CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

Chapter 2 provides an overview of the proposed action and alternatives evaluated in this EIS/OEIS for the proposed aircraft carrier berthing. The chapter begins with a description of operation, facilities and design standards that are common to both action alternatives. Then the chapter summarizes the alternatives that were considered and dismissed, and continues with a detailed description of the alternatives carried forward for analysis in this EIS/OEIS. The chapter ends with a description of the no-action alternative.

2.1 OVERVIEW

The Navy proposes to construct a new deep-draft wharf with shoreside infrastructure improvements in Apra Harbor, Guam to provide for a transient nuclear powered aircraft carrier. The nuclear powered aircraft carrier is the largest ship in the Navy's fleet. The environmental planning and preliminary design of the wharf, support infrastructure, and harbor accommodations are projected to meet the requirements of both the USS Nimitz Class (CVN 68) as well as the next generation of carrier, the Gerald R. Ford Class (CVN 78) that is anticipated to be operational in 2015.

The transient capability would increase the number of in-port days for the aircraft carrier from approximately 16 to a cumulative total of up to 63 visit days per year. The anticipated increase in the duration of visits along with the additional support requirements needed for transient capability requires 100% shoreside utility capability. The visiting transient carrier does not require housing for crew, new training or maintenance facilities but may require limited shoreside facilities for recreation, laundry, support for transportation shuttle services, and food and beverage sales. Up to 59 aircraft including strike, surveillance, control, and other logistic and combat aircraft, would either remain onboard the ship or fly to Andersen Air Force Base (AFB) where they would be assigned airfield space on a space-available basis. No airfield facility improvements are proposed. Training requirements for the carrier and its associated air wing would be fully met by existing training ranges and covered by appropriate environmental compliance documentation including the Mariana Islands Range Complex (MIRC) Draft EIS (Navy 2009) and Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, (ISR) and Strike Capability EIS (PACAF 2006). Maintenance requirements can be met with existing shoreside maintenance support.

Two locations for siting the new wharf are considered under the proposed action: 1) Polaris Point (preferred), and 2) the Former Ship Repair Facility (SRF). The alternative sites are both located at the entrance to the Inner Apra Harbor channel and the navigational approach to both is similar. Both wharves would be aligned with one edge along the coastline. In addition to these two action alternatives, the no-action alternative is described in this chapter.

2.2 ELEMENTS COMMON TO BOTH ACTION ALTERNATIVES

2.2.1 Operation

To support forward operations, Commander, United States (U.S.) Pacific Fleet plans to conduct aircraft carrier transient visits throughout the year. The present projected operational requirements indicate a proposed schedule for aircraft carrier transient visits with a cumulative of up to 63 visit days per year, with an anticipated length of 21 days or less per visit. Schedules are subject to operational, contingency, and geopolitical considerations.

Assumptions regarding operational concepts would be the same for both action alternatives and include the following.

- Aircraft carriers that would visit Guam are Nimitz Class, such as CVN 68 (currently visits Guam) and Ford Class (the next generation aircraft carrier), such as CVN 78 (see Section 2.2 for aircraft carrier specifications).
- Up to 59 aircraft (including strike, surveillance, control, and other logistic and combat aircraft) could fly off from the aircraft carrier and beddown (park) at Andersen AFB on a space-available basis, where they would follow all transient operational requirements, as is the current practice.
- A typical air wing might include:
  - 2 Hornet squadrons – 10 aircraft each
  - 2 Super Hornet squadrons – 5 aircraft each
  - 1 EA-6B squadron – 5 aircraft (EA-6B to be replaced by F-18 G in 2014)
  - E-2C – 4 aircraft
  - SH-60 – 6 aircraft
- Aircraft carrier escort vessels would be accommodated at existing Apra Harbor wharves on a space available basis, as is the current practice for port visits. For information concerning improvements and increased usage of Apra Harbor, refer to Volume 2 of this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS). For long term and cumulative impacts for increased usage of Apra Harbor, refer to Volume 7.
- Pilots may need aircraft carrier landing practice during extended visits of approximately 21 days at a time. This landing practice and any other increased fixed wing aircraft operations associated with the visiting aircraft carrier are accounted for in Volume 2, Chapter 6, Noise. All other training activities, including use of Farallon de Medinilla for aerial bombing, associated with aircraft carrier activities is captured in existing documentation including the Mariana Islands Range Complex (MIRC) EIS (Navy 2009) and Establishment and Operation of an Intelligence, Surveillance, Reconnaissance, (ISR) and Strike Capability EIS (PACAF 2006).
- Aircraft carrier munitions transfers are anticipated to occur at sea.
- Nuclear reactor re-fueling operations would not occur in Apra Harbor.

- Aircraft carrier scheduled maintenance and repairs would not be done on Guam. Scheduled maintenance and repairs refers to those maintenance operations that are regularly scheduled throughout the life a ship. Scheduled maintenance includes high-level maintenance on aircraft carriers that occurs approximately every 8 years in a dry dock for a 2-year period, as well as depot-level maintenance that occurs usually at the ship's homeport approximately every 2 years for a 6-month period.
- Emergent, or unscheduled, repairs and emergency maintenance would be provided by repair teams from Hawaii or the west coast of the U.S. mainland and use existing maintenance facilities on Guam.
- It is anticipated that transient aircraft carriers potentially would rely on shoreside utility infrastructure only after 2015.
- Aircraft carrier crew is estimated to be 5,680 people:
  - Ship's company: 3,200 people
  - Air wing: 2,480 people
- Morale, Welfare, and Recreation (MWR) services would be provided using existing base facilities. Additionally, there would be some temporary pier-side Sailor support services at the wharf that could include tent facilities for portable laundromats, telephones, and/or food vendors.
- Shuttle services would be provided during port calls to support movement within the base, as well as to off-base locations.
- Operations at the wharf would be available 24 hours per day during aircraft carrier visits.
- Up to four tugboats would be required to assist in navigating the aircraft carrier through the harbor, as is the current practice.
- All nuclear powered aircraft carriers require a minimum of 6 ft (2 m) beneath the keel to ensure cooling and firefighting system intakes do not get clogged or damaged by mud and debris from the seafloor. A water depth of -49.5 feet (ft) (-15 meters [m]) is required for nuclear powered aircraft carriers to meet this requirement under all ship loading and tidal conditions.

Daily operations at the wharf would include people arriving or waiting to depart the wharf area via bus or car, personnel congregating around the wharf's temporary facilities, and shoreside and in-water security patrols. There would be shuttle buses provided to Naval Base Guam as well as to other Guam recreation and shopping areas. Traffic would also include taxis and private vehicles.

Periodically, there would be truck traffic to the wharf to re-supply the ship. The trucks may be from Navy supply or direct from commercial vendors. The cargo movement would likely require mobile cranes or other material handling equipment, such as forklifts, to load the ship. This equipment would be brought to the wharf as needed. The frequency of deliveries would be dependent on the status of supplies on board.

There also would be temporary solid and hazardous waste storage areas provided at the site that would be managed in accordance with current Naval Base Guam practices.

All alternatives include electronic surveillance (closed circuit television), associated alarms, surface craft or swimmer detection, and underwater detection defined as electronic security systems on the landside and electronic harbor security systems on the waterside.

When the aircraft carrier is not in port, the proposed on-site Port Operations Support Building would be used for storage, including the security barriers that are deployed when the ship is docked. There would likely be other storage or administrative uses of the building when the aircraft carrier is not visiting.

2.2.1.1 Aircraft Carrier Specifications

Specifications for the nuclear powered aircraft carriers CVN 68 (Nimitz Class) and CVN 78 (Ford Class) are similar, as shown in Table 2.2-1. The specifications are based on various Navy documents and summarized in the *CVN-Capable Berthing Study* (NAVFAC Pacific 2008).

Table 2.2-1. Vessel Characteristics

Vessel Characteristic	*CVN 68 ft (m) (Nimitz Class)*	*CVN 78 ft (m) (Ford Class)*
LOA	1,123 (372.77)	1,092 (332.84)
Length at waterline	1,040 (316.99)	1,040 (316.99)
Beam, with removable appurtenances	280 (85.34)	280 (85.34)
Beam, without appurtenances	256 (78.03)	256 (78.03)
Beam at waterline	134 (40.84)	134 (40.84)
Draft, maximum	40.8 (12.44)	40.8 (12.44)
Displacement[a]	104,200 LT	104,200 LT
Height at light load (air draft)	215 (65.53)	215 (65.53)

Legend: LOA = length overall; LT = long ton
[a] The weight of the volume of water that is displaced by the underwater portion of the hull is equal to the weight of the ship. This is known as a ship's displacement. The unit of measurement for displacement is the Long Ton (1 LT = 2,240 pounds [lbs]).
Source: NAVFAC Pacific 2008.

2.2.2 Support Facilities for Each Alternative

This section summarizes facilities and structures that would be required under either action alternative. The facilities not addressed here are the staging area and access; security; aids to navigation; and MWR facilities. While these facilities are common to both alternatives, there are differences that warrant separate treatment under the respective alternative discussions (see Section 2.5 and Section 2.6).

2.2.2.1 Structures

Facility requirements for the Nimitz Class (CVN 68) and Ford Class (CVN 78) aircraft carriers would be the same for both action alternatives. The requirements were compiled from various sources and described in the *CVN-Capable Berthing Study* (NAVFAC Pacific 2008).

Onshore requirements for either class of aircraft carrier are as follows:

- Wharf
  - Up to 1,325 ft) (404 meters [m]) in length
  - 90 ft (27 m) wide
  - Deck height: +12 ft (+7 m) mean lower low water (MLLW)
  - Pier strength: 800 pounds per square foot
  - Mobile crane load: 2,140 ton
  - Bollards: 100 ton posts, 100 ft (30 m) intervals along length of wharf to attach mooring lines
  - Storm bollards: four 200 ton bollards at each end of wharf
  - Port Operations Support Building: 10,000 square feet (ft^2) (929 square meters [m^2]); a permanent, all concrete, unoccupied, storage shed with shelves and restrooms

  - Air Compressor Building: 1,195 ft^2 (185 m^2); storage for compressed air for aircraft carrier requirements
  - Water Treatment Building: 1,249 ft^2 (116 m^2); a permanent structure for taking potable water from the existing infrastructure system and treating it to Grade A quality dedicated to the aircraft carrier
  - Boiler House: 1,120 ft^2 (104 m^2); a permanent facility to house two marine oil fired boilers to provide steam to the aircraft carrier while in berth
  - 13,210 Gallon Fuel Tank: 968 ft^2 (90 m^2) (surrounded by a containment berm)
  - Electrical Substation: 10,125 ft^2 (941 m^2)
  - Bilge and Oily Wastewater (BOW) Pump Station: 625 ft^2 (58 m^2) and Bilge and Oily Wastewater Treatment System (BOWTS): 5,000 ft^2 (465 m^2); system used to treat the bilge water from the hull of the ship to remove oils, grease, and other pollutants prior to discharge into the domestic wastewater system
  - Security watch towers: 797 ft^2 (74 m^2), 30–50 ft (9–15 m) in height
  - Guard Booth: 3,100 ft^2 (288 m^2); provides security at the entrance to the pier area
  - MWR area (3-inch [in] [7.6-centimeter {cm}] asphalt with utility tie-ins for temporary MWR structures); this area would provide services such as tent facilities for portable laundromats, telephones, and/or food vendors
  - Security measures: landside and waterside
- In-water requirements for either class of aircraft carrier are as follows:
  - 600 ft (183 m) of clearance in front of wharf; (Alternative 1 Polaris Point) provides only 442 ft [135 m]) but this clearance has been approved for safe navigation
  - Minimum dredged depth: - 49.5 ft (-15 m) MLLW
  - Turning basin (minimal): 1,092 ft (333 m) radius
  - Channel width: 600 ft (183 m)
  - Navigational aids
  - Security

2.2.2.2 Design Standards

All buildings would be designed to the current Guam building code and modified by the applicable Unified Facilities Code (UFC). Buildings would be designed to meet criteria for typhoon winds, seismic events, anti-terrorism force protection, sustainability, and other issues in accordance with UFC 1-200-01. Foundations can be shallow if soil improvement methods are utilized to consolidate the fill materials and native soils beneath to prevent liquefaction. Buildings would be all concrete construction. Leadership in Energy and Environmental Design (LEED) Silver criteria would be met for proposed facilities.

2.3 ALTERNATIVES CONSIDERED AND DISMISSED

Selection of wharf location alternatives in Apra Harbor involved evaluation of multiple parameters. The key parameters are described in this section. They are:

- Wharf alignment
- Turning basin
- Access through the channel
- Wharf structural design
- Dredging methods
- Dredge disposal sites

Selecting reasonable alternatives for the wharf locations to be carried forward in the EIS/OEIS analysis was based on consideration of the following criteria. A brief description of the criteria is provided below.

- Practicability (with sub-criteria)
  - Meets security/force protection requirements
  - Meets operational/navigational characteristics
  - Cost, technology, and logistics
- Avoids/minimizes environmental impacts to the extent practicable

Security/Force Protection

The suicide bombing attack against the U.S. Navy guided missile destroyer USS Cole (DDG 67) in Yemen on October 12, 2000 elevated security as a primary criterion for all ship berthing, including aircraft carriers. Security/force protection is related to the distance between Department of Defense (DoD) assets and potential sources of threats (non-DoD lands and ships). UFC 4-025-01 (*Waterfront Security Design*) describes the required security clearance zone on the water around ships in port. These areas are delineated by deployable floating port security barriers. The minimum buffer distance between a security threat and a potential naval target is 450 ft (137 m), although the minimum could be greater depending on the force protection conditions. In addition to the specified minimum distances, the Commander, U.S. Pacific Fleet has discretionary authority to determine separation distances based on site-specific assessments of potential threats. Wharf locations that did not meet security/force protection requirements were not considered feasible.

Operational/Navigational

Apra Harbor is an active commercial and military harbor. Potential aircraft carrier berthing locations that would compromise or interfere with ongoing DoD or Guam Commercial Port operations were not considered feasible. Navigational considerations refer to the ability to safely maneuver the aircraft carrier into position during berthing and departure. Any wharf location that could not accommodate safe maneuvering of the aircraft carrier was eliminated from further analysis.

Cost, technology, and logistics

Cost, technology, and logistics refers to how expensive the project would be, whether or not there would be technological limitations to project execution, or whether logistically, the project is not feasible due to distance from support facilities, for example. Factors associated with higher project costs could include construction techniques and/or labor or materials. Wharf locations that did not meet the cost, technology, and logistics criterion were dismissed from further analysis.

Environmental

Environmental factors, such as the amount of fill and dredging and related impacts to coral reefs, were used to identify and screen potential wharf locations, wharf alignments, turning basin options, and channel alignments. The Navy identified the options that would minimize impacts to the environment to the extent practicable.

2.3.1 Wharf Location Alternatives Considered

There are no other harbors in Guam, aside from Apra Harbor, capable of supporting Naval vessels for the proposed action. Other small boat harbor locations within Guam are not feasible, as Apra Harbor is the only harbor that provides the necessary security, potential channel capability, and potential wharf locations to support the aircraft carrier berthing. Aircraft carrier port visits are currently accommodated in Apra Harbor at Kilo Wharf, as it is the only Navy wharf that meets aircraft carrier draft (depth) requirements. However, for the reasons previously discussed in Chapter 1 and below, Kilo Wharf is not a feasible option and alternative wharf locations had to be considered.

Figure 2.3-1 and Table 2.3-1 show the wharf locations in Apra Harbor that were considered. This section also describes the reasons why certain wharf locations in Apra Harbor were dismissed from further analysis and identifies the screening criteria that were used to dismiss the individual wharf locations. Table 2.3-1 also summarizes wharf alignments (Section 2.3.2), turning basin and channel alignments (Section 2.3.3), wharf structural design (Section 2.3.4), and dredging methods and disposal options (Section 2.3.5) considered and dismissed in the noted sections below.

Guam Commercial Port

The Guam Commercial Port is located on the northern side of Apra Harbor. Several locations at the Guam Commercial Port were assessed. One location, shown by number (**3**) on Figure 2.3-1 would be a new deep-draft wharf. Initial planning has been conducted for construction of this wharf by the Port Authority of Guam. Other locations that were assessed were located within the port across the channel from Delta/Echo Wharves. These locations were dismissed for the reasons discussed below.

Security/Force Protection

Location number (**3**) was dismissed as a potential aircraft carrier berthing option because it would be vulnerable to attack from ships in the Philippine Sea and difficult to defend.

Operational/Navigational

Locations at the port proximal to the channel were dismissed because the required buffer zones around the aircraft carrier would effectively close harbor access to the majority of the available commercial port operations including cargo handling. This is an untenable situation for Guam, which relies on receiving over 95% of its commodities by sea.

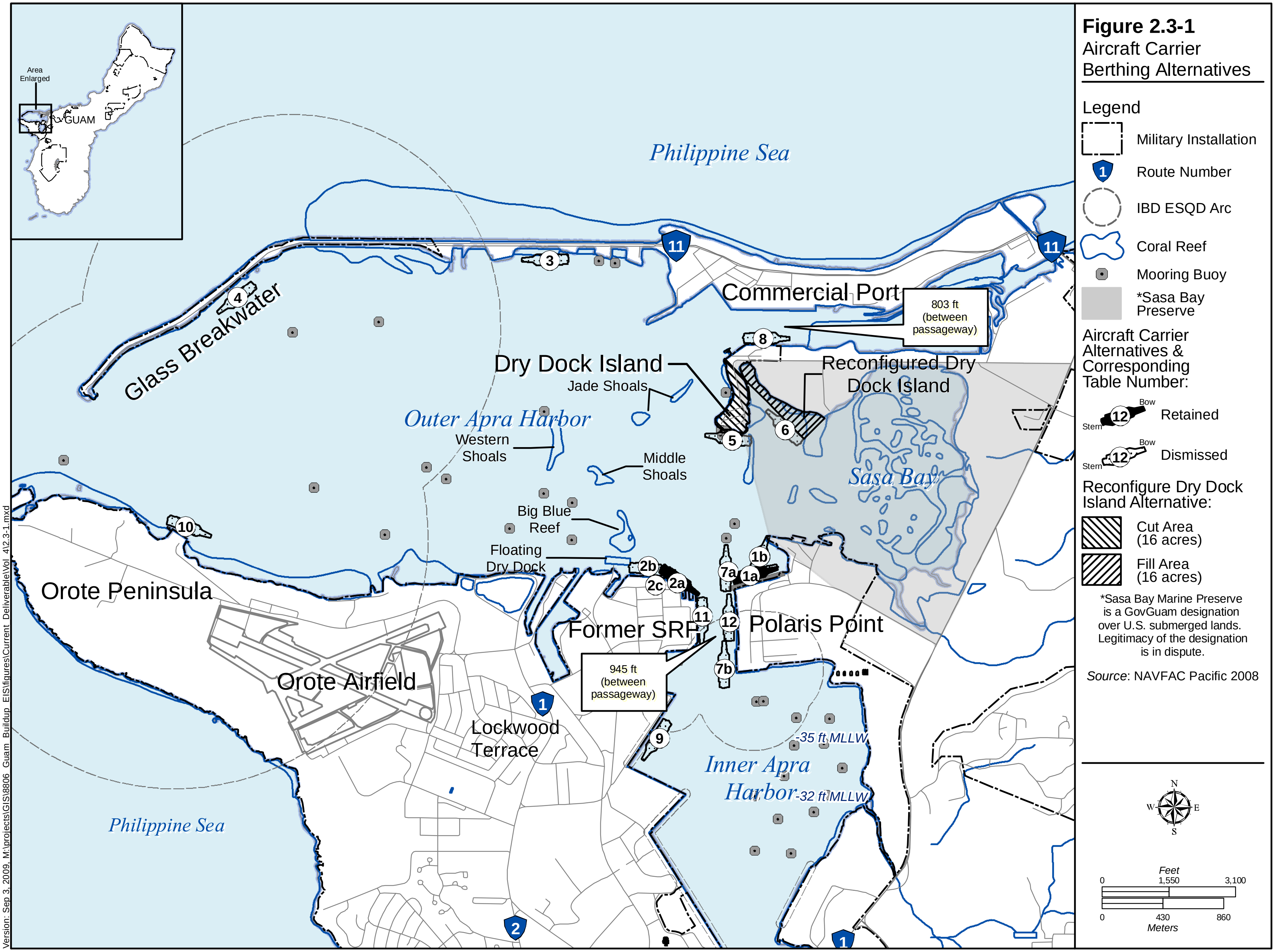


Figure 2.3-1
Aircraft Carrier Berthing Alternatives

Table 2.3-1. Alternative Analysis Summary

Component	*Alternatives* ***(Key to Figure 2.3-1)***	*Dismiss/Retain in EIS/OEIS Impact Analysis*	*Reasons for Dismissal or Retention*
Wharf Location			
New Wharf	Polaris Point (northern coast) **(1a)**	Retain	Meets all practicability criteria
	Former Ship Repair Facility (SRF) (northern coast) **(2a)**	Retain	Meets all practicability criteria
	Commercial Port **(3)**	Dismiss	Security/Force Protection Operationally/Navigationally not practicable
	Glass Breakwater **(4)**	Dismiss	Security/Force Protection Cost, technology, and logistics Environmental impact
	Dry Dock Island **(5)** and **(6)**	Dismiss	Security/Force Protection, Environmental impact Cost, technology, and logistics
	Bravo Wharf –North **(7a)** and South **(7b)**	Dismiss	Operationally/Navigationally not practicable
Existing Wharf	Delta/Echo Wharf **(8)**	Dismiss	Operationally/Navigationally not practicable
	Sierra Wharf (or other Inner Harbor Wharves) **(9)**	Dismiss	Security/Force Protection Operationally/Navigationally not practicable
	Kilo Wharf **(10)**	Dismiss	Operationally not practicable
	Lima Wharf **(11)**	Dismiss	Operationally/Navigationally not practicable
	Bravo Wharf **(12)**	Dismiss	Operationally/Navigationally not practicable
Wharf Alignment			
Polaris Point	Parallel to coast, full 600 ft clearance **(1a)**	Dismiss	Environmental impact
	Parallel to coast, reduced clearance at east end (not shown)	Retain	**Avoids environmental impact of full clearance alternative**
	Diagonal **(1b)**	Dismiss	Environmental impact Cost and technology for structural support due to wave impacts
Former SRF	Parallel to shore at coastline **(2b)**	Dismiss	Environmental & Dry Dock operation impacts
	Parallel to shore & recessed **(2c)**	Dismiss	Environmental impact of excavation
	Parallel to coast but angled through finger piers **(2a)**	Retain	**Minimizes environmental impacts**
Turning Basin			
	Optimal radius	Dismiss	Environmental impact
	Minimal radius	Retain	**Minimizes environmental impact**
Channel Alternatives			
	Optimal-straight	Dismiss	Environmental impact
	Slight bend	Dismiss	Environmental impact

