recovery | 06-Jan-17 | 13-Jan-17 | |
| .6 | Processing and analysis | 30-Jan-17 | 20-Feb-17 | |
| 6 | Meeting Prep and Mobilization | 26-Sep-16 | 09-Oct-16 | |
| 7 | Kick-Off Meetings w/ CPA | 10-Oct-16 | 15-Oct-16 | X |
| 8 | Tinian / Rota Public & Stakeholder Meetings | 10-Oct-16 | 15-Oct-16 | X |
| 9 | Tinian / Rota West Harbor Site Evaluation | 10-Oct-16 | 15-Oct-16 | |
| 10 | Tinian / Rota West Harbor Operations Analysis | 10-Oct-16 | 20-Oct-16 | |
| 11 | Rota West Harbor Condition Assessment | 10-Oct-16 | 31-Oct-16 | |
| 12 | Rota West Harbor Bathymetry (Survey, Mapping) | 21-Oct-16 | 18-Nov-16 | |
| 13 | Tinian Harbor Bathymetry (Survey, Mapping) | 28-Oct-16 | 21-Nov-16 | |
| 14 | Tinian Harbor Master Plan First Draft | 28-Nov-16 | 20-Feb-17 | |
| .1 | Harbor Development Plan | 28-Nov-16 | 19-Dec-16 | |
| .2 | CPA Review of Plan | 26-Dec-16 | 02-Jan-17 | |
| .3 | Capital Rough Order of Magnitude Cost Estimate | 09-Jan-17 | 14-Jan-17 | |
| .4 | Financial Analysis | 30-Jan-17 | 11-Feb-17 | |
| .5 | Draft Report Preparation | 26-Dec-16 | 20-Feb-17 | |
| 15 | CPA Review of Tinian Harbor Master Plan First Draft | 27-Feb-17 | 10-Mar-17 | |
| 17 | **Final Tinian Harbor Master Plan** | 05-Jun-17 | 05-Jun-17 | X |
| 18 | Rota West Harbor Master Plan First Draft | 27-Feb-17 | 01-May-17 | |
| .1 | Harbor Development Plan | 27-Feb-17 | 20-Mar-17 | |
| .2 | CPA Review of Plan | 27-Mar-17 | 09-Apr-17 | |
| .3 | Capital Rough Order of Magnitude Cost Estimate | 10-Apr-17 | 15-Apr-17 | |
| .4 | Financial Analysis | 17-Apr-17 | 24-Apr-17 | |
| .5 | Draft Report Preparation | 27-Mar-17 | 01-May-17 | |
| 19 | CPA Review of Rota West Harbor Master Plan First Draft | 02-May-17 | 15-May-17 | |
| 16 | Second Public and Stakeholder Meetings | 15-May-17 | 15-May-17 | X |
| 20 | **Final Rota West Harbor Master Plan** | 05-Jun-17 | 05-Jun-17 | X |



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# NOTES OF MEETING

**DATE OF MEETING:** Thursday, 08 September 2016 **TIME:** 8:00 a.m. HST

**LOCATION:** via Teleconference **WRITTEN BY:** Moffatt & Nichol (D. Kokubun) (rev2)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9538/9539

**SUBJECT:** USACE Rota Harbor and Tinian Harbor Integrated Feasibility Study and Environmental Impact Statement (EIS)

**PARTICIPANTS:** U.S. Army Corps of Engineers (USACE): Milton Yoshimoto, Jessica Podoski, Sherida Bonton
Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson

**DISTRIBUTION:** Attendees

**REFERENCE DOCUMENTS:**

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | MN has been hired by the Commonwealth Ports Authority (CPA) to prepare a Master Plan for Tinian Harbor and a Master Plan for Rota West Harbor.<br><br>As part of the Rota West Harbor master plan project, the MN Team will be deploying metocean instrumentation to gather wind, wave and current data at Rota West Harbor over a three-month period beginning in mid-October 2016, performing an underwater structural inspection in October 2016, and performing a hydrographic survey (by Sea Engineering, Inc.) in late October / early November 2016.<br><br>As part of the Tinian Harbor master plan project, the MN Team will be performing a hydrographic survey (by Sea Engineering, Inc.) in late October / early November 2016.<br><br>MN's two master plan projects have just begun. The kick-off teleconference for the two projects was just conducted on Tuesday, 06 September (HST). The project scope and schedule is still being discussed and details worked out.<br><br>The Tinian and Rota master plans are both currently scheduled to be completed in June 2017.<br><br>Ms. Wendi Prater of the Commonwealth of the Northern Mariana Islands (CNMI) Commonwealth Ports Authority (CPA) is MN's designated point of contact. | | |
| 2 | The USACE is preparing an Integrated Feasibility Study and Environmental Impact Statement (EIS) for Tinian Harbor and separately for Rota Harbor.<br><br>Tinian Harbor investigations include breakwater repair / replacement and increasing channel / basin depth. | | |

| | | |
|---|---|---|
| | Rota Harbor investigations are addressing adverse wave action within the channel and basin resulting in operational and cargo transportation inefficiencies. The revetted mole and channel are also being investigated.<br><br>USACE conducted some numerical modeling for a 2015 study under the Planning Assistance to States (PAS) program. As part of the current Feasibility Studies, the USACE will be using the existing data as well as conducting additional modeling (Boussinesq and spectral wave) of the existing conditions and potential alternatives using existing hindcast and wave buoy data.<br><br>In the USACE's use of the existing bathymetry data for Rota Harbor and Tinian Harbor, it was found that the major data gap at Rota Harbor is bathymetry of the shallow reef area adjacent to the harbor, and the shallow lagoon area on the opposite (southwest) side of the harbor.<br><br>The USACE Feasibility Studies for both harbors began in January 2016 and will be completed by January 2019 according to the USACE's prescribed three-year schedule.<br><br>The CNMI CPA is the local sponsor of the USACE Feasibility Studies and EIS. Ms. Maryann Lizama is the USACE's designated point of contact at CPA.<br><br>Mr. John Gonzalez of the Lieutenant Governor's Office is USACE's designated point of contact at the CNMI Lt. Governor's office. | |
| 3 | The U.S. Fish and Wildlife Service (USFWS) has conducted biological surveys of both Tinian Harbor and Rota Harbor. The studies for both harbors should be submitted to the USACE in October 2016. The USACE has offered to share the studies with the MN Team. | |
| 4 | A federal hydrographic survey of the harbor and entrance channel of Tinian Harbor and Rota Harbor was last completed in 2013 and a new survey is scheduled to be conducted later this year 2016. The surveys are jointly funded by CPA and USACE.<br><br>*Post meeting update: The USACE will use the hydrographic survey being performed by the MN Team for the Tinian Harbor and Rota Harbor master plans in lieu of conducting its own surveys.* | |
| 5 | A consultant has been selected to prepare the EIS for both harbors. The contract award is forthcoming.<br><br>For Rota Harbor, expansion of the harbor basin is being contemplated for the EIS. | |
| 6 | The Department of Defense (DoD) has shared future vessel requirements at Tinian Harbor. The USACE has not been told that any additional information is forthcoming. | |
| 7 | The USACE recommended close coordination between USACE and MN throughout MN's projects to ensure the analysis and conclusions are coordinated and do not result in contradictory conclusions between MN's Master Plans and the USACE's Feasibility Study and EIS. MN concurred. | |

Item of concern is the timing of available information. USACE's Tentatively Selected Plan Milestone is currently scheduled for June 2017, same time as MN's final report.

~ End *Notes of Meeting* ~

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# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Tuesday, 25 October 2016 | **TIME:** | 10:00 a.m. CHST |
| **LOCATION:** | Port of Saipan, Second Floor Conference Room | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9538/9539 |
| **SUBJECT:** | On-Site Coordination Meeting | | |

| | |
|---|---|
| **PARTICIPANTS:** | Commonwealth Ports Authority (CPA): Wendi Prater, Christopher Tenorio, JoyAnn Deleon Guerrero<br>Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson<br>SSFM CNMI (SSFM): Jessie Arizala, Gregorio Castro, Denn Manglona, Roy Reyes, Edwin Simbulan<br>Micronesian Environmental Services (MES): Nathan Johnson |
| **DISTRIBUTION:** | Attendees |
| **REFERENCE DOCUMENTS:** | • Agenda<br>• U.S. Army Corps of Engineers' (USACE) Feasibility Report and Environmental Impact Statement (EIS) Milestone Schedule, provided by the USACE |

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***CPA's vision for master plans for Tinian Harbor and Rota West Harbor***<br>A. Tinian Harbor<br>1. Deteriorated condition of piers and breakwater<br>2. Department of Defense's (DoD) plans and their potential impact to port operations<br>3. Fire hydrant(s) (seawater?) at the port to facilitate firefighting should be considered. Currently when tankers offload fuel, an airport fire truck is called upon to standby at the port.<br>4. Closing of Dynasty Hotel-Casino<br>5. Two proposed hotel-casinos, one by Bridge Investment Group (BIG) and one by Alter City Group Incorporated (ACG), including:<br>a. Roll-on/Roll-off (RO/RO) plus passenger ferry service from Saipan<br>b. BIG lease of a significant portion of waterfront and backland areas of the port, including the Titanic-replica casino at the east end of the port. CPA to provide MN the conceptual sketches for the proposed development.<br>c. BIG will be constructing three new buildings for CPA on port property; CPA to provide MN the plans for the projects<br>6. Staging construction material at / near the port during near term construction projects at the port<br>7. Best Sunshine:<br>a. Yacht service from Saipan (two yachts already in Saipan; company plans to purchase three more)<br>b. Possible plans for a floating casino<br>8. Possible future direct flights from China and the potential impact to future cargo volumes<br>9. Funding the future port development | CPA<br>CPA | |

B. Rota West Harbor
1. Addressing the active wave and current environment of the harbor and the on-going challenges with safe cargo delivery and offloading
2. Berth 2 may be experiencing undermining at its southwest corner. This will be investigated during MN's underwater inspection at the end of the week.
3. Possible future need to accommodate Best Sunshine's yacht service from Saipan (two yachts already in Saipan; company plans to purchase three more)
4. A RO/RO ramp may be useful at Rota West Harbor
5. Possible future direct flights from China and the potential impact to future cargo volumes
6. A new breakwater or harbor reconfiguration project may encounter significant environmental challenges
7. Funding the future port development

| | | |
|---|---|---|
| 2 | ***Stakeholders and key interests***<br>It would be favorable to identify all key stakeholder, public and special interest groups early in the master planning process so potential key issues and concerns of those groups may be anticipated and considered through the master planning process. MN cautioned that many times stakeholders and special interests will reserve comment until near the end of the master planning process, after decisions have been made, direction has been taken, and plans have been developed when incorporating changes to address their concerns and interests is difficult. The Team should try to anticipate those concerns and consider them in developing the master plans. | |
| 3 | ***Stakeholder outreach***<br>A. CPA has coordinated a meeting with representatives from the shippers, stevedores, vessel captains, and other harbor users for Friday, 28 October 2016 at 10:00 a.m. CHST at the Port of Saipan Conference Room.<br>B. CPA has coordinated a meeting with GHD, CPA's consultant for the Saipan Master Plan, for Friday, 28 October 2016 at 2:00 p.m. CHST at the Port of Saipan Conference Room. | |
| 4 | ***Data and record gathering***<br>A. CPA (W. Prater) is in the process of reviewing the data request from MN to determine which information requested has not yet been provided to MN. CPA will get back to MN with additional information that has not already been provided to MN.<br>B. Among the most urgent data / information required by MN is the cargo and passenger data and other information needed to prepare the cargo and passenger projections, the port financial data and funding options needed for the financial analyses, and a copy of the recently enacted wharfage law disallowing collection of wharfage fees for cargo offloaded in Rota and Tinian which originated in Saipan. MN will follow up with an e-mail to CPA (W. Prater) describing the cargo and passenger data, and financial and funding information that is needed.<br>C. MN asked if CAD files of survey maps and other drawings are available. W. Prater will check with Fermin.<br>D. SSFM CNMI is available to assist with data gathering on island if the information needs to be searched and pulled. | CPA<br>CPA<br>MN<br>CPA |

E. MN requested a copy of the parcel maps of the Tinian and Rota West Harbor properties and adjacent properties that may be affected by future harbor development.
   1. CPA will provide the parcel maps of its properties CPA
   2. MN should contact the Department of Public Lands (DPL) or Division of Land Surveys for parcel maps of properties outside of CPA's properties MN
   3. Since both harbor properties currently have a lot of unused land available for development, CPA will not be acquiring properties outside of those it currently owns for future harbor development / expansion. However, CPA leases land at both ports to others which CPA could reacquire, if necessary. CPA will identify those lands and provide a copy of the lease agreements for both harbors to MN. CPA

***Project* schedule (dates cited are for Saipan, CNMI)**

A. Current project schedule:
   - Notice to Proceed: 15 August 2016
   - Rota West Harbor metocean instrumentation and monitoring: August 2016 – February 2017 (including planning, data gathering, mobilization/demobilization); pending permit approvals
   - On-Site Meetings with CPA and first Public Information Meetings: week of 24 October 2016
   - Rota West Harbor condition assessment (dive inspection): 27 – 28 October 2016
   - Rota West Harbor bathymetric survey: 29 November – 03 December 2016 (including mobilization / demobilization)
   - Tinian Harbor bathymetric survey: 04 – 06 December 2016 (including mobilization / demobilization)
   - Draft Tinian Harbor Master Plan submittal: 20 February 2017
   - Draft Rota West Harbor Master Plan submittal: 01 May 2017
   - Second Public Information Meetings: week of 15 May 2017
   - Final Tinian Harbor Master Plan and Rota West Harbor Master Plan
5 submittal: 05 June 2017

B. Since the USACE's Feasibility Study will only be reaching *Decision Point 2 - Concurrence on its Tentatively Selected Plan* on 13 June 2017 based on the schedule provided by the USACE, MN suggested that postponing the completion of both master plans until after concurrence of the USACE's Tentatively Selected Plans may be a good idea so CPA and MN have an opportunity to consider the USACE's plans before the CPA master plans are finalized.

   CPA asked if completion of the CPA master plans is delayed until after the 13 June 2017 concurrence of the USACE's Tentatively Selected Plans, when will the Final Master Plans be completed. MN responded that completion of the Final Tinian Harbor Master Plan and Rota West Harbor Master Plans will likely be delayed about two months since the Second Public Information Meetings on each island should occur only after the USACE announces its Tentatively Selected Plans.

   CPA asked if an extension of the CPA master plan schedules to accommodate the USACE's schedule would have a cost impact to the MN Team. MN responded that as long as the schedule extension is agreed upon at the start of

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| | the project so project spending can be adjusted for the longer project duration, there will be no increase in the MN Team's fees.<br><br>CPA requested a written request to adjust the schedule to better align with the USACE's schedule. A proposed revised schedule should accompany the written request.<br><br>If advanced copies of the Tentatively Selected Plans can be provided to CPA and MN by USACE as the plans are discussed and finalized, it would help to coordinate the CPA's master plan. | <br><br>MN |
| 6 | ***Miscellaneous items of discussion and notes***<br>A. Rota West Harbor: Rota West Harbor Pier 1 is used for homeporting the M/V Luta<br>B. Rota West Harbor: Vessels offloading cargo at Rota West Harbor are required to clear its cargo at Pier 2<br>C. Tinian Harbor: Saipan Stevedore provides all stevedoring at Tinian Harbor | |

~ End *Notes of Meeting* ~

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# AGENDA

**Subject:** **Tinian Harbor Master Plan, Project No. CPA-TS-001-15**
**Rota West Harbor Master Plan, Project No. CPA-RS-001-15**
**Coordination Meeting**
**Port of Saipan, Office of the Executive Director**
**Tuesday, 25 October 2016, 10:00 a.m. ChST**

**M&N Job No.:** **9538, 9539**

1. CPA's vision for master plans for Tinian Harbor and Rota West Harbor, including:
   A. CPA's expectations for the master plans
   B. Critical issues and priorities for both harbors
   C. New opportunities for both harbors
   D. Funding considerations (e.g., sources, limitations, opportunities, etc.) and construction (work-to) budgets for full build out of master plans (if known)
   E. Phasing considerations / key milestones (if any)

2. Stakeholders and key interests (i.e., individuals, government entities, businesses, others)

3. Stakeholder outreach, including vessel operators (M/V Luta and M/V Tug Mangilao)
   - MN would like to meet with tug captain and other harbor users

4. Data and records gathering

5. Project schedule – key dates (subject to change):
   A. Notice to Proceed: 15 August 2016
   B. Rota West Harbor metocean instrumentation and monitoring: August 2016 – February 2017 (inc. planning, data gathering, mobilization/demobilization); pending permit approvals
   C. On-Site Meetings with CPA and first Public Information Meetings: week of 24 October 2016
   D. Rota West Harbor condition assessment (dive inspection): 27 – 28 October 2016
   E. Rota West Harbor bathymetric survey: 29 November – 03 December 2016 (inc. mob/demob)
   F. Tinian Harbor bathymetric survey: 04 – 06 December 2016 (inc. mob/demob)
   G. Draft Tinian Harbor Master Plan submittal: 20 February 2017
   H. Draft Rota West Harbor Master Plan submittal: 01 May 2017
   I. Second Public Information Meetings: week of 15 May 2017
   J. Final Tinian Harbor Master Plan and Rota West Harbor Master Plan submittal: 05 June 2017

* Dates cited above are for Saipan, CNMI

## Milestone Schedule

| SMART Task/Milestone | Completion Date |
|---|---|
| Execute FCSA | 4-Dec-2015 |
| Receive Federal Funds | 4-Dec-2015 |
| Receive Non-Fed Funds | 4-Dec-2015 |
| PDT Kickoff - Step 1: Probs&Opportunities | 13-Jan-2016 |
| Scoping Charette | 18-Feb-2016 |
| Complete Step 2: Inventory and Forecasting of Resources | 30-May-2016 |
| Complete Step 3: Alternatives Formulation (Complete) | 12-Jun-2016 |
| Federal Notice of Intent for Environmental Impact Statement (EIS) | 8-Jul-2016 |
| EIS Public Scoping Meeting | 20-Jul-2016 |
| **Decision Point 1 - Concurrence on Final Array of Alternatives** | **3-Aug-2016** |
| Complete Steps 4 & 5: Evaluate & Compare Alternatives (ROM Screening Level) | 20-Nov-2016 |
| IPR: Convert to Remote & Subsistence (if needed) | 15-Jan-2017 |
| Value Engineering Workshop & Schedule IPR/TSP Meeting | 19-Mar-2017 |
| Complete Step 6: Initial Selected Plan | 22-Mar-2017 |
| IPR: Discussion of any issues/outcomes of VE Workshop | 26-Mar-2017 |
| Compile Draft Feasibility/EIS Integrated Report | 3-May-2017 |
| Submit TSP Read-Aheads to POD | 16-May-2017 |
| PDT Review of Draft Feasibility/EIS Integrated Report | 17-May-2017 |
| Submit TSP Read-Aheads to HQ | 23-May-2017 |
| POH District Quality Control, Legal Sufficiency, and Sponsor Review (End) | 12-Jun-2017 |
| **Decision Point 2 - Concurrence on Tentatively Selected Plan** | **13-Jun-2017** |
| Federal Notice of Availability | 1-Jul-2017 |
| Draft Feasibility/EIS Integrated Report Published | 17-Jul-2017 |
| Public Hearing | 20-Jul-2017 |
| ATR of Draft Feasibility/EIS Integrated Report Complete (30 days) | 18-Aug-2017 |
| Public Cmment Period Complete (45 days) | 31-Aug-2017 |
| Planning Workshop w/ Key Stakeholders - Addressing Comments & Revising Document | 26-Sep-2017 |
| Independent External Peer Review (IEPR) Complete (90-120 days) | 31-Oct-2017 |
| **Decision Point 3 - Agency Decision Milestone** | **19-Jan-2018** |
| Final FR/EIS Completed | 16-Feb-2018 |
| Final FR/EIS District Quality Review | 2-Mar-2018 |
| Final FR/EIS ATR complete (includes Cost ATR) | 6-Apr-2018 |
| IPR: Confirm Appropriate to initiate process for Decision Point 4 | 18-May-2018 |
| DE Signs Final FR/EIS | 21-May-2018 |
| **Decision Point 4 - Final Report Milestone** | **25-May-2018** |
| Final FR/EIS POD Review | 8-Jun-2018 |
| POD Commander Transmittal to HQUSACE | 25-Jun-2018 |
| Final FR/EIS HQUSACE Review | 11-Jul-2018 |
| Civil Works Review Board | 27-Aug-2018 |
| DGC-CEO Release Report for Commonwealth and Agency Review | 26-Sep-2018 |
| Commonwealth & Agency Review of FR/EIS complete (30 days) | 26-Oct-2018 |
| HQUSACE Prepares Final Chief's Report | 12-Nov-2018 |
| **Decision Point 5 - Chief's Report to ASA (CW)** | **27-Nov-2018** |

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# NOTES OF MEETING

Revision 1

**DATE OF MEETING:** Wednesday, 26 October 2016

**TIME:** ~8:30 a.m. CHST

**LOCATION:** Benjamin Taisacan Manglona International Airport
Office of the Rota Ports Manager

**WRITTEN BY:** Moffatt & Nichol
(D. Kokubun, C. Matson)

**PROJECT TITLE:** Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9539

**SUBJECT:** Coordination Meeting with Rota Ports Manager

**PARTICIPANTS:**
Commonwealth of the Northern Mariana Islands (CNMI) Commonwealth Ports Authority (CPA):
Martin Mendiola
Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson
SSFM CNMI (SSFM): Gregorio Castro, Denn Manglona, Edwin Simbulan

**DISTRIBUTION:** Attendees; Wendi Prater (CPA)

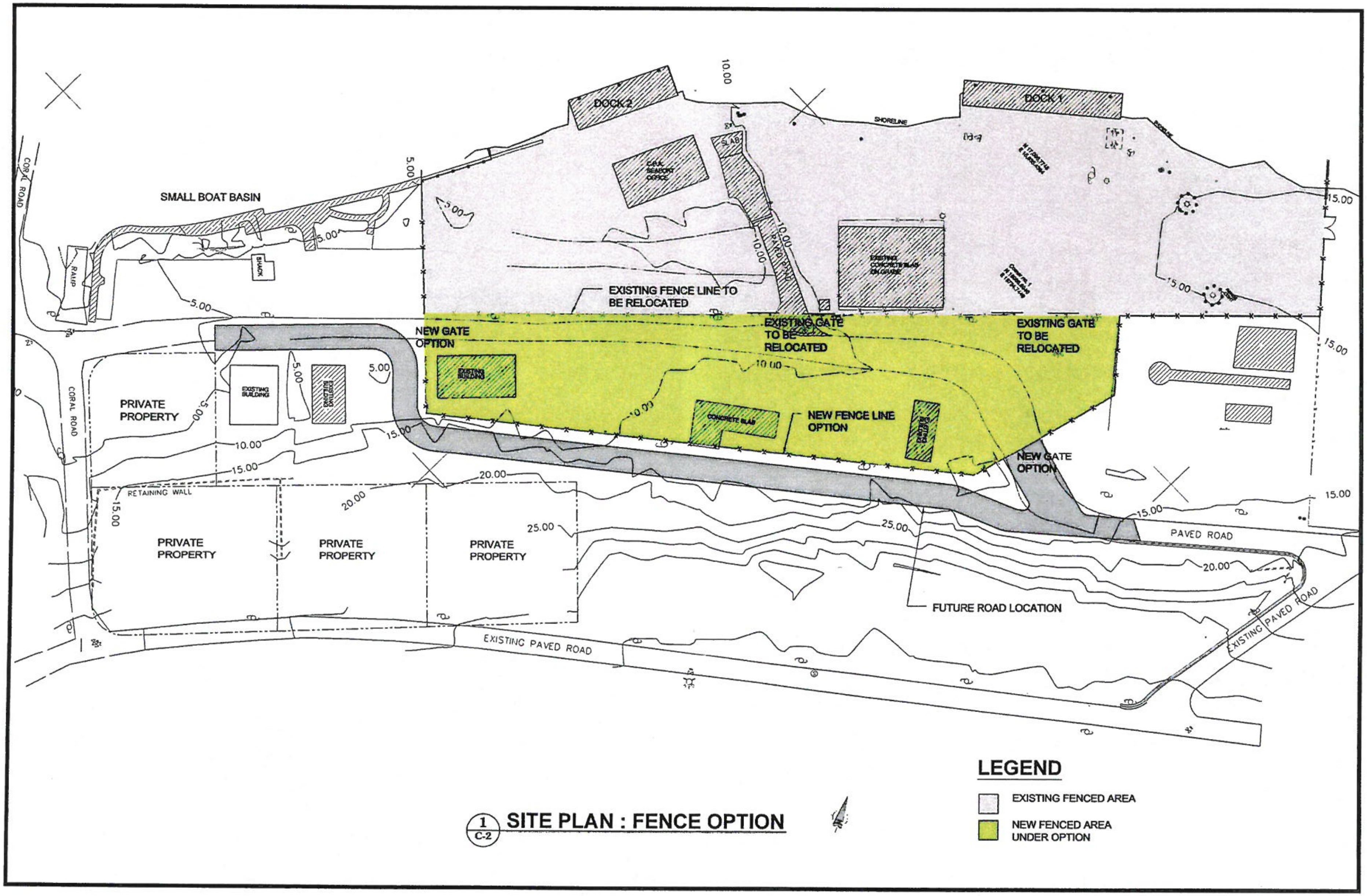
**REFERENCE DOCUMENTS:**
- Site Plan for new DLNR road and fence (1 sheet, undated)
- *Memorandum of Agreement*, Small Boat Marina, West Harbor Rota, between CPA and CNMI Department of Lands and Natural Resources, Fish and Wildlife Division (DLNR), executed on 29 August 2005 (13 pages)

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***Port of Rota comments***<br>• The active wave and current environment of the harbor and the on-going challenges with safe cargo delivery and offloading are a significant concern<br>• The priority for the port and island of Rota is to achieve reliable cargo delivery<br>• A new breakwater would help to decrease the wave activity in the channel, the harbor basin, and at the berths<br>• Dredging of the channel and harbor should be considered to allow deeper draft vessels to call the port<br>• Consideration should be given to widening the channel since the channel is too narrow<br>• A new entrance channel at the north end of the harbor would facilitate easier access to the harbor and especially, Berth 1<br>• A project to replace the mooring bollards at both Berth 1 and Berth 2 is currently underway<br>• Due to the need to keep the port operational and the lack of laydown space, any development would have to be phased<br>• A boat repair facility at the port would be beneficial. The facility would need a way of removing vessels from the water such as a boat haul out, crane, boat ramp with hydraulic trailer, etc.<br>• A new access road to the DLNR small boat marina at West Harbor Rota is currently being planned. CPA provided MN a conceptual site plan of the new road and security fence (attached). MN may contact Fermin Flores at CPA to request the AutoCAD file of the conceptual site plan. CPA noted that consideration should be given to utilizing the excess soil leftover from the site regrading to accommodate the proposed new road for landfill cover by the CNMI Department of Public Works. | MN | |

| | |
|---|---|
| 2 | ***Small boat marina at West Harbor Rota***<br>• CNMI customs has issued a notice to boaters that all offloading of cargo shall be performed at the CPA commercial port and no cargo shall be offloaded at the DLNR small boat marina at West Harbor Rota<br>• Concerns with unmonitored and uncontrolled offloading of cargo include the importation of illegal and contraband goods (e.g., illegal drugs), invasive species (e.g., brown tree snake), and the potential risk of losing U.S. federal funding used to develop, operate and manage the marina facilities<br>• Vessels were previously allowed to bring cargo into Rota through the small boat marina, bypassing the commercial port, since Rota was suffering from unreliable commercial cargo service and residents needed supplies. It was reported that there were times when regular shipping service could not make port calls to Rota for several months. However, with the start of the M/V Luta service and more reliable cargo delivery, CPA needs to enforce customs and port security requirements.<br>• CPA provided MN a copy of the *Memorandum of Agreement* between CPA and DLNR covering the development, management and operation of the small boat marina at West Harbor Rota (attached) |
| 3 | ***Miscellaneous information***<br>• Seabridge previously ran regular service between Guam, Saipan and Rota with the *M/V Super Shuttle* but service was halted a few years ago<br>• Original purpose of Berth 1 is unclear<br>• Bulk manganese was previously exported from the port<br>• Based on anecdotal observations, 75% of the waves entering the harbor come out of the northeast<br>• Captain Lino Mendiola piloted the *M/V Fidel* and *M/V Celeste* that called the port<br>• Tugs that have called the port include the *M.T. Chamorro* and *M.T. Mingilao*<br>• CPA is seeking a federal Port Security Grant for the installation of new lighting, security cameras and fencing, and for a snake control program |

~ End *Notes of Meeting* ~

APPENDIX 8


DOCK 2
DOCK 1
SHORELINE
SMALL BOAT BASIN
CORAL ROAD
RAMP
SHACK
SLAB
PAVED ROAD
EXISTING FENCE LINE TO BE RELOCATED
NEW GATE OPTION
EXISTING GATE TO BE RELOCATED
EXISTING GATE TO BE RELOCATED
PRIVATE PROPERTY
EXISTING BUILDING
CONCRETE SLAB
NEW FENCE LINE OPTION
NEW GATE OPTION
RETAINING WALL
PRIVATE PROPERTY
PRIVATE PROPERTY
PRIVATE PROPERTY
PAVED ROAD
FUTURE ROAD LOCATION
EXISTING PAVED ROAD
EXISTING PAVED ROAD
LEGEND
EXISTING FENCED AREA
NEW FENCED AREA UNDER OPTION
1
C-2
SITE PLAN : FENCE OPTION

# MEMORANDUM OF AGREEMENT
# SMALL BOAT MARINA
# WEST HARBOR ROTA

Memorandum of Agreement, entered into by and between the Commonwealth Ports Authority, hereafter the "Authority," and the CNMI Department of Lands and Natural Resources, Fish and Wildlife Division, hereafter "DLNR."