Component	*Alternatives* ***(Key to Figure 2.3-1)***	*Dismiss/Retain in EIS/OEIS Impact Analysis*	*Reasons for Dismissal or Retention*
	54 degree bend	Retain	**Minimizes environmental impacts**
Wharf Structural Design (subject to modification on final design)			
	Vertical steel or concrete pile	Retain	Cost effectiveness based on oceanographic conditions
	Steel sheet pile bulkhead	Dismiss	Poor performance, historically, in seismic events
	Concrete caisson	Dismiss	Environmental impact associated with cut and fill and poor performance during seismic events
Dredging Methods (subject to modification on final design)			
	Mechanical	Retain	EIS/OEIS analysis is conservatively based on this dredge method alternative with greater potential environmental impact
	Hydraulic	Dismiss	Potentially less environmental impact than mechanical
Dredged Material Disposal (likely a combination of all three alternatives)			
	ODMDS	Retain	Viable option
	Upland placement	Retain	Viable option
	Beneficial reuse	Dismiss (viable option; but reuse project-specific details are not available for impact analysis)	Viable option; but reuse project-specific details are not available for impact analysis

Legend: **BOLD text =** potential mitigation
BOLD numbering corresponds to wharf location/alignments presented in Figure 2.3-1

Glass Breakwater

Glass Breakwater is a narrow strip of man-made land that separates the Philippine Sea to the north and Outer Apra Harbor to the south (see number [**4**] on Figure 2.3-1). There are no existing wharves or piers on the breakwater. This location was dismissed for reasons discussed below.

Security/Force Protection

- A wharf at this location would be vulnerable to attack from ships in the Philippine Sea and difficult to defend. Also, access to the site would be through non-DoD lands representing an additional force protection issue.

Environmental

- Extensive fill would be required to provide the amount of shoreside land area for activities and accommodate the movement of more than 5,600 personnel on and off the ship.
- Cost, Technology, and Logistics.
- There are no existing utilities in the vicinity of the remote site, and providing these utilities at the level an aircraft carrier requires would be cost prohibitive.
- The area is subject to wind and wave events that would require significant costs to meet structural design requirements.
- The single lane access road would require structural improvements to support two lanes for truck and bus traffic.
- The site is a great distance from the base, which is problematic for personnel quality of life activities and supply replenishment. Personnel would have to rely on bus service to access

base amenities. The Navy Supply Wharf is X-Ray, which is at the southernmost point of Inner Apra Harbor.

Dry Dock Island

Dry Dock Island is located south of the Guam Commercial Port, near the Sasa Bay Preserve. Dry Dock Island (see numbers [**5**] and [**6**] on Figure 2.3-1) was dismissed as described below.

Security/Force Protection

Access to the site would be through non-DoD land, representing a force protection issue.

Environmental

- Extensive fill would be required to provide the amount of shoreside land area for activities and to accommodate the movement of more than 5,600 personnel on and off the ship. Also, as presented in Section 2.3.3.1, the required turning basin for this location would not avoid or minimize coral loss.

Cost, Technology, and Logistics

- The site is a great distance from the base, which is problematic for personnel quality of life activities and supply replenishment.
- The emergency response, unscheduled (emergent) repair, and radioactive waste management facilities are located on Polaris Point.
- The utilities on Dry Dock Island that support Echo and Delta Wharves do not have the capacity to support a carrier.
- The access road, which is a service road for the parallel petroleum, oil, and lubricants (POL) pipeline, and the pipeline itself would require structural improvements, and possibly relocation to support two lanes for truck and bus traffic.
- The site would create incompatible uses with existing recreational use of parts of Dry Dock Island.

Bravo and Lima Wharves

Bravo and Lima Wharves were dismissed because of operational/navigational reasons, as discussed below. Bravo Wharf locations are shown as numbers (**7a**), (**7b**), and (**12**) on Figure 2.3-1. Lima Wharf is shown as number (**11**) on Figure 2.3-1.

Operational/Navigational

Bravo and Lima Wharves are located within the Inner Apra Harbor channel. The Inner Apra Harbor channel is difficult to navigate in high cross-wind conditions. In addition, the carrier presence in the channel with the required floating security barriers would interfere with ship traffic to and from Inner Apra Harbor wharves and restrict submarine access to Polaris Point Wharves. Another operational limitation to using these locations is that nuclear submarines are already utilizing Alpha and Bravo Wharves.

Delta/Echo Wharves

Delta/Echo Wharves are located south of the Guam Commercial Port, within a channel that is 803 ft (245 m) wide. Please see number (**8**) on Figure 2.3-1 for the location of these wharves.

Operational/Navigational

Delta/Echo Wharves were dismissed because the required buffer zones around the aircraft carrier would obstruct harbor traffic.

Sierra Wharf (and all Inner Apra Harbor Locations)

In order to access Sierra Wharf and other Inner Apra Harbor locations, a narrow channel must be navigated. The narrow channel entrance to Inner Apra Harbor is 945 ft (288 m) across. Sierra Wharf is identified as number (**9**) on Figure 2.3-1. These locations were dismissed as discussed below.

Security/Force Protection

The narrow channel that provides access to these locations could be obstructed by a disabled or sunken ship, and potentially trap the aircraft carrier if it were berthed at any of the Inner Apra Harbor Wharves. Mobility and responsiveness are critical and the time required to remove an obstruction from the Inner Apra Harbor Channel would be unacceptable.

Operational/Navigational

The width of the narrow channel leading to Inner Apra Harbor would not allow for the minimum buffer distance around an aircraft carrier to be met without obstructing harbor traffic.

Kilo Wharf

Kilo Wharf is located on the western edge of Apra Harbor on Orote Peninsula. Kilo Wharf is indicated as number (**10**) on Figure 2.3-1 and was dismissed, as discussed below.

Operational/Navigational

This wharf is DoD's only dedicated munitions wharf in the Western Pacific Region. For planning purposes, Apra Harbor currently supports an average of 16 days in port per year for carrier and CSG port calls (however, as described in Chapter 1, this schedule varies based on Fleet operational requirements). Currently, the visits are disruptive to munitions operations, but manageable. The proposed increased frequency and duration of carrier visits (a maximum of 63 days in port per year) coupled with expected increased ammunition ship operations would result in a significant negative impact on the ability of the Navy to meet their munitions mission, as described in Chapter 1 of this Volume.

In conclusion, only the Polaris Point and Former SRF sites meet the criteria described in Section 2.3, and consequently these alternatives were retained and carried forward for detailed impact analysis in this EIS/OEIS.

2.3.2 Wharf Alignment

Wharf alignment describes the position of the wharf relative to the coastline. For example, the alignment can be parallel to the shore (marginal wharf) where the back edge of the wharf is land based. A wharf can also be aligned at an angle to the coastline where one terminus is land based and the other three edges are facing the water. Structural engineers were tasked with developing the best alignment options at the Polaris Point and Former SRF sites (NAVFAC Pacific 2008). These wharf alignment options were evaluated based on coastal engineering considerations, avoiding or minimizing environmental impacts, and minimizing impacts on harbor operations.

Polaris Point

Two wharf alignments were assessed for Polaris Point: parallel to shore (east-west) and a diagonal alignment from Polaris Point across the bay (southwest to northeast) (see Figure 2.3-1, **1a** and **1b**). For the parallel to shore (east-west) alignment, two options for aircraft carrier approach clearance were considered. The difference between the two options has to do with the clearance area provided in front of the wharf at the eastern end. The specifications for an aircraft carrier require an approach clearance area of 600 ft (183 m) extending from the edge of the entire length of the wharf. This area must be free of obstacles. To achieve the standard clearance distance for the parallel alignment, the land outcrop north of Polaris Point would have to be removed. Survey data indicated there is coral along the outcrop that would have to be removed to provide the 600 ft (183 m) of clearance in front of the wharf at the eastern end. To minimize impacts to coral, a reduced clearance option was proposed specifically to avoid the environmental impact associated with excavating this outcrop of land with coral cover. Port operations and harbor pilots were consulted and provided concurrence that this reduction in the berth was acceptable from a navigation perspective. Additionally, verbal concurrence was provided from Commander, U.S. Pacific Fleet and Naval Sea Systems Command (NAVSEA) with respect to this modification for the aircraft carrier berth.

In addition to minimizing environmental impacts, the parallel to shore (east-west) alignment minimizes the impact to navigation along the channel leading into Inner Apra Harbor. There would be security barriers associated with the aircraft carrier when in port that would have to be adjusted to allow for channel traffic as necessary. The new wharf and operations at the wharf would not interfere with harbor operations at the adjacent Bravo Wharf.

From a coastal engineering perspective, this wharf alignment is preferred over the diagonal Polaris Point option, as the likelihood of deck overtopping from waves would be reduced.

The diagonal alignment also would require removal of the land outcrop north of Polaris Point but to a greater extent. A harbor control tower located at the point would have to be relocated. By dismissing this alternative, a potential direct impact to coral is avoided. The diagonal alignment alternative has the primary storm wave energy perpendicular to the wharf structure rather than along the shore. Of all the alignment alternatives, the diagonal alignment is the one that would be most exposed to storm waves. A more substantial structure would be required to prevent buckling in deep water when subjected to wave forces. There would be additional construction costs to achieve the stability required. The diagonal alignment has the additional disadvantage of poor aesthetics. The nearby bay and beach are potential family recreational areas with planned amenities for the Polaris Point Field and recreation area. The massive wharf structure would obstruct views from the beach.

Therefore, for the reasons discussed above, the parallel to coast (reduced clearance) option was retained as the preferred wharf alignment option for Polaris Point.

Former SRF

Three berth alignments were studied at the Former SRF. The alignments considered were all parallel to shore. Two wharf alignments were considered but eliminated from further consideration in this EIS/OEIS. The first, an east-west alignment along the existing coastline was dismissed because this alignment would permanently block access to the dry dock operations even when an aircraft carrier was not present. Figure 2.3-1 shows this alignment located closest to the dry dock and parallel to the coastline (shown as [**2b**]). The second dismissed alignment would also be aligned east-west, but would be recessed into the existing shoreline allowing the dry dock traffic to pass, but this option would excavate significant amounts of existing land area. This recessed alternative would be located south of the first east-west alternative described (shown as [**2c**] on Figure 2.3-1).

The wharf alignment alternative retained for further consideration in this EIS/OEIS follows the current shoreline as it extends from the end of the finger pier at Lima Wharf in a north-westerly direction toward the current location of the floating dry dock (AFDB-8) (see [**2a**] on Figure 2.3-1). The precise final location in the onshore-offshore direction is subject to minor adjustment during final engineering design. The berth face runs approximately along the -50 ft (-15 m) MLLW contour, which meets the aircraft carrier requirement and minimizes the amount of dredging/excavation required at the shoreline. When the aircraft carrier is in port, there would be no access to the dry dock by other ships. The wharf alone would not interfere with dry dock access.

Based on the consideration of the various wharf alignment options, it was determined that the parallel to shore wharf alternatives at both the Former SRF and Polaris Point would be retained.

2.3.3 Channel Options

The *CVN-Capable Berthing Study* (NAVFAC Pacific 2008) assessed three channel alignment options that are applicable to both alternative wharf locations as follows and as shown on Figure 2.3-2. These alignments include:

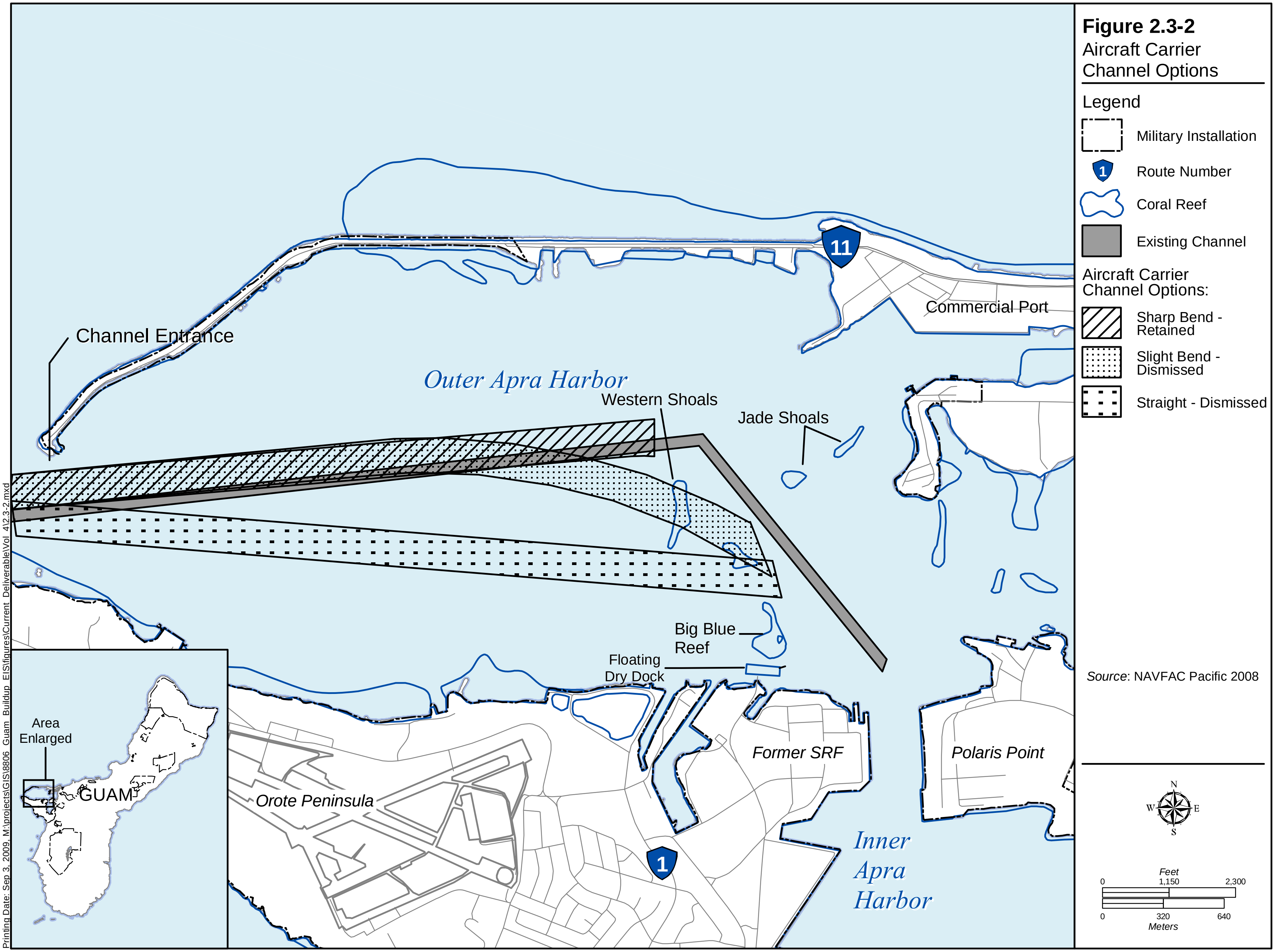
- Sharp bend (54 degrees)
- Straight channel
- Slight bend

In that study, a high priority was placed on reducing dredging impacts to coral while still complying with published design criteria for nuclear powered aircraft carrier navigation. Where there was a choice, high quality coral (high in biodiversity and percent cover) was protected over low quality coral (low in biodiversity and percent coverage) (see Chapter 11, Marine Biological Resources for more information). As shown in Figure 2.3-2, the sharp bend option follows the same location as the existing navigational channel, but the channel would be widened to 600 ft (183 m) to meet the UFC channel width requirements for a nuclear powered aircraft carrier. Commercial shipping traffic would continue to use this existing navigational channel. To minimize and avoid impacts to coral, there would be a 54 degree angle bend in the vicinity of Jade and Western Shoals. Of the three channel alignment options, this is the least favorable for navigation but the least environmentally damaging. Tugboats would be required to assist an aircraft carrier through the channel and into the berth. No dredging would be required to accommodate ship movement around the bend, but additional navigational aids may be required. The sharp bend channel option, while meeting operational requirements, is carried forward in the EIS/OEIS because it also minimizes impacts to coral.

The other two channel options considered, but dismissed, are located south of the sharp bend alignment and provide a more direct approach (Figure 2.3-2). These two channel options would require dredging through coral shoals and significantly increase the dredging volume and direct impact to coral. These two channel options were dismissed from further consideration in the EIS/OEIS because of the direct impact to high quality coral.

2.3.3.1 Turning Basin

Because of ship design, aircraft carriers are always berthed starboard (right side of carrier) to the wharf. To enable berthing of the carrier on the starboard side and its departure, a turning basin is required in front of Polaris Point or the Former SRF Wharves. A turning basin is a circular area free of obstruction



Printing Date: Sep 3, 2009, M:\projects\GIS\8806_Guam_Buildup_EIS\figures\Current_Deliverable\Vol_4\2.3-2.mxd that provides sufficient maneuver area for an aircraft carrier to be pivoted and then berthed on its starboard side. Because wind and waves exert uncontrolled additional forces on aircraft carrier movement in a harbor, tugboats are required to guide the aircraft carrier into a starboard position parallel to the wharf as well as assist during its departure. Because of the water depth requirements of an aircraft carrier, the turning basin would be dredged to a depth of -49.5 ft (-15.0 m) MLLW.

There are specifications (minimum and optimum) for establishing turning basins. The *CVN-Capable Berthing Study* (NAVFAC Pacific 2008) recommends the optimal radius of 2,200 ft (671 m) for an aircraft carrier; that is double the length overall of the ship. However, to reduce dredging and impact to coral, the minimal radius of 1,092 ft (333 m) for the turning basin was retained. Because of advanced navigational aids, Commander, U.S. Pacific Fleet has determined the minimum radius would allow the transient aircraft carrier with its tug escorts to be safely maneuvered in a 360 degree circle with appropriate margins of navigational safety. Further reductions of the turning basin radius were proposed and dismissed by the Navy because the radius retained is the minimum acceptable radius for navigational safety.

As shown on Figure 2.3-3, the optimal radius turning basins considered but dismissed are shown as red circles. The retained turning basin radii are shown as green circles on the same figure. Figure 2.3-4 shows the positions of the aircraft carrier under the two action alternatives as well as the location of the turning basin in Inner Apra Harbor that was dismissed, as discussed below.

The following turning basin options were also considered but dismissed:

- *Relocate the turning basin to deeper water in Outer Apra Harbor and move the carrier in reverse when leaving the berth.* All ships are more difficult to control (speed and direction) in reverse and the risks increase with the length of the ship. A carrier may need to leave the berth under emergency conditions and reversing the ship in a hurry would be difficult. This option does not meet the criteria for practicability (including requirements for security/force protection and operational/navigational characteristics).
- *Relocate the turning basin to Inner Apra Harbor, while maintaining one of the proposed Outer Apra Harbor berths (Polaris Point or Former SRF).* As a replacement for an Outer Apra Harbor turning basin, an Inner Apra Harbor turning basin would reduce the volume of direct impact to coral. However, the Inner Apra Harbor turning basin would not eliminate the need for an Outer Apra Harbor turning basin. After making the 180 degree turn in Inner Apra Harbor, the ship bow would be facing north as it exits the channel. Once it clears the channel, it must be pivoted 90 degrees before being guided into either Polaris Point or the Former SRF berths. A full 360 degree turning basin is required for safe navigation. This option is dismissed because of practicability (operational/navigational) and environmental criteria.
- Use of Dry Dock Island as a carrier berth location instead of Polaris Point or the Former SRF to eliminate the need for a turning basin. Reasons for dismissal of Dry Dock Island from full impact analysis have been previously described. Two options were proposed for Dry Dock Island: the current configuration and a reconfigured land mass that relocates the western shoreline to the northeast. The second option would require dredging and fill within the Sasa Bay Preserve, but it would provide a larger area for aircraft carrier movement. The second option was subsequently dismissed.