## WITNESSETH:

**WHEREAS**, DLNR wishes to develop, manage and operate a small boat marina at West Harbor Rota; and

**WHEREAS**, the Authority has seaport property at West Harbor Rota that it is not actively using, which property could be developed and improved for a small boat marina; and

**WHEREAS**, DLNR wishes to develop and improve such property for a small boat marina, with federal and local funding; as well as assign DLNR personnel to operate and manage the marina; and

**WHEREAS**, Authority agrees to give DLNR a permit to develop, improve, operate and manage the below-described property for a small boat marina at West Harbor Rota, subject to certain terms and conditions; now therefore,

**For and In consideration of the Mutual Benefit** to be derived by the parties and particularly the people of Rota, the following term and condition are hereby agreed to:

## ARTICLE 1: USE OF PREMISES

DLNR is permitted to develop and improve a certain parcel of Authority property hereinafter called the "premises" as described in Article 2, located at West Harbor Rota, ("Port") for a small boat marina.

## ARTICLE 2: PREMISES COVERED

The premises covered by the permit herein given is that certain seaport property of the Authority immediately adjacent to and in the vicinity of the causeway connecting West Harbor Rota and Anjota Island, as shown and delineated in red in the attached Exhibit "A," which is incorporated herein by this reference. The total land area is **50,000** square feet.

## ARTICLE 3: INTEREST CONVEYED

The Authority hereby gives to DLNR a fifteen (15) year permit to the above-described property to develop, improve, operate, manage and maintain a small boat marina, to be built in accordance with drawings, plans and specifications to be submitted to and approved in advance by the Authority. The Authority may thereafter authorize two (2) extensions of the permit in increments of five (5) years each. It is understood that the permit given DLNR is not a conveyance of an interest in land.

## ARTICLE 4: INGRESS AND EGRESS

The Authority hereby agrees to give to DLNR and to boat owners using the small boat marina access for ingress and egress to the property encompassed by the marina, subject to reasonable restrictions and conditions that may be imposed by the Authority that are necessary for the safe and efficient operation of West Harbor Rota's shipping and dock operations and activities.

## ARTICLE 5: RULES AND REGULATIONS

In conducting is operations hereunder, DLNR shall comply with all applicable laws and regulations of the United States of American, and the Authority, now or hereafter in force. The Authority shall have the right from time to time, to amend and enforce its rules, regulations, and tariffs covering port operations which DLNR agrees to observe and obey. In the event the Authority shall be subject to any civil fine or penalty by reason of the DLNR's violation of any rules, regulations, and standards now or hereafter enacted or promulgated, the cost of such fine or penalty shall be borne by DLNR. DLNR shall indemnify fully and save harmless the Authority from any fine or penalty charges against the Authority by reason of the DLNR's violation of any governmental rules, regulations, and standards.

## ARTICLE 6: FEES AND CHARGES

In consideration of the improvements to be made by DLNR and the benefit to be derived by the people of Rota, the Authority shall not charge DLNR, a government agency, any rental or permit fee for the use of the port property covered by the small boat marina. As operator and manager of the marina, DLNR is hereby authorized to impose and collect reasonable user fees and related charges from small boat operators and owners using the marina. Such fees and charges shall be kept in a separate account to be used strictly for the repair, maintenance and upkeep of the marina. DLNR shall provide a written report to the Authority regarding fees collected and the expenditures made therefrom no later than thirty (30) days after the end of each calendar year.

## ARTICLE 7: INSURANCE

The Lessee shall maintain in force during the term of this MOA public liability insurance covering personal injury, death and property damage in an amount comparable to that held by small boat marina's of similar size and function. DLNR shall cause the Authority to be named as an additional insured under such liability insurance policy or policies.

## ARTICLE 8: FACILITIES AND CONCESSIONS

In addition to the marina itself, DLNR may construct small boat facilities, say, for fuel bunkering of small boats and for the sale or rental of supplies and equipments needed by fishermen and boat owners. All facilities constructed and concessions granted require the prior written approval of the Authority.

No activities of DLNR shall interfere with rights granted to Duty Free Shoppers, Ltd., (DFS) by virtue of the Mater Concession Agreement, as amended, between the Authority and DFS, without the express consent and approval of the Authority and DFS. In no event shall DLNR use or permit the Premises to be used in whole or in part for any purpose other than as set forth hereinabove, or in any manner contrary to law.

## ARTICLE 9: REVOCATION OF PERMIT

(A) In the event the Authority requires the return of the property occupied by the small boat marina, either for needed port expansion or future improvements of port facilities at West Harbor Rota, or because of safety or environmental concerns, or for their good cause as the Authority alone shall determine, then and in the event the Authority may revoke the permit granted DLNR herein, upon prior written notice to DLNR specifying the reason permit revocation, providing at least six (6) months lead time before the permit revocation becomes effective.

(B) The Authority may also revoke the permit herein given DLNR, for DLNR's failure to comply, fulfill, or follow the terms and conditions of this memorandum or the orders and directives of the Authority. Authority shall notify DLNR in writing of such failure to comply and if the same is not corrected within thirty (30) days of receipt of notice, Authority may thereafter revoke the permit given.

## ARTICLE 10: MAINTENANCE AND SAFETY

(A) **Repairs and Maintenance**. DLNR covenants and agrees that it shall at its own cost and expense during the term of this MOA, keep and maintain the Premises, including all buildings, structures, storage facilities, and improvements thereon, whenever or by whomever placed thereon, in good order and repair and in tenantable condition, and shall not allow such structures to deteriorate, become unsafe or an eyesore at the Port.

(a) The responsibility of DLNR to perform repairs and maintenance, as provided in this section shall include both structural and operational repairs and maintenance. Except for damage or injury to the Premises caused by the negligence of the Authority, its agents, or employees, which injury or damage the Authority shall repair, the Authority shall not be obligated to make any repairs, alterations, additions, improvements, or betterments to said Premises during the term of this MOA. Should DLNR fail to make any repairs for which it is liable, the Authority shall have the option to make the same if DLNR fails to do so within thirty (30) days after notice from the Authority. DLNR shall be liable for the full costs thereof, plus ten percent (10%) to cover overhead charges. The making of such repairs by the Authority shall in no event be construed as a waiver of the duty of DLNR to make repairs as provided herein.

(b) DLNR shall pay for all labor performed and materials furnished in any construction, repairs, maintenance, additions, alteration, or improvements made by it on the Premises, and shall at all times keep its possessory interest under this MOA free and clear of all liens and encumbrances arising out of said work.

(c) DLNR shall at all times maintain, operate and keep the Premises in a neat, clean, sanitary, and orderly condition, and shall not permit the presence of weeds, refuse, trash, or waste materials which present an unattractive appearance or which might constitute a safety, fire, or health hazard.

(d) DLNR shall not discharge any substance whatsoever into the waters surrounding the Premises nor cause nor permit any other person or entity to do so. In the event any petroleum product or other hazardous material is discharged or spilled onto the premises or waters or land within the Port, the DLNR shall take immediate action at its sole cost and expense to remedy the discharge or spill and notify the Authority as soon as practicable after the incident.

(B) Safety. DLNR shall assume the sole and exclusive responsibility for the guarding and safekeeping of, and the risk of loss to all property and equipment stored or located upon or used in connection with the premises, and shall save and hold harmless the Authority, its officers, agents, and employees from any and all claims, demands, and liabilities arising therefrom.

### ARTICLE 11: IMPROVEMENTS

(A) Right to Construct. DLNR may make alterations, additions, improvements, or betterment to the Premises at its sole cost and expense. Prior to such work being done, complete plans and specifications therefor shall be submitted to the Authority for review and approval. DLNR may begin work only upon prior written approval of the Authority as to both the plans and specifications and the nature and type of improvement, alteration, additional or betterment.

(B) Title to Improvements. Title to all structures, buildings, and any and all other permanent improvements constructed, erected, or placed upon the premises by DLNR and additions or improvements made thereto, shall vest in and become the property of DLNR, but shall be surrendered to the Authority together with the Premises as part thereof upon termination of this MOA and shall become the exclusive property of the Authority; provided, DLNR may, at the termination of this MOA, remove its machinery, equipment, movable interior partitions, and other fixtures placed by it upon the Premises.

(C) Damage or Destruction. In the event that, during the term of this Lease, the buildings and structures located upon the Premises shall be damaged or destroyed by fire, typhoon, or other insurable risks, the Lessee agrees that it shall with due diligence restore the Premises to a good and tenantable condition, using for the purpose proceeds of the insurance provided herein or such other funds as may be available. In the event DLNR fails or refuses to restore the Premises to the condition existing immediately prior to the damage, casualty or loss within 180 days of said damage, casualty or loss, the Authority may terminate this MOA upon thirty (30) days written notice to DLNR.

### ARTICLE 12: HOLD HARMLESS, INDEMNIFICATION

It is an express condition of this MOA and the permit granted hereunder that the Authority, its directors, officers, agents, and employees shall be free from any and all liabilities and claims for damages and or suit by reason of any death or deaths of or any injury or injuries to any person or persons, or damage to property, of any kind whatsoever, whether to the person or property of DLNR, its agents, employees, permittees, licensees, or of other third persons, from any cause or causes whatsoever while in or upon said Premises or any part thereof during the term of this MOA or occasioned by or arising out of any occupancy or use of said Premises or any activity carried on by DLNR in connection therewith, except where caused by negligence of the Authority, its officer, agents or employees. DLNR hereby covenants and agrees to indemnify and save harmless the Authority, its directors, officers, agents, and employees from all liabilities, charges, expenses (including counsel fees) and costs on account of or by reason of any such death or deaths, injury or injuries, damage to property, liabilities, claims, suits, or losses however occurring, or damages growing out of same. DLNR does further hereby waive any limitation of liability on any action brought by the Authority against it to recover for losses and injury the Authority may sustain due to third party claims against DLNR and the Authority arising out of the intentional or negligent conduct of DLNR, its employees and agents or others acting on is behalf.

## ARTICLE 13: NON-DISCRIMINATION

DLNR shall not discriminate against any individual or entity with respect to the use of or services provided by the small boat marina.

## ARTICLE 14: NON-ASSIGNMENT OF PERMIT

The permit granted herein shall not be assigned, transferred, or delegated by DLNR to a third-party, except and only upon the express, prior written approval and consent of the Authority. Any attempted assignment, transfer or delegation of the permit given DLNR shall be void, shall have no force and effect, and shall be a ground for immediate revocation of the permit by the Authority

## ARTICLE 15: WAIVER

No waiver at any time by the Authority of any of the terms, conditions, covenants, or agreements of this MOA shall be deemed or be taken, as a waiver at anytime thereafter of the same or any other term, condition, covenant, or agreement herein contained, nor of the strict and prompt performance thereof by DLNR. No delay, failure, or omission of the Authority to re-enter the premises or to exercise any right, power, privilege, or option arising from any default, nor subsequent acceptance of rental then or thereafter accrued, shall impair any such right, power, privilege, or option, or be construed to be a waiver of any such default or relinquishment thereof, or acquiescence therein, and no notice by the Authority shall be required to restore or revive time as of the essence hereof after waiver by the Authority of default in one or more instances. No option, right, power, remedy, or privilege of the Authority shall be construed as being exhausted or discharged by the exercise thereof in one or more instances. It is agreed that each and all of the rights, power, option, or remedies given to the Authority by this MOA are cumulative, and no one of them shall be exclusive of any other or exclusive of any remedies provided by law, and that the exercise of one right, power, option, or remedy by the Authority shall not impair its right to any other right, power, option, or remedy.

## ARTICLE 16: INSPECTION

The Authority or its duly authorized representatives, agents, or other persons authorized by it may enter upon the Premises at any and all times during the term of this MOA for the purpose of determining whether or not DLNR is complying with the terms and conditions hereof or for any other purpose incidental to the rights of the Authority.

## ARTICLE 17: SIGNS

DLNR agrees that no sign or advertising displays shall be painted on or erected in any manner upon the Premises without the prior written approval of the Authority's Executive Director; and that the signs identifying DLNR or the improvements will conform to reasonable standards established by the Authority, with regard to type, size, design, color and location. Subject to such limitations, DLNR may paint or erect such sign or signs as reasonably necessary to identify DLNR or the improvements, or both. DLNR agrees to remove promptly and to the satisfaction of the Authority, at the cost and expense of DLNR, upon the expiration of the term or the earlier termination of the MOA, any and all signs placed by DLNR upon the Premises.

## ARTICLE 18: UTILITIES AND UTILITY EASEMENTS

DLNR, at its sole expense shall bring or cause to be brought to the premises such public utility services as it may require. To this end DLNR may, with the prior approval of the Authority and the Commonwealth Utilities Corporation and Department of Public Works of the Commonwealth Government, tie into any existing lines on or near the Premises, provided that the same does not unreasonably interfere with the use of the same by the Authority or its other tenants. DLNR shall pay directly to the utility company or supplier all charges for such utility services.

## ARTICLE 19: FEDERAL PROVISION

(A) **Subordination**. This MOA shall be subordinate to the provisions of any existing or future agreement between the Authority and the United States relative to use, control, and operation of the Port.

(B) **Nondiscrimination**. The Lessee, its successors and assigns does hereby consent and agree, as a covenant running with the land that:

(a) In the event the Premises is operated by DLNR for a purpose for which a Department of Transportation program or activity is extended or for another purpose involving the provision of similar services or benefits, DLNR shall maintain and operate the Premises in compliance with all requirements imposed pursuant to 49 C.F.R. Part 21, Non-Discrimination of Federally Assisted Programs of the Department of Transportation, as said regulations may be amended; and

(b) No person on the grounds, of sex, race, color, creed, or national origin shall, by DLNR, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities on the Premises; and

(c) In the construction of any improvements to the Premises and the furnishing of services thereon, no person on the grounds of sex, race, creed, color or national origin shall be excluded from participation in, be denied the benefits of, or otherwise by subjected to discrimination; and

(d) DLNR shall comply with all federal and local laws, rules and regulations, including but not limited to: The Americans with Disabilities Act of 1990 (ADA), the Rehabilitation Act of 1973 and any subsequent amendments thereto, and the provisions of Title II, Public Accommodations and Services Operated by Private Entities, 28 U.S.C. 121/81- 12183, 12186(b)- 12189; 28N C.F.R. Part 36; 36 C.F.R. Part 1191; 46 C.F.R. Part 507; 49 C.F.R. Part 27; 49 C.F.R. § 37.3 Misc., and ADA provisions at 42 U.S.C. 12103, 112201 - 12213 prohibiting discrimination against individuals on the basis of disability. DLNR, for itself, its successors and assigns, concessionaires, and tenants further agrees that, as part of the consideration for this Lease, does hereby covenant and agree that it will hold harmless and indemnify the Authority, its agents, employees, directors and officers from and against any claim or liability arising from any claims brought against DLNR and/or the Authority covered under this Section arising out of or attributable to DLNR's operations.

(e) DLNR shall use the Premises in compliance with all other requirements imposed by any other federal statute or regulation as presently existing or hereafter amended. In the event of a breach of any of the nondiscrimination covenants in this Section, the Authority shall secure such other relief as provided by Article 9, above; provided, however, that DLNR shall have the right to contest said alleged breach under applicable federal statutes and regulations, and the termination of this MOA or any sanctions herein shall be withheld pending completion of such procedures.

## ARTICLE 20: RIGHT TO IMPROVE PORT

The Authority specifically reserves the right to further develop or improve the Port as it deems necessary. If feasible, such improvements shall be made in a manner which will cause DLNR, its tenants and concessionaires as little inconvenience as possible. DLNR agrees that temporary inconveniences such as noise, disturbances, traffic detours and access, dust or air pollution, and the like associated with the construction or maintenance of improvements at the Port shall not constitute or form the basis for direct or consequential damages of any kind including loss of profits or business interference. In the event the Authority requires the Premises for expansion or development of the Port, the Authority reserves the right on twelve (12) months notice to terminate this MOA.

## ARTICLE 21: HOLDING OVER

In the event DLNR remains in possession of the Premises after the expiration of this MOA without written approval, such holding over shall not be deemed as a renewal or extension of this MOA, but shall create only a tenancy from month to month which may be terminated at any time by the Authority.

## ARTICLE 22: NO EXCLUSIVE RIGHT

It is understood and agreed that nothing contained in this MOA or use of the Premises shall be construed as granting or authorization an exclusive right to DLNR to engage in any activity at the Port, nor to be exempt from compliance with all rules, regulations and tariffs imposed by the Authority; and the Authority reserves the right to grant others the privilege and right of conducting any one or all of the activities listed herein, or any other activity of the same or a similar nature, upon such terms and conditions as it shall in its sole judgment deem appropriate.

## ARTICLE 23: SEVERABILITY

If any term, condition, or provision of this MOA is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

## ARTICLE 24: ATTORNEYS FEES

In the event the Authority or DLNR shall bring an action or proceeding for damages for an alleged breach of any provision of this MOA, or to enforce, protect or establish any right or remedy of such party, the prevailing party shall be entitled to recover as part of such action or proceedings reasonable attorney's fees and court costs.

## ARTICLE 25: AGREEMENT COMPLETE

This MOA contains the entire agreement of the parties in respect of the matters covered by this MOA, and no other agreement, statement, or promise made by any party, or to any employee, officer or agent of any party, which is not contained in this MOA shall be binding or valid. No modification of this MOA shall be effective unless in a writing duly executed by the Authority and the Lessee, stating it is their intention to modify this MOA.

## ARTICLE 26: TIME OF THE ESSENCE

Time is of the essence of this MOA and performance required hereunder.

## ARTICLE 27: SUCCESSORS

This MOA shall bind and inure to the benefit of any successors of the Authority and any successors or assigns of the DLNR.

## ARTICLE 28: PUBLIC AUDITOR

The Commonwealth Public Auditor, pursuant to 1 CMC § 7845, shall have the right to examine, review, and inspect all books, data, papers and records of Lessee and its subcontractors relevant to this Lease during and for a period of three (3) years after final payment under this Lease.

## ARTICLE 29: SURRENDER

DLNR covenants and agrees that at the expiration of this MOA or upon its earlier termination, it will quit and surrender the Premises with all the improvements thereon in as good state and condition as the same were when possession thereof was given to DLNR, reasonable wear and tear alone excepted. DLNR shall ensure at the time it surrenders the Premises that all pollutants, whether petroleum products or other hazardous materials have been cleared from the Premises in accordance with requirements from the Authority and those government agencies, both federal and Commonwealth, who may have jurisdiction over such matters. Any clean up or required remediation shall be at the sole cost and expense of the DLNR.

DLNR, unless otherwise permitted in writing by the Authority, shall remove all personal property belonging to it. Upon such termination, the Authority shall have the right to enter upon and take possession of the Premises.

IN WITNESS WHEREOF, the Authority and DLNR hereby affix their hands to this agreement this 29th day of August 2005.

COMMONWEALTH PORTS AUTHORITY

By:

CARLOS H. SALAS
Contracting Office - Executive Director

**DEPARTMENT OF LANDS AND NATURAL RESOURCES**

By:

**RICHARD B. SEMAN**
**Secretary**

By:

**VIANNEY B. HOCOG**
**Resident Director**

APPROVED AS TO FORM:

By:

DOUGLAS F. CUSHNIE
CPA Legal Counsel

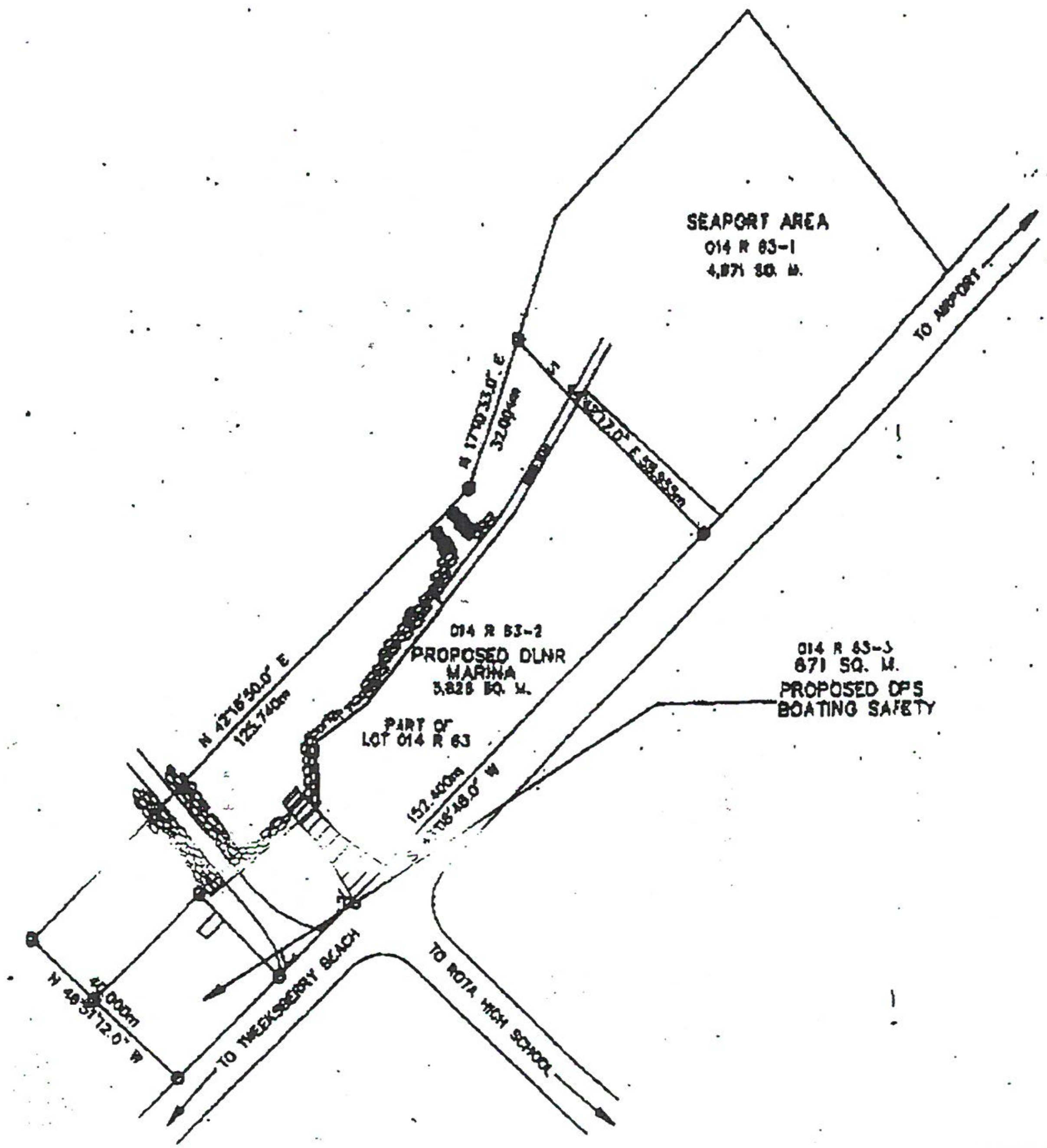
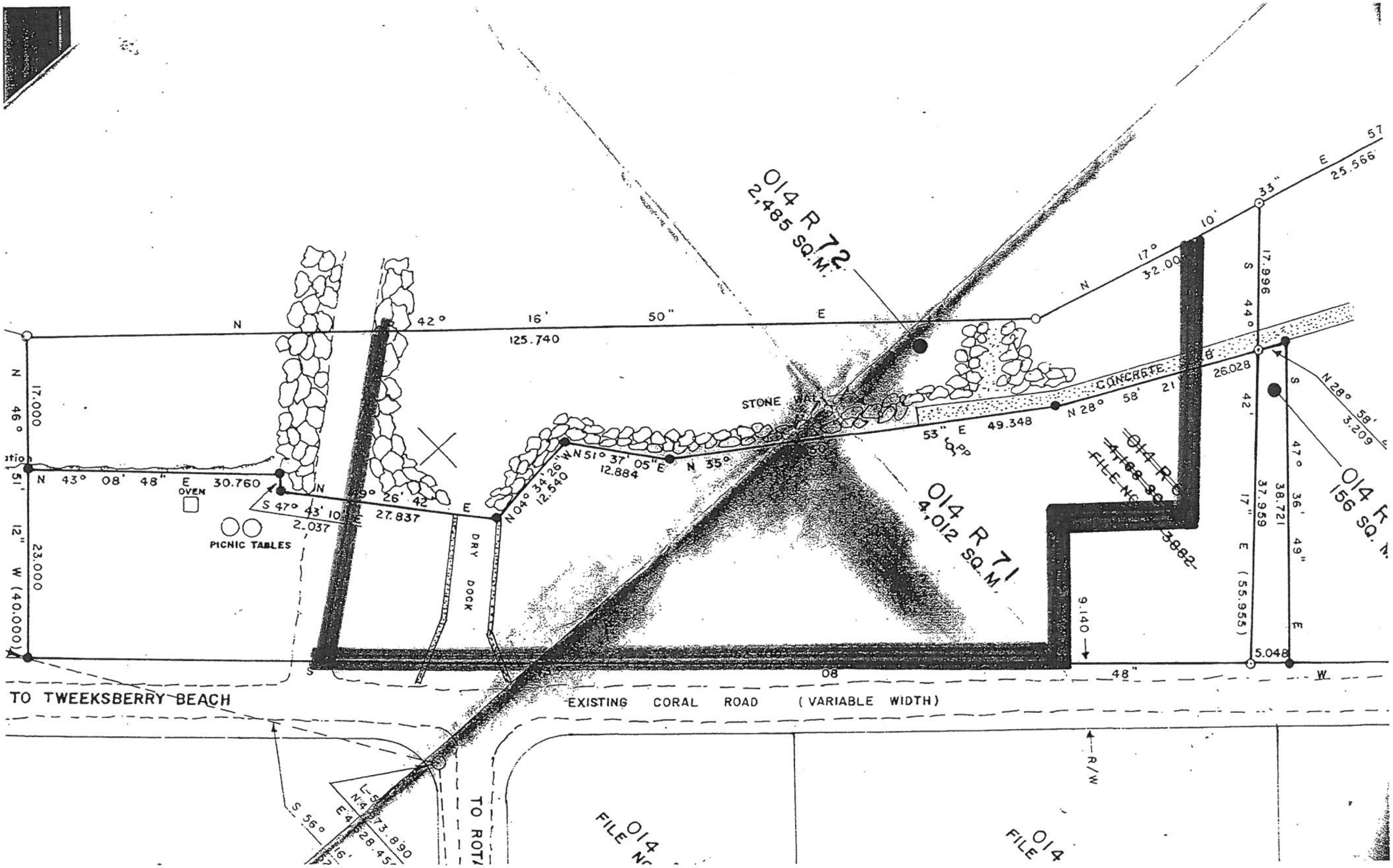

SEAPORT AREA
014 R 63-1
4,871 SQ. M.
TO AIRPORT
N 17°00'33.0" E
32.000m
N 42°15'30.0" E
123.740m
014 R 63-2
PROPOSED DLNR
MARINA
3,828 SQ. M.
PART OF
LOT 014 R 63
152.400m
014 R 63-3
871 SQ. M.
PROPOSED DPS
BOATING SAFETY
TO ROTA HIGH SCHOOL
47.000m

EXHIBIT "A"



014 R 72
2,485 SQ.M.
014 R 71
4,012 SQ.M.
014 R
156 SQ.
N 42° 16' 50" E
125.740
N 17° 10' 33" E 25.566'
32.00
STONE WALL
CONCRETE
N 28° 58' 21" 53" E 49.348
26.028
N 51° 37' 05" E
12.884
N 35°
N 04° 34' 26" W
12.540
N 49° 26' 42 E
27.837
S 47° 43' 10" E
2.037
N 43° 08' 48" E 30.760
OVEN
PICNIC TABLES
DRY DOCK
N 46° 51' 12" W (40.000)
17.000
23.000
S 44° 42' 17" E (55.955)
17.996
37.959
S 47° 36' 49" E
38.721
5.048
N 28° 58'
3.209
9.140
TO TWEEKSBERRY BEACH
EXISTING CORAL ROAD (VARIABLE WIDTH)
R/W
TO ROTA
014 FILE NO
014 FILE
S 56°
73.890
28.45

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# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Wednesday, 26 October 2016 | **TIME:** | Morning CHST |
| **LOCATION:** | Office of the Mayor of the Municipality of Rota | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9539 |
| **SUBJECT:** | Meeting with Mayor Efraim M. Atalig | | |

| | |
|---|---|
| **PARTICIPANTS:** | Commonwealth of the Northern Mariana Islands (CNMI): Mayor Efraim M. Atalig<br>CNMI Commonwealth Ports Authority (CPA): Martin Mendiola<br>Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson<br>SSFM CNMI (SSFM): Gregorio Castro, Denn Manglona, Edwin Simbulan |
| **DISTRIBUTION:** | Attendees; Wendi Prater (CPA) |
| **REFERENCE DOCUMENTS:** | None |

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|

***Comments from Mayor Atalig***

- Offloading of light vessels typically carrying cargo from Saipan and Guam shall be performed at the CPA commercial port. Cargo shall not be offloaded at the Department of Lands and Natural Resources (DLNR) small boat marina at West Harbor Rota.
- Enforcement of cargo off-loading at the commercial port is the responsibility of the CNMI central government, not the Municipality of Rota
- Concerns with unmonitored and uncontrolled offloading of cargo include:
    - the need to perform agricultural inspections and facilitate quarantine of cargo entering Rota to avoid introduction of invasive species (e.g., brown tree snake);
    - avoidance of wharfage and other fees by persons offloading cargo at the marina that would otherwise be paid for cargo offloaded at the commercial port.
- The master plan for Rota West Harbor should consider and accommodate safe offloading of cargo from light vessels at the CPA commercial harbor. Currently, there are concerns with safe offloading of cargo due to the freeboard height, especially during low tide.
- Although establishment of a more reliable commercial cargo delivery service to Rota in the future could decrease the number of light vessels carrying cargo to the island, the actual result is uncertain.
- The small boat marina should only be used by sports fishing boats, and other vessels with a “PU” (Personal Use) license. Heavier loaded vessels carrying cargo and offloading at the marina are also suspected of causing damage to the marina docks.
- A new access road and operations area expansion project at the small boat marina, including a new comfort station, has been funded and designed.

~ End *Notes of Meeting* ~

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# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Wednesday, 26 October 2016 | **TIME:** | ~3:00 p.m. CHST |
| **LOCATION:** | Rota West Harbor, CNMI | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9539 |
| **SUBJECT:** | Rota West Harbor On-Site Meeting and Walk Through | | |

| | |
|---|---|
| **PARTICIPANTS:** | Commonwealth of the Northern Mariana Islands (CNMI) Commonwealth Ports Authority (CPA): Martin Mendiola, Rodney Taisacan, Laura Manglona<br>Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson<br>SSFM CNMI (SSFM): Gregorio Castro, Denn Manglona, Edwin Simbulan |
| **DISTRIBUTION:** | Attendees, Wendi Prater (CPA) |
| **REFERENCE DOCUMENTS:** | None |

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| | ***Port of Rota comments***<br>• Estimated offload time for a delivery of four containers = half a day<br>• Estimated offload time for a delivery of 15 containers = 3 days<br>• Shifting the deck crane during cargo offloading operations requires a lot of time<br>• Furthermore, in order to offload containers on the outboard side of a vessel, the vessel may have to be spun around due to the limited reach of the deck crane<br>• Although manufactured arch fenders were installed along both berths, most are missing / damaged so tractor tires are currently hung along the wharves for fendering at both berths<br>• A project to replace the mooring bollards at Berth 2 is currently underway. The existing bollards have been removed and new anchor bolts have been installed in preparation for mounting of new bollards that are already on-site. The Berth 1 bollards will be replaced after the Berth 2 bollard replacement is completed. The new bollards are steel with concrete infill.<br>• Due to limited coverage of the existing wharf lighting, cargo operations are not currently performed at night. Port representatives noted that there are dark zones on vessels after sunset which pose a safety concern during cargo operations.<br>• Next barge call is scheduled for November 2016<br>• Rota currently has eight 20 foot chassis and two 40 foot chassis on island<br>• During high wave conditions, seawater has reached 30' upland; under typhoon conditions, water has encroached up to the existing port access road | | |

~ End *Notes of Meeting* ~

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# NOTES OF MEETING

Revision 1

**DATE OF MEETING:** Wednesday, 26 October 2016

**TIME:** ~6:30 p.m. CHST

**LOCATION:** Rota Mayor's Office Conference Room

**WRITTEN BY:** SSFM CNMI (D. Manglona); Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Rota Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9539

**SUBJECT:** Public Information Meeting

**PARTICIPANTS:**
Commonwealth Ports Authority (CPA): Martin Mendiola, Rodney Taisacan, Laura Manglona
Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson
SSFM CNMI (SSFM): Gregorio Castro, Denn Manglona, Edwin Simbulan

See attached *Public Information Meeting – Sign-In Sheet*

**REFERENCE DOCUMENTS:** Rota West Harbor Master Plan (CPA-RS-001-15) Meeting Presentation, dated October 26, 2016 (7 sheets)

**ITEM**

***Introduction***

A. Opening remarks by CPA Rota Ports Manager, Mr. Martin Mendiola, The Honorable Efraim M. Atalig, Mayor of the Municipality of Rota, and MN, CPA's Port Planning Consultant
   1. M. Mendiola explained that the primary intent of the Rota West Harbor Master Plan public information meeting was to gather information and initial input from the public and other stakeholders
   2. Mayor Atalig welcome
      a. Acknowledged CPA and the MN Team and thanked the public for participating in the meeting
      b. Mayor Atalig referenced his morning meeting with CPA and the MN Team
      c. Expressed concern about small vessels discharging cargo at the small boat marina and emphasized the need for the master plan to consider and accommodate the safe offloading of cargo from small vessels at the commercial Rota West Dock where cargo is intended to be handled, not at the marina
   3. MN introduced its Team: SSFM CNMI LLC, the local liaison; Micronesian Environmental Services (MES), review of environmental entitlement; and RPS, wind and wave instrumentation

B. Scope of Work
   1. A coastal analysis will be conducted and MN is in the process of seeking permits to perform wave and current monitoring. The coastal analyses will help to better understand the wave and current conditions within the harbor.
   2. The public information meeting is intended to gather information from the public and other stakeholders. MN noted the master plan is still in its early stages of data gathering and information review, and initial public input is part of this first phase.
   3. MES will identify the permits and environmental entitlements that will be needed to implement the master plan once a plan is established
   4. Cargo forecasts and future harbor operations will be projected
   5. A development plan will be developed as part of the master planning process
   6. Development of a realistic vision for the master plan is essential to the master planning process and especially critical to assessing expenditures and a capital improvement budget. Therefore, input from the public and stakeholders is important at this early stage of the master plan.

***Presentation (by Moffatt & Nichol)*** – see presentation provided herewith

A. Schedule of Master Plan Study
   1. Public Meeting
      a. MN noted that a primary purpose of the meeting is to gather the public's questions, comments, or concerns regarding the harbor so that it may be considered in formulating the master plan
      b. MN requested that e-mailed questions or comments be submitted to MN or CPA by November 4, 2016
   2. An underwater dive investigation of the harbor facilities will be conducted later in the week
   3. A hydrographic survey of the harbor will be conducted in late November / early December 2016
   4. Wind and wave instrumentation will be deployed to gather data for approximately 3 months
   5. The first draft of the master plan will be completed by May 2017
   6. The final master plan will be completed by June 2017 based on the current schedule

B. Key Issues for Rota West Harbor
   1. Issues and concerns about small vessels that were offloading at the marina but now being required to offload at the commercial port
   2. Existing operational restrictions
      a. MN would like to speak with the vessel operators to understand their experience with the harbor
      b. MN will coordinate with the USACE which is doing a separate Feasibility Study of the harbor
   3. Current depth of the harbor
      a. MN to analyze if the harbor depth is adequate or if additional dredging is needed to accommodate vessels calling the port
      b. MN will review how additional dredging may affect the wave activity in the harbor
   4. Structural inspection of the existing wharves to assess whether near term repairs need to be considered
   5. Identification of potential new opportunities for the port upland and in water
      a. Ferry and / or cruise service
      b. Maximize the utility of existing vacant port land
      c. Other opportunities for future economic development and tourism

C. Composition of the Master Plan
   1. Master plan will have three parts
      a. "Phase Zero" – current needs; i.e., issues that should have already been corrected or completed
         i. Master plan will consider these items based on actual current conditions assessed via interviews and site investigations
         ii. Intended to solve existing problems / issues
      b. "Phase One" – plan for the next 5 years
      c. "Phase Two" – long range plan / vision
         i. Plan for year 5 through year 20
         ii. Master plans typically are revisited every 5 to 10 years to assess how the master plan may be adjusted and modified for the next time frame
         iii. The goal is not to plan or build something now that will be "in the way" in a few years
   2. The master plan needs a realistic vision
      - A primary goal of the master plan is to inform CPA how much money it will need to complete the master plan development

***Public and Stakeholders' Question/Comments***

A. Prior Study and CPA's Proposed Plan of Action
   1. Immediate needs should be addressed now. What is CPA's plan to fix the current problems?
      a. MN Team agrees that immediate ("Phase Zero") improvements are needed to address current problems, but the studies need to be done first. The MN Team understands the situation on Rota through work done on the Rota East Harbor Feasibility Study for the CNMI Capital Improvement Program Office but noted that no investigations or engineering studies such as an underwater inspection, modeling and

similar studies have been done so far for Rota West Harbor. It is important that further improvement on the harbor be based on sound engineering studies and not speculation, so it's important to approach the master plan step-by-step.

2. What happened to the previous studies on the Rota West Harbor? What happened to the previous study of Rota East Harbor and how can a copy be obtained? There were discussions about bringing large vessels into Rota East Harbor.
   a. MN previously prepared the Rota East Harbor Feasibility Study, not for Rota West Harbor, and it was available for anyone to download after it was completed, however, the website was closed a while ago. MN will coordinate with CPA to make the Rota East Harbor Feasibility Study available to those interested in obtaining the study.
   b. MN reiterated the need for the master plan to address the "Phase Zero" needs but also account for the next 20 years of the master plan. The long term plan or vision will require periodically revisiting the master plan and reassessing the facilities, service and operation, wharfage and vessel accommodation charges, etc.

B. Existing Problems, Challenges and Potential Opportunities for the Harbor
   1. Existing Harbor Facilities and Wave Conditions
      a. If cargo cannot be offloaded at the small boat marina and will have to be offloaded at the commercial port, a safe and viable method for offloading cargo from small vessels at the commercial port is needed. This should be included in the master plan.

      b. The existing channel is too narrow, however, widening of the channel alone may not solve the problem. A meeting participant suggested that widening the channel could even cause the conditions within the harbor to worsen since strong wind and current is always a challenge. Concern was also raised about the impact to the marina. It was noted that the USACE is also developing a plan for the channel and construction of a new breakwater.

         The MN Team responded that the wave and current instrumentation that will be installed in Rota West Harbor will gather data to help the MN Team assess the existing wave and current conditions and guide any recommendations. This data will be correlated with historical data and data from ocean weather buoys that continuously record wave and wind activity in the Philippine Sea. The analyses will be used to assess the impact of modifications to the existing channel, construction of a new breakwater, or a combination of both. MN is already working with the USACE to coordinate the USACE Feasibility Study with the MN master plan.

      c. Existing docking facilities are insufficient. Space is adequate for current cargo operations but future ferry or cruise service cannot be accommodated.
      d. Navigating barges and small vessels during high swells and bad weather is a challenge
      e. After storms, most debris is found on the reef and on shore.

   2. Financing / Cost of the Improvements
      a. Question was raised about how the proposed improvement would be paid for / financed as the improvements could cost $200M or more. Would funds come from local taxes, revenue bonds, grants, or other sources?

         The MN Team clarified that it is too early to tell at this early stage of the project how much funding will be required since the study is not locked into any specific plan for the future master plan and the MN Team will be looking at the master plan from a holistic standpoint. The study will offer recommendations to CPA and once a plan is known, funding options will also be reviewed.

b. A meeting participant noted that in terms of cargo volume, the economics are not there and not currently being realized. The participant further offered that a delivery needs at least eight (8) containers in order to just break even.

   MN responded that the full master plan buildout will likely require a significant capital investment and the economics alone will likely not justify the investment, however, the justification will likely have to be driven by the need to be able to reliably supply Rota's residents with subsistence cargo, especially food and other necessities.

3. Preserving and Maintaining Cultural Functions and Resources
   a. Preserve annual activities that occur at the small boat marina and Angyuta Island, such as the Annual Fishing Derby during the San Francisco De Borja Fiesta, and the seasonal run of the atulai (bigeye scad), i'e' (trevally) and tiao (goatfish)
   b. Maintain access for sports divers who utilize the boat ramp to get to and from various local dive spots
   c. Maintain access for sports fishermen from Guam, Tinian and Saipan who also deliver local produce for family and friends

4. New Landside Opportunities
   a. Angyuta Island has the potential to be developed with a fish market, restaurants, etc. to serve as a destination for visitors and locals alike
   b. A small boat repair / dry docking facility to service and repair small boats

C. Other Discussion
   1. The MN Team commented that input, firsthand accounts and suggestions received by the Team from users of the harbor is very valuable. This input, along with the engineering data that will be gathered and studies that will be performed, are all important to the master planning process.
   2. Detailed engineering, such as designing energy efficiency into buildings, is not part of the master planning effort.
   3. Category 5, or worst-case scenario, storm will be considered in the study in the context of how the port may recover in the aftermath of the storm, however, the master plan will not address the detailed engineering of hardening the structures and facilities to withstand the storms.

~ End *Notes of Meeting* ~

# ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

## Public Information Meeting - Sign-In Sheet

Rota Mayor's Office Conference Room, Wednesday, 26 October 2016, 6:30 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | PHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 1 | Andrei A. Manatita | Mayors office | 783-6289 | |
| 2 | Beato Calvo | Mayors Office Rota Channel 5 | 532-1345 | rota.channel5@gmail.com |
| 3 | MARTIN MENDIOLA | CPA-ROTA | 532-9497 | martinm@cpa.gov.mp |
| 4 | Rodney Taisacan | CPA - Rota | 532-9489 | rotaseaport@yahoo.com |
| 5 | CLINT BARCINAS | DFEMS ROTA | 532-3736 | clint barcinas@gmail.com |
| 6 | Ricky masga | DFEMS Rota | 532-3736 | Rmasga93@gmail.com |
| 7 | Laura manglona | CPA-Rota | 532-9489 | rotaseaport2016@gmail.com |
| 8 | ESTHER YATAR | ROTA MAYOR'S OFFICE | 287-5350 | eyc12658@yahoo.com |
| 9 | Valerie Atalig | Commerce | 532-9478 | rotacommerce@gmail.com |
| 10 | Aniceto Mundo | Self | 532-0300 | anicetomundo670@Gmail.com |
| 11 | Beato M. Calvo | S.S.S | 532-3994 | PO BOX 848 |
| 12 | MARK MICHAEL | DIVE ROTA | 532-3423 | mark@diverota.com |
| 13 | Pedro Delgado | RMC | 285-4018 | |
| 14 | Albert Schroeder | self | 532 4828 | sywhitecap@yahoo.com |
| 15 | Christine Schroeder | - " | " | - " - |

# ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

## Public Information Meeting - Sign-In Sheet

Rota Mayor's Office Conference Room, Wednesday, 26 October 2016, 6:30 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | PHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 16 | Jude Amida | Sunshine / Quality [illegible] | | elfash@hotmail.com |
| 17 | | | | |
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# Rota West Harbor Master Plan (CPA-RS-001-15)

**Commonwealth Ports Authority**
**Commonwealth of the Northern Mariana Islands**
**Public Information Meeting**

**October 26, 2016**

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## Meeting Agenda

- Welcome and introductions
- Purpose and scope of master plan study
- Schedule of master plan study
- Key issues for Rota West Harbor – audience input session


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## Welcome & Introductions

- Martin Mendiola, Rota Ports Manager
- CNMI government and CPA representatives and other distinguished guests
- Moffatt & Nichol – port planning and engineering consultant to Commonwealth Ports Authority
  - Dean Kokubun, Project Manager
  - Christopher Matson, Senior Port Planner
- SSFM CNMI – civil engineering subconsultant and local coordinator to Moffatt & Nichol
  - Greg Castro, Liaison
  - Roy Reyes, Civil Engineer, P.E.
  - Edwin Simbulan, Design Engineer
  - Denn Manglona, Civil Engineer
- Micronesian Environmental Services – environmental and permitting subconsultant to Moffatt & Nichol
- RPS – metocean instrumentation subconsultant to Moffatt & Nichol

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## Purpose and Scope of Master Plan Study

- Conduct public and stakeholder meetings to solicit input and feedback from the general public and key stakeholders
- Review available existing information – i.e., prior CPA Master Plans, reports, studies, surveys, financial data and records, record drawings
- Conduct metocean study, hydrographic survey, and underwater structural investigation
- Identify the federal and local environmental entitlements and permits required to implement the Master Plan and develop a realistic timeframe and budget for the environmental entitlement process
- Prepare a cargo and use forecast, future harbor operations analysis, logistics cost analysis, and concept-level cost and financial feasibility analyses
- Prepare a development plan, including submerged land improvements (i.e., dredging, harbor configuration, breakwaters, structural rehabilitation and improvements) and upland improvements (yard, utilities, buildings, and other upland infrastructure)
- Develop schedule and opinion of probable construction cost to implement development plan
- Prepare Rota West Harbor Master Plan Study

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## Schedule of Master Plan Study

- Key Milestone Dates*:
  - October 26, 2016: First Public Information Meeting
  - October 28 – 29, 2016: Underwater dive investigation
  - October / November 2016: Hydrographic survey of harbor
  - November 2016 – February 2017: Metocean instrumentation and data gathering
  - May 2017: Draft Master Plan submittal to CPA → CPA review and comment on Draft Master Plan → Second Public Information Meeting
  - June 2017: Final Master Plan submittal to CPA

* Dates subject to change

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## Key Issues for Rota West Harbor

- Existing operational restrictions and active wave environment in harbor:
  - Review of possible future navigation improvements, including new breakwater, channel realignment, dredging, new berth(s) / reconfiguration of existing berth(s), etc.
  - Coordination with U.S. Army Corps of Engineers feasibility study and environmental impact statement
- Dredging of harbor and navigation channel (existing dredge depth = -14')
- Condition of existing wharves (to be assessed through underwater structural investigation)
- Identification and coordination of potential upland and in-water opportunities:
  - In-Water:
    - Future ferry and cruise opportunities
  - Upland:
    - Maximize utility of existing vacant port land
    - Opportunities for future port development and expansion, economic development and tourism
- Others – from meeting participants

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# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Friday, 28 October 2016 | **TIME:** | 9:00 a.m. CHST |
| **LOCATION:** | Port of Saipan Conference Room | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9538/9539 |
| **SUBJECT:** | Meeting with Tinian and Rota West Harbor Commercial Users | | |

| | |
|---|---|
| **PARTICIPANTS:** | See attached Sign-In Sheet |
| **DISTRIBUTION:** | Attendees; Joseph Mendiola, Martin Mendiola, Wendi Prater (CPA) |
| **REFERENCE DOCUMENTS:** | Sign-In Sheet |

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***Port of Rota***<br>• There is a large rock at the north end of Pier 2 that should be removed<br>• Fuel is typically delivered to Rota every 40 days; Mobil could increase frequency, if needed<br>• Additional wharf lighting would be beneficial since CPA currently does not allow cargo to be loaded / offloaded at night. For tug and barge operations, the tug could light the “dark” side of the barge but CPA still would not allow cargo to be offloaded at night.<br>• Navigating Rota West Harbor:<br>o Navigating the harbor is only done during daylight hours, from dusk till dawn; navigating at night is not done due to safety concerns<br>o The two sets of two pipes that penetrate the causeway at the rear of the harbor, at the south end of the small boat marina, affect the currents within the commercial harbor<br>o The decision of whether or not to attempt to bring a vessel into the harbor is dependent on observations of the ship’s crew, communication with port personnel on shore, and largely on the experience and feel of the vessel pilot<br>o Swells greater than approx. 3 feet make it difficult to navigate the channel and harbor<br>• The M/V Luta has bow thrusters only<br>• It was opined that new engineered fenders and bollards along Berth 1 and Berth 2 would make berthing and mooring safer for vessels and vessel and port personnel during cargo operations | | |
| 2 | ***Port of Tinian***<br>• Dredge depth greater than 30 feet in the harbor basin would be favorable<br>• Tinian has a 120 ton Tadano crane<br>• Typical offloading operations at Tinian Harbor:<br>1. Land at dock; load containers on chassis with crane<br>2. A typical load currently consists of two, 40’ containers but a typical load when the Dynasty Hotel & Casino was operating was three-to-four, 40’ containers | | |

| | |
|---|---|
| | 3. There are two, 40’ chassis on-island<br>4. Break bulk cargo is also common<br>5. Remove empties<br>• The U.S. Coast Guard (USCG) mandates that all potentially hazardous cargo shall be offloaded at the commercial port and shall not be offloaded at the small boat marina just north of the commercial port. Currently, non-hazardous cargo is allowed to be imported through the small boat marina but it is not regulated nor inspected and no wharfage, dockage or stevedoring fees are collected on the imported cargo.<br>• Pacific Marine Enterprises Inc.’s *Pacific Marine I* currently moors along the west side of the Connecting Pier<br>• GPPC’s *M/V Jayden* currently moors along North Quay Berth 1<br>• The *Thunder & Lightning* – a RO/RO vessel - and *Ocean Freedom* – a bulk carrier with three deck cranes – were chartered by the Department of Defense / Military Sealift Command (MSC) and are the largest vessels to recently call the port<br>• The U.S. Army Corps of Engineers / Seabridge performed the most recent maintenance dredging of the channel and harbor<br>• Master plan needs to consider the underground fuel pipe line extending from the manifold along North Quay Berth 2 to the upland fuel tanks<br>• Mooring lines currently rub against the existing concrete barriers set between the bollards and the wharf. It was stated that the barriers were placed per USCG regulations.<br>• Wharf lighting is currently inoperable. Harbor users requested that the inoperable lights be investigated and addressed as a high priority operational need. If wharf lighting was available during the recent Department of Defense cargo offloading operation, the cargo could have been offloaded during non-daylight hours and completed much more efficiently. It was stated that it is suspected that the electrical wiring had been removed from the existing light towers.<br>• Firefighting capability (i.e., fire hydrants) at the wharf would be extremely beneficial. Currently when tankers offload fuel, an airport fire truck is called upon to standby at the seaport.<br>• Shoreside water would be beneficial and could be sold to visiting vessels |
| 3 | It was estimated that approx. 11 dedicated ships have called Saipan to deliver construction material for the new Saipan hotel and casino to date |
| 4 | A Facilities Security Plan is currently being prepared at the request of the USCG. This plan is necessary to accommodate the arrival of ferry passengers and vehicles at a commercial cargo port. |
| 5 | If ferry service is to be considered between Saipan and Tinian / Rota, a viable port of call on Saipan needs to be identified. The prior ferry services was run out of Sugar Dock on Saipan but the facility has since been condemned. The Port of Saipan’s commercial terminal does not seem to have available berth nor wharf space to accommodate an interisland ferry service. It was noted that David Dougherty owns land adjacent to the Port of Saipan where a dock could be built from which the ferry service may be launched. It was suggested that the companies proposing the ferry service reach out to Mr. Dougherty. |

~ End *Notes of Meeting* ~

COMMONWEALTH PORTS AUTHORITY
PORT OF SAIPAN

EVENT: Rota/Tinian master plan

DATE: 10/28/16

TIME: 0900 -

| NO. | NAME | COMPANY | TEL. NO. | FAX. NO. | EMAIL |
|---|---|---|---|---|---|
| 1 | Lee Cabrera | Saipan Stevedore | 670-322-9240 | | lee.cabrera@saistev.com |
| 2 | MIKE HARKREADER | LUTA MERMAID LLC | 670-989-1511 | | mikeyharky@gmail.com |
| 3 | JESSE ARIJALA | SSFM CNMI | 233-7770 | 233-7771 | jarijala@ssfmcnmillc.com |
| 4 | GREGORIO Q. CASTRO | SSFM CNMI | 233-7770/2 | 233-7771 | gcastro@ssfmcnmillc.com |
| 5 | CHRISTOPHER MATSON | MOFFATT & NICHOL | (757) 404 6600 | | CMATSON@MOFFATTNICHOL.COM |
| 6 | Michael Demapan | Saipan Stevedore | 670-989-1011 | | demapan@gmail.com |
| 7 | Guillermo Faller | Saipan Marine Corp. | 670-322-7345 | 322-7347 | gfaller@saipanmarine.com |
| 8 | BANZUELA, BONG | NORTON LILLY | 670-322 9978 | 322-9979 | SAIPAN-OPS@NORTONLILLY.COM |
| 9 | Anthony Camacho | CPA | 664-8556 | 322-4710 | anthony.camacho@cpa.gov.mp. |
| 10 | MATT BUENABAJO | INCHCAPE SHIPPING | 322-4777 | 322-4779 | iss.saipan@iss-shipping.com |
| 11 | ERIC NABANG | AMBYTH SHIPPING | 322-0970 | 322-0977 | OPS@AMBYTHSAIPAN.com |
| 12 | John H.B. Salas | Saipan Marine Corp | 888-5628 | | |
| 13 | DANIEL MENSAH | SAIPAN SHIPPING CO. INC | 670-287-6376 | | OPERATIONS@SaipanShipping.com |
| 14 | DEAN KOKUBUN | MOFFATT & NICHOL | 808-533-7000 | | DKokubun@MoffattNichol.com |
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# NOTES OF MEETING

**DATE OF MEETING:** Friday, 28 October 2016 **TIME:** 2:00 p.m. CHST

**LOCATION:** Port of Saipan Conference Room **WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) **MN PROJECT:** 9538/9539

**SUBJECT:** CPA Master Plans Coordination Meeting

**PARTICIPANTS:**
Commonwealth Ports Authority (CPA): Wendi Prater
Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson
SSFM CNMI (SSFM): Edwin Simbulan
GHD: Fred Smith, Richard Hill (via teleconference)

**DISTRIBUTION:** Attendees

**REFERENCE DOCUMENTS:**

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***Saipan Harbor Master Plan***<br>• GHD is in the process of collecting and reviewing data that will feed into its cargo and passenger forecasts. Initial cargo and passenger projections will be available in November 2016.<br>• Saipan Master Plan will consider:<br>o existing port operations<br>o anticipated growth of the tourism sector<br>o Saipan's new hotels and casinos<br>o a dedicated cruise terminal<br>o recreational boats and yachts<br>o Department of Defense cargo transshipped out of Saipan<br>• A bathymetric survey of Saipan harbor will be conducted in December 2016 | | |
| 2 | ***Tinian and Rota West Harbor Master Plans***<br>• Master planning process for Tinian and Rota West Harbor have just begun. MN has begun gathering and reviewing existing records, data, drawings, reports, studies, etc. from CPA.<br>• Information gathering meetings with CPA and harbor stakeholders were conducted over the week (week of 24 October)<br>• Public Information Meetings on Rota and Tinian were held on Wednesday (26 October) and Thursday (27 October)<br>• An MN structural dive inspection team is performing an under and above water inspection of the Rota West Harbor today (Friday, 28 October 2016)<br>• A bathymetric survey of Rota West Harbor and Tinian Harbor will be conducted in late November / early December 2016<br>• Initial feedback from this week's meetings included:<br>o For Rota West Harbor, the wave and current conditions in the harbor are primary issues of concern<br>o For Tinian Harbor, the proposed new hotels and casinos will bring a significant volume of construction cargo to the island in the near term and | | |

| | | |
|---|---|---|
| | the port will need to accommodate supply cargo and ferry service from Saipan for the new facilities. | |
| 3 | CPA encouraged the exchange of information between MN and GHD as the master plan projects progress. Wendi Prater shall be "Ccd" on all e-mail correspondence between MN and GHD.<br><br>MN and GHD shall distribute its respective project schedules. | MN/GHD |

~ End *Notes of Meeting* ~

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# NOTES OF MEETING

Revision 2

**DATE OF MEETING:** Friday, 28 October 2016

**TIME:** 3:00 p.m. CHST

**LOCATION:** Port of Saipan Conference Room

**WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15) and Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9538/9539

**SUBJECT:** CPA Out-Brief Meeting

| | |
|---|---|
| **PARTICIPANTS:** | Commonwealth Ports Authority (CPA): Wendi Prater<br>Moffatt & Nichol (MN): Dean Kokubun, Christopher Matson<br>SSFM CNMI (SSFM): Edwin Simbulan |
| **DISTRIBUTION:** | Attendees |
| **REFERENCE DOCUMENTS:** | None |

| # | ITEM | ACTION | DUE DATE |
|---|---|---|---|
| 1 | ***Port of Rota***<br>• CPA is beginning to enforce CNMI customs policy that all offloading of cargo shall be performed at the CPA commercial port and no cargo shall be offloaded at the Department of Lands and Natural Resources (DLNR) small boat marina at West Harbor Rota.<br><br>Concerns with unmonitored and uncontrolled offloading of cargo include the importation of illegal and contraband goods (e.g., illegal drugs), invasive species (e.g., brown tree snake), and the potential risk of losing U.S. federal funding used to develop, operate and manage the small boat marina facilities.<br><br>In addition, CPA does not collect wharfage and other fees when cargo is offloaded at the DLNR small boat marina.<br><br>This was a primary issue of concern during the meeting with Mayor Atalig and during the public information meeting on Rota.<br><br>MN will be looking at ways to accommodate the safe offloading of small vessels at the commercial port.<br><br>• CPA is in favor of a new breakwater for the harbor but is concerned about the cost, time to permit and construct, and the environmental challenges with building a new breakwater. Given those concerns, consideration should be given to planning as small a breakwater as possible – i.e., U.S. Army Corps of Engineers' Public Scoping Meeting Project Alternative 1 Offshore Breakwater – that will still mitigate the wave energy in the harbor and channel but carry the least cost and impose the least environmental impact as possible. | | |
| 2 | ***Port of Tinian***<br>• The Coast Guard mandates that all potentially hazardous cargo shall be offloaded at the commercial port and shall not be offloaded at the small boat | | |

| | | |
|---|---|---|
| | marina just north of the commercial port. Currently, non-hazardous cargo is allowed to be imported through the small boat marina but it is not regulated nor inspected and no wharfage, dockage or stevedoring fees are collected on the imported cargo. MN asked if this policy will be continued into the future; CPA will get back to MN. | CPA |
| | • Harbor users reported that the wharf lighting is currently inoperable. Harbor users requested that the inoperable lights be investigated and addressed as a high priority operational need. It was stated that it is suspected that the wiring had been removed from the existing lights. | |
| | • Since the U.S. military holds “lease back” on approx. two-thirds of the island of Tinian, the U.S. military’s authority as it relates to the harbor operations and future master plan for the Tinian Harbor is unclear (i.e., does the U.S. military have the authority to review, change, direct the master plan; does the U.S. military have the authority to control the day-to-day operations of the port and direct how berths and wharf / yard space is assigned; etc.). CPA will get back to MN with clarification. | CPA |
| | • MN requested air passenger arrival logs for the past few years, including the time when the Tinian Dynasty Hotel & Casino was operating and after it closed. MN would like to try to correlate and approximate cargo volumes to the island due to the hotel. | CPA |
| 3 | The U.S. Transportation Security Administration (TSA) and U.S. Customs and Border Protection (CBP) do not currently maintain a presence in either Tinian Harbor or Rota West Harbor. | |

~ End *Notes of Meeting* ~

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# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Tuesday, March 13, 2018 | **TIME:** | 1:30 p.m. CHST |
| **LOCATION:** | Saipan Seaport Conference Room | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15)<br>Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9538 & 9539 |
| **SUBJECT:** | CPA In-Brief Meeting | | |

**PARTICIPANTS:** See attached *In-Brief Meeting - Sign-In Sheet*

**REFERENCE DOCUMENTS:**

- Tinian Harbor Master Plan (CPA-TS-001-15) Meeting Presentation, dated March 13, 2018 (6 sheets)
- Rota West Harbor Master Plan (CPA-RS-001-15) Meeting Presentation, dated March 13, 2018 (5 sheets)

**ITEM**

***Presentation (by Moffatt & Nichol)***

Christopher Matson of Moffatt & Nichol (MN) presented the Tinian Harbor Master Plan and the Rota West Harbor Master Plan presentations. The presentations are attached herewith.