The Dry Dock Island options were also dismissed because they do not eliminate the need for a turning basin, would not avoid or minimize coral loss, and there is insufficient area to negotiate the sharp turns

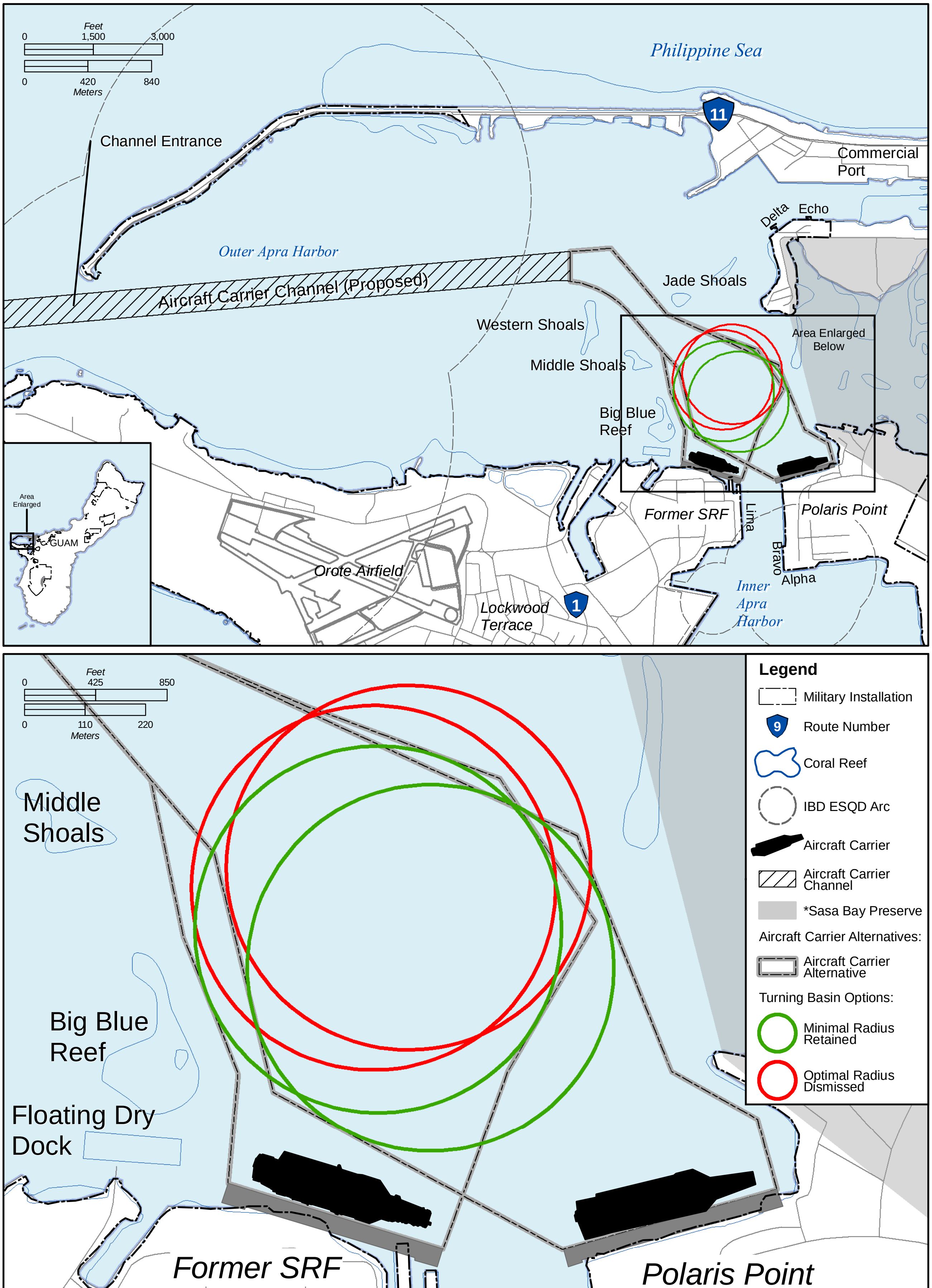


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Figure 2.3-3
Aircraft Carrier Berthing Channel & Turning Basin

*Sasa Bay Marine Preserve is a GovGuam designation over U.S. submerged lands. Legitimacy of the designation is in dispute.

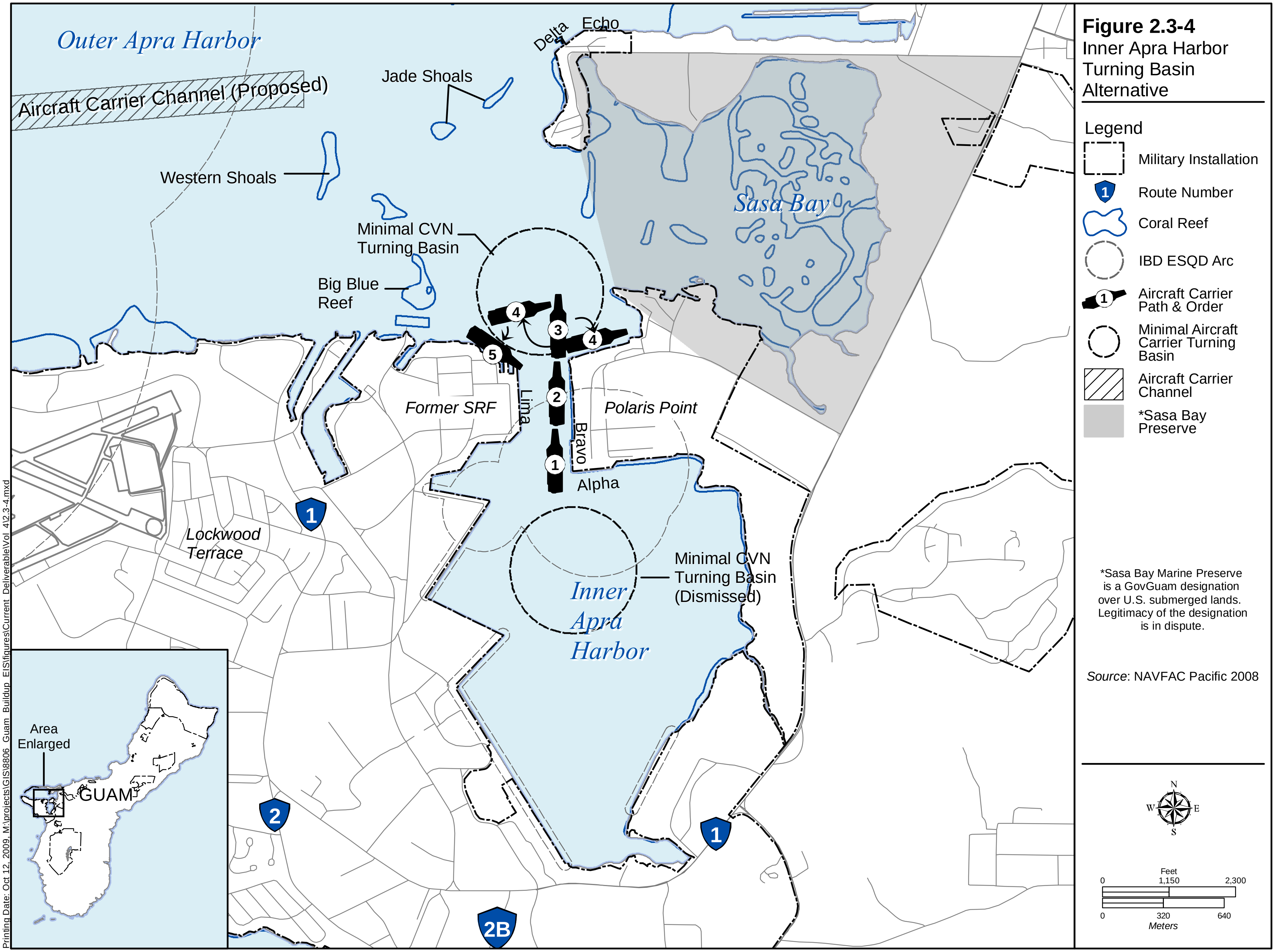


Figure 2.3-4
Inner Apra Harbor Turning Basin Alternative

Printing Date: Oct 12, 2009, M:\projects\GIS\8806 Guam Buildup EIS\figures\Current Deliverable\Vol 4\2.3-4.mxd without a turning basin (Figure 2.3-5). In summary, the Dry Dock Island options were eliminated from further analysis under the cost, logistics, and technology and environmental criteria.

2.3.4 Structural Design

The *CVN-Capable Berthing Study* (NAVFAC Pacific 2008) evaluated wharf structural design options for general site compatibility, constructability, costs, and seismic performance. Structural design alternatives included:

1. Vertical-pile-supported wharf on armored sloped embankment
2. Tied-back steel sheet pile bulkhead
3. Concrete caissons

While both the sheet pile bulkhead and concrete caissons are used in Apra Harbor, it was determined that a pile supported wharf for this proposed action is preferable for several reasons, including superior seismic performance, less dredging, and less cost.

All design options would disturb the same area and have comparable impacts, but there are structural advantages to a steel pile supported wharf as described below. Therefore, steel pile construction is retained as a wharf design option for consideration in this EIS/OEIS. A brief summary of each design option is presented below.

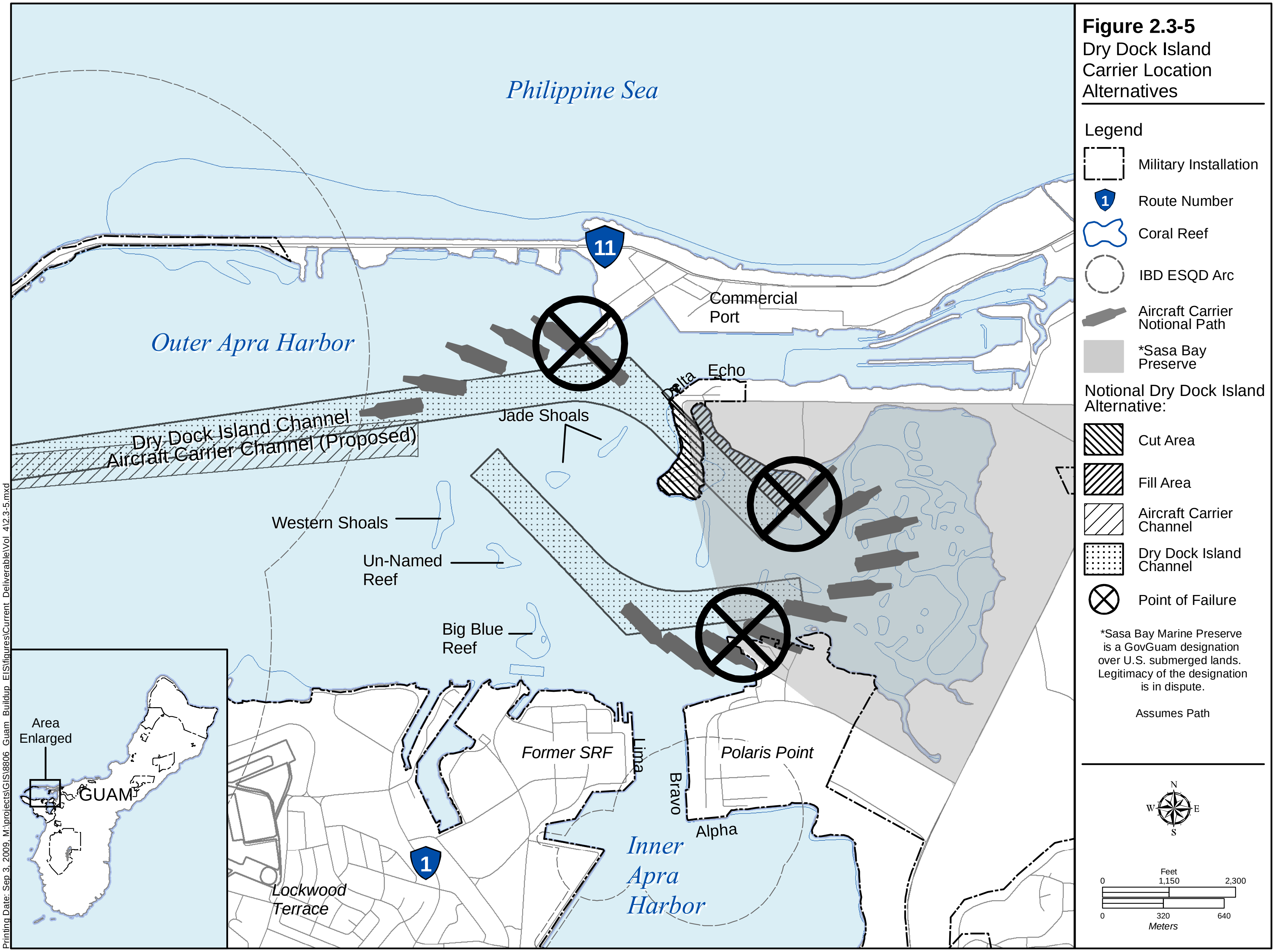
2.3.4.1 Steel Pile Supported Wharf

This structural design alternative would result in a concrete deck superstructure 90-ft (27-m) wide by up to 1,325-ft (404-m) long, supported by all vertical piling. When all piles are installed vertically, the deck and piles resist lateral loads as a ductile moment resisting frame. This allows the wharf to flex slightly during an earthquake without serious damage. Piling is driven through the superficial soil and into underlying rock.

Both pre-stressed concrete piling and steel piling were considered for the structure. Generally, pre-stressed concrete piles are preferred in a marine environment due to their inherent corrosion resistance capacity. These piles can be installed at sites with sands and bay mud, and even very dense sands with the aid of jetting. However, at sites with limestone, rock, or similar materials, concrete piles require difficult and expensive pre-drilling to penetrate the rock. Steel piles were selected due to the highly variable soil strata expected at the site. Given that either type of pile would be imported into Guam, steel lends itself better to on-site lengthening/shortening to match the variability in the bearing depth and embedment. During final design, and after additional site subsurface investigations have determined the actual bearing elevations, the steel versus concrete issue would be revisited. Concrete could then be selected if cost savings are apparent. With modern coatings and suitably maintained protection systems, steel piles can easily obtain a 50-year or more life.

A flat plate concrete deck structure was recommended in the *CVN-Capable Berthing Study* (NAVFAC Pacific 2008). In addition to excellent seismic performance, the concrete flat slab is very durable in the marine environment and can support a variety of loads.

The underlying embankment slopes upward from -49.5 ft (-15 m) MLLW to +7 ft (+2 m) MLLW. Placement of quarry stone and riprap stone for a marine revetment for shoreline protection would be necessary along the slope of the shoreline beneath where the wharf would be constructed. Some dressing of the existing slope would be required to prepare the slope for the rock. The slope would be protected with large armor rock over a filter course of quarry run. Approximately 42,000 cubic yards (cy) (32,111



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m^3) of quarry stone would be placed as fill and 19,815 cy of riprap stone (15,150 m^3) placed as fill. The surface area that would be affected along the slope of the shoreline is approximately 3.6 ac (1.5 ha).

The sloped embankment and armor rock would also provide lateral support for the piling against seismic, mooring, and berthing forces. The rock and sloped embankment would be an integral part of the entire structure. A similar structure was constructed for the two aircraft carrier berths at North Island, San Diego. As the seismic conditions for San Diego and Guam are very similar, and that structure meets current aircraft carrier requirements, it has been used for planning purposes at this site with modifications to reflect the needs of this project and advances in seismic engineering since the construction of the San Diego wharves.

2.3.4.2 Sheet Pile Bulkhead

Sheet pile bulkhead construction has long been considered economical in many ports and military harbors due to its simplicity, ease and speed of construction, available U.S. suppliers, and costs, when considered for non-seismic berths to 30 or 35 ft (9 or 11 m) depth. Unfortunately, many times these systems were installed without adequate protection (coatings and/or cathodic protection) and thus earned a bad reputation for durability. However, with proper modern coatings and periodically maintained cathodic protection systems, the expected life is 50 years or more.

For berths greater than 30 ft (9 m) water depth and in seismic areas, such as this project, the advantages of sheet pile bulkheads quickly disappear. Sheet pile bulkheads have performed poorly in severe seismic events, such as the 7.7 Mercalli Guam earthquake that occurred in 1993. Most of the wharves experienced some degree of structural damage, ground cracking and settlement, liquefaction, and lateral spreading. Underground utility lines and structures located within the affected areas were damaged, and significant settlement of trench backfill occurred. The worst damage occurred along portions of the Victor, Uniform, Sierra, and X-Ray Wharves, with Sierra Wharf experiencing lateral displacements of 4 to 6 ft (1.2 to 1.8 m). The primary cause was liquefaction of loose material placed behind the bulkhead during construction and the subsequent failure of the tie back system.

While the bulkheads and backfill can be designed for these seismic events, the need to use very large and heavy sheet pile sections negates the cost effectiveness they once enjoyed. They also tend to fail in a non-yielding manner that causes abrupt and not-easily-repaired failures. The deeper berths require more retained fill and hence larger soil retaining stresses. Furthermore, these heavy sections are only produced by one or two foreign mills and require long lead times for large quantities. To resist the lateral forces caused by a seismic event, the tie back system should be pile supported; however, that introduces more cost inefficiencies. Liquefaction of the backlands still remains a problem unless soil improvement techniques (surcharging, stone columns, and dynamic deep compaction being the most common) are incorporated.

2.3.4.3 Concrete Caissons

Reinforced concrete caissons are widely used for the construction of vertical breakwaters and gravity quay walls. Concrete caissons are particularly useful in areas of large tidal fluctuations. A caisson structure was used in the construction of Kilo Wharf in Apra Harbor. This type of construction is also employed where extreme waves are known to occur that could uplift and destroy a pile supported wharf. This is the primary reason that caissons were utilized in both the original construction and the planned extension (Military Construction P-502) of Kilo Wharf.

The caisson is constructed dry in a fabrication facility (typically a graving yard or dry dock), launched or lifted out, floated into place and sunk onto a dredged and prepared gravel foundation placed on the sea floor. The cells of the caisson are then filled with soil and Portland Cement Concrete paving is placed on top to provide the working surface. Because caissons are stand-alone units, they can be used in offshore installations by themselves (as is the case in a portion of the Kilo Wharf facility) or backfilled to provide a contiguous area with the backlands.

Similar to the sheet pile bulkhead, the caisson has a history of poor seismic performance, the primary example being Kobe Port in Kobe, Japan during the Hyogoken Nanbu 6.8 Mercalli event of 1995. In that case, the primary mode of failure was lateral movement (up to 25 ft [8 m]) and rotation of the top of the caissons (tipping) due to foundation failure. Both were due to liquefaction of the retaining and supporting materials during the earthquake.

This design option would require additional dredging/excavation to cut out and level the area behind the selected berth face. Alternatively, the caisson could be placed further offshore in deeper water, but that could require placing a gravel pad to raise the elevation of the foundation to an appropriate level. In addition to the cost for concrete, dry construction, launching, and towage to the site, the added costs of foundation preparation and dredging/excavation makes caissons the most expensive option of the three.

In addition, caisson fabrication in Guam is problematic. There is essentially only one facility capable of fabricating and launching the caissons in a timely manner: the floating dry dock (AFDB-8), that is currently the property of the Guam Shipyard, and may not be available for use in construction of the caissons. Foreign fabricators may be able to provide caissons in a cost effective manner, even though transportation costs may be high. There may be other options such as partial construction on land, launching into a nearby shallow waterway, and finishing construction in deeper water.

2.3.5 Dredging

2.3.5.1 Methodology

The NEPA approach for addressing aircraft carrier-related dredging methods is the same as described in Volume 2 for Sierra Wharf dredging (Volume 2, Chapter 2). There are two general types of dredging operations that could be implemented: mechanical dredging and hydraulic dredging. The operations vary by the method used to loosen the material from its in situ state and transport the material from the seafloor to the water surface. The type of dredging equipment that is used would affect the characteristics of the dredged material. Differences in dredged material characteristics resulting from dredging methods as well as logistical considerations relevant to the use of mechanical and hydraulic dredges are described in Appendix D in Volume 9 of this EIS/OEIS. The distinctions between the two dredging methods are described as follows:

<u>Mechanical Dredges</u>

- Excavates dredge sediments using an open or enclosed bucket that may vary in size from 1.5 cubic yards (cy) to 25 cy (1 to 20 m^3) ; typically barge mounted.
- Placement of dredged material into open scows that hold the material for transport to an offloading site. The offloading site can be upland or open water with proper permits.
- Operates best in hard-packed consolidated sediments and is not well suited for hard rock environments; loose or fine materials tend to be released into the water column during withdrawal from the dredge floor to the surface and back.
- Water content of the dredged material is typically in the range of 10%.