- Tinian and Rota government and CPA representatives and other dignitaries lists were updated in each presentation

***Summary of discussion on the Tinian Harbor Public Meeting presentation***

a. *Akri* (fuel ship) is still operating service to Tinian
b. *Pacific Seas* requires 29 feet of draft clearance
c. Bridge Investment Group (BIG) is still investigating options for Saipan-Tinian ferry service; site for Saipan ferry terminal has not been identified yet
d. Pacific Marine (*Jayden* operator) just renewed its lease with CPA for another 5-years
e. Pacific Marine currently moors at the West Quay
f. MN shall confirm and identify dimensions on full plan master plan layout figure (i.e., RO-RO ramp, access road)
g. MN shall modify upland maps to show road on Commonwealth Ports Authority Land to run straight to the intersecting (proposed “public and military access”) road
h. Department of Defense fuel facility will be located upland of the Commonwealth Ports Authority Land road; temporary construction staging area will be on the water-side of the road

***Summary of discussion on the Rota West Harbor Public Meeting presentation***

a. CPA reported that bollards have been replaced at Berth 1, but not sure if bollards at Berth 2 have been replaced (Post-meeting note: the bollards at Berth 2 have been replaced)
b. CPA will be replacing tractor tires but not sure if at Berth 1 or Berth 2 (Post-meeting note: CPA later confirmed new fenders will be installed at both Berth 1 and Berth 2)

***Any additional comments on the Master Plans should be sent to Wendi Prater within one week.***

~ End *Notes of Meeting* ~

TINIAN HARBOR MASTER PLAN (PROJECT NO. CPA-TS-001-15) and ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

In-Brief Meeting with Commonwealth Ports Authority - Sign-In Sheet

Saipan Seaport Conference Room, 13 March 2018, 1:30 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | TELEPHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
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| 2 | Skye Aldan | CPA | | skye.aldan@cpa.gov.mp |
| 3 | DENN MANGLONA | PEGS | | dmanglona@pegsmp.com |
| 4 | ROY REYES | PEGS | | rreyes@pegsmp.com |
| 5 | Nathan Johnson | MES | | natejohnson72@yahoo.com |
| 6 | Jerra Cing | CPA | | jerra.cing@cpa.gov.mp |
| 7 | Anthony Camacho | CPA | | anthony.camacho@cpa.gov.mp |
| 8 | Wend Prater | CPA | 2376519 | wprater@cpa.gov.mp |
| 9 | DEAN KOKUBUN | MOFFATT & NICHOL | 8085337000 | DKokubun@MoffattNichol.com |
| 10 | CHRISTOPHER MATSON | MOFFATT & NICHOL | 7576288222 | CMatson@MoffattNichol.com |
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# Tinian Harbor Master Plan (CPA-TS-001-15)

**Commonwealth Ports Authority (CPA)**
**Commonwealth of the Northern Mariana Islands**
**CPA In-Brief Meeting**

**March 13, 2018**

moffatt & nichol

## Tinian Harbor Public Meeting - Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Joey P. San Nicolas, Mayor
  - Tinian Legislative Delegation
  - Tinian Municipal Council
  - Kimberlyn King-Hinds, CPA Board of Directors, Tinian Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Antonio L. Borja, Tinian Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination



## Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion

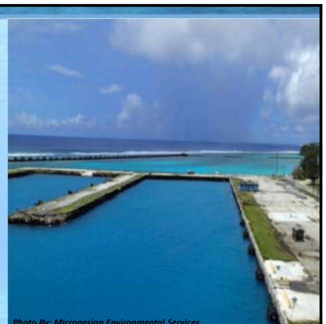


*Photo By: Micronesian Environmental Services*



## Tinian Harbor Master Plan Scope

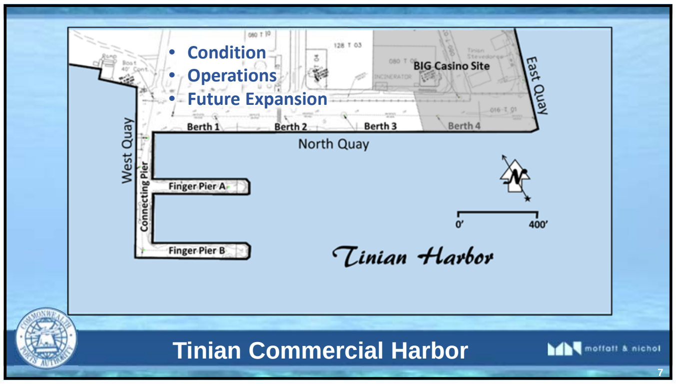
- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan



## Tinian Harbor Master Plan Public & Stakeholder Comments

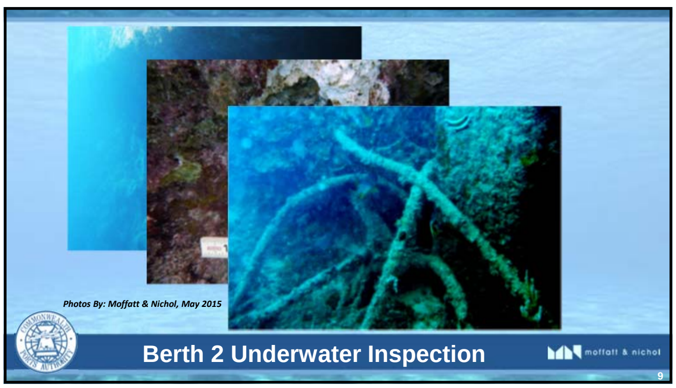
- Deterioration of existing breakwater
- Deterioration/Restrictions imposed by existing piers & wharves
- Lack of berth space:
  - Cargo
  - Fuel
  - Military use of harbor
  - Future cruise and ferry service
- Public access & use of harbor (i.e., small boat berths & ramp, fish cleaning and weighing stations, picnic & BBQ area, boat wash down area, etc.)



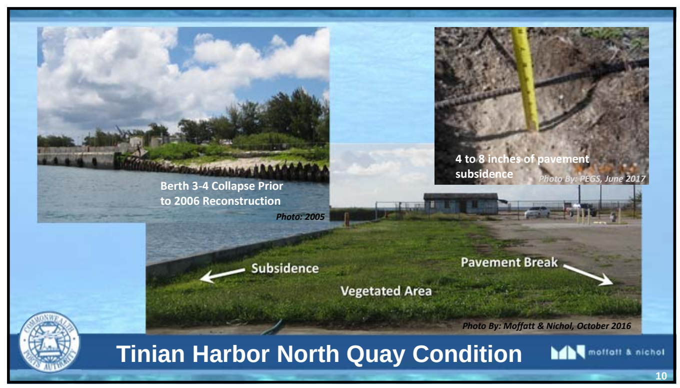


• Condition
• Operations
• Future Expansion
BIG Casino Site
East Quay
West Quay
Berth 1
Berth 2
Berth 3
Berth 4
North Quay
Connecting Pier
Finger Pier A
Finger Pier B
0'
400'
Tinian Harbor
Tinian Commercial Harbor
moffatt & nichol

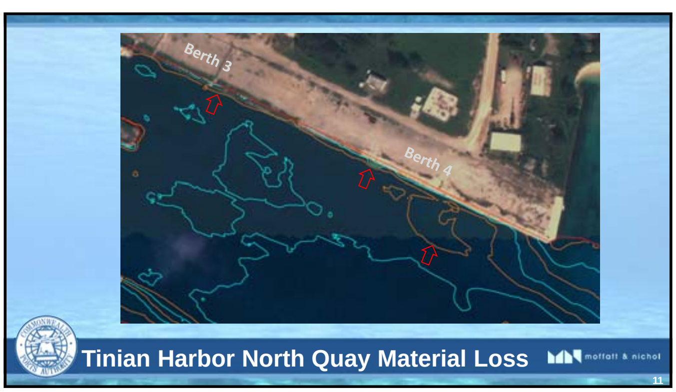

Berth 1: Quay wall corrosion, loss of backfill, missing fenders
Berth 2: Quay wall corrosion, loss of backfill
Berth 3: Quay wall corrosion, loss of backfill, missing fenders
Berth 1
Berth 2
Berth 3
Photos By: Moffatt & Nichol, October 2016
Tinian Harbor North Quay Condition
moffatt & nichol

Photos By: Moffatt & Nichol, May 2015
Berth 2 Underwater Inspection
moffatt & nichol

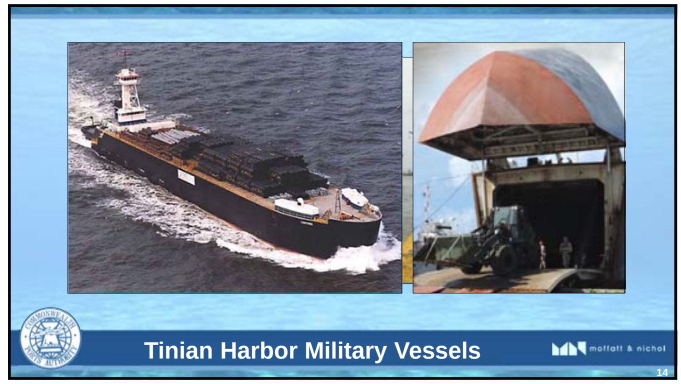
Berth 3-4 Collapse Prior to 2006 Reconstruction
Photo: 2005
4 to 8 inches of pavement subsidence
Photo By: PEGS, June 2017
Subsidence
Pavement Break
Vegetated Area
Photo By: Moffatt & Nichol, October 2016
Tinian Harbor North Quay Condition
moffatt & nichol

Berth 3
Berth 4
Tinian Harbor North Quay Material Loss
moffatt & nichol


Photo By: Micronesian Environmental Services
Tinian Harbor Finger Piers & Breakwater
moffatt & nichol


Tinian Harbor Commercial Vessels
moffatt & nichol
13


Tinian Harbor Military Vessels
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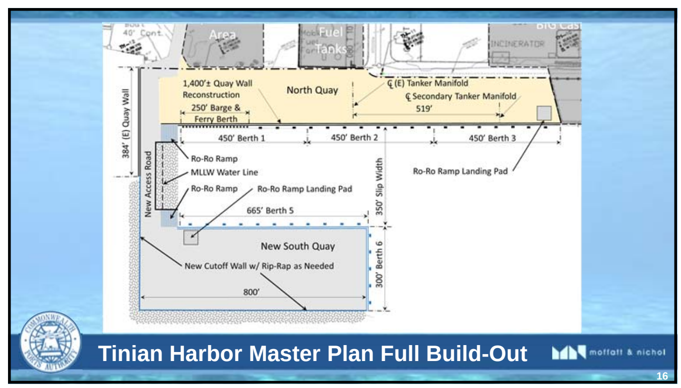
14


Passenger Building
Tanker Manifold
Light Towers
North Quay
Bollards
656'
Foam-Filled Fenders
Tanker Berth
1,400' Sheet Pile Quay Wall
385' Concrete Quay Wall
West Quay
Connecting Pier
Finger Pier A
Ro-Ro Ramp
Finger Pier B
Tinian Harbor
Tinian Commercial Harbor
moffatt & nichol
15


1,400'± Quay Wall Reconstruction
250' Barge & Ferry Berth
North Quay
(E) Tanker Manifold
Secondary Tanker Manifold
519'
450' Berth 1
450' Berth 2
450' Berth 3
384' (E) Quay Wall
New Access Road
Ro-Ro Ramp
MLLW Water Line
Ro-Ro Ramp
Ro-Ro Ramp Landing Pad
Ro-Ro Ramp Landing Pad
665' Berth 5
350' Slip Width
New South Quay
New Cutoff Wall w/ Rip-Rap as Needed
800'
300' Berth 6
Tinian Harbor Master Plan Full Build-Out
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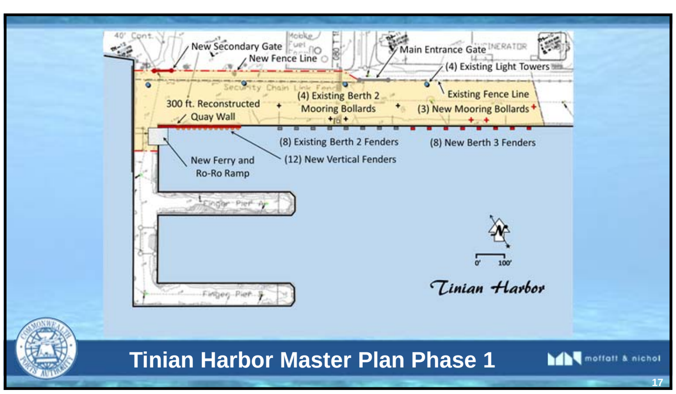
16


New Secondary Gate
New Fence Line
Main Entrance Gate
(4) Existing Light Towers
300 ft. Reconstructed Quay Wall
(4) Existing Berth 2 Mooring Bollards
Existing Fence Line
(3) New Mooring Bollards
(8) Existing Berth 2 Fenders
(8) New Berth 3 Fenders
New Ferry and Ro-Ro Ramp
(12) New Vertical Fenders
Tinian Harbor
Tinian Harbor Master Plan Phase 1
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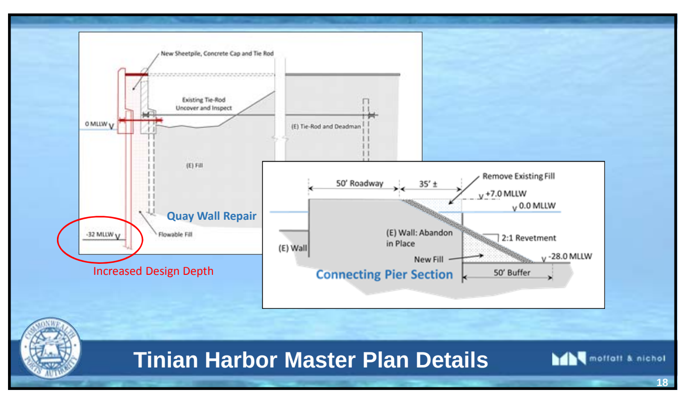
17


New Sheetpile, Concrete Cap and Tie Rod
Existing Tie-Rod Uncover and Inspect
0 MLLW
(E) Tie-Rod and Deadman
(E) Fill
Quay Wall Repair
-32 MLLW
Flowable Fill
Increased Design Depth
50' Roadway
35' ±
Remove Existing Fill
+7.0 MLLW
0.0 MLLW
(E) Wall: Abandon in Place
2:1 Revetment
(E) Wall
New Fill
-28.0 MLLW
Connecting Pier Section
50' Buffer
Tinian Harbor Master Plan Details
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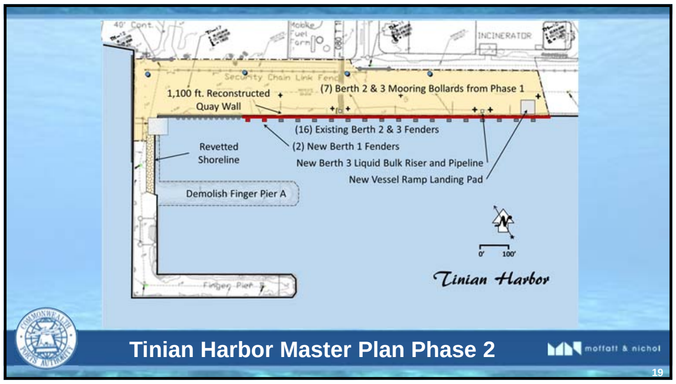
18


1,100 ft. Reconstructed Quay Wall
(7) Berth 2 & 3 Mooring Bollards from Phase 1
(16) Existing Berth 2 & 3 Fenders
(2) New Berth 1 Fenders
New Berth 3 Liquid Bulk Riser and Pipeline
New Vessel Ramp Landing Pad
Revetted Shoreline
Demolish Finger Pier A
Tinian Harbor
Tinian Harbor Master Plan Phase 2
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19


NORTH QUAY
New Ro-Ro Cargo Ramp
New Vessel Ramp Landing Pad
690 Feet
350 Feet
(11) New Berth 5 Fenders
New Pile Supported Berth 5
SOUTH QUAY
(3) New Light Towers
New Sheetpile Wall and Revetment
New Berth 6 Quay Wall
(5) New Berth 6 Fenders
300 Feet
Tinian Harbor
Tinian Harbor Master Plan Phase 3
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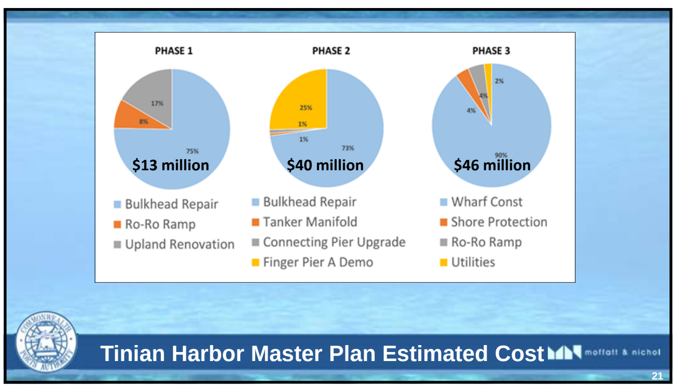
PHASE 1
$13 million
Bulkhead Repair
Ro-Ro Ramp
Upland Renovation
PHASE 2
$40 million
Bulkhead Repair
Tanker Manifold
Connecting Pier Upgrade
Finger Pier A Demo
PHASE 3
$46 million
Wharf Const
Shore Protection
Ro-Ro Ramp
Utilities
Tinian Harbor Master Plan Estimated Cost
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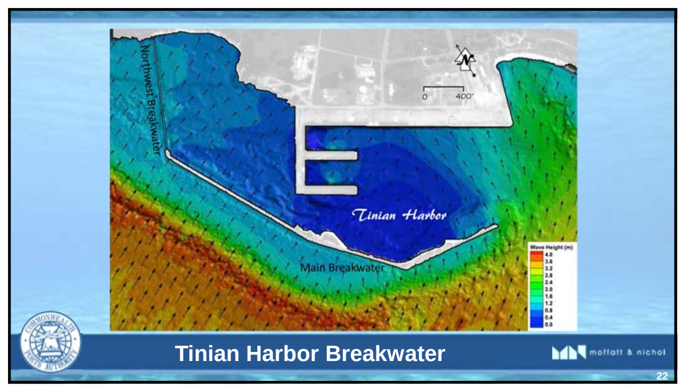
21


Northwest Breakwater
Tinian Harbor
Main Breakwater
Tinian Harbor Breakwater
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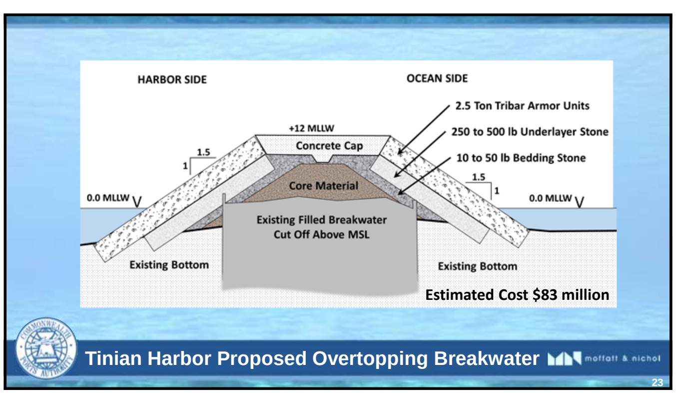
HARBOR SIDE
OCEAN SIDE
2.5 Ton Tribar Armor Units
250 to 500 lb Underlayer Stone
10 to 50 lb Bedding Stone
+12 MLLW
Concrete Cap
Core Material
0.0 MLLW
Existing Filled Breakwater Cut Off Above MSL
Existing Bottom
Estimated Cost $83 million
Tinian Harbor Proposed Overtopping Breakwater
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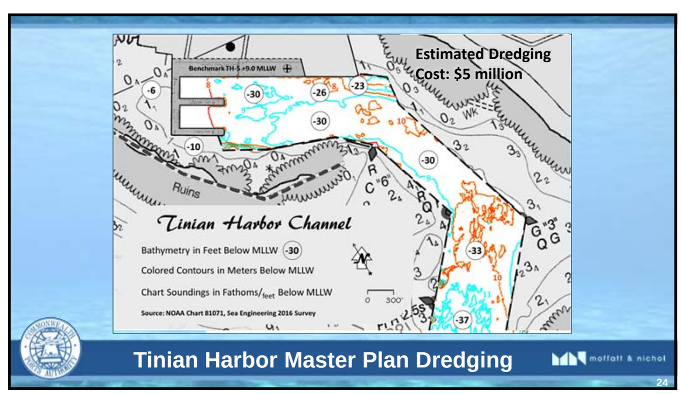
23


Estimated Dredging Cost: $5 million
Tinian Harbor Channel
Bathymetry in Feet Below MLLW
Colored Contours in Meters Below MLLW
Chart Soundings in Fathoms/feet Below MLLW
Source: NOAA Chart 81071, Sea Engineering 2016 Survey
Ruins
Tinian Harbor Master Plan Dredging
moffatt & nichol
24


SAN JOSE MUNICIPALITY
Suzuran Street
8th Street
Canal Street
Commonwealth Ports Authority Land
House of Taga
BIG Casino Site
Small Boat Harbor
North Quay
South Quay
0 400'
Tinian Harbor
Breakwater
Tinian Harbor Master Plan
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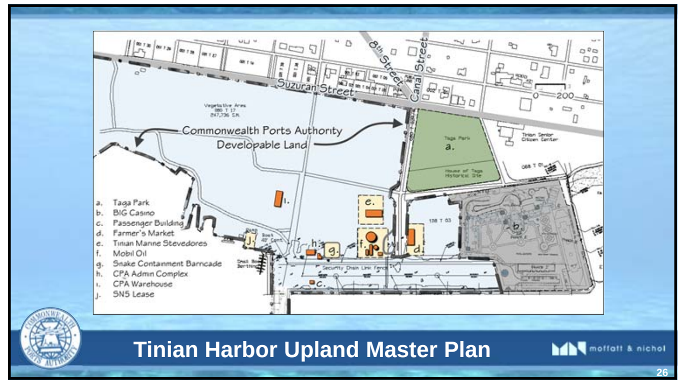
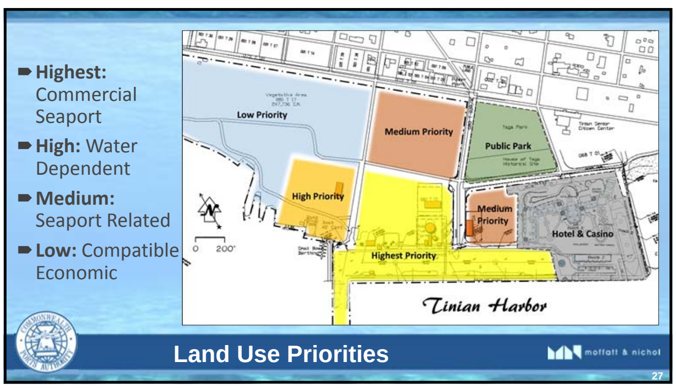
25

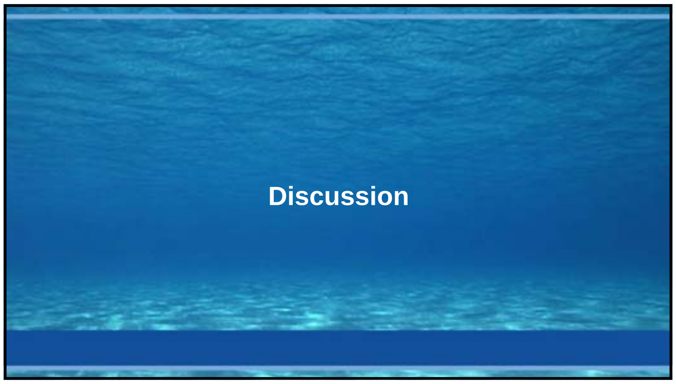

Suzuran Street
8th Street
Canal Street
Commonwealth Ports Authority Developable Land
0 200
a. Taga Park
b. BIG Casino
c. Passenger Building
d. Farmer's Market
e. Tinian Marine Stevedores
f. Mobil Oil
g. Snake Containment Barricade
h. CPA Admin Complex
i. CPA Warehouse
j. SNS Lease
Tinian Harbor Upland Master Plan
moffatt & nichol
26


Highest: Commercial Seaport
High: Water Dependent
Medium: Seaport Related
Low: Compatible Economic
Low Priority
Medium Priority
Public Park
High Priority
Medium Priority
Hotel & Casino
Highest Priority
0 200'
Tinian Harbor
Land Use Priorities
moffatt & nichol
27


Suzuran Street
8th Street
Canal Street
Future Commercial & Manufacturing
Commercial Development
House of Taga Cultural Resource Center
0 200'
Public Access & Small Boat Center
Cargo Area Expansion
Market-place
Bridge Investment Group Hotel & Casino
A. DoD Aviation Fuel Tank
B. Seawater Fire Suppression System
C. Small Boat Harbor Expansion
Commercial Fish Area
Commercial Seaport
Tinian Harbor
Recommended Land Use
moffatt & nichol
28


Parking
Public Launch Ramp
Parking
Picnic Shelter
Commercial Lease
Small Boat Landing
Ro-Ro Ramp
Parking
Marina
Commercial Port Fence
moffatt & nichol
29


A. Small Boat Storage and Repair Area
B. Trailer Parking and Boat Wash-down
C. Commercial Fish Center
D. Turning and Bus Loading Area
E. Picnic and Recreation Area
F. Restrooms
I. CPA Warehouse
II. Pump Station
III. CPA Administration
IV. Commercial Wharf
0 100
a. New Launch Ramp Boarding Float
b. Relocated Small Boat Slips
c. Bulkhead Fenders
d. Fish Hoist
e. New Small Craft Float
Tinian Harbor Master Plan Public Areas
moffatt & nichol
30


Discussion

## Rota West Harbor Master Plan (CPA-RS-001-15)

**Commonwealth Ports Authority (CPA)**
**Commonwealth of the Northern Mariana Islands**
**CPA In-Brief Meeting**

**March 13, 2018**

moffatt & nichol

## Rota West Harbor Public Meeting - Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Efraim Atalig, Mayor
  - Rota Legislative Delegation
  - Rota Municipal Council
  - Barrie Toves, CPA Board of Directors, Rota Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Sharlene Manglona, Rota Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination

**Rota West Harbor Master Plan** moffatt & nichol

2

## Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion


Photo By: Micronesian Environmental Services

**Rota West Harbor Master Plan** moffatt & nichol

3

## Rota West Harbor Master Plan Public & Stakeholder Comments

- Reliable & safe cargo delivery
- Channel & breakwater improvements
- Limitations of existing crane
- Unregulated/Uncontrolled offloading of cargo at small boat marina
- Facilitating safe offloading of cargo from light vessels
- Maintaining public access to harbor

**Rota West Harbor Master Plan** moffatt & nichol

4

## Rota West Harbor Master Plan Scope

- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan

**Rota West Harbor Master Plan** moffatt & nichol

5


**Rota West Harbor General Site Plan** moffatt & nichol

6

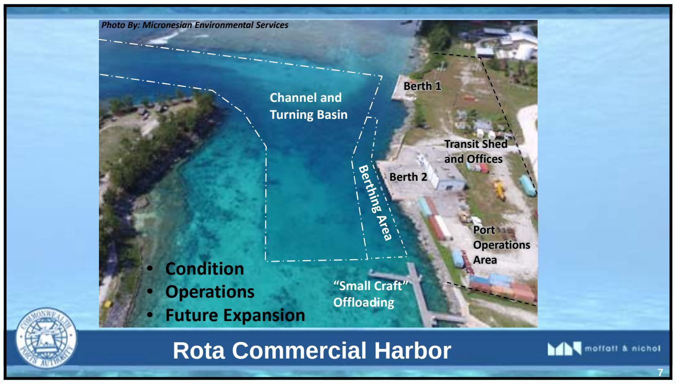
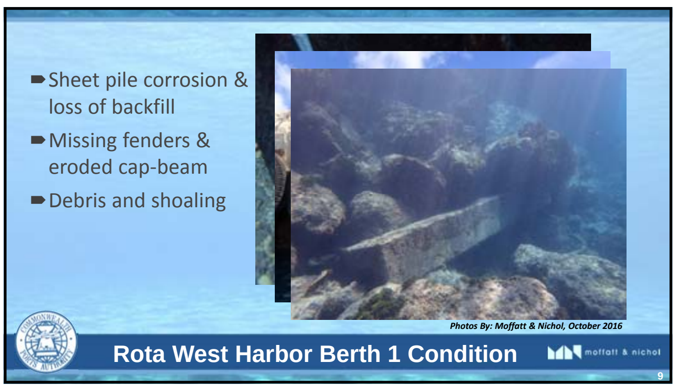
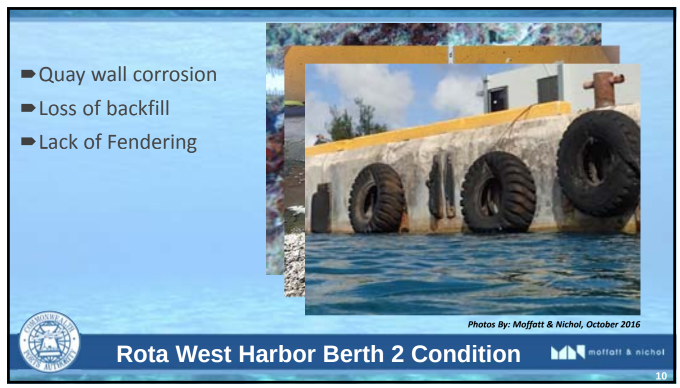
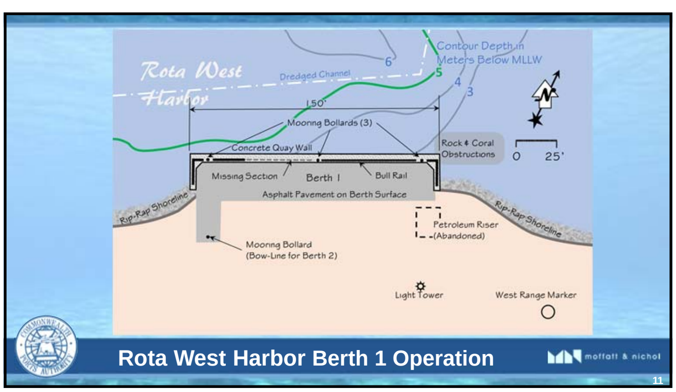


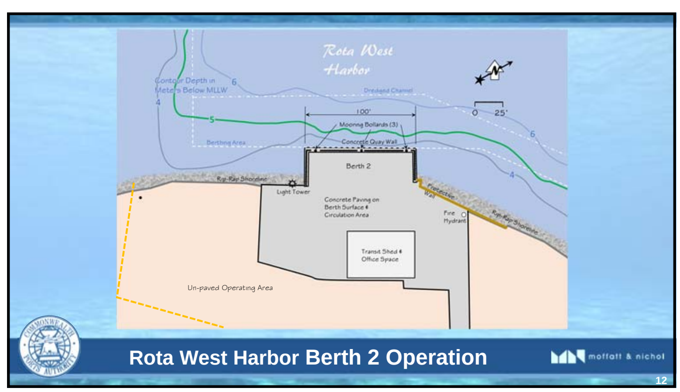
Photo By: Micronesian Environmental Services
Channel and Turning Basin
Berth 1
Transit Shed and Offices
Berth 2
Berthing Area
Port Operations Area
"Small Craft" Offloading
• Condition
• Operations
• Future Expansion
Rota Commercial Harbor
moffatt & nichol
7

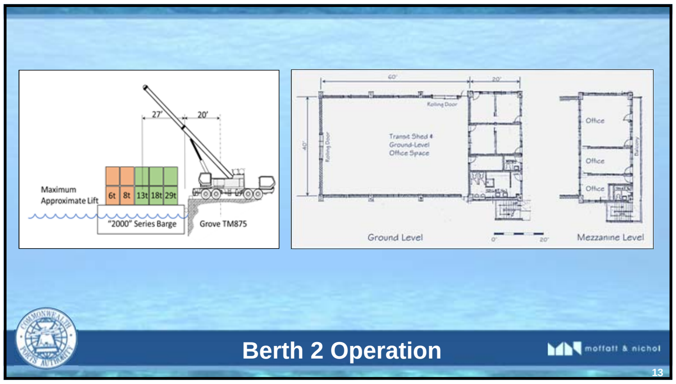

Berth 1: Quay wall corrosion, loss of backfill, missing fenders, damaged cap beam, debris and shoaling
Berth 2: Quay wall corrosion, loss of backfill missing fenders
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth Condition
moffatt & nichol
8

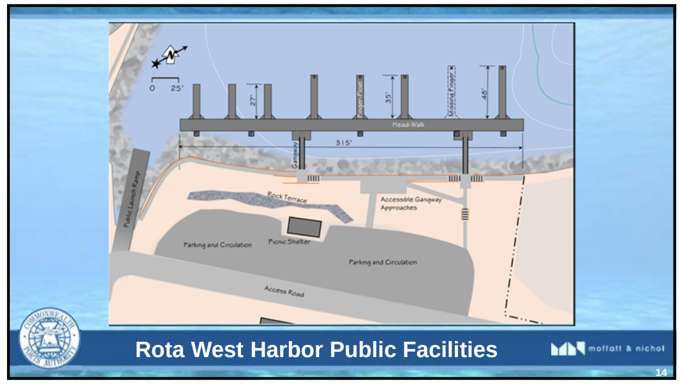

Sheet pile corrosion & loss of backfill
Missing fenders & eroded cap-beam
Debris and shoaling
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 1 Condition
moffatt & nichol
9

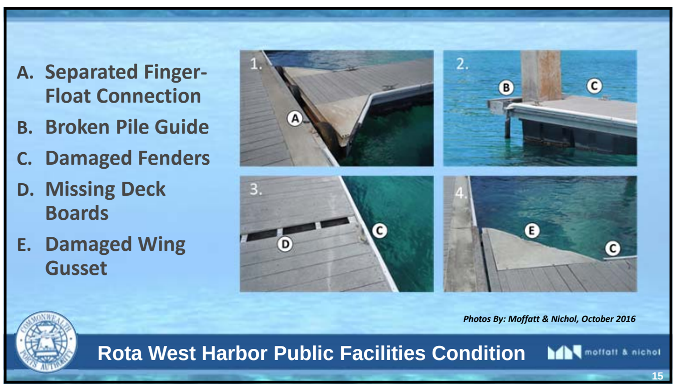

Quay wall corrosion
Loss of backfill
Lack of Fendering
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 2 Condition
moffatt & nichol
10


Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
150'
Mooring Bollards (3)
Concrete Quay Wall
Rock & Coral Obstructions
0 25'
Missing Section
Berth 1
Bull Rail
Asphalt Pavement on Berth Surface
Rip-Rap Shoreline
Petroleum Riser (Abandoned)
Mooring Bollard (Bow-Line for Berth 2)
Light Tower
West Range Marker
Rota West Harbor Berth 1 Operation
moffatt & nichol
11

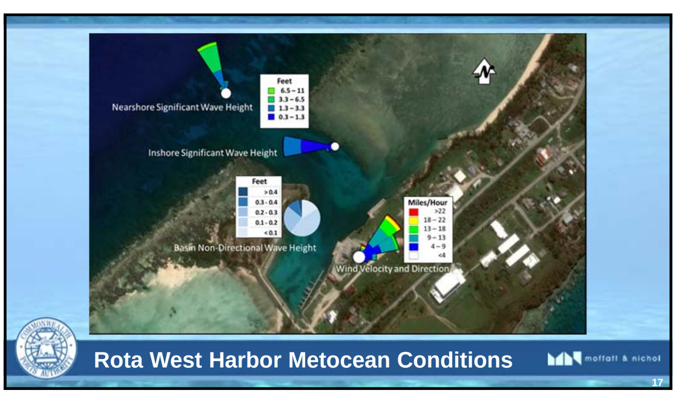

Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
100'
Mooring Bollards (3)
Concrete Quay Wall
0 25'
Berth 2
Rip-Rap Shoreline
Light Tower
Concrete Paving on Berth Surface & Circulation Area
Fire Hydrant
Transit Shed & Office Space
Un-paved Operating Area
Rota West Harbor Berth 2 Operation
moffatt & nichol
12

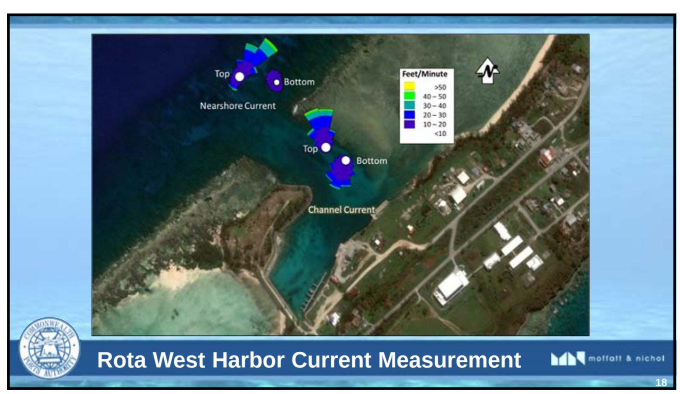

Maximum
Approximate Lift
6t
8t
13t
18t
29t
27'
20'
"2000" Series Barge
Grove TM875
60'
20'
Rolling Door
Transit Shed 4
Ground-Level
Office Space
40'
Office
Office
Office
Ground Level
0'
20'
Mezzanine Level
Berth 2 Operation
moffatt & nichol
13

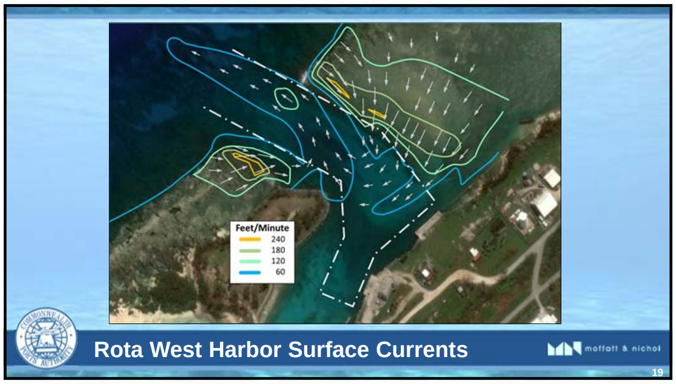

0
25'
27'
Finger-Float
35'
Missing Finger
48'
Head-Walk
315'
Gangway
Public Launch Ramp
Rock Terrace
Accessible Gangway
Approaches
Parking and Circulation
Picnic Shelter
Parking and Circulation
Access Road
Rota West Harbor Public Facilities
moffatt & nichol
14

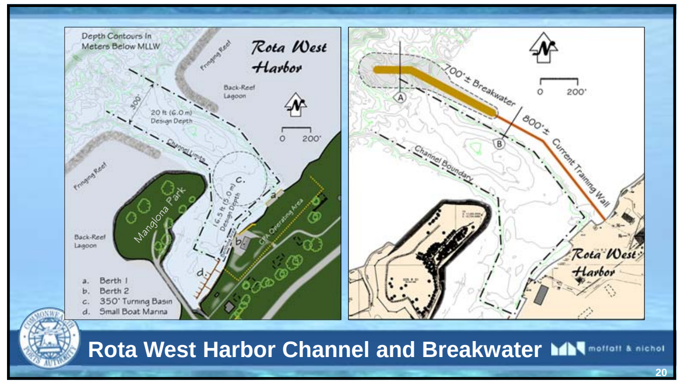

A. Separated Finger-Float Connection
B. Broken Pile Guide
C. Damaged Fenders
D. Missing Deck Boards
E. Damaged Wing Gusset
1.
A
2.
B
C
3.
D
C
4.
E
C
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Public Facilities Condition
moffatt & nichol
15

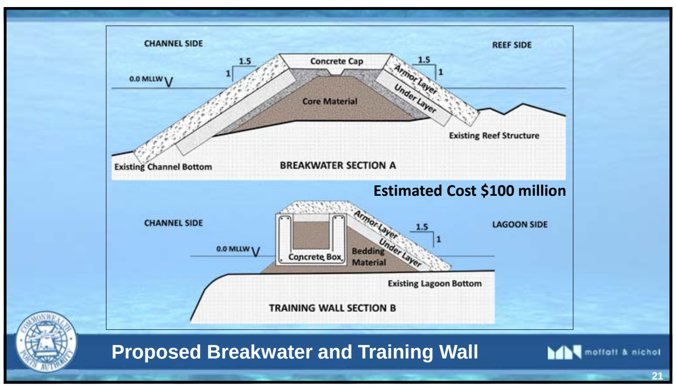

Tug Chamorro
Barge "2000"
Rota West Harbor Design Vessels
moffatt & nichol
16


Nearshore Significant Wave Height
Feet
6.5 – 11
3.3 – 6.5
1.3 – 3.3
0.3 – 1.3
Inshore Significant Wave Height
Feet
> 0.4
0.3 - 0.4
0.2 - 0.3
0.1 - 0.2
< 0.1
Basin Non-Directional Wave Height
Miles/Hour
>22
18 – 22
13 – 18
9 – 13
4 – 9
<4
Wind Velocity and Direction
Rota West Harbor Metocean Conditions
moffatt & nichol
17

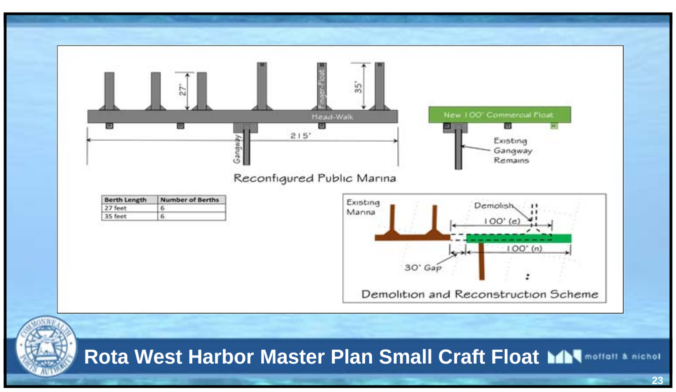

Top
Bottom
Nearshore Current
Feet/Minute
>50
40 – 50
30 – 40
20 – 30
10 – 20
<10
Top
Bottom
Channel Current
Rota West Harbor Current Measurement
moffatt & nichol
18

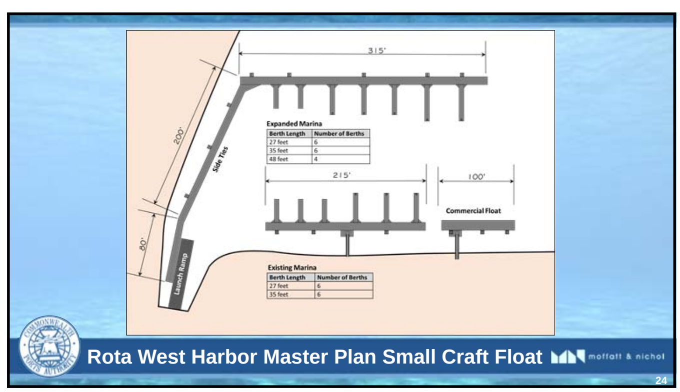

Feet/Minute
240
180
120
60
Rota West Harbor Surface Currents
moffatt & nichol
19


Depth Contours In Meters Below MLLW
Rota West Harbor
Fringing Reef
Back-Reef Lagoon
20 ft (6.0 m) Design Depth
0 200'
Manglona Park
a. Berth 1
b. Berth 2
c. 350' Turning Basin
d. Small Boat Marina
700' ± Breakwater
800' ± Current Training Wall
Channel Boundary
Rota West Harbor
Rota West Harbor Channel and Breakwater
moffatt & nichol
20


CHANNEL SIDE
REEF SIDE
Concrete Cap
0.0 MLLW
Armor Layer
Under Layer
Core Material
Existing Reef Structure
Existing Channel Bottom
BREAKWATER SECTION A
Estimated Cost $100 million
CHANNEL SIDE
LAGOON SIDE
Concrete Box
Bedding Material
Existing Lagoon Bottom
TRAINING WALL SECTION B
Proposed Breakwater and Training Wall
moffatt & nichol
21


Manglona Park
0 100'
Rota West Harbor
Public Access Improvements
a. Improved Manglona Park Facilities
b. Expanded Public Marina
c. Boat Repair & Storage
d. Marine Supplies & Charters
e. Restaurants & Entertainment
f. Picnic Areas w/ Shelter & Toilets
g. Public Parking
b. Public Marina & Commercial Float
Berth 2 Shed & Offices
Berth 1
Security Fence
Historical Site
Tree Snake Confinement Area
Retaining Wall
Rota West Harbor Master Plan Full Build-Out
moffatt & nichol
22


27'
35'
Head-Walk
215'
Gangway
New 100' Commercial Float
Existing Gangway Remains
Reconfigured Public Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Existing Marina
Demolish
100' (e)
100' (n)
30' Gap
Demolition and Reconstruction Scheme
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
23


315'
200'
Side Ties
Expanded Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
48 feet | 4
215'
100'
Commercial Float
80'
Launch Ramp
Existing Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
24

**Phase I Cost: $3.4 million**

- Berth 2 upgrades
- Second crane
- New commercial float
- Storage improvements
- Misc. repairs


## Rota West Harbor Master Plan Phase 1



**Phase II Cost: $3.9 million**

- Berth 2 upgrades
- Marina and boarding float
- Breakwater Cost Share: $25 million (est.)


## Rota West Harbor Master Plan Phase 2



**Phase III Cost: $3.4 million**

- Berth 1 upgrades


## Rota West Harbor Master Plan Phase 3



## Discussion

1132 Bishop Street, Suite 1595
Honolulu, HI 96813

(808) 533-7000
www.moffattnichol.com

# NOTES OF MEETING

**DATE OF MEETING:** Tuesday, March 13, 2018

**TIME:** 3:00 p.m. CHST

**LOCATION:** Saipan Seaport Conference Room

**WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15)
Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9538 & 9539

**SUBJECT:** Tinian and Rota Seaport Operators Meeting

**PARTICIPANTS:** See attached *Seaport Operators Meeting - Sign-In Sheet*

**REFERENCE DOCUMENTS:**

- Tinian Harbor Master Plan (CPA-TS-001-15) Meeting Presentation, dated March 13, 2018 (6 sheets)
- Rota West Harbor Master Plan (CPA-RS-001-15) Meeting Presentation, dated March 13, 2018 (5 sheets)

**ITEM**

***Presentation (by Moffatt & Nichol)***

Christopher Matson of Moffatt & Nichol (MN) presented the Tinian Harbor Master Plan and the Rota West Harbor Master Plan presentations. The presentations are attached herewith.

***Summary of discussion on the Tinian Harbor Master Plan presentation***

a. *Question 1: Who is responsible for the breakwater?*
Response 1: Breakwater repair/reconstruction is currently being reviewed by the U.S. Army Corps of Engineers (USACE).

b. *Question 2: Would breakwater repairs/improvements have to be done before any Commonwealth Ports Authority (CPA) improvements being proposed under the Master Plan can be undertaken?*
Response 2: No, not necessarily, master plan improvements may be done without the USACE improvements. Although the breakwater improvements would improve the conditions in the harbor in the long run, the improvements proposed under the CPA master plan themselves would improve the port facilities during for more active harbor conditions.

c. *Question 3: Does the master plan accommodate small vessels?*
Response 3: Yes, small vessels can be accommodated at the West Quay. Ferry service is accommodated at Berth 1.

d. *Question 4: Does the master plan costs include dredging and breakwater improvements?*
Response 4: No, the dredging and breakwater repair/improvements would be performed by the U.S. government so costs are estimated by, and would be funded by, the U.S. federal government (with CPA cost sharing).

e. *Question 5: Does the master plan include a new seawater fire suppression system?*
Response 5: Yes, the Recommended Land Use Plan does identify the seawater fire suppression system located upland of the small boat harbor expansion area, west of the west access road.

f. *Question 6: Could the area identified as the Small Boat Harbor Expansion area be used for RO/RO operations?*
Response 6: It was considered in preparing the Master Plan, however, the area is fairly shallow (6' to 8' depth) so dredging would be necessary for larger vessels to make this area viable for RO/RO operations. Furthermore, the USACE's study area and area of responsibility (i.e., federal project area) does not include this area so funding

would not be available from the U.S. federal government to perform the dredging which would make the repurposing prohibitively expensive for CPA.

g. *Question 7: Port lighting is currently not operating. When will it be repaired? Has the master plan recommended additional new lighting?*
Response 7: CPA is aware of the non-operational lights. CPA had requested funding from the Department of Homeland Security (DHS) but the funding has not been approved yet. The yard lighting will be repaired as soon as possible. The current spacing of the light poles at the port is fairly typical so lighting of the North Quay was presumed to be adequate once the lights are repaired (Post-meeting note: A lighting analysis was not in the scope of this master planning effort so the wharf lighting would have to be analyzed under a separate action to be sure). Three new light poles have been identified on the Berth 5 and 6 build out.

h. *Question 8: Has the Tinian delegation been provided the draft master plan? If government funding is needed, coordination should be performed with the Tinian delegation.*
Response 8: The Tinian delegation has been invited to the public meeting to be held on Wednesday, 14 March 2018.

i. *Question 9: Will construction material be allowed to offload directly at the port in the future?*
Response 9: Construction material is allowed to enter the port as long as the vessel has been cleared with U.S. Customs and Border Protection (CBP) at the Port of Saipan or CBP inspection in Tinian is coordinated beforehand since CBP does not have a full-time inspector stationed on Tinian and the CBP inspector would have to travel from Saipan to meet the vessel.

***Summary of discussion on the Rota West Harbor Master Plan presentation***

a. *Question 1: Is there a chance the M/V Luta may return to Rota service?*
Response 1: The M/V Luta is currently in drydock, under new ownership, so it is believed the intent is for the vessel to return to serve Rota (service is anticipated to be 17-20 containers per month).

b. *Question 2: Would the Luta be a Saipan-Rota only service?*
Response 2: Not sure if Saipan-Rota or Saipan-Tinian-Rota service. Shippers are still reviewing.

c. *Question 3: Did the master plan include the Rota East Harbor?*
Response 3: Although the Rota East Harbor master plan was prepared under a separate contract in 2015, it was considered in preparing the Rota West Harbor Master Plan.

d. *Question 4: Could a RO-RO operation be possible on Rota?*
Response 4: A RO-RO operation at Rota East Harbor may be possible, however, it is currently not legal so additional coordination and permission would have to be obtained before service is even considered.

e. *Question 5: Was widening of the channel considered?*
Response 5: The CPA Master Plan and the USACE's feasibility study/Environmental Impact Statement (EIS) do not consider widening of the channel.

***Any additional comments on the Master Plans should be sent to CPA within one week.***

~ End *Notes of Meeting* ~

TINIAN HARBOR MASTER PLAN (PROJECT NO. CPA-TS-001-15) and ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

Meeting with Tinian & Rota Seaport Operators - Sign-In Sheet

Saipan Seaport Conference Room, 13 March 2018, 3:00 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | TELEPHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 1 | John Reyes | GPPC | 285-5646 | JSReyes98@yahoo.com |
| 2 | WILFREDO M. CUESTA | HUANGSHUN CORP. | 235-6667 | |
| 3 | REINA CAMACHO | CNMI CUSTOMS | 664-1699 | customsplanning@outlook.com |
| 4 | DENN MANGLONA | PEGS | | dmanglona@pegsmp.com |
| 5 | ROY REYES | PEGS | | rreyes@pegsmp.com |
| 6 | Skye Aldan | CPA | | skye.aldan@cpa.gov.mp |
| 7 | Nathan Johnson | MES | | natejohnson72@yahoo.com |
| 8 | DAVID DOUGHERTY | Pacific Marine Enterprises | | tjddave@hotmail.com |
| 9 | DANILYN VARELA | Pacific Marine Enterprises | | pme@pticom.com |
| 10 | Wende Prader | CPA | 2376500 | wprader@cpa.gov.mp |
| 11 | JOY ANN DLGUERRERO | CPA | | joydlg@cpa.gov.mp |
| 12 | mary tenorio | Saiship | 3229702 | mary_tenorio@saipanshipping.com |
| 13 | Lee Cabrera | Saipan Stevedore Co. | 322-9270 | lee.cabrera@saisteve.com |
| 14 | Anthony Camacho | CPA | 669-3556 | anthony.camacho@cpa.gov.mp |
| 15 | Ed Mendiola | CPA | 237-6500 | cpa.edmendiola@pticom.com |
| 16 | DEAN KOKUBUN | MOFFATT & NICHOL | 9085337000 | DKokubun@MoffattNichol.com |
| 17 | CHRISTOPHER MATSON | MOFFATT & NICHOL | 7576288222 | CMatson@MoffattNichol.com |
| 18 | | | | |
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| 25 | | | | |

## Tinian Harbor Master Plan (CPA-TS-001-15)

**Commonwealth Ports Authority (CPA)**
**Commonwealth of the Northern Mariana Islands**
**Port Operators Meeting**

**March 13, 2018**

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## Tinian Harbor Public Meeting - Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Joey P. San Nicolas, Mayor
  - Tinian Legislative Delegation
  - Tinian Municipal Council
  - Kimberlyn King-Hinds, CPA Board of Directors, Tinian Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Antonio L. Borja, Tinian Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination

Tinian Harbor Master Plan

2

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## Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion

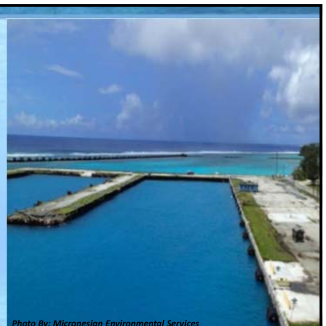

*Photo By: Micronesian Environmental Services*

Tinian Harbor Master Plan

3

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## Tinian Harbor Master Plan Scope

- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan

Tinian Harbor Master Plan

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## Tinian Harbor Master Plan Public & Stakeholder Comments

- Deterioration of existing breakwater
- Deterioration/Restrictions imposed by existing piers & wharves
- Lack of berth space:
  - Cargo
  - Fuel
  - Military use of harbor
  - Future cruise and ferry service
- Public access & use of harbor (i.e., small boat berths & ramp, fish cleaning and weighing stations, picnic & BBQ area, boat wash down area, etc.)

Tinian Harbor Master Plan

5

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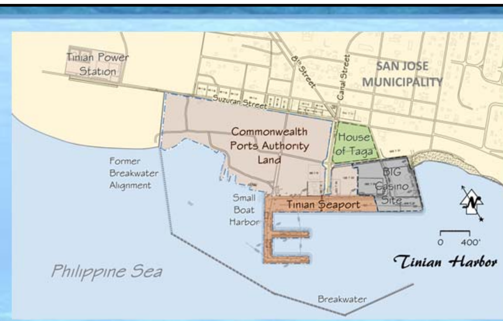
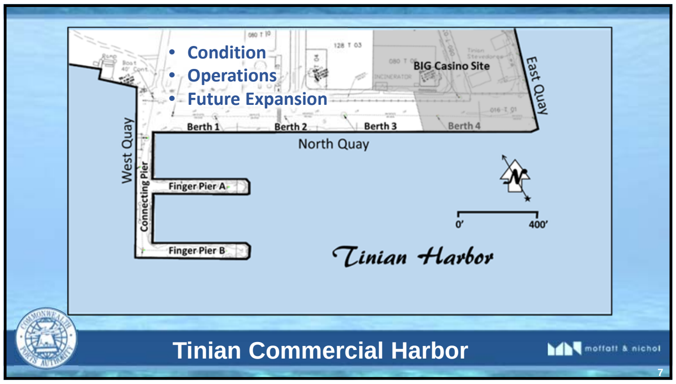
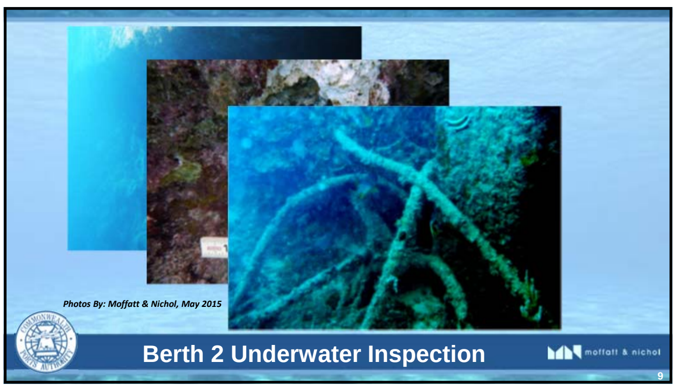


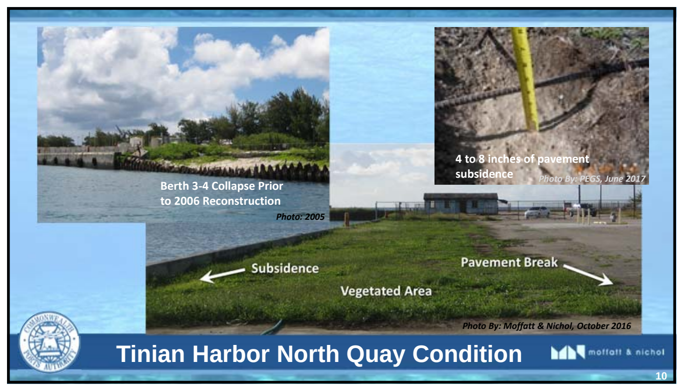

Tinian Harbor General Site Plan

6


Condition
Operations
Future Expansion
BIG Casino Site
East Quay
West Quay
Berth 1
Berth 2
Berth 3
Berth 4
North Quay
Connecting Pier
Finger Pier A
Finger Pier B
0'
400'
Tinian Harbor
Tinian Commercial Harbor
moffatt & nichol
7


Berth 1: Quay wall corrosion, loss of backfill, missing fenders
Berth 2: Quay wall corrosion, loss of backfill
Berth 3: Quay wall corrosion, loss of backfill, missing fenders
Berth 1
Berth 2
Berth 3
Photos By: Moffatt & Nichol, October 2016
Tinian Harbor North Quay Condition
moffatt & nichol
8


Photos By: Moffatt & Nichol, May 2015
Berth 2 Underwater Inspection
moffatt & nichol
9


Berth 3-4 Collapse Prior to 2006 Reconstruction
Photo: 2005
4 to 8 inches of pavement subsidence
Photo By: PEGS, June 2017
Subsidence
Pavement Break
Vegetated Area
Photo By: Moffatt & Nichol, October 2016
Tinian Harbor North Quay Condition
moffatt & nichol
10

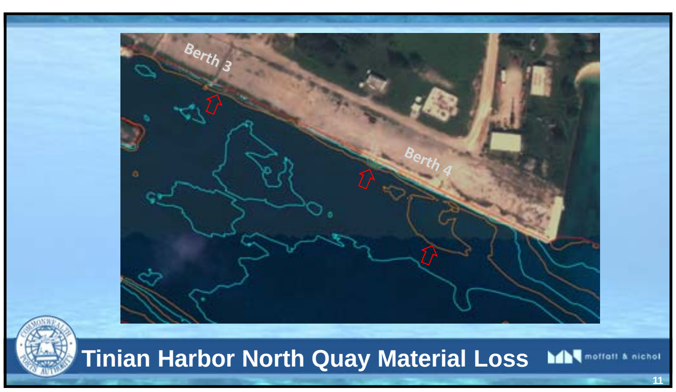
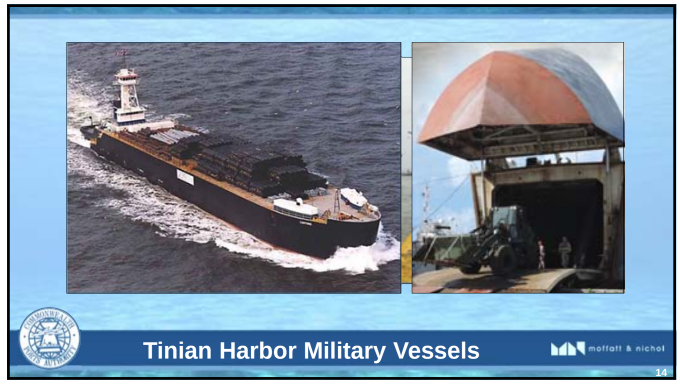
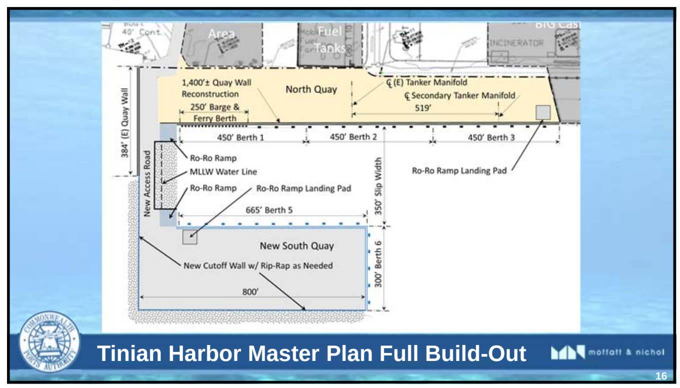