Hydraulic Dredges

- Excavates dredged sediment in place using a system of pipes and centrifugal pumps; typically a self-propelled unit.
- Placement of dredged material into upland placement site where dewatering occurs with return flow discharge into receiving water body; loose or fine material is not released into the water column during transfer of dredged material.
- Able to operate in a wide range of sediment types including some hard surface environments when a cutterhead can be used to grind or claw away hardened materials.
- Water content of the slurry containing the dredged material is approximately eighty percent requiring more management of the upland placement area than mechanical dredges. Freeboard of slurry from the top of the bermed storage area must be maintained and weir structures are typically needed to control effluent to meet water quality standards.

Mechanical or hydraulic dredging or a combination of both could be used for the project. Volume 9, Appendix D describes the general characteristics of the methods. Historically, mechanical dredging has been used in Apra Harbor, and would likely be the preferred method. Mechanical dredging is assessed as the environmentally conservative method (maximum adverse impact) of dredging in the EIS/OEIS because it has the greater combined potential for environmental impacts from direct and indirect impacts to coral reefs due to sediment redistribution. Specific potential impacts to water quality from mechanical dredging are addressed in Chapter 4 of this Volume. Specific potential impacts to marine biological resources are addressed in Chapter 11 of this Volume.

The standard best management practices associated with in-water work (including dredging), such as silt curtains, would be implemented (see Volume 7).

Dredged Material Disposal

This EIS/OEIS assumes four scenarios for the placement of dredged material: 100% disposal in a proposed ocean dredged material disposal site (ODMDS), 100% disposal upland, 100% beneficial reuse, and 20-25% beneficial reuse/75-80% ocean disposal. These four scenarios are explained further below. The 100% ODMDS and 100% upland disposal options are analyzed as the environmentally most adverse scenarios, because placing all dredged material in either location would limit the capacity of either the ODMDS or upland site(s) and does not account for some of the sediment being used for a beneficial purpose. Further discussion of each potential disposal option, including the sediment testing and sampling that has been conducted, is provided below.

Sediment Sampling/Testing

Sediment samples near the proposed dredging areas are being analyzed according to testing criteria (40 Code of Federal Regulations [CFR] Parts 225 and 227). If the sediment meets the criteria, it can be beneficially reused, placed on land, or disposed of in an ODMDS. If the material does not meet the criteria for ocean disposal, it would not be placed in the ODMDS but potentially can still be beneficially reused, placed on land in an upland placement site or a confined disposal facility for treatment or remediation. Preliminary sediment characterization data (NAVFAC Pacific 2006) suggest most, if not all, of the material would meet the testing criteria and be suitable for disposal/dewatering on land or ODMDS disposal (NAVFAC Pacific 2006).

Previous testing for Alpha/Bravo wharf construction and maintenance dredging of Inner Apra Harbor and the approach to the inner harbor has indicated minimal contamination in the nearshore substrate.

Sediment quality investigations in Inner and Outer Apra Harbor were conducted at three locations in Apra Harbor in 2006. The sites were being considered as potential locations for berthing an aircraft carrier. The three sites were: 1) former Charlie Wharf located at Polaris Point east of the Inner Apra Harbor Channel in Outer Apra Harbor; 2) northern coastline of the Former SRF area west of the Inner Apra Harbor Channel in Outer Apra Harbor; and 3) Sierra Wharf on the western edge of Inner Apra Harbor (NAVFAC Pacific 2006). The term Charlie Wharf is a term used in the NAVFAC Pacific 2006 report to describe the northern shoreline area of Polaris Point adjacent to Bravo Wharf even though there is no wharf presently at that location. The reconnaissance level effort was performed consistent with guidance outlined in the Ocean Testing Manual (EPA and USACE 1991). The purpose of the study was to delineate the distribution and magnitude of chemicals of concern within the materials to be dredged from these potential wharf sites.

Sediment core samples were selected from multiple locations within the dredging footprints for the three dredge areas (Figure 2.3-6). The number of samples and the compositing of samples were consistent with common practice for USACE dredging permit applications for Hawaii and Guam dredging projects. Within nine geographic areas, the core samples were composited and analyzed. Composite 1 (six sample locations) and Composite 2 (three sample locations) were representative of the proposed dredging for the turning basin and aircraft carrier berthing at the Former SRF location. Composite 1 and Composite 3 (five sample locations) were representative of the area to be dredged for the proposed turning basin and berthing at Polaris Point (see Figure 2.3-6).

The results of the physical testing indicated that, with the exception of the Composite 3 area adjacent to Charlie Wharf, the sediments were coarse-grained and comprised predominantly of gravelly sand. In the Composite 3 area and all of the Inner Apra Harbor areas, the sediment samples were predominantly finer-grained, silty clay material.

Chemical analyses were conducted according to USEPA and American Society for Testing and Materials standards. The results were compared to Effects Range-Low (ER-L) and Effects Range-Median (ER-M) values, and regulatory levels or total threshold limit concentration values (TTLC). The ER-L value represents the concentration below which adverse effects rarely occur and the ER-M value represents the concentration above which adverse effects frequently occur. Study areas in which many chemicals exceed the ER-M values and exceed them by a large margin would be considered more contaminated than those in which none of the sediment quality guidelines were exceeded. With respect to chemical analyses and as noted in detail in Chapter 4, Volume 2, in general, sediment contaminant concentrations were low throughout all the areas sampled. This included results for total organic carbon, heavy metals, ammonia, sulfides, total petroleum aromatic hydrocarbons, PCBs, chlorinated pesticides, organotins, and phthalates. Of all the composite sample chemical test results, only one result in Composite 3 (Polaris Point area) exceeded the ER-L concentration and that was for nickel (NAVFAC Pacific 2006). The ER-L concentration is 20.9 and the test result was slightly higher than the ER-L with a value of 21.50. The results from this study would suggest that the materials to be dredged would not require special handling and would be suitable for upland placement for beneficial reuse or ocean disposal, although the ocean disposal permitting process would require separate analysis and toxicity testing.

There is a low probability of encountering unexploded ordnance in the sediment as the area has been dredged recently. There are no known unexploded ordnance sites within the dredge areas. There have been no Navy dredging projects on Guam that have required designation of an upland site for the treatment or remediation of sediment. None is anticipated for this project.

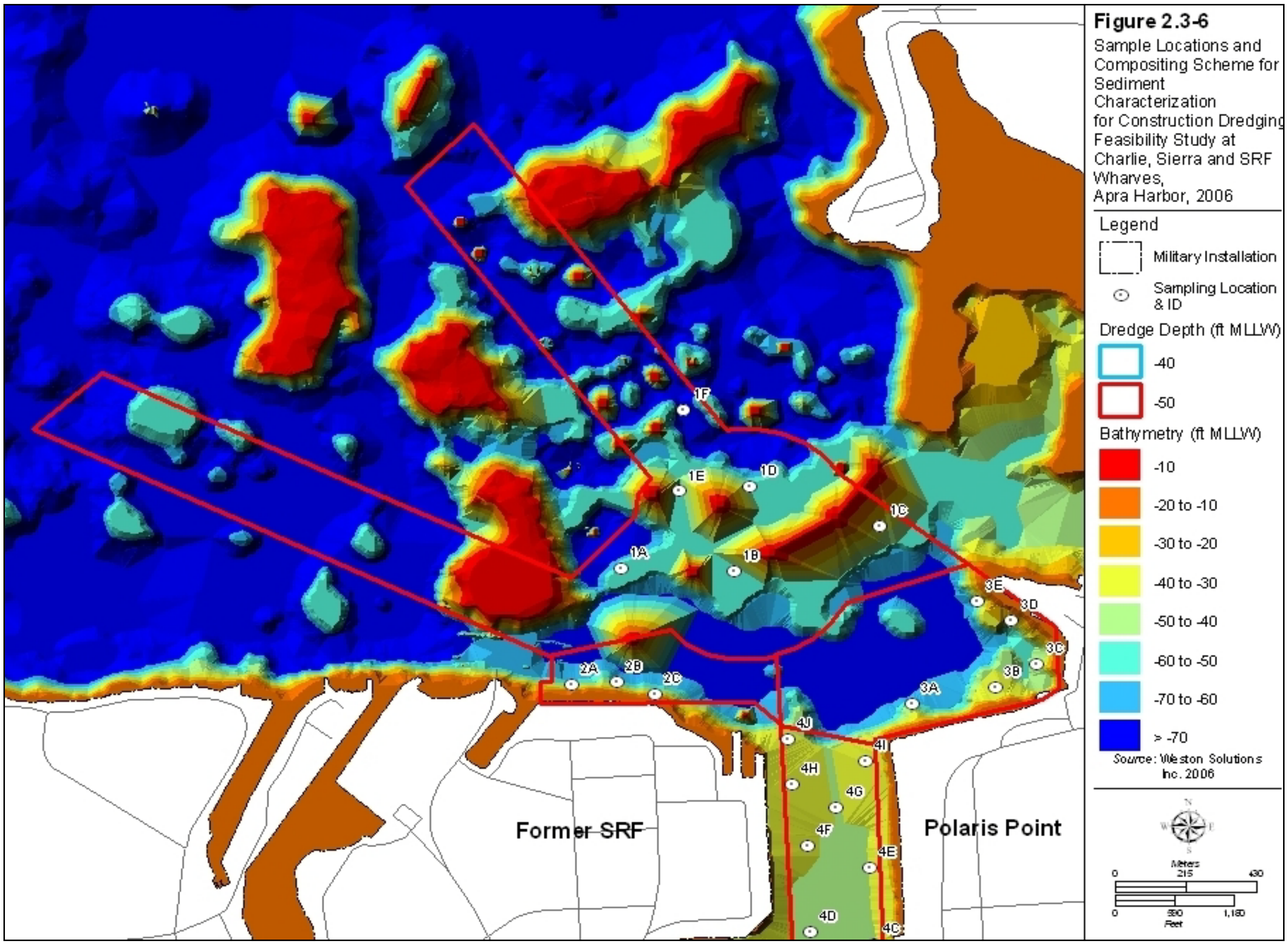


Figure 2.3-6. Sediment Sample Locations

Upland Disposal

The placement of dredged material in upland sites is often referred to as upland disposal even though the primary purpose is to first allow the dredged material to dry out (or "dewater") so it can more easily and cost-effectively be handled for relocation elsewhere once a beneficial reuse has been identified. Existing upland disposal sites are typically managed so that new wet dredged material is kept separate, if possible, from the dry material so that if there is a need for the dry material it easily can be removed from the site. Although sediment can be dewatered in a separate site, for the purposes of the proposed action in this EIS/OEIS, sediment would be "dewatered" and stored within the same areas.

There are existing and feasible new proposed sites for upland placement on Naval Base Guam. The feasible sites are Fields 3, 4, 5, former Public Works Center (PWC) and Polaris Point as discussed in Volume 2. As noted in Volume 2 and in detail in Volume 9 Appendix D, there is sufficient capacity, with berm modification, in the Polaris Point, PWC, and Field 5 sites individually to contain 100% of the total volume of the dredged material from either alternative. Some of the upland placement sites are described under previous NEPA documents (Fields 3 and 5 and Polaris Point) for historical dredging projects. The environmental impacts of using the disposal sites for aircraft carrier wharf dredged material are the same as those described in Volume 2 for the Sierra Wharf dredging, based on preliminary sediment characterization.

Beneficial Reuse

Between 1 and 1.1 million cubic yards (cy) (764,555 million cubic meters [m^3]) of dredged material would be excavated from the Inner and Outer Apra Harbor for the proposed Navy and Marine Corps actions. The dredged material is expected to consist of a mixture of sediments including sand from the outer harbor and silts/clays from the inner harbor. Additionally, there would be coral fragments and other submerged rubble that would be included in the volume of dredged material.

Beneficial use of portions of this total volume would be possible and several local projects have been identified. These local projects include:

- Support shoreline stabilization below Aircraft Carrier Wharf: As part of the construction process, some fill would be used with the riprap stone that would be placed along the shoreline and under the wharf to support the piles. Approximately 40,000 cy (30,582 m^3) of quarry stone in addition to an estimated 20,000 cy (15,291 m^3) of riprap stone is envisioned for this stabilization purpose. It is possible that some of the rubble or some other suitable material from the dredged material could be used and mixed in below the quarry stone layer. Therefore, it is estimated that approximately 50% of the quarry stone amount or 20,000 cy (15,291 m^3) of the dredged material could be used.
- Fill of berms and backstops at proposed military firing ranges on Guam: There are a number of berms and backstops that would be constructed as part of the development of new military firing ranges on Guam. The berms range in length from 35 to 255 ft (11 to 78 m); 7 to 56 ft (2 to 17 m) in width; and 3 to 7 ft (0.9 to 2 m) in height. Fill would be used to create these earthen mound structures. The volume within these berms and backstops has been calculated and equals an estimated 160,000 cy (122,328 m^3).
- Port Authority of Guam (PAG) expansion program: The PAG has prepared a Master Plan that includes a proposed eighteen acre area for expansion of fast land to support new commercial port cargo handling in Apra Harbor. The potential in-water expansion project is an ambitious endeavor that may be confronted with cost, feasibility and ecological concerns and also requires full environmental documentation by the USACE and subsequent permit approval before implementation. Up to 1.5 million cy (1.2 million m^3) of artificial fill would be needed to create this new land if this PAG expansion program comes to fruition. The Navy has a memorandum of agreement with PAG to provide fill from proposed dredging projects should the material be deemed suitable and the timing and logistics of both projects work out.

Given the potential availability of these upland beneficial use projects on Guam, the following four scenarios are possible for the disposal or placement of the proposed dredging projects in the Inner and Outer Apra Harbor:

1. 100 % beneficial use with all dredged material being used as artificial fill for the PAG expansion program (either direct waterfront placement or following placement at PAG upland placement site)
2. 20-25% beneficial use of dredged material in berm construction and under wharf for shore and pile stabilization (assumes no PAG need and/or logistics/approval problems for use of fill) and 75 to 80 % ODMDS placement;
3. 100% upland placement on existing Navy confined disposal facilities on base on Apra Harbor; and
4. 100% placement in the Guam ODMDS.

The percentage of beneficial re-use could exceed the 20-25% scenario depending on the individual potential projects noted above or a combination of them or other re-use options such as landfill cover or road base material use.

ODMDS

The U.S. Environmental Protection Agency (USEPA) is pursuing the designation of an ODMDS approximately 11 to 14 nm (20 to 26 km) from the west coast of Apra Harbor. The designation is anticipated in 2010 and an ODMDS EIS is being prepared concurrent with this EIS/OEIS. Ocean disposal is regulated under Title 1 of the Marine Protection, Research, and Sanctuaries Act (33 USC 1401 et seq.) Formal designation of an ODMDS does not constitute approval of dredged material for ocean disposal.

Results from additional analysis and testing would be required to develop a dredged material management plan and the USACE Section 404/10/103 permit application. Ocean disposal is only allowed when USEPA and USACE determine that the project dredged material: 1) is environmentally suitable according to testing criteria, as determined from the results of physical, chemical, and bioassay/ bioaccumulation testing that is briefly described in Section 2.7 (USEPA and USACE 1991); 2) does not have a viable beneficial reuse; and 3) there are no practical land placement options available. Should dredged material be deemed unsuitable for ocean disposal, it would have to be disposed of in an upland placement site on land.

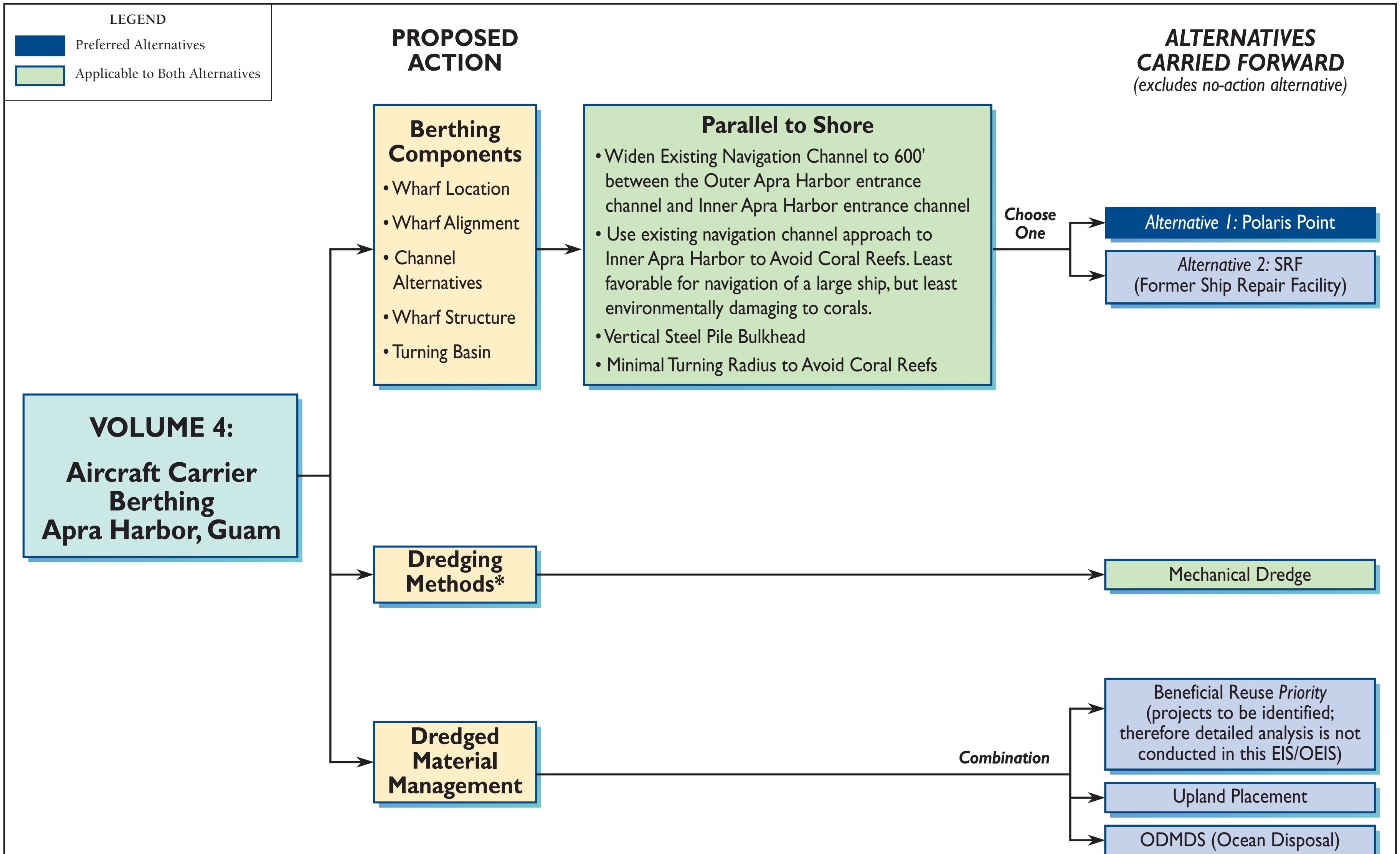
2.4 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

The lead agency's primary decision relative to the visiting aircraft carrier is whether to construct a new deep-draft wharf along the northern coastline of Polaris Point or the Former SRF, or to take no action. The proposed operation and required facilities would be the same at both sites; however, there would be site-specific differences in construction required to meet the operational requirements. The two wharf location alternatives have the same navigation channel alignment that follows the existing ship navigation route between the Outer Apra Harbor entrance channel and the Inner Apra Harbor entrance channel. The turning basins are slightly different but both turning basin radii are the minimum allowable within Navy navigational and operational constraints.

The alternatives in this EIS/OEIS were evaluated to ensure they met the purpose and need as outlined in Chapter 1. Subsequent sections (Sections 2.5 and 2.6) describe in detail the two alternative wharf locations carried forward for analysis: Alternative 1, Polaris Point (preferred alternative), and Alternative 2, Former SRF. Figure 2.4-1 provides an overview of the alternatives that are considered for analysis in this EIS/OEIS.

2.4.1 Least Environmentally Damaging Practicable Alternative (LEDPA)

Chapter 4 of this Volume contains an analysis of the least environmentally damaging practicable alternative (LEDPA), which is required under the Section 404(b)(1) guidelines of the Clean Water Act (CWA). Specifically, Section 404(b)(1) of the CWA stipulates that no discharge of dredged or fill material into waters of the United States, which include wetlands, shall be permitted if there is a practicable alternative (LEDPA) which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences. Furthermore, an alternative is considered practicable if it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The Section 404 (b)(1) guidelines are applicable to the proposed aircraft carrier berthing activities analyzed in this Volume and are discussed in detail in Chapter 4.



*Note: Analysis assumed dredging by mechanical means as an environmental maximum potential adverse affect method and is the method historically used at Apra Harbor. Hydraulic dredge may be used in final design and permitting.

Figure 2.4-1
Summary of Proposed Action and Alternatives Carried Forward for the Navy Aircraft Carrier Berthing, Guam

2.5 ALTERNATIVE 1: POLARIS POINT -PREFERRED ALTERNATIVE

2.5.1 Operation

Figure 2.5-1 shows the Alternative 1 Polaris Point (referred to as Alternative 1) project area, including a 3-dimensional rendering. As described in the alternatives considered and dismissed section, the navigation channel would be widened to 600 ft (183 m) and the alignment would follow the existing navigation channel fairway with a sharp bend between Jade and Western Shoals. The most likely route of the aircraft carrier through the harbor and to the wharf is depicted by ship icons in Figure 2.5-1. The carrier would be pivoted within the minimum radius turning basin to be aligned starboard side to the wharf and the bow would be facing east. On departure, the aircraft carrier would follow the same route with assistance by tugboats. When a carrier is not present, other ships would be able to use the wharf at the discretion of Port Operations. These ships would be significantly shorter and easier to maneuver into the wharf than an aircraft carrier.