Berth 3
Berth 4
Tinian Harbor North Quay Material Loss
moffatt & nichol
11

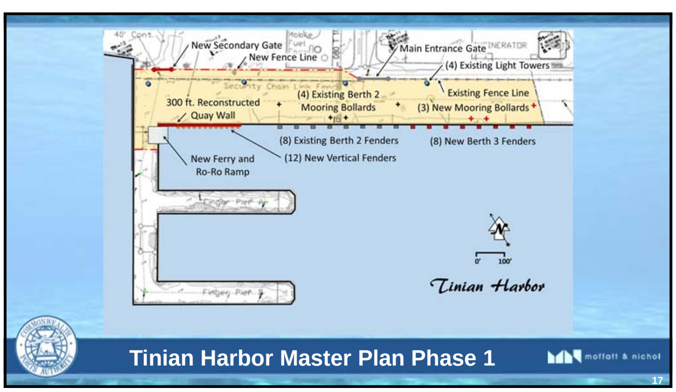

Photo By: Micronesian Environmental Services
Tinian Harbor Finger Piers & Breakwater
moffatt & nichol
12

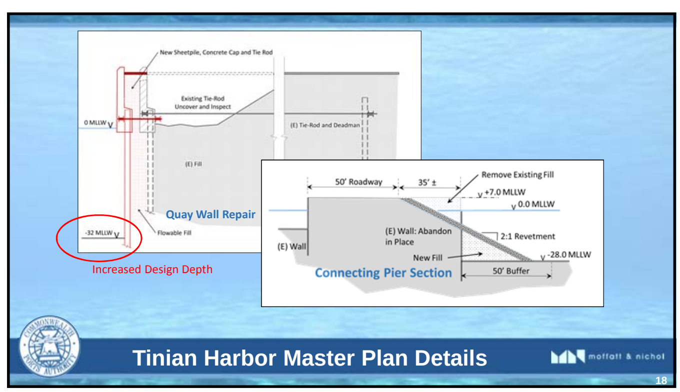

FastCat
Tinian Harbor Commercial Vessels
moffatt & nichol
13

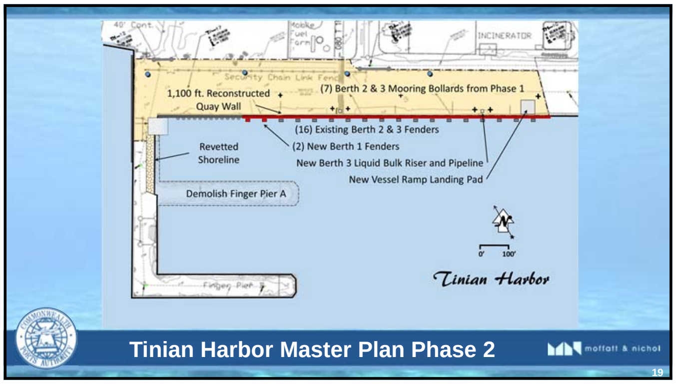

Tinian Harbor Military Vessels
moffatt & nichol
14


Passenger Building
Tanker Manifold
Light Towers
North Quay
Bollards
656'
Foam-Filled Fenders
Tanker Berth
1,400' Sheet Pile Quay Wall
385' Concrete Quay Wall
West Quay
250'
Finger Pier A
Connecting Pier
Ro-Ro Ramp
Finger Pier B
Tinian Harbor
Tinian Commercial Harbor
moffatt & nichol
15

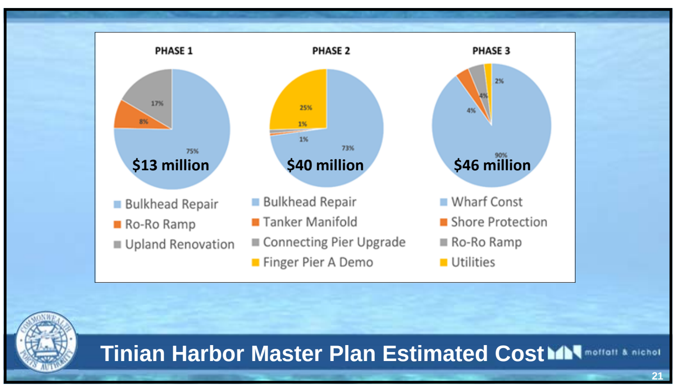

1,400'± Quay Wall Reconstruction
250' Barge & Ferry Berth
North Quay
℄ (E) Tanker Manifold
℄ Secondary Tanker Manifold
519'
450' Berth 1
450' Berth 2
450' Berth 3
384' (E) Quay Wall
New Access Road
Ro-Ro Ramp
MLLW Water Line
Ro-Ro Ramp
Ro-Ro Ramp Landing Pad
Ro-Ro Ramp Landing Pad
665' Berth 5
350' Slip Width
New South Quay
New Cutoff Wall w/ Rip-Rap as Needed
300' Berth 6
800'
Tinian Harbor Master Plan Full Build-Out
moffatt & nichol
16

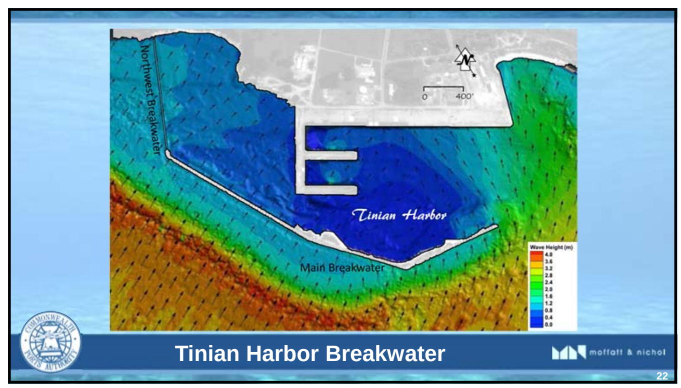

New Secondary Gate
New Fence Line
Main Entrance Gate
(4) Existing Light Towers
300 ft. Reconstructed Quay Wall
(4) Existing Berth 2 Mooring Bollards
Existing Fence Line
(3) New Mooring Bollards
(8) Existing Berth 2 Fenders
(8) New Berth 3 Fenders
New Ferry and Ro-Ro Ramp
(12) New Vertical Fenders
Tinian Harbor
Tinian Harbor Master Plan Phase 1
moffatt & nichol
17

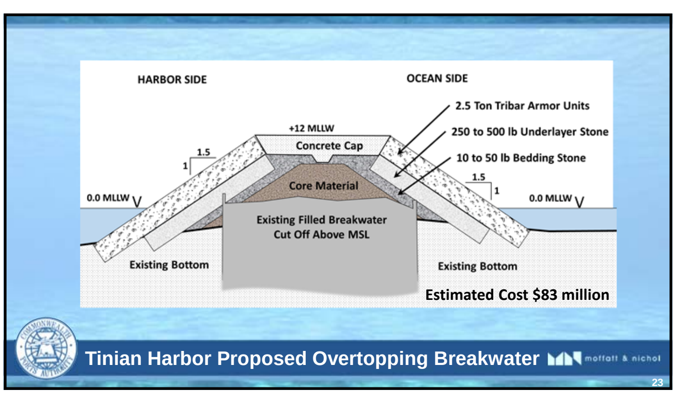

New Sheetpile, Concrete Cap and Tie Rod
Existing Tie-Rod Uncover and Inspect
0 MLLW
(E) Fill
-32 MLLW
Flowable Fill
Quay Wall Repair
Increased Design Depth
50' Roadway
35' ±
Remove Existing Fill
+7.0 MLLW
0.0 MLLW
(E) Wall: Abandon in Place
2:1 Revetment
(E) Wall
New Fill
-28.0 MLLW
50' Buffer
Connecting Pier Section
Tinian Harbor Master Plan Details
moffatt & nichol
18

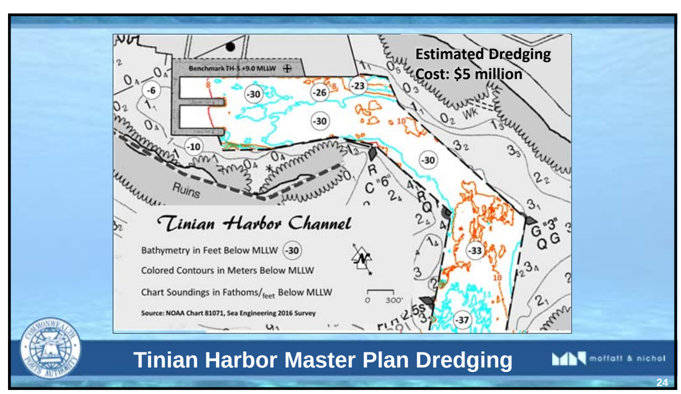

1,100 ft. Reconstructed Quay Wall
(7) Berth 2 & 3 Mooring Bollards from Phase 1
(16) Existing Berth 2 & 3 Fenders
(2) New Berth 1 Fenders
New Berth 3 Liquid Bulk Riser and Pipeline
New Vessel Ramp Landing Pad
Revetted Shoreline
Demolish Finger Pier A
INCINERATOR
Tinian Harbor
Tinian Harbor Master Plan Phase 2
moffatt & nichol
19


INCINERATOR
NORTH QUAY
New Ro-Ro Cargo Ramp
New Vessel Ramp Landing Pad
690 Feet
(11) New Berth 5 Fenders
New Pile Supported Berth 5
SOUTH QUAY
(3) New Light Towers
New Sheetpile Wall and Revetment
New Berth 6 Quay Wall
(5) New Berth 6 Fenders
350 Feet
300 Feet
Tinian Harbor
Tinian Harbor Master Plan Phase 3
moffatt & nichol
20

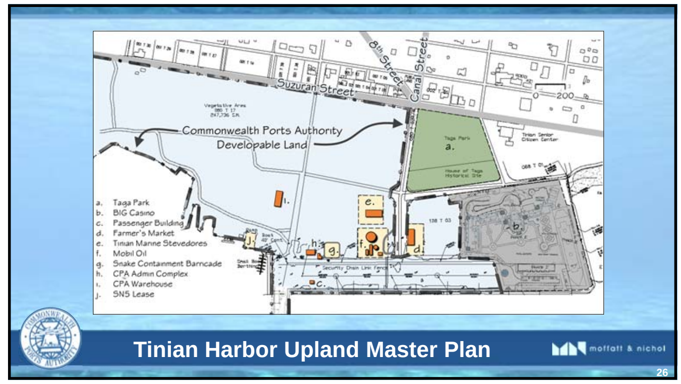

PHASE 1
$13 million
Bulkhead Repair
Ro-Ro Ramp
Upland Renovation
PHASE 2
$40 million
Bulkhead Repair
Tanker Manifold
Connecting Pier Upgrade
Finger Pier A Demo
PHASE 3
$46 million
Wharf Const
Shore Protection
Ro-Ro Ramp
Utilities
Tinian Harbor Master Plan Estimated Cost
moffatt & nichol
21

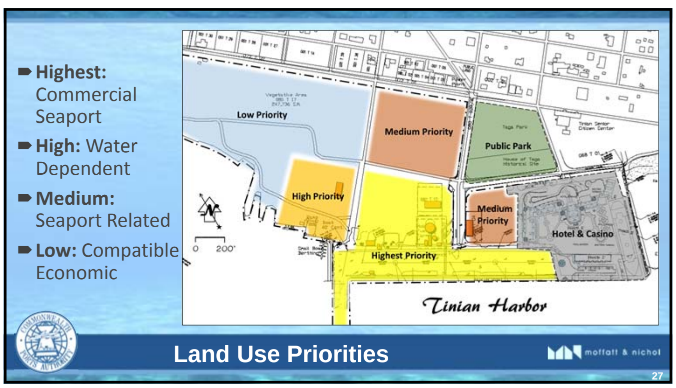

Northwest Breakwater
Tinian Harbor
Main Breakwater
Tinian Harbor Breakwater
moffatt & nichol
22


HARBOR SIDE
OCEAN SIDE
2.5 Ton Tribar Armor Units
250 to 500 lb Underlayer Stone
10 to 50 lb Bedding Stone
+12 MLLW
Concrete Cap
Core Material
0.0 MLLW
0.0 MLLW
Existing Filled Breakwater Cut Off Above MSL
Existing Bottom
Existing Bottom
Estimated Cost $83 million
Tinian Harbor Proposed Overtopping Breakwater
moffatt & nichol
23


Estimated Dredging Cost: $5 million
Tinian Harbor Channel
Bathymetry in Feet Below MLLW
Colored Contours in Meters Below MLLW
Chart Soundings in Fathoms/feet Below MLLW
Source: NOAA Chart 81071, Sea Engineering 2016 Survey
Ruins
Tinian Harbor Master Plan Dredging
moffatt & nichol
24


SAN JOSE
MUNICIPALITY
Suzuran Street
8th Street
Canal Street
Commonwealth Ports
Authority Land
House of
Taga
BIG Casino
Site
Small
Boat
Harbor
North Quay
South Quay
0 400'
Tinian Harbor
Breakwater
Tinian Harbor Master Plan
moffatt & nichol
25

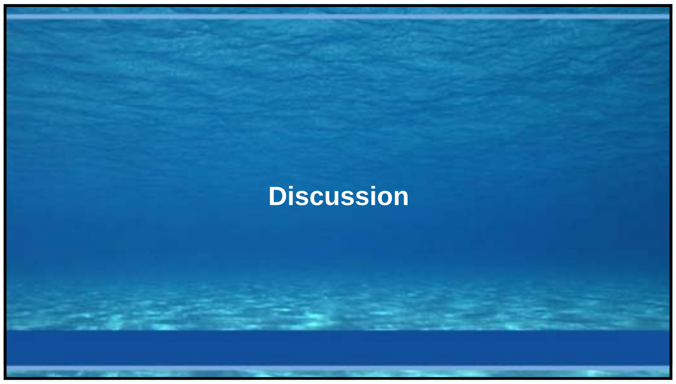

Suzuran Street
8th Street
Canal Street
Commonwealth Ports Authority
Developable Land
0 200'
a. Taga Park
b. BIG Casino
c. Passenger Building
d. Farmer's Market
e. Tinian Marine Stevedores
f. Mobil Oil
g. Snake Containment Barricade
h. CPA Admin Complex
i. CPA Warehouse
j. SNS Lease
Tinian Harbor Upland Master Plan
moffatt & nichol
26


Highest: Commercial Seaport
High: Water Dependent
Medium: Seaport Related
Low: Compatible Economic
Low Priority
Medium Priority
Public Park
High Priority
Medium Priority
Hotel & Casino
Highest Priority
0 200'
Tinian Harbor
Land Use Priorities
moffatt & nichol
27


Suzuran Street
8th Street
Canal Street
Future Commercial & Manufacturing
Commercial Development
House of Taga Cultural Resource Center
Public Access & Small Boat Center
Cargo Area Expansion
Market-place
Bridge Investment Group Hotel & Casino
Commercial Fish Area
Commercial Seaport
A. DoD Aviation Fuel Tank
B. Seawater Fire Suppression System
C. Small Boat Harbor Expansion
0 200'
Tinian Harbor
Recommended Land Use
moffatt & nichol
28


Public Launch Ramp
Parking
Picnic Shelter
Commercial Lease
Small Boat Landing
Ro-Ro Ramp
Marina
Commercial Port Fence
moffatt & nichol
29


A.
B.
C.
D.
0 100
A. Small Boat Storage and Repair Area
B. Trailer Parking and Boat Wash-down
C. Commercial Fish Center
D. Turning and Bus Loading Area
E. Picnic and Recreation Area
F. Restrooms
I. CPA Warehouse
II. Pump Station
III. CPA Administration
IV. Commercial Wharf
a. New Launch Ramp Boarding Float
b. Relocated Small Boat Slips
c. Bulkhead Fenders
d. Fish Hoist
e. New Small Craft Float
Tinian Harbor Master Plan Public Areas
moffatt & nichol
30


Discussion

## Rota West Harbor Master Plan (CPA-RS-001-15)

**Commonwealth Ports Authority (CPA)**
**Commonwealth of the Northern Mariana Islands**
**Port Operators Meeting**

**March 13, 2018**

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### Rota West Harbor Public Meeting - Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Efraim Atalig, Mayor
  - Rota Legislative Delegation
  - Rota Municipal Council
  - Barrie Toves, CPA Board of Directors, Rota Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Sharlene Manglona, Rota Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination

Rota West Harbor Master Plan

2

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### Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion


*Photo By: Micronesian Environmental Services*

Rota West Harbor Master Plan

3

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### Rota West Harbor Master Plan Public & Stakeholder Comments

- Reliable & safe cargo delivery
- Channel & breakwater improvements
- Limitations of existing crane
- Unregulated/Uncontrolled offloading of cargo at small boat marina
- Facilitating safe offloading of cargo from light vessels
- Maintaining public access to harbor

Rota West Harbor Master Plan

4

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### Rota West Harbor Master Plan Scope

- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan

Rota West Harbor Master Plan

5

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Rota West Harbor General Site Plan

6

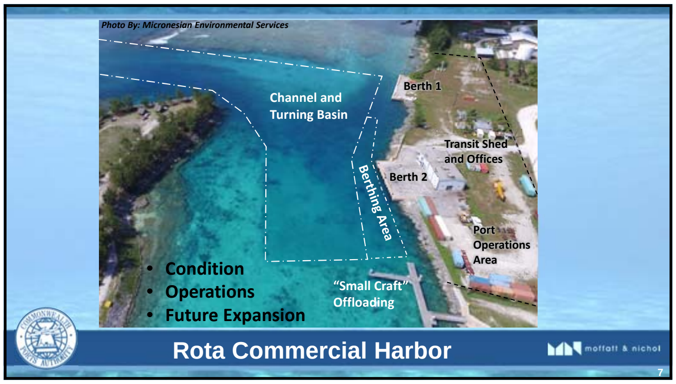
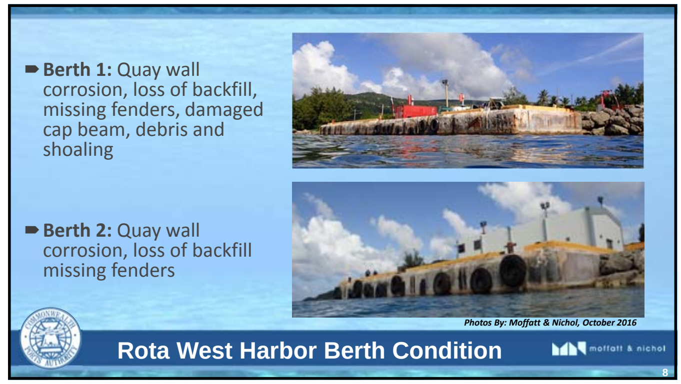
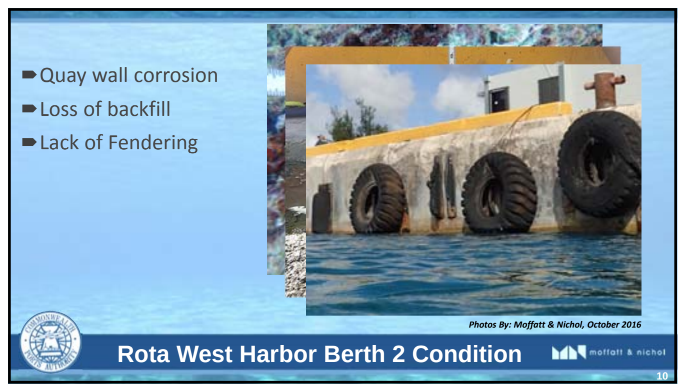
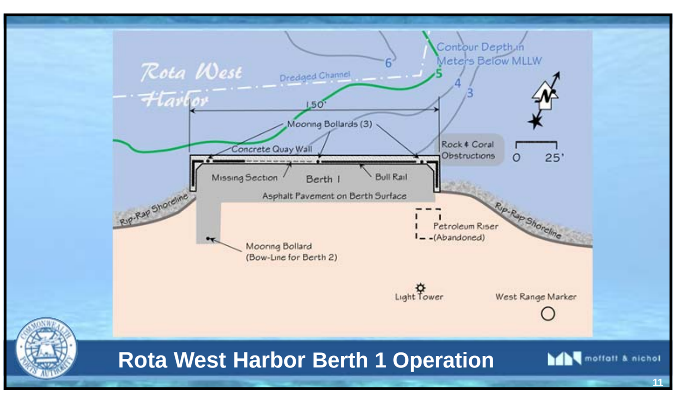


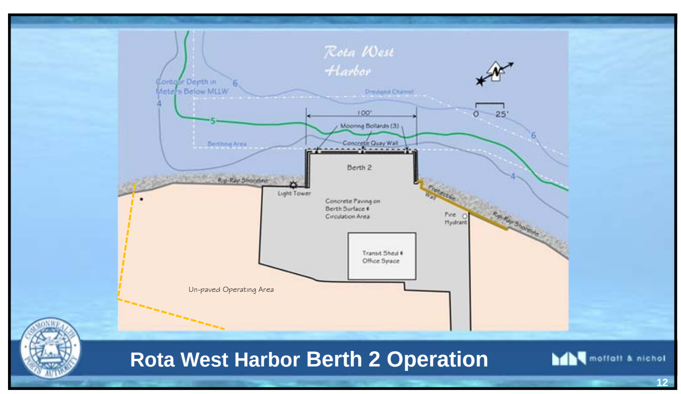
Photo By: Micronesian Environmental Services
Channel and Turning Basin
Berth 1
Transit Shed and Offices
Berth 2
Berthing Area
Port Operations Area
"Small Craft" Offloading
• Condition
• Operations
• Future Expansion
Rota Commercial Harbor
moffatt & nichol
7

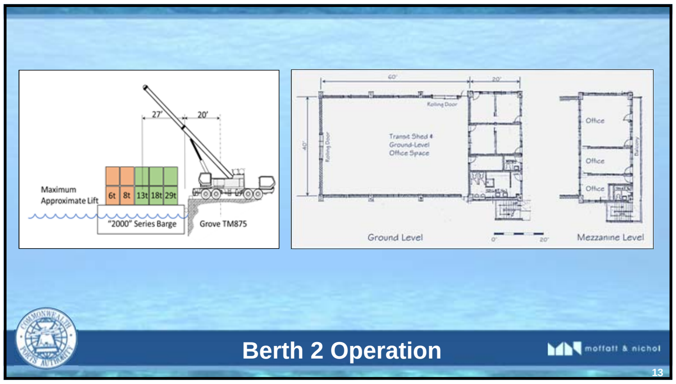

Berth 1: Quay wall corrosion, loss of backfill, missing fenders, damaged cap beam, debris and shoaling
Berth 2: Quay wall corrosion, loss of backfill missing fenders
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth Condition
moffatt & nichol
8

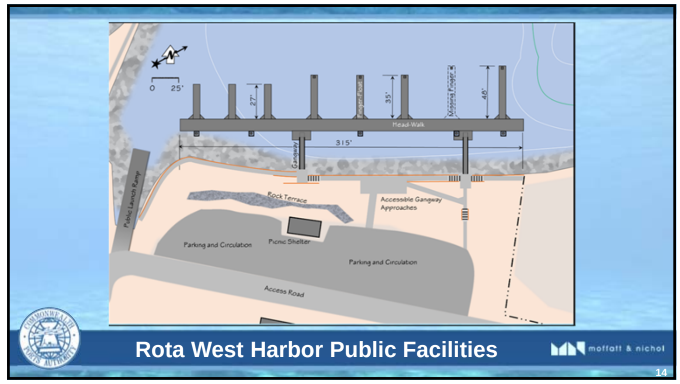

Sheet pile corrosion & loss of backfill
Missing fenders & eroded cap-beam
Debris and shoaling
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 1 Condition
moffatt & nichol
9

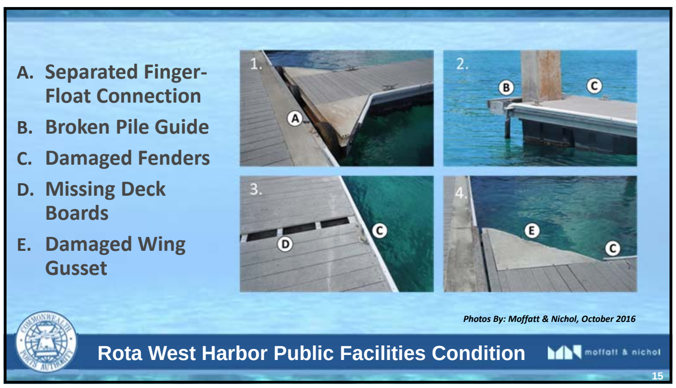

Quay wall corrosion
Loss of backfill
Lack of Fendering
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 2 Condition
moffatt & nichol
10


Rota West Harbor
Dredged Channel
Contour Depth in Meters Below MLLW
150'
Mooring Bollards (3)
Concrete Quay Wall
Rock & Coral Obstructions
0 25'
Missing Section
Berth 1
Bull Rail
Asphalt Pavement on Berth Surface
Rip-Rap Shoreline
Petroleum Riser (Abandoned)
Mooring Bollard (Bow-Line for Berth 2)
Light Tower
West Range Marker
Rota West Harbor Berth 1 Operation
moffatt & nichol
11

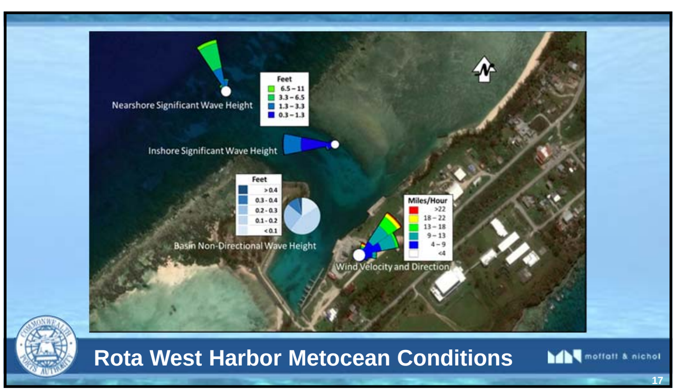

Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
100'
0 25'
Mooring Bollards (3)
Concrete Quay Wall
Berth 2
Rip-Rap Shoreline
Light Tower
Concrete Paving on Berth Surface & Circulation Area
Fire Hydrant
Transit Shed & Office Space
Un-paved Operating Area
Rota West Harbor Berth 2 Operation
moffatt & nichol
12

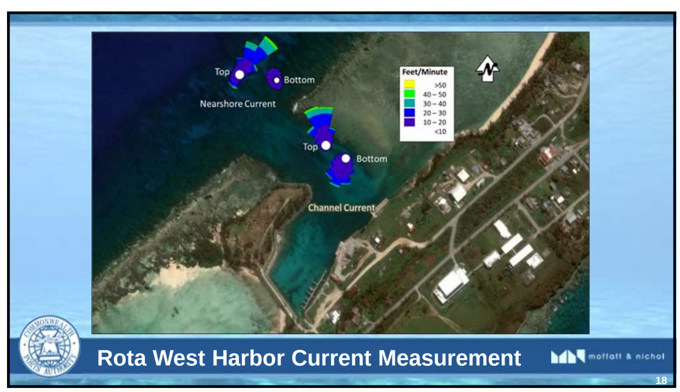

Maximum Approximate Lift
6t
8t
13t
18t
29t
27'
20'
"2000" Series Barge
Grove TM875
60'
20'
Rolling Door
Transit Shed 4
Ground-Level
Office Space
40'
Office
Office
Office
Ground Level
0'
20'
Mezzanine Level
Berth 2 Operation
moffatt & nichol
13

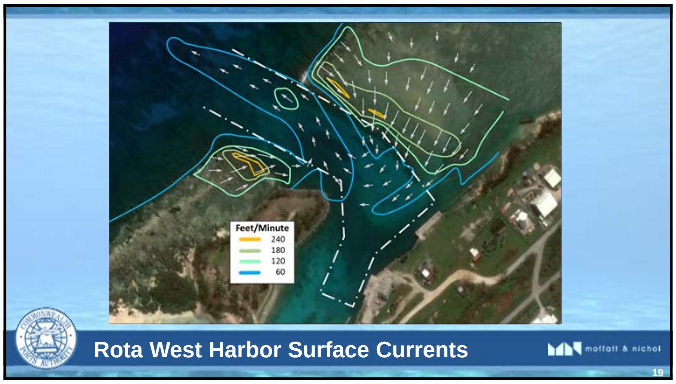

0
25'
27'
Finger-Float
35'
Missing Finger
48'
Head-Walk
315'
Gangway
Public Launch Ramp
Rock Terrace
Accessible Gangway Approaches
Parking and Circulation
Picnic Shelter
Parking and Circulation
Access Road
Rota West Harbor Public Facilities
moffatt & nichol
14

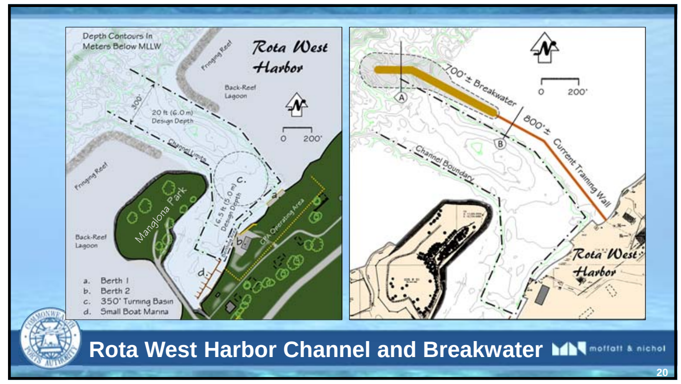

A. Separated Finger-Float Connection
B. Broken Pile Guide
C. Damaged Fenders
D. Missing Deck Boards
E. Damaged Wing Gusset
1.
A
2.
B
C
3.
D
C
4.
E
C
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Public Facilities Condition
moffatt & nichol
15

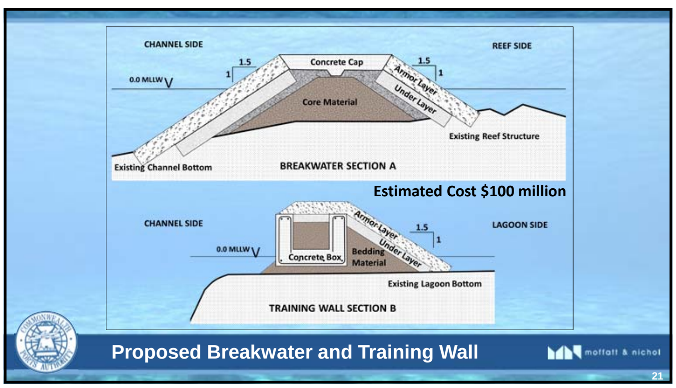

Tug Chamorro
Barge "2000"
Rota West Harbor Design Vessels
moffatt & nichol
16


Nearshore Significant Wave Height
Feet
6.5 – 11
3.3 – 6.5
1.3 – 3.3
0.3 – 1.3
Inshore Significant Wave Height
Feet
> 0.4
0.3 - 0.4
0.2 - 0.3
0.1 - 0.2
< 0.1
Basin Non-Directional Wave Height
Miles/Hour
>22
18 – 22
13 – 18
9 – 13
4 – 9
<4
Wind Velocity and Direction
Rota West Harbor Metocean Conditions
moffatt & nichol
17

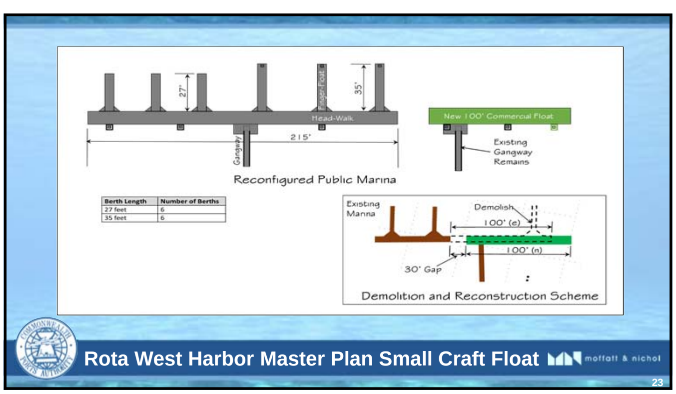

Top
Bottom
Nearshore Current
Feet/Minute
>50
40 – 50
30 – 40
20 – 30
10 – 20
<10
Top
Bottom
Channel Current
Rota West Harbor Current Measurement
moffatt & nichol
18

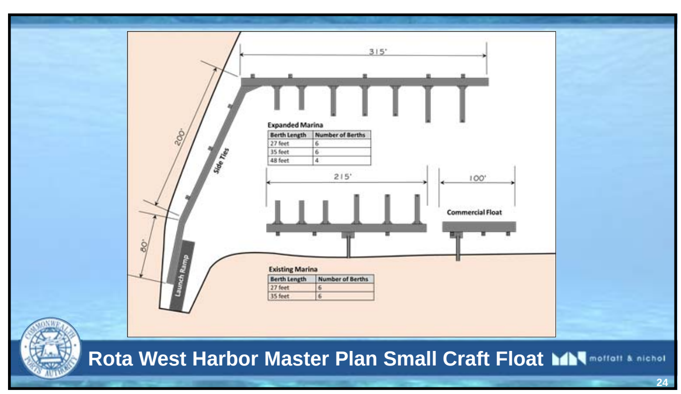

Feet/Minute
240
180
120
60
Rota West Harbor Surface Currents
moffatt & nichol
19


Depth Contours in Meters Below MLLW
Rota West Harbor
Back-Reef Lagoon
20 ft (6.0 m) Design Depth
0 200'
Manglona Park
a. Berth 1
b. Berth 2
c. 350' Turning Basin
d. Small Boat Marina
700'± Breakwater
800'± Current Training Wall
Channel Boundary
0 200'
Rota West Harbor
Rota West Harbor Channel and Breakwater
moffatt & nichol
20


CHANNEL SIDE
REEF SIDE
Concrete Cap
1.5
1
0.0 MLLW
Armor Layer
Under Layer
Core Material
Existing Reef Structure
Existing Channel Bottom
BREAKWATER SECTION A
Estimated Cost $100 million
CHANNEL SIDE
LAGOON SIDE
0.0 MLLW
Concrete Box
Bedding Material
Existing Lagoon Bottom
TRAINING WALL SECTION B
Proposed Breakwater and Training Wall
moffatt & nichol
21


Manglona Park
0 100'
Rota West Harbor
Public Access Improvements
a. Improved Manglona Park Facilities
b. Expanded Public Marina
c. Boat Repair & Storage
d. Marine Supplies & Charters
e. Restaurants & Entertainment
f. Picnic Areas w/ Shelter & Toilets
g. Public Parking
b. Public Marina & Commercial Float
Berth 2 Shed & Offices
Berth 1
Security Fence
Historical Site
Tree Snake Confinement Area
Retaining Wall
Rota West Harbor Master Plan Full Build-Out
moffatt & nichol
22


27'
35'
Head-Walk
Gangway
215'
New 100' Commercial Float
Existing Gangway Remains
Reconfigured Public Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Existing Marina
Demolish
100' (e)
100' (n)
30' Gap
Demolition and Reconstruction Scheme
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
23


315'
200'
Side Ties
Expanded Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
48 feet | 4
215'
100'
Commercial Float
80'
Launch Ramp
Existing Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
24

**Phase I Cost: $3.4 million**

- Berth 2 upgrades
- Second crane
- New commercial float
- Storage improvements
- Misc. repairs


## Rota West Harbor Master Plan Phase 1

moffatt & nichol



**Phase II Cost: $3.9 million**

- Berth 2 upgrades
- Marina and boarding float
- Breakwater Cost Share: $25 million (est.)


## Rota West Harbor Master Plan Phase 2

moffatt & nichol



**Phase III Cost: $3.4 million**

- Berth 1 upgrades


## Rota West Harbor Master Plan Phase 3

moffatt & nichol



## Discussion

moffatt & nichol

1132 Bishop Street, Suite 1595
Honolulu, HI 96813

(808) 533-7000
www.moffattnichol.com

# NOTES OF MEETING

**DATE OF MEETING:** Thursday, March 15, 2018

**TIME:** 2:00 p.m. CHST

**LOCATION:** Office of the Rota Ports Manager

**WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Rota West Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9539

**SUBJECT:** Meeting with Rota Ports Manager

**PARTICIPANTS:** See attached *Port of Rota Meeting - Sign-In Sheet*

**REFERENCE DOCUMENTS:**
- Rota West Harbor Master Plan (CPA-RS-001-15) Meeting Presentation, dated March 15, 2018 (5 sheets)

**ITEM**

***Presentation (by Moffatt & Nichol)***

Christopher Matson of Moffatt & Nichol (MN) presented the Rota West Harbor Master Plan presentations. The presentations are attached herewith.

***Summary of discussion on the Rota West Harbor Master Plan presentation***

a. Berth 1 is typically not used and is used only during emergencies.

b. Pacific Marine used Berth 1 recently for deliveries of aggregate in Super Sacks when a barge was temporarily moored at Berth 2 due to weather that would not allow it to leave the harbor.

c. Barges typically require 2-1/2 days to off-load cargo. A typical load is between 10 and 16 automobiles and 10 to 15 containers, each way (for containers only).

d. M/V Luta was recently renamed M/V Marianas. It is still unknown if/when M/V Marianas service to Rota will restart.

e. Pacific Marine currently delivers project-specific shipments between 2 to 4 times per week for Tropex Garden (Contractor) for the Commonwealth Ports Authority's (CPA) Aircraft Rescue Fire Fighting (ARFF) project. Shipments have included cement, sand and aggregate in Super Sacks and CMU on pallets.

f. CPA is seeking a federal Port Security Grant for the installation of new lighting. Although the port security grant has not been awarded yet, the lights at the terminal were recently replaced, except for the outdoor yard lights since there was no manlift available on Rota.

g. CPA had advertised a project to repair the building pavement (next to the rollup doors) but CPA received no bids. Repairs will have to be done at another time.

h. The Department of Homeland Security visited with CPA last week. The lack of a second crane on Rota to serve as a backup was discussed.

***Any additional comments on the Master Plans should be sent to Wendi Prater within one week.***

~ End *Notes of Meeting* ~

ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

Meeting with Rota Ports Manager - Sign-In Sheet

Benjamin Taisacan Manglona International Airport, Office of the Rota Ports Manager, 15 March 2018, 2:00 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | TELEPHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 1 | SHARLENE MANGLONA | CPA | 532-9497 | sharlene.manglona@cpa.gov.mp. |
| 2 | ROY REYES | PEGS | 233-7770 | rreyes@pegsmp.com |
| 3 | DENN MANGLONA | PEGS | 233-7770 | dmanglona@pegsmp.com |
| 4 | DEAN KOKUBUN | MOFFATT & NICHOL | 8085337000 | DKokubun@MoffattNichol.com |
| 5 | CHRISTOPHER MATSON | MOFFATT & NICHOL | 7576288222 | CMatson@MoffattNichol.com |
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## Rota West Harbor Master Plan (CPA-RS-001-15)

**Commonwealth Ports Authority**
**Commonwealth of the Northern Mariana Islands**
**Meeting with Rota Ports Manager**

**March 15, 2018**

moffatt & nichol

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## Rota West Harbor Public Meeting - Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Efraim Atalig, Mayor
  - Rota Legislative Delegation
  - Rota Municipal Council
  - Barrie Toves, CPA Board of Directors, Rota Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Sharlene Manglona, Rota Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination

Rota West Harbor Master Plan

moffatt & nichol

2

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## Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion

*Photo By: Micronesian Environmental Services*

Rota West Harbor Master Plan

moffatt & nichol

3

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## Rota West Harbor Master Plan Public & Stakeholder Comments

- Reliable & safe cargo delivery
- Channel & breakwater improvements
- Limitations of existing crane
- Unregulated/Uncontrolled offloading of cargo at small boat marina
- Facilitating safe offloading of cargo from light vessels
- Maintaining public access to harbor

Rota West Harbor Master Plan

moffatt & nichol

4

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## Rota West Harbor Master Plan Scope

- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan

Rota West Harbor Master Plan

moffatt & nichol

5

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Rota West Harbor General Site Plan

moffatt & nichol

6

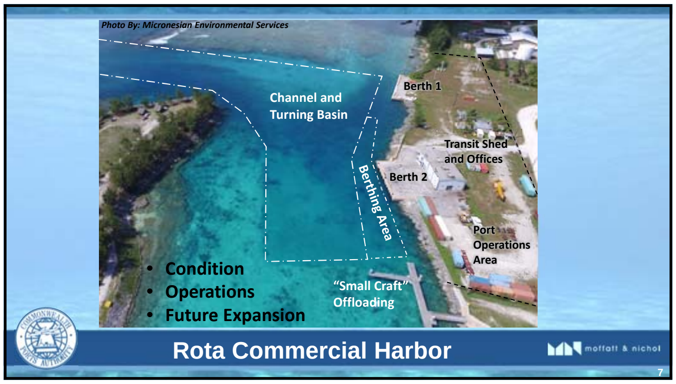
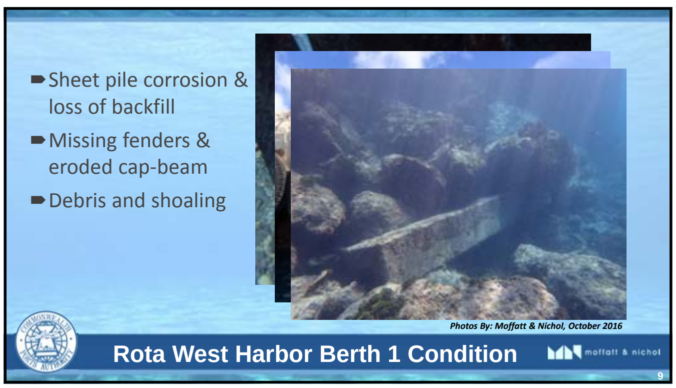
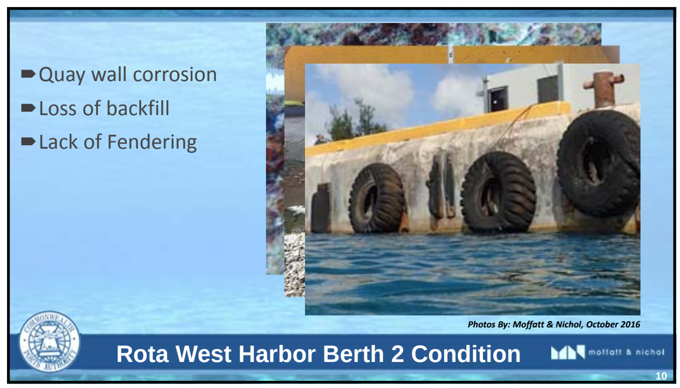
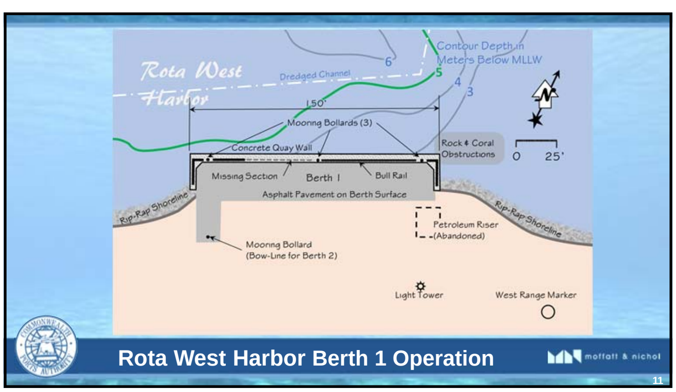


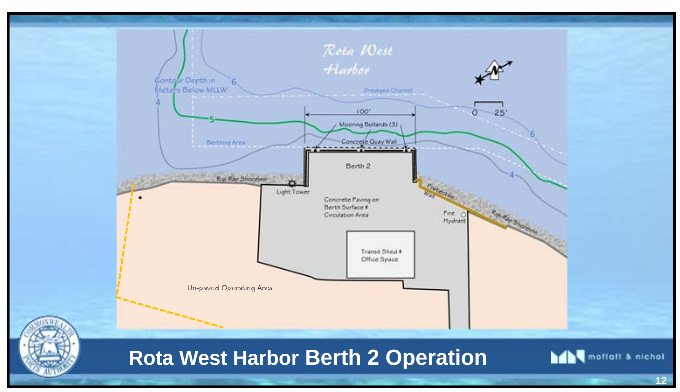
Photo By: Micronesian Environmental Services
Channel and Turning Basin
Berth 1
Transit Shed and Offices
Berth 2
Berthing Area
Port Operations Area
"Small Craft" Offloading
• Condition
• Operations
• Future Expansion
Rota Commercial Harbor
moffatt & nichol
7

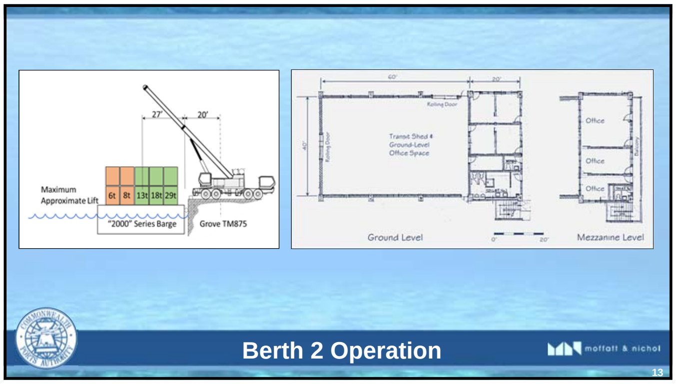

Berth 1: Quay wall corrosion, loss of backfill, missing fenders, damaged cap beam, debris and shoaling
Berth 2: Quay wall corrosion, loss of backfill missing fenders
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth Condition
moffatt & nichol
8

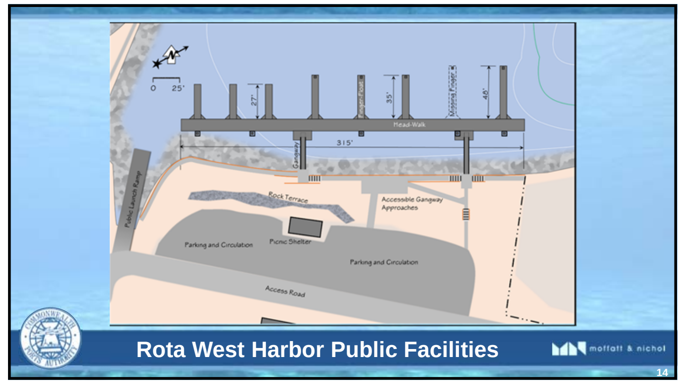

Sheet pile corrosion & loss of backfill
Missing fenders & eroded cap-beam
Debris and shoaling
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 1 Condition
moffatt & nichol
9

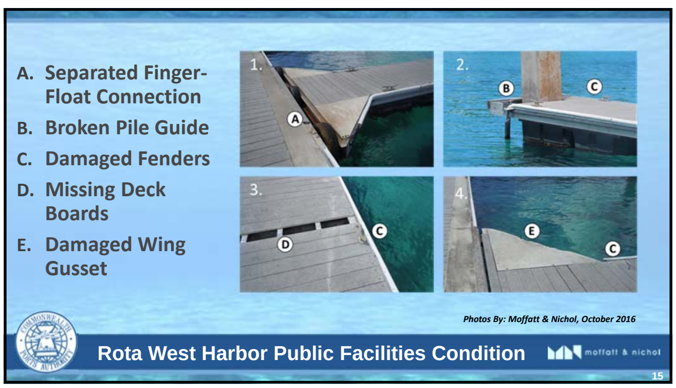

Quay wall corrosion
Loss of backfill
Lack of Fendering
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 2 Condition
moffatt & nichol
10


Rota West Harbor
Dredged Channel
Contour Depth in Meters Below MLLW
150'
Mooring Bollards (3)
Concrete Quay Wall
Rock & Coral Obstructions
0 25'
Missing Section
Berth 1
Bull Rail
Asphalt Pavement on Berth Surface
Rip-Rap Shoreline
Petroleum Riser (Abandoned)
Mooring Bollard (Bow-Line for Berth 2)
Light Tower
West Range Marker
Rota West Harbor Berth 1 Operation
moffatt & nichol
11

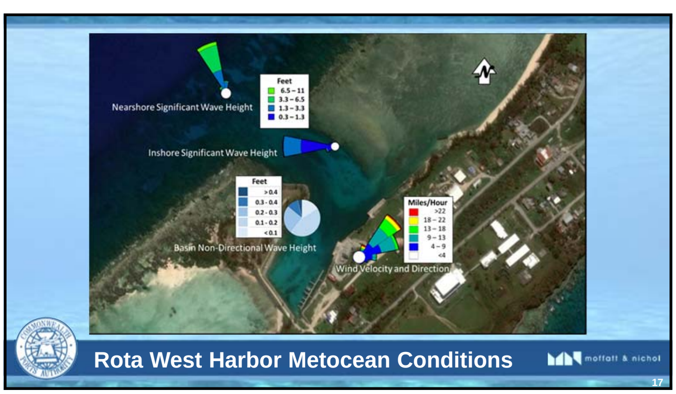

Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
100'
Mooring Bollards (3)
Concrete Quay Wall
Berth 2
Light Tower
Concrete Paving on Berth Surface & Circulation Area
Transit Shed & Office Space
Un-paved Operating Area
Rota West Harbor Berth 2 Operation
moffatt & nichol
12

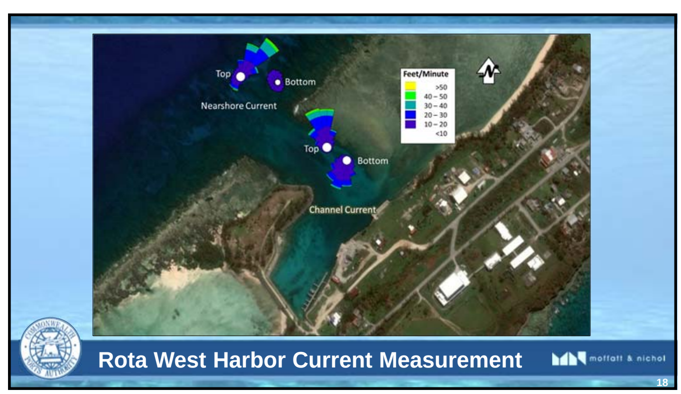

27'
20'
Maximum Approximate Lift
6t
8t
13t
18t
29t
"2000" Series Barge
Grove TM875
60'
20'
Rolling Door
Transit Shed 4 Ground Level Office Space
Office
Office
Office
Ground Level
Mezzanine Level
Berth 2 Operation
moffatt & nichol
13

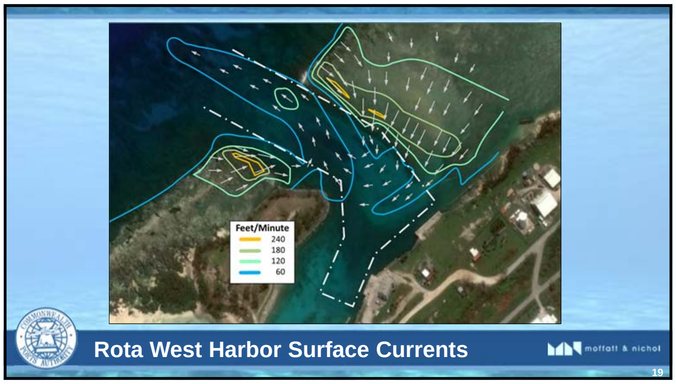

0
25'
27'
35'
46'
315'
Head Walk
Rock Terrace
Accessible Gangway Approaches
Parking and Circulation
Picnic Shelter
Parking and Circulation
Access Road
Rota West Harbor Public Facilities
moffatt & nichol
14

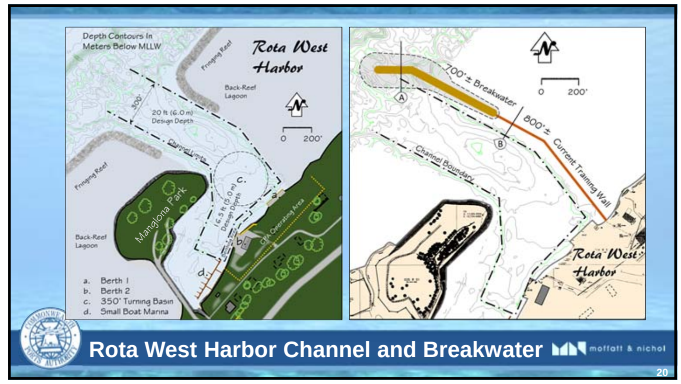

A. Separated Finger-Float Connection
B. Broken Pile Guide
C. Damaged Fenders
D. Missing Deck Boards
E. Damaged Wing Gusset
1.
2.
3.
4.
A
B
C
D
E
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Public Facilities Condition
moffatt & nichol
15

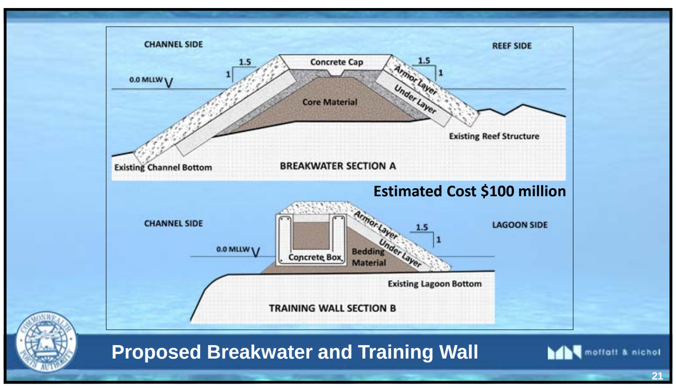

Tug Chamorro
Barge "2000"
Rota West Harbor Design Vessels
moffatt & nichol
16


Nearshore Significant Wave Height
Feet
6.5 – 11
3.3 – 6.5
1.3 – 3.3
0.3 – 1.3
Inshore Significant Wave Height
Feet
>0.4
0.3 - 0.4
0.2 - 0.3
0.1 - 0.2
<0.1
Basin Non-Directional Wave Height
Miles/Hour
>22
18 – 22
13 – 18
9 – 13
4 – 9
<4
Wind Velocity and Direction
Rota West Harbor Metocean Conditions
moffatt & nichol
17

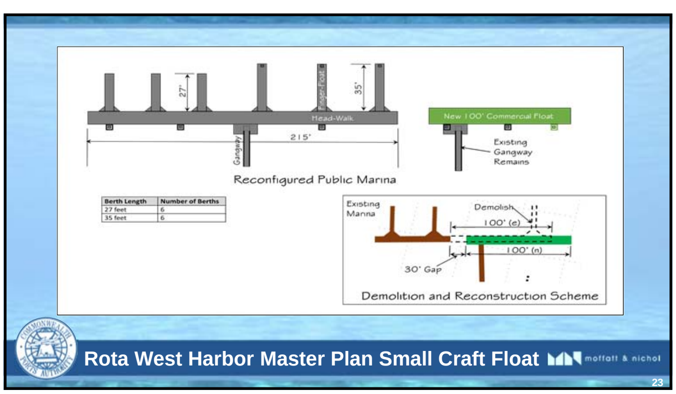

Top
Bottom
Nearshore Current
Feet/Minute
>50
40 – 50
30 – 40
20 – 30
10 – 20
<10
Top
Bottom
Channel Current
Rota West Harbor Current Measurement
moffatt & nichol
18

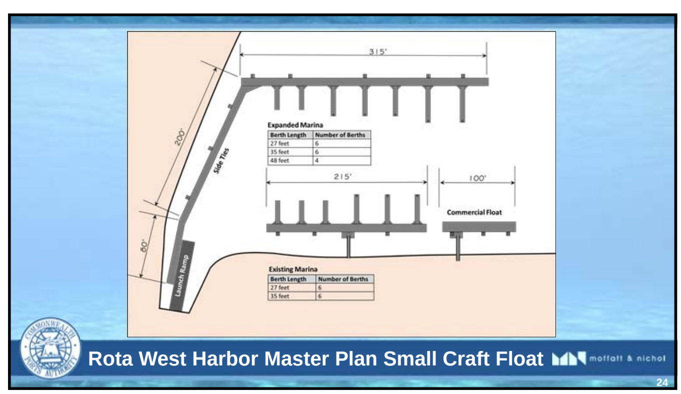

Feet/Minute
240
180
120
60
Rota West Harbor Surface Currents
moffatt & nichol
19


Depth Contours in Meters Below MLLW
Rota West Harbor
Fringing Reef
Back-Reef Lagoon
20 ft (6.0 m) Design Depth
0 200'
Manglona Park
a. Berth 1
b. Berth 2
c. 350' Turning Basin
d. Small Boat Marina
700' ± Breakwater
800' ± Current Training Wall
Channel Boundary
Rota West Harbor
Rota West Harbor Channel and Breakwater
moffatt & nichol
20


CHANNEL SIDE
REEF SIDE
0.0 MLLW
Concrete Cap
Armor Layer
Under Layer
Core Material
Existing Reef Structure
Existing Channel Bottom
BREAKWATER SECTION A
Estimated Cost $100 million
CHANNEL SIDE
LAGOON SIDE
0.0 MLLW
Concrete Box
Bedding Material
Armor Layer
Under Layer
Existing Lagoon Bottom
TRAINING WALL SECTION B
Proposed Breakwater and Training Wall
moffatt & nichol
21


Manglona Park
0 100'
Rota West Harbor
Public Access Improvements
a. Improved Manglona Park Facilities
b. Expanded Public Marina
c. Boat Repair & Storage
d. Marine Supplies & Charters
e. Restaurants & Entertainment
f. Picnic Areas w/ Shelter & Toilets
g. Public Parking
b. Public Marina & Commercial Float
Berth 2 Shed & Offices
Berth 1
Security Fence
Historical Site
Tree Snake Confinement Area
Retaining Wall
Rota West Harbor Master Plan Full Build-Out
moffatt & nichol
22


27'
35'
Head-Walk
215'
Gangway
New 100' Commercial Float
Existing Gangway Remains
Reconfigured Public Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Existing Marina
Demolish
100' (e)
100' (n)
30' Gap
Demolition and Reconstruction Scheme
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
23


315'
200'
Side Ties
Expanded Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
48 feet | 4
215'
100'
Commercial Float
80'
Launch Ramp
Existing Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
24

**Phase I Cost: $3.4 million**

- Berth 2 upgrades
- Second crane
- New commercial float
- Storage improvements
- Misc. repairs


## Rota West Harbor Master Plan Phase 1

moffatt & nichol



**Phase II Cost: $3.9 million**

- Berth 2 upgrades
- Marina and boarding float
- Breakwater Cost Share: $25 million (est.)