Access to the site on land is from the traffic signaled intersection at Marine Drive and existing Polaris Point Road through the Polaris Point manned security gate and manned security gates at the aircraft carrier compound. Because of the distance from the wharf to Naval Base Guam, there likely would be limited increased pedestrian traffic between the wharf and Naval Base Guam.

2.5.1.1 Radiological Material Operation

Nuclear-powered aircraft carriers already visit Guam. No changes to current in-port operations would be expected because of the anticipated longer visit times (21 days compared to 7 days). Minor regularly scheduled maintenance, or small emergent repairs, may occur while in port just as might happen today. If required, a routine transfer of radiological waste packaged per Department of Transportation requirements would be conducted. Existing radiological response capability stationed at the Polaris Point Alpha and Bravo wharf area supporting the homeported submarine squadron would to be available to support the aircraft carrier if needed, as occurs under existing conditions.

2.5.2 Facilities

2.5.2.1 Shoreside Structures

Staging Area and Access

Alternative 1 provides for approximately 5.8 ac (2.3 ha) of staging area adjacent to the back of the wharf (Figure 2.5-2 and Figure 2.5-3.) The staging area would be sloped landward at 1%, the same as the wharf. The entire area would be paved with asphalt and concrete over a crushed aggregate base. All underground utilities and storm drains as well as building and light standard foundations would be installed prior to paving.

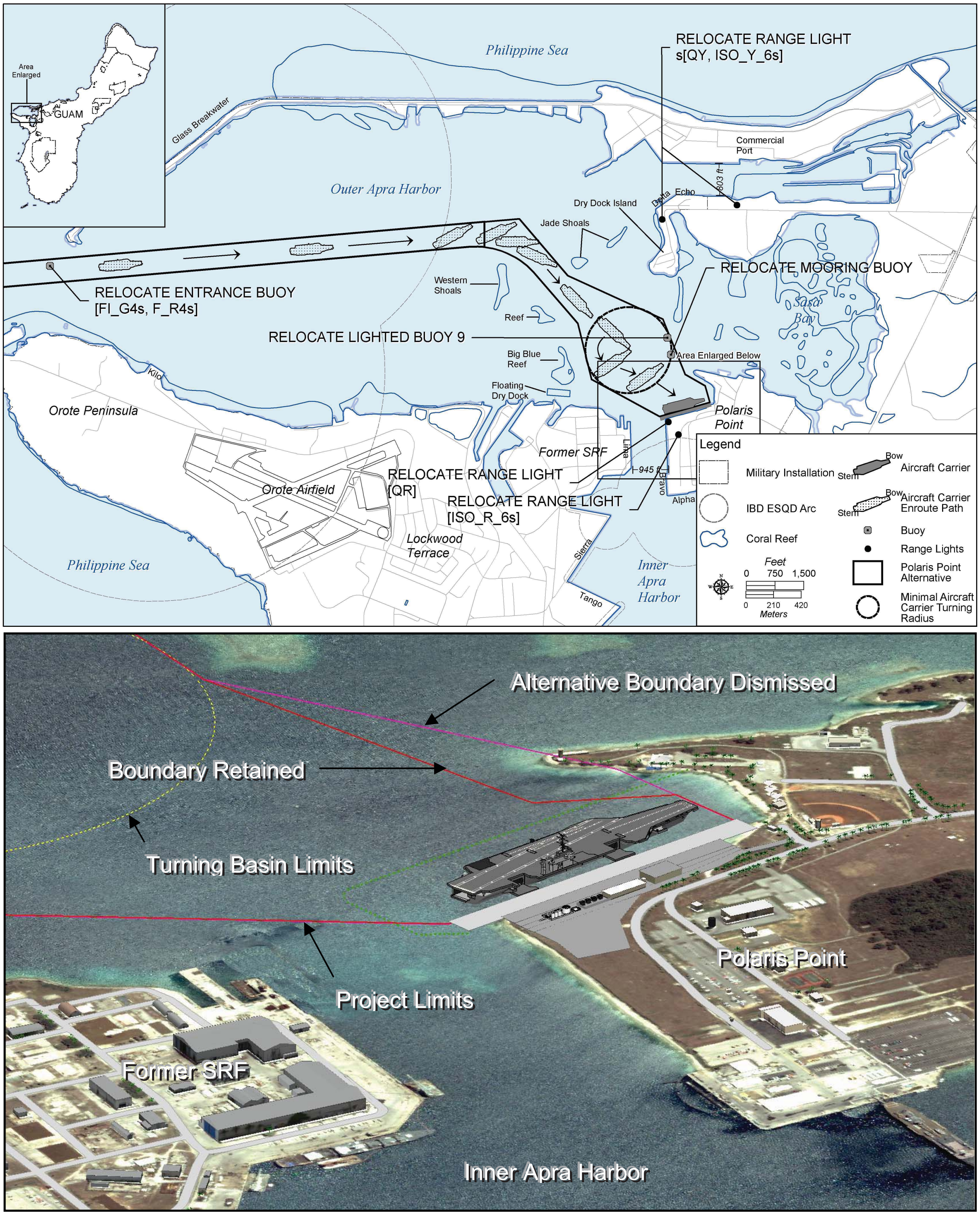


Figure 2.5-1
Alternative 1 – Polaris Point

Source: NAVFAC Pacific 2008

The proposed staging area for the aircraft carrier services is configured and sized to provide unimpeded access to the wharf, with a reasonable amount of area for operation, staging, and support. In addition, adequate areas to accommodate the various buildings listed in the previous section and associated parking would be provided. Demolition of nearby buildings and roadways would be kept to a minimum.

A new 10,000 ft^2 (929 m^2) Port Operations Support Building with restrooms would be used for storage of material and equipment that support the aircraft carrier visits, including floating security barriers and replacement parts shipped to Guam pending aircraft carrier arrival. The building would be uninhabited with no planned office space. The building would be constructed of concrete and designed to meet typhoon winds, seismic forces, anti-terrorism/force protection (AT/FP) requirements, sustainability objectives and other applicable codes. It would be located at the western end of the staging area and west of the proposed utility buildings.

The site plan provides access from Polaris Point Road with a short one-way access lane cut through the apex of the existing softball field lot. This would provide queuing for about 12 vehicles without obstructing Polaris Point Road or the right hand turn-off to the softball diamond. Vehicles denied entry would have room to back up onto the turn-off road and return back down Polaris Point Road. The driveway entrance/exit is quite a bit longer than that for the Former SRF site but the slope is not as steep (NAVFAC Pacific 2008).

Security/Biosecurity

Security

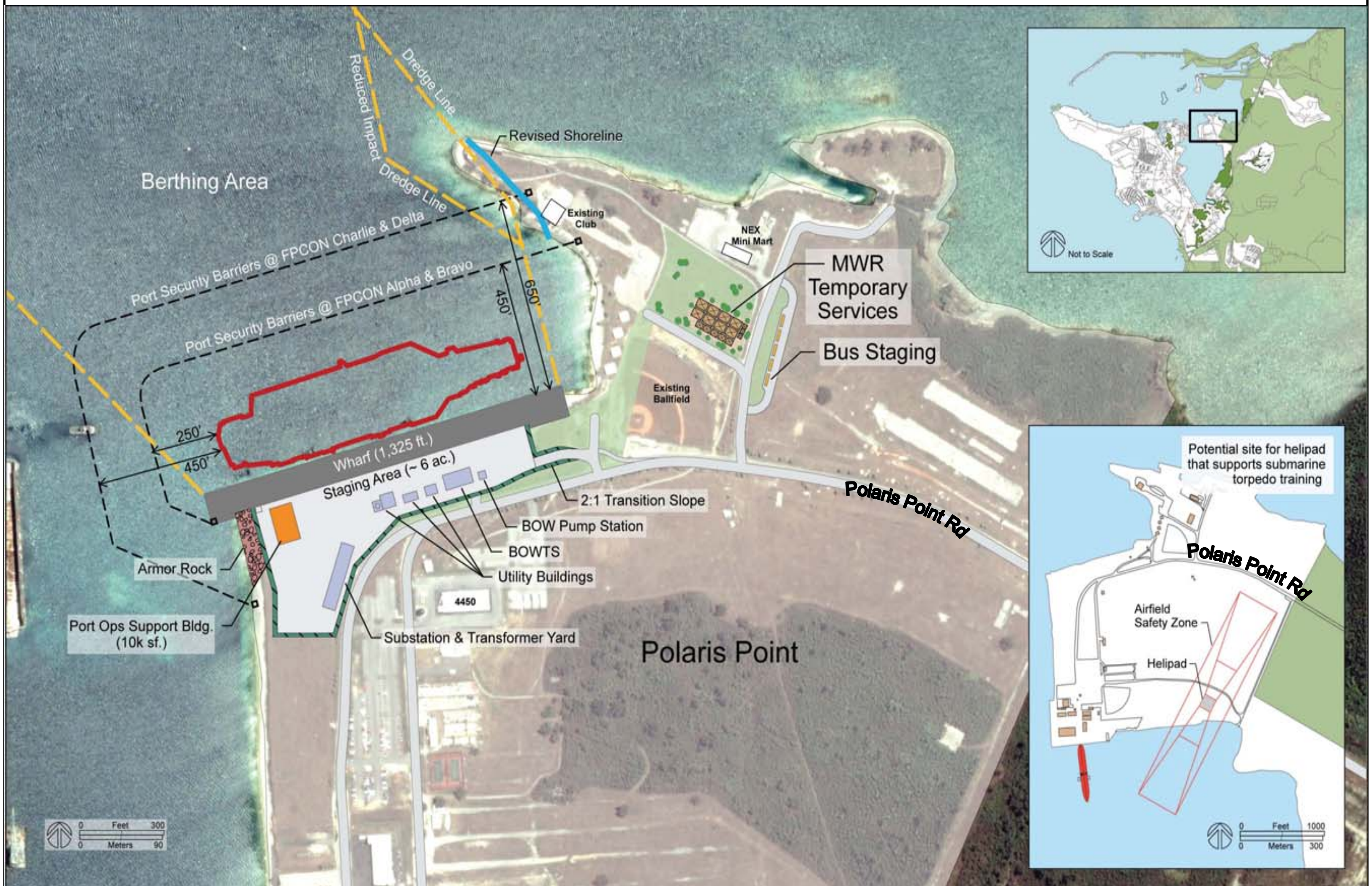
Landside and waterside security requirements were established from UFC 4-025-01 (*Waterfront Security Design*). The perimeters of staging areas are designed to protect against vehicle intrusion with hardened security fencing (security fencing supported on concrete vehicle barriers). In areas inaccessible to vehicles, such as rock revetments and beach shorelines, only security fencing would be used to prevent pedestrian intrusion. The wharf access control point, via the staging area or directly from an approach ramp, would be at a guard booth controlling active vehicle barriers (hydraulic bollards and traffic spikes) for the inspection of vehicles.

Watch towers are required for the berth. UFC specifications require that they be at least 30 to 50 ft (9 to 15 m) above the wharf, positioned to monitor the waterfront, spaced at approximately 1,000 ft (305 m) intervals, and that they be hardened and secured by fencing. The towers would be sized to support two personnel with Heating, Ventilation, and Air Conditioning (HVAC), water, sewage, telephone, fire alarm, security power circuits, etc., but designed to be operated by a single person. Due to the orientation of the wharf and the dredging required at the end of the point, the existing guard tower would have to be demolished. A replacement tower would be constructed at the southern side of the east end of the wharf.

Floating port security barriers are required to surround an aircraft carrier while it is at berth. The recommended minimum barrier standoff requirement for force protection condition Alpha and Bravo is 250 ft (76 m) from the aircraft carrier hull. In the event that force protection conditions Charlie and Delta are declared, the port security barriers would have to be relocated 200 ft (61 m) beyond the barriers for force protection condition Alpha and Bravo. The proposed locations are shown on Figure 2.5-2.

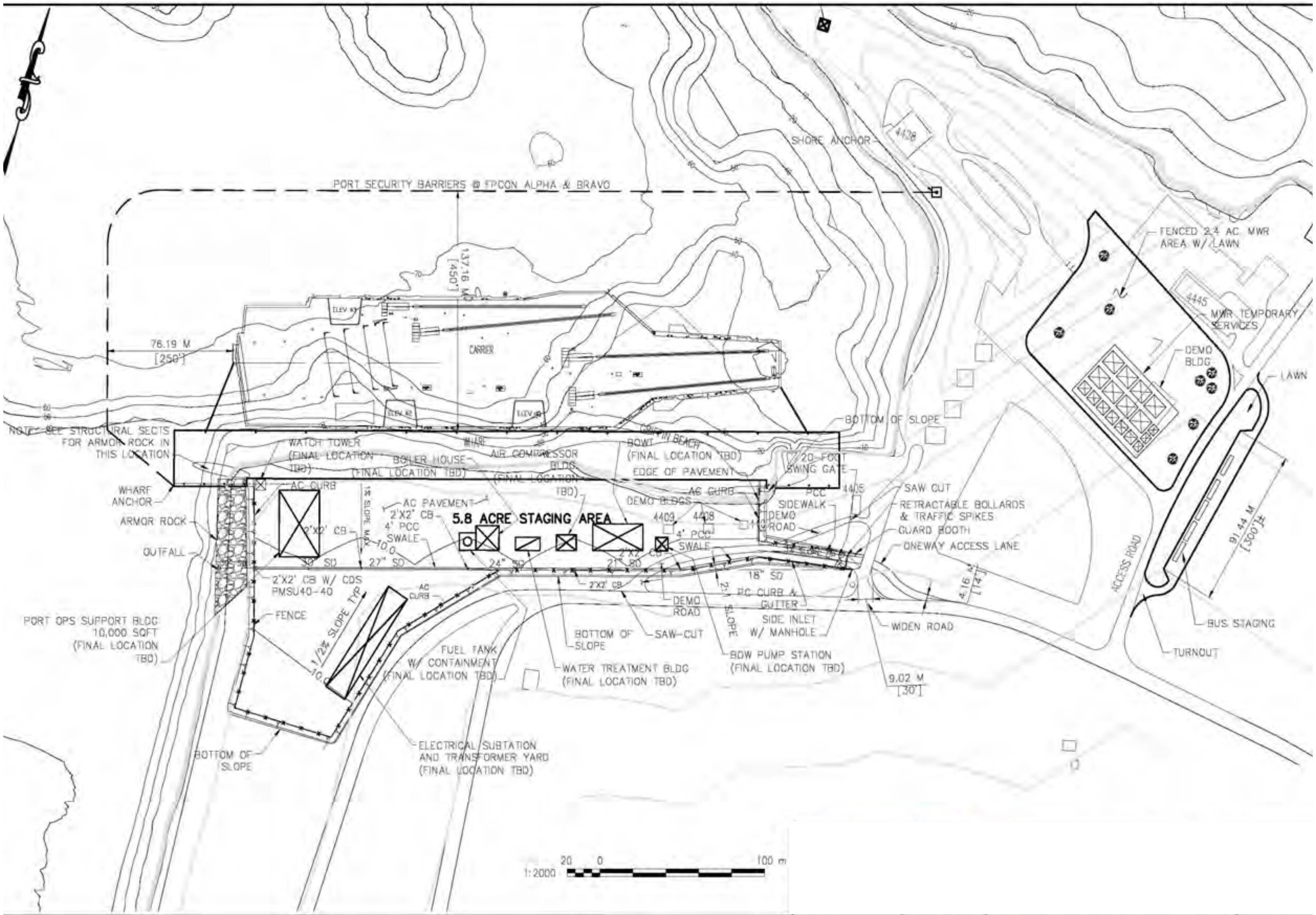
Shoreside security would be enhanced by a combined single entrance and exit ramp to the surrounding grade. Access to the facility would be controlled by a guard building at the entrance and protected by hydraulic bollards and traffic spikes. Traffic queuing would be afforded to various degrees in each alternative layout.

Figure 2.5-2
Polaris Point Alternative Site Plan



Source: NAVFAC Pacific 2008

Figure 2.5-3
Polaris Point Improvements



Source: NAVFAC Pacific 2008

Each layout is designed so that rejected vehicles can turn around without being boxed in from behind. This eliminates the possibility that a vehicle would have to drive past the check point and make a U-turn and leave. For additional protection, the entrance ramps also would be situated a reasonable distance from the asset. An enclave gate and concrete sidewalk along the entrance side of the ramp also would be provided for pedestrians. Pedestrian access would be controlled by the same guard booth as the vehicles. Appropriate electronic surveillance would be installed.

Biosecurity

Brown treesnake (BTS) control plans and other invasive species controls would include a quarantine and inspection area and security fencing designed for both humans/vehicles inspection and BTS control. The DoD has a joint region BTS Control and Interdiction Plan which includes measures such as 100% cargo inspections, 100% vehicle and aircraft inspections, fenceline trapping, and nighttime searches. A comprehensive Biosecurity Plan is being developed in cooperation with the U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA), U.S. Geological Survey (USGS), National Invasive Species Council (NISC), the state of Hawaii, the Commonwealth of the Northern Mariana Islands (CNMI), and GovGuam. Aircraft that stage at Andersen AFB would be subject to existing joint region BTS protocols. Additional protocols as identified in the joint region Biosecurity Plan would be adopted at that time. Volume 7 contains a more detailed description of the proposed Biosecurity Plan.

<u>MWR</u>

The Navy MWR area for supporting aircraft carrier activities would be situated on a 2.4 ac (0.97 ha) lot north of the existing baseball field on Polaris Point (see Figure 2.5-2 and Figure 2.5-3). The MWR area would be located about 500 ft (152 m) north of the access control point for the staging area. There is a 7,200 ft^2 (669 m^2) building pad that would have to be razed before that area could be graded and landscaped for lawn and trees. The lawn may be supported by a permanent irrigation system. A 3 in (7.62 cm) thick asphalt lot about 0.5 ac (0.2 ha) in size would be constructed for locating temporary facilities such as food and beverage booths, seating areas, parking and lighting.

The MWR area would require utility connections. The area would be enclosed by a 1,300 ft (396 m) long chain-link fence and would have multiple locking swing gate entry points. One of the gates would have a permanent turnstile and guard shack. A loop road would be constructed off of the east side of the Polaris Point access road. The loop road would have a 10 ft (3 m) wide by 300 ft (91 m) long turnout on the west side to park five buses. Bicycles would be made available at the MWR area.

<u>Aids to Navigation</u>

To accommodate the widened channel, turning basin, and approaches to both wharf location alternatives, the existing aids to navigation would require modification. The existing Inner Apra Harbor Channel is marked at the entrance in Outer Apra Harbor with two lighted buoys designated as: “FI G 4s” and “FI R 4s.” The centerline of this channel is defined for navigation by the entrance range lights designated “QY” and “Iso Y 6s.” Because the proposed realignment and widening of this channel is not identical with the current centerline, relocation of entrance lighted buoy “FI R 4s” and both range lights “QY” and “Iso Y 6s” would be required.

The existing Approach Channel to Inner Apra Harbor would be widened and slightly realigned. The alignment of this channel is currently designated by range lights “Q R” and “Iso R 6s.” Additionally, the channel limits are marked with lighted buoys to warn pilots of the shoals on either side of the navigation path. It is recommended that both range lights “Q R” and “Iso R 6s” be relocated to redefine the channel centerline. For Alternative 1, the range lights at Polaris Point would have to be relocated and raised so that the lights are high enough to be seen by other ships when the carrier passes in front of the lights. The proposed enlargement of the turning basin would also require relocation or removal of two other buoys. One is a mooring buoy located at the eastern edge of the proposed basin and the other is lighted buoy "9" just north of the mooring buoy. Figure 2.5-1 illustrates the buoys and range lights that would have to be relocated or removed to avoid obstructing the channel.

2.5.2.2 Utilities

Although the utility requirements for the CVN 68 (Nimitz Class) and CVN 78 (Ford Class) are similar, there are some differences, as shown in Table 2.5-1. The differences are highlighted in bold typeface. The requirements were compiled from Navy technical guidance and specifications (NAVFAC Pacific 2008). These requirements are significantly greater than for other Navy vessels. The *CVN-Capable Berthing Study* (NAVFAC Pacific 2008) contains detailed information on utility requirements. Table 2.5-2 indicates which utilities require new facilities or improvements to existing facilities based upon alternative locations. Volume 6 includes the waterfront demand on utilities and addresses alternatives to large scale utility demands as a result of the proposed nuclear aircraft carrier berthing, relocation of the Marine Corps, and Army Air and Missile Defense Task Force to Guam. The Volume 4 discussion of utilities is specific to utility improvements to support the aircraft carrier requirements.

Steam, Compressed Air, and Pure Water

Steam, compressed air, and pure water utilities do not exist at either alternative site.

Saturated steam (150 pounds per square inch gauge [psig]) is used by CVN 68 vessels to supply shipboard laundry and galley facilities, in addition to any supplementary heating requirements. The steam demand is what is required by the berthed vessel crew complement with an embarked air wing. Steam is not required for CVN 78 vessels. The constant load for the CVN 68 is 7,500 pounds/hour. System redundancy and capacity is described in UFC 3-430-08N. Two marine oil-fired boilers would be installed in a new boiler house with condensate collection systems. Two distribution pipes would be installed underground between the boiler house and the wharf.

A compressed air system is required for CVN 68 class vessels at all active berths, but CVN 78 does not have a compressed air requirement. Under emergency conditions, the vessel's compressed air system would be used to fill any additional compressed air demand. Typically, the vessel requirement for 125 psig compressed air should be at a minimum commercial quality. However, it is presumed that the air may also be used for emergency response equipment and thus shall meet the requirements of Class D breathing air as described by American National Standards Institute G-7.1-1989. Both the steam and compressed air requirements and conditions are defined by Military Handbook (MIL-HDBK) 1025/2, and UFC Manual 2150-02. A new 2,400 standard cubic foot per minute system would be built with underground piping along the wharf.

Pure water is required to support the nuclear powered capabilities of the aircraft carrier. The requirement is 20,000 gallons per day (gpd) (75,708 liters per day [lpd]). Existing potable water infrastructure would be used and water would be treated to Grade A quality. A structure would house the equipment, and underground pipes would extend to the wharf. The possibility of using temporary portable equipment was evaluated and determined not feasible due to procurement costs, maintenance, and storage when not in use; and labor for set-up, tearing down, and certification.

Table 2.5-1. Aircraft Carrier Utility Requirements

System	*Criteria*	*Requirement*		*Source*
		CVN 68 (Nimitz Class)	*CVN 78 (Ford Class)*	
Bilge Oily Waste	Peak Quantity	80,000 gpd	**82,000 gpd**	UFC 4-150-02;
	Average Quantity	35,000 gpd	**38,000 gpd**	
	Design Rate	90 gpm	90 - **180 gpm**	
Wastewater	Average Daily Flow	550,000 gpd	550,000 gpd	UFC 3-240-2N
Potable Water	Average Demand	185,000 gpd	**235,000 gpd**	UFC 4-150-02; UFC 2150-02
	Design Rate	1,000 gpm	1,000 gpm	
	Minimum Pressure	40 psi	40 psi	
Steam	Constant	7,500 lb/h	**Not required**	UFC 4-150-02; UFC 3-430-08N; UFC-3-430-09N
	Intermittent	7,200 lb/h	**Not required**	
Compressed Air	Design Rate	2,400 scfm	**Not required**	UFC 3-150-02; UFC 4-213-10; UFC-3-430-09N
Pure Water	Peak Rate	150 gpm	**100 gpm**	Draft CVN 78 facilities planning criteria
	Design Rate	20,000 gpd	20,000 gpd	
Shore Power	Peak Demand	21 MW 4,160 V	**30 MW @ 13,800V**	UFC 4-150-02; UFC 2150-02
Information Systems	Capacity	200 pair copper; 48-strand fiber optic cable; provision for CATV connection	Assume same as CVN 68	UFC 4-150-02; UFC 2150-02; and NCTS discussions

Legend: **BOLD** text indicates that requirements differ for CVN 78 compared to CVN 68
CATV = cable television, gpd = gallons per day, gpm = gallons per minute, lb/h = pounds per hour, MW = megawatts, psi = pounds per square inch, scfm = cubic feet per minute at standard conditions, V = volts.
Source: NAVFAC Pacific 2008.

Table 2.5-2. Aircraft Carrier Utility Type of Construction

System	*Alternative 1 Polaris Point*	*Alternative 2 Former SRF*
Bilge Oily Wastewater	New	New
Wastewater	Improve existing and supplement	Improve existing and supplement
Potable Water	Improvement (extend line)	Improvement (extend line)
Steam	New	New
Compressed Air	New	New
Pure Water	New	New
Shore Power	New and improvements	New and improvements
Information Systems	Improvement (extend line)	New extend from Building 3169

Bilge and Oily Wastewater Treatment System (BOWTS)

A BOWTS separates oil, grease, and oily waste found in bilge and oily water. A BOWTS has the capability to lower the contaminant levels to less than the permissible limits for discharge to publicly owned treatment works. The new BOWTS would be sized to accommodate the ultimate requirements of the CVN 78: i.e., a pumping rate of 90 gallons per minute (gpm) (341 liters per minute [lpm]) with an average flow rate of 38,000 gpd (143,846 lpd) and a peak flow rate of 82,000 gpd, (310,404 lpd).

The existing BOWTS at Apra Harbor Naval Complex are inadequate to handle the requirements of either a CVN 68 or CVN 78 for a 21 day duration visit. Therefore, a permanent BOWTS is proposed near the wharf and would include a combined gravity and force main collection system as well as a bilge oily wastewater (BOW) pump station. Separated water would be sent to the DoD water treatment facility at Apra Harbor. Reclaimed oil would be handled in accordance with existing base oil management procedures and used for power generation or recycled/re-refined for other purposes. BOW operations are carried out according to a Naval Base Guam Facilities Response Plan prepared under the Oil Pollution Act of 1990 (OPA 90) regulations and guidelines.

Wastewater

The existing wastewater treatment plant and collection system at Apra Harbor Naval Complex is inadequate to handle the volume of wastewater of either a CVN 68 or CVN 78 for a duration of 21 days. Depending on the selected berthing location, upgrades would be required for various portions of the landside wastewater collection system.

Proposed improvements to the Apra Harbor Wastewater Treatment Plant (AHWWTP) are being executed under other military construction projects (MCON P-262 and P-534). This particular plant currently operates at a secondary wastewater treatment plant level. The AHWWTP is being rehabilitated and upgraded to restore its designed capacity of 4.36 million gallons per day (mgd) (16.5 million liters per day [mld]). The Navy is upgrading the plant disinfection system to reduce the discharged coliform level, implementing/monitoring pre-treatment programs, and removing wastewater treatment plant (WWTP) sludge from the sewer to reduce metals to the plant. The composition of the wastewater from the aircraft carrier is primarily domestic waste but in a more concentrated form. The projected aircraft carrier wastewater inflows would increase wastewater flows to AHWWTP by approximately 550,000 gpd (2.1 mld). Currently AHWWTP has an average flow of 2.9 mgd (11 mld). Even with the additional proposed flow, the wastewater plant would be operating within its design parameters and permitted capacity. However, in addition to completion of the programmed projects, other improvements to the wastewater system would be required to support the aircraft carrier berthing.

Upgrades to the existing Sewage Pump Station (SPS) Number 9 at Polaris Point, associated force main, and trunkline "B" would be necessary to accommodate the additional flows from an aircraft carrier. Specific improvements would include the construction of a new submersible type SPS, a new dry pit/wet well-type pump station to replace the aging SPS 9, and 14,800 linear ft (4,511 m) of associated force mains. In addition to the pressurized systems, approximately 4,940 linear ft (1,506 m) of new gravity sewer lines would be required, including 4,420 linear ft (1,347 m) of 8, 12, 15, and 21 in (0.2, 0.3, 0.38, 0.53 m, respectively) lines. These upgrades would follow existing rights of way and utility lines that currently parallel Route 29 and Marine Corps Drive. Standard construction practices would be utilized to ensure that existing lines are not disrupted.

A standard ship to shore sewage hose capable of handling pressurized sewage would connect the vessel's discharge fitting to the shore receiving station also known as a riser. The riser consists of a hose connector, plug valve, and a check valve. The manifold piping system transfers wastewater to the shore piping system and to the lift station. This control network ensures that the wastewater exits the ship and arrives into the lift station avoiding the possibility of uncontrolled release of the wastewater.

Potable Water

The potable water supply would be connected to the southern Navy water system, which receives its surface water supply from Fena Reservoir. Potable water demand for the aircraft carrier would have no impact on the Northern Guam Lens Aquifer. According to and following the applicable UFC documents and guidance provided in the review draft Navy Facility Planning Criteria for aircraft carriers, the daily average potable water requirements, with air wing or troops aboard, for a CVN 68 is 185,000 gpd (700,301 lpd) and for a CVN 78 is 235,000 gpd (889,572 lpd). Therefore, the existing potable water system requirements are based on the necessity to supply a minimum flow rate at the berthing location of 1,000 gpm (3,785 lpm) at 40 psi and satisfy an average daily demand of 235,000 gpd (889,572 lpd). During periods of low rainfall, the flow rate requirement may have a localized impact on the existing water distribution system, including water provided to GWA to supply water to southern Guam. In accordance with existing DoD directives and existing agreements with GWA, every effort would be made during periods of low rainfall and drought to ensure appropriate water conservation measures are implemented for on base demand at Naval Base Guam, including transient carrier demand.

Potable water is supplied to Polaris Point from the Tupo Tank system. In addition to Polaris Point, the Tupo Tank supplies water to areas outside of the Apra Harbor Naval Complex and north to Barrigada (Navy), including GovGuam and Navy areas between those two locations. Based on the water demands of the service area and the maximum fire flow requirements, the storage capacity of the tank was evaluated based on criteria provided in UFC 3-230-19N (*Water Supply Systems*). The storage capacity required for all users served by the Tupo Tank, including the proposed water demand of a CVN 78, was calculated to be 4.2 million gallons (mg) (15.9 million liters [ml]). The Tupo Tank has a capacity of 5.0 mg (18.9 ml). Therefore, no improvements are required at the Tupo Tank for the berthing of either a CVN 68 or CVN 78 at Polaris Point.

MCON Project P-431 (Alpha/Bravo Wharf Improvements) improved the water distribution lines within Polaris Point. Approximately 5,000 linear ft (1,524 m) of 8 and 12 in (0.2 m and 0.3 m) water lines supplying water to Polaris Point were replaced with a 16 in (0.4 m) main. The 6 in (0.15 m) water lines along the wharf were replaced with 8 in (0.2 m) lines. A new fire pump house was constructed under this project. These improvements were incorporated in the water system model used to evaluate the capacity of the existing potable water system. The results of the model indicate that more than 1,000 gpm (3,785 lpm) can be provided at pressures exceeding 40 psi to the berthing site at Polaris Point. Therefore, no major water system improvements would be required for this option. Water system improvements would be limited to the construction of a new 8 in (0.2 m) service lateral to the berthing site and the associated pier side water outlets.

The potable water system would be used for any fire fighting requirements at the berth.

Electrical Power Distribution and Communications System

The electrical infrastructure at Polaris Point is capable of supporting planned projects such as Military Construction Project (MCON) P-465, Consolidated Submarine Learning Center Training & Commander Submarine Squadron 15 Headquarters Facility, and P-528, Construct Torpedo Exercise Support Building.

The electrical infrastructure at Polaris Point is incapable of accommodating the aircraft carrier Polaris Point berth without major improvements and additions as follows:

- A new 34.5 kilovolts (kV) circuit breaker and underground feeder circuit in the Guam Power Authority (GPA) Piti 34.5 kV Switching Station (by GPA)
- A new aircraft carrier berth substation
- Operational and security lighting using high-mast steel poles with metal-halide luminaries

Stormwater

Alternative 1 provides for approximately 5.8 ac (2.3 ha) of staging area adjacent to the back of the wharf. The maximum surface area of the pier would be approximately 2.7 ac (1.1 ha). Additionally, the MWR area would be situated on a 2.4 ac (0.97 ha) lot adjacent to the pier. Surface flow would be directed toward the west and south perimeters of the staging area and would be intercepted by a concrete swale. The layout of the staging area intercepts surface flow from the southeast. Therefore, a catch basin is planned to intercept this flow (however, more refined topographical and planimetric information may demonstrate that this catch basin may be eliminated and the total design flow reduced accordingly). The storm drain path would be along the same alignment as the swale, southward and then westward. A cyclonic separator would be located in the southwest corner of the staging area and the outfall located on the east end of the channel between the Apra Inner and Outer Harbors. Armor rock would be installed from the back of the wharf to about 250 ft (76 m) southward along the channel. However, additional rock cover is planned on the east side of the staging area at the west end of Griffin Beach, to protect the concrete cut-off wall return from undercutting action by waves. Chapter 4 of this Volume contains more information on potential impacts from stormwater.

Solid and Hazardous Waste

Typically, solid waste storage bins would be provided in the aircraft carrier compound and near the MWR activity area, as needed. Solid waste would be handled and managed in accordance with Navy standard operating procedures and would be disposed of at the Navy landfill as long as it meets all criteria for disposal in the landfill.

A ship-board hazardous regulated waste receptacle is typically designated at the wharf. The hazardous waste would be managed in accordance with Navy standard operating procedures and the Navy Resource Conservation and Recovery Act (RCRA) permit would be modified to consider the additional volumes of waste. Additionally, the increase in hazardous materials would be handled and disposed of per applicable best management practices as described in Volume 7. Volume 4, Chapter 17 contains a description of the types and quantities of hazardous waste that would be generated from the proposed action.

2.5.3 Construction

2.5.3.1 Polaris Point-Specific

The wharf plan for Alternative 1 (Polaris Point) is shown on Figure 2.5-4. Site preparation would require the grubbing and removal of all ground cover for construction of the staging area. The site area is estimated at 250,000 ft^2 (23,226 m^2). Site preparation would include demolition and replacement in-kind of three minor buildings (4407, 4408, 4409) (totaling approximately 940 ft^2 [87 m^2]). Surveys of these buildings have been conducted for asbestos-containing material, lead-based paint, and PCB-containing electrical equipment. Demolition and recovery of these types of materials, if present, would be conducted in accordance with Navy procedures and applicable laws.

There would be required some minor roadway and remnant pavement removal and possibly re-alignment of utility lines along this portion of roadway. The soil would be scarified and re-compacted before the fill material is placed to prevent differential settlement. No tree removal would be required. Landscaping, including trees and grass, is proposed in the MWR area. Subgrade work would be required for installation of utility ducts and storm water facilities. Fill would be required behind the riprap slope underneath the wharf. Vertical sheet pile would be driven into the slope (Figure 2.5-5).

There would be required some minor roadway and remnant pavement removal and possibly re-alignment of utility lines along this portion of roadway. The soil would be scarified and re-compacted before the fill material is placed to prevent differential settlement. No tree removal would be required. Landscaping, including trees and grass, is proposed in the MWR area. Subgrade work would be required for installation of utility ducts and storm water facilities. Fill would be required behind the riprap slope underneath the wharf. Vertical sheet pile would be driven into the slope (Figure 2.5-5).

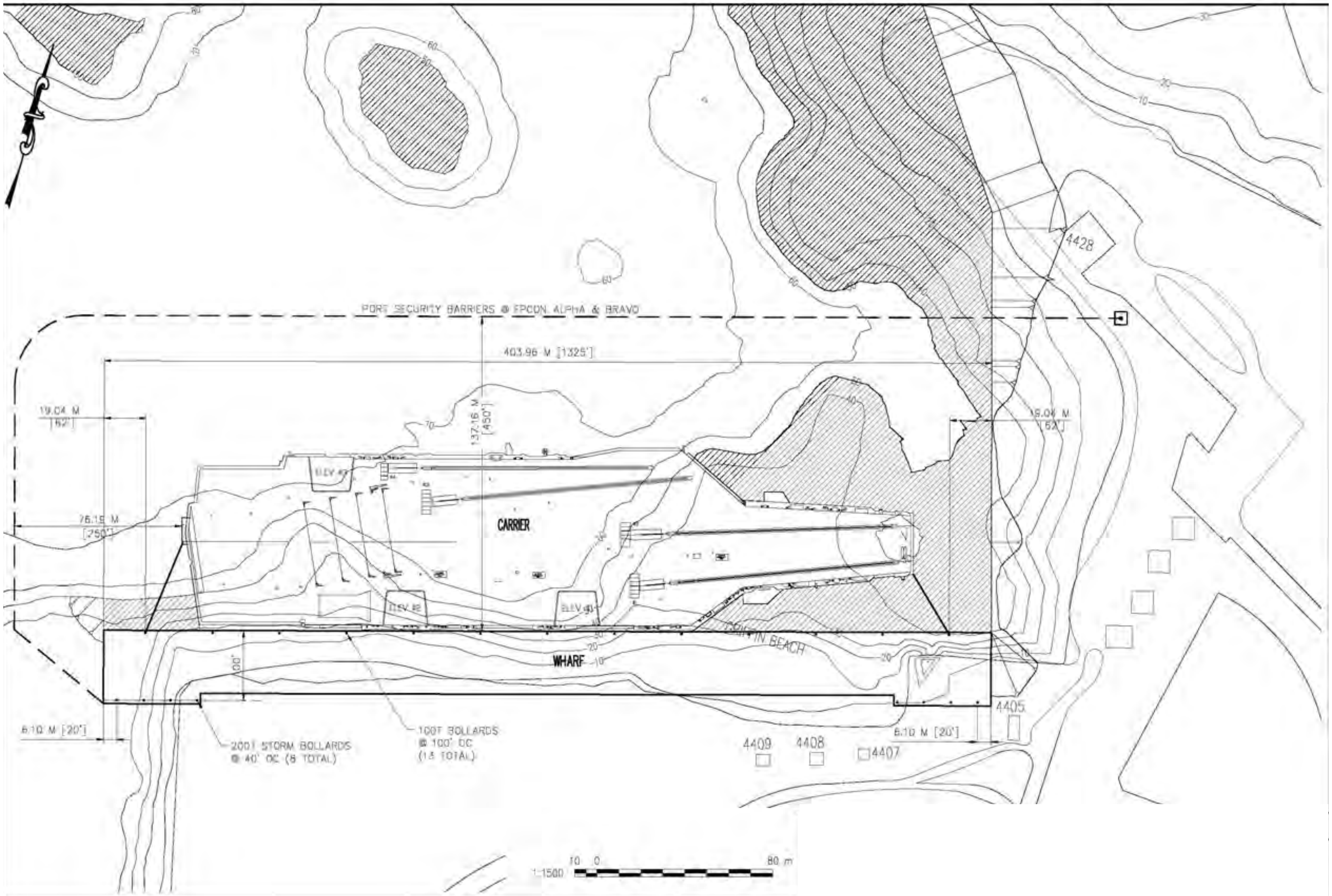
The project dredging would be limited to an area near the channel bend, portions of the turning basin and areas under the wharf structure. Figure 2.5-6 shows the outer limits of dredging and specific areas that would require dredging because they are currently less than -49.5 ft [-15 m] MLLW. The minimum turning basin radius is shown on Figure 2.5-1. Approximately 608,000 cy [465,850 m^3] of dredged material including 2 ft (0.6 m) for overdredge would be generated.

2.5.3.2 Construction Common to Both Action Alternatives

<u>Dredging</u>

Standard dredge design has been modified through continuing engineering studies to find the least environmentally damaging alternative for Polaris Point (see *CVN-Capable Berthing Study* [NAVFAC Pacific 2008]). Figure 2.5.6 illustrates the smallest dredge footprint for this alternative. The dredge methods and dredged material disposal options would be the same as those described to support the Marine Corps Sierra Wharf dredging in Volume 2, Section 2.5. Dredging operations have been modeled as a 24 hours per day operation for a duration of 6 to 9 months, but depending upon dredging efficiency, could last from 8 to 18 months. Continuing consultation between the Navy and regulatory agencies would determine the actual operational parameters and duration. The total dredge volume would be approximately 608,000 cy (465,850 m^3), including a 2 ft (0.6 m) overdredge. The total dredge area would be approximately 53 acres (ac) (21.5 hectares [ha]). Approximately 30% of the dredged material would be generated at the shoreline area of Polaris Point to provide an appropriate slope for the wharf structure. The anticipated dredging production rate is 75 cy/hour (57 m^3/hour) based on recent mechanical dredging of similar substrate (Volume 9, Appendix E). At this rate, total production would be approximately 1,800 cy (1,376 m^3) per day.

Figure 2.5-4
Polaris Point
Wharf-Plan View



Source: NAVFAC Pacific 2008

The thickness of the substrate to be dredged (from existing water depths to proposed water depths) is only 1.6 to 3.3 ft (0.5 to 1 m) throughout most of the project area. Dredging would therefore pass rapidly from site to site; a 75.5 by 75.5 ft (23 m by 23 m) grid area would require only a half day of dredging. The wharf area would require a longer dredging duration because there would be a greater volume of dredged material. Assuming two 4,000 cy (3,058 m^3) scows, there would be one to two barge trips per day to the ODMDS or an Inner Apra Harbor wharf for loading trucks and hauling to an upland placement site.