## Rota West Harbor Master Plan Phase 2

moffatt & nichol



**Phase III Cost: $3.4 million**

- Berth 1 upgrades


## Rota West Harbor Master Plan Phase 3

moffatt & nichol



## Discussion

moffatt & nichol

1132 Bishop Street, Suite 1595
Honolulu, HI 96813

(808) 533-7000
www.moffattnichol.com

# NOTES OF MEETING

| | | | |
|---|---|---|---|
| **DATE OF MEETING:** | Thursday, March 15, 2018 | **TIME:** | 6:30 p.m. CHST |
| **LOCATION:** | Office of the Rota Mayor Conference Room | **WRITTEN BY:** | Moffatt & Nichol (D. Kokubun, C. Matson) |
| **PROJECT TITLE:** | Rota West Master Planning Services (Project No. CPA-RS-001-15) | **MN PROJECT:** | 9539 |
| **SUBJECT:** | Rota West Harbor Second Public Information Meeting | | |

| | |
|---|---|
| **PARTICIPANTS:** | See attached *Public Meeting - Sign-In Sheet* |
| **REFERENCE DOCUMENTS:** | • Rota West Harbor Master Plan (CPA-RS-001-15) Meeting Presentation, dated March 15, 2018 (5 sheets) |

**ITEM**

***Introduction***

Opening remarks and introductions were made by Denn Manglona of Pacific Engineering Group & Services (PEGS).

***Presentation (by Moffatt & Nichol)***

Christopher Matson of Moffatt & Nichol (MN) presented the Rota West Harbor Master Plan presentations. The presentations are attached herewith.

***Summary of discussion on the Rota West Harbor Master Plan presentation***

a. *Question 1: Small boat marina slips do not receive regular repair and maintenance, which is the reason the slips are damaged.*

   Response 1: Concur, if the slips are not maintained, that could be a contributing factor to slip damage.

b. *Question 2: Cranes belong to the stevedores, correct?*

   Response 2: Yes, stevedores maintain the cranes, so a new crane would have to be negotiated and coordinated with the stevedores.

c. *Question 3: Have the pipes that penetrate the causeway been considered in locating the new public marina slips?*

   Response 3: Yes, that shouldn't preclude the marina layout shown in the master plan but additional detailed analysis needs to be performed during future design. Small boats may not be able to moor at the pipes.

d. New fenders are on their way to Rota and will be installed at Berth 1 and Berth 2 shortly.

e. Any additional comments from the public should be sent to the Commonwealth Ports Authority (CPA) within one week.

***Any additional comments from the public should be sent to the Commonwealth Ports Authority (CPA) within one week.***

~ End *Notes of Meeting* ~

ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

Public Information Meeting - Sign-In Sheet

Rota Mayor's Office Conference Room, 15 March 2018, 6:30 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | TELEPHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 1 | Wende Prater | CPA | 2376500 | wprater@cpa.gov.mp |
| 2 | DENN MANGLONA | PEGS | 233-7770 | dmanglona@pegsmp.com |
| 3 | JADENE VILLAGOMEZ | CPA | 237.6500 | cpa.boardsec@pticom.com |
| 4 | JOY ANN DLGUERRERO | CPA | 237-6500 | joydlg@cpa.gov.mp |
| 5 | PATERNO S, HOCOG | ROTA CITIZEN | 287-4159 | |
| 6 | MARK MICHAEL | DIVE ROTA / BLUE PALMS | 5323423 | mark@diverota.com |
| 7 | Roy Reyes | PEGS | 233-7770 | rreyes@pegsmp.com |
| 8 | Ed Mendiola | CPA | 237-6500 | cpa.edmendiola@pticom.com |
| 9 | SHARLENE MANGLONA | CPA | 532.9497 | sharlene.manglona@cpa.gov.mp |
| 10 | DEAN KOKUBUN | MOFFATT & NICHOL | 8085337000 | DKokubun@MoffattNichol.com |
| 11 | CHRISTOPHER MATSON | MOFFATT & NICHOL | 7576288222 | CMatson@MoffattNichol.com |
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## Rota West Harbor Master Plan (CPA-RS-001-15)

Commonwealth Ports Authority
Commonwealth of the Northern Mariana Islands
Public Information Meeting

March 15, 2018

## Welcome & Introductions

- CNMI government and CPA representatives and other distinguished guests
  - The Honorable Ralph DLG Torres, Governor
  - The Honorable Victor B. Hocog, Lt. Governor
  - The Honorable Efraim Atalig, Mayor
  - Rota Legislative Delegation
  - Rota Municipal Council
  - Barrie Toves, CPA Board of Directors, Rota Representative
  - Edward B. Mendiola, CPA Deputy Director
  - Sharlene Manglona, Rota Ports Manager
- Moffatt & Nichol – port planning and engineering consultant to CPA
- Pacific Engineering Group & Services – civil engineering and local coordination

Rota West Harbor Master Plan

2

## Meeting Agenda

- Welcome and introductions
- Public & Stakeholder Comments
- Scope of Master Plan
- Condition report
- Findings
- Master Plan recommendations
- Construction cost and phasing plan
- Discussion

Photo By: Micronesian Environmental Services

Rota West Harbor Master Plan

3

## Rota West Harbor Master Plan Public & Stakeholder Comments

- Reliable & safe cargo delivery
- Channel & breakwater improvements
- Limitations of existing crane
- Unregulated/Uncontrolled offloading of cargo at small boat marina
- Facilitating safe offloading of cargo from light vessels
- Maintaining public access to harbor

Rota West Harbor Master Plan

4

## Rota West Harbor Master Plan Scope

- Define the issues
- Document the physical conditions
- Forecast the need
- Develop solutions
- Devise an implementation plan
- Consider the costs
- Present the plan

Rota West Harbor Master Plan

5


Rota West Harbor General Site Plan

6

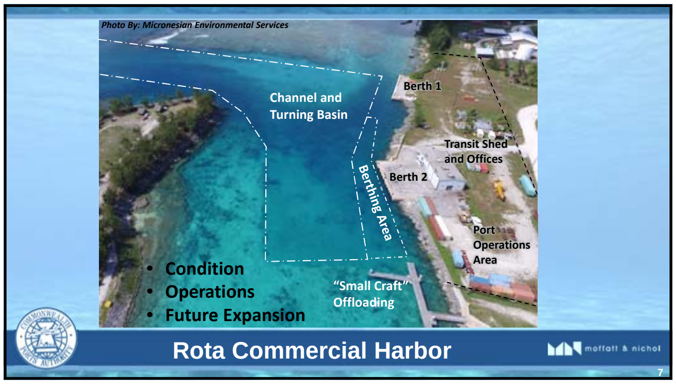
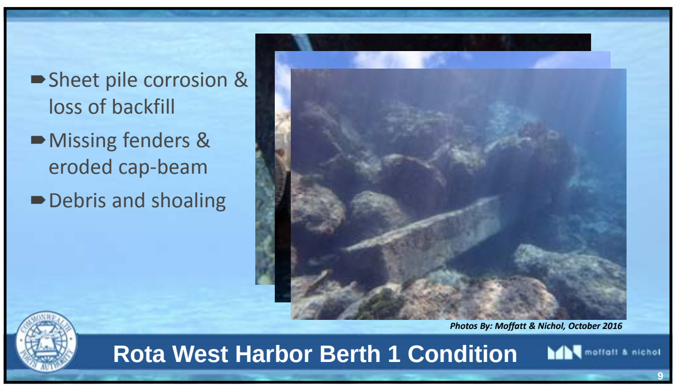
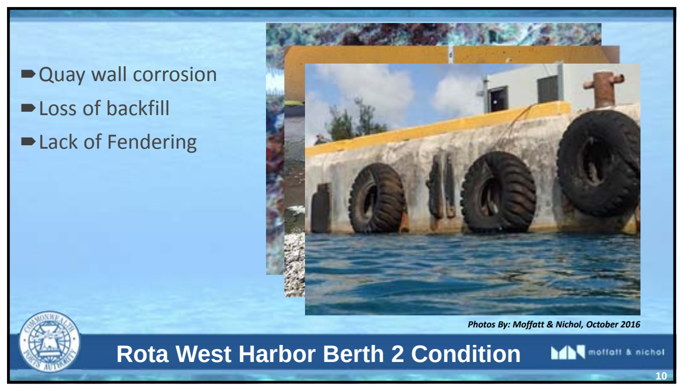
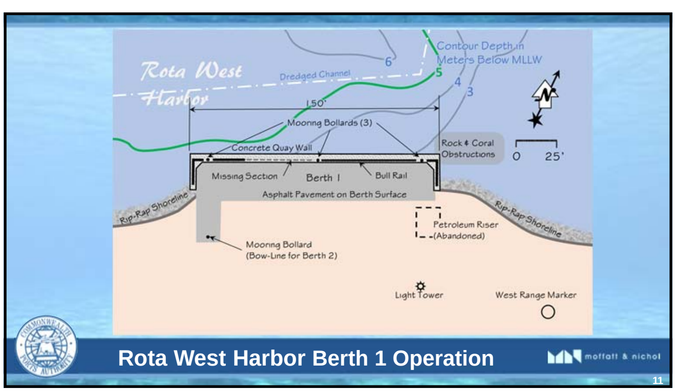


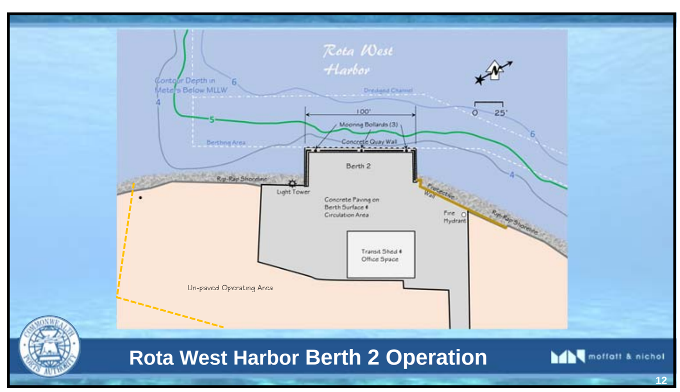
Photo By: Micronesian Environmental Services
Channel and Turning Basin
Berth 1
Transit Shed and Offices
Berth 2
Berthing Area
Port Operations Area
"Small Craft" Offloading
• Condition
• Operations
• Future Expansion
Rota Commercial Harbor
moffatt & nichol
7

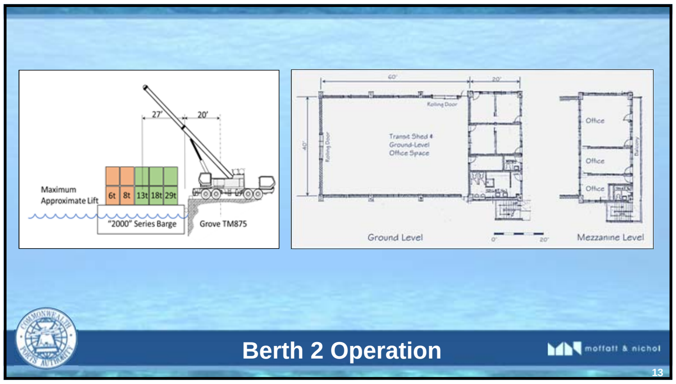

Berth 1: Quay wall corrosion, loss of backfill, missing fenders, damaged cap beam, debris and shoaling
Berth 2: Quay wall corrosion, loss of backfill missing fenders
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth Condition
moffatt & nichol
8

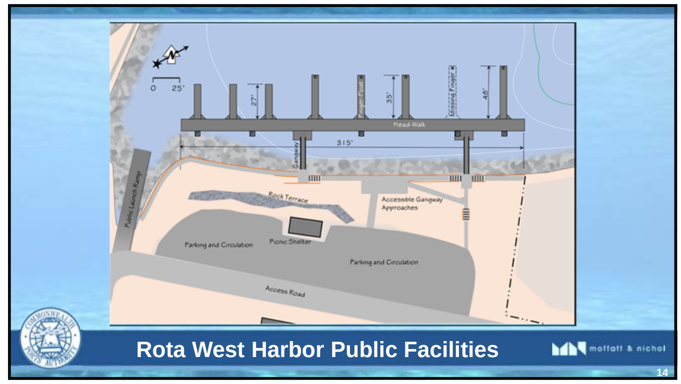

Sheet pile corrosion & loss of backfill
Missing fenders & eroded cap-beam
Debris and shoaling
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 1 Condition
moffatt & nichol
9


Quay wall corrosion
Loss of backfill
Lack of Fendering
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Berth 2 Condition
moffatt & nichol
10


Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
150'
Mooring Bollards (3)
Concrete Quay Wall
Rock & Coral Obstructions
0 25'
Missing Section
Berth 1
Bull Rail
Asphalt Pavement on Berth Surface
Rip-Rap Shoreline
Petroleum Riser (Abandoned)
Mooring Bollard (Bow-Line for Berth 2)
Light Tower
West Range Marker
Rota West Harbor Berth 1 Operation
moffatt & nichol
11


Rota West Harbor
Contour Depth in Meters Below MLLW
Dredged Channel
100'
0 25'
Mooring Bollards (3)
Concrete Quay Wall
Berthing Area
Berth 2
Rip-Rap Shoreline
Light Tower
Concrete Paving on Berth Surface & Circulation Area
Protective Wall
Fire Hydrant
Transit Shed & Office Space
Un-paved Operating Area
Rota West Harbor Berth 2 Operation
moffatt & nichol
12


Maximum Approximate Lift
6t
8t
13t
18t
29t
"2000" Series Barge
Grove TM875
27'
20'
Transit Shed 4 Ground Level Office Space
Office
Office
Office
Ground Level
Mezzanine Level
Berth 2 Operation
moffatt & nichol
13


315'
27'
35'
46'
Rock Terrace
Accessible Gangway Approaches
Parking and Circulation
Picnic Shelter
Parking and Circulation
Access Road
Public Launch Ramp
Rota West Harbor Public Facilities
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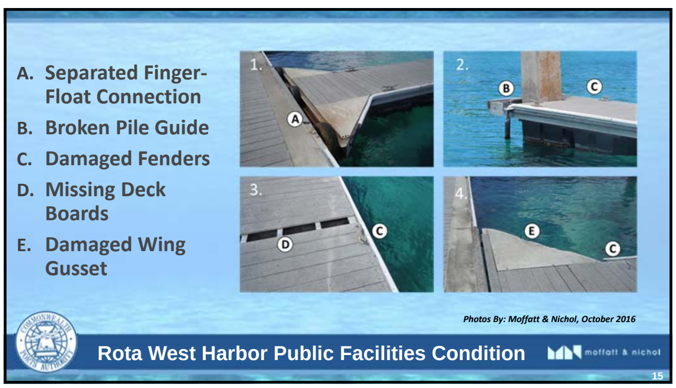
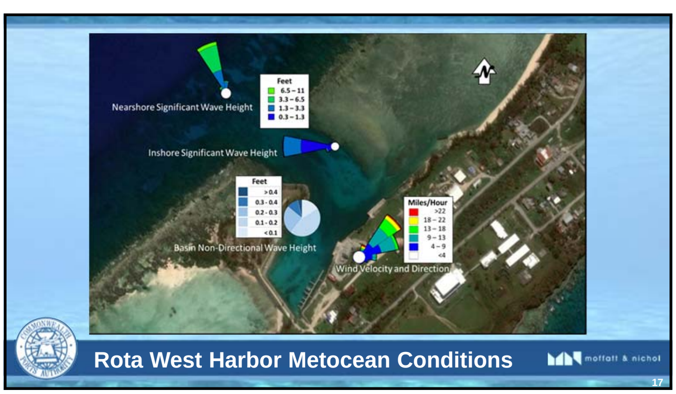
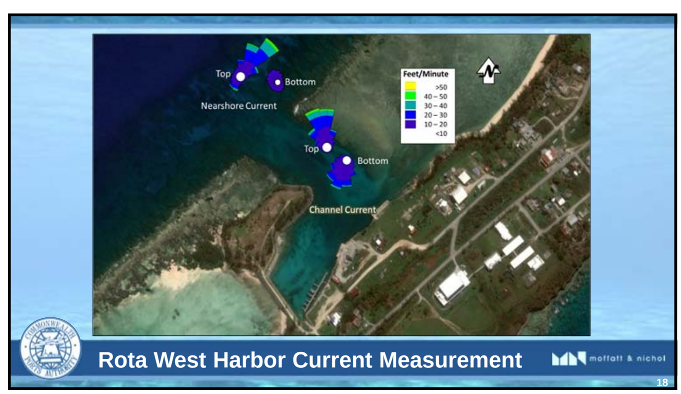
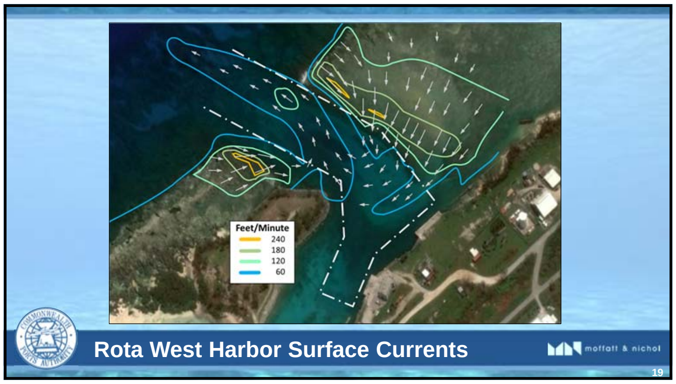
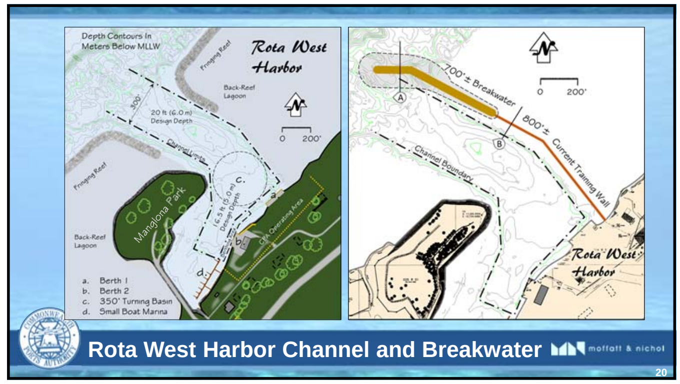

A. Separated Finger-Float Connection
B. Broken Pile Guide
C. Damaged Fenders
D. Missing Deck Boards
E. Damaged Wing Gusset
Photos By: Moffatt & Nichol, October 2016
Rota West Harbor Public Facilities Condition
moffatt & nichol
15

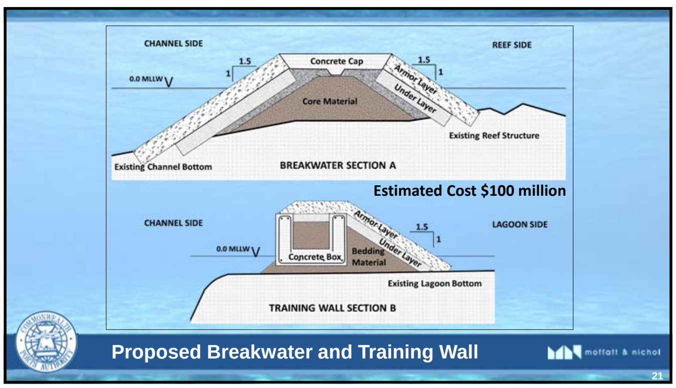

Tug Chamorro
Barge "2000"
Rota West Harbor Design Vessels
moffatt & nichol
16


Nearshore Significant Wave Height
Inshore Significant Wave Height
Basin Non-Directional Wave Height
Wind Velocity and Direction
Feet
Miles/Hour
Rota West Harbor Metocean Conditions
moffatt & nichol
17


Top
Bottom
Nearshore Current
Top
Bottom
Channel Current
Feet/Minute
Rota West Harbor Current Measurement
moffatt & nichol
18


Feet/Minute
240
180
120
60
Rota West Harbor Surface Currents
moffatt & nichol
19


Depth Contours in Meters Below MLLW
Rota West Harbor
Back-Reef Lagoon
20 ft (6.0 m) Design Depth
Fringing Reef
Manglona Park
a. Berth 1
b. Berth 2
c. 350' Turning Basin
d. Small Boat Marina
700' ± Breakwater
800' ± Current Training Wall
Channel Boundary
0 200'
Rota West Harbor and Channel and Breakwater
moffatt & nichol
20


CHANNEL SIDE
REEF SIDE
Concrete Cap
Armor Layer
Under Layer
Core Material
0.0 MLLW
Existing Reef Structure
Existing Channel Bottom
BREAKWATER SECTION A
Estimated Cost $100 million
CHANNEL SIDE
LAGOON SIDE
Concrete Box
Bedding Material
Existing Lagoon Bottom
TRAINING WALL SECTION B
Proposed Breakwater and Training Wall
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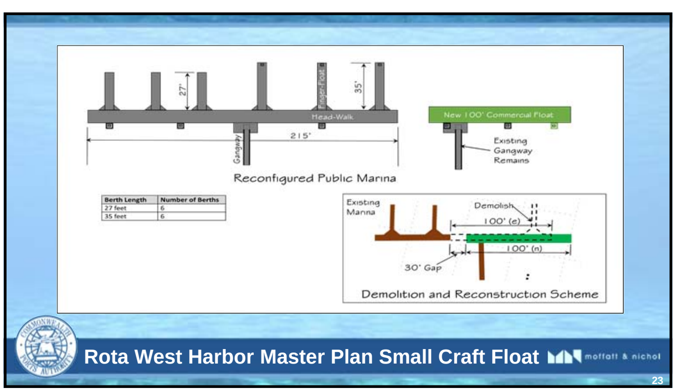
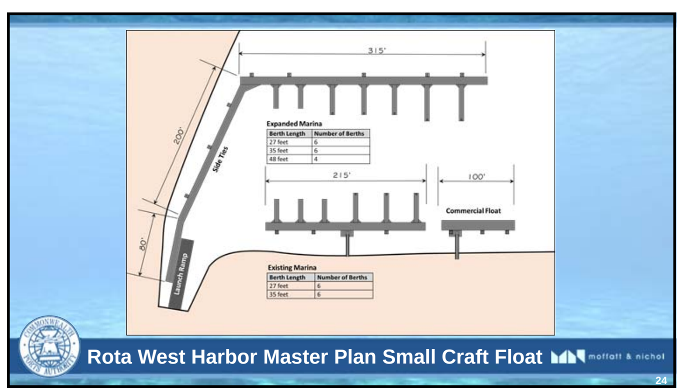
21


Manglona Park
Rota West Harbor
Public Access Improvements
a. Improved Manglona Park Facilities
b. Expanded Public Marina
c. Boat Repair & Storage
d. Marine Supplies & Charters
e. Restaurants & Entertainment
f. Picnic Areas w/ Shelter & Toilets
g. Public Parking
b. Public Marina & Commercial Float
Berth 2 Shed & Offices
Berth 1
Security Fence
Historical Site
Tree Snake Confinement Area
Retaining Wall
Rota West Harbor Master Plan Full Build-Out
moffatt & nichol
22


27'
35'
Head-Walk
215'
Gangway
New 100' Commercial Float
Existing Gangway Remains
Reconfigured Public Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Existing Marina
Demolish
100' (e)
100' (n)
30' Gap
Demolition and Reconstruction Scheme
Rota West Harbor Master Plan Small Craft Float
moffatt & nichol
23


315'
200'
Side Ties
Expanded Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
48 feet | 4
215'
100'
Commercial Float
80'
Launch Ramp
Existing Marina
Berth Length | Number of Berths
27 feet | 6
35 feet | 6
Rota West Harbor Master Plan Small Craft Float
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**Phase I Cost: $3.4 million**

- Berth 2 upgrades
- Second crane
- New commercial float
- Storage improvements
- Misc. repairs


## Rota West Harbor Master Plan Phase 1



**Phase II Cost: $3.9 million**

- Berth 2 upgrades
- Marina and boarding float
- Breakwater Cost Share: $25 million (est.)


## Rota West Harbor Master Plan Phase 2



**Phase III Cost: $3.4 million**

- Berth 1 upgrades


## Rota West Harbor Master Plan Phase 3



## Discussion

moffatt & nichol

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# NOTES OF MEETING

**DATE OF MEETING:** Friday, March 16, 2018

**TIME:** 3:00 p.m. CHST

**LOCATION:** Saipan Airport Conference Room

**WRITTEN BY:** Moffatt & Nichol (D. Kokubun, C. Matson)

**PROJECT TITLE:** Tinian Harbor Master Planning Services (Project No. CPA-TS-001-15)
Rota West Harbor Master Planning Services (Project No. CPA-RS-001-15)

**MN PROJECT:** 9538 & 9539

**SUBJECT:** Commonwealth Ports Authority Out-Brief Meeting

**PARTICIPANTS:** See attached *CPA Out-Brief Meeting - Sign-In Sheet*

**ITEM**

***Summary***

1. Public Information Meeting for the Tinian Harbor Master Plan and Rota West Harbor Master Plan were held during the week. The public seemed pleased with the Master Plans and few comments were received.
2. Tinian Harbor: During the Tinian Harbor Master Plan meeting, an attendee suggested including a list of possible uses for the medium priority area of the conceptual land use priorities plan. A free trade zone, open market, and shops and retail uses have already been suggested in the master plan. Moffatt & Nichol (MN) asked if Commonwealth Ports Authority (CPA) had been approached with proposals for other uses for the area but CPA responded that CPA has not received any proposals recently. CPA may consider issuing a request for proposal for concessionaires for the low and medium priority areas in the future.
3. Rota Harbor: During the Rota West Harbor Master Plan meeting, an attendee commented the small boat marina slips are not being maintained. Although the small boat marina is on CPA property, the slips are the property of the CNMI Department of Land and Natural Resources (DLNR). DLNR is responsible for maintaining the boat slips.
4. Deadline for final comments on the draft Master Plans is Friday, 23 March 2018.
5. MN will send Ms. Wendi Prater a draft final of both Master Plans during the week of 26 March 2018.
6. Barring receipt of any comments from CPA that require significant changes to the report(s), the Final Reports will be delivered to CPA during the first week of May 2018.
7. MN to provide thirty hard copies and one electronic copy on compact disc of the final master plan.
8. MN to provide five 24” x 36” hard copies and one electronic copy of all final layout plans on compact disc.
9. CPA would like reports to be comb bound with plastic covers (front and rear).
10. Double-sided printing for final reports is acceptable.

~ End *Notes of Meeting* ~

TINIAN HARBOR MASTER PLAN (PROJECT NO. CPA-TS-001-15) and ROTA WEST HARBOR MASTER PLAN (PROJECT NO. CPA-RS-001-15)

Out-Brief Meeting with Commonwealth Ports Authority - Sign-In Sheet

Saipan Airport Conference Room, 16 March 2018, 3:00 p.m.

| # | NAME | AGENCY / COMPANY (as applicable) | TELEPHONE (optional) | E-MAIL (optional) |
|---|---|---|---|---|
| 1 | Anthony Camacho | CPA | 483-3554 | anthony.camacho@cpa.gov.mp |
| 2 | Jerra Cing | CPA | 6643560 | jerra.cing@cpa.gov.mp |
| 3 | DENN MANGLONA | PEGS | 233-7770 | dmanglona@pegsmp.com |
| 4 | Ed Mendiola | CPA | 237-6500 | cpa.edmendiola@pticom.com |
| 5 | Skye Aldan | CPA | 237-6500 | skye.aldan@cpa.gov.mp |
| 6 | JOY ANN DLGUERRERO | CPA | 237-6500 | joydlg@cpa.gov.mp |
| 7 | Wendi Prater | CPA | 2376500 | wprater@cpa.gov.mp |
| 8 | DEAN KOKUBUN | MOFFATT & NICHOL | 8085337000 | DKokubun@MoffattNichol.com |
| 9 | CHRISTOPHER MATSON | MOFFATT & NICHOL | 7576288222 | CMatson@MoffattNichol.com |
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## Appendix F Disclaimer and Acknowledgement

Moffatt & Nichol (M&N) devoted effort consistent with (i) the level of diligence ordinarily exercised by competent professionals practicing in the area under the same or similar circumstances, and (ii) the time and budget available for its work, to ensure that the data contained in this report is accurate as of the date of its preparation. This study is based on estimates, assumptions and other information developed by M&N from its independent research effort, general knowledge of the industry, and information provided by and consultations with the client and the client's representatives. No responsibility is assumed for inaccuracies in reporting by the Commonwealth Ports Authority (hereafter “Client”), the Client's agents and representatives, or any third-party data source used in preparing or presenting this study. M&N assumes no duty to update the information contained herein unless it is separately retained to do so pursuant to a written agreement signed by M&N and the Client.

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Possession of this study does not carry with it the right of publication or the right to use the name of "M&N" in any manner without the prior written consent of M&N. No party may abstract, excerpt or summarize this report without the prior written consent of M&N. M&N has served solely in the capacity of consultant and has not rendered any expert opinions in connection with the subject matter hereof. Any changes made to the study, or any use of the study not specifically identified in the agreement between the Client and M&N or otherwise expressly approved in writing by M&N, shall be at the sole risk of the party making such changes or adopting such use.

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This document may include “forward-looking statements”. These statements relate to M&N’s expectations, beliefs, intentions or strategies regarding the future. These statements may be identified by the use of words like “anticipate,” “believe,” “estimate,” “expect,” “intend,” “may,” “plan,” “project,” “will,” “should,” “seek,” and similar expressions. The forward-looking statements reflect M&N’s views and assumptions with respect to future events as of the date of this study and are subject to future economic conditions, and other risks and uncertainties. Actual and future results and trends could differ materially from those set forth in such statements due to various factors, including, without limitation, those discussed in this study. These factors are beyond M&N's ability to control or predict. Accordingly, M&N makes no warranty or representation that any of the projected values or results contained in this study will actually be achieved.

This study is qualified in its entirety by, and should be considered in light of, these limitations, conditions and considerations.

# Appendix G References and Previous Reports

1. ADA Standards for Accessible Design, 2010

2. Layout and Design Guidelines for Marina Berthing Facilities, State of California, Department of Boating and Waterways, July 2005

3. Marinas and Small Craft Harbors, Tobiasson and Kollmeyer (second ed., 1991)

4. Planning and Design Guidelines for Small Craft Harbors, American Society of Engineers (ASCE) Manual No. 50, (third ed., 2012)

moffatt & nichol

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