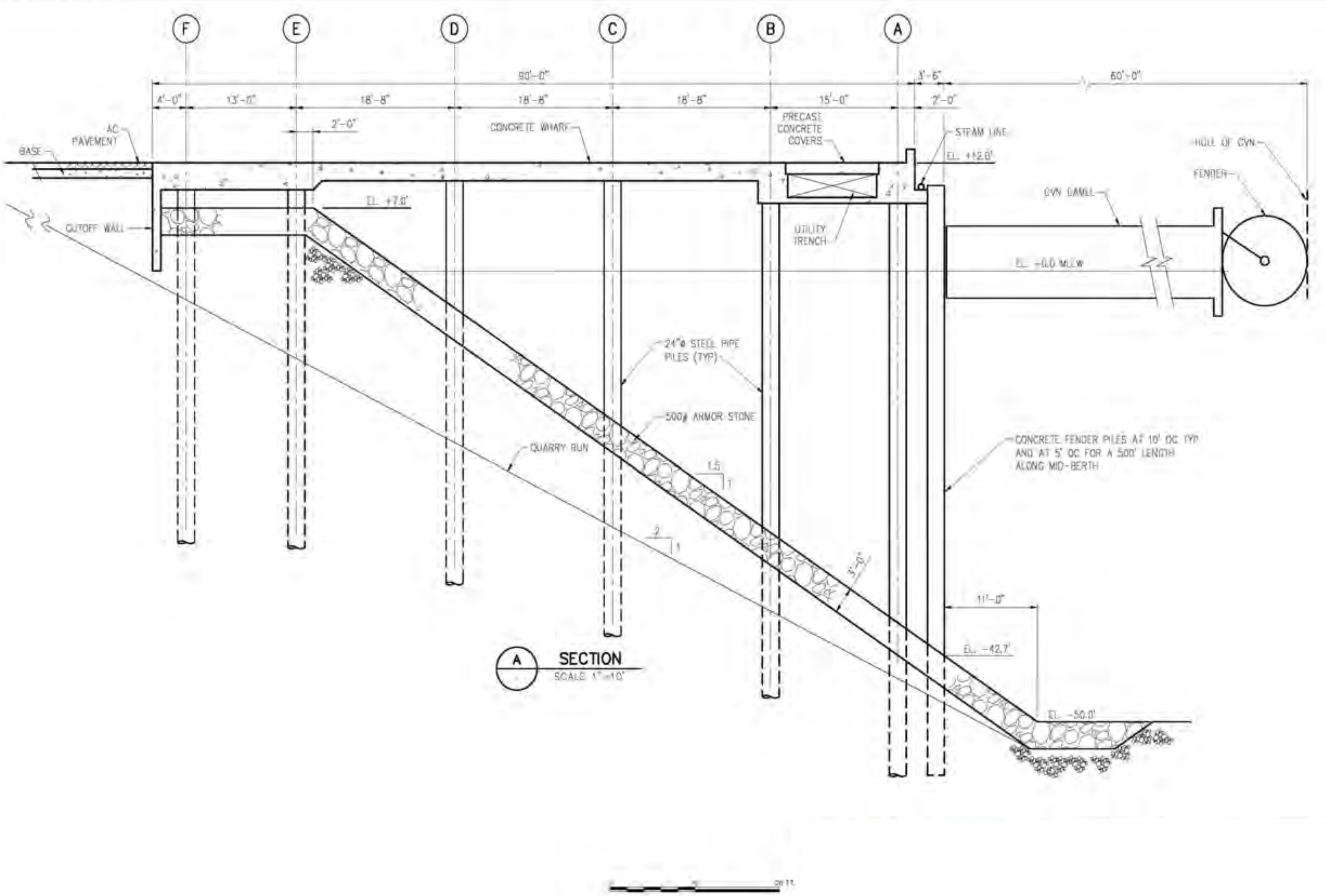
The required Best Management Practices (BMPs) that are not project-specific are described in Volume 7. BMPs to avoid or minimize indirect impacts to nearby reefs would likely include installation and maintenance of silt curtains to contain the re-suspended material within the dredge area. The substrate may require chiseling to roughen the surface prior to dredging to allow the clamshell to grab hold of the material. No blasting would be required.

2.5.3.3 Equipment and Materials

The project would utilize specialized heavy equipment including a dredger and a large floating crane barge with pile driving equipment (if piles are specified in final design). Smaller equipment would include smaller cranes, concrete pumps, small barges, tugboats, and excavation equipment that is available locally. Smaller dredgers have been used historically in Apra Harbor, but the magnitude of this project would likely require imported equipment.

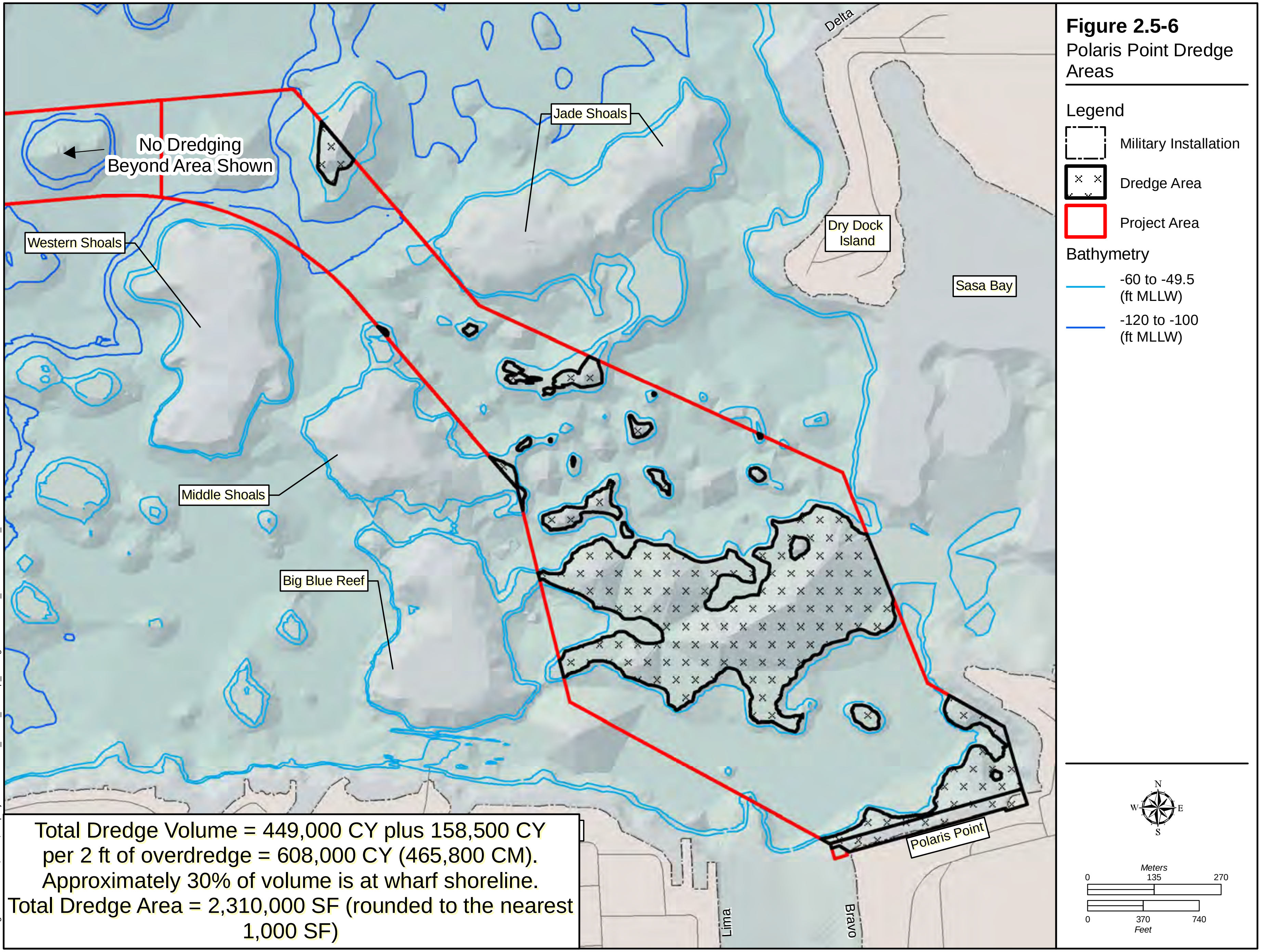
This project would utilize imported materials, including steel pipe piles and steel shapes, concrete forms, miscellaneous metals, fenders, bollards, steel reinforcing and cement for concrete, asphalt, and mechanical equipment and piping for steam, compressed air, and pure water. Some assembly of these items on Guam would be required. Local aggregates for concrete, road base, asphalt paving, and possibly armor rock may be used. All imported materials would come through either the local commercial port or be specially shipped by barge.

Figure 2.5-5
Wharf Profile View-Steel Piles



Source: NAVFAC Pacific 2008

Figure 2.5-6
Polaris Point Dredge Areas



2.6 ALTERNATIVE 2: FORMER SRF

2.6.1 Operation

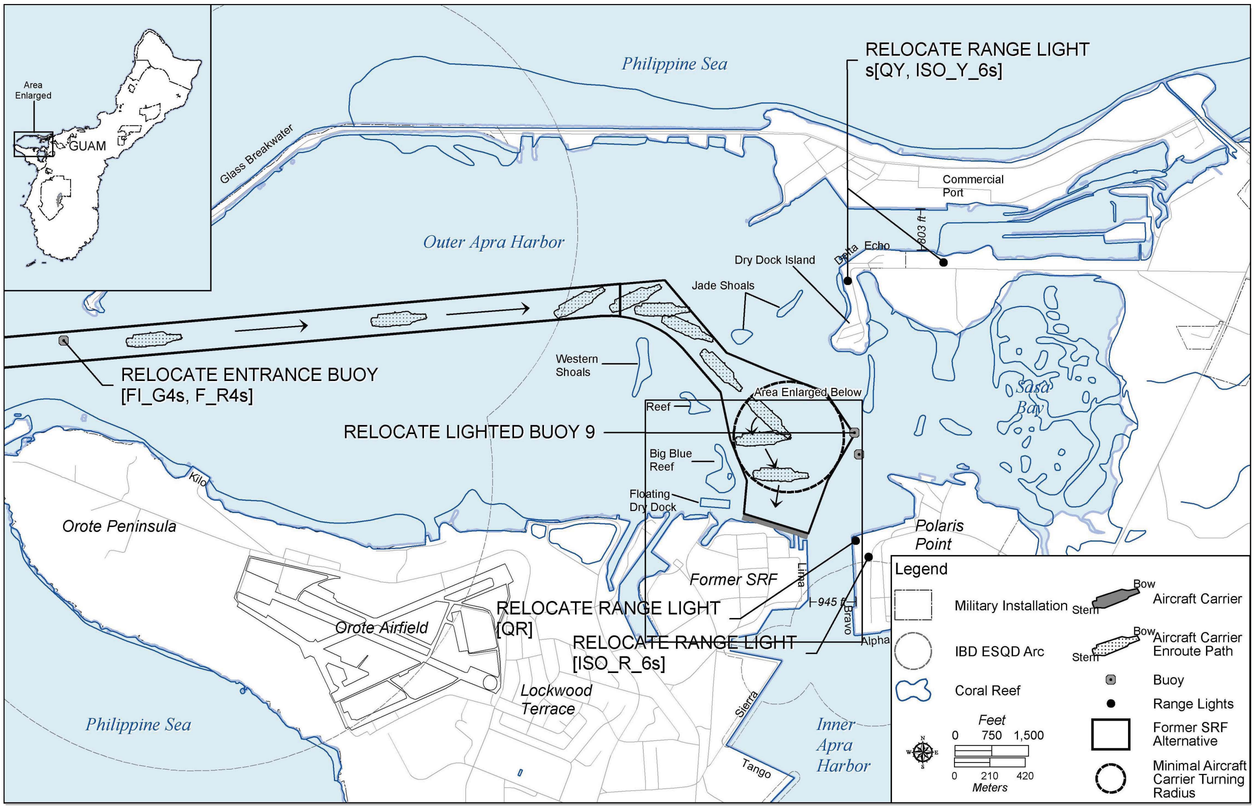
The Alternative 2 Former SRF (referred to as Alternative 2) project area and a 3-dimensional rendering are shown in Figure 2.6-1. The site plan is shown as Figure 2.6-2. As described in the alternatives considered and dismissed section, the channel would be 600 ft (183 m) in width and the alignment would follow the existing navigation channel fairway with a sharp bend between Jade and Western Shoals. The proposed route of the aircraft carrier through the harbor and to the wharf is depicted by ship icons in Figure 2.6-1. The carrier would be pivoted within the minimum radius turning basin to be aligned starboard side to the wharf and the bow would be facing east. Unlike at Alternative 1 (Polaris Point), the full 600 ft (183 m) approach distance in front of the wharf would be available. On departure, the aircraft carrier would follow the same route with assistance by tugboats. Operation would be as described for Alternative 1, except for the specifics identified in this section.

Access to the site is from existing primary (Marine Drive and Sumay Drive) and secondary roads (4th Street and Main Street) through Naval Base Guam and into the Guam Economic Development and Commerce Authority (GEDCA) lease area. The lease to GEDCA expires in 2012 and is currently being renewed by the Navy. No decision has been made at the present time in connection with the future reuse of the Former SRF lands to include a new lease for commercial ship repair facility purposes beyond the current 2012 lease expiration date. The proposed project construction would occur after the existing lease term expires. The lease area could be reduced and the proposed project area could be excluded from any new lease.

There would be some disruption of shipyard activities during wharf construction and aircraft carrier visits. Disruption from construction would be temporary and would be mitigated through scheduling of construction and ship repair visits. Disruption of shipyard activities during aircraft carrier visits would be minimized through scheduling with the shipyard and potentially mitigated through compensation for delays or lost work. When an aircraft carrier is in port, the dry dock (AFDB-8, Big Blue) could not be used for docking or undocking. Further, force protection requirements, including deployment of the floating port security barriers, would conflict with continued use of the dry dock at its present location. The effects of these limitations would be a restriction on commercial business opportunities at the commercial ship repair facility. Figure 2.6-1 and Figure 2.6-2 show the location of the dry dock.

2.6.1.1 Radiological Material Operation

Nuclear-powered aircraft carriers already visit Guam. No changes to current in-port operation are expected because of the anticipated longer visit times (21 days compared to 7 days). Minor regularly scheduled maintenance, or small emergent repairs, may occur while in port just as might happen today. If required, a routine transfer of radiological waste packaged per Department of Transportation requirements would be conducted. Existing radiological response capability stationed at the Polaris Point Alpha and Bravo wharf area to support the homeported submarine squadron would continue to be available to support the aircraft carrier if needed, as occurs under existing conditions.



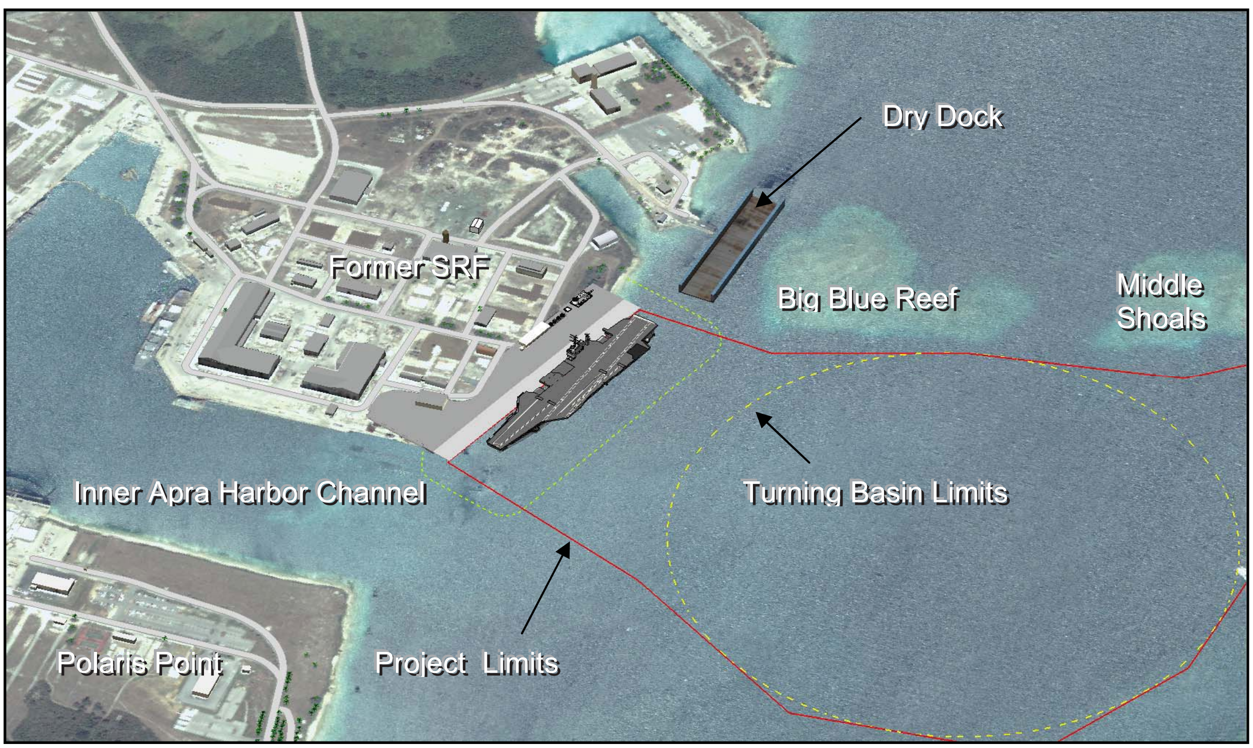


Figure 2.6-1
Alternative 2 – Former SRF

Source: NAVFAC Pacific 2008

Figure 2.6-2 Former SRF Alternative Site Plan

Source: NAVFAC Pacific 2008

2.6.2 Shoreside Structures

2.6.2.1 Design Standards

Design standards would be the same as described for Alternative 1 (Section 2.5).

2.6.2.2 Staging Area and Access

The Alternative 2 location would provide an approximate 6 ac (2.3 ha) staging area adjacent to the back of the wharf (see Figure 2.6-2). The staging area would be sloped landward at 1%, the same as the wharf deck. The entire area would be paved with asphalt concrete over a crushed aggregate base. All underground utilities and storm drains, building, and light standard foundations would be installed prior to paving. The Port Operations Support Building would be at the eastern end of the wharf near Lima Wharf.

Security/Biosecurity

Security

Security measures would be similar to that of Alternative 1, Polaris Point, in that the location is within an active military base with the full complement of protective measures. Site specific requirements would be similar to Polaris Point. Watch towers would be located just behind and at either end of the wharf.

Biosecurity

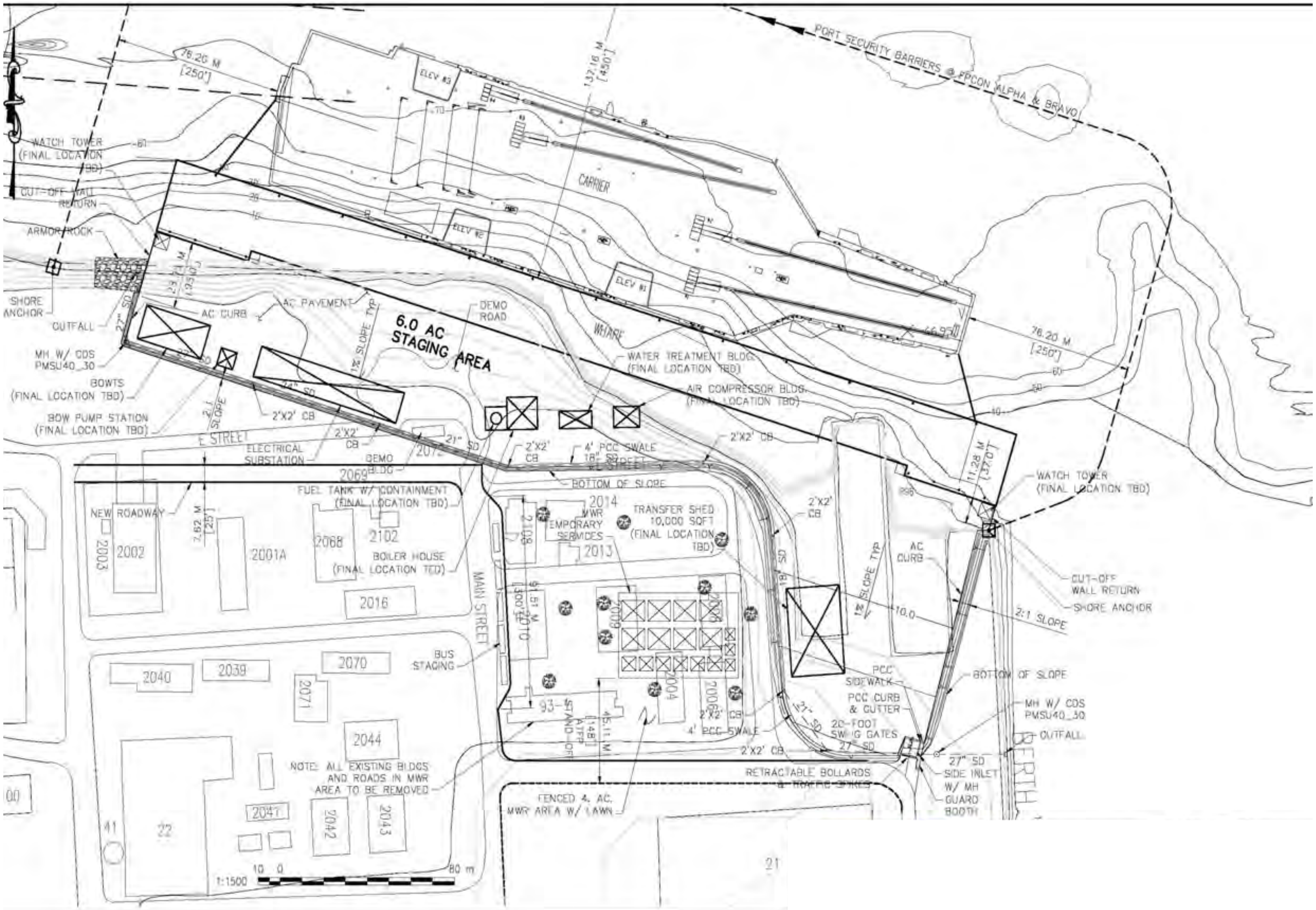
BTS control plans and other invasive species controls would include a quarantine and inspection area and security fencing designed for both inspection of humans/vehicles and BTS control. The DoD has a joint region BTS Control and Interdiction Plan which includes measures such as 100% cargo inspections, 100% vehicle and aircraft inspections, fenceline trapping, and nighttime searches. A comprehensive Biosecurity Plan is being developed in cooperation with the USFWS, USDA, USGS, National Invasive Species Council (NISC), the state of Hawaii, the Commonwealth of the Northern Mariana Islands (CNMI), and GovGuam. Aircraft that stage at Andersen AFB would be subject to existing joint region BTS protocols. Additional protocols as identified in the joint region Biosecurity Plan would be adopted at that time. Chapter 2, Volume 7 contains a more detailed description of the proposed Biosecurity Plan.

Biosecurity requirements would be the same as those described at Polaris Point, but because the area is a previously developed industrial area and does not contain forest or secondary growth, the habitat is less favorable for snakes or other invasive species.

MWR

The Navy MWR area for supporting aircraft carrier activities would be situated on a 4 ac (1.6 ha) lot to the west of the access control point for the staging area (Figure 2.6-2 and Figure 2.6-3). There are nine existing structures totaling about 36,500 ft^2 (3,391 m^2) that would have to be razed and about 43,900 ft^2 (4,078 m^2) of roadway servicing the buildings removed. Relocation of existing shipyard capabilities at these locations would be required. Subsequently, the area would be graded and landscaped for lawn and trees. The lawn may be supported by a permanent irrigation system. A 3 in (7.62 cm) thick asphalt lot about 0.5 ac (0.2 ha) in size would be constructed for locating temporary facilities such as food and beverage booths, seating areas, parking and lighting.

Figure 2.6-3
Former SRF Improvements



Source: NAVFAC Pacific 2008

The MWR area would require utility connections. The area would be enclosed by a 900-ft long (274-m long) chain link fence, and would have multiple locking swing gate entry points. One of the gates would have a permanent turnstile and guard shack. Additional parking for five buses would be provided in a 10-ft wide by 300-ft long (3-m wide by 91-m long) turnout on the east side of Main Street. Bicycles would be made available at the MWR area.

Aids to Navigation

Aids to navigation modifications would be as described for Alternative 1, with the exception that range lights at Polaris Point, while requiring relocation, would not have to be raised, and the mooring buoy would not have to be relocated (see Figure 2.6-3).

2.6.2.3 Utilities

Refer to the engineering drawings included in the *CVN-Capable Berthing Study* (NAVFAC Pacific 2008) for details on existing conditions. Table 2.5-1 and Table 2.5-2 summarize the utility requirements.

Steam, Compressed Air and Pure Water

Although there is a possibility of re-using the existing steam plant at the Former SRF, the cost for a new system and the upgrades are comparable. Therefore, a new system as proposed for Polaris Point is proposed for Alternative 2.

There would be no differences in terms of the pure water systems between this alternative and Alternative 1, with the exception of pipe lengths from the wharf structure and water source to the pure water production plants, compressed air production plants, and steam production plant.

BOWTS

The new BOWTS would be sized to accommodate the ultimate requirements of the CVN 78, i.e., a pumping rate of 90 gpm (341 lpm) with an average flow rate of 38,000 gpd (143,846 lpd) and a peak flow rate of 82,000 gpd (310,404 lpd).

The existing BOWTS at Apra Harbor Naval Complex is inadequate to handle the aircraft carrier BOWTS requirements of either a CVN 68 or CVN 78 for a 21 day duration visit. There is no BOWTS at the Former SRF. Mobile BOWTS units are available at the Former SFR; however, these units are typically small and would not be able to process the amount of BOW generated by a carrier. Therefore, a new BOW collection and treatment system would be constructed near the location of the proposed berth. The BOWTS would consist of a combined gravity and force main collection system, a BOW pump station, and a treatment system.

Wastewater

For the proposed berthing at the Alternative 2 location, a separate and dedicated wastewater collection system sized to handle only the aircraft carrier loadings would be required because this alternative provides for the wharf to be located adjacent to a commercial industrial area and segregation of wastewater would be necessary. This dedicated system would be designed and constructed solely within military property and would include the construction of three new submersible type sewage pump stations and 6,700 linear ft (2,042 m) of associated force mains. In addition to the pressurized systems, approximately 4,420 linear ft (1,347 m) of new gravity sewers are required; of that, 2,720 linear ft (829 m) of 15 in, 18 in, and 24 in (0.38 m, 0.46 m, 0.61 m, respectively) relief sewer lines are proposed along Marine Corps Drive to increase the capacity of the existing sewer trunkline "A" for the aircraft carrier berthing. As with Alternative 1, the sewage line would terminate at the military AHWWTP, and improvements as described for Alternative 1 would be required. Regarding the makeup of the wastewater generated from the aircraft carrier for Alternative 2, the composition of the wastewater is primarily domestic but in a more concentrated form than residential wastewater. The transfer of the wastewater from the aircraft carrier to the landside lift station would occur as described for Alternative 1 in Section 2.5. These upgrades would follow existing rights of way and utility lines that currently parallel Marine Corps Drive. Standard construction practices would be utilized to ensure that existing lines are not disrupted.

Potable Water

The potable water supply would be connected to the southern Navy water system, which receives its surface water supply from Fena Reservoir. Potable water demand for the aircraft carrier would have no impact on the northern Guam Lens Aquifer.

Potable water is supplied to the Alternative 2 site from the Apra Heights Tank system. In addition to the Alternative 2 site, the Apra Heights Tank supplies water to most of the Apra Harbor Naval Complex. Based on the water demands of the service area and the maximum fire flow requirements, the storage capacity of the tank was evaluated based on criteria provided in UFC 3-230-19N (*Water Supply Systems*). The storage capacity required for all users served by the Apra Heights Tank, including the proposed water demand of a CVN 78, was calculated to be 2.6 mg (9.8 ml). The Apra Heights Tank has a capacity of 5.0 mg (18.9 ml). Therefore, no improvements are required for the Apra Heights Tank for the berthing of either a CVN 68 or CVN 78 at the Alternative 2 site.

Approximately 1,200 linear ft (366 m) of 10 in (0.25 m) water line along the entrance road to the Alternative 2 site would be replaced with a 12 in (0.30 m) water line under project P-494 (an Environmental Assessment [EA] and Finding of no Significant Impact [FONSI] have been completed). In addition to this project, approximately 2,200 linear ft (671 m) of 16 in (0.41 m) water line along Sumay Drive is currently being replaced with an 18 in (0.46 m) main. These improvements were incorporated in the water system model used to evaluate the capacity of the existing potable water system. The results of the model indicate that more than 1,000 gpm (3,785 lpm) can be provided at pressures exceeding 40 psi to the berthing site at the Alternative 2 site. Therefore, no major water system improvements would be required for this option. Water system improvements would be limited to the construction of a new 8 in (0.20 m) service lateral to the berthing site and the associated pier side water outlets.

The potable water system improvements required to support the aircraft carrier would be located along and adjacent to the proposed berthing location. The pier side water lines and outlets would be constructed concurrently with the wharf site work. Construction scheduling of the supply lateral to the wharf would be coordinated with other adjacent site improvements. The potable water system would be used for and has sufficient capacity for fire fighting.

Electrical Power Distribution and Communications System

A programmed construction project (P-494) would construct a new SRF Substation to support planned waterfront upgrades for Sierra, Romeo, and Uniform Wharves and existing SRF loads. The SRF Substation would be fed from the new Orote Substation with two 34.5 kV circuits, each with conductors capable of roughly 25 mega volt amperes (MVA), but with duct capacity that would enable doubling the capacity of each circuit.

The scope of P-494 does not include providing the capacity to accommodate the aircraft carrier without additional circuits and 34.5 kV switchgear additions. Proposed improvements under Alternative 2 include:

- Provide a new circuit breaker in the GPA Piti 34.5 kV Switching Station (by GPA)
- Upgrade existing GPA 34.5 kV Overhead Feeder Circuit X20 between Piti 34.5 kV Switching Station and Orote
- Provide a new underground, concrete encased, 34.5 kV feeder circuit from the GPA Piti 34.5 kV Switching Station to Orote Substation
- Provide additions to the Orote Substation 34.5 kV switchgear
- Provide a new aircraft carrier berth substation
- Provide one underground, concrete-encased, 34.5 kV express feeder circuit from the SRF Substation to the aircraft carrier SRF berth substation
- Provide wharf operational and security lighting using high-mast steel poles with metal-halide luminaries

<u>Stormwater</u>

Initial designs indicate that a concrete swale to collect surface flow would run east to west along the perimeter of the pad on the east side and would subdivide the pad on the west side. Flows captured in catch basins would be conveyed through two separate concrete storm drain pipe systems. Following the last catch basin and before discharge, the stormwater would be treated in each system by inline cyclonic separators to remove oil, grease, and trash. The separators would collect and retain the undesirable material for the first 0.5 in (12.7 mm) of rainfall that occurs. Greater flows would bypass the separator. Discharge from the separators would be to an outfall to Outer Apra Harbor and at the channel connecting the Outer and Inner Harbors. Volume 4, Chapter 4 contains more information on potential impacts from stormwater.

<u>Solid and Hazardous Waste</u>

As described for Polaris Point, solid waste storage bins are typically provided in the aircraft carrier compound and near the MWR activity area, as needed. Solid waste would be handled and managed in accordance with Navy standard operating procedures and would be disposed of at the Navy landfill as long as it meets all criteria for disposal in the landfill.

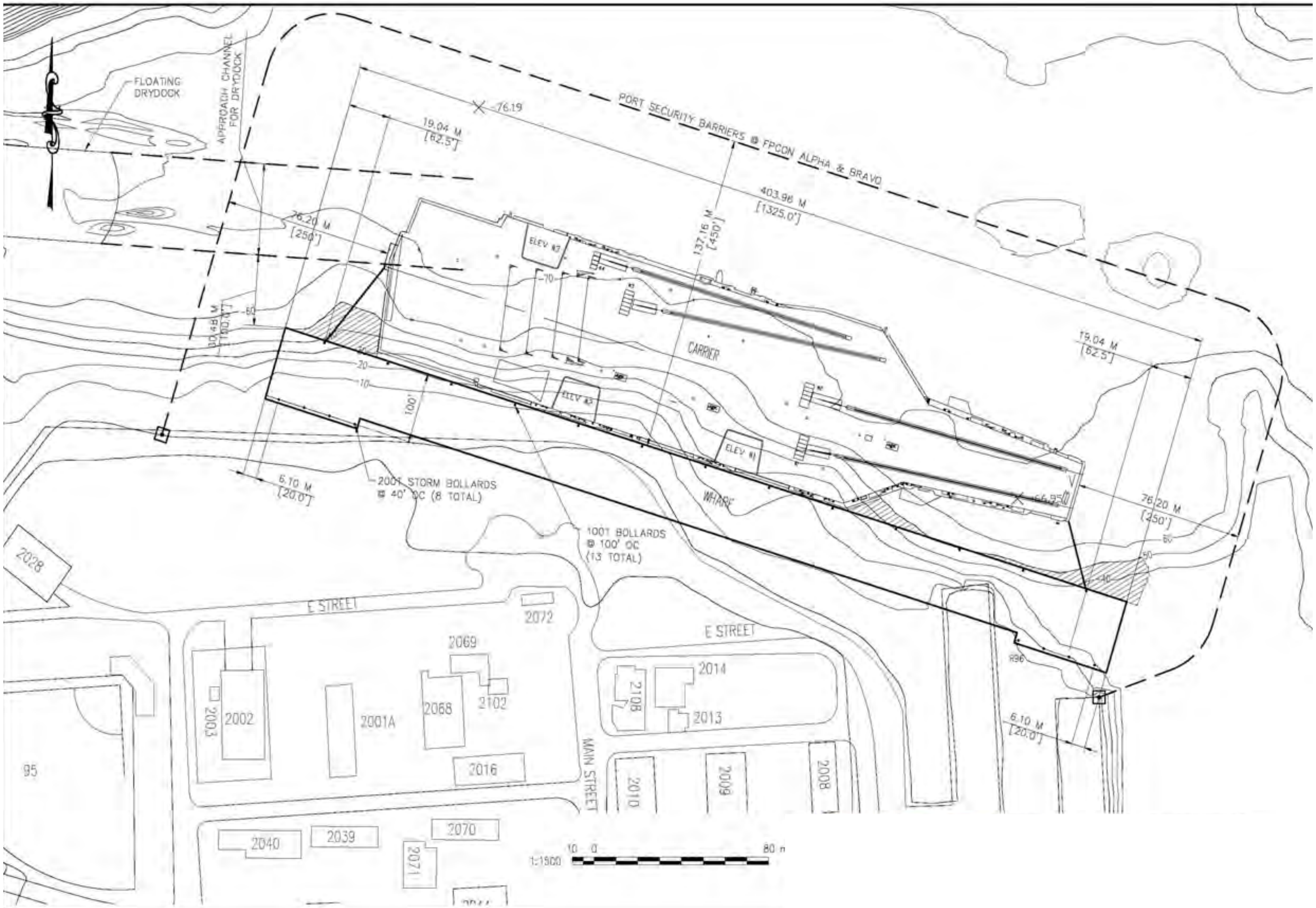
A ship-board hazardous regulated waste holding area is typically designated at the wharf. The hazardous waste would be managed in accordance with Navy standard operating procedures and the Navy RCRA permit would be modified to accommodate the increased volumes of waste. Volume 4, Chapter 17 contains a description of the types and quantities of hazardous waste that would be generated from the proposed action.

2.6.3 Construction

2.6.3.1 Alternative 2 - Specific

Site preparation would require the grubbing and removal of all ground cover for construction of the staging area. This would include the demolition and removal of a minor building (approximately 700 ft^2 [213 m^2]) and the removal of about 3,400 ft^2 (1,036 m^2) of the end of the inner finger pier. Surveys of these buildings have been conducted for asbestos-containing material, lead-based paint, and PCB-containing electrical equipment. Demolition and recovery of these types of materials, if present, would be conducted in accordance with Navy procedures and applicable laws.

Figure 2.6-4 Former SRF Wharf-Plan View



Source: NAVFAC Pacific 2008

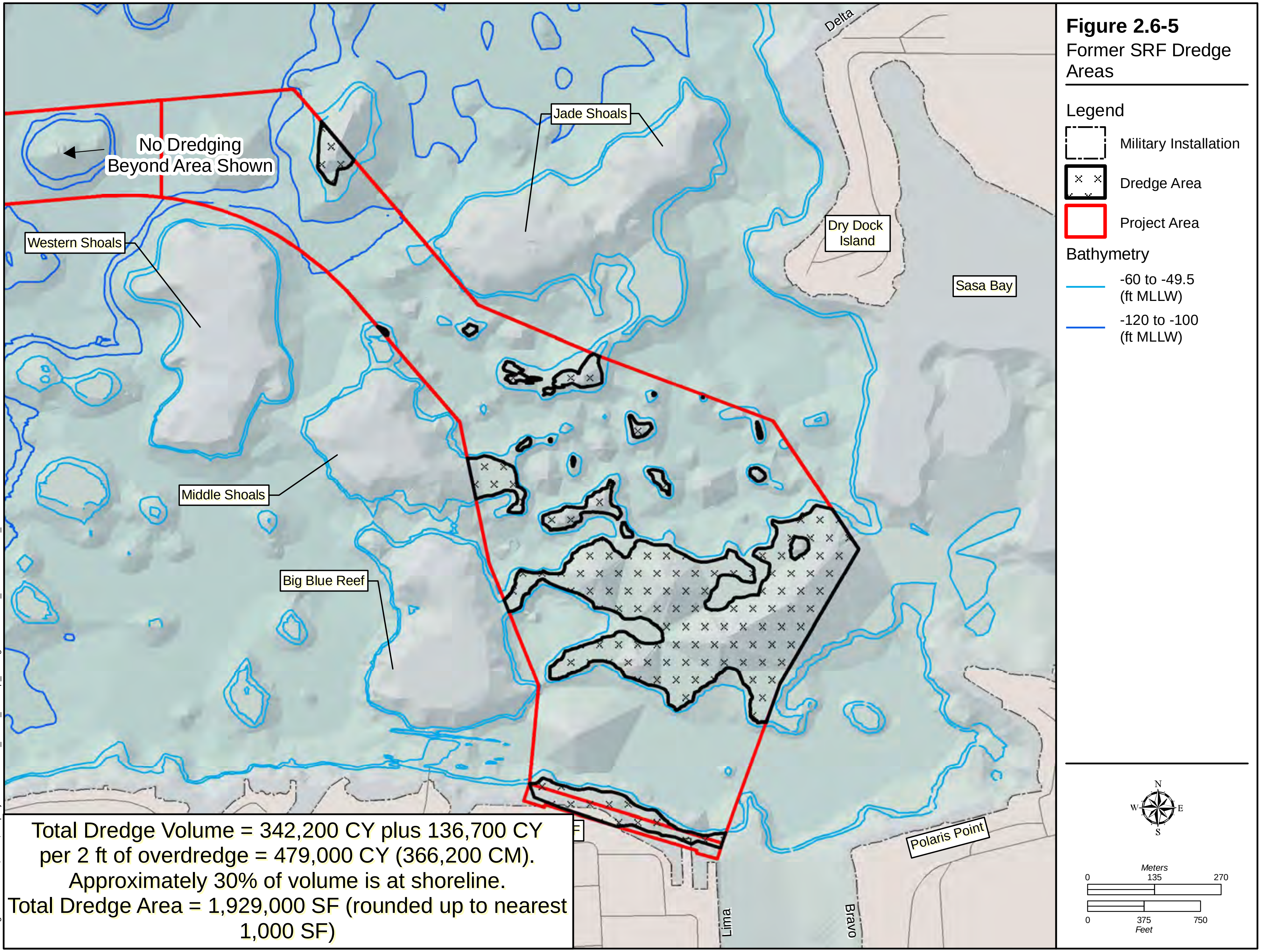
There would be some minor roadway removal around the demolished building and re-alignment of some utility lines along E Street near the demolished building location. The pavement over the finger piers would be pulverized and left in place. The soil in the other areas would be scarified and re-compacted to prevent differential settlement before the fill material is placed. The water areas between the slips would be filled and the entire site would be raised to the required grade using reclaimed dredged materials. Soil improvement methods may need to be utilized to consolidate the various soil fills to prevent liquefaction.

The project dredging would be limited to an area near the channel bend, portions of the turning basin and areas under the wharf structure. Figure 2.6-5 shows the specific areas that would require dredging (areas less than -49.5 ft [-15 m] MLLW) within the project area, that represent the outer limits of the proposed dredging activity. The minimum turning basin radius to allow the aircraft carrier to be safely maneuvered within Navy operational and navigational constraints is shown on the figure in blue. The total dredge volume would be 479,000 cy (366,200 m^3) including 2 ft (0.6 m) overdredge and approximately 30% of that would be generated at the shoreline area of Alternative 2 to provide an appropriate slope for the wharf structure. The anticipated dredging production rate is as described for Alternative 1: 75 cy/hour (57 m^3/hour) based on recent mechanical dredging of similar substrate. The total dredge area would be approximately 44.3 ac (17.9 ha). At this rate total production per day would be approximately 1,800 cy (1,376 m^3). Throughout most of the project area the depth to be dredged is less than 1 ft (0.3 m) and the dredging would proceed quickly at an estimated rate of 22,777 ft^2 (2,116 m^2) per day in the turning basin and the channel. The wharf area would require a longer dredging duration because there would be greater depths of dredging (excavation) required, creating a higher volume of dredged material.

2.6.3.2 Construction Common to Both Action Alternatives

The dredging equipment and materials required for Alternative 2 would be the same as those described for Alternative 1 (refer to Section 2.5.3.2).

Figure 2.6-5
Former SRF Dredge Areas



Total Dredge Volume = 342,200 CY plus 136,700 CY per 2 ft of overdredge = 479,000 CY (366,200 CM). Approximately 30% of volume is at shoreline.
Total Dredge Area = 1,929,000 SF (rounded up to nearest 1,000 SF)

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2.7 NO-ACTION ALTERNATIVE

Under the no-action alternative there would be no wharf, deep water channel access or associated facility construction to support the aircraft carrier extended visits in Apra Harbor. No dredging would be required.

Under the no-action alternative the transient aircraft carrier visits could not be accommodated and the projected level of port visits for ammunition ships would be reduced due to increased ammunitions ship operations.

The no-action alternative would not meet the purpose for and need of the proposed action. It would not support the QDR goal of an increased aircraft carrier presence in the Western Pacific.

Chapter 2:

